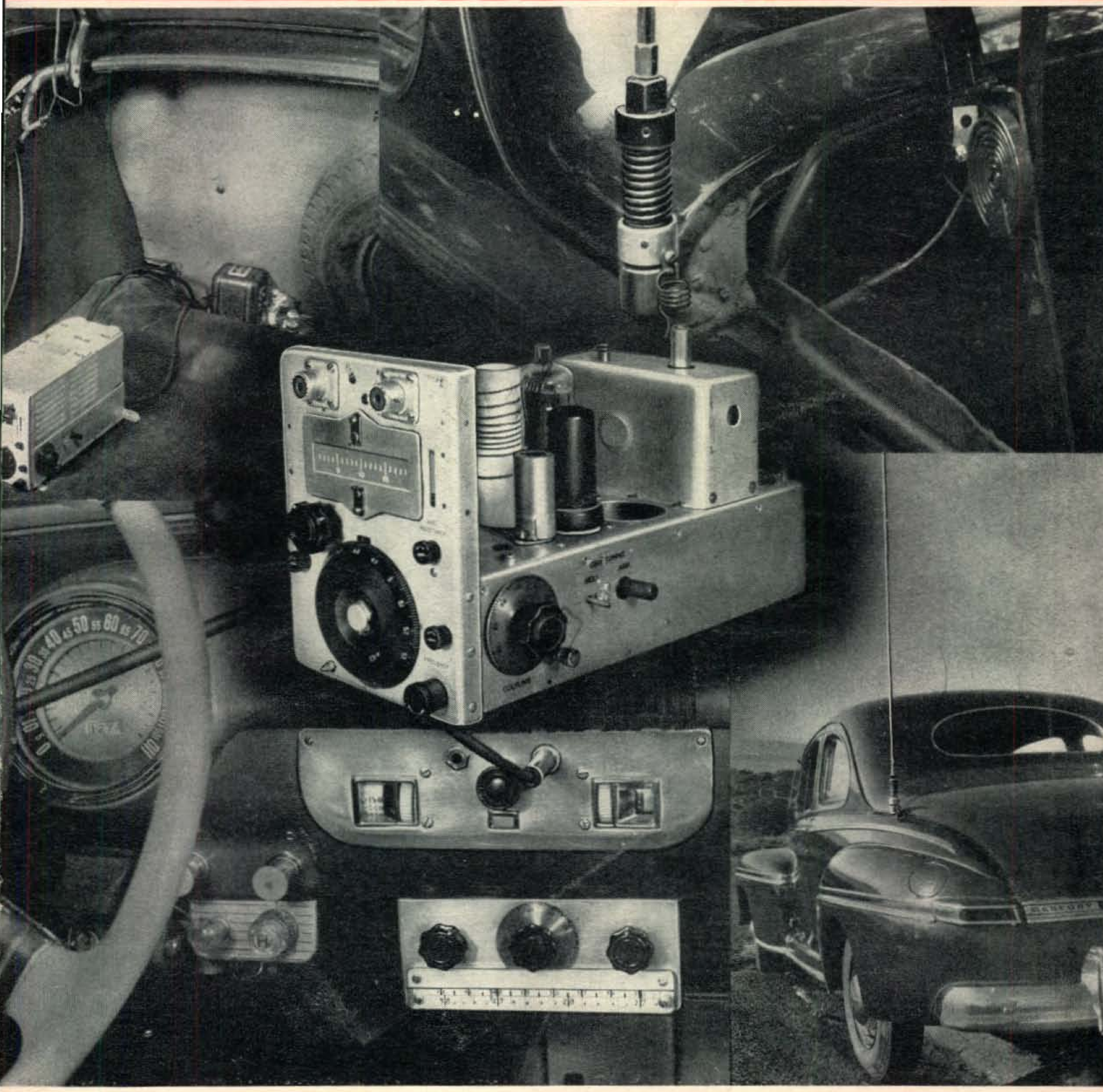
CQ

JANUARY, 1948

The Radio Amateurs' Journal

35¢



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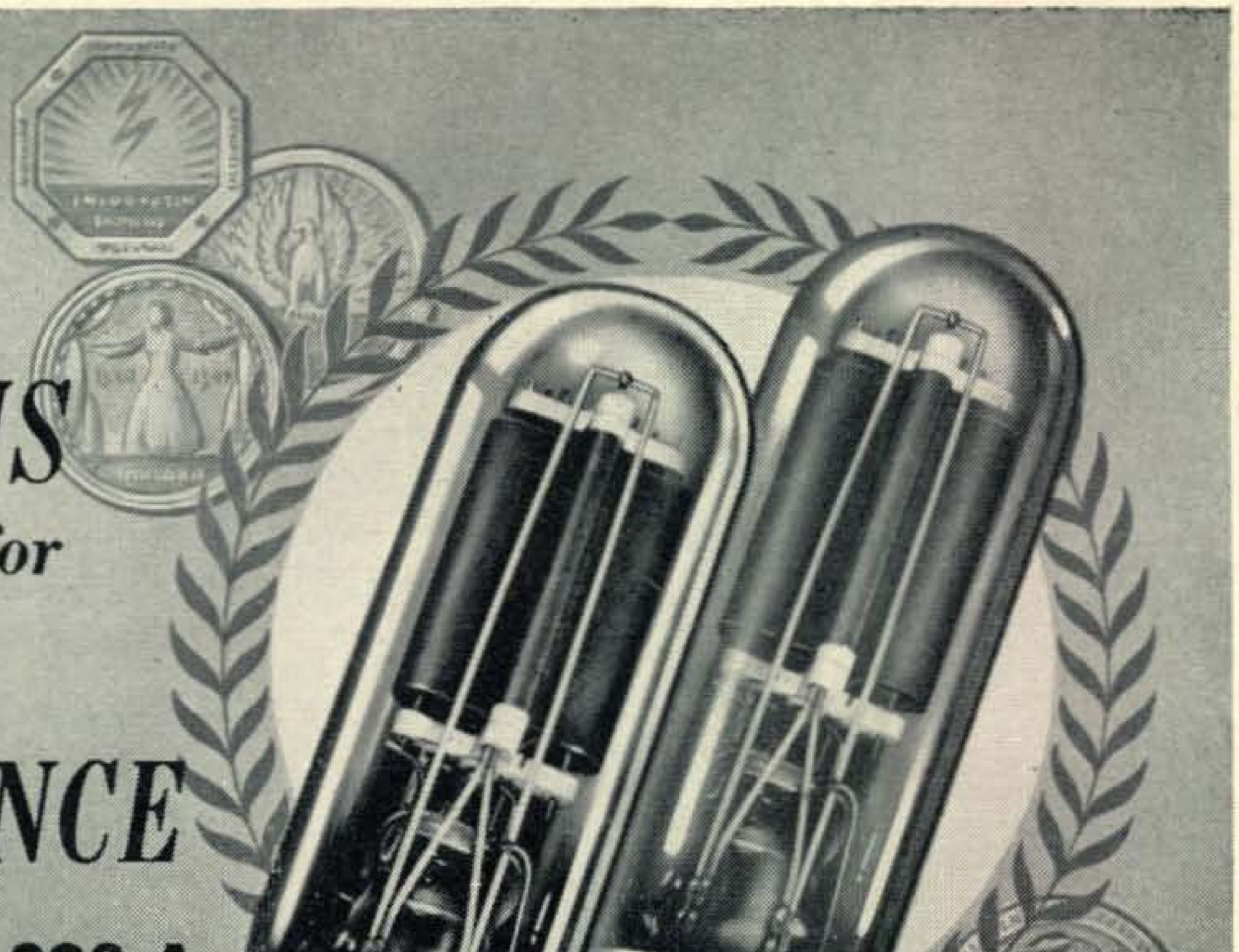

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ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

GENERAL ELECTRIC

161-GA1-8850

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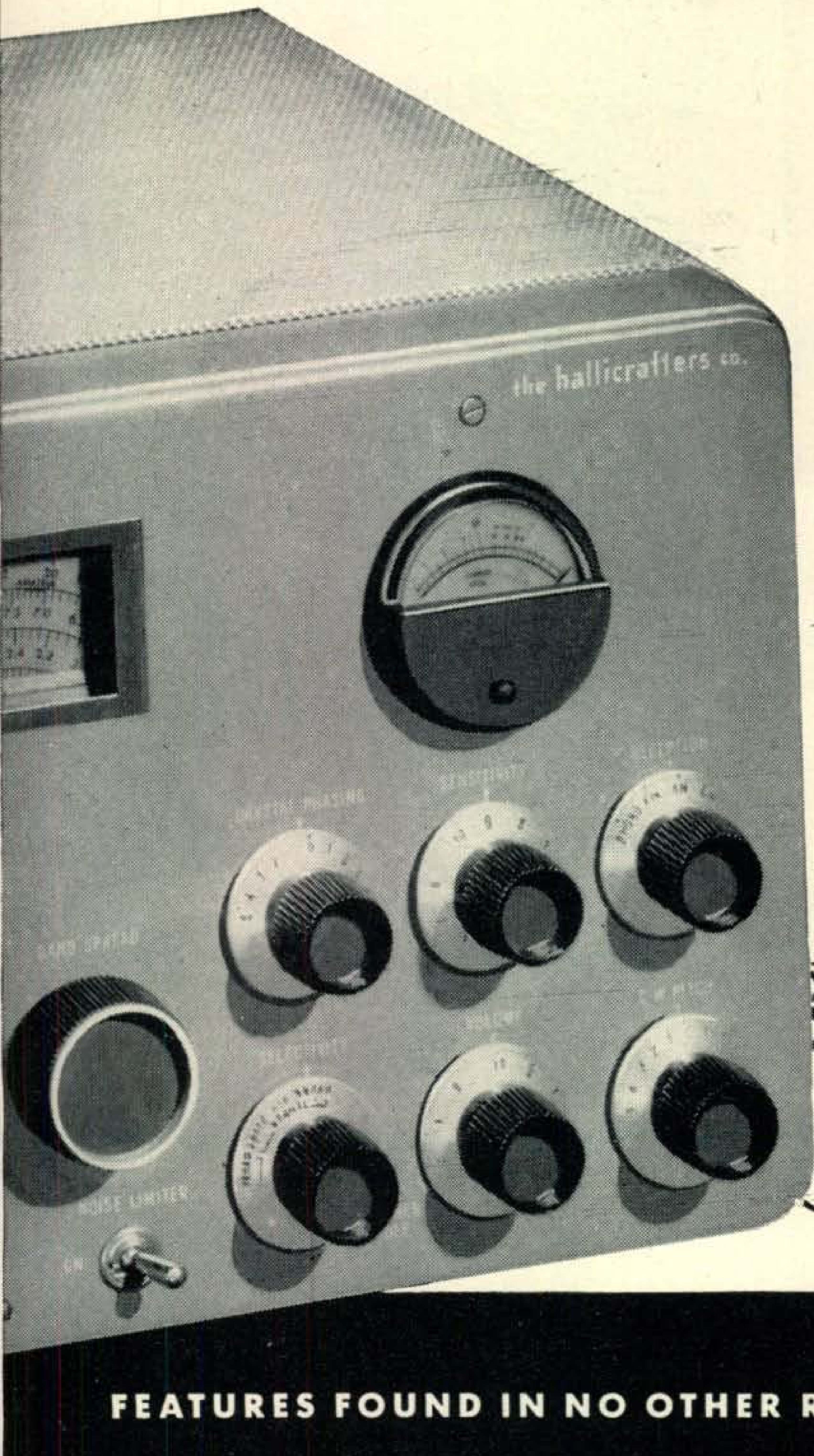
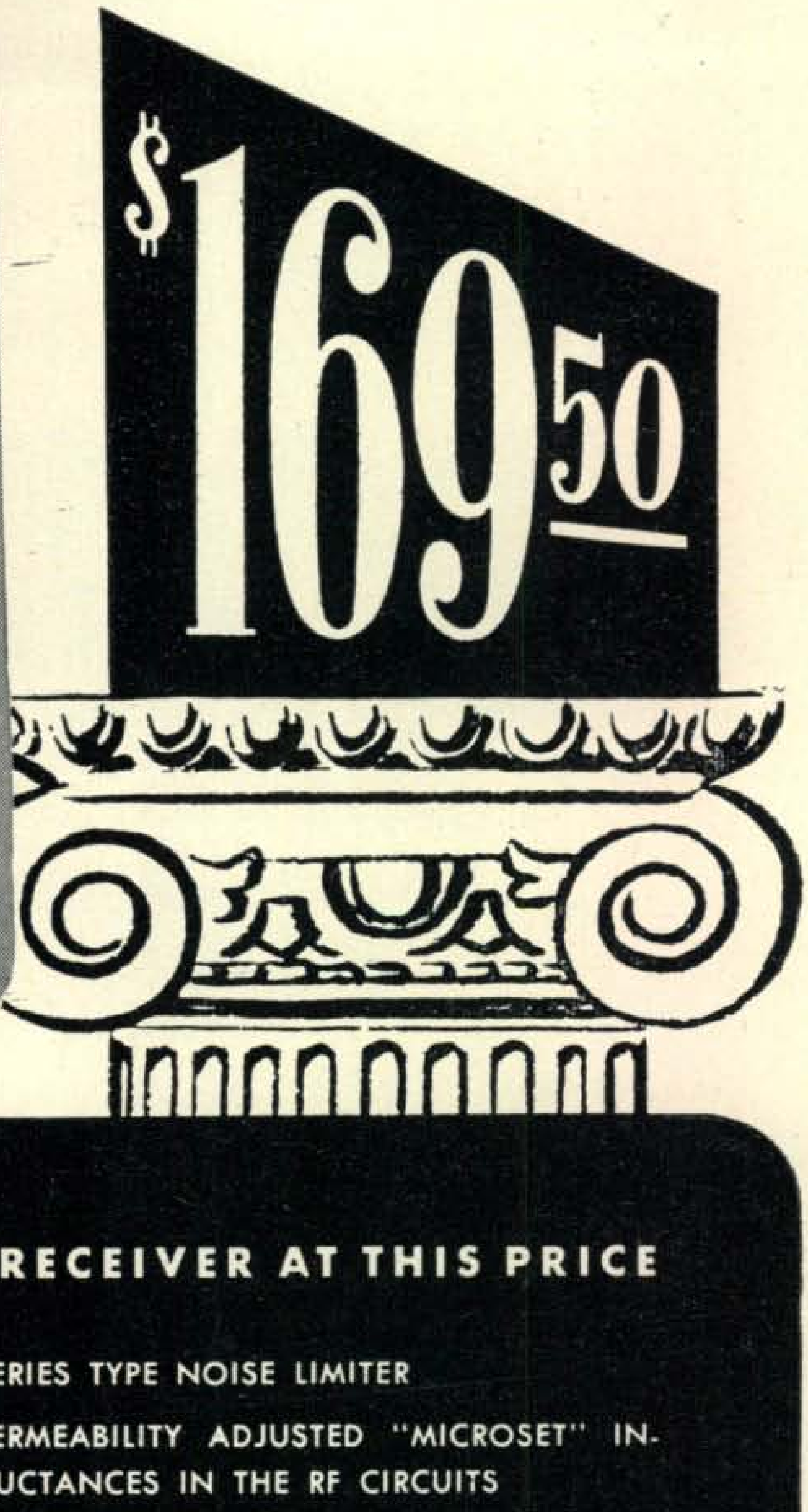
Vol. 4 **JANUARY, 1948** **No. 1**

In This Issue

COVER—The SCR-274N transmitter is ideally suited for 10-meter mobile operation. W2CVV, starting on page 22, describes completely the conversion and installation of the 4 to 5.3-mc unit. The center of the montage shows the rig with additional controls. The loading capacitor is provided with a dial and lock. The PA grid tuning iron slug has a switch handle mounted on it for a knob. The dash controls are mounted on the center of the broadcast receiver tuning plate and include the AUDIO GAIN knob, MODULATION MONITOR jack, and MICROPHONE jack. The unusual two-band converter for 75 and 10, to be described in a future issue, is mounted just below the BC tuning plate. Also shown is the transmitter-modulator trunk location and the special antenna bracket and insulator so arranged that no holes are required in the visible part of the car body.





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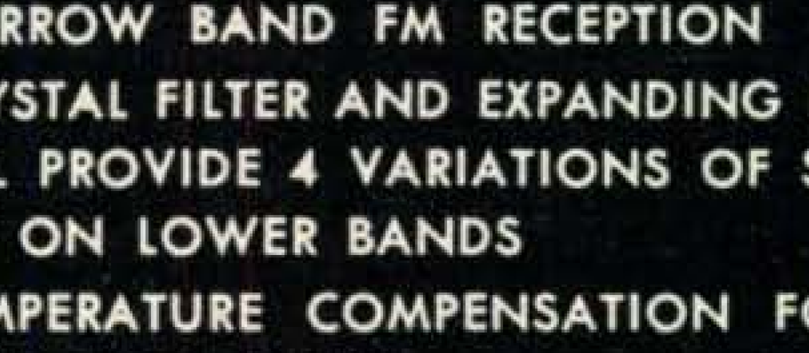

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. . . Letters . . .

"Life Insurance in the Shack"

Editor, *CQ*: 1203 N. Walnut, Brady, Texas

I greatly enjoy *CQ*, and particularly appreciated your article in the November issue entitled "Life Insurance in The Shack!" I think it is well written, and certainly timely with the many new hams joining the ranks each month.

However, it seems a bit inconsistent with the safety idea to publish the article on the SCR-274N receiver conversion without a word of caution on the a.c.-d.c. power supply, since all the condensers, etc., in the receiver are grounded making it practically impossible to use a separate ground bus. As shown in the diagram, it would be easy to get a severe shock or injury by completing the circuit from an ungrounded side of the line through the 25Z5 voltage doubler. Of course, this danger could be avoided by putting the receiver in a cabinet so that no metal parts are exposed, as required by the Underwriter's Laboratories for a.c.-d.c. radios.

Cecil R. Nelin

---

318 N. Matlack St., West Chester, Pa.

Editor, *CQ*:

Congratulations on your article, "Life Insurance in the Shack!" by Dr. Nichols in November *CQ*, and your page on "Emergency Treatment for Electric Shock." Such items reveal foresight and real service to the ham. Your publication is to be commended.

George W. Brown, M.D., W4HAO

The Endless Question

3753 Frances Ave., Cheviot 11, Ohio

Editor, *CQ*:

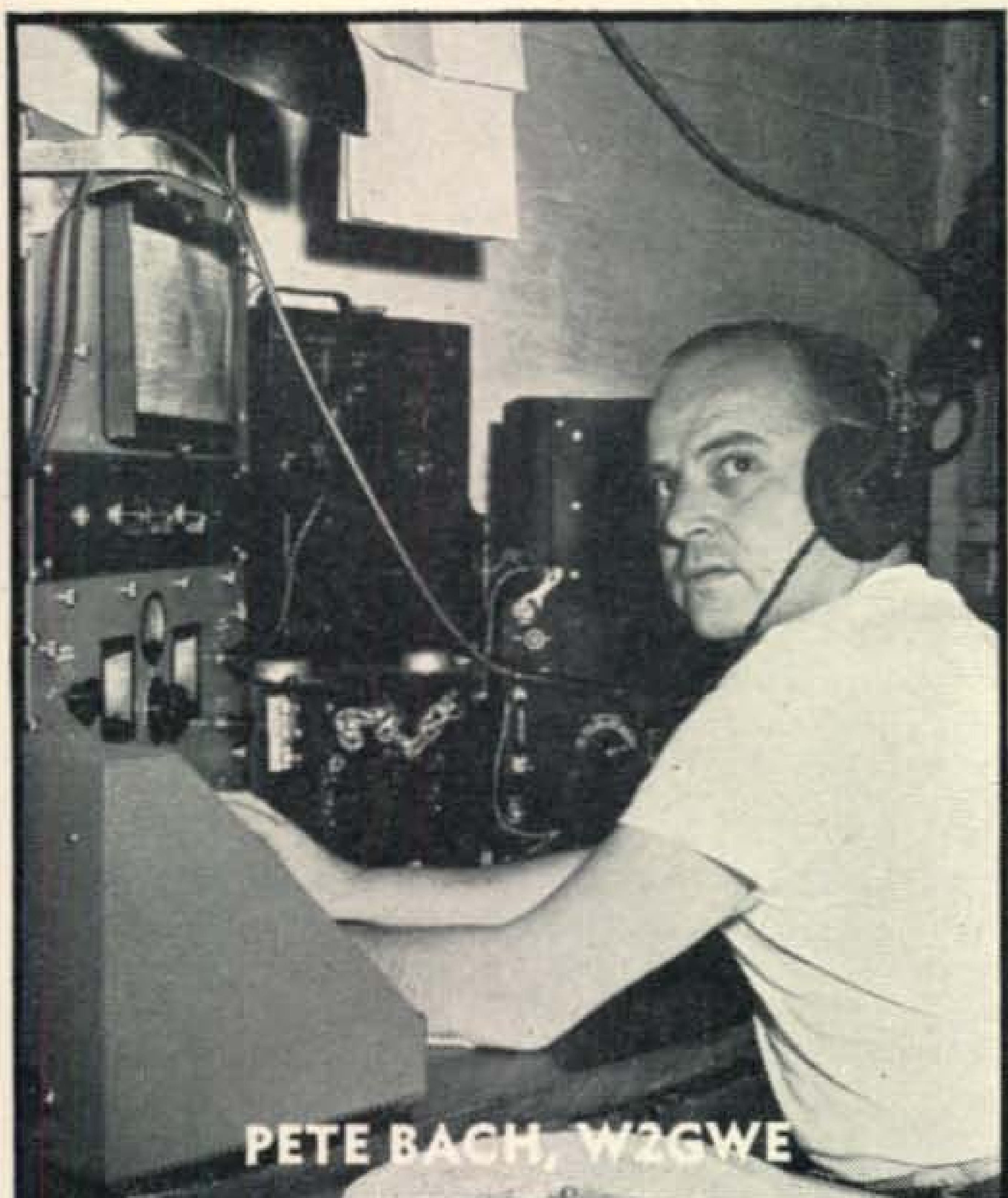
I read with interest the letter by Richard Devaney* setting forth reasons why the amateur license examination should not contain a code test. He states that reasons heretofore given favoring the code test, were merely sentimental. I am afraid that I have to disagree with that view.

I am afraid that Mr. Devaney, along with many others, has overlooked the most important reason for the issuance of an amateur license, "*in the public interest*." The owners of commercial radio stations know what the words, "in the public interest," mean. Many of these stations have had their licenses canceled because of misuse of this phrase. Any licensee, amateurs included, must prove that his station will be operated in the public interest before a license can be issued. Fortunately, for the amateur, the F.C.C. has taken into consideration all of the past public services rendered by amateur stations and praise by the armed services and government officials and deemed that *all* amateur licenses are issued in the public interest. This confidence in amateur radio must be upheld by all amateurs and guarded jealously by them.

Now let's consider what the term "in the public interest" means. It does not mean that "John Doe" should be given an amateur license so he can talk to "Joe Blow," located somewhere else, for his own personal amusement, although this is one of the privileges granted to the true amateur. Instead it does mean that "John Doe" should be prepared to give communication service to his fellow citizens, whether it be an individual, city, state or his country,

**CQ, October, 1947, p. 6.*

AGAIN . . . DX TOP SCORERS USE EIMAC TUBES



PETE BACH, W2GWE

TOPS ON CW . . . Pete Bach, W2GWE, national leader with 153,450 points using Eimac 250TH's in the final, with Eimac 35T and 100TH tubes in preceding stages.

TOPS ON PHONE . . . J. Dawson Ransome, W2SAI, who chalked up 135,774 points using Eimac 450TH's in the final stage.

J. DAWSON RANSOME, W2SAI

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100T
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Where dependability and performance are the paramount factors of vacuum tube selection, there is only one choice . . . EIMAC, the criteria of good design in any electronic equipment.

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in times of emergency. This does not necessarily mean that he is training for the armed services, although our armed services would have been very "hard put" for vital communications if they had not had trained amateurs to call on after Pearl Harbor. Instead, it means that the amateur has to be versatile in all types of communication, code included. As a matter of fact, in emergency communication code transmissions are almost universally used. Code is used because it affords accurate communication with minimum equipment, thus prolonging meager emergency power supplies.

Now let's don't forget the phrase "in the public interest." Amateurs must be versatile, prepared to use either phone or c.w. when an emergency arises and communications are needed. Therefore to retain this versatility, a knowledge of code must continue as a part of the amateur license requirements; a license that is issued not for personal pleasure but "in the public interest."

Milton J. Heidt, W8SDD

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223 W. Summit St., Somerville, N. J.

Editor, *CQ*:

Mr. Devaney forgets the fact that for a given investment you can obtain more power on code than on voice. Voice is fine, but c.w. is better.

Comparing Russian to c.w. is just plain silly. I've tried both and code is easier to learn.

Arthur Larky

---

324 Frederick St., Cumberland, Md.

Editor, *CQ*:

Mr. Devaney's statement putting code and the Russian language on equal terms is pure nonsense. If Mr. Devaney had an interest in the Russian language and had an opportunity to learn it for nothing, honestly, do you think he would refuse? In nine out of ten cases you would probably get a "no." And the same thing in code would occur, taking into consideration that a person has interest in code. Fellows like c.w. better after they learn it. Possibly Mr. Devaney doesn't know this.

The Army and Navy would have discarded code long ago if it was of no use. The amount of equipment (average) for code is far less, and less costly, than for phone. With present conditions, F.C.C. rules, and assuming that nothing is essential but life itself, code is very worth while. Code is a regular art, and should be treated as one.

Leo H. Kenney, W3MLQ

Any Old-Time Gear?

315 Beechwood Ave., Trenton 8, N. J.

Editor, *CQ*:

. . . Do you ever run across any old-time hams or commercial ops who may have old-time wireless gear lying around which they do not want? If so, I should appreciate your letting me know and if they would be willing to donate to my collection I shall gladly pay all transportation charges. The collection is increasing each year. It has now been in four public exhibits, one of which was in cooperation with the N. J. State Department of Education.

Ed. G. Raser, W2ZI/W2ZQ

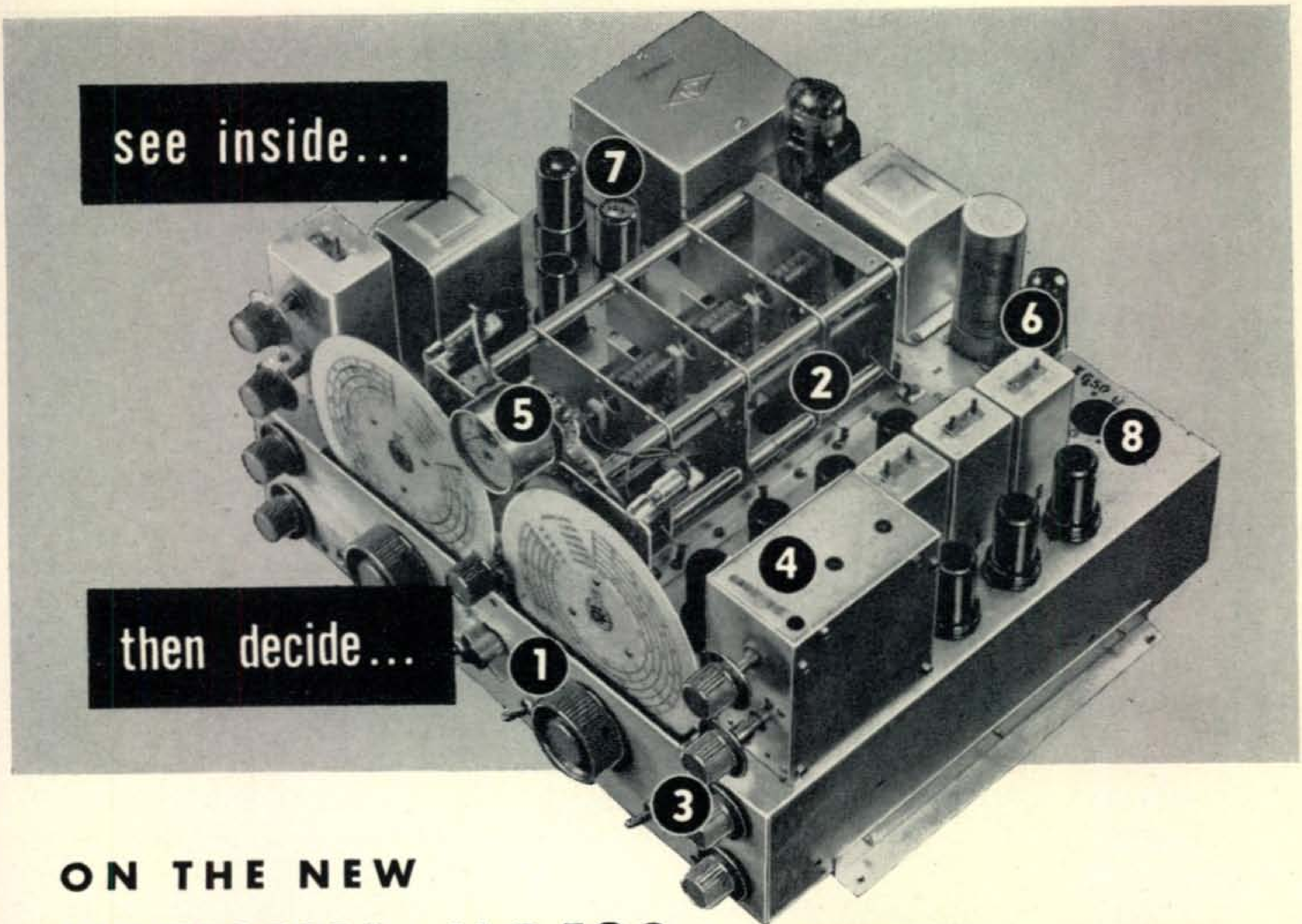
There's More in Store

Tucson, Ariz.

Editor, *CQ*:

The face lifting operation on *CQ* really worked! No kidding, the appearance is greatly improved . . .

And the content of the mag is certainly better. I've got a perfectly good v.f.o. at the shack, but doggoned if I'm not going to build a cathode-coupled job to play with. *Bud Keller, W7QAP*



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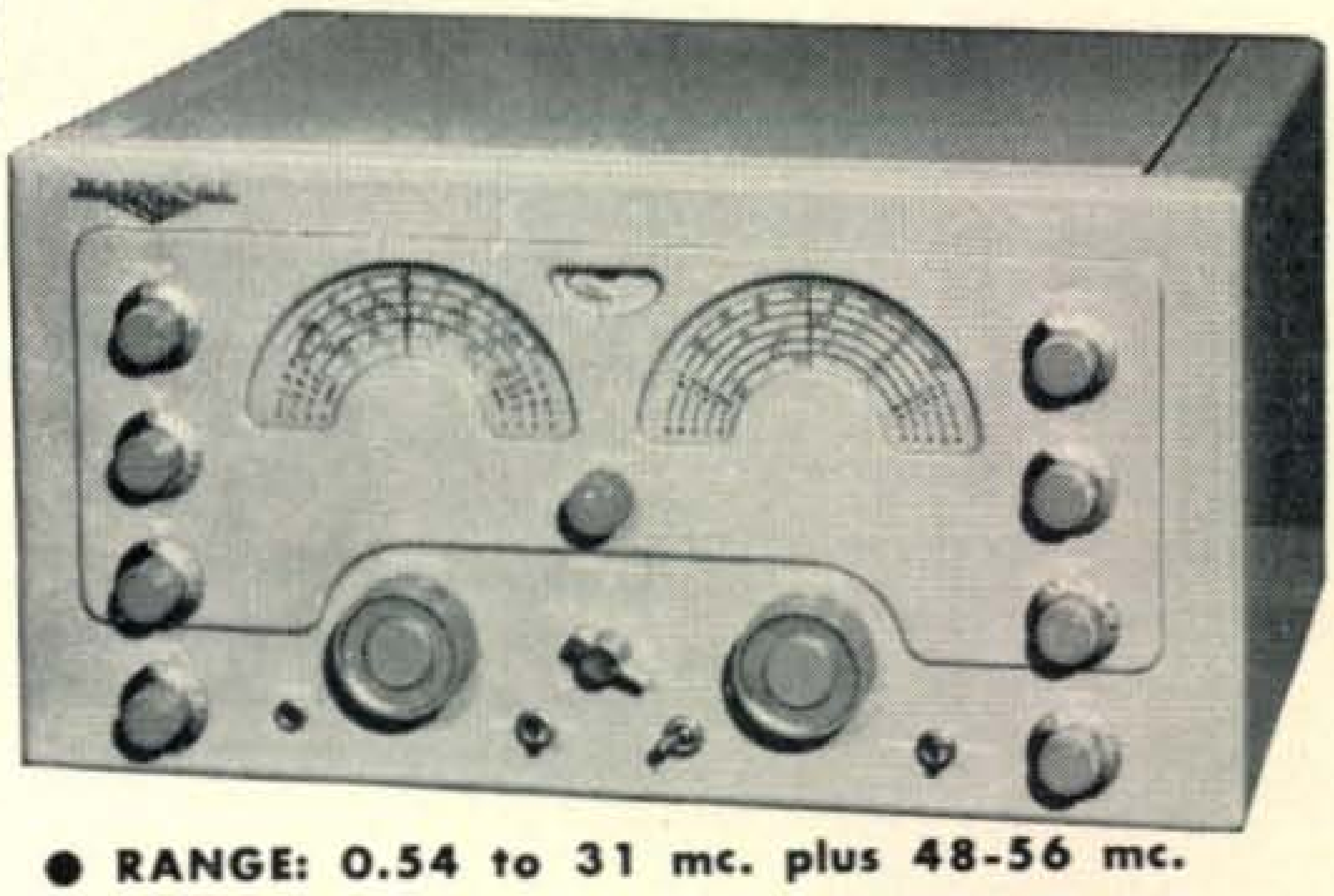

- **RANGE: 0.54 to 31 mc. plus 48-56 mc.**
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$269 *(with 10" speaker)*

NFM-83 adaptor makes the NC-183 a top-notch NFM receiver. Instant selection of AM or NFM from front panel.

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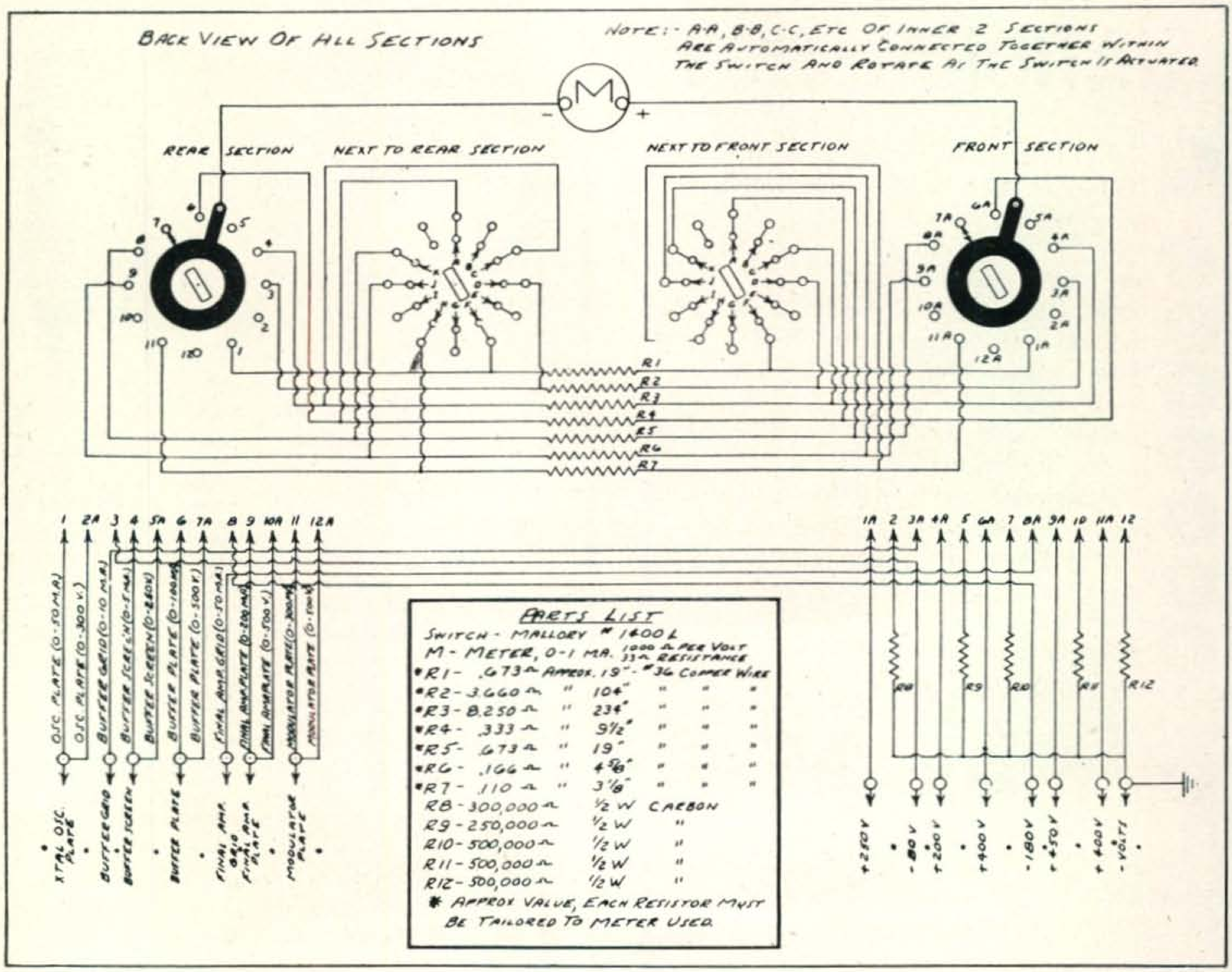
MALLORY HAM BULLETIN

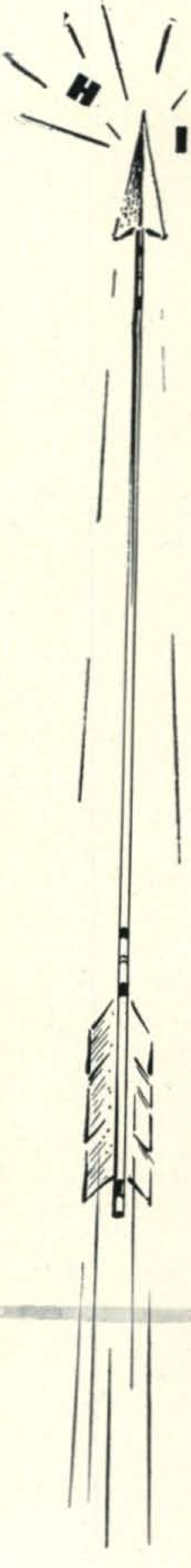
Meter Switching in DC Circuits

ALMOST every amateur designer at one time or another has been confronted with the task of making a single DC meter do multiple duty for measurement of voltages and currents in several electrically isolated circuits.

The most common and practical approach for accomplishing this task has been to employ a switch of some sort by which the meter may be moved electrically from circuit to circuit.

Unfortunately, however, not all conventional switching arrangements employed for this purpose have been completely free from limitations. For example, one such switching circuit commonly used permits measurement of *either* currents *or* voltages, but not both with the same meter. Another provides measurement of total current drawn by each in turn of several tubes but does not permit measurement of plates and screens separately. And with none of the popular switching





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In any contest, Sweepstakes or DX, you will find HQ owners way up among the High Scorers. Why? Because the HQ-129-X has what it takes—plenty of selectivity to dig out those "down under" stations that you have to work if you want to be **HIGH SCORER.**

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E D I T O R I A L

The Annual DX Marathon

THIS IS THE TIME of the year when contest operating starts in earnest. Usually the various operating activities sponsored by the ARRL and other radio societies are the principal topic of discussion among ham circles round about now. This year isn't an exception with the possibility, of course, that the terrific 6-meter openings have stolen some of the thunder.

Contests are a phase of ham radio that some of the gang take very seriously, perhaps more so than the contests deserve, but by and large each one of them serves a very useful purpose—it gives a lot of the gang a lot of fun, and it improves the operating ability of the average amateur. Back in the Fall we wrote about what we considered the gradual deterioration of the aims and objects of the Field Day competition. For a contest that had as its stated purpose the improvement of emergency operated apparatus, the FD fracas had degenerated into a straight contact competition. Emphasis, instead of being placed on the type of equipment used, the nature of emergency supplies, etc., had been centered on making the most contacts.

> *To All Our Readers*
>
> **A**
>
> **Happy New Year**
>
> *from the staff of CQ*

Now don't misunderstand us, we think that a contact contest is fine and we've been in the good old SS hot and heavy. As a matter of fact, the first weekend has just gone by and we're not producing our fair quota of work this week, awaiting with such anticipation the next weekend and wondering how our performance the first half of the contest compares with other operators throughout the country. We think all contests are very fine and that is the reason for writing this particular editorial.

You know we hear a lot of griping about how the contest gang hogs the bands for the weekends that their particular affairs are on. But the best answer to the boys who don't like contests seems to be: "Come on in, the water's fine." You don't have to be out to win to enjoy them. The proof that this must be true are the thousands of small scores from the fellows who use their normal quota of operating time and do the best they can. There are, after all, contests of just about every description, and what is right down your alley may not be for someone else. It is widespread participation which makes any contest a success and we believe that all of them benefit the amateur very directly.

Operating skill is one of the great assets that the amateur has to offer his country. In normal day-to-day contacts too few of us get the opportunity to test this skill, to improve it, and discover its shortcomings. Contests are an ideal proving grounds. Whether it is DX, or relatively local stuff like the SS, to move along with the crowd takes skill. It is a test of equipment, individual operator ability —and, I suppose, the patience of one's family. Quite seriously, aside from having a grand time, every competition helps improve the operating ability of the participants. Contests are justified on these grounds alone. So, naturally when we have a chance to add a contest to the list we are going to do so, which is exactly what we have done in reviving the annual DX Marathon.

The DX Marathon rules were planned so that a non-DXer, about to enter this particular field of the hobby, would not be hopelessly handicapped by the amateur who has been at it for a good many years. Everyone starts from scratch on January 1, 1948. The DX Marathon runs for an entire year closing on December 31, 1948. One of the big features is, we believe, that there will be no pressure exerted on the operator at any single concentrated period. The cumulative operating skill over the year is what will make a winner. Furthermore, the potential DXer, who has not acquired all the know-how necessary to do a creditable job at the onset, has a good many months to learn and develop. We anticipate seeing a lot more good DX men at the end of each Marathon. No one objects to sharing crowded frequencies with even more *good* operators. Even under tough conditions, QRM, QSB and the other vagaries of the DX frequencies, if you are working with good operators everyone has his fair crack at DX. It is the "hog," the unintentional "lid" and the novice with no incentive to improve that most clutter up DX frequencies. It is hoped that the Marathon will do much to alleviate this condition, and because it will be repeated yearly, it should provide benefits year after year.

Competition in the DX Marathon will be worldwide and on a zone-to-zone basis. In other words, the high station in each of the 40 zones will be given an award for his individual achievement. Since classification will be as for the Honor Roll, that is phone and c.w. and straight phone, there will be actually two winners in each zone, making a total of 80 individual winners. There will also be special awards to the top scorer in the two competing categories.

In order to receive credit, claims sent in for zones, and/or countries must be postmarked within sixty days from the date of QSO. This will assure listing the current monthly scores and eliminates last minute entries. It also enhances the chance for the newer DX man, who does not have to fear a last minute burst of activity from some more experienced DXer. (*Continued on page 94*)

A New Converter for 10, 6 and 2

Front view of the three-band converter, shown in its cabinet. The left-hand switch permits the converter to be easily taken out of the circuit while the other control is the on-off switch.

W. C. LOUDEN, W2QZO*, and G. H. FLOYD, W2RYT*

An unusual mechanical treatment of a hot converter circuit.

THE NEW 12AT7 miniature tube, recently released by G. E., has been designed particularly for high frequency converter use. This twin triode, with the new 9-pin miniature base, has separate cathodes which permit the design of a more satisfactory converter than is possible with twin triodes having a common cathode.

A special plug-in coil system has been devised which gives optimum efficiency on 2, 6 and 10 meters. Each band uses a single plug-in unit, which avoids having to change three coils when changing bands. Further, the coils are arranged so that there is very little possibility of them becoming detuned due to repeated band changing. Improved shielding also results from these compartmented plug-in coils.

Using a triode mixer simplifies the construction of a converter and does away with much of the tune-up required to get the converter operating at peak efficiency. The result is a four-tube converter, using two tubes in the r-f end and a rectifier with its associated voltage regulator tube.

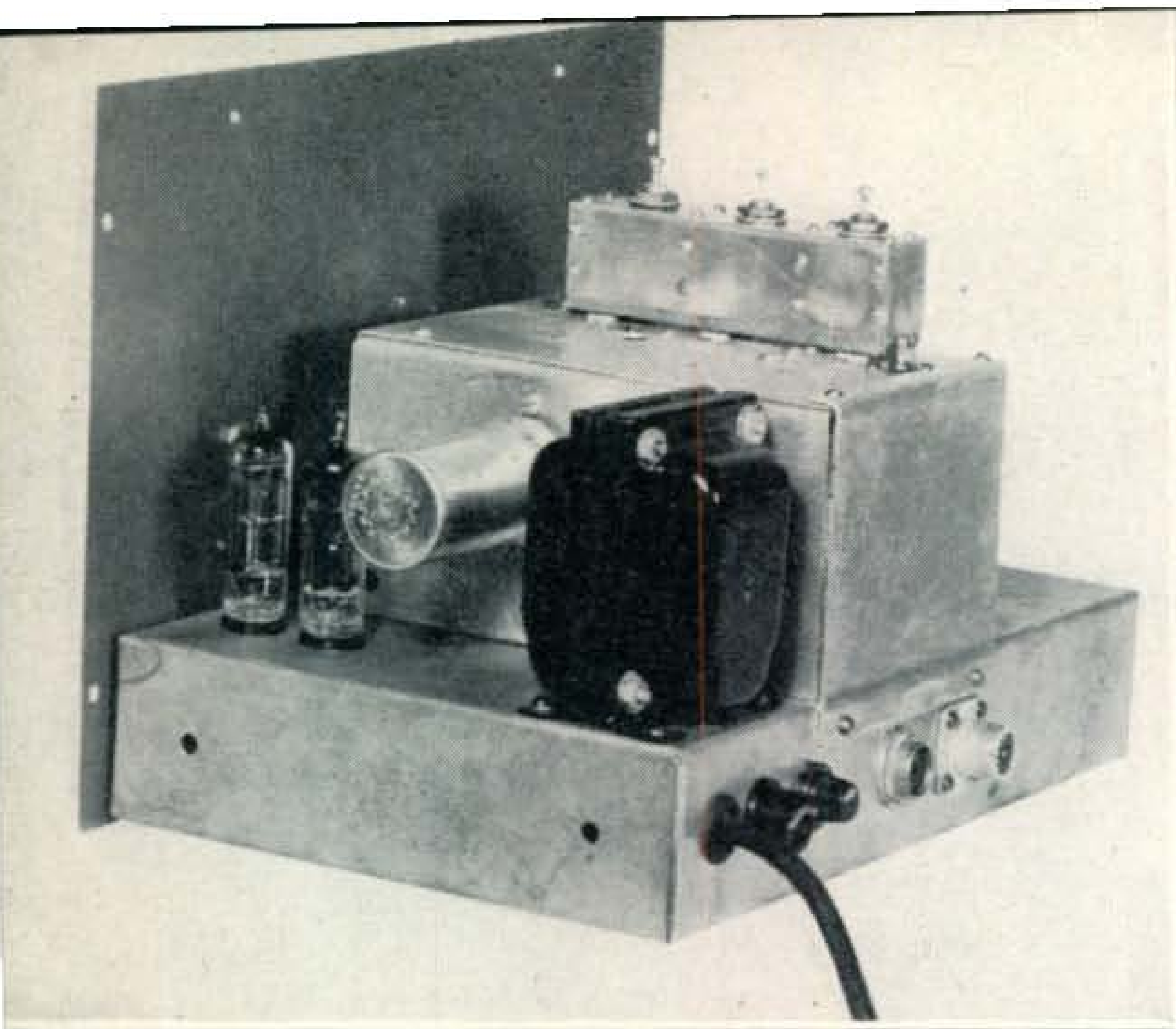
Circuit Details

The radio-frequency stage uses a 6AK5 tube as a broad tuned amplifier. The input section is an exact electrical duplicate of the R-9'er circuit.† This was selected because it provides a high order of gain without the necessity of tuning. In addition, it does its usual good job of antenna matching, which is invaluable on the higher frequency bands. The grid coil for this stage is one of the three in the plug-in coil unit. As bands are changed, this coil automatically matches the converter to the antenna for that band.

The 12AT7 tube, which incidentally operates from either a 6.3 or 12.6-volt filament supply is employed as both the mixer and the oscillator. Having a transconductance of 5,500 micromhos per section, excellent mixer gain and good oscillator stability is obtained. Tube construction is such that there is no danger of overcoupling existing between the oscillator and mixer sections, even for operation on 2 meters, if the circuit shown is used.

There are two interesting items in the mixer stage design. Injection is accomplished by capacitance C_3. Note that this capacitance is contained in the plug-in coil, so that the amount of injection voltage may be adjusted for each band. This is very important if noise is to be kept down. For example, if C_3 were adjusted to an optimum value for 10-meter operation, it would be too large a value for 2 meters, and the resultant overdrive would add noise. Actually, C_3 consists of two wires twisted to-

Tube Division, G.E. Co., Schenectady, N. Y.
†*G.E. Ham News, Vol. 1, No. 4.*

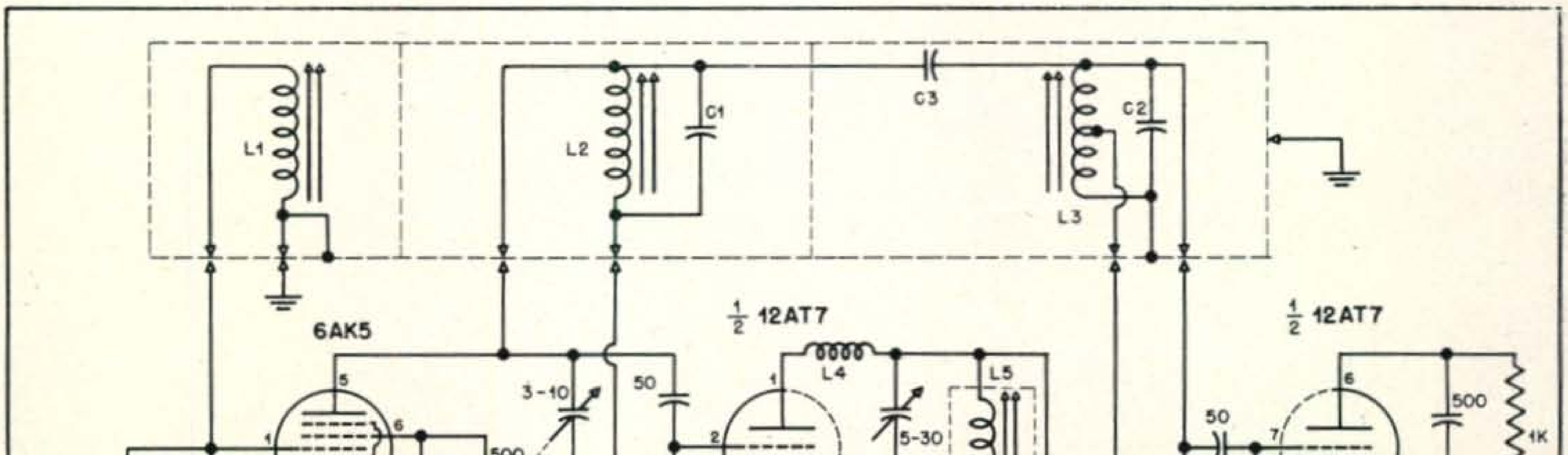


Right-hand three-quarter rear view showing, respectively, the OB2 voltage regulator tube, the 6X4 rectifier tube, the i-f plug-in coil, and power transformer.

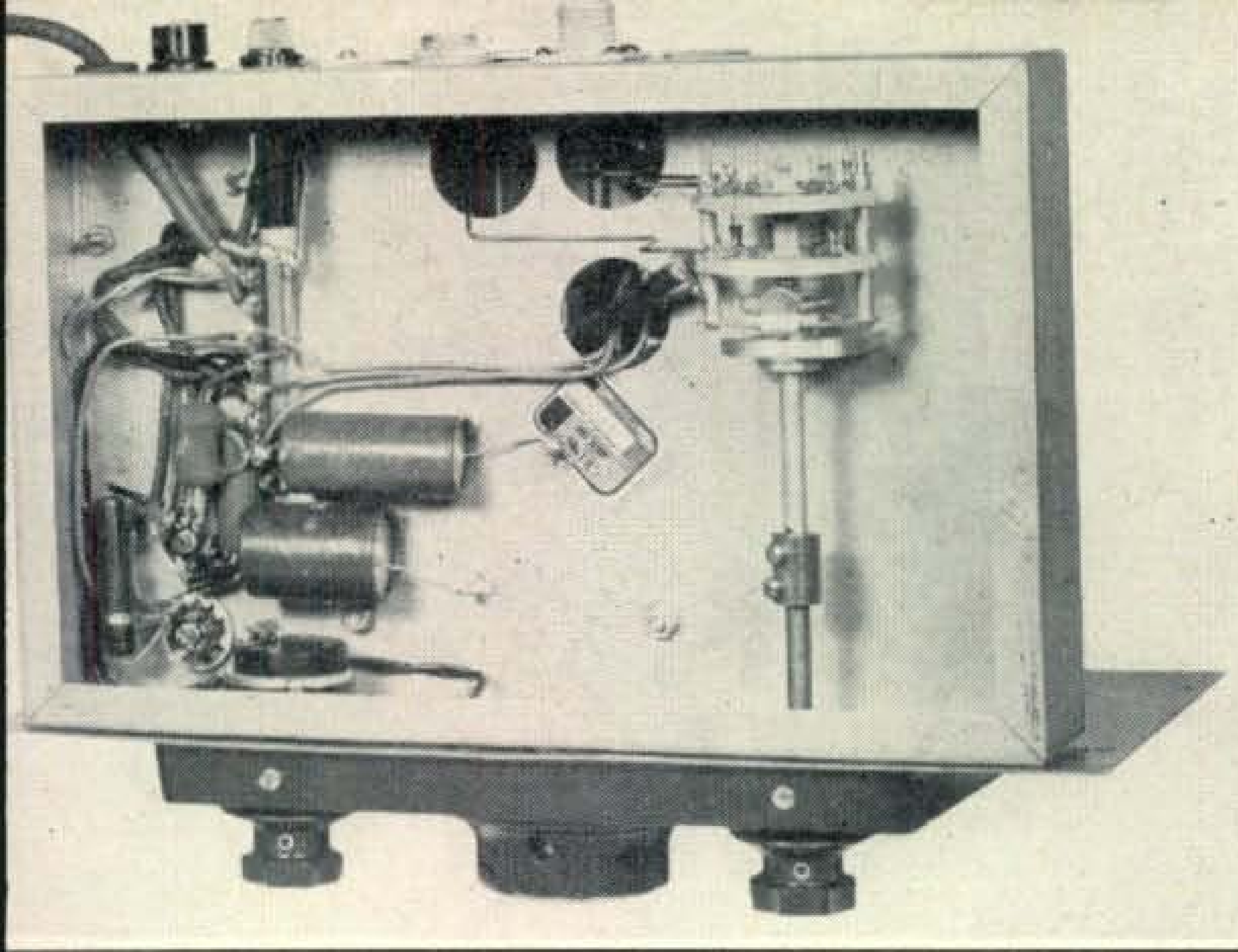
gether and therefore adjustment to optimum capacity is simplified.

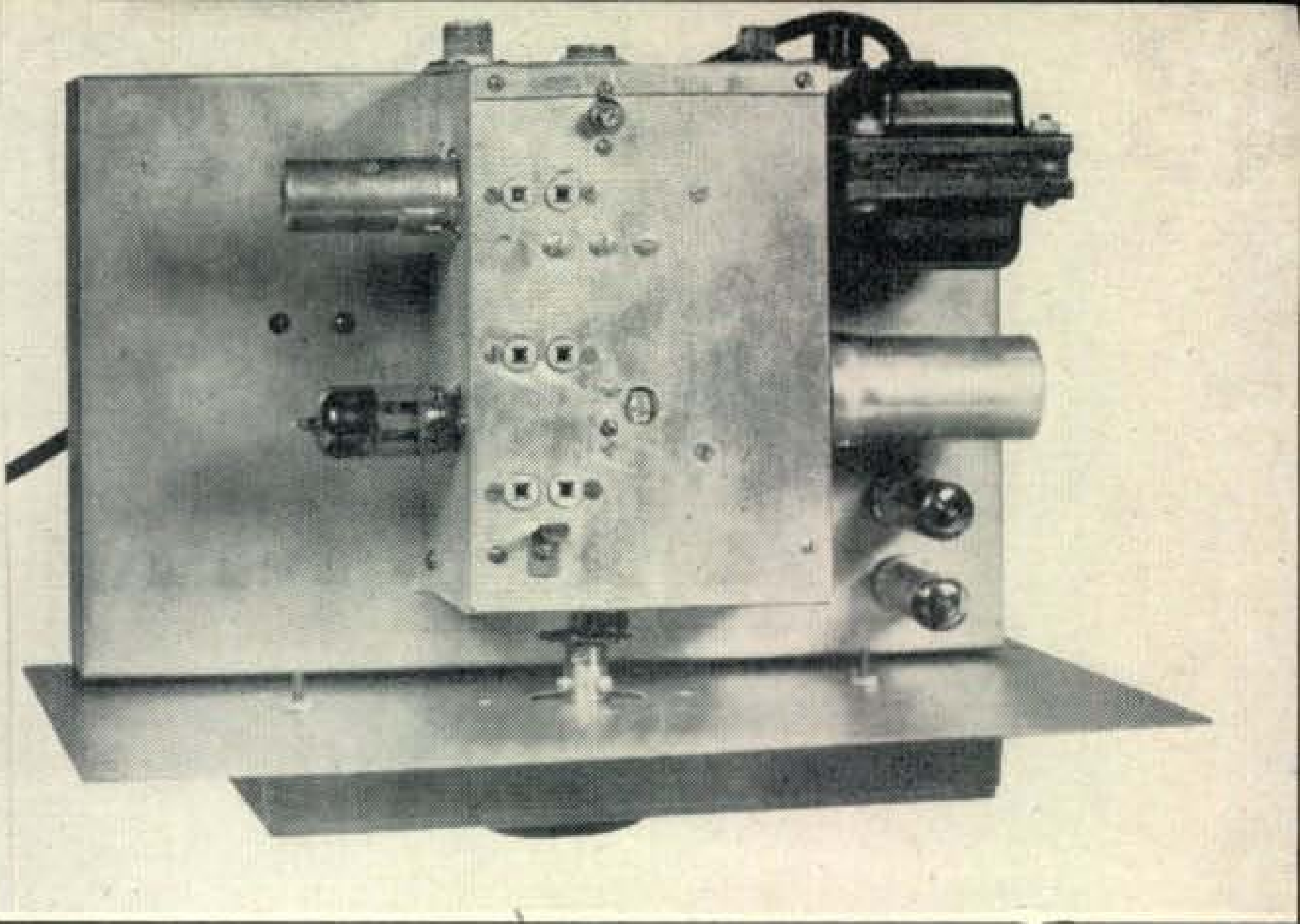
Another interesting point is inductance L_4. The 30-$\mu\mu$f trimmer capacitor across the i-f transformer (L_5) is placed approximately 1″ from the plate terminal of the mixer tube. This 1″ long lead is the inductance L_4, and it is shown as an inductance to emphasize its importance. The grid-to-plate capacitance in a triode causes an inductive reactance in its plate circuit to appear as a negative conductance across its input terminals. The 1″ long plate lead supplies this inductive reactance, which in turn causes sufficient negative conductance across the input terminals to offset partially the effects of transit time and cathode-lead inductance loading and circuit dissipation. At the same time, this negative conductance is not allowed to be high enough to cause self-oscillation.

Refer to the photograph showing the inside details of the sub-chassis. The i-f trimmer is a small silvered-ceramic condenser mounted between the two ganged condenser. The plate lead from the 12AT7 tube on the left is 1″ long in order to connect to the trimmer. From this point the same lead continues on through the small shield and connects to the i-f coil which is plugged in the side of the sub-chassis opposite the tubes. The important lead length is from tube to trimmer. The lead from trimmer to i-f coil may be any reasonable length. With L_4 adjusted properly it will be found that the input impedance is not affected appreciably on the 10-meter band (where the tubes used have good gain),



Circuit diagram of the 10, 6, and 2-meter converter.





Left: Under-chassis view of three-band converter. The lack of parts is due to the fact that all r-f components are mounted in the sub-chassis. Power supply components are on the left, while the in-out switch takes up the right-hand section. Right: Top view of converter. The crystal sockets into which the coil plugs are clearly shown. Of the two r-f tubes on the left, the 6AK5 uses a shield. It was found unnecessary to shield the 12AT7.

but on the 6 and 2-meter band the input impedance increases and gives a feed-back effect which increases the gain of the tube. This increased gain offsets the normal drop-off of gain found in many tubes beginning at 50 megacycles.

The output of the mixer works into a second R-9'er matching circuit. The output frequency is 10.7 mc, but even at this comparatively low frequency a matching circuit of this sort is to be preferred over the usual link-coupled output. This is because it is usually difficult to adjust properly a link which will match into your receiver without a great deal of cut and try. The R-9'er circuit allows this match to be made almost automatically, and in addition permits a match to any type of receiver with only minor adjustments of the 100-$\mu\mu$f condenser in the output circuit.

In order that the converter may operate properly on 2 meters a filament decoupling circuit is required. This consists of L_6 and the two 500-$\mu\mu$f condensers. This system provides an r-f filter to isolate the 12AT7 oscillator circuit from the 6AK5 r-f amplifier and prevents the oscillator frequency from being changed due to 6AK5 grid tuning. Overcoupling between oscillator output and the mixer is also prevented.

The 6X4 rectifier is used in a regular full-wave circuit, with a resistor-condenser filter. This type of filter is economical and yet effective. The OB2 voltage regulator tube may be dispensed with and very little difference will be seen on 6 and 10 meters. Two meter operation is not as stable without the voltage regulator tube, however.

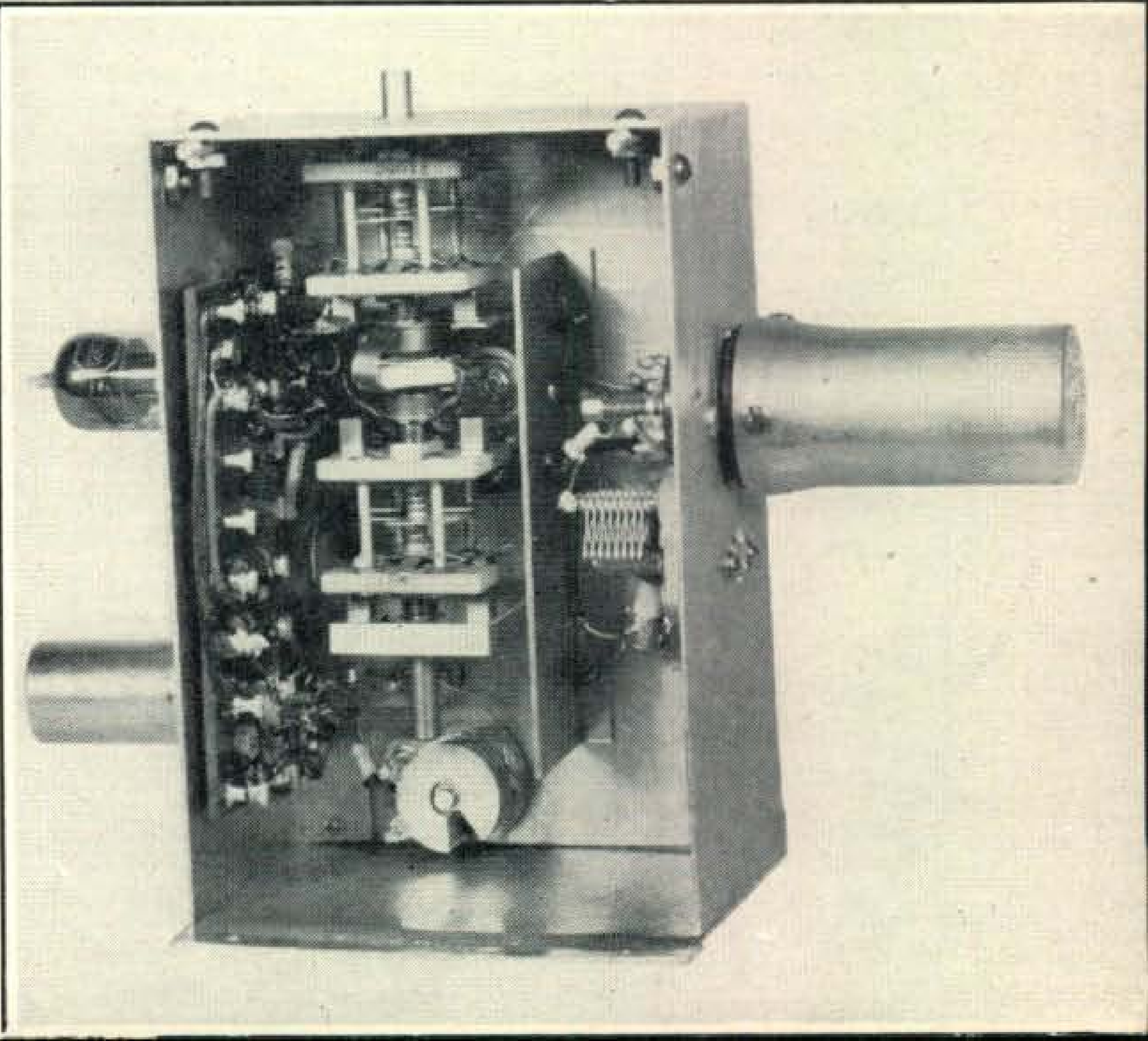
Constructional Details

Construction will be simplified if the converter is thought of as three separate units—main chassis, sub-chassis and plug-in coil. Each of these three units may be completed separately. The circuit diagram is arranged so that the components in each unit are obvious.

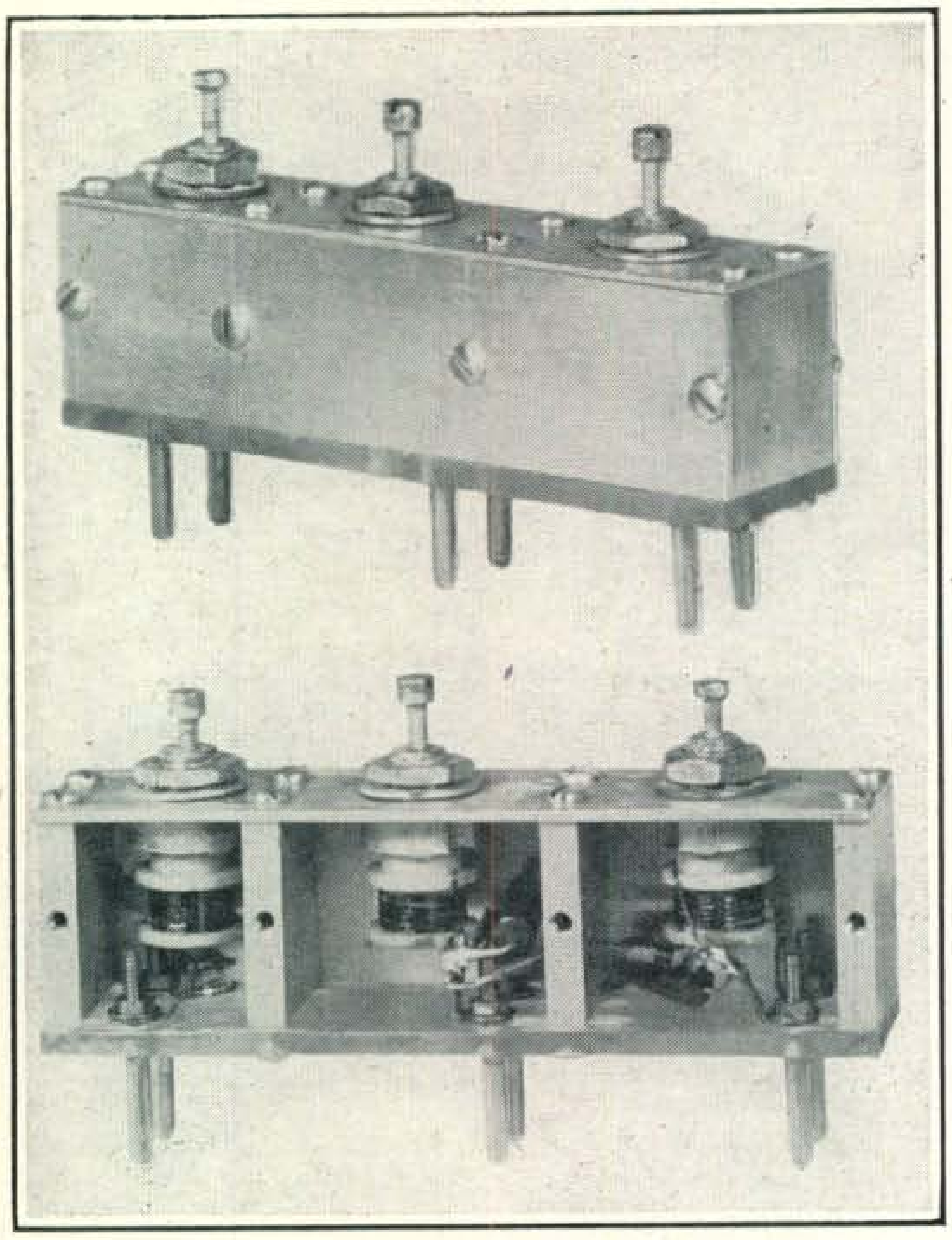
Starting with the main chassis, which is a standard 11″ by 7″ by 2″ chassis, the power transformer and two miniature tube sockets are placed on the far right portion (seen from the front). The only precautions to observe are that the tubes are placed so there is room for the plug-in coil form which extends horizontally from the sub-chassis, and also so that the power transformer does not extend toward the middle of the chassis more than 2¾″.

Once these parts are located, the relay terminals, coaxial input and output, fuse, a-c line and the two switches may be mounted on the chassis. The placement of these parts is not critical except that the two switches must be laid out in conjunction with the main dial if the Millen No. 10035 dial is used. The main chassis wiring may now be completed. It will be seen from the circuit diagram that only five connections are necessary between the main chassis and the sub-chassis. These are left until the sub-chassis has been assembled.

The driving shaft from the Millen dial is located 1⅞″ from the top of the two-inch high chassis—



Under-chassis view of the sub-chassis. Note the terminal board, used for ease in wiring. The small vertical shield isolates the i-f wiring from the r-f wiring.



Plug-in coil assemblies. The coil on the left is the 10 meter plug-in unit, with the side cover removed. The pins are spaced unequally so as to act as a guide to proper insertion.

or 3⅞″ from the bottom of the chassis. The SPST switch in the primary of the power transformer consists of an old burned-out potentiometer with an attached switch. This is used in order to get a rotary action switch. Obviously any type of switch may be used.

The front panel is 8″ high and 12″ long, which fits into a standard 8″ x 8″ x 14″ cabinet.

The sub-chassis contains all the main radio-frequency wiring and should therefore be carefully constructed. The sketches indicate how the sub-chassis is made. Piece *B* is the main piece, with the 3″ by 4″ face being the front of the box and the 4″ by 6″ face being the top of the box. Pieces *A* and *A′* are the two sides, *A* being the left-hand side (as seen from the front of the converter), and *A′* being the right-hand side. Piece *C* is the back, and is extra long in order that it will fasten on the rear of the chassis. Pieces may be made of aluminum or any other workable metal.

The photograph of the underside of the sub-chassis indicates how the pieces are fitted together. Note the two studs on the front face of piece *B*. This unit looks as though it were hard to wire, but this is not the case, if wiring is done as follows.

Before the sub-chassis is assembled, all pieces must be drilled so that the various components may be mounted. The 12AT7 and the 6AK5 socket holes are cut in piece *A*, with the socket centers being 2⅜″ from the bottom. The 12AT7 socket is mounted 2⅛″ from the front of the box and the 6AK5 socket 1⅜″ from the rear of the box A terminal board is then mounted on piece *A*. On this board are mounted the cathode and screen resistors of the 6AK5 stage, the cathode resistor of the mixer stage, and the plate resistor of the oscillator stage. The other resistors and condensers are mounted on the tube sockets, with pigtails left free where connection is necessary to the rest of the sub-chassis.

Piece *B* is now obtained and the ceramic crystal sockets are mounted. These sockets (Millen No. 33202) are for the plug-in coil. The front two sockets are placed 1½″ apart, and the third socket placed 1¾″ from the center socket. This staggered spacing is employed so that it becomes impossible to place the plug-in coil in wrong. Also mounted on piece *B* are the two variable condensers as shown in the photographs, and the 2½″ long shield. Pieces *A* and *B* are now joined and the wiring continued. When this is complete the ganged condensers are mounted. The condensers used are Millen No. 21050 with plates removed so that two stator plates and one rotor plate remain on each. The front condenser mounts against the front plate of piece *B* and the rear condenser is mounted on an aluminum bracket. Be sure to use an insulated coupling as the condenser in the 6AK5 plate circuit has an ungrounded rotor.

The last operation is to drill piece *A*, mount the 100-μμf condenser and Millen No. 74001 plug-in coil form, and complete the wiring. Piece *C* is then added and the sub-chassis is done. The under-view of the main chassis shows the three large holes

(*Continued on page 89*)

COIL TABLE

MC	L1	L2	L3	C1	C2	C3
28–29.7	16 T #30 WIRE	8 T # 24 WIRE	8 T # 24 WIRE TAPPED 2½ T FROM GND. END	25 μμf (ERIE N750K CERAMIC)	25 μμf (ERIE N750K CERAMIC)	5 T #18 WIRE CLOSE WOUND ON PUSHBACK W.
50–54	8 T # 24 WIRE	4½ T # 24 WIRE	4 T #24 WIRE TAPPED 1 T FROM GROUND END	20 μμf (TWO 10 μμf ERIE N470K CERAMICS)	20 μμf (TWO 10 μμf ERIE N470K CERAMICS)	2 T #18 WIRE CLOSE WOUND ON PUSHBACK WIRE
144–148	3 T # 24 WIRE	1 T # 14 WIRE (SEE TEXT)	1 T #14 WIRE TAPPED IN MIDDLE (SEE TEXT)	10 μμf (ERIE N240K CERAMIC)	4–30 μμf TRIMMER (ERIE N350)	NO CAPACITANCE USED (SEE TEXT)

L4 = SEE TEXT
L6 = 50T #22 WIRE ON ¼″ FORM – CLOSE WOUND
L5 = 31 T #24 WIRE
L7 = 2½ MH. R.F.C.

Automatically Tuned
All-Band Kilowatt

VERNON VOGEL, WØHMS*

Automatic tuning is a much discussed feature that most amateurs would like. Admittedly not something for the newcomer to tackle, WØHMS has gone all the way in this high-power phone and c-w rig. This first part of the two-part article is a discussion of the automatic tuning circuit design. Part 2, to appear next month, will describe the transmitter.

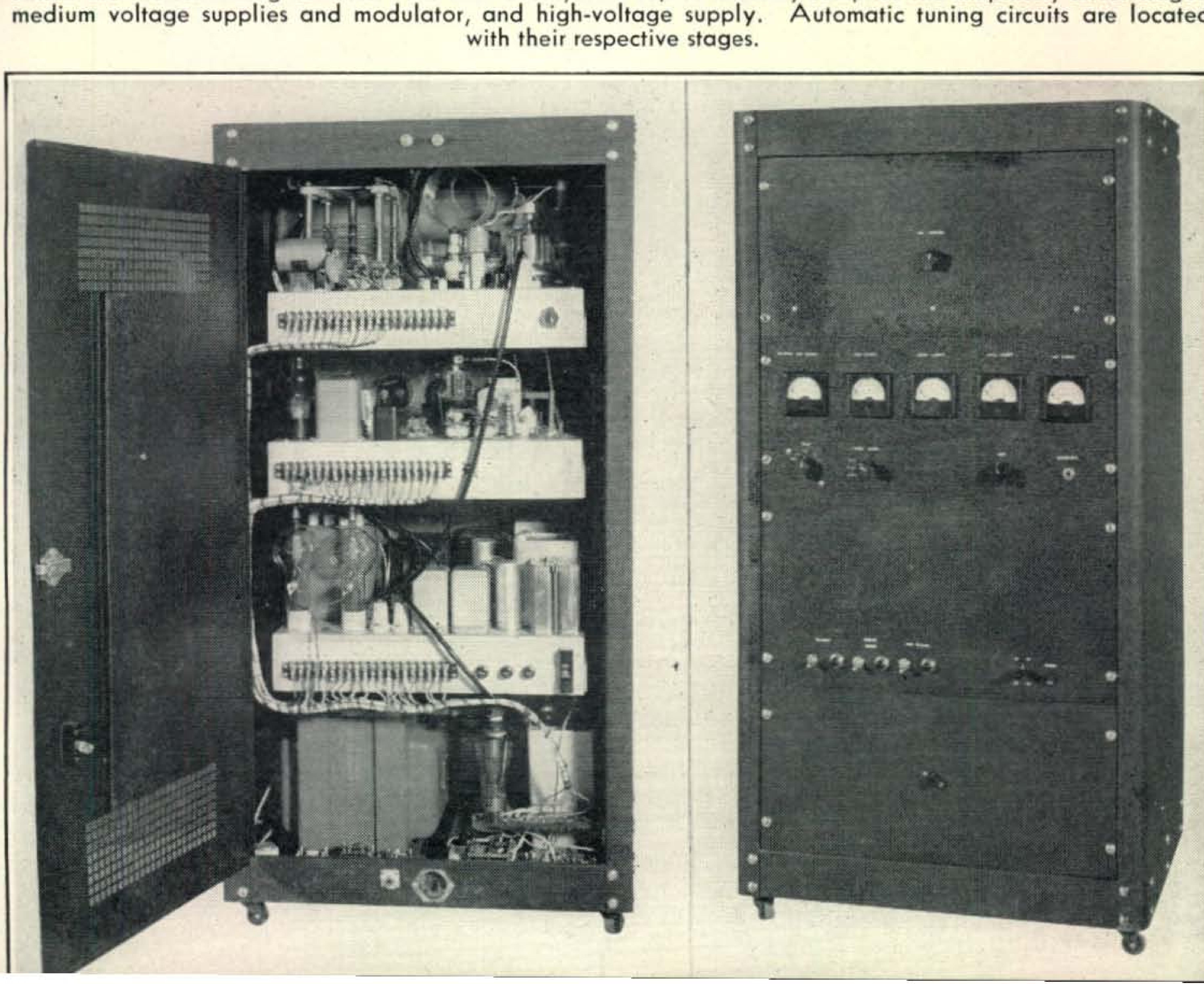
THE TRANSMITTER to be described is the result of the writer's efforts to obtain the ease of operation considered desirable with the new operating techniques used in postwar ham radio. The transmitter, with the exception of the final amplifier, is band switching and covers the 80, 40, 20, 15, and 10-meter bands.

To obtain maximum use of v-f-o flexibility and maintain maximum transmitter efficiency at all times, full automatic tuning of the transmitter was considered a necessity. Since ganging the final amplifier to the v.f.o. was rather impractical, automatic tuning was applied to the final; and to reduce the size of the v-f-o unit, since it was to be on the operating table, all exciter tuning was put in the transmitter with separate automatic tuning applied to it.

In general, most antenna circuits can be modified to permit transmitter tuning over at least half of any ham band, with little variation in final amplifier loading, without changing antenna tuning, and this will be described in more detail later. If the amateur link couples into the usual low-impedance non-resonant transmission line, where there are no further antenna tuning circuits that must be resonated, the antenna tuning and loading is no problem. In actual

*Engineering Research Associates, Inc., 1902 W. Minnehaha Ave., St. Paul 4, Minn.

The complete transmitter except for the frequency control unit is contained in this single rack. The only manual tuning controls are the final loading link and gain control. Filament, tune-up and high-voltage controls with their associated warning lights are on the front panel. Band switch, meter switch, and an auxiliary phone-c.w switch are the remaining controls. The four decks, from top to bottom, comprise the amplifier, driver stages, medium voltage supplies and modulator, and high-voltage supply. Automatic tuning circuits are located with their respective stages.



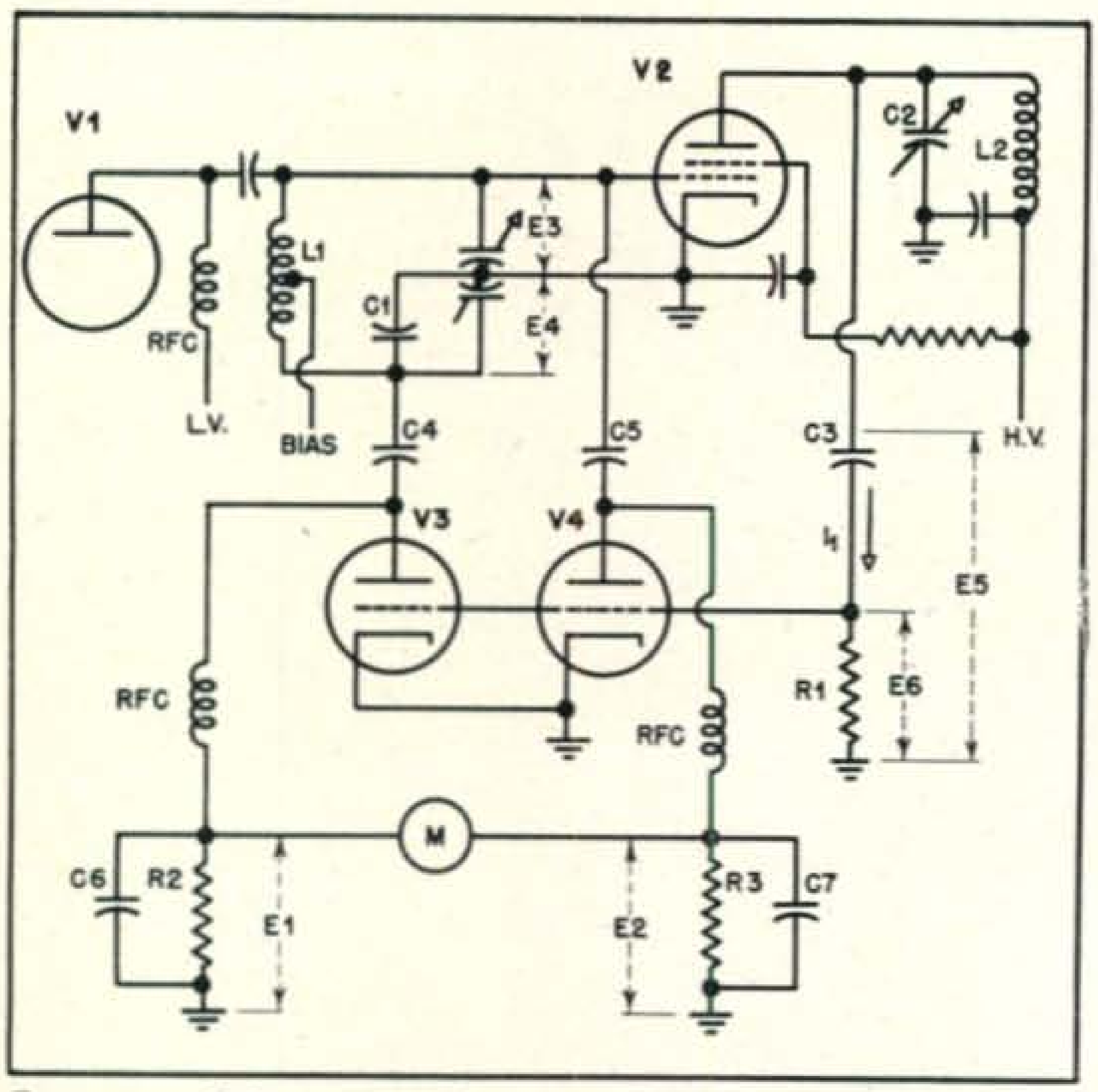


Fig. 1. Schematic showing the basic components of the phase discriminator.

operation this means that the operator merely selects the frequency desired, as indicated by the v.f.o., presses the key or push-to-talk switch and starts normal transmission, unless a large frequency shift is made, such as going from one end of the 80-meter band to the other, which band must then be covered in two steps.

Special consideration was given the control circuits for fast and easy operation with due safety precautions taken with regard to the life of the operator as well as the life of the equipment. All operating controls for phone or c.w. are on the v-f-o panel. Small details such as a switch to cut in and out v-f-o pickup in the receiver for spotting purposes and receiver disabling circuits relay operated by key or mike control, aid in operating ease. Phone operation employs speech clipping, which is considered a valuable asset if for no other reason than preventing over-modulation—and it does help cut through QRM. Compact construction, a kilowatt input on c.w. and 600 watts on phone, was achieved through careful layout considerations.

Utilizing the Phase Detector for Automatic Tuning

The operation of the automatic tuning feature of the transmitter utilizes a phase sensitive detector, which requires that the input and output r-f voltages across the grid-to-ground and plate-to-ground, respectively, of a Class C amplifier be 180° out of phase before a balanced condition is established in the phase detector. This condition corresponds to resonance in the plate tank circuit. The phase detector, besides having the ability to tell if the 180° phase inversion exists, has the ability to tell if the phase angle is leading or lagging. This information given to a polarized relay and a tuning motor will make the tuning motor always tune toward resonance, and stop when resonant condition is reached.

Two types of phase detector are used on this transmitter. One phase detector operates on a single ended buffer stage in the 80-meter band. The remaining multiplier and buffer circuits are ganged to the automatically tuned stage, and tracked over the amateur bands. The second phase detector is especially adaptable to push-pull circuits and operates on the final amplifier, which isn't readily ganged to the earlier stages since it is desired to make it operate at peak efficiency on all frequencies. Because it is somewhat simpler, the final amplifier phase discriminator will be described first.

Figure 1 is a schematic showing the basic components of the discriminator, and it has the necessary r-f and d-c voltages indicated as an aid to understanding the circuit. *Figs. 2* and *3* are vector diagrams of the r-f voltages indicated on *Fig. 1*. *Figure 6* is a typical curve of the d-c output voltages as read on meter *M*, and is the difference between d-c voltages *E1* and *E2*. This voltage is plotted against variation of plate tank tuning condenser. Voltages *E3* and *E4* are equal and 180° apart with respect to ground regardless of the tuning of the grid input circuit *L1-C1*. These voltages, it is seen, are obtained by the conventional split-stator condenser and center-tap coil methods such as used to feed a push-pull output circuit. Since the tuning circuit works equally well on a single-ended, as well as a push-pull, circuit, a single-ended circuit has been shown, which merely requires the addition of capacity *C1* to obtain equal voltages *E3* and *E4*.

The two voltages *E3* and *E4* are fed through blocking condensers *C4* and *C5* to the plates of the

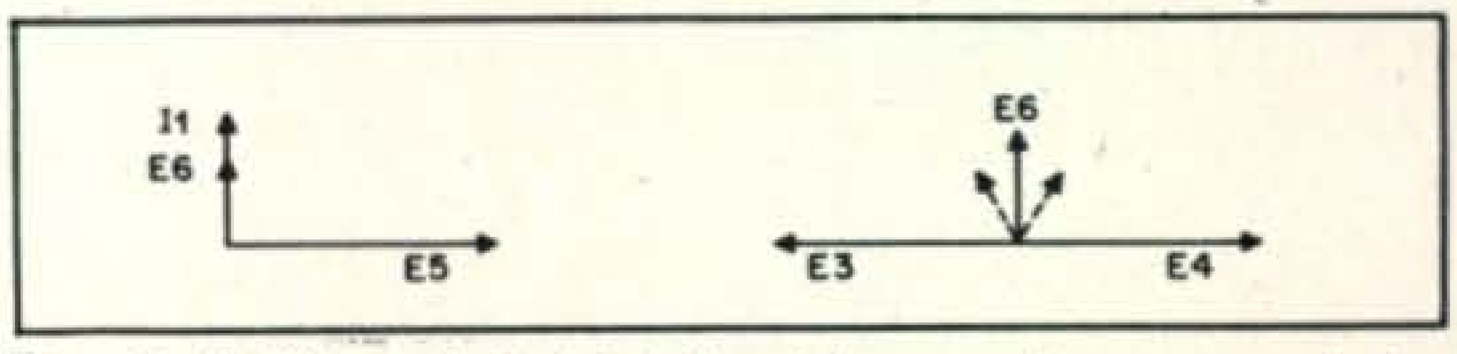


Fig. 2 (left) and 3 (right). Vector diagrams of the r-f voltages indicated on Fig. 1.

discriminator tubes *V3* and *V4*. If we consider the grids of *V3* and *V4* removed for the moment, it is seen that in each tube circuit there exists a conventional diode rectifier circuit with load resistors *R2* and *R3* with the conventional r-f chokes in each lead and the r-f bypass condensers *C6* and *C7*. Further, if a meter *M* is connected across the top

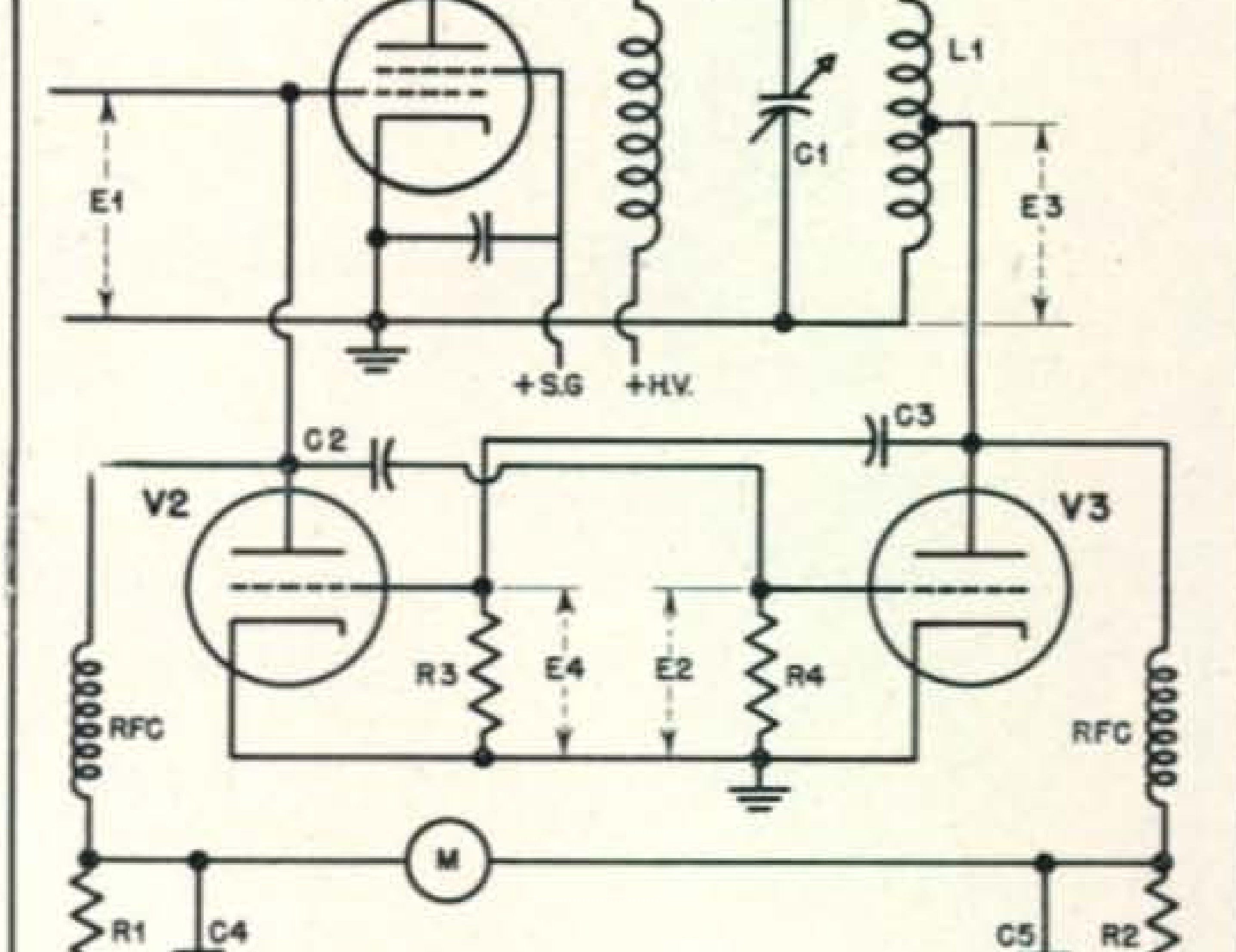


Fig. 4 Discriminator circuit used to tune the buffer stages.

ends of the two resistors, the voltage across the meter will be zero since the voltage across *R2* and *R3* are equal if *R2* and *R3* are made equal.

Next consider the grids on *V3* and *V4* and consider the output of tube *V2*. Connected across the plate of *V2* to ground is a small capacity *C3* in series with a small-resistor *R1*. Since *C3* has a high reactance compared to the resistance of *R1*, the voltage *E6* developed across *R1* will be approximately 90° out of phase with the voltage *E5* at all times. This is illustrated by vector diagram *Fig. 2*. Since the current is determined mainly by condenser *C3*, and the current in a condenser always leads by an angle of 90° and, further, since the voltage across the resistance is in phase with the current, the 90° phase situation is obtained. This quadrature voltage is applied to the grids of both *V3* and *V4* and the resultant vector diagram for the voltages *V3* and *V4* is shown in *Fig. 3*.

The a-c component of plate current in a vacuum tube is always 180° out of phase with the grid input voltage except at v.h.f. where transit time is appreciable. Therefore, when the output circuit looks like a pure resistance, which condition is produced when the output tank circuit is at resonance, it is seen from *Fig. 3* that *E6* is 90° out of phase with *E3* and *E4*. Since the grid voltage has a 90° phase relation with both the plate voltages *E3* and *E4*, the effect of *E6* on the rectifier action of the discriminator tubes is equal and any change in

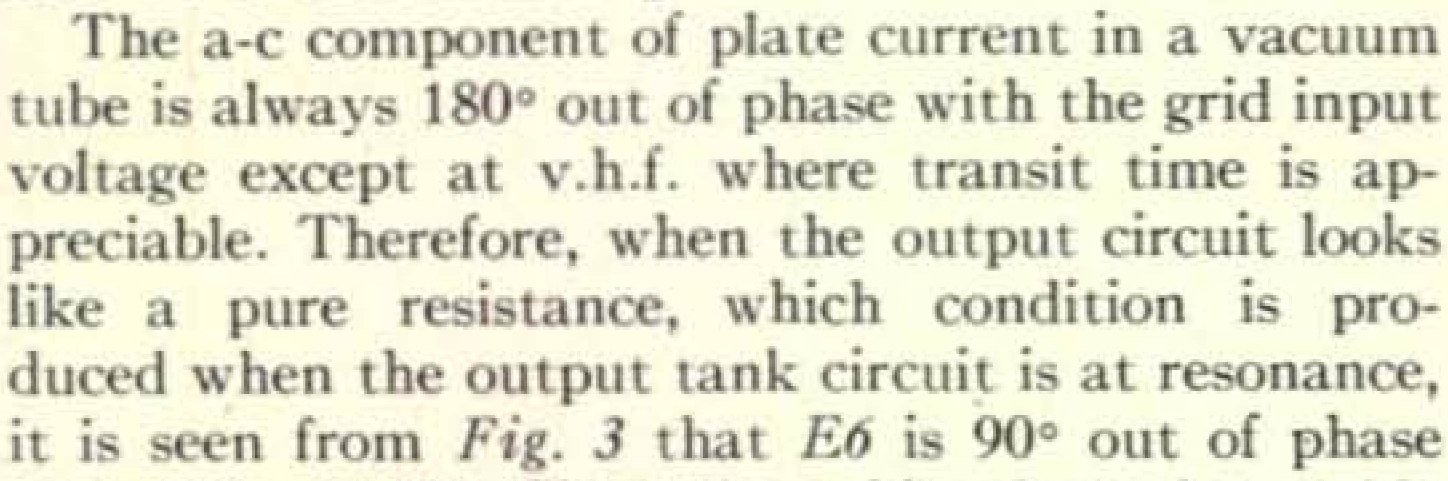


Fig. 5. The respective vector diagrams of the r-f voltages indicated on Fig. 4.

voltage across resistor *E1* and *E2* due to the insertion of the grids will be equal; therefore, the meter *M* will still read zero, indicating resonance. However, if the output circuit *C2-L2* is tuned either above or below resonance, the voltage *E5* is no longer 180° out of phase with *E3* and *E4* but has some other value. Therefore, *E6* is not in phase with the a-c plate current *E1* and the voltage *E6* then assumes some angle that is more than 90° with respect to, say, *E4* and less than 90° with respect to *E3* or vice versa as indicated by the broken line vectors.

In the first case where the angle of *E6* is less than 90° with respect to *E4*, tube *V3* will conduct more than tube *V4* and thereby produce more voltage across *R2* than *R3*, producing a voltage across meter *M*. This voltage, of course, can be used to operate a polarized relay controlling a tuning motor operating on the output tank circuit. It should be noted that the tuning of *L1-C1* has no effect on the phase relations in the output of *V2*, nor does it in any way affect the operation of the phase discriminator aside from varying the sensitivity with variation in voltage applied to the discriminator plates.

The second discriminator described, which is

The control unit. The operator selects the desired frequency on the v.f.o. or crystal and presses the key or push-to-talk switch. A switch for spotting the v.f.o., crystal or v-f-o selector, and phone-c.w. switch are the other major controls.

used to tune the buffer stages, is sensitive to r-f voltage variations, but has the advantage of operating from the usual single-ended circuit, thereby saving a tuning condenser. This circuit is illustrated in *Fig. 4* with the respective vector diagrams shown in *Fig. 5*. The discriminator output curve is similar to the first discriminator except that it has a second crossover as indicated by the dotted curve. Voltages *E1* and *E3* are chosen so that they are equal when the output circuit *C1-L1* is tuned to resonance. This requires a tap on the coil *L1*, which can best be determined by experiment. Condensers *C2* and *C3* are again of small capacity, thereby having a large reactance compared to resistors *R3* and *R4*. These condensers, *C2* and *C3*, are made equal, as are resistors *R3* and *R4*. The voltage *E4* developed across resistor *R3* is 90° out of phase with the voltage *E3* at all times, and the voltage *E2* developed across resistor *R4* is 90° out of phase with the voltage *E1* at all times. At resonance *E1* and *E3* are 180° out of phase so that the four voltages concerned are all 90° out of phase with each other as shown in *Fig. 5A*. (*Continued on page 92*)

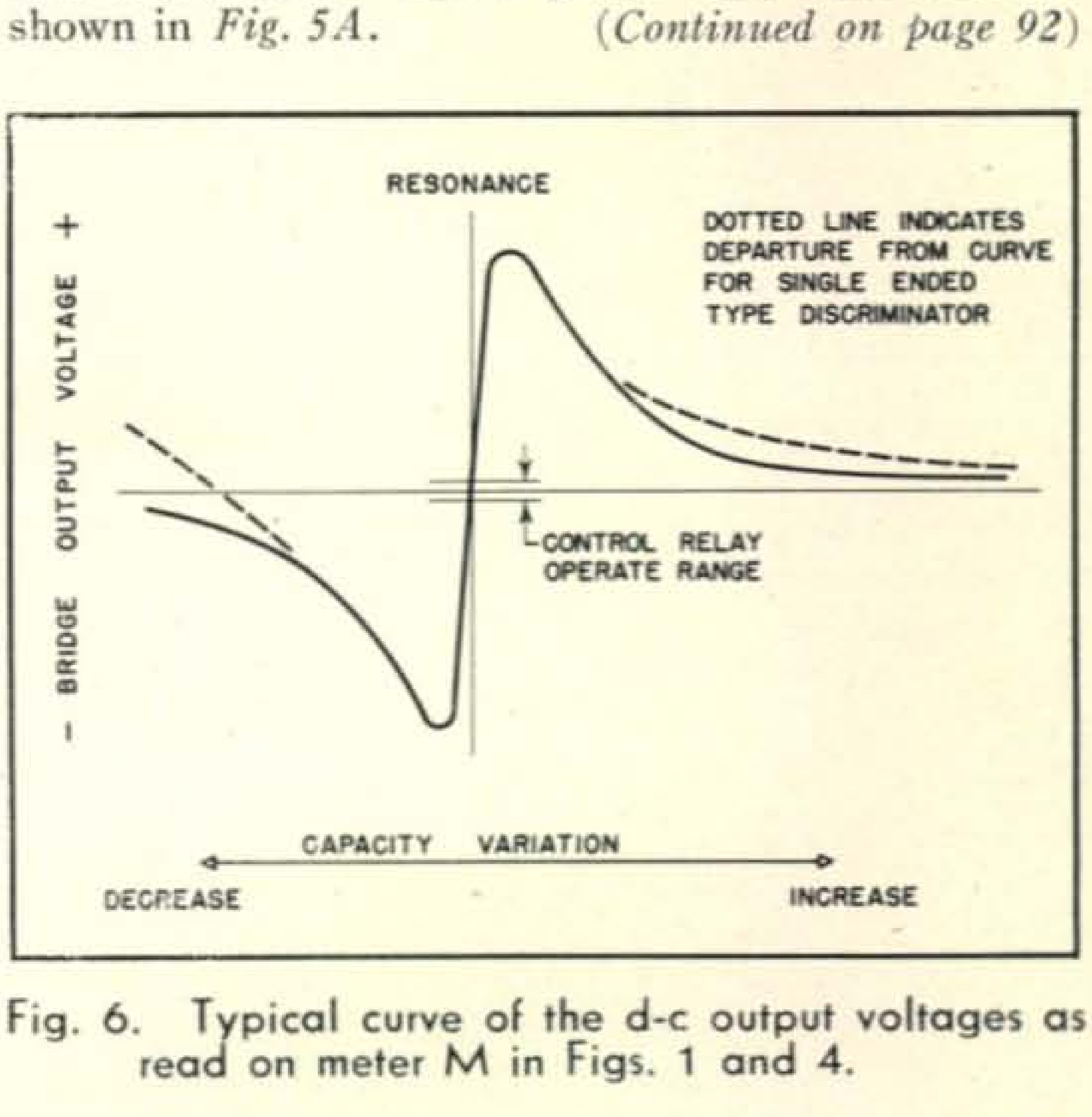
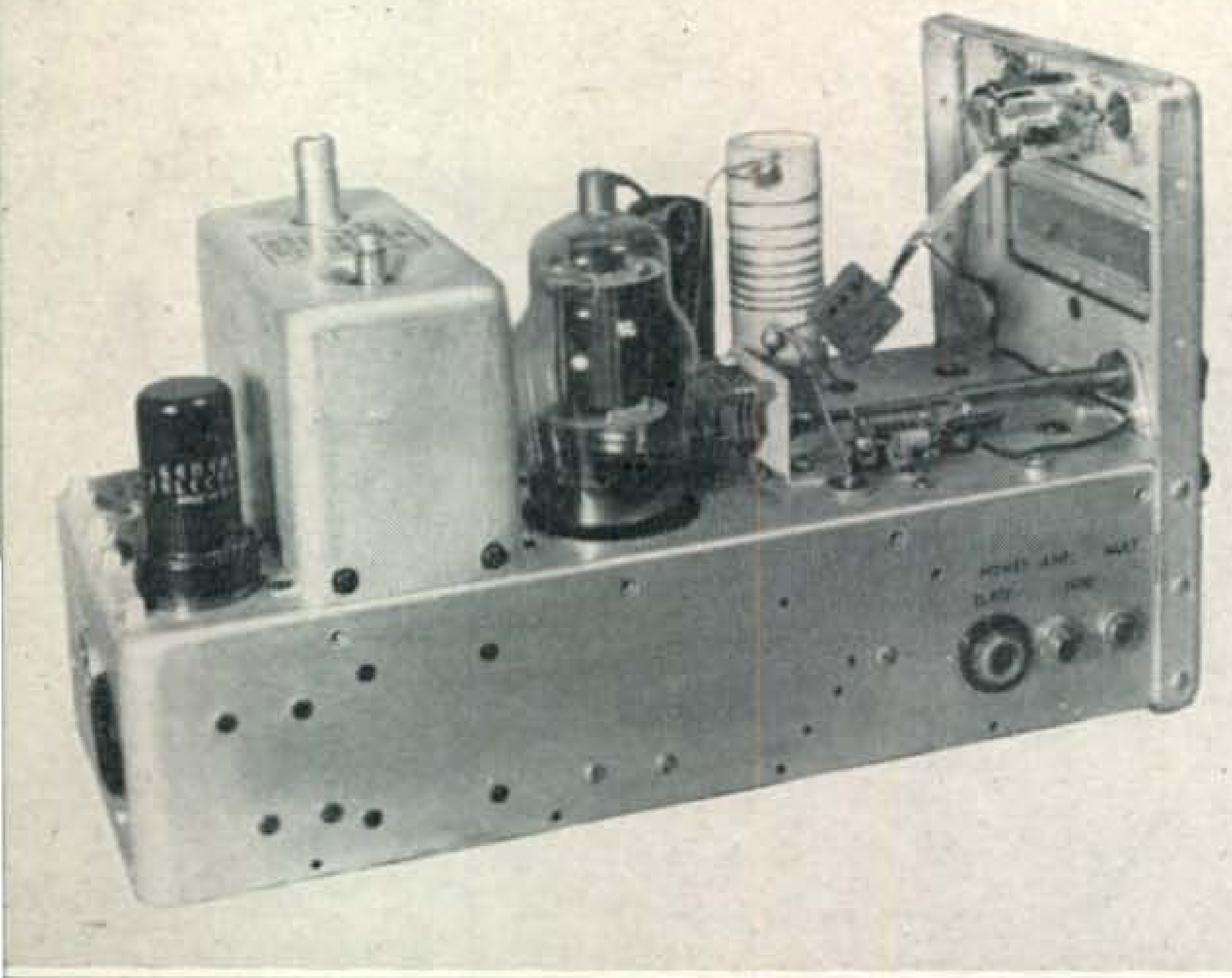


Fig. 6. Typical curve of the d-c output voltages as read on meter M in Figs. 1 and 4.



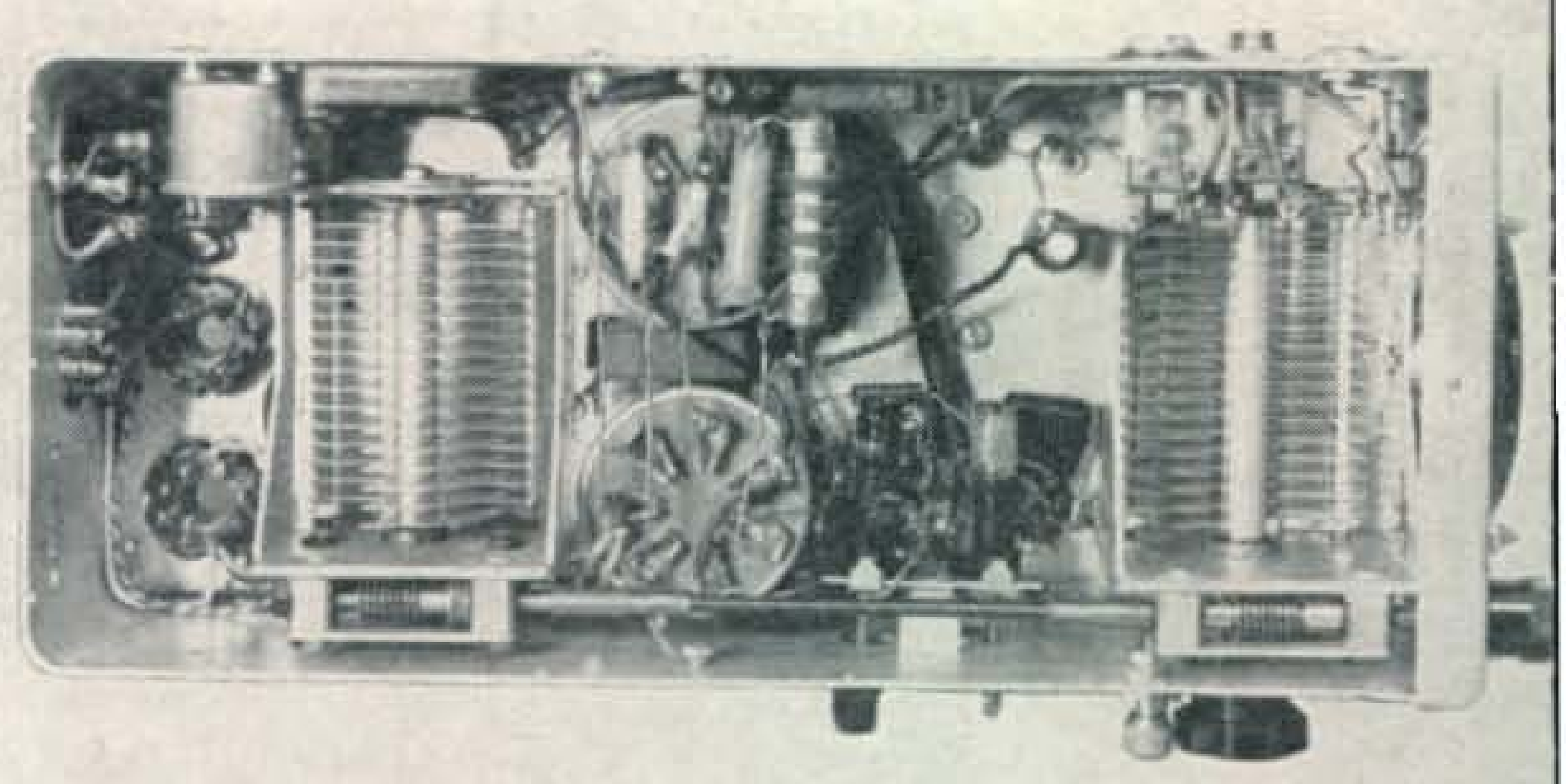


Fig. 4 (left). All components forward of the PA tubes are removed from the chassis top, and replaced by the frequency multiplier tubes, PA plate circuit, antenna relay and germanium crystal monitor. Fig. 5 (right). The frequency multiplier slug-tuned coils and other components, together with the plate feed choke, L7, are mounted in space made available by the removal of the original PA plate padding capacitor. The screen resistor and bypass condenser and the grid choke and resistor are mounted adjacent to the 807 socket.

Mobile with the SCR-274N

GEORGE M. BROWN, W2CVV*

The complete modification and installation of the SCR-274N 10-meter mobile station shown on the cover. It is equally well adapted to fixed station operation.

Mobile operation is an important phase of amateur radio, not only because it affords an opportunity to work under special conditions, but because it places the ham in a position to render valuable emergency service to his community. Mobile stations are the heart of any effective emergency network and ground coverage of a 10-meter mobile station provides effective short-haul communications. The chance to work skip DX under normal operating conditions makes 10 a fascinating band for mobile operation.

The principal obstacle to this type of operation seems to be that the necessary equipment occupies space which can ill be spared in the average family vehicle. Once the 10-meter mobile bug had bitten W2CVV, the least objectionable course to all members of the family seemed to be to work out a system involving the least possible dislocation of the normal space and functioning of the car. This resulted in the following list of desirable, or should we say essential, requirements. They apply particularly to the transmitter, since that is the subject of this paper. Reference to the associated broadcast receiver and converter are included herein only when necessary to the explanation of the transmitter design and operation.

1. The space required, particularly in frequently used locations such as the trunk, should be kept to a minimum.

2. The equipment should operate from the standard car battery and generator without frequent battery recharging being required. Item 1 effectively disposes of the possibility of extra batteries or a gas-engine-generator.

3. The transmitter should be amplitude modulated, with modulation capability of essentially 100% with low distortion. NBFM has possibilities and would certainly permit higher carrier output within the limitations imposed by item 2, but both experience and theory have firmly convinced the writer that until the time when at least a large proportion of amateurs are using receivers equipped with efficient limiters and discriminators or ratio

*14 Kingsland, N. Tarrytown, N. Y.

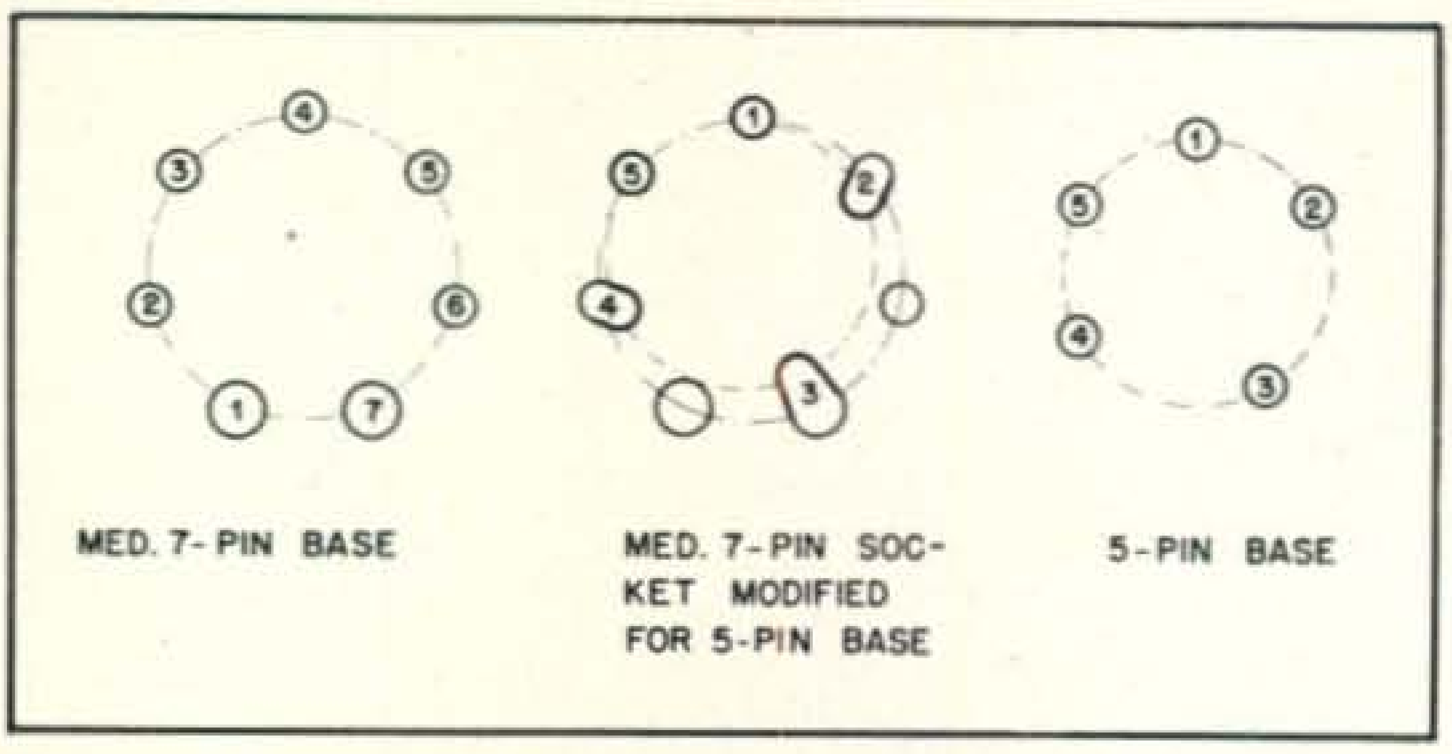


Fig. 1. 7-pin 1625 sockets may be modified to take 807s. In the scale drawing, the center illustration shows the 5-pin socket superimposed on the 7-pin, with the three holes filed to fit.

detectors, AM will do a better job, with less distortion and better signal-to-noise ratio.

4. Within battery and generator limitations, the maximum possible power output is essential. It seemed reasonable to expect that output in the order of 15 to 20 watts to the antenna would be obtainable.

5. Although crystal control is conventional with mobile transmitters, it is believed that a v.f.o. of sufficient stability, both electrical and mechanical, is highly desirable.

Although the approach of the purist to these requirements would probably involve the development and construction of a transmitter specifically designed to meet them, such a procedure would involve quite an extensive and time-consuming program. Consideration of the various suitably convertible pieces of equipment available on the surplus market resulted in the selection of the 4 to 5.3-mc transmitter of the SCR-274N or ARC-5 equipment. For those unfamiliar with this item it consists of an excellent and extremely stable v.f.o. with direct frequency calibration driving a pair of 1625s (12-volt 807s) as a power amplifier. Modulation, when used, was provided by an external unit. The power amplifier plate tuning is ganged to the oscillator by separate worm drives and a built-in loading coil is provided to permit operation into a short antenna.

The reason for the selection of this particular fundamental frequency range may seem a bit obscure, since it does not fall in any amateur band. However, the addition of a tripler and doubler with a total multiplication of 6 pushes the frequency range up to 24 to 31.8 mc, covering the 11 and 10-meter bands with adequate overlap at both ends. Although a similar transmitter having a fundamental range of 7 to 9.1 mc would have required a total multiplication of only 4 to provide 28 to 36.4-mc

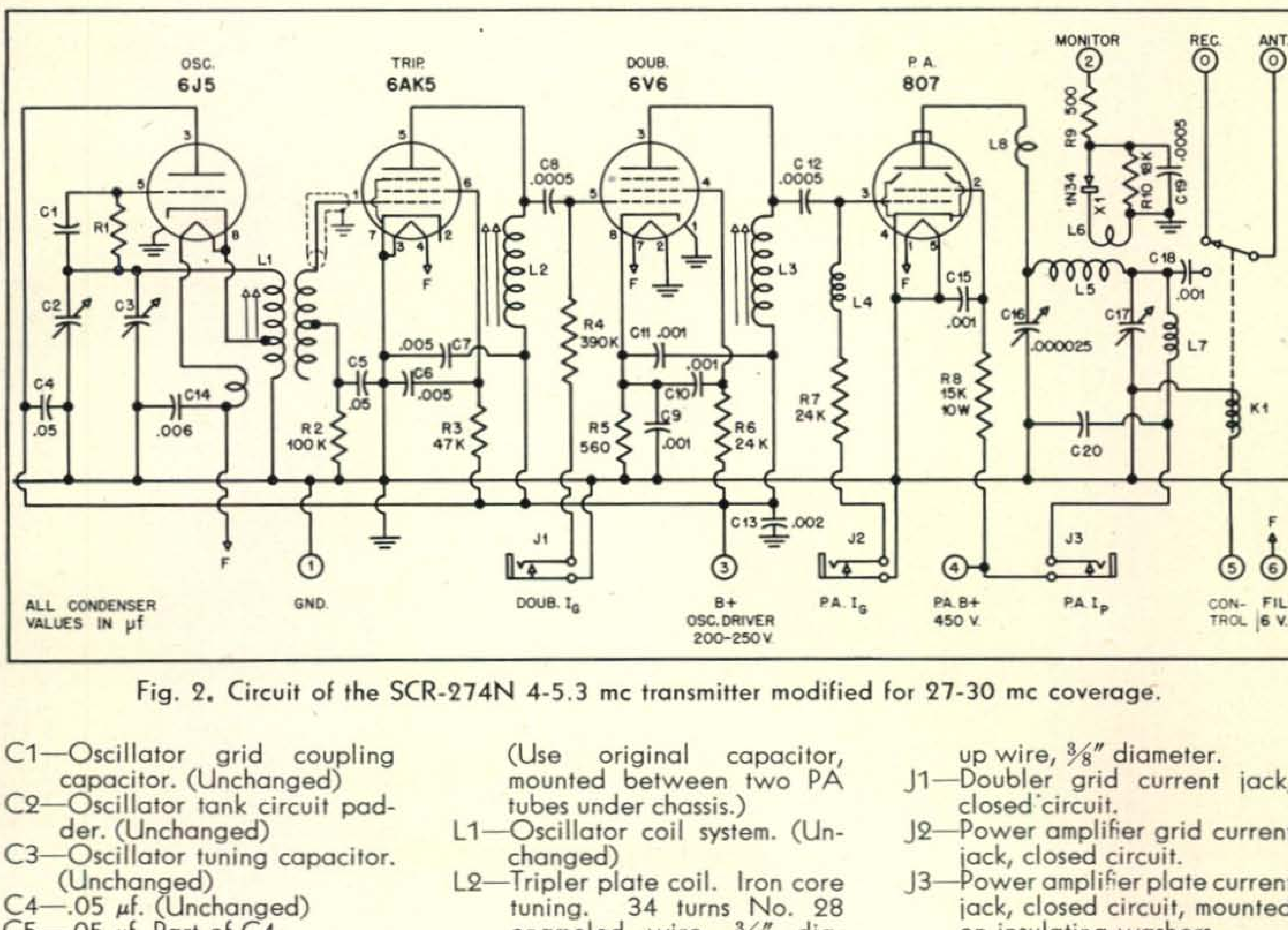


Fig. 2. Circuit of the SCR-274N 4-5.3 mc transmitter modified for 27-30 mc coverage.

C1—Oscillator grid coupling capacitor. (Unchanged)
C2—Oscillator tank circuit padder. (Unchanged)
C3—Oscillator tuning capacitor. (Unchanged)
C4—.05 μf. (Unchanged)
C5—.05 μf. Part of C4.
C6, C7—.005-μf mica.
C8, C12, C19—500-μμf mica.
C9, C10, C11—1000-μμf ceramic.
C13—.002-μf capacitor. (Use old PA screen bypass.)
C14—.006-μf capacitor. (Unchanged)
C15—1000-μμf ceramic.
C16—PA plate tuning capacitor, 25 μμf.
C17—Antenna loading capacitor. (Use old PA plate padder.)
C18—.001-μf mica.
C20—PA plate bypass capacitor. (Use original capacitor, mounted between two PA tubes under chassis.)
L1—Oscillator coil system. (Unchanged)
L2—Tripler plate coil. Iron core tuning. 34 turns No. 28 enameled wire, 3/8" diameter, 1/2" long.
L3—Doubler plate coil. Iron core tuning. 7 turns No. 22 enameled wire, 3/8" diameter, 3/8" long.
L4—PA grid choke, Millen 34-100.
L5—PA plate coil. 9 turns No. 16 tinned copper wire, 1" diameter, 1 1/2" long.
L6—Crystal monitor coil. One turn No. 14 wire, 1/2" from low end of L5.
L7—PA plate feed choke. Millen 34100.
L8—Parasitic choke. 5 turns hookup wire, 3/8" diameter.
J1—Doubler grid current jack, closed circuit.
J2—Power amplifier grid current jack, closed circuit.
J3—Power amplifier plate current jack, closed circuit, mounted on insulating washers.
R1—Oscillator grid leak. (Unchanged)
R2—Tripler grid leak. 100,000 ohms, 1/2 watt. Mounted in same location as old PA grid leak.
R3—47,000 ohms, 1/2 watt.
R4—390,000 ohms, 1/2 watt.
R5—1000 ohms, 1/2 watt.
R6,R7—24,000 ohms, 1/2 watt.
R8—15,000 ohms, 10 watts.
R9—500 ohms, 1/2 watt.
R10—18,000 ohms, 1/2 watt.
K1—Antenna switching relay. See text.
X1—Germanium crystal, 1N34.

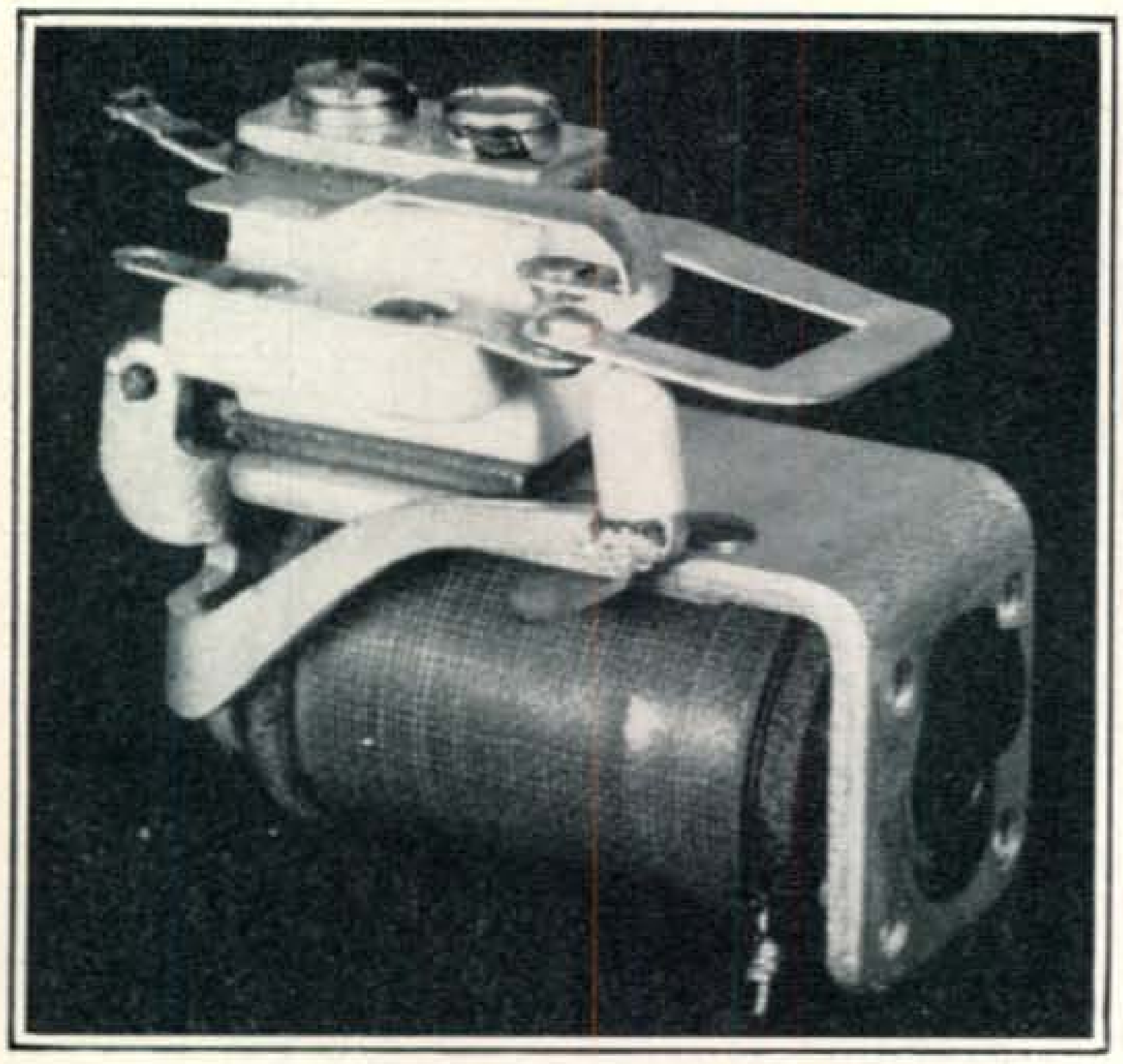


Fig. 6. Rearranging the contacts and rewinding the coil of the salvaged keying relay provides an excellent ceramic-insulated antenna switching relay.

output, the fact that the 11-meter band was not included in this range, together with the lower price usually asked for the 4 to 5.3-mc version, caused the selection of the lower frequency unit.

Tube Substitution

The original transmitter has the 12-volt tube heaters connected in series-parallel for 24-volt operation. Since 6-volt operation is required for most mobile applications, it will be necessary to substitute 6-volt for 12-volt tubes and to rewire for parallel heaters. A 6J5 is a suitable replacement for the 1626 oscillator and the 807 is electrically similar to the 1625s. Unfortunately, the 1625 sockets are of the large 7-pin variety and will not accept the 5-pin 807 base without modification. This modification is not difficult, however, and is much easier than replacing the tube sockets themselves since thay are spun into aluminum shields. It is made as follows:

Remove all connections from both tube sockets except the old lead running from grid to grid of the two tubes.

The spacing of the filament pins of the 807 is identical to the old spacing in the 1625 socket and these pins will not require modification. However, in the interest of short leads, it is desirable to rotate the connections and use old pins 3 and 4 for the 807 filaments. This will make old pin 7 the 807 grid, old pin 5 the 807 screen and old pin 2 the 807 cathode. These three socket holes will not quite match the corresponding 807 pins and it will be necessary to file the socket insulating material as shown in *Fig. 1* to permit them to enter. Before filing the holes, pull the steel "U" shaped spring of each socket contact back and spring the brass contact material apart to provide access for a small rat-tail file. After the holes have been filed correctly, the steel springs can be pushed back in place, restoring the original tension to the clips.

If external high level modulation is to be used as recommended, it is only necessary to modify one of the PA sockets in this way, since a single 807 will readily accept the 40-watts input. However, if screen modulation is contemplated, or higher power is required, two 807s should be used. The multiplier to be described will be capable of driving either one 807 or two in parallel.

Filament Connections

A filament voltage ballast resistor (125 ohms wirewound) is mounted on the end of the chassis. This

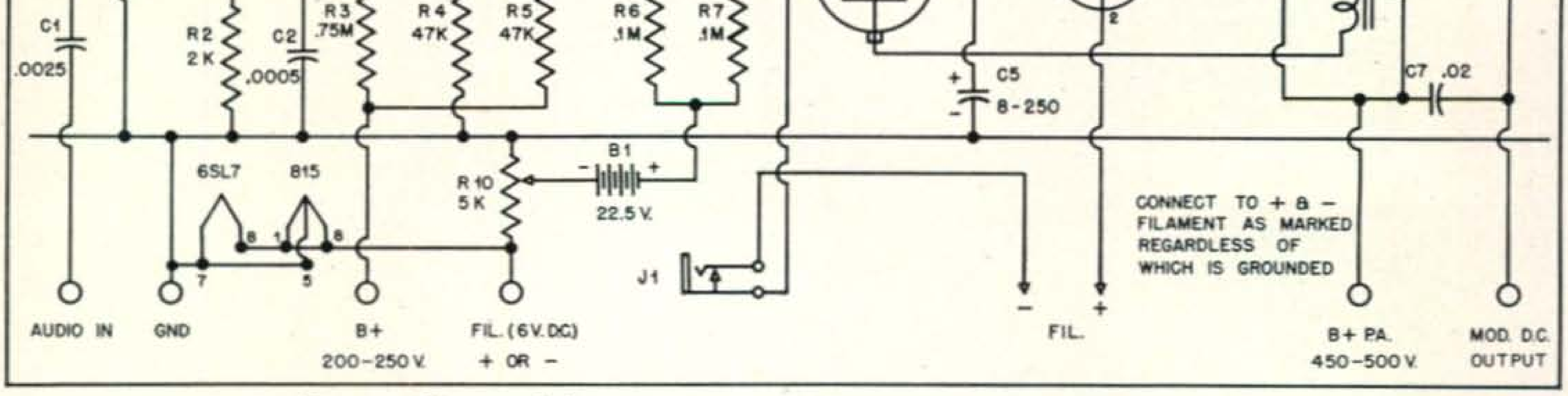


Fig. 7. Circuit of the 20-watt modulator used with the SCR-274N.

B1—22.5-volt small size "B" battery for bias.
C1—.0025-μf mica.
C2—500-$\mu\mu$f mica.
C3, C4, C6—.03 μf, 400 v.
C5—8-μf 250-volt electrolytic.
C7—.02 μf, 1000 v.
J1—Cathode current jack, closed circuit.
R1—500,000-ohm pot., gain control.
R2—2000 ohms, ½ watt.
R3—750,000 ohms, ½ watt.
R4, R5—47,000 ohms, ½ watt.
R6, R7—0.1 megohm, ½ watt.
R8—25,000 ohms, 10 watts.
R9—1 megohm, ½ watt.
R10—5000-ohm pot., bias control.
T1—Modulation transformer, 16,000/5000 ohms.

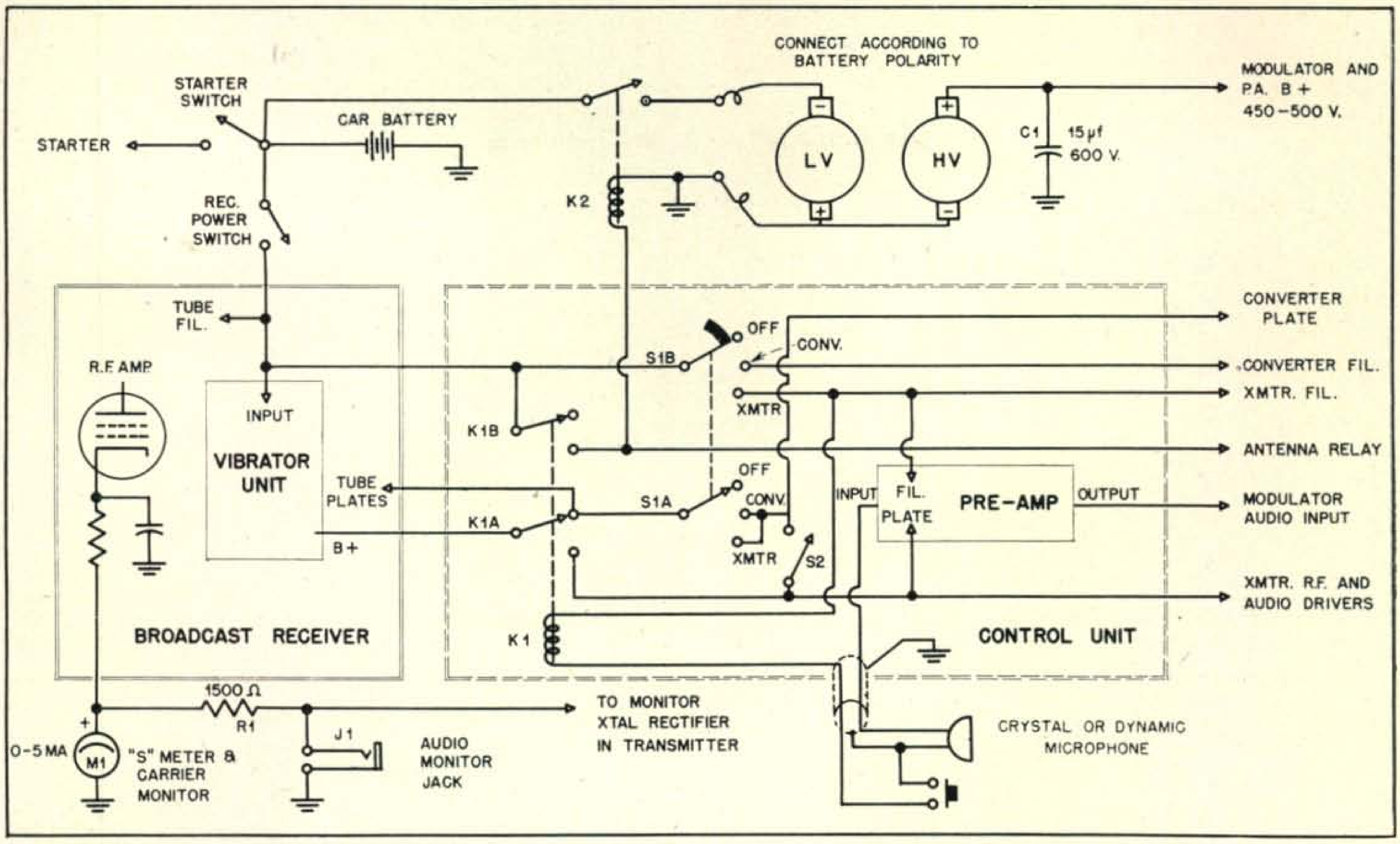


Fig. 8. Power and control circuits for the complete mobile installation.

C1—Filter capacitor, 15 µf, 600 volts.
J1—Audio monitor jack.
K1—Push-to-talk relay, DPDT, 6-volt d-c coil.
K2—Dynamotor relay, SPST, 6-volt d-c coil, heavy duty contacts.
M1—"S" meter and carrier monitor, 0-5 ma or more sensitive movement with adjustable shunt.
R1—1500 ohms, ½ watt.
S1—Control switch, 2-pole 3-position.
S2—Frequency check switch, SPST.

should be removed as it is no longer needed. The original chassis connector mounted beside this resistor can be retained for external connections if a suitable cable connector to match it can be obtained. If not, it is suggested that it be removed and replaced by a 6-pin tube socket. On the unit shown in the photographs, the original connector was retained and an additional one connected in parallel with it mounted beside it. This is not recommended since it congests the chassis and one of them serves no useful purpose.

The filament voltage for the oscillator tube is fed through two sections of *L1*, the oscillator coil, to avoid frequency instability resulting from the conventional oscillator circuit having r-f voltage between cathode and heater. One side of the tube heater is grounded through the tuning coil itself and this connection can remain unchanged. The "hot" heater connection is made by means of a white wire running from one of the oscillator terminals to the ungrounded end of *C14*. *C14* is a 0.006-µf mica capacitor, the smaller of two mounted on the chassis skirt at the end of the oscillator tuning capacitor. Two white leads actually connect to this point on the capacitor, the second one going to the 1629 tuning indicator. The 6-volt heater supply for the 6J5 oscillator tube should be connected to this point.

Since all the old wires have been removed from the PA tube sockets, no difficulty should be involved in rewiring the heaters.

Addition of Multiplier Stages

In order that the transmitter may operate on the 10-meter band a total multiplication of oscillator frequency of 6 is required. This is attained by the use of a 6AK5 tripler and by a 6V6 doubler which in turn drives the 807 amplifier, as shown on the schematic diagram, *Fig. 2*.

Slug-tuned coils are used for tuning the tripler and the doubler plates to obtain maximum band width and gain. No tuning capacity other than the tube and circuit strays is necessary. Since the antenna circuit loads the PA plate tank and consequently broadens it, it is possible to shift frequency over a range of several hundred kilocycles by means of the oscillator control only, without serious detuning.

The first step in the addition of the multiplier stages consists of stripping the top of the chassis from the 807 tube forward. None of the components originally mounted in this space will be used. Beneath the chassis the large air padder adjacent to the PA tuning capacitor, the small fixed neutralizing capacitor and the small relay mounted on the chassis skirt should be removed. Be sure to save this small relay since it will be used later for antenna switching. The neutralizing capacitor leads should be clipped off short and removed.

Before mounting any of the new components, the tuning capacitor originally used for the PA plate should be removed and the gear mounted on its shaft removed. Since this capacitor will be used as the antenna loading control its shaft should be provided with an extension sufficiently long to extend through the chassis skirt to permit mounting a dial. It is suggested that a metal dial and a Millen type 10050 shaft lock be used on this control, as shown in *Figure 3* (front cover center), to avoid accidental movement.

After reinstalling this capacitor, sockets for the 6V6 doubler and the 6AK5 tripler should be mounted along the same edge of the chassis as the worm drives, spaced between the 807 PA socket and the capacitor. The 6V6 should be nearest the PA.

The tripler and doubler coils should be mounted on the chassis skirt approximately in line with their respective tubes and with their slug controls accessible through the chassis skirt. The coils used in the original model were obtained from surplus and probably cannot be duplicated. They happen to have an outside diameter of ⅜" and the coil winding data are given for this diameter. If it is necessary to use coil forms having slightly different diameters, the number of turns should be changed to correspond accordingly. In any case, adjusting these coils is not difficult providing an absorption wavemeter is available to check the harmonic on which they are operating. It was found convenient to mount the doubler coil in the hole in the chassis skirt originally providing access to the lock on the PA padder condenser. The knob from a telephone type key switch tightly screwed on the end of the tuning slug shaft makes a convenient tuning knob. Any of the commercially manufactured slug-tuned forms, such as the National XR-50, will do a good job.

The various bypass and coupling capacitors and resistors associated with the multiplier tubes should be mounted in such a way that lead length is kept to a minimum. The grid of the 6AK5 should be driven from the same terminal of the oscillator as originally drove the grids of the two 1625s. Since this requires a rather long lead, a piece of shielded microphone cable was used for the connection.

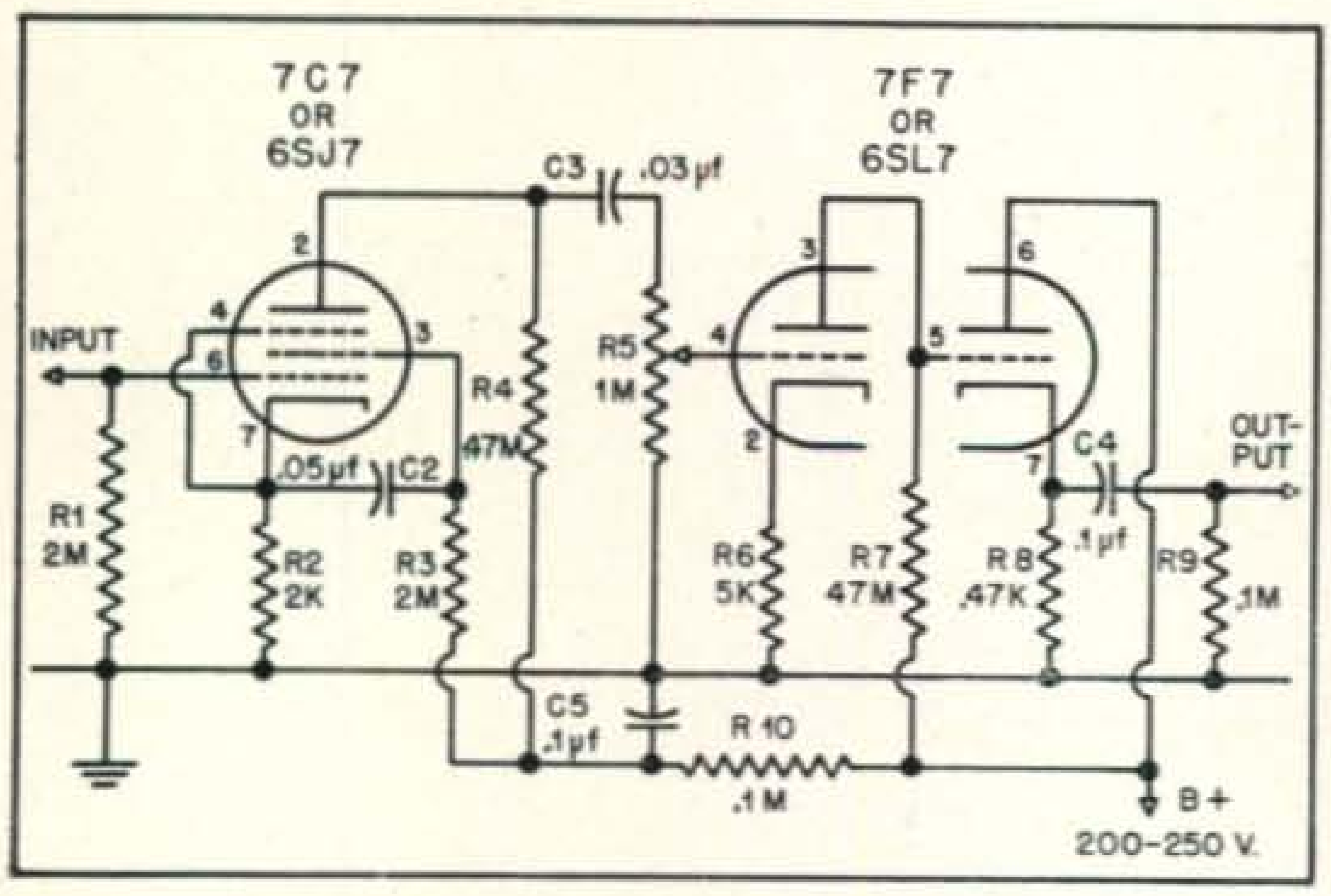


Fig. 9. Circuit of the preamplifier. The preamplifier can be mounted with the receiver or converter, the output connecting to the modulator in the trunk.

C2—.05 µf, 400 v.
C3—.03 µf, 400 v.
C4, C5—.1 µf, 400 v.
R1, R3—2 megohms, ½ watt.
R2—2000 ohms, ½ watt.
R4, R7—0.47 megohm, ½ watt.
R5—1-megohm pot.
R6—4700 ohms, ½ watt.
R8—47,000 ohms, ½ watt.
R9, R10—0.1 - megohm, ½ watt.

The original grid leak for the PA is a 15,000-ohm resistor mounted between pins 5 and 7 on the crystal socket. Since the same circuit is used to feed the 6AK5 tripler grid, the 15,000-ohm resistor should be replaced by 100,000 ohms (*R2*).

Tuning Jacks

Three tuning jacks should be mounted along the chassis skirt as shown in the photographs, *Fig. 4* and *5*, directly below the old PA tuning capacitor. Be sure that the one for metering PA plate current is well insulated since it will be connected in the hot side of the plate supply. The reason for this is that it is possible to tune and load a pentode or tetrode amplifier much more accurately by means of plate current only, than if plate, screen and grid current are all read, as would be the case if the jack were in the cathode circuit.

PA Plate Circuit

The PA tuning capacitor *C16* should be mounted as near the 807 power amplifier as possible and directly in line with the original loading control. The old loading control shaft should be extended or a new shaft turned out to permit tuning this capacitor from the original front panel loading control location and using the old shaft lock.

The power amplifier tank coil should be mounted beside the tuning capacitor approximately in the location shown in the photographs, *Fig. 3* and *4*. The bottom of this coil should connect to the stator of the old PA tuning capacitor, now the loading capacitor *C17*, through the mica-insulated feed-through button originally used to connect to this same capacitor. The PA tuning capacitor should connect to the top of the PA tank coil and to the PA plate through the small parasitic choke *L8*. This produces a pi network, which is particularly desirable at high frequencies since it permits low circulating current, good harmonic attenuation and readily adjustable loading. The coil *L5* and the capacitor *C17* have essentially constant r-f current flowing in them, so that the voltage across *C17*, and thus that applied to the antenna circuit is a minimum when *C17* is at maximum. Decreasing the capacity of *C17* increases the voltage and the loading.

Antenna Circuit

The original antenna connector on the panel should be removed, and replaced by a coaxial fitting such as an Amphenol type 83. A similar one should be mounted on the other side of the panel for the antenna connection to the receiver.

The rather fancy relay originally used for antenna grounding on the transmitter is not very well suited for antenna switching. Fortunately, the small relay removed from beneath the chassis can be readily modified to produce an excellent low-power antenna switching relay complete with ceramic insulation. Reference should be made to the photograph of the modified relay, *Fig. 6*. The modification is accomplished as follows:

1. Spring the lower movable contact (the "J" shaped one) by its mate to make them normally closed instead of normally open. There is enough of the silver contact extending through the spring to the wrong side to provide a satisfactory contact.

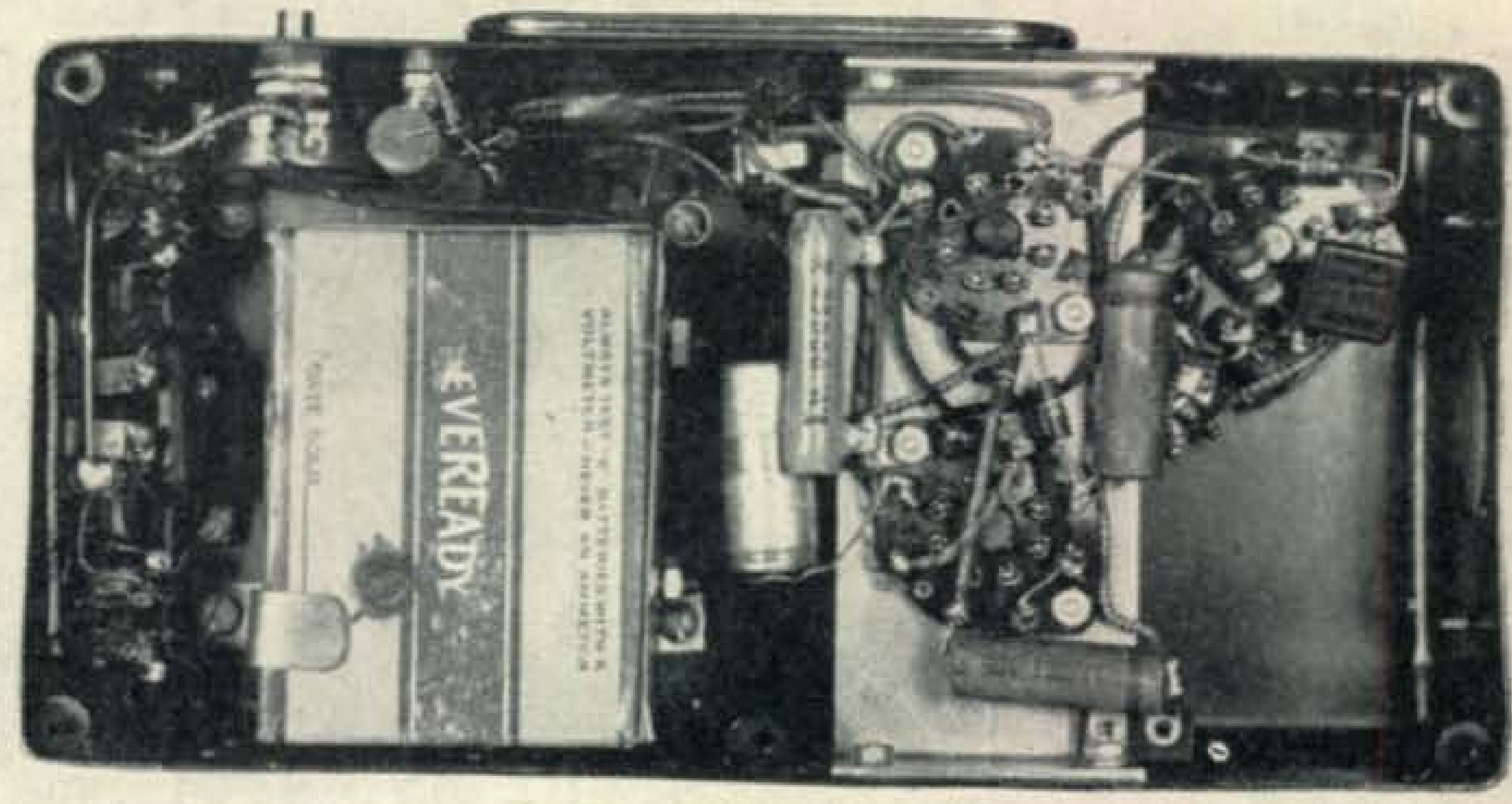


Fig. 10 (left). The 815 modulator, with 815, VR-150 screen regulator and 6SL7 amplifier-phase inverter-driver mounted in recessed sockets. The modulation transformer shown has at least twice the required rating but was used because it was available. The screwdriver-controlled gain potentiometer is just visible behind the 6SL7. Fig. 11 (right): Bottom view of the modulator. The number of components is kept to a minimum by the use of a simple phase inverter and direct coupling between it and the tube that drives it.

2. Remove the contact assembly and discard the small fibre spacer used to operate the top set of contacts.

3. Remove or clip off the top "L" shaped contact spring.

4. Bend the remaining top contact (the straight one) doubling it under itself to make it match up with the movable contact. This provides the normally open connection.

5. Reassemble and adjust. It will be necessary to bend the operating arm of the relay and the stop below it to get the contacts to operate properly.

6. To make the relay operate on 6 volts d.c. instead of its rated 24 volts, remove the wire from the coil and rewind it full of No. 30 or No. 32 enameled wire. Either size will be satisfactory but No. 32 is preferred since there will be less current consumption and less heating of the coil than if the larger size is used. Random winding is satisfactory.

The relay when modified should be mounted on the front panel between the antenna and receiver connectors using the same mounting holes and mounting screws as the old antenna relay. Be sure to make the connections from it to the antenna and receiver connector and to the PA tank coil of substantial conductor to minimize losses.

Monitor Circuit

In order to provide some sort of visual or aural indication of normal functioning of the transmitter, it is suggested that a simple monitor circuit be included. This may readily be done by adding a one-turn coil, *L6*, to the bottom end of the PA tank coil and rectifying the voltage induced in it with a 1N34 crystal. The constants shown on the schematic, *Fig. 2*, will produce suitable level for feeding a pair of phones for aural monitoring or, if desired, operating a carrier indicator meter.

Modulator

The first attempt at applying modulation to the modified transmitter consisted of the installation of a 6V6 in the socket originally occupied by the 1629 tuning indicator and arranged to modulate the screens of two 807s. This system worked fairly well and it was possible to obtain approximately 12 watts of r-f output with total amplifier plate, screen and modulator plate current of 130 ma at 450 volts. Under this condition the maximum positive modulation was between 60% and 70%.

The reports obtained with the screen modulation too frequently were something like: "Your carrier is strong here but your modulation seems a little low." Presumably this was caused by the maximum positive limitation of 60% to 70%. This could have been increased to a full 100%, but with a serious reduction in carrier power output. Accordingly, it was decided that the best expedient would be to build a small external modulator unit capable of modulating some 40 watts of input to the plate and screen of the power amplifier.

It was decided to use an 815. Its maximum plate voltage rating is 500 volts and under Class AB_2 conditions it can deliver a power output of 54 watts. Its zero-signal plate and screen current are low. Although no AB_1 operating conditions are specified in the tube book an experimental setup showed that 20 watts of audio power could be obtained with 450 volts on the plate, 150 volts on the screen and zero grid current. Under this condition the maximum plate current was 80 ma and maximum screen current 10 ma. Static plate and screen current totaled only 30 ma.

Two minor disadvantages appeared, one being that it was necessary to regulate the screen voltage closely between its static value of approximately 2 ma and its full output value of approximately 10 ma in order to obtain high audio output with low static plate current. The other was that this low static plate current prohibited the use of cathode grid bias.

A VR150 regulator was provided for the screen voltage and a 22.5-volt midget B battery was used to supply bias. Since the correct grid voltage to produce the optimum value of static plate and screen current was somewhat less than 22.5 volts, an interesting expedient was employed to use the 6 volts

(*Continued on page 95*)

Inside the

SHACK AND WORKSHOP

Conducted by A. DAVID MIDDELTON, W1CA*

Data on Surplus Frequency Meters

The following information may be useful to those of the gang owning various types of surplus military frequency meters.

Models BC-221 AA-AH-AE-AF-AG-AJ-AK-AL-B-M-N-O-P-Q-R- and T may be operated directly from an a-c power supply, without change.

Models BC-221 A-C-D-E-F-J-K-and L must be *modified* for use with an a-c power supply, as follows:

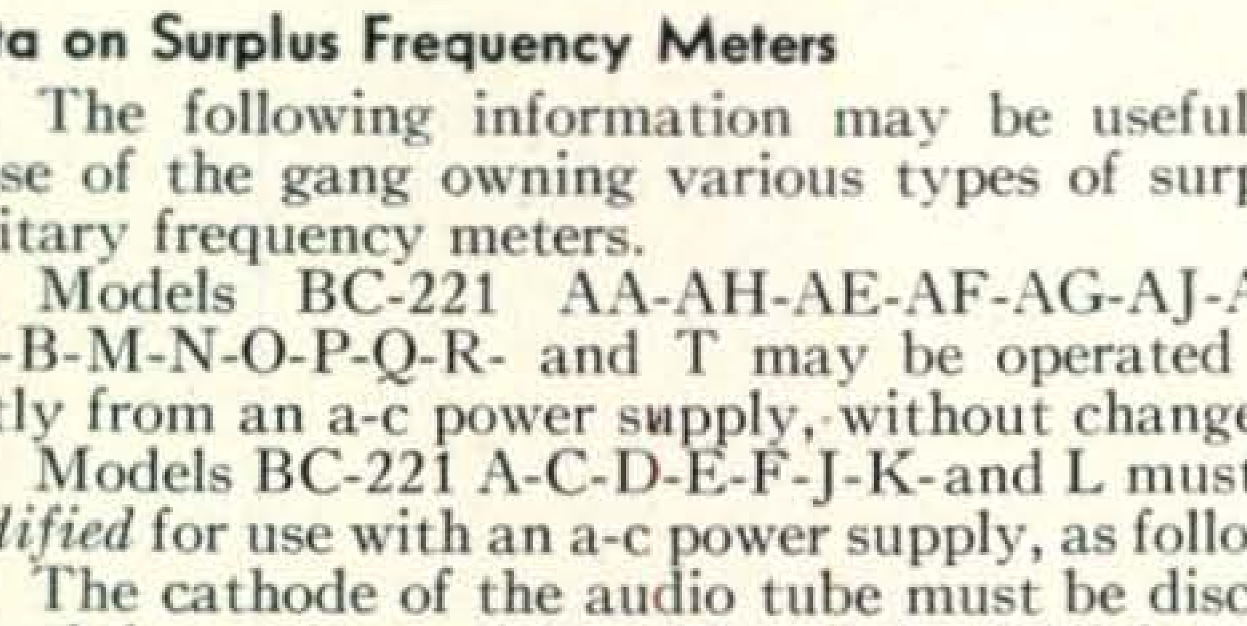
The cathode of the audio tube must be disconnected from the positive side of the "A" battery supply and a 400- or 500-ohm resistor inserted between the cathode and ground.

This change does not affect the operation of the meter but it does reduce the audio hum, present when the cathode is returned to the "A" battery circuit, on those models listed.

Felix W. Mullings, W5BVF, Galveston, Texas

Tuning Device for ARC-5

Probably a good many amateurs purchased SCR-274N receivers (ARC-5) without the tuning cables necessary for remote control. The mechanical construction of these receivers is such that they are difficult to tune locally without a key for the purpose.



This situation was solved at W2RAC by using the removable part of a fuse holder. The fuse holder is partially filled with Duco cement, and inserted in the receptacle for the tuning cable, making a convenient knob. The Duco cement must be allowed to dry overnight.

George Nelson, W2RAC

Tracing Circuits

It is good practice to "pencil out" lines in a circuit diagram when wiring up a set or instrument. By doing this, no connections get left out and repeats are prevented. But such pencilling mutilates the diagram.

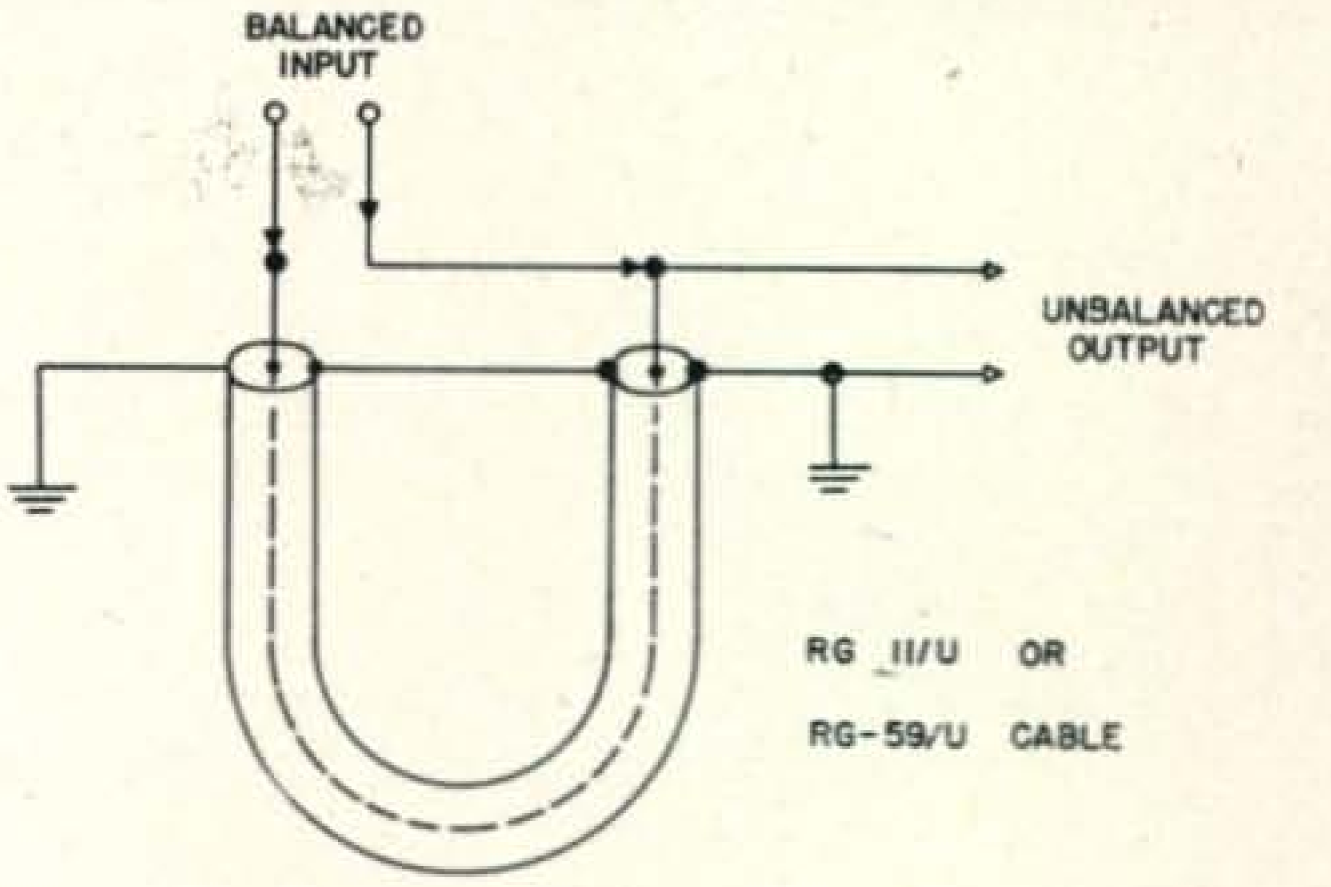
To eliminate defacing the page, simply attach a sheet of draftsman's tracing paper to the diagram with paper clips and do your marking on this transparent paper.

Rufus P. Turner, W1AY

Connecting a Balanced Line to the R-9'er

When using an R-9'er preselector (or other similiar device designed primarily for a symmetrical or "unbalanced" input) with 300-ohm Twin-Lead or a 400-600 ohm two-wire open line, the performance can be improved by incorporating a line balance converter or "phase inverter" section of coaxial line between the device and the balanced line.

A section of RG-11/U or RG-59/U coaxial cable, cut to exactly 67% of a "free space" half wavelength



(at the mid frequency) is connected as shown in the drawing. This length is 11′5″ for the 28-mc band and 6′4″ for the 50-mc band.

When the "phase inverter" section of line is employed, the line balance is maintained and the two-wire open line is prevented from acting as an antenna, thus minimizing noise pick-up by the line and affording improved discrimination when a directional antenna is employed.

W. W. Smith, W6BCX

Relays for Coaxial Cable

Many hams using coaxial cable do not like to introduce the mis-match that would be present when the old-style two-pole antenna change-over relay is used.

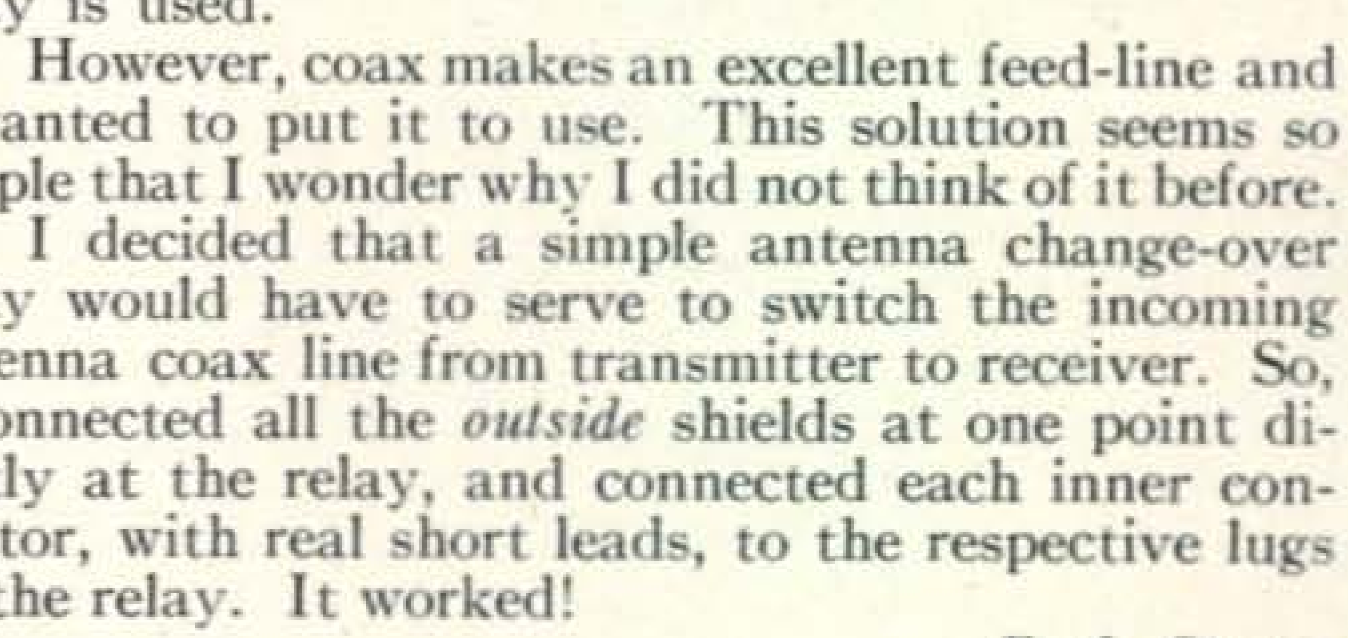
However, coax makes an excellent feed-line and I wanted to put it to use. This solution seems so simple that I wonder why I did not think of it before.

I decided that a simple antenna change-over relay would have to serve to switch the incoming antenna coax line from transmitter to receiver. So, I connected all the *outside* shields at one point directly at the relay, and connected each inner conductor, with real short leads, to the respective lugs on the relay. It worked!

Fred Craven

Bass Boost for SX-28 Receiver

When I installed a good coaxial speaker for use with my SX-28 I found I wanted more bass boost. After some experimenting I hit upon the circuit



shown, in which a 500,000-ohm variable and a 5,000-ohm fixed resistor were placed in series with a .04-µf paper capacitor between the plate of the 6SC7 phase inverter and ground.

F. B. Frank, W5HKH

**Address all contributions to S & W Department c/o CQ, 342 Madison Ave., N. Y. 17, New York.*

ANTENNA FACTS

ROBERT L. ROD, W2KVY*

A discussion of basic antenna theory to permit a better understanding of why the average radiating system performs as it does.

It is well known that amateur radio during a life span of but a few years has become a complicated, highly technical hobby, so much so that many hams not regularly engaged in radio engineering are unable to keep up with their theory. Antennas have always been a problem to many amateurs, not so much from the standpoint of making them perform as the literature suggests, but more from the mastering of the fundamental electrical laws which govern their use. A semi-technical treatment of simple antennas, as well as feeder systems, will be discussed to assist the average ham to understand what actually is happening up on the roof.

Any antenna is designed with but one major view in mind. The problem is how to obtain maximum radiation of radio waves in one or more particular directions through space, having as a source of energy the radio-frequency output of some sort of radio transmitter. The antenna converts the intelligence developed by the transmitter, which is usually in the form of high-frequency alternating currents, into fields of radio energy moving through space at a velocity of 186,000 miles per second perpendicular to each other. These fields are known as the electric and magnetic fields respectively. At the receiving end, this radio energy is intercepted by another antenna and is then converted back into the same type of intelligence as was originally transmitted. The latter process is accomplished by means of a receiver whose output is generally in the form of audible sounds.

Radiation of radio waves may be accomplished by producing an alternating current flow in a wire of finite (or actual) length, a process which sets up a magnetic and an electric field about the wire. One of the fundamental antennas, known as a "half-wave dipole," forms an efficient radiator which consists of two pieces of wire, each having a length of the order of one-quarter of the wavelength ($\lambda/4$) of a transmitter's output. The transmitter is, for theoretical purposes, considered to be at the center of these wires, although actually it may be located at some point remote from the dipole with electrical connection made by means of a section of "transmission line." Either horizontal or vertical positioning of the dipole is permissible with the two wires being located along a line common to the long axis of the two. Assuming that the transmitter is operating and is generating radio-frequency energy in a sinusoidal manner, an r-f electron stream will flow into one side of the dipole for one-half cycle of the impressed r-f e.m.f. and will then reverse itself during the remaining half cycle. During the first half cycle, a negative charge is formed on one leg of the dipole and a positive charge on the other. Thus, the antenna can be considered as a capacitor having as plates the two legs of the dipole separated by a dielectric consisting of the air between them. The lines of force joining the two halves of the dipole are shown dotted in *Fig. 1*.

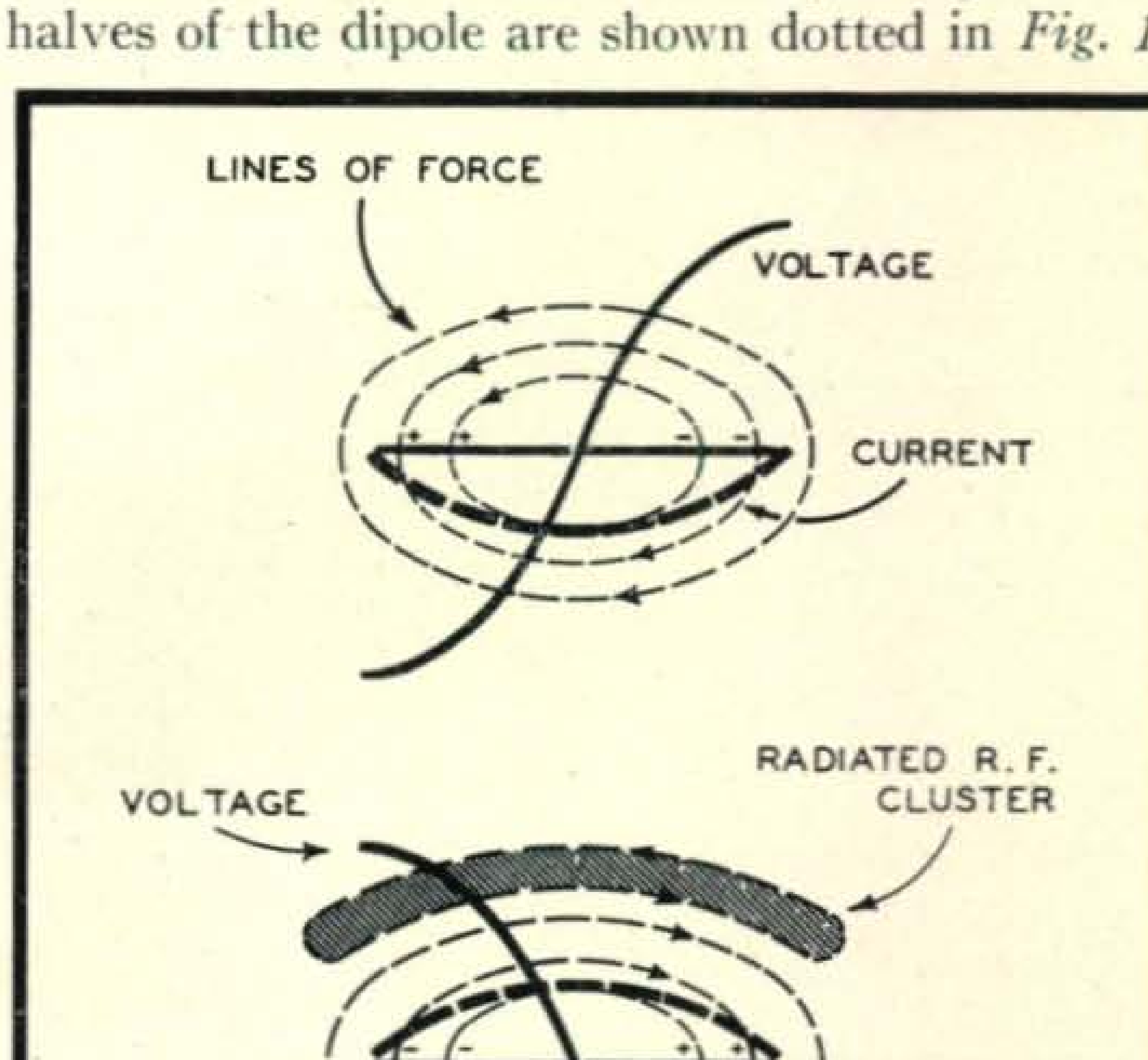


Fig. 1. The top figure shows the current-voltage relationships existing on a $\lambda/2$ dipole with lines of force linking opposite charges existing on either leg. The transmitter, or source of r-f energy, is assumed to be located at the center. In the lower figure, taken one-half cycle later, a cluster of r-f energy is being radiated by the action of the changing lines of force.

**145 East 49th St., New York, N. Y.*

For one-half cycle they move in one direction, only to reverse for the remainder of the cycle.

When the transmitter reverses the polarity of its output during the remainder of the cycle, the existing lines of force created by the half-cycle charges earlier tend to collapse: however those lines of force existing some distance out from the dipole do not collapse before new lines, moving oppositely to those created earlier, are now set up. The outcome of this phenomenon is that some lines never completely collapse; in fact, they are repelled outward from the dipole by lines of force established previously in the r-f cycle. The field caused by the changing lines of force is known as the electric field, the existence of which causes a similar magnetic field to be created at right angles to the electric field. Combined, the energy of both fields comprises the radio wave which moves through space at the speed of light.

Since the dipole is treated as a condenser in discussing its characteristics, it is apparent that to have a large number of lines of force linking the legs it is necessary to have a large potential difference between the outer ends of the legs remote from the center of the dipole. By choosing the leg lengths to be $\lambda/4$ each, this condition is automatically fulfilled. Firstly, the current flowing into the legs from the generator reflects back toward the center in time to meet new onslaughts of current arriving from the r-f source. The incoming and outgoing currents add in such a manner that the sum of the currents in a correctly dimensioned dipole approaches zero at both ends and maximizes at the center. By a similar process, the absolute value of the voltage along the antenna varies so that at the center there is minimum voltage while at the ends there is a maximum of voltage existing with respect to ground. The length, L, in feet, of a $\lambda/4$ leg of a

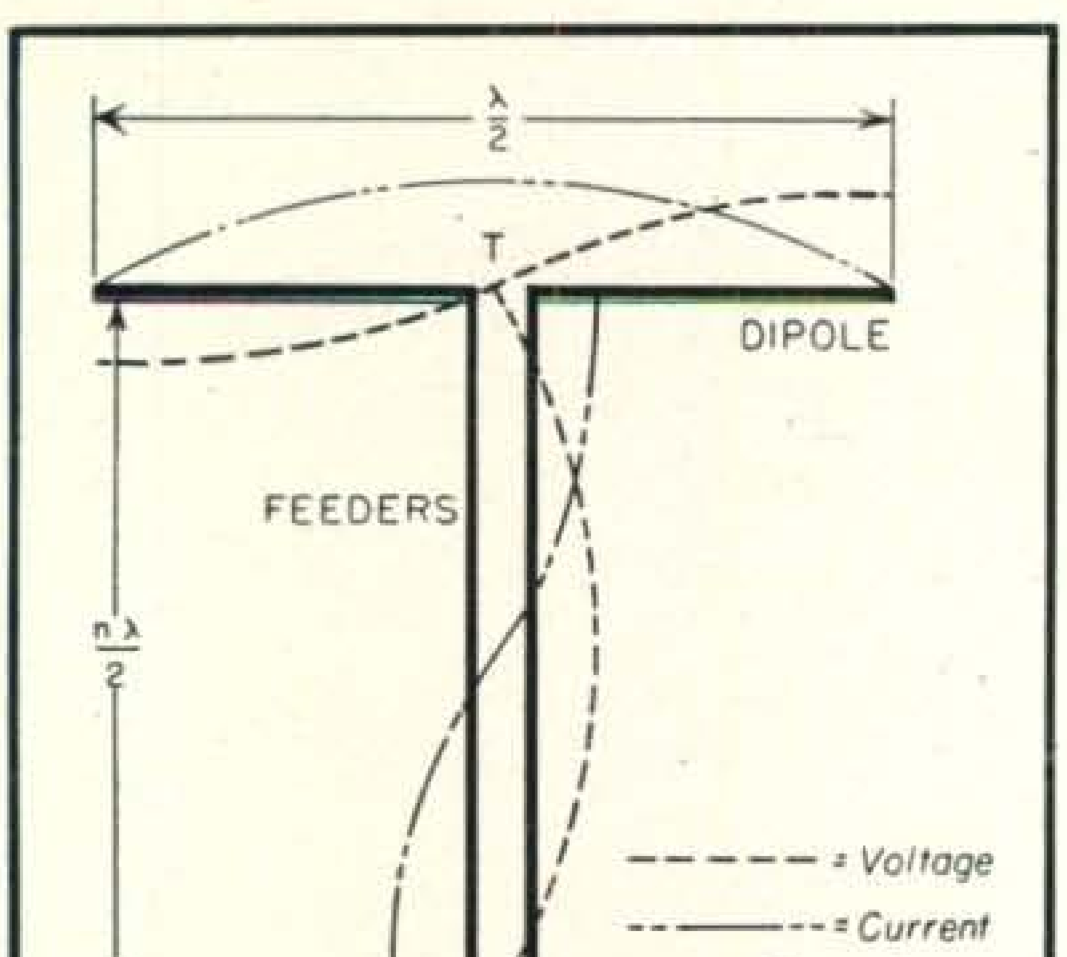


Fig. 2. A radio transmitter may be located, as convenient, at either point labeled, "T", or at any remote point nλ/2 away from the center of the dipole along a closely spaced parallel wire or twisted pair feeder.

dipole in terms of the frequency in megacycles, f, can be found from the following formula:

$$L = \frac{468}{f}$$

Fig. 1 shows the distribution of current and voltage on a dipole at one instant of an r-f cycle (in the top diagram) while the lower diagram illustrates conditions existing exactly one-half cycle later. Note that although each polarity has changed for the two cases, the current approaches zero at the ends while the voltage at the same points is greatest in amplitude. Theoretically, since $Z = E/I$, the impedance at the center of the dipole would appear to be zero, however the transmitter looks into a pure resistance of about 73 ohms, called the "radiation resistance." In practice, the actual value varies with the height of the dipole above the earth.

Antenna Efficiency

If the current at the feeding point, in this case the center of the dipole, is I amperes, the radiated power, P_R, can be regarded as I^2R_R where R_R is a fictitious resistance known as the "radiation resistance." In practice the power delivered to the dipole by the generator $= P_R + P_L$, where P_L is power lost in wire resistance, dielectric losses, etc. The losses can be lumped into a resistance R_L, and then

$$P_R + P_L = I^2 (R_R + R_L)$$

The efficiency of the antenna will then be the ratio of output to input power or:

$$\text{Efficiency} = \frac{R_R}{R_R + R_L}$$

An interesting point is that the generator may be moved a distance away from the center of the dipole shown in *Fig. 2*. In one case if the generator is moved along a "feeder" or pair of closely spaced parallel wires in half-wave steps, the dipole will function as if the generator were still at its center. Practically no radiation will occur along the feeder in this case. Note that the generator still sees the radiation resistance of the dipole whenever it is $n\lambda/2$ away from the center (where n is any whole number) inasmuch as the current-voltage relationships existing at the $\lambda/2$ points are identical to that at the center of the dipole itself. Radiation will not occur along the feeder, if it is the length mentioned, since the feeder can be regarded as a dipole folded back on itself in such a manner as to cause the electromagnetic field to cancel at every point along its length. More will be said about feeders shortly; a few more interesting points regarding dipoles can be discussed now.

A dipole does not radiate equally in all directions about itself; in fact, it is directive in some radiation planes. To indicate the theoretical

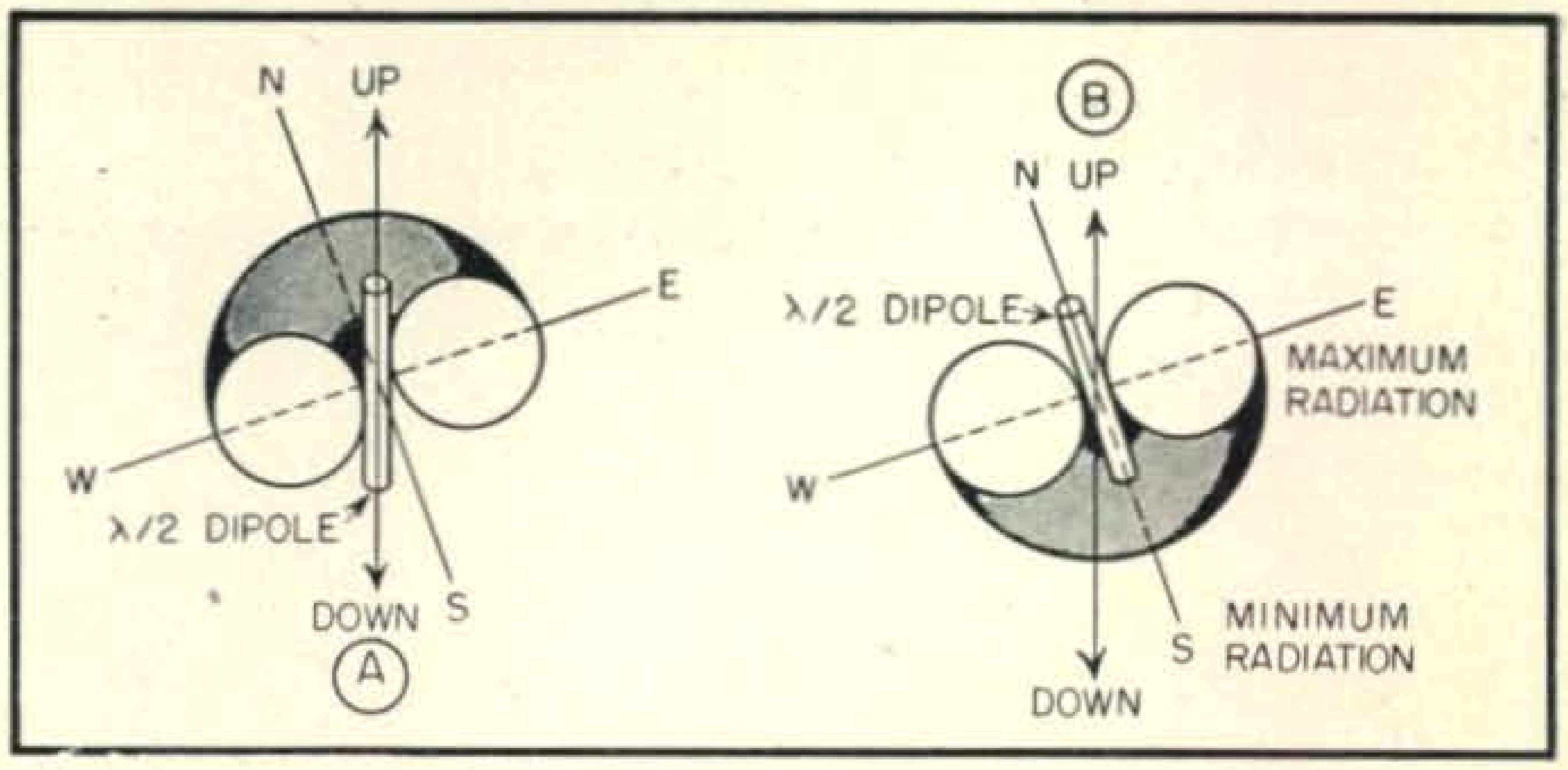


Fig. 3A. Relative radiation about a λ/2 dipole mounted vertically far above the earth.

Fig. 3B. Relative radiation about a horizontal dipole in space.

radiating or receiving properties of antennas, recourse is made to "polar diagrams," so called because they graphically show relative outputs plotted against the angular displacements from a given plane of the antenna at which the outputs are measured. Four such polar diagrams graphically show the radiation patterns of a dipole rotated either vertically or horizontally. For example:

a) Mounted vertically, the horizontal polar diagram (any plane perpendicular to the dipole) is a *circle* (*Fig. 3a*).

b) Mounted vertically, the vertical polar diagram (any vertical plane containing the dipole) is a *figure 8* (*Fig. 3a*).

c) Mounted horizontally, the horizontal polar diagram is a *figure 8* (*Fig. 3b*).

d) Mounted horizontally, the vertical polar diagram is a *circle* (*Fig. 3b.*).

In all the above polar diagrams it is assumed that the dipole is far above the earth and removed from its effects. The reasons will be discussed shortly. An amateur desiring an antenna having a uniform horizontal radiation pattern in all directions from his station would most likely find a $\lambda/2$ vertical dipole desirable.

A dipole located far away from other conductors is not usually met in practice, since the proximity of the earth and its effects must be considered. For example, when a horizontal dipole is placed above soil of high conductivity, the earth assumes the proportions of a good reflector of antenna radiation directed towards it. The energy reflected off the earth either aids or retards the energy being radiated by the antenna at angles depending only upon the height of the dipole above ground and the frequency of operation (the effective electrical height of the antenna above the ground.) The vector addition of these two quantities produces a polar diagram greatly different from that obtained in the simple case of a dipole far up in space, and it is of great value to investigate a typical polar diagram, in this case a half-wave horizontal dipole located $3\lambda/2$ high. If the antenna is above the surface of the earth by some multiple of one-half wavelength, a vertical polar diagram shows that the majority of antenna radiation is concentrated in one or more "lobes" between the horizon, 0°, and the zenith, or 90° elevation point, the actual number of lobes equaling the number of half-waves of elevation. In the $3\lambda/2$ case, three lobes result, the elevations of which can be computed as explained in standard texts. The angle passing through the maxima of the lowest lobe with respect to ground decreases as the antenna is further elevated above the ground.

An operator in the u-h-f bands, wherein line of sight propagation exists, would be most interested in an antenna having usable energy directed as close to the surface of the earth as possible. Without resorting to more elaborate antennas for the moment, the simple horizontal dipole mounted $3\lambda/2$ above the earth (or a good simulated ground system) would have approximately one-third of its transmitted energy directed in a lobe 9.5° above the horizon. The remaining energy would be directed in two lobes existing at 30° and 57°. Theoretically, as shown in *Fig. 4*, a receiving system placed at angles of 0°, 19°, 42°, and 90° would receive absolutely no radiation, but, fortunately, in practical work nearby buildings and trees usually modify radiation patterns so that some energy usually can be received at a location within range of the radiation at practically any angle. Such an antenna as just described could be useful for u-h-f work since its radiation is directed in part close to the horizon. More

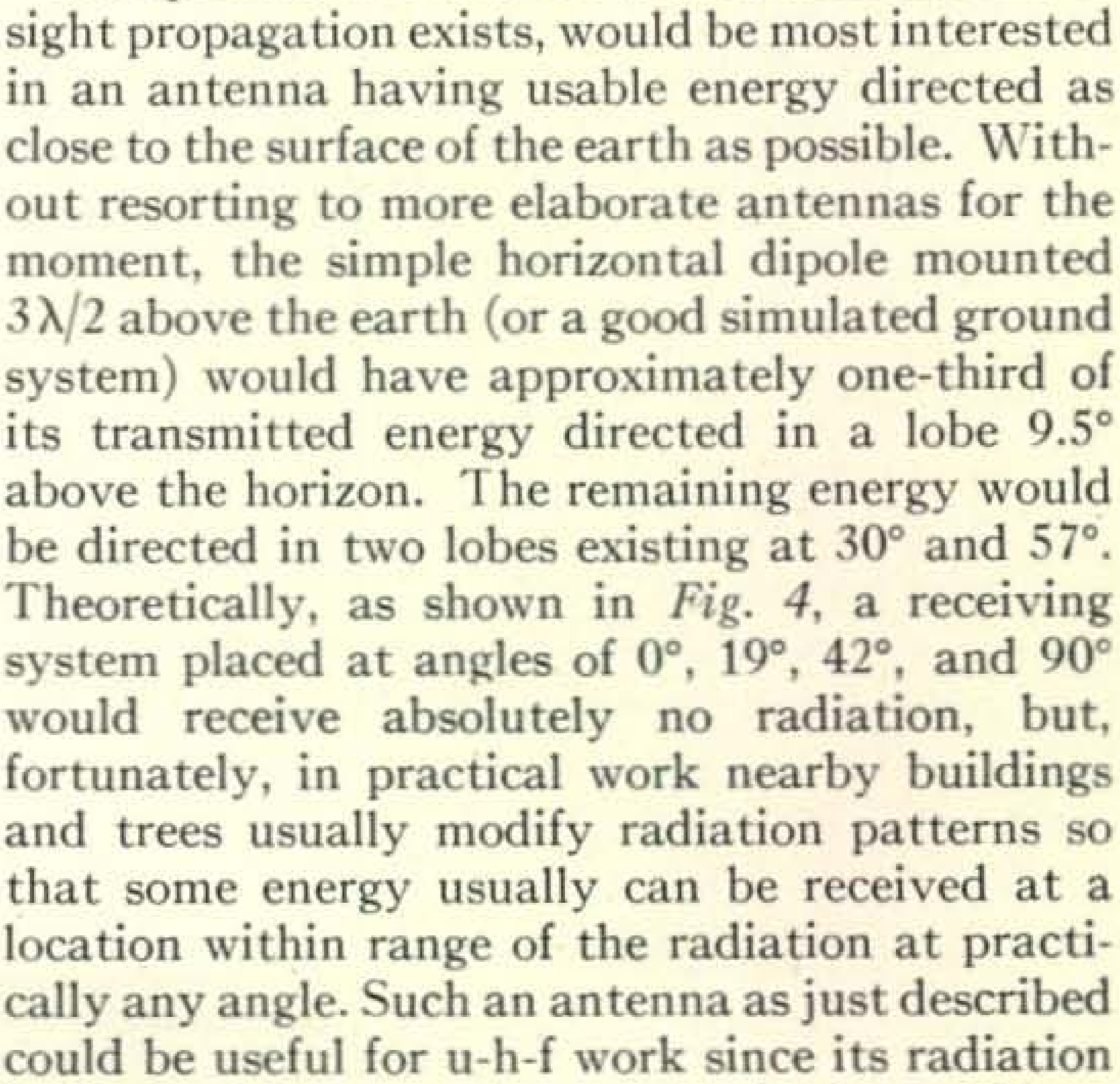


Fig. 4. A vertical polar diagram of a λ/2 dipole mounted horizontally 3λ/2 above the earth, measured to the center, showing realtive radiation at right angles to the antenna.

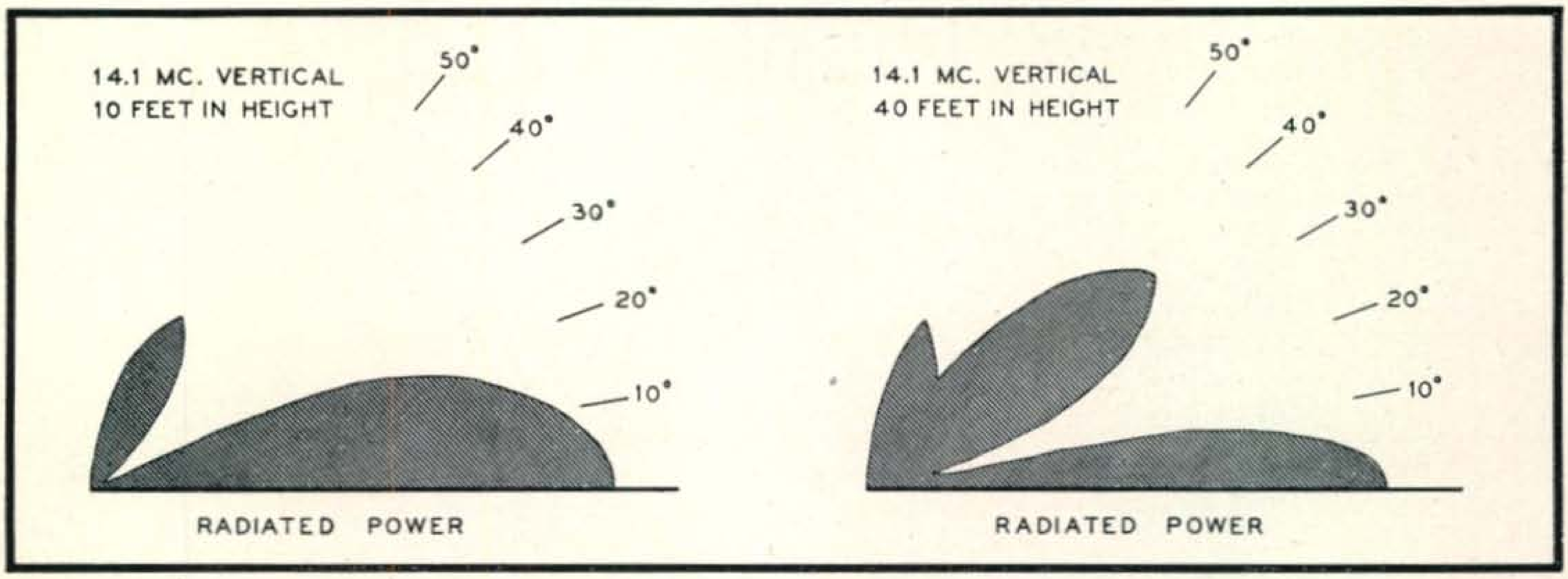


Fig. 5. An efficient radiation pattern well suited for 20-meter DX is obtained from a $\lambda/2$ vertical mounted less than $\lambda/4$ above the ground with maximum radiation being concentrated in a lobe some 5° above the horizon. Fig. 6 (right). When the vertical half-wave is elevated above ground by more than $\lambda/2$, the above polar diagram results. Note considerable energy is radiated upwards at too great an angle for long range DXing.

suitable u-h-f antennas will be described shortly.

Just as polar diagrams can be produced for horizontal dipoles, so can they be devised for these antennas mounted vertically. Here again the effects of the earth as a reflector must be taken into consideration. At a height above ground of one-quarter wavelength, a vertical dipole will transmit energy in one lobe whose maxima is at 0°. The number of lobes to be found at increasing heights is not easily quoted compared to the horizontal dipole case; however, the number of lobes increases as the antenna elevation becomes greater. For low frequency work, taking 20 meters for an example, the best DX occurs when the maximum radiation is directed off the ground at an angle of under 10 degrees. A 14.1 mc half-wave vertical located about 10 feet above a "perfect" ground (measured to the bottom of the vertical) will concentrate most of its energy in the optimum elevation of perhaps 5°. The polar diagram for this antenna is shown in *Fig. 5* while the radiation of a less desirable antenna for DX is shown in *Fig 6*. The latter antenna is too far off ground to concentrate the radiation at low angles and wasted energy occurs by virtue of the lobe existing at 37°.

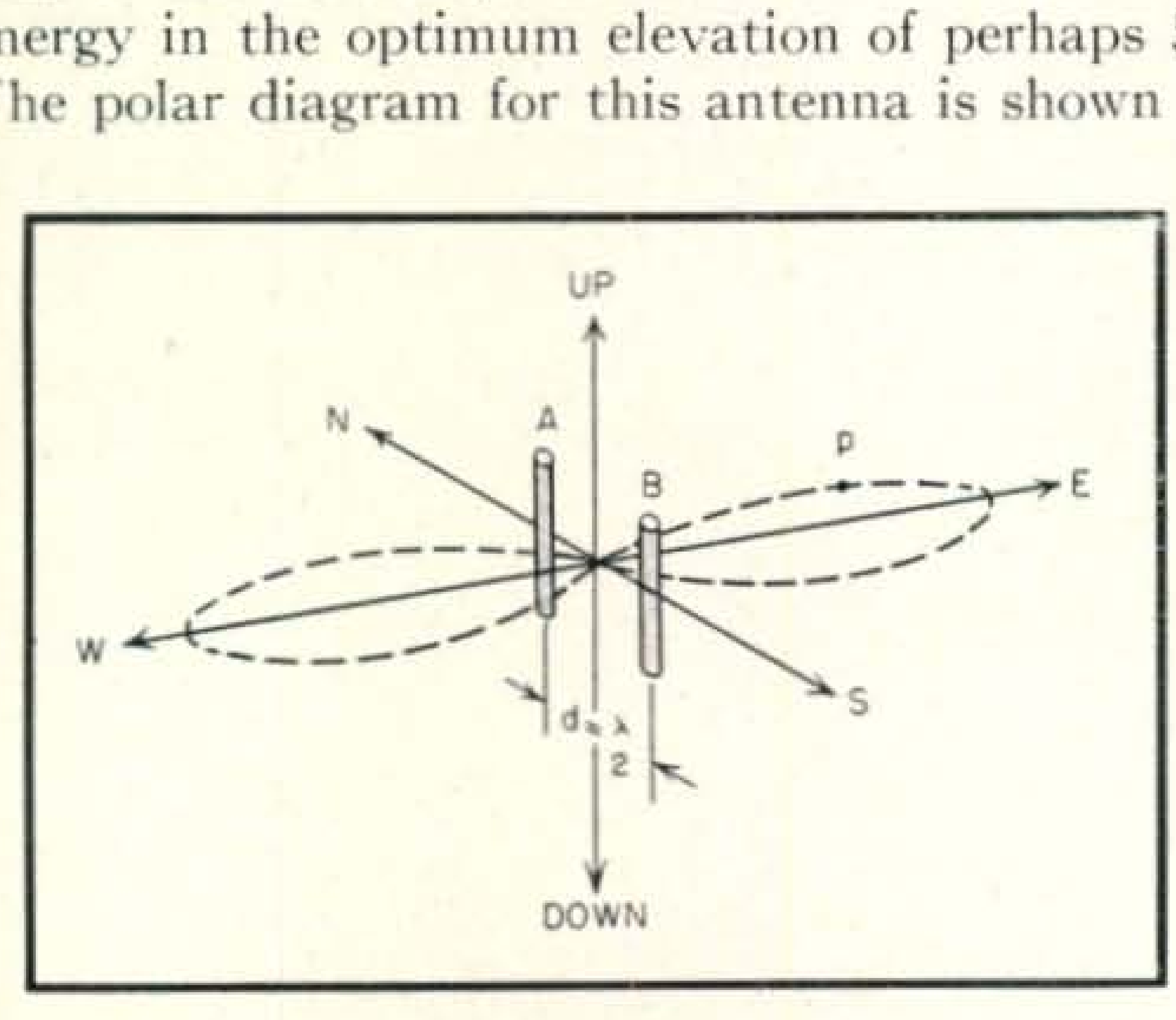


Fig. 7. Horizontal polar diagram illustrating relative directivity of a simple array consisting of two $\lambda/2$ vertical dipoles, excited in-phase, spaced $\lambda/2$ apart. Minor side lobe radiation has been neglected. The "broadside" array is another name for this configuration.

A simple vertical dipole close to ground is valuable in u-h-f work, since its radiation is directed close to the ground in equal amounts in all directions on the ground around it.

Arrays

Since the directivity of a simple dipole changes when placed near the earth, it is known that one or more conductors of specified lengths will vary the directivity of the antenna when they are in close proximity. Correct positioning and dimensioning of the conductors will produce beam effects which concentrate the radiation in selected directions. One of the simplest of these so called antenna "arrays" is formed by using two half-wave vertical dipole antennas, A and B in *Fig. 7*, spaced a distance, d, apart and excited in-phase. In-phase means that the instantaneous polarity of the energy existing at the same point on both antennas at a given instant is the same. *Fig. 7* depicts a top view of this array wherein it is evident that the magnitude of the radio field existing at any random point, p, depends upon several factors, namely the electric path difference AC between Bp and Ap. By trigonometry it is possible to show that with half-wave spacing between the two "elements," the radiated energy is equally divided in two lobes along a line perpendicular to the plane determined by the dipoles. Additional elements may be placed along the line, AB, spaced apart to give further directivity to the array. This arrangement is known as a "broadside" array, and the polar diagram in the horizontal plane is given as the dotted line in *Fig. 7* for the two

(*Continued on page 99*)

The "Why" of 6-Meter DX

OLIVER PERRY FERRELL*

An explanation of the propagation conditions making possible International DX on 50 mc.

IN LOOKING BACK over 1947 the subject of sensational 6-meter DX could not have failed to cause widespread interest in this band. Certainly 1947 will be the year most easily remembered by anyone active on 50 mc. Even as this is being written intercontinental DX is still taking place daily. To those amateurs who never operate below 10 meters all of this hullabaloo is rather strange. Many questions are being asked regarding the cause of this sudden burst of DX. Some rightly want to know why they never heard this type of DX on 5 meters. Others want to know how long will it last and where it came from.

Only partial answers to these questions can be given. More activity and considerably more experimentation at 6 meters is necessary. Although speaking from a DXing or propagation aspect we have learned much, there is still a lot of work being left undone. The wholehearted cooperation of the 6-meter gang has been marvelous. We have been able to make a certain number of predictions with the object in mind of constantly improving them. These have so far been fairly successful. However, more startling has been the long range DX across unpredictable areas and using unpredictable modes of propagation. This has been possible because of the fortitude and persistence of a small group of 6-meter amateurs who were there and ready to go when the conditions were right.

This article will lead off our series of recapitulations on 6-meter propagation. It discusses an important epic in the 6-meter band history and the simultaneous discovery of complex reflections between the different ionosphere layers. Although this effect had been suggested theoretically beforehand, the particular instances described are the first definite examples to be recorded.

Ionospheric Propagation

At the very high frequencies we need concern ourselves only with two principal modes of ionospheric propagation. These are F2-layer transmission and sporadic-E layer transmission. The latter mode of radio transmission is also known commonly as "short-skip," an effect which may occur equally as well on 10 or 20 meters as on the 6-meter band. In particular, sporadic-E is a condition of the E-layer when certain localized areas become greatly ionized with respect to the density of the normal layer. This abnormal ionization may appear at almost any time of day or night, although the densities that appreciably affect 50-mc communication appear to be confined to the daylight hours, principally immediately after local sunrise and shortly before local sunset.

Radio signals that encounter this high density area on their way through the ionosphere will be reflected back to earth at ranges inside of the normal skip zone. Hence, the derivation of sporadic-E reflections as "short-skip."

Sporadic-E may be divided into two distinct classifications: the blanketing type (referred to as *Type B*) and the reflecting type (*Type R*). The Type B sporadic-E is closely associated with ionosphere storms and aurora borealis. It generally involves very high ionization densities in and around the polar or auroral regions. It also occurs during the first phase of ionosphere storms in the temperate latitudes. The Type B sporadic-E is the common type observed frequently in the temperate and equatorial latitudes. Varying densities of the Type B sporadic-E occur almost continuously during the local summer. There also seems to be some inverse relationship between the Type B and ionosphere storminess and the sunspot cycle. *Fig. 1* shows the percentage of time per year at midnight in Washington, D. C., when the critical frequency of the spora-

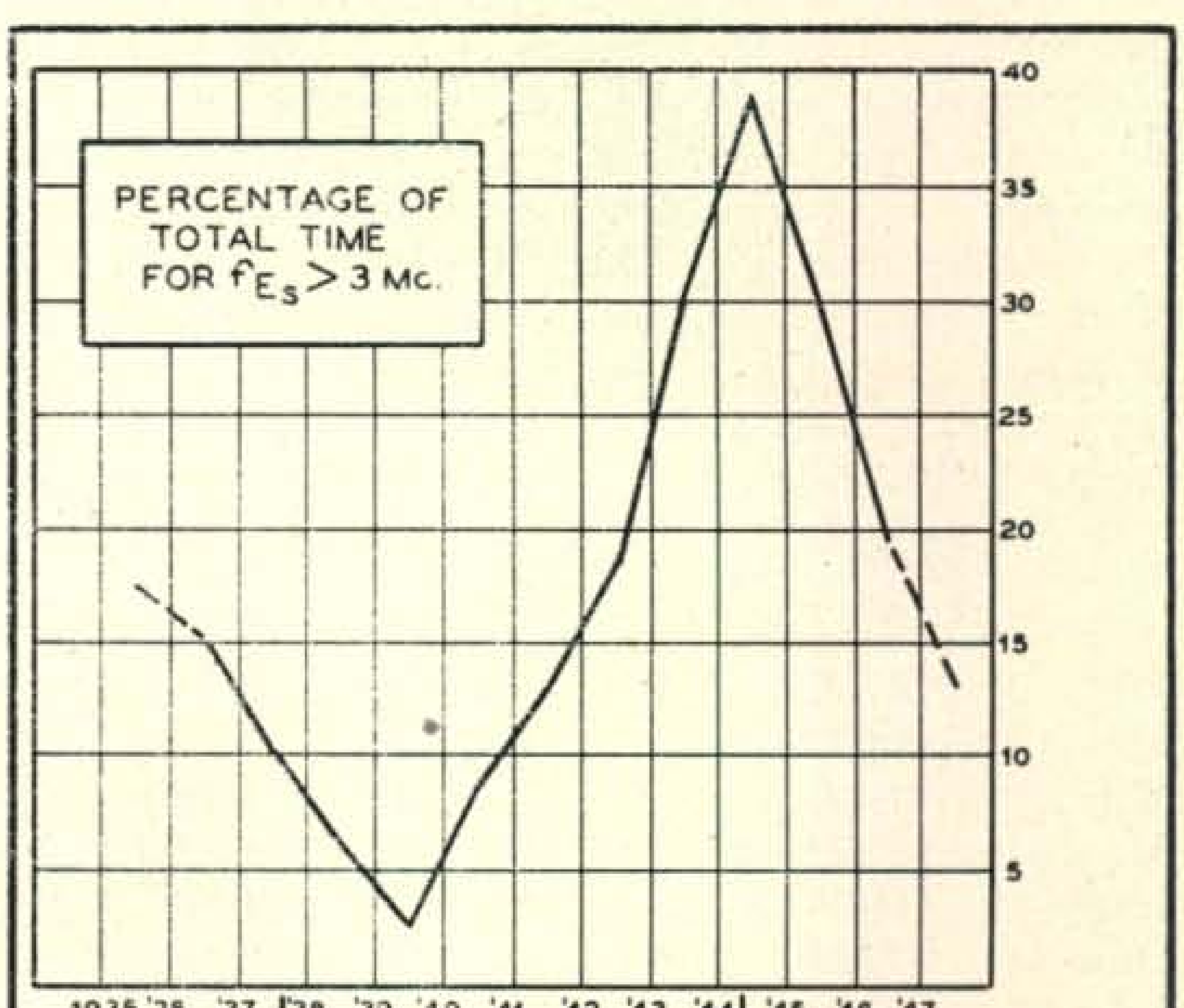


Fig. 1. Sporadic-E varies inversely with the sunspot cycle. This graph depicts the percentage of yearly time at midnight in Washington, D. C., when the critical frequency of the sporadic-E layer was greater than 3 mc.

*Assistant Editor, CQ.

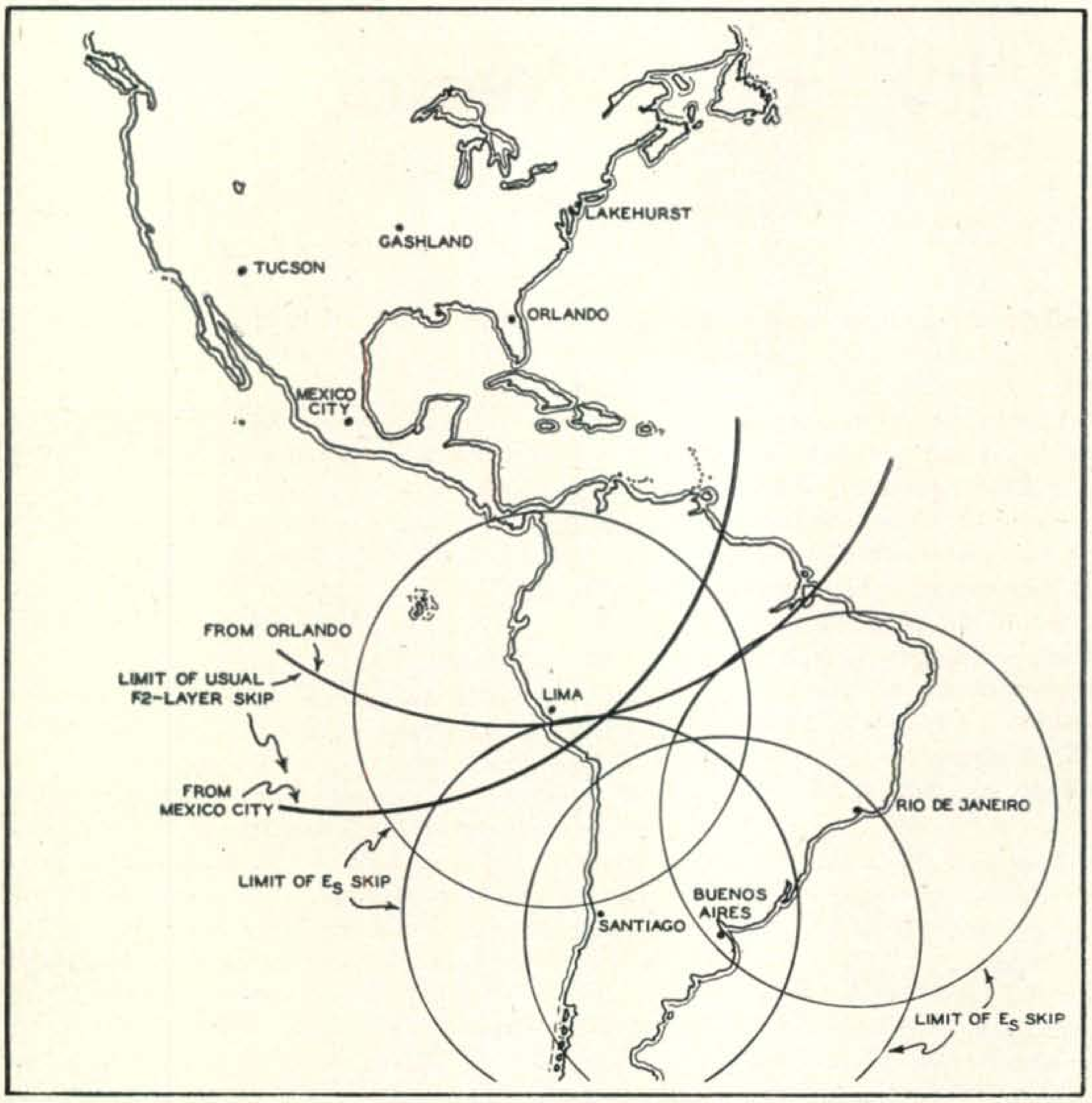


Fig. 2. Range circles of the maximum single hop transmissions via the sporadic-E layer from four South American cities. Range circles that encompass another city indicate that single hop transmission is possible. Range circle segments also are shown for a long single hop via the F2-layer from Mexico City and Orlando, Fla.

dic-E layer was greater than 3 mc. The inverse variation of sporadic-E and the sunspot cycle is quite apparent.

While more sporadic-E may occur during the sunspot minimum, it has been found that the maximum usable frequencies of the Type B follow a direct trend with the sunspot numbers. Thus we may expect to find stronger and longer 50-mc openings during the sunspot maxima than during the sunspot minima. The following is a tabulation of the highest values of Type B MUF observed at Washington, D. C., during the past two summers. Note the higher values of MUF that occurred during 1947.

1946			1947		
Date	*EST*	*Mc*	*Date*	*EST*	*Mc*
May 12	1700	64	May 27	1800	62
May 17	1400	54	May 28	1000	68
May 19	1900	54	June 8	1300	68
May 31	1000	64	June 26	1400	70
June 7	0800	53	June 29	1000	54
June 28	1100	61	July 18	0900	61
July 13	1700	64	July 18	1300	70
July 18	0900	60	July 20	1600	57

In contrast to sporadic-E transmission, the density or the reflecting ability of the F2-layer can be directly correlated with the sunspot numbers. During the periods of very low sunspot numbers the MUF of the F2-layer may drop to as low as 16 mc. During the present very high peak the MUF has been observed at 60 mc. A graph showing the trend of the current sunspot cycle compared to the trend of the last cycle is on page 46 of this issue. The highest point of the sunspot peak corresponded to an MUF of about 45 mc. On examination of the above sunspot number graph it becomes obvious why similar v-h-f DX has not been heard or worked in previous years. It simply wasn't there. When the sunspot numbers reached astounding values, the F2-layer MUF reached well into the v-h-f spectrum. The fortunate reallocation of the 5-meter band to a spot some six megacycles lower in frequency coupled with the great sunspot activity is the basic reason behind most of this 6-meter band DX.

Analyzing the 6-meter DX

Sporadic-E transmission occurs more or less uniformly around the world at a height of 65 miles. The maximum limit of a single hop 50-mc transmission via the sporadic-E layer is therefore limited by simple geometry to about 1500 miles.

The height of the F2-layer is not constant from hour-to-hour or from day-to-day. While a value of 4000 km (2500 miles) is generally accepted as the limit of an F2-layer single hop, it is apparent to anyone familar with 50-mc communication that the range limit is about 2800 to 2900 miles. Sufficient experimental and observational material is at hand to predict the median MUF of the F2-layer in certain confined areas. A particular exception has been the 6-meter paths between North and South America during the fall of 1947.

For a number of weeks during the evening hours in the early fall, the South American 6-meter stations were working "short-skip" paths (i.e., less than 1000 miles) and F2-layer paths (over 3500 miles) at the same time. Neither of these paths were predicted to be open for 50-mc work. In analyzing just why this DX was possible it has been discovered that some of this DX was via a combination of both F2-layer and sporadic-E propagation. This is the first clear-cut record of this phenomenon at these frequencies.

To illustrate the ranges involved in this 6-meter DX, *Fig. 2* has been drawn to show the maximum limits of the sporadic-E layer skip from Santiago, Chile; Lima, Peru; Buenos Aires, Argentina; and Rio de Janeiro, Brazil. These range circles indicate that the path from Santiago to Buenos Aires and from Rio de Janeiro to Buenos Aires are both well within the single-hop sporadic-E skip.* The distance from Lima to Buenos Aires is, however, about 550 miles beyond the single-hop skip range. In the absence of evidence to the contrary and since we already are fairly well assured that sporadic-E is occurring within this neighborhood, it appears likely that this path is being worked via a double-hop sporadic-E reflection. It is then possible by taking the reported times of these contacts supplied to me by our V.H.F. Editor, Vince Dawson, WØ-ZJB, and arrange a reasonable picture of what has actually happened over these paths.

From these reports we find that on September 23, 1947, for example, 6-meter stations were active in all four of the aforementioned cities. XE1KE worked LU8DJE and LU9AS at about 2000 hours EST. OA4BG worked LU9EV, LU9AS, LU5CK and had an hour long roundtable discussion with LU1CC and LU6DO. PY2QK was heard in Buenos Aires, as was CE1AH operating in Chuquicamata, Chile, some 750 miles north of Santiago. CE1AH also worked PY2QK. From this information we have drawn *Fig. 3.* This illustration shows the probable area of the highest density of the sporadic-E layer during this period. It is interesting to note that the reports of non-contacts are just as essential as those reports of two-way communication. Apparently OA4BG did not hear or work either PY2QK or CE1AH; this then helps establish the extent of the sporadic-E layer formation. XE1KE did not hear OA4AE, OA4BG, PY2QK or CE1AH who were all on the air about the time of his Buenos Aires contacts.

*At these distances an F2-layer reflection may be discounted. An F2-layer MUF of approximately 80 megacycles would be necessary for this short a skip-distance.

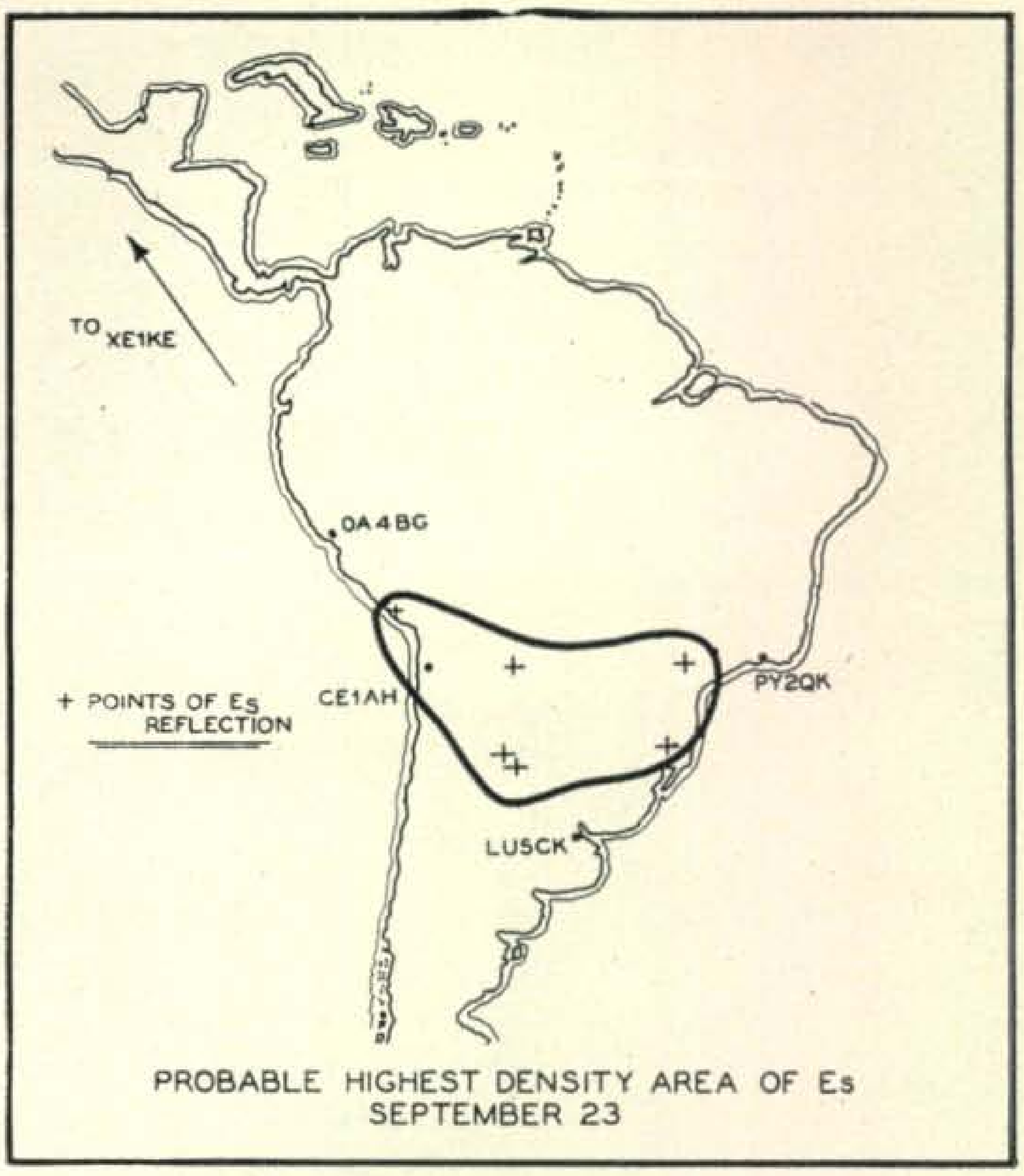


Fig. 3. The reported two-way 6-meter contacts enable the extent of the sporadic-E layer to be plotted. No contacts between Lima, Peru, and Santiago, Chile, or Rio de Janeiro, Brazil, were reported. The paths from Lima and Buenos Aires and between Rio de Janeiro and Santiago are via double hop sporadic-E layer reflections.

Because of the distance involved (see *Fig. 2*) the only possible means for the XE1KE signal to span this path is by a very high F2-layer reflection. Thus, the path from Buenos Aires to Mexico City was accomplished in two hops, one hop via the F2-layer and the other hop via the sporadic-E layer. *Fig. 4* shows the profile of this path. We must assume that since XE1KE did not hear OA4BG that the length of the F2-layer hop was greater than the distance

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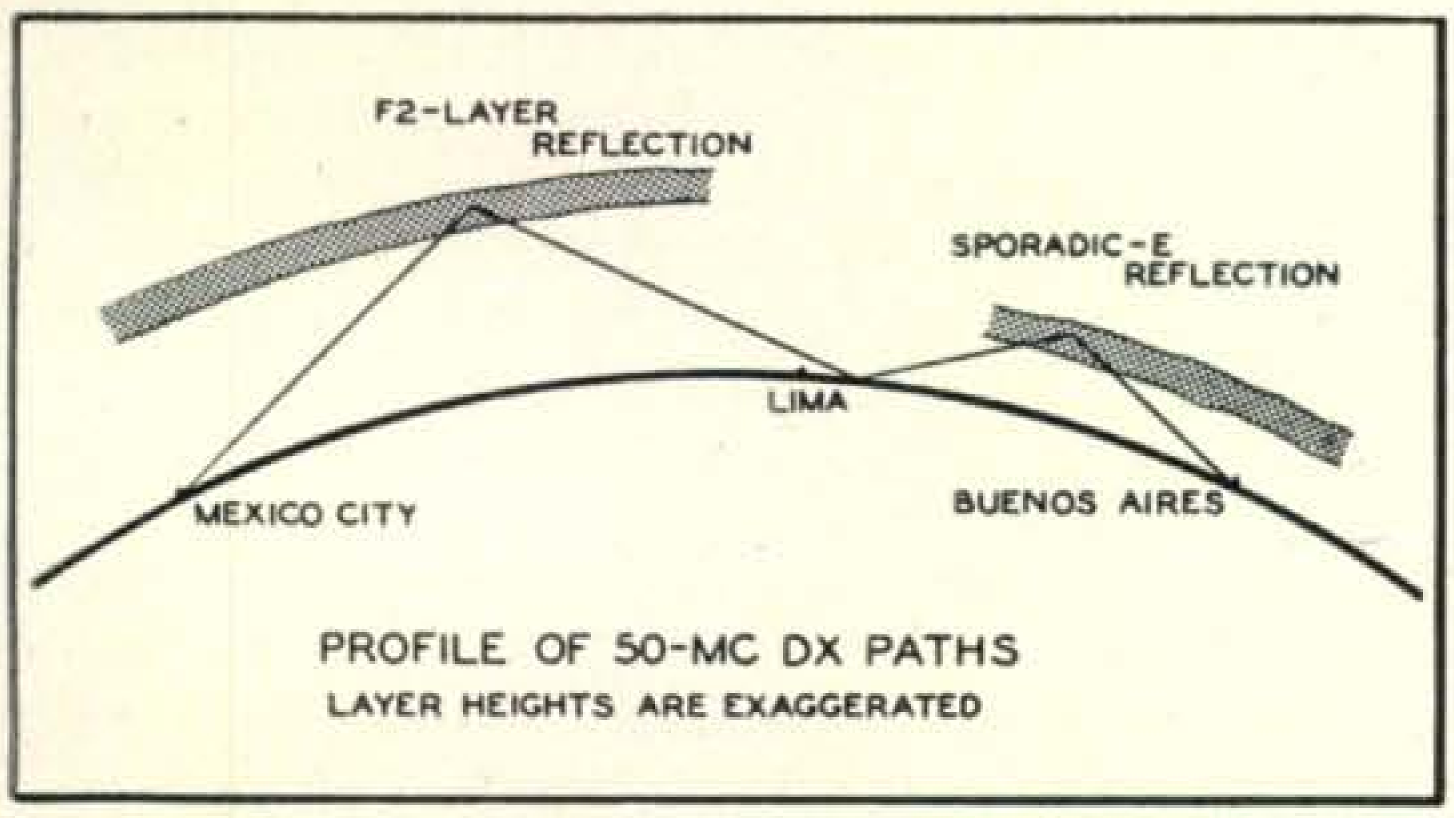

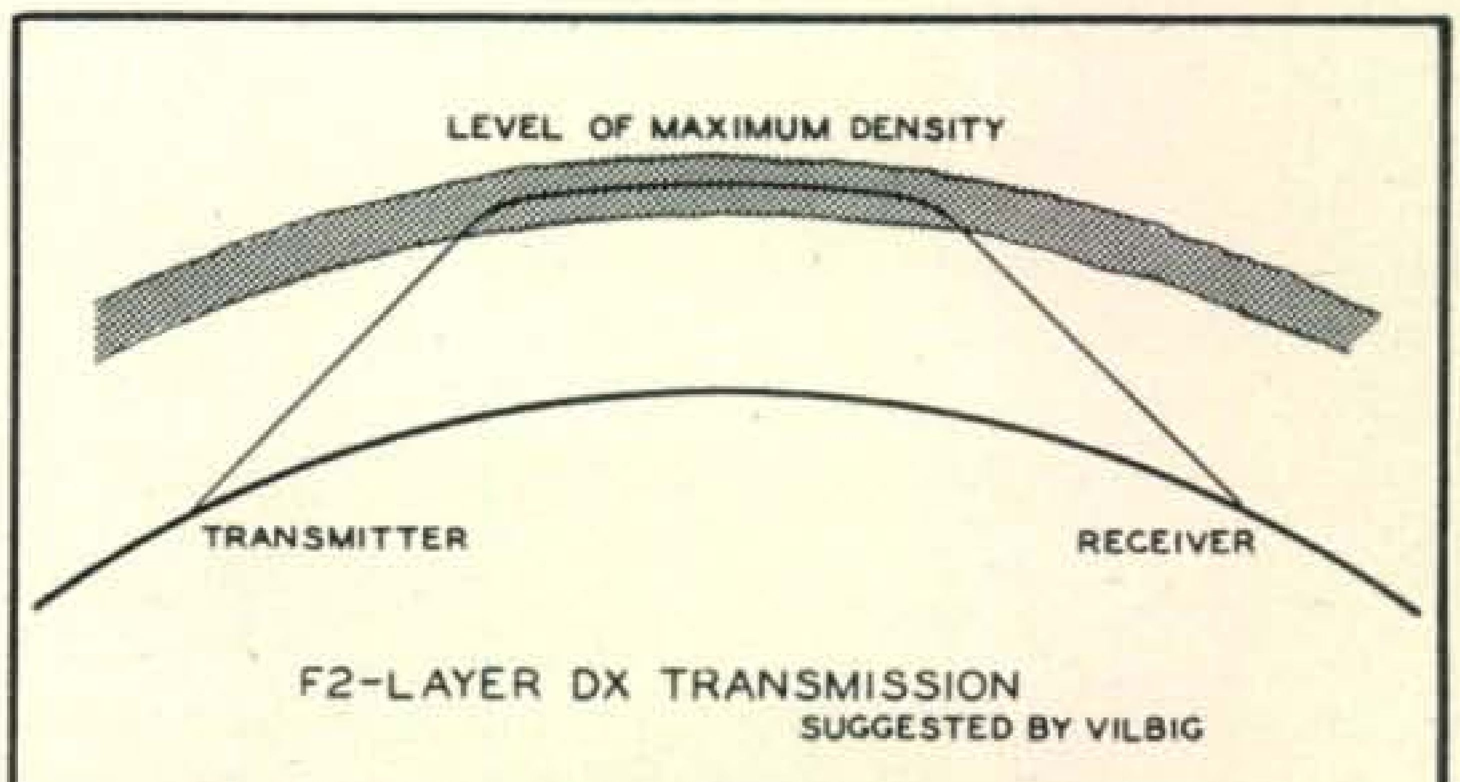

Fig. 4 (left). The analysis indicates that the 6-meter transmissions during the Fall of 1947 between Mexico City and Buenos Aires were due to complex reflections involving both the sporadic-E and F2-layers. Fig. 5 (right). Considerable research on 6 meters is still necessary to establish beyond all doubt that other modes of long range transmission are not possible. It has been proposed that under certain conditions the high-frequency wave train will travel great distances totally within the F2-layer. This postulation would explain the great ranges sometimes possible at 6 meters.

Versatility Plus

CLIFFORD A. HARVEY, W1RF*

Gear trains, gang tuning, and a departure from rack and panel construction are almost certain to stop most home builders of transmitting equipment. But when hams with commercial facilities get together and apply their combined ingenuity, good use is made of all the mechanical aids possible. The result is a small but unusually versatile phone and c-w transmitter that covers eight bands.

Front view shows the neat grouping of controls and the compact housing.

FLEXIBILITY CONTINUES to be the keynote of post-war commercial transmitters. Amateurs are much more frequency conscious, due perhaps to the better understanding of propagation characteristics of the various bands, and also to the fact that there is now extensive operation on all the ham bands through 2 meters. The complete amateur station should be able to work from 80 to 144 mc.

The answer to the problem of what a ham rig should contain seemed to resolve itself into a medium-power transmitter that would have wide frequency coverage, could be used at home with an a-c pack, or mobile with a dynamotor, and could serve adequately as a driver for any of the modern power amplifier tubes popularly employed.

By producing an all-band transmitter in a package small enough to fit comfortably beside the communications receiver, the space problem is of no consequence. Since up to 50 watts is available on all but the highest frequencies, where power is far less a factor because of high-gain beams, satisfactory communications can be carried on using this rig alone. And the 807 will always be usable as a driver, avoiding the problem of obsolescence when going QRO.

Whenever the problem of a new transmitter design comes up, one of the first questions is, "What tubes shall it use?" This is broken down into tubes for the excitation stages, tubes for the final stage, and tubes for the modulators. As the final amplifier tube will determine almost completely, or at least decidedly influence the decision on all remaining parts of the transmitter, it by itself is most important. It was decided to use the tried and true 807 in the final socket. It is an inexpensive tube and it has a reasonably high plate dissipation allowing inputs of 50 watts up to 60 mc. Being a beam power tube, it has very low driving requirements. It is also capable of some output on frequencies as high as 150 mc. For the driver stages, it was decided to use a 6AQ5 as a crystal oscillator in a harmonic generating circuit and a second 6AQ5 as a frequency multiplier. These tubes have recently been rated for amateur use as transmitting tubes, are small and compact, and operate well on high frequencies because of the small lead inductance and the absence of any base. Because of the low driving requirements of the 807 and the relatively high output of the 6AQ5, the use of broadly resonant plate circuits in the 6AQ5 tubes are extremely practical.

In an experimental breadboard layout, this tube line-up was tried out, together with broadly resonant tank circuits in the plate leads of both 6AQ5s. These were found to perform very well, and if an excitation control was used to set the 807 grid excitation, it was found possible to secure more than sufficient excitation for the 807 for 40 watts input on all bands from 3.5 through 29.7 mc without any retuning, assuming the broadly resonant tanks initially tuned to the center of the band. The 807 was found to work equally well on the 50-54 mc band except that here efficiencies start to fall off and the broadly resonant tank allows sufficient 807 grid current over only about half the band without retuning. This same situation holds on the 144-148 mc band where the 807 was also able to put out a smaller but adequate amount of power as a doubler.

These experiments show that no tuning is required

**Harvey Wells Electronics, Inc., Southbridge, Mass.*

up to the plate circuit of the final over any of the more popular bands; merely set the switch for the band desired and plug in the proper crystal.

With the input to the 807 established at about 40 watts, the choice of modulators becomes easy—a pair of 6L6s operating in Class AB_1. These can be driven directly by a single-button carbon microphone through a microphone transformer having the proper step-up ratio.

Preliminary circuits are aligned at the approximate center frequencies. Starting with the highest frequency band, the 6AQ5 oscillator uses an 8.1-mc crystal, tripling in the plate circuit to 24.3 mc. The plate inductance is adjusted with a brass slug and tunes to 24.3 mc with the distributed capacities of the tubes and circuit. The 6AQ5 multiplier triples the frequency again to 72.9 mc and is adjusted to this frequency. Note that the 6AQ5 multiplier plate inductance is in the circuit at all times; this is a must in order that the coil can begin at the plate terminal of the socket and be bypassed with short leads at the B+ end, otherwise too much inductance will be in the leads, and the 72-mc output will be negligible.

The 807 acts as doubler to 146 mc. It is very inefficient under these conditions, but does produce a watt or two of r.f., which at that frequency is sufficient for a good signal. The 146-mc tank is also in the circuit at all times and is series tuned by the same tank condenser which parallel tunes all the other coils. The 146-mc tank also acts as a parasitic choke on the lower frequency. A separate antenna terminal is provided for this band which does not affect the other bands except for a slight amount of additional circuit capacity.

On the next lower frequency band, operation becomes more conventional. A 5.7-mc crystal is used and the first 6AQ5 triples to 17.1 mc. The same coil is used with sufficient additional capacity connected by the bandswitch to raise the frequency from 24.3 to 17.1 mc. The multiplier plate tank inductance is added to L10 and tuned to 51.2 mc., so that the 807 becomes a straight amplifier with L14 in its plate circuit parallel tuned. As we progress to lower frequencies, the operation is much the same. The power output with 400 volts on the 807 is about 20 watts on 54 mc and 25 watts on 3.5 mc.

A switch actuated by the bandswitch is used to cut in additional resistance in the oscillator plate and screen lead to prevent driving the multiplier too hard on the lower frequencies. Full voltage is thus available to the oscillator on the two highest frequency bands.

An antenna coupling method of the simplified pi type is used in the 807 plate. The capacities and inductances are proportioned so that the transmitter can be loaded into any non-reactive load of 50 to 500 ohms on any frequency. On the lowest two bands an external variable condenser may be inserted from antenna to ground if required for low resistance loads.

One meter is switched to read grid current or cathode current of the final and supplies all in-

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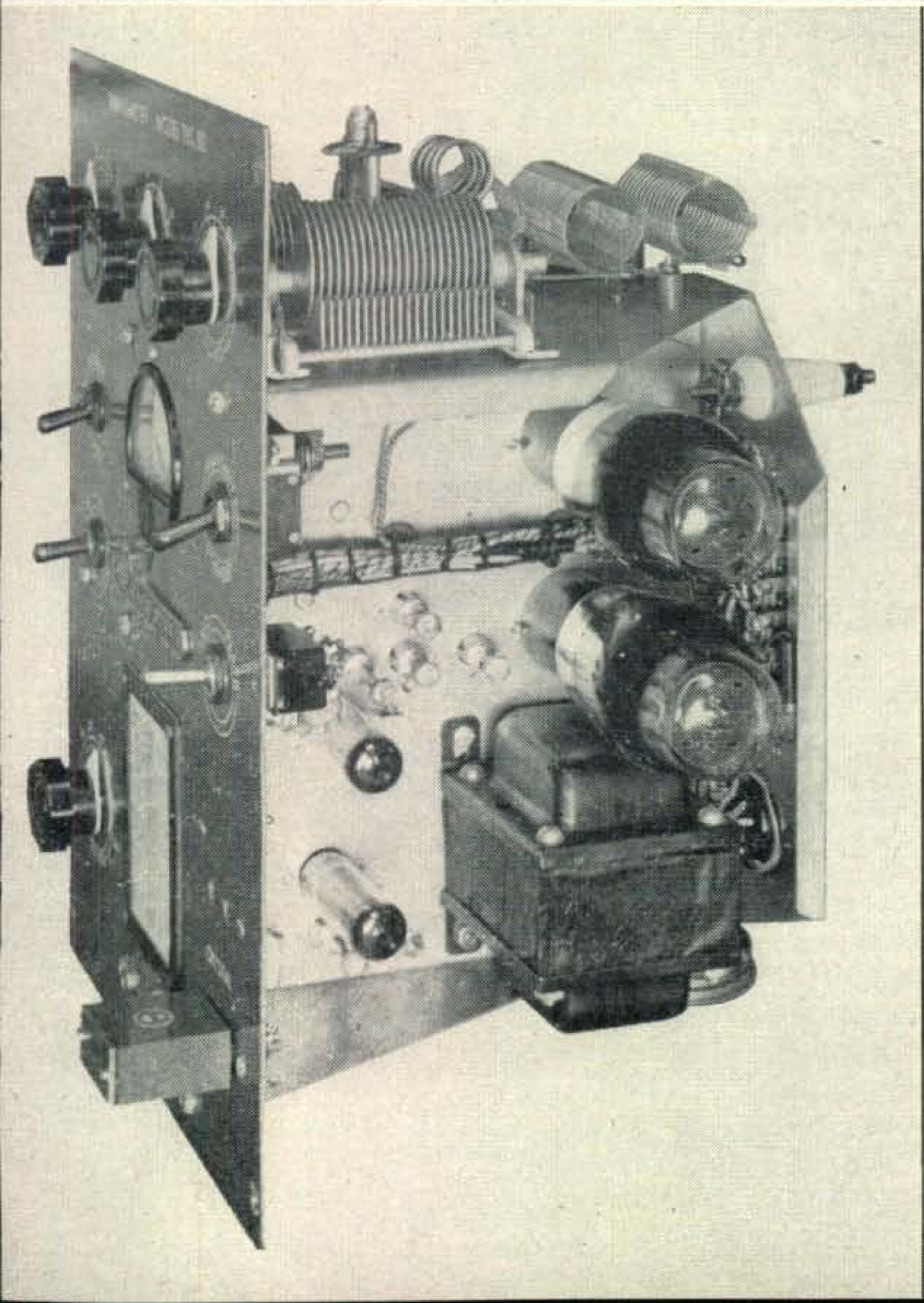
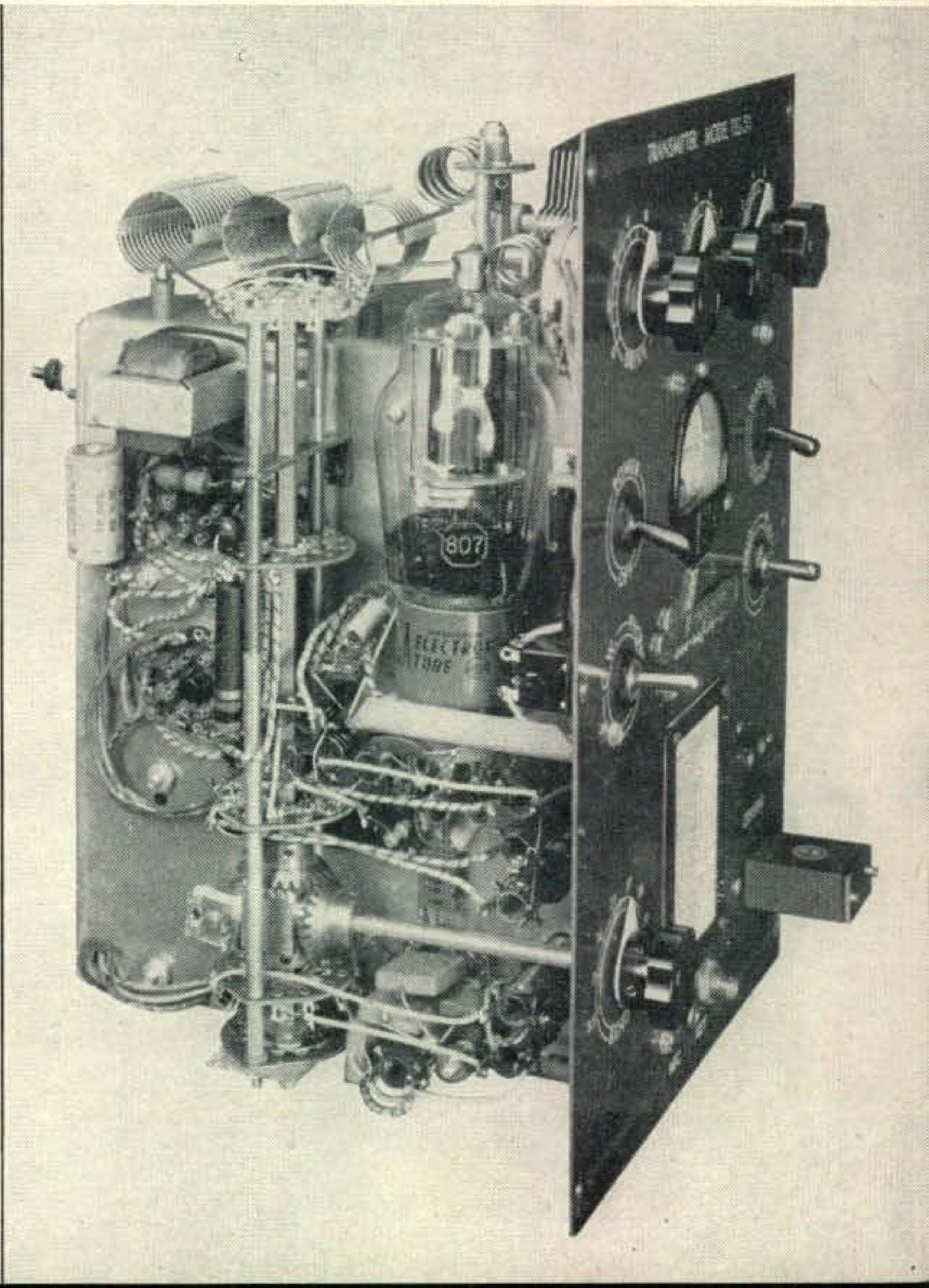
Left: Right side view showing 6AQ5 oscillator and multiplier tubes and 6L6G modulators.
Right: Left side view showing 807 final amplifier, band switch assembly and final tank coils.





Main Street, Mukden, Manchuria.

The Other Fellow's Station - W2WMV/C9

MANCHURIA HAS ALWAYS stood high on the list of rare DX—those who contacted "MX" could be listed on a small page. But war brought many changes and sent Americans to far off corners of the world. When Jack Closson, W2WMV, was transferred to Mukden, the capitol of Manchuria, this once very rare DX catch began to pop up on DX lists all over the world.

W2WMV/C9 tells the story best himself: "This really is a ham's paradise. After laboring through interference back in the States, it is a relief to work here where about the only QRM is from stations QRMing themselves back there. Many evenings I sit down at seven-thirty and work through to midnight with a clear channel. I usually have to call only one CQ when I start and that lasts until I quit. Once in awhile I have to fight some phone QRM, but on the whole, QRM is the least of my troubles. Stateside signals are quite consistent here every evening starting with the East Coast about seven o'clock and crossing the country to the West Coast about midnight. After midnight and up until eight o'clock all of Europe and the Middle East is available. I only wish I could sleep all day and stay up all night to get hold of that DX. During the day the band is practically dead with the exception of a couple of J or C stations. I guess I didn't mention that it's the 20-meter band I'm talking about. As far as 80 and 40 are concerned, there just isn't any. I often listen in on them hoping I might hear a ham, but I haven't had any luck. Both bands are full of *commercial phone and c.w.* [The italics are ours—*Ed.*]. Last winter I did work a W6 on 40 from Shanghai, though.

I guess everyone who works DX has made a suggestion some time or other as to how to alleviate the congestion caused by everyone calling on the same frequency. I can assure you it is terrific congestion and the fellows with lower power never have a chance. For a while I tried "LM" and found that while it has its advantages, it certainly cut down my possible number of contacts. It meant that after every QSO I had to call CQ again, tune for a station and wait until he called me a few thousand times. The system I use is to answer the station farthest away from my calling frequency, and consequently the easiest to read as he's farthest away from the QRM of the others. Of course, the one thing I can't understand is why some keep calling when it is obvious I've already made contact with another station. The net result is I try to get in as many stateside contacts as possible and by arranging fifteen or twenty each night I should be able to QSO all the Ws in five or six years.

One of my greatest difficulties here is power. The city power usually runs about 85 to 90 volts, and I use a transformer to step it up to 115 v. Occasionally it drops down to 60 v., or suddenly up to 95 or

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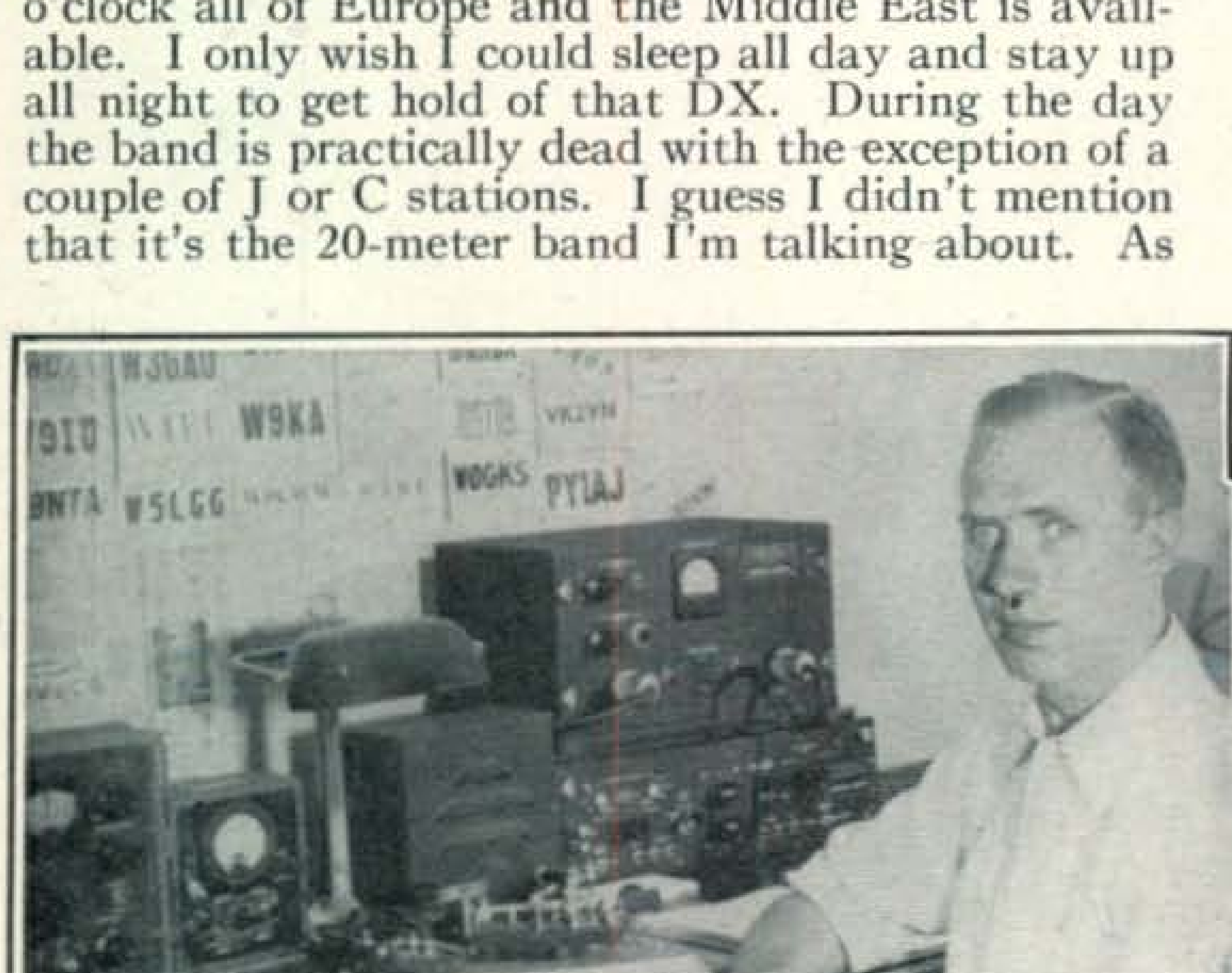


A Boxful of Watts

RAYMOND P. AYLOR, JR., W3DVO*

A versatile c-w rig ready for portable, home station or emergency use as fast as you can lift the lid of it's portable carrying case.

THE TRANSMITTER DESCRIBED in this article was constructed to satisfy the desire for a medium power, highly stable rig small enough to fit in congested living quarters. The word "fit" is meant to imply a transmitter occupying a minimum of space and also presenting an innocent appearance to visiting neighbors and landlords . . . and more than anything else to be truly portable.

Design Considerations

To conserve space on the operating table and to allow the use of an external battery supply for emergency operation, it was decided to build the transmitter on a separate chassis from the power supply. Both units are constructed on 9½" x 5" x 2½" chassis. A six-wire cable connects the two units. The carrying case is an inexpensive record case purchased from Sears-Roebuck.

To the writer, other requirements besides stability for the ideal transmitter are good break-in, no b.c.i., noiseless keying (no keying relay), ability to follow a bug without chirping or otherwise distorting the keyed signal, frequency setting independent of the amplifier and r-f monitoring facilities. Any transmitter which compromises even a single one of the above requirements, in our opinion, compromises with operating convenience and flexibility.

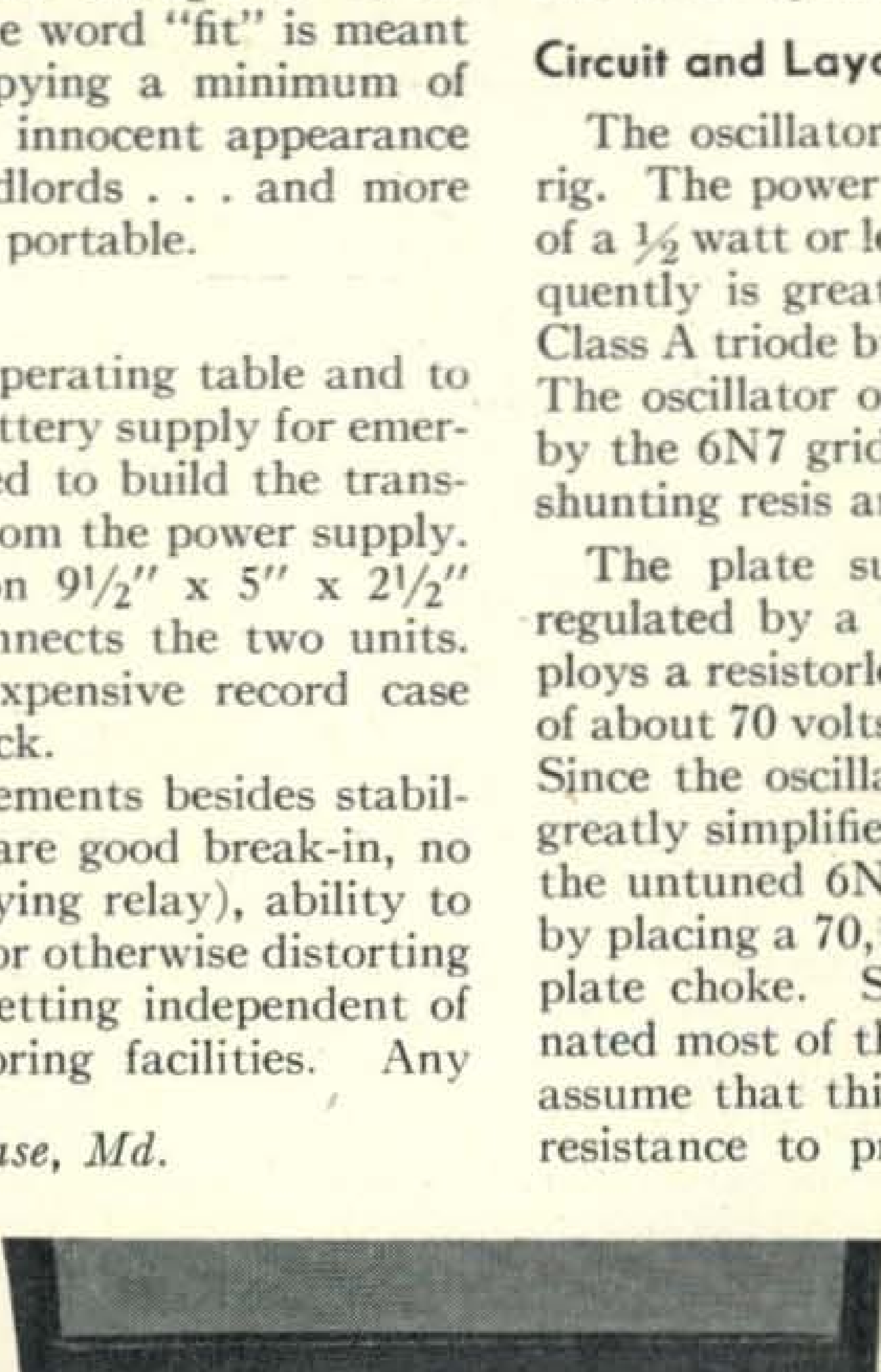
*132 W. Leland St., Chevy Chase, Md.

Circuit and Layout

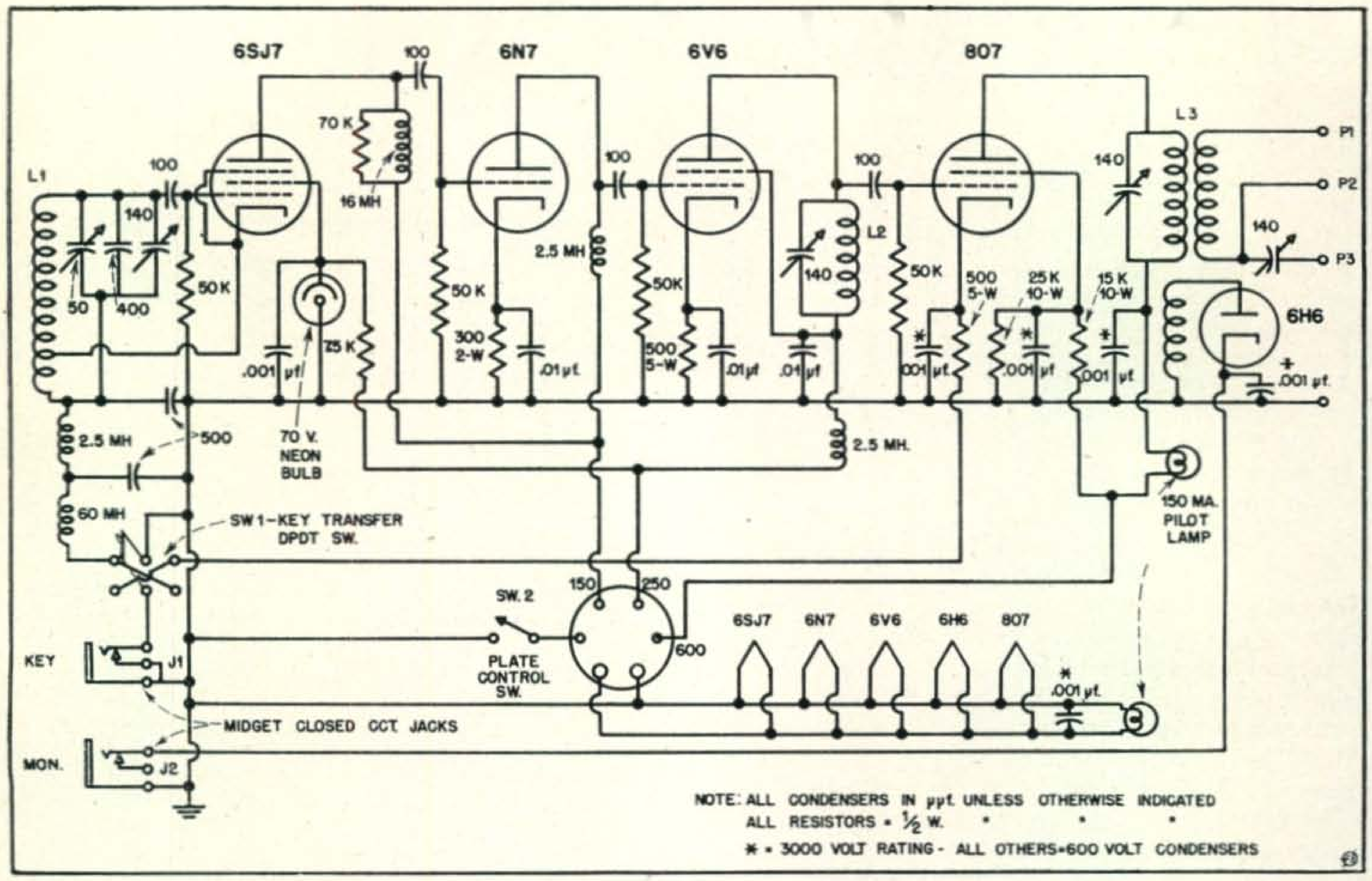
The oscillator is the first point of interest in the rig. The power which is keyed is only in the order of a ½ watt or less. The problem of key clicks consequently is greatly minimized. A 6N7 is used as a Class A triode buffer to further isolate the oscillator. The oscillator operates with a fixed load presented by the 6N7 grid resistance and the oscillator choke shunting resis ance.

The plate supply of the oscillator is voltage regulated by a VR150 and the screen supply employs a resistorless ¼-watt neon bulb for regulation of about 70 volts (a VR75-OB2 could be employed). Since the oscillator is keyed, break-in operation is greatly simplified. A slight tendency on the part of the untuned 6N7 to oscillate was completely cured by placing a 70,000-ohm resistor across the oscillator plate choke. Since this one operation also eliminated most of the keying chirp it seems plausible to assume that this resistance acts with the 6N7 grid resistance to provide a load for the oscillator in much the same manner as a bleeder load on a power supply.

A two-section r-f filter is used in the keying lead from the oscillator. Numerous types of key-click filters were tested and in most cases they had a tendency to introduce a bad chirp in the signal. It was found that the filter actually used was the most satisfactory in reducing clicks below average broadcast receiver noise level



The v-f-o controlled 807 and voltage regulated power supply are mounted on separate chassis. Meters are optional since the traveling man may not want to risk damage to them.



Circuit diagram of the complete r-f portion of the 50-watt portable transmitter.

without impairing the keying characteristics. Depending upon circuit layout, it may, however, be necessary to change the keying filter slightly.

It will be noted that a key transfer switch is used which allows the transmitter to be keyed in the master oscillator or in the final stage. This switch serves a dual purpose. It can be switched to the final keying position and the oscillator can be spotted on any frequency without causing interference on the air. The final and antenna tuning can be made within 3 or 4 seconds, upon initiating the call. In actual use, the receiver is lined up on the station to be called, then the receiver b.f.o. is switched off, and the harmonic of the transmitter oscillator tuned to zero beat as a heterodyne oscillator to the incoming signal. The key transfer switch has another function, allowing a meter to be plugged into the key jack for a temporary indication of the final cathode current. The grid current may be checked

COIL DATA

Oscillator Coil, 1.8 mc: 30 turns No. 28 enameled wire on 7/8-inch form close wound with cathode tap 11 turns above ground permanently mounted.

L2, 3.6 mc: 30 turns No. 22 enameled wire close spaced on 1½-inch ribbed form (Hammarlund).

7.2 mc: 16 turns as above.

L3, 3.6 mc: No. 22 enameled wire close spaced on 1½-inch ribbed form (Hammarlund). 28 turns plate tank, 20 turns antenna tank, 15 turns monitor winding.

7.2 mc: 15 turns plate tank, 12 turns antenna tank, 11 turns monitor.

14 mc: 8 turns plate tank, 7 turns antenna tank, 5 turns monitor.

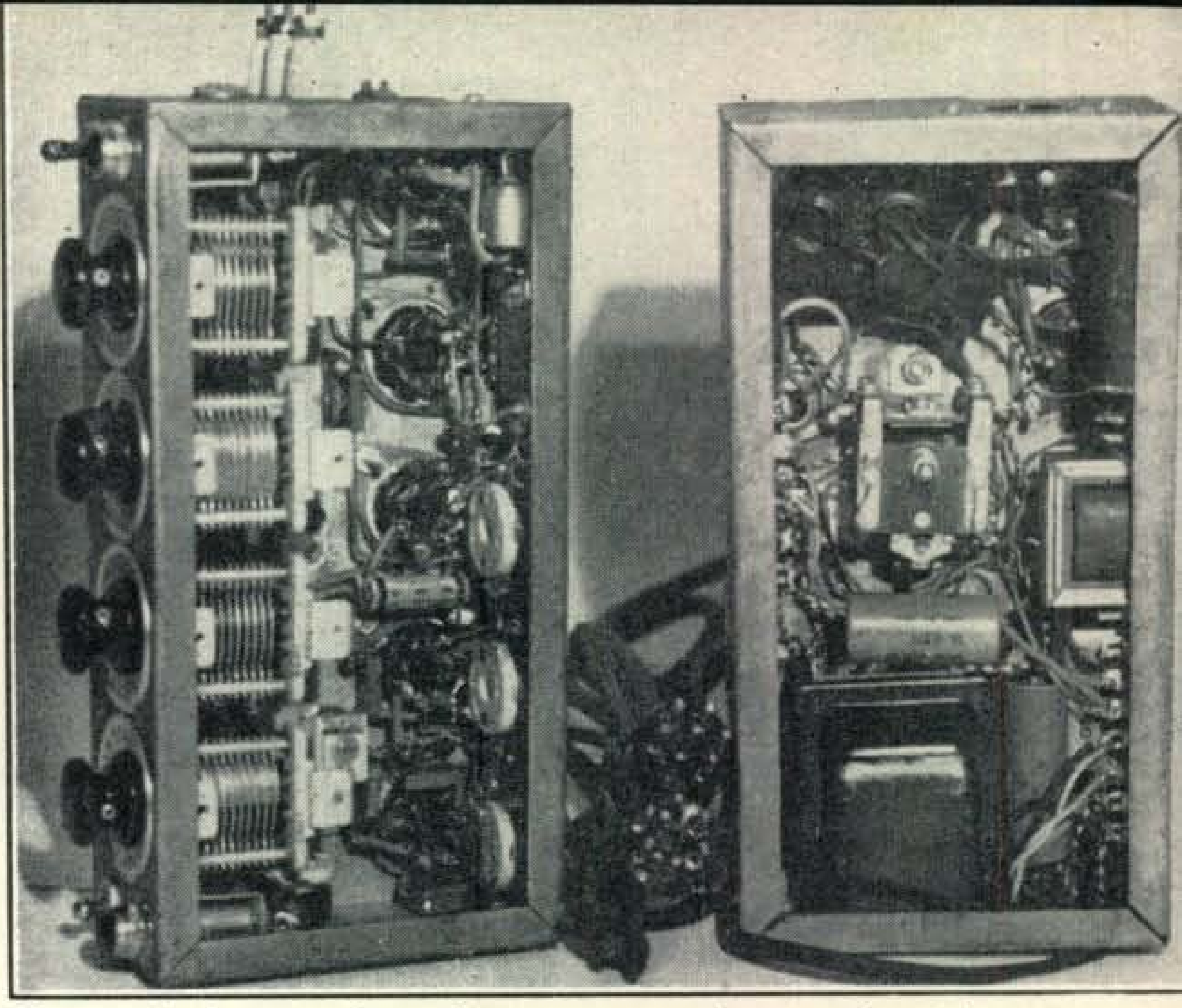
in the same position by removing the rectifier for the final stage from the power supply.

A relay is provided in the power supply to remove the plate voltage from the transmitter during standby periods. This relay is controlled from the transmitter unit itself, and forms an interlock circuit to prevent peak voltages from being applied to the power supply filter condensers when the transmitter is not connected. The screen grid voltage divider in the transmitter unit acts as a bleeder for the high-voltage supply. The high-voltage supply is further stabilized by the potential equalizing resistances which split the series filter condenser voltage.

In the choice of rectifier tubes, previous experience had shown that mercury vapor tubes can produce a very objectionable amount of "hash" during key-up periods. Rather than complicate the power supply with hash suppression filters, an 83V rectifier tube was used in the high-voltage supply. A conventional 80 is used in the low-voltage supply.

It was the original intention to provide a keying monitor in the transmitter. For this reason, a type 6N7 buffer tube was used following the oscillator. In using one section of the 6N7 as an audio oscillator, the tone modulated the r-f output of the untuned buffer section.* This makes a very beautiful signal, but it is one way of getting an "F C.C. QSL." Both sections of the 6N7 were finally tied together as a buffer. However, the other section can be used as an amplifier/doubler with minor changes.

*An audio bypass condenser (25 μf-25 v. from cathode to ground and 100-μμf condensers from grid and plate of the oscillator section of the 6N7 to ground should eliminate this condition.



There is little crowding of components despite the tight knit layout. The r-f portion of the rig is kept separate from the heavy power supply to make it available for emergency use and permit flexibility in handling.

If desired, the transmitter can as easily be duplicated substituting a 6C5 in place of the 6N7.

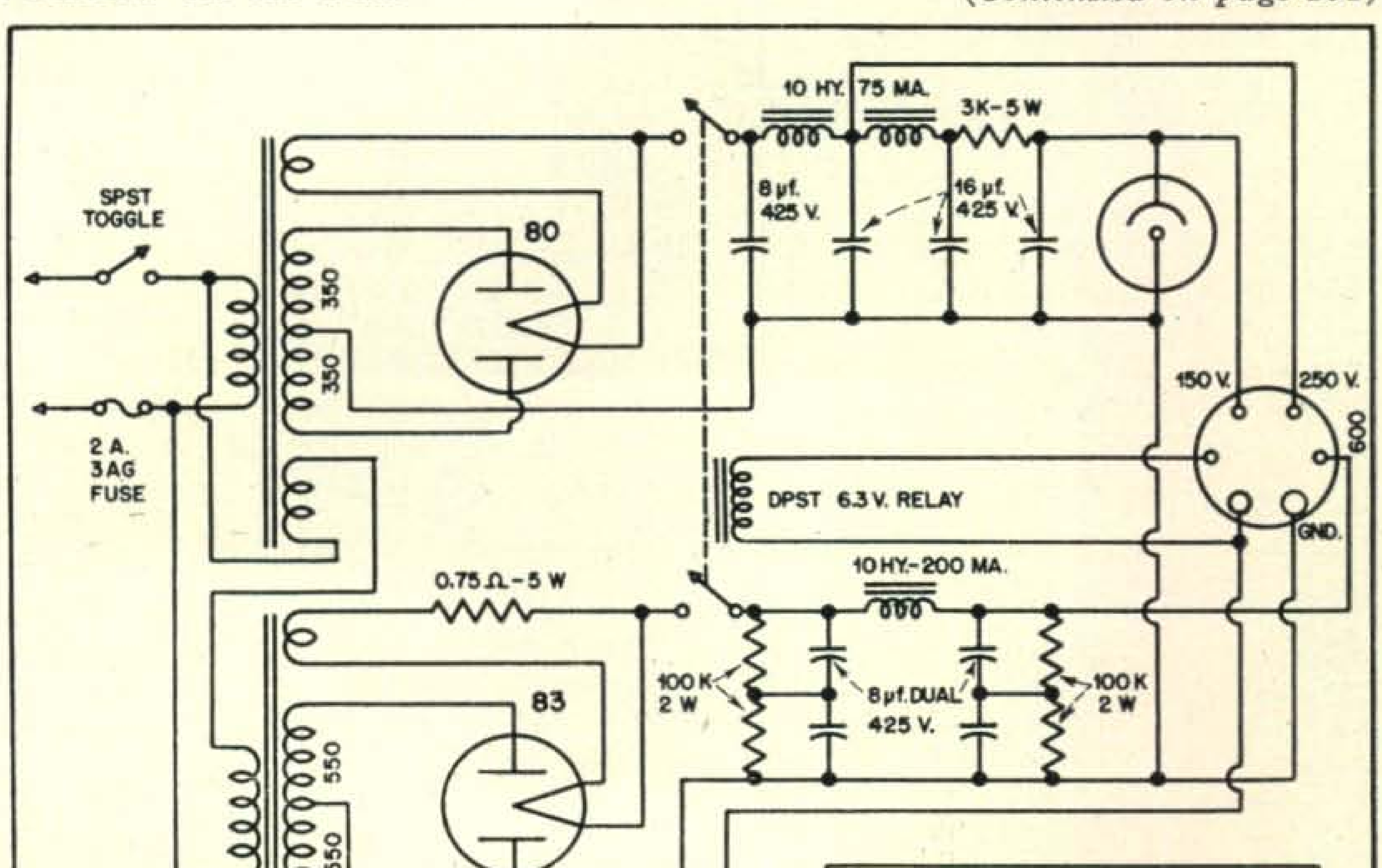
The monitoring system finally used is a small winding on the 807 final output tank coil. This winding is not tuned. A 6H6 acts as a monitoring rectifier, the output of which is passed to a small Hartley audio oscillator built into the receiver. The output of the audio oscillator is mixed into the 2nd detector output. The rectified r-f voltage is in the order of 40 or 50 volts and is not critical. It is probably just as well to locate the audio oscillator externally because no changes are necessary in the transmitter if it is desired to use phone at a later date, in which case the rectified r.f. can be monitored directly as in broadcast practice. Any hum or instability, such as spurious oscillations, can be instantly detected by the monitor on the output, either on c.w. or phone.

No meters are used in the transmitter for normal operation. After the transmitter has been initially lined up with a test set and stability has been checked, a single dial lamp (S-47) is used in the plate supply plus lead of the 807 as a tuning indicator. In much the same manner as a photometer, the brilliance of this lamp is compared with that of the filament lamp. Both bulbs draw 150 ma and their brilliance may be readily compared for an estimate of input. With 550 volts on the plate of the 807, it is easy to realize 50 watts of r-f output, assuming only 60% efficiency. Actually, the transmitter will fully light a 60-watt Mazda lamp bulb.

In planning the transmitter to be fully portable, it was assumed that a wide range of antennas would be encountered. The Marconi antenna is the easiest and quickest (and most innocent-appearing) antenna to erect quickly. No trouble has been experienced in tuning up 75 or 100 feet of haywire at the home location. The output circuit can be tuned as a closed link to a more elaborate antenna tuner if a better grade antenna is desired. As the transmitter stands, it can either be tuned up with series or parallel output tuning, as desired. Another S-47 bulb shunts 6 or 8 inches of the antenna lead to indicate antenna resonance. In portable operation, we found it is better to avoid carrying meters because of their fragility. The tubes are relatively inexpensive and may be regarded as expendable, and the S-47 in the plate circuit of the 807 acts as a fuse, and prevents any damage to the rig or power supply if the 807 "takes off."

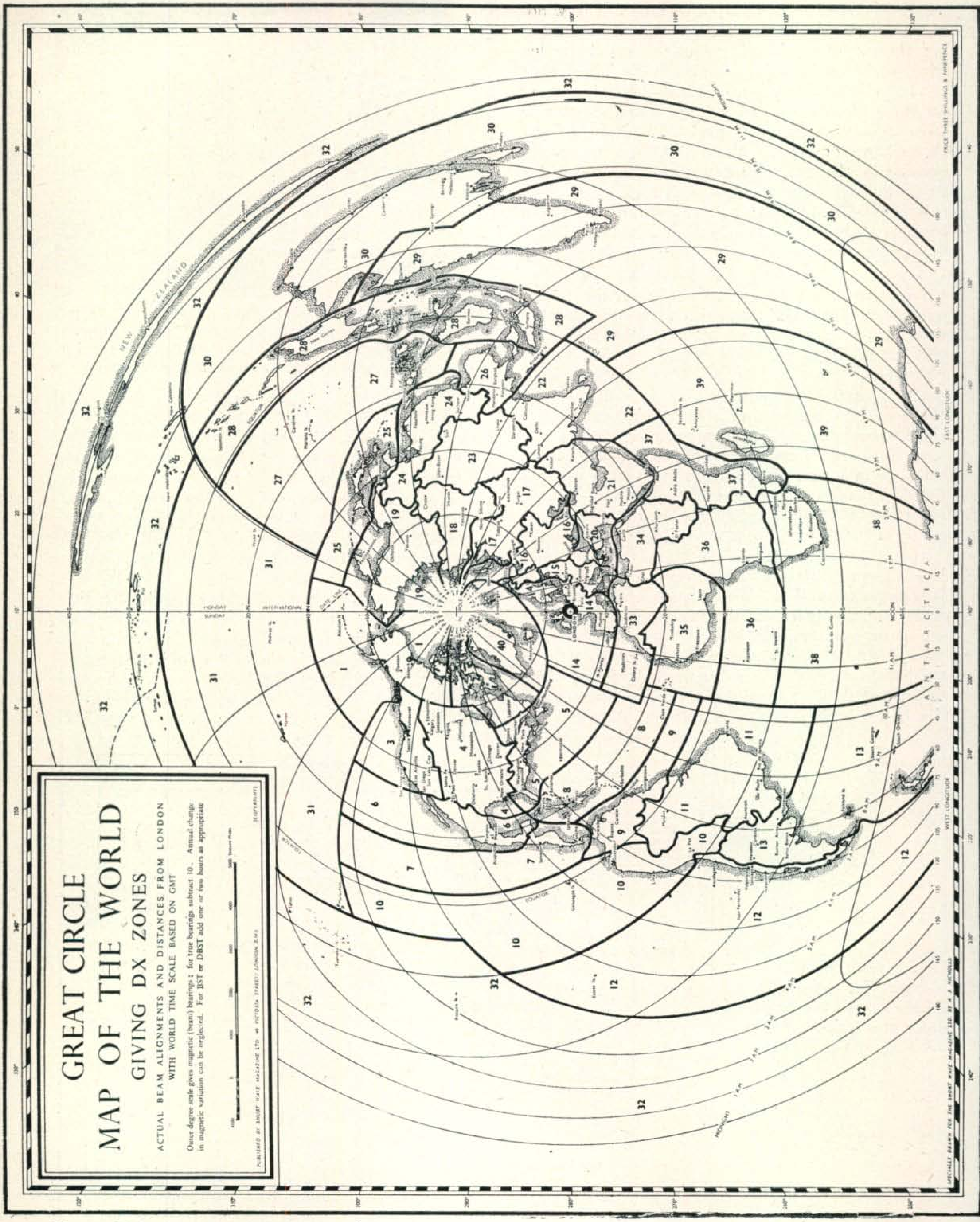
Referring to the circuit diagram, a series bucking arrangement is used on the high-voltage rectifier transformer. This is done in order to overcome the filament voltage drop in the 3-foot cable connecting the power supply to the transmitter. At the same time, the plate voltage is boosted 5 or more per cent.

(*Continued on page 101*)

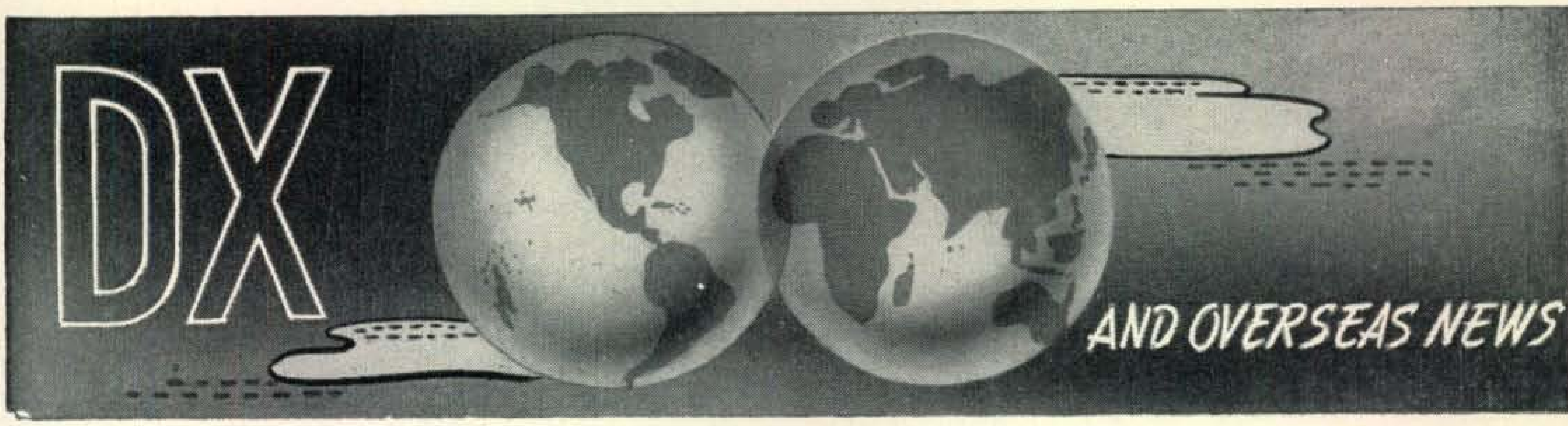


Circuit diagram of the voltage regulated d-c supply. Three d-c voltages, one regulated for the v.f.o., are available.

W.A.Z. Great Circle Map of the World
Centered on London, England



The world looks somehwat different when aiming your beam from Europe. This great circle map, centered on London, and including the boundaries of the 40 zones comprising the W.A.Z. system was prepared and first published by *Short Wave Magazine*. *(Reproduced by permission of Short Wave Magazine.)*



Conducted by HERB BECKER, W6QD*

JUST ABOUT THE TIME you read this, you will be cooking up your New Year's resolutions. In a way, New Year's resolutions are a waste of time—I have yet to hear of one that has been lived up to. For example, perhaps you resolve that in 1948 you are going to let your "pal" work a little DX, therefore, you will make your calls a short "three by three"; or maybe you would resolve to adopt a strange set of DX courtesy rules whereby you would never zero beat a DX station's frequency. If you did make these resolutions, you know darn well they won't last long. These would be ideal resolutions to be broken, and since all resolutions are eventually broken, you might as well make some that you can get out of the way in a hurry.

Don't forget the 1948 DX Marathon, fellows. This ought to prove to be a highly interesting year-long contest. You don't have to go out and break your necks to work all the DX in one month in this type of contest. Since it will be on a world-wide basis with winners in each zone, you might spread the word around to some of these overseas boys you work from time to time. Complete rules for the DX Marathon will be found elsewhere in the column. I would appreciate, however, that you follow the suggestion of sending in all your DX Marathon scores on a separate sheet of paper, and plainly marked with your call letters, and that it is for the "DX Marathon." This will help the committee very much in keeping it separated from the W.A.Z. Honor Roll, etc.

1948 DX Marathon

CQ is sponsoring a DX Marathon for the year 1948. Many of the DX men feel that by the first of the year a DX Marathon will revive some of the interest that has been lost during the terrific last two years of DX. A simple set of rules governs the DX Marathon:

1. The 1948 DX Marathon begins January 1, 1948, and closes December 31, 1948.

2. Competition will be worldwide and on a zone-to-zone basis. In other words, the high station in each of the 40 zones will be given an award as winner of his zone.

3. Classifications will be the same as in the Honor Roll, i.e., "C.W.—Phone" and "Phone only", thus actually making two winners in each zone.

4. In order to receive credit, claims sent to us for zones and/or countries must be post-marked within sixty days from the date of the QSO. This will assure listing the current monthly scores in CQ and eliminate last minute entries.

5. Due to the tremendous amount of detail work, please list all DX Marathon scores on a separate page from Honor Roll scores and other DX news, and mark plainly "DX Marathon". This will greatly assist W6DI and W6SA, of our committee, in tabulating the Marathon scores for you.

6. Zone and country lists must be submitted in the same manner as though they were for the Honor Roll: the zones listed in numerical order showing the call letters, date, and time; the countries in alphabetical order by country, followed by the call, date, and time.

7. The CQ DX Zones of the world, and the official DX Country list, will be used for the yardstick.

The cooperation of all DX men in the states to help spread the word overseas is requested. We think that as the years progress, it will be interesting to see who the winners are from one year to another.

W8HGW Latest to W.A.Z.

Leslie Misch of Cleveland, Ohio, will receive W.A.Z. certificate No. 10. Les goes into the Honor Roll with 40Z and 181C. The fly in the ointment for Les was the card from *UAØKQA* for which he had been waiting six months. W8HGW runs 500 watts into a pair of 100THs. Our congratulations to W8HGW, as 40Z and 181C is a lot of post-war DX.

Now let's see what we can dig out of the mail. First let me say that I am going to follow the same procedure as I did in the December column, and eliminate practically all mention of the number of zones and countries worked. Some of the fellows feel that it gets a little boring, as well as taking up additional space, especially in view of the fact that, by referring to the Honor Roll, you can bring yourself up to date on any of the present totals. If, on the other hand, you fellows like to see direct mention of the number of zones and countries in the column proper, just let me know the next time you write in, and we can sure enough go back into it. Another thing which I am attempting to do is omit the calls of most of the new countries worked by you fellows each month. Once again, some of you have indicated that for the most part, the DX worked by a majority of the contributors to the column is the same, therefore, each paragraph, in a

**Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles 15, Calif.*

W.A.Z. HONOR ROLL

C.W.-PHONE		
W8HGW	**40**	**181**
W6VFR	**40**	**180**
W2BXA	**40**	**175**
W6PFD	**40**	**173**
W6MJB	**40**	**171**
W6ITA	**40**	**169**
W6SA	**40**	**162**
W6LEE	**40**	**150**
ZS2X	**40**	**142**
W6SAI	**40**	**135**
W2GWE	39	179
W8RDZ	39	178
G6ZO	39	176
W3BES	39	176
G2PL	39	173
W8BKP	39	170
W6ENV	39	166
W2HHF	39	165
W9ANT	39	160
W6ADP	39	160
W4CYU	39	157
W6DI	39	156
G5DQ	39	151
W2COK	39	150
W6KRI	39	149
W6FHE	39	147
W7BD	39	147
W8LEC	39	146
W6TT	39	145
W6SN	39	144
W9IU	39	143
W7FZA	39	143
G2WW	39	143
G6QB	39	142
W9DUY	39	141
G5YV	39	141
WØYXO	39	139
G8KP	39	135
G2AJ	39	135
W6WKU	39	135
W6RDR	39	134
WØGKS	39	134
W6BPD	39	134
G2CDI	39	132
G3FJ	39	132
W6CEM	39	131
D2KW	39	131
W6BAM	39	130
W6ZCY	39	127
W9NRB	39	126
G5BJ	39	126
G5RV	39	126
G5VU	39	124
W6TI	39	124
W6LER	39	122
G5WM	39	120
G6BS	39	117
W6OMC	39	114
W6YZU	39	114
G3QD	39	114
G3AAK	39	114
G3AAM	39	109
W6QD	39	107
W7GXA	39	106
OK1AW	39	106
W6UZX	39	104
W3JNN	38	162
W2PEO	38	154

C.W.-PHONE		
W2CYS	38	144
W3GHD	38	142
W8NBK	38	142
W3EPV	38	140
W9RBI	38	139
W2IOP	38	137
W3EVW	38	135
G3DO	38	134
W8FJN	38	134
W4BRB	38	133
W1NMP	38	133
W3JTC	38	132
WØNTA	38	131
W3IYE	38	130
W8CVU	38	125
W2RDK	38	124
G8IL	38	123
WØSQO	38	123
G2VD	38	122
CE3AG	38	121
ON4JW	38	116
G8RL	38	115
W6EAK	38	115
W5CPI	38	113
G3ZI	38	107
W7ETK	38	89
W6LEV	38	79
WØNUC	37	142
W2HZY	37	137
W1BIH	37	129
PY1DH	37	128
W4OM	37	126
W6AM	37	122
W1KFV	37	121
W1JYH	37	114
G5CI	37	113
W4FPK	37	110
GW3AX	37	110
W4ML	37	110
G3TK	37	109
G4AR	37	108
VE1EA	37	107
W9YNB	37	102
W2BLS	37	100
VK2ACX	37	99
W8WWU	37	96
W6ANN	37	95
W5ASG	36	150
KP4KD	36	120
W9LNM	36	116
W2RGV	36	116
W3KDP	36	111
W2PUD	36	111
W3ZN	36	110
W9MZP	36	106
W9VND	36	104
G4CP	36	101
G6WX	36	95
W8HSW	36	85
W2SGK	36	84
W2CNT	36	82
W6LN	36	72
G6PJ	36	69
W2CWE	35	116
W2DYR	35	110
G2CNN	35	109
W8REU	35	104
W2PQJ	35	101

C.W.-PHONE		
VE3AAZ	35	99
W2TJF	35	96
W6DLY	35	89
W9FNR	35	85
G5MR	35	84
W9TB	35	82
W6PQT	35	78
G3BDQ	35	74
W6EPZ	35	73
CM2SW	34	117
G8QX	34	99
W9WCE	34	93
W3JKO	34	91
W6YYW	34	88
W4DIA	34	86
G2AO	34	84
W6MI	34	84
D4ANM	34	77
W4MZ	34	75
G8RC	34	72
J4AAK	34	66
W7FNK	34	54
W2ZW	33	115
WØOUH	33	99
W4QN	33	94
G8KU	33	91
W6ZZ	33	91
G8IP	33	88
G2LC	33	85
W3AYS	33	85
GW4CX	33	84
PHONE		
W6CI	37	130
W1HKK	37	127
W8BKP	37	113
G3DO	37	110
W4CYU	36	135
W1JCX	36	126
G2PL	36	113
W2BXA	36	111
G6WX	36	102
W3DHM	36	96
G3FJ	35	109
W8BF	35	108
W1MCW	35	105
GM2UU	35	97
W1NWO	35	97
W9HB	35	89
W2DYR	34	104
W6PXH	34	101
W9RBI	34	99
W6PCK	34	91
W7HTB	34	90
W6SA	34	74
W2ZW	33	113
W2PQJ	33	90
W5ASG	33	86
W8BIQ	32	88
W2HY	32	81
WØHX	32	80
G6BW	32	69
W2NXZ	32	57
W4HA	31	78
W5LWV	31	75
W9GZK	31	66
W9WCE	30	75
WØSQO	30	74

way, would be a repetition. However, if you feel it is good reading material, I can again list all the new stuff each of you send in to me.

A few months ago, we stopped listing frequencies for most of the run of the mill stations, because, in the first place, most of them were using v.f.o. and, in the second place, even if we did guess at a frequency, by the time the stuff appeared in print, the station either had disappeared from the air, or possibly was located a couple of dozen kc away from where we showed it. Pending further word from you, I will continue to show only the newest and rarest of current DX, as well as the approximate frequency, and, naturally, the QTHs. What is your reaction to the above? How about telling me in the next letter you send my way?

Oh, yes . . . the mail bag.

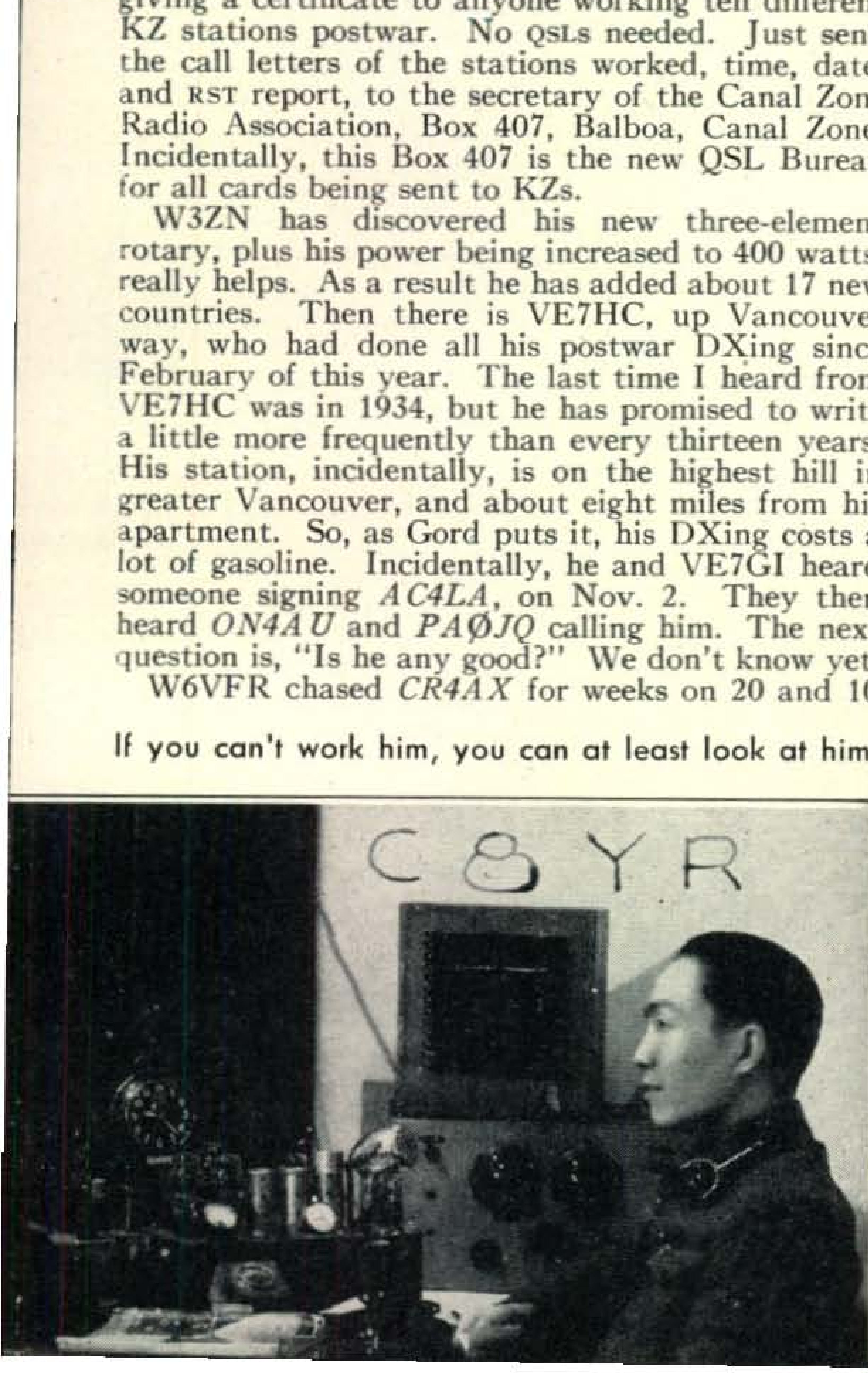
A nice letter from Bill Wayne, *ex-KS4AE*, tells us that he is now in Manila and hopes soon to be a KA. Bill left KS4 sometime in August and, after four uncomfortable days on a Banana boat, he arrived in Tampa where he called on W4GEE. After this he spent two weeks in his home town having a heck of a good time. During this period he had a chance to visit W9CPZ and W9ABB. He then took off for Fort Worth and gave W5ENE, in Dallas, a blast on the land line. Ben drove over to Fort Worth and took Bill home with him for a couple of days. His next stop was San Francisco where he had a swell visit with W6WN. After a DX session, Art took him to the plane, and his next stop was Honolulu where he had a chance to get together with KH6IV. After five days there, he left by P.A.A. for Manila, stopping off at Midway, Wake and Guam. You'll probably hear Bill on the air with a new KA call one of these days.

W6TI says the Canal Zone Radio Association is giving a certificate to anyone working ten different KZ stations postwar. No QSLs needed. Just send the call letters of the stations worked, time, date, and RST report, to the secretary of the Canal Zone Radio Association, Box 407, Balboa, Canal Zone. Incidentally, this Box 407 is the new QSL Bureau for all cards being sent to KZs.

W3ZN has discovered his new three-element rotary, plus his power being increased to 400 watts, really helps. As a result he has added about 17 new countries. Then there is VE7HC, up Vancouver way, who had done all his postwar DXing since February of this year. The last time I heard from VE7HC was in 1934, but he has promised to write a little more frequently than every thirteen years. His station, incidentally, is on the highest hill in greater Vancouver, and about eight miles from his apartment. So, as Gord puts it, his DXing costs a lot of gasoline. Incidentally, he and VE7GI heard someone signing *AC4LA*, on Nov. 2. They then heard *ON4AU* and *PAØJQ* calling him. The next question is, "Is he any good?" We don't know yet.

W6VFR chased *CR4AX* for weeks on 20 and 10

If you can't work him, you can at least look at him.



with no luck. One day he heard a W1's harmonic on 10 calling the CR4, whereupon he checked the frequency, QSY'd to 20, and . . . you guessed it . . . worked CR4AX. Marv also worked *RV2* for his 180th country.

TA3SO was in town the other day and had quite a session with some of the locals, such as W6QQL, W6GAL, W6SA, and a few of the others. Yes, he'll QSL all contacts made while he was in Ankara. He is having the cards printed now, and says his wife will do the mailing honors.

If you fellows want to send a card to TA3SO, here is the address: M. Aritay, Devlet Hava Yollari, Ankara, Turkey, and there are a couple of "don'ts" attached to his, however. *Don't* put his call, your call, or mention of the word "radio" anywhere on the envelope. If you have worked *TA1OS*, here is his QTH, and the same "dont's" apply here, too: Sabahattin Bay, Deulet Hava Yollari, Yesilkoy, Istanbul, Turkey.

W9MZW operates mostly 10 phone, and although he has only worked 17 countries, he is using a 3-element beam 19′ above the ground. It happens to be on top of an 8′ step ladder which, in turn, is on his back porch roof. I wonder what happens when his wife wants to borrow the step ladder.

W6HJP is now WØDSF at the University of Minnesota. He instructs in electronics and communications in the Department of Military Science and Tactics. He has transplanted his California kilowatt, and finds that it is paying off in his DX "demonstrations."

CR9AG is on 10 phone practically all the time nowadays, and is using an 813 in the final which is grid modulated. The antenna is a Bi-square with a reflector. He says *CR9AN* is out of the hospital and is batting away again on 14-mc c.w. John said he was over to VS6 and met *G2PQ*, who is now a VS6. However, through some mixup, they issued John's old call, VS6AG to G2PQ. CR9AG expects to go back there, one of these days, and hopes to use his old call when things get straightened out.

W1EYP seems to be astounding a lot of the DX stations when he tells them he is only running 20 watts into an 807. He operates 10 and 20-meter c.w., and has worked 62 postwar countries. His antenna is a vertical folded dipole starting four feet off the ground and running up the side of the house. His 20-meter antenna is a 33½′ off center fed semi-vertical. In exactly one year's time, he has contacted 398 foreign stations.

Sorry—C6HH Not In Number 23

A few months ago, some of you fellows began to report *C6HH*, not knowing exactly where he was. Later, cards came through showing his longitude and latitude, and the DX committee decided they had some work to do. Judging from the position of 33° N. and 107° E., it looked as though it could be just on the line of Zone 23 and 24, or even just inside Zone 23. However, the facts are that when the zone map was originally compiled and drawn, it was decided that wherever possible, we would use whatever natural boundaries existed through certain countries. Boundaries, that is, of provinces, states, etc. In this instance, if C6HH were to be counted in Zone 23, that would mean the boundary line between 23 and 24 would be cutting through the western edges of Shensi Province. This, you will have to admit, would not be a sensible way of drawing a zone boundary line. We have checked this on our very large, accurate maps, and it does appear that the boundary line of Shensi Province does not completely follow the curves of the boundary line of zone

(*Continued on page 78*)

Monthly DX Predictions - January

OLIVER PERRY FERRELL*

A PREDICTION GRAPH last month illustrated the condition when no amateur band was open for a certain DX path. This was due to the fact that the lowest usable frequency (LUF) based upon average signal absorption of one kilowatt of radiated power exceeded the maximum usable frequency (MUF). Somewhat similar conditions to varying degrees are shown in all of the graphs illustrated for January.

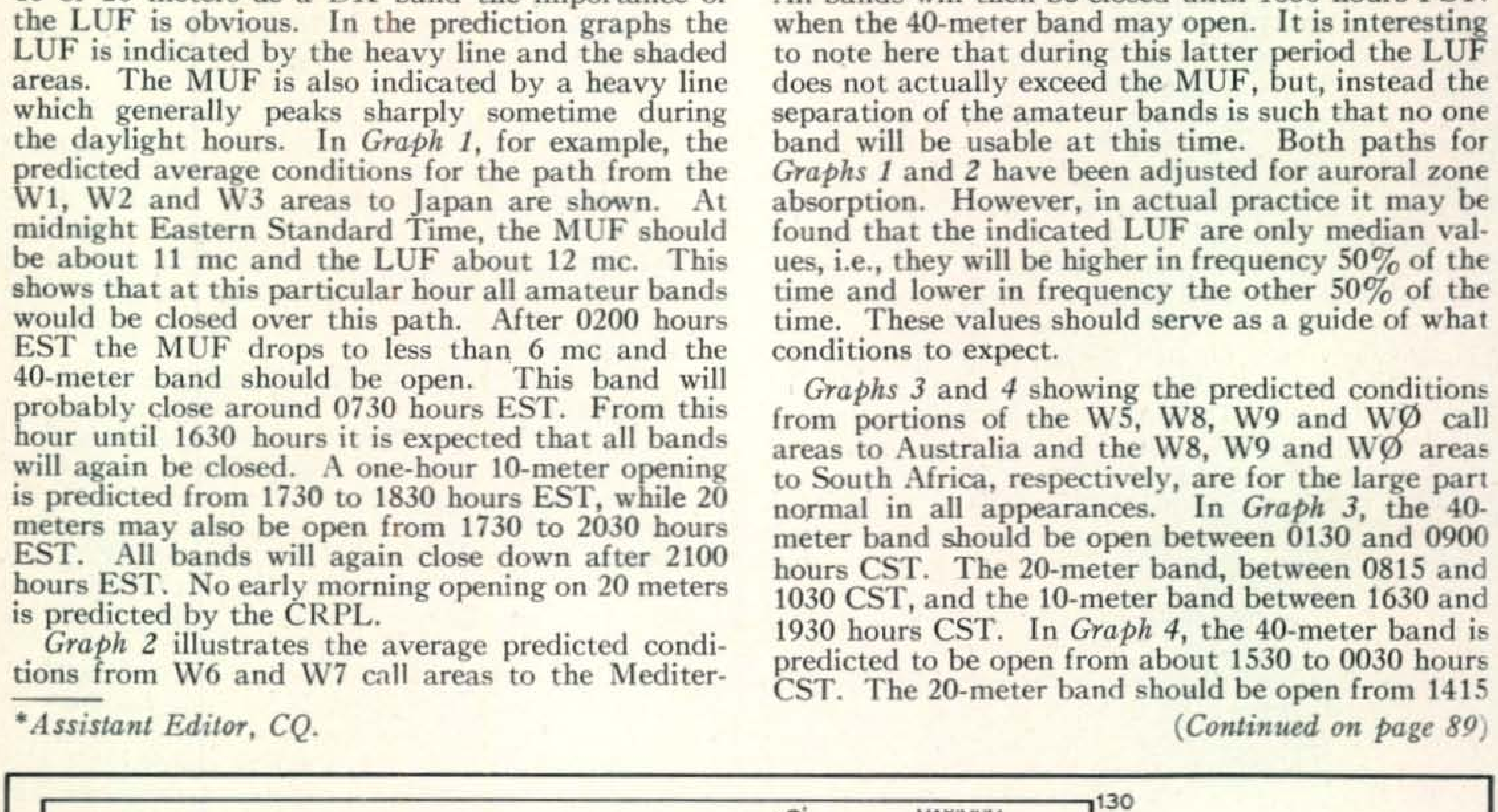
In the instance where the amateur uses either 40 or 20 meters as a DX band the importance of the LUF is obvious. In the prediction graphs the LUF is indicated by the heavy line and the shaded areas. The MUF is also indicated by a heavy line which generally peaks sharply sometime during the daylight hours. In *Graph 1*, for example, the predicted average conditions for the path from the W1, W2 and W3 areas to Japan are shown. At midnight Eastern Standard Time, the MUF should be about 11 mc and the LUF about 12 mc. This shows that at this particular hour all amateur bands would be closed over this path. After 0200 hours EST the MUF drops to less than 6 mc and the 40-meter band should be open. This band will probably close around 0730 hours EST. From this hour until 1630 hours it is expected that all bands will again be closed. A one-hour 10-meter opening is predicted from 1730 to 1830 hours EST, while 20 meters may also be open from 1730 to 2030 hours EST. All bands will again close down after 2100 hours EST. No early morning opening on 20 meters is predicted by the CRPL.

Graph 2 illustrates the average predicted conditions from W6 and W7 call areas to the Mediterranean and Balkan countries. Once again, all bands will be closed at midnight over this path. They will probably remain closed until the 10-meter band opens at about 0745 hours PST. Some scattered 20-meter signals are expected around 0700 PST, however, these should be weak with day-to-day variations in signal strength. 10 meters will probably close after 1030 hours PST. At about this same hour it is expected that 20 meters will reopen and should remain open on this path until 1230 hours PST. All bands will then be closed until 1630 hours PST. when the 40-meter band may open. It is interesting to note here that during this latter period the LUF does not actually exceed the MUF, but, instead the separation of the amateur bands is such that no one band will be usable at this time. Both paths for *Graphs 1* and *2* have been adjusted for auroral zone absorption. However, in actual practice it may be found that the indicated LUF are only median values, i.e., they will be higher in frequency 50% of the time and lower in frequency the other 50% of the time. These values should serve as a guide of what conditions to expect.

Graphs 3 and *4* showing the predicted conditions from portions of the W5, W8, W9 and WØ call areas to Australia and the W8, W9 and WØ areas to South Africa, respectively, are for the large part normal in all appearances. In *Graph 3*, the 40-meter band should be open between 0130 and 0900 hours CST. The 20-meter band, between 0815 and 1030 CST, and the 10-meter band between 1630 and 1930 hours CST. In *Graph 4*, the 40-meter band is predicted to be open from about 1530 to 0030 hours CST. The 20-meter band should be open from 1415

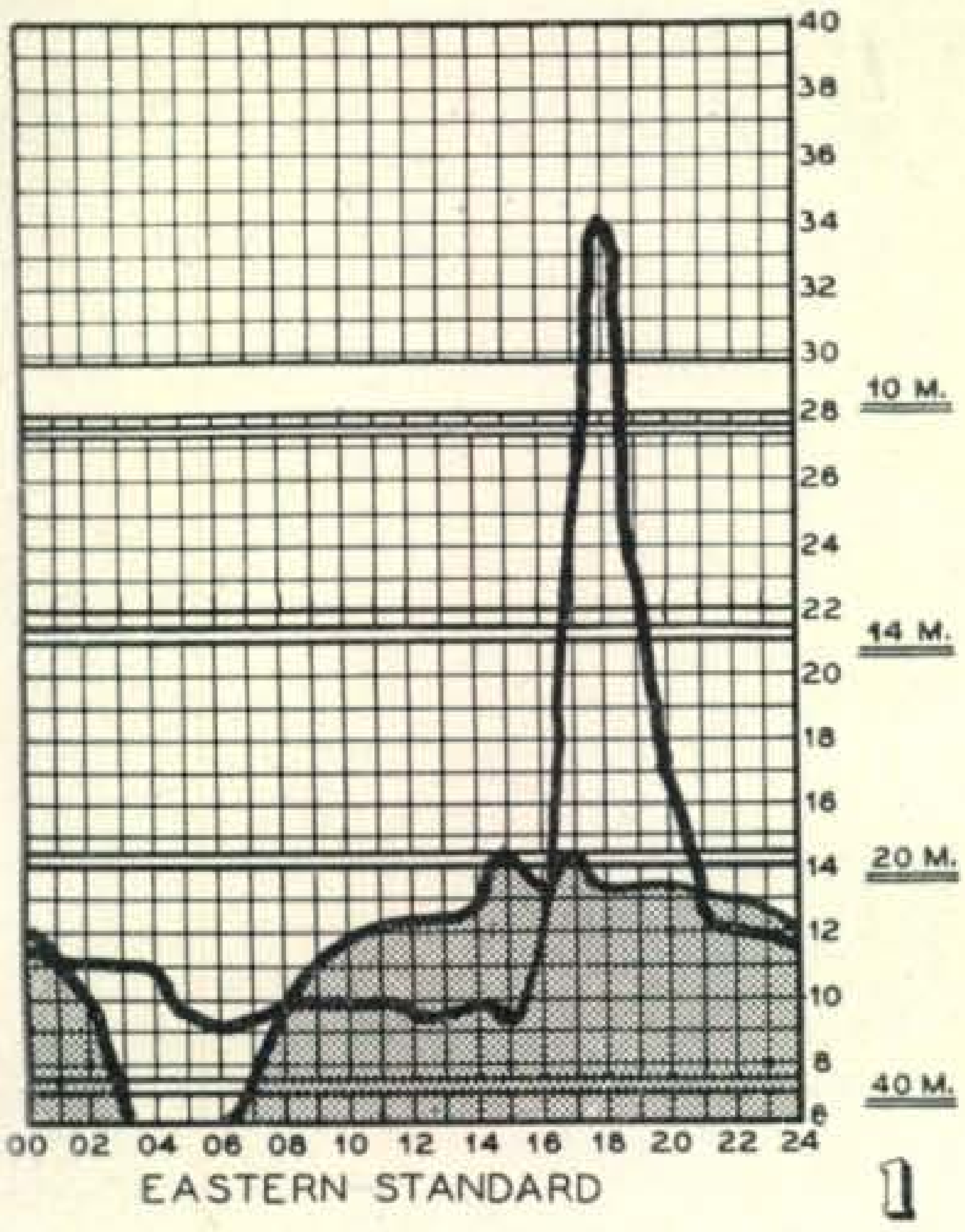
(*Continued on page 89*)

**Assistant Editor, CQ.*



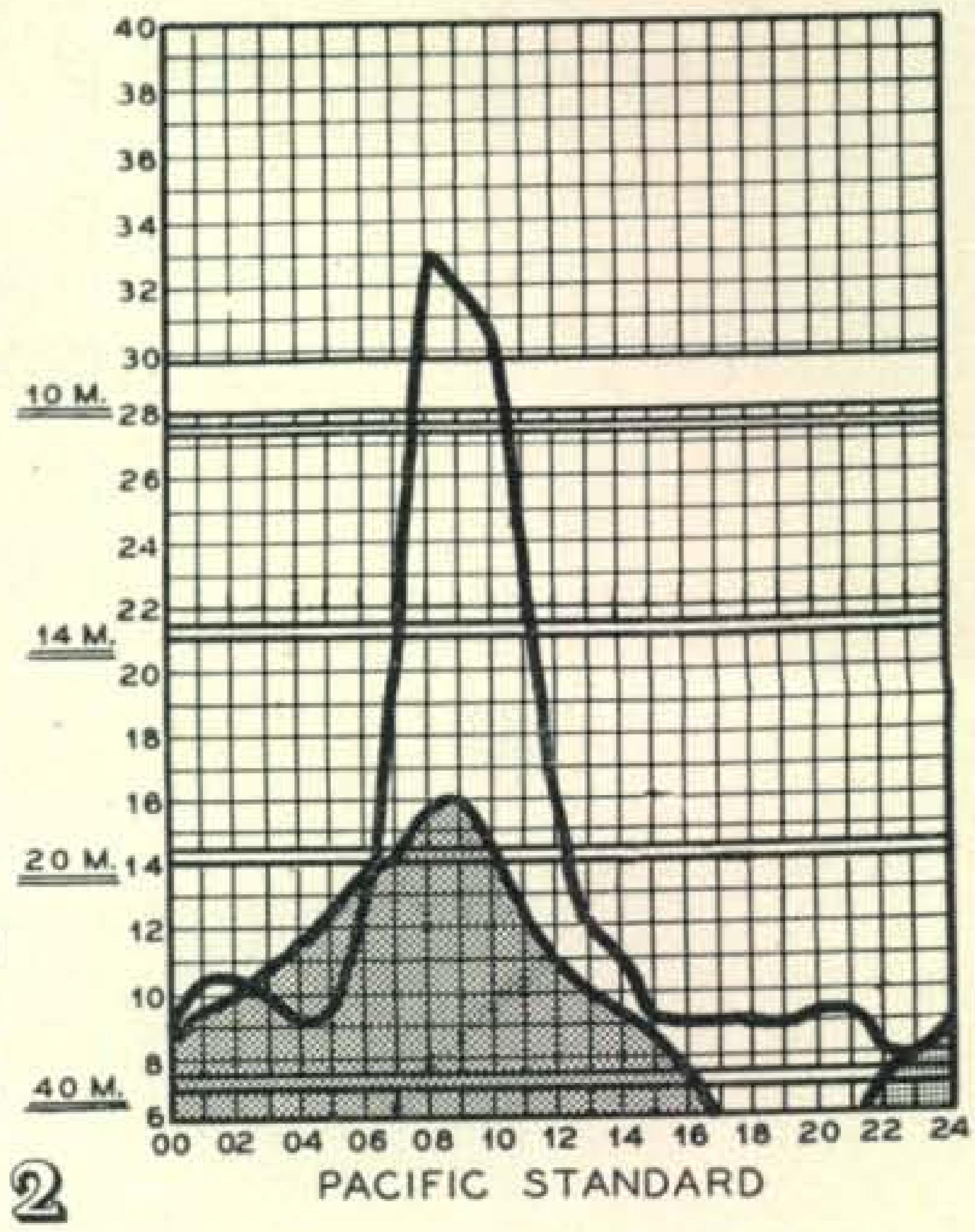
Relationship of the present sunspot cycle and the sunspot cycle extending from 1933 to 1937. The distinct difference is readily apparent, the current cycle being far more intense.

Monthly DX Predictions

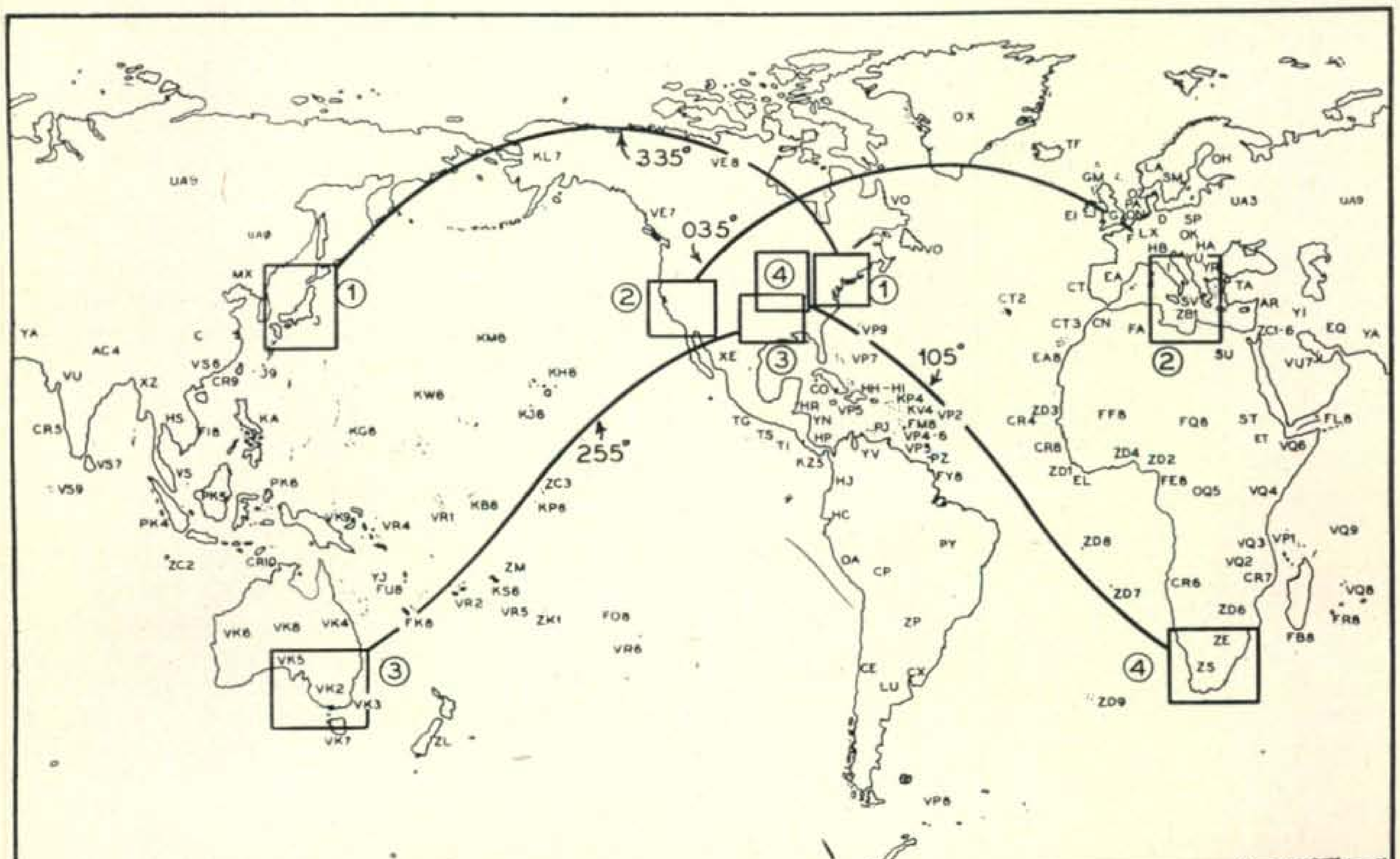


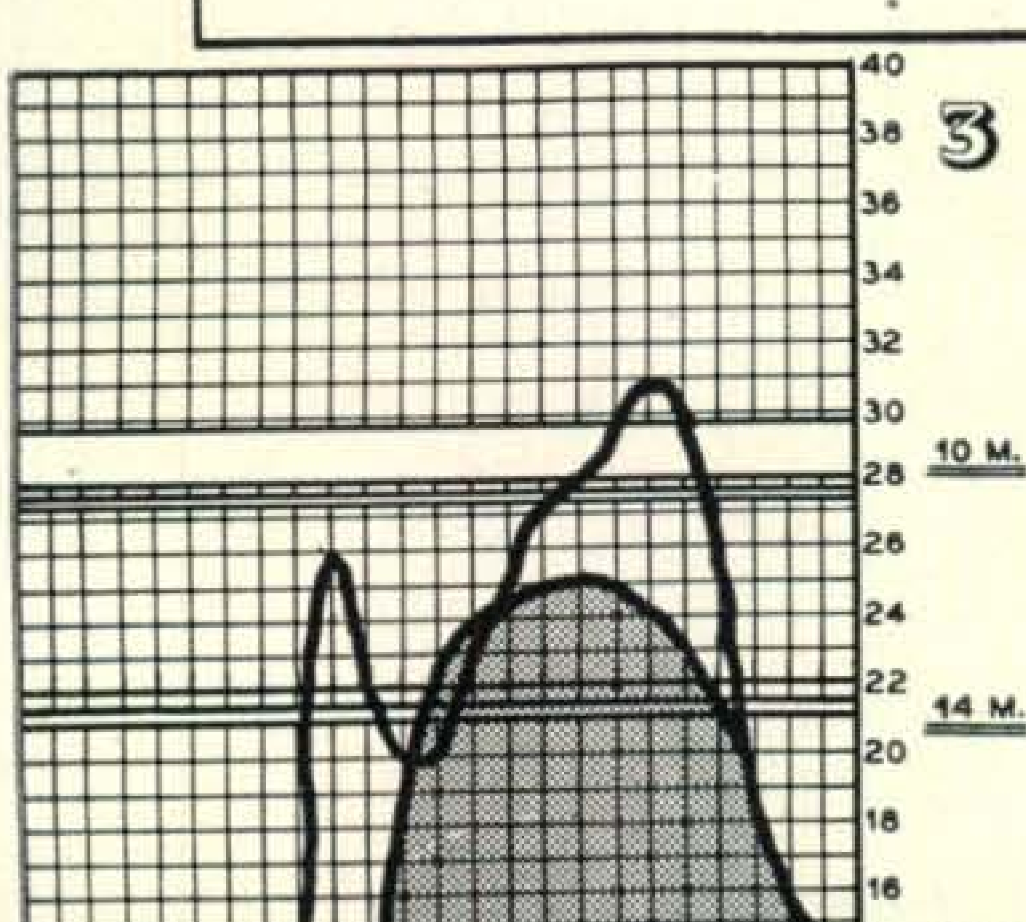
1

Maximum Usable Radio Frequencies—Charts show the maximum usable frequencies propagated by the F2-layer over the paths indicated in the world map. The abscissa shows the local standard time at the point of origin of the path. The ordinate shows the frequency in megacycles. Amateur frequencies fall within the two heavy parallel lines that indicate the upper and lower limits of the principal bands.



2





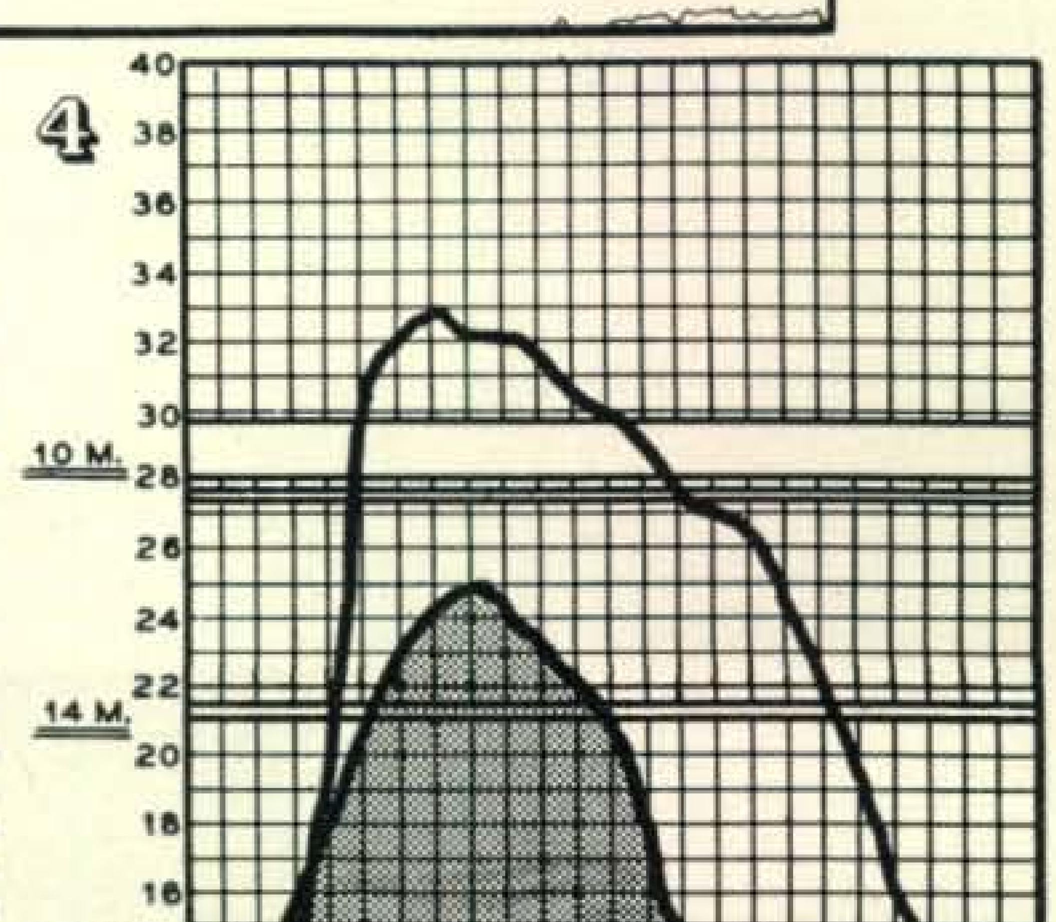
3

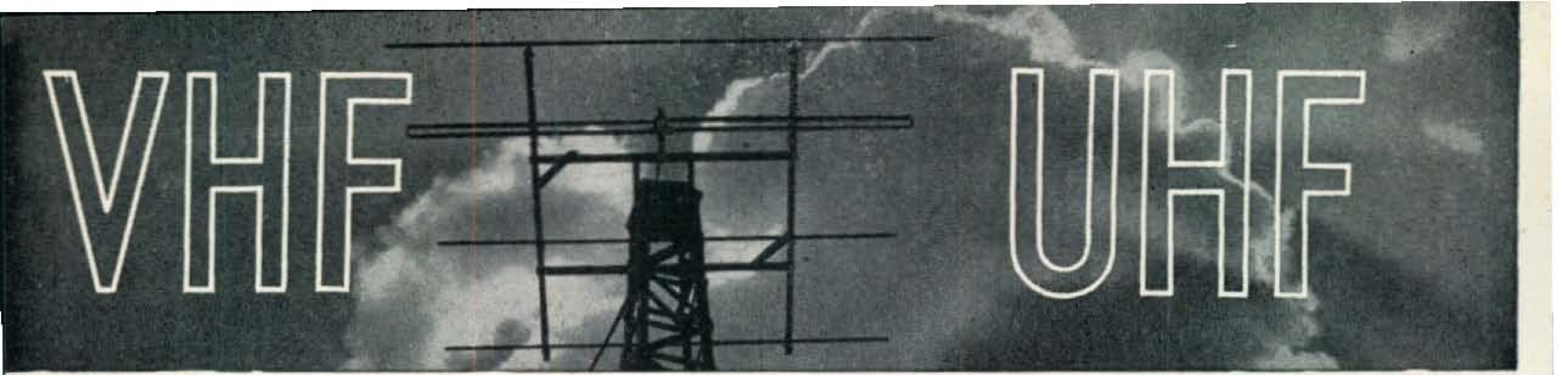
Lowest Usable Radio Frequencies—The shaded area in each chart indicates unusable radio frequencies for the illustrated path. The LUF is calculated for an above average amateur location using a good communications receiver. The effective radiated power is assumed to be 1000 watts. The LUF is based upon average monthly signal absorption and does not include the effects of abnormal or auroral zone absorption.

Azimuth—Radio transmission is known to vary considerably with geographic latitude and longitude. Each path MUF and LUF as illustrated is calculated for the "short-path". This is the path shown in the map.

Variations in Forecast—All graphs are monthly predicted average conditions. On ionospherically "quiet" days some variation amounting to less than 15% may be expected. However, a value representing 0.85 of the MUF will be exceeded over 90% of the total time. The graphs do not indicate radio propagation conditions during ionosphere storms or sudden ionosphere disturbances. They are not adjusted for the effects of sporadic-E layer formation or long and short scatter. Radio disturbances of the ionosphere storm type are the most severe for paths which pass through the auroral or polar regions, the effects gradually tapering off towards the equator.

4





Conducted by VINCE DAWSON, JR., WØZJB*

By telephone, telegram and radiogram comes the news of outstanding DX on 6 meters, and by DX we mean the honest-to-goodness type that makes the blood tingle of those hunting DX on the lower frequencies.

To some of the old-timers who kept plugging the 28-mc band in the 30s, this will be more than a fond memory, for these same old-timers were among the first to join in this DX on 6 meters, the first reported of its kind of real two-way contacts on the 50-54 mc band. These two-way contacts have been made possible by countries outside the U.S. allowing their amateurs to operate on the 50-54 mc band, the latest addition being Great Britain, who has given the Gs temporary permission until the first of 1948, to engage in experimenting on 50-54 mc. The addition of the Gs has been most welcome as it has given the Ws a chance to make it both-ways on 50 mc, rather than the 28-50 mc crossband contacts that had been taking place.

While there has been lots of work from W1-2-3-4-8-9 to the British Isles and Europe, interest has also been kept high among the v-h-f gang by some very good trans-continental work between the W1-2-3-4 and W6-7, VE1-2-7 districts.

Naturally, with all the DX work done, there have been lots of "firsts," but until we have the complete story from all sides, which may take some time, we will present to you the highlights.

Past reports have been on the north-south path from XE1KE in Mexico City to South America and from W4-5-8 to OA. However, this path has shown little activity since Oct. 19, as it seems the high-density mass has moved further north, to allow the trans-continental work and from the U.S. to Europe. The path from W6 to KH6 has repeated only once since Oct 12th, although ionosphere recordings from that area have indicated the band should have been open many times. Yet W7ACS/KH6 has been on consistently and hasn't caught these indicated openings.

**Send all contributions to Vince Dawson, Box 837 Gashland, Mo.*

A few of the highlights, before we get into the mass of stations heard and worked, really show that 50 mc has now taken its place as a DX band.

G5BY in South Devon, England, has had 152 cross-band contacts with 52 W and VE stations, and 20 others heard. All this was before Nov. 5 when he received his temporary license to operate on 50 mc. Having no rig on 50 mc, Hilton grabbed a few eats and worked until 4:30 a.m. to get a rig on, then went to bed for two hours sleep, and got up to have his first 50-mc two-way contact with ZS1P, a distance of 6000 miles. 45 minutes later he had a QSO with W1HDQ, and another in 30 minutes with a local. Within 1 hour, 15 min., 3 contacts with 3 *continents*!! G5BY has heard harmonics on 50 mc from Japan and S. America, so a WAC doesn't seem far off for Hilton.

Dennis Heightman, G6DH, was in better shape as he was able to get his PP 24Gs on to work W1-HDQ, Nov. 5, at 1302 GMT, and W2AMJ at 1345 for the first G-W 50-mc contacts that have been reported to us. On Nov. 10, G6DH got MD5KW in the Suez canal, for the first African 50-mc contact from G land.

Actually, the first G 50-mc QSOs will have to go unheralded, for G6X stole the show by working ZS1T, Oct. 17, VE1QZ on Oct. 28, and W1CLS on Oct. 29, making history, which will have to fade into obscurity for obvious reasons.

W1CLH, Ed O'Neill, says that all the W1s could write pages of stuff concerning the past weeks of 6-meter DX, for it was just unbelievable. Yep, he says it was well worth sticking on the v.h.f. to get in on these F-2(?) openings.

VK5NO, along with about five others in VK5, heard on Nov. 18, around 1900 PST, a W6 with the call letters either BE or BC. That W-VK contact isn't far off.

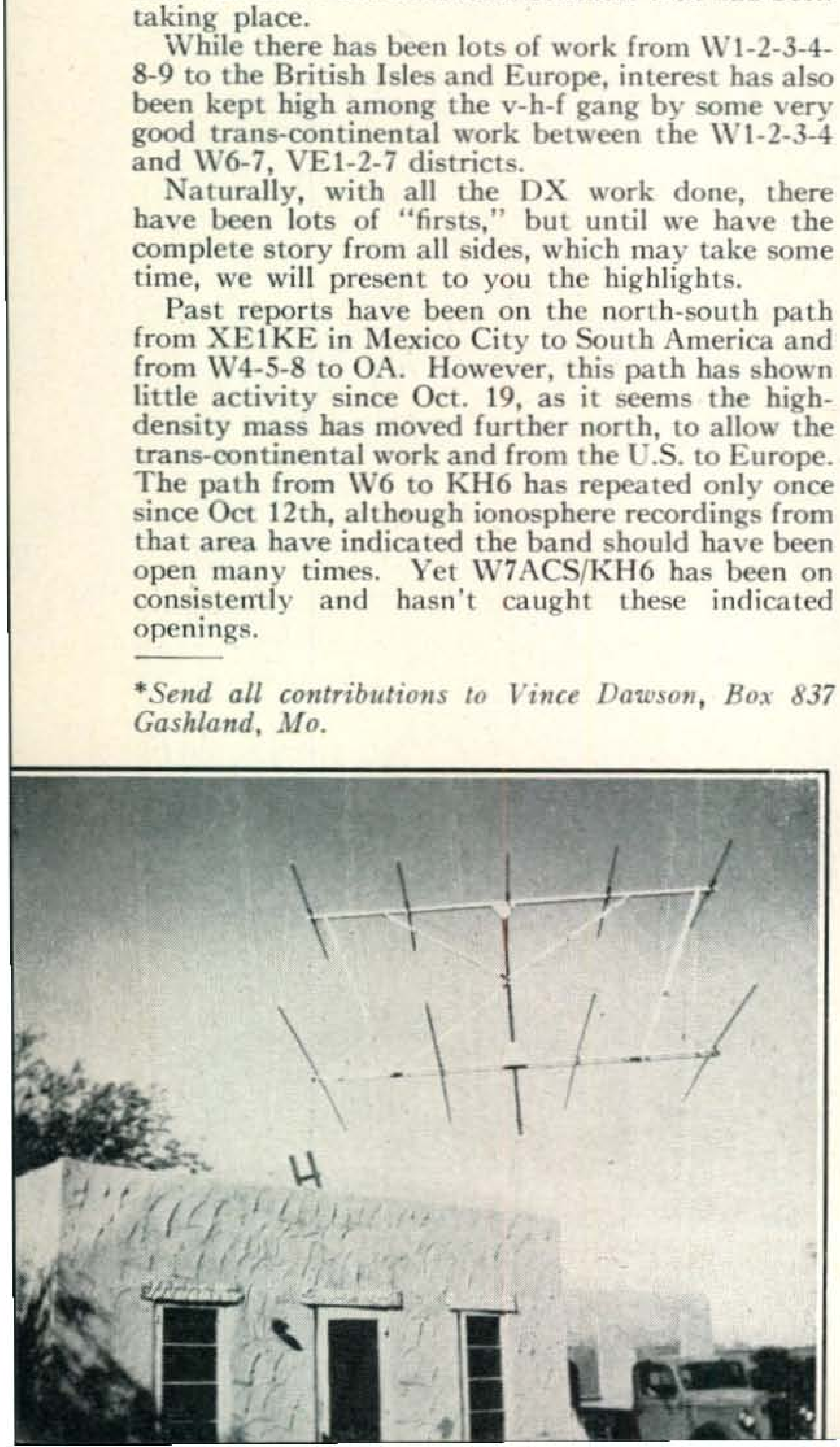
During the Nov. 1 opening, which was evidently the hottest for trans-continental work, W7ERA in Milwaukee, Ore., couldn't believe his ears when he turned the 6-meter converter on. He thought it was on 28 mc for the QRM from W1-2-3-4 was just amazing; not one or two loud signals, but hordes of them.

CRPL advises that during the period of Oct. 25 to 28, peak values recordered were 45 mc at 10-11 hours EST, although this can be a conservative recording from the 50 mc work done during the period mentioned.

W9ALU has heard PAØUN on 50-mc c.w., but too weak for good copy. Hod did get G5BY cross-band and KL7DY, still running his 40 watts. Sure takes high power!

W7QLZ in "Feenix," Ariz., says the highest frequency station heard was on Nov. 4, around 57,500 kc. The signal appeared to be a Forestry Tower, but QSB was bad and prevented identification. Clyde mentions that he hears the FM station CKWR, in Kingston, Ontario, almost daily.

VE3BQF in Hamilton, Ont., was the first VE3



The 6-10 dual array at W7QLZ, Phoenix, Ariz.

to get G5BY cross-band on Oct. 30. On Nov. 1 KL7DY, VE7DU and numerous W7s-W6s were worked in the Toronto area.

W5JLY in San Antonio says he chewed nails, and not on his fingers either, when LU9EV and W7ACS/KH6 came through, but they were in contact with W5VY and faded before Earl could contact them.

W5AJG in Dallas finally got KL7DY on Nov. 2 around 1230 CST, signals running way over S-9. Leroy mentions that KL7DY has 17 states and only lacking W1-6-7 for WACA in just two days of operating. During the opening to KL7, Leroy says that the 45-50 mc region was alive with buzz-saw signals, some with tones, others like diathermy, which he has never heard before.

W7BQX in Sequim, Wash., mentions hearing J9AAO at 1643 PST, S-3 for about 2 minutes. Ernie has had his share of the fun on the trans-continental openings also.

W2AMJ, Frank Lester, of converter fame, received a message from MD5KW in the Suez Canal, saying he had heard Frank's 50-mc signals on Nov. 4 at 1445 GMT RST 5-6-9, W1HDQ was heard by MD5KW about the same time.

Oscar Landoz, VE1QZ in Halifaz, N. S., has had 185 QSOs on 50 mc with 130 different stations, and plenty of the DX across the pond. Now he is anxious to try 235 and 420 mc with New England Ws, an almost all-water path.

Here's a surprising contact between XE2C in Monterrey, Mexico, and W9HSB in Springfield, Ill., on Nov. 15. This appears to be E_s as it is 1000 miles between the two, Monterrey being about 150 miles west of Brownsville, Texas. Gilberto, XE2C, will be on much more now that the ice has been broken, with his 100 watts to an 829B on 50.26 mc. This will be a good contact for E_s.

Bill Copeland, WØYKX, unfortunately had his usual run of bad luck, and had to be taken to the hospital just as the big DX started and missed it all. Bill is now doing okay and will be back at 'em for this real DX on six!

The Sad Sacks in Washington didn't get a chance to pick up any of the New England boys during last summer's E_s session, but have added lots since on the purported F-2 openings. The good openings to W1 even converted W7FIV, who was a 20-meter c-w hound, but he's on 50 mc to stay now after all this, says Bish, W7HEA, who also has been getting his share of 6-meter DX.

50-MC DX HONOR ROLL

Calls	States	Districts	Others
W6UXN	46	10	VE1-2-3-6-7-KH6
W4GJO	45	10	VE1-2-3-OA4
WØZJB	45	10	VE2-3-4-7, G5
WØUSI	45	10	VE2-3-7
W6WNN	45	10	VE1-7
W9DWU	45	10	
W9ZHL	43	10	VE1-2-3-4-7-XE1-KL7-G5
WØDZM	43	10	VE1-2-3-7
WØQIN	43	10	VE1-2-3-7
W7BQX	43	10	VE1-3-4-7
W9ZHB	42	10	VE3-4-7
WØBJV	42	10	VE2-3-7
W1CLS	42	10	VE1-3-G5-G6-PAØ
W7ERA	42	10	VE1-7
W3CIR/1	41	10	VE1
WØINI	41	10	VE2-3-4
W8NSS	40	10	VE1-4-VP7
WØSV	40	10	VE7
W4GIY	40	10	VE1
W1LLL	40	10	VE1-G5-G6-PAØ
WØYSJ	39	10	VE2-3-7
W6AVV	39	10	VE1-7-KH6
W7FFE	39	9	VE7
W5JLY	38	10	VE7-XE7-VP7-OA4-G5
W5AJG	38	10	VE3-XE1
W5ML	38	10	VE3-XE1
W6UXN	38	9	VE3-7
W8ZVY	38	10	KL7-G5
W6OVK	37	10	VE1-2-3-7-KH6
W8QYD	37	10	VE1-4-OA4-G5
W2IDZ	37	10	VE1-G5-G6-PAØ
W4QN	37	10	VE2-3-OA4
W9UNS	37	9	
W5VV	36	10	VE7-XE1
W7FDJ	36	10	VE1-7
W5FSC	35	9	VE1-3-7-XE1-OA-KL7
W2RLV	35	10	VE1-3-7-KL7
W5HF	35	10	VE1-3-4-7
W1JLK	35	10	VE7-G5

Calls	States	Districts	Others
W5VY	35	8	VE7
W2BYM	34	10	VE1-VP7
WØDKS	34	10	VE3
W5FRD	34	10	VE7-XE1
WØJHS	34	10	VE1-2
W7HEA	34	10	VE1-7
W4WMI/4	33	10	VE1-2-3-VP7
W1HDQ	33	10	VE1-G5-G6-PAØ
W4DRZ	33	10	VE1-2-3
W6PUZ	33	10	VE3-7
W7KAD	33	10	VE7
W9PK	32	10	VE3-7
W1CLH	32	10	VE7-G5-G6-PAØ
W6FPV	31	10	VE1-2-3-KH6
W4FBH	31	10	VE1-2-3-XE1
W5LCZ	31	10	VE3-XE1
W3OMY	31	10	VE1-VP7
W9ALU	31	10	VE1-2-3-4, G5, KL7
W6BPT	30	10	VE1-3-7-KH6
W4HVV	30	10	VE1-2-3
W9UIA	30	10	VE1-2-3
W5WX	30	10	VE4-7-XE1
W4EQM	29	10	
W3RUE	29	10	VE1
W4EQR	28	10	
W6ANN	28	9	VE3-7
W1CGY	28	8	VE1-G5-G6-PAØ
W4FQL	28	9	VE1
W7ACD	27	8	
W5LBG	26	8	VE7-XE1
WØDNW	26	10	
WØYKX	26	10	VE2-3
W6NAW	25	9	VE7
W5ESZ	25	8	VE7
G5BY	24	8	VE1-2-3-ZS-MD5-SU-W
VE1QZ	24	8	VE1-3-G-PAØ-F7-HB8
W7JPA	24	8	VE7
W5LIU	24	8	
W8MVG	23	9	VE1-PSØ-G5
W9AB	23	9	VE1-2-3-4
W4JML	20	9	VE2-3-G5

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W4GJO says the 6-meter band is screwy as—well its screwy anyway, says he, for there is something new every day and you never know what to expect next. Grid hears garbled FM sigs on the old FM band daily and says that HCJB in Quito, Ecuador, has a terrific harmonic just outside the low edge of 50 mc. Too bad someone in Ecuador won't join the fun on 6 meters to give us another country, which would probably be the most consistent signal into the states.

On Nov. 12, MD5KW in the Suez Canal Zone worked ZS6HS, ZS6JB and VQ2PL on 50 mc both ways. These are all good countries the DX hounds would like. They are there gang, just keep plugging away.

Many of the gang have reported hearing signals from 200-400 miles while the band is open to long distance skip. This evidently is the same scattered reflections noted on 28 mc when the ends of the beams are on each other. This scattering can be used to determine the location of the high density F-2 mass and give an indication of where the band should be open to, in case there is activity in that direction.

Last summer when the double-hop was on it was noted by most of the 50 megacyclers that everyone was crowding the low end of the band, and now comes the same news on these long distance hauls, that the first 200 kc of the band is overloaded, preventing identification of signals. So let's do a little spreading out fellows, and don't forget that the band goes to 54 mc. Try a CQ and tune from the high end down; this will give the FM boys a chance, as well as the lower powered boys.

While all this DX has been fun for lots, there are some who have yet to hear a peep out of the band, but they have been in there plugging. Yep, you guessed it; the WØs are just "Lucky Pierre," caught in the middle just too far for the hop to Europe, South America and Africa, and too close for the KL7s, but just about the right distance for KH6. It's still fun, but discouraging.

To many, the following reports may seem somewhat dull, but let's compare our logs against the reports to see what took place. Of course, if you are a WØ you will probably end up at the local pub, doing a lot of - - - crying.

The big day appears to be Nov. 1, where we shall begin the reports for this month. Last month's report covered part of this but not fully.

Nov. 1—W6UXN started this day off before going to work by getting between 0810-1106 PST the following: W1KUD, EIO, LLL, CLS, LSN, AF, NF, POD, W2BYM, RC, AMJ, BQK, W3CGV, MKL, VE1QZ, FL and hearing W1BWJ, DJ. W7QLZ heard many W1s calling W6s with W1CLS being outstanding. The VE1s were also in, louder than the W1s. Signals stayed in from 0925-1025 MST. Stations heard were W1CLS, EIO, BWJ, LSN, AF, KLH, ASZ, HIL, VE1QY, FL. VE1QZ was worked by Clyde at 1030 MST. The highest MUF heard was WQR harmonic on 51.3 mc. At 1330 a signal on 50.1 mc was heard, peaking from the Hawaiian direction. Ed Ladd, W2IDZ had fun contacting: W6ANN, AMD, W7JPA, JFS, HEA, BQX, FIV, EVO, ERA, VE7AHZ, AEZ, DU; and heard: W6UXN, WNN, UOV, BPT, W7DF, and KL7DY. The QSO with W6ANN gave Ed his WACA. KL7CM heard the following; W6KD, BPT, IWS, BVK, W8MVG, W3IUN, OR, W6PUZ, OB and a VE1. Also heard was W7QLZ. KL7-DM will be on 50.2 mc shortly. W7CTY in Grandview, Wash., got W2BYM, W1CLS, JLK from O815-0831 PST. W6BPT, Santa Clara, went to town with: W1KUD, KMZ/3, EIO, AF, LLL, BWS, CGY, NF, EKT, LSN, JLK, POD, W2AMJ, RLV, MGF, BYM, W3IUN, VE1FL, VE3AEU, AME, AIB, all between 0815 and 1157 PST. W7FIV, a newcomer from 20 meters tore into: W1AF, BWJ, KUD, EIO, LSN, EYM, HIL, EKT, W2BYM, AMJ, IDZ, UED, W3IUN, MKL, CGV and VE1FL. W9QCY in Ft. Wayne, heard and worked W8RLT, the only signal on the band; just too close for the W6-7s. W7JPA in Yakima, Wash., rolled up: W1BWJ, EY, EIO, LSN, HIL, PID, DJ, NF, CLS, LLL, W2IDZ, AMJ, RGV, JPX, W3OR, KC, IUN, W4WMI, VE1QZ from 0845-1155 PST. W9ALU, Illinois faithful reporter, got KL7DY who was S-9 plus at 1320 CST. W2RLV in Western N. Y. QSOd: W6BPT, AMD, UOV, ELU, IWS, IMI, JRM, W7FP, ERA, VE7AHZ, DU, KL7DY. W1NF in Beverly, Mass., made contact with: W6ANN, WNN, UXN, BPT, BWG, CAN, UOV, W7ERA, JPA, DF, BQX, VE7NM, DU from 1249-1545 EST. W7HEA, Toppenish, Wash., got: W1EIO, LLL, KMZ/3, W2AMJ, JPX, IDZ, W3OR, MKL, CGV, IUN, W4GLV, VE1FL. W9ZHL in Terre Haute, Ind., reports that KL7DY was S-9 for 3 hours, from 1200-1500 CST. W6IWS at Brookdale found the band open for the following: W1LLL, KMZ/3, CGY, EIO, W2AMJ, RLV, PWP, BYM, W3OR, IUN. VE2KH in Montreal called G5BY at 0755 EST but did not raise him, then went on starting at 1425 EST to get W6CAN, EIL, W7ERA, EUL, DF, BQX, VE7DU until 1515. W4HVV, Raleigh, N. C., got W7BQX at 1440 EST and KL7DY at 1540 EST, the only signals Charley heard. Elmer Walker, a v-h-f listener in Alderwood Manor, Wash., heard W2BYM at 0746, closing at 1210 with W1BNS. The highest MUF Elmer heard was 51.1 mc. W1CLS in Waltham, Mass., went into gear and hooked: W6HXA, ANN ,EID, QG, OHM, UXN, AMD, TMI, WNN, QFT, CCI, FSH, UOV, W7CTY, EVO, JPA, FP, DYD, DF, VE7AHZ, DU and KL7DY all from 1130-1530 EST. W7BQX in Sequim, Wash., dashed out these: W1JLK, BWJ, EIO, JQA, CLH, BKE, KMZ/3, PEA, BJB, EKT, NF, W2FBA, RGV, IDZ, RC, JPX, MLX, SYR, BYW, IQQ, W3HC, IUN, CGV, OR, GKP, AIR, W4KMA, WMI, EQM, KUN, HVV, VE'FL,

West Coast QRM was light at the time this photo was taken. From left to right, rear row: Unidentified, W6YRL, W6AOR, unidentified, unidentified, W6VMT, W6ANN, W6LSN, W6VOG, W6NAW, W6UXN, W6QXB, and W6APG. Front rows: W6QUK, W6TMI, W6YYN, W6OLO, W6TJZ, and W6WNN.

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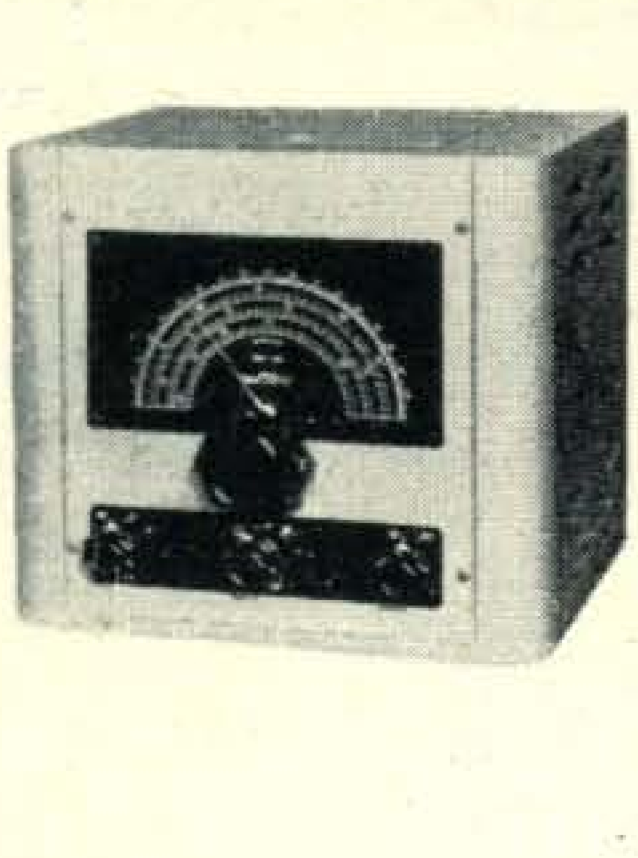

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Peoria 6, Illinois U. S. A.

VE2KH, VE3BQL from 820-1253 PST. VE1QZ, Halifax, N. S., wound up with these: W6UXN, ANN, WNN, BPT, OB, W7OWX, QLZ, SP, JPA; hearing W7HEA, ERA, BQX, W6PUZ, VE7DU. W7SP, Saltair, Utah, worked VE1QZ at 1055 MST for the only signal identified, all others were in the mud. Ted Valpey, W1ATP, worked VE7NM, DU and heard W2s calling KL7DY, but could not hear him. W7ERA recovered from the shock of finding the band so wide open and got: W1NF, ATP, LLL, CHY, EKT, NWL, KUD, EIO, LSN, IID, DJ, CLH, PEA, CLS, W2BYM, PWP, RFV, BQK, IDZ, FBA, RLV, SUR, MLX, W3CGV, OR, IUN, MKL, AIR, VE1FL. W1CLH, Bridgeport, Conn., wound up with: W6CAN, PIV, W7BQX, HOL, ERA, VE7NM, signals all peaking S-9 and over.

Nov. 2—W7ERA, still slightly shocked, worked: W1KMZ/3, HMS, KHL, HDQ, CLS, W2AMJ, RRG, KZG, BYW, IQQ, HEL, QVH, W3GKP, HC, W4WMI, GLV, JCV, KMA and heard W4GJO and W4FLH, all between c842-1140 PST. W1CLS still going strong with: W6UXN, FPV, KD, QFT, OVK, FSH, CLO, JRM, OB, BWG, CDQ, BPT, BOS, AOP, CAN, QFT, OLO, GGM, BHR, W7FFE, ERA, DF, BQX and, of all things, W1SZ. (No wonder he isn't working any 20-meter DX—Ed.) Heard were W6UQV and W7EUI. W9ALU couldn't raise G5BY, but did hear some scattered reflections from W8RLT, MG, ZFY, W9IWX, WØKYF, JVE and KL7DY all from 1245-1345 CST. A TV signal was heard on 49.5 peaking N.W. Elmer Walker, V.H.F.L., heard W4HVV at 0900, closing with W2BYM at 1202, the MUF going to 50.750 mc. W4HVV had a better day than the 1st, getting: W7DMN DYD, FIV, EVO, HOL, BOC, HEA, DF, FP, JFS, EUI, JPA, W8MVG, ZUY, VE7DU, AEZ, AHZ, BQ, NM, ADW, and KL7DY from 1023-1341 EST. VE2KH called G5BY to no avail, but worked W6BPT, LMV, JRM, OVK, EUL, AOR, FPB, VOV, FPV, TMI, GGM, UXN, PUZ, SSM, all from 1305-1400 EST. VE1QZ was heard by G5BY at 0850. At 1030 Oscar heard an Omaha FM station on 43 mc, and at 1125-1500 worked the following: W6GGM, PUZ, FMH, FPV, KD, OB, BOS, URN, AMD, QFT and heard W6NAW, IV, QG, AOR, TMI, OVK. W6IWS, from 0855-1007 PST worked: W2KNQ, RGV, IQQ, W3OR, CGV all around S-9. W1NF beachheaded with these: G5BY, W6JRM, NAW, GGM, EJD, AMD, ACR, IV, CCJ, TMIK, OVK, ZDJ, PUZ, from 0946-1455 EST. W9QCY worked KL7DY at 1500 CST with S-3 signals. VE1QY took off at 1220 EST, with: W6UXN, OB, IVA, KD, FPV, LSN, GGM, IV, CCJ, PUZ, BOS, FSH, NAQ, URN, BPT, and heard W6OV/K, FMH, AOP, ANN and W7DF ending 1527 EST. W1CLH got W6BPT, OVK, EUL, UOV, W7BOC from 1240-1337 EST signals averaging S-9. W7BQX started at 0810 with W1CLS, KMZ/3, W2BYM, AMJ, W3OR, AVL, W4EID, HVT, EQM, GLV, AVT, signals going out at 1222 PST. W2RLV hooked W6OVK, ZDJ and saying condx were very good from 1230-1315 EST. W7QLZ says he heard VE1s from 0900-1300 MST, with the MUF going up to 50.3 mc. W2IDZ worked W6EUL, BPT, OVK, UOV and called W6IWS, GGM, 7FFE, DF, HBH and W7ADW. W7JPA had a lone contact with W4HVV at 1040, signals S-5 to 9. W5AJG got his first real DX by hooking KL7DY at 1230 CST for a S-9 report. W4GJO got WØKYF on scatter; W7FIV, DYD, HOL, VE7DU, AEZ, NM and KL7DY from 1052 to 1317 EST, mentioning condx were excellent. W7BOC had contacts with: W1CLH, W3IUN, OR, W4HVV from 0900 to 1046 PST. W6OVK says he had 51 contacts with W1-2-3, signals way over S-9. W6UXN made contacts with W1CLS, POD, HDQ, IN, NWL, HIL and heard W1JCI from 0815-1016 PST. W3GKP, Silver Spring, Md., worked W7ERA, DMN, HOL, condx fair, and heard W7DF, FFE, FP, VE7AHZ from 1157-1340 EST. W7FIV, with condx fair to very good, worked: W1HDQ, KMZ/3, W3HC, W4HVV, FLH, GJO, 0905-1050 PST. W7CTY got W1KMZ/3 and W3IUN both in Wash., DC, with fair signals. In Van Nuys, W6FPV worked: W1CLS, CJL, LSN, HIL, EIO, PBT, LLL, W2AMJ, BYM, VE1QZ, QY, FL, AYL, and VE2KH from 0830-1125 PST, condx good.

Nov. 3—W7FIV got W1JLK and VE1QZ from 1025-1030, condx poor. W3GKP heard KL7DY at 1313 EST S-2. W7JPA worked W1HMS, DBM, AF, HDQ, JLK, W2BYM, RGV from 0910-1035 PST, condx very good. VE1QZ found the band open for W6OVK, W7HEA, KKB, DF, FIV, DYD and heard W7DMN and VE7AEZ; KL7DY was thought to be heard but not sure, all from 1120-1400 EST. Elmer Walker in Washington heard VE1QY at 0832, going out at 1035. W9ALU called G5BY again without any results. He heard PAØUN at 0846 CST very weak on c.w., also W8MVG and W9HGE on scatter. W1CLS worked VE7AEZ and heard W7EUI from 1221-1246 EST, condx good while they lasted. W7ERA getting used to it all by now, had to work, but his mother (!!) tuned the band and found W1AF, NWL, HDQ, DBM, HMS, W2BYM, RGV coming in nicely between 0830 0930-MST. W9ZHL worked G5BY as late as 1240 EST, with S-8 signals. W7QAP in Tucson heard a VE calling KL7DY at 1213 MST, with a chirpy note. W2AMJ worked on 50 mc PAØGN and G6X from 0933-0952, getting G5BD crossband at 1020 EXT with loud signals. W7HEA hooked W1BDM, NWL, W2GYV, VE1QZ, AYL from 0925-1006 PST with condx excellent both ways. W7DF got VE1QZ at 1300 EST S-9.

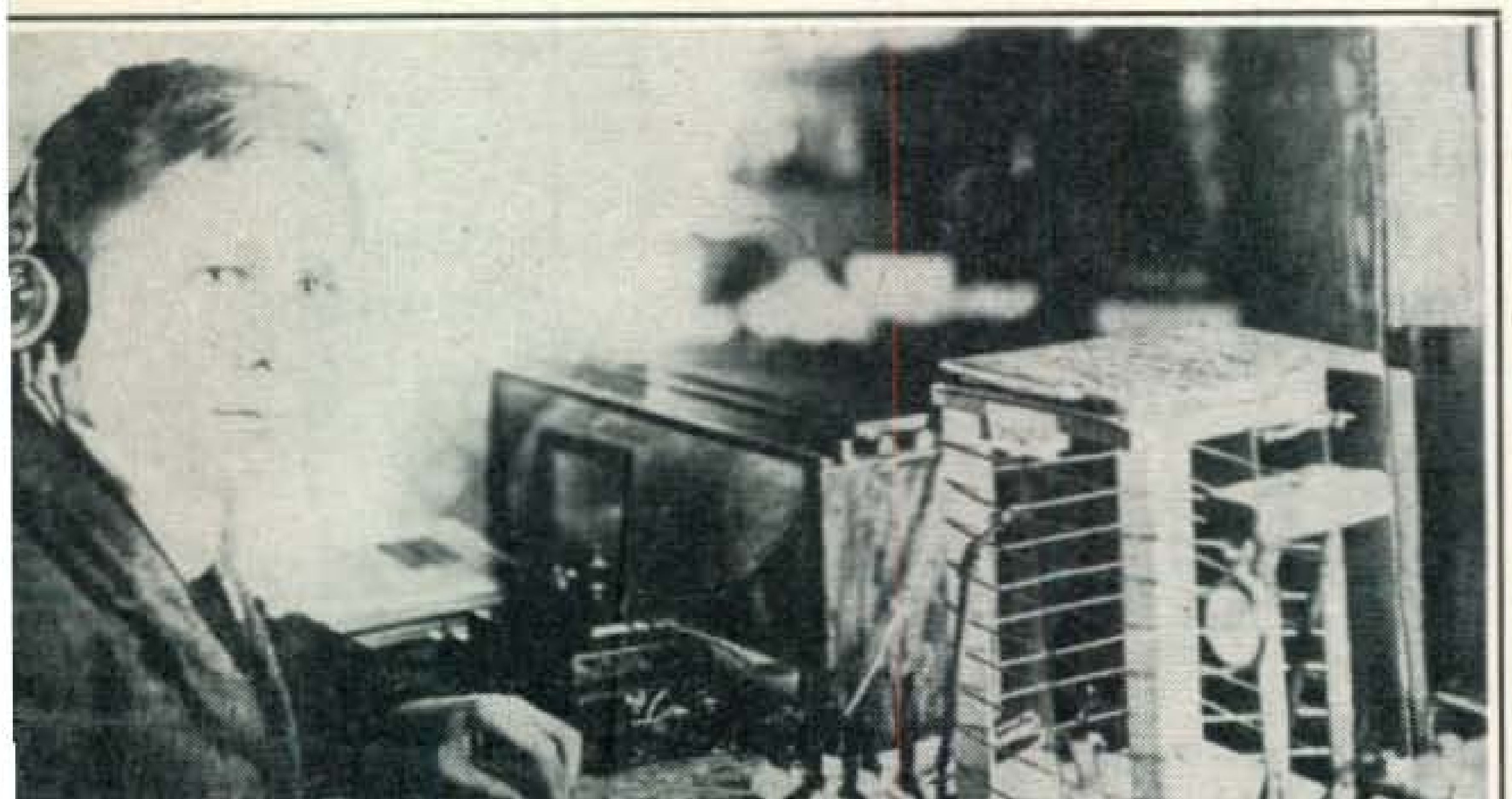
Nov. 4—G5BY worked W4HVV, good c-w signal at 0929 EST. W8QYD, Dayton, Ohio, worked G5BY crossband at 1345 EST and WØNFM on scatter at 1300 EST. W2AMJ plugged away and got: (DX hounds please note): G5BY, G5ZT, G6X, G5BM, PAØUN, PAØGN, G6Y, G6DH, G6LK, G6FO, G5WP, G6DH with ripping signals. W7HEA worked W3GKP, VE1QZ from 1057-1106 PST, condx poor. W1CLS hooked W6PSQ, ACR, VIB, YRL, HBD, all from 1308-1337 EST condx good. W7ERA got on to raise: W1JLK, NWL, W2OUS, EUI, KNQ, SYR, OSF, IDZ, AMJ, W3OR, W4HVV from 0945-1120 PST, condx excellent, no less. W9ALU hooked G5BY crossband at 0915 and heard W5BSY/M near Azores calling G6WT. Elmer Walker in Wash. heard W3OR at 0946 and closed at 1222 with VE1OD. VE1QY worked on 50 mc PAØUN and G6X, then got crossband G5BY, G6DH, G5BD, G5ZT. The latter tried 58.5 mc, but was not heard at VE1QZ. W7JPA had a single contact with W1CGY at 1023 EST, condx poor. W3GKP in Md. got W7DYD and W7HEA from 1301-1358 EST condx fair-good. At 1308 W7ERA was heard S-9. W7FIV got W1NWL, CGY, W2BYW, W3OR, W4-HVV and VE1OD from 0950-1320 EST, with condx averaging good. W2IDZ got G5BY, G5BD, G6LK crossband; worked on 50 mc PAØUN, hearing PA ØGN, then followed with: W6BPT, GGM, PIV, IWS, W7ERA, DMN and heard W7FIV. W7QLZ heard and worked W1s and VE1s, mentioning the highest signal heard as 57.5 mc. W9QCY worked G5BY crossband at 0845 CST with good condx. W6IWS made it with: W2SYR, EUI, IDZ, AMJ, BYW, W3OR, CGV, hearing W1HDQ and W1LLL from 0944-1125 MST with very good condx. W4HVV down "suth" in Raleigh, (Rally) worked G5BY, at 0829 and again at 1405 EST. Evidently there was a second peak, for these were worked in-between, from 1245 to 1328; W7DYD ERA, FIV, all with S-9 signals.

Nov. 5—This was the day the Gs were authorized temporary operation on 50-54 mc. G6DH was one of the first to use his temporary license and got W1HDQ, LLL, AF, CLS, W2AMJ W8MVG, the contact with W1HDQ evidently the first G-W two-way 50-mc QSO. W1CLS made it two-way on 50 mc with: PAØGN, WL, UN, G5BD, G6DH, W7BQX, all from 0950-1234 EST, condx very good. W2AMJ made it with G6XM, G6LK, G6DH, before having to rush off to work. G5BY added crossband to his list: W4JML and W9QCY, both S-9. OA4BG took off with the LUs again by getting: LU1CC, LU9AX, LU3BR, from 1957-2100 EST, evidently Es. W1ATP got PAØUN, GN, G6LK, G6X, G6DH, G5ZT, G5BD, G5WP and G6LK from 0920-1345 EST with very good condx. VE1QY raised G5BY, G5BD, G6OS, from 0730-1130 EST. W7QLZ reports an MUF of only 44.8 mc, with no ham sigs. W7FIV got W1JLK for a quickie at 1000 EST, poor condx. Elmer Walker in Wash. heard W1HMS at 0919 and W1JLK at 0953 when the band went out.

Nov. 6—W7QLZ says the MUF got up to 42.3 mc when he heard a SWBC harmonic at 1145 MST. Elmer Walker heard W1LSN at 0930, closing with W1HMS at 0935.

Nov. 8—W7ACS/KH6 worked W6BPT, S-9 at 0926 HCT. At 1250, J9AAO was heard by W7ACS/KH6, S-9 for 10 mins.

(Continued on page 70)



W1NF in 1903 and 1948! The first rig used a 1" spark coil and a helix tuner. For receiving there was a coherer detector. Art Ericson is still very active on 6.

The YL's Frequency

Conducted by LOUISA DRESSER, W1OOH/2*

THE DEBATE goes on . . . To the question in September *CQ*, "Are the rest of these girls so completely thrilled at their ability to copy code and so ashamed of their ability to make conversation on the air that they never get on phone?" the best answer to date comes from Carol Witte, W6WSV.

Carol writes: "Some of the gals in the Los Angeles club were stimulated by Eloise Cook's remarks in September *CQ*—namely, Lenore, W6NAZ (both phone and c.w.); Clara, W6TDL (10 phone); Maxine, W6UHA (10 phone), and others. Our club has a predominating phone operator membership—to the chagrin of c-w stalwarts like Enid, W6UXF, and myself, who think it requires more personality to keep a good c-w rag-chew going, where the s.a. element of voice, even, is dispensed with. We think there're too many $%&'()* unlicensed wimmin (wives, gal friends, etc.) cluttering up the phone bands with chin music—so that any self-respectin' licensed gal wouldn't be caught dead blabbin' fer hours on a mike—nor a good OM operator, either. Hi! In other words, blabbin' on a mike isn't ham radio—you can put a nickel in any telephone and get the same effect. Hi! Occasionally it may be justified, but for all-time operating, phfooey!"

Any more comments forthcoming, girls? We'll be glad to pass them on to the rest of the gang.

In the same FB letter Carol tells of receiving her Master's degree at the end of the summer session at the Univ. of Southern California. She and her OM have a nice apartment in South Pasadena, but adds: "We aren't on the air yet, though we have a converted BC-348 receiver. With the cost of living so high we are lucky to make ends meet, so when we save an occasional buck it goes into the transmitter fund. Hi! My own rig in Chicago was drowned in a spring flood in the basement, so that means we start out from scratch practically."

Carol, who is publicity chairman for the YL Radio Club of Los Angeles, also brings us up to date on the club's doings. At their October meeting, which was the first birthday meeting of the club, the guest of honor was Diana Tuck, ZS6GH. A surprise visitor, May England, XYL licensed op at VE3QL in Windsor, Ontario, also attended the combination luncheon-meeting. May said she and her OM came to the U.S. with the intention of settling down and becoming citizens, but when the R.I. informed them that they'd have to wait five years or so until they got their final citizenship papers before they could operate, they decided they couldn't do without ham radio that long—and so departed again for Canada!

Ellen, W6YYM, tells us that the San Diego YL Club also entertained Diana the latter part of October with a luncheon at Imig Manor.

All of us have been following with interest reports of Diana's travels from ham shack to ham shack throughout Canada and the U.S. and at long last we in N.Y.C. have had the pleasure of meeting this charming representative of ZS-land. Arriving in New York on December 1st, Diana was immediately initiated into the local YL roundtable on 10 from W2PMA's station. Then to a big hamfest in Yonkers on the 5th before sailing for England.

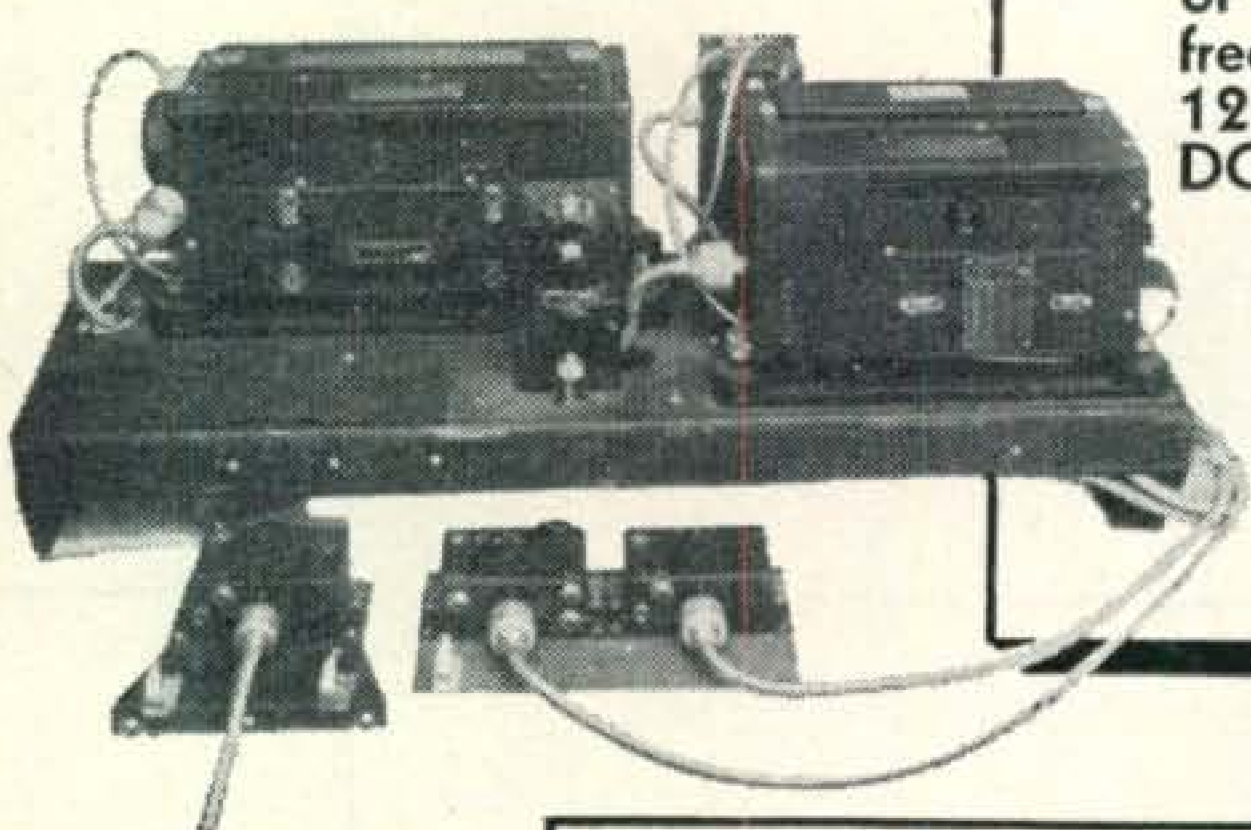
Diana related some interesting facts and figures about ham radio on her continent, in which she pointed out that there are about 600 hams in all of South Africa, of whom 15 are licensed YLs. Hams are limited their first year to 50 watts of power and can operate on 40 c.w. only; their second year thay are still limited to 50 watts but can operate 40 c.w. and phone, and their third year they can go up to 100 watts. 40 phone and c.w.

(*Continued on page 62*)

**Assistant Editor, CQ. Send all contributions c/o CQ, 342 Madison Ave., New York 17, N. Y.*

When the girls of the N.Y.C. YL Club gathered recently for a group picture, we rounded up the club officers, DC and the hostess for the evening for this pix. Left to right, standing: Mignon Rosenfeld, W2QWL, vice president; Sohpie Lash, W2QGK, president, and Lillian Ruocco, W2PMA, secretary. Seated: W1OOH/2, your column editor; Hope Plummer, W2RTZ, who kindly made her apartment available for the occasion; and Wilhelmina Grabner, W2MEG, YLRL second district chairman.

ESSE Specials!



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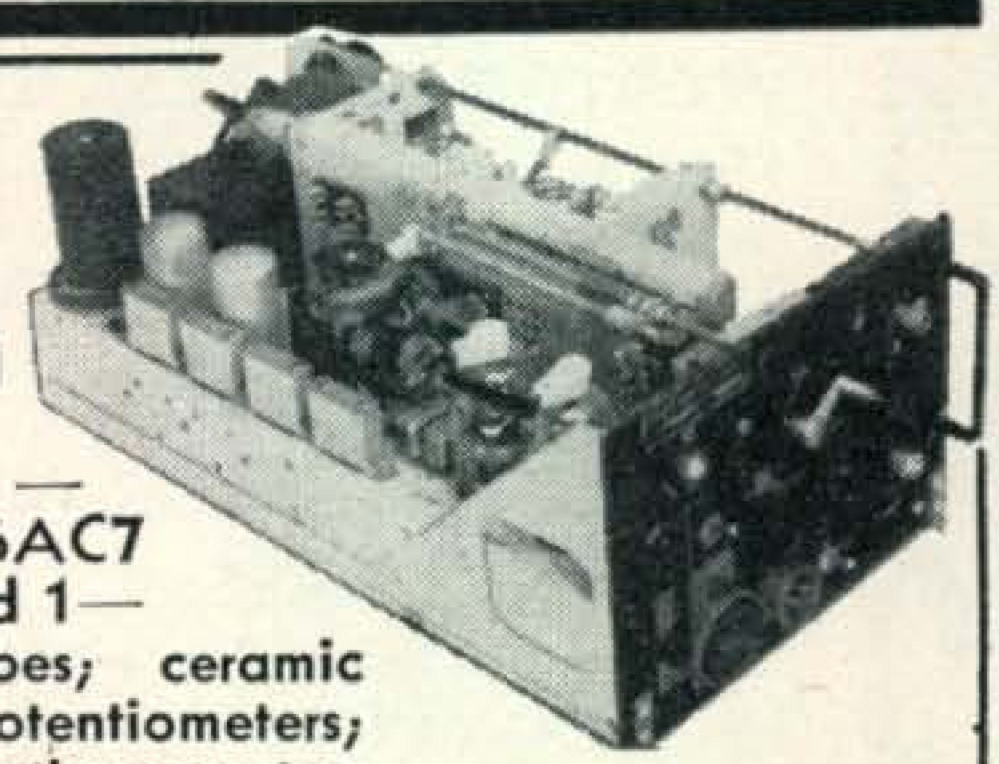

Contains 2—807's, 2—6AC7 1—931 and 1—6AG7 tubes; ceramic switch; potentiometers; gears; revolution counter; Cavity oscillator using 2—RCA 8012 tubes rated at full output to 500 Mc. (tubes are forced air-cooled by 24 V. DC motor—easily converted 110 V. AC operation.); a goldmine of parts for the VHF experimenter. Price............ **$12.50**

CP-11/ APS-15

Contains 13—6SN7-GT's, 3 6SA7-GT's, 1—5Y3-GT, 24 V. motor and blower (will operate on 110 V. 60 cy.); 4—one megohm precision wire-bound resistors; 80—86 Kc. crystal. Wgt. approx. 25 lbs. Price.... **$9.95**

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7C5	each	**$.35**
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30 (VT-67) (Hi-freq.-low-loss base)	each	**.35**
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1625	each	**.35**
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All tubes checked before shipment.

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Has metal case—7"x12"x16", 6 or 12 V. DC or 110 V. 60 cy. AC. Used by Army for jamming, by random noises, keying, or bagpipe systems. 1—6SN7, 1—6V6, 1—6X5, 1—2050, and 3—991 tubes; jacks for microphone; output monitoring or connection to transmitter. Price **$12.95**

130-140 W. New York Street
Indianapolis, Indiana

January 1, 1948

Hello CQ:

Happy New Year, Everybody, Everywhere!

Above is a picture of Esse Radio Company, 130-140 W. New York Street, Indianapolis, Indiana, owned and operated by Ben L. Selig and Stanley Selig (brothers). This large 3-story store is chuck full of practically every conceivable piece of Army and Navy surplus radio equipment, as well as thousands of items bought at either public or private sales of radio factories or radio parts manufacturers or jobbers throughout the United States.

In this store, your order is received and shipped. Part of the downstairs floor is used as a salesroom for store sales. Every available inch of the store is crammed with small parts, transmitters, receivers, public address equipment, modulators, power supplies, transformers, batteries, and most every piece or part of radio equipment that is available on the radio markets today.

Besides the store shown in the picture above, Esse has three warehouses in Indianapolis; and also, has warehouses in Arizona, Arkansas, New Mexico, Oklahoma, and California.

Esse's mail orders come from all over the United States, Canada, Mexico, Cuba, Argentina, Brazil, England, Holland, Denmark; in fact, every country in the world.

Esse tries to keep all customers satisfied by being conservative on its advertising and fair on its adjustments. Any problems that you have, feel free to consult Esse's experts.

73's

Ben L. Selig

W9OVG

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is the most popular band in South Africa. One other interesting limitation is found in ham radio in S.A.—that only licensed operators can operate amateur transmitters (that means no wives, sisters, brothers, etc.) Diana explained still another reason for the popularity of ham radio in S.A.—a license for a radio receiver costs $7 per year, but for a complete ham station only $4 a year!

YL Nets

Now that winter is well on the way, many YLRL nets have been re-established and new ones organized. Everybody is welcome—YLs, that is—and so we'll list the nets here hoping more will join in.

DAY	TIME	FREQ., KC.	NCS
Mon.	5 p.m PST	14.360	Lenore, W6NAZ
Tues.	9:30 a.m. PST	14,140	Betty, W7GUQ
	11 a.m. PST	28,545 (phone, tunes entire band)	Helene, at W6MBD
Wed.	7:30 p.m. CST	7,220	Naomi, W6YZU Alt, Lou, W5IKC
	8:00 p.m. PST	3,770	Miriam, W7JFB
Thurs.	noon PST	14,260	Lizette, W7HDS
	8:00 p.m. PST	7,220	Edna, W6SLT
Sat.	10:00 p.m. EST	3,610	Marge, W2NAI
1st each month	8:00 p.m. EST	29,000 (phone, tune entire band)	Ruth W2OWL; Lil. W2PMA; Jerry, W2PBI

The Western NCS especially invite Eastern YLs to join in the nets. Those in areas which do not hear the W6s should listen in and call those stations apparently in QSO with control station. NCS stations, particularly in the East, are wanted. Volunteers please advise YLRL Vice President, Lenore Conn, W6NAZ, 4639 Coldwater Canyon, North Hollywood, Calif.

Frances Darne, W3AKB, YL of the month.

While we're giving addresses we want to correct the one listed in October *CQ* for YLRL Secretary, Louise Willomitzer, W6VWR. Louise's address is 5887 Woodlawn Ave., Los Angeles 3, Calif.

Getting back to YL nets and roundtables, the N.Y.C. YLs initiated their 10-meter phone roundtable on Halloween beginning at the witching hour of 12 midnight. It was very successful, lasting for two hours—till 2 a.m. (Yes, we guess there were a few OMs grumbling in the background—hi!) Those checking in were Ruth, W2OWL; Lil, 2PMA; Willy, 2MEG; Betty, 2PVS; Rose, 2TU, and W1OOH/2 at 2PMA's shack.

Dot, W1TJF, is on the committee for the New Hampshire QSO Party, Feb. 7-8, and says this will be a good chance for the YLs who have wanted to work N.H. for WAS, as oodles of N.H. stations get on for these parties.

The Young Ladies' Radio League has started a YLRL membership drive contest, to continue until March 1, 1948. All YLRL members are asked to participate and help get new members, both North American YLs and those of other countries. There will be a substantial prize for the winner. Non-members may contact members for details of joining.

As we write this the Hobby Show is in progress in N.Y.C. at Madison Square Garden and we at *CQ* wish to express our appreciation to the YLs assisting at the *CQ* booth: Lillian, W2PMA; Jean, 2PZA, and Helen, 2NFR.

YL of the Month

A couple of months ago we told you about a YL who is an electronics engineer—Terry McLaughlin, W3VYU. This month we are happy to present another YL who is also an electronics engineer—and also a W3—Frances Darne, W3AKB. Some of our YLs really go places through their interest in ham radio and we're mighty proud of them.

Radio "got" Frances when she was about 14 years old and her pal, the boy next door, received a spark-gap transmitter for Christmas.

"We learned the code together," says Fran, "but I don't think he ever got on the air. I didn't do any active hamming for a long time after that, but became sufficiently interested to major in electrical engineering when I went to Cornell.

"My license for W3AKB was received in 1927, when I was in Philadelphia, and has since been transferred to Washington. My chief interest has always been in 80-meter traffic and rag-chewing. Before the war I was ORS, RM, Asst. SCM for Eastern Pennsylvania, and also active in the Army Amateur Radio System, holding various positions including State Net Control of Pennsylvania and Third Corps Area cryptographer. This included the conducting of a correspondence course in cryptography for AARS members, and cryptography became my second hobby. Served as secretary of the York Road Radio Club of Philadelphia for a number of terms. For several years my occupation was secretary to Dr. V. K. Zworykin, who was directing research on television and the electron microscope at RCA.

In 1942 Fran became an electronics engineer for the Navy Department's Bureau of Ships in Washington where, she says, "My chief duties are preparing specifications for about a million (at least it seems that many) different kinds of radio tubes. During the course of this work I meet many representatives of Army and Navy groups and manufacturers of tubes. Lots of them are hams, and I think being a ham has been a great help.

"All the years I was working in various nets and trunklines, I hung onto one old-time sure-fire 'sked' with my old standby—W3BWT. When I came to Washington the sked had to be canceled, but I hated to lose the contact, so I married the guy! At present my old prewar 50-watt 80-40-20 rig is still doing service in a few traffic nets. I have resumed my ORS, am Asst. SCM for Md.-D.C. Section (the OM is SCM) and am secretary of the Washington Radio Club for the 1947-48 season. Between a full-time job and keeping house I don't get on the air as often as I would like, but am hoping to be able to concoct some super-modern pushbutton arrangement so that I can wiggle a bug with one hand and wash dishes with the other!"

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Hammarlund SPC400X	398.25
Hammarlund Four-20	120.00
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RME HF-10-20	77.00
RME DB22A	66.00
Collins 32V1	475.00
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Signal Shifter model EX	99.50
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PARTS AND PRODUCTS REVIEW

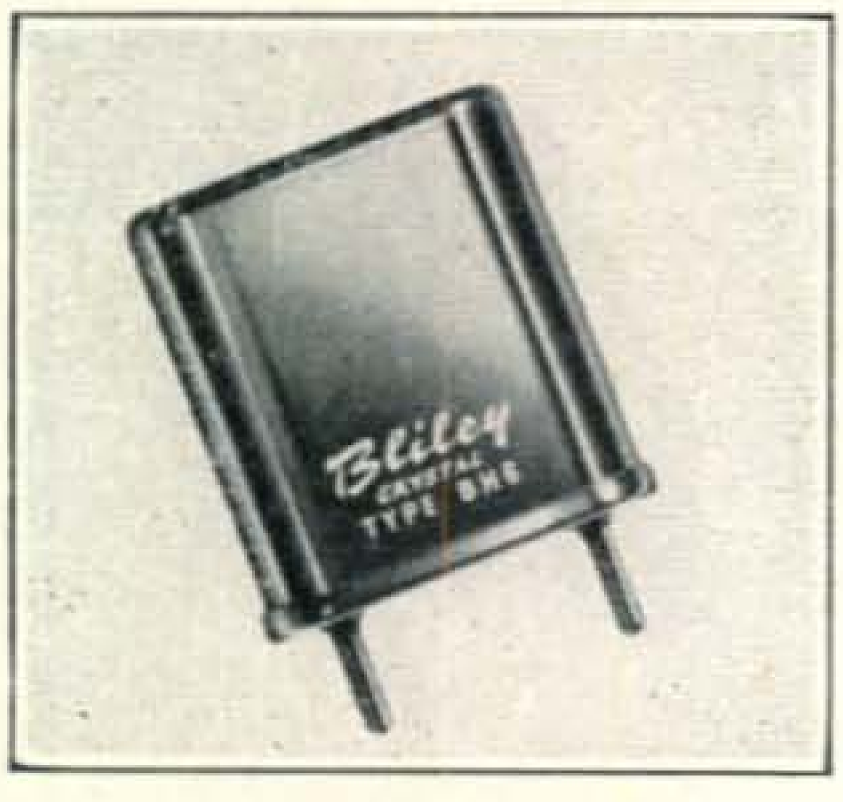
V-H-F Power Pentode

RCA-5618 is a new, low-drain, filament-type, miniature pentode designed primarily for transmitting use in mobile and emergency-communications equipment. It has a maximum plate dissipation of 5 watts, and can be operated with full input to 100 mc. In Class C telegraph (and FM telephone) service at 80 mc, the 5618 can deliver a useful power output of 4.5 watts (ICAS) at a plate voltage of 300 volts with a driving power at the tube of 0.3 watt approximately.

The filament employed in the 5618 combines sturdiness and efficiency with low power consumption and quick heating. It is of the mid-tapped, coated types permitting operation at either 6 or 3 volts, requires less than 1.5 watts, provides for a filament voltage operating range of ± 10 per cent, and is ready for operation in less than one second after the power is turned on.

V-H-F Crystal

Bliley Electric Co., Erie, Pa., announces a v-h-f crystal in the 15-100 mc range. This unit, Type BH6, employs a paper-thin quartz plate operating on third, fifth, and seventh overtones. The crystal is processed to micro-tolerances and silver plated to insure long term precision. Recommendations covering oscillator circuits best suited for optimum performance will be made by manufacturer when qualifications are stated, such as drive requirements to the following stage frequency tolerance, and temperature range over which tolerance must be maintained.



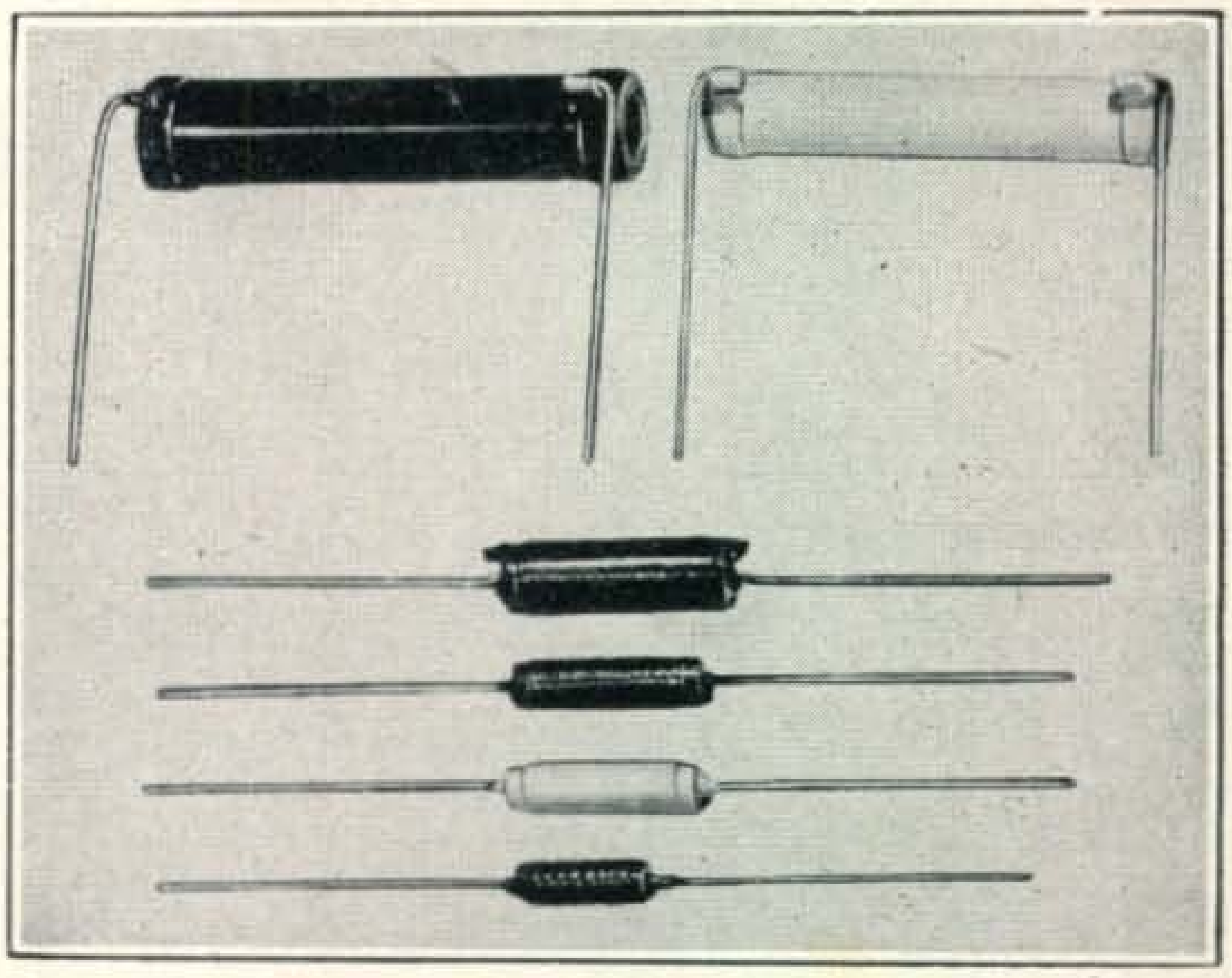
Antenna Tower

In production by the Rostan Corp., 202 E. 44th St., N. Y. 17, N. Y., and soon to be sold by dealers throughout the country, Trig Tower is fabricated of 61 ST aluminum alloy and comes in three sizes: 30', 20', 10' and ten foot add-on sections.

Delivered knocked-down, complete with all fastenings and metal parts for ground mount, one man can prepare concrete base and assemble the tower from full instructions and drawings supplied. Two men can "walk" the tower into position. Self-supporting, no guys required. The tower is tested to hold 200 pounds with a projected area equal to 5 sq. ft. of flat surface, in a 90 mile wind. The aluminum base plates are so designed that only one bolt is required for anchoring each leg. This permits installation without concrete if desired or permits the use of insulators.

Composition Resistors

The Little Devil composition resistors, offered by Ohmite Mfg. Co., Chicago, are now available in



the $\frac{1}{2}$ and 1-watt sizes with a tolerance of ±5%.

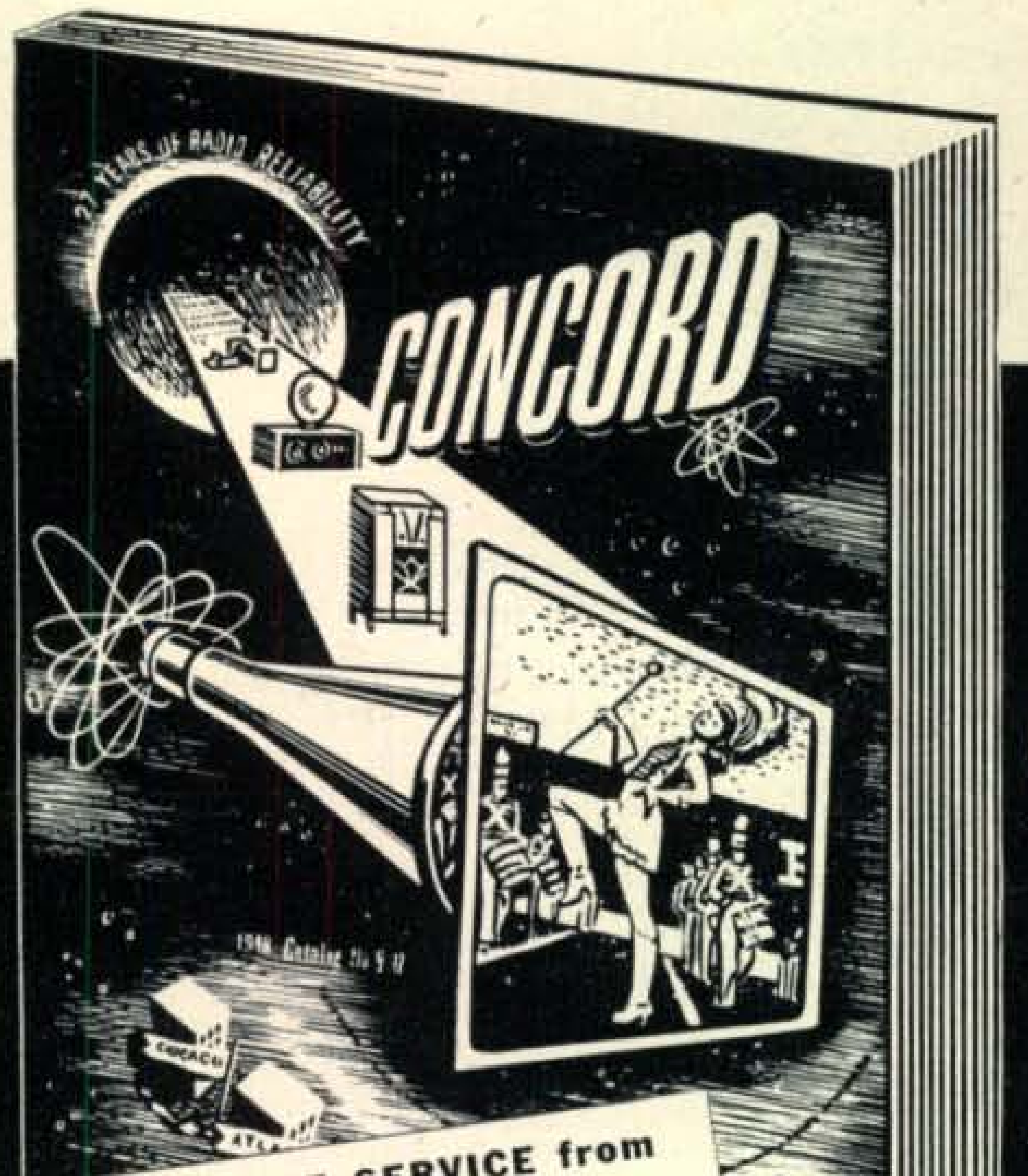
Little Devil composition resistors are completely sealed and insulated by molded plastic. Leads are soft copper wire, hardened immediately adjacent to the resistor body, strongly anchored, and hot solder coated.

All units are individually marked with the resistance value and wattage for quick identification, and in addition are color coded. Available from stock in standard RMA values from 10 ohms to 22 megohms. Write for Little Devil Bulletin. Ohmite Mfg. Co., 4980 West Flournoy St., Chicago 44, Ill.

Frequency Calibration Units

Two frequency calibration units, No. 90515 and No. 90511, for use in checking transmitter carrier frequencies and other high-frequency signals against WWV have been announced by the James Millen Mfg. Co., Malden, Mass. This equipment is par-

(Continued on page 76)



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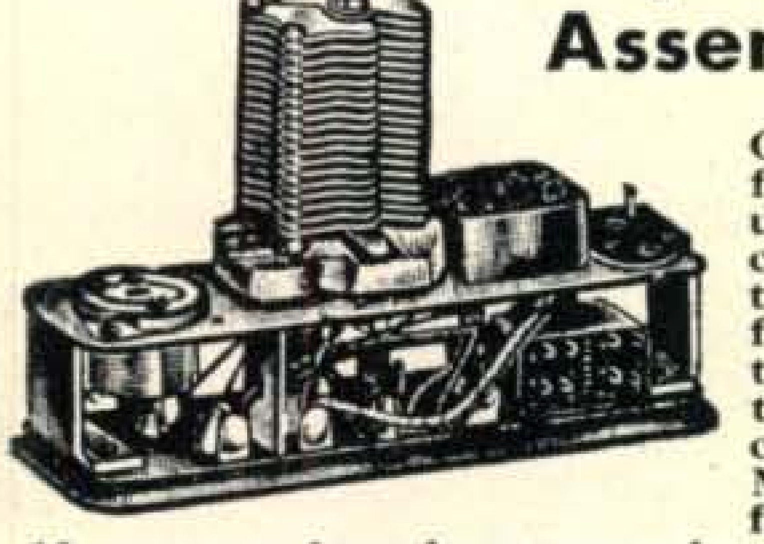
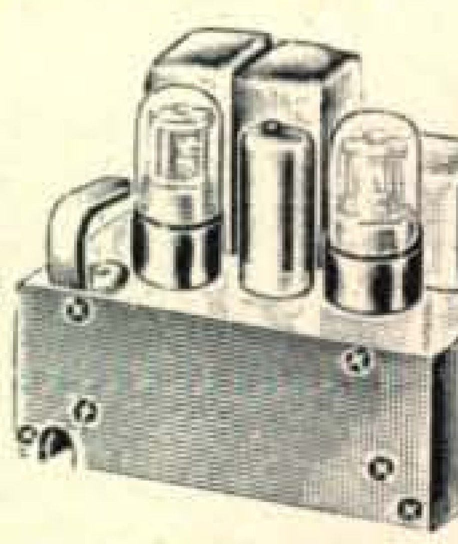


Compact foundation unit for construction of high frequency transmitter or receiver. Metal frame with 10 contact female receptacle at bottom, 140 mmfd. variable capacitor on top, miniature polystyrene coil socket, dual crystal socket, and male contact socket with spring locking clip. 4" long, 1¼" wide, 2¾" high. Tuning condenser worth more than the price of the entire assembly!

5B3553 .... **39c**

Xtal Frequency Standard



Can be adapted into an excellent frequency meter range 50 KC to 18 MC by adding an external power supply and VFO. Unit as it stands employs a regenerative frequency divider and multiplier circuit to obtain a 50 KC fundamental and harmonics, incorporating a 200 KC crystal (not furnished) as the controlling standard, and will yield from 50 KC to 18 MC. Chassis measures 5" high, 5⅞" long, 3⅜" wide. With tubes and schematic.

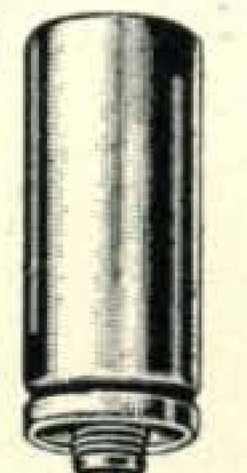
5B9548—your cost **$2.95**

Jack Box

Consists of one 3 circuit jack, one single circuit jack, one 150,000 ohm potentiometer, 5 position rotary switch enclosed in aluminum case 4½" long, 3" wide, 3" high. With knobs. Circuit diagram inside cover. Shpg. Wt. 2 lbs.

5B3959 .... **25c**

4 MFD 600 VOLT OIL TYPE CAPACITOR



Oil filled and impregnated. Single hole mounting. Size 4½ x 1½". 4 mfd., 600 working volts, DC.

5B3164 .... **59c**

Marker Beacon Receiver

BC-1023—A regulation marker beacon receiver designed to receive modulated signals on the 75 MC band. Variable tuning permits coverage of 62-80 MC without circuit changes. Output of the receiver is into relay circuit which can be used to control external circuits, open doors, etc. Weight is only 3.4 lbs. Dimensions are 5⅜ x 5⅜ x 3 7/16". Units are new, in original cartons and complete with tubes (6SQ7, 6U6GT, 6SC7, 12SH7). Operates directly from any 12-14 VDC power source.

5B9547 .... **$3.95**

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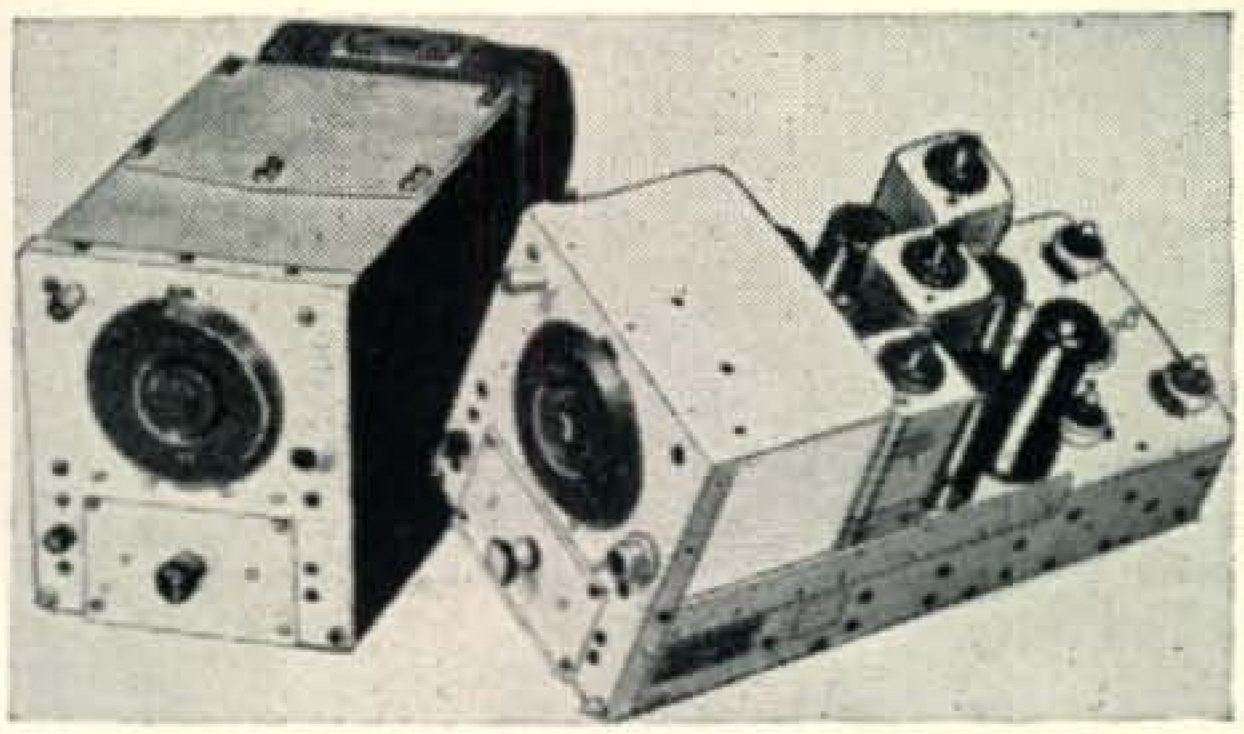

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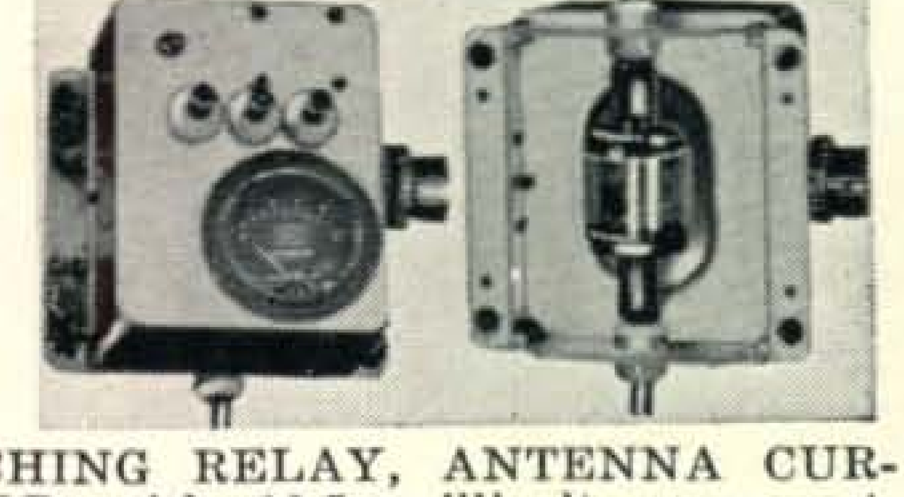

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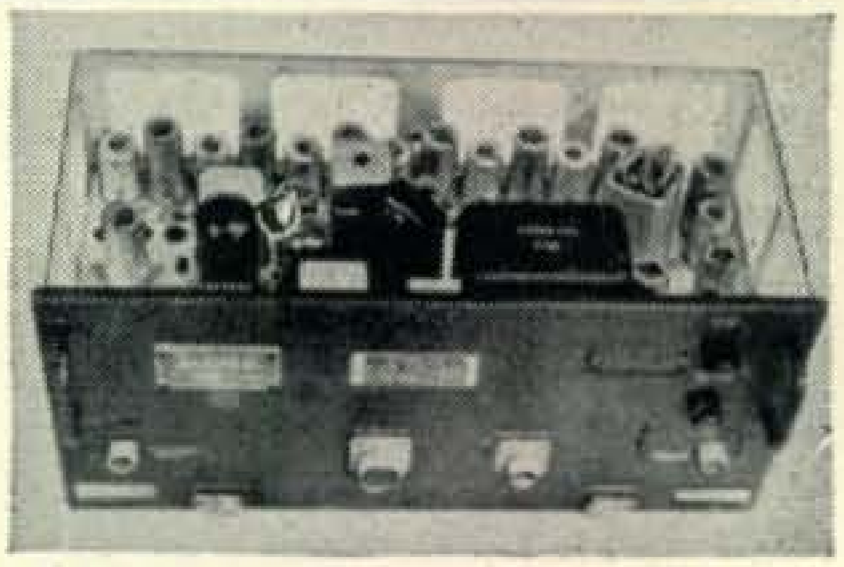

AC powered, needs only standard 50 mills 60 cycle transformer to replace present 400 cycle transformer; entire set usable as T. V. receiver with minor RF assembly changes. Has 6 I.F. stages, 30 mc, broad band width, 6AG5 tubes; stages mounted straight line; may be cut out intact to fit any set. One of the best 420-450 mc. Super-Het Receivers obtainable today. Schematic diagram furnished. **$14.50**

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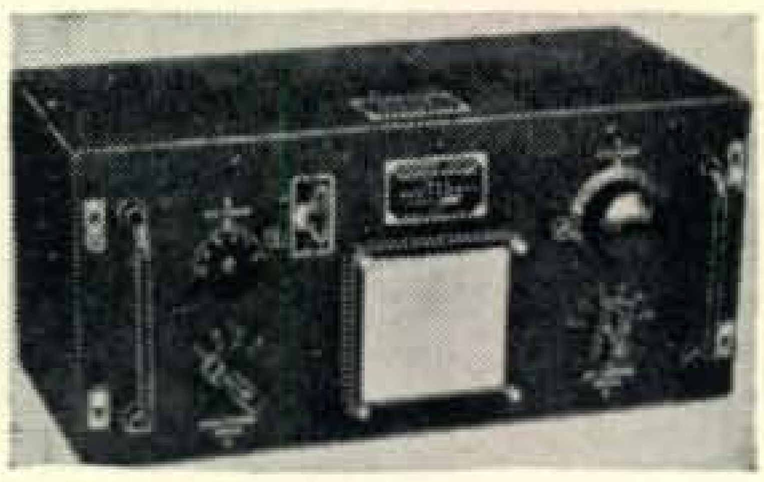

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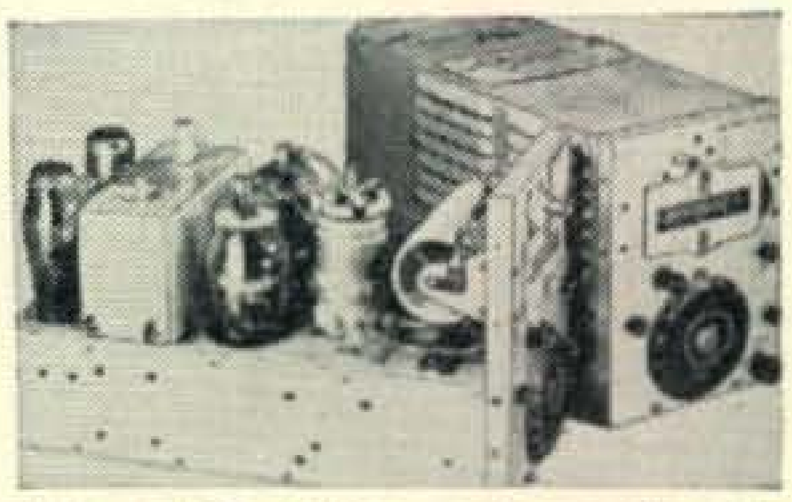

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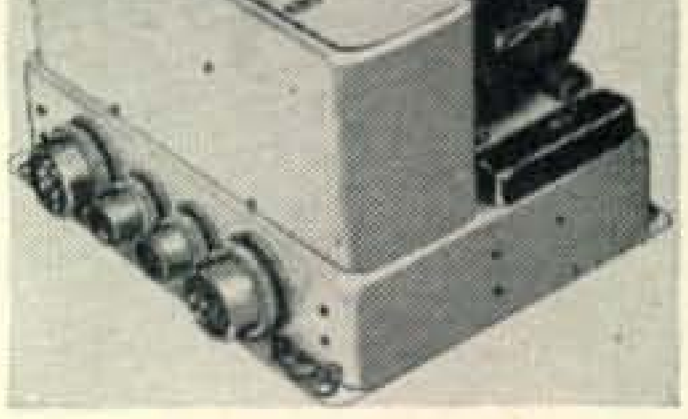

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Book Reviews

Klystron Tubes, by A. E. Harrison. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y. 246 pages 22 page appendix 3 page index. 5½ by 8½ inches, illustrated. Price $3.50

Many amateurs will recall that shortly after the return of the v-h-f bands in 1945, W6BMS/2 and W2LFG made interesting headlines by working duplex FM on 5300 megacycles. To A. E. Harrison, W6BMS/2, then of the Sperry Gyroscope Research Laboratories and now Assistant Professor of Electrical Engineering, Princeton University, this occasioned only one more use of the klystron. Mr. Harrison had several years previously established his interest in klystrons through the small *Klystron Technical Manual*. Apparently, *Klystron Tubes* is the commendable outgrowth of this book.

Klystron Tubes should be on the "must" reading list of every amateur or engineer interested in the super-high frequencies. The book is a comprehensive analysis of the underlying principles, construction, operation and uses of velocity modulation tubes. As far as can be seen, every phase of the subject is treated effectively somewhere in the text material. Although portions of this book involve intricate mathematics, there is still sufficient readable material for those unfamiliar with klystrons to make it well worthwhile.

Most readers will find the system of subject and paragraph heading by title and number very valuable, although probably originally designed to meet the needs of a college or engineering text. The appendix is divided into three sections. The first section consists of a "Glossary of Terms and Symbols", the second of "Klystron Design Charts" and the third, a bibliography of klystron references in periodicals and books.

Sunspots in Action, by Harlan T. Stetson. Published by The Ronald Press Company, 15 E. 26th St., New York 10, N. Y. 227 pages, 12 page appendix, 8 page index. 5½ by 8 inches, illustrated. Price $3.50

Dr. Harlan T. Stetson of the Cosmic Terrestrial Research Laboratory has once again broached the difficult subject of sunspots and has once again come away with an interesting accounting of their activities. His previous books, *Sunspots and Their Effects*, and *Earth, Radio, and the Stars*, have proven to be lucid accounts of the many correlations between the solar blemishes and radio reception, weather, business, etc. *Sunspots in Action* continues along those identical lines while at the same time bringing the entire subject up to date. Almost every aspect of the sunspots is covered in the text; including their possible modes of origin, size and distribution with the sunspot cycle. As to the effects of sunspots upon our earthly domain, there is well over one-half of the text devoted to the influence of sunspots upon radio wave propagation. Thus, many amateurs who have only a vague impression of the sunspot relationship to high-frequency transmission will find this book absorbing and informative. The style of writing tends largely toward the not-too-technical and it may be safely recommended to those with only a very minor previous knowledge of sunspots.

The sunspot effects upon weather and tropospheric radio wave transmission in recent years are also covered in detail. The theoretical effects upon business and economics are discussed, while in the

last chapters, Dr. Stetson reviews the reallocation of the FM broadcast band with an eye to discrediting the sunspot effects which were said at the time to have necessitated this fifty megacycle frequency shift. A complete bibliography of sunspots and sunspot numbers is incorporated in the appendix.

Considering the complexity of the subject, there were very few errors of a serious nature to be found in the text material. One of the more serious on page 55 is a discussion of the term "critical frequency." The unwieldiness of the explanation makes it appear as though the "critical frequency" is the highest usable radio frequency (MUF). This could not be further from the truth—since practically all radio transmission over long distances takes place on frequencies greatly in excess of the "critical frequency." It was also noted that very little is said in *Sunspots in Action* about the solar static which is in contrast to the extraordinary amount of research work accomplished in this field in the past several years.—*O.P.F.*

V.H.F.—U.H.F.

(*from page 54*)

W7QLZ reports the MUF as only 35.65 mc, a police station in Mass.

No. 9—VE1QZ heard the harmonic of OCP2 calling and sending Vs on 41 mc, at 0937. W1CLS worked W8CMS on aurora at 1917 EST. W8QYD worked from 1815-2010 EST, on aurora: W8APG, TDJ, SFG, W9ZHL, with W1-2-8-9 heard. W7QLZ heard a station on 38.8 mc for the highest MUF there. W2RLV got in on the aurora, working: W1CGY, W8WSE, SFG, between 2010-1935 EST.

Nov. 10—G6DH worked MD5KW at 0855 GMT on 50 mc, signals running past S-9 both ways. OA4BG took off with the LUs, getting: LU9AS, LU1DO, LU1CC, LU9AX, LU9MA, LU6DR, mentioning heavy QSB on all the signals from 2035-2304 EST. VE1QZ heard CVZ6 calling ZHC on 41.5 mc, and an OmahaFM station on 44 mc. W6QG says this sounded like a splendid day for Pacific DX as Ray heard a carrier on 49.9 mc from 1300-1400 PST, peaking over S-9, and other signals from the West between 44-49 mc, but no ham signals. W7QLZ heard MUF an of 35.5 mc only.

Nov. 11—W6QG said this was another promising day for the Pacific, with the same signals heard same time as on the 10th, an MUF of 49.9 mc to the West. W7QLZ heard an FM station on 44.8 mc from Mass., at 1100 MST.

Nov. 13—Ray, W6GQ, heard FM from the East up to 46.2 mc, but no ham signals, during morning and afternoon.

Nov. 14—Again W6QG furnishes the only report. The MUF went to 49 mc, when WEM5 a c-w harmonic, came in at 1200 PST. WJFM on 48.5, from Schenectady, N. Y., was very good also, as well as WQR on 48 mc.

Nov. 15—This was the end of the ionosphere storm as predicted by CRPL. VE1QZ heard W7QLZ for the only signal heard at 1150 EST. OA4BG heard his first W6s from 1305-1335 EST, when W6JRM and W6QG came in, both S-7. W6JRM heard an OA4, presumably OA4BG, the same time. W1CLS got, from 1230-1340 EST: W7QAP, QLZ, W6BPT, QG, and heard W6IV and W6OB, with poor-good condx. W6QG worked on his MBF, running 5 watts: W1CGY, LSN, CLS, EYN, LLL, W2BZ, BQK, AMJ. W4GJO got W6IWS and W7ERA from 1232-1315 EST, condx excellent. XE2C in Monterrey, Mexico, worked W9HSB in Springfield, Mo., on c.w. W7ERA got W4GJO, EID, FLH, from 1010-1100 PST, fair condx.

Nov. 16—W7QLZ worked VE1QY, hearing W1CLS, LSN, LLL from 0945-1100 MST. W4GJO QSOd: W7BXQ, HEA, EVO, FDJ from 1302-1400 EST, poor-fair condx. W6QG got on his 5-watter: W1NF, AEP, GJZ, W3CIR/1, W2SIN/1. G5BY worked SUIHS and MD5KW from 0910-0930 GMT; then W2BYM, W4HVV, WMI, W5JLY between 1530-1600 GMT, two-way on 50 mc. W1CLS got: W6UXN, WNN,FPV, NYF, URN, BPT, IWS, FPV from 1218-1417 EST, condx fair-excellent. W7ERA hooked: W4GJO, FLH, AVT, EID, W3OR and W7BQX, the latter on scatter, at 300 miles, all between 0900-1110 ,PST. VE1QY got W6ANN and heard W6UXN, BPT, NYF, RPV, RPV from 1230-1330 EST. W6UXN, took off with: W1CLS, LLL, CJZ, CGY, W2BQK, W3CIR|1 from 0900-1030 PST, excellent condx.

Nov. 17—W1CLS and W6UXN contacted at 1235 EST. W6UXN went on to work W1CGY and HDQ from 0930-0956 PST.

Nov. 18—VK5NO and four others copied a W6BE or BC at 1700 PST.

Nov. 19—W7FS/MM on S|S Nathaniel Crosby, 1400 miles E. of Cape Hatteras, N. C., heard PAØUN, G6XM,

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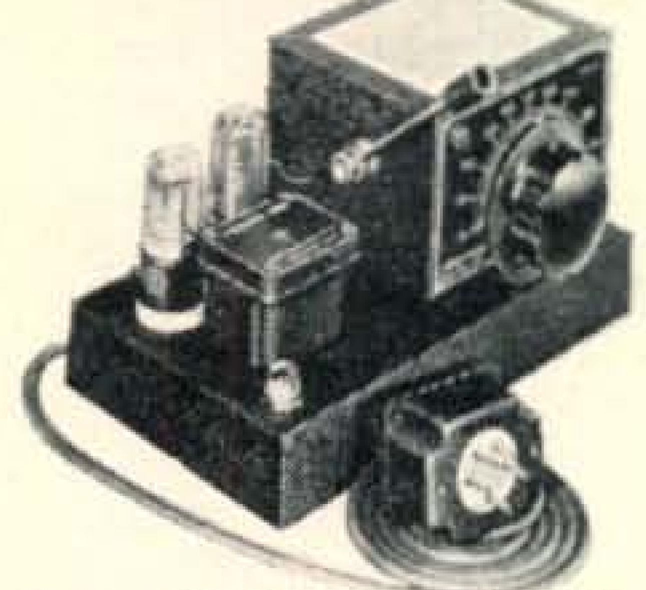
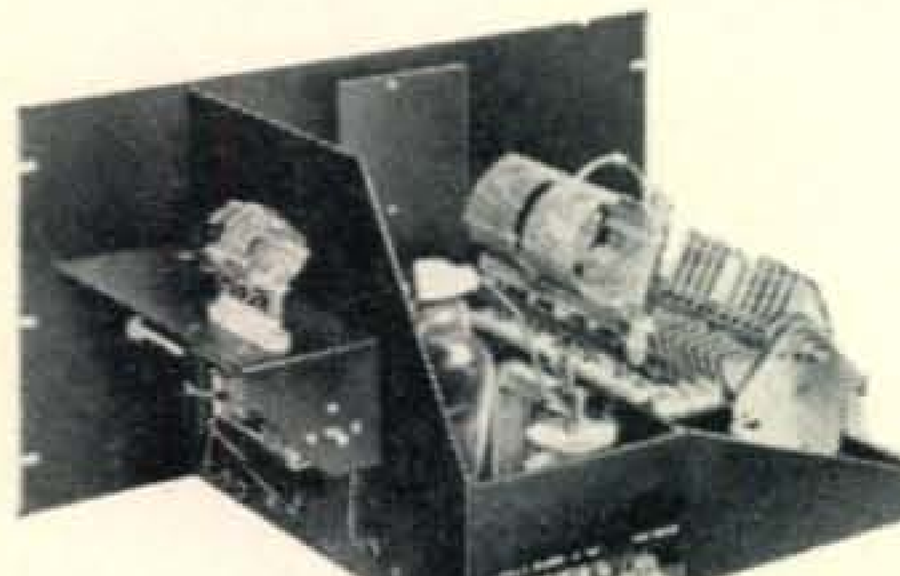


Millen 90700 VFO . . . A favorite frequency shifter, plug in in place of your crystal for instant, finger-tip control of carrier frequency. Extremely low drift. Chirpless keying. Vibration immune. Large bandspread dial, accurately calibrated.
Complete with tubes.......... **$42.50**

Millen 90800 Exciter-Transmitter . . .
Based on an original Handbook design, this popular 50-watt Exciter-Transmitter is ideal for use as a low power transmitter or as an exciter for high power transmitter stages. It uses a 6L6 and 807. With coils for 10 meters, less tubes.......... **$42.50**



Millen 90881 RF Power Amplifier . . . This 500-watt amplifier may be used as the basis of a high power amateur transmitter or as a means for increasing the power of your present transmitter. Wired for use with two 812 type tubes, but may be used with TZ40's, 35T's, 812H's, HF100's, HK54's, etc. Plug-in coils are available for all bands 10 through 80. The Millen 90800 exciter is an ideal driver for this amplifier. Complete with one set of coils, less tubes.......... **$89.50**

Millen 90810 HF Transmitter . . . A crystal controlled unit for 2-6-10-11 meters. Rated 75 watts output. Uses a 6AG7 crystal oscillator in the new Bliley CCO-2A crystal unit, 2E26 tripler and 829B power amplifier stage. For 10-meter operation a conventional crystal is used; for 6, an overtone crystal is used; for 2, the overtone crystal drives the 2E26 tripler. Transmitter is normally supplied with grid and tank coils for 10-11 meter operation. Coils are available for 2 or 6 at $3.60 per set. Transmitter complete, less tubes.......... **$69.75**

Millen 90281 Power Supply . . . This unit is rated 700 V. DC at 250 mils, completely filtered. Also supplies 6.3 volts AC at 4 amps. Unit is designed for use with transmitters such as the Millen 90800, 90810 or any other transmitter or laboratory purpose requiring this power. It uses two 816 rectifier tubes and has a 2-section pi filter with 10 henry GE chokes and a 2-2-10 mfd. bank of 1000-volt working GE Pyranol capacitors.
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PAØGN from 1300-1320 GMT.

Nov. 21—W7FS/MM, 1000 miles E. of Cape Hatteras, heard PAØGN and G5MQ from 1340-1350 GMT.

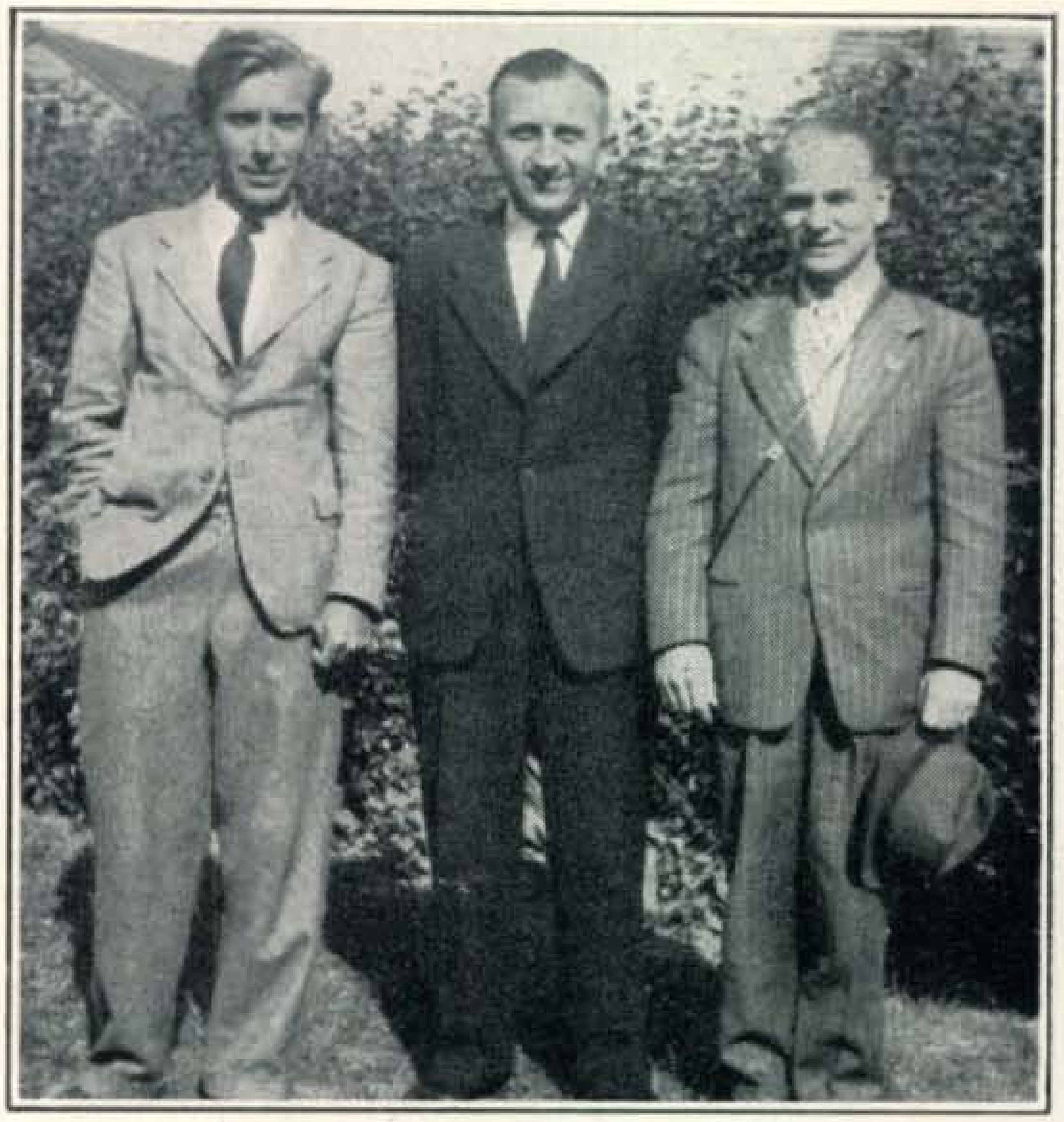
Nov. 22—Ferrell in Philadelphia, heard on 50 mc, between 0850-1030 EST: G5BY, BM, WP, ZT, GL6K, DH. W6QG did not hear any ham signals but heard CEC5B c-w harmonic on 46.3 mc at 0840 PST. G5BY gladdened the WØs by breaking through to get: WØIFB, WØKYF, W9HGE, ZHL, ZHB, W5AJG, from 1533-1632 GMT.

Nov. 23—W7QLZ heard G6LK working W1ATP at 1005 MST, W1CLS and others very weak, from 0900-1100 MST. G5BY again broke into WØ, getting: WØIF, IJA, HAQ, KYF, NFM, OJA, W9JMS, ALU, VZP, and heard W5FRD.

Nov. 24—G5BY worked two-way on 50 mc: WØIFB, OJA, TOZ and WØZJB, the latter not hearing any harmonics, buzz-saw tones, FM or c-w harmonics, just a weak S-4 signal not like skip at all.

Well that's the lot of it for the time being. By next month we should have more on the openings from the 23rd on. But at any rate you can see that 50 mc has really been open for real DX, so come on, you fellows, on the lower frequencies, join the fun.

Last minute tid-bits: XE1KE is taking a tour of the U.S. from Dec. 15 to Feb. 15. He has asked FCC for permission to operate mobile and if granted will be found on 27306-29350-500024 kc. So watch for him as BJ has the wanderlust in his veins and plans to meet all the v-h-f gang he can.



From left to right: G6DH, PAØUM, and W2BZR

144-mc Notes

Last month we asked you to send in your reports of states worked, so we could start a 144-mc Honor Roll, but only a couple were received. Make with 'em gang so we can see who is leading who on 2 meters.

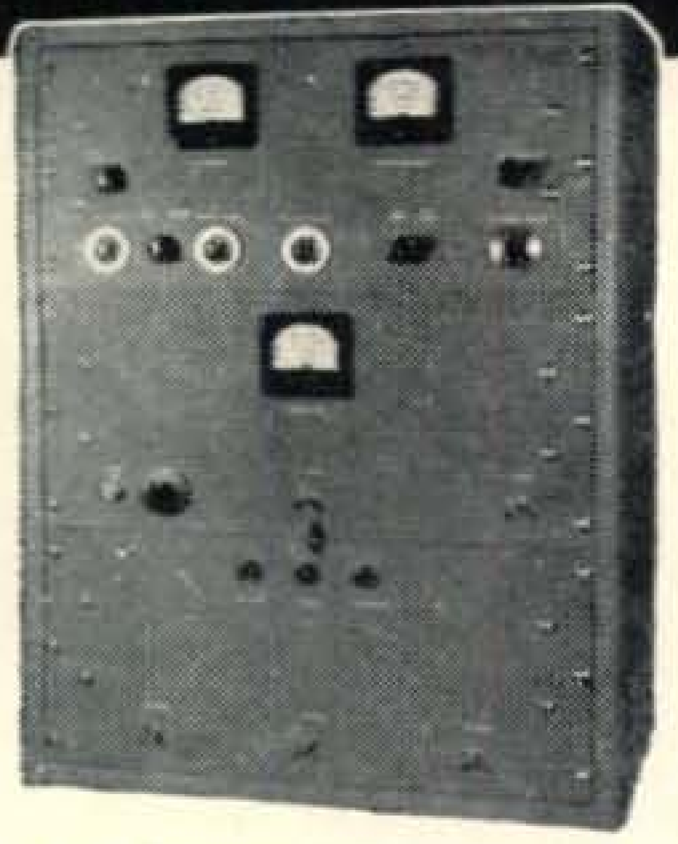
VE1QZ has worked 520 miles to W1 and is anxious to try 235 and 420 mc, with anyone. Write Oscar for skeds.

Activity is picking up in the Upper Miss. Valley Net around St. Paul and Minneapolis. WØSV has 700 watts to a pair of 4-125As and really runs in a signal at 70 miles to WØJHS who uses a 522 transmitter-receiver and 4-element beam on a 60' tower. WØTOZ has a 522 and 829B final as well as WØQHC, HCY, RIL, HXY. They plan on forming a 522 club in St. Paul soon.

W6WNN says they have a 522 club around the San Diego area with the following active stations:

(*Continued on page 85*)

The Sensational New 275 Watt Globe King . . . UNCONDITIONALLY GUARANTEED



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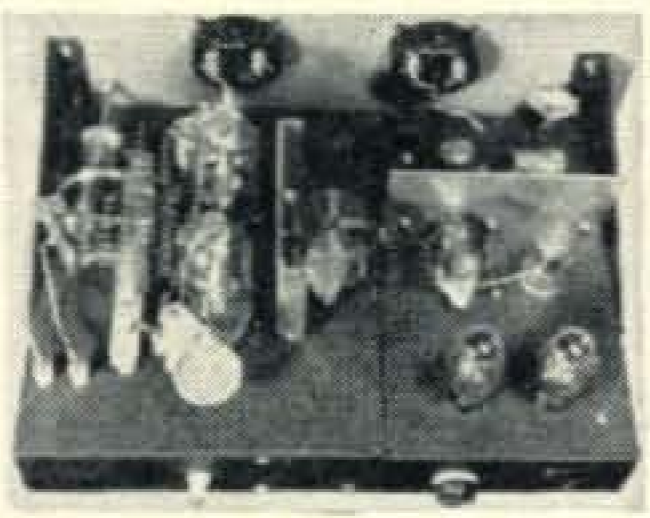
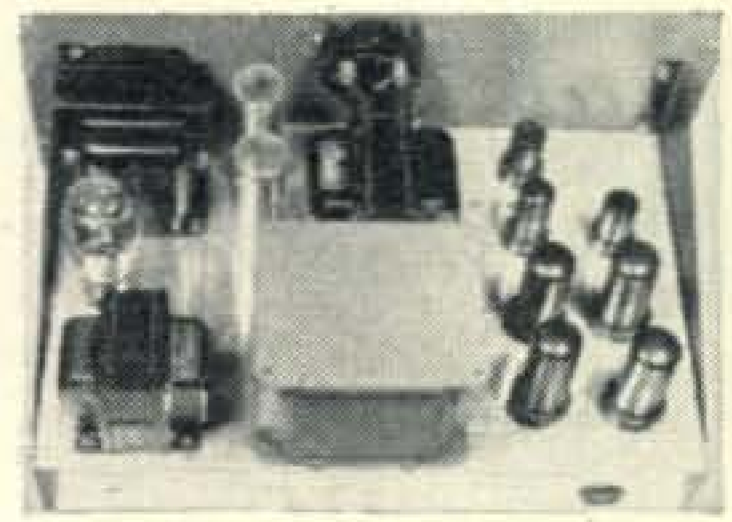
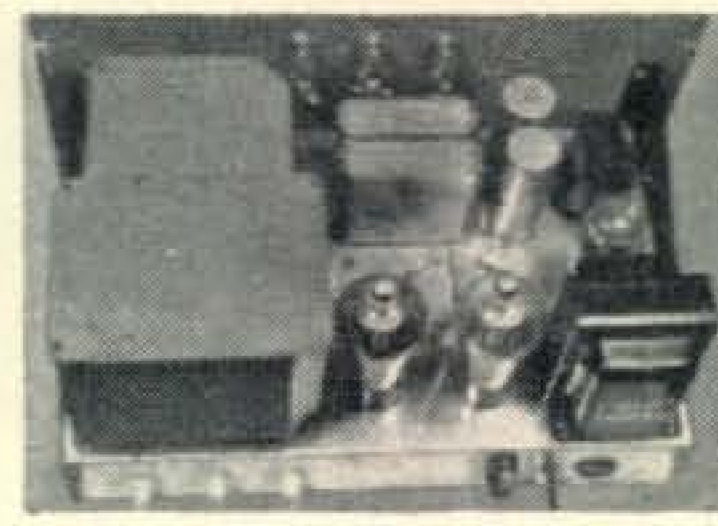


Final • Exciter Section



Speech Amplifier and Modulator



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WRL Globe Trotter XMTR Kit

Amateurs the world over are praising the performance of this high quality, low cost rig. It's a 40 watt input kit including all parts, power supply, chassis panel and streamlined cabinet. Write for export prices.

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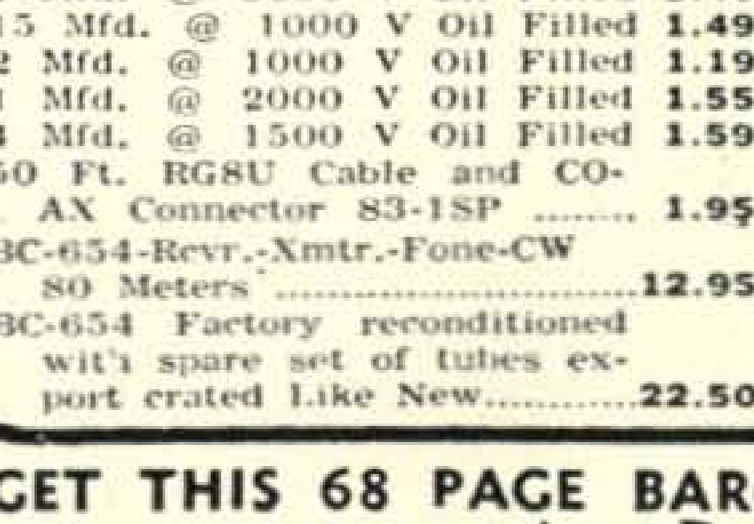

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Shielded Thordarson 15H-200 Mil CHOKE **$1.88**
Aerovox 1509—1MFD—1500 V Oil Filled Condenser.............. **.49**
1 Mfd. @ 5000 V Oil Filled **3.49**
15 Mfd. @ 1000 V Oil Filled **1.49**
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1 Mfd. @ 2000 V Oil Filled **1.55**
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75TL Transmitting Tube, new **2.49**
304TH Transmitting Tube, new **4.95**
PE-104-Receiver pack for 654 **4.95**
PE-103-Popular Dynamotor new **9.95**
6 ft. Cable and 2 plugs to fit 654 and PE 103 .... **1.95**
274 N SERIES VFO and XMTR. Complete with tubes and crystal.
New BC-459 A—7 to 9.1 MC **$5.95**
Nearly new BC-457A—4 to 5.3 MC **3.95**
Nearly new (Navy) CCT-52208 —3 to 4 MC **4.95**
Brand new (Navy) CBY-52232 —2 to 3 MC **5.95**
New completely Shielded Transformers to operate with the above. 274 transmitters—1200V C. T. 200 MA, 5V @ 3a—Two 6.3 V C. T. fil @ 3 A ea. Series these for 12 Volts to operate XMTR **$5.95**

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COUNCIL BLUFFS, IOWA

The "We's" Have It

POLLY OLTION, W7JPO's XYL*

When a man says "we" he means just what he says: we—he and you, or some other person. Does a man say, "We caught a fish this long," meaning he and his fishing pole and a worm? He does not. He says, "*I* caught the fish," and he *means* "I." He gets his "I" and his "we" pretty much in the right places.

But do you ever hear a ham say, "I have a new 20-meter beam," or "I contacted Timbuctoo with 40 watts"? Not by a jugful you don't. And it took me months to find out why "we" always led the parade.

You've heard them:

"We had a swell QSO with a KL7."

"We rectified the line voltage."

"We put in a new transformer."

"We have to QRT old man, so 73."

"We—"But no need to go on down the line; you know what I mean. I found out what all that jargon meant, but I spent plenty of time wondering where the "we" came in. I would look through the door and couldn't see another soul in the "shack"—

my once-immaculate living room. The only one visible would be the once-familiar hubby. He wasn't meaning me, that was for sure, because when had I helped him put in a transformer, or hold a QSO with a KL7?

I knew all the Q signals from dint of repetition and I came to know the dits from the dahs. I would recognize, in the dark, an antenna of any description —I've been tangled up in enough of them. But "we" had me stumped.

Months passed. I learned what it meant to neutralize a triode radio-frequency power-amplifier, and I knew what electrostatic shields were for. I should know; goodness, I had to read something after all the other books and magazines had been exhausted.

Hubby was growing less and less familiar. Not only did I begin to wonder if he was still a good chess-player, but how did he feel about the international situation, or didn't he know there was one?

Twenty-five minutes after dinner is announced: "Hey, fill me a plate and bring it in here, will you? Boy, this guy is long-winded." And soon, "Great

**Box 16, Billings Polytechnic Inst., Polytechnic, Ariz.*

little XYL we have here, old man, she brought our dinner to us here at the rig."

"Maybe he has schizophrenia," I mutter as I attack my cold potato and scrape the grease off my steak. "Maybe a dual personality. Maybe he thinks there are two of him."

But weeks of careful study disclosed the fact that only in the shack was he a plural pronoun.

"Why don't you say 'I'?" I finally shouted in desperation.

He frantically waved me to silence. I hadn't chosen the psychological moment. He was listening with his earphones clasped in despair while a ZL4 squealed and snarled through the QRM. I said no more; the competition was too great.

One evening he was lovingly, carefully, diagramming a new power-supply. "There," he said tenderly, "Now we'll have more soup to get out on."

So then it came to me. His "we," that so annoyed and bewildered me, was no more and no less than that disreputable conglomeration of tubes, wires, cans, and noise. "We" was the ham's way of expressing to the world his pride and his affection for his bosom pal.

"We've been having a swell time on 10."

"We raised a fellow in Morocco."

"We stay up until midnight every night."

It was as simple as that. I couldn't believe I'd been so dumb. Of course, I should have known right away that the other half of his "we" was the rig.

And who is *my* "we" you ask? Well, you see, "we" to me is me and the 14 pair of socks I've knitted to pass away the time. "We" are just starting on the 15th, and are listening to a voice of ecstatic delight, "Well, OM, how's DX? We just had a swell contact with ZE1—— . . . . . "

PARTS AND PRODUCTS

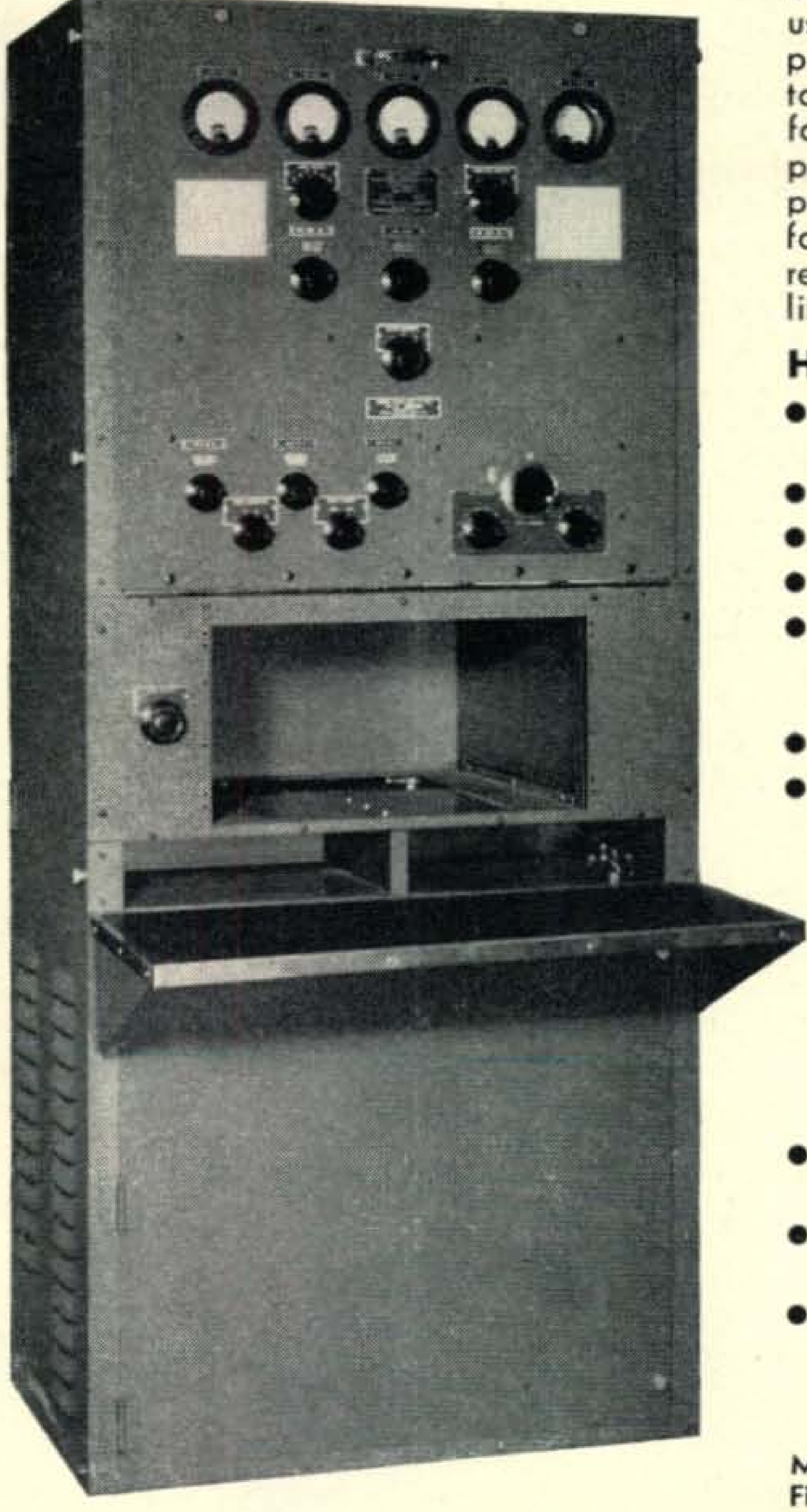
(from page 64)

ticularly valuable in checking both transmitting carrier and station monitor and assures compliance with FCC requirements. Model 90515 calibration unit combines the functions of the secondary fre-

quency standard Model 90505 and the high-frequency multiple and mixer unit, Model 90511. No. 90511 is available separately for those already having a secondary frequency standard Model 90505.

This Famous 167 BY-C.W. TRANSMITTER

is Yours for Only $187.50 fob. New York



Overall size 69"high, 29"wide, 19" deep. Beautiful dark - grey wrinkled finish.

Be one of the lucky Hams to get a 167BY Transmitter — Order yours today! No C.O.D.'s

Built by one of the foremost transmitter manufacturers for use on Liberty ships. Brand new surplus in original export-packed, moisture-proof cases. Complete and ready to go except for power supply. Terminal strip provided for latter in bottom compartment of cabinet. Hook in your present power supply or build one from available, inexpensive surplus, and proceed to pound brass! Also ideal for narrow-band FM with addition of simple phase or reactance modulator. This is the opportunity of a Ham's lifetime!

Here are some of the Features of the 167BY . . .

- 200 Watts C.W. output from 2 to 16 mcs; 150 Watts from 16 to 24 mcs. (Conservative commercial ratings)
- Any frequency between 2 and 24 mcs.
- Choice of 10 Xtal positions or V.F.O.
- High Stability V.F.O. with precision reset dial.
- Tube Lineup: 76 V.F.O., 6L6 buffer amp., 6L6 doubler, 6L6 doubler, 6L6 doubler-tripler, parallel 813s final amp.
- All important circuits metered.
- Pi antenna network matches impedance various antenna lengths.
- Built-in shock-mounted keying relay and key.
- Built-in filament transformer for all tubes.
- Space provided for receiver (18" wide, 19" deep, 10" high)
- Entire lower compartment of cabinet available for power supply, modulator, etc. Space 29" wide, 19" deep, 24" high.
- Demountable, chromium-edged, linoleum-covered operating shelf.
- Hinged R.F. deck. Swings down exposing all parts for easy service.
- Side doors and bottom-front of cabinet hinged providing access to interior.

FRONT PANEL CONTROLS

Multiplier Plate Meter, Amplifier Grid Meter, Amplifier Plate Meter, Filament Voltage Meter, Antenna Current Meter, (All 3" bakelite model 301 Westons), Amplifier Range Selector, Antenna Coupling Switch, Antenna Coupling Control No. 1, Amplifier Tuning Control, Antenna Coupling Control No. 2, Plate Current Selector Switch, 2 Frequency Logging Charts, Multiplier Tuning Control No. 1, Multiplier Tuning Control No. 2, Multiplier Tuning Control No. 3, Multiplier Selector Switch, Frequency Check Switch, V.F.O. Tuning Dial, Oscillator Range Switch, Crystal Selector Switch (10 positions), Filament Transformer Variable Primary Control.

HERE IS WHAT YOU GET FOR YOUR MONEY:

1—167BY Transmitter as described.
2—Sets of tubes including: 2-76s, 8-6L6s, and 4-813s!
10—Mounted Crystals!
1—Transmit-Receive Switch.
1—Demountable operating shelf.
3—Boxes spare parts, wire, cable, fuses, insulators, copper tubing, lugs, misc. hardware, etc.
1—Set of V.F.O. calibration curves.
1—Complete instruction book.

Above comes packed in 3 wooden cases weighing as follows: Case No. 1–610 lbs., Case No. 2–45 lbs., Case No. 3–175 lbs.

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DX

(*from page 45*)

23 and 24 on our zone map. The line itself is a rather wide line, which, for all practical purposes, gives us an approximate boundary. If Shensi Province was actually in Zone 23, we could very easily have listed it among the other provinces and areas shown under the description of Zone 23. I have just received a letter from C6HH written to G2PL. Here's an excerpt from it: "I am so sorry to say that I am not in Zone 23, as QTH here is Namcheng (Hanchung) E. 107°, N. 33° and is located in the southern part of Shensi Province, about 200 Km., apart from Kansu Province, but Kansu is Zone 23." In a way, for you fellows who have worked him, it is a tough break, but, on the other hand, it's as fair for one as it is for another, and there is no use kidding ourselves into believing a station is in Zone 23, when he actually is not. Maybe you could influence C6HH to move about 100 miles into Kansu Province. This would make things better for you, and I assure you, much easier on the DX committee.

Some of those WØ's seemingly are having a contest all of their own; for example, WØNUC, WØGKS, WØYXO, and WØNTA are all pretty well up the line, and each admits the others spur him on.

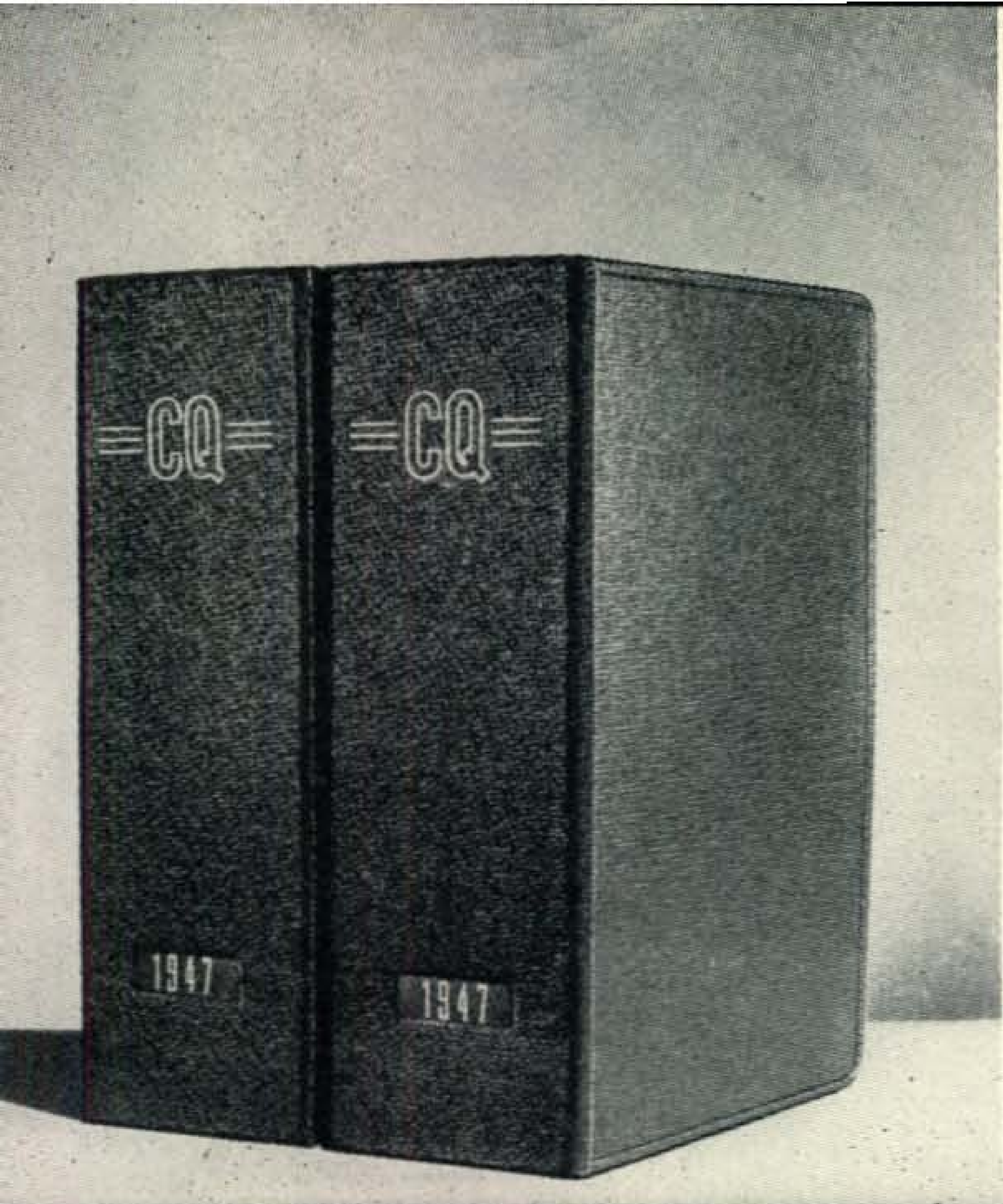
W9RBI has just worked his 100th country on phone; station being CR9AG. Ross is quite happy about this, as he should be. He also tells us that *VE8MB* is a U.S. weather station on Cornwallis Island in Zone 2, and is being operated by W9AWO of Madison, and WØFNL of Denver. They work on 14,100 c.w., and the phone frequency is 14,180 and 28,400. They usually run about ½-kw input.

Down San Diego way, it looks as though the DX activity involves such guys as W6EPZ, W6MI and W6YYW. EPZ has revamped his BC-610 putting in a pair of 4-125As. Input on c.w. is 900 watts . . . phone 750 watts. He is using a dual rotary with a three element close spaced on 20, and a three element wide spaced on 10. W6EPZ also seems to believe in coincidences. For example, when he worked *SU1HR* in Zone 34, it happened to be his 34th zone. And, a couple of days later, he worked EL3A in Zone 35 for his 35th zone. And, further, W6EPZ raised EL3A right after W6PZ got through with him.

W6YYW just got going, a short time ago, and worked himself up to 34Z and 88C, and, what happens . . . he receives orders to report to Honolulu. Before leaving, he is going to try his best to boost his countries to 100. Anyway, by the time you read this, he will probably be a KH6. Such is life when you're in the service. There are some pretty hot DX men in the service, but about the time they really get going at one QTH, they receive orders to move on. At least these fellows could work *AC4YN* every time they move without being called a hog.

If you are wondering why *D4AVW* knows so many of you by name, it is not because he has an up-to-date Call Book. He is W6BYB, Johnny Mayes, formerly of Sacramento, and in the prewar days his signal really made a dent in a lot of ear drums. Johnny is using a BC-610, and, so far, has worked 95 countries. These were worked in a period of ten days. He says he gets sort of lonesome over there, and especially would like to chew the rag with some of the old timers. If you hear him frequently working W6AYZ, don't get too antsy, because that's his brother, Bill.

When the neighbors leave him alone W2GWE manages to add an occasional country. Rumors are


CQ
CQ
1947
1947


CQ
CQ

that Pete is having TVI—whether he is on the air or not they blame him. So if activity at GWE picks up you'll know it's open warfare. W2IYO has deserted c.w. and is working 'em right and left on NBFM. Dave says he is raising a lot of stuff he had difficulty with on c.w. W2IOP is almost back on the air. In fact he did make the SS contest and managed to sneak in a quickie with *G2PL* for his first DX at the new QTH.

W2HY wants to know how to go about breaking into the charmed circle that works *VR6AA*. We're glad to see another VE in the Honor Roll. This time it is *VE3AAZ*, and he is in with 35Z and 99C. It seems that he does a lot of traveling, and took occasion to type up a very neat Zone and Country list while on the road. He is running 500 watts into a pair of 75-THs; the receiver being an AR88LF. The antenna set-up consists of two 144′ Zepps, which are supposed to work either singly or together as a "V" beam.

W6DLY has received a card from *C6TM* who said, on the card, he was operating portable in Zone 23. DLY is now awaiting further identification which will pin down his exact location. This is probably what C6HH should do once in a while. It's good to see another W7 show up. This one is W7EYS from the far northwestern corner of the United States; more specifically, Bellingham, Washington. Before the war, Bob said he used a single Philco 210 with a hole in the plate, as his rig, therefore, his DX didn't then amount to much. Now he is using a couple of 304-TLs in the final. His antenna layout consists of a 3-element on 20, with the driven element being four half-waves in phase folded back. (A lá KH6CT) The 28-mc job is a 5-element rotary with the three directors stacked, and the 50-mc antenna is a half-wave in phase. Bob wants to know what the deadline is for the DX column. The answer is, the 15th of the month.

This is a good spot to remind you fellows, once again, that when you send in your DX Marathon scores, please keep them on a separate sheet of paper, and mark them plainly "DX Marathon," and, of course, with your call letters. Do not get this mixed up with your regular Honor Roll additions or the chatter for the column.

I can't help but blow off a little steam on behalf of one of our "hard working" DX committee members, W6DI. He heads the phone section of the Honor Roll with 37Z and 130C. And, if you will search further, you will note that he has been doing a little code practicing at the expense of some of the DX men with the result that his c.w.-phone totals are 39Z and 156C.

Right on W6DI's heels is W1HKK with 37Z and 127C. But, these fellows better watch out for W4CYU who has 36Z and 135C. One more zone, and he'll top the phone list. W6PXH is coming right along with his microphone warbling, his most recent addition being *HZ1AB*.

I'm still butchering things up a little, and I think we finally yanked W7HTB out of the c.w.-phone section in the Honor Roll and have him placed where he wants to be and belongs . . . in the phone only section. He modestly says, however, "I have worked c.w. though." Then, we had the call of W9LNM transposed in the October issue, and, worse yet, we left it out of the November and December columns. I am sure we have him in the January Honor Roll, at least, we did five minutes ago. In any event, W9LNM has 36Z and 113C.

WØOUH says, "Boy, what a month!" "Finally got up a new 2-element 20-meter beam and worked 16 new ones." Now I expect he'll try 4 elements.

WØNTA feels the same way about DX and picked up 19 new ones. He said he missed three others. Now that's tough, isn't it? . . . Missing three out of 22. What does the guy want anyway?

W9MZP says working 100 countries seems to be a snap compared to working 40 zones. I think the second and third hundred countries will be a little harder, however. But then again, maybe not, some of them are getting above 180 now. Along this line, W2BXA with a measly W.A.Z. and 175 countries wants to know when and where do they find these other countries. I don't know about this. W6QD is still looking for Zone 2. Of course, some smart guy will come back and advise me that Zone 2 can be found in northwestern North America.

KP4KD is still banging away, but was a little griped at a certain W2 who had a little code practice for 45 minutes calling *LU1ZA*. KP4KD gave up, as did LU1ZA. ON4JW is doing O.K. with 38Z and 116C. A new one added to our family is CE3AG with 38Z and 121C. W8JM got serious about DX around the first of February of this year and has 70C and 31Z to his credit. He is running 450 watts to a pair of 812s, and his antenna, which is somewhat unusual, consists of a wire 285′ long running northwest, and a 140′ wire running north with the station ends of the wires going through a two turn loop coupled to a final tank. W3KDP is finally convinced that his haywire rhombic is doing a little better job for him than his old half-wave doublet. Ren is running 500 watts to a pair of 100-THs on 14-mc c.w., but on 10 phone, his input is around 100 watts.

W6PFD, one of those lucky guys in the W.A.Z. bracket, tells us that *ZC1AL* was operating portable in the southern part of Transjordan near the border of Saudi Arabia. The rig there was the same one he uses in Mafraque when operating c.w., 25 watts input; power supply is a 12-volt battery. In Mafraque, he switches to phone at 125-watts input when the supply mains are activitated for nightly use. Another bit of news from W6PFD is that *LX1AS* does QSL, but claims his call has been bootlegged quite frequently. We have the calls of a few W6s he worked from August 1 to September 10. *VU2BX* told W6PFD that his QTH is in North Bengal near the border of Sikkim (AC3), and Bhutan (AC2). As Mark says, this makes wonderful drooling material when you spot it on large scale maps. The operator's name is J. Bullick, Rungamuttee Tea Estate, Mal P.O., Doors.

The DX committee would like to thank all of you fellows for the cooperation in sending in better looking Zone and Country lists. You don't realize how much easier it is for us to check them and refer to them, as we do quite frequently. They also appreciate foresight that some of you have had in sending in completely new lists that are much neater.

Just in case there are some of you who want to get in the Honor Roll for the first time, all you have to do is make out two lists. One for your Zones, and number them down the page from one to forty. After each zone, put the call letters, the date, and time. Country lists should be in alphabetical order by country, followed by the call letters, date, and time. While you are at it, you might just as well number the countries as you go along, then as additions are made, from time to time, we would like very much to have this information separated from any chatter, gossip, or what have you, for the DX column itself.

W.A.Z. Certificate

A few of the boys have asked me if they could get a W.A.Z. certificate by just submitting 40 con-

Brand New Automatic Direction Finder

RADIO COMPASS

SCR-269F Complete with Component Parts Less Power Supply J-254 $75.00

This equipment comes complete with 17 - tube superheterodyne receiver which is tunable from 200-1750 KC in three bands. A complete instruction book for operation and maintenance accompanies this equipment.

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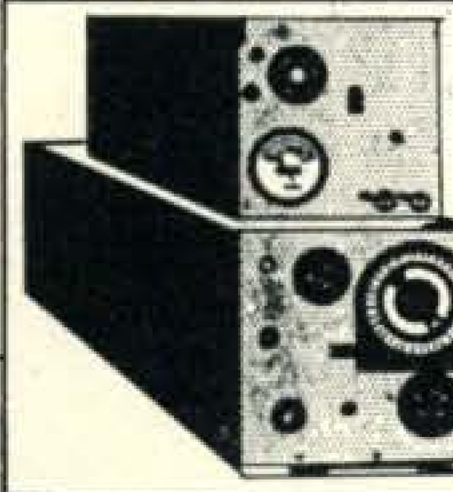
DYNAMOTOR UNIT PE-101-C

Duo output Dynamotor, input voltage 12 to 24V., output voltage 400V. at 135 ma, 800V at 20 ma, and 9 V. at 1.1 amp. J-226 $2.95



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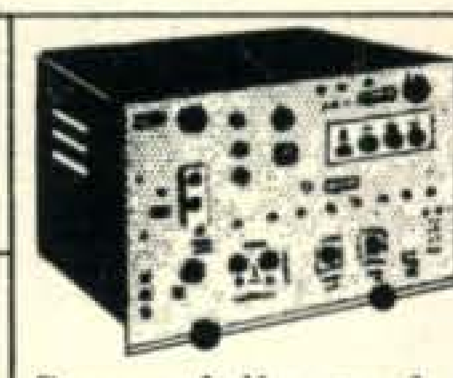
Including 4 tubes and Rf Amps. meter.

BC-AL229 Receiver

Including 6 tubes. Used in aircraft.

BOTH UNITS ONLY $9.95 J-226



J-227 1FF TRANSMITTER AND RECEIVER

$9.95

Successfully used as a television receiver. 30 MC I.F. channel and video amplifier, original diagram furnished. Less tubes and power transformer

BC223AX TRANSMITTER

Complete with tubes and tuning unit covering 80 meter Ham band, including frequencies charts, less xtals. J-255 $12.50

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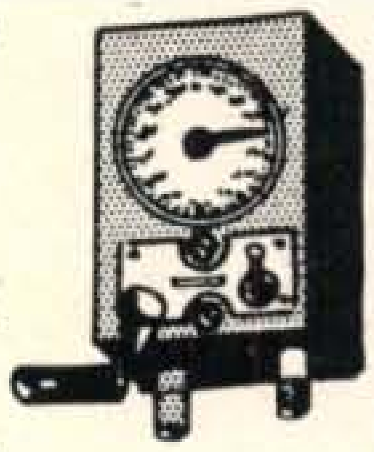
Like new.



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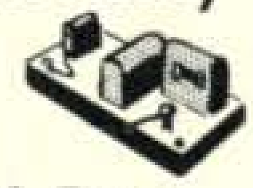
Dial calibrated, 360° face, ideal for antenna rationalizing indicator.



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Used in conjunction with SCR269F. changeover contains 29V, step relay, 5 deck, 6 position switch. 12V D.P.S.

Variable Resistor

2500 ohm. 100 W. 49¢

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5 gang, approx. 50 M.M.F.D. per section with individual air-tuned padders. 18 to 1 vernier drive.

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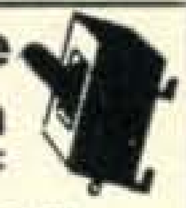
110-V, 60-cy. Pri. Sec. 5-V, 3", Shelled case.	$1.49
110-V, 60 cy. Sec.: 2.5V at 5.25 amps. Shelled case.	$2.45



Toggle Switch

J-213 39¢

D.P.D.T. 30 Amps, in black Bakelite case.

PYRANOL CAPACITATOR

J-229 $2.95

General Electric. 1 MFD. 5,000 VDC.

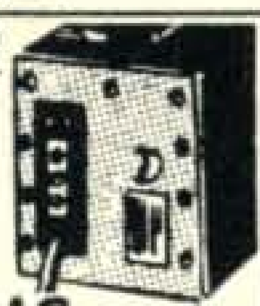
4" x 4½" x 3¾".

DYNAMOTOR DA-3A

J-210 $1.50

Input. 28 V.D.C.. 10.5 AMPS Output, 300 V.D.C., .260 AMPS 150 V.D.C., .010 AMPS 14.5 V.D.C., 5 AMPS Shipping Wt. 25 Lbs.

RADIO RECEIVER TRANSMITTER BC-620-A



J-200 $9.95

20 MC - 27.9 MC

This Xtal controlled FM set has 13 tubes and has dual Xtal controlled channels. It also contains built-in Fil. and Plate Meter. Tubes used: (4) 1LN5, (1) 1LC6, (1) 1LH4, (2) 1291, (4) 1299, (1) 1294. Ideal for communication between Trucks. Boats. etc. Used, in good condition. Less power supply. Wt. 38 lbs. Complete with carrying case and diagrams

30MC IF TRANSFORMER

29¢

Slugged Tune.

Condensers

Cap. MFD	Working Volt	Your Cost
1	1000 oil	44c
8	600 oil	95c
2	600 oil	49c

POWER TRANS.

J-224

Primary 110V, 60 cy., Sec. 700V each side of center at 80MA. 6.3V at 1.2 Amps, 5V at 3 Amps. Hermetically sealed size 6" x 3½" x 3". $1.95

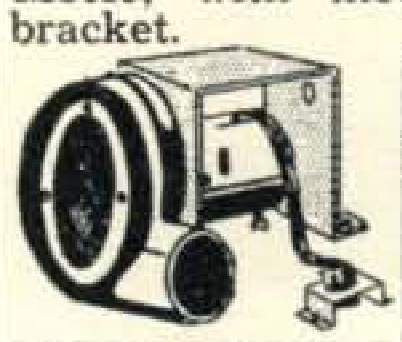
Butterfly Condensers

Oscillator assembly 76 to 300 MC with acorn tube socket mounted on condenser.	J-239A $1.95
Type B, frequency range 300 to 1000 megacycles.	J-239B 95¢
antenna condenser 105-330 MC.	J-239C $1.95
Oscillator 105-330 MC.	J-239D $1.95

Squirrel Cage Blower

$7.50 J-258

2" outlet, 110 AC, 60cy Silent Ball Bearing Motor, with mounting bracket.



Sockets for acorn tubes	$ .19
Powdered iron ⅜ slug	.10
Jacks, PL55, PL68	.15
Asst. mica condensers	1.95
3 lbs. asst. hardware	1.00
Pin straightener for min. tubes	.49
Ear phones, 2000 ohms, used	.95
Johnson sockets, No. 210, 25W	.39

CORONA BALLS

$1.00 Dozen 10¢ Each

High-Speed Photo Flash Tube

10,000 Flashes

12,000,000 lumens light output. Stops all action. Ignition coil included on back of bulb. 10,000 flashes. Diagrams furnished.

$8.95 J-222

TUBES

813	5.95	872A	1.95
VR150	.69	9004	.49
955	.65	9006	.59
9002	.89	50B5	.89
RK60	.95	VT127A	2.95
9001	.89	35W4	.69
6J4	1.50	3AP1	1.95
5FP7	1.95	3BP1	1.95
3BP7	2.95	6J5	.49
9LP7	3.95	5BP1	3.95
6N7	.89	6H6	.59

1T4, 3Q5, 6SN7 .59

3S4, 5W4, 6SA7, 1G5, 12H6, 6SH7 44¢

General Electric 25 MFD Photoflash pyramol capacitator, 2000 VDC-INT	$14.95
SPST relay 24V, 528 ohm. coil contact rating 5 amp. Packed 2 to a carton. 2 for	.49
Coxail solid copper tubing, 30 foot.	2.95
30-20 MFD Solar condenser. 150 V. tubular	.49
Assorted tubular oil-filled condensers, up to 5 MFD, 15 for	1.00
Westinghouse oil 1MFD 6000V, WVDC	7.95
144 MC radar osc., uses 15E with variable coupling, complete less tubes	3.95
Assorted high frequency chokes, 25 for	1.00
Thordansen 300 MA power transformer, 110 or 220V, 60 cy. input, secondary 500/ct/100 tapped at 400/400 extra bias winding 200/ct/100 at 50 MA, 18 lbs.	4.95
Assorted resistors ½ watt fully insulated in popular ohmages, 100 for	1.49
Thordorsen T48003, 2H-7H 550 MA swing choke, size 4½x5½x5½, square black crackle case.	5.95
Wafer sockets, 4, 5, 6. 7 and 8 prong, per 100	2.95
Assorted knobs, push on wood and plastic	1.95
Ideal filament transformer 110V 60 Cy. 220V. at 50 MA. 6.3V. at 1 amp. 6.3 at 2 amp. at 6.5 amps. 6" x 4½" x 5". 11 lbs. J271	$1.29

J-264 89¢

±1% 1 MEG.

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Hershel Radio Co.

5249 GRAND RIVER • DETROIT 8, MICH.

20% DEPOSIT REQUIRED ON ALL ORDERS

All Orders F.O.B. Detroit *Minimum Order $2.00* Michigan Customers Add 3% Sales Tax firmations and no Country List. The answer is no, and here's why. We will award a W.A.Z. certificate to anyone in the Honor Roll who submits proof of working all 40 zones. We do not require confirmations of the countries; however, to enter the Honor Roll, you must submit a list of zones and countries, and then you are eligible for a W.A.Z. certificate.

Well, gang, that does it. Don't forget the Marathon, and spread the word around. Let's see if we can have some entries in it during the month of January.

Happy New Year, and I hope it doesn't bring headaches, but, instead, good luck with your DX in 48. 73.

QTHs

AR1AK	Box 89, Beirut, Syria
C7AT	Box 51, Tientsin, China
CR6AI	Box 51, Lubango, Angola
CR7AF	Box 264, Lourenco Marques, Mozambique
CT1IT	Manuel Torres, Rua Zaire Nr. 26, Lisboa, Portugal
EP1AL	Via IARU
EQ1AM	Box 56, Kaswin, Iran
ET3AF	P.O. Box 858, Addis Ababa, Ethiopia
FT4AB	Marcelle, 20 Bd. Didon, Carthage, Tunisia
HA1KK	Via W2IOP, 261 Central Ave., Lawrence, N. Y.
HI8MV	Avenida Francia Nr. 10, Cuidad Trujillo, Dominican Republic
J5AAN	19th Infantry, APO 24, c/o P.M. San Francisco
J8AAF	2 Co., MM, APO 712, c/o P.M. San Francisco
PK3JF	Box 222, Surabaya, Java, N.E.I.
SU1HR	c/o Trans World Airlines, Cairo, Egypt
VP5AS	Milford C. Gossard, Vernam Field, Jamaica, B. W. I.
VP6KM	Kent House, Barbados, B. W. I.
VP9D	James A. Mann, Watts Farm, Southhampton, Bermuda
VU2CN	72 British Bde Sigs Hospital, Town West, Bangalore, India
VU2RS	545 Newark Rd., Lincoln, England (Station at Karachi, Pakistan)
VS6AR	Hong Kong Telephone, Company, Hong Kong
VS6BA	109 Austin Road, Hong Kong
VS6VC	c/o 3 Sqdn. Mal. Comd. Sigs Regt., Seremban, Malaya
WØSQS/J	Lyle A. Gallegos, Iwo Jima CAABC (P), APO 86, c/o P.M. San Francisco
ZD1BD	Royal Signals, Freetown, Sierra Leone
KX6AF	AACS, FPO 824, c/o P.M. San Francisco
KZ5BE	Box 802, Curundu, C.Z.
KZ5KN	Box 451, Howard Field, C.Z.
MB9AG	No. 3 Squadron, 8th Army Sig. Regt. CMF, Austria
OA4BE	Mel Boynton, U. S. Embassy, Lima, Peru
PK3CK	Box 222, Surabaya, Java, N. E. I.
PK6XA	Bert Kyrgsman, c/o NNGPM, Morotai, N. E. I.
TI2ES	Edgar Selano, Box 30, San Jose, C. R.
VO2AY	Walt Corbett, C. G. Air Det., Navy 103, FPO New York, N. Y.
VP3TR	APO 857, c/o P.M. Miami, Florida
VP4TAF	AACS, FPO 824, c/o P.M. San Francisco

VS1CE / VS1CF	Box 434, Singapore, Malay
VS2CB	Telecoms, Dept. Kuala Lumpur, Malaya
VS4VR	Via VS2AL
VU2BG	George W. Benzie, Sessa Tea Estate, Jokai PO, Dibrugarh, Assam, India
WØMCF/C1	Box 100, Navy 3930, c/o FPO San Francisco
W6YAW/AK	Don Dow, Box 497, El Monte, Calif.
YN1OC	Otto Cabezas, Calle Central Nro 708, Managua, Nicaragua
YO5J	Mr. Nestor, Box 326, Bucarest (No mention of radio on envelope)
ZB1AH	"Edelweiss", Ramel Bldgs., Isouard St. Sliema, Malta
ZC1AL	The Arab Legion, c/o Post Office, Mafraq, Transjordan
ZD4AO	c/o PAA, Accra, Gold Coast
ZD4AP	Via W2RIH
ZM6AI	Box 46, Apia, British Samoa
ZS2AG	Box 1135, Port Elizabeth, South Africa
ZS3F	Box 297, Windhoek, Southwest Africa
ZS3G	Box 513, Windhoek, Southwest Africa

QSL BUREAUS

Canal Zone Radio Club (QSL Bureau for KZ) Box 407, Balboa, Canal Zone

Austria	W. Blaschek (OE3WB) Kierlingerstrake 10/10 Klosterneuburg, Austria
Belgium	Fernand Baptiste (ON4TA) 159 Avenue Charles—Quint Brussels, Belgium
Czechoslovakia	C.A.V. Post Box 69 Praha, Czechoslovakia

V.H.F.—U.H.F.

(from page 72)

W6JRM, IV, CAV, MXK, NBJ, FMJ, FSH, WNN, KD, SP, GRD, BOS, CDQ, YZJ. W6WNN, BOS, CDQ all have an APS/13 for 420 mc and wonder if they can make the 30 miles over the mountains?

W6FMO reports the following active on two, around the Los Angeles area: W6ZJI, VXM, WGT, DSW, HZ, JXC, UTD, ZEM, YGN, FMO, YLL, VIX, WWP, MEP, HWJ, YHP, ZGY, SKA, BWY, mostly with 522s and ARC-3s.

W4WMI/4 at Georgetown, Ky., was all packed to go back to Raleigh, when he worked W9ZHB on 50 mc who told him that 144 mc was open. Bill got his 144-mc gear out and hurriedly put it on to work W9ZHB, W9ZHL, W9BBU on Sep. 17 from 2145-2200 CST with fair-good condx.

W5VV wants some interest in Waco, San Antonio and other neighboring cities for 144-mc tests. He will call CQ nightly at 1900 CST and would appreciate hearing from those interested.

W4BYR in Tampa, Fla., says that 30 miles DX was tops, but with the gang adding xtal-control and beams they have closed the 65-mile gap between Palm Beach and Miami. The best distance so far is to W4GJO at 82 miles, although the record for Florida is held by W4GJO-W4FPC in Gulf Beaches, a distance of 102 miles. W4FVW builds some really hot receivers from the ARC-4 receiver, according to W4BTR.

420-mc

Activity seems to be picking up here although 235 mc still seems deserted according to reports we have received (or haven't received).

Around the Los Angeles area we find these on 420 mc evidently using BC-645s; W6RJS, VDE, DEY, BOB, DJW, VIX, ZRN, NTW. They expect some of the San Diego fellows to break in any time. The first chess game on 420 mc was played for 2 hours and 20 minutes by W6BOB and W6DJW, as if getting on 420 mc wasn't deep enough.

Out in Salinas, Kansas, WØPKD, WØMVG, WØINM all have APS/13 units and are getting ready to try the band.

This winter the following stations in Westchester County, N. Y. (20 miles north of N.Y.C.), will operate a net on 420 mcs, using converted BC645s: W2FOT and W2JL broke the ice and W2RH, W2PFM and W2POO are expected to follow shortly. Horizontal polarization will be used with some elaborate arrays planned.

Please note we are back at Gashland, so send in all reports to this QTH. Thanks for reports and try to get them to us by the 18th of each month. Extra hot specials can be handled even later.

Nov. 3, 1947—ZS6GX heard W7DF working VE1AYL at 1305 EST. ZS6GX also heard WØQIN. Had a QSO resulted this would have equaled the record for 6-meters.

Nov. 11, 1947—LU9MA heard W7HEA at 1625 EST.

Nov. 23, 1947—W5AJG works HB8VK, while W5JLY works HB8VD during the short opening between 1040—1130 EST.

Sporadic-E DX continues within South America as PY1GJ and PY2DS in Rio de Janeiro and PY2AC in San Pablo come on 6 meters. Good prospects predicted for DX over these paths during the last of February and all of March.

6-METER DX

(from page 35)

between Mexico City and Lima, Peru. This places the point of sky-wave return south of Lima but as far south as Chuquicamata, Chile. A point of sky-wave return in this instance is the same as though a transmitter were located in this area. Following along this azimuth the next reflection will be via the sporadic-E layer which we already know exists within this region. The return path from Buenos Aires to Mexico City will follow the same route, only in reverse. The lack of XE1KE contacts with CE1AH and PY2QK further establishes the location of the sporadic-E layer formation.

Certain other factors support this hypothesis. Signals between Mexico City and Buenos Aires have at times been extremely difficult to read. This is probably due to the inherent patchy structure of the sporadic-E layer. Long scatter has also been observed during some openings. A particular instance occurred on October 14, 1947, when XE1KE contacted W5VY. At this time the beam antenna at XE1KE was pointed toward the southeast. The beam at W5VY was pointed toward the south. Apparently at this time the density of the F2-layer capable of supporting 50-mc communication was reaching further north than it had been on previous days. This is known since XE1KE had worked both OA4AE and OA4BG during the afternoon. The path from XE1KE to LU4DD and LU6DO reopened at about 1800 hours EST. Just prior to

this opening the contact between XE1KE and W5VY was made. It is believed that the W5VY signal traversed along a path similar to the type illustrated in *Fig. 4.* However, the angles of incidence were such than an appreciable amount of the signal was scattered backward from the sporadic-E layer over South America. This scattered component then followed the route via the F2-layer back to XE1KE.

Further Research

Many instances of 6-meter DX are not clear-cut and are not explainable in the usual terms of F2-layer and sporadic-E layer transmission. Paths extending 2800 to 3600 miles that are appreciably longer than a single hop via the F2-layer must be due to either a very high F2-layer (or possibly G-layer) reflection or to a damping of the wave within the ionized region. A slow progressive bending or damping of the v-h-f wave within the F2-layer has been proposed recently by Vilbig. *Fig. 5* shows the profile of this method of transmission. Actually a modification of this hypothesis is used by the CRPL in their two control point predictions of radio conditions. This type of transmission would explain the extraordinarily long path between J9AAO and CE1AH.

Active 6-meter amateurs in the United States are amazed at the extent and duration of the double hop sporadic-E openings in South America. These far exceed anything of a similar nature observed in North America. Incidents such as these serve to indicate our relatively poor knowledge of ionospheric conditions in certain parts of the world. 6-meter stations and 6-meter band DX has proved to be not only a fascinating and history making effort but a valuable contribution to scientific research. Keep up the good work!

VERSATILITY PLUS

(*from page 37*)

formation necessary to properly tune and load the transmitter.

A PHONE-C.W. switch allows quick selection of the type of emission. In the c-w position, the modulation winding is shorted, the short is removed from the key jack, and the voltage removed from the modulation screen and plates.

Two terminal strips are provided at the rear allowing many variations of operation. A power supply voltage of 400 volts for the final and modulators has been selected as the normal value, and 300 volts for the oscillator and multiplier. The plate power requirements are about 250 ma at either 300 or 400 volts.

On the 144-148 mc band, because the efficiency of the final is so low, it is not advisable to run much more than 300 volts. For this voltage, which of course can be used on any band, no dropping resistor for the 6AQ5s is needed.

This transmitter makes an excellent exciter for a higher power stage. It will drive a pair of 4-125A or similar tubes to a kilowatt input, or a triode like the 811 or 75TL to 200-300 watts input. The 6L6 modulators can also be used as Class B drivers and there is a 15-ohm output winding provided for feeding a line to grid transformer.

Two front panel toggle switches are provided which may be connected in any desired way. The POWER ON switch may be connected in series with the primary of an a-c pack to light the heaters, or in series with the heaters directly if a battery is used. The standby switch may similarly be used in any convenient way to turn off the B supply while receiving. A 3-circuit microphone jack is used with the control lead brought out so that the transmitter may be arranged for press-to-talk operation.

MONTHLY DX PREDICTIONS

(from page 46)

to 2030 hours CST, and the 10-meter band from 0530 hours until 1330 CST.

The Sunspot Peak

We hear plenty of talk these days about the sunspot peak. While at writing it can not be definitely established there is, however, reason to believe that the peak has been reached. In answer to the many questions we have received the accompanying illustration has been drawn to show the relationship of the present cycle and the one from 1933 to 1937. The monthly time scale $A—A'$ corresponds to the $A—A'$ curve of sunspot numbers extending from January, 1933, to October, 1937. The $B—B'$ curve of the present cycle is displaced until the two minima are aligned. In this manner it is possible to see the distinct difference between this cycle and the one of 11 years ago. The very sharp rise in the sunspot numbers has produced remarkable month-to-month variations in the band conditions. The smoothed relative sunspot number 100 was reached in a little over three years after the minimum of 1933. During this present cycle, the number 100 was reached in about two and one-third years after the 1944 minimum.

Graphs of this type also serve as a means of calculating the future sunspot peak. We note here that if the rising span between the two cycles were to be even then the present peak should have ocurred in August or September of 1947. It will not be until the summer of this year that we will definitely know when the sunspot peak was passed. Plotted on the same basis we should expect to see the sunspot peak reach 160. This would correspond to maximum usable radio frequencies in North America of 50 to 51 mc, a condition which was observed in October and November, 1947.

CONVERTER FOR 10, 6 AND 2

(from page 18)

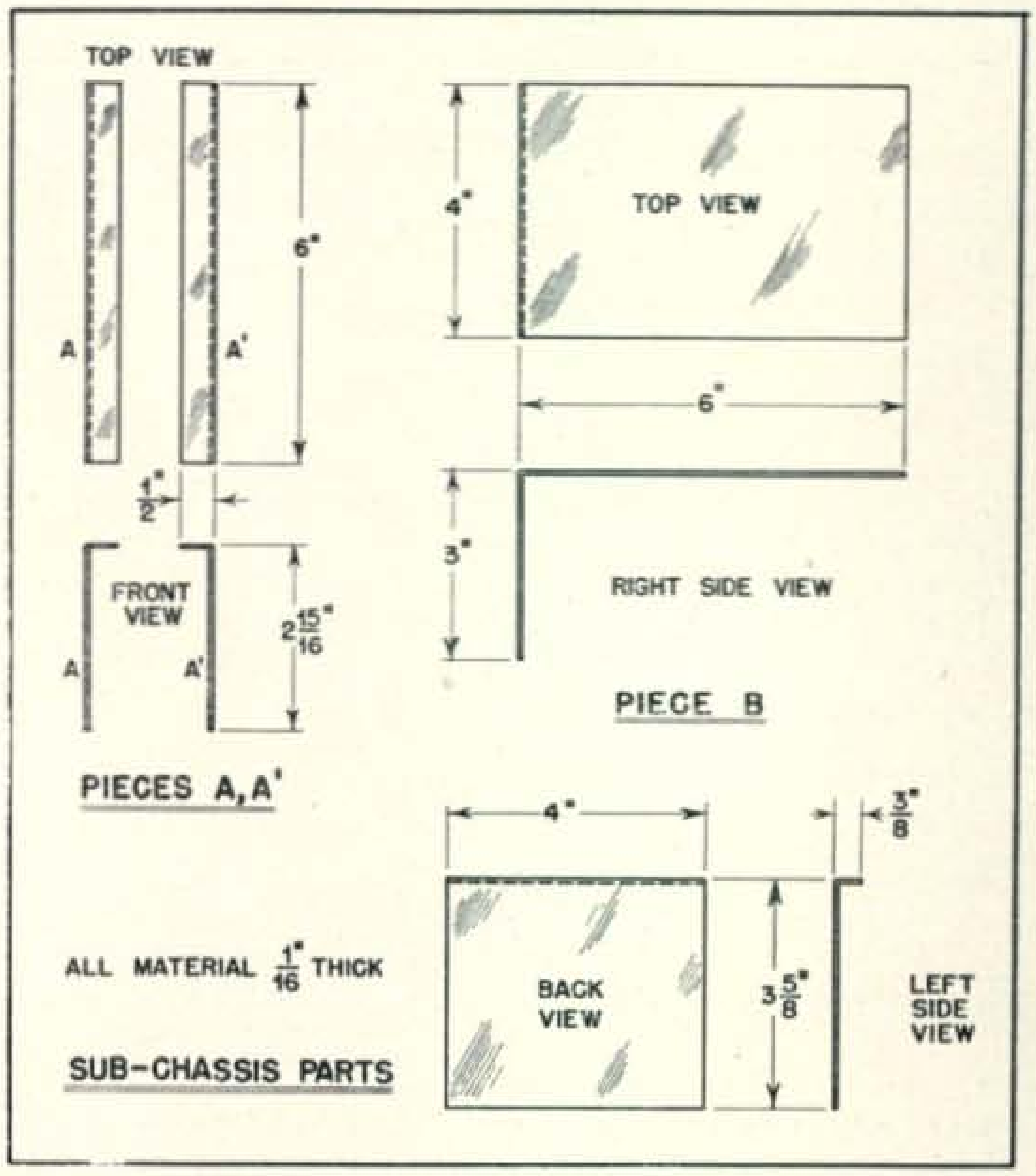
through which the five wires go which connect the sub-chassis to the main chassis.

Plug-in Coils

The plug-in coil assembly consists of three coils wound on small ceramic slug-tuned forms (Millen No. 69041), mounted in separate compartments. The coil box is made of aluminum and polystyrene. The top piece of $\frac{1}{16}''$ aluminum is $4\frac{1}{8}''$ by $1''$. The $\frac{1}{8}''$ thick poly piece on the bottom is the same size. The compartment separators are made of $\frac{3}{16}''$ thick aluminum, drilled and tapped on all four sides. Four are required for each coil. The dimensions are $\frac{7}{8}''$ by $1''$. Coil plug pins (Millen No. 10029) are mounted on the poly bottom piece and spaced to fit the sockets on the sub-chassis. 4-40 machine screws are used throughout.

The coils are wired by winding each form and mounting it on the top piece, and then assembling the unit without the side plates. Wiring is done through the open sides, after which the sides may be screwed in place.

Data for winding the coils will be found in the coil table. Some cut and try may be needed, but this is easy to do because of the coil box construction.



Mechanical layout and dimensions for sub-chassis containing main r-f wiring.

Tune-Up Procedure

After completion of the converter apply plate voltage to the oscillator through a milliammeter. If this current increases when the 3-10 μμf condenser in the oscillator grid circuit is shorted out, the oscillator is oscillating. Next, couple the converter to your receiver, and tune your receiver until a small bit of noise is found around 10 or 11 mc. (It is not necessary to have an antenna on the converter.) Once this spot is found, tune L_5 or the 5-30 μμf condenser in the mixer plate circuit until the noise in the receiver increases about two or three db. Your receiver is now tuned to the output frequency.

Following this, set the main dial at midscale and put a 29-mc signal into the antenna terminal. (This is for tune-up on 10 meters.) Tune L_3 by its slug until a signal is heard in the receiver. Next, peak this signal by tuning the slug in L_1 and the 100-μμf condenser which is across L_5. Next, tune L_2 until the signal is peaked further. If the signal changes frequency, when L_2 is tuned, condenser C_3 is too large, and should be cut down in value. (It is also possible that this effect may be caused by inadequate shielding.) After L_2 has peaked the 29-mc signal, the dial may be calibrated.

When the signal is removed and replaced by an antenna, the 100-μμf condenser in the 6AK5 grid circuit should be adjusted again for maximum signal

strength. If this condenser is not "on-scale" the antenna feeders should be lengthened by a quarter-wavelength and then cut a few inches at a time until this condenser comes on scale. The same holds true for the 100-$\mu\mu$f condenser in the mixer plate circuit. The line between the converter and the receiver should be good quality coaxial cable, and should also be as short as possible, unless it is necessary to lengthen it as described.

The oscillator works on a frequency approximately 10 mc higher than the signal frequency for the 6 and 10-meter bands, and on a lower frequency for the 2-meter band. In other words, the oscillator runs at approximately 38 to 40 mc for the 10-meter band, 60 to 64 mc for the 6-meter band, and 134 to 138 mc for the 2-meter band.

Final Notes

After the original model of the converter was completed, the frequency changed slightly when the same plug-in coil was plugged in and out. This was found to be due to an imperfect ground connection. This difficulty was overcome by means of a phosphor-bronze ground clip which contacts the front of the plug-in coil. This clip may be seen in the top view photograph of the converter.

Another point regards the condenser C_3. If this capacitance is too large, several effects may be found. One is that the noise level may be too high in the receiver. Too high a value of C_3 will also cause "pulling," or a change in oscillator frequency due to tuning of L_2. Audio distortion may also be noticed. All of these effects may be eliminated by reducing the value of C_3. When C_3 is too small no signal will be heard, so that the proper value is one which just causes the signal to be heard in the receiver.

High receiver noise may also be due to the oscillator super-regenerating. This may be stopped by putting a lower value of grid resistance in the oscillator stage. The 10,000-ohm resistor specified should be a satisfactory value.

The 2-meter coil is different from the other coils in two respects. Coil L_3 is air wound. One turn of No. 14 wire is soldered directly to the socket pins, and a 4-30 $\mu\mu$f trimmer, C_2, is wired in so that it is adjustable through the opening in the top of the coil box. Also, no connection is made for C_3, as this capacitance is not required, because the tube itself furnishes enough feed-back capacitance.

Performance tests, made with laboratory equipment, showed that a 20-microvolt signal into the converter gave 50 microvolts out on 10 meters, 50 microvolts out on 6 meters, and 20 microvolts out on 2 meters. This gain is substantially constant across each band.

ALL-BAND KILOWATT

(from page 21)

Since *E3* equals *E1*, and *E2* then equals *E4*, and the 90° phase relations exist, the conduction in tubes *V2* and *V3* are equal, thereby developing equal voltages across resistors *R1* and *R2* and zero voltage across meter *M*. However, if the tank circuit *C1-L1* is detuned from resonance, voltage *E3* is no longer in phase with *I1;* but in the case of a capacitive tank circuit where more C than required is used, the voltage $E3$ lags $I1$ as illustrated in *Fig. 5B*. However, $E4$ always maintains the 90° phase relation with $E3$, therefore both $E3$ and $E4$ assume different phase relations with respect to $E2$ and $E1$.

Since grid voltage $E2$ is now less than 90° out of phase with voltage $E3$, but grid voltage $E4$ is more than 90° out of phase with voltage $E1$, tube $V3$ will conduct more than $V2$ with a resultant voltage of given polarity across M. When the tank circuit is tuned off resonance with a value of capacity less than required, the phase relations of *Fig. 5C* are obtained, and $V2$ then conducts more than $V3$ with a resultant reversal in polarity of voltage across meter M.

The operation of the single ended discriminator farther removed from resonance is different from the double ended in that it is not symmetrical about resonance. This is due to decrease in magnitude of $E3$ and $E4$ as departure from resonance gets larger. A more detailed analysis of the discriminator operation shows a discriminator curve departure as indicated by the dotted lines of *Fig. 6*. For best results

$$X_{c2}/R_1 = \frac{X_{c3}}{R_2} = M \text{ of } V2 \text{ and } V3 \text{ of } Fig\ 4.$$

This will move the undesired crossover point as far as possible from the resonance point.

The double ended discriminator will normally operate over a 1-to-1.5 frequency range. This is more than sufficient to cover all amateur bands. For instance, referring to *Fig. 1*, after voltages $E3$ and $E4$ are obtained at a frequency of 2 mc, but with the output circuit $C2$-$L2$ previously tuned to 3 mc, sufficient output would still be obtained from the discriminator tubes $V3$ and $V4$ to actuate a sensitive polarized relay in place of meter M.

The single ended discriminator will normally operate over a 1-to-1.5 frequency range in one direction but due to the crossover it only operates over a 1-to-1.1 frequency range in the other direction. This low discriminator frequency ratio plus the fact that in the transmitter described, $E1$ is obtained from a tuned gang circuit and is thus of such low value off resonance that the frequency ratio is further limited. This requires that the 80-meter band must be covered in two steps. In other words, to tune 80, assuming that one is on the low-frequency end of the band, it is necessary to place the v.f.o. approximately in the center of the band, press the key, and obtain resonant conditions; then to go to the high-frequency end of the phone band, the key is pressed again and resonance is secured at the end of the phone band. Tuning on all other bands is accomplished in one step, which means that no attention need be given to the automatic tuning system when jumping from one end of the band to the other. The tuned input circuit on the tube across which the discriminator works was used in order to have two tuned circuits on 80 meters, thereby reducing chances of spurious response, which was thought desirable, considering the kw input.

The speed at which automatic tuning operates is a problem to consider since if extremely high-speed operation is desired, hunting of the tuning motor becomes a problem and requires an anti-hunt system. Using tuning condensers of about 10 to 45 $\mu\mu f$

variation, and the usual padding condensers together with stray circuit capacities, the lower frequency amateur band required about 160° condenser rotation out of the usual 180° Driving this condenser with a motor through a gear reduction giving about 10 revolutions per minute was sufficiently slow to eliminate any hunting effects, and still permitted tuning up, when going from one end of the band to the other, in less than three seconds. In normal QSY procedures this time is, of course, negligible and the automatic tuning is completed before many characters are transmitted. The sensitivity of the phase detector, and hence the amount of hunting, is determined by the Q of the tank circuit and the final amplifier tank hunts continuously in this transmitter with no load but stops hunting when loaded. Blocked rotor braking of d-c motors reduces stopping time of the motor after power is removed by a factor of from 4-to-1, or better, over merely opening the motor circuit. If shaded pole induction motors are used, blocking action can be obtained by normally shorting both shading windings, but opening the clockwise winding for counterclockwise rotation and vice versa. Such motors are manufactured by Barber-Colman Company of Rockford, Ill., and can be obtained with varied gear reductions.

Generally the degree of accuracy of the tuning is greater than obtained by hand, thus the tubes always operate under optimum conditions. When using link-coupled circuits, such as coupling the final amplifier to the antenna through a link, small amounts of reactance in the antenna can be cancelled out from the tank circuit automatically through reflected reactance and the optimum tuning condition for the final amplifier is still maintained.

ZERO BIAS

(*from page 13*)

Due to the detail work involved in tabulating scores, entries must submit DX Marathon scores on a separate page from Honor Roll scores and other DX news. It is requested that scores be plainly marked "DX Marathon."

Zone and country lists must be submitted in the same manner as though they were for the Honor Roll; the zones listed in numerical order showing the call letters, date and time; the countries in alphabetical order by country, followed by the call, date, and time. The CQ DX Zones of the world, and the official DX country list, will be used for the yardstick.

Standard reporting forms for both the DX Marathon and the Honor Roll are now in preparation. A self-addressed envelope sent to the editor's attention will secure a set of these forms for you. Please indicate whether or not you want them for just the Honor Roll or both the Honor Roll and DX Marathon. You can mark this on the lower left hand corner of the envelope.

The 1948 Annual DX Marathon is the first operating activity to be sponsored by *CQ*. During the year several others will be announced, all of which will be aimed at giving the participants a lot of fun and at the same time benefiting amateur radio as a whole. A most important activity which will be of special interest to clubs will be outlined in detail in the February editorial. —*W2IOP*

SCR-274N MOBILE

(from page 27)

available from the automobile battery to buck the bias battery down to the correct value. *Fig. 7* shows how this is done with either positive or negative ground on the car battery. In either case *R10* is used to provide continuously variable grid voltage from 22.5 volts to 16.5 volts.

Since the cathode of the modulator tube is returned to the negative of the car battery, when the positive is grounded this same connection provides an additional 6 volts on the plate of the modulator tube. If the negative of the car battery is grounded, returning the negative of the high voltage winding of the dynamotor to the positive of the battery will produce the same result. In both cases the plate voltage on the modulator tube is 6 volts higher than the dynamotor output. The negative (pin 2) of the VR150 regulator is also connected to the positive of the car battery, regardless of battery ground polarity to provide an additional 6 volts on the 815 screen. It was found that this slight increase in screen voltage provided greater audio output.

Approximately 24 volts grid-to-grid audio is required to drive the 815 modulator to 20 watts output. A 6SL7, with one triode connected as a voltage amplifier and the other as a phase inverter was used to supply this driving voltage. Sufficient gain was available to permit full output with 0.4-volt input. This was somewhat more sensitive than was required and an inverse feed-back circuit consisting of *R9* and *C6* from the secondary of the modulator transformer back to the cathode of the voltage amplifier was used to reduce the gain by a factor of 4 and at the same time reduce distortion.

With this driver, the output of the modulator is rather sharply limited at 20 watts of audio, with the grids of the 815 acting as a peak clipper above this level. In order to minimize splatter resulting from this clipping, *C7* was used to "build out" the leakage reactance of the modulation transformer into a low-pass filter. The value of .02 μf was selected for *C7* because it was found that this gave good response to approximately 3000 cycles and then reasonably rapid attenuation. *C1* was selected to produce low-frequency attenuation beginning at about 200 cycles.

Although a preamplifier and dynamic microphone were used to drive this speech amplifier, it produces adequate gain for direct operation from a carbon microphone.

Top and bottom views of the final modulator are shown in the photographs, *Fig. 10 and 11.*

A similar modulator has been built by W2QJZ around a surplus ART/13 speech amplifier. He removed the 6V6 side-tone amplifier and transformer, making room to mount the 815 in the enlarged transformer mounting hole and an OA2 regulator in the space vacated by the 6V6. Heaters were rewired to take a 6SJ7 speech amplifier and a 6V6 driver. The cathode resistor of the 6V6 can be increased to about 2000 ohms to reduce plate current, since only a small portion of its available power is needed to drive the 815. Sufficient gain is available to permit the use of a low-impedance dynamic microphone without a preamplifier. With this unit, it is necessary to mount the modulation transformer and bias battery outboard at the end of the chassis.

Control and Power Circuits

Fig. 8 shows in detail the control and power circuits. With the switch *S1* in the first or OFF position as shown on the drawing the converter and transmitter circuits are dead and the broadcast receiver functions normally. Plate voltage from the vibrator power supply in the broadcast receiver is disconnected internally from the plates of the broadcast receiver tubes and is brought out to the blade of the push-to-talk relay, *K1*. During reception it returns to the broadcast receiver plates through the back contact of the relay.

When *S1* is advanced to the No. 2 or CONVERTER position, filament voltage is applied to the converter by one set of contacts and plate voltage by the other. An additional switch associated with the converter but not shown is used to take care of the antenna and r-f switching between broadcast reception and high frequency reception through the converter.

When *S1* in the third or TRANSMITTER position, filament voltage is applied to speech amplifier tubes in the control unit, to the transmitter and modulator tubes and to the coil of the push-to-talk relay, *K1*. Under this condition, operating the push-to-talk button on the microphone switches the broadcast receiver B+ from the receiver and converter circuits over to the speech amplifier and audio and r-f driver circuits. This feature is particularly valuable since it saves 40 to 50 ma of plate current which would be required from the high-voltage dynamotor if it were used to supply these low-level stages. The same relay operation applies 6-volt operating voltage to the coils of the dynamotor relay, *K2*, and to the antenna switching relay in the transmitter.

Note that the negative brush of the high voltage commutator of the dynamotor is connected to the positive brush of the low-voltage commutator rather than to ground. The reason for this is that when a battery with negative ground is used, the battery voltage is added to the dynamotor output voltage producing an extra 6 volts for the modulator and PA plates.

The only filter found necessary for the transmitter high-voltage supply was a 15-μf capacitor, *C1*, connected across the high-voltage output. No filter choke is needed since the internal inductance of the dynamotor itself serves as an effective choke.

In order to save space in the trunk and to keep the high-current leads from battery to dynamotor as short as possible, the high-voltage dynamotor (450 volts at 175 ma) with its associated relay and filter capacitor is mounted on the bulkhead under the hood.

On the control circuit diagram, *Fig. 8*, are shown the "S" meter connections used to provide carrier monitoring during transmitting periods as well as normal "S" meter functioning. The "S" meter is connected in the cathode circuit of the r-f amplifier of the broadcast receiver. With no signal being received, the meter sensitivity is adjusted by means of a variable shunt, not shown, to provide full scale deflection. When a signal is received, the a.v.c. of the receiver reduces the r-f amplifier plate current causing a corresponding reduction in meter reading.

During transmitting periods, the r-f amplifier plate current is zero since plate voltage is removed from the receiver circuits. Rectified r-f supplied by the monitor circuit shown in the transmitter takes its place in the meter. With the constants shown (500 ohms in series with crystal in the transmitter and 1500 ohms, *R1*, in the control unit) and with the coupling to the PA tank coil provided by one turn approximately 1/2" from the low end of the coil, the rectified current is 2 ma.

J1 on the panel of the control unit provides a strong signal in a pair of phones for aural monitoring of modulation. *R1*, in addition to limiting the crystal current to a safe value, prevents the "S" meter from shortening out the monitor jack.

An additional switch *S2* is provided for checking transmitter frequency in the receiver. When *S1* is in the transmitter position and the PUSH-TO-TALK button is not pressed, closing *S2* applies plate voltage to the oscillator and frequency multiplier stages of the transmitter without de-energizing the receiver. This permits checking the point on the converter dial where the transmitter signal is located or even setting the transmitter frequency to zero beat with an incoming signal. Since the transmitter v.f.o. frequency calibration is highly accurate, it also permits obtaining an accurate calibration on the converter.

A preamplifier to permit the use of a low-level microphone is included in the control unit. A detail of its circuits is shown in *Fig. 9*. It operates in straight-forward fashion with two stages of amplification direct-coupled to a third stage used as a cathode follower to provide a low-impedance source for feeding the line back to the modulator. It provides sufficient gain to permit operating from a 50-ohm dynamic microphone (salvaged from a surplus B19 tank set). Its maximum output is 8 to 10 volts. Although this may seem like an excessive amount of speech amplification, the total plate current consumption by this preamplifier is only 2 ma and the additional speech amplifier included in the modulator unit requires only 2 ma more. It is believed that the improvement in audio quality resulting from the use of the dynamic microphone justifies the additional circuit complexity.

Lock-in type tubes were used in the preamplifier since they were mounted in an inverted position.

Antenna

The antenna used is of the type normally encountered on police installations and includes a coil spring at the base to provide flexibility in going under low obstructions. It was found important to include a flexible connection between the upper and lower spring fitting since depending on a connection through the spring itself gives rise to inductance variation and detuning as the antenna sways.

Although the antenna could be mounted on the rear bumper as is frequently done, experience with previous police installations has shown that a higher mounting point produces much greater radiation efficiency. Accordingly, the antenna was placed at as high a point on the body as was possible. In order to avoid drilling holes in the car body, a special bracket was fabricated of 1/8" sheet steel curved to fit the body and bolted to the flange inside the trunk cover. It extends through the crack between the trunk cover and the body and provides a sturdy and sufficiently rigid mount. This mounting is shown in the photographs on the cover. Note that four bolts are used to secure the bracket to the car body and that it was made in the form of a gusset in the corner of the trunk opening thus providing much more strength than if it had been mounted at one edge only.

The small loading coil shown in the photographs was found to provide a somewhat better match and better loading since the antenna itself is slighly shorter than a quarter wave.

Due to the proximity of the trunk cover to the base of the antenna, it has been found that opening the cover has a slight effect on antenna loading and PA tuning. Accordingly, the final loading and PA tuning adjustments are made with the trunk closed except for a crack wide enough to permit reaching in to the controls and to peek in at the PA plate current meter.

Adjustment

Because the substitution of the 6J5 oscillator for the 1626 and the change in the circuit which the oscillator drives will have a slight effect on the frequency calibration, it will be necessary to recalibrate the oscillator to make the indications on the dial correct. This may be done by any convenient means and using any signal of known frequency in the oscillator range. WWV on 5 mc is suggested. The compensation should be accomplished by adjusting the oscillator padding condenser trimmer, accessible through the top of the oscillator shield, until the oscillator is on frequency at one point. Since the oscillator inductance is not disturbed during the modification this should provide correct calibration at all dial settings. If the oscillator coil inductance is found to be off, it may be easily corrected by the slug adjustment provided.

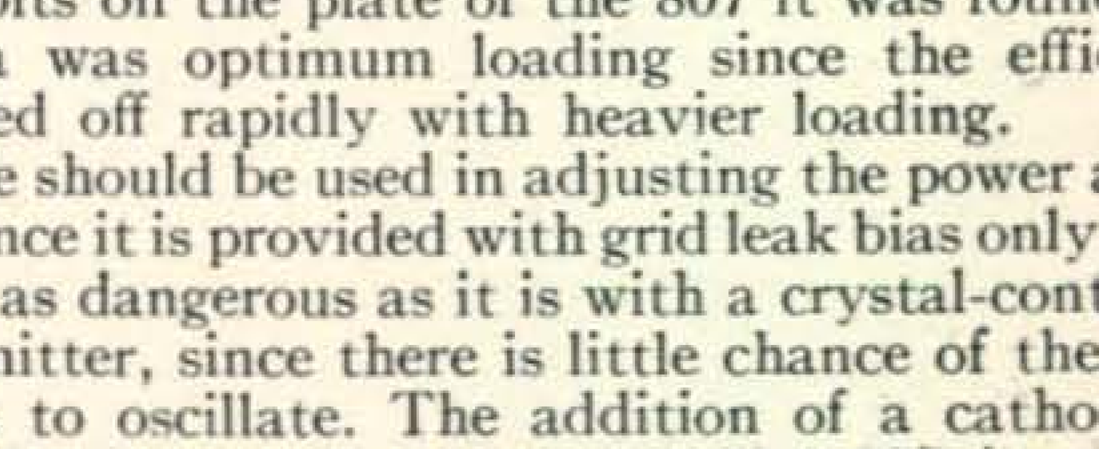
During adjustment of the low-level stages, plate and screen voltage should be kept off the power amplifier. When the oscillator is on calibration, set it so that its sixth harmonic is at the desired point in the 10-meter band, and adjust the tripler tuning coil, *L2*, for maximum grid current on the 6V6 doubler. It should be possible to obtain 300 to 500 microamperes. After tuning for maximum grid current, check the frequency with a wavemeter to be sure that the third harmonic of the oscillator has been selected.

The doubler plate coil, *L3*, should next be adjusted for maximum grid current on the power amplifier and the frequency checked with a wavemeter to be sure that it is tuned to the sixth harmonic of the crystal. Grid current of from 2 to 3 ma should be obtainable.

With the antenna connected to the transmitter, the loading capacitor, *C17*, should be set for its maximum capacity. Plate voltage and excitation should be applied to the 807 and its plate tuned for minumum by means of *C16*. The capacity of *C17* should now be decreased and after each change *C16* reresonated until correct loading is obtained. With 450 volts on the plate of the 807 it was found that 90 ma was optimum loading since the efficiency dropped off rapidly with heavier loading.

Care should be used in adjusting the power amplifier, since it is provided with grid leak bias only. This is not as dangerous as it is with a crystal-controlled transmitter, since there is little chance of the v.f.o. failing to oscillate. The addition of a cathode resistor large enough to protect the 807 in case of loss of excitation would dissipate an appreciable portion of the plate voltage with consequent reduction in power output.

After all adjustments have been made to the transmitter, the oscillator frequency control, the loading control and the PA plate tuning should all be locked



to prevent their shifting under vibration.

It will be found that small changes of frequency may be made when desired without readjusting the multiplier and power amplifier tuning controls. All that is necessary is to set the oscillator frequency control to the correct point.

ANTENNA THEORY

(from page 32)

element case. The effects of the earth have been neglected, and to consider them is beyond the scope of this article.

If two $\lambda/2$ dipoles spaced d apart are now fed, not in-phase, but by some out of phase relationship, the polar diagram in *Fig. 7* is altered. Assuming that d is now $\lambda/4$ and that antenna A is excited 90° later than B, the polar diagram becomes an "end-fire" array wherein the transmitted energy is concentrated in one direction

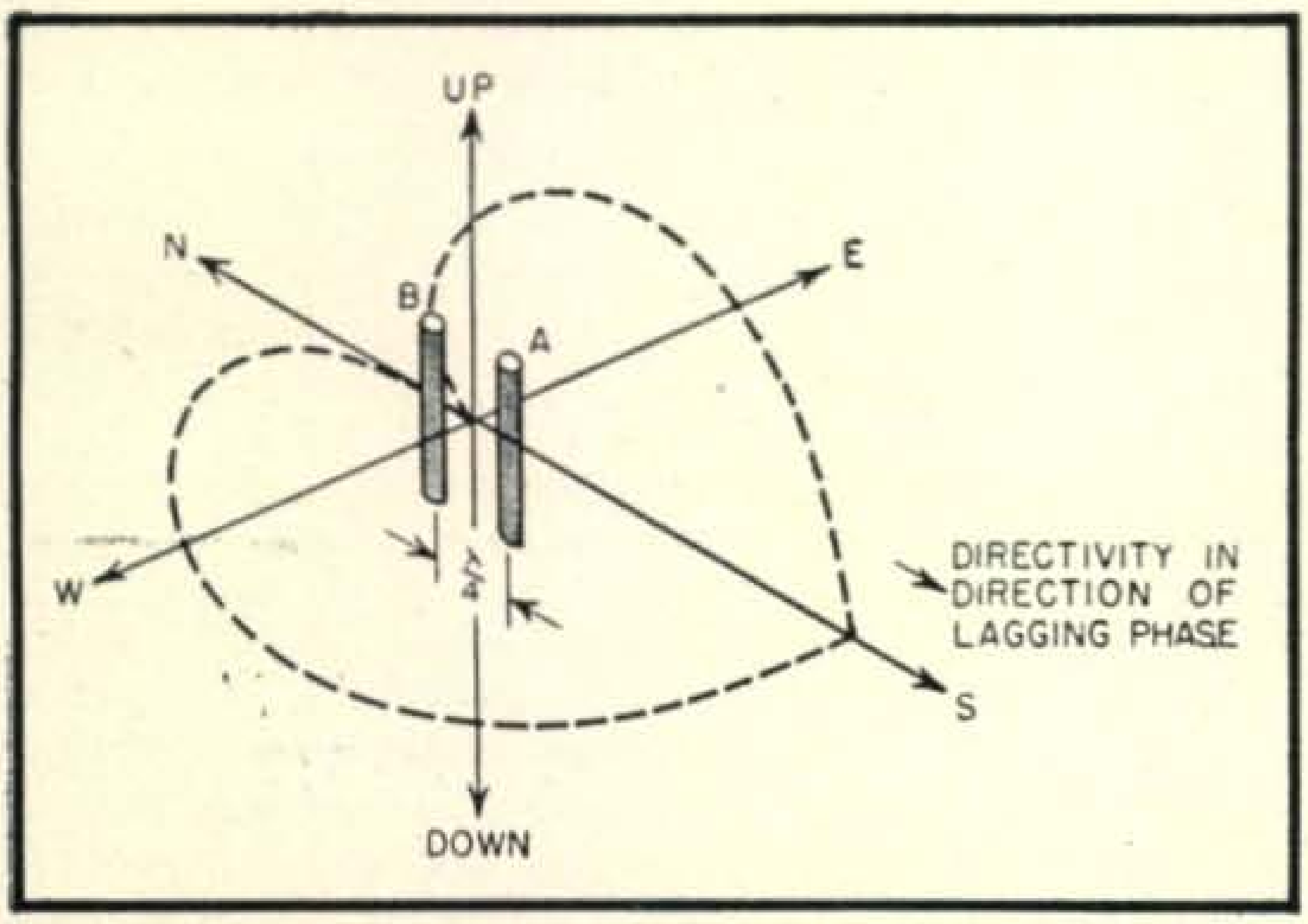


Fig. 8. Horizontal polar diagram of a simple "end-fire" array wherein a cardiod radiation lobe is obtained when two vertical dipoles are excited 90° out of phase with $\lambda/4$ spacing. In this case, antenna A is excited 90° later in the r-f cycle than B.

along the line joining the elements. This array yields a radiation pattern known as a "cardioid," *Fig. 8*, which becomes more directive in the direction of the lagging phase as the number of elements increase. Mentioned merely to show the complexity of more advanced arrays, the interested reader can find further information on these antenna systems in the literature.

Aside from the few remote cases wherein a radio transmitter is actually mounted in the middle of a half-wave dipole antenna, it is more convenient to locate the transmitter some distance away from the antenna itself. A multiple of one-half wavelength feeder consisting of two closely spaced parallel wires may be utilized as one approach to the problem, as has been mentioned previously. Several other simple systems, each having certain advantages and disadvantages, can also be employed.

A dipole has a center impedance which varies around 73 ohms, depending upon its height above ground, therefore basic transmission line theory shows that a theoretically infinite length of 73-ohm transmission line, of either coaxial or twin-lead cable, could be used as a feeder. Since the 73-ohm transmission line is terminated at its end (i.e. the antenna) by an impedance equal to the characteristic impedance of the line itself, no radiation can occur along the line, and furthermore the line will look like a pure resistance to the remote transmitter irrespective of length. In practice, dielectric and resistance losses in these cables limit feeder lengths to several hundred feet, however the average amateur seldom finds use for longer feeder lengths in his work. To use coaxial cable in this application, the outer shield is connected to one half of the dipole while the center conductor joins to the other half. At the transmitter, the feeder terminates in a three or four turn link coupled closely to the final amplifier tank circuit. When the feeder is terminated at the antenna end by an impedance exactly equal to the characteristic impedance of the line, changes in link coupling will not detune the final amplifier in any way the reactance of the link must be tuned out proving that a correctly matched feeder and antenna system looks like a pure resistance load to the transmitter.

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Attention Ex-Marines

Former electronics technicians in the Marine Corps who have been discharged since September 1, 1945, are now free to re-enlist at the same rank held at the time of discharge, comes the announcement from Marine Headquarters.

The only exception is in the case of master sergeants who have been inactive for more than 24 hours. They will be reappointed to the grade of technical sergeant.

Greatest need is for former Marines with the following specification serial numbers: 648, signal electrician; 649, radio technician; 759, radio technician; v.h.f. 774, airborne radar technician; 775, radar technician; 878, radar-radio technician, aviation; and 879, radar-radio repairman, aviation.

To further attract volunteers for duty in the electronics field, the Marine Corps has authorized promotions to the next higher grade for Marine trainees upon successful completion of various phases of electronics instruction.

W2WMV C9

(from page 38)

100 v., and things really start jumping then. I also have complaints from my friends that they can't read as the lights flicker so at night. When I depress the key the line drops about 7 v.

The station here consists of a BC-610-E transmitter, a SCR-221 frequency meter and an SX-28 receiver. The antenna is a two-section 8JK array which is about 45' off the ground. The antenna is really FB except that it's good only for North and

South America. For Europe I use a long wire.

Many questions have been asked me about why I'm using "C9" and others are using "MX," whether Manchuria can be counted as another country, whether it is Northeast China or Manchuria, etc. The way it stands with C.A.R.L., Chinese Amateur Radio League, is that it's Northeast China and "C9." To my knowledge there are only two "C9" stations, C9SY, also of this city, and myself. But Northeast China still counts as a separate country."

A BOXFUL OF WATTS

(from page 41)

Sufficient margin for overload is provided in the choice of the power transformer, since it is only worked at about 80% of its VA rating. The 122 volts applied to the primary is of small consequence, as shown by measurements on temperature rise after 6 or 8 hours c-w operation. To prevent the 83V tube from getting too much filament voltage, a 3/4-ohm fixed resistance reduces its voltage.

Construction

We found it advisable to avoid numerous series grounds or chassis grounds. All grounds were insulated from the chassis by an insulated master ground bus which itself was grounded at the oscillator tube.

In wiring up the unit, the master ground bus and the filament circuits should be completed first. Next, the bypass and screen circuits should be wired. Cathode resistances and filament bypass condensers should be tucked away with minimum length leads to the ground bus. Space between the top of the tuning condensers and the bottom of the panel may well be used for the key click filter and the power amplifier screen divider/power bleeder.

The construction is not difficult, once the proper layout has been determined. It should be borne in mind that sloppy construction is to be avoided, if good results are to be expected. By saving space in the less important circuits, it is possible to provide good isolation for important ones like "hot" r-f circuits.

If self-oscillation is experienced in any of the stages, it may be necessary to re-route some of the r-f circuits or provide greater isolation for the lower powered stages. Other than the tendency of the untuned buffer to oscillate in the initial testing of the transmitter, no trouble was experienced from the other stages.

For 40-meter operation, the oscillator operates on 1.8 mc. The buffer tube isolates the oscillator and the 6V6 picks off the fourth harmonic which is fed to the 807 at 7 mc. On 20 meters, it is necessary to double in the final. When the transmitter is operated on 3.5 mc, the 6V6 acts as a straight doubler. During the first tests on 3.5 mc, the doubler showed some tendency to oscillate but the LC ratio of the doubler plate was altered slightly toward a high-C circuit, and excellent stability was obtained.

In setting up the oscillator, it is well to observe the stability on the eighth or tenth harmonic, as any frequency instability will be magnified by that amount and provide an excellent check on the performance of the transmitter.

Classified Ads

Advertising in this section must pertain to amateur radio activities. Rates: 25c per word per insertion for commercial advertisements. 5c per word for non-commercial advertisements by bona fide amateurs. Remittance in full must accompany copy. No agency or term or cash discounts allowed. No display or special typographical ad setups allowed. "CQ" does not guarantee any product or service advertised in the Classified Section. Closing date for ads is the 25th of the 2nd month preceding publication date.

ABBOTT TR-4, complete and now on 2 meters, $25 f.o.b. Mallory 300 v. 100 ma vibrator power supply. Both $30 f.o.b. No trades. W2RTM, Rt. 72, Schenectady, N. Y.

GENERAL RADIO capacitance bridge, type 740. 5 mmf to 1100 mfd. Strictly a precision laboratory instrument ± 1% accuracy. Cost $140—will sell for $75 f.o.b. Fully guaranteed. No trades. W2RTM.

GENERAL RADIO variac-variable auto transformer, type 100, 1000 va. $17.50 f.o.b. Type 200, 860 va, $7,50 f.o.b. No trades. W2RTM.

SOLVE YOUR PROBLEMS with a straightedge. Write to Nomographs, Inc., Lawrenceville, New Jersey.

A REAL BARGAIN for users of the ARC-5. Six type 1625 tubes for $1.75. Brand new surplus. Electronicraft, Inc., 5 Waverly Place, Tuckahoe 7, N. Y.

FOR SALE: Super-Pro SPR-210-LX with power supply, newly reconditioned, $150. Four dual section (2 mfd. 1000 v., 6 mfd., 800 v.) condensers, all for $5 or $1.50 each. New broad band ten meter converter, $22.50. Check or money order. W5MOT, 4010 Maryland, Shreveport, La.

VHF-152—$75, DB-22A—$58 (slightly used). W8BV, care P.O. Box 218, Holland, Mich.

WANTED: 26 inch Bud or Par-Metal cabinet. Sell: Millen, brand new, never used, 75 watt exciter. 10, 20, 40 m. coils. First $35. W5AUB.

COLORTONE QSLs! Outstanding! Samples? Colortone Press, Tupelo, Miss.

BC-221 FREQUENCY METERS (without modulation). Used, but each instrument tested and guaranteed working order. While they last: $28.50 f.o.b. Memphis, Tenn. W. Bettersworth, W4IIY, Box 4245.

HQ-129-X without speaker for sale. Slightly used $135. E. Kindquist, 404 Riverside Drive, New York 25, N. Y.

SURPLUS BARGAINS: Tuning knob for command set receivers—69c. ALVARADIO, 903 S. Alvarado, Los Angeles 6, Calif.

VESTO self-supporting steel towers. No guys. Easily erected. Every ham can afford. Write The Vesto Company, Parkville, Mo.

FOR SALE: Very slightly used Ballantine electronic voltmeter, 300 A. Cost $300. Price $150. W9TML, Independence, Kansas.

SELL 350 watt rack panel PP35TG's c-w transmitter—$125. 250 watt PPTZ40's mod. by PPTZ40's, 42″ cabinet rack, $200. New Sonar VFX680—$70. New RCA audio osc. $35. ARC-3, 8 crystal channel motor tuned xmtr. and receiver converted for 2 meters, cabinet rack complete with power supply and 6 element beam—$150. W2UXI A. D. Miller, 9012—52nd Ave., Elmhurst, L.I., N. Y.

CHASSIS ALUMINUM. Custom built, any size, shape. 17x13x3, $2.50 Other sizes, other prices. Write for quotation, folder. John Heim, 713 West 3rd St., Williamsport. Pa.

WAR SURPLUS SPECIALS: Receivers and Transmitters: BC-375 $36.95; SCR-522 $35.95; BC-1266 $39.50; Indicator I-221A $24.50; SCR-274N $29.95; BC-603 $12.95; BC-604 $14.95; BC-191 $12.95. Cathode Ray Tubes: 5BP4 or 5BP1 $4.94; 12DP7 or 12GP7 $8.95. Mine Detectors: SCR-625 $49.95; AN/PRS-1 $14.95. Cable: RGS/U 52 ohm with connectors 50′ $4.50; per ft 6c; 14 conductor No. 15, connector one end 50′ $3.95. 7 conductor 65 ft. No. 14 ga, plug each end 3.95. Miscellaneous: hand mike, T17B $1.95; Premax antenna 24′ extended $4.95; with base $8.90; battery charger Tungar 6-70 V. @ 6 amp DC $35.00; Shure crystal pick-ups $1.89; spark plug suppressors, 50 for $2.95; 6 v. lantern batteries, box of 30—$2.75; 45 v. battery, heavy duty—"B", 4 for $1.98; safety belt w/strap $5.75; ¼ w. GE neon bulbs 115 v. bayonet base, box of 10—$1.20. Thousands of other items—send for flyers. The Abell Distributing Co., Box No. 3, 5 E. Biddle St., Baltimore 2, Md.

TERRIFIC BARGAIN! 50-60 watt phone-c.w. transmitter, 6AG7 osc., 6AG7 dblr., 807 final. 6SJ7, 6N7 speech, 6L6's mod. All tubes, power supplies, built-in antenna relay, 20, 11, 10, and 6 meter coils, black crackle cabinet, all controls decaled, 2 three inch sq. meters, professional appearance, nearly new. Remote control box and cables, D104 mike, streamlined stand, Speed-X bug. 11 Bliley and P.R. Xtals, % modulation and F.S. meter, 100 ft copperweld antenna wire, 300 ohm twinlead, 1852-6C5 6 meter converter. You can't lose! First $175.00 takes all. J. D. Anderson, WØKVP, 1900 Jefferson, Lincoln 2, Nebraska.

FOR SALE: 250 watt transmitter in 3 ft. Par-Metal cabinet; T40s RF, TZ40s AF, complete with mike and E.C.O. Price $250. Herb Kreckman, W2LLR, 11517-237th St., Elmont, Long Island, N. Y.

ABBOTT TR4 with 955 detector. Also Mallory vibrator power supply (VP557 type) 400 volts, 150 ma. Both for $50. New SCR522 transmitter only $12. One pair heavy duty selsyns, $12. W1JFF, Newport, R. I.

GIBSON RADIO RULE for designing circuit diagrams accurate-quick-uniform. 75c postpaid. P.O.Box 307, Seattle 11, Wash.

NEW NC-173 Narional receiver and speaker. Best offer over $150 takes it. An excellent receiver. Quitting ham business. Write 222-24th Street Drive, Cedar Rapids, Iowa.

IN STOCK: New and used Hallicrafters, National, Hammarlund, RME, Collins, Millen, Meissner, other receivers, transmitters, etc. Lowest prices. World's best terms. Shipped on approval. Guns, etc. traded for. Write. Henry Radio, Butler, Missouri.

BEAM CONTROL CABLE. New material. 2 No. 16; 6 No. 20 rubber insulated, coded, tinned conductors. Weatherproof rubber jacket. Heavy overall braided shield. ½″ diameter. Value 30c foot. Real buy 11c foot. F.O.B. Chicago Associated Industries, 6639 Aberdeen Street, Chicago 21, Illinois.

QSLs? SWLs? America's finest. Sample 10c. Sackers, W8DED, Holland, Mich.

QSLs. SWLs. Made just the way you want them. Samples? Write W9BHV QSL Factory, 857 Burlington, Frankfort, Indiana.

FOR SALE: New Victor 16 mm sound projector, complete, $450.00 or will trade for factory converted BC-610. W1KWY, 87 Samoset, Central Falls, R. I.

400 CYCLE MOTOR GENERATOR. New army surplus in original cases. 28 volt motor direct coupled to 400 cycle 115 volt generator. Drive it with a pulley and motor or gas engine if you wish. PU-7/AP has output of 21.6 amps. PU-16/AP has output of 6.5 amps. Either model—$19 95 Radiolab, 1612 Grand Ave., Kansas City, Mo.

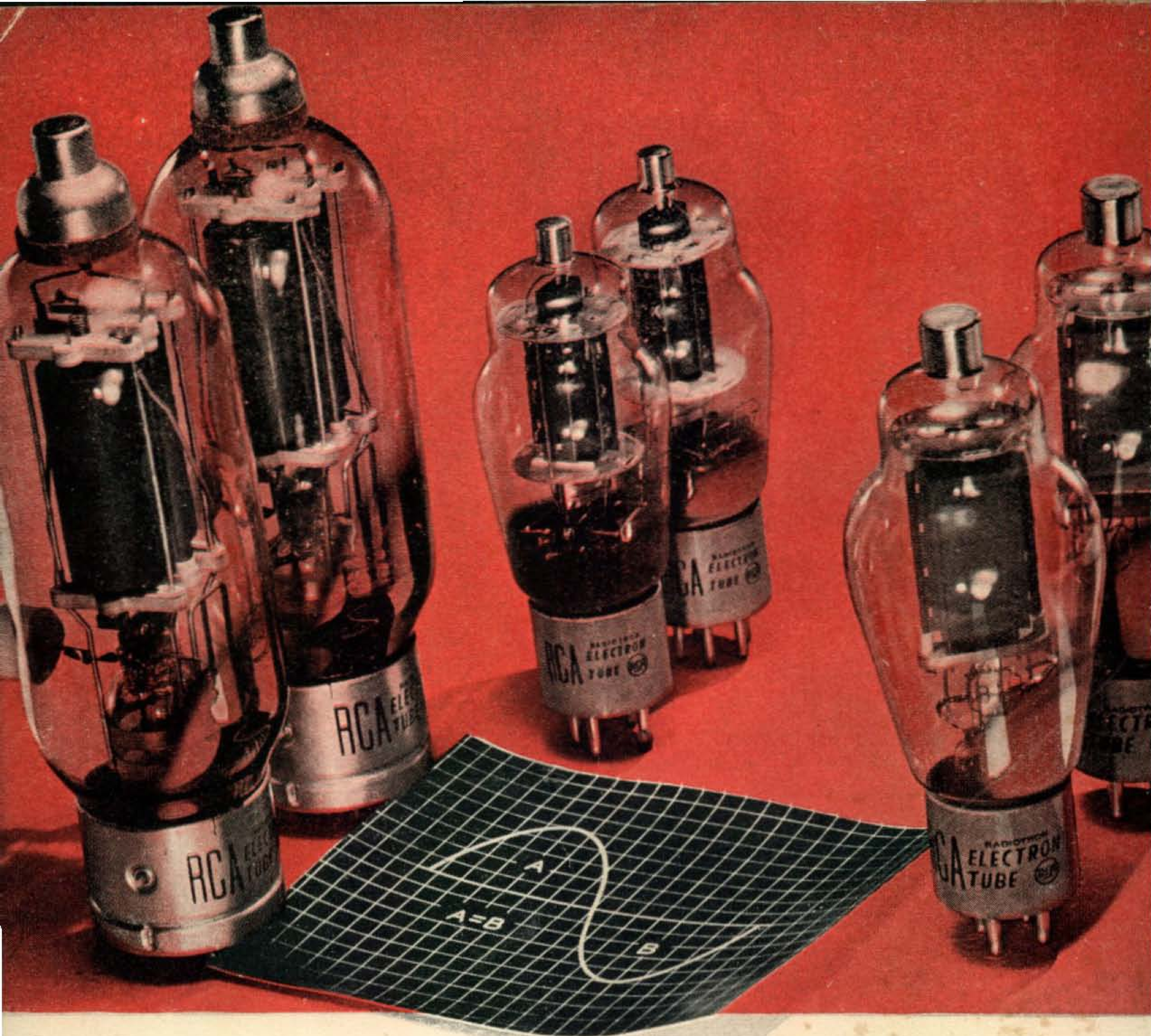
New Hampshire QSO Party

The Concord Brasspounders, W1OC, of Concord, N. H., extend an invitation to all hams to join in the second New Hampshire QSO Party, Feb. 7-8, 1948. It will be from 6 p.m. EST Saturday until 6 p.m. EST Sunday, with no limit on operating time and no power restrictions. An engraved certificate will be issued to all stations sending in a report, plus special certificates for high scorers in and out of the state.

Scoring: For stations outside N. H., 5 points per contact with each N. H. station, total points to be multiplied by the number of different N. H. counties worked. For stations in N. H., 5 points per contact with each N. H. station, 1 point per contact with stations outside N. H., total points to be multiplied by number of N. H. counties worked. The same station may be worked for additional credit on another band, phone or c.w. The general call will be "CQ NH" on c.w. and "CW New Hampshire" on phone.

Information required on reports: RST (or RS on phone) report, plus city or town and state. For N.H. stations, RST report plus their county. Mail reports and scores to Dorothy W. Evans, W1FTJ, Box 312, Concord, N. H. Scores must be received not later than Feb. 28.

—CQ Ad Index—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