CQ

JANUARY 1947

The Radio Amateurs' Journal

25¢

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THE NEW VHF-152, used with any communications receiver, will give you peak performance on the 28 to 29.7, 50 to 54 and 144 to 148 mc. bands, utilizing the extremely efficient *double detection system.* Not only can you enjoy reception on these frequencies economically, but you'll do so more efficiently and effectively than is possible with any higher priced, specifically designed VHF receiver.

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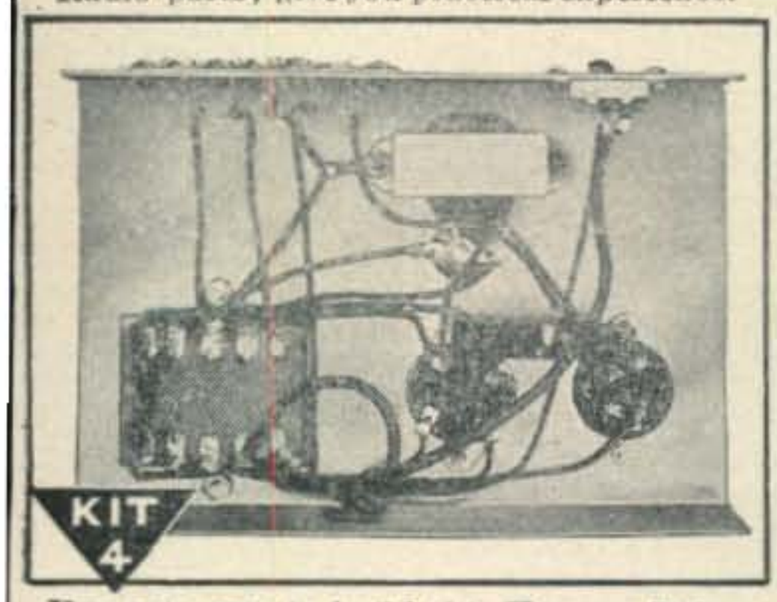
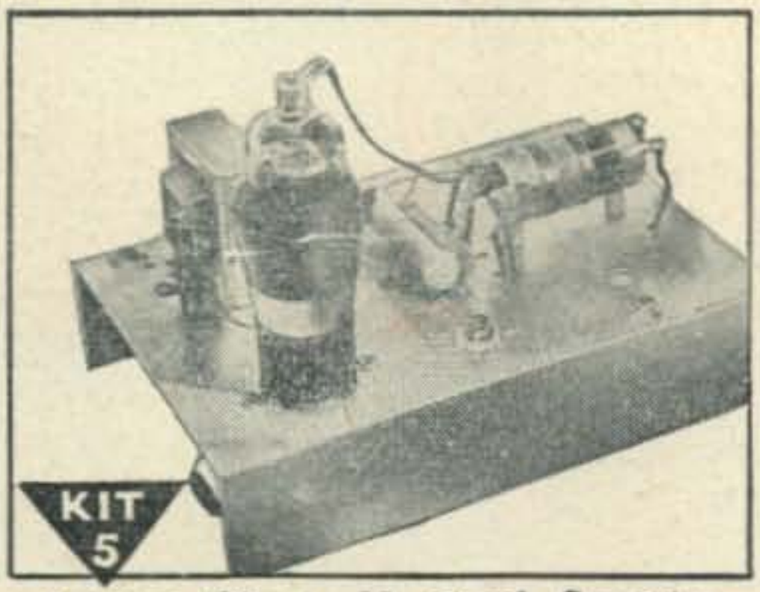


You get parts to build this Vacuum Tube Power Pack; make changes which give you experience with packs of many kinds; learn to correct power pack troubles.



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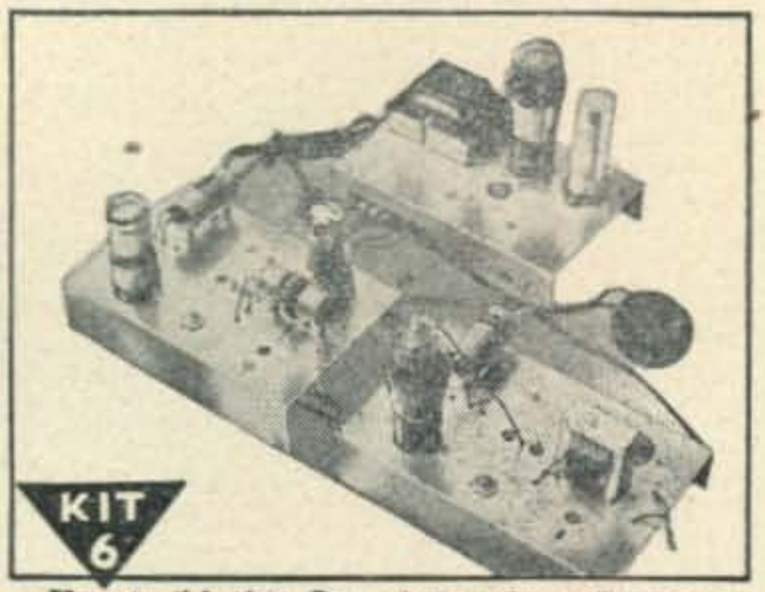

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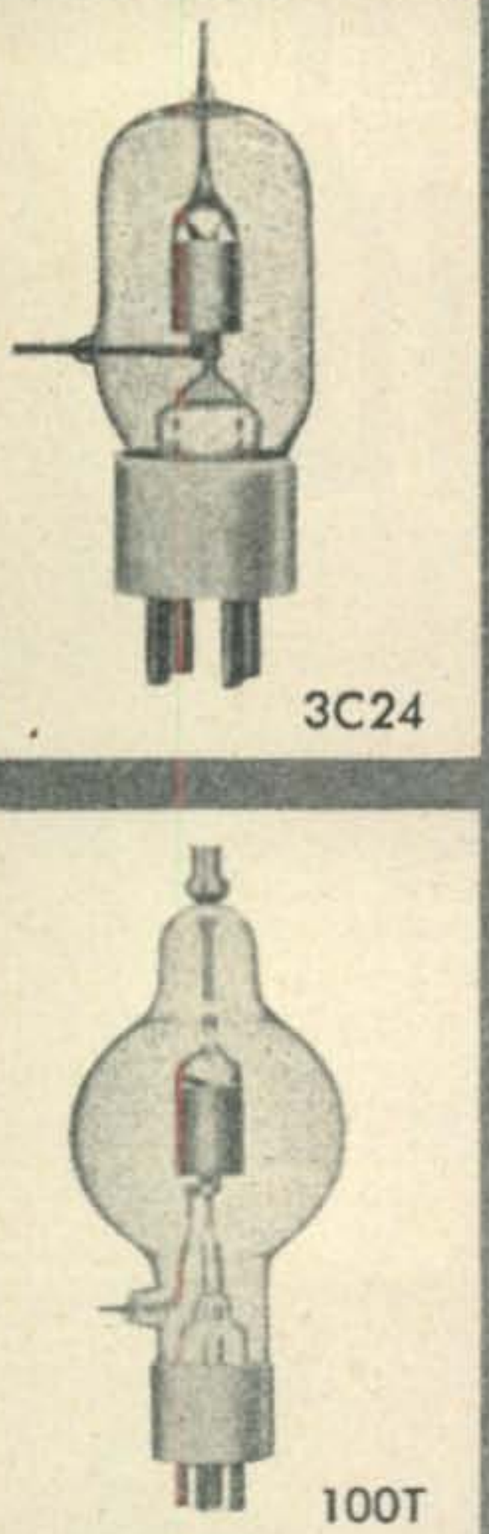
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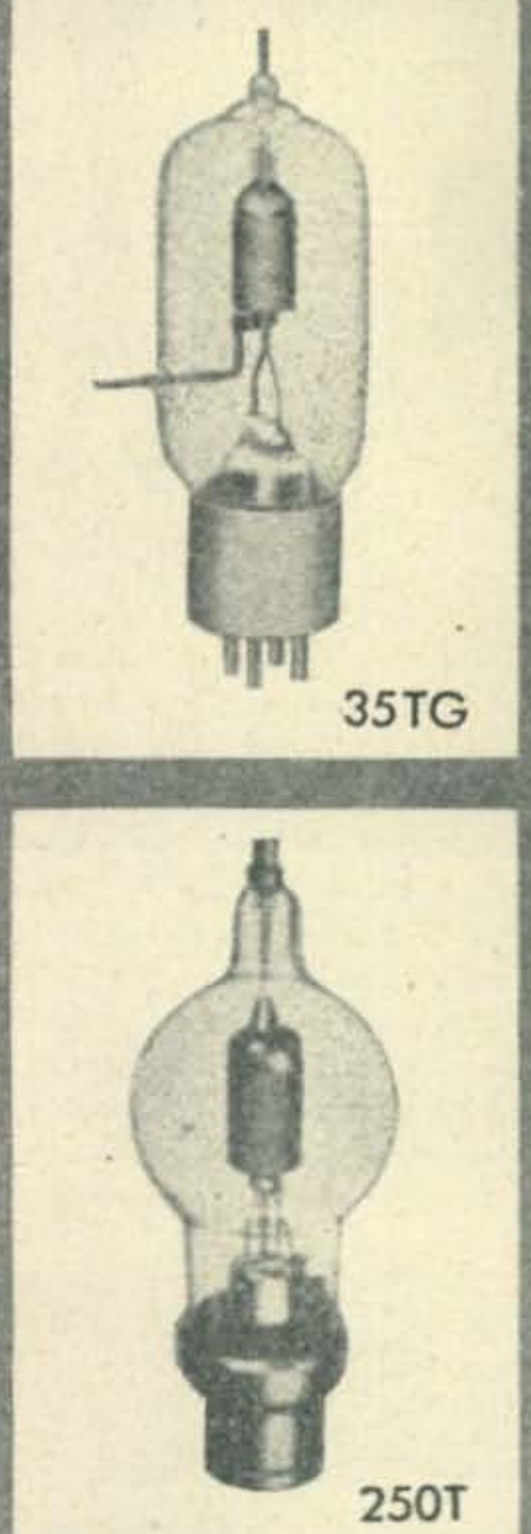
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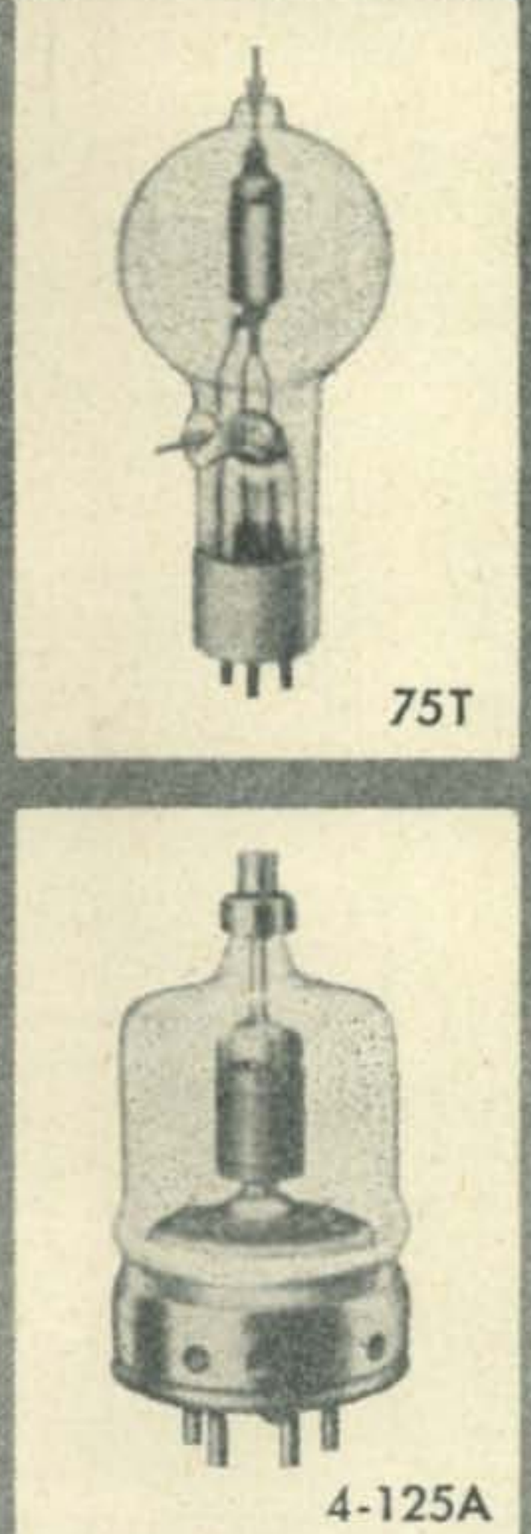
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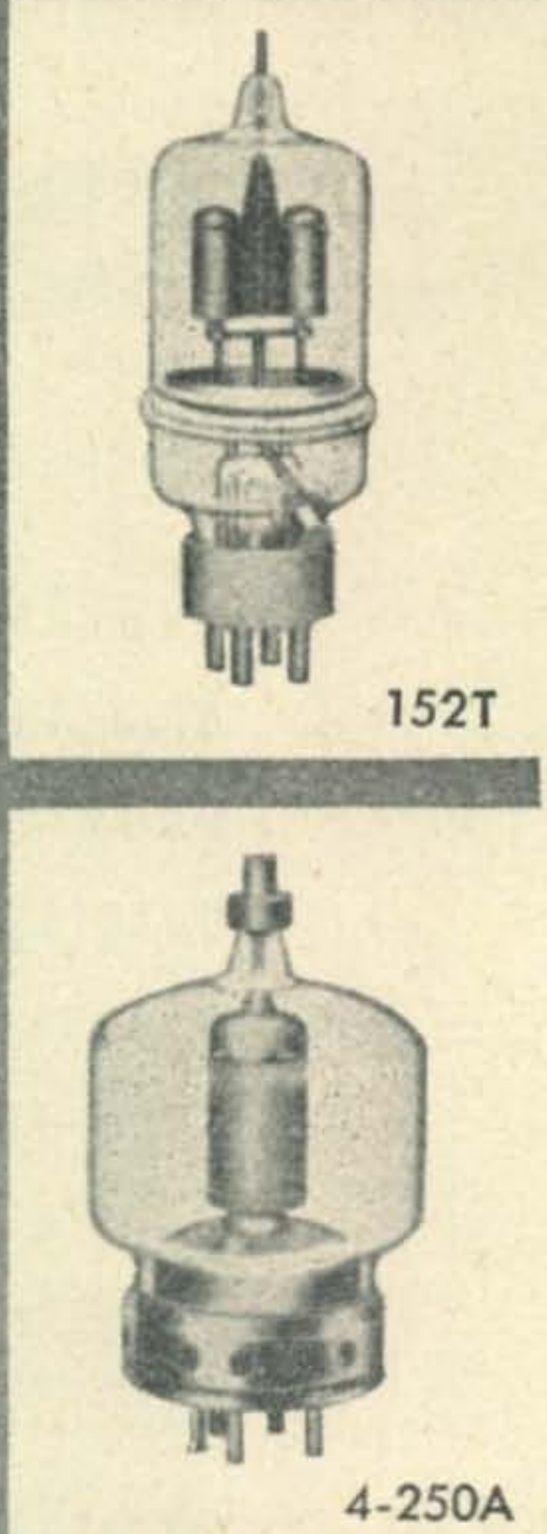
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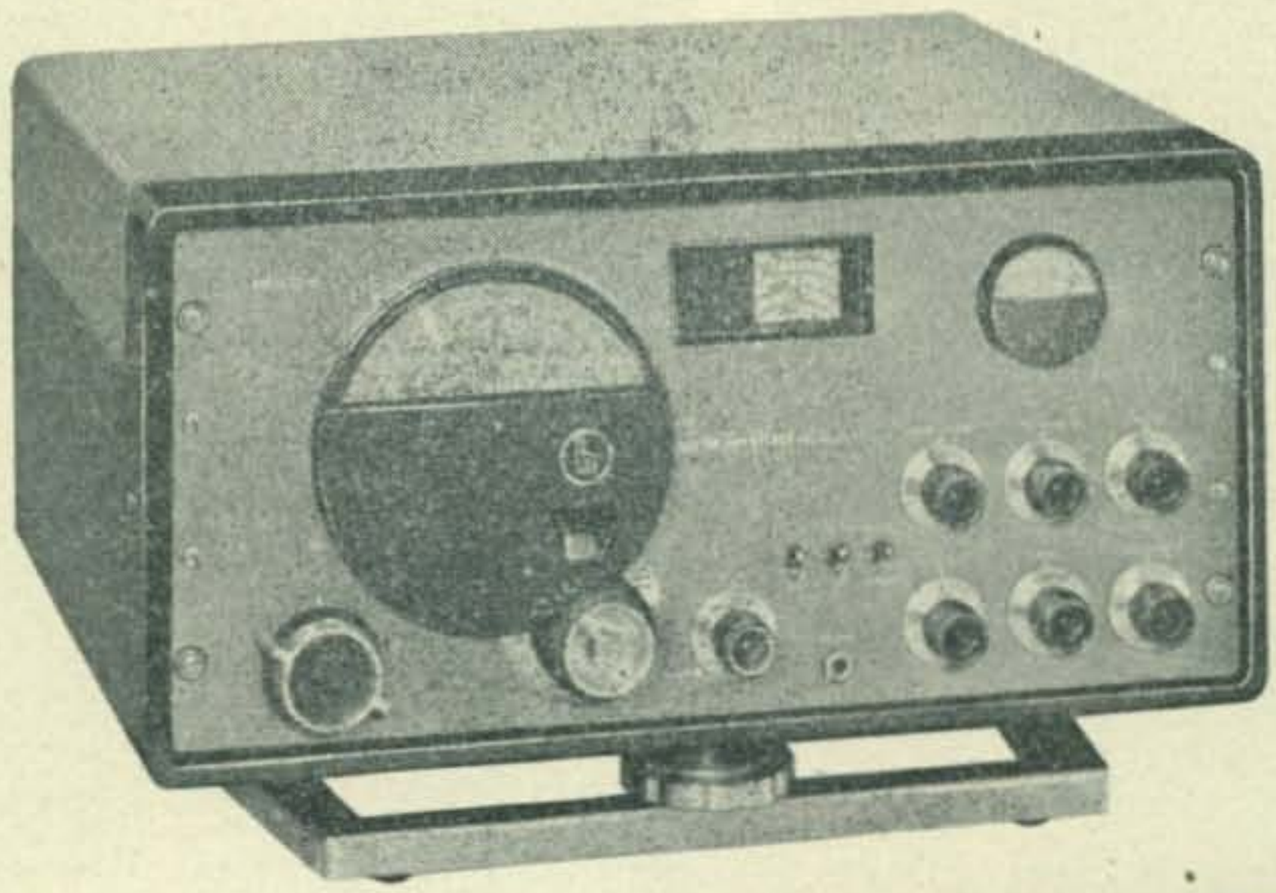
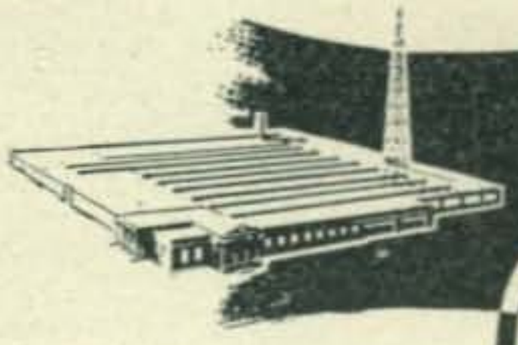
This is the long-awaited Hallicrafters SX-42, a truly great communications receiver. The tremendous frequency range of the SX-42, *greater than ever before available in a receiver of this type,* is made possible by the development of a new "split-stator" tuning system and the use of dual intermediate frequency transformers. Packed with advance features that every ham and every other radio enthusiast desires, the SX-42 clearly lives up to the Hallicrafters ideal of "the radio man's radio."

From now on watch Hallicrafters — the name that's remembered by the veteran, preferred by the radio amateur. See your distributor for demonstration of the SX-42 and for colorful literature describing this great set in complete technical detail.





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The Radio Amateur's Journal

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Vol. 3. JANUARY, 1947 No. 1

In This Issue

COVER

This Month's Cover: W2GYV, Schenectady, New York. Jeff is comparing the microphone-stand audio amplifier described in a recent issue of G.E. Ham News, with his own conventional audio amplifier located to the right of the HQ129-X. W2GYV is on 20, 11, 10 and 6 meters.

At Last! A low-cost, easy-to-use modulation meter

Now you can monitor your modulation percentage and speech quality with the new Sylvania Model X-7018 Modulation Meter.

Compactly styled to fit the most cramped operating tables, this new instrument offers you these features:

1. Elimination of battery or A. C. power supply, with consequent freedom from hum or distortion. These advantages result from the use of the **Sylvania 1N34 Germanium Crystal Diode** to replace the vacuum tubes used in conventional monitor circuits.

2. Direct, accurate readings of modulation percentage with carrier frequencies up to 54 mc. Convenient switch permits checking positive or negative peaks and carrier shifts.

3. Phone jack provided to allow amateur to hear his modulation with complete clarity.

4. Hermetically-sealed meter with easily-read, three-color scale indicating from 0 to 120% modulation.

5. Completely shielded, crackle-gray metal case with etched aluminum nameplate. Terminal strip in rear for external link.

You'll find the Sylvania X-7018 of great assistance in complying with FCC regulations on overmodulation. Equally important, it will help you keep your average percentage up in the effective region between 60% and 90%.

With its rugged, compact construction, the Sylvania X-7018 is also ideally suited for police, fire, marine and forestry radio stations.

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. . . Zero Bias . . .

AMATEURS IN THE UNITED STATES start the new year with almost all prewar frequencies returned. The initial thrill of getting back on the air lies behind us—ahead countless more enjoyable operating hours are anticipated. In the future new technical achievements in every branch of ham radio will contribute greatly to the development of the entire art. It is satisfying to know that amateur radio is undergoing one of the greatest booms in history. The calibre of new amateurs is high, and while the number is large, newcomers to our crowded frequencies are still to be encouraged. By maximum use of fewest frequencies we will accommodate that many more stations in each kilocycle. Perhaps in time, by sheer weight of numbers, we will gain more space to operate in. But until then, by encouraging more diversified operation on the part of most hams, the situation can be relieved greatly.

The urgency of making maximum use of minimum frequencies has been stressed by recent conversations we have had with a number of prominent people in the amateur field. They have deplored the increase in amateur ranks because some of our bands have already become untenable. How right! Absolutely so . . . *if* operations are continued in the haphazard space-wasting manner of today. But in our opinion, discouraging new participation in amateur radio is not the solution. Such action will eventually cause a dwindling in our numbers that would be disastrous. Everyone with an interest in amateur radio should be encouraged to participate. But along with this welcome should go some sound advice and education toward putting flexibility into their station. For it is only through flexibility that we can achieve our ultimate goal—the greatest use of the fewest frequencies.

Often, on a holiday or week-end, there isn't a vacant spot on 20 or 40-meter c.w. and 20 or 75-meter phone. But even on these special periods of activity there are wide-open spaces on 80 c.w. during the day, and even popular 10 meters can absorb additional stations on the high end of the band. 11 varies widely in different parts of the country, but it too can usually accommodate more stations. Ask any 6-meter man about his band. Talking about these problems may be old stuff to some hams, but it is of sufficient importance to bear repetition.

A good percentage of the work done on 75-meter phone could be more efficiently conducted on 6 or 10 during the evening. Much of the intercontinental rag chewing on 14 mc would prove just as enjoyable on 7 mc, which is a much abused band anyway. Too many hams have 40 tagged as a short-haul band, which it definitely isn't. The limited range QSOs on 40 belong up on 80. We are asked why more amateurs don't utilize the bands properly. Well, we could give excuses from now until AC4YN answers our CQ. In many instances the excuse is bona fide; many a ham is limited to a one-band setup because of current housing. But excuses aside, abuse of the bands is a phase of amateur radio that requires some prompt action on everyone's part.

Among the lessons learned in the war was the value of highly flexible gear. In the surplus market, hams have some top-notch examples of automatic bandswitching and channeling in the Collins ART/13. Individual plug-in tuning units of the BC-375-E and the rugged Command transmitters are all prime examples of flexible station gear. Some of the commercial transmitters recently made available carry these wartime developments to logical progression and provide automatic bandswitching on the five most popular ham bands. But the average postwar amateur station is constructed at home and is woefully inadequate from the standpoint of flexibility. In fact, most postwar stations we have seen reflect the builders' haste to get back on the air and include little that is worthwhile which hasn't been done before.

It has been our personal experience that flexibility need not be accompanied by complicated design. Our station is completely housed in two standard five-foot racks, one containing in addition to various equipment, a desk-shelf of the type made by Par-Metal. A 100-watt transmitter using a 4D32 driven from a single dial bandswitching v.f.o. provides five-band operation in a matter of seconds. The big rig, essentially the Lazy Kilowatt (CQ, July 1946) uses plug-in coils in three circuits, but these are easily changed in a minute or so. A three-room apartment and restricted antenna space have not prevented our constructing an adequate station capable of working 80 to 10. Principal problem was the antenna. A 272 foot Zepp was settled upon as the radiator. By mounting the tuning unit above the kitchen window and running Twin-Lead through wall partitions to the trans-

[*Continued on page 67*]

BUILT TO ORDER

Designers of mobile equipment and amateur vhf enthusiasts asked for this driver tube. The 2E30 (outgrowth of the Hytron development type HD59) is a filamentary-type beam tetrode. Standby current is eliminated. Yet the 2E30 is ready to operate a second after electrode potentials are simultaneously applied.

In vhf equipment, the 2E30 is ideal as a class C oscillator, frequency multiplier, or audio frequency amplifier. Important to you—the 2E30 is a transmitting tube—not just a re-hashed receiving type. Check its versatility and its many features. Quite possibly you will discover that the 2E30 was built to order for you too.

Now Available
At Your Jobber's
AMATEUR NET PRICE · $2.2

HYTRON TYPE 2E30

Instant-Heating Miniature Beam Tetrode

GENERAL CHARACTERISTICS

Filament	Oxide coated
Potential, a-c or d-c	6.0 ± 10% volts
Current	0.7 ampere
Grid-plate capacitance	0.5 mmfd
Input capacitance	10.0 mmfd
Output capacitance	5.0 mmfd
Max overall length	2⅝ in.
Max diameter	¾ in.
Base	T-5½ min button 7-pin

ABSOLUTE MAXIMUM RATINGS

D-c plate potential	250 volts max
D-c screen-grid potential	250 volts max
D-c plate current	60 ma max
D-c screen-grid input power	2.5 watts max
Plate dissipation	10 watts max

OUTPUT—TYPICAL OPERATION

Output, class A1 power amplifier	4 watts
Output, class C oscillator	7.5 watts†
Output, class C doubler (80 to 160 mc)	3 watts†

†Useful power output delivered to load under normal circuit efficiency. Total plate power output (including power actually lost in circuit and by radiation) is at least two watts higher.

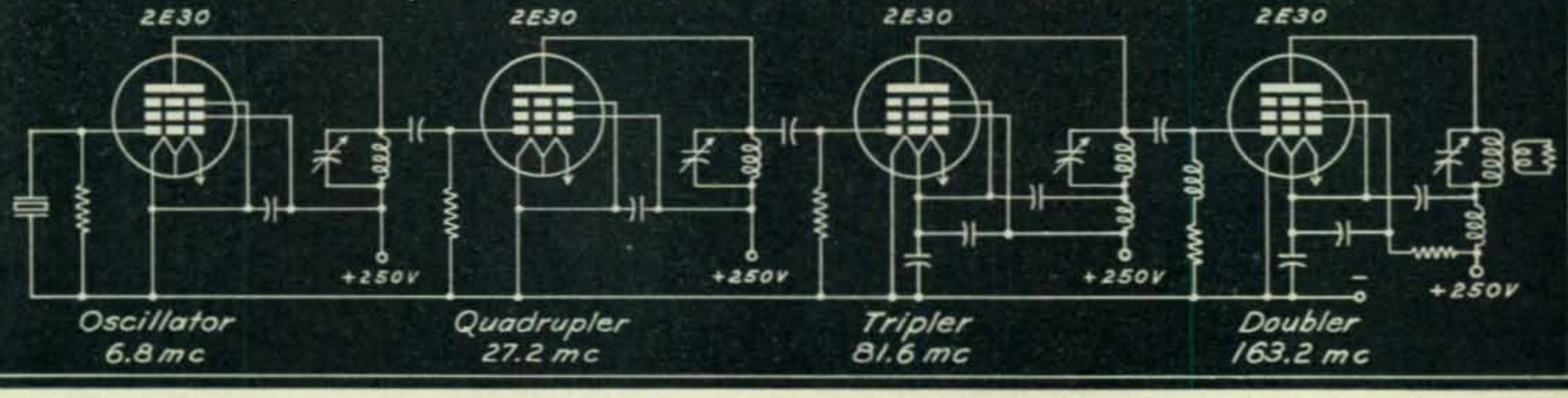
FEATURES THE 2E30 OFFERS YOU

- Designed, manufactured, and tested for transmitting
- Special testing controls assure interchangeability*
- Oscillator, frequency multiplier, or a-f amplifier
- Filament power is fully adequate for transmitting
- 1/10 watt driving power for 4 watts output at 80 mc
- 10 watts plate dissipation—surplus reserve for vhf
- Miniature bulb saves space and has low base losses
- Low lead inductance and capacitance—ideal for vhf
- High efficiency at low plate potential—250 volts
- Instant-heating filament—approximately one second

*For example, characteristics are tested at positive grid potentials.

TYPICAL CIRCUIT FOR *VERSATILE HYTRON 2E30*

Extremely Compact Driver Giving 3 Watts to Load at 160 Mc



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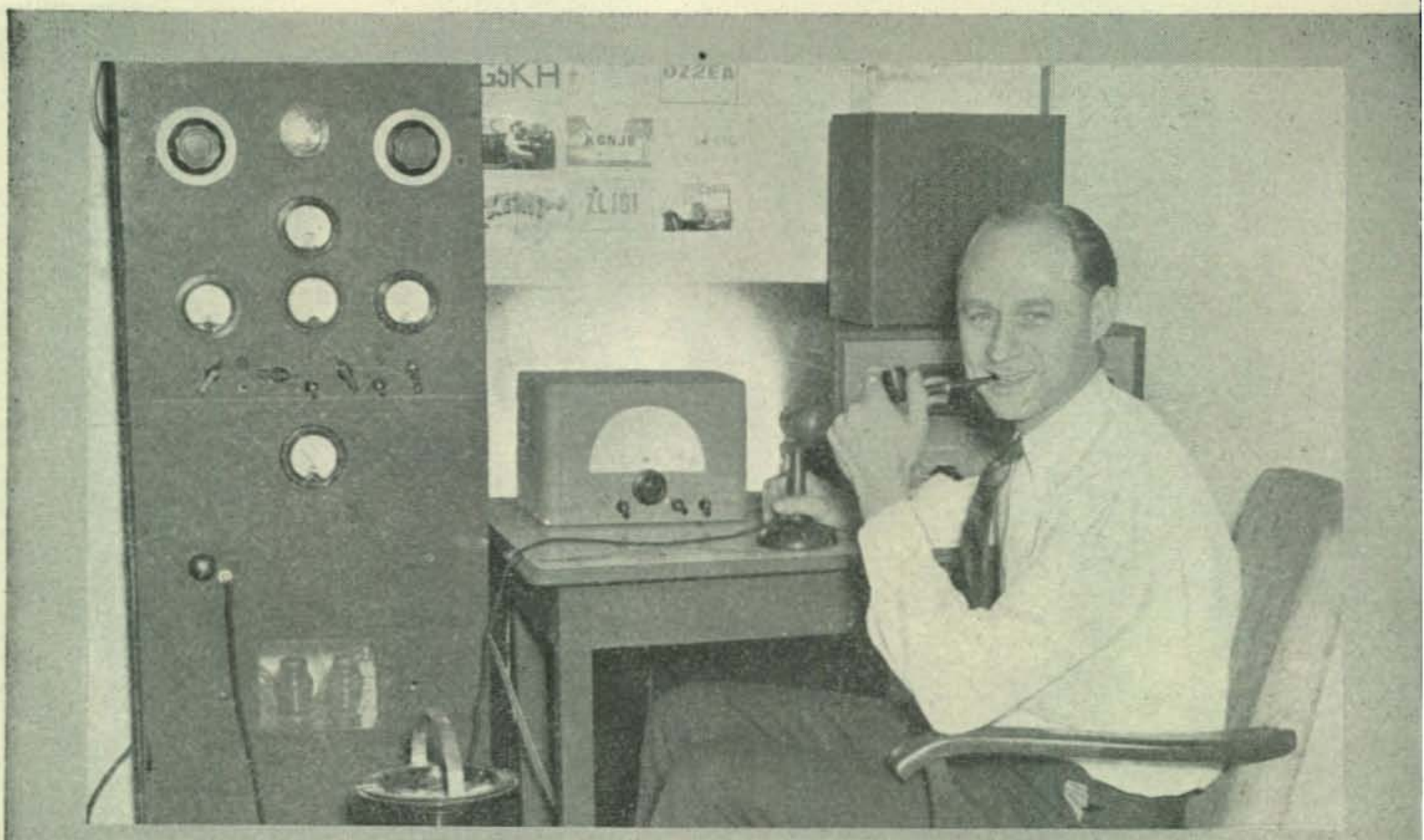
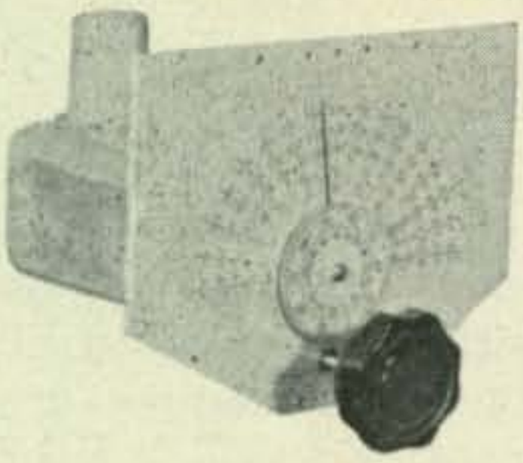
10 METERS **PR Type Z-5.**	Temp. coefficient less than 2 cycles per MC per degree centigrade. High activity. Heavy drive without crystal damage. . $5.00
20 METERS **PR Type Z-3.**	Temp. coefficient less than 2 cycles per MC per degree centigrade. High power output. High activity $3.50
40 & 80 METERS **PR Type Z-2.**	Rugged. Low Drift (less than 2 cycles per MC per degree centigrade). High keying activity. High power output. Accurate calibration $2.65



The Collins 70E-8 wins an Enthusiastic Booster!

Frank W. Oberlander, W9YPS

When W9YPS got his 70E-8 PTO (permeability tuned oscillator), we asked him to give it a workout and send us his comments. He did, and we'd like to quote him:



Frank's exciter line-up, following the 70E-8, consists of a 6AK6 isolator (untuned), 6AG7 buffer-doubler, 7C5 buffer-doubler. Here are some of the reasons why he's happy with his PTO:

1. The 70E-8 is accurate to within ½ kc on 80 meters.
2. It's calibrated directly in frequency.
3. The frequency range of 1600-2000 kc is covered in sixteen turns of the vernier dial.
4. The stability is within 1 dial division.
5. The dial covers the 80, 40, 20, 15, 11, and 10 meter bands.

Write for an illustrated bulletin with full details.

Galesburg, Illinois
October 1, 1946

Collins Radio Co.
Cedar Rapids, Ia.

Gentlemen:

I wish to express my appreciation of the new 70E-8 PTO. I have used this unit since the latter part of July on 75 meter phone, 80 meter cw, 20 meter phone and cw and 10 meter phone and cw. I cannot fully describe the feeling of assurance that this unit affords in the matter of stability and ease of frequency spotting. I am sure it has enabled me to make many contacts that otherwise I would not have made. All reports are very favorable as to stability and freedom from chirps. All contacts on cw were greeted with T9X reports.

It certainly is one of the finest pieces of equipment that I possess and I would truly feel lost if I had to be without one.

Yours very truly,
Frank W. Oberlander (W9YPS)
457 Fifer Street
Galesburg, Illinois

FOR RESULTS IN AMATEUR RADIO, IT'S . . .

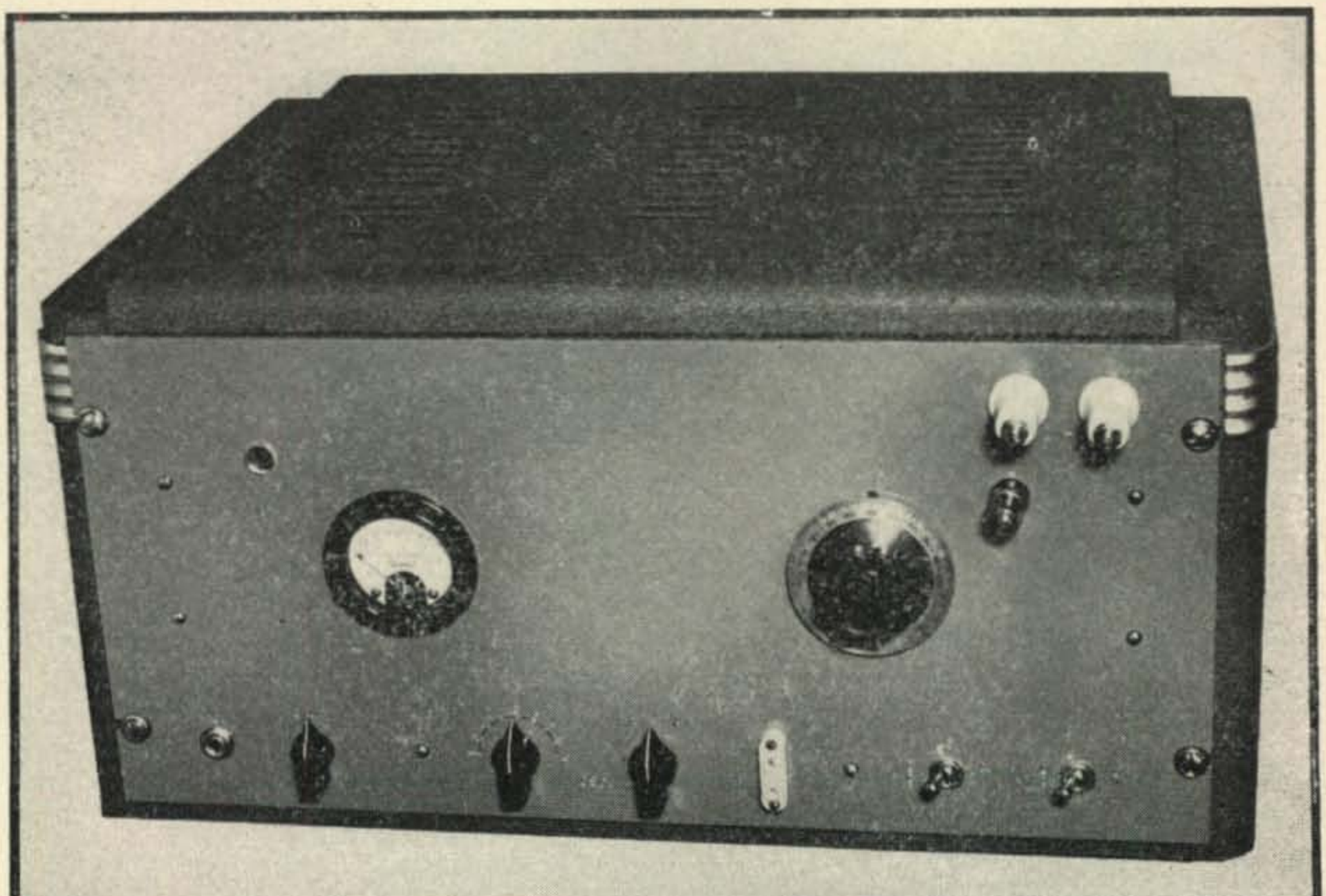
COLLINS

COLLINS RADIO COMPANY, CEDAR RAPIDS, IOWA

11 West 42nd Street, New York 18, N. Y. **458 South Spring Street, Los Angeles 13, California**

Plate Modulated

60 WATT TRANSMITTER



Front view of 60 watt, plate-modulated 807 rig.

FRANK C. JONES, W6AJF*

The popular 807 in a circuit incorporating some novel features

A SINGLE 807 r-f amplifier can be operated at an input of 60 watts using plate modulation without exceeding the maximum tube ratings made by the manufacturer. Experience with 807 amplifiers over a period of many years brought out several points in circuit design that eliminate certain difficulties some amateurs have had with these tubes. Several of these design ideas are shown in this transmitter. Operated at or near its maximum rating, tube life can be astoundingly short when tuning up the rig unless some precaution is taken to prevent even temporary overload conditions.

———•

*2057 Durant Ave., Berkeley 4, Calif.

Overload Protection

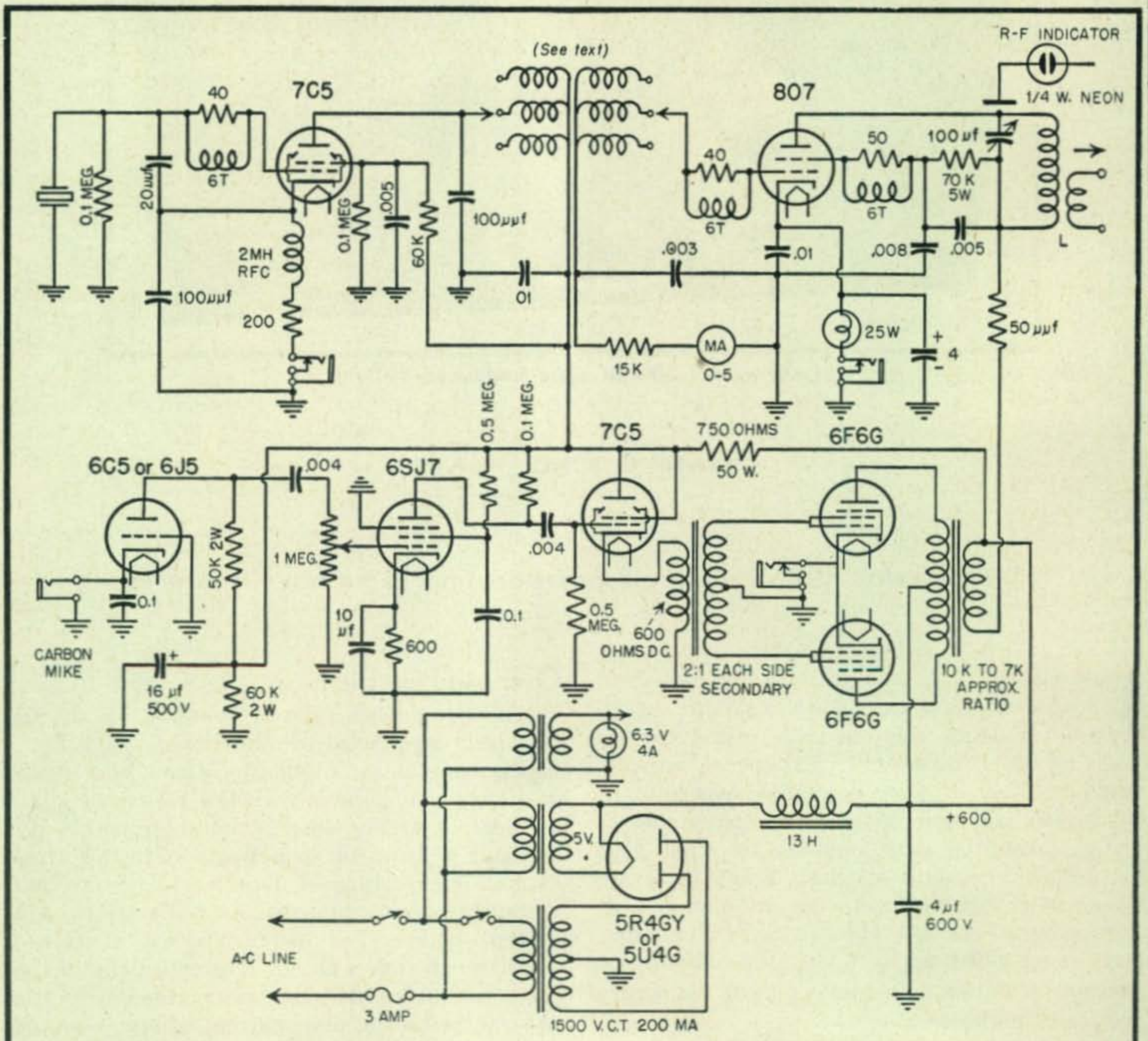
Out-of-resonance type of overload on an 807 tube can be practically eliminated by using a mazda lamp as an automatic cathode bias resistor. These lamps have very low resistance cold, and high resistance when lit to full brilliancy. By choosing a lamp of such wattage that normal cathode bias voltage is obtained at a very dull red filament color, operation of the lamp on a "steep shoulder" of its current vs. resistance characteristic takes place. This means that if the plate circuit is detuned from resonance, the natural increase of plate current will increase the cathode bias about as the square-of-the-current increase. This tends to reduce the plate current,

and if the proper lamp is chosen it is possible to hold the out-of-resonance current to about 125% of normal load value. A single 25-watt 120 volt mazda lamp does an effective job with a single 807 and 40-watt size takes care of a pair of 807s. Gridleak bias added to the cathode bias should be such as to give the normal grid bias voltage for the r-f amplifier. The mazda lamp also protects the 807 tube against excessive plate current in case the crystal oscillator is not functioning, or is being keyed for c.w.

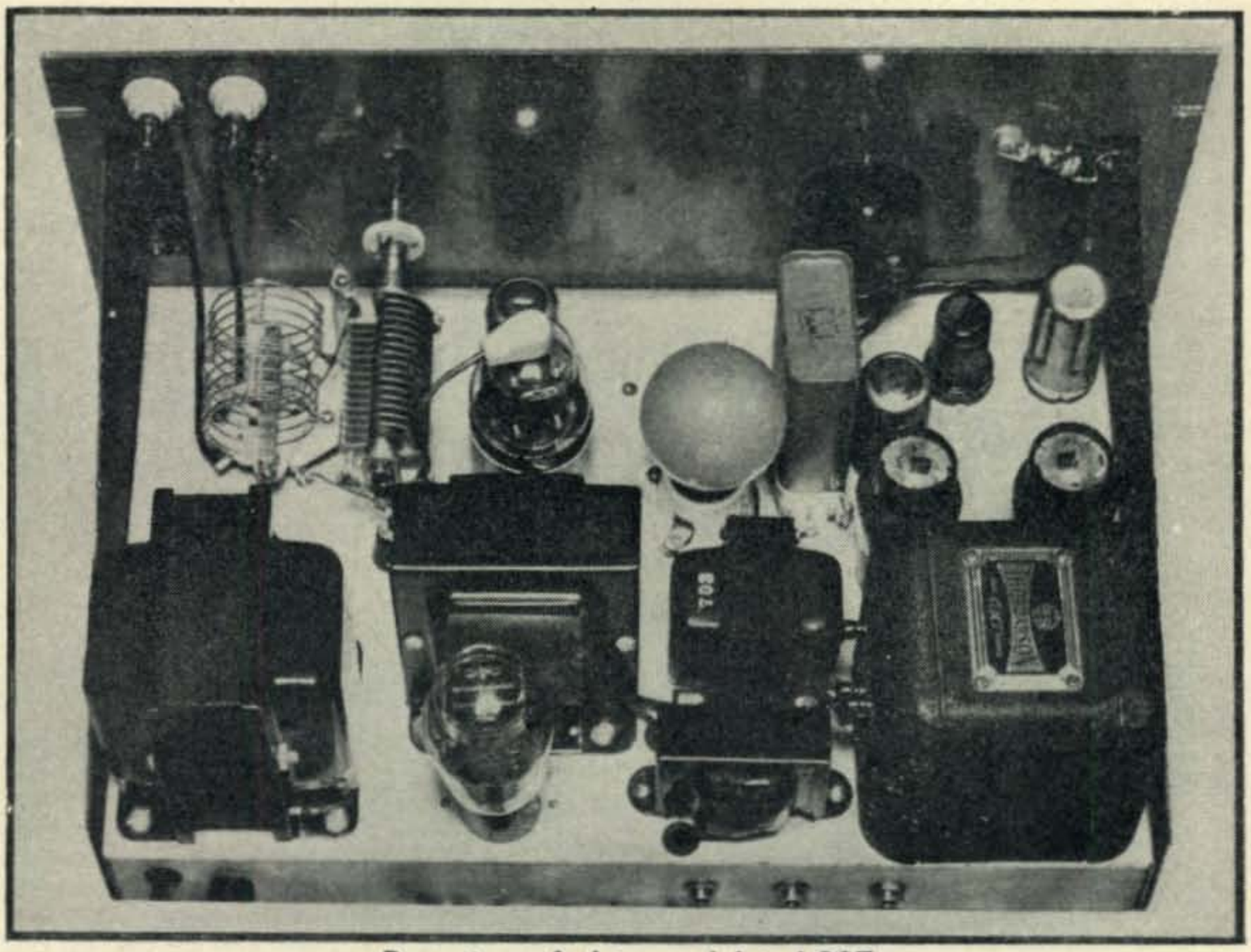
Suppressing Parasitics

Another trouble in 807 amplifiers is very high frequency parasitic oscillation. This takes place in many screen-grid amplifier tubes due to screen-grid lead reactance and ineffectiveness of by-passing at very high frequencies. A simple cure is to put parasitic suppressors in each grid lead at the tube socket. Very effective suppressors can be easily made by winding a half-dozen turns of No. 22, 20 or 18 wire over a ½ or 1 watt resistor of 40 to 200 ohms. A winding about ½-inch long with the coil and resistor leads twisted together makes a good, self-supporting parasitic suppressor, suitable for control-grid and screen-grid leads of any size screen-grid tube. It is usually desirable to put these in the control and screen-grid leads of crystal oscillators to insure stable operation of this circuit also.

A common ground point normally is necessary for an 807 stage. The by-pass condensers in *all* leads should return to this point on the chassis if possible. The control-grid return circuit should always be isolated from the preceding driver plate ground circuit if maximum grid drive is to be obtained at the higher frequencies. Unity coupling from driver plate to 807 grid is one method of doing this, since each circuit can then be by-passed to its own cathode return point.



Circuit diagram of 60 watt plate-modulated 807 transmitter.



Rear view of plate-modulated 807.
The bulb is used as an automatic cathode bias resistor.

Link coupling with two tuned circuits also does this job but requires an additional tuning control. Unity coupling provides isolation and good driving voltage but the mechanical construction of the coils is a little difficult. The two methods of approximate "unity" coupling consist of a secondary interwound turn-for-turn with the tuned primary (or vice versa), or two coils of slightly different diameters. The new self-supporting coils available now can be slipped inside of standard plug-in coil forms to give tight coupling between primary and secondary windings. If the coupling is great enough, only one winding need to be tuned in order to obtain good driving power into a grid circuit. In several cases, changeover from capacity coupling to unity coupling resulted in as much as 50% more grid drive at 28 mc.

The bandswitching coils in the transmitter illustrated here were made by winding the primaries on ¾-inch forms and the secondaries on ½-inch forms which fitted inside of the ¾-inch forms. All windings were made 1 inch long. The 3.5 and 7-mc bands were covered by one coil combination of 36 turns of No. 24 E. wire on each winding. The 14 and 21-mc band coils have 11 turns each of No. 20. The 28-mc band coils were made with 8 turns each.

Crystal Oscillator

A harmonic oscillator drives the 807. This 7C5 or 6V6GT crystal oscillator will furnish about the same output on the fundamental or second harmonic frequency with 3.5 or 7-mc crystals. The output on the third harmonic is ample for driving the 807 at 21 mc and does a fair job on the fourth harmonic at 28 mc with 7-mc crystals. If 28-mc operation is desired at all times with 7-mc crystals, the plate voltage but not the screen voltage, on the 7C5 should be raised.

A single power supply was used for all stages in the transmitter in order to conserve space and save weight. The first audio amplifier consists of a grounded grid tube driven by a carbon microphone in its cathode circuit. This tube provides a gain of about 10 and supplies over 1 volt of a.f. to the 6SJ7 stage when close-talking into an ordinary carbon hand mike. The 6SJ7 with a gain of about 100 supplies the needed peak voltage to a cathode-follower Class B driver stage with a low mu 7C5 tube. A small Class B driver transformer with a 2-to-1 ratio of primary to each secondary connects the cathode follower to the high-mu-connected 6F6G triodes. For low mu connection the normal "screen grid" is connected to the plate. For zero-bias Class B connection as high-mu tubes, the screen grid is tied to the control grid. The zero signal d-c plate current of the two 6F6G tubes is less than 10 ma and at full modulation of the 807 stage, the d-c plate current rises to about 50 ma on speech peaks.

At about 1½ to 2½ ma of 807 grid current, an output of about 40 watts can be obtained. The set is built on a 12" x 17" x 2" chassis supported by an 8¾" x 19" relay rack panel. The photographs show the general arrangement of parts.

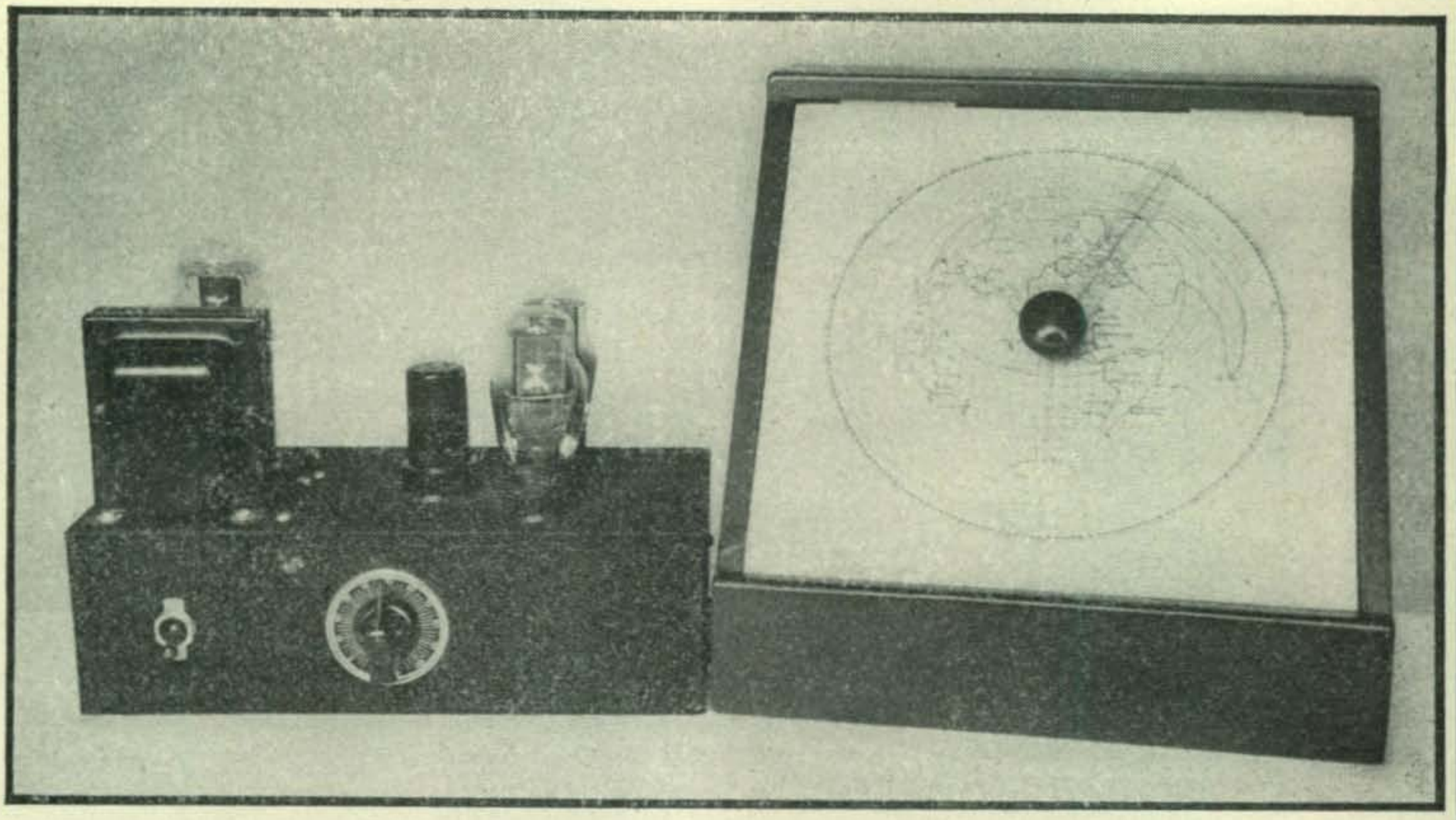


Fig. 1. Direction indicator cabinet may be located at operating position. Chassis can be placed out of the way.

POINT YOUR BEAM ANTENNA

PAUL A. GODDARD, W6AKQ*

AFTER HAVING BATTLED the QRM on ten and twenty meters with very moderate power we decided that one of the projects to be undertaken at W6AKQ should be the construction of a beam antenna. The rotation of the beam presented no particular obstacle since there have been numerous small reversible electric motors on the war surplus market. One of these which would suit our purpose very well was purchased, but there remained the problem of indicating the position of the beam. Many different systems for indication were considered and each was rejected for one reason or another.

Mechanical systems for indication are probably the simplest and the easiest to get into operation, provided the antenna is not too distantly located. If the antenna is directly above the radio shack, its shaft may be brought through the roof and both indication and rotation accomplished without elaborate equipment. If the antenna is distantly located, mechanical means may still be used, but pulleys or flexible shafting would have to be employed; this would lead to some complications. Mechanical systems seemed to merit no really serious consideration.

*330 West Fairview Blvd., Inglewood, Calif.

Electrical Indicators

One electrical system for indicating, which is extremely simple, is that of the gasoline gage variety. In this system the "generator" is an annular resistor with three equally spaced terminals and two diametrically opposite sliding contacts applying direct current to the annular resistor. The three terminals of the resistor are connected to a toroidal coil in the center of which is a magnetized needle that lines up with the resultant magnetic field. The magnetic needle may be used to give an indication of the beam position on a great circle map. This apparatus is available as war surplus and many hams are using it with good results.

Another system for indication uses selsyns.[1] In this system two identical units are required. They are essentially motors, although when operating, one acts as the generator and the other as a driven motor which duplicates the position of the generator. Power to drive the indicating selsyn, or "slave," is transformed in the generator as a result of the displacement of its armature in an alternating field; the slave positions itself in such a way as to cancel the applied voltage from the generator. In many respects this system and the

gasoline gage are similar. Both systems will give very satisfactory indication of the position of the beam, but neither will control the position.

The selsyns may well be adapted to control the position of the beam and also to give the indication, provided that they are large enough to rotate the beam through gear reduction. When selsyns are used in this manner the generator and the slave are interchanged. The slave serves to rotate the antenna and the generator is located at the operating position, being turned by the pointer or indicator on a map. The selsyns have to be geared down for two reasons, first, to obtain sufficient torque and second, to prevent the possibility of the system working in reverse. If direct drive were used on both ends, wind acting upon the antenna could cause it to rotate freely, giving no control at all. The use of a high gear ratio on the generator and on the slave would provide the necessary friction to eliminate the difficulty. The most satisfactory gear reduction may be obtained through the use of worm gears, for the action can generally be transmitted in one direction only.

though it is remote; the energy for rotation of the beam is supplied by the operator in turning the selsyn at the operating position in the shack. For this reason, and because of the unavailability of sufficiently large selsyns, this system was not considered favorably.

The elimination of the various methods of indication and control, for one reason or another, seemed to formulate a requirement: the antenna must be operated by electrical energy and its position must be governed by the position of the indicator. In the not too distant past we had some contact with an instrument which would do exactly what we wanted here; this instrument was essentially a form of a "servomechanism," or "servo." Strictly speaking, a servo is a system which will duplicate some action, with the necessary energy for the action supplied from some external source.

A very simple servo could be constructed for our purpose using two linear potentiometers to form a Wheatstone bridge, a polarized relay in place of the usual null indicator, and a reversible motor to rotate the antenna. One of the potentio-

WITH A SERVOMECHANISM

An electrical system for accurately directing a rotary beam.

Although the adaptation of the selsyns to control the position of the beam would operate in a completely satisfactory manner, it involves a certain amount of mechanical work. Also, in the last analysis, this arrangement is actually a means of rotating the beam by manual control,

meters is used as the indicator and control, and the other is operated by the antenna shaft. A displacement of the control potentiometer would unbalance the bridge and apply a certain polarity of current to the relay, causing it to close in one direction; the motor would then rotate in such a

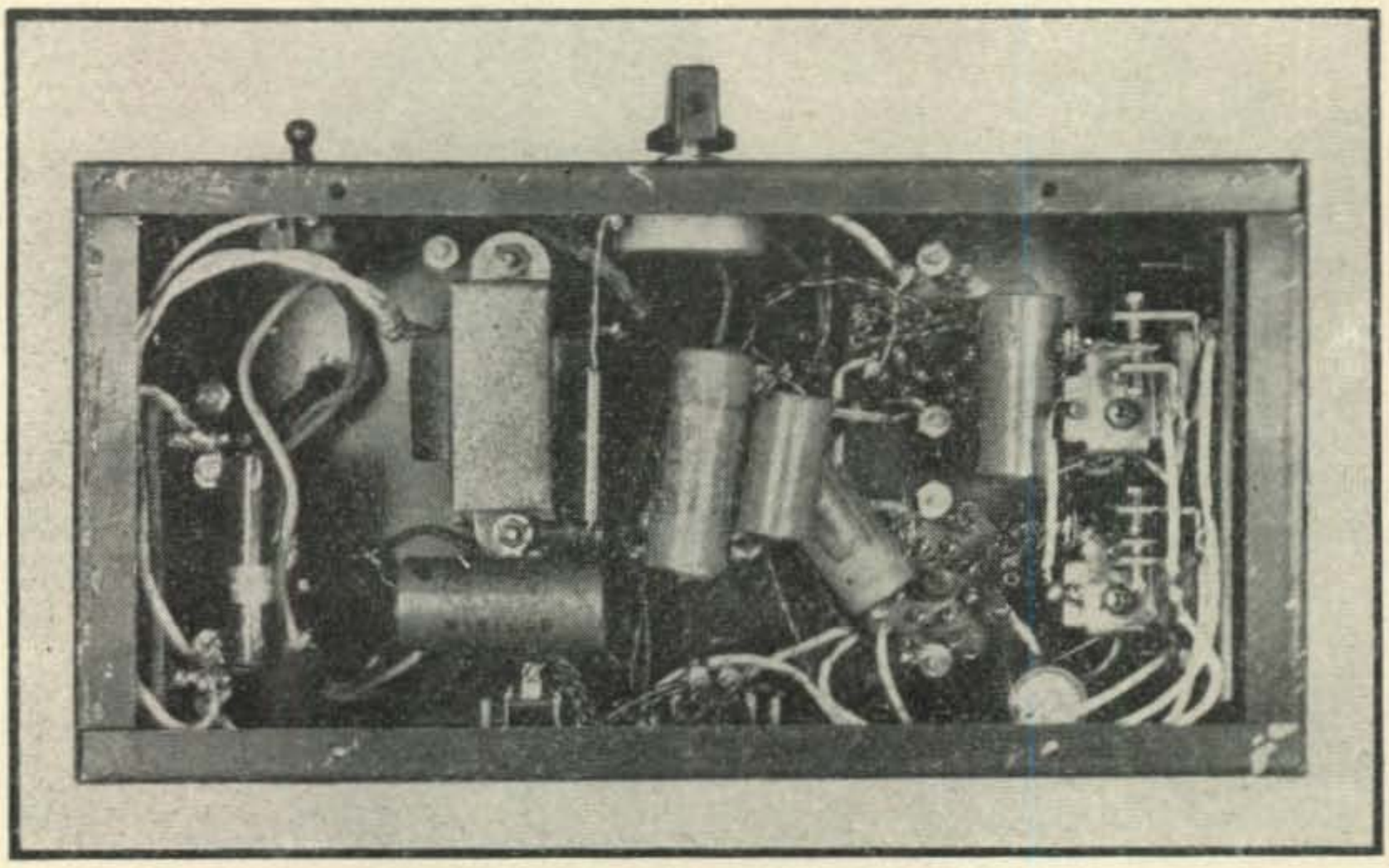


Fig. 3. Underside of servomechanism amplifier chassis showing placement of parts.

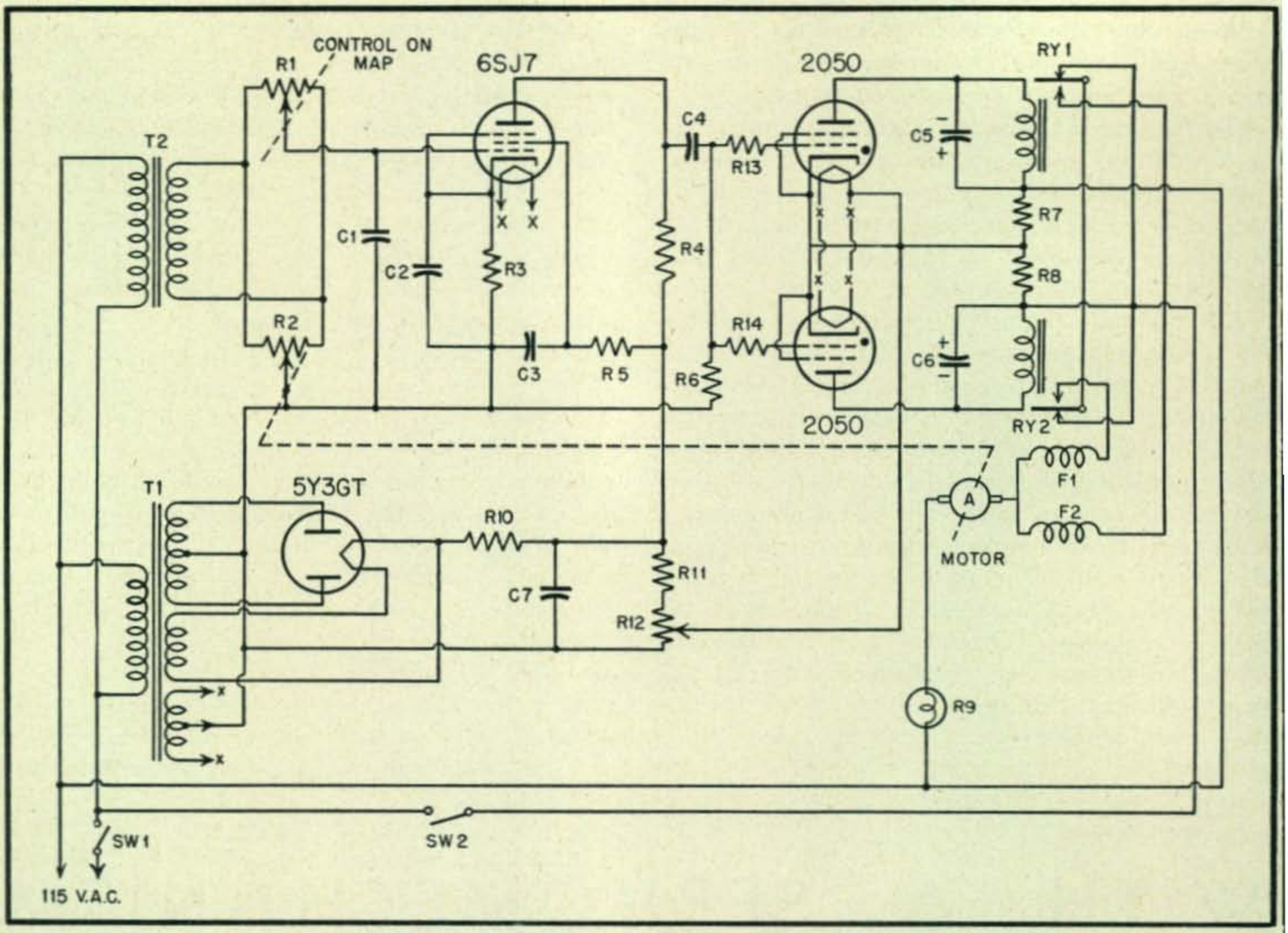


Fig. 2. Wiring diagram for the beam control amplifier.

C1—0.001 μf, mica
C2—10μf, 25 v., electrolytic
C3, C4—0.1 μf, 400 v., paper tubular
C5, C6—10 μf, 150 v., electrolytic
C7—8μf, 450 v., electrolytic
R1, R2—10,000 ohms, wire-wound (IRC Type W)
R3—500 ohms, ½ watt
R4—0.1 meg., ½ watt
R5—0.39 meg., ½ watt
R6—0.27 meg., ½ watt
R7, R8—3000 ohms, 10 watts
R9—100 watt lamp (motor dropping resistor)
R10—47,000 ohms, 1 watt
R11—27,000 ohms, 1 watt
R12—5000 ohms, wire-wound pot.
R13, R14—0.1 meg., ½ watt
RY1, RY2—SPDT relays
SW1, SW2—SPST switch
T1—250 v., 40 ma., receiver type power transformer.
T2—20 v. transformer (see text)
A, F1, F2—armature & 2 fields of motor to rotate ant.

direction as to re-balance the bridge. When the bridge is again in balance, the antenna will have been rotated by the motor into a position corresponding to that of the indicator-control on a map. It will be noted that this simple servo consists of a means of generating an error signal, the control potentiometer, and a means of amplifying this error signal, the polarized relay, so that the action on the antenna could be realized. Under some conditions this simple servo might be perfectly satisfactory, but it would not be too sensitive and it requires the use of polarized relays which are not always available and which are generally expensive.

The system to be described functions in a very satisfactory manner and it is neither complicated nor expensive to construct. As may be seen from the photograph shown in *Fig. 1* and the wiring diagram shown in *Fig. 2*, the system consists of a bridge to obtain the error signal, an amplifier, two thyratrons, two relays, and the reversible motor. As was the case with the simple servo above, one of the potentiometers forming the bridge is driven by the antenna shaft and the other is operated by the pointer on the map. The latter serves as the indicator control, or as the "director" for the antenna. The chassis contains the power supply, amplifier, thyratrons, and relays, with the director mounted in a separate cabinet.

Thyratrons

The average amateur has contact mainly with vacuum tubes and a few gas-filled types, such as the 866, which he uses for rectifiers. Except for the occasional use of a gas-filled triode for sawtooth oscillators in sweep circuit applications, or for grid-controlled rectifiers, his experience with tubes of this general classification is almost nil. As an aid in the explanation of the operation of

this servo unit, we shall review the peculiar characteristics of the thyratron. One of the principal differences between a vacuum triode and a gas-filled triode lies in the grid-control properties of the tubes. In the vacuum tube the plate current is continuously controlled by the grid voltage; if the grid voltage is gradually reduced (made less negative), the plate current will gradually increase and when the grid voltage is made more negative the plate current will decrease. With the thyratron the grid control is definitely limited; the grid voltage determines only the plate voltage at which plate current will start to flow. The plate current in the thyratron begins suddenly to flow when a certain critical plate voltage has been reached, with a given grid voltage. After the plate current has commenced, the grid can exert no further influence upon the plate current. The plate current will cease to flow only when the plate voltage is reduced to a certain critical value, usually of the order of 5 to 20 volts. Once the conduction of plate current has stopped, the grid has control as before. The fact that the plate current can be caused to start suddenly by changing the grid voltage makes the tube useful in its application here.

Another difference between vacuum and gas-filled tubes should also be recalled. In the vacuum tube the amount of current flowing in the plate circuit depends to a great extent upon the resistance of the tube. In the gas-filled tube the amount of plate current depends almost entirely upon the external circuit and the voltage drop through the tube itself is very low.

The thyratron we have selected to use here is the 2050 and it is one of the shield-grid type. The shield-grid in this tube performs somewhat the same purpose as does the screen in some vacuum tubes; it isolates the elements of the tube from each other. As we shall use the tube, the shield-grid will be operated at the same potential as the cathode. The 2050 is capable of passing an average current of 100 ma and a peak current of 1 ampere.

The Circuit

In the wiring diagram (*Fig. 2*), *R1* and *R2* form the arms of the bridge to which about 20 volts is applied from the transformer *T2*. The tap on *R1* is varied by rotating the pointer on the map at the operating position and *R2* is varied by rotation of the antenna shaft. When the corresponding arms of the bridge thus formed are proportional, the signal applied to the grid of the 6SJ7 is zero, but if the pointer on the map is rotated, the arms of the bridge are no longer balanced and some signal voltage is applied to the grid of the 6SJ7. This applied voltage is amplified by the 6SJ7 and is then applied to the grids of both thyratrons in phase. The plates of the thyratrons have voltage applied directly from the 115-volt line and they are out of phase with each other by 180°. The cathodes of the thyratrons are connected to the junction of *R7* and *R8*, which act as a voltage divider across the line.

The voltage applied to the grids of the thyratrons will be in phase with the plate voltage of

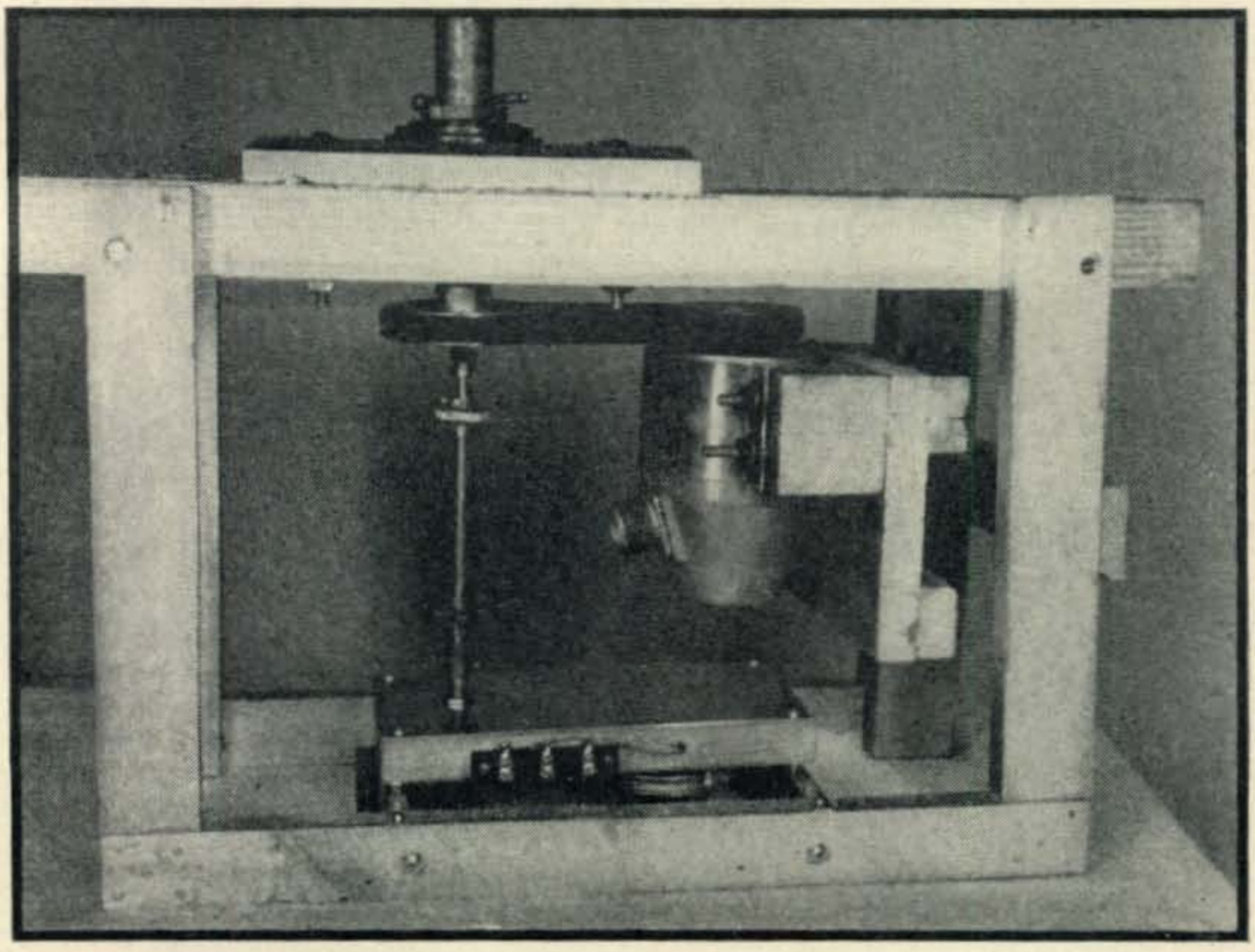


Fig. 4. The mounting for the potentiometer assembly on the antenna tower.

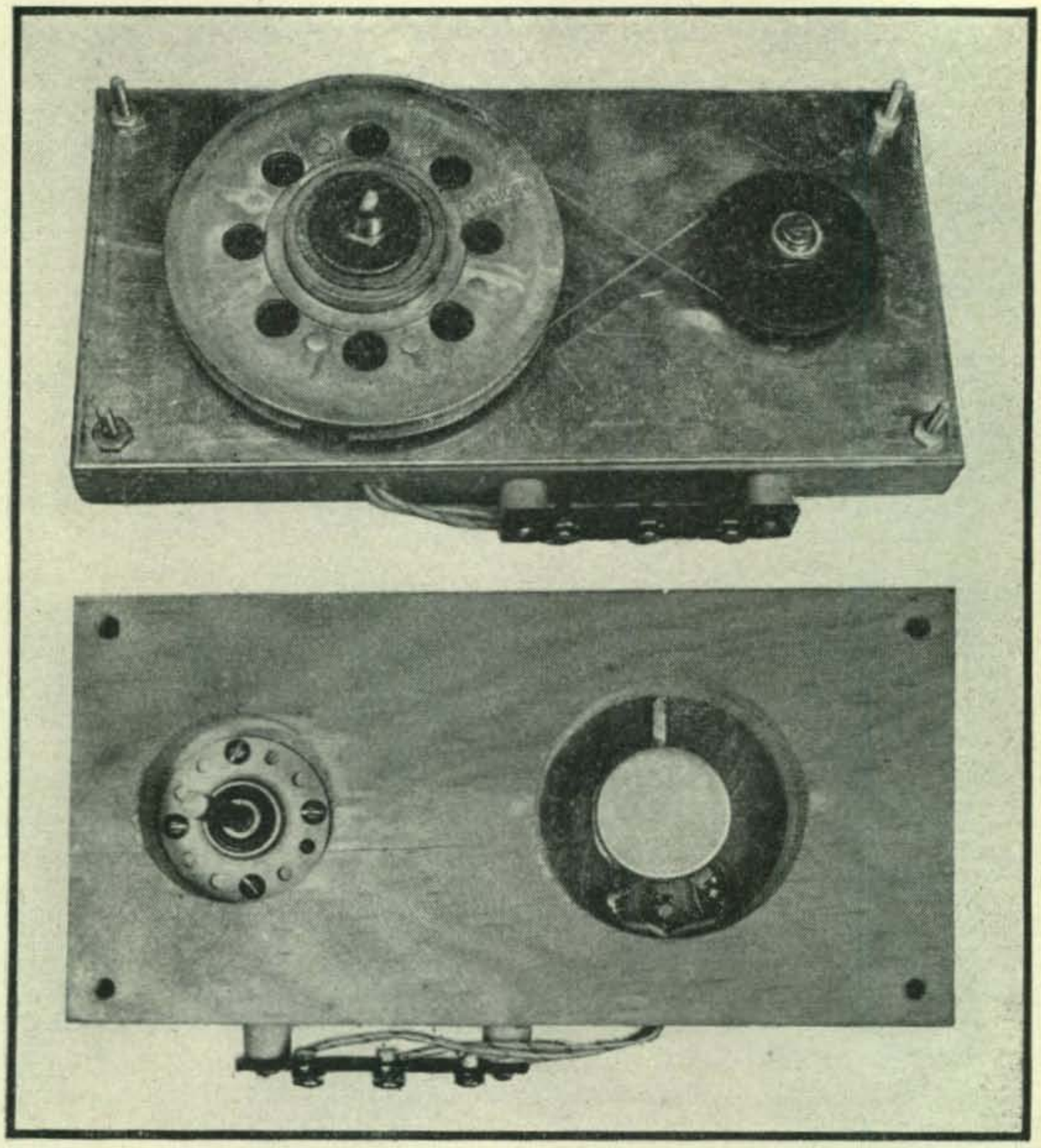


Fig. 5. (top). Potentiometer assembly for mounting in the antenna tower Fig. 6. (bottom). The bearing is an aircraft bell-crank ball-bearing.

one tube and out of phase with the other. The in-phase tube will begin to conduct when its grid voltage reaches a certain critical value. When the in-phase tube "fires", one of the relays will close, applying current to the motor through one of its field windings. Rotation of the antenna will operate *R2*, bringing the bridge back into balance and removing the signal from the grids of the thyratrons. The thyratron will then cease to conduct after the next negative half-cycle. It might be well to point out that the thyratron extinguishes during every negative half-cycle of plate voltage and that when grid voltage of the proper phase is removed, the tube simply does not fire on the next positive half-cycle. If the pointer on the map is rotated in the opposite direction, the other thyratron fires and its relay closes, causing the antenna to rotate in the opposite direction.

R7 and *R8* perform functions other than that of voltage divider. They are part of the filter system for the relays and they tend to limit the current through the tubes. *C5* and *C6* with the two resistors, filter the a.c. rectified by the conducting thyratron. In this way d-c relays may be used without hum or chatter.

R12 is used as the sensitivity control and applies a negative bias to the grids of the thyratrons. If the bias is increased it means, of course, that the amplitude of the a.c. applied to the grids must be greater to cause the thyratron to fire. Another form of sensitivity control may be substituted; the amplitude of the voltage applied to the grid of the 6SJ7 may be varied by placing a volume control potentiometer in its grid circuit. If this were done, some means would still have to be provided for adjusting the bias on the thyratrons, though this method may be fixed in nature.

It is conceivable that under some temporary conditions both thyratrons might fire simultaneously, causing both relays to close at once. To avoid having current passing through both motor windings at the same time the relays are wired in such a way as to be interlocking. If one relay closes, closing of the other breaks the circuit entirely. Under operating conditions, with the bias on the thyratrons properly adjusted, only

one tube will fire at a time, closing only one relay.

Before passing on to the construction of the equipment several remarks should be made about the amplifier. Since the only frequency to be amplified will be 50 or 60 cycles per second, the response of the amplifier should be good at these frequencies and the phase shift within the stage should be small. The circuit constants shown will produce the desired results. The amplifier has sufficient gain and the phase shift is slight, as checked on a scope. The mica capacitor, *C1*, was included to by-pass any possible r.f. entering the system; its reactance at 60 cycles is very high.

Construction of the Servomechanism

As may be seen from *Fig. 1* and *Fig. 3*, all parts except the potentiometer assemblies are mounted on a 5″ x 10″ x 3″ chassis. The two relays are mounted on a 2½″ x 4″ piece of fabric reinforced bakelite at one end of the chassis and the two 3000-ohm, 10-watt resistors (*R7* and *R8*) are mounted on a terminal board at the other end of the chassis. The 20-volt transformer is mounted on the under side of the chassis. All connections to the unit are brought out through Jones plugs, with the exception of the 115-volt line connection. The motor connections and the connections for the potentiometer located at the antenna are brought out through an eight-pin plug. The connections for the potentiometer on the director go to a three-pin plug. The sensitivity control and the line-switch are both mounted on the front of the chassis.

The mounting for the potentiometer at the antenna is shown in *Figs. 4*, *5*, and *6*. No potentiometers with 360° of rotation were obtainable and so it was necessary to use regular wire-wound volume controls with a linear taper (resistance proportional to angular shaft displacement). These potentiometers permit just a little over 270° of rotation and this necessitated use of the pulley arrangement shown. The pulleys are of the aircraft type and they have a ratio of about two to one, permitting 360° rotation of the antenna with only 180° rotation of the potentiometer. The pulleys will have to be mounted rigidly on their respective shafts and the builder will need to exert some ingenuity in this regard. The mounting here was accomplished with bushings inserted in the center of the pulleys and tightened on the ¼″ shafts by means of a locking nut. The pulleys and potentiometer are mounted on two pieces of 0.051″ 52 SO aluminum measuring 4″ x 8″, separated by a one-inch piece of soft pine. This wooden piece has two holes bored in it, one 2¼″ and the other 1¾″ in diameter, for the potentiometer and the bell-crank bearing. The wooden piece serves to make the mounting rigid and it also provides protective housing for the potentiometer. The drive for the unit is through two flexible couplings at the end of the antenna shaft. The connections from the potentiometer are brought out to a terminal strip and then from the antenna tower to the amplifier by three-wire unshielded rubber covered cable. Shielded cable was not found to be necessary.

The control potentiometer is mounted in a manner similar to that of the one at the antenna, but in this case the mounting bracket consists of only one piece of aluminum. The pulleys are, of course, identical with those used on the antenna unit (see *Figs. 1*, *7*, and *8*). The beam control is mounted in a wooden cabinet measuring 8″ x 10″ x 10″ having a sloping front panel of

[*Continued on page 58*]

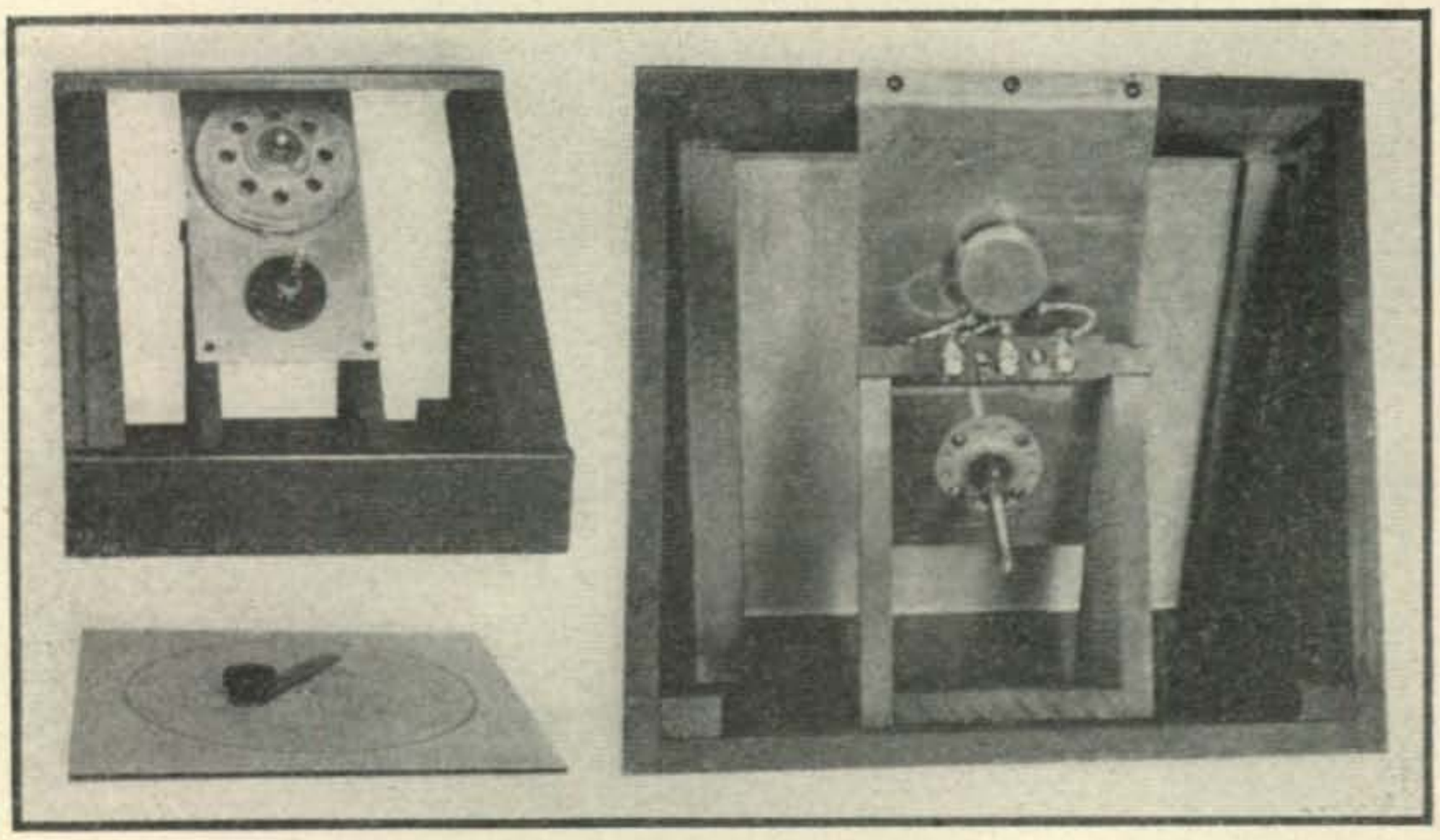


Fig. 7. (left). Front of the control cabinet with the panel removed. The pointer is plexiglas and is fastened to an ordinary knob with small screws. Fig. 8. (right). Rear of the control cabinet.

Barnstorming the U.S. with a Portable

A report of the equipment for 3.5, 7 and 14mc described in October 1946 CQ,in operation on Mid's cross-country automobile tour

IF YOU THINK THIS YARN will include tales of super-DX worked on flea power, you're wrong! If you expect tales of hundreds of machine-gun QSOs—stop right here. This is not for you. But if you want a factual account of one ham's actual portable operation over the U.S.A. in the summer of 1946—read on.

Early in June, Charlet (she's my YF) and I left Connecticut on a projected tour of the US. Packed into the Oldsmobile was a varied lot of radio gear, including the portable transmitter-receiver described in October CQ. It's simply amazing the amount of gear that accumulates when a trip of such magnitude is planned. Wire, accessories, spares, logs, tools and a lot of stuff got piled into the car—and each piece was considered *essential*, or it did not get aboard. Both v-h-f and l-f equipment were included, which really made a lot of gear—a hundred pounds, all told.

No provision was made for mobile or random operation on the l.f. due to regulations concerning "prior notification." So this account tells mainly of l-f operation in semi-fixed locations—under difficulties.

The first setup was made in Valparaiso, Indiana, long famous home of Dodge Institute, the Morse and radio school. My host's back porch made a swell ham shack . . . cool and cozy.

An antenna about a hundred feet long was run out from the clothes line rack to a convenient telephone cable pole in the alley. Lucky for me, this pole had steps, so putting up the far end of the wire was a cinch.

Of course a couple of sharp-shooting, wide-eyed youngsters inquired, while I was up top, if I was a lineman. (Me, with my seersucker pants and delicate blue sport shirt!) When I said "Yep, sort of," they wanted to know where my big belt and tools were! Having fastened the holdup wire for the antenna, I descended and carefully explained that the wire just put up was to keep the telephone pole standing upright. The coup d'etat came with the following remark "Oh, you were installing a guy wire" . . . and the wise-guy junior departed.

**23 River Glen, Farmington, Conn.*

The first actual field QSO was with W9GGI, at Western Springs, Ill. Bob told me that he had two rather unusual features at his station. No. 1—his mother, who could copy 25 wpm. No 2—a transmitter—a 6L6GTX built on a chassis made out of a fruit-cake-mix can. There is some sort of tie-in between those two features! Anyway, maybe we can work W9GGI's Mom one of these days.

A swell evening QSO was had with K7JDA/2 in New Brunswick, N. J. and a good daylight one came from a call to W9NBD in Louisville, Ky. when Art was raised at 8:45 a.m. That's not bad on 80 meters. And 80 was all we had in the l-f bracket in June, remember?

A good ragchew with W8PKI revealed that Earl was a Dodge Institute man back in '26. I hated to tell him that the old Dodge's is no more, having been replaced with a very modern radio school.

We heard, one Sunday morning, an old pal of mine, W9DPL, former resident of Valpo, now living some miles away. However, no QSO was effected due to Howard signing off after a long QSO with some other Joe, leaving me hanging in mid-air calling him. Tsk. Tsk!

I never did hear any locals in Valparaiso and if there were any—they sure were not on when I was, which was often. The Valparaiso score—calls made—21—QSOs—9.

We Move On

The long road from Indiana to the Rockies kept the portable off the air until June 22. We drove through the wonderful Rocky Mountain National Park and stopped at the Timber Creek camp grounds, north of the Grand Lake entrance.

A good antenna was erected, using two well-placed trees for support. This was better than the Valparaiso job, as it was about 175 feet long and in the clear except for plenty of trees all around. When the receiver warmed up the first signal heard was that of W4DWB/5, Ed Jurney at Los Alamos, N. Mex. All my efforts brought no results and it was a pity as Ed was always good for a ragchew, and had been worked many times from Connecticut on 10-meter c.w.

C-W Rig

A. DAVID MIDDELTON
W1CA*

Mid operating W1OJH/Ø at Timber Creek Campground in Rocky Mountain Park. The portable transmitter-receiver rests on a rugged camp table. Note the Baldies! Purchased in 1928 from Windy, W8GZ, these cans have been hauled about 150,000 miles and have been in almost constant use at Mid's various QTHs since that time. The small unit at the right is a Radiart Vipower pack.

From Timber Creek we first QSO'd WØKQX/Ø in Gering, Nebr. and next, in the ARRL Field Day clambake, WØADJ/Ø in Rapid City, S. Dak., with Bob, WØBLK at the key.

The little portable didn't get out so well from Timber Creek and although many signals were heard, not many were raised. W9FS was consistent through the evening but no QSO could be made with Bert.

Only a few FD stations were heard at Timber Creek as the activity in that section was low, so it seemed to me. However, I managed to work several fellows who handled messages to the "outside," and also had a few good ragchews. But with heavy QRM, (remember, it was summer) and with the 9000 feet high variety of static, 80 meters wasn't much good.

During the FD period a rather interesting operational feature became apparent. There were too many CQs being made without the sender *ever* finding any answer. A feller would call CQ, and that would be the last I'd hear of him until he CQed again some time later. Sometimes I would reply to the CQ and other times I would hear several others answer him, but it happened so many times that I kept track of the failures and they were terrific.

WWV was heard steadily there at Timber Creek on 15 mc. Short-wave broadcast stations and 75-meter fones were good during the evening.

All in all, what with low daylight 80 meter activity in the Rocky Mountain area and with trout fishing, marvelous scenery to see and to photograph, not many QSOs were made. We had a good ragchew with W6PNY at Walnut Creek Calif. Hank was worked at 8:55 p. m. for one of the few static-filled evening QSOs. Long periods were spent during daylight hours, listening without signals on the 80-meter band, but dusk brought several excellent QSOs. The Timber Creek score—calls made—36; QSOs—15.

To The Road Again

After leaving Timber Creek we made a thousand-mile circle tour of Colorado without putting the rig on the air and arrived at Boulder on July 3. The next morning I turned on my host's Philco and tuned in the 20-meter band. Yep—there they were—those good old 20-meter *ham* signals. Plenty of guys were hammering away and there was a lot of "yacta-yacta" too. I had heard that some portion of the 20-40-meter bands would be opened July 1st and it sure had. An antenna was thrown up over a tree limb and the rig set up on 7160 kc. Several calls finally resulted in a QSO with WØFQB in Omaha, at 12:35 p.m. That was a good daylight DX QSO, and FQB gave me the full and very welcome dope on the opening of this portion of the bands. That QSO appeared to have been a freak, however, as somebody pulled a string down over the band and *no* more QSOs could be made. The lid was really closed down on Boulder! I called and CQed and tried everything in the book. Even a new 7-mc antenna didn't help, so I put up a 20-meter Windom and went to 14138. Finally at 7 a. m. on the 5th I raised W1LTA in Worcester, Mass. Jim gave me a 359 and we had a good QSO. At 8:35 a.m. I raised W6DQZ in Los Angeles, and he told me that XU1RP was giving me plenty of QRM. At 11:40 a.m. I heard

[*Continued on page 68*]

ANNOUNCING W.A.Z.

The Zone system of DX has steadily gained in popularity since its inception in 1936. The measure of its achievement is testified by the fact that at the time of its suspension in February 1941 only three stations in the entire world (ON4AU, G2ZQ, J5CC) had worked the forty zones. As a DX "yardstick" the W.A.Z. system offers a more equitable basis of comparison for stations throughout the world. In addition, W.A.Z. eliminates any question of "when is a country not a country?" The DX Zone Map of the world appears on pages 36 and 37.

In February 1936 the editors of *Radio Magazine* first announced a new DX yardstick, *Worked All Zones. W.A.Z.* was a new DX scheme believed to be much superior to any list of countries or continents worked. The tremendous popularity since February 1936 of this DX yardstick has proven the merit of the system.

CQ, as the successor to old *Radio*, announces the resumption of W.A.Z. honor roll listing in the editorial pages of our mazgaine. In addition, a handsome certificate suitably inscribed will be awarded to any station proving two-way communications with each of the forty established zones. Certificates will be numbered as issued.

W.A.Z. not only provides an ultimate goal which is all the more desirable because few will probably achieve it, but more important for the average DX station, it provides a means whereby progress of different stations toward that goal may be easily compared and concisely stated.

Nearly all amateurs are interested to a degree in working DX. It was in answer to this almost universal interest that W.A.Z. was originally created and is now revived. Working all comtinents is now so relatively simple that as a measure of DX it is not particularly impressive. Realizing this, the DX Century Club was created for those who can prove two-way communications with 100 countries or more. But the definition of a "country" has resulted in many inequalities in this method of determining DX achievements.

In several places on the earth's surface a considerable number of small countries are grouped together in one natural geographical area; DX stations that can work one easily can usually work all of them just as easily, unless some have very few hams. On the other hand there are several large countries which lie in two or more natural geographical areas and it may be, and frequently is, a much more difficult feat to work stations in several parts of such a country; yet the station so doing takes credit for working but one country. This condition has of course been modified in the DXCC so, for example, U.S.S.R. may count as several countries. In this illustration the division is fair. But the main islands of the United Kingdom are broken down into four countries alone, something not dissimilar to counting the U. S. as 48 countries, or each U. S. time zone as a country.

Accordingly the zone scheme has been evolved which may be used as a fairer basis of comparison. The zone system may be used not only by those who have worked all zones but also by others who can readily compare their progress toward the ultimate goal with that of other stations having the same objective. The results of the creation of the W.A.Z. scheme are shown in the map on p. 36 and 37 and the list of zones at the end of this article. The map is not "official"; it is merely intended to give the general picture. Reference should be had to the list of places in each zone to settle questions which may arise.

The W.A.Z. degree should of course be used only by those who have reached the goal of working all forty zones. The scheme, however, is subject to much wider application as progress made toward the goal can be indicated by a designation such as *W38Z*, signifying that the station has "worked thirty-eight zones." The designation W.A.Z. is simply an indication of performance, and nothing else. Indicating other than the proper total would be akin to cheating at solataire . . . you're fooling no one but yourself. In order to obtain the certificate, however, documented proof of the contacts will be required. For listing in the monthly W.A.Z. list, a statement from the operator will be accepted.

In determining zone boundaries originally, it was admitted that no two persons in the world would probably make up exactly similar lists. Careful attention was given to typographical maps, calls heard lists, and similar factors in compiling the zone lists. For convenience in determining the zone in which a distant station may be located, zone lines have in most cases been made to coincide with political or call area boundaries even where slight departures from natural geographical boundaries were necessitated. No consideration has been given to the number of amateur stations which may be located within a particular zone, as this is a factor of no permanence. In the postwar period after much debate and discussion it was decided to let

the original zones stand intact. This means that some political and call area boundaries will have been altered by the war and if after the peace conference minor readjustments are called for, they will be made.

The plan has been laid out as carefully as possible without reference to any particular country or portion of a country. The number of zones on each continent is roughly proportional to its area. In the zone list some overlapping units are included, that is, many places listed are subdivisions of other places also listed. This has been done purposely because sometimes one of the names is omitted in the postal address given on QSL cards.

W.A.Z. Honor Roll

For listing in the new W.A.Z. honor roll it is only necessary to drop a note to the DX Editor or to CQ Magazine, 342 Madison Ave., N. Y. 17. Total prewar and postwar zones and countries are desired, although listing will be in order of postwar zones worked. At what point the honor roll starts will be determined largely by performance records to date. The editors of CQ would appreciate suggestions from readers since it is our desire to keep the zone DX system abreast of DX techniques. Large wall-size W.A.Z. maps will be available shortly. Announcement will be made when these maps arrive from the printer.

W.A.Z. ZONE BOUNDARIES DEFINED

Zone 1—Northwestern Zone of North America

Alaska	KL7
Yukon (part of)	VE8
Canadian Northwest Territories (part of)	VE8
District of Mackenzie	VE8
District of Franklin Islands west of 102° W., including Victoria, Banks, Melville, and Prince Patrick.	VE8

Zone 2—Northwestern Zone of North America

Canada, that portion of Quebec (part of VE2) north of an east and west line drawn along and extended from the southern boundary of Labrador.	
Canadian Northwest Territories (part of)	VE8
District of Keewatin	
District of Franklin east of Long. 102° W., including Islands of King William, Prince of Wales, Somerset, Bathurst, Devon, Ellsmere, Baffin, and the Melville and Boothia Peninsulas.	

Zone 3—Western Zone of North America

British Columbia (part of VE7)	
W7 except Wyoming and Montana	
All W6.	

Zone 4—Central Zone of North America

All VE3, VE4, VE5, VE6	
W5, W9 and WØ	
Wyoming and Montana (part of W7)	
Ohio (part of W8)	
Tennessee, Alabama and Kentucky (part of W4)	

Zone 5—Eastern Zone of North America

All VE1, VO, W1, W2, W3.	
VE2 (Quebec) south of line mentioned in Zone 2	
W4 except Tennessee, Alabama, and Kentucky	
W8 except Ohio	
Bermuda	VP9
Swan Is.	KD4

Zone 6—Southern Zone of North America

Mexico	XE

Zone 7—Zone of Central America

Honduras	HR
British Honduras	VP1
Guatemala	TG
Costa Rica	TI
Nicaragua	YN
Panama	HP
Canal Zone	KZ5

Zone 8—West Indies Zone

Cuba	CM
Puerto Rico	KP4
Virgin Islands	KV4
Cayman Islands, Jamaica., Turks & Caico's Is.	VP5
Bahamas	VP7
Barbados	VP6
Haiti	HH
Dominican Republic	HI
Dominica, St. Lucia, Antigua, St. Kitts-Nevis	VP2
Guadeloupe	FG8
Martinique	FM8
All Greater and Lesser Antilles except Bermuda and those listed in Zone 9	

Zone 9—Northern Zone of South America

Colombia	HK
Venezuela	YV
Dutch Guiana	PZ
French Guiana	FY
British Guiana	VP3
Trinidad	VP4
Curacao	PJ
Tobago	VP4
Grenada	VP2

Zone 10—West Central Zone of South America

Ecuador	HC
Peru	OA
Bolivia	CP
Colon or Galapagos Archipelago	HC

Zone 11—East Central Zone of South America

Brazil	PY
Paraguay	ZP

Zone 12—Southwestern Zone of South America

Chile	CE

Zone 13—Southeastern Zone of South America

Argentina	LU
Uruguay	CX
Falkland Island	VP8
South Shetland Islands	VP8
Georgia Island	VP8

Zone 14—Western Zone of Europe

Portugal	CT1
Spain	EA
Andorra	PX
France	F
Switzerland	HB
Belgium	ON
Luxembourg	LX
Saar	EZ
Germany (except East Prussia)	D
Denmark	OZ
Sweden	SM
Norway	LA
Great Britain	G
North Ireland	GI
Scotland	GM
Wales	GW
Channel Island	GC
Irish Free State	EI
Netherlands (Holland)	PA
Azores Islands	CT2
Faroes Islands	OY
Gibraltar	ZB2
Monaco	PX

Zone 15—Central Zone of Europe

Italy	I
Albania	ZA
Austria	OE
Liechtenstein	HE
Poland	SP
Finland	OH
Latvia	YL
Lithuania	LY
Esthonia	ES
Czechoslovakia	OK
Yugoslavia	YU

Corsica SV
Sardinia
Hungary HA
Malta ZB1
Sicily I
San Marino
Polish East Prussia

Zone 16—Eastern Zone of Europe
European portions of U.S.S.R. including European portion of Soviet Russia, White Russia or Bellorussia, Ukraine, and Novaya Zemlya. UA, UB, UC

Zone 17—Western Siberian Zone of Asia
Asiatic U.S.S.R. UA
Ural
Kirghiz
Tadzhik
Turkomen
Uzbek
Kara Kalpak
Kazak

Zone 18—Central Siberian Zone of Asia
Buryat Mongol UA
Oyrat
Siberian Krai (Eastern and Western)

Zone 19—Eastern Siberian Zone of Asia
Yakutsk UA
Far Eastern Area or Dalnevostchnyi

Zone 20—Balkan — Asia Minor Zone
Rumania YR
Bulgaria LZ
Greece SV
Crete SV
Aegean Islands SV
Syria AR
Palestine ZC6
Transjordania ZC1
Cyprus ZC4

Zone 21 — Southwestern Zone of Asia Saudi Arabia
Saudi Arabia (Hedjaz, Nejd) HZ
Yemen
Oman
Aden VS9
Asir
Iraq (Mesopotamia) YI
Afghanistan YA
Persia EP
India (Baluchistan only) VU
U. S. S. R. (Transcaucasia only, Georgia, Amenia, Azerbaijan) UA
Kuweit
Behrein Island VS8

Zone 22—Southern Zone of Asia
India (except Baluchistan and Burma) VU
Assam
Sikkim
Ceylon VS7
Nepal
Mahe
Maldive Islands VS9
Laccadive Islands VS9
Karikal
Bhutan
Pondichery
Goa CR8

Zone 23—Central Zone of Asia
Chinese Republic, following portions only: C(XU)
Tibet AC
Sinkiang (Chinese Turkestan)
Tannu Tuwa (Tannou Touva)
China Proper (Kansu province only)
Outer Mongolia
Inner Mongolia (except Chahar Province)

Zone 24—Eastern Zone of Asia
China Proper (except Kansu Province C(XU)
Inner Mongolia (Chahar Province only)
Manchukuo (Manchuria) MX
Kwangchow
Macao CR9
Hong Kong VS6
Darien
Japan (Taiwan or Formosa only,) J9

Zone 25—Japanese Zone of Asia
Japan (except Taiwan or Formosa) J
Chosen (Korea) J8

Zone 26—Southeastern Zone of Asia
Burma XZ
Siam HS
French Indo-China FI
Andaman Islands VU

Zone 27—Philippine Zone
Philippine Archipelago KA
Guam KG6
Yap
Caroline Islands
Mariana Islands KB6
Islands east of Philippines, west of Long. 163° E., north of Lat. 2° N., and south of a line from 153° E., 40° N. to 131° E., 23° N.

Zone 28—Malayan Zone of Asia
Malay States (Federated and Non Federated) VS2
Johore
Straits Settlements VS1
Malay Archipelago, including Netherlands Indies (Dutch East Indies)
Java PK
Sumatra PK4
British North Borneo VS4
Sarawak VS5
Papua VK4
New Guinea VK9
Borneo PK5
Solomon Islands VR4
Timor Islands CR10
Portuguese East Indies CR8
Islands between Lat. 2° N. and 11° S., and west of Long. 163° E.

Zone 29—Western Zone of Australia
Australia VK
Western Australia
North Australia
Central Australia

Zone 30—Eastern Zone of Australia
Australia VK
Queensland
New South Wales
Victoria
Tasmania VK7
South Australia
Islands south of Lat. 11° S and west of Long. 153° E.

Zone 31—Central Pacific Zone
Hawaiian Islands KH6
Ellice Islands VR1
Gilbert Islands VR1
Baker, Howland, American Phoenix Islands KB6
Midway KM6
Palmyra Group, Jarvis KP6
Wake Island Group KW6
Johnson KJ6
Islands between Lat. 11° S. and 40° N., and between Long. 163° E. and 140° W.

Zone 32—New Zealand Zone
New Zealand ZL
Loyalty Islands
Tahiti FO
Fiji VR2
New Hebrides FU8, YU
Samoa KS6
New Caledonia FK
Pitcairn Islands VR6
Chatham Islands
Islands south of Lat. 11° S. and between Long. 163° E. and 120° W.

Zone 33—Northwestern Zone of Africa
French Morocco CN8
Spanish Morocco EA9
Rio de Oro
Tunisia FT4
Algeria (Northern and Southern) FA
Ifni
Madeira CT3
Canary Islands EA8

Zone 34—Northern Zone of Africa
Libya
Egypt SU
Anglo-Egyptian Sudan ST

Zone 35—Western Zone of Africa
French West Africa FF8
Nigeria ZD2
Ivory Coast ZD4
Gambia ZD3
Cape Verde Islands CR4
French Guinea
Liberia EL
Portuguese Guinea CR5
Dahomey
Ashanti
Sierra Leone ZD1
Senegal
Gold Coast ZD4
French Sudan FD8
Togoland FD8, ZD4

Zone 36—Equatorial Zone of Africa
Angola (Portuguese West Africa) CR6
Cameroons FE8
Spanish Guinea
French Equat. Africa FQ8
Belgian Congo OQ5
Northern Rhodesia VQ2
Cabinda
Rio Muni
Gabon
St. Helena Island ZD7
Ascension Island ZD8

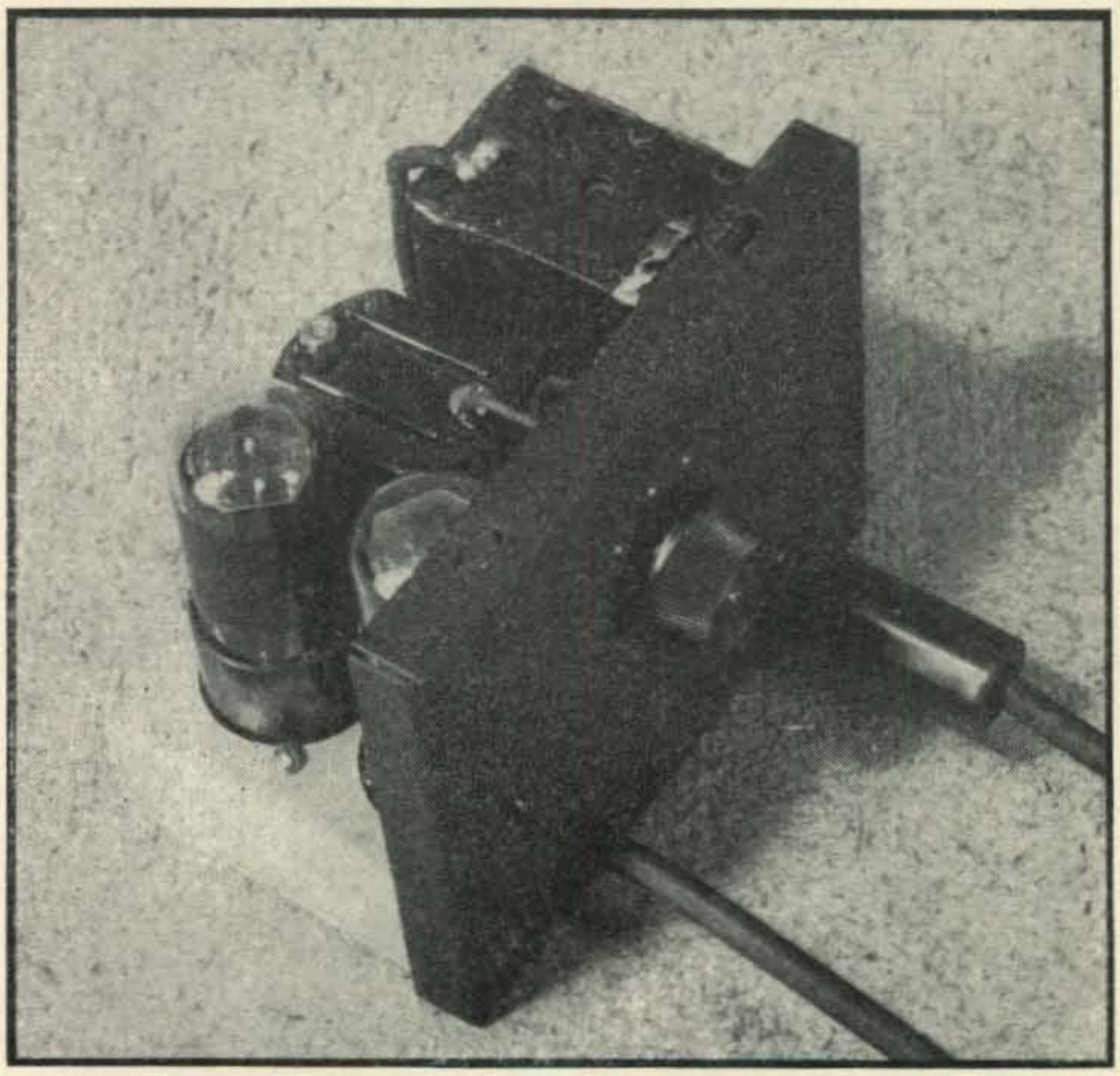
Zone 37—Eastern Zone of Africa
Mozambique (Portuguese East Africa) CR7
British East Africa
Kenya VQ4
Uganda VQ5
Tanganyika VQ3
Nyassaland ZD6
Ethiopia (Abyssinia) ET
Italian Somaliland
British Somaliland VQ6
French Somaliland FL8
Eritrea I6
Zanzibar Islands
Socotra Islands
Mafia Islands

Zone 38—Southern Zone of Africa
Union of South Africa ZS
Southern Rhodesia ZE
Swaziland ZS
Basuotoland ZS
British Southwest Africa ZS3
Bechuanaland ZS
Tristan de Cunha Isl'd ZD9
Gough Island
Bouvet Island

Zone 39—Madagascar Zone
Madagascar FB8
Reunion Island FR9
Seychelles Island VQ9
Admirante Island
Mauritius Island VQ8

Zone 40—North Atlantic Zone
Greenland OX
Iceland TF
Svalbard (Spitzbergen)

A COMPACT KEYER



Small enough to fit comfortably on the operating table, the compact keyer is a sure-fire cure for key clicks.

COURTNEY MATTHEWS, W6EAK*

THE KEYER UNIT described is the result of attempts to achieve clickless keying with an absolute minimum of auxiliary equipment. Considerable experimentation with various combinations of filter chokes, r-f chokes, resistors, and condensers in center-tap and high voltage positions led us to the conclusion that vacuum tube keying was the only really satisfactory approach to the problem.

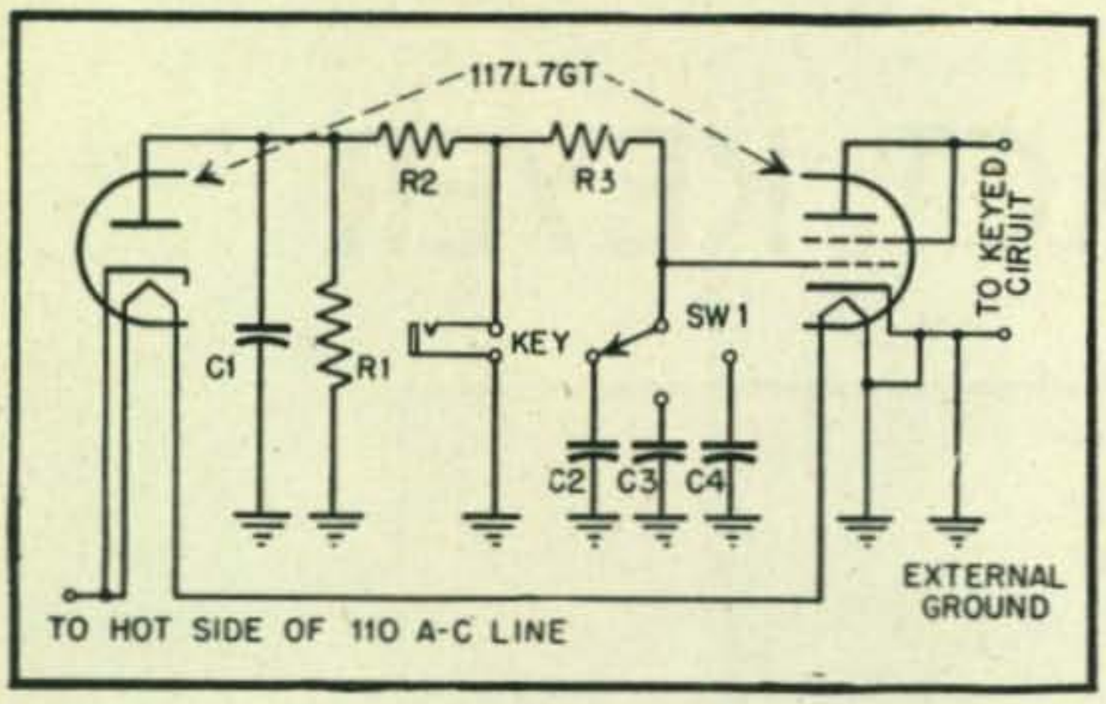
In the particular installation for which this keyer unit was designed, lack of space precluded a separate power transformer, rectifier tube, and the associated components usually found in keyer units of conventional design. The return of the ever versatile 117L7GT tube to the shelves of the local radio supply house provided the answer to the space problem. Although the 117L7GT is very small, it is almost a complete power supply in itself. Not only does it eliminate a power transformer and rectifier tube, but we get our "keyer" tube in the same package. This really results in a great saving of space.

*1813 N. Naomi St.

Circuit Design

The diagram shows the circuit to be straightforward in most respects. Two 117L7GTs are connected in parallel (only one is shown for simplicity); the pentode sections are triode connected to act as the keyer tubes, and the diode sections act as half-wave rectifiers to supply bias voltage directly from the 110-volt a-c line. Connected in in this manner the diode sections deliver a bias voltage of 150 volts to the grids of the keyer sections, which is more than enough to cut them off completely under key-up conditions.

The action of the keyer unit is simple. Under key-up conditions, the keyer sections of the tubes are biased to cut-off and no plate current can flow. Under these conditions (with *SW-1* in the position shown on the diagram), *C2* will become



Circuit diagram of the compact keyer

C1—4 μf, 200 v., paper
C2—.002 μf, mica
C3—.006 μf, mica
C4—.01 μf, mica
R1—25,000 ohms, 2 w.
R2—0.1 megohm, 1 w.
R3—0.5 megohm, 1 w.
SW1—3PST

charged to the full bias voltage. When the key is pressed, *C2* discharges through *R3* at a rate determined by the *RC* constant *R3 C2*, and when the voltage at the grids of the keyer sections passes cut-off, the tubes conduct and plate current flows, "keying" the external circuit. It can be seen that

[*Continued on page 67*]

FOREIGN AIR MAIL RATES EFFECTIVE NOVEMBER 1, 1946

(Half Ounce)

Ten Cents

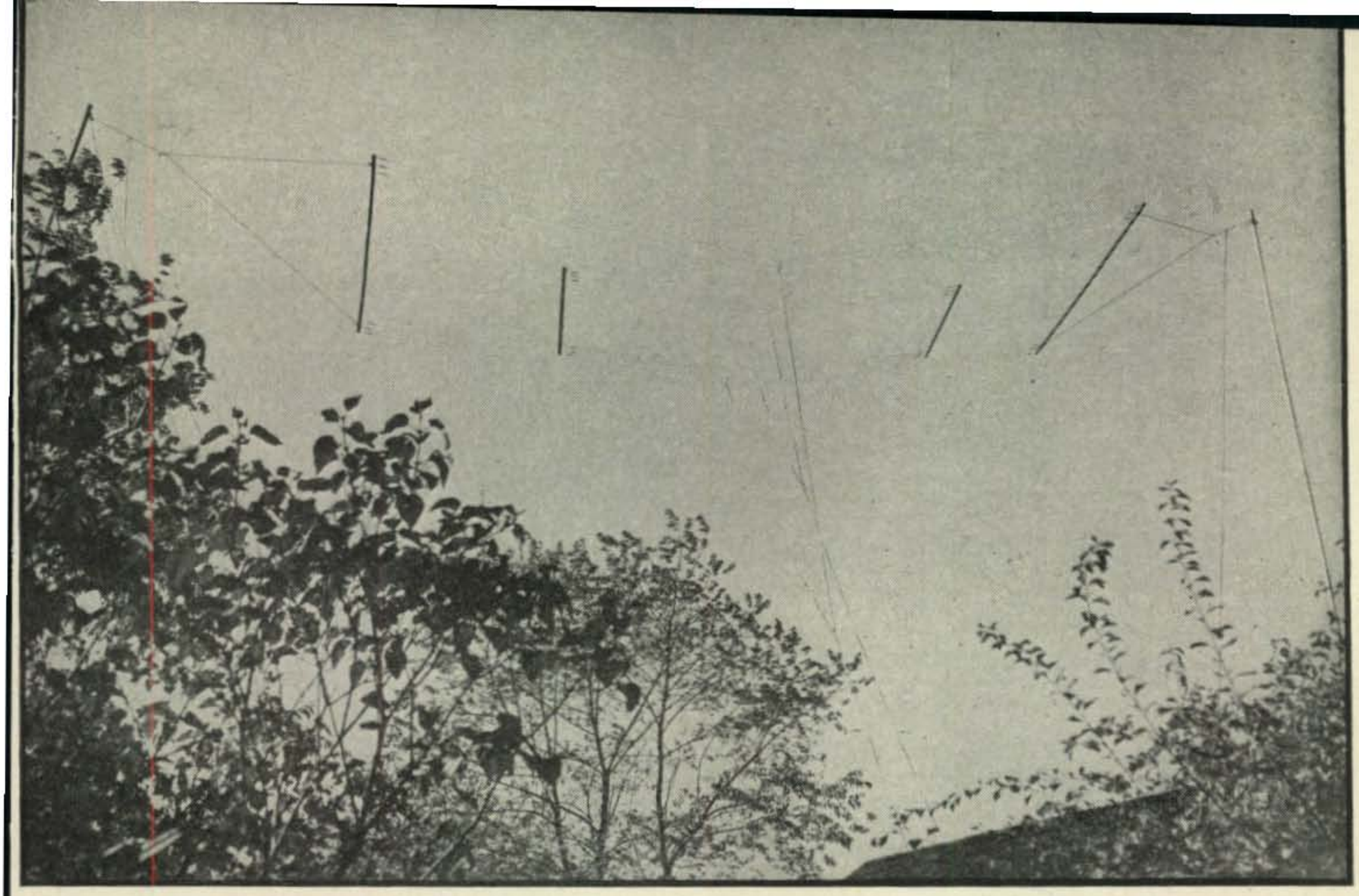
Argentina
Bolivia
Brazil
British Guiana
Chile
Colombia
Ecuador
Falkland Islands
French Guiana
Newfoundland
Paraguay
Peru
Surinam
Uruguay
Venezuela

Fifteen Cents

Albania
Algeria
Austria
Azores
Belgium
Bulgaria
Corsica
Czechoslovakia
Denmark
Egypt
Estonia
Faroe Islands
Finland
France
Germany
Gibraltar
Great Britain and Northern Ireland
Greece
Hungary
Iceland
Ireland
Italy (continental only)
Latvia
Libya
Lithuania
Luxembourg
Madeira Islands
Malta
Morocco (British)
Morocco (French)
Morocco (Spanish)
Netherlands
Norway
Poland
Portugal
Rumania
Spain (including Spanish offices in North Africa).
Sweden
Switzerland
Tunisia
Turkey
Union of Soviet Socialist Republics
Vatican City State
Yugoslavia

Twenty-five Cents

Aden
Afghanistan
Anglo-Egyptian Sudan
Angola (Portuguese West Africa)
Australia
Bahrein
Belgian Congo
British Cameroons
British Somaliland
Brunei
Burma
Canary Islands
Cape Verde Islands
Ceylon
China
Cyprus
Dahomey
Eritrea
Ethiopia
Federated Malay States
Fiji
French Cameroons
French Equatorial Africa
French Guinea
French Indo-China and the French Settlements in India
French Somaliland
French Sudan
French Togoland
Gambia
Gold Coast Colony
Hong Kong
India (British)
Iran
Iraq
Italian Somaliland
Ivory Coast
Kenya and Uganda
Lebanon (Republic of)
Liberia
Macao
Madagascar
Malay States (Nonfederated)
Manchuria
Mauritania
Mauritius
Netherlands Indies
New Caledonia
New Zealand
Niger
Nigeria
North Borneo
Nyasaland Protectorate
Palestine
Philippines
Portuguese East Africa (Mozambique)
Portuguese Guinea
Portuguese India
Portuguese West Africa (see Angola and Portuguese Guinea)
Reunion
Rhodesia (Northern)
Rhodesia (Southern)
Rio de Oro
Sarawak
Saudi Arabia
Senegal
Siam
Sierra Leone
Southwest Africa
Spanish Guinea
Straits Settlements
Syria
Tanganyika
Trans-Jordan
Union of South Africa
Yemen and Zanzibar



The 20-meter beam with a 10-meter model suspended in the center. No apparent performance change resulted in this space-saving arrangement of the two beams.

The Double Triplex Beam

J. ALAN BIGGS,* W8LO/2*

When you work DX on 20-meter phone with no trouble it's a good bet you're either out of the band or using something unusual in the way of antennas. W8LO/2 has gotten so many inquiries about his beam that in self-defense he wrote this article. The Double Triplex is W8JK's Twin-Three modernized to take advantage of the 300-ohm twinlead.

IT IS THE GENERAL amateur practice to consider the current loop resistance of a center-fed half-wave dipole as being of 70 ohms impedance. However, when a second half wave length of wire is located parallel to the first, and fed in phase, the close spacing tends to increase the current loop resistance. When a third half-wave very closely spaced radiator is added, the loop resistance reaches a value wherein the method of feeding and matching may be greatly simplified. John D. Kraus, W8JK, developed this idea of very closely spaced half-wave radiators into what was called the *Twin-Three Flat-top Beam.*

The advantages of the Twin-Three were: (1) broad band frequency response (greater than the folded dipole), (2) excellent matching characteristics, necessitating no tuning adjustments other than accomplished with a yardstick, (3) very high radiating efficiency and (4) good wet weather performance. Although quite a few Twin-Three beams were erected a disadvantage arose from the time-consuming and tedious job of cutting and laying out of 600-ohm feeder lines—not to mention the occasional requisition of neighbors

*48 Curtis Lane, Yonkers, N. Y.

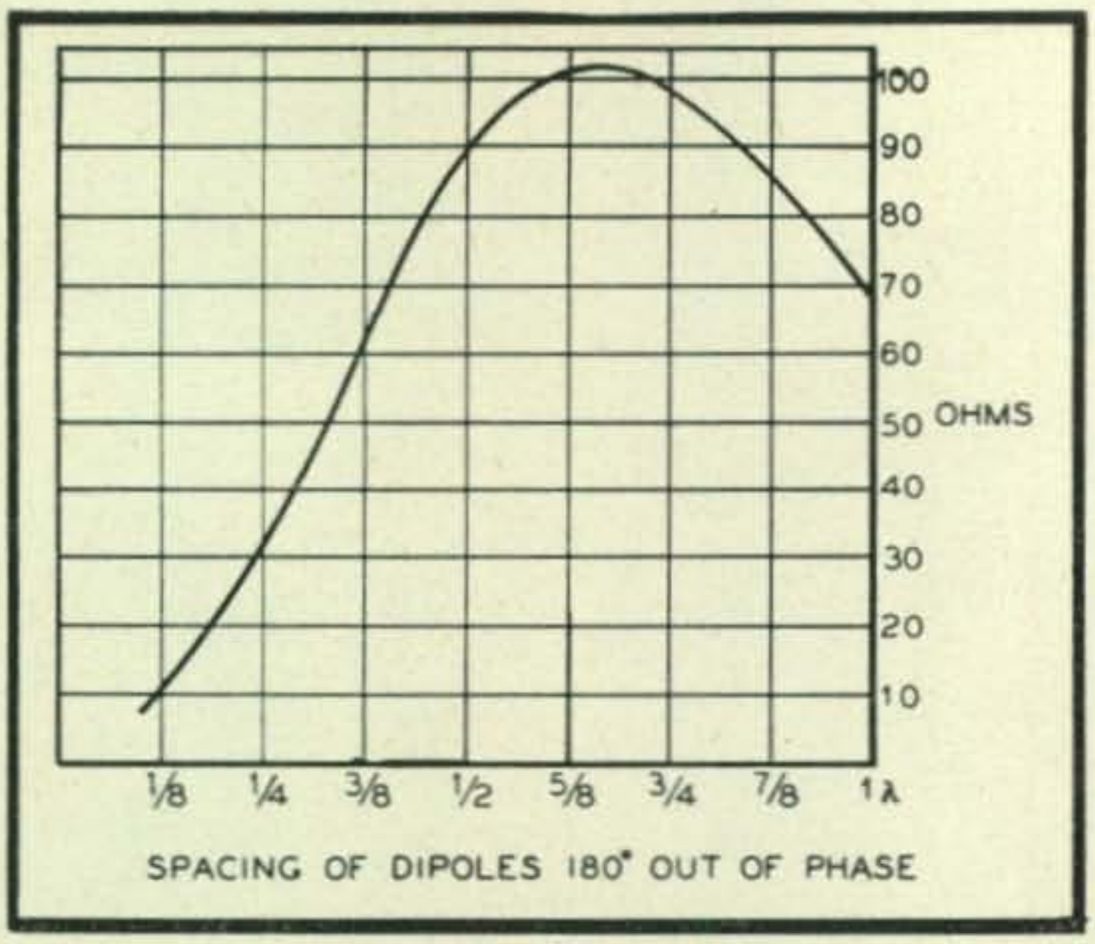


Fig. 1. Effective center impedance of two dipoles in free space fed 180 degrees out of phase.

to aid in extricating the constructor from a hopeless tangle of feeders and antennas. With the current developments in twin-lead feeders, there is no reason why the advantages of the Twin-Three should not now far outweigh its disadvantages.

Modernizing The Twin-Three

The first step in modernizing the Twin-Three is to provide for using the common 300-ohm twin-lead. An examination of *Fig. 1* shows that if two half-wave dipoles are fed with a phase difference of 180 degrees and spaced 1/6th wavelength apart, their center impedance will be approximately 16½ ohms. The use of three closely spaced dipoles instead of the simple doublets will raise this center impedance by a factor of nine, or to 150 ohms.

A quarter-wave matching section made of 300-ohm twin-lead may be used to match that 150 ohms to a 600-ohm line. However, this 600-ohm termination in parallel with the 600-ohm termination of the quarter-wave section from the other three-wire section results in 300 ohms, or a perfect match if a 300-ohm twin-lead line is used as a feeder from the transmitter. One of the quarter-wave sections must be transposed in order to get the necessary 180-degree phase difference in the two three-wire radiators. This is accomplished by an intentional twist in the twin-lead 300 ohm line coming from one of the radiating sections.

Published information on what constitutes a quarter wavelength of 300 ohm twin-lead line differs so widely that we determined our matching sections experimentally. This was done with a v.f.o., a flashlight bulb, and a small piece of twin-lead that had been weathered for about three months. We found that the formula

$$\frac{246}{f \text{ (in mc)}} \times 0.835$$

gives the length of a quarter wave section in feet, or 14′ 3½″ for the 20-meter band.

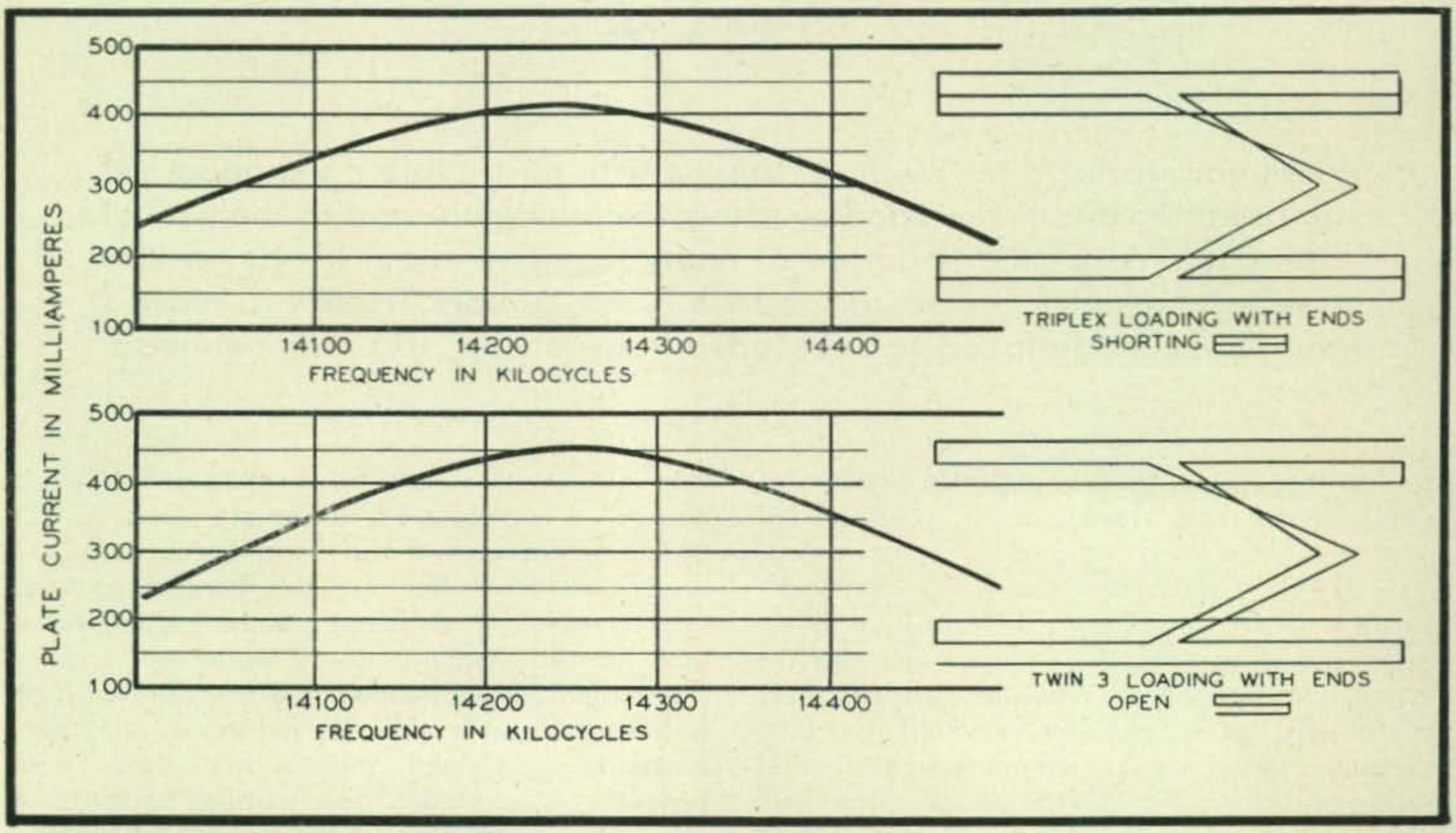


Fig. 2. Comparative final tank loading of the Triplex beam with the dipole end open and shorting. Although loading is somewhat better with the dipole ends open, constructional facilities favor closing the ends.

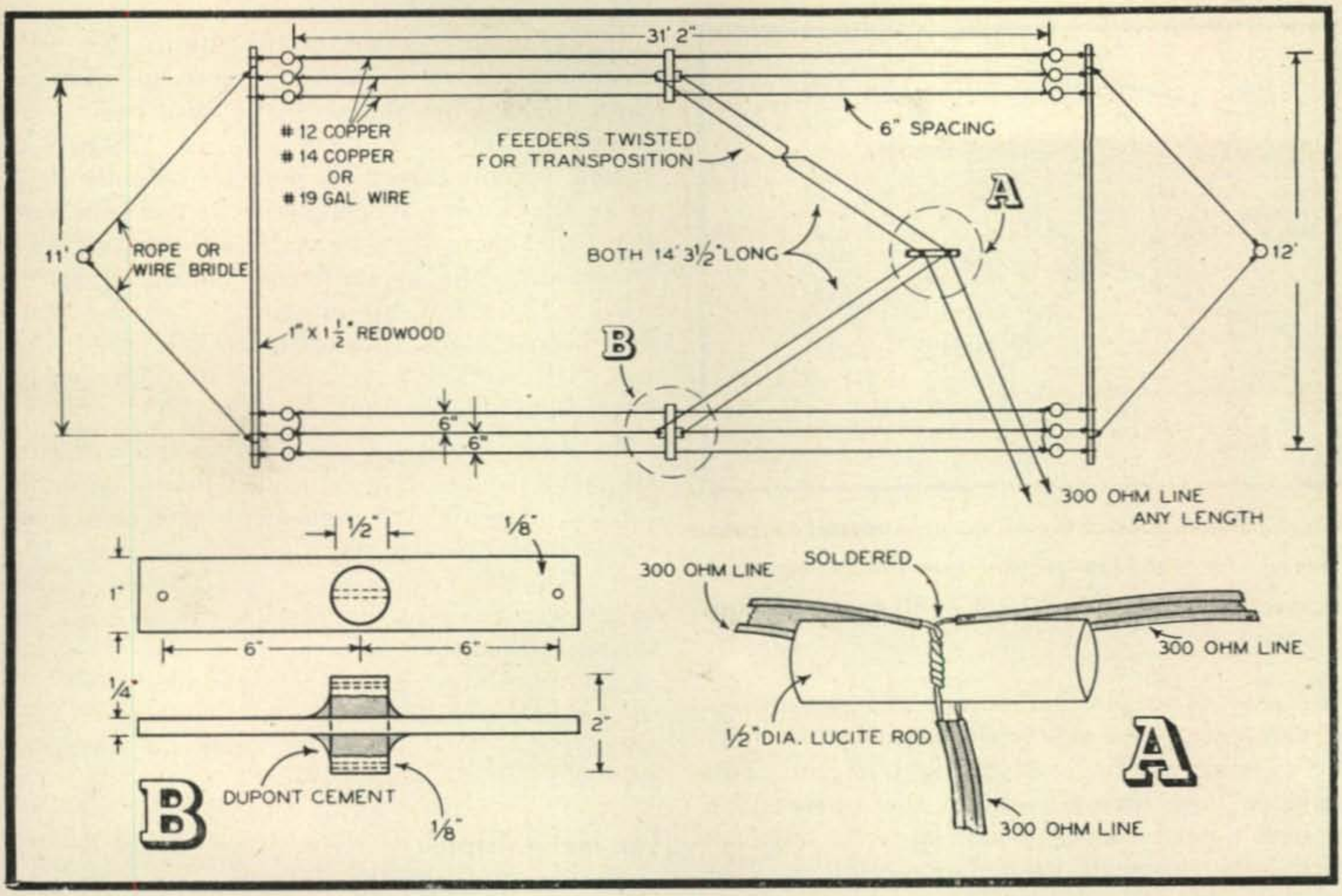


Fig. 3. Dimensions for the 20 meter Triplex beam shown in plan view. The twin lead junction is illustrated in the closeup view *A*. The Q sections are made from one continuous 29 foot length of 300 ohm line. The dipole center insulator in the closeup view *B* is made of lucite.

It is to be noted from the curves of *Fig. 2* that there is little difference in performance whether the ends of the three-wire doublets are open or closed. In view of the simplified construction, it was decided to use the three-wire doublet with the three wires connected together at each end. Since a verbal description is then, "a three-wire folded doublet with ends shorted," and is confusing, Arthur Lynch, W2DKJ, has suggested that such a radiator be called a *Triplex* element. The twin three, with all the modifications which we are suggesting, could then be called the Double Triplex.

Construction

Laying out the beam is simplicity itself. First, obtain two 12′ lengths of 2″ x 1″ redwood or similar hardwood for the spreaders. Stake the two spreaders approximately 33 feet apart on the ground. About 3 inches from the end of one spreader tie the insulator and the first half-wave element. Thread the wire through the lucite center spacer as illustrated in *Part A* of *Fig. 3*. The center element is cut in half and is threaded through holes drilled in the ½-inch round solid piece of lucite, thus breaking the center of the dipole as per usual. The distance between the two holes in the round lucite piece is about 1½″. The third half-wave is threaded on the spacer and the same entire procedure repeated for the twin radiator section.

The quarter-wave matching section is best made of one continuous piece of 300-ohm lead 29 feet long. Each end of this matching section length is cleaned for about 1½ inches and exactly in the center a one-inch space (i.e., ½″ either side

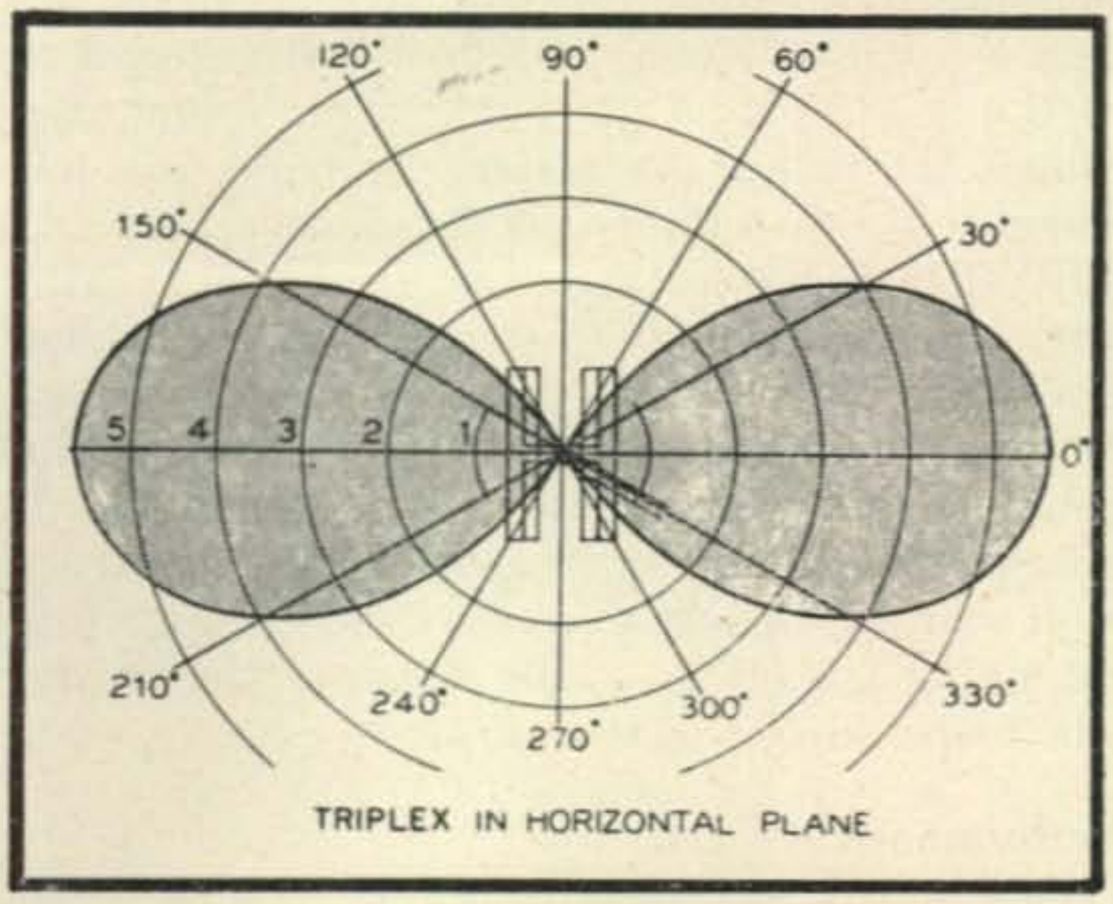


Fig. 4. The horizontal pattern of the Triplex beam. At the 40 degree points the power is 6 db down from the nose.

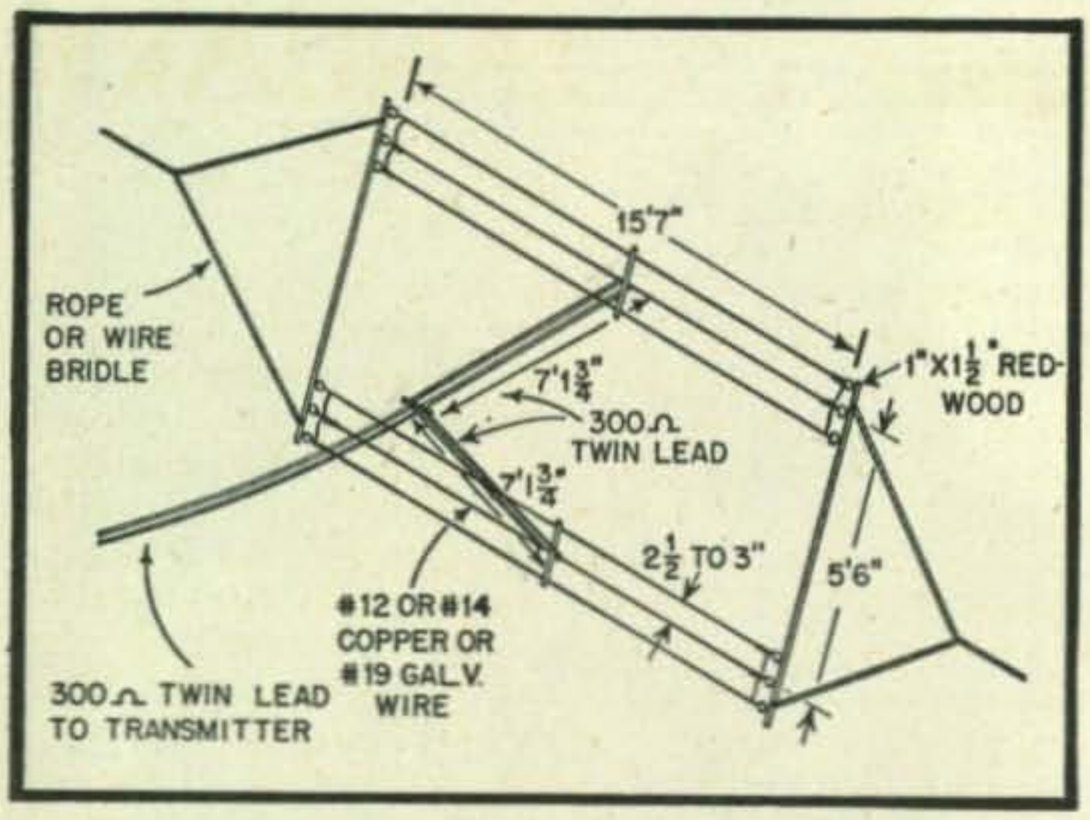


Fig. 5. Dimensions of the 10 meter modernized Twin-Three. The matching section from the lower three element dipole is twisted for the 180 degree phasing.

of center) is cut out and cleaned. The separation of the plastic insulator in the center is drawn up by twisting the wire off at right angles. This twist is then brought around the outside of a porcelain insulator and joined on to the 300-ohm twin-lead coming in from the transmitter. The insulator is left in place and the whole arrangement as shown in *Part B* of *Fig. 3* is carefully taped. Don't forget that one length of the matching section has an intentional twist for the 180° phasing.

Because the twin lead is so easy to handle, very little time will be lost in getting the whole antenna into the air. The feeders should be made as rigid as possible as this antenna may have a tendency to swing. Generally, however, when the dimensions are followed the array is fairly steady.

The general figure eight horizontal pattern of the Triplex is shown in *Fig. 4*. Naturally, on DX the pattern may appear sharper, but on local contacts it will appear rather broad. At the 40-degree points the power is about 6 db below that of the nose. The height of the beam follows the adage, the higher the better. Probably this has much to do with the angle of radiation since the VSWR does not vary to any great extent with various heights above ground. The Triplex does have one peculiarity, since unusually heavy loading is required. At W8LO, four turns in the coupling link were required, but brought no ill effects. Shortening, or lengthening the feeder by a quarter wavelength may also benefit the loading by taking advantage of the standing wave ratio, which should be less than 2/1.

Performance

One of the most frequent questions we have had regarding the antenna concerns its wet weather performance. Contrary to expectations, the 300 ohm twin-lead performed very well over the four-month period of operation. No rain storm has ever caused the loading to fall off more than 15%. This characteristic has been confirmed by other users of the antenna. W8QQN/5 of San Antonio reported a reduction of only 10% in loading during a downpour. It has been our belief that this reliability under wet weather may be accounted for by the rather unusual quarter-wave "Q" used in this antenna. When the twin-lead becomes wet, its impedance is lowered. As the "Q" section impedance is simultaneously lowered, the over-all mismatch is less.

In order to test the possibility of mounting a 10-meter Double Triplex inside a similar antenna for 20 meters the arrangement was made, as shown in the photograph. For comparison, a 10-meter Double Triplex was erected at the same height with the same orientation. Tests made on the air showed there to be no difference. The one in the clear, however, had less standing waves on the feeders, and its resonant frequency was much broader than the other. The 20-meter performance was in no way altered.

Ten-meter Triplex

To determine the effect of using metal spreaders, a 10-meter Double Triplex was erected with 1" diameter dural spreaders 6' long. Apparently, the capacity effect was such that the Triplex elements had to be shortened to 15' 2½" from the 15' 7" in *Fig. 5*. This indicates that if dural spreaders are used, the 20-meter antenna elements would also need to be shortened slightly.

Two identical ten-meter antennas were set up using #19 galvanized wire and the other using #14 enameled copper. No difference in loading or standing waves could be detected. Checks on the air also showed no difference. Galvanized wire being stronger, cheaper and having less tendency to stretch can be used with complete satisfaction. It may also be easier to obtain than currently scarce copper wire.

Repeated checks have shown the Double Triplex performance on 20 meters to be everything that could be asked of it. The signal compares favorably with those of other stations using the same power and three element beams. At W8LO/2, two twenty-meter Double Triplex beams at right angles to one another afford world coverage. An eight-hour thirty-five minute WAC was accomplished within twelve hours after the second antenna was erected. W5KTL's signal increased an average of two Rs in New York over the folded dipole he had been using. W4HOK's signal with medium power is comparable in New York City to any stations in his area. The first week, using 600 watts and the Double Triplex WAC was worked on ten meters. This included an R 8-9 from India.

Monthly DX Predictions - - JANUARY

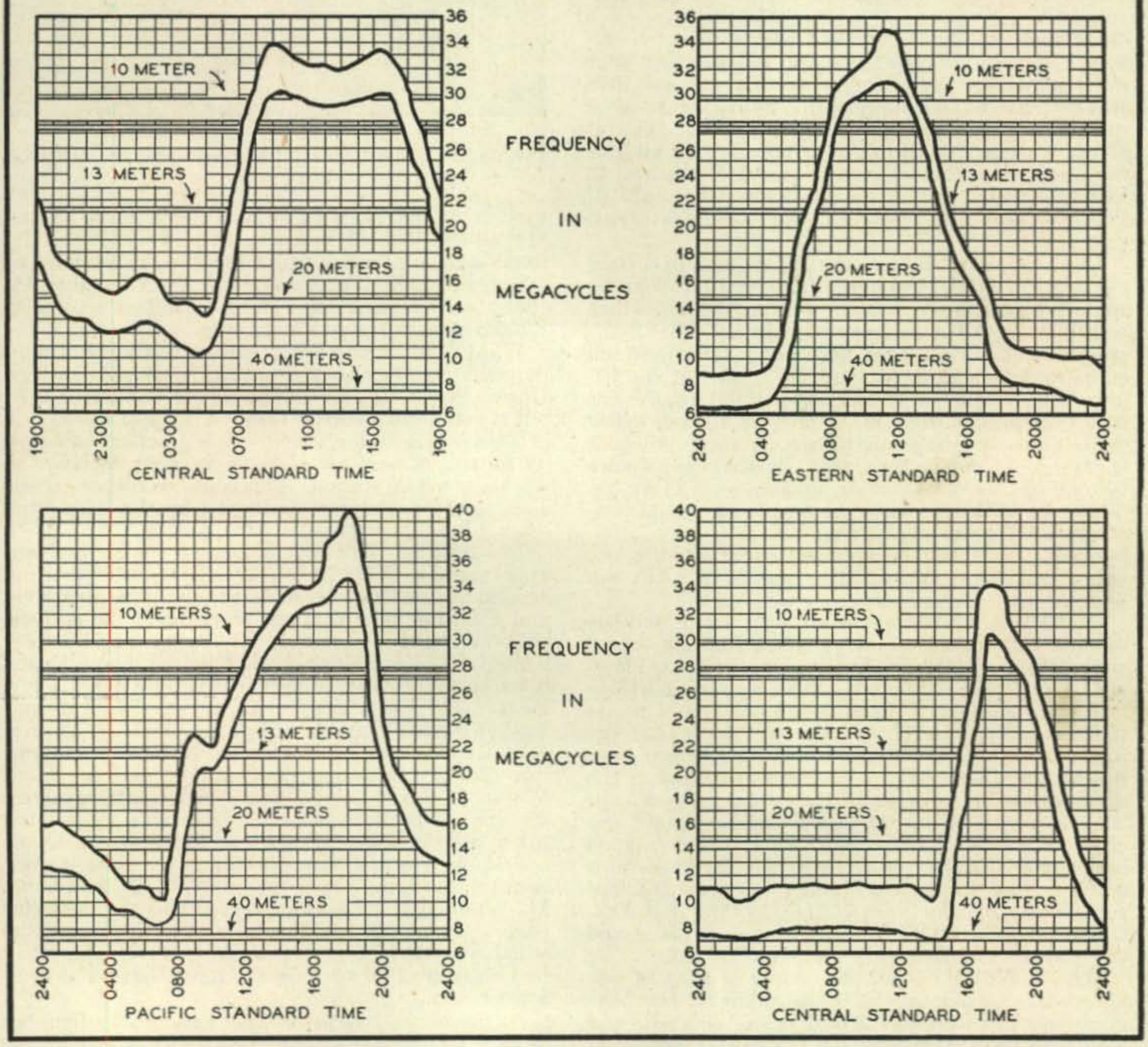
OLIVER PERRY FERRELL*

CURRENTLY OBSERVED ionosphere phenomena indicate that January will be a rather good month for DX into the Far East and Australasia. Otherwise, conditions will be a little below those of December, with the exception that towards the end of the month and the beginning of February the South Africans will be very strong.

In *Fig. 1* the average daily conditions for a path from Central United States to South America are illustrated. Following the top variable line of the graph (or the maximum usable frequencies) we find that 20 meters will close down around 0230 hours CST when the MUF line drops below the horizontal 20-meter marker. At about 0530 hours and as the outline ascends, the 20-meter opening is expected. As indicated when the MUF line crosses the 10-meter marker at 0730 hours CST this band should start to show some life. As the MUF line remains above 10 meters, this band should remain open until 1900 hours. Actually, the best possible band conditions are indicated by the inner graph line of optimum working frequencies (OWF) where on 10 meters very good conditions are expected from 0830 hours until 1630 hours CST. On 20 meters and neglecting mid-day absorption; from 0630 hours to 2000 hours CST. The spacing of the MUF and OWF lines of about three megacycles indicates the fre-

[*Continued on page 56*]

*Assistant Editor



January 1947 average conditions. Fig. 1. (top, left). Central United States to South America. Fig. 2. (top, right). Eastern half of the United States to Europe and North Africa. Fig. 3. (bottom, left). Western half of the United States to Eastern Australia and New Zealand. Fig. 4. (bottom, right). Central United States to Southern Japanese Islands and the Phillipines.

CQ DX

By HERB BECKER, W6QD

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

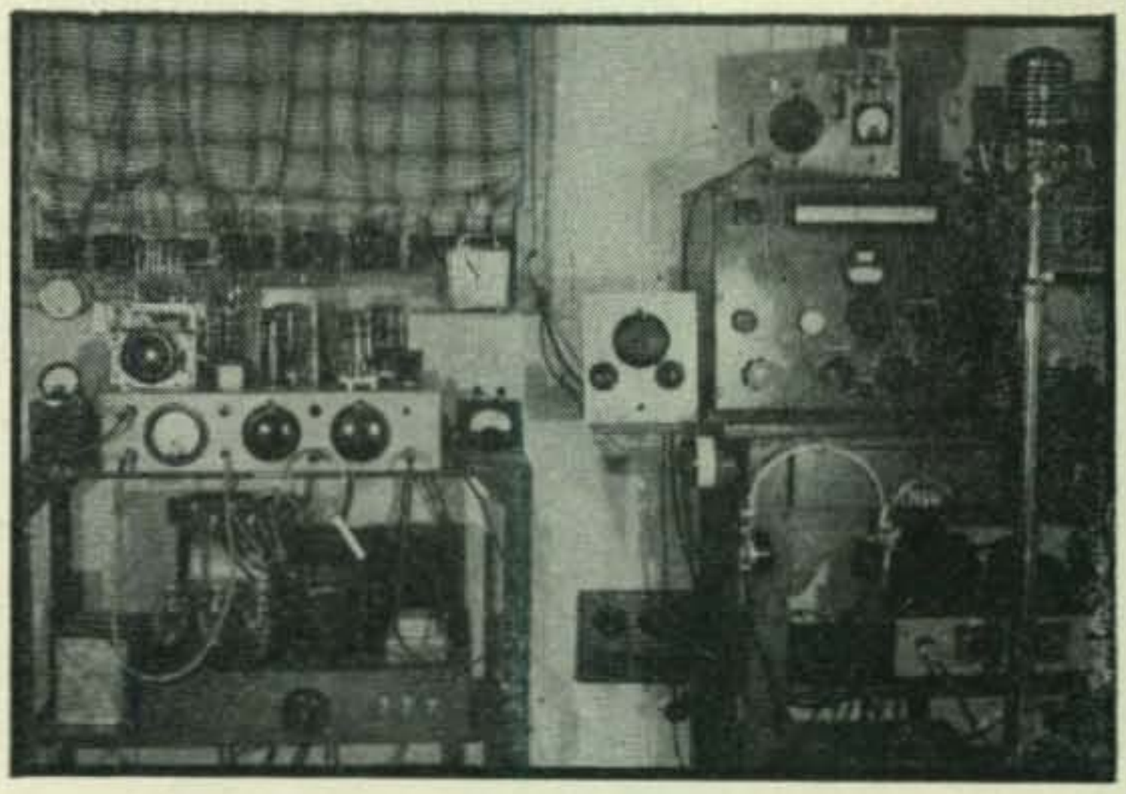
ABOUT THE TIME you read this, most of you will have made your New Year's resolutions and broken them. With the holiday spirit in the air, a lot of the boys have good intentions about doing something really worth while, starting the first of the year. However, the a. m. following New Years' Eve, outside of the fact that there is a run on the Alka-Seltzer department, half our resolutions made the night before have been broken. Don't know what this has to do with DX, except there might be some who would resolve not to park on the frequency of Joe down the street during 1947, or for that matter, knowingly park on anyone's frequency. Then there might be the effervescent phone man who resolves to learn the code again and actually do a little c-w operating. Conversely, could be, the c-w man would decide to become versatile, put in a modulator of some sort, and get in there pitching with the rest of the orators. Maybe a good resolution for all during 1947 would be to ask the rare DX stations to listen for your "pal" down the street. Oh, yeah! If you can think of a resolution you can break easier, let me know.

I was browsing through the DX column in several old issues of *Radio*, and in the January 1941, column, we listed the rules for a little contest, WAAP, which was Worked All American Possessions. One of the possessions at that time was Swan Island, which supported one station, *KD4GYM*. If any of you fellows worked him in 1940-41 and didn't receive his card, you might drop me a line, as I have a few cards at home made out to certain stations whose QTH's could not be obtained. By the way, we are going into this WAAP thing again as soon as we can determine with reasonable assurance just what constitutes American possessions. Ideas from you fellows on this would be appreciated. Formerly, we issued certificates for all those making WAAP; will do same when we get going again.

W3EVW has been on the air since April, and has worked 76 countries, making a total of 138 for all time. He, with dozens of others, wants the QTH of *HZ1AB*. Roger is running 500 watts into an 813.

W3RIS worked *J9ANA* on Okinawa, and wants to know where to send the card. We don't have the information here. W9BVV has worked 40 countries postwar, and is using a pair of 40's in the final. His antenna system consists of folded dipoles—two for 20, and a vertical for 10. He finds them quite efficient radiators for DX. WØLAE has done a good bunch of DX in the past five weeks on 20. As a matter of fact, it consists of about forty good DX stations, some of which are *OX1BC*, *UA9CB*, *LA2Z*, *ON4G*, and *SM5LN*. The frequencies of these and the others will be found in the frequency list.

Who is W6DI? With the issuing of a lot of two letter calls to old timers, it has many of the boys guessing. For example. W6DI is ex-W6NNR, and who hasn't heard of NNR on phone? Inasmuch as Guy Dennis used to have W6CR, he applied for it again, and up popped W6DI instead. Anyway, he recently worked *Z3IE*, and *VQ3EDD* on 10 phone, and *ZE1JA* on 20 phone. To date, his post-war total is 29 and 73, with an all time total of 33 and 114; all 100% phone contacts. W6DI (Ex-W6NNR) has done a swell job of traffic handling in addition to his regular DX. For example, from November 15, 1945, to November 15, 1946, he handled a total of 1,256 messages from GIs overseas.



The station behind the outstanding signal of VU2CQ.

W5MY put a new set of tubes in his HRO, and immediately after hooked up with *VE8AW* in White Horse. Not that Doc claims this is wonderful DX, but it was a good starter from his neck of the woods in Texas. Also I don't believe it's practical to figure on putting a new set of tubes in your receiver to work a new DX station. This could be rather expensive, to say nothing of cluttering up the joint with several baskets of tubes every evening.

Doc Stewart, W6GRL, is now on the air in Nanking signing *XU6GRL*. Doc is still waiting around for his 10 kw broadcast transmitter to arrive, and I assume now that the shipping strike is over, the equipment is on its way. As we have said before, while GRL is learning a little Chinese, Dave Evans hops up to his station in Ventura and snags a few good ones. For example, his latest—*ST2AM* and *VQ5JTW*, both apparently e.c.o. and on 14 mc. W6GRL had a nice QSO with XU6GRL. I ran into W6AM the other day, and he said he heard W6GRL (Dave) batting away with *G2PL* at about 35 wpm. Speaking of W6AM, he was visited the other day by Dave Evans who sat down in Don's operating position, and promptly worked a new country for him; this being *FG3FP* on 20 phone. Dave said W6GRL hasn't worked this one yet. Apparently, the DX is still rolling in at Rolling Hills, which is W6AM's new location, and he apparently had no trouble in working about 10 Europeans over a week-end.

A lot of you boys in the east will remember W2VY, George Shields, and you may also remember, he is now operating in the W6. Well, good ole George has "gone and done it." Yep, he was married on November 12; the XYL being imported from New York. Well, he *was* a good DX man, anyway!!

W2PEO, Ex-W9VDQ, really did himself proud on the afternoon of October 26. Look what the guy worked on 20 c.w. between 2:18 p.m. and 3:37 p.m., or in 1 hour and 19 minutes. *HB9EI*, *VU2FM*, *ZS6CH*, *ZL4CK*, *PY7AD*, and *W9DQO*. By golly, that's WAC, and since Eric had none of these stations on schedule, I think that's darn good work. In fact, it would be good work even on schedule. He is running 700 watts into an Eimac 4-250A, driven by a 6L6. His antenna is a half-wave folded doublet fed with a 500-ohm line. His receiver is an RME-69. During the past two months, W2PEO has worked 50 countries, all on 20 c.w. These include *ZD8A*, *VQ3HJP*, *PX1O*, who says his location is Andorra and to QSL via RSGB. Then there is *CN8MI*, *YR5V*, *OY3G*, *EK1AA*, *UA1KBA*, *TA1DB*, *D5FF*, who says he is in Germany, and to QSL via HB9AG. QTH of *VS7JB* is Ceylon, West Receiving Station, c/o B.F.M.O., Colombo, Ceylon And then there's *OX1BC*, QSL via APO 55, c/o P.M. New York City.

Another voice from the past heard from this time is W2GVZ. As Pat puts it, he had to work some post-war DX in order to make the column, so he shorted out some turns on his 80-meter rig until he hit 14 mc. As a consequence, his post-war total is 6 zones and 6 countries!! These were worked on c.w. with an ART-13 surplus transmitter — the receiver is an HRO. W2GVZ says that at this rate, he has calculated it will take until 1956 to work his pre-war total again, which was 39 zones and 130 countries. Better short out a few more turns, Pat!

Thanks to W6OJW for a batch of stations and their frequencies. While we are in the sixth district, W6PVB has worked a few new ones—*EL5B*, *LA1U*, *OX1BC*. He wants to know how W1JPE got the new call W1DX. Well, you see, it's this way—no, I better not tell you. W6UIE up in the northern part of the state, writes an entertaining letter, which is a build-up to hearing a station signing UP4ME. He wants to know if it is possibly a new Russian province. What do you think? Seriously though, he figured it was someone just having fun.

W2IYO, who hasn't been heard from in years has been doing alright by himself working *VS1BX*, *VU2AC*, *VS7ES*, *TA1DB*, *YI6C*, *ET1JJ*, *I7AA/I6*, *ZD8A*, *UA9CB*, and *XABU*, *G5KW* both located on Rhode Island in the Dodecanese group. Then there was *LX1JB*, *LX1AX*, *LZ1XX*, *OX3G*, *OX1BX*, *EZ4X*, *VQ8AB*, *VP3JM* and *PZ1FM*. W2IYO has an all-time total of 39 and 132, and doesn't like the idea of, as he puts it, starting all over. This is a good place to bring up what we are going to do.

As soon as possible, we plan to run a list of calls showing the total post-war zones and countries, as well as the all-time total zones and countries. However, to qualify in the list, a person must be active now, and must submit his post-war total. These will be shown in the same numerical order as we used to show them in *Radio*, and will be listed by post-war zone totals.

W3KNT worked *LA2H*, *XAEG*, who says to QSL via RSGB, *RAEM*, Box 88, Moscow. *HA5EW* in Budapest—QSL via G6AQ, *OX1Z*, APO 858, c/o P.M. New York City.

Our esteemed editor received a letter from Jim Cheeks who was operating ET3Y in Ethiopia up until January, 1946. After reading in this column about W2IOP working *ET3Y*, he is wondering just who is operating the station, now that he has left. Jim was flight instructor in the Ethiopian air force for two years, and is now technical instructor in Lowry Field, in Denver. For any of you fellows who worked ET3Y prior to January, 1946, Jim will gladly send a QSL card upon receipt of yours. His QTH is James Cheeks, 2515 Clarkson Street, Denver, Colorado. Post-war *ET3Y* is Gunnar Granath, Box 1191, Addis Ababa.

From G2MI's October DX column, we see that *VS4JH* should be back in England, and they wonder how he'll feel being "just another G." G2PT worked *UD6KBA*, who says to QSL via RSGB, although located at Baku, Azerbaijan. We also see where UA1 is the Leningrad district. The QTH of *YI1CX* is #6 FBU, Basrha. *VP8AI* is A. S. Betts, Pebble Island, Falkland Islands. *KA6FA*, at 19 Ortez Street, Ilo Ilo, Panay, P. I. — also *LZ1XX* has cards printed hoping to QSL everyone soon — presumably, those he has worked, of course. *VP8AD*, is using 8 watts on 28 mc. He is R. McLaren. South Georgia Island. *ZC6FP* is O. K.; he is G5FP and QSL's. G2PL boasts a card from U.S.S.R. on which is a portrait inscribed below, "A. Popov, inventor of radio." There probably could be some difference

[*Continued on page 62*]

PHONE		PHONE	
ZE1JA	14160	YI2CA	28380
ZE1JA	14160	YI2CA	28380
ZB1E	28 mc.	W4BOW/Iwo Jima	28498
VQ3EDD	28 mc.	VU2CQ	14075
		VU2CQ	28300
FG3FP	14315	C8YR	14300
W6OJZ/J3	14370	ZD4AB	14190
W1LTQ/TF	28490	HB9DQ	14020
VU2AQ	28290	OX3WD	14150
ZB2A	28090	CN8AB	14095
XU1RP	29030	J2ROC	14385
W2SLW/KL7	28910	ZE1JX	14180
W6RMC/KJ6	29100	ZE1JD	14250
SU1HF	28270	J2AAI	14310
LX1SI	28475	VE8MF	14370
LX1BG	28300		

C.W.		C.W.	
VP3JM	14053	GC8NO	28100
UA9CB	14078	KP6AB	14100
PK6HA	14068	W6VKV/16	14105
OX1BC	14095	SU1UQ	14070
HH5PA	14095	HZ1AB	14070
UP4TD	14090	VU2KM	14080
LA2Z	14088	UA3AF	14mc
LA2H	14090	EP1AL	14080
HB9X	14083	UAØKAA	14090
ON4UT	14065	W3EKK/J2	14040
CN7AD	14098	SU1US	14185
RAEM	14075	OQ5LL	14080
HA5EW	14090	VQ2GW	14075
EK1AA	14040	W6VDG/KW6	14150
ZD4AB	28075	AR1PC	14125
UA3KBC	28100	OK1WX	14095
SP1X	28025	YR5V	14095
YR2A	28100	VE8MF	14085
J9ACS	28600	VQ8AB	14120
CN8MZ	28280	VQ8AD	14105

V.H.F.-U.H.F.

by G. Vincent Dawson, Jr., WØZJB*

W1HDQ SPANS ATLANTIC ON 50MC
G6DH and G5BY heard him for over an hour on Sunday, Nov. 24th, 1946. ONLY SIGNAL of 16 other stations on that was heard.

SUNDAY MORNING, Nov. 24th brought joy to the heart of at least one 50-mc man, by getting his signals into England. Ed Tilton W1HDQ, in Hartford, Conn. is the first man who has accomplished this feat and ham circles are buzzing with talk of a new band for DX. To G6DH and G5BY goes a debt of gratitude for having the ingenuity to install antennas for the 50-mc band, whereas the Gs are still alloted the 58-60 mc band.

Shortly after this historic contact the 28-mc band was full of stations talking about getting down on 6 meters. If more stations, particularly those overseas, were on, without a doubt there would be more ocean-spanning. Activity in the past has held progress down as most stations working the band during the Sporadic E skip in the summer, usually go to other bands for DX after Sept. If these fellows remained on the band from October to January during which period the MUF, (maximum usable frequency) goes high enough for DX contacts to be made, more work would be done.

We have been advised by the CRPL of the National Bureau of Standards that although the critical frequencies of the F2 layer were high on these sensational DX days, nothing extraordinary has been reported. The St. Johns, Newfoundland ionosphere sounding station of the Canadian Radio Wave Propagation Committee which must be fairly close to G6DH-G5BY and W1HDQ path, found the critical frequency to be 11.9 mc corresponding to a maximum usable frequency (MUF) of 43.5 mc at 2500 miles. On November 24 at noon EST the Ottawa station recorded 10.6 mc for about 40.0 mc at 4000 km while the Washington station of the CPRL found the critical frequency to be nearly 12.0 mc or 44.0 mc MUF at 2500 miles.

On the west coast, Mr. Robert A. Helliwell, W6MQG and Mr. James H. Davis of the Stamford University ionosphere project inform us that conditions were normal with the MUF at 42.2 mc for a 2500 mile hop. This was between 1000 and 1100 PST. The MUF of the month of November was 45.2 mc recorded on November 5. Although information has not been received from the Louisiana State University ionosphere sounding station at Baton Rouge it appears that in the obvious absence of sporadic E short skip these contacts must be the result of an unusual height of the F2 layer or possibly one of the very rare G layer formations described in the *Six Meter D X* article by *Ferrell* in the February, 1946 issue of *CQ*.

W1JQA hears 144 mc signal of W5KL. 1500 mile skip is confirmed and authentic. W5KL running 15 watts!!

*B St., Gashland, Mo.

For two weeks prior to W1HDQ's working G6DH and G5BY cross-band, daily skeds were held on 28 mc, watching the MUF at both ends. This was done by each checking commercial harmonics and in many instances they had heard them up to 48 mc. Sunday at 1100 EST, sigs as high as 48 mc were coming through at both ends. Arrangements were made for W1HDQ to call and test for 5 minutes every 15 mins, with listening periods in between. Ed made the first transmission at 1115 EST in the form of QST-50 mc and finished it out with a short c-w call to G6DH. Upon standing by G6DH came back on 28 mc all out of breath, reporting W1HDQ's signals were breaking through. The QSO was continued cross-band 28 mc-50 mc while G6DH searched for others in the United States. Meanwhile G5BY sent word via W1BEQ on 28 mc that he was hearing W1HDQ also. QSO was maintained with both G6DH and G5BY till the fadeout at G6DH around 1145 EST. Contact with G5BY was continued until 1225 EST., when W1HDQ faded out. Sigs at G5BY were solid, peaking over S9 near the end. Checks were made with G5BY on 58.6 mc but his sigs were not heard at W1HDQ. Although there were 16 other stations on along the East coast, W1HDQ was the only one successful in getting his 50 mc signals across. This is probably due to his location on Selden Hill, in the same house the late Ross Hull started his v-h-f work in the middle 30's.

Checks with each of the Gs the next morning showed no signals over 47 mc. The skeds are to continue, however, and probably with a far greater listener audience.

Coincident with the above, some nice trans-continental contacts were being made between Florida and California. W4GJO of Orlando, Fla. and W6QG in Santa Ana, Calif. contacted at 1212 EST just before the fadeout of W1HDQ at G5BY. Signals at both ends of the W4GJO-W6QG contact were S9 and many more contacts could have been had if activity were greater.

W4GJO now needs only W7 for his WACA. From Florida this is no easy job, considering the distances involved. Evidently Grid's contact with W6QG was via *F-2* and is the first reported to us on the 50 mc band since the switch over from 56 mc.

Ray Bloemer, W6QG at Santa Ana, Calif. was listening early in the morning of Sunday, Nov. 24th and heard the commercial harmonic of HKO in Colombia, South America on 40 mc about 0800 PST. Going out to the shack Ray pointed his 3 element horizontal beam in that direction and called several CQ's on c.w. Finally at 0921 PST, (there is a time difference of 9 minutes between their reports), he heard W4GJO call him on c.w. also. Ray doesn't have a b.f.o. in his receiver but could hear the rush noise of grid's carrier well enough to make 100% copy. Both shifted to phone and the contact was over S9 at both ends.

The rig is W6QG is a pair of HK-24Gs with 100 watts input, a 3 element horizontal beam, 20 feet high, and a Collins MBF for receiving—the latter being temporary until he finishes a converter.

About the same time W6FPV in Van Nuys, Calif. contacted W4IUJ in W. Palm Beach at 0935 PST. W6FPV also heard W4GJO, and a weak c-w sig signing either WØHAL or WØHAW, evidently

WØHAQ in Davenport, Iowa, who was on at the time. W6FPV heard no more as he was looking for skip to Hawaii or ZL-VK, but to no avail.

In Metamora, Ill., W9ALU wants to know where all the good 6-meter men were during the periods the above DX was taking place. Hod heard W4GJO mention on 28 mc that 50 mc was dead except for an unidentified c-w signal. Tuning to 50 mc W9ALU heard W9QUV calling CQ test with his beam East. At 1024 CST he heard W2BYM calling G6DH on c.w., then two commercial harmonics on 50 and 53 mc sending coded number groups. A broadcast station harmonic on 49.7 mc with Spanish and Latin music, was coming in very strong. W8CYX in Detroit was heard on c.w. at 1044 CST; a few seconds later a broadcast station harmonic came on top of W8CYX with Latin Music R4-5. A voice-modulated carrier on 50.9 mc was heard at 1047 CST but with too much hum on the carrier for Hod to read. Any chance of this being W7IYW/8 in Dayton?? We heard him last summer with some hum on sigs, which might have been a mixture of Aurora skip. At the same time WWV was broadcasting W's that an ionosphere storm was on. These W's continued all day Sunday until Monday Nov. 25 around noon. Incidentally, these W's sent out by WWV indicate ionosphere storms only across the North Atlantic path which explains why we hear them here in the Middle-West, giving N's when 50 mc is wide open. These conditions do not extend as far west as Kansas City, so be governed accordingly when you hear them in the future, gang.

Down in Ingleside, Texas, near Corpus Christi, W5AOK (ex-W6SLO) heard a broadcast harmonic playing Spanish music on 50 mc at the same time all this was going on elsewhere. The signal peaked best when his beam was pointed in a southeasterly direction. Another chance to KP4 or South America for contacts on 50 mc missed. When are you guys down south gonna give us W's in the Middle-West a break?

Mileages on the above contacts as made on a Lochner's Telecurve Great Circle map shows the W1HDQ-G contact to be slightly over 3000 miles. The W4GJO-W6QG QSO is around 2200 miles while the W6FPV-W4IUJ distance is around 2400 miles. Only the W1HDQ-G contact betters the W6NAW-W8CIR/1 contact of 2600 miles, made last summer on E-layer double-hop transmission.

Perhaps more startling is the news of the reception of W5KL in Ft. Worth, Texas, by W1JQA in Randolph, Mass, just below Boston. This is about 1500 miles and has the boys taken quite by surprise, as most are a loss to explain it. The time was 2232 CST on Oct. 11th. W1JQA heard a signal signing W5KL, and mentioning Dallas, W5KL, was on at that time calling CQ Dallas prearranged with W5AJG. He didn't mention his QTH as Ft. Worth, because who would think someone way up near Boston would be hearing him, when the Dallas contact 35 miles to the East was doubtful.

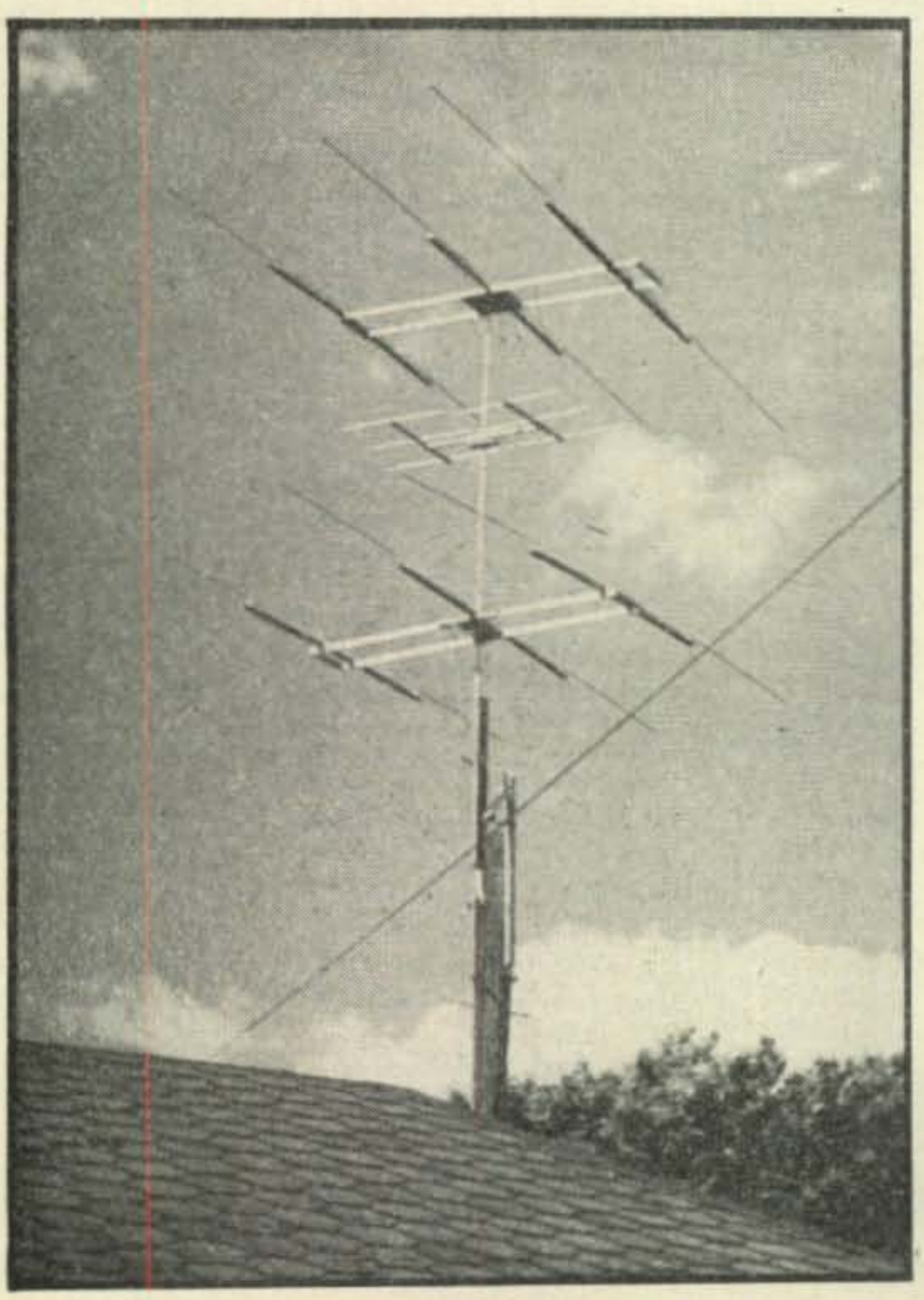
The set-up at W5KL is an HY-75 in a rod oscillator with 15 watts input feeding a vertical folded dipole 54 feet high. This is something to tell the kiddies about and a good subject for the next ham club meeting.

What type of skip was this long haul on 144 mc? Could it be the wave was trapped in a duct, or does the fact this skip occurred two days after the meteoric display on Oct. 9th have any effect on it? As something to think about, could some meteoric body still burning have passed between these two stations at the right height above earth and the burning of the air caused an ionization dense enough to reflect the signal? Think that one over, and if it causes a nightmare to pull you straight up in bed, we, the composer of this column, accept no responsibility as to what happens to the readers. You read it at your own risk!!

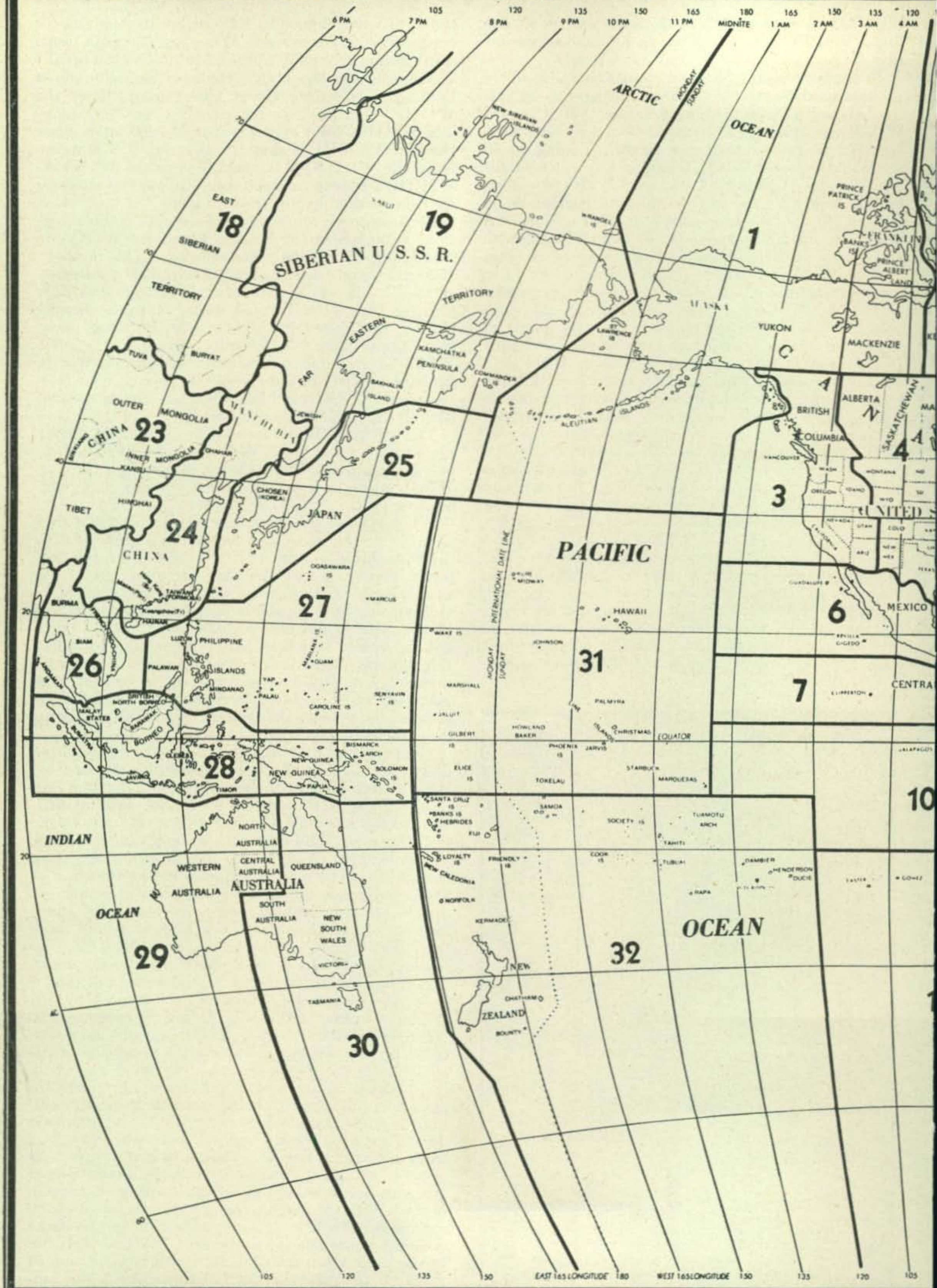
Commencing with this issue we are to fill the shoes of Bill and Jo Conklin, who have brought you v-h-f reports each month in the old *Radio* magazine and of late in *CQ*. Trying to fill these shoes will be difficult, as Bill has done a great job of it. To any 56 mc or 50 mc man, Bill Conklin (it's really Elmer, fellows, yet he kidded W7QAP about his monicker being Winchell) is the man who pioneered as far back as 1935. Bill has accepted a regular Navy appointment and will soon be leaving for his overseas assignment, first to South America on the USS MACON for a few weeks, then on to China and eventually to Guam. So there is a good possibility of KG6 showing up on the 50 mc band. Good luck, Bill, and I know the rest of the fellows say the same.

The purpose of the V.H.F.-U.H.F. column is to create interest and activity on these bands and not to build up any one particular station or section of the country. If you do see one of either listed frequently it is because he has sent us his report, or reports, for his neck of the woods. In other words, gang, this columr is yours and we depend on you for reports. So don't forget to drop us a note or card when ever you work something unusual. Pictures are always welcome and if possible please include the dimensions of antennas so the other fellows can try them if they so desire. With the biggest year yet coming up on the 50 mc band, let's help to get stations on in the areas where they are missing at present. The states shown below need v-h-f activity, so if you contact one of them on the other bands, tell them about the fun-plus QRM-less contacts—that can be had.

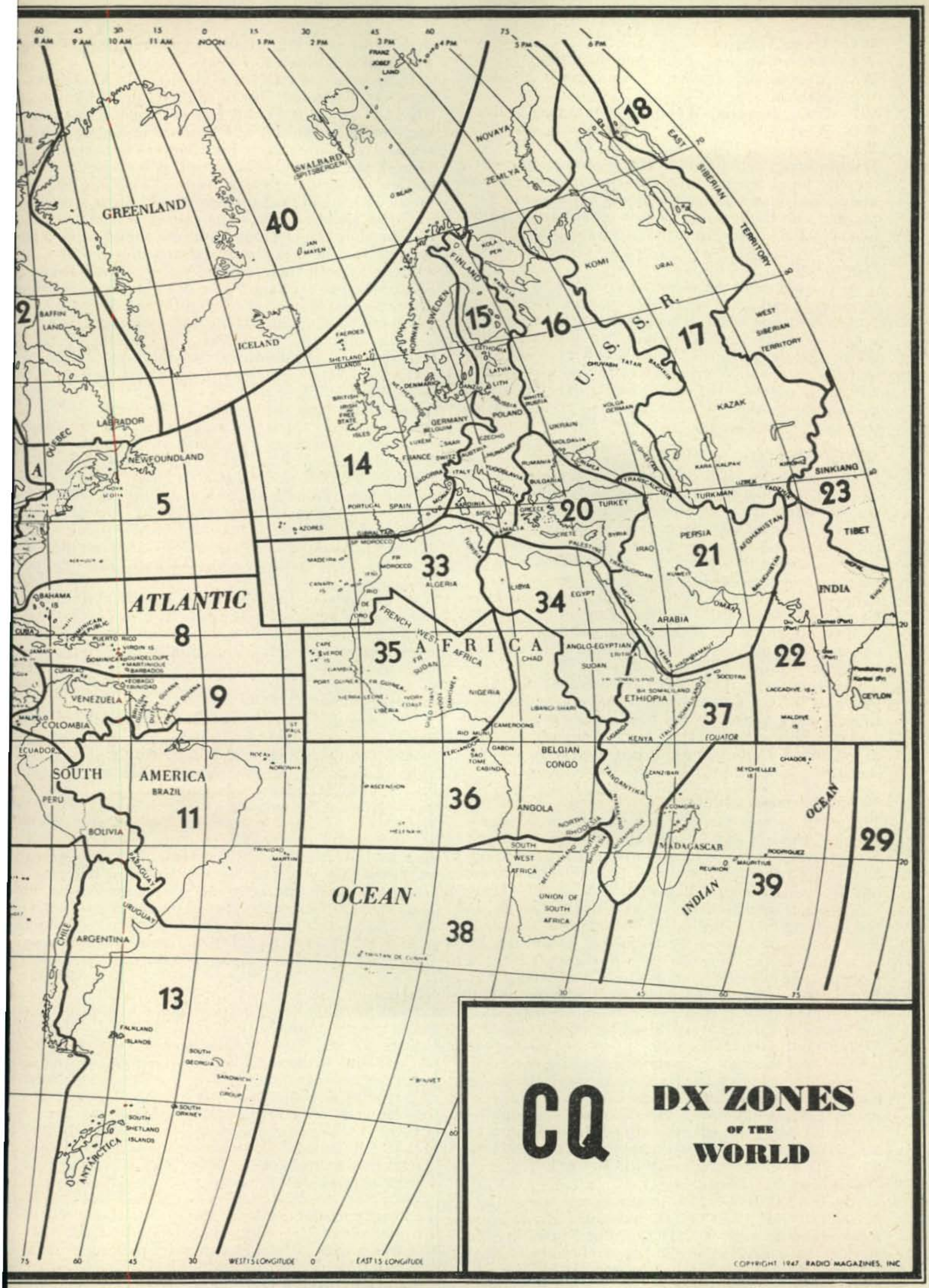
[*Please turn to page 38*]



12-element H array at W8JLQ for 50 mc



A large wall map including definition of zone boundaries and international DX prefixes will be available shortly.



CQ DX ZONES OF THE WORLD

The zone boundaries shown are only approximate; for exact area included in each zone, see table in text.

W1—Maine, Vermont
W4—South Carolina, Tennessee, Kentucky
W5—Mississippi, Louisana, Arkansas, Oklahoma, New Mexico
W7—Utah, Nevada, Wyoming, Montana, Idaho
W9—Wisconsin
WØ—Nebraska, Colorado, North Dakota

We can imagine the bedlam that would ensue on the 50 mc band when some one from any of the above-mentioned states cuts loose on the band. Yep, for someone there would be lots of contacts, in fact like AC4YN on the 20-meter band.

Honor Roll

In the old days the *Honor Roll* was very popular to indicate call areas and states contact. We should like to continue it and it will start in the next issue. Please drop us your score and it will be included. Every three months the Honor Roll will be corrected and stations weeded out if reports are not received to keep it up to date. By doing this it will bring you an up-to-date picture of what goes on in v-h-f work throughout the country.

WACA Certificate for 1947

For many moons the gang on 5 and 6 meters has sweated out *Working All Call Areas* in the United States. After that last district was worked the let-down was, often very great, and in many instances the station left for other bands. In order that you may be identified as having worked WACA on 50 mc, *CQ* magazine will present to any station showing proof of having Worked All Call Areas, a WACA Certificate. Proof may be in the form of QSLs from all districts or regular reports from stations that are active, forwarded to us. In most cases QSLs will not be required unless requested, by *CQ*. The time period is from January 1, 1947, to December 31, 1947. Previous WACA's do not count. As soon as the Certificate is received from the printers it will be reproduced in this column. Here is your chance, fellows, to get proof of that WACA and display it in your shack.

50 MC International Notes

Interest outside the United States on 50 mc is progressing, but not as fast as the boys on the East and West Coast would like. Of course, we in the middle-west consider ourselves out of that possible range, unless a miracle should happen.

A contact with Ken Bryan, ex-K6MVV, on 28 mc finally straightened us out on his 50 mc equipment. Ken has no transmitter on 50 mc as yet but is very interested in listening for W signals and keeps a nightly sked with W's at 2030 CST to 2035 CST. During this period he listens for signals on 50 mc and will come back to anyone he hears on his regular 28 mc phone frequency. His receiving equipment is a DM-36 and a Skyrider 5-10. For antennas he has a horizontal H array on the U. S. and a vertical dipole for general reception. So far Ken has been unable to identify any signals although he has heard some. No doubt c.w. would have helped so use c.w. on the skeds and sign your call every third time. As soon as a signal is identified, Ken promises to have a good rig on and will really bang away for 50 mc DX.

Other stations outside the U. S. hunting for DX are ZL1AO, KA1CB, VK2NO in the Pacific area, while in Europe G5BY and G6DH have been running extensive checks with W1HDQ. From Norway, via a contact with LA2UA on 28 mc, we found out that LA1F and LA8C are on the 5-meter band and ready to run checks with other stations. HB9U in Switzerland is on. All the above DX stations have been written for more information which will be passed on to you as it is received.

In Montreal, VE2KH has the band to himself, except for occasional checks VE2UC gives him on a SX-16. One night when VE2KH turned his 6-meter receiver on he heard VE2AM working mobile with a transceiver. John had to put the FM on to copy him. During the Meteor night on Oct. 9, he heard an FM station on 49 mc playing records, reaching S-9 on peaks with a bad flutter sounding like signals bouncing off a passing plane. The station was not identified as when the call was given the signal seemed to fade down. John is also interested in starting a 50 mc net between these cities; Quebec, Three Rivers, Sherbrooke, Ottawa, etc. Anyone interested? John wants to hear from you. VE2KH is on 50.5 mc and has some beams planned for next Summer's DX.

From Brandon, Manitoba, in Middle-Western Canada, VE4AP, gives us the info on the gang around there. For a town the size of Brandon, 125 miles West of Winnipeg, Bert says they have the finest 50 mc club in the world. Although their set ups are not finished as yet, they are full of enthusiasm and next summer will see them in there pitching. The club consists of the following; VE4HD, VE4AU, VE4NB, VE4RK and VE4CT. VE4AU has a mobile rig and heard some of the DX last Summer. VE4AP will have a 4-element beam and a 813 for next summer and will be looking for DX. How's about some of you VE5's and 6's getting on? VE4AP has moved to a new location on a high hill and named same "Megacycle Hill".

We received a message from TG9RC in Guatemala City who says he is ready to run checks and will be looking for the U. S. gang next summer. He is an ex-Kansas City ham, so naturally we won't overlook this bet.

Skip Reports and Activity

Here's some news from Shorty, WØDZM, at Anoka. On Nov. 11th he heard strong VE6 signals around noon on 28 mc which suggested Aurora. At 2130 CST the first signals came through very weak. Finally at 2230 Zearing, Ill. popped in for a contact, the only one of the evening for Shorty and the Upper Miss Valley Gang. W9DWU (hold out for WØ) heard W9QUV in Moline, Illinois, call DZM but Ivan was not heard at DZM. Along with the Aurora which came in best with their antennas at 30°, good bending was present as 28 mc and 50 mc sigs at 60 miles came in very strong before and after the opening. The Beavers were on and were hearing fading carriers on Shorty's and DWU frequency but none was identified as they were in only for a minute or so. The stations mentioned above are all in a 350-400 mi radius.

Jack, W9PK, near Chicago, gives us info on his contacts by bending. He worked W9AB in Indiana 8 times in 1941, but only once since the change to 50 mc, and that on June 13, 1946. Unfortunately this is prevalent in other sections of the country where on 5 meters good nets and contacts were made, but since the change 6 mc lower in frequency to 50 mc, many of these nets are not as solid as before. Possibly it is because lots of the fellows are trying to use old converters re-aligned to 50 mc when the L/C ratios were designed for operation on 56 mc. By adjusting the padders, 50 mc can usually be reached but proper tracking is off and results in loss of sensitivity. So, if if at all possible, rewind those coils and get that sensitivity back so things can start perking on this new band.

W5LOW, ex-W9BDL, now in Corpus Christi,

[*Continued on page 44*]

The YL's Frequency

by Amelia Black, W1NVP - W2OLB

DESPITE ALL KIDDING from our friends regarding the necessity of passports—and elaborate planning of safaris to visit us—we're happy to report that we're back in a.c. again, living in *Brooklyn.* At this very moment the OM is out on the roof looking over possible antenna sites; soon W2ESO/W2OLB will be taking advantage of this alternating current with at least 300 watts, probably on 20 through 80. An acquisition for the new apartment is a National NC-240D to keep the HRO company, so it won't be long now . . .

Until recently we had always thought that OLB meant Old Lady Black, and was a singularly appropriate call, but one of our friends (?) sent us a clipping from "Arpad," the weather forecaster (*New York World Telegram* front page). Sez he, "An OLB would be an old leaky bathtub—launched from a junkyard on the Jersey side of the river. Loaded with cannonballs she'll come up the river under full steam in a shakedown cruise . . ." Well!

As we consider it an important subject, we were pleased to receive more opinions on the controversy of radio in the home. One of the letters was from Esther L. Davies, W9EFW, who writes, "If the ham were wise, when spending money on an instrument or tube, he would also buy a little something for his wife so she won't resent his purchases. That's where the boys make their mistake. They forget that the little woman helps make the home, if not in dollars and cents, in time and effort, and she should be on the receiving end too . . ."

In the case of one ham whenever he succeeds in snagging a new country, the wife gets a gift, so she's even more eager for his record to improve! This discussion will probably bring the men howling at us, but we believe in some instances—where the wife is not interested in the hobby—such treatment might prove helpful.

The New York YLRL group is very unhappy to lose the second district chairman, Lenore Conn, W2NAZ, who has just moved to California with the OM, W2MSC. Lenore is originally from California, and the Conns will live temporarily with Lenore's mother at 4633 Coldwater Canyon Avenue, North Hollywood. Lenore and Joe spent most of their last days in New York rigging up a ten-meter transmitter for the car with which Lenore hopes to talk her way across the country. Her great ambition is to have a home on a mountain top with a rotary beam *in the clear.* Now that she will no longer be "looking for the W6s" from a crowded Manhattan apartment Lenore will turn her attention to DX. Incidentally, this is the third time she has had to resign as a YLRL-DC due to a move.

We've been hearing a great deal lately about W7JWC, Manila Beebe, a new but very active ham. Manila's been on the air for about six months now phone only, using an HT9 transmitter and an HQ129X receiver. She uses a half-wave vertical antenna and also "borrows" OM W7IGM's six-element rotary beam, which, she says, is the secret of her getting out so well.

W3CDQ writes that she's now moved over to 7166 kc.

We were happy to hear from KL7AX, Verna, who is just leaving for a winter of trapping. As usual parts of her letter read like an Alaskan adventure story. "We are in Ugashik again and all ready to leave for our trapping cabin on the lake. Verne has made one trip to the cabin with the sailboat loaded with supplies, and one of the Eskimo boys is going to take a load for us, so we can get it all there at the same time. It's blowing very hard now, but if the wind dies down we will leave tomorrow; I'm anxious to get back up there. Verne said it looked good to him, and everything seemed to be just as we left it five years ago. Before winter sets in we are going to put another layer of building paper on the cabin, then shingles and paint the inside all white. Besides all that we have to take a trip across the lake to the second rapids and put up fish for the dogs, and then, of course, get up some antenna poles, as our old ones blew down . . ." Letters from Verna dwarf our own activities by comparison, and point up the wonderful part ham radio plays in the lives of those in out-of-the-way places.

Further mail was received from W5FJW, Judy

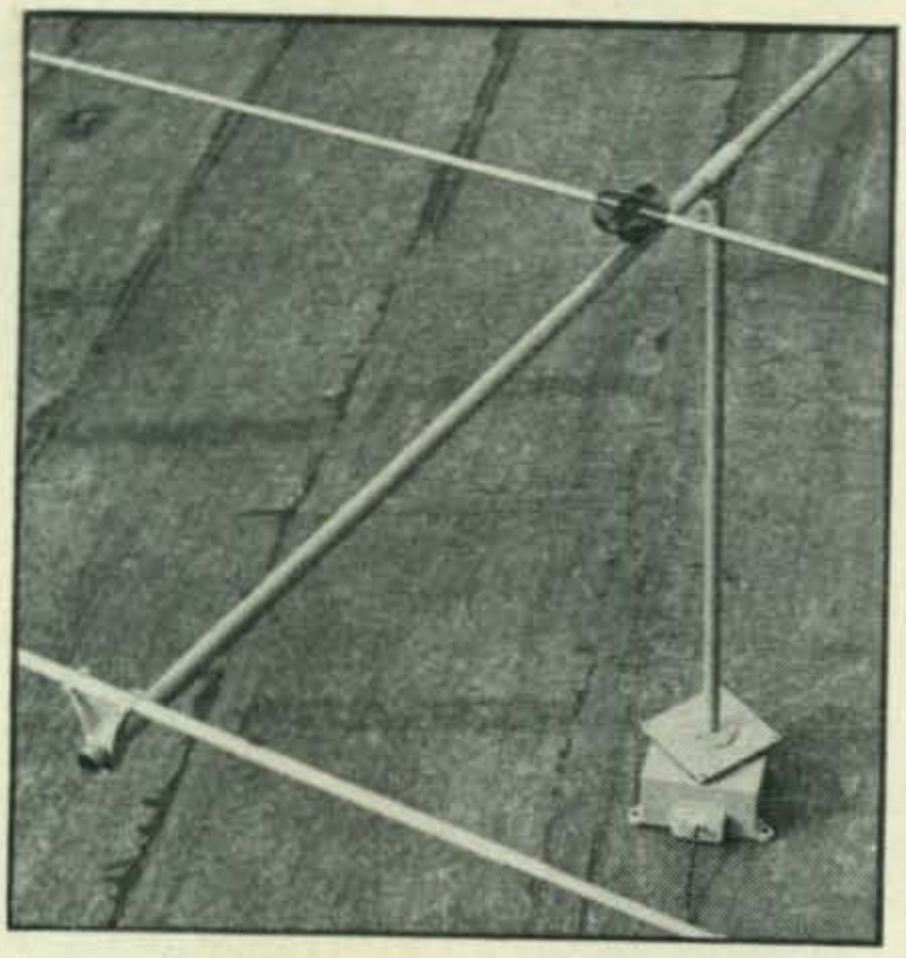
[*Continued on page 57*]

Rose Reiffen, W2TU, our YL of this month.

parts & products

Beam Rotator

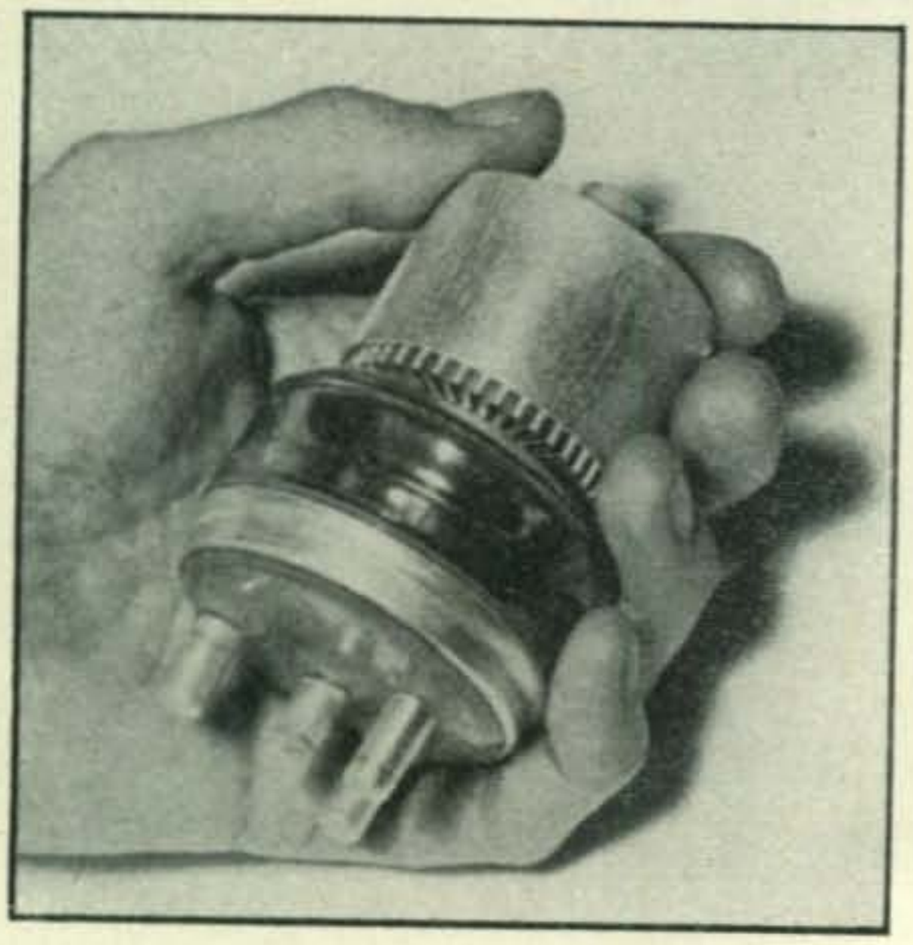
The Workshop Associates have announced a new beam rotator. The rotator automatically stops at North, so that breaking of coax lines to allow 360 degree rotation is unnecessary, with a resulting improvement in impedance matching. Features of the rotator are: 360 degree rotation at 1 rpm; single three-way switch provides rotation in either direc-



tion; instantly reversible from any point; indicator housed in aluminum cast case finished in crinkled black enamel; rotator housed in a sealed aluminum housing weighing only 27 pounds. The rotator will handle a dual 10 and 20-meter beam with no difficulty

High Power Tetrode

Another high-power-gain tetrode has been announced by Eitel-McCullough. The new Eimac tube is type 4X500A, a power tetrode rated at 500 watts of plate dissipation. Performance at maximum ratings is applicable up to 110 mc. The compact design and unique lead arrangement enable the tube to be used in cavity circuits or in conventional pin type sockets. It is an external anode requiring forced air cooling.



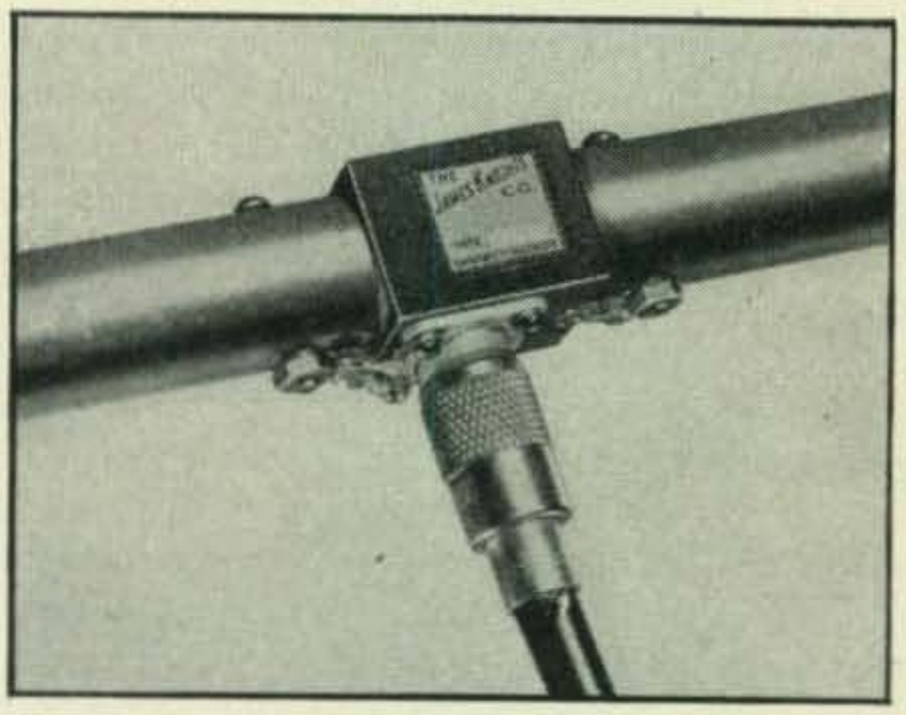
The 4X500A incorporates many of the features found in the 4-125A and 4-250A namely: low grid drive, controlled grid emission, high-power gain, and stability. A descriptive data sheet on the 4X500A is available by writing Eitel-McCullough, Inc., 1016 San Mateo Ave., San Bruno, California.

Coax Antenna Connector

The Impedacoupler is a universal type antenna insulator-connector for making a secure weatherproof junction between Amphenol "RG" type flexible coaxial line and any current-fed antenna or array. It can also be used with Amphenol "flat lines" or with the usual type of open wire lines.

Equipped with type 1R receptacle, this James Knight coupler requires only the addition of type 1SP cable connector on the end of the coax line, for quick, positive connection without fanning and without disrupting terminal impedance of the line.

A Mykroy center insulator block provides optimum dielectric properties, has ample strength to withstand the pull of the antenna and to support the weight of the coaxial line. The Impedacoupler provides maximum insulation with minimum weight. The insulator is drilled at both ends for bolt or rivet to accommodate tubing and connections, or for looping wire if latter is to be used.



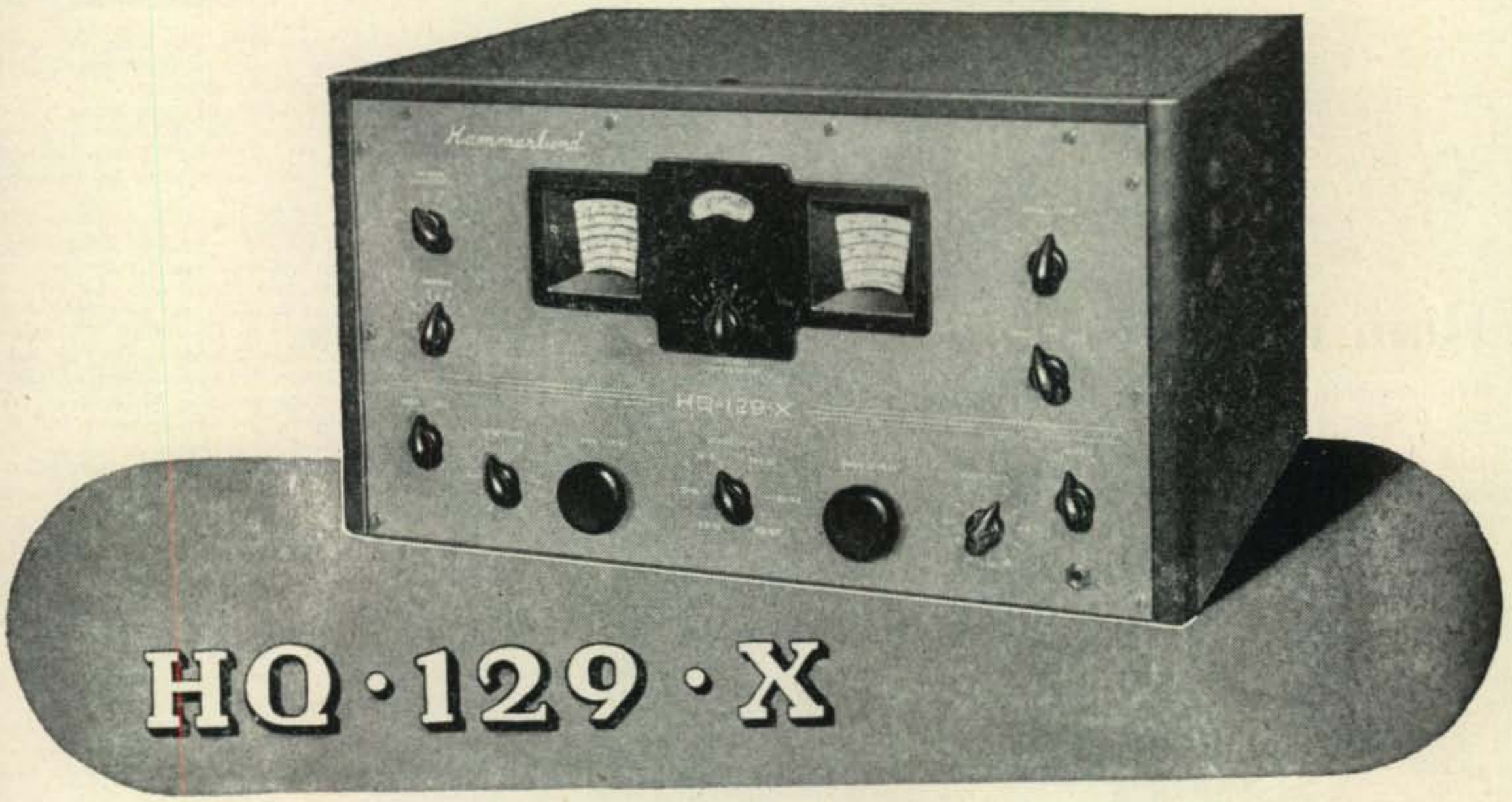
Insulator ends are machined to fit the inside diameter of standard aluminum or dural tubing having 1" outside diameter, commonly used by amateurs for rotary beams. If smaller tubing is to be employed, the user can turn down the insulator ends to fit his particular needs.

The Impedacoupler can be used to couple coaxial cable to:

1. Center of ½ wave doublet.
2. Any current-fed point on long wire array
3. Bottom end of open wire matching stubs
4. Driven element of rotary beams when coax is used as ¼ matching section and also from coax section to the open wire line.
5. Terminating junction at either end of coaxial line used between transmitter and remote antenna tuner.
6. Ground plane antenna and center or base insulator on mobile and other vertical antennas.

[Continued on page 66]

BACKED BY 36 YEARS OF *know-how*



HQ·129·X

"This morning I had a VK on phone, driving the S-meter completely off scale."

Another says, "Finest receiver on the market." Thus run the comments on the HQ-129-X. And why shouldn't they—thirty-six years of craftsmanship and research engineering back up every Hammarlund product.

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Letters

Delayed Echo Reception

937 Sherburne Ave., St. Paul 4, Minn.

Editor, *CQ*:

I have intercepted a long delay echo which may be of interest to your readers. My log shows that I called CO2FA at 2350 hours CST on Sept. 28, 1946 while operating 20 meter c. w. Upon standing by for him, this is what I have heard. *CO2FA de WØLAE WØLAE WØLAE ar* K. This channel at that time was 100% clear of other signals. The quality of the signal tone was just a shade *frail* and about *S-5* to *6*. At 2355 hours CST I tried sending out a signal again but at that time I did not hear an echo. I did not contact CO2FA. My exact frequency was 14104.6 kc and my rig is an HT4 running just about 900 watts input. My antenna was a 80-meter Zepp running approximately northeast and southwest.

I judge that my average code speed is about 20 to 22 words per minute, therefore having heard 25 characters or more, the total time delay of this echo is approximately 15 seconds. This may also be the reason for my failure to hear another echo after my transmission at 2355 hours, since I am positive I did not wait sufficiently long to hear a 15 second echo delay.

From my past experience, including a ticket from 1937 and three years on a point to point network in the AACS, I am satisfied that some weird phenomenon has occurred.

Robert J. Spielman, WØLAE

Washington 25, D. C.

Editors *CQ*:

Thank you for your letter concerning the long delayed echo. We appreciate your reporting of unusual phenomena and would welcome further reports of a similar nature.

The account of the long delayed echo was interesting. The reported delay time was about the time it would take for two round trips to the moon at the velocity of light. The period of the reception of the echo coincides with a number of disturbances as reported to the CRPL.

The American 3 hour geomagnetic character figure was 5 and at Washington at 2400 hours EST the highest frequency of vertical-incidence reflection of sporadic-E was 7.2 mc, which was the highest value recorded at that hour for the entire month. More than usual amounts of sporadic E were reported by College, Alaska and the results from Churchill, Ottawa; St. John's and Portage La Prairie indicate a disturbed period. The disturbance rating for transmission between Montreal and Great Britain was 4, where 5 means a total *blackout*. The Canadian Broadcasting Corporation rating of the reception of the BBC was 3.5, where 4 is the most disturbed.

I hope this data will prove interesting to you and trust that we may hear from you in the future regarding reports of unusual propagation phenomena.

Newburn Smith
Assistant Chief, CRPL
National Bureau of Standards.

C.W.-Phone Subdivisions

P. O. Box 277, Chatham, Ontario

Editor, *CQ:*

. . . We Canadians, as well as those in other countries outside of the United States, are very deeply concerned over the apparent desire . . . to increase the United States' phone divisions to overlap those countries in the western hemisphere outside the United States.

We feel that it is asking for more than their rightful share of the amateur band, and encroaching upon the rights of others, who, if forced to work in the same bands as the U. S., would be literally wiped out because of U. S. interference.

John Beardall, VE3MJ

VE3MJ, a government radio inspector, reflects the views of many amateurs outside the U. S. Canadian amateurs are far better off than many DX stations insofar as restrictions on power are concerned. The relative complexity of the allocations is underscored by the necessity to reconcile American allocations with those of amateurs outside this country.—Ed.

P. O. Box 1061, San Juan 5, PR.

Editor, *CQ:*

Before the war (and after it too, for that matter) DX stations on c.w., to avoid W QRM, operated outside W assignments. None of them, to my knowledge, went into phone bands to avoid W c-w QRM. However, DX phones, to avoid W phone QRM, instead of moving into some unoccupied band of frequencies, moved into internationally assigned c-w bands.

I am definitely convinced that it has become necessary that DX phones be assigned exclusive bands, preferably adjacent to the U. S. assignments. I am sure that no c-w man will oppose giving a few kilocycles of the U. S. c-w assignment up for that purpose. I personally would prefer to have fewer frequencies without any phone interference at all on them, than to have more c-w frequencies with phones operating indiscriminately every place in the band.

KP4KD operates both phone and c.w. and likes to listen to phone QRM (if you can like any QRM) when working phone and c-w QRM when I work c.w.

E. W. Mayer, KP4KD

Ham Teletype

622 W. 13th St., N. Y. 31, N. Y.

Editor, *CQ:*

Recently it was my pleasure to investigate the double current keying system described in November CQ by John Williams. W2BFD. I thought you would like to see it in action.

Otto Eppers, W2EA

Narrow Band FM

New York Central System
466 Lexington Ave., N. Y. 17, N. Y.

Editor, *CQ:*

I have been an ardent advocate of frequency modulation ever since my extensive engineering experience with it in 1938 . . . As is well known, an amplitude modulated signal consists of a carrier and two side bands. For the specific case of 3,000 cycle amplitude modulation, the two side bands are spaced 3,000 cycles on each side of the carrier. Their position is determined by the audio frequency and their amplitude by the percentage modulation. No other side bands are produced.

In the case of FM, the radiated signal also consists of a carrier and side bands. For the specific case of 3,000 cycle modulation, the first side bands are spaced 3,000 cycles each side of the carrier exactly as in the case with FM. Additional side bands also appear at 3,000 cycle intervals all the way from zero to infinity. It is quite true that with modulation index of less than one, the side bands, other than the first, are extremely small but the first side bands are not and their position is determined by the audio frequency, not by the amount of frequency swing. Their amplitude, as is also the amplitude of all other side bands, is a function of the frequency swing and also of the corresponding bessel function.

I have just been checking the amplitude of the various side bands produced by narrow swing FM and find that, for a modulation index of .5, the amplitude of the carrier is reduced to .88. The first side band is .25 and the second .02. These figures are approximate but indicate that side bands beyond the first are down more than 30 db from the carrier. With a modulation index of one, the second side band is more than 20 db below the original carrier.

But, neglecting the smaller side bands, an FM signal cannot occupy less space than an AM signal, provided the modulating frequencies are equal. Narrow swing FM can cause less QRM because of the fact that the FM signal cannot cause shock excitation since the two first side bands are 180 degrees out of phase and, therefore, cancel out unless they are received on a slope circuit. This same canceling effect occurs when a sharp receiver is tuned to the center of a narrow FM signal.

I believe that it would be well to point this fact out in order that narrow band FM in the low frequency amateur phone bands will not get off to a bad start by promising something which it cannot deliver.

G. G. Brown, W2CVV

E.T.O. Amateurs Attention

R.F.D., Kennebunk, Maine

Editor, *CQ:*

A friend of mine, W1CEQ, sent me a German transceiver a year and a half ago. It's a Torn FUd2, similar to Torn FUF and Torn FUB1 and the SCR-300. The unit is a 7-tube superhet covering 33.8 to 38 mc, 4-tube transmitter using RV2P800s and RL2T2 amplifier. Can anyone help with the circuit and advise U. S. tube equivalents?

Bertram W. Hanscom, W1BWB

V.H.F.-U.H.F.

[*from page 38*]

Texas, says the gang there is all ready for the DX to start poppin' in. These stations are active in the area; W5GEL on 50.5 mc, W5MX on 51 mc, W5AOK (ex-W6SLO) on 50 mc and Elmer, W5LOW on 51.6 mc. Glad to see the new stations on there, fellows, the gang will be on the lookout for you no doubt, especially several of the W1's who need your district for WACA.

Orville Bishop, W7HEA, gives us lots of good news on the Yakima Valley gang in the Middle-Southern section of the state of Washington. Bish says the last opening he had was on October 17th to Arizona when W7KAD came in nicely. He has a new QTH and a very good "Radio Location." So far he doesn't yet have his large rig on, but for a substitute is using a Harvey UHX-10 with about 20 watts. An 829A has been added as an amplifier, running about 80 watts to it. For next summer's DX, he will have 600 watts to a pair of 4-125A's and a good beam' way up thar in the blue. His receiver is a S36A.

W7BOC of the same Yakima Valley gang is using a folded dipole of 300 ohm twin lead and 75 watts to a 815. His receiver is a 3-tube converter into a BC312.

W7CTY has a "W1HDQ wide-spaced beam" using 4 elements and 350 watts to a pair of 812s. The receiver is a 2-tube converter, 6AK5 det and 6C4 osc. He is sweating out a new SX-42. CTY is on 50.2 mc and the rest of the gang are l.c.o.

W7CAM has a pair of VT-127As at 500 watts, (WAA please note, hams never overload things), altho the final is seldom tuned to 50 mc, seems like 28 mc DX gets in his way. His receiver is a concentric tank acorn converter into a SX-28A and the antenna a 4-element rotary. Some mighty nice equipment there, OM. How's about getting on with the gang a little more, especially when short skip is on 28 mc.

W7GMC has started construction of a mobile rig using a 832A FM job, but the boys haven't heard from him as yet.

W7AWX went back to 2 meters after having a 832 mobile job on; why, well, only W7AWX knows.

W7JPA has a 6F6-6V6-829B with 57 watts to a 4 element horizontal beam using a folded di-pole radiator fed with Twin-Lead. Mac's receiver is a concentric tank superhet. His receiving condx are bad due to ignition noise, but his enthusiasm is very high. On September 22 he heard VE7BQ on Aurora but couldn't raise him; the beam was pointed due north for best reception. Mac has done most of the DX work in the Yakima net, mostly with W6's and Arizona.

Out thar in Western Texas at Amarillo, W5WX now has a Gon-Set converter and is ready to put up one of the 3 element ¼-wave spaced beams the Eager Beaver net uses.

W8QYD in Dayton, Ohio, sends news that is welcome to all. The gang in Kentucky is now active on 6 and Harold has been working them on ground wave. He lists quite a few active stations in his locality, but that old "demon", vertical-horizontal polarization, looms up again. Harold lists these stations as active; W8DAL, W8UQG, W8WIH, W7IYW/8 all in Dayton and vertical polarized, W8VSY West Milton, Ohio with either, W8YAJ mobile, W8JTF/mobile of Troy, Ohio, W6WPN/8 of Wilmington, Ohio vertical, W8CYE Miamisburg, Ohio has either, W9MBL, New Castle, Indiana,

RELAYS

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115v/60 cps.....**$1.49**

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SPDT Struthers-Dunn sensitive keying relay, 5 ma-dc Coil. 110v/60 cycles—2 amp contacts..... **$1.49**

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ARC-5 Transmitters; (25 watts CW; 15 watts phone. Tubes: 2-1625; 1-1629; 1-1626; 1 crystal. Range (Specify frequency desired): .5-.8 Mc; .8-1.3 Mc; 1.3-2.1 Mc; 4-5.3 Mc; 5.3-7 Mc; 7-9.1 Mc; Power 24-28 VDC. Remote control. Rack & plugs. Less dynamotor.. **$32.50**

Modulator unit; (with tubes) 1-1625; 1-VR150; 1-12J5.....**$12.00**

Transmitter-Dynamotor extra, new..... **$16.00**

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Mod. for 211's cl. A. 50W...**$1.35**
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Weston 0-20—microammeter. 54 mv movement. Model 301. Brand new.... **$4.50**

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Visors for 5 inch 'scopes....**$ .75**
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Oscilloscope chassis, completely punched, for use with a 2 inch tube. Octal sockets included 15" x 11" x 9".....**$1.50**
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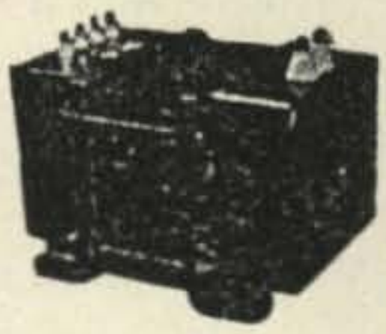
Kilowatt Components



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12hy-12 hy @ 150 ma., 15 amp. rating, each price.....**$4.25**
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1 mf 300 vdc...	.25	2 mf 1000 vdc...	1.10
2 mf 300 vdc...	.30	1 mf 1500 vdc...	1.20
4 mf 300 vdc...	.35	.4 mf 1500 vdc...	.30
4 mf 400 vdc...	.55	2 mf 660 ac/1000 dc	.95
.25 mf 600 vdc...	.25	1 mf 2000 vdc ...	1.00
1 mf 600 vdc...	.35	2 mf 4000 vdc...	5.95
2 mf 600 vdc...	.40	.1-.1 mf 7000 vdc.	4.95
3 mf 600 vdc pyr	.65	.75 mf 20,000 vdc.	22.00
4 mf 600 vdc pyr	.70	G.E. Pyranol .06 mf 15,000 vdc (List $25.00)..	$5.95
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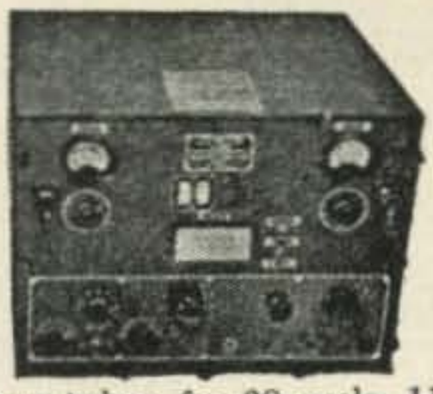

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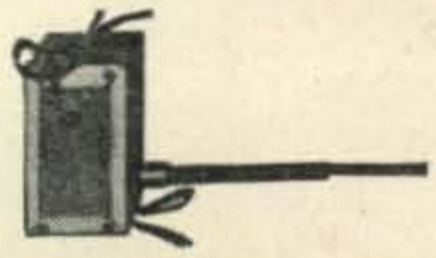

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MAGNETRONS!! Westinghouse type 2J32 (JAN) just released. Complete information included. The 2J32 is designed for 10 cm. operation. Brand New, packed in individual protective cartons. The 2J32 is listed at $200. OUR PRICE..... **$25.50**

Just received: 3J31, 1 cm MAGNETRON 40 Kw peak pulse power. Our low price of....**$20.00**
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30 Mc IF AMP with 2-6AC7's—uses 723a/b..... **$10.00**

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Cardwell Split-Stator type PK-200-QD. 200-30 mmf per section. Special Hi-Volt with 2" spacing.....**$9.95**
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stud. mtg. (Erie/Centralab.) 175-180 - 185 - 245 mmfd 400 vdc each..... **$ .05**

horizontal, W8LRE Gettysburg, Ohio vertical, W8ODF Cincinnati, Ohio vertical, W8NDN and W8AKW both in 8ODF's town all vertical. And, at long last, to those Kentucky elusives, W4JBF in Covington has 800 watts and is horizontal while in Erlanger W4AWN has 300 watts to a vertical. You last two watch out lest you get smothered the first band-opening you are in on 'cause am sure the boys will besiege you. Good luck, and let us know your results. Harold ends up by saying he can work any of these stations with up to R-9 sigs from Kentucky. What's happened to W8NSS and W8OJF in Dayton? They use to plug the 5-meter band for all it was worth and got good results.

Here's more on another of those hard-to-get States. W5HLD, Bob Wells in Enid, Oklahoma, is now on and really giving the band a fit. Bob had no idea of getting on 6 meters but he happened to get engulfed in the 50 mc gangs meeting at the Topeka convention, and before W1HDQ-W9ZHB got through with him he was a convert. His rig is at the Enid Ham Club using a pair of 35TGs and 400 watts to a 3-element horizontal beam on top of the City's Convention Hall over *100' in the air*. The receiver is another Gon-Set converter. Bob also says W5GZK is on as well as several others there in Enid.

Seems like we have hit a jack-pot on these boys that have been holding off on 6, as here is another hard-to-getter. This time its from way down "Suth" in New Orleans, Louisiana, namely W5HHT. Irv was on 5 in the "Pre" days and now has the rig on 6, using a Gon-Set converter, a beam, and 150 watts to a 35T. His xtal frequency is 50988 kc. No doubt lots of receivers will be parked on that frequency and gunning for you, Irv.

Wanna work Nevada? Well, we do, so watch 51 mc for W7NIV in Hawthorne, as he has a pair of 807s and S36. His antennas are a ground plane and a 3-element horizontal. To date he has heard not a peep out of the band but has been on since January, looking for his buddies VE7AEZ and VE7ZM. Mel says it will be a red-letter day when they make that first 6-meter contact at W7NIV.

W7QAY in Reno, Nevada, has a receiver and will get his old 5 meter rig on for next summer. Yep, things are picking up out thar.

News has just reached us that W7GBI, who is dear to our hearts as he gave us that long-sought W7 in 1939 for our WACA on 5 meters, has left for his home QTH in Great Falls, Montana. What's cooking up there, Bud, gonna leave the flying alone to give some of the boys a Montana contact? We all hope.

W7QAP drops us a card saying he is off 50 mc for awhile till the CQ SS is over. He has moved everything out to Rhombic Farms, which will give him lots of room to try some Rhombics and Beverage antennas, sounds like a telephone circuit to W7-KAD, 100 mi South. Incidentally, Bud, what's happened to our boy at Douglas? Last we saw of him, we waved him off on the train after the Topeka affair, and from then on he has been unheard of. What gives, Wayne?

W1NF in Beverly, Mass., gives us quite a list of stations on 50 mc around him. Some are on occasionally, others are quite active, but the list is impressive and shows that the East is still predominant for activity. Art's list shows 50 stations from the Boston area down to Hartford.

Out in Los Angeles W6NAW wants to know why his contact with W8CIR/1 in Boston on July 5th, 1946, isn't the 50 mc DX record for two-way. According to all the maps we can rake up here, it does beat the W6OVK-W2BYM haul by around 100

miles. In order to accord the boys due credit, both contacts will be listed until there is one that can not be disputed.

W8SLU, near Detroit, is one of the area's most consistent stations into Chicago and to Toledo. Mike uses a 4-element plumber's delight beam on top of a 40-foot tower, which really bridges the gap between Chicago and Pittsburg for the 50 mc net from the West.

W8NKJ, in Detroit, is in on most openings and is doing nicely on his ground-wave coverage, with a beam like W8SLU's. He often contacts the Toledo area, which helps to keep the band alive during the winter months, less that QRM everyone is bitter about.

W8CYX in Detroit is now consistent at W8JLQ in Toledo (65 miles), since raising his antenna from 20 feet to 40 feet. When we raised ours at WØZJB from 24 feet to 40 feet we noticed very little difference. Shore is funny how these things work out.

The Upper Miss. Valley gang around the Minneapolis-St. Paul area is keeping things alive there and is always on hand when the band pops open. Shorty WØDZM in Anoka, was the first of the gang to make WACA and has 18 States. W9DWU, Lee Herron, another of the gang, had WACA and 18 states on 5 meters. His score for the first year on 50 mc is, 8 districts and 13 States. WØJHS has him tied with the same score so competish is keen between these two when the band is open.

Robbie, W4EDD/3, now in Washington, D. C. says that the gang should have a good vertical ground plane to use for locating signals and the beam can then be pointed in the proper direction after locating them. This is a good idea, but it's hard enough for most of the fellows to get even one antenna up. Those in the prize locations can do it and it is a good suggestion. An extended-Zepp would be better, especially in the East as it could be utilized for bending work. Robbie is convinced this should become general practice and gives this example; on Oct. 16th, at 1900 EST, he turned on the 6-meter receiver and heard W5AJG in Dallas coming in. A call resulted in a nice contact for over a hour as no one else seemed to be on the band. After the contact was over Robbie looked over the band and as it sounded dead he left for other adventures. Later he found that the band was still open but in a different direction and as his beam is very directive he was out in the soup. Yep, we agree with you, Robbie, and same shall be installed at a lot more of the boys, as this has been discussed very much by those who are able to have two antennas.

Yep, fellers, the most amazing thing has happened! The Alamo has been left undefended as W5EHM has accepted a traveling job with CAA which will take him in the states of New Mexico, Okla., Ark., La., and all of Texas. The Alamo unprotected may be bad news to the Texans, but to VHF-ites who are looking for states, just take notice and you will see that Pat will be in four of them where 50 mc activity is low. Pat is very anxious to give the 6-meter gang contacts in these states and has gone all out to make it possible, which the installation of his Super-Mobile rig shows. The rig runs 250 watts input, to a pair of 35 TG's, 832, 6V6, 6V6 and modulated by a pair of 811's. For an antenna he has a collapsible 3 element beam for 28 mc which works on 50 mc by shortening the elements. While in motion a ¼-wave vertical is used. The receiver for low frequency is a BC-348Q and a 3-tube converter ahead of it for 28 mc and 50 mc. So keep a sharp eye peeled for W5EHM,

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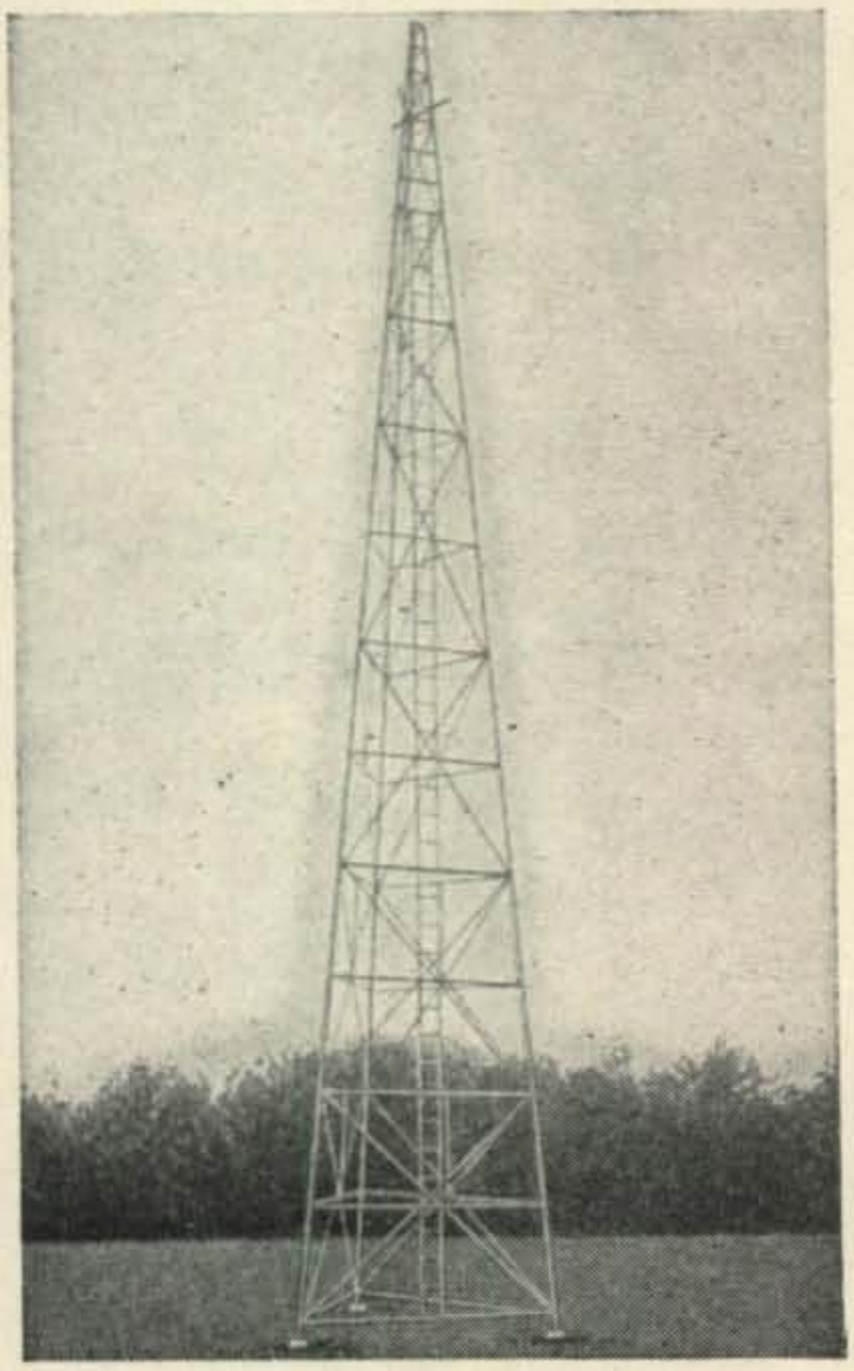

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and if you hear him anytime, call him, as he might be in another of those hard-to-get states mentioned above. The power for Pat's gismo is obtained from a 1-horse gasoline motor, which turns a 1000V-400 ma generator.

144 MC Reports

Now that word of the reception of W5KL by W1JQA has gotten around to the 2-meter boys, we can imagine lots of soldering irons are being heated these days and more activity will be noticed in the remote areas.

Paul, W3HWN in Mechanicsburg, Pa., who holds the 2-meter DX record with W1MNF, says that 75-80% of the fellows who had super-regen receivers now are sporting super-hets and xtal-controlled rigs. When he first got on the band last year, his super-het had a band pass of 150 kc, which was too much. But in the last several months he has had to narrow it down to 65 kc because of the New York QRM.

On Nov. 3rd, Paul started at 1000 EST by working W2OJA, W2NKO, W2OZH, W2MDE all in New York, and W2MRG, W2RDR, W2STZ, W2NLE, all of Northern New Jersey, and W1SF, W1OSQ, W1OFS, all in Conn. W1SF was worked 4 times that day and he was still coming in when bed-time came around. Usually every evening brings W2SAK and W2UM both of Somerville, N. J. in for nice contacts. Evidently these two have excellent locations or weather condx do not affect this haul.

Nov. 19th was another good evening. Starting at 1945 EST W3HWN worked W1SF of Branford, Conn., W1IZY, East Freetown, Mass., W1HQY, of Taunton, Mass., W1NWM of Milford, Conn., and W1MNF of East Orleans, Cape Cod. This night permitted only contacts as close as 200 mi. No New York stations were heard and it was not until quite late that the New Jersey stations came in. The contacts with Taunton and East Freetown were over 350 mi and the East Orleans one set the new record of 410 mi.

Out California way, W6PSQ sends word about the Fresno gang on 2-meters in that vicinity. Their location is not suited to the Very Highs as they are in a flat valley some 300 miles long and a hundred or so wide. This restricts them to Summer work when they can trek to the surrounding mountains on Park Ridge Lookout in General Grant's Park, which is some 7500 feet high. From there good coverage in three directions can be made and a dozen or so contacts held for around 150 miles. This was where the 420 mc record was broken by working the W6FZA-W7UID combination on Mt. Frazier, south of Bakersfield.

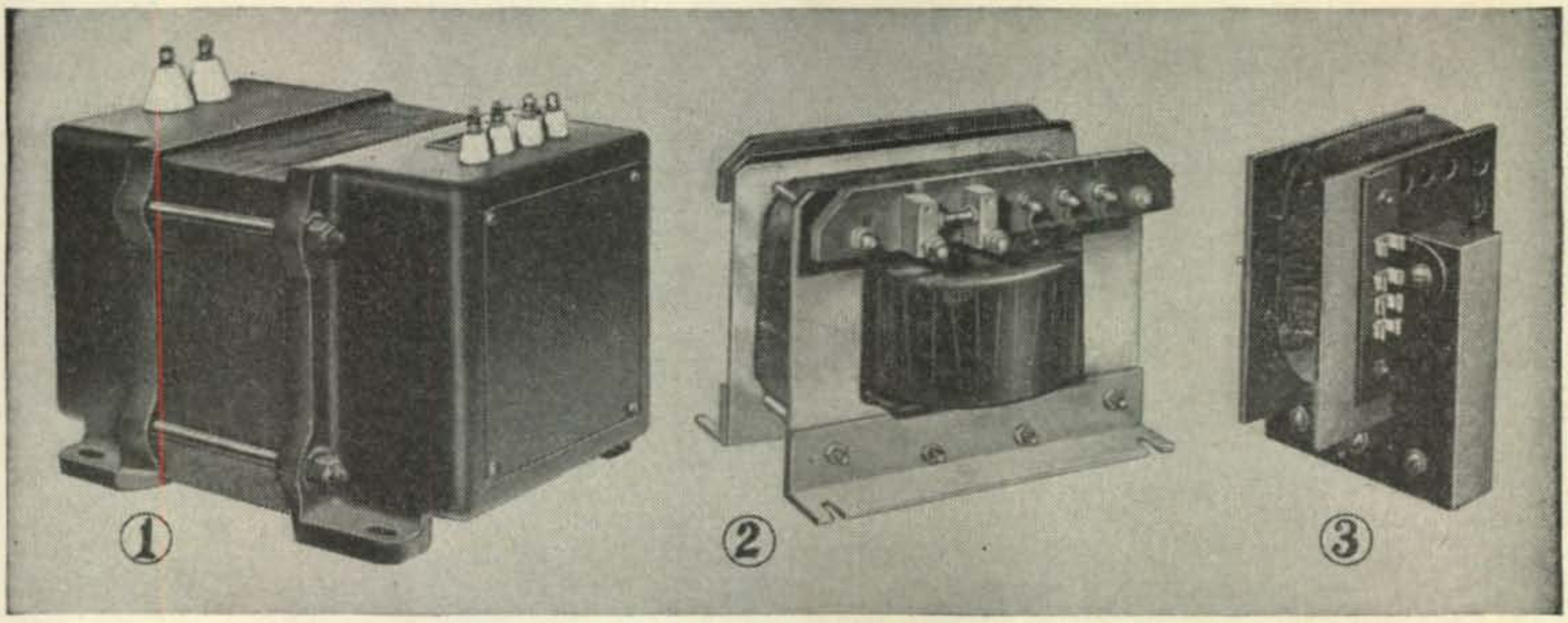
Those on 144 mc in Fresno are: W6JPU 145.8 mc xtal-controlled, W6JCB, MOPA, and the rest using modulated oscillators, W6SGH, W6SJS, W6WYT, W6GCF, W6OWL, W6UVN, W6BWK, and W6MGN. Activity is rather light but a rush is expected when the colder months set in, (COLDER months, that is, and in California, too!!). Their antennas range from concentrics to multi-element beams, but as yet no startling DX has been accomplished. (Oh, sure, what's 170 mi on 20 mc??) W6DYF and others in Bakersfield are reported on the band, how about some dope from youse guys down there??

Activity around Cleveland is quite high as W8UKS has logged 93 stations. Among the new ones are:

W8VO—Akron, Ohio
W8BPZ—Cleveland
W8QYH—Cleveland
W8ZMH—Cleveland
W8YSD—Cleveland
W8WMX—Cleveland
W3GV/8—Cleveland

TRANSFORMERS

From Wells' Great Stock of Selected Government Radio Equipment



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	Impedance Ratio	*Turns Ratio*
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Primary to secondary #2 tap	625:1	25:1

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Transformer List No. 105

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Daily skeds with W8UB, ex-W8FHA, in Port Clinton, Ohio, are held nightly at 2100 EST and good long QSO's are had. W8UKS has heard W2RPO in Buffalo about six times in the last month but he has been unable to raise him.

By the first of the year, W8WJC will be well established in his new location and his tower extended another 30 feet. Jerry has an eye out for 2 meter locations as his new one has a sign in front of it saying, Highest point in Summit County."

W8WJC will be located between Cleveland and Akron and will be the relay station for contacts with Pittsburgh. He will listen for Pittsburgh stations ea h eve at 2200 EST. W8LIO in Andover, Ohio will also be listening every Friday and Saturday at the same time for them. W8UKS will be in on it and the plan is for the Cleveland gang to listen for five minute intervals then transmit for five minutes continuing on half-hour periods.

W8VVY deserted 2 meters for a couple weeks to work DX on 28 mc but BCI in his apartment has brought him back to the home band.

W8YGM is keeping skeds nightly with his brother, W8LGM in Cuyahoga Falls, 'course the only trouble with this is that the family trials and tribulations are made more public. Another mark on the wall for Ham Radio. (Kilroy beat us to the mark, naturally.)

W8YGG in Detroit can contact the Cleveland boys when he points the beam that way. Others in the Detroit area have either started back to school or have deserted the band for other climes. Our thanks to the XYL of W8UKS, Helen Harris for the FB report, fire away with more Helen when ready.

The Sacramento, California, gang are still the same and contacts are made nightly. The local police were allotted a new frequency around 152 mc, now the gang can listen for scandal when tired of CQ 2 meters," sez W6CLV.

W5AJG in Dallas has a SCR-522 receiver going now and altho it's a bit too sharp at present, the boys in the Dallas-Ft. Worth area are going xtal which will make it the last thing. The gang in Ft. Worth consists of: W5KL, W5LAR, W5LPN, and W5BBH. In Grand Prairie about half-way in between the two cities is W5LIJ, while Leroy holds down the town of Dallas. They are quite interested in getting stations on in about a hundred-mile radius, so how ab ut Lancaster and Mineral Wells? Anyone interested contact any of the gang and skeds will be made, but pronto. Guess the caste system has fallen down between Dallas and Ft. Worth as when we knew it, there was quite a rivalry between the two.

In Kansas City, there is lots of talk from such guys as WØTNA, WØJBS, WØVRF, WØBAU of getting on 144 mc, but to date the only thing we have heard of being worked is WØGK in Overland Park, Kans. getting to WØDDX in Independence with R-9 sigs, about 20 mi. WØGK uses an HY-75 in a long-lines osc and comes in nicely on WØDDX's ARC/3 converted receiver, altho the band-pass on the ARC/3 is in the order of 65-75 kc at 2 times down. Horizontal beams are at each end using folded dipoles; 2 dir ctors and 1 reflector close spaced. Your compiler of this here stuff hopes to get on soon. We have an ARC/3 receiver and a SCR-522 transmitter xtal controlled, and are eyeing

Ham Bargains

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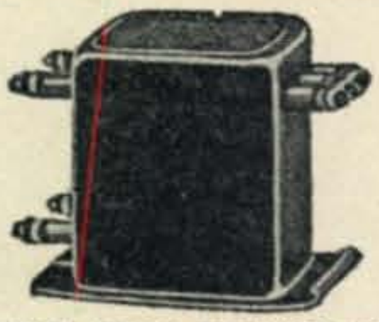

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Modulation transformer, perfect for input up to 300 Watts—150 Watts of audio with screen winding. Class C loads on secondary No. 1, 1400 ohms—secondary No. 2 is designed for screen of Tetrode or Pentode-Primary will match 811, 809, TZ 20 or TZ 40 Tubes. Complete factory specifications and circuit diagram included..... **$4.95**

W. E. Driver Transformer Class B will match any Class B grids from 6L6's. Perfect match for above transformer..... **3.95**

Collins built—speech amplifier, 6V6, 6V6, 12SQ7 requires 28 V. DC filament, 175 to 200 volts plate, easily converted to 6 volt operation, fidelity will cover entire speech range, Dimensions 3⅜ x 7⅛ x 4⅝ inches. 3 page diag. supplied. Less tubes..... **2.95**

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10 Terminal strip on bakelite—bolt front, solder lugs rear..... **.19**

Insulated aircraft cable clamps. Tinnerman number 3—for ½" cable 12 for..... **1.00**

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Delco 110 v. 60 cy. blower. 200 cu. feet per minute. Noise free..... **15.95**

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1000 KC. Xtal "AT" CUT. Perfect for freq. standard..... **4.95**

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Broadcast Stations—0 to 100 DB meter. 3" bakelite case. Translucent face with provision for back-of-dial lighting. Jan..... **9.95**

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.1	7500	Sprague	C-59644	2.89

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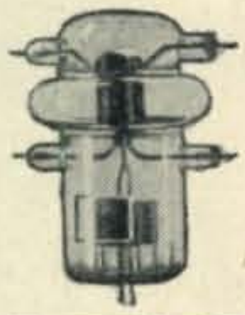

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RELAYS

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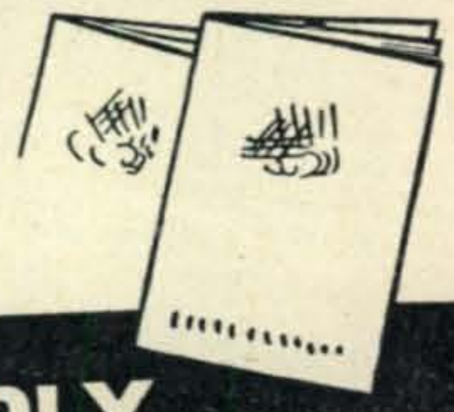

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BOwling Green 9-7993

a square-corner reflector beam with folded dipole radiator and fed with 300 ohm twinlead, naturally in a horizontal plane.

Down in Sen. Claghorn's territory, where wahr ain't what it should be, Roy Snider, W4FBH near Atlanta, says quite a few of the fellows are getting on 2 with SCR-522 transmitters converted to the band. Actually the conversion is plugging in a power supply and an 8 mc xtal and, presto, thar she is! Roy gives the gang active there as: W4BBR, W4IU, W4ZD, W4FKN, W4HZG, W4IKJ, W4GT and W4FBH.

In Springfield, Mass., W3ROC/1 reports hearing the following on Wednesday nights, which is round-table night. W1PAB, W1OJV, W1KUE, W1NLE, W1OBQ, W1MBT, W1LIH, W1NY, WLJYH, W1BCT and W1OIL. His receiver is a 10 tube super het, 956 r.f., 954 mix, 955 osc, 3 1852's i.f.'s, 6G6 det, 6N7 anl, 6J5 b.f.o. and 6V6 output. They welcome all comers to the round table and will be on the lookout for more.

W8UB, ex-W8FHA, in Port Clinton is on and working the Cleveland gang with an 829B final, running 30 watts, a SCR-522 receiver and super-regen for the modulated oscillators, is used for listening. He has held regular skeds with W8UKS in Cleveland at 70 mi for the past few months. Others he works are: W8YGM, W8WJC, W8VO, W8GJF, W8YGG, W8ARF, W8VDR and W8TWD in Cleveland, Detroit, Toledo areas.

With the change of the band, activity dropped off for W1LSN in Exeter, N. H. But slowly the gang is coming back and Jerry has been working W1LB, Hampton, N. H., W1KEX Somersworth, N. H., W1KXK Newmarket, N. H., W1FZ Farmington, N. H., W1ANM, W1JJS and W1NXT in Newburyport, Mass. are heard ok. He also hears W1DHX in Fall River, Mass. but QRM there is too heavy for Jerry to break in.

In the Yakima Valley Net in Washington the following are active with various rigs: W7AWX, W7KFM, W7JPH, W7CAM, W7GMC, W7IYB, W7ITR, W7JPA and W7HQO. Contacts are local but they want activity in Pasco, Prosser, Kennewick, Walla Walla and Ellensburg. Looks like a good start out there for mountainous territory.

U.H.F.–420 Mc Activity

Barney Bates, W1BBM, continues to hear WRJV at 170 miles and during the week October 3-8 the peaks were around R-8 late in the eve, here is his log:

Oct. 3, 10p.m. R-2, 10:20 R-8, 10:30 R-8
Oct. 4, 6:40p.m. R-2, steady climb to R-9 at 10:45 p.m.
Oct. 5, 12:30a.m. R-9, 9:30a.m. R-8 went out until 4:20p.m.
Oct. 6, 12:05a.m. R-9, 8:35a.m. R-8 went out until 9:40p.m.
Oct. 7, 5:55p.m. R-3, steady climb to R-9 at 10:45p.m.
Oct. 8, 10:20p.m. R-2 (Clouds).

With Barneys location he has almost a salt water path to the NY area and would like to see a net all the way to Florida. Well with these BC-645A's now on the surplus market with 20 watts output there will probably be more activity for you Barney. Those sets mentioned are a honey and are well worth the money, but do some shopping before buying as the prices seem to be very variable at present. Anyone interested in trying skeds with W1BBM you may write us and we will give the info to him, let's see a new record on this band soon, plus some more activity.

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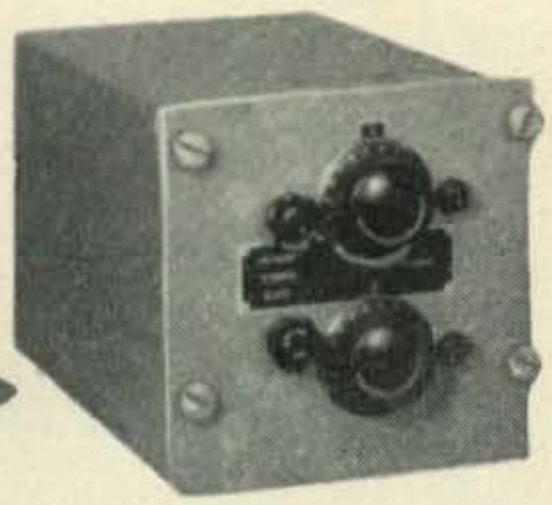

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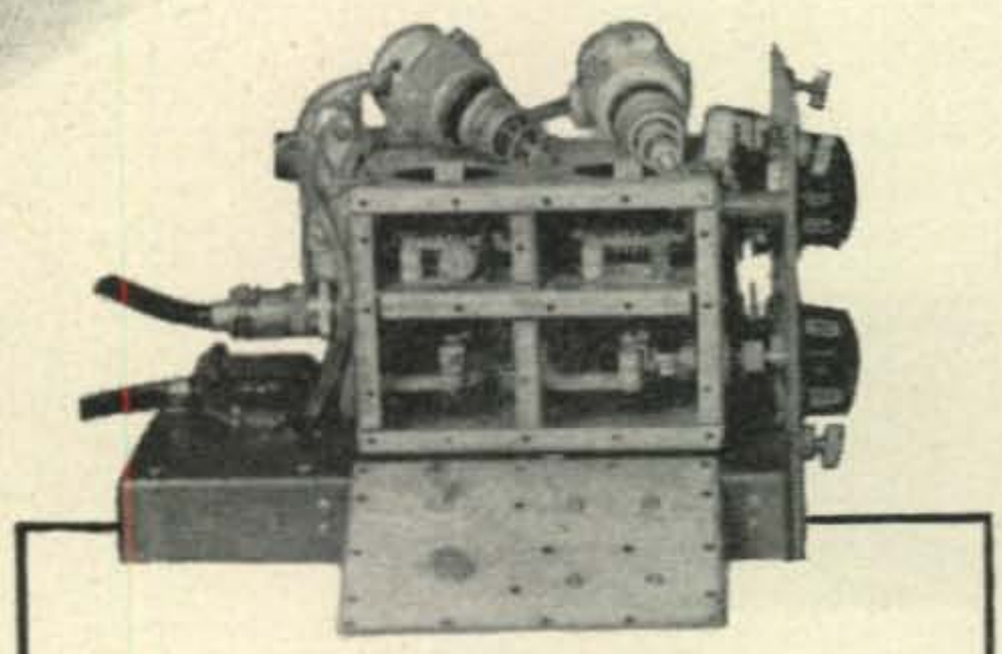

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- Tuned cathode and plate circuits.
- R.F. circuits individually shielded with silver-plated brass.
- Disk type vernier trimmers.
- National velvet vernier dials.

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PORT WASHINGTON, N. Y.

The Monmouth County Amateur Radio Association reports considerable activity on 420mc. More stations are desired within and adjacent to Monmouth County. The Club meets on alternate Thursday evenings in the Vail Homes Audotorium, Eatontown, N. J. Francis E. McAllan W2SPB of Neptune, N. J. may be contacted for skeds on 420 mc. Looks like a natural for W1BBM so lets hear more of your activity.

The record busters W6FZA-W6UID split up a month ago with one on Lookout Mountain east of Porterville and the other on Mt. Hamilton in the Coast Range Mts, a distance of 170 miles, another record made!!!

W6PSQ in Sacramento is building a pr of 8025's in a long lines with 60 watts. His receiver will be a 955 with 1¾ inch lines of No. 8 wire and tuned with a 100 $\mu\mu$f cond, same as W6FZA uses.

W1NF says he is monkeying on this band, and he does mean monkeying. What do the Monkeys do Art? Run the antennas up and down trees!

1250 Mc

W1BBM has been hearing about the Navy covering 3500 miles from the Gulf of Mexico to the Hawiian Islands and wants to be the first ham to do something similar. For the time being he has deserted 420 mc and wants to know if anyone in the New York area is interested in running checks with him on this band. So far he has built several cavities, re-entrant, grid separation in both co-axial and radial types and had them all the way up to 1600 mc with a watt output. He believes the radial type is most efficient but is experimenting with other things to bring the efficiency up. Even with the small power output it will be quite easy to get as much as 20 db gain out of antennas, using a horn or parabola type. Barney hopes to be mobile on this frequency soon as he has 3 motor generators he got for a song.

SK

Well this is the end for this month. Being our first presentation of V.H.F.-U.H.F. we would like comments and suggestions because after all it is your column and we strive to please. Reports that are regular are the best means of getting activity so if its low in your area drop us a line and we will tell more of the fellows about it in hopes of helping you out.

DX PREDICTIONS

[from page 31]

quencies where radio signals are not commercially satisfactory for communication.

Conditions for stations operating east of the Mississippi River remain very good on all paths to Europe; North, Central and South Africa. Although the length of the 10-meter opening will be somewhat shorter this month than in previous months, band may be expected to open, according to *Fig. 2* at about 0800 hours EST. Peak 10-meter conditions generally between 1030 and 1130 hours EST and a band closing at approximately 1330 hours. The MUF is expected to be about 35.0 mc. 20-meter activity will be confined to the early morning hours around 0600 EST when the band opens or around 1800 hours when it is expected to close over most of this path.

Fig. 3 illustrates the average conditions from west of the Mississippi River to Eastern Australia and New Zealand. Tracing the skew of the MUF line

we find that 20 meters will close at about 0200 hours PST and will reopen at 0800 hours. 10 meters is expected to open at 1200 hours with peak conditions around 1800 hours PST and closing at 2000 hours. The peak MUF is expected to exceed 40.0 mc. 10 meters should also be good into the East coast between 1800 and 1930 hours EST.

The graph in *Fig. 4* covers the general conditions from the Central United States to the Southern Japanese Islands and the Phillipines. A 20-meter opening at 1500 hours CST is expected followed by a 10-meter opening at 1630 hours. Peak 10-meter conditions at 1730 hours CST and closing at 1900 hours.

The data incorporated in the prediction graphs is drawn from the *Basic Radio Propagation Predictions . . . Three Months in Advance* as issued by the Central Radio Propagation Laboratory of the National Bureau of Standards. These booklets are available on a subscription basis from the Superintendent of Documents, Washington 25, D. C.

YL'S FREQUENCY

[*from page 39*]

Caraway, of Monroe, Louisiana. Judy seems to be so very busy that we wonder how she found time for her interesting four-pager to us. Her activities include Little Theatre plays, music lessons, acting as church pianist, also planning church programs. Besides all this she's attending radio theory classes at the local radio club and is studying for her class A ticket. Judy says she's never been interested in the technical side of radio, but has concentrated on use of the bug. She says at one time she could send at 60 wpm, but can't reach that now.

At present Judy's on 40 c.w., at 7216 kc. Her ham activities to date have been on 40 c.w. and 160 phone. She says, "The OM is definitely not a ham. He has never liked hamming, and doesn't like my fooling with it. However, that hasn't slowed me down in the least! After Uncle Sam put a rig on the ship my OM worked on, he exhibited a spark of interest . . . even went so far as to learn the code. So maybe some day I'll make a ham out of him.'

YL of the Month

Rose Reiffen, W2TU, our YL of this month, is full of humor and zest. Ham radio has meant a great deal to her, but Rose is such a vital person herself that no matter what her interests, she would have made her life an exciting one. Rose, as you'll observe, (p. 39) is a pretty gal with plenty of sparkle.

We asked her that old question—when 'n why? Rose recalled, "It was in the early part of 1932 when I first became interested in amateur radio. As you may have guessed, this rather unusual interest was brought about through my husband, who at that time was still eluding my marital snare. You know what they say about having common interests, so I studied the handbook and the license manual and surprised everyone, especially myself, when I passed the examination."

In those days a YL operator was something of a rarity, and the men down on Pine Street in what was then the "Federal Radio Commission" recognized that fact and presented Rose with a two letter call. She says she'll never forget the mixed look of sur-

prise, pleasure, and envy on the OM's face when he heard the happy news.

To her knowledge Rose was the only licensed YL in New York City at that time, and the only other in the area was W2WP over in Staten Island. She admits that part of the fun in hamming then was the usual delight and amazement when the men learned that they were working a YL. Just as they were ready to end with the far-too-usual stereotyped comments, they'd discover that TU was a YL, and the conversation would revive. Rose was on 80 c.w. almost entirely in the old days.

She was very proud of her first rig, a simple TNT oscillator, using a 210, meticulously copied from a "How to Become" manual. The best thing about it was that it *worked*, though when Joe, W2CWP, came over to inspect it, Rose says he succeeded in knocking most of her connections loose with little effort.

But all in all she did pretty well, and in 1934 Joe couldn't resist her two letter call any longer, so W2CWP and W2TU took the big step and merged. Rose's interest in ham radio didn't suffer any after they became settled in their own apartment. She insisted on having a separate transmitter for W2TU, and that's the way they've hammed for the past twelve years.

The present rig is on narrow-band FM using about 250 watts to an 810 in the final amplifier. Receiver is a Navy type HQ-120, the antenna a double Zepp. W2TU and W2CWP are delighted with FM, which is clearing up their BCI problem; they have plans of raising the power to 500 watts and erecting a two-element beam.

All engineering and construction work on the equipment is strictly the OM's department, for besides hamming, as a hobby, Joe happens to be a radio engineer. Although Rose loves the hustle and bustle of raising Jimmy, age 8, and Susan, one and a half, she looks forward to operating the rig in her spare moments. She says its a wonderful diversion to visit with friends on the bands—and a grand feeling to know that just by flicking a few switches, she can QSO to her heart's content.

BEAM ANTENNA

[*from page 19*]

lass upon which the great circle map is cemented with shellac. The aluminum bracket for the potentiometer is supported by sub-brackets inside the cabinet so that the pointer extends through the panel at right angles to it. If glass is used for the panel, the hole for the shaft will have to be bored and this may be done with a broken three-cornered file in a hand drill and turpentine for the lubricant. The map used is a great circle map of the world measuring 7″ in diameter and is one given away by General Electric (Form ETX-18, Filing No. 8850, Electronics Department). A larger map was originally planned, but the present space dictates the use of the smaller map. One caution about the maps, which may be unnecessary, the map should be one centered on the

approximate geographic location of the station; the number given above refers to a map centered on Oakland, California. However, it is understood that others are available which are centered on other parts of the United States.[2]

The relays used were some from our junk-box and they are similar to some built by Sigma with 8000-ohm coils. On testing them it was found that by properly adjusting the contacts and the springs they could be made to close on about three ma and to open on about one ma. This great sensitivity was not required for this application and they were adjusted for positive action in both open and closed positions. It should not be necessary to duplicate these relays; any SPDT relay, either a.c. or d.c., should work without difficulty provided that it does not require more than the available 100 ma from the thyratron for its operation. If relays requiring more than 20 or 30 ma are used changes may be necessary in the values of *R7* and *R8*. It should be born in mind that the line voltage is across these two resistors and that they are part of the filter for the relays. If their values are reduced, their dissipation may be too great and their filtering action inadequate.

The transformer supplying the voltage for the bridge provides an odd voltage not generally found. Here, again, was an item from the junk-box which does not have to be duplicated. If a lower sensitivity can be tolerated, then the builder may find it conveninet to use a small 6-volt filament transformer. With 20 volts applied to the bridge the sensitivity of the control is about two degrees and with 6 volts it is a little more than six degrees. 20 volts can be easily obtained if the builder wants to exert a little effort. It is no job at all to remove the 6-volt winding from a transformer and to replace it with a 20-volt winding. The 20-volt winding may be of considerably smaller wire than was the 6-volt winding, for practically no current will be drawn from it.

The motor used to rotate the antenna is an aircraft motor designed to operate on 24-28 volts d.c. It is reversed by the use of one field winding or the other, the fields being wound in opposite directions. This arrangement would permit reversal of the motor by means of one SPDT switch, or by means of two SPST relays. We used the SPDT relays with the extra contact on each relay for the interlocking system, preventing current through both motor windings simultaneously. The motor may be operated on a 24-volt transformer, but we found it most convenient to use the 100-watt lamp in series with it across 115 volts. The actual voltage across the motor is about 18 to 22 volts when the motor is rotating the antenna. As used,

the motor shaft turns two revolutions per minute. Faster rotation of the antenna without externally applied friction caused the system to overshoot and hunting resulted.

It may be that the builder already has a reversible motor operating the beam and that it is one which requires double-pole switching for reversal. If this is the case then, as mentioned above, two DPDT relays may be used and the same general system adapted.

If a motor is available which will operate on less than 0.5 ampere, FG-17 or 5557 tubes may be substituted for the 2050s. In this case the relays may be eliminated, so that the motor operates directly on the rectified output of the conducting thyratron.

It will be noted from the wiring diagram that the filter in the power supply contains no choke and that the filter consists of *R10* and *C7*. When first constructed a choke was included, but this was later removed when the RC filter was found to be adequate.

Operation of the Servomechanism

When the system has been connected up for operation there are several things that may happen in the way of position control. Since there are two possibilities for each of the potentiometers and for the motor, there are eight possible combinations of connections for the three. Difficulty with potentiometers can be avoided by the use of color-code wire, and then the direction of rotation of the motor is the only variable. If wrong connections are made on any one of the three, either of two things may happen, or they may both happen. If the potentiometers are reversed, with respect to each other, the compass points will simply be off; it will be possible to get two opposite directions, say north and south, to track, but the other two, east and west, will be reversed. Of course, this difficulty can be rectified by reversing one of the potentiometers, the one at the control. If the motor connections are reversed, it will not rotate in such a direction as to obtain a consistent point of balance. It may be that in this last case a point of balance will be reached and passed; this will be evident by erratic operation of the motor. The remedy for this difficulty is simply reversal of the motor windings.

Addendum

Since the completion of our beam servomechanism several suggestions have been received from interested friends. One of these suggestions has already been incorporated in the unit and is represented by *R13* and *R14* in *Fig. 2*. The value of the resistor directly in series with the control grid of the 2050 is not critical and can be something about 0.1 megohm. This resistor limits the amount of grid current that can flow, and also tends to keep r.f. off of the tube's grid when the tube is used near the transmitter.

It is good practice in the use of thryatrons to see that there is a d-c connection between heater element and the uni-potential cathode. This connection should limit the potential between the two elements to that indicated in the tube data sheets. If a d-c connection is not used, it is possible for the heater element to develop a high voltage static charge which may cause erratic ionization of the tube at unwanted intervals.

The 2050 thyratrons should have their cathodes preheated at least 10 seconds before any voltage is applied to any one of the elements. This switch, *SW2*, was added after the unit was completed. Had it been installed on initial tests it is entirely possible that single throw relays would have been adequate, instead of the double throw relays now used.

A change of radical nature that might be made, is the use of a-c instead of d-c bias on the 2050s.

This could be accomplished in the following steps:

a. Remove the d-c connection between the 2050 cathodes and their filaments.
b. Connect one 2050 cathode to one side of the filament winding and connect the other cathode to the other side of the filament winding. It may be necessary to reverse these connections.
c. Connect the center tap of the high voltage transformer (*T1*) winding to the center tap of the 2050 filament transformer winding.
d. Remove *R11* and *R12* from the circuit and disconnect the wire between the arm of R12 and the 2050 cathodes.

With the above bias change the 2050s are now supplied with a bias which is equal to one-half of the voltage on their filament transformer. This bias is supplied immediately when the unit is turned on, an advantage over the present circuit which supplies no bias until the 5Y3G filament is heated.

---

[1]"Putting the Selsyn to Work," Merle C. Worster, WIKVV, *CQ*, May, 1946.

[2]Large great circle maps which may be reduced in size by photographs or photostats are available from the Supt. of Documents, Washington, 25 D. C. Maps are centered on Washington or San Francisco. In addition, maps centered on other parts of the U.S. will appear in CQ.

CQ DX

[*from page 33*]

of opinion here! Speaking of G2PL, I wonder what ever happened to the picture of Ginger Rogers. Of course, now that Pete is a family man, I guess Ginger doesn't occupy a place on his wall anymore.

Bumped into a bunch of the boys chewing the rag in one of the local radio stores last week, and they were all putting in their two bits worth on BCI trouble. The payoff was when W6OQB said his phone signals were coming through very well on his neighbor's electric guitar. Imagine this guy holding his guitar, all set for some music, and what does he hear . . . "This is W6OQB, calling CQ, short skip!" etc., etc. . . . a bit uncanny, eh what!!

Hey, did any of you work *W9JVP/J9* on Kwajelein? Well, he isn't there any more, but if you want a QSL card, he will be very glad to send it. All you have to do is send yours to Fred J. Wells, 417 Fourteenth Avenue South, Fargo, North Dakota. Naturally, he's going to first check your card with his log book. See what I mean?

The second Op. at W3LCP shoots in a little information which may be of interest, mostly about QTH's.

EA1D	306 N. Willomet, Dallas, Texas
PZ1A	P. O. Box 679, Paramaribo, D. Guiana
PZ1G	P. O. Box 184, Paramaribo, D. Guiana
OX1AS	136 AACS, A.P.O. 858, c/o P. M. New York
VO2D	Communications Officer, APO 862, c/o P. M. New York
ZD2K	Kitchen United Africa Co., Lagos, Nigeria

VP4TE	Major Louis Kirk, Chief Sig. Officer, British Army, Trinidad
PK1AW	45 Dreef St., Rotterdam, Netherlands
HZ2YY	QSL via HB9CX
SU2GV	QSL via GW2GV
SU1KE	Major Ken Ellis, A.W. 2, G.H.Q., Cairo, Egypt
XAAV	Howard Fojle, Jr., P. O. Box 75, Clark, Penno
XADP	QSL via W9VWP
XACP	QSL via G8AB
XAZO	QSL via G6ZO

It is good to see a lot of the clubs putting a little emphasis on DX operating. For example, the S.A.R.O., (Society of Amateur Radio Operators) located in the San Francisco Bay area, is running a club DX contest for their c-w men. They run the contest in periods; the one just concluded ended on November 16. W6SC won this, edging out W6CEM. Third was W6WN, followed by W6VX and W6OMC. By a strange coincidence, and maybe it isn't so strange, all five of these guys work for Eimac, and I don't have to tell you what they are using for tubes. The second period ends on December 16, and they're looking for a hot and heavy session with a lot of new entries. Post-war countries for these five stations are: W6SC 72;W6CEM-58; W6WN-49; W6VX-32; W6OMC-22.

W1LQQ submits a few QTHs which I know will come in handy for a lot of you fellows. He is located in Salem, Mass., and is a member of the Yankee Radio Club, which meets the second Thursday each month at the YMCA. Charlie says it is a darn good club, and some of you "out of towners" might like to drop in sometime. Their president is W1NNU; vice-president W1NVB; secretary W1LQQ; and the treasurer (ah, that's for me!) is W1AMT. The QTH for *VO6K* is Myron E. Chisley RM 2/C, U.S.C.G. Loran Radio Station, Battle Harbor, Labrador, Navy 228, FPO NYC. Also, *YR5X's* QTH is Box 326, Bucharest, Roumania.

W2IOP has been spending a little time on the air for a change, and is up to 30 and 77 post-war; and a grand total of 38 and 130. Larry says W2GWE added one last week, in working *EP1AL*. W6ADP is still knocking them off and has 92 countries. His latest include *ST2AM*, *EP1AL*, *UQ2AD*, *ET1JJ*, *VQ8AD*, and *VQ8AB*.

W6SA reports a few of his latest and their QTHs, hoping they will come in handy. *KP6AB*, Navy 309, c/o FPO S. F.; *W6VKV/I6*, APO 843, c/o PM N. Y. C.: this station is located in Asmara, Eritrea. W6SA reports *UA3AF* as using e.c.o. with 100 watts in his final amplifier, and working 78 countries. Other stations from W6SA—*SU1UQ*, *HZ1AB*, *VU2KM*, and *EP1AL*.

W8PQQ received word that some Hams in the service in Palestine are about to be licensed for operation on 10, 5, and 2½ meters with maximum input of 50 watts. Calls will probably be of the four-letter series, similar to the XA calls. The first two letters for these Palestine calls will be JX, to be followed by the operators initials. Also from W8PQQ, we have some very disappointing news. Those who have worked ZC1 in Transjordan will not receive a QSL as confirmation, because the station was never there. We have it on good authority, 8PQQ, about *ZC1AR* for example. That's about all we can tell you, and no doubt, there are many of you who are going to be highly disappointed.

We have the correct QTH for *VE8MV*. Here it is, fellows, write it down! G. R. Gaisford, Ft. Resolution, Northwest Territory, Canada. From W8REU, we learn the QTH of *C8YR* is P. O. Box

73, Laochanmiao, Kansu, China; also that *VU2CQ* is back on the air on 28,300 and 14,075. He wants the gang to know he will be on, usually, from 0900 EST, for an hour or so everyday—he will be running about 30 watts. His QTH, incidentally, is 82 St. Andrews Road, Bombay #20, India.

W6UXN phoned the other day to say our old friend *VP9L*, Cyril Lindley, is back on the air operating on 28,250. Cyril was out this way 7 or 8 years ago, and we had quite a time.

W9RBI shoots in his zone and country list with his post-war totals looking like 32 and 74, and on phone only 28 and 58. Ross lists a few of his latest—*W1LTQ/TF, VU2AQ, ZB2A, W4BOW/Iwojima;* these were all on phone—and on c.w, some of his latest include *J9ACS, CN8MZ, GC8NO;* you'll find the frequencies in the list.

It's nice to hear from W3JKO, who has knocked off 56 post-war countries on 10 meters. Bob runs 125 watts into a pair of 807s, and prefers sticking to low power, concentrating his effort on a good antenna system. A short time ago, he decided to stack a W8JK a half wave above another one, feeding them in phase. Putting it mildly, he was really amazed at the fine results obtained, and says he would be glad to furnish details on this stacked W8JK to anyone sending hin a self-addressed, stamped envelope. His address is C. R. Shaffer, Riva, Md. Bob apparently has an ideal location about 25 miles from Washington, next to Chesapeake Bay. He says he has an acre in a secluded spot where there is no noise from ignition to speak of. Among some of the stations recently worked are: *HE1CE, ZD4AB, UA3KBC*, and he raised *SP5X*, but lost him in the sweepstakes QRM. Practically all of his DX has been done on c.w., although, a few weeks back, he hooked up an 815 modulator, and is now doing a little phone work. He's no newcomer to the game, having been a ham since 1923, and other calls held previously include 9AZC, 4GA, and W8CHK.

W4DKA of Miami uses a half-wave vertical, and has worked 83 post-war countries. He runs 500 watts to an 806. W2QCP, who is ex-W8ACY, sends in a list of DX stations. Most of their frequencies will be found listed. In 12 weeks, he has worked 73 countries, making a grand total of 122. This has been divided between phone and c.w.—all on 14 mc. Just got another card from W2GVZ saying he has added 2 zones and 5 countries to his post-war list. This makes a huge total of 8 zones and 11 countries. WØAZT is doing a pretty good job in Denver, although, due to traveling a great deal, he doesn't have all the time in the world to chase DX. He does have 30 countries, and some of the more recent contacts are *OK1DX, LX1AS, PK6HA*, plus the usual run of Europeans. Cliff says his friend, W9PGS, formerly of Boulder, Colorado, is now on the air in Denver—his pre-war total was 102 countries. Here is some news from WØAZT which should be of interest to all of you guys. Our old friend G6WY "Ham" Whyte, during a QSO with Cliff, the other day, said he was moving to Toronto, Canada, next spring, and will then, of course, be a VE3. Maybe we'll get a chance to meet Ham personally one of these days. Getting back to WØAZT, it looks as though he is completely surrounded with this radio influence. Outside of being an active ham, he represents quite a number of radio parts factories; to top this off, his youngest daughter goes to a nursery school, and of all things, it's run by W9OTR.

W8BKP sent in his list of zones and countries; he has 30 and 70 confirmed, although he's worked 39 and 114. I would say this is really stepping on it.

W8KPB, Ned Jacoby, hasn't been heard from for a long time,. He was one of the few DX men in Cleveland pre-war. After leaving the service, he spent the past year in California, but all good things must come to an end, and Ned dropped in the other day to say he was shoving off for Cleveland. We'll no doubt hear him banging away on the air before too long. Incidentally, while Ned was in the India-Burma area, he saw *AC3SS* who, as you probably know, is located in Gangtok, Sikkim Province. Speaking of this province in our November column, it was spelled "Sickim." How in the world this ever got in there. I'll never know! Ned related that a couple of his non-ham buddies lost from their outfit for a period of time, explained upon return that they had parachuted to safety in Tibet where they met a swell chap in Lhasa, who had a "bunch of radio stuff." Then W8KPB took a shot in the dark, and asked his buddies if this fellow's name couldn't be Fox. Sure, you've guessed it by now, it was! And, of course, Ned wished by golly that he'd been in one of those 'chutes.

W6PCS, who seems to be doing all the DX in Fresno, is up to 85 countries with 40 of them confirmed. Jerry is running a kilowatt, and is using a half-wave antenna at the present time, although he hopes to get his beam back up shortly. His receiver is an NC-240D. W6QQL worked *ZD2G* on 20 c.w.; he is located at Lagos, Nigeria.

Received a note from W7FST who says he's being asked by a lot of the boys if he were ever in Alaska. So far as I know, he spent considerable time there before the war signing *K7FST*, but is now living in Sandy City, Utah. Of course, you have heard that W9FS is now W4FU. From Ft. Worth, we received another letter from Billy Lyerly, who contributes a few QTHs, as well as frequencies. This guy, apparently, has an ear for DX, and I can't figure out why he doesn't snag a license and get on the air. He probably would give us all a little competition.

Various opinions on our printing a frequency list every month indicate that some think it is okay; others feel we are wasting time and space because so many DX stations are using v.f.o.s, a guy is seldom heard in the same place twice. By the time the frequency appears in print, even if the station were crystal controlled, he may have changed frequency. Personally, I don't know exactly what to do. I'll leave it up to you guys. If you want the list, we'll compile it and print it. When you drop me a line, please say if it is a good idea or a bum one. As an alternative, we could indicate the band, instead of the frequency.

I hope by the time you read this stuff, we will have the zone maps off the press, because there are certainly plenty who have been asking for them. Our DX committee is still hashing over the country list, and as soon as we are all in agreement, we'll spring it loose. It seems like a fairly large percentage of the boys would like to have us publish the zone and country totals of *confirmed* QSOs only. They feel there is a possibility that many of these DX stations which you have been working are not actually where they say they are, and if this were true, of course, it wouldn't be a legitimate country. Thus, maybe the best way out for all of us is to show only the zones and countries that are confirmed. How do you feel about this?

Well, things are shaping up at QDs layout. As a matter of fact, if you hear a strange noise on the air, it will probably be yours truly firing up the new rig, which consists of a pair of 4-250As, driven by an 807. With this, I hope to increase my post-war total of W9s. I think this is a good place to sign off.73.

PARTS AND PRODUCTS

[*from page 40*]

7. Delta match at center of driven element in parasitic arrays and other similar installation.

It preserves necessary proximity of coax leads at antenna end of line making it unncessary to "fan" end of line in bridging across the ordinary types of antenna insulators used in the center of a doublet. Such "fanning" is often done in a random manner, preventing good impedance match between antenna and line.

Miniature Tube Reference Guide

A handy reference guide for miniature tubes has been made available by Hytron. Listing all the currently available miniature tubes with ratingsand typical operating characteristics the guide has the additional virtue of giving the larger envelope prototype.

All miniature types which have been announced to date are included, regardless of the originating or producing manufacturers. Copies of the guide may be obtained by writing to Hytron Radio and Electronic Corp., Salem, Mass.

Feed-Thru Capacitors

A new series of Hi-Q feed-thru capacitors is announced by the Electrical Reactance Corporation, Franklinville, New York. Fitted with brass, cadmium plated feed-thru bushings, they are designed to attain efficient by-passing capacity to ground when feeding through a chassis or metal cover.

The capacitors are of tubular ceramic type. Bushings are securely soldered to the outer electrode. Size range of bushings is from .243" O.D., 28 thread to ⅜" O.D., 24 thread, class #2 fit. Lengths, exclusive of hex head are 9/32" to 5/16", accommodating capacitors from .125" O.D. to .272" O.D. Capacitors range from 5$\mu\mu$f to 17,500$\mu\mu$f capacity. The manufacturer claims that unusually high capacitance in relation to physical dimensions make these capacitors especially applicable where space is extremely limited.

Sub-Miniature Thyratron

A sub-miniature thyratron tube designed specifically for amateur and intermittent service, the RK61, is now being manufactured by the Special Tube Section of Raytheon Manufacturing Co., Newton, Mass.

For remote control circuits, particularly radio control of model aircraft and boats, the RK61 is ideal in applications requiring extreme economy of space, weight and battery drain. Similar in characteristics to the popular RK62, the RK61 is much smaller and lends itself to ultra-compact design.

Type RK61 is designed for use as a self-quenching super-regenerative detector which will operate a high resistance relay in the anode circuit upon reception of a radio signal. The flexible terminal leads may be soldered directly to circuit components without the use of a socket. Standard sub-miniature sockets may be used by cutting the tube leads to .20" length.

Electrical characteristics are:

Filament voltage (d.c.)	1.4 volts
Filament current	.05 amperes
Average tube voltage drop (at 1.5 ma)	30 volts
Anode voltage	45 volts
Relay resistance	5000 to 10000 ohms
Anode current (no signal)	1.0 to 1.5 ma
Anode current (with signal)	0.1 to 0.5 ma

ZERO BIAS

[*from page 7*]

mitter rack the antenna problem was solved. A tuning chart on the matching network has proved satisfactory for rapid reset on different bands.

We do not hold up our station as a criterion for modern design. It is relatively straightforward except that it takes full advantage of the new tetrode tubes. It was an ambitious project at the outset, but when completed was worth the effort. A similar job can be done under most circumstances and every amateur owes it to his fellow ham to start thinking about flexibility in his station. We believe that therein lies the answer to enjoyable operating despite increased congestion. Let's get the most out of the bands we have.

COMPACT KEYER

[*from page 26*]

the lag factor on the "make" depends on the time constant of *R3 C2*, and on the "break", on the time constant of $(R2+R3)C2$. The values specified here for *R2*, *R3*, *C2*, *C3*, and *C4* will provide a reasonable range of keying characteristics; the keying becoming "softer" as more capacity is switched in. If a still greater range is desired, it is a simple matter to add more condensers.

Very little comment regarding the physical layout is necessary, the photograph being almost self-explanatory. This shows the unit with the cover removed. The components are all contained in a 3x4x5-inch metal box. A small aluminum chassis is used and the filter condenser, "lag" condensers, and tubes are seen mounted on the upper side. The remaining components are small in size and are mounted underneath. No special arrangement of parts is necessary; they may be fitted in wherever convenient.

Mica condensers should be used in the lag circuit (*C2*, *C3*, *C4*) and a paper condenser in the filter circuit (*C1*). Do *not* use an electrolytic filter condenser. One final constructional comment is necessary. Be sure to provide plenty of ventilating holes in the shield box . . . these little tubes develop plenty of heat!

The tube manual shows permissible plate current slightly in excess of 50 ma for the pentode section of a 117L7GT. In our present installation, the unit keys the cathode of an 807 doubler operating at 450 volts and 75 ma of cathode current. It handles this load nicely with only a negligible voltage drop through the keyer unit, comparing favorably with more complex keyers using several paralleled 45s or 2A3s.

Use of this keyer unit in conjunction with a c-w transmitter of some 850 watts has brought forth

very favorable comments on the keying characteristics . . . particularly from some of our local friends, for whose benefit the project was originally started.

PORTABLE C-W RIG

[*from page 21*]

KF6SJJ/1 "the DX factory man" but I could not raise Bob, altho I sure tried hard.

And all this was in Boulder, Colorado, the former home of such DX men as W9PGS, W9FYK and many other outstanding performers. I couldn't believe it!

After many hours of trying, I finally raised W6UWQ (exW9CSB) at El Monte, Calif. and Bud said "You are R8 here and you should have no trouble in raising em." Those were kind words, Bud, but they didn't make me feel any better. He took some traffic, got local replies and we had a regular clambake. Then the lid closed down again. A cloud had set in over the Flatirons and W1OJH-Ø was covered up.

I surely could hear them, even if I couldn't get out. At 10:05 p.m. I heard ZL1CK calling CQ on 14 mc. At 9:10 p. m. I heard a fine 7-mc QSO between those two bug-masters, W6AOA and W2IOP. Right then I became pretty disgusted with flea-power—especially in Boulder, Colorado.

One thing I noticed as I moved westward—the lack of East coast stations heard on 7 mc. Only a very few came through. I never did figure why! (This grew worse as we moved west).

The score at Boulder was awful—63 calls—5 QSOs! and that was on the "good old reliable" 20-40-meter bands. Ugh!

On July 12th I set up the rig in a new spot—Jackson Hole, Wyoming. We were camped at Jenny Lake for a while, and I got on there, plenty.

Operations in Wyoming

Jackson is famous for many things, but to a ham, probably the most important fact is that it's the home of that real old timer Harold Mapes, W7DXV, ex Mexican BX etc! Hal, famous for his early ham radio work and for his South Sea Cruises (with ham gear) lives at "Snug Harbour," in Moose. He spends his summers at the Triangle X dude ranch, run by his charming daughter Louise, W7HFE, and her husband John Turner.

I had a fine personal visit with both W7HFE and W7DXV at the Triangle X. Also got to see what a real dude ranch is like! Schedules were arranged and worked daily between the ranch and various camps set up by the writer around that section. These skeds, worked on both the 7 and 3.5-mc bands, were a lot of fun even though only a dozen odd miles separated us. Signals

were not too strong either way, but we always got through. The W1OJH/7 antenna was a 7-mc Windom, buried in deep woods.

I had a good 14-mc QSO with W7FS in Seattle when I got an R8 from Keith, but it also brought an end to 14-mc operation at W1OJH. The only available crystal that would double into the 14-mc band went out in the middle of this QSO. Several other crystals brought along on the trip would not hit the band, and every effort made to bring this crystal back failed completely. In anticipation of just such a difficulty, duplicate crystals had been ordered, but in line with the modern state of affairs, they were back-ordered and *not* received. So–W1OJH/7 was without any 14-mc spots.

One interesting daytime QSO was abruptly ended when W7COB, Aloha, Oregon burned out an antenna ammeter and dropped from a fat R9 to an unreadable signal. It was a nice bit of daylight DX up until then.

On July 26th, at 9:10 p. m. right during a severe attack of the Northern lights, CO6PP came booming through on the 7-mc band. Evidently he didn't have any such assistance at his location, because he didn't hear W1OJH/7.

One notable bit of reception all during our stay in Jackson Hole was the almost continuously reliable signals from W9USA, Milwaukee. They were heard as early as 10:25 a.m. MST and stayed in all day and evening. It was unfortunate that no QSO could be made but it was a lot of fun listening to the various ops there at W9USA chewing the fat with the fellows they raised, one after another. Too bad they couldn't hear the "pip squeak" signal from Jackson Hole. I called them often enough to have bored a hole clear through to Milwaukee on 7160, but there were too many local W9s!

By the way, speaking of 7160 – – working only 10 kc away from the low edge of the 40-meter band with only about 10 watts power is not so very productive during the QRM portion of the day. But, due to the lack of any other crystal, 7160 was what we had and that was what we used. Oh – – for that good ole v.f.o., sitting on the table at Farmington! However, during the daytime 7160 was fine, especially after a test antenna was made up consisting of a doublet, a 0-1 ma meter, and a Sylvania germanium crystal. After making this setup, Charlet and I squeezed the little transmitter until the last 1/100th of a mil appeared on the Marion meter. Then I got out better!

After waiting a long time, Saturday July 27th rolled around with the long-awaited tests being made between some of the California two-meter hot-shots! Early that morning Charlet and I

[*Continued on page 78*]

Classified Ads

Advertising in this section must pertain to amateur radio activities. Rates: 25c per word per insertion for commercial advertisments; 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 1st of the month preceding publication date.

AMATEUR radio licenses. Complete code and theory preparation for passing amateur radio examinations. Home study courses. American Radio Institute, 101 West 63rd Street, New York City.

CALL PLATES - - white on sturdy black plastic, 9¾" x 3" with name or QRA - - $2.00. See "CQ" December page 59. W2NJF, Radio Ham Call Plate Co., P. O. Box 233, Bronxville, N. Y.

CRYSTALS: Amateur, marine, aircraft, etc. Descriptive price list. Nebel Laboratory, 1104 Lincoln Place, Brooklyn 13, New York

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CRYSTALS: Precision low drift units. Type 100A in 80, 40 and 20 meter bands. Two units plug in one octal socket. One dollar each. Rex Bassett, Incorporated, Fort Lauderdale, Florida.

GON-SET CONVERTERS for improved reception, mobile or fixed stations, voltage regulator, 6AK5 pre-selection without images, instructions and schematic, complete, $39.95. Shipped same day. Murray Black, 839 N. June, Hollywood 38, California.

LAFAYETTE PB46A transmitter for sale. Complete CW and phone. Price $65.00. A. Gazzale, 1711 Wallace Ave., New York 60, N.Y.

PE-103A DYNAMOTORS, New, Postpaid, $19.95. BC-223A Transmitters, New, Postpaid, $27.50. Free list. ERECO,1006 Hewitt, Everett, Washington.

QSL CARDS that stand out! Individualized, original. Cartoon by W2EA [ex 8EA] incorporating your ideas, personality, etc. Reasonable, but not cheap. Send stamp for specimens. Harrison Radio Corp., 10 West Broadway, New York City.

QSL's Highest Quality, samples 10c, refunded. VYS Print, 1704 Hale Avenue, Ft. Wayne 6, Indiana.

QSL's? Samples 20c. Sakkers, W8DED, Holland, MIch. (Veteran)

QSL's .... Samples for Stamp ... Henry L. Carter, Jr. ... W2RSW, 747 S. Plymouth, Rochester 8, N. Y

RADIO TUBES, Parts, Condensers. Free bargain lists. Potter, 1314 McGee, Kansas City 6, Mo.

RIDERS MANUALS wanted. Singly or complete set. State price and condition. Sommers, 118-46 191 St., St. Albans 12, N.Y.

SELSYN BEAM rotation kit complete, 110 VAC operated. Includes pair selsyns, motor, drive gears, switches, etc. $22.50 Postpaid, ERECO, 1006 Hewitt, Everett, Washington.

WORLD DX GLOBE, Oriented for your location. Great circle direction and distance at a glance. $9.95 Postpaid. ERECO 1006 Hewitt, Everett, Washington.

KA1JM is back home at W3ILD and will QSL all of his 4000 contacts from the Philippines. Listen for me from W3ILD on 14004 kilocycles. Will measure your frequency to exact kilocycle on request. Transmitter Temco 500GA—1000 watts. Receiver HRO with Panadaptor. 4912 Quebec Street NW, Washington 16, D.C.

"BT" CRYSTAL BLANKS, assorted frequencies, 5.8 to 3.5 mc.; size .5 by .6 inches; lapped and edged; 6 for $1.00. Breon Laboratories, Williamsport, Pa.

$50.00 for 19-tube SCR-522, 100-156 mc., crystal-controlled transmitter, superhet receiver. 12 mc. iron-core I.F. transformers, $1.00. SCR 522 r.f. osc. section, $3.00 per set. Meter insurance kit, 20 mixed Littelfuses, $1.00. Box of 10, bayonet base, T4½—¼ watt neons—$2.25. 50 ft. RG8/U—$2.00. Castle Radio Supply, W2JBM, 677 Euclid Ave., Brooklyn 8, N. Y.

FOR SALE: Hallicrafters S22R Marine Communications Receiver, perfect condition, $40.00. BC 423 Modulator, 205 mc., $15.00. New Leach heavy duty relay, 115v 50cps, 30 amps DPDT $4.50. Box153, Shrewsbury, N. J.

5" CATHODE RAY radar scope, ID-93/APG-13A, 115v 400cps complete with 11 tubes incl. 3BP1, brand new, $25.00. Request surplus bargain list. Rubin Radio, Shrewsbury, N. J.

TRADE BC-375-E, BC-223-A, BC-406-A, BC-284 plus cash for BC-610, West Coast. Late radio correspondence course, $100. W6VTC, Box 1293, Hollywood, Calif.

TOWERS for your rotary beam. Full latticework spruce construction. Priced for the amateur. Write for Bulletin T-101. Sky-Lane Products, 101-03 Vaughn, Ironwood, Michigan.

TWO RECONDITIONED SX-28 receivers for sale at $179.50 each. Matching speakers $15.00. 90 day guarantee. Wanamaker & Co., 110 N. Broadmoor, Topeka, Kansas.

HRO-5TA1 National Receiver for sale or trade at best offer. Perfect condition complete with bandspread coils, noise limiter, power supply, and speaker. Also new HRO-W. R. W. Yeager, 4423 Sheridan Road, Chicago, Illinois.

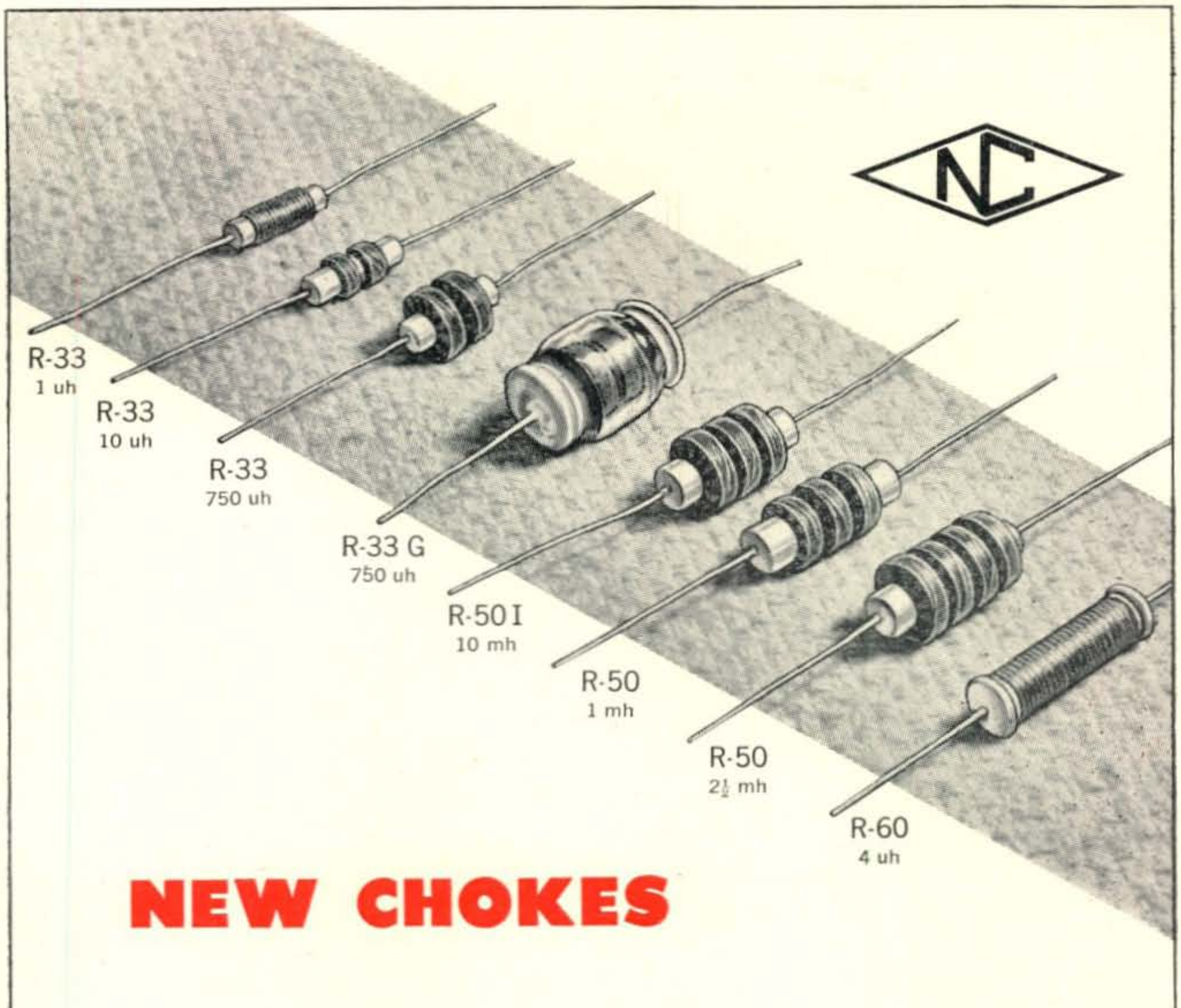
CQ Ad Index

started for the highest point around the Hole, accessible with a car – – the Twogwotee Pass, east of Moran, and 9656 feet up! Arriving there, we were quite disappointed to find that the pass, as is so often the case, was not so hot as a v-h-f location forit had only a narrow opening towards the west. Since the v-h-f gear was 6-volt battery-operated, and heavy, instead of lugging it up a severly stiff butte, we made our setup right in the pass. A three-element high-gain beam was erected about 15 feet high and with the YF holding the beam support listening periods began We carefully scanned the band for ten minutes past each hour. This was followed by a five minute call. We were quite hopeful but not too expectant of any results. It's a good thing the scenery and the lunch were good . . . as no two-meter signals were received. W6OVK, W6RBQ and W6OIN were never more heartily called than by W1OJH/7 there on chilly, windy Twogwotee Pass. Although the sun was bright, my hands grew cold turning the dial. I called CQ East! CQ West! and straight up, but no answers or signals were heard. If anybody received W1OJH/7 on two meters on July 27th—will you please drop us a QSL!

After several hours we decided that the Grand Teton mountains rising right up in the wrong (for us) place, were too much of a handicap so we moved down to Signal Mountain Lookout, some 8000 feet high, but closer to our camp. We heard nothing there, even if it was a steep bluff front to the west. Not even the assistance of several inquisitive chipmunks helped pull in any California signals on two meters.

The following Monday we worked W6OCZ/6 (on 7 mc) at Pinecrest, in the California Sierra Mts. Sid told us that the Mt. Lassen tests were successful and that 240 miles had been hopped. We had a good ragchew about the deal and Sid was quite surprised that we had not heard the gang. So were we!

The Jackson Hole l-f results were good, but quite surprising. The tabulation bore out our previous contention, that it was *not* just W1-OJH/7 who could not raise them! For example – – I called (and logged) 55 guys calling CQ, each of whom failed to raise *anybody*, including W1OJH! Out of 80 stations called, only 35 were heard *replying* to another station, and of that number 25 came back to W1OJH. Those other 55 guys could just as well have been whistling into a rain pipe for all the good it did them, or us. Most of these fifty-five fellows were heard a few minutes later, merrily calling CQ again—and again! What is this? QRM?—bum receivers?—bum operating?—or what? Not *everybody* on 40 meters is operating a ten watt portable deep in the Wyoming wilds.



NEW CHOKES

The enlarged line of chokes now offered by National includes many new sizes and types and provides units suited to specialized as well as standard applications. Many popular new chokes are illustrated above, including the R-33G which is hermetically sealed in glass. Other models cover current ratings from 33 to 800 milliamperes in a variety of mountings carefully planned for your convenience. These as well as old favorites like the R-100 are listed in the latest National Catalogue.

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PRICE:

Why the RCA-810 is now the outstanding triode for high-power cw and phone transmitters

1. Power Input: A single RCA-810 at its new ICAS ratings will take 300 ma. at 2500 volts in class C telegraphy, or 250 ma. at 2000 volts in class C telephony.

2. RF Power Output: 575 watts tube output in class C telegraphy, or 380 watts tube output in class C telephony is possible with one RCA-810.

3. Push-Pull Operation: A pair of RCA-810's will take 1000 watts on phone for that high-power final. A pair in class B at reduced ratings will plate-modulate an input of 1.0 kw.

4. Low Driving Power: Its high perveance allows the RCA-810 to deliver 575 watts output in class C telegraphy with a grid-driving power of only 19 watts, or 380 watts output in class C telephony with a grid-driving power of only 35 watts.

5. High-Frequency Operation: RCA-810's will operate at full plate input at frequencies up to 30 Mc.

6. Features: The filament of the RCA-810 is shielde at both ends to eliminate losses resulting from bul bombardment and stray electrons.

The large, graphite anode provides high therma radiation and a minimum of gas. Plate and gri leads are brought out to rugged terminals at the to and side of bulb, respectively, providing low lea inductance and permitting compact circuit layout The ceramic washers provide a superior bond t the glass, and eliminate strain. The plate washe minimizes corona discharge.

For further details, see your local RCA Tube Di tributor or write RCA, Commercial Engineerin Section A-5A, Harrison, N. J.

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