CQ

AUGUST, 1950

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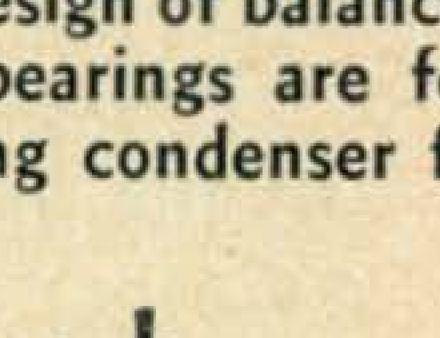

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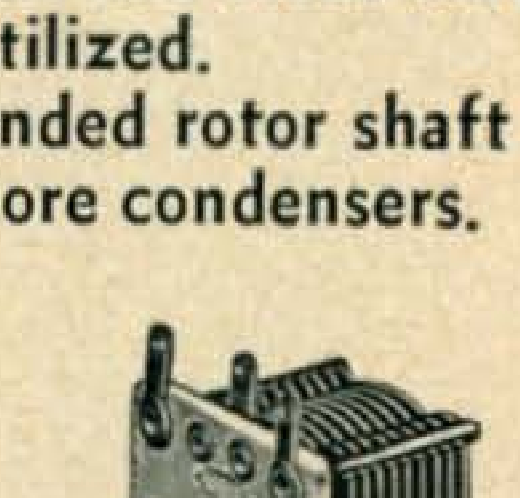

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CE-2021	35	6	.030"	7	1 29/32"	1.15
CE-2022	50	7	.030"	9	2 1/32"	1.25
CE-2023	75	8	.030"	14	2 ¼"	1.40
CE-2024	100	9	.030"	18	2 15/32"	1.55
CE-2025	150	10	.030"	27	3"	1.80
CE-2028	15	5	.060"	5	1 15/16"	1.20
CE-2029	35	7	.060"	11	2 7/16"	1.40
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Vol. 6 August, 1950 No. 8

In This Issue

OUR COVER—This handy device is Bill Scherer's latest development. You can use it to measure the radiation resistance and resonant frequency of your antenna, the impedance of a transmission line, or the input impedance of your receiver. Adjusting your radiating system for minimum s.w.r. is easy, too. Nope, it's not in this issue, but we thought we'd advise you that it will be the big feature of September *CQ*. Watch for it! (Photo by Newman Studio)

Feenix, Ariz.

Deer Hon. Ed:

Why is it that I are always putting my foot in things up to my neck when playing with radio? How comes things turning tipsy turvy when Scratchi get his hands on it? Honestly, Hon. Ed., Scratchi are decent citizen and gentlemen. I always opening door for ladies, except of course when dinner call comes, I always obeying traffic laws, except maybe for occasional jay-walking, and Scratchi even obeying all laws (not including FCC regulations, as these not counting). Howsomever something, but always something, are usually happening.

Like taking for examples cupple weeks ago. As you knowing Scratchi are experts on antennas and I are always trying new and better ways to getting classy signal out over ether waves. As I sitting and thinking of how to make sooper-dooper sky-wire, idea are suddenly coming that longer the antenna is the better chance are having of getting good signal. Now how to get long antenna? Can't stringing wire over ranch because Brother Itchi not wanting cows branded with r.f. Can't trying underground antenna on acct. Scratchi are allergic to spade handles.

Next day are getting red-hots idea. If can't go underground or on top of ground, why not go way up in the air with a kite! Thinking are doing, as the saying goes, so in next two hours are making six foot box kite out of aluminum angle from old relay rack and sheet from spare bedroom. Next problem are antenna wire. Rummaging around in basement are coming across four or five old one-ampere chokes local BC station are throwing away. Are all wound with number 20 wire and are so heavy that Brother Itchi are having to help me carry them upstairs one by one.

Are making up special unwinding jig to hold chokes and knocking out laminations. Then getting outside away from house and in matter of cupple hours kite is finally getting airborne. Along about time the second choke is unwound darkness is setting in, so I tie the wire to house foundation.

The following morning are rushing outside bright and early at 10 o'clock and finding kite still in air. Are far away so can barely see it, but wire is going up in sky still. So next are letting out more and more wire until all wire is used up. Now can't see kite, but can see having 1/c long-wire antenna.

Are quickly matching antenna to transmitter and Hon. Ed., it are reely sharp. I have two contacts with east coast on 80 meter see-w with R-9 plussedy-plus reports, then getting on 20 phone and knocking off half-dozen Europeans. Peeples not believing that Scratchi running only 5 KW, they saying it sounds more like 500 KW. Later

(Continued on page 57)

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★ ★ *Letters* ★ ★

Grid Dipper Info

138-07 35th Ave., Flushing, N. Y.

Editor, CQ:

Despite the great publicity given to W2AEF's Grid Dipper, I doubt that much attention has been given to the hazard that lurks within the unit. Since it is possible for the hot side of the 117-volt line to make its appearance on the aluminum container by breakdown of the .001-μf condenser, the user may receive a surprising jolt. In order to minimize the possibility of a serious shock, I suggest the use of a celluloid or plastic cover about 1/16-inch thick fitted around the back and sides of the Dipper.

J. I. Leskinen, W2RUZ

Ham Teletype

38-06 61st Street, Woodside, N. Y.

Editor, CQ:

We call to your attention the ham teletype setup at Stevens Institute of Technology on the occasion of their alumni day reunion. The Stevens Radio Club, invited the N. Y. Teletype gang to participate in the handling of amateur traffic solicited from the visitors. From 11 AM on May 20th until 3 AM the following day this gear handled several hundred messages. All messages were first punched into tape, and the significant thing is that in the entire period of sixteen hours the radio channel was only used for three hours for the high speed transmission of all the traffic. This left the RTTY frequency, 147.96 mc, free for other communications.

Most of the message traffic went through W2QGH in Larchmont, N. Y., who received it simultaneously on printer and reperforator, so that little time was lost in retransmission.

Personnel manning the equipment at Stevens included W2WXI, W2OQX, W2OTM, W2BCK, W2CKT, W2WCW, W2WST, W2VZN, W2VVV, and W2BFD. All but the last named are members of the Stevens Radio Club.

J. E. Williams, W2BFD, Secretary,
V.H.F. Teletype Society

Paging Dr. Rapp!

Rhombic Acres, Block Island

Editor, CQ:

Being a rather new ham, and not too well acquainted with higher mathematics, I am communicating with you in the hope that one of your readers may be able to help me out.

The other day, while trying to raise some DX on my 20-watter, I noticed that my neighbor's electrical razor was QRMing my receiver beautifully, just around the middle of the band. Well, I thought, if he can get out of his back yard without an antenna, and I can't with, maybe there is a reason why. Not having a razor, I took the spark coil out of my Model T and hooked the primary through my key to the a.c. filament line, and the secondary to my plate tank. The tank condenser arced over when the key was pressed, but it didn't seem to do much damage.

Not wishing to use my own call, KB4CA, I called CQ and signed it backwards, AC4BK. The whole band seemed to come back, and I worked lots of people, all RST 559X. The note sounded rough in my headset, but I suppose that was due to local blocking, since the T-9X reports were so consistent.

Since this system is so effective, I wonder if we couldn't use it to replace the present expensive array of tubes, crystals, and the like in ham rigs. I would appreciate any information your readers may be able to supply.

I like your magazine lots, especially the construction articles.

Robert Ackerly, KB4CA

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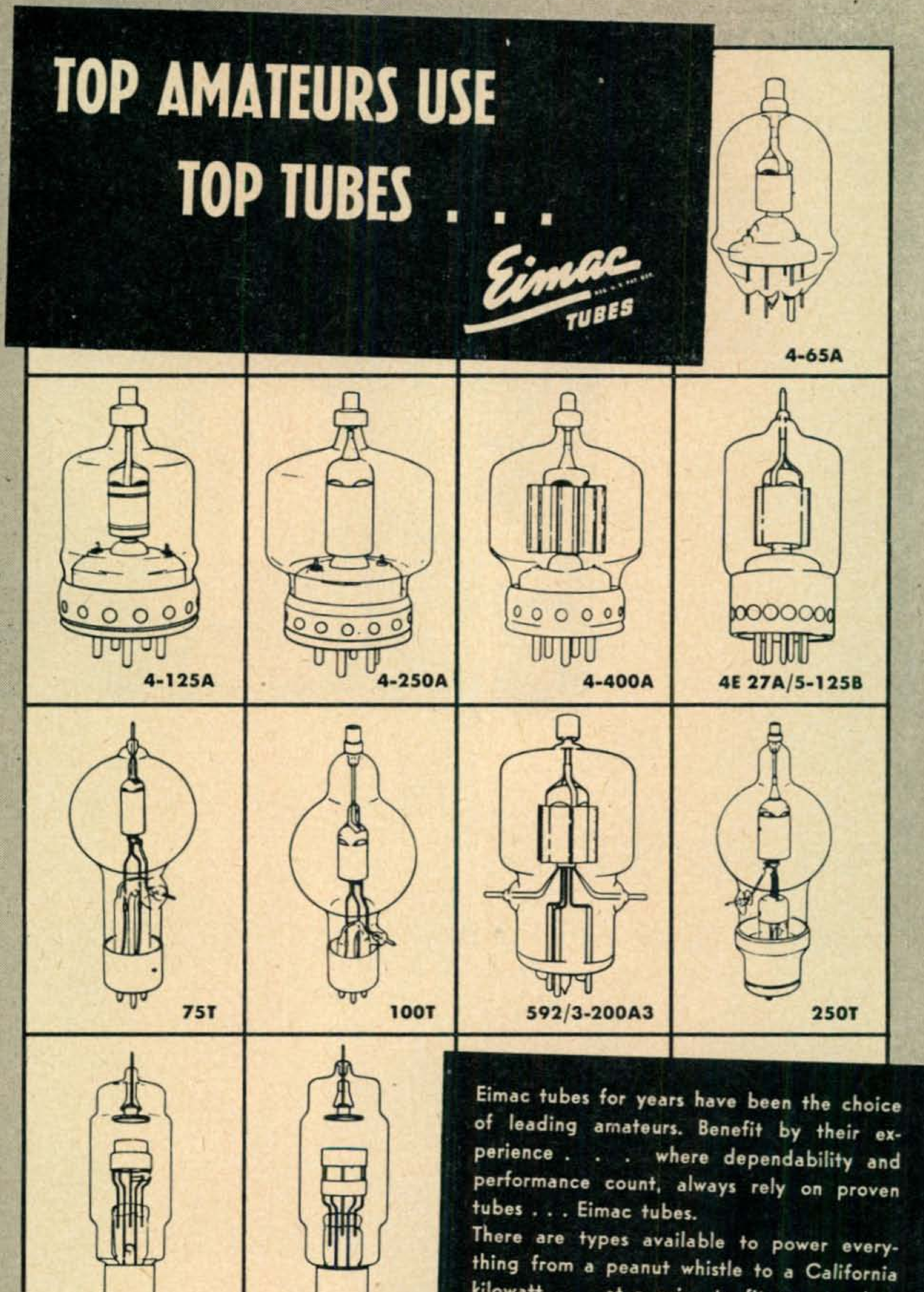

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EDITORIAL

JUST AS THE CROSSING OF THE 38TH PARALLEL by the North Korean forces demonstrated to the country the need for a strong army of fighting men, so has it demonstrated to us the need for a great team of amateur radio operators. Whether as trained operators, used to working under QRM and QRN conditions unthinkable to the military communicators, or as technicians ready and able to furnish emergency repairs to electronic gear, we hams are an invaluable resource in the continuing battle for peace. In peacetime or in wartime the radio amateur has been and will continue to be of prime importance to the country at large.

The unexpected military events of late June have served to underline the necessity for the establishment of international understanding and good will on as wide a basis as we can manage. The ability of ham radio to contribute to international understanding should be kept always in mind, and our efforts redoubled during these trying times. When you work a DX station, do not forget that you are, in a small way, a representative of the American way of life travelling the disturbed areas of the world.

But the Korean situation served, too, to emphasize the need for the swift enactment of the new regulations establishing the Novice Class of amateur license. The on-the-air training of these prospective licensees—both in operating through our "impossible conditions" and in keeping the old rock crusher on the air "no matter what"—must begin without further delay. There will be more international incidents, and our army, our navy, our air force, and *our amateur radio* must be ready! Come on, FCC, its your shot.

It's Your Kid, Too!

With school out these days, what are the youngsters in your neighborhood doing? Are they playing baseball in the streets where they are in constant danger of injury from the ubiquitous automobile, or are there playgrounds where they can play safely? Are they swimming at contaminated beaches and swimming holes, or are there healthy spots where these sports can be enjoyed? Are some of these kids hanging around neighborhood pool rooms or are there youth centers and the like tailored to the level of the growing boy? If things aren't 100% on these and other scores in your community, you have, of course, your duty as a citizen to do all in your power to see that young America is given the opportunity to grow up into the American we all want him to be.

But besides the general community level, have we done all we can, as hams, to contribute to the health, welfare, and development of the neighborhood youngsters? How many of the kids on your street have been invited to come in and learn of the big bang to be gotten out of ham radio? When was the last time you invited one of the neighborhood youth to see what goes on in *your* shack? How many of our citizens of tomorrow have *you* put on the right track through ham radio?

Let's get to work on it.

Progress

The next character who wanders into our shack and remarks about the "good old days" of ham radio is likely to get a punch in the nose. We're getting a little tired of these stagnant oldsters who yearn, to all and sundry, for the days when spark was king, for the era when a debased 201A meant u.h.f. operation on 5 meters, and for the regenerative receiver. We'll admit we go back only to 1931 in this great game, but it seems to us that there was just as much (if not more) QRM in those days—the DX was just as hard to raise—and the "lids" were just as bad as they are today.

Let's, for a minute, forget our successes of the past and consider the tougher times. Would you swap your superhet for the regen you were using 20 years ago—that slick v.f.o. signal for the soupy Hartley you sweated to get working right—our three-buck crystals for the jobs Uncle Dave had to charge $15 for? You're darn right you wouldn't.

So enough of this worship of the ham radio of the past. We are living in the present and building for the future. Let's see to it that ham radio becomes all that it is in our power to make it today, and that we contribute toward a brighter future for all of us.

Visibility Zero

Your ham radio means a lot to you, whether your specialty is DX, traffic, the v.h.f. range, or any of the dozens of other facets of "the greatest hobby in the world." Have you ever stopped to consider how much it would mean to you if your ham radio were your only contact with the world at large other than the BC set and your immediate circle of acquaintances? How would you feel if you were without newspapers, books, pictures, spring sunlight and the smile on your loved ones' faces? Pretty low, we'll bet.

Let's not forget that there are many hams in this country and throughout the world who are in that exact spot. They need your help.

We call your attention to page 7.

—Doc, W2BYF

How to Neutralize Your

Single-Ended Tetrode Final

WARREN B. BRUENE WØTTK*

Here, at last is a simple, economical, and sure way to neutralize any single-ended pentode or tetrode amplifier. With capacity-bridge neutralization your 807, 813, or 4-250A can be as stable on 28 mc as it is on 3.5 mc.

Capacity-bridge neutralization is particularly adaptable to "single ended" circuits using power tetrodes (or pentodes) such as the 813, 4-250A, etc. It is a wide-band type of neutralization in that its adjustment holds for all bands through 10 meters. Balanced tank circuits are not required in either the plate or grid circuit. Since unbalanced power amplifier circuits using beam power tetrodes are being used increasingly, this circuit is destined to become quite popular.

The data sheets for most tubes in this category state that neutralization is not required for frequencies below 30 mc, and it is true that they will not "take off" under the usual operating conditions. Many users have found, however, that the grid current can vary all over the place when the plate circuit gets a little off resonance, which regularly happens when shifting frequency with a VFO. Also, the tubes are less stable when lightly loaded—especially when minimum grid drive is used. For these and other reasons it is good practice to neutralize these tubes, especially on 10 and 20 meters.

* *Collins Radio Company, Cedar Rapids, Iowa.*

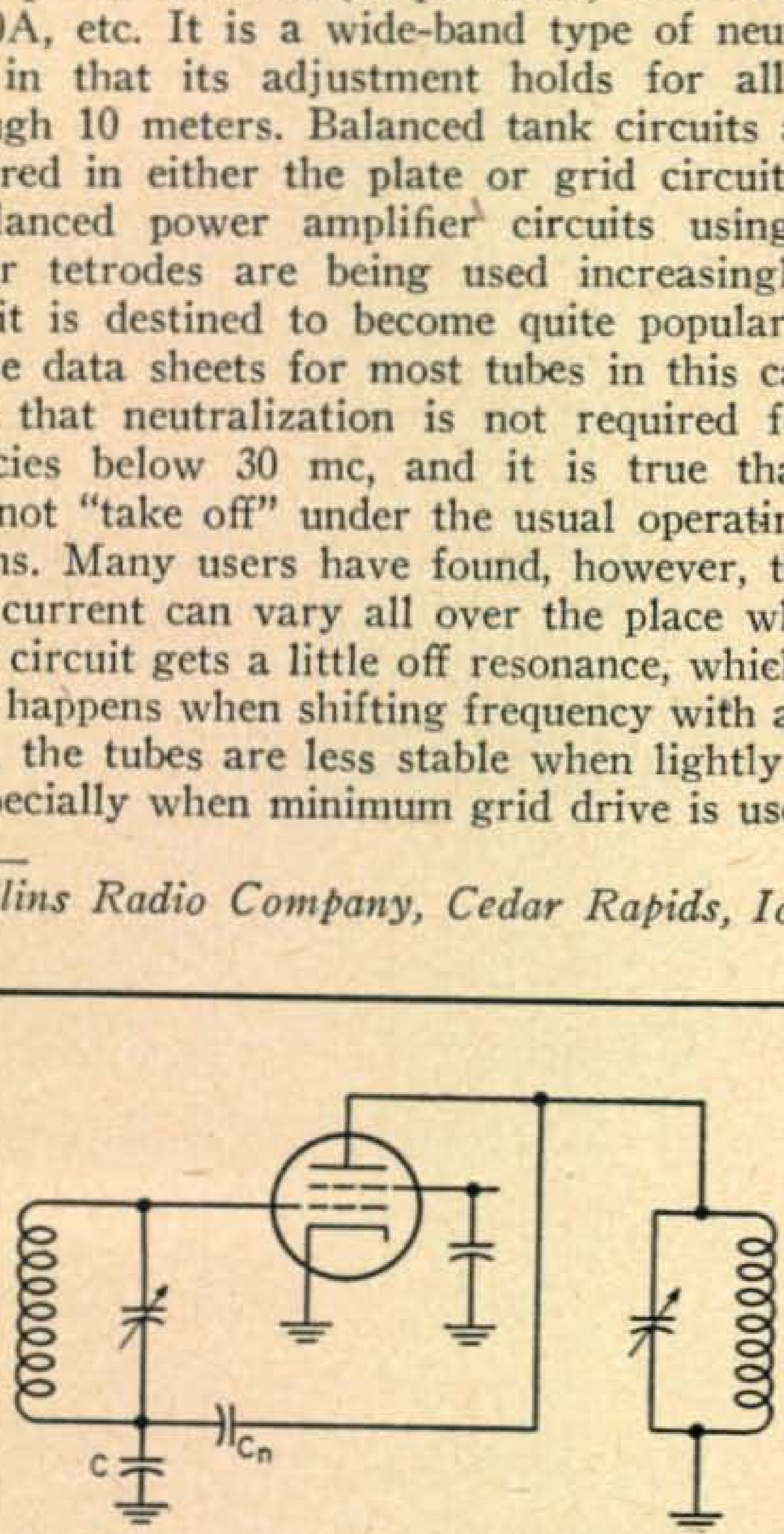


Fig. 1, above. The basic capacity-bridge neutralization circuit.
Fig. 2, right. The schematic of Fig. 1 redrawn to show how the elements form the capacity bridge.

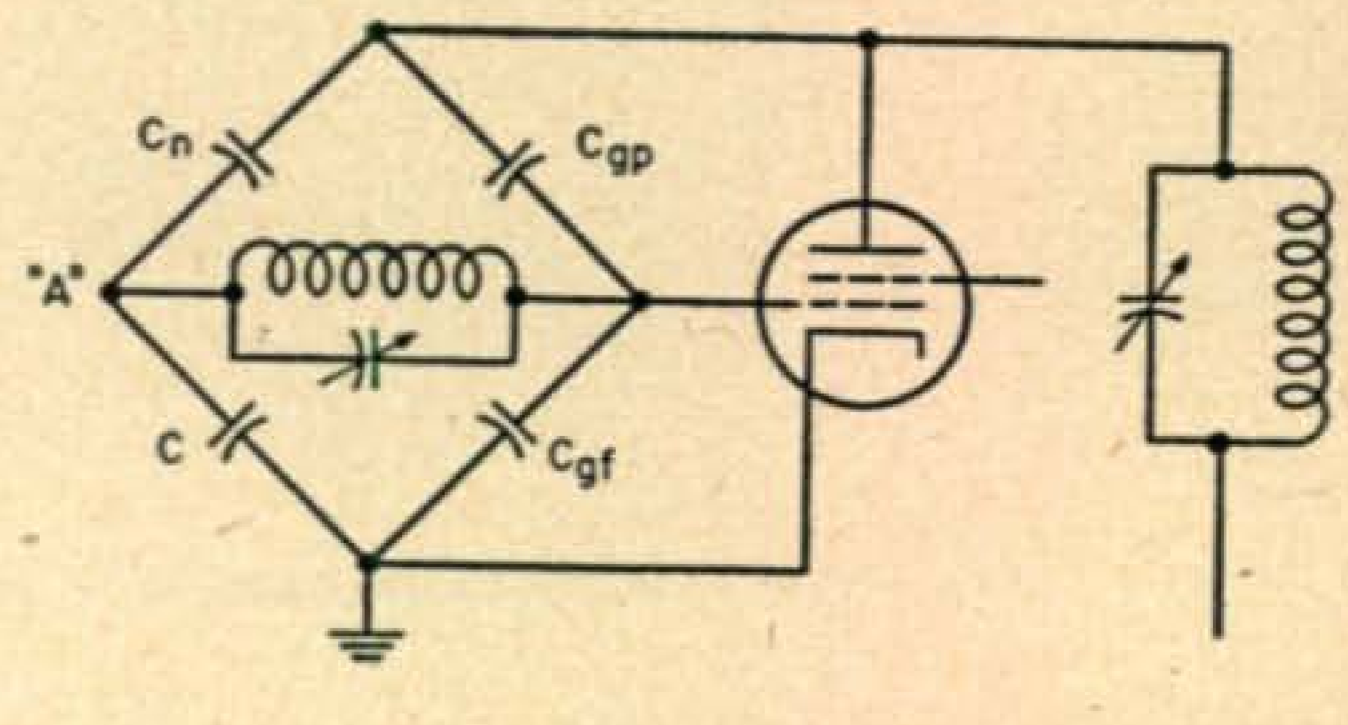
The Basic Circuit

Figure 1 shows the basic circuit and *Fig. 2* shows it redrawn to show more clearly the capacity bridge. The requirement for neutralization is

$$\frac{C_n}{C} = \frac{C_{gp}}{C_{gf}}$$

C_n may be considered to be the neutralizing condenser and C can be the usual bypass condenser in a series-fed grid circuit. C_{gp} is the tube plate-to-grid capacity as given on the tube data sheet, and it is usually in the range of .02 to .2 μμf for power tetrodes. C_{gf} is the total circuit capacity from grid to filament (or cathode) that does not pass through condenser C. This includes the tube input capacity, all stray capacities from the grid wiring and grid tank condenser stator to ground, and also the output capacity of the driver tube if it is directly capacity coupled to this grid circuit.

A closer inspection of *Fig. 2* will reveal its similarity to conventional grid neutralizing. Remove the tuning capacitor from directly across the tank coil, use a split-stator tuning condenser in place of C and C_{gf} and there you have it. When $C = C_{gf}$ the neutralizing capacity equals the tube plate-to-grid capacity, which should ring a familiar bell. Now, getting back to *Fig. 2,* we see that a voltage exists at the bottom end of the grid tank



(when power is coupled into it) that is 180° out of phase with the voltage on the grid end. Actually, in practice, this voltage at the bottom end of the grid tank is often less than one volt because C_{gf} is so much larger than C_{gp}, but it has to be there to work.

The theoretical critic will say that grid neutralization isn't perfect (which most books point out) so this circuit can't be the best either. Well, that is true, but we are more interested in something that works satisfactorily and is practical than in perfection itself. This circuit will make a tetrode handle as well on 10 meters as it would on 40 or 80 without it, which is all that we desire. Also, we should point out that this circuit is of no value in push-pull circuits. Conventional cross neutralization is best in them.

This circuit has several other advantages. On 10 meters the grid tank losses sometimes become quite high because the minimum circuit capacity is higher than desired. When a split tank circuit is used these losses practically double. Thus, the capacity-bridge neutralizing circuit will take a little less driving power than a single tube with grid neutralization. If a split plate tank circuit is used for plate neutralization the plate tank circuit losses are higher and this costs you some power output. Also, split-stator tank condensers are more expensive than single section condensers. If you desire more tuning capacity on 80 and 40 meters than on 10 and 20 meters you can parallel both sections of a split stator condenser on 80 and 40 and use just one section on 10 and 20. One more important advantage is that single-ended circuits are much more easily and economically band switched.

Neutralizing a 4-250A

Now let's see what some circuits and typical values of capacity will be for a power amplifier circuit using a single 4-250A as in *Fig 3*. The grid and plate tank tuning capacitors are chosen in the usual manner and their values do not affect the neutralizing. From the data sheet we find that C_{pg} is .12 μμf and the tube input capacity is 12.7 μμf. To this 12.7 μμf we must add the other grid circuit stray capacities which differ with choice of parts and wiring but can be assumed to be 10 μμf for this discussion—which gives 22.7 μμf for C_{gf}. With C_{gp} and C_{gf} established we can find the ratio of C_n to C that is required from the equation for neutralization. Any values of C_n and C that satisfy this ratio will neutralize the circuit but practical considerations restrict this choice to some extent.

Since C also acts as a bypass condenser it must offer a low impedance path for the harmonic components of the grid current. A value of C that is several times larger than a proper value of grid tank circuit capacity is ordinarily sufficient.

It can be observed that C_n also results in added capacity across the plate tank circuit so, in order to keep the plate tank circuit losses down on 20 and 10 meters, it is best to keep the value of C_n small. Some value around 5 μμf or less is usually a good practical choice. Regular neutralizing capacitors intended for use with triodes can be used.

A suitable choice of values which satisfies these limitations and the equation:

$$\frac{C_n}{C} = \frac{C_{gp}}{C_{gf}} \text{ is } \frac{5.2}{1000} = \frac{.12}{22.7} \text{ or } \frac{2.6}{500} = \frac{.12}{22.7}$$

Thus, if 1000 μμf is chosen for C, the C_n will be approximately 5.2 μμf, or, if 500 μμf is chosen for C, then C_n will be approximately 2.6 μμf. Either set of values will perform equally well. Since the stray capacity forming part of C_{gf} may differ from the estimated 10 μμf, and since the actual value of C may be 10% from its marked value, these values of C_n are only approximate but they are accurate enough for purposes of choosing the type and size of a neutralizing capacitor.

Adjusting the Circuit

The actual neutralizing adjustment can be accomplished by adjusting any of the four capacities in the bridge. A simple way is to vary C_n by using a regular triode-type neutralizing condenser. Perhaps a more economical way is to choose C so that C_n is only 1 or 2 μμf, then C_n, can simply be a metal plate mounted on a feedthrough and spaced ¼ to ½ inches from the side of the tube envelope near the plate. The proper size plate can be found by experiment, but a plate with 5 to 10 square inches area is a good size to start with.

Capacity C can be adjusted, instead, by using a smaller value than calculated, and then adding small condensers across it until satisfactory neutralization is obtained. C_{gf} can be adjusted by

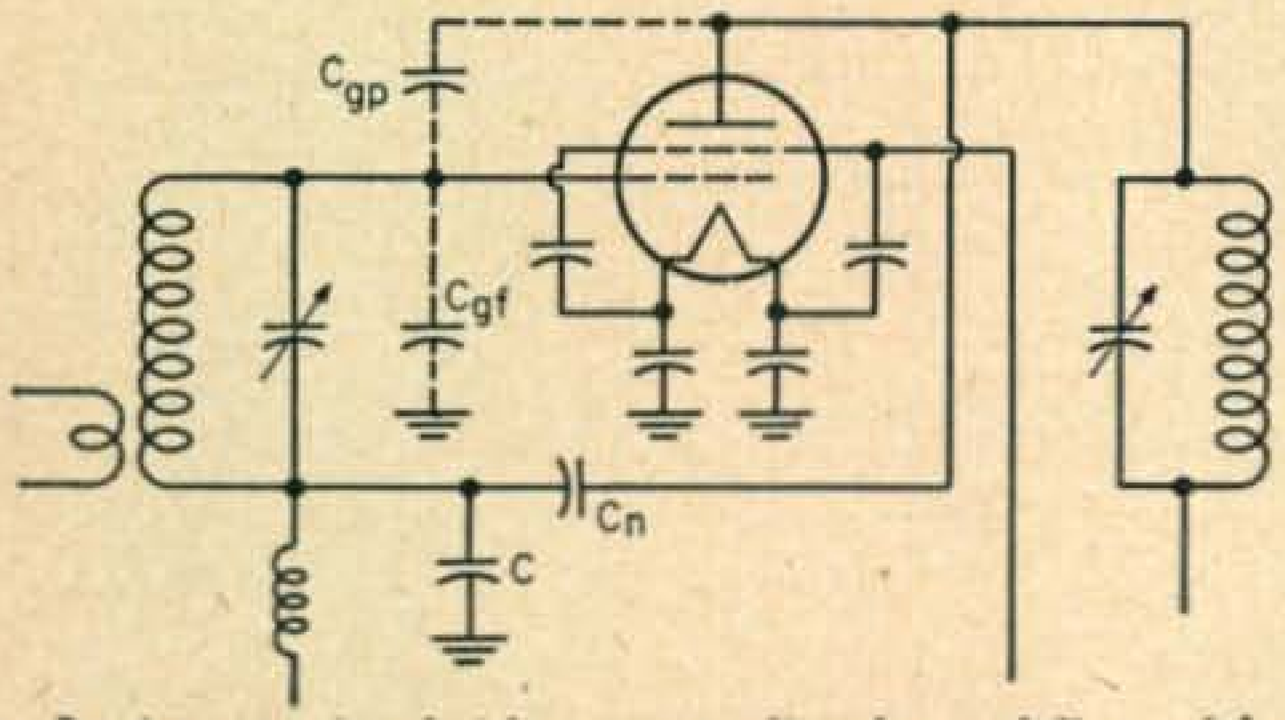


Fig. 3. A capacity-bridge neutralized amplifier with link coupling to the grid tank circuit.

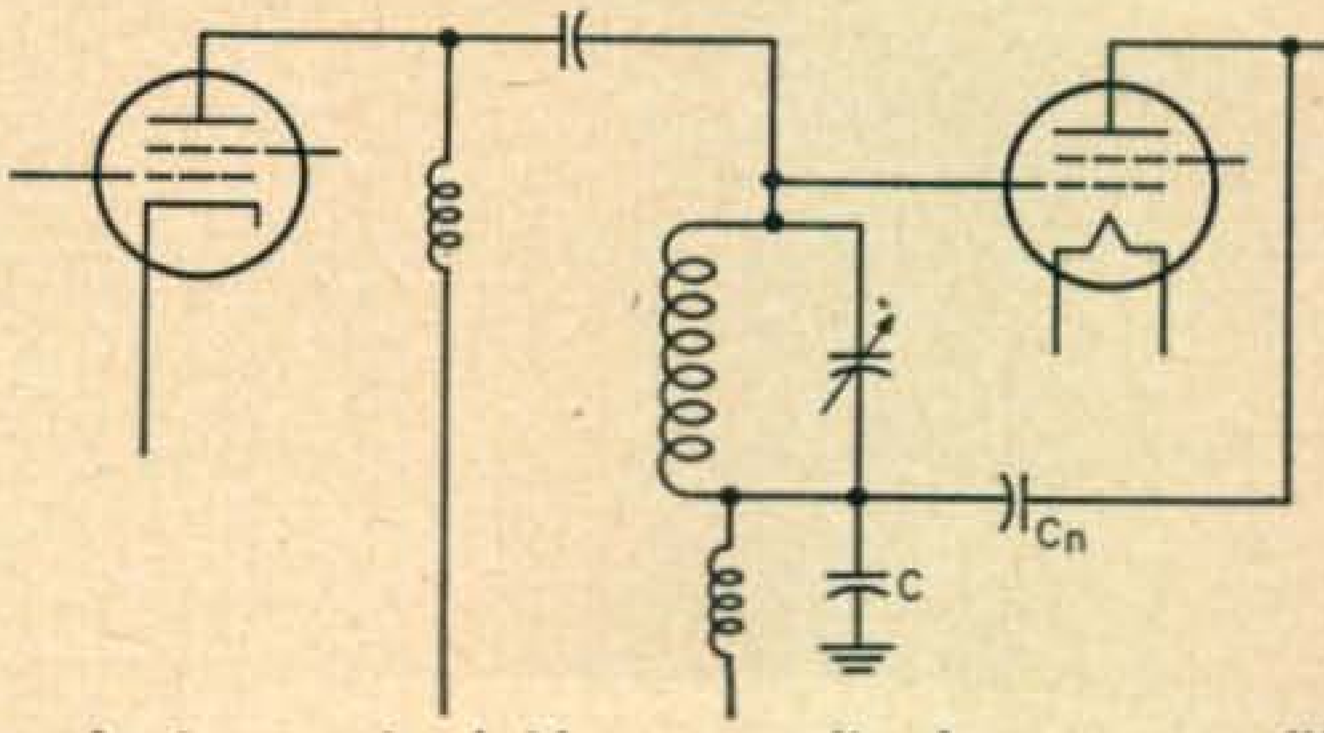
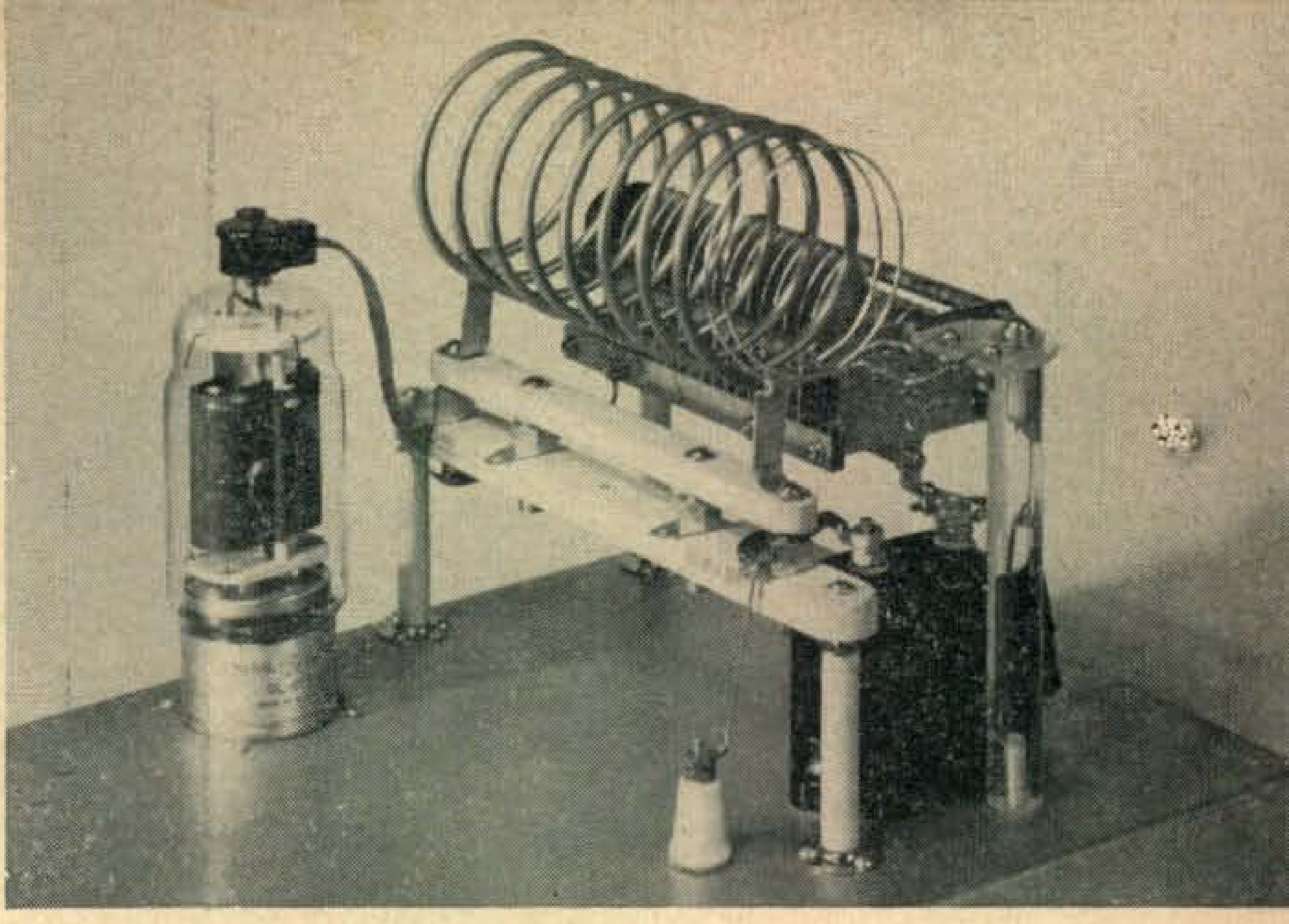


Fig. 4. A capacity-bridge neutralized power amplifier with the driver tube capacity-coupled to the grid.



Capacity-bridge neutralization, permitting single-ended construction, simplifies circuitry.

placing a small variable condenser of 10 μμf or so from grid to ground, but this is undesirable because it increases the grid tank capacity, which raises the grid tank losses on 20 and 10 meters.

The plate-to-grid capacity can be paralleled with a small adjustable capacity very easily however. Just drill a clearance hole ¼ to ½ inch diameter in the chassis near the grid terminal of the tube socket and let a wire that is soldered to the grid terminal stick up through this hole an inch or so. This wire can be bent or clipped to adjust neutralization. Remember we are dealing with just a few hundredths of one μμf capacity in this case. Of course, we should use about a 30% greater value of C_{gp} in the equation than the actual tube plate-to-grid capacity so that a suitable value of C will be chosen to start with.

Perhaps this is a good place to give some tips about making the actual neutralizing adjustment. The writer recommends that the "grid current peak and plate current dip" method be used because we are primarily interested in minimum reaction on the grid from the plate circuit. First set the capacities to your estimated values, then fire the stage up and tune both grid and plate circuits to resonance. Now tune the plate tuning condenser off resonance on the low capacity side and watch the grid current meter. If it reads higher as you go off resonance then the capacity of C_n must be increased (C_{gp} decreased or C decreased). Very often this grid current peak is not very pronounced and you may have to tune thru resonance from one side to the other to get the trend. It will be more pronounced with the plate lightly loaded rather than fully loaded. The best adjustment may be hard to determine exactly because anything close to optimum will make a substantial reduction in that grid current swing on 10 and 20 meters.

When tetrodes are connected in parallel the neutralizing capacity doesn't just double because the stray grid capacity does not ordinarily double. It must be figured out again. The plate-to-grid capacities are added together to get C_{gp}. To get C_{gf}, add the two input capacities together, and then add on the strays which will be slightly more than for a single tube. For example, for parallel connected 4–250As, C_{gp} becomes .24 μf. The stray grid-to-ground capacities may be estimated at 12 μμf so that $C_{gf} = 12.7 + 12.7 + 12 = 36.7$ μμf. By choosing 1001 μμf for C and using the equation again

$$\frac{C_n}{1000} = \frac{.24}{36.7}$$

we find C_n to be 6.54 μμf.

When the grid is directly capacity coupled to the plate of its driver tube, as in *Fig. 4*, the output capacity of the driver tube must be added in as part of C_{gf}. For example, if a 2E26 is used to drive a pair of parallel connected 4–250As, the 7 μμf output capacity of the 2E26 must be added in, which gives 36.7 + 7 or 43.7 μμf for C_{gf}. Using 1000 μμf again for C, we find C_n to be 5.5 μμf.

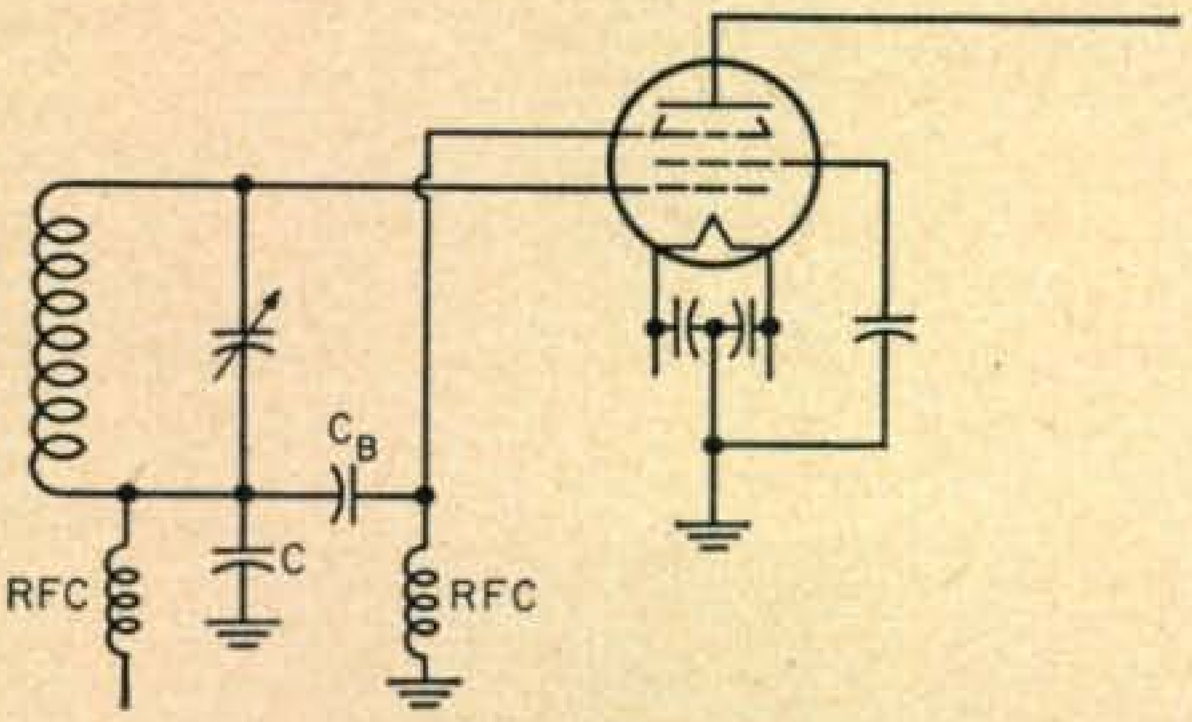


Fig. 5. The plate-to-beam-forming-plate capacity may be used for the neutralizing condenser in tubes such as the 813 where the beam-forming plates are brought out to a separate pin on the tube base.

Special Trick with the 813

The boys having 813s can use a little trick shown in *Fig. 5* which uses the plate-to-beam-forming-plate capacity for C_n. This avoids increasing the plate circuit capacity. The beam-forming plate is connected to the bottom end of the grid tank circuit through the blocking condenser C_b. A d.c. return to ground for the beam-forming plate is provided by RFC which may be an ordinary 2.5-mh r.f. choke. The value of C_b is not critical but a good bypass value of 1000 μμf is suggested. A considerable amount of r.f. current flows through C_b and C so something larger than postage stamp micas should be used. The r.f. path from the beam plate terminal through C_b, C, and the filament bypass

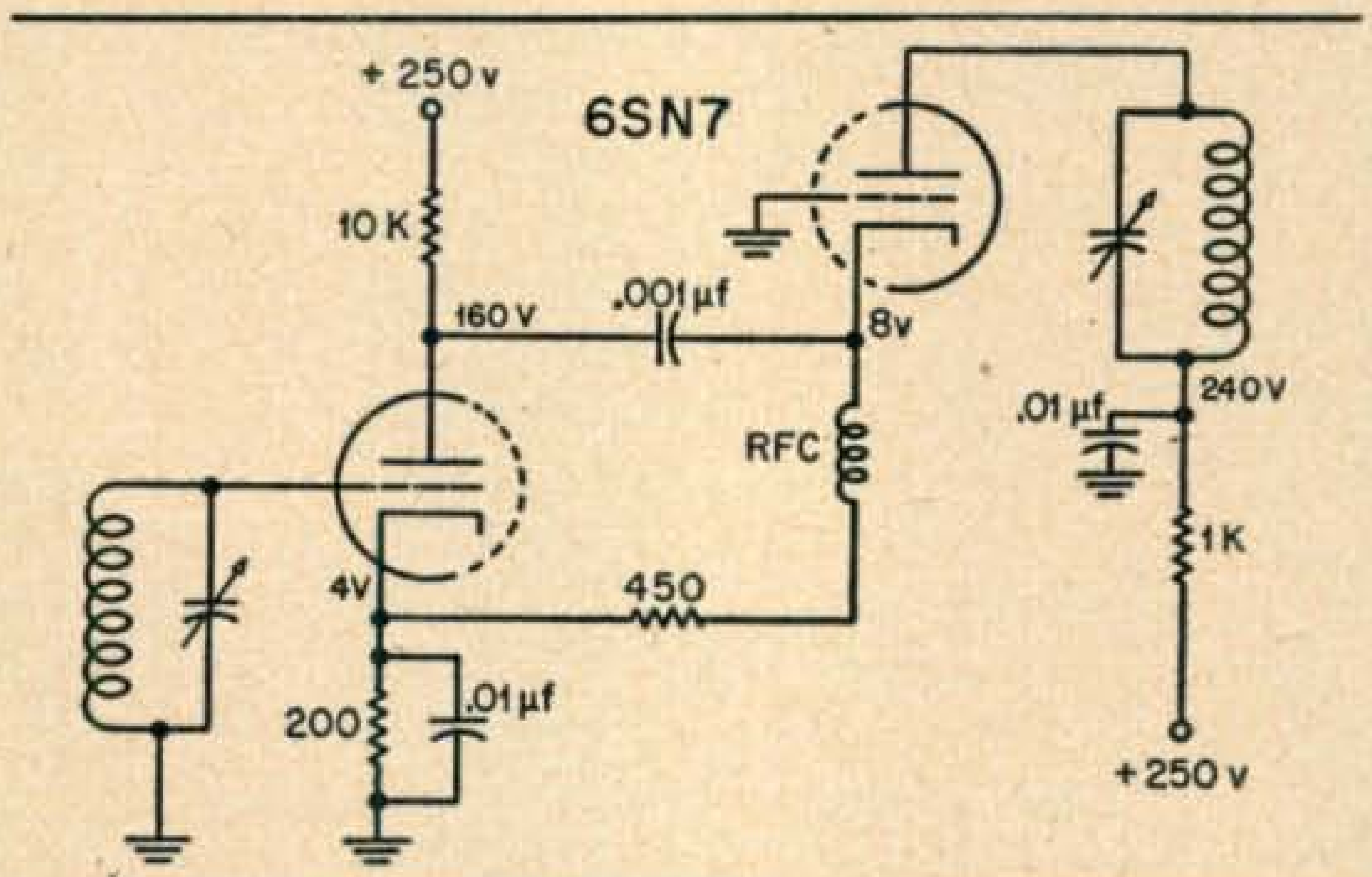
(Continued on page 54)

Gain Without Headaches

C. KENNETH FALOR*

Whether as a v.h.f. front end, the first i.f. amplifier of a 420-mc superhet, or as an r.f. or i.f. amplifier in your communications receiver, the Wallman circuit has much to recommend it. Let's put it to work in our shacks!

FROM TIME TO TIME articles have appeared in various radio publications describing the Wallman radio frequency amplifier. It nevertheless does not seem to have the favor this writer believes it deserves. Those examples we have seen have all adhered rigidly to the configuration originally submitted by Wallman and his associates in a paper published in the *Proceedings* of the Institute of Radio Engineers. Now this is all very well and good in so far as it goes, but perhaps many experimenters have shied away from fulfilling certain requirements of that original circuit or simply could not see how such an apparently intelligence-insulting circuit could be worth the effort. Thus a darned good, versatile circuit has been shelved in too many cases. At the end of these notes a description of how and why the circuit functions will be presented.



The Wallman circuit as heretofore presented has called for the use of two separate tubes per stage—a 6AK5 and a 6J6—and then one of the 6J6 sections is not used. This may seem uneconomical and space-consuming where a single pentode might be more conventionally used. Adherents to the original circuit may point to the somewhat better signal-to-noise ratio and, with proper matching conditions, a greater bandwidth. That is all true but involves considerations and restrictions not easily understood by many and not important for many purposes of the experimenter.

Now we are getting to the point. The Wallman circuit constructed with certain adaptations and simplifications is capable of excellent performance in many roles and can be constructed to use one dual triode. Would you like a high frequency booster for 144 mc or for your FM or TV receiver? Or perhaps an unusually quiet and stable r.f. stage in the front end of your present receiver? Or in the i.f. of any receiver? With a tube to fit the frequency, the Wallman fills the bill!

216 S. Birney St., Bay City, Mich.

I have worked out the following adaptation of the Wallman circuit with an eye to simplicity and effectiveness and it can easily be incorporated into many existing receivers.

The above is a tested circuit using a dual triode 6SN7 as an i.f. amplifier stage in my 18 mc to 550 kc home receiver. I have also used it as an r.f. stage in the front end of the same receiver with a measured stage gain, as compared to a 6SK7, of 40 × as to 45 ×. In this case the input and output inductances were the ones usually found in such a receiver . . . nothing was altered except the tube and its immediate circuit components. When used in the front end the low signal-to-noise ratio of the pentode in the presence of a carrier was well demonstrated, as the Wallman was noticeably quieter.[1] In the i.f. of this particular receiver the gain was improved and *stable!*

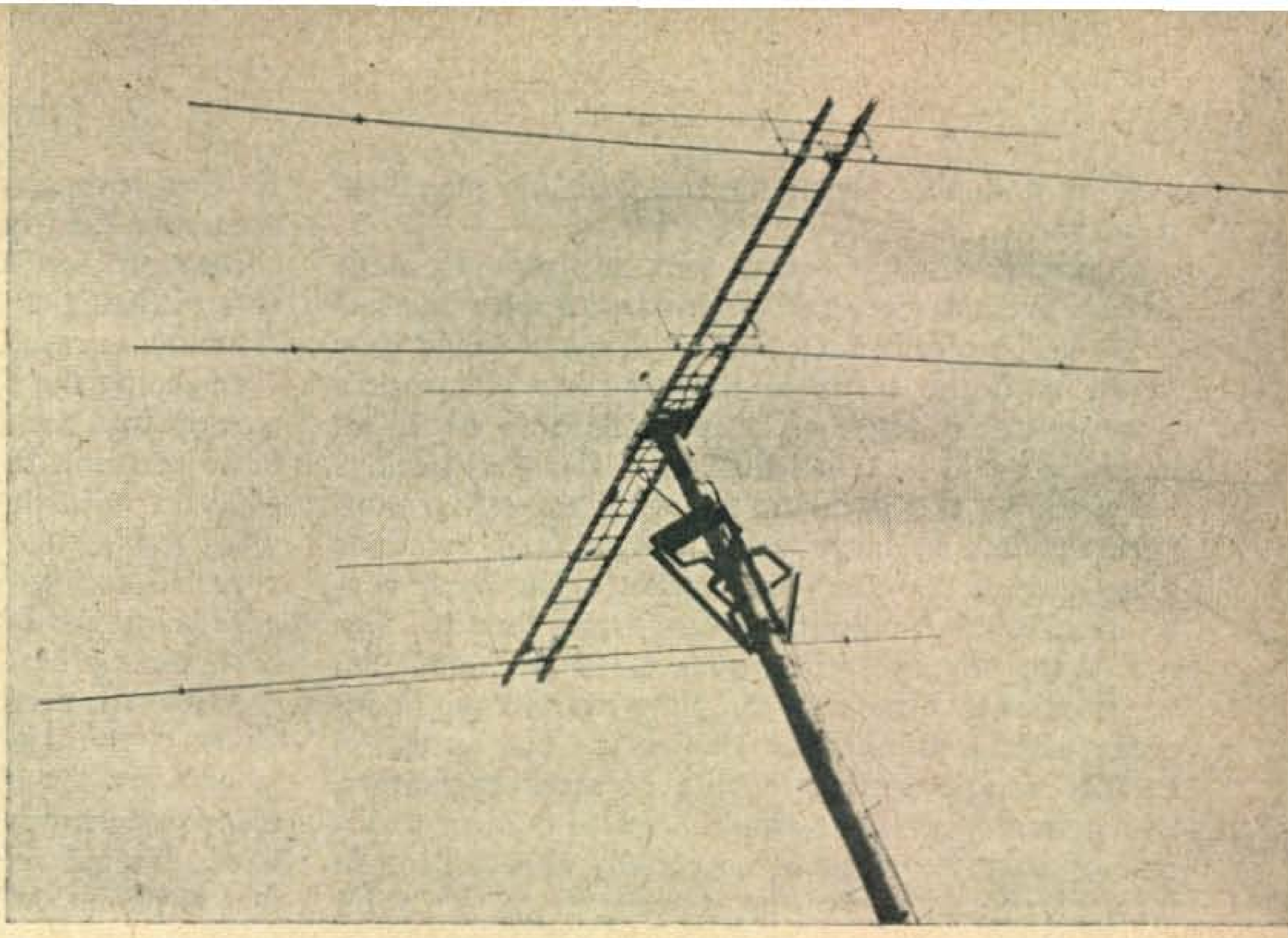
The sample circuit above merely outlines a basic consideration for an excellent amplifier without resorting to unduly complicating considerations. The 12AT7 should be excellent for most purposes, especially high frequencies. A.v.c. may be used provided it is not excessive and if the receiver tube sequence provides that the clipping of modulation by a high negative a.v.c. voltage occurs in such a fashion that when the resulting wave form is presented to the detector for demodulation it is properly phased for the type of detection employed. This means that a.v.c. could be effectively used only when this factor is considered.

The only portion of the above circuit that might be called important in design is to see that you select the r.f. choke to be effective at the lowest frequency to be used and that it maintains a reasonable efficiency up to the highest one to be used.

Many experienced radio people might examine

(Continued on page 54)

[1] Wallman has pointed out that the noise figure of the circuit will be considerably improved by neutralization of the first stage, even though oscillation is not a problem.—*Editor.*



There is more to beam design than meets the eye. Herb built a "multiband" job and had his troubles. Separate units on 10 and 20, mounted on the same boom, solved most of his problems.

W9EGQ Builds Another Beam

HERBERT S. BRIER, W9EGQ*

BEING A HAM (and maybe not so young), last spring turned my fancy towards a new beam. Reports such as, "Your signals are two S units weaker than W9. . . ," especially on twenty meters, had tempered my enthusiasm for the old one. *Figure 1* shows the essential details of my new fancy.

Described originally by W3NJE[1], the beam is basically a four-element, close-spaced one for twenty meters, with phasing networks in the centers of the elements to permit them to operate as four pairs of colinear elements on ten meters. This article is not intended to tell the reader about the wonderful beam W9EGQ built; *Go ye, therefore, and do likewise*. Quite the contrary, the beam was a failure, but my failure may help anyone who entertains ideas of a multi-band parasitic array.

For strength, combined with lightness, I chose all-metal construction. The boom consists of two, twelve-foot, magnesium ladders, joined in the center and mounted in a cradle so that it can be tilted parallel to the pole to facilitate antenna adjustments.

Elements are of 61S-T6 aluminum alloy tubing. Each quarter-wave one consists of a six-foot length of 1½" O. D., 0.065" wall tubing, into which the end of a twelve-foot length of 1⅜" O. D., 0.035" tubing was telescoped after the former was laboriously reamed out a few thousandths of an inch. Umbrella guys within four feet of the ends of the elements were added after discussing wind velocities and ice loads to be expected with representatives of the local utility company.

These elements are compromises. Those originally selected were calculated to sustain a minimum ice load of one-half inch without guying, even in "plumber's delight" construction. Their specifications called for six-foot lengths of each of the following sizes of tubing per quarter-wave element: 1¼ O. D., 0.120" wall; 1" O. D., 0.100" wall; ¾" O. D., 0.065" wall—all of 24 S-T3 aluminum alloy.

Although 24S alloy is approximately one-third stronger than 61S, it has been almost entirely replaced by 61S for commercial purposes, because of the latter's superior working qualities and somewhat lower cost. Also, warehouses do not, ordinarily, stock aluminum tubing in wall thicknesses exceeding 0.083". To have special sizes run off costs approximately $60.00 a size, plus cost of the material.

Before putting the antenna on top of the pole, we gave it a preliminary tune-up in the back yard. Unless you have set up a four-element, twenty-meter array in a thirty-five by forty-two back yard, containing three trees, a telephone pole, and traversed by power and light lines, you cannot appreciate that sentence! In spite of the forest growing between the elements, and houses and garages on three sides, tuning the phasing networks increased the field strength across the alley 250 percent on twenty meters and slightly less on ten meters.

For evaluating results on the pole, we ran a temporary extension telephone between the one in the operating room and the top of the pole. Next we put "twin-lamp" standing-wave indicators in the 300-ohm feedline at the transmitter and at the radiator. Then I called up W9HEI (nine miles away) who manned his 75A-1 to act as field-strength man. We thus had instant and simultaneous communication between the man on the pole, the one at the transmitter, and the one at the field-strength meter, as

* *385 Johnson St., Gary, Ind.*

[1] A. M. Pichitino, W3NJE, "A New Principle in Two-Band Rotary-Beam Design," *QST*, October, 1948.

well as a double check on the feed-line standing-wave ratio.

Our first discovery was that adjustments made on the ground were far from correct with the antenna in the air. In fact, neither director would tune at all until the turns in the network inductances were squeezed together. After this was done, all elements could be tuned through a resonant peak.

As tuning the parasitic elements through resonance resulted in large variations in final amplifier plate current, an effort was made to find some correlation between amplifier current and forward signal. With one exception, none could be found. An adjustment that reduced the plate current might increase signal strength, or vice versa. The exception to this was a setting of the director capacitors, which would cause the amplifier plate current to increase sharply and cause an equally abrupt drop in forward signal. Decreasing capacity from this point slightly would drop plate current a bit and bring forward gain to a very sharp maximum, the adjustment being very critical on the first director on twenty.

All field-strength measurements were made with the plate current held to the reference figure of 200 milliamperes; however, we could never observe a detectable difference in field strength from a twenty or thirty milliampere variation from this point. Possibly this would not hold true for a conventional field-strength meter.

While on the subject of plate current and loading, here are the results of another test. Conditions were: frequency, 28,500 kilocycles; power input, 300 watts; feed line, 100 feet of 300-ohm ribbon, one-kw size; standing-wave ratio, approximately four-to-one; S-meter reading, eighteen db over nine. Readjusting the radiator network capacitors dropped the standing-wave ratio to less than two to one. At the same time, power input to the final amplifier dropped almost to its unloaded value, and the S-meter reading decreased sharply. Increasing coupling to restore the former plate current then increased the S-meter reading to a trifle above 18 db over 9, the best it had been to that time. Further adjustment of the condensers in the radiator network increased both the final amplifier plate current and the standing-wave ratio.

A different length of feed line would have changed the loading s.w.r. curve undoubtedly, but it would have been the merest coincidence had the length been such that the adjustment for minimum standing-wave ratio and maximum plate current coincided.

Neither reversing the connections to the feeders or reversing the "twin-lamp" affected either the plate current or the apparent standing-wave ratio, indicating that the line was well balanced and that "antenna currents" on it were low.

In tuning the parasitic elements, it was discovered quickly that the first director was extremely critical in adjustment, the second one much less so, and the reflector adjustment very broad for maximum forward gain, although it was extremely sharp when adjusted for best front-to-back ratio. No forward gain being lost by doing so, the reflector was always adjusted for best front-to-back ratio.

With all networks peaked, the array exhibited about a twenty db front-to-back ratio on twenty meters. On ten meters, it had an approximately circular pattern with very sharp nulls at oblique angles to its line of fire. In operation, a CQ on twenty-meter phone, when the East Coast was coming through, often would burn a hole in the band at that frequency from the number of stations replying. DX results were not as startling, although apparently somewhat better than with the old two-element beam; however, discrimination was poorer. On ten meters, results were far inferior, in all respects, to the old three-element array. On both bands, a small change in frequency caused a noticeable drop in both transmitted and received signals. Most disturbing were reports that others were experiencing similar results, fair performance on twenty meters and poor performance on ten.

When W9EBQ, W9HEI, and I were discussing the theory of operation of this type of array, the question of whether each half of an element opened in the center would resonate at exactly twice the original frequency came up. We agreed that they probably would not. I argued, however, that adjusting the phasing networks would automatically compensate for any discrepancy. W9HEI said it would not, and W9EBQ said, "How will we know unless Herb tries it?"

Well, now we know. With a grid dip meter, we measured the resonant frequencies of the phasing networks when adjusted for maximum forward signal from the antenna. Invariably, they were resonant to the frequency used in tuning the array. As W9HEI takes delight in pointing out, the function of such networks is to appear as open- or closed-circuits at their parallel- and series-resonant frequencies. The only frequency to which they could be resonated would be the transmitter frequency; yet, in a parasitic array, the directors and reflectors are normally self-resonant approximately five per cent above and below the design frequency. When properly adjusted, therefore, the elements and the networks will be resonant to different frequencies—a fact verified by the grid-dip meter.

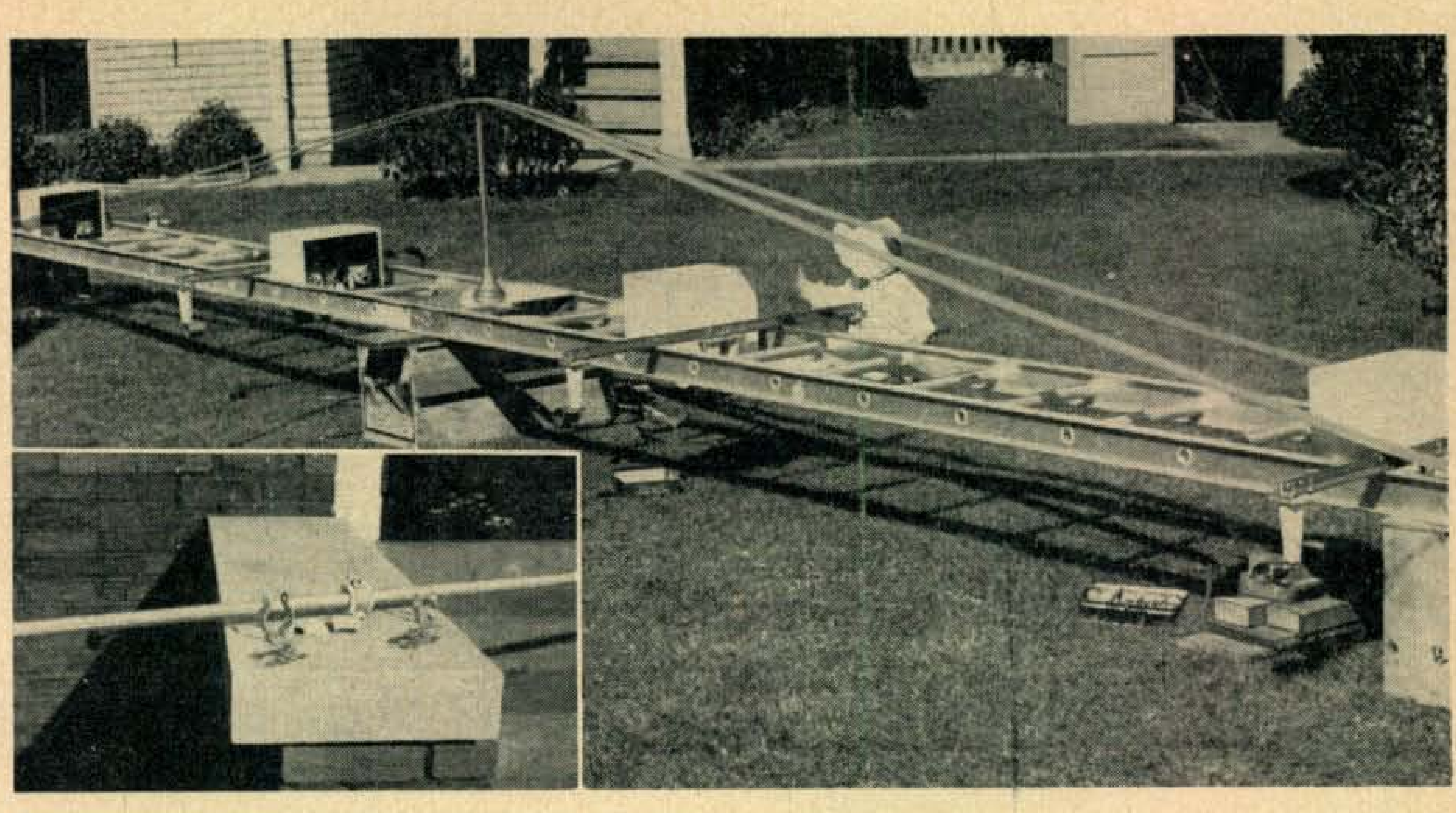
Comparing the lengths of each half element with

FUNCTION	DUAL-BAND ARRAY		OLD THREE-ELEMENT BEAM	FOUR-ELEMENT BEAM (TYPICAL)
	CALCULATED	ACTUAL*		
RADIATOR	16′ 5″	16′ 5″	16′ 6″	16′ 2½″
REFLECTOR	17′ 3″	17′ .	17′ 4″	17′ 2″
1ST DIRECTOR	15′ 9″	15′ 6″	15′ 6″	15′ 6″
2ND DIRECTOR	15′ 9″	15′ 6″	......	15′ 4″

* Three inches subtracted from calculated lengths of parasitic elements for connections to phasing networks

Spacing between elements, seven feet (two-lengths wavelength at ten meters)

Lengths in columns one and two are for each half element. Those of columns three and four are for the full ten-meter element.



The insert shows the Mineralac conduit hangers.

those of the old three-element beam and of a widely-duplicated four-element one (see table) revealed that they corresponded rather closely. We decided to try the array on ten with the networks removed completely. Ten-meter signals immediately increased, but the combination was still inferior to the old beam. Also, at times, it was difficult to tell which was the front and which was the back of the beam.

The obvious thing to have done at this time would have been to replace the networks, change the element lengths, and try again. However, winter was upon us, and for reasons to be discussed more fully later, we decided to forget about the dual-band array. Instead, we removed the first director, placed shorting bars across the centers of the remaining parasitic elements, and fed the radiator from a 300-ohm line through a quarter-wave length of 52-ohm coaxial cable to match its estimated 10-11 ohm center impedance. We had a three-element, twenty-meter array, with two-tenths wave spacing between radiator and director, and one-tenth spacing between radiator and reflector.

For ten meters, we mounted four elements to the boom by means of insulated *Mineralac* conduit hangers (see photo) at approximately two-tenths spacing and T-matched it to another 300-ohm line. All lengths and spacings are given in *Fig. 2*.

The decision to discard the radiator matching network was made reluctantly, because it always did such a good job of putting power into the radiator. We decided, however, that it was probably its high Q that made the arrays using it so frequency-conscious.

The performance of these untuned arrays follow. Twenty meters: five to six db better than the dual-band array for DX; front-to-back ratio, forty-four db. Ten meters: at least ten db better than the dual-band array, even with the networks removed; front-to-back ratio, twenty db, with the previously observed nulls at oblique angles. Incidently, the weather broke before the ten-meter conversion was completed; therefore, I operated for several weeks with only two elements in place. This combination out-performed the big array. Adding the additional element further increased the gain.

After several weeks of operation, one conductor of the ten-meter "T" loosened. Although final amplifier input gyrated wildly when the wind blew, the antenna seemed to get out just about the same whether one or both sides of the "T" were in the circuit. However, the resulting arc put flashes on television receiver screens for blocks around. This gave us an excuse to try an RG-8 U feed line and the gamma match.

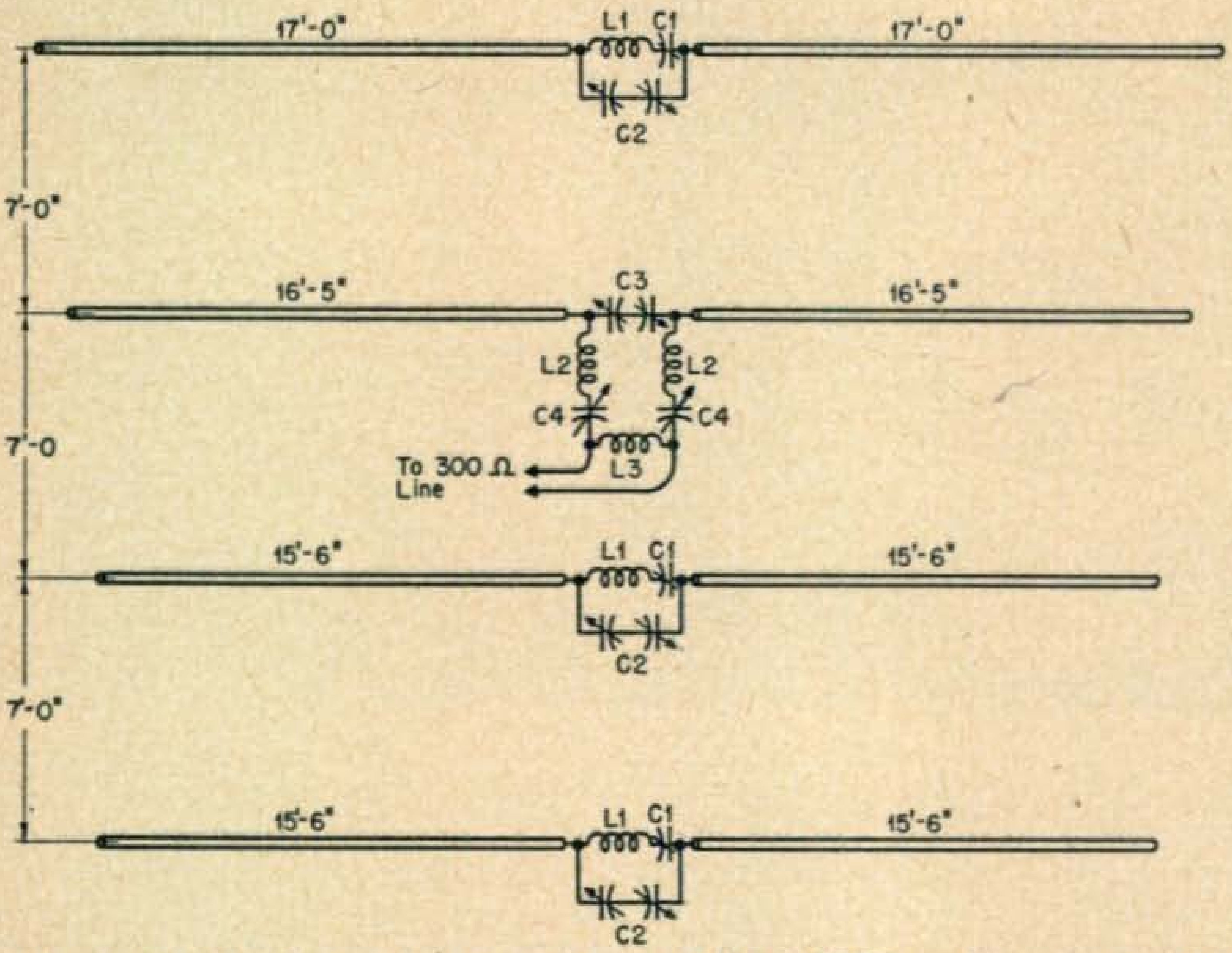
Eureka! After six days of calling DX, I raised a ZS, and reports from the West Coast were down twenty db. This was even worse than we had expected—and several of us had previously had some rather sad experiences with coax.

Doubting the coax-type twin lamp, which showed a standing-wave ratio of approximately three-to-one at 28.5 mc, decreasing to around two to one at 29.65 mc, I built a resistance-bridge type of s.w.r. meter. It showed exactly the same thing. Assuming that minimum s.w.r. corresponded to the radiator's resonant frequency, it was lengthened six inches. This should have lowered the resonant frequency at least a megacycle. Instead, the best s.w.r. occurred at about 29.3 mc. As the array then performed as well at 28.5 mc as it had previously with the 300-ohm line, it was left that way. The oblique-angle nulls disappeared upon lengthening the radiator.

About this time the wind snapped the pipe between the prop-pitch motor at the bottom of the pole and the beam at the top, ungrounding the boom and increasing the s.w.r. about fifty per cent. With the boom ungrounded, adjusting the gamma match had little effect on the s.w.r. This condition had no noticeable effect on the transmitted signal, but each time the pipe ends touched, there was a bad crackling noise in my receiver. Noise pickup by the antenna was slightly less with the pipe grounded.

All concerned feel that we learned much from our months of work. First and foremost, we learned, once again, that it is very, very difficult to improve on the old standby arrays. Secondly, if we ever try to make another two-band array work, we have set up the following rules for ourselves.

Set up the array in a large field, clear of obstructions, and close enough to the ground so that



C1—100 μμf variable
C2—50 μμf per section variable
C3—35 μμf per section variable
C4—116 μμf variable
L1—7 turns #8, 3½" dia., 4¾" long
L2—6 turns #8, 1-9/16" dia., 1-9/16" long
L3—4 turns #8, 1-9/16" dia., 2½" long

Details of multi-band array for ten and twenty that W9EGQ could not get working right. Condensers C_1 and C_4 are adjusted first on 20 meters and then left untouched, while C_2 and C_3 are adjusted on 10 meters.

the elements can be reached easily. Then, with the elements set to formula length, feed power into driven element and adjust all networks for maximum field-strength reading. Record all figures. Change an element length, retune, record. Repeat until proper lengths are determined for each band. Next, choose the compromise lengths giving the best results on both bands. Place array on top of pole, readjust networks again for maximum field strength. If a significant change in tuning is required to restore resonance, readjust element lengths again.

Do not assume an element is resonant because its network can be tuned through a peak. This merely indicates that the networks themselves are tuned. On the other hand, changing element lengths will shift the network resonant point and may necessitate squeezing or spreading the turns in the parasitic network coil before it will resonate.

Merely as an opinion, I now believe that stubs in the centers of the elements with means of switching them in and out of the circuit[2] might do a better job than lumped phasing networks, simply because their lengths could be changed to compensate for differences in element lengths.

Whether enough is gained from such arrays to warrant the added trouble is now doubtful in my mind. Ignoring losses in the phasing systems, the theoretical gain on ten meters over a conventional array is less than two db. without affecting the all-important angle of radiation. (W2FBA gives a measured gain of approximately six db over a dipole, while eight to ten db gain is common for conventional "wide-spaced' three- and four-element arrays.) Besides, waterproof boxes to protect the phasing devices may easily weigh more and have more wind resistance than the elements they are designed to replace. Too, splitting the elements requires a more-elaborate supporting structure than is required with unbroken ones.

How many of the poor results obtained from the dual-band array were due to the all-metal construction? Via the "grapevine," I have heard of others, using wooden construction, who had exactly the same results—fair performance on twenty meters and poor performance on ten meters. However, W2FBA warns specifically against metal cross arms in his article, and W8KML, who was associated with his brother, W3NJE, in developing the original dual array,[1] has advised against metal construction over the air.

Why all-metal construction should be taboo is mysterious; calculations show that the construction used here added only about one μμf of capacity between each element and the supporting structure. This would not seem sufficient to have caused the difficulty, considering that the new arrays built on the same boom (and with identical element lengths on twenty meters) work well. The comparatively poor front-to-back ratio of the new ten-meter array might indicate that the metal construction (or the presence of the twenty-meter elements) has undesirable effects. However, the ratio is comparable with that of another local station's array, using exactly the same element lengths and spacings, but of "plumber's delight" construction.

Possibly what we learned about field-strength meters was the most interesting of all. First, position of the meter is all-important. One twenty-meter adjustment, made with the aid of a field-strength meter 150 feet from and thirty feet below the array, doubled the meter reading. However, in operation, the array's discrimination disappeared, very "short-skip" reports were tremendous, and DX reports were down. Returning with the aid of the remote S meter restored previous conditions. Confirming the effect of meter placement is the action of the meter seventy-five feet from the base of the antenna. It shows peaks and minimums as the array is revolved, but maximum signal is *not* indicated when the array is aimed at the meter! ZS6Z discovered a similar effect in the development of his ten-twenty meter array.[2] Get the field-strength meter antenna in the same plane and at the same height as the antenna being tuned.

A remotely-located receiver has its disadvantages as a field-strength meter too. Our telephone hookup eliminated the most obvious one, but there are others. Receiver stability and meter accuracy are musts. Also, the S meter will usually respond differently to beam adjustments than a field-strength meter. The latter usually responds on an approximately "square-law" curve, and doubling field strength quadruples the meter reading. A similar change would only move the S-meter pointer three db. This is not much of a handicap, however, because the S meter more nearly shows the results of an antenna change at that ZS9's receiver.

Too much separation between the S meter and the antenna is a disadvantage. At nine miles, outside interference sometimes made it very difficult to determine nulls and measure discrimination ratios. Fading, both a short, pulsing type and a long rolling one, complicated by variations caused by passing aircraft, was also a problem. Repeated observation of each adjustment overcame these handicaps. That this took time is best indicated by a look at my phone bill—it being a "toll" call to W9HEI.

Another disadvantage to too much separation between meter and antenna is the tremendous variations in measurements made at different times of the day. For example: at noon, the following results were obtained on twenty meters: forward signal, 26 db over 9; front-to-back ratio, 44 db; front-to-side ratio, 38 db. At 1:30 AM, forward signal was 30 db over 9; front-to-back ratio 36 db; front-to-side ratio, over 84 db! As the ends of the elements came around towards W9HEI, the S meter dropped to zero and remained there during a considerable period. Similar differences are apparent on ten meters, forward signal varying by as much as thirty to forty db at different times.

Observations made by W9EBQ, who also has a 75A-1, reveal similar variations, although on a reduced scale, at a distance of four to five miles. Because of such effects, discrimination ratios etc., are those obtained between 11:00 AM and 1:00 PM. They are necessarily only approximate, but have been verified by many random ground-wave, local, and DX contacts. In addition, during all our tests, I held a still-continuing schedule with DL4LD-DL2OQ, which gave an invaluable check on our moves.

W9CWB, W9CQU, W9EBQ, W9HEI, W9MVZ, and other members of the Lake County Amateur Radio Club gave invaluable assistance in the evolution of this beam. W9CWB, in particular, spent so much time on top of the pole that he has sworn

(Continued on page 58)

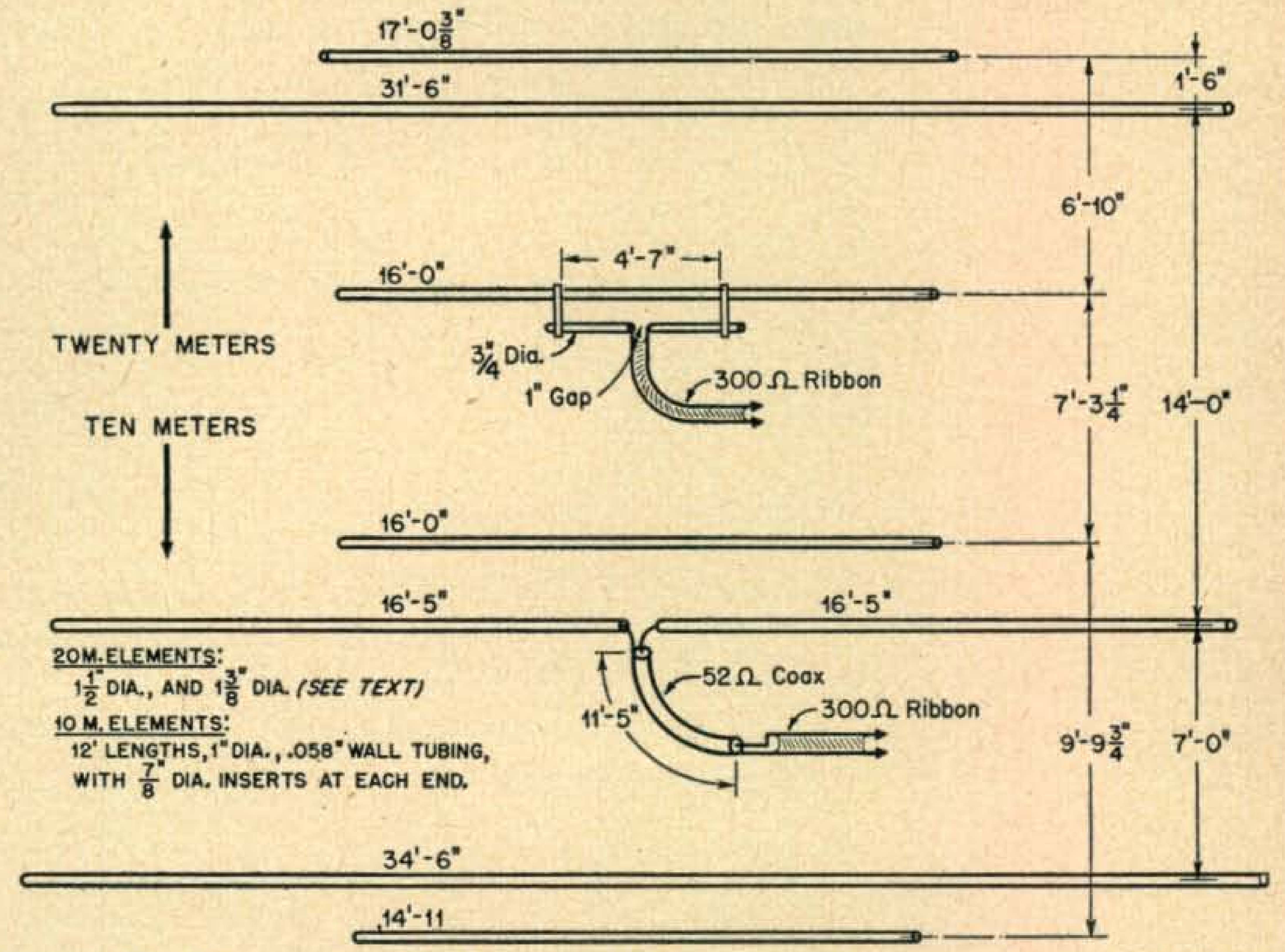


Fig. 2. The Antenna that finally worked! Twenty-meter elements are underslung on large ceramic stand-off insulators, and ten-meter elements are supported in insulated Mineralac conduit hangers, bolted to the top of the boom, giving a vertical separation of about ten inches between beams. The rather unusual lengths and spacings for the ten-meter elements were obtained experimentally in an array a few feet from the ground. The radiator had to be lengthened to 16′ 6″ before the array would work when fed with RG8-U and a gamma match. It is reasonable to assume that raising the beam also affected the optimum lengths of the other elements; however, it does work.

The gamma match consists of connecting the outer shield of the coax to the center of the radiator and the inner conductor to one side of the T. Coincidently, the position of the slider corresponded for minimum s.w.r. with either feed line.

[2] Arland Ussher, ZS6Z, "A Super-interlaced Beam For Ten and Twenty Meters," *QST*, August 1949.

The Lysco Transmaster

ALBERT E. HAYES, JR., W2BYF*

We present a factual report on a series of tests run on the latest entry in the low-power ham transmitter field.

THE NEW LYSCO TRANSMASTER is a mighty attractive little unit. It seemed unlikely to us that a single black box no larger than our old NC-101X could contain a *good* v.f.o. transmitter together with its power supply and a low-pass TVI filter, but the first few hours of operation changed our mind on that score. It can be done!

The Circuit

Electrically the Transmaster comprises a 6AG7 Clapp oscillator driving a 6AG7 buffer which, in turn, drives an 807 final amplifier to about 20–25 watts output on all ham bands from 160 to 10 meters, completely band-switched. Optional crystal control, with the crystal socket mounted on the front panel where you can get at it in a hurry if needed, is provided by the novel method of switching the crystal into the circuit in series with the series-tuned Clapp grid circuit. This arrangement permits the operator to "rubber" the crystal over a considerable range without losing the effect of crystal control. In our particular unit, with a Bliley AX-2 3.7-mc rock, we can swing the frequency as much as 100 cycles above and 1.5 kc below the marked crystal frequency. This comes in handy when the net control station starts an argument on the subject of frequency precision.

The grid circuit of the oscillator runs on 160 when 160-meter output is sought, 80 meters for 80-meter operation, and 40 for all the higher bands. The plate circuit of the oscillator is untuned for all the bands except 15 and 10. The plate circuit of the buffer is untuned on 160 and 80, and is broad-tuned on the four higher-frequency bands.

The 807 final stage is operated straight-through on all bands, and appears to be completely stable throughout its range. The entire final stage, including the 807 itself, is mounted below the chassis in order to provide a large degree of isolation between the oscillator and the output, and to simplify the reduction of TVI. This, of course, means a slight "operation" to change the final stage if tube trouble develops, but is well worthwhile from the shielding standpoint.

Keying

All three stages are keyed, by the blocked-grid method, on all bands. This system appears to be more than satisfactory, since it not only provides excellent keying, but also prevents the radiation of tube noise—frequently audible in the receiver—under key-up conditions. The only thing missing in the keying circuit is a "non-swisher"—that is, some means of spotting the oscillator on the desired output frequency without actually radiating a signal. This could be coupled well with a switch enabling the operator to key the final alone when 100% breakin operation is not a necessity. The ability to key the final alone might soften the keying characteristic a bit on 20 and 10 where the oscillator signal is so weak as to be almost inaudible in the receiver when the key is up. The keying is now a lot better

* *Editor, CQ*

than the average keyed v.f.o. signal to be heard around the ham bands. Most of the reports we've gotten on 20 during the past few days have been "T9X," and that's something on a band where the "X" is almost archaic.

Stability

As is the case with almost all v.f.o. rigs, there is a fair amount of drift during the first 10 or 15 minutes of operation. After the Transmaster has been running for about 15 minutes it is indeed as stable as a rock from a drift standpoint. Minor line voltage fluctuations, such as the drop in voltage when the refrigerator starts up, have no noticeable effect on the output frequency. The VR-150 associated with the oscillator screen supply seems to have solved that problem quite well.

The only thing we noticed which should be watched carefully on the stability side of things is to see that the cabinet lid is undisturbed during operation. The oscillator tuning elements are above the chassis, and the position of the lid seems to have quite an effect on the frequency. Since the rig is 100% bandswitched, we drilled a couple of holes in the lid and clamped it down with a pair of self-tapping screws. This has solved the stability problem.

We haven't had a chance to do a "heat run" on our unit, but the stability on that score—changes of ambient temperature—seems to be above average.

Mechanical Details

The Transmaster is about the size of the average communications receiver and presents a very nice appearance on the operating desk. The celluloid cover on the large fan-type main tuning dial appears to have a tendency to warp a bit, but we corrected that on ours by pulling out the original cover and putting in a heavier sheet. A slice of glass might make an even greater locking setup, and we're going to pick up a glass cutter one of these days and see what can be done along those lines.

Two controls only are used in changing frequency: the oscillator, or "main tuning" control, and the final amplifier plate tank condenser. If it is desired to change bands, a single switch performs that operation for all circuits. It is really as easy

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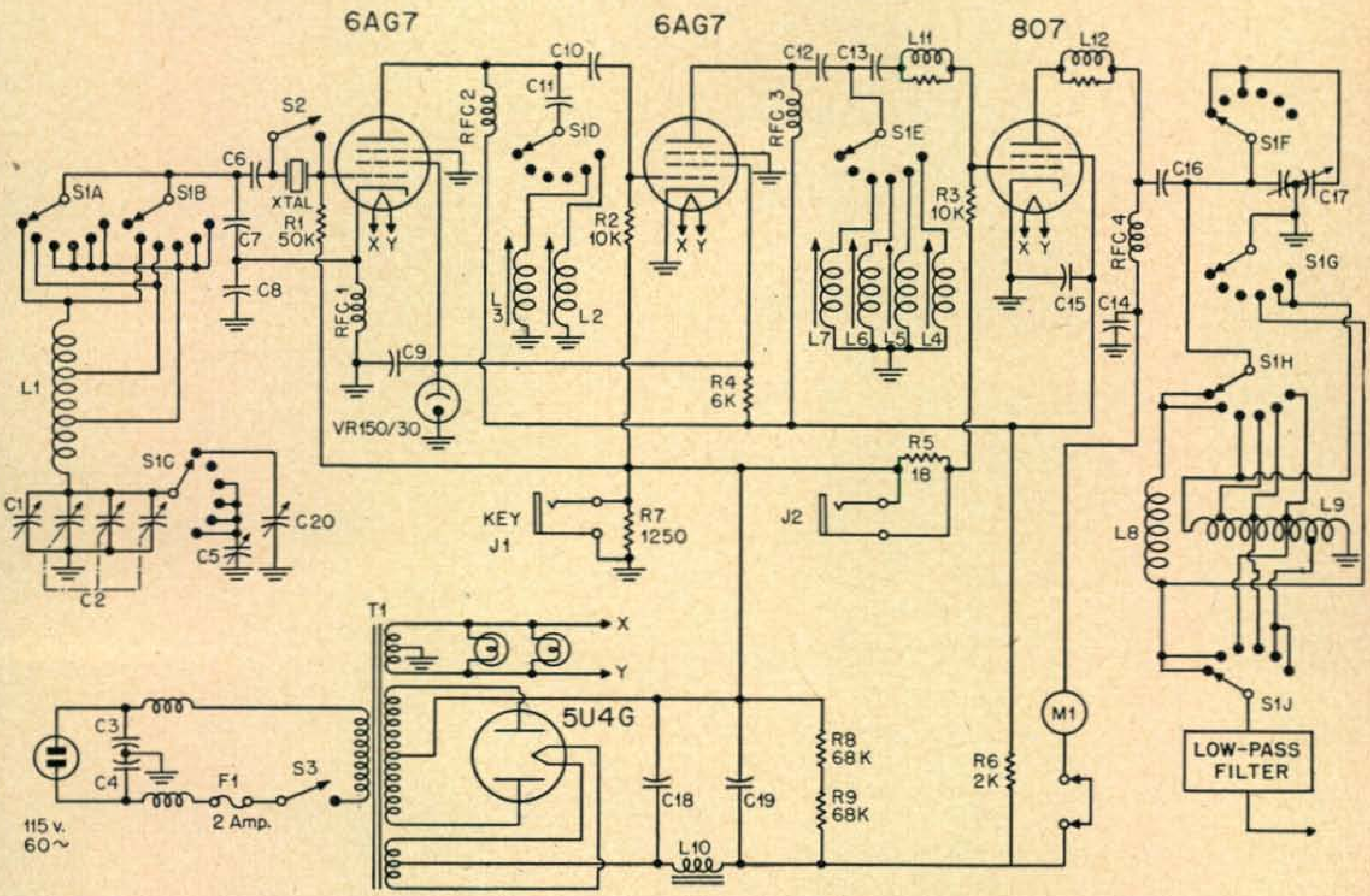

C1—7-35 μμf ceramic variable
C2—15μμf per section
C3, C4—510 μμf, mica
C5, C20—7-35 μμf ceramic variable
C6, C10—75 μμf, mica
C7, C8—500 μμf, mica
C9, C11-15—.006 μf,
C9, C11-15—.006 μf, mica
C16—.01 μf, mica
C17—100 μμf per section (Bud MC911-A)
C18, C19—4μf, 600 w.v.
L1-L7—Special Lysco coils, available only from manufacturer
L8—Barker & Williamson #3012
L9—Barker & Williamson #3014
L10—8 Henry filter choke
R1—50K, ½ w.
R2—10K, ½ w.
R3—10K, 2 w.
R4—6K, 10 w.
R5—18 ohms, 2 w.
R6—2K, 25 w.
R7—1250 ohms, 5 w.
R8, R9—68K, 2 w.
S1—12 pole, 6 position band switch
S2, S3—S.p.s.t. toggle switch
T1—Power transformer, 800 v., c.t., at 200 ma, 5 v. at 3 amp, 6.3 v. at 5 amp.
RFC1—400 μHy r.f. choke
RFC2-4—2.5 mHy r.f. choke

Use Your 304TLs

EMMETT P. BONNER, W5RCA*

Don't let your 304TLs gather dust any longer. They were a terrific buy at the low surplus price you paid for them, and they're easy to put on the air.

After getting a "full gallon" on the air using a pair of 304TLs in the final and another pair in the modulator, it was surprising to find out, in QSOs, how many other hams have some of these tubes around the shack but have not put them to use. Typical remarks over the air, after exchanging dope on rigs, antennas, WX, etc, are:

"Fine business on the 304TLs. We have a pair of them kicking around here but never have used them because of the expensive filament transformers they require. . . ."

". . . . We have some too, but don't have enough driving power. I'm running only 190 grid mils to these 250 THs. . . ."

". . . . but the grid bias required is so high. . . ."

". . . . only to get a kw, you have to have a very heavy plate current load, running up the cost of your power supply. . . ."

". . . . but I don't have enough audio driving power. . . ."

After a while it is apparent that quite a few amateurs are overlooking one of the biggest surplus bargains there is. The 304TLs are offered for as low as 70¢ in the surplus market and are still in good supply. (The writer just bought a complete set of four as spares for $3.00.) This tube sells for $55 net from the regular dealers, and at that price would not be the most desirable tube for the amateur. It was undoubtedly this tremendous tube bargain that has lead so many hams to buy their unused 304TLs.

After getting their tubes, though, many amateurs seem to have been discouraged from taking advantage of their wonderful bargain, apparently for one or more of the reasons indicated above. Let's consider each objection voiced and see if it is valid or if there is a way of getting around it.

Filament Supply

The filament requirement for a pair of 304TLs is 5 volts at 50 amps, or 10 volts at 25 amps, or 250 watts any way you figure it. Some stations operate only half of the filaments of each tube, thus cutting the filament power requirements in half. A study of the plate dissipation rating and maximum current rating will indicate that a kw rig might be safely operated thus. However, this expedient would reduce the reserve plate dissipation available, and this may or may not be important to the individual amateur.

Fortunately, there are still plenty of surplus transformers being offered for less than $3.00 that will supply 11.5 volts at 30 amps. These transformers do not have a center tap, and the old expedient of a center tap resistor must be resorted to (*Fig. 1*). A 50-ohm resistor, tapped in the center, will provide the necessary balanced connections for the B(−) and C(+) leads. Filament power wasted in the resistor is 2 watts. Plate voltage drop in the parallel branches of this resistor is only 0.528 volts for 330 mils of plate current. Certainly these

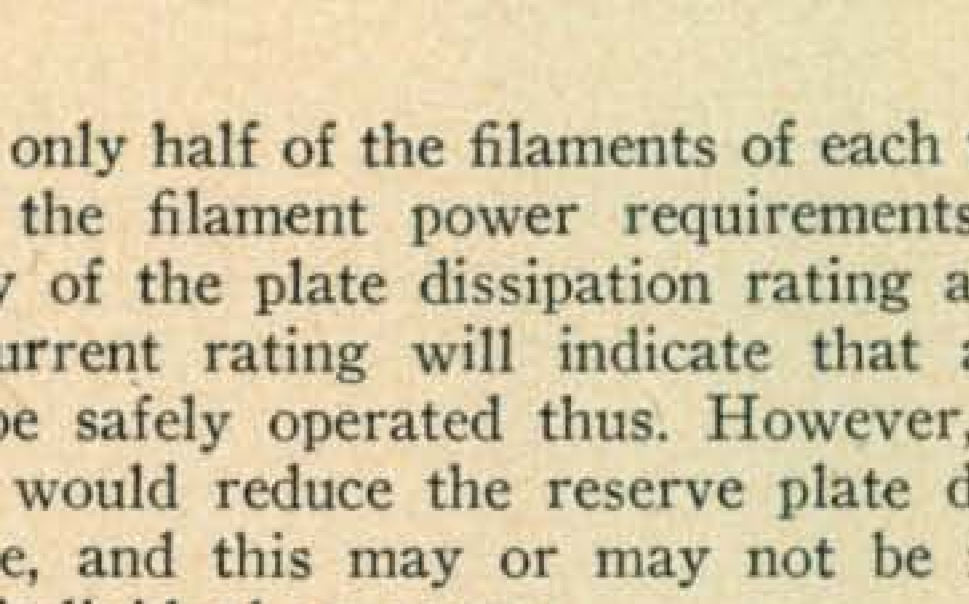

Fig. 1. A center-tapped filament transformer is not an absolute necessity if you remember the center-tapped resistor of the old days.

are acceptable losses in exchange for being able to use such an inexpensive transformer. It is also necessary to insert a voltage dropping resistor in the primary so that the output will drop from 11.5 v. to 10 v. This can be done easily by varying a length of resistance wire in series with the primary until exactly 10 volts is obtained at the tube sockets with the transformer supplying full load. The length of resistance wire thus determined can then be wrapped around a wooden form and attached to the chassis with one screw.

Plate Supply: Volts vs. Amps.

Before taking up the other varied objections to

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* *Commander, U. S. Navy, P. O. Box 525, AA & GM Branch, The Artillery School, Fort Bliss Texas.*

the 304TLs, let's consider briefly what plate voltage we'd like to use. Obviously, high voltage will mean lower current ratings for the same power output of the power supply, hence less expensive chokes can be used. On the other hand, the filter condensers will have to have a higher voltage rating and will accordingly be more expensive. A look at the surplus ads will reveal some bargains in 4000 v. working voltage 2 µf condensers. Using two of these in parallel gives a 4000 v. 4 µf condenser at reasonable price. Four such 2 µf condensers will be needed for a complete filter circuit. High voltage will be practical if we can find a suitable economical plate transformer. Such a transformer is being offered for about $47, or half of what any other new kw transformer sells for. This transformer is new (not surplus), and is rated at 3000 v. out of filter at 650 ma ICAS rating, and is for sale by several big mail order companies. Using 700 ma swinging and filter chokes, a reliable 3000 volt 650 mil power supply can be built up for what is probably the cheapest price of any full kw phone power supply. It has satisfactory voltage regulation, dropping only to 2900 volts under full load, including modulator load.

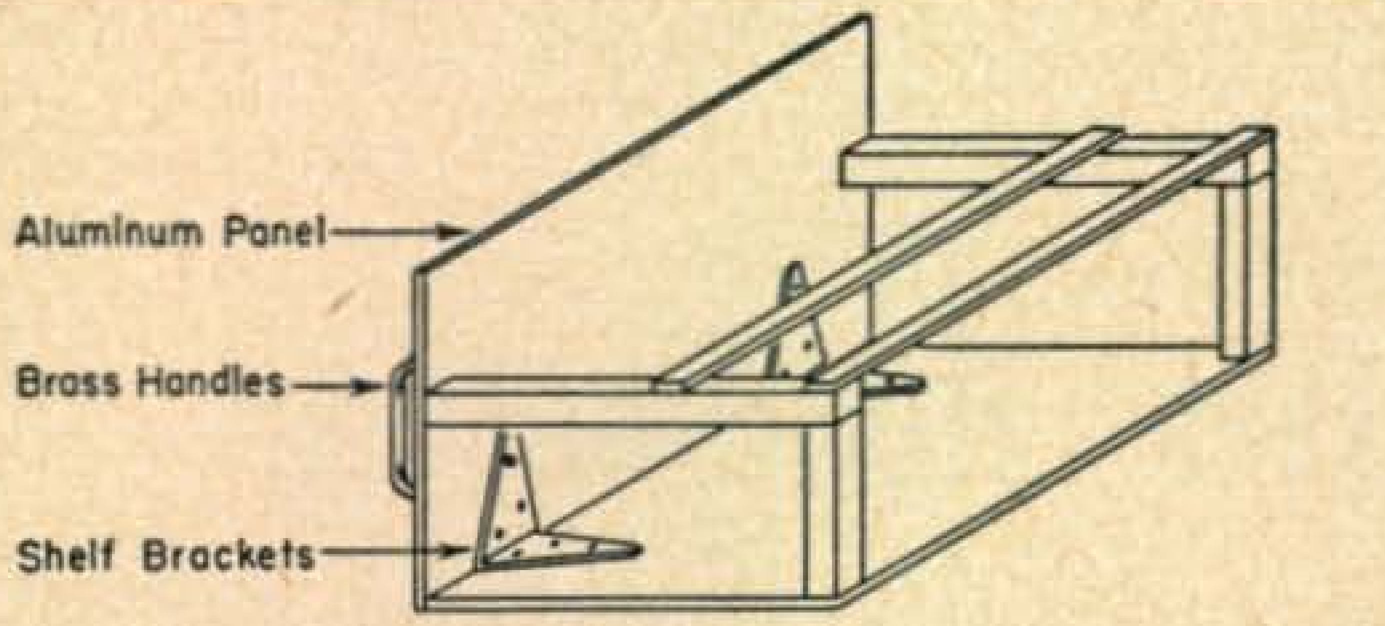

Fig. 2. A combination of breadboard and rack-panel construction makes it simple to attain a nice layout.

The choice of high voltage was finally the result of correspondence with the tube manufacturer, who pointed out that less driving power is required, greater tube efficiency is realized, and that at 2500 v. or above, a pair of 304TLs will give 600 watts of zero grid current audio power.

Driving Power

The answer to the driving power objection is simply that high driving power is *not* required. One experienced old-timer who has built innumerable high power rigs advised me to run about 190 mils grid drive, and was amazed when shown the manufacturer's tube sheet. Actually, at 2500 volts class C phone operation, a pair of 304TLs requires only 36 mils of grid current (22 watts) plus losses. No published data are available on 3000 v. operation, so the writer has been using the same grid drive for this voltage as given for 2500 v. on the theory that the extra plate voltage should just about take care of grid circuit losses. This low driving power compares fairly well with that required for tetrodes, and using triodes eliminates many additional problems, such as screen voltage supply, modulation, and control, and parasitics and other troubles frequently encountered.

The grid bias requirements of the 304TL are somewhat high, being 300 v. for the final and 290 v. for the modulator (plus additional grid leak bias in the case of the final). This is far from an insuperable problem, and can be solved by the "brute force" method of building up two separate bias packs from b.c. set power transformers. Since only one stage operates from each bias pack, metering is simplified, and it is feasible to use an adjustable tap on the bleeder resistor to obtain the desired fixed bias. For the final, an additional adjustable resistance in series with the bias lead will allow adjustment of the operating bias to the desired value when rated grid current is flowing. The final plate voltage does not have to be on for this adjustment, and it can be made very conveniently if a bias voltage meter is included in the rig, or an external volt meter can be used if preferred. (In either case, be sure to by-pass the meter with a condenser.)

The matter of heavy plate current for a kilowatt has been touched on, and can be avoided in this rig, as in any other, by going to higher voltages.

The last common objection to the 304TL as a modulator is probably the most wide-spread and the most erroneous superstition of all. This is that a lot of audio driving power is required. The writer ordered a 500-ohm line to P.P. grid transformer from one of the better known ham radio dealers, and mentioned the service intended. Back came a letter saying that the $2.78 transformer ordered would not carry the audio power required to drive a pair of 304TL modulators, and recommending instead a $19 transformer with a 60-watt audio rating. We referred him to the very excellent article in November 1949 *CQ* by Robert C. Cheek, W3LOE, giving full data on the advantages of Class AB_1 operation of these tubes, which are, briefly, zero driving power and inherently distortion-free operation.

Thus it appears that none of the commonly expressed drawbacks of this tube is insuperable, and some are even imaginary!

The circuit used in the writer's rig is entirely conventional and calls for no special comment. The

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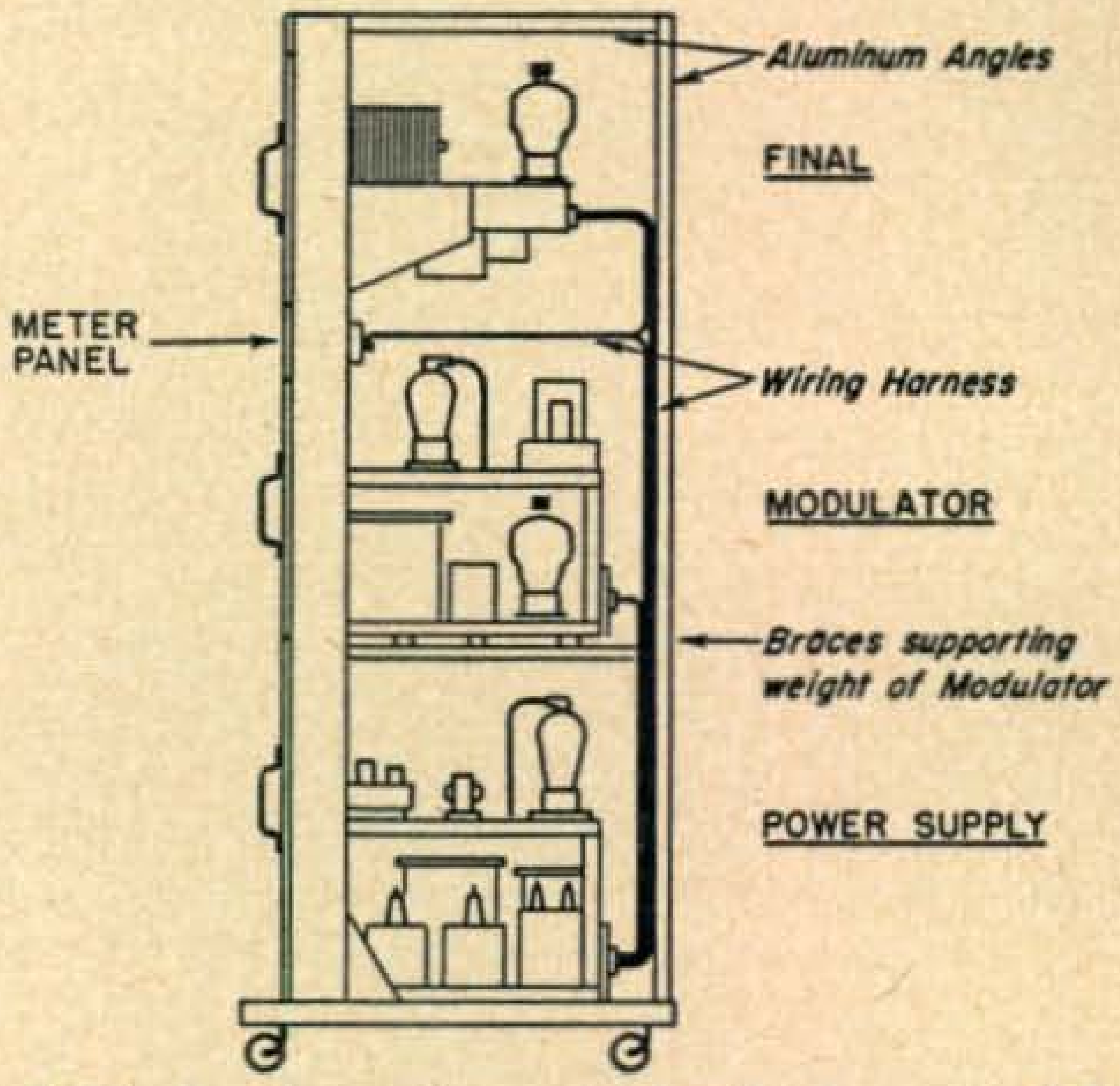


Fig. 3. The bracing system used for the heavy modulator.

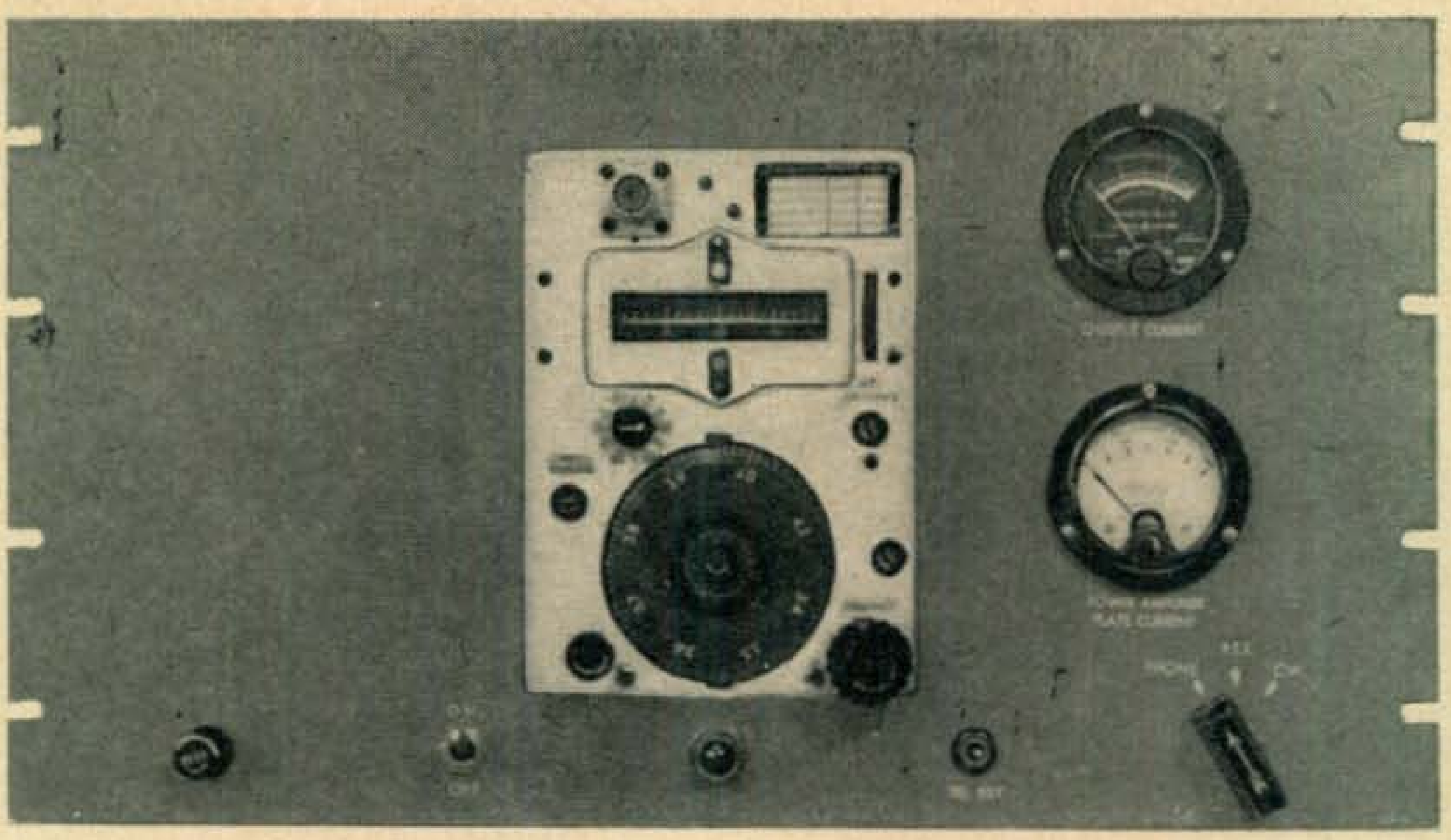


Fig. 1. An attractive appearance is easy to attain with 274-N transmitters.

SCR-274N Transmitter Modifications

JAMES N. WHITAKER, W2BFB*

Some helpful suggestions and words of warning to those planning to use these excellent units for amateur transmitter and VFO applications. Particular emphasis is placed on good keying.

THE SCR-274N COMMAND SETS have unquestionably been the most popular of all war surplus equipments for conversion to amateur use. The transmitters are by far the most useful of all units included. They not only are used as transmitters directly, but are also very popular as exciters and variable frequency oscillators for larger transmitters.

As is the case in most war surplus items, the amateur use of these excellent little transmitters requires a certain amount of modification. Articles too numerous to mention have been written describing various ways of modifying the units for amateur service, each modification having its own particular advantages and disadvantages. With such a well-designed piece of equipment to start with, it is reasonable to expect that the most satisfactory modification would be the one that disturbed the original circuitry the least. Actually, very little is required in the way of modifications to the sets which cover the amateur bands as is. For instance, the BC-696-A and the BC-459-A cover the 3.4–4 mc band and the 7-mc band respectively. The only absolutely necessary modification to these two units is the provision of a suitable output connection and a means for operating the keying relay. It is also generally desirable to parallel the heaters for 12-volt operation.

*93 Shepard Ave., West Englewood, N. J.

If the unit is to be used as a VFO for driving a string of multipliers for operation in the higher amateur bands, it is wise to provide for operating the oscillator heater from rectified and fairly well filtered power. This is to prevent the slight amount of frequency modulation at a 60-cycle rate which is present in some instances when raw a.c. is used for the oscillator tube heater power. This frequency modulation is not sufficient to be noticeable on the fundamental or even at twice the oscillator frequency. It is also not present in all sets. It is present in some, however, and in some instance, is very noticeable on 28 mc.

The power requirement for the oscillator tube is rather low, and a 250 ma selenium rectifier followed by about 250 µf of capacity (dry electrolytic) is all that is required. Listen to the 28-mc harmonic of the transmitter with a good receiver. If no a.c. hum is noted, it is safe to say that your particular unit is free from serious 60-cycle frequency modulation.

The original schematic diagram is shown in *Fig. 2*. The modification preferred by the author appears in the modified schematic diagram, *Fig. 4,* which includes the changes required to produce satisfactory keying to be described.

Numerous ways have been suggested for changing the frequency of the BC-457-A (4–5.3 mc) and the BC-458-A (5.3–7 mc) to the amateur frequencies.

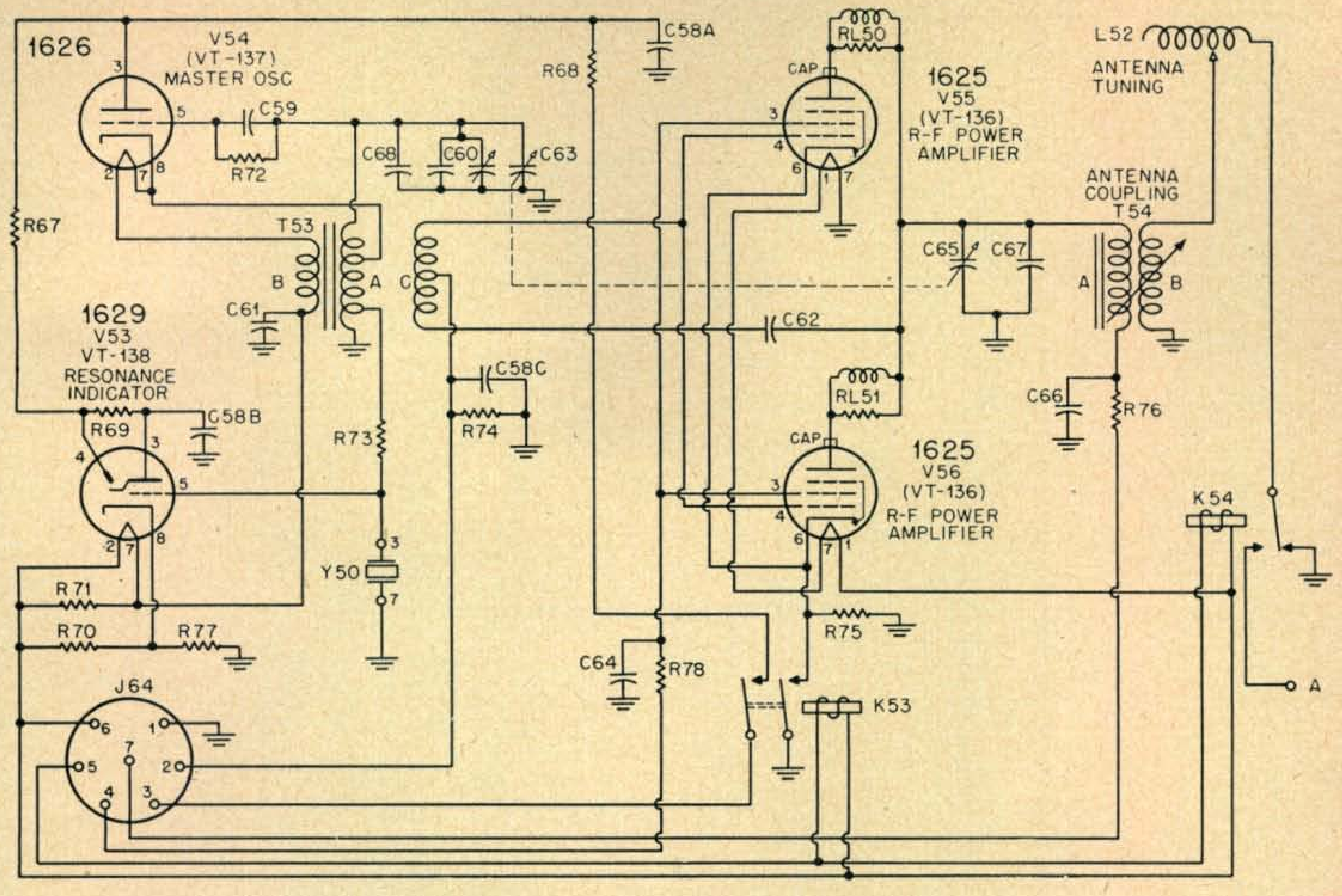


Fig. 2. The original circuit of the 274-N series transmitters.

Most of the suggested systems involve modifications to the inductances of the oscillator and P. A. tank circuits. The BC-457-A may be changed to cover the 3.5 mc amateur band by the simple addition of a good quality capacitor of between 25 μμf and 50 μμf capacity in parallel with the oscillator tuning capacitor, and by a readjustment of the variable padders in both the oscillator and P. A. plate tank circuits. The BC-458-A may be adjusted to cover the 7-mc band by simply adjusting the oscillator and P. A. padder capacitors.

To adjust the BC-457-A to frequency after adding the capacitor to the oscillator circuit, insert a 4-mc crystal in the crystal socket. (An FT-243 type crystal is excellent for this purpose, and is inserted in the socket using pins 3 and 7.) Next, remove the cover from the oscillator coil and capacitor assembly, using care not to disturb the iron core setting (screwdriver slotted screw on top, sealed with blue glyptal). Cut a screwdriver opening in the end of the shield opposite the variable capacitor shaft. Loosen the setscrews which lock the capacitor shaft, and replace the shield cover over the oscillator tuning assembly. Turn on the transmitter, and with the tuning eye in place, adjust the main tuning dial to 5.2. Adjust the oscillator padder until the eye indicates resonance with the crystal. The oscillator is now operating at 4 mc. Remove the oscillator tuning assembly cover, tighten the capacitor shaft lock setscrews, and replace the cover.

Tune the fixed padder of the P. A. stage for resonance as indicated by a minimum of P. A. plate current. If the iron cores in the tuning coils have not been disturbed, or if the coils have not been modified, the tuning will track over the entire range, and the new range will be 3.4 to 4.1 mc. The dial may be

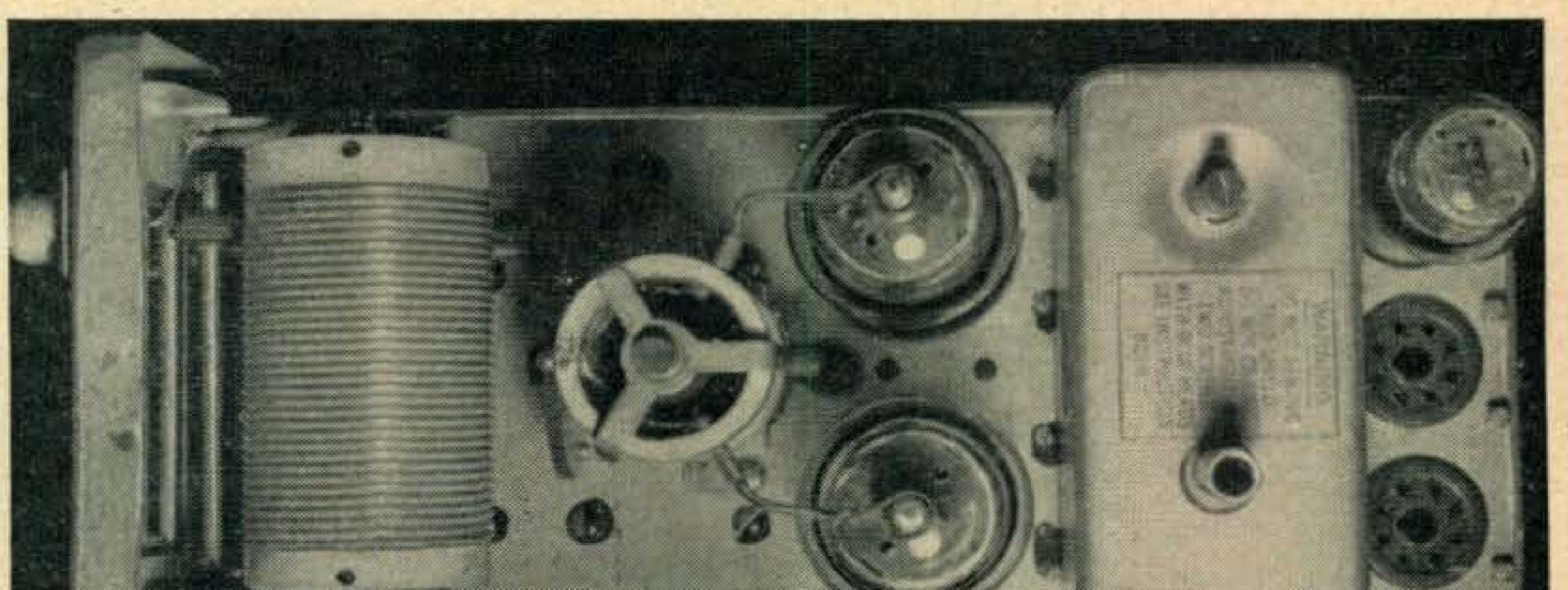


Fig. 3, illustrating the location of the mounting holes for the time constant capacitor C69.

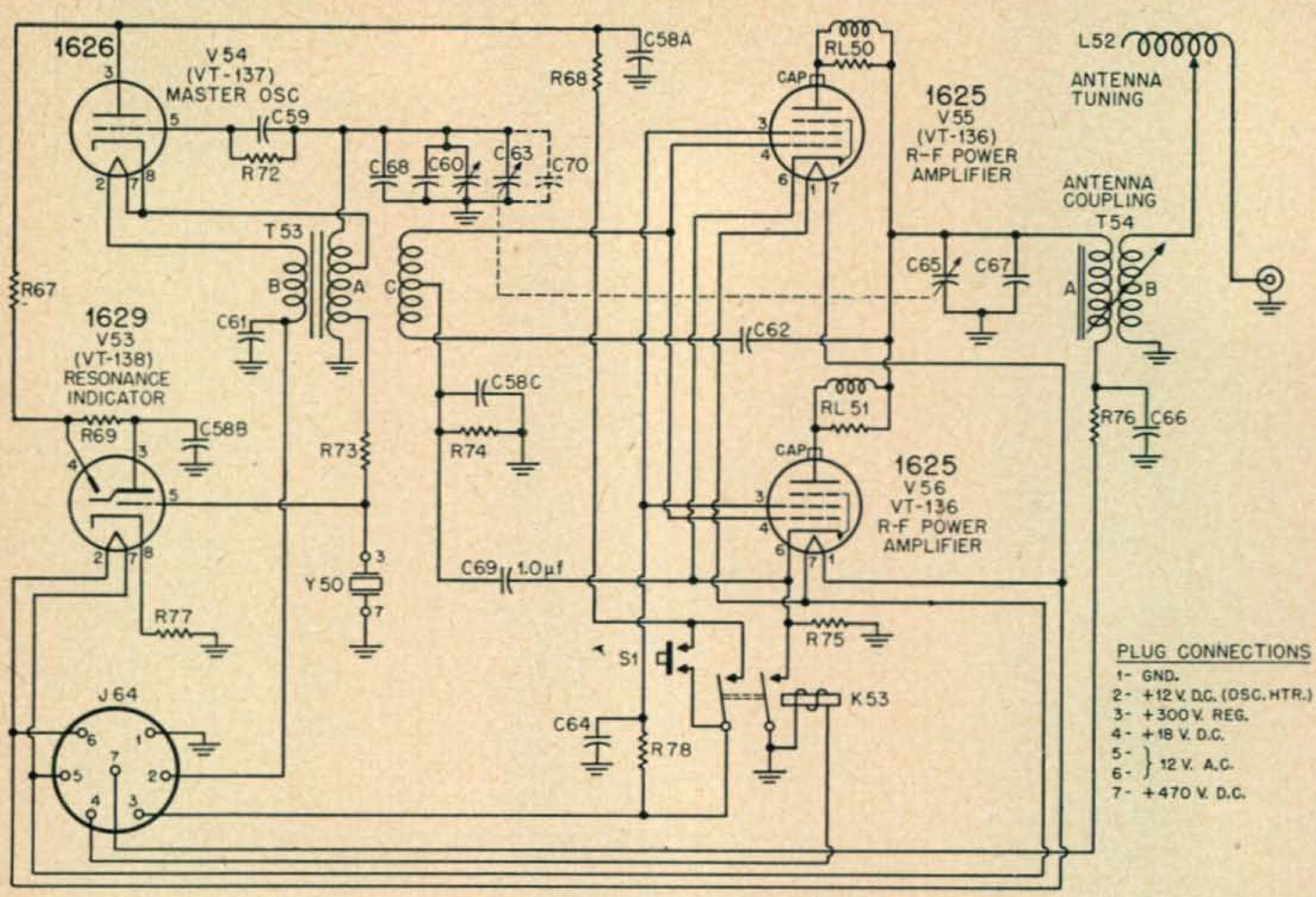


Fig. 4. The circuit of the modified transmitter. K53 is used as the keying relay.

C58A, B, C—.05 μf	C64—.002 μf	C70—25 to 50 μμf (BC-457A only)	R73—10K
C59—.00018 μf	C65—Amp. tuning	RL50, RL51—42 ohms	R74—15K
C60—Osc padder	C66—.01 μf	R67, R72, R75—51K	R77—390 ohms
C61—.006 μf	C67—Amp. padder	R68, R76—20 ohms	R78—51 ohms
C62—Fixed neut. cond.	C68—3μμf	R69—1 meg.	S1—Push button osc. test switch
C63—Osc. tuning	C69—See text		

covered with paper and a new scale inscribed thereon, or the dial may be removed and turned down on a lathe, repainted, new calibration lines painted on, and new numerals added. (A handy numeral set is included in most popular panel marking decal sets.) The same general procedure is used when tuning up the BC-458-A for operation in the 7-mc band, except that a 7.5-mc crystal is used.

If the adjustment of the iron core has been disturbed, the transmitter may be completely realigned by first adjusting the oscillator section for the desired frequency coverage by tuning the padder capacitor at the high frequency end of the tuning range, and by adjusting the iron core at the low frequency end of the tuning range. It may be necessary to repeat this several times to obtain the desired frequency spread or to obtain coincidence between the frequency and the calibration of the dial.

Having adjusted the oscillator, the P. A. tank tuning may be made to track with the oscillator by using a similar procedure. Adjust the capacitance trimmer at the high frequency end of the tuning range, and adjust the inductance trimmer at the low frequency end of the tuning range, repeating the two adjustments until perfect tracking is obtained. This is the same procedure as is used in adjusting the gang-tuned stages of a receiver.

If the SCR-274-N transmitter is to be used as a complete transmitter, or if it is to be used as a keyed VFO, it will be necessary to clean up the keying. Many systems suggested in the past include radical modifications, with the installation of vacuum tube keyers in some instances. Let us bear in mind that whenever we make changes in one of these units, we are modifying a piece of precision apparatus and should disturb it as little as possible.

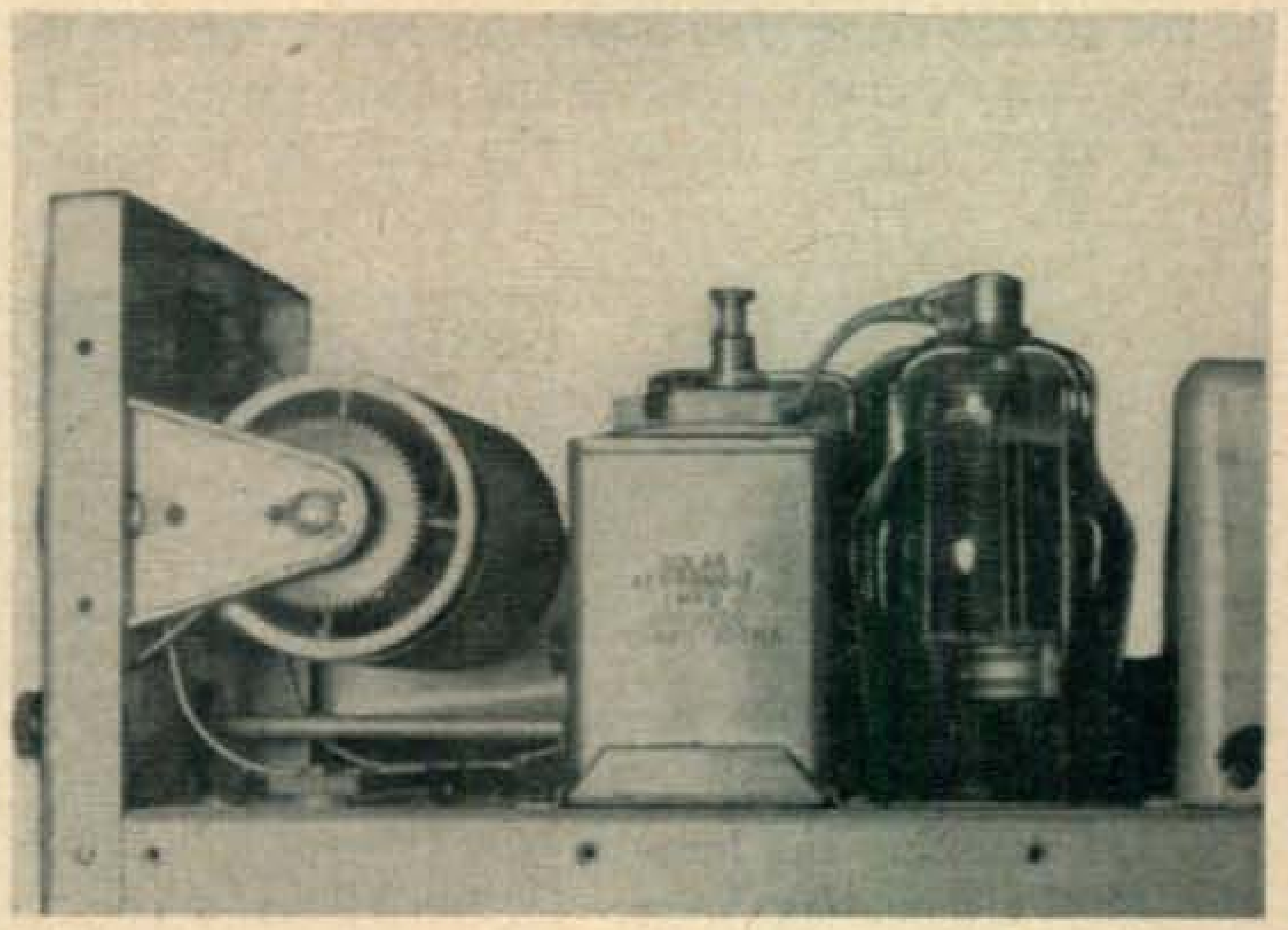
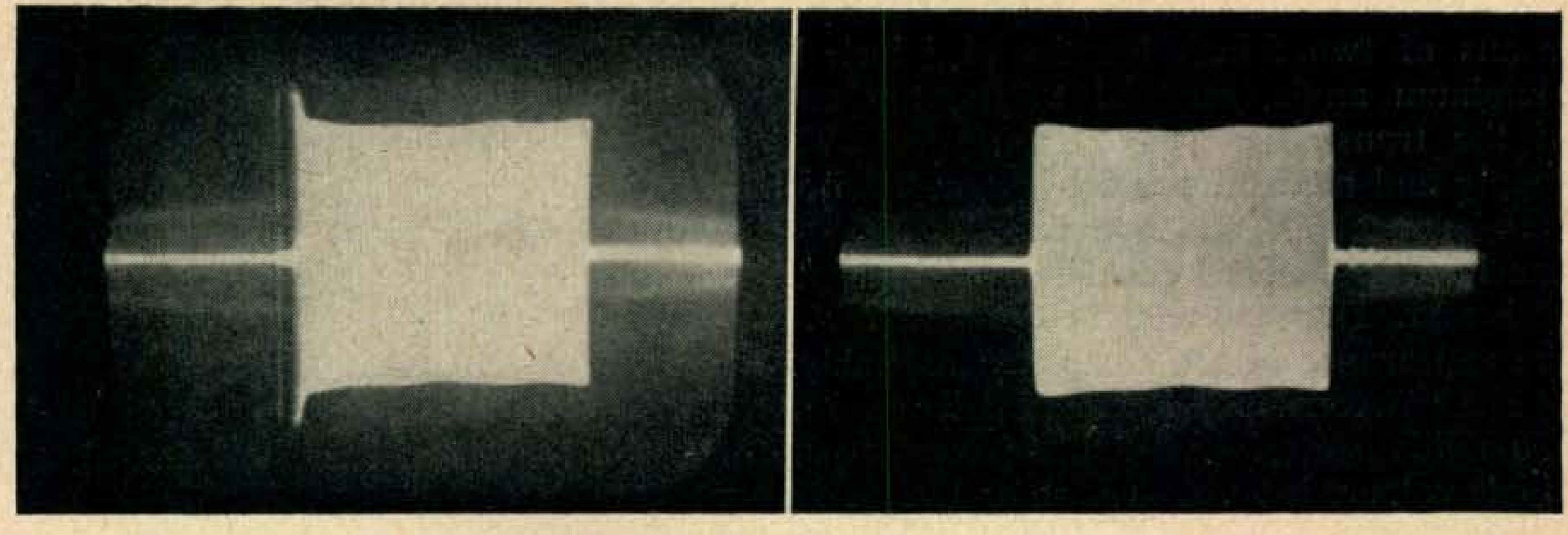


Fig. 5. Side view of the transmitter showing capacitor C69.

Fig. 6, L., the keying oscillogram before modification, and Fig. 7, showing the improvement attained.



Therefore, why not use the keying system included, after cleaning it up so that it is free from clicks, thumps, and chirps?

We have 12.6 volts available from the tube heater supply. From this we can get approximately 17.5 volts of d.c. for operating the keying relay by the simple addition of a low voltage senenium rectifier and a high capacity electrolytic capacitor. The keying relay will follow keying up to more than 40 words per minute with the power thus supplied if the relay armature and contacts are carefully adjusted.

The keying relay is quite noisy as it is. If this noise is objectionable, a short piece of small rubber tubing, soft plastic tubing, or "spaghetti" tubing may be placed over the armature arm stop. If this is done, the armature arm will require re-adjustment so that the relay contacts will open when the relay coil is de-energized. The contacts should be adjusted until the P. A. cathode circuit is closed just slightly before the relay armature comes to rest on the pole face of the relay coil. The contacts closing the circuit to the oscillator plate supply should be adjusted to close before the P. A. cathode circuit is closed. This is important if the operation is to be free from a keying "chirp." If the oscillator plate circuit is closed slightly ahead of the closing of the P. A. cathode circuit, the oscillator frequency will be stable before the power is actually applied to the P. A., and the "chirp" will not be present in the transmitter output.

The keying waveform before modification is shown in *Fig. 6*. Note the sharp spike just ahead of the main keying pulse, and the high amplitude of the start of the pulse. The sharp spike is caused by relay chatter, and the high amplitude at the start of the pulse is due to power supply regulation. Both of these faults are corrected very nicely by the addition of the time constant in the keying system, as is indicated in the oscillogram shown in *Fig. 7*.

The time constant which has been added to the keying circuit is a bit unusual in its operation. While the relay is open, the potential appearing in the cathode to ground circuit of the P.A. tubes will charge capacitor C_{60} through resistor R_{74}. When the relay closes, the terminal of C_{60}, which connects to the P.A. tube cathodes, is connected to ground. C_{60} then discharges through R_{74}, placing a negative potential upon the grids of the P.A. tubes, momentarily holding them at cutoff. As the charge is reduced in C_{60}, the potential across R_{74} is reduced, and the P.A. tubes start operating normally, until the full output is reached. This delaying action is just sufficient to produce a starting slope of approximately 2 milliseconds duration in the keying pulse, resulting in the desirable keying pulse shape shown in *Fig. 7*.

Figure 5 shows the location of C_{60}. This capacitor is a Solar No. XEMRBW6-1. This same type of capacitor is produced by several other manufacturers. (The JAN type designation is CP68B1EF105WK. These units are generally available in the surplus market at less than one dollar.) The mounting of this capacitor is rather simple. It involves the drilling of two one-half inch diameter holes and one small screw hole. One existing screw hole is used. This existing hole is used to fasten a wire clamp on the underneath side of the chassis. This wire connects to the antenna shorting relay. The antenna shorting relay is removed, and the wire is therefore no longer needed. The wire clamp bracket and the wire are both removed. The screw which originally held the clamp in place is now used to fasten one end of the capacitor bracket. The two ½-inch holes and the small screw hole are drilled in line with the wire clamp screw hole and spaced as shown in *Fig. 3*.

One very convenient arrangement when using a SCR-274N transmitter as a complete transmitter for phone-cw, work in the 3.5–4 mc band is shown in *Fig. 1*. The assembly pictured consists of a BC-457-A modified, as shown in *Fig. 4*, together with power supply and modulator units, all mounted on a standard 19-inch relay rack type of panel. The schematic diagram of the power supply, modulator, and the incidental connections between units and to the pilot light, switches, etc., is shown in *Fig. 9*. This arrangement includes a power switch and fuse, a pilot light, a plate current meter, an r.f. output ammeter, and a "phone"-"push-to-talk phone"-"c.w." selector switch. When operating "push-to-talk" phone, the push-to-talk switch connection is plugged into the telegraph keying jack.

An additional filter section is added to the P.A. plate power supply system when the unit is operating as a phone transmitter. This provides ample filtering to produce a hum-free signal for phone work. Type 1625 tubes are used in the modulator, since they are also used in the transmitter. Type 807 tubes could be used with identical results. Either type will provide sufficient power for producing 100% modulation of the power amplifier.

The panel used for mounting the entire system is made from 3/16-inch thick 24ST aluminum, 19 inches wide and 10½ inches high. A cutout is made in the center of the panel to accommodate the transmitter. The transmitter is mounted in place by means of two 5-inch lengths of ½-inch by ½-inch aluminum angle, screwed to the top and bottom of the transmitter and to the panel. The power supply and modulator units are built on 5″ by 10″ standard chassis and are mounted end-on to the panel, with standard chassis panel brackets, two to each unit. The rear view of the unit, *Fig. 8,* shows the appearance of the completed assembly.

The power supply described delivers 470 volts at 170 milliamperes. Under these conditions, the a.c. ripple voltage is 9 volts r.m.s., or 1.92%. The output of the transmitter on c.w. is 38.5 watts, with an input of 56.4 watts to the p.a., representing an efficiency of 68%. The r.f. current into a 52-ohm load is 0.86 amperes. The output when operated with telephone modulation is reduced slightly due to the additional load on the power supply by the modulator tubes. The output under these conditions is approximately 35 watts.

The values given in the parts list of *Fig. 4* are taken from the instruction book covering this particular equipment, with the exception of C_{60} and C_{70}, and are listed for the convenience of those who may not otherwise have access to this information.

The SCR-274-N transmitters will perform very satisfactorily if treated properly and if not altered unnecessarily. Make as few changes to the frequency determining portions of the circuit as possible; don't try to overload the output stage, regulate the plate supply to the oscillator and to the screen grids of the power amplifier, and you will have a signal that will be outstanding in quality and a joy to copy.

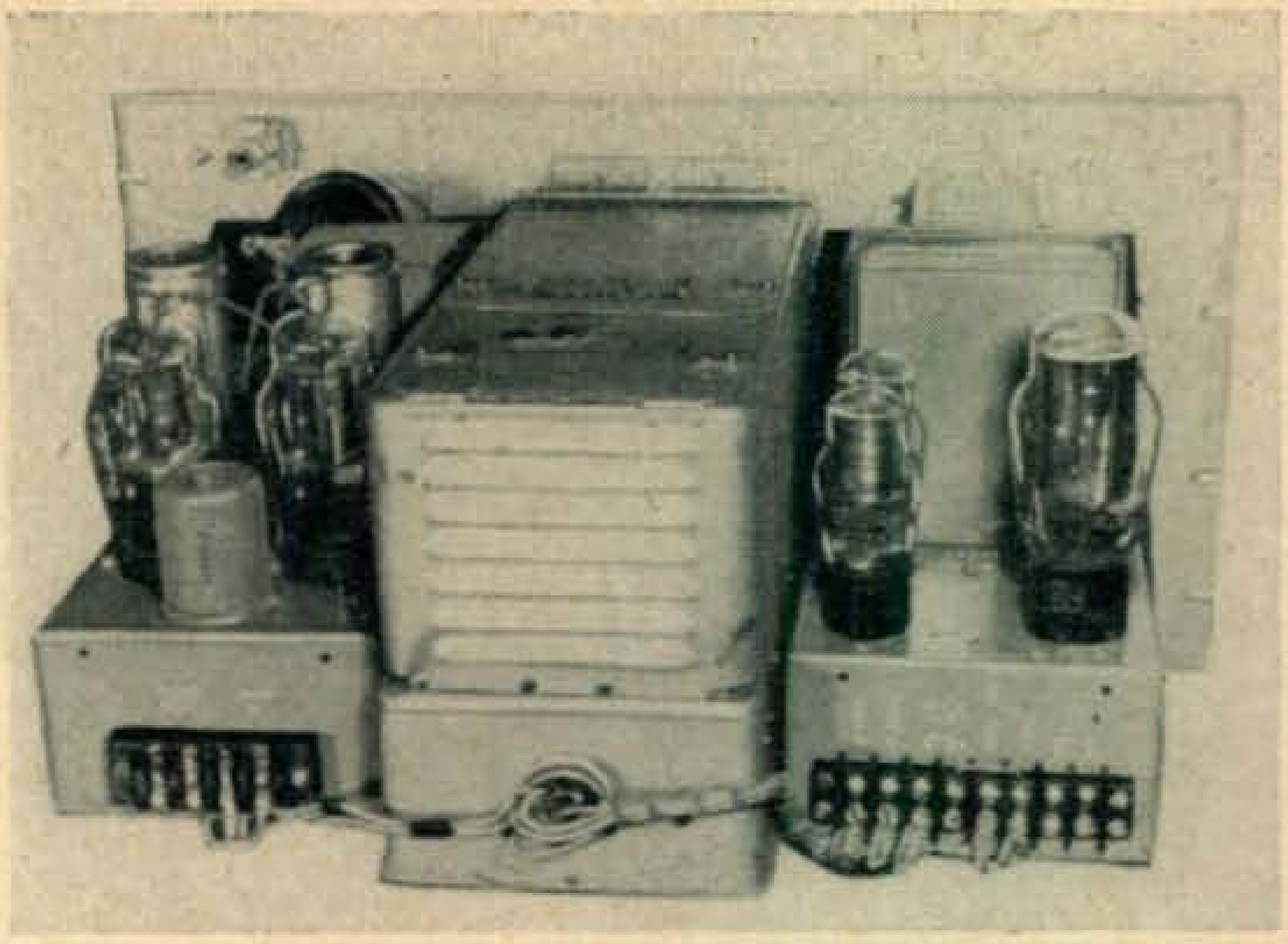


Fig. 8. Rear view of complete phone/c.w. transmitter.

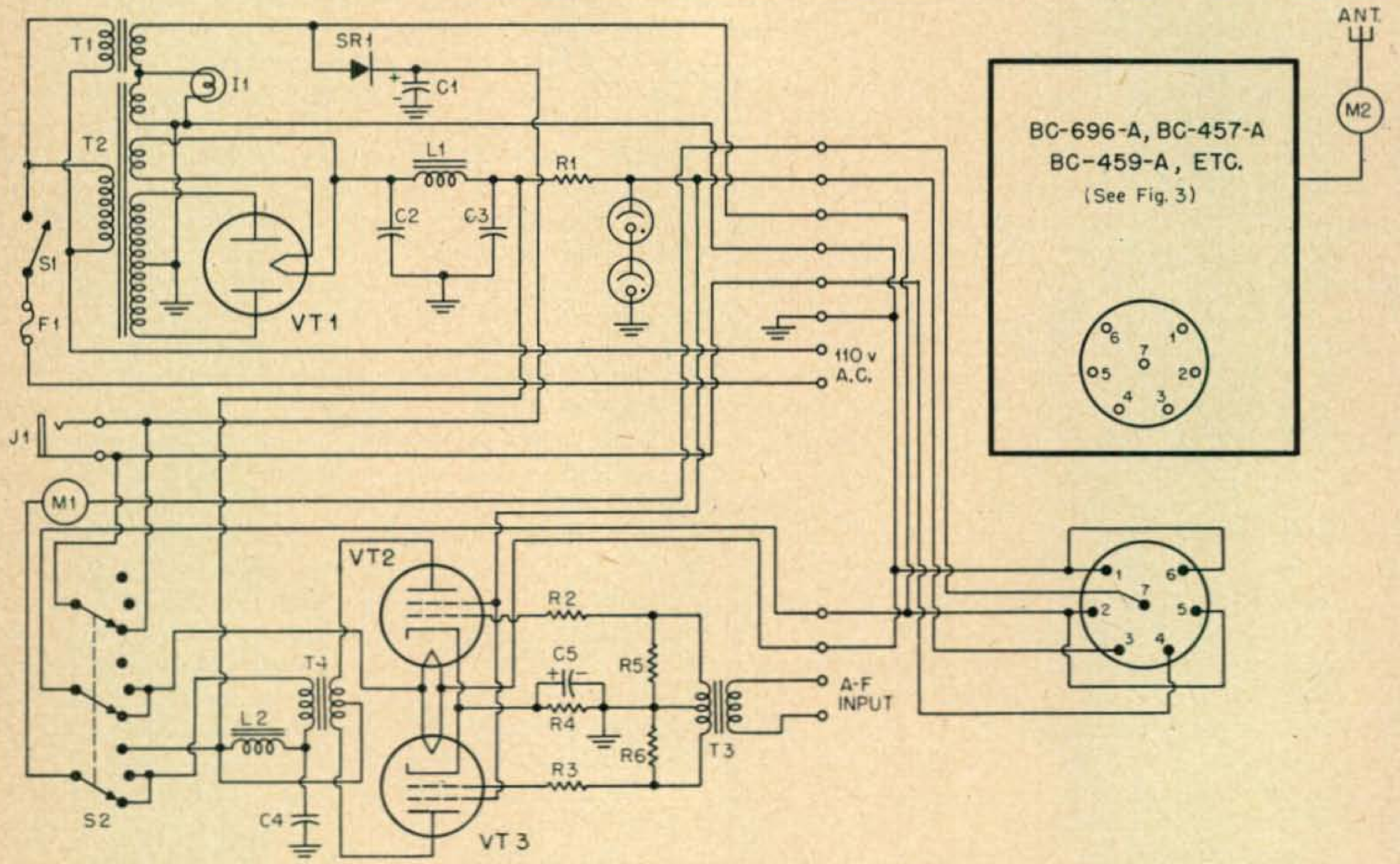


Fig. 9. The power supply, modulator, and interunit cabling.

C1—500 µf, 25-volt dry electrolytic
C2—1 µf, 600 v., oil filled
C3—10 µf, 600 v., oil filled
C4—4 µf, 600 v., oil filled
C5—40 µf, 150 v., dry electrolytic
L1, L2—Thordarson T-20C64 chokes
R1—5K, 20 w., wirewound
R2, R3—500 ohms, 1 w.
R4—250 ohms, 5 w., wirewound
T1—6.3 v. at 3 amp, fil. trans.
T2—Plate and filament transformer, 400 v. each side c.t. at 250 ma. with 6.3 and 5 v. windings
T3—Mike or line to grid trans.
T4—25-watt modulation transformer, select to match p.p. 807s to 3,000-5,000 ohm load
S1—S.p.s.t. toggel switch
S2—Three-pole, 3-position wafer switch
SR1—Seletron 1M1 selenium rectifier
F1—Bussman type 3AG 3-ampere fuse
I1—6.3-volt pilot lamp
J1—Single-circuit jack
M1—0-300 ma d.c. milliammeter
M2—0-3 amp r.f. ammeter

Building a Non—Guyed Steel Tower

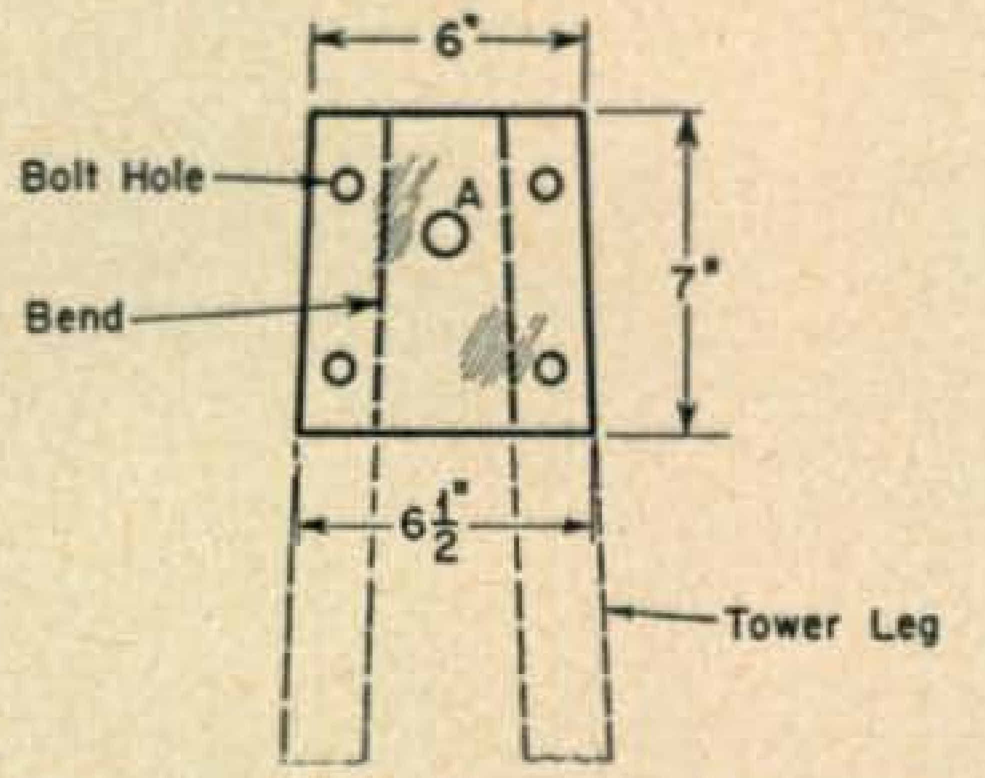
GLENN D. JOHNSON, WØTJ*

LAST SPRING, after getting on phone with a long-wire antenna and hearing all the talk of different kinds and shapes of beams, we decided that we needed a beam, too. Cost seems to be a big item with most hams, so after figuring on several materials to support a beam, steel seemed to be the answer. Steel could be purchased very reasonably, and, as the tower would be near the house, it would be neat looking also. We purchased it from Jones and Laughlin in Chicago for $16.11; the freight charge was $2.60. This cost will fit in with every ham's budget. We ordered nine pieces 20 ft. long of 1¾″ × ⅛″, 90-degree angle-iron.

First we gave it a heavy coating of good aluminum paint to prevent rusting. Two of the 20 ft. lengths were bolted together with a 2 ft. lap. One × ⅜″ lengths bolts were used with lock washers. Three of these lengths were made for the legs of the tower, and two were laid on the ground. The angle was figured so that there would be one foot of spread for every seven feet of rise. Four feet were left to set into the ground. From this ground level measurement, spreader braces were put every 5′ 8″, or 5 in all, to the top.

Each spreader brace was cut with a hacksaw, and

* *Pleasantville, Iowa*



Three of these plates ensure rigidity at the top.

a small notch was cut at each end to fit the angle of the leg and then bolted to it. This means that there would be three of each length, each bolted to three legs. The notch cut was a small V, bent slightly to fit the 90-degree angle. This would not be necessary if 60-degree angle-iron could be bought.

From a machine shop a piece of ⅛-inch iron was purchased that was large enough to cover the small opening at the top of the tower and to lap down about 5 inches with enough for three extra pieces. These three pieces were cut 7 inches long, 6½ inches at one end and 6 inches at the other. Five holes were drilled for bolts in these plates. They also were bent slightly to fit the leg angles.

The top plate was a piece of this same ⅛ inch iron cut in the shape of a triangle 7½ inches to each side. Holes were drilled at the exact center and at each corner, the first for a pipe to run through, and the second for bolts. The corners were bent to almost a 90-degree angle, and a sleeve was welded in the center hole for the support pipe to go through.

This pipe supports the beam. When the three plates were bolted around the sides and the top plate lapped down and bolted, the top of the tower was very solid. From some iron that was left, several 8-inch pieces were sawed and bolted at intervals on one leg for steps for easy climbing.

We added another heavy coating of aluminum paint to cover scratches, bolts, etc. It now looked almost like a professional job, we thought. It certainly created a lot of curiosity among the neighbors and passersby.

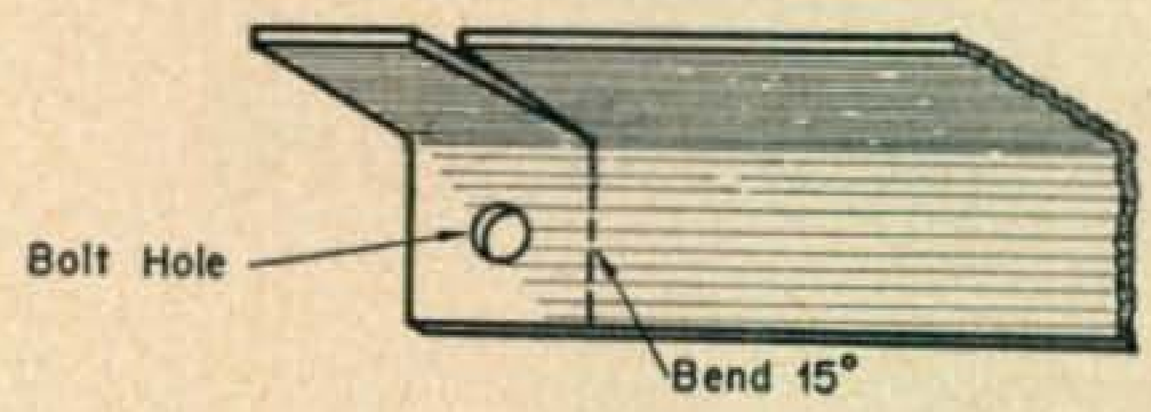
The Vertical Position

Before setting the tower in a vertical position, a string long enough to reach the ground was strung through the hole in the top plate. This was used later to level with. To set the tower in a vertical position was not so difficult—it only weighs 260 pounds. Three holes were dug, each 4 feet deep and approximately 1 foot in diameter, and the bottom of them levelled in respect to each other. Then a flat rock, block of wood, or something similar, was put in the bottom of each for the legs of the tower to rest on. Two ⅜ inch holes were drilled in each leg about 6 inches apart and near the bottom. A 6-inch bolt was stuck through to tie into the cement.

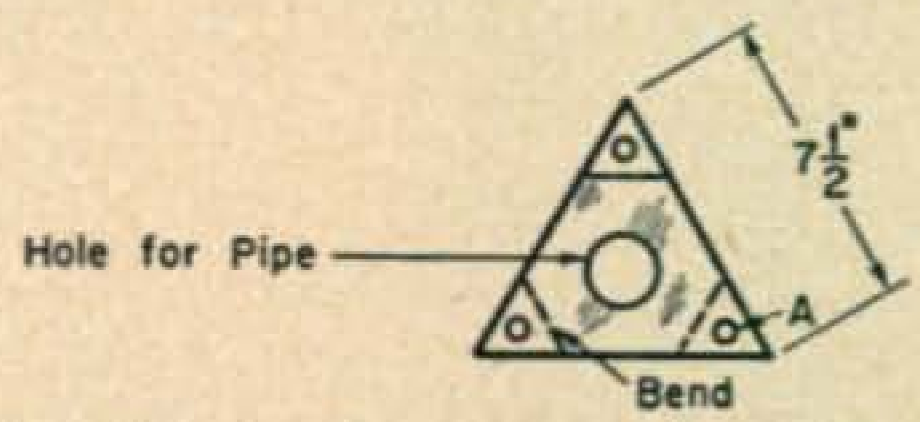
Two 2×4s were bolted near the bottom of two legs to the other leg at the first cross brace to carry the weight as the tower was raised. Some boards were laid near the holes, and a rope was tied near the top of the tower. A near-by tree was used as a gin-pole. With the help of three neighbors on the guy wires, it was raised easily. The 2×4s were taken off, and three men lifted it and set it down in the holes, a fourth man helping to steady it. We then levelled it using the center string.

We picked up some old scrap iron, broken bricks, etc., and put some in each of the holes. It was a good way of disposing of the debris.

Each leg was then filled with about 350 pounds of cement. Each guy wire was fastened down until the cement hardened, which was about eight days. Then we climbed the tower and unfastened the guy wires and string. It was neat-looking and now self-supporting.



The notching of the spreader braces.



The top plate fits the three legs and provides a bearing surface for the pipe.

The Quad

The contraption on top that you see in the picture is a quad. A piece of this same angle-iron about 3 feet long was welded on the 1 inch diameter pipe with the V up to hold a 2×2 boom. The arms were made of 9/16×1 1/8 clear fir. The radiator is two wires about 5 inches apart. One-fourth wavelength on a side, figured to the 468 formula, with the crossover in the bottom fed direct with 150-ohm Twinlead. The spacing is .02, and the reflector is a single wire 5 inches longer on a side than the radiator. A shorting stub runs up from the center to the boom and is used for tuning. Lucite or bakelite insulators are used.

This tower could be made of other material, such as pipe with the cross braces welded together, or maybe a different weight of iron. It doesn't need skilled labor to put it together and is within the price range of all. It is self-supporting. It has withstood many hard winds and storms. It isn't too tall to climb easily when any repair is necessary.

We think it really fulfills all of WØPJ's requirements and might be a helping idea for some of our other ham friends who need something for their antenna.

We all have had ideas and probably could find many ways to improve on and add to the ones I used in this tower.

Real Audio Selectivity Using Standard Parts

LAWRENCE FLEMING*

Although toroidal chokes and other esoteric components are nice to have when designing an audio filter, some of the lowly units to be found in almost any junk box can be pressed into service quite nicely.

While high-Q toroidal chokes make the best audio filters[1], they are by no means indispensable in obtaining effective audio selectivity for c.w. reception. The chokes from a surplus FL8A filter, having a Q of about 12, have been used successfully[2], but may not always be available.

Most midget radio replacement-type filter chokes have a 1000-cycle inductance of 5 to 7 henries, with a Q of 6 or 8. One such choke, Thordarson No. T-20C52, measures 8.7 henries, $Q = 7.5$. An inductor such as this one, which has the further advantage of unusually small physical size, can be made the basis of a thoroughly satisfactory 1000-cycle low-pass network.

The filter is a three-section constant-k type which may be connected between the first and second audio stages of a receiver, as shown in *Fig. 1*, or between the plate of the output tube and a pair of headphones, as in *Fig. 2*. In either case, the measured response is as shown in *Fig. 3*. The transmission of the filter starts down at about 900 cycles, and has dropped 40 db at 2100 cycles. In a listening test, with a good strong signal in the phones from an oscillator at 1000 cycles, the signal was very weak at 2000 cycles, and inaudible above 2500.

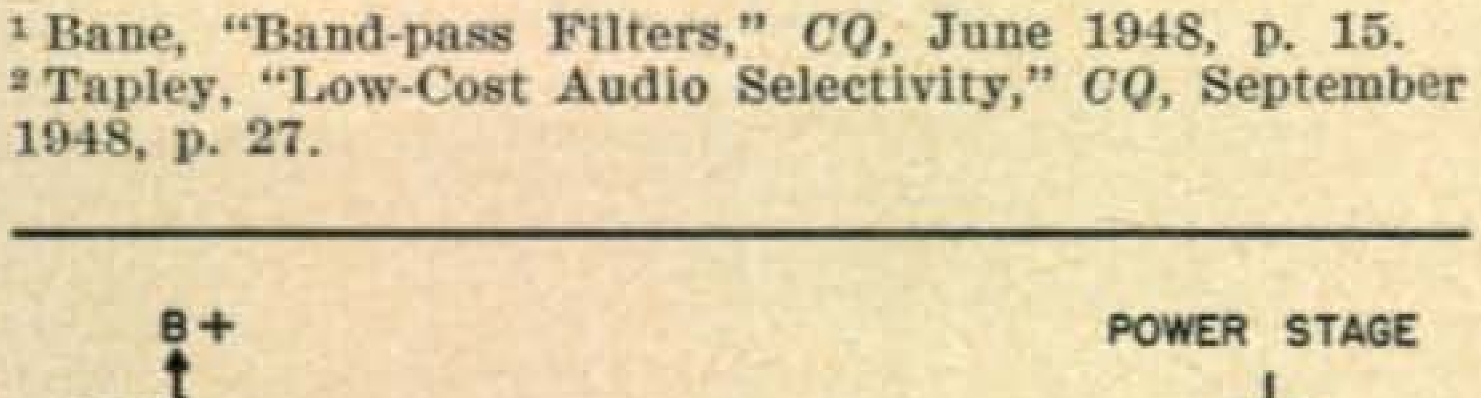
The characteristic impedance comes out 27,000 ohms, as is evident from the diagrams; in *Fig. 2* the phones are partly isolated by means of two resistors so that the inductance of the phones does not upset the termination. The impedance of the source driving the filter in *Fig. 1* is partly made up of the plate resistance of the 6J5 tube (15,000 ohms) and partly of an additional 12,000-ohm resistor. The pentode in *Fig. 2* has a high plate resistance so that the right source impedance can be obtained with a shunt resistor across the output transformer primary.

The low-frequency cut off below 300 cycles is due

(Continued on page 56)

* *510 N. West Street, Falls Church, Va.*

[1] Bane, "Band-pass Filters," *CQ*, June 1948, p. 15.
[2] Tapley, "Low-Cost Audio Selectivity," *CQ*, September 1948, p. 27.



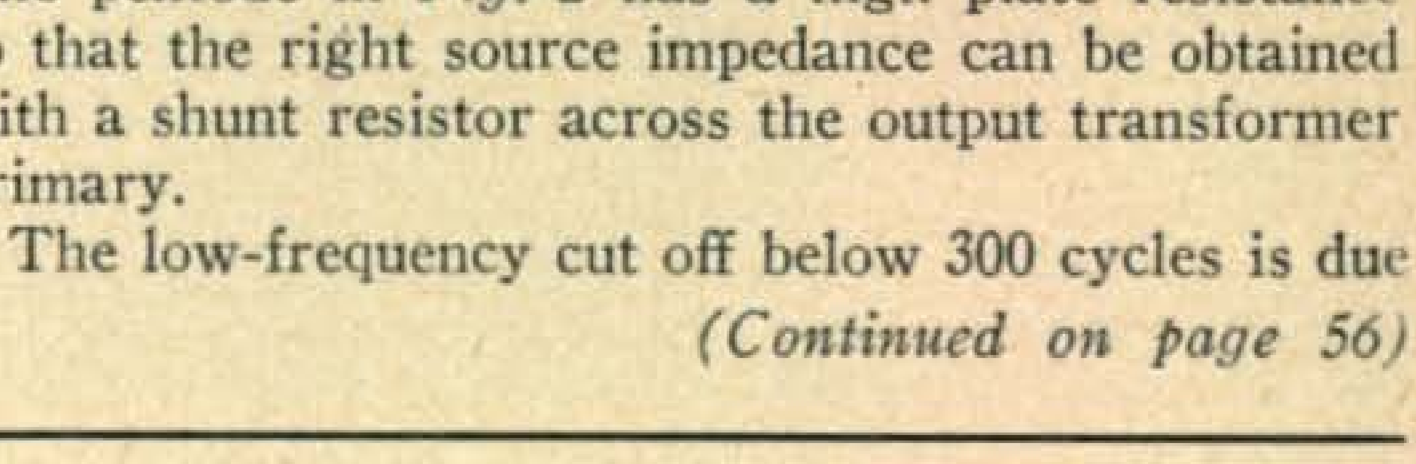


Fig. 1, left. The filter connected between the first and second audio stages of a receiver.

Fig. 2, above. Perhaps the simplest application is placing the filter between the last audio stage and a pair of cans.

FIELD DAY 1950

Final assembly of the 10-meter rotary and unloading the spares from the trunk just before the 4 o'clock deadline marks the real beginning of Field Day.

Operation in the car is not unadulterated comfort.

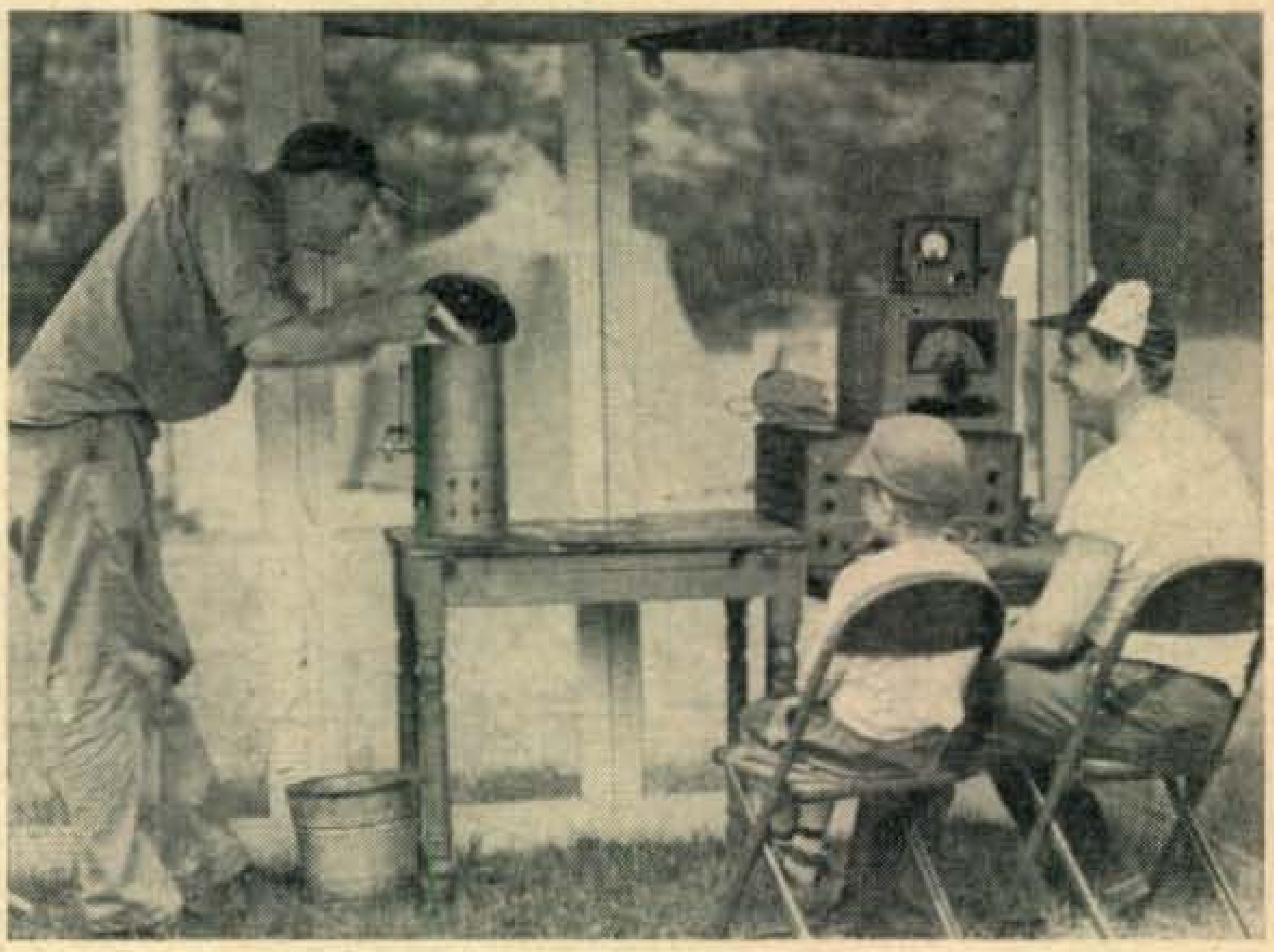
Ah, yes, the solitary op!

AS WE SAW IT

FD operation in grand style.

The chef, of course, is King of the gang.

Time out for a snack.



And at the conclusion of his shift the weary hotshot catches a moment of rest and dreams of bigger and better Field Days in the years to come. See you all next year.

Conducted by LOUISA B. SANDO, W7OOH/1*

FOR SOME OF US a year goes very fast—for others it must seem slower, and in this second category YLRL officers must find themselves, seems to us, for there is much work and many headaches in trying to keep together such a far-flung organization. The officers this past year have done a good job, but they will surely be glad to hand over the reins to the new officers on July 1st. Taking over as president is W1FTJ, Dot Evans, of Concord, New Hampshire, and vice president is W8UDA, Dorothy Willett, of Flint, Michigan. Secretary-treasurer is W4HWR, Hilda Andrew of Tampa, Fla. All of these girls are well known to you through their great activity on the air and through writeups in *CQ* and *Harmonics*. We do not know yet whom Dot will appoint for editor and publicity chairman, but more on this next month.

Taking over as District Chairmen for the new term are: W1RTB, Nell Waterman, 120 Argonne St., Bridgeport 29, Conn.

W3LSX, Catherine Barclay, 2022 Columbia Rd., N. W., Washington, D. C.

W4PPQ, Katherine LePine, 939 N. W. 81st St., Miami, Fla.

W5PTW, Peggy Libbe, Box 931, North Shore Drive, Port Isabel, Texas.

W6YZD, Jean Baptie, 1237 Palmer Court, San Diego 11, Calif.

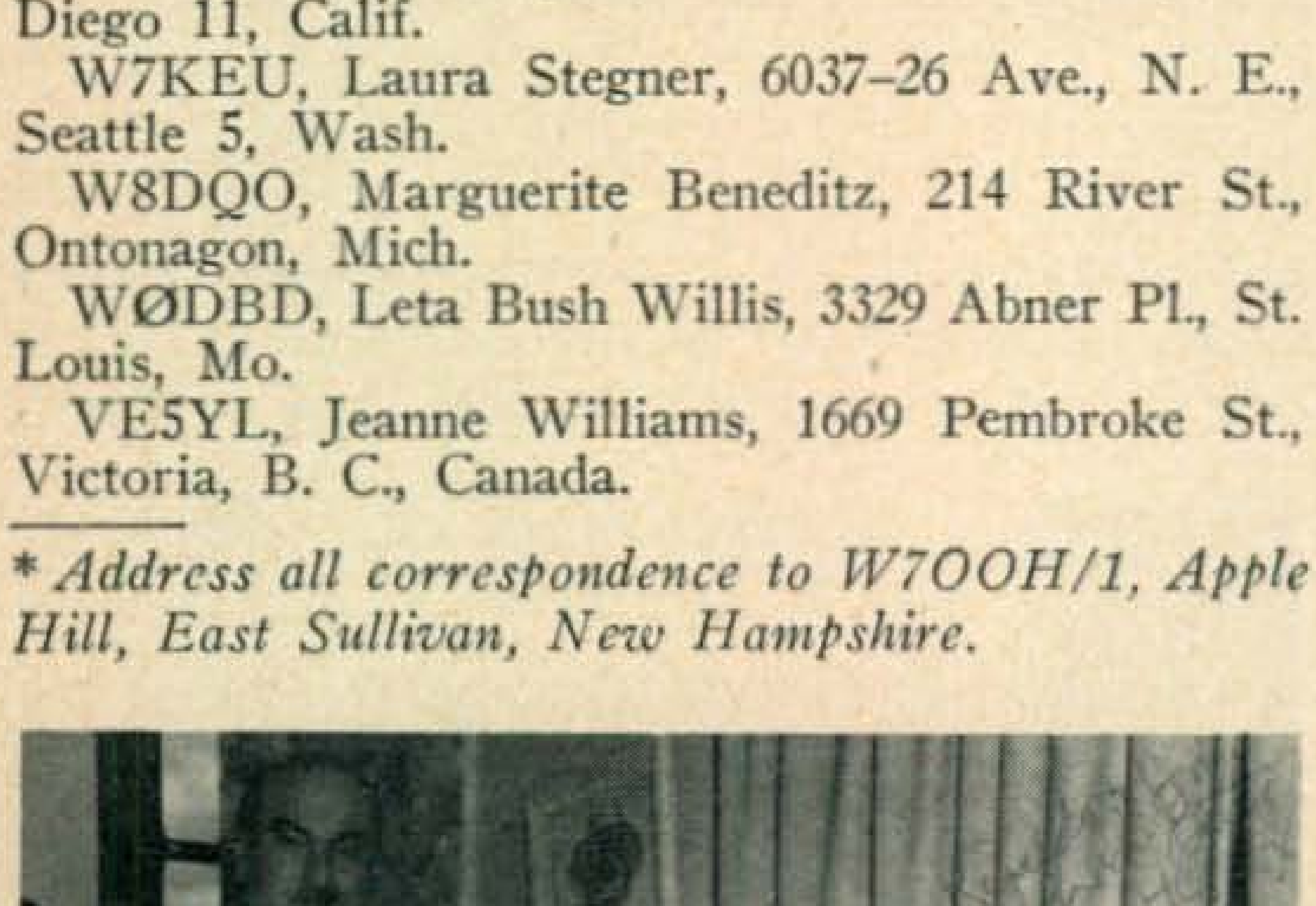
W7KEU, Laura Stegner, 6037-26 Ave., N. E., Seattle 5, Wash.

W8DQO, Marguerite Beneditz, 214 River St., Ontonagon, Mich.

WØDBD, Leta Bush Willis, 3329 Abner Pl., St. Louis, Mo.

VE5YL, Jeanne Williams, 1669 Pembroke St., Victoria, B. C., Canada.

* *Address all correspondence to W7OOH/1, Apple Hill, East Sullivan, New Hampshire.*



YL of the Month. HC1KX, Betty Hahn Bernbaum.

G2YL, Nell Corry, Petersmead, Walton-on-the-Hill, Tadworth, Surrey, England.

These gals will be looking for news from all of you YLs for *Harmonics*, so don't disappoint them.

Nominees for districts two and nine were found ineligible. District chairmen for these areas will be appointed by W1FTJ.

Here and There

From W3NNS we were very sorry to learn of the death of W5PTW's OM early in June. Peggy, who has just been elected D/C, is going to stick with ham radio and expects to be at the convention in San Antonio in August. She has just been awarded a certificate for checking in girls on the Tuesday 10-meter net. Peggy didn't miss a single net from December 1st through the middle of March.

Also to receive a certificate was W6PJF, Rosemary Robin, for being NC of the c.w. net having the greatest number of active members between December 1st and April 1st. All of the members, too, received a certificate and included these "old faithfuls": W6GQZ, W7GLK, W6ZTJ, W7LCS, W6YYM, W6EKX, W7JFB, W7NH, W6NAZ, W6TCN, and, of course, W6PJF.

Travelogue

Since the last column was written we've traveled some 3500 miles, and while we missed out on seeing some YLs along our route, the over-all score was pretty high.

After spending a few days with the OM's family at Jemez, New Mexico, we dropped in for overnight on Mid, W5CA, and his XYL, Charlet, at Tijeras. Friends from way back when we worked together at ARRL, we were pleased to learn of his nomination for director of the West Gulf Division. Good luck on the vote, Mid! Also from Mid we learned of an active YL in Albuquerque, W5IGO, Thelma Ferguson. Formerly from Oklahoma, Thelma is a traffic handler and is NC for the New Mexico c.w. net. Hope to see you when we get back to the Southwest next September, Thelma.

The following day took us over 500 miles to Electra, Texas, and to the QTH of W5IZL, Ruth Brown, and her OM, W5AWQ. We had a wonderful visit with Ruth and Ernie. Though we didn't arrive until 10 p.m., we rag-chewed for a while, and the next a.m. Ruth drove us around town and showed us the Electra News office where she helps Ernie with their weekly paper, doing office work and selling advertising. Now a busy little town, when Ernie and Ruth came to Electra it was just about a muddy crossroads between ranches, and much of the area was encompassed in the famous 560,000 acre Waggoner ranch. Practically

(Continued on page 53)

The Monitoring Post

gleaned by THE BRASSPOUNDER*

THE INTERNATIONAL SPORTS CAR RACES held at Bridgehampton, N. Y., depended upon the hams for the second time to cover the four-mile course of twisting roadway of concrete, macadam and dirt, with only a small portion visible from any given point. Accurate information from eight points around the course was constantly transmitted to the starting line. Operation was from 9:30 A.M. to 5:30 P.M. without a single station failure for even a moment. Those handling the race details were: **W2PDU**, control; **PIA**, **UGH**, **AJF**, **MFJ**, **HWR**, **ZUN**, **JFP**, and **OQI**.

W2BX will be happy to forward many QSL cards he's recently received from all parts of the world to the station using his call letters; the cards are for 20-meter QSOs—BX has a rig capable of operation on 80 and 40 meters only. . . . Thirty QSL cards attesting to QSOs with as many maritime mobile stations will earn a suitable certificate of accomplishment from **W3NL**, R. Anderson, 2509 32d St. S.E., Washington, D. C. . . . **W9WEA** is still on speaking terms with his landlord who has a 10-meter rig. . . . **W7NQH** leads the emergency net that includes **W7NPK**, **KCO**, **SSQ**, **MLM**, and others.

The Atlanta Ham, official newsy sheet of the Atlanta RC, tells of plans to include non-residents of Atlanta in their club, that is, those residing more than 20 miles airline from Five Points. . . . **W9NN** is more than pleased with his new Premax vertical antenna; four buried ground radials and buried coax along with lead cable to operate the relay at the base of the vertical completes the system; **W9ATH** is planning to duplicate it at his new home in Berwyn, Ill. . . . **W7EVM** is prexy of the North Seattle ARC, and **W7DXF** heads the West Seattle ARC. . . . **W9KHJ** and **W9CRC** are the newest additions to the staff at WGN.

Three Cotton Carnival parades, the longest three miles long, moved smoothly with a net of two portable and six mobile stations in Memphis, Tenn. Progress of the parades reported by observers to portable stations was relayed to the mobile units, spaced equi-distance in the line of marchers, giving all necessary information. Spot-frequency, break-in opeartion was used; under the direction of **W4LI** and **W4BAQ** the mobile stations were: **W4FWX**, **HSU**, **NBN**, **PXW**, and **BAQ**; the portables were operated by **W4IBG** and **HHK**. All operation was on 29 mc. . . . **W9PEB** enjoys dxing on 14 mc with mobile and reports everything lovely except the traffic cops who get in his hair at times.

Members of the Hilltop RC of Worcester, Mass., dedicate their June club bulletin to the memory of **W1BIM** whose passing to the list of Silent Keys is noted with deep regret and a definite loss to ham radio; he was a true amateur radio operator in every sense of the word, always helpful to his brother ham and loyal to the hobby and all it stands for. W1BIM is expected to be the new call letters of the club. **W1SPI's** tribute to BIM is well worth setting down here:

BIM's driven element is now at ease,
Not even a tremble in the summer breeze;
The 300-ohm line is hanging with slack
Where it once ran into his radio shack.

God give us faith that there will be
A place for Jim in Eternity,
With the freqeuncies clear, no QRM
On 20 and 40, and even on ten.

Field days, conventions and other joys,
Emergency work for the traffic boys;
May each of us try to reach his goal
With the Lord above as Net Control.

The Hilltop Club will sure miss Jim,
Or better known as Good Old BIM;
BIM has departed, but the Lord only knows
How we all have enjoyed his QSOs.

BIM the loyal, sincere and true
And always ready to help the new;
He would always lend a helping hand
That helped so many get on the band.

So BIM, old boy, may you rest in peace.
And a prayer to you from all of these;
Never again will we hear your key,
But CUL, OM, and 73.

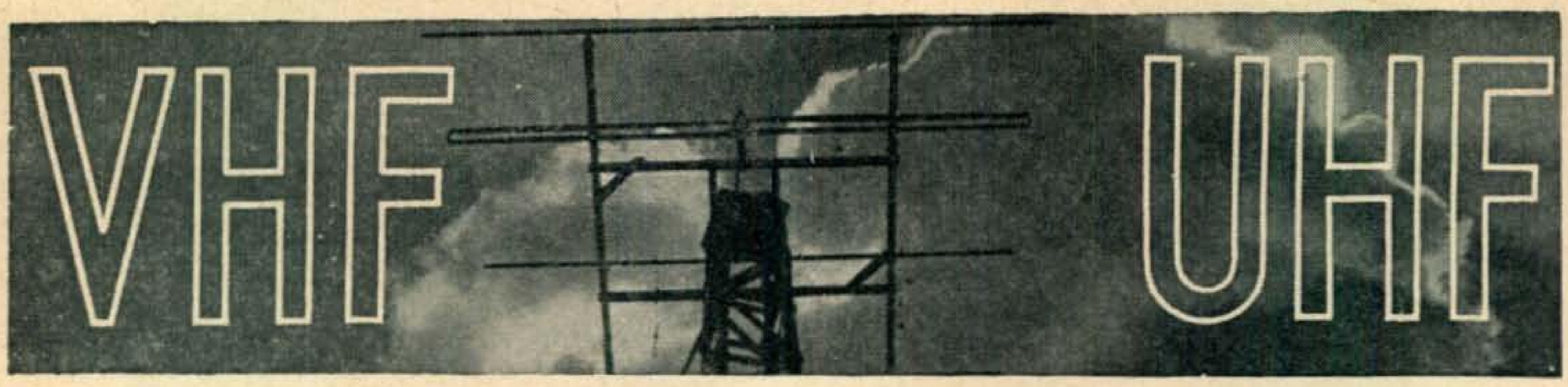
—*W1SPI.*

KP4LH says there is a certificate available for anyone QSOing 10 or more stations at Ramey Air Force Base. . . . **W4HHK**, **FWH**, **EID**, and **W5JTI** are interested in two-meter DX and will coöperate with any desiring to make skeds. . . . Many hope that ex-**W7SL** will get back in the ham game; right now he's noted as the noise interference man for Seattle City Light Co., running down noisy heating pads, neon signs, etc., to the satisfaction of the local hams who in many cases would be off the air without his help. His work is commendable and appreciated by the

(*Continued on page 58*)

W2PIA at the Bridgehampton races.

* *Address correspondence to: The Brasspounder, c/o CQ Magazine, 342 Madison Ave., N. Y. 17, N. Y.*



Conducted by E. M. BROWN, W2PAU*

THE V.H.F. GANG HIT THE JACKPOT during the past month. Sporadic-E openings gave the six-meter band a much-needed shot in the arm. Hundreds of QSOs were accomplished, and experienced old-timers reported that signals were, in many cases, the loudest they had ever experienced. Distances covered during these wide-spread openings ranged from as low as 400 miles during periods when ionosphere activity was at its peak, up to over 2,000 miles when wide-spread good conditions permitted "double-hop" contacts. But, except in degree, these openings were about what the six-meter gang have come to expect for this time of year. The big news was made on the higher bands!

1196 Miles On Two Meters

On the morning of June 24th W5VY, of San Antonio, Texas, checked conditions on two and six meters, and found things pretty hot. Although excellent groundwave conditions had prevailed on two in the early morning hours, they seemed to be on the way out. But six meters was wide open. W8s and W9s were rolling in, pinning the meter. Pat recalls that he had seldom heard signals over that path so strong on six meters. Tuning the FM broadcast band, he discovered it loaded with stations up to 108 mc. He immediately started CQ-ing on two meters, short calls, and frequent standbys. In hopes that some of the two-meter boys might be listening on six, he QSYed to that band, and announced his intentions to transmit on two meters.

W8WXV, of Shiloh (near Mansfield), Ohio, walked into his shack about 11:00 A.M. EST and warmed up the two and six-meter receivers. He had been checking the TV channels, but had heard nothing unusual, so thought that he would try a little cross-band two to six meter work with W8CMS and W8NQD. On tuning six meters, he found the band open to W5-land, and heard W5VY announcing that he was going to QSY to two meters. Pat gave his freqency as 144.360. Luckily, that was the same frequency used by W8WXV, so Al knew exactly where to dig. He heard W5VY immediately at the start of his first CQ, on c.w. The signals peaked at S7. Al answered on phone, but did not hear W5VY come back until after the third stand-by. W5VY's signals were then quite weak, and he reported W8WXV's signals as S5 in San Antonio. Al then went over to c.w. and passed out the report and QTH, whereupon W5VY responded using phone, loud and clear. After about ten minutes, W5VY's signals faded out, ending the QSO, but around 11:30 he was heard again, about S7, calling CQ. Al copied three or four transmissions, then the signals faded out. So now there's a new record to shoot at—we figure it to be 1196 miles.

W8WXV was using an 829B in the final, running about 75 watts input. The antenna was a 45-degree corner reflector (measured gain of 12 db), about 45 feet in the air. His receiver was a crystal-controlled converter, with two cascaded 6J4 r.f. stages, working into a communications receiver.

W5VY was running a full kilowatt into a pair of 4-125s (he sez they'll take it without too much trouble if the bias is pushed up to over 400 volts!). His antenna was a 4-over-4 stacked array, with 5/8-wave length spacing between sections, about 55 feet in the air. We do not have the dope on Pat's receiver at this time.

Horizontal polarization was used on both ends of the QSO.

New 420-mc Fixed-Station Records Established

Figuring in the 420-mc news again this month we find our friend G5BY. As reported in past issues of *CQ*, Hilton has been working stations at distances over 100 miles on 435 mc with amazing regularity. On May 30, he worked G2XC, at Portsmouth, a distance of 132 miles, at 2145 GMT. Signals were RST 579 in both directions, fading to 559 as the QSO progressed. G2XC was not equipped to transmit on phone, but was able to copy G5BY's phone signals S2 to S5. G2XC was using an 832A tripler with 22 watts input and a corner-reflector antenna about 31 feet high.

On June 4 at 2115 GMT, G5BY worked G6LK, Cranleigh, Surrey, over a distance of 161 miles. Signals were RST 599 on c.w. in both directions, and G5BY was later reported as S8 on phone. As though to prove that this performance was not unusual, G5BY hooked G5TP, at Stoke Row, Oxfordshire, for a 154-mile contact, at 2316 BMT. Signals over this path were RST 559 with some fading. Hilton was again able to get through on phone.

G5BY's transmitter uses a pair of 8012s as triplers, with 20 watts input, on phone and c.w. His receiver, described in previous *CQ* columns, uses a 1N23A crystal mixer, working through a 6AK5 pre-amp into an ARC5 communications receiver tuned to 8 mc. He is now using two separate antennas, transmitting on the 24-element W2NLY array, and receiving on a newly-constructed array which sports 24 driven elements in front of a screen reflector, mounted 40 feet above the ground. The screen array seems to average about 2 S-units better than the 24-element array on reception.

On the evening of June 13 generally excellent propagation conditions prevailed over the north-eastern seaboard. The two-meter band was wide open, from southern Virginia to New England.

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* *Associate Editor, CQ. Send contributions to E. M. Brown, 88 Emerald Avenue, Westmont, Collingswood 7, N. J.*

W2QED decided that this would be a good opportunity to run tests with some of the 420-mc experimenters located beyond his normal ground-wave range. He found W1PBB, of Stratford, Connecticut, on two meters. Their first checks on 420 yielded no results. They arranged to try again in a couple of hours. W2QED next hooked up with K2AH, of East Orange, N. J. They established contact on the first try, on 420 mc, with Q5 S7 signals each way, over the 100-mile path. After signing with K2AH Ken hooked W2AOD of Plainfield, N. J., W2QKW, of Yonkers, N. Y., and W2BQK of Bergenfield, N. J. Signals were strong, averaging S7, on these contacts. On the schedule with W1PBB, contact was established on 420 mc at 1124 P.M. EDST. Signals on 420 were fairly weak, and it was necessary to use m.c.w. to complete the QSO. We calculate the distance as 160.5 miles—so durned close to G5BY's record that it seems only fair to call it a tie!

W1PBB was using an 832A straight-through amplifier as the final stage in his crystal-controlled transmitter. This fed an 8-element "H" type array about 30 feet in the air (shooting directly into several trees)! Barney's receiver uses a 2C40 lighthouse r.f. stage into an APS-13 front end, which feeds a 30-mc i.f. strip with a bandwidth of about 500 kc.

W2QED's receiver uses an APS-13 front end into a modified BC645 i.f. strip. His antenna is a 32-element array with 16 driven elements and 16 reflectors. Vertical polarization was used during the record-breaking contact.

Six Meters in Review

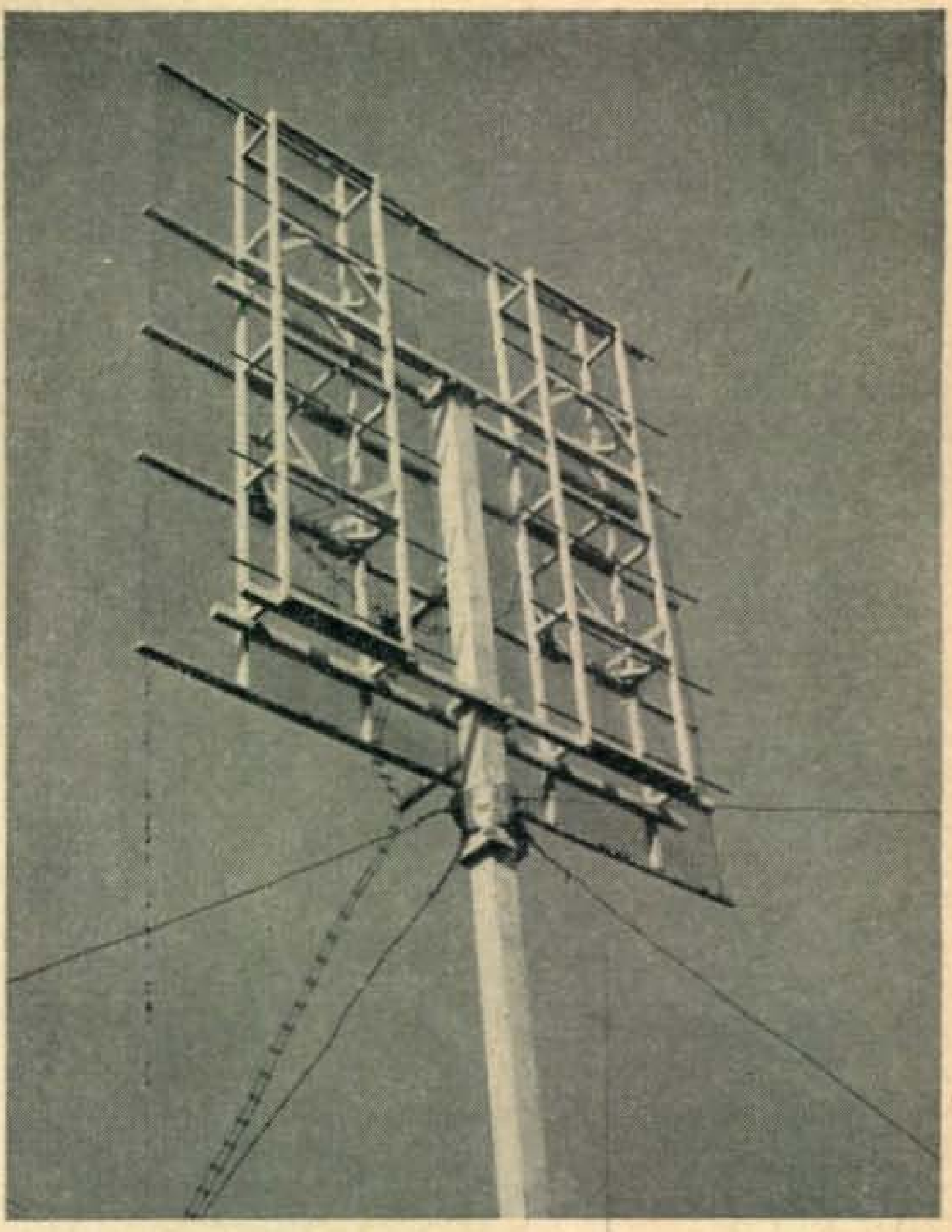
After a late start, six meters finally busted loose! The month of June, 1950 brought so many band openings to all parts of the country that it would be next to impossible to report them all, even briefly, in the limited space available here. But let's try, at least, to give an over-all picture of the activity which has been reported, to date.

June 2: Scattered opening occurred in the southwest, W5CXS, W5FXN, W5JLY and W7FGG were active. WØBPL worked W7IAP later in the day.

June 3: Good conditions returned to the southwest, with W5QIO, W5BDT, W5VY, W5JLY and others holding forth in the 5th district, W7FGG and W7QLZ representing the Phoenix area, and W4LRR also reported on deck. W7LYA worked W6OB, and W6FYM heard W7BYK.

June 4: Another good Sunday morning session materialized in the midwest, with plenty of W9s and W5s present to take advantage of it. The signals over this path faded out around 1030 EST, but the opening had merely shifted to the west, where W7QLZ had a busy time working WØs in Kansas and Iowa, W7s in Washington and Idaho, and he was heard by VE7DU. W6FYM meanwhile was working W5s and WØs. W7KOP compiled an impressive list of W6s. Somewhat later, an opening developed on the west coast, with VE7DU providing most of the excitment for W6OB, W6ANN, W6ERE, and others.

June 5–9: This period was relatively quiet. VE3AET and VE5NC report a few contacts with WØs and W7s during the late evening hours of the 6th. Scattered openings occurred between the northeastern part of the country and the south central section. On the 8th, W9JMS worked W2s, VE2, and W5s. W5CUH heard W9MBL's beacon transmitter. On the 9th things were relatively dull, with



The latest 24-element array at G5BY's. Spacing between the sections of the beam is 11½ inches (dipole tip-to-tip). The elements are spaced ¼ wavelength in front of the screen. 330-ohm feed line is employed.

weak scattered openings reported over the eastern half of the country.

June 10: Fair openings occurred over the entire continent. There were skip contacts made from W6 to VE7, W5 to W7, W8 to W4, W9 to W4, W6 to W5 during the daylight hours. Several separate openings seemed to have taken place during the evening, one centered between Texas and Illinois, the other between VE7DU and southern California.

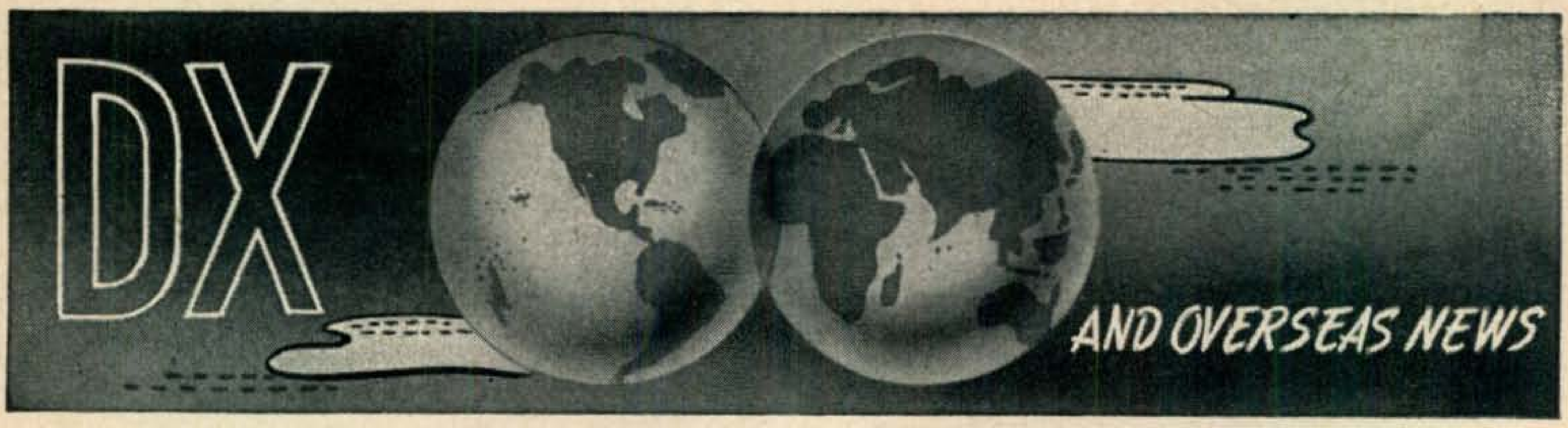
June 11: The band opened during the morning from VE1 south and southwest. VE5NC reported working W9s and WØs. W8WRN reports the VE1s loud and clear from 1045 EST till noon. Conditions faded for a while, then came back strong around 1745 EST. Signals from VE1 were reaching out to the 9th district, with W9ZHL compiling a nice list of contacts. The opening developed into a good one between the region centered around northern Ohio and the Gulf coast states.

June 12: Conditions were fair for the boys in the 6th district, with several contacts between southern California and Texas. The shortest skip reported was between W7QLZ in Phoenix and W6BQR. Later, the band opened from W6 up into the Seattle area.

June 13–14: Scattered openings, on the 13th with VE5NC working a flock of W7's and VE7's. The 14th produced a fair opening from the northeast to the Kansas section. VE3AJS also reports strong signals from W4-land.

June 16 through 18: During this week-end period, the band was open almost continuously. Double-hop skip permitted contacts from W2 to W6, W3 to W7 . . . It would be impossible to list in any detail the DX worked on six meters at this time. For example,

(Continued on page 60)



Conducted by HERB BECKER, W6QD*

LAST MONTH, the column was handled by W6ENV, and I am sure that you will agree with me that he did the usual good job.

The following well-known DX men have achieved WAZ, and we want to offer our sincere congratulations to them.

211	W2JVU	Frank Frisch	40-183
212	W2AGW	Howard Wolfe	40-207
213	W8BRA	Dave Kennedy	40-203
214	VK5JS	Jack Strafford	40-198
215	W9VND	Oscar Jaeger	40-173

In this issue, we have included the rules for the 1950 World-Wide DX Contest. This is the third contest sponsored by *CQ*, and, judging from the interest shown in the 1949 contest, it looks as though this one will surpass it in participation. Actually, the rules for the 1950 affair are exactly the same as last year's. After reading the comments sent in by you fellows, we felt that the great majority of you seemed to indicate that the rules were all OK. The last weekend in October will be for the phone sections, while the first weekend in November will be for the c.w. sections. Those of you who did not get in last year's contest and who are not familiar with the rules might find it worthwhile to give the rules the once over. I think you will get a lot of fun out of this type of a contest.

Once again, we will offer first, second, and third place certificates to the highest scoring stations in each of the four sections. For example, there will be (1) our operator phone section, (2) multiple operator phone section, (3) one operator c.w. section, (4) multiple operator c.w. section.

We have a quantity of contest log forms, country lists, and reprints of the contest rules. They can be had by writing to Radio Magazines, Inc., 342 Madison Avenue, New York 17, New York. Be sure to specify how many contest log forms you think you will need, including sufficient copies for carbons. Send a stamped, self-addressed envelope, and in the case of overseas stations, unattached postage stamps. Some of you may like to get some of these reprints of the contest rules in order to send them to overseas hams, thereby creating a little more participation.

4X4RE is another one of the overseas boys who liked our contest last year, and he is looking forward, as he puts it, "with much impatience," to the one this fall. By the way, he is just finishing up a 300-watt rig and hopes to have this done in time for the contest. In the meantime, he is running 50 watts. A 3-element beam is also figuring in the plans.

A few of the boys have been working a station on the Island of Sicily, but this counts the same as Italy. One of the boys there is I1AXV. . . . Apparently W9AND is handling the QSL cards from VP8AO for the W9 stations only. So, it looks as though you W9s who want one of these cards had better send a self-addressed stamped envelope to W9AND, 624 College Street, Dixon, Illinois.

I get a tremendous bang out of the reaction to some of the stuff which is run in this column. For example, I think it was in the May issue that something was said about a W station working a station signing "F37," and he wondered who it was. Since that time, I have had 15 or 20 explanations as to who "F37" is (or was), with some of these coming from France. We got a big laugh out of this, but strange as it seems, there are still people who think the station actually was "F37." Naturally, the code boys were the first to jump on this thing as was expected. Nuff of this, but, did you work F37 or F3MS??

W8EYE worked VK1RA for his 38th Zone. . . . On TA3AA's jaunt to AR8, he had 81 QSO's with all W districts except W7. And, what do I see here! The only W6 was ENV!! Guess Andy gave up Canasta for 15 minutes. . . . Jules also worked HZ1HZ, VE2BV, KV4AA, and ZL2FA. Jules said that while he was operating AR8AR, he got a scare one morning when he almost lost his little 6L6 rig. It seems that he had his antenna hanging over the balcony of his hotel room, and someone below gave it a yank.

W2WZ thinks everybody else can work an AC3 or AC4, but he can't. Al had better set his alarm clock for a little earlier in the a.m. . . . W6VBI is shoving off from Los Angeles for the northern part of the state, Sacramento to be exact. DX will be tried from that spot from now on.

Don Wallace was telling me the other day that probably few of us realize that Bill Shuler, KH6VP, is the holder of two WAZ certificates. The first one he achieved was at W7BE. While Bill was stationed in W7, he didn't think he had a chance to make WAZ from there, but look at what happened. . . . When he moved to KH6, he thought it would be a long haul to get his DX score up in the running. Once again . . . look at what happened! Where is your next stop, Bill?

DL1DA says that as far as he knows, there are still no licenses in Saarland. However, some of the boys are working with EZ4 calls; most of them from Saarbrucken.

It looks as though W9AND is working himself into a job. He also has the log of FY7YB, ex-FY8AE. He expects to send out cards for him and requests that all W stations send a self-addressed, stamped envelope to him. . . . Some of us have wondered what happened to C8YR, so W6TI provided the answer by working him on June

(*Continued on page 41*)

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

W. A. Z. HONOR ROLL

CW & PHONE

WAZ

40 Zones

W1FH	234
W6VFR	232
W2BXA	227
W6EBG	225
W6ENV	225
W3BES	225
W6GRL	224
W6ADP	223
W3GHD	223
W6MEK	222
G6RH	222
W6PFD	222
G6ZO	222
W3LOE	221
WØTXO	220
W8BHW	218
G2PL	216
W2PEO	215
W6FSJ	215
W6SN	214
W6ITA	214
W4AIT	213
W3EVW	213
VK3BZ	213
W6TT	212
W6AM	211
W6SYG	211
W6SAI	210
VE7HC	210
W9VW	209
WØPNQ	209
ZL2GX	209
W2AQW	208
W8HGW	208
W6MX	208
W9NDA	208
ZL1HY	208
W6SC	207
W6MJB	207
W2AGW	207
VE7ZM	206
W4BPD	206
W6OEG	205
W7GUI	205
W6NNV	205
LU6DJX	205
W6DZZ	205
W6MVQ	205
W6DI	204
W6PKO	204
VK2DI	204
KH6CT	204
W4CYU	203
ZS2X	203
VE4RO	203
W8BRA	203
W6RM	202
CE3AG	202
W6OMC	202
W6PB	202
W7AMX	201
PY1DH	201
W6BPD	201
W9KOK	200
W6PQT	200
VK2ACX	199
VK5JS	198
W2IOP	197
PY1AJ	196
W6WB	196
G2FSR	196
G4CP	195
W5KC	195
G6QB	195
KH6IJ	194
W6GAL	193
W6DLY	193
W6AVM	192
W6HX	192
WØ[illegible]	19[illegible]
W6GDJ	192
W6ZCY	191
VK2DI	191
W6RW	190
W6RBQ	190
W6EFM	190
W6SRU	190
VK3JE	189
ON4JW	189
W5GEL	189
WØNTA	188
W6TI	188
W6AMA	186
W2CZO	185
W6SA	184
W6UCX	184
G3AIU	183
W2JVU	183
W6VE	183
W6RLN	182
W6AOA	181
W6KRI	181
G8IG	181
WØELA	181
W6EPZ	180
W6IFW	180
OK1FF	180
W8SDR	179
I1KN	179
W6UHA	179
KH6QH	179
W7DL	177
WØDOX	177
VK6KW	177
W6UZX	177
CX1FY	176
W6IGD	176
W1AB	175
G3DO	175
W6WKU	174
W6CIS	174
W6TS	174
W7FZA	174
W6PCS	174
W6KUT	174
W6TZD	173
W9VND	173
KH6VP	172
G5YV	172
OK1LM	172
W6SRF	171
LA7Y	171
WØSQO	171
PY1AHL	171
W6BAM	170
W6PZ	169
VK4HR	169
KH6BA	169
W5AFX	169
W6JZP	168
W6ANN	167
VK3CN	167
G2VD	167
W6DUC	166
KH6MI	166
W6CEM	166
VE7GI	165
W6LRU	165
W6BUD	165
W6EAK	163
W6YZU	163
W6WWQ	163
W6BVM	163
VE7VO	162
OK1HI	162
W6PH	162
ZS6DW	162
W7ENW	162
VK4EL	162
W6PDB	161
W6PUY	160
W6LN	160
W6JK	160
JA2KG	160
W6MHB	160
I1IR	158
W6CYI	157
W7BD	157
WØ[illegible]UH	15[illegible]
W7BE	156
KH6LG	156
W6BAX	155
G3AAM	154
W6KEV	153
G3YF	152
VK2OL	151
OK1SV	151
W6LEE	150
W6FHE	150
W6EYR	150
W6LDD	150
OK1CX	147
W6LS	147
W7DXZ	146
W6AYZ	146
VE6GD	146
W9NRB	145
W6MUC	145
W6QD	145
W6MUC	145
W6LER	145
KH6VP	145
ON4IA	144
G3BI	144
W6KLQ	144
KH6PY	144
W6UNZ	139
W6ID	138
ZC1CL	138
OK1WX	135
G3AZ	133
W6IEU	133
W6KDR	133
W6OBD	131
ZS2CR	131
W7ASG	129
W7GBW	127
G8IP	127
G5BJ	126
FK6HA	124
G5VU	124
W6NRQ	123
W6MLY	123
W6BIL	121
ZS6CT	113
KG6AL	103
VK6SA	103
W7KWA	98

39 Zones

W3DPA	218
W8NBK	218
W3KT	217
W9ANT	216
WØNUC	211
W2NSZ	210
W3IYE	209
W1ENE	209
W9RBI	209
W1BIH	209
W2HHF	208
W3JTC	208
W1JYH	208
F8BS	205
W3EPV	203
W9IU	201
W2HZY	209
W5ASG	200
W4GG	197
W3OCU	196
W2GWE	195
VE3QD	195
W2CWE	192
W3JNN	191
W1HX	191
W2AGO	191
W1AWX	191
W2WZ	188
W3DKT	187
W9LNM	186
WØ[illegible]YR	186
W9MXX	185
W8RDZ	184
W1ZL	184
W3DRD	183
W4INL	183
KP4KD	182
W8SYC	182
W1DQH	181
VO6VP	179
W2EMW	179
VE3IJ	177
W6EHV	176
W2CNT	173
W8CVU	172
W3JKO	171
W4LVV	171
W9LM	170
W6CTL	169
W1NMP	169
W3JTK	169
OZ7EU	169
PY2AC	168
W4DKA	168
F9BO	167
W2CYS	167
OK1VW	167
W8LEC	166
W7PGS	164
W9FKC	163
W2BJ	163
W3KDP	162
W4BRB	162
W4VE	162
W2RGV	161
W6BZE	161
W4RBQ	159
WOGKS	158
W4OM	158
WØAIW	157
I1AY	157
VE3AAZ	156
W9YNB	155
DL1FK	155
W8VLK	155
I1AIV	154
W9TQL	154
W4AZK	154
W2RDK	152
W8WWU	151
SM5WI	148
W2COK	146
W2GUR	146
GM3CSM	146
W2MEL	145
OK1AW	144
TF3EA	142
W6LGD	141
W9DUY	140
W6ATO	139
W6KYV	139
W9ABA	139
I1XK	137
OE1CD	134
W7ETK	132
VK4RC	131
W6TE	131
CR9AG	131
W6WJX	131
W5CPI	130
VE7KC	127
DL1DA	127
VR5PL	124
W6MI	124
W6NTR	123
W6MUF	123
W7BTH	120
DL3DU	118
W6NRZ	117
KL7UM	117
W9NZZ	117
ZS2EC	116
W7HXG	115
W6JWL	114
W6EYC	114
KL7GG	114
KG6GD	111
W6VAT	110
W6FBC	110
W7GXA	105
W6LEV	103
W7LEE	91

38 Zones

W2HMJ	187
W2PUD	180
CM2SW	174
W8KPL	173
W8EJN	167
W8EYE	158
W2RGV	156
W2UEI	156
LU7CD	155
W2GVZ	154
W3LVJ	145
W8ZMC	143
ZS2AT	143
WØAZT	143
W9FKH	135
VE2BV	135
VE3ACS	134
W4FPK	131
W2PQJ	130
W3ZN	129
WØ[illegible]A	127
W9MZP	126
FE8AB	126
W9TB	122
GW4CX	120
W6ETJ	119
WØFET	118
W6CAE	113
KL7PJ	108
W7EYS	107
W6FXL	92
C1CH	84

37 Zones

W1KFV	168
W2ZA	160
W3WU	152
W4IWO	146
ZL3CC	143
GM2UU	142
W4ML	138
W3FYS	136
W2AYJ	133
ZL3AB	131
W7HKT	130
W4DIA	129
W1APA	122
VE1EA	116
WØFWW	108

36 Zones

W4HA	149
W9WCE	136
OA4AK	128
VE1PQ	128
W3AYS	124
W2WC	124
W9LI	124
SV1RX	119
W2BF	115
W9HUZ	114
VE5JV	113
4X4BX	112
OE1FF	111
W5CD	108
W2JA	102
W5BX	99
VE8AS	93
OH3OE	85

35 Zones

W2OST	146
W1BFT	141
W4DHZ	132
W9CKP	132
W6ZZ	120
W9RQM	119
CO6AJ	119
W8AVB	119
G6QX	117
W9FNR	112
W9DGA	108
KZ5IP	108
W2HAZ	107
WØRGJ	101
ZL1QW	99
DL3AB	79
KL7CZ	66

34 Zones

W8NSS	133
W1DEP	129
W4IYT	127
W3MZE	121
W1MRP	118
W5NTT	107
W8JM	102
G2BVN	91
W9WEN	83
W8PCS	80

33 Zones

W4QN	110
W5FXN	101
W2SEI	100
W8QUS	85

PHONE ONLY

39 Zones

W6DI	192
W6VFR	172
W7HTB	161
VQ4ERR	160
HB9DS	145
VE7ZM	145
DL1FK	125

38 Zones

W2BXA	179
W4CYU	173
W9NDA	159
G8IG	155
W1HKK	153
W6KQY	149
F9BO	143
W6AM	119

37 Zones

XE1AC	189
W1JCX	179
W9RBI	172
W3LTU	169
W8REU	163
W7MBX	158
VZ3BZ	158
G2PL	154
W6WNH	153
G3DO	153
W6PXH	153
W8BF	146
W6TT	139
W3JNN	136
E8VC	124
W7MBW	124
C1CH	83

36 Zones

W1NWO	172
W1MCW	170
W1BEQ	164
PK4DA	150
W9HB	150
W4ESP	144
W2DYR	140
W9BZB	139
GM2UU	135
W6PDB	130
W4INL	129
W1FJN	128
W8AUP	128
G6BW	127
W9HP	127
VE3BNQ	122
WØHX	120
VE7HC	115
W3DHM	96
W6SA	92
F8DC	87

35 Zones

HC2JR	152
W6PCK	141
W4HA	140
W9RNX	135
W6CHV	133
WØEYR	131
W2RGV	128
W2GHV	126
WØPUE	117
W9CKP	124
G8QX	123
W8XMC	122
CE3AB	121
WØPUE	117
W5LWV	108
W4OM	106
W3PA	105

34 Zones

LU8CW	129
W5KC	125
W2ZVS	124
W4LZM	124
W9BVX	124
W6UZX	123
W8BIQ	120
WØANF	115
W1BPH	105
W5UIG	100
W4IWO	99
W8QBF	92

33 Zones

W5ASG	134
W9MIR	127
W5ALA	122
W9WCE	119
W2ZW	115
W8BFQ	114
W8SDR	113
W3NSS	112
VE3BQP	108
WØANE	106
W2PQJ	100

CQ's World-Wide DX Contest

The 1950 contest will be bigger and better than last year's fracas. Study these rules, write in for your log sheets, and get ready for the greatest time you've ever had

1. **Contest Period:**
PHONE SECTIONS: 0200 GMT October 28 to 0200 GMT October 30.
C.W. SECTIONS: 0200 GMT November 4 to 0200 GMT November 6.
(See time chart for local times and dates.)
2. **Bands:** The contest activity will be confined to three amateur bands, 7, 14, and 27/28 mc.
3. **Competition** will be divided into four sections as follows:
(1) One-operator phone section
(2) Multiple-operator phone section
(3) One-operator c.w. section
(4) Multiple-operator c.w. section
Stations in both phone sections may contact each other, and stations in both c.w. sections may contact each other, but no contacts between phone and c.w. stations will be allowed.
4. **Equipment:** There will be no limit to the number of transmitters and receivers allowed, and competitors may use the maximum transmitter power permitted under the terms of their licenses.
5. **Serial numbers:** C.W. stations will exchange serial numbers consisting of five numerals, the first three being the RST report, and the last two being their own zone number. Stations in Zones 1 through 9 will prefix their zone number with zero (01, 02, 03, etc.) Phone stations will exchange serial numbers consisting of four numerals. The first two being the readibility and strength report, and the last two being their own zone number. Phone stations in Zones 1 through 9 will prefix their zone number with a zero (01, 02, 03, etc.).
6. **Contacts:** Contacts between amateur stations on different continents shall count three points; contacts between amateur stations on the same continent, but not in the same country, shall count one point; contacts between stations in the same country, for the purpose of obtaining zone and/or country multipliers, shall be permitted, but no points will be allowed for these contacts.
7. **Multipliers:** Two types of multipliers will be used: (1) a multiplier of 1 for each zone contacted on each band, (2) a multiplier of 1 for each country worked on each band.
8. **Awards:** 1st, 2nd, and 3rd place certificates will be awarded for each of the four Sections as follows:
A. To the highest scoring stations on each SINGLE BAND in the following areas:
(a) Each call area of the U.S.A.
(b) Each licensing area of Canada and Australia
(c) All other countries
B. To the stations having the highest combined total on ALL BANDS (or more than one band) in the following areas:
(a) Each call area of the U.S.A.
(b) Each licensing area of Canada and Australia
(c) All other countries
Certificates will also be awarded to each operator of each winning station in the multiple-operator sections.
9. **Scoring:** The contest score will be the sum of all contact points multiplied by the sum of the zone and country multipliers.
A. Everyone who sends in a log for a single band is eligible for a single band award only.
B. Those who submit logs for two or more bands will be eligible for the all band award, as well as the single band award.
10. **Zones and Continents:** The W.A.Z. boundaries as defined in CQ and the CQ DX Handbook, as well as on the W.A.Z. maps, will be recognized, and for continental boundaries, the same as used for W.A.C. will be recognized. Should any question arise as to the positive location of any station, the official definitions will be final. Copies of the country list and contest logs are available from the CQ editorial offices upon receipt of a stamped, self-addressed envelope, or in the case of overseas stations, unattached postage stamps.
All logs must be postmarked no later than December 15, 1950. Send logs direct to CQ, 342 Madison Avenue, New York 17, New York.

Operating Suggestions:

We suggest that overseas phone operators indicate which end of the band they are tuning, or which portions of the phone band (American or foreign) they intend to tune. On 28 mc, where the band is 1700-kc wide, it is extremely important that overseas phone stations specify the approximate frequency they intend to tune. C.W. stations, likewise, could greatly assist by indicating where they intend to tune. We think if the above principle is used by all, it will result in far less QRM, as well as fewer useless calls.

Foreign amateurs, remember scores are based on the greatest number of different countries and zones as well as stations worked. Do not concentrate on working only U. S. stations, this is a world-wide competition!

CQ WORLD-WIDE DX CONTEST SCHEDULE

TIME ZONE	STARTING TIME	ENDING TIME
Greenwich Mean Time (GMT)	Saturday, Oct. 28, 0200	Monday, Oct. 30, 0200
	Saturday, Nov. 4 0200	Monday, Nov. 6, 0200
U. S. A. Eastern Standard Time	Friday, Oct. 27, 9:00 P.M.	Sunday, Oct. 29, 9 00 P.M.
	Friday, Nov. 3, 9:00 P.M.	Sunday, Nov. 5, 9:00 P.M.
U. S. A. Pacific Standard Time	Friday, Oct. 27, 6:00 P.M.	Sunday, Oct. 29, 6:00 P.M.
	Friday, Nov. 3, 6:00 P.M.	Sunday, Nov. 5, 6:00 P.M.

LOG OF W2BYF ZONE 5 COUNTRY U.S.A. DIVISION C.W. OP. 1

DATE & TIME (LOCAL OR GMT)	STATION	COUNTRY	SERIAL NUMBER		ZONE & COUNTRY MULTIPLIERS						PTS
			SENT	RECEIVED	7.0 mc		14 mc		27/28 mc		
					Z	C	Z	C	Z	C	
10-27 1002	KR6AZ	OKINAWA	58905	58925					1	1	3
1007	VK2DI	AUSTRALIA	58905	57930					2	2	3
1045	PY1DH	BRAZIL	57905	56911			1	1			3
1056	G6QB	ENGLAND	57905	56914			2	2			3
10-28 1202	ON4JW	BELGIUM	57905	56914	1	1					3
1215	W6QD	U.S.A.	57905	57903	2	2					0
1218	ON4QF	BELGIUM	56905	57915							3
1230	XF1A	MEXICO	59905	59906	3	3					1
				TOTALS	3	3	2	2	2	2	19

COUNTRY MULTIPLIER 3+2+2 = 7
ZONE MULTIPLIER 3+2+2 = 7
TOTAL MULTIPLIER 7+7 = 14
CONTACT POINTS = 19

TOTAL SCORE 14 × 19 = 266

7, 14040 kc. C8YR is still at the same old QTH.

Some of you fellows in Utah can make OK1MB a happy guy by working him. Listen for him on 14035 daily, between 1600 and 1800 g.m.t. . . . XEIAC tells us that ex-CR5UP is quite active as CTIBW on 20 meter phone. Also, a new expedition is headed for Cocos Island under the call TI9ES. Al also has found out that there will be activity in Spanish Guinea.

A couple of months ago, W2BMX shoved off for a six-month sojourn in Europe, and the other day a letter arrived from I1KN stating that he had had the pleasure of meeting W2BMX. Since they had been working each other for about 15 years, the boys had quite a personal reunion. There happened to be an International High-Frequency Conference going on at this particular time, and other visiting hams included HK3SQ, XE1K, OQ5AQ, W4JNX, HB9DB, and CT1BE.

G6RH is having quite a time trying to locate WØOZW/KS6. He has sent QSL cards, but, as yet, he has nothing in return except his own card. . . . W4LZM spends practically all his time on 10 phone but is thinking seriously of shifting over to 20 c.w., hoping it will help jack up his Honor Roll rating.

LU8CW operates phone and has worked 35 Zones and about 130 countries. Jose has heard AC4RF on 20 phone and is hoping like the dickens that he connects with him as soon as possible. LU8CW says some of the hardest Zones for him to work are 17, 18, and 19. His station supports a 3-element rotary on 20, and this is connected to a Collins 75A. On 10 meters, he uses a 4-element rotary, while the receiver is an HRO-5. The rig uses a pair of 4-125As with 805s as modulators.

ZL1HY says he is resting easier nowadays after receiving a QSL card from CR1ØAA. This happens to be his 200th confirmed country. . . . LU8BF, who writes the DX column in *Radio Onda*, says that some guy has reported hearing PX1H. He then goes on to say, "Is this a genuine station?" That is a question which I wish we could answer.

G8IG knocked off FY7YC on 20 c.w. . . . A lot of the boys have been grabbing VR1C, who seems to be having fun giving the boys a new one.

At this point, most of the cards from HC8GRC have been mailed. These folks did a good job out there, and I believe their expedition was nicely planned.

W6CAE, who is with the Navy in San Diego, recently visited W3AEL while on business in Washington. Yes, of course, he worked his own station from there!! . . . F9BO has added a few on phone: CT2AE, SV5UN, SP5AB, UA9CL, UG6AB, PK4KS, and VQ5AI. On c.w., he logged FY7YC.

G5WI, who has had 835 or so QSOs with W6AY, has signed off and is headed west. He expects to join up with W6AY out on the Pacific Coast, and, of course, that will be quite a union or reunion. Les' skeds with W6AY have been over the past three years, and it has enabled him to compile some very interesting data on conditions. G5WI has worked over 2,000 Ws, which has provided him many good QSOs, as well as the making of many fine friends. . . . W3LE has heard that Vic, 3V8AA, ex-FT4AA, is in a clinic in France recuperating from a rather serious ailment and may not be back on the air for a year or so. He, no doubt, would appreciate hearing from any of the boys, and his QTH is as follows: Victor S. Attias, Sanatorium Al Sola, Montbolo, Pyrenies-Orientales, France.

W6UZX finds there is new activity in Netherlands New Guinea, PK6NL, 14035, T7. He is on Biak Island, which is part of Dutch New Guinea. This is a little confusing, since it had been thought that the correct prefix there should be PK7. Anyway, the guy gives a QTH which will be found in the usual spot.

W9RBI just couldn't wait to drop us a line since he worked two new ones. Ross says that apparently SP5AB has a new crystal, and instead of finding phone QRM on 14255, it is now c.w. QRM on 14120. He also says that 3V8BB must be VFO now, as he showed up on 14335. ZK2AA will be a little hard to find from now on, since he is VFO too.

Don't be surprised if you see PK6HA showing up in the States any day now. W8NBK received a letter from him mailed in Australia, and it looks as though he will turn up at a Pacific Coast port before too long. . . . As far as W8NBK is concerned, he is getting a little impatient at not getting a card from AC4YN, but I wouldn't be a bit surprised but that it would show up any day now. Don't give up, Arkie, as 4YN has lots to do, and sends out his cards in not-too-frequent batches. . . . Don't know whether it will be too late or not, but he also says that I1ADW is going to be in HV for a while. . . . KH6BA was in town the other day, and he said that he thought VK4SI/VR1 is NG.

W9ABA had a sad experience in having his card to VR1C returned. On the other hand, W6HSK gives us a little info which might be good. It seems that KX6BA is operated by a couple of

(Continued on page 59)

Results, CQ's Second World-Wide DX Contest

Here is part two of the results, continued from last month. Now you can see what we meant when we said it was too big to run in a single issue!

Single Band, Single Operator, Phone

	Station	Band	Total Countries	Total Zones	Points
Zone 1	KL7UM	14 mc	24	14	5,472
	KL7HI	28 mc	5	5	170
Zone 2	VO6EP	14 mc	2	1	3
Zone 3	W6DI	14 mc	50	22	24,624
	W6EPZ	28 mc	24	19	4,386
	W7CUD	14 mc	13	13	1,430
	W7LBN	28 mc	16	17	1.430
	VE7HC	14 mc	48	27	24,675
	VE7HC	28 mc	1	1	2
Zone 4	W4HA	14 mc	23	16	3,1[illegible]8
	W4NBV	28 mc	53	28	23,571
	W5JUF	14 mc	34	23	6 535
	W5KC	28 mc	21	14	2 030
	W8VLK	14 mc	36	19	8 745
	W8NXF	28 mc	51	33	15,022
	W9EWC	14 mc	30	22	7,436
	W9EWC	28 mc	40	22	7,936
	WØHNF	14 mc	17	10	1,431
	WØDBC	28 mc	31	20	4.7[illegible]3
	VE3HB	14 mc	23	13	3,708
	VE3BNQ	28 mc	38	16	12 204
	VE4XO	14 mc	31	20	9 180
	VE4RO	28 mc	23	20	6,450
Zone 5	W1CJK	14 mc	41	20	8.[illegible]06
	W1BEQ	28 mc	57	26	30 710
	W2BXA	14 mc	49	23	26,712
	W2ZVS	28 mc	37	20	16 017
	W3LOE	14 mc	49	26	16.350
	W3LOE	28 mc	42	19	7.808
	W4OM	14 mc	41	25	10 362
	W4KKM	28 mc	36	18	11,232
	VE2IZ	28 mc	25	16	3,895
Zone 6	XE1AC	14 mc	50	26	17,480
Zone 7	TI2HP	14 mc	34	23	9,291
	YN4CB	14 mc	7	8	900
	TI2HP	28 mc	37	18	9,090
	KS'AC	28 mc	5	5	380
	KZ5DE	28 mc	2	2	16
	HP1TS	14 mc	36	20	18,894
	HP1LA	28 mc	19	15	8,194
Zone 8	CO2IC	14 mc	21	14	4,235
	VP6SD	28 mc	46	23	48,921
Zone 9	HK4AR	14 mc	22	15	7,326
	HK4CO	28 mc	54	24	47,034
	YV5BZ	14 mc	9	9	4,410
Zone 10	HC2KJ	7 mc	3	2	10
	HC2KJ	14 mc	18	14	5 312
	HC2KJ	28 mc	26	14	8,280
	CP5FB	28 mc	30	19	15,435

Single Band, Single Operator, Phone

	Station	Band	Total Countries	Total Zones	Points
Zone 11	PY2CK	14 mc	60	31	49 049
	PY2CK	28 mc	63	27	53 1[illegible]0
	ZP5BL	28 mc	55	25	67,680
Zone 12	CE2DY	7 mc	2	2	28
	CE2DY	14 mc	19	14	4,488
	CE4BP	28 mc	32	21	15,635
Zone 13	LU8CW	14 mc	15	12	2,565
	LU8CW	28 mc	38	25	11,781
	CX3BH	14 mc	18	15	5.181
	CX3BH	28 mc	23	17	12,400
Zone 14	G2DPZ	7 mc	16	6	638
	G2DPZ	14 mc	55	25	30 660
	G2PU	28 mc	40	23	44,511
	ON4AZ	14 mc	1	1	2
	ON4AZ	28 mc	6	4	120
	GW4CX	28 mc	33	23	8,904
	HB9DS	7 mc	15	6	693
	HB9DS	14 mc	59	29	25 008
	HB9DS	28 mc	50	26	35,568
	PAØRU	28 mc	29	17	9.154
	EA4LA	28 mc	39	22	28,121
	GM3DZB	28 mc	46	25	14,910
	F9BO	7 mc	4	2	24
	F9BO	14 mc	30	12	4,[illegible]72
	F9BO	28 mc	36	17	7,155
	LA7Y	7 mc	22	9	3,813
	LA7Y	14 mc	37	23	34.620
	LA7Y	28 mc	29	17	11,132
	SM4KP	7 mc	3	2	12
	SM4KP	14 mc	38	17	7,7[illegible]5
	SM4KP	28 mc	37	25	7,7[illegible]0
	OZ3Y	28 mc	24	15	28,8[illegible]0
	CT1NT	14 mc	19	8	2,970
	CT1NT	28 mc	21	7	1,960
	DL1FK	14 mc	32	23	5,247
	DL3DO	28 mc	34	22	22,176
Zone 15	OK1HI	14 mc	31	12	8,643
	OK1FF	28 mc	43	23	31,492
	I1ARU	14 mc	4	2	18
	OH2NB	14 mc	42	23	34,775
	OH2NB	28 mc	33	18	21,267
	HA5BF	14 mc	24	8	9,6[illegible]6
	MF2AA	28 mc	16	13	1,972
	OE6BB	14 mc	21	4	1,750
Zone 20	AR8AB	14 mc	4	4	84
	AR8AB	28 mc	14	8	1,584
Zone 22	VS7GR	7 mc	1	1	0
	VS7GR	14 mc	21	13	3,638
Zone 24	CR9AG	28 mc	32	22	17,928
	VS6AM	28 mc	10	7	561
Zone 26	XZ2SY	14 mc	49	25	30,046

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Kurt Wydler at HB9DS, one of the biggest signals in Zone 14.

	Station	Band	Total Countries	Total Zones	Points
Zone 28	VS2BD	14 mc	16	13	1,537
	VS2BD	28 mc	4	3	56
	PK3MR	28 mc	15	11	2,340
	PK4KS	28 mc	37	21	19,024
Zone 29	VK5AS	28 mc	57	25	49,446
	VK6KW	14 mc	28	21	15 435
	VK6KW	28 mc	32	19	12,087
Zone 30	VK2WD	14 mc	19	15	2,856
	VK3LN	14 mc	32	30	16,214
	VK7LZ	28 mc	16	15	2,821
Zone 31	KH6IJ	14 mc	24	20	14 388
	KH6IJ	28 mc	28	22	30,300
Zone 32	ZL4HP	14 mc	36	20	20,888
	ZL4HP	28 mc	28	18	26 266
Zone 35	ZD4AH	28 mc	30	17	9,071
	FF8PG	28 mc			untabulated
Zone 36	VQ2GW	14 mc	18	13	1,922
	FQ8SN	14 mc	14	9	2,070
	FQ8SN	28 mc	8	8	736
	CR5UP	14 mc	35	19	20 088
	CR5UP	28 mc	35	15	12,250
Zone 37	VQ4SC	7 mc	3	1	8
	VQ4SC	14 mc	29	18	7,708
	VQ4IMS	28 mc	67	28	80,370
	MI3SC	14 mc	21	17	2,736
	MI3SC	28 mc	37	16	23,055
	VQ5ALT	28 mc	13	8	1,218
	CR7AF	14 mc	11	10	1,092
Zone 38	ZS3G	14 mc	14	9	3,151
	ZS3G	28 mc	23	16	13,611
	ZS5U	7 mc	5	5	110
	ZS6JS	14 mc	44	27	39,973
	ZS6OV	28 mc	48	30	56,550
Zone 40	TF3SF	28 mc	4	2	36

Single Band, Multiple Operator, Phone Winners

	Station	Band	Total Countries	Total Zones	Points
Zone 3	W6SZY	7 mc	31	21	12,012
	W6GAL (W6GHU)	14 mc	81	34	88,665
	W6OEG	28 mc	38	27	20,215
Zone 4	WØJPH (WØGOP)	28 mc	32	20	14,612
	VE4RO	7 mc	35	22	10,659
	VE4RO	14 mc	53	31	36,892
	VE4RO	28 mc	39	23	16,182

	Station	Band	Total Countries	Total Zones	Points
Zone 5	W2BXA	7 mc	37	17	12,690
	W2BXA	14 mc	60	28	65,648
	W2FBA	28 mc	45	24	34,431
	W3NKI	14 mc	58	27	33,150
	W4EZL	28 mc	44	23	28,408
Zone 8	KP4ID (KP4DJ)	28 mc	1	3	75
Zone 10	HC2JR	7 mc	10	9	4,693
	HC2JR	14 mc	33	22	42 625
	HC2JR	28 mc	32	18	38,400
Zone 14	EA3EP (EA3DY)	14 mc	31	18	29,000
Zone 15	HA5B	7 mc	22	12	5,168
	HA5B	14 mc	26	11	10,952
Zone 20	4X4BX (4X4AO)	14 mc	54	23	50,512
	4X4BX (4X4AO)	28 mc	9	4	546

List of Entrants

All Band, Single Operator, C. W. Entries

Zone 1 KL7PJ, 75,735; KL7CZ, 17,591; KL7KQ, 7,840.

Zone 3 W6GRL, 190 080; W6RM. 186,154; W6IBD, 116,602; W6EPZ, 95 256; W6OMC. 93,790; W6CTL, 73,-008; W6MVQ. 62,828; W6BAM. 55 338; W6ATO, 50,125; W6VE, 42,480; W6SRF, 37.189; W6RXV, 30,039; W6CQK, 28.105; W6BJU, 26 980; W6NKR, 22.327; W6KEK, 17.160; W6EFM, 15 570; W6AMO, 13,680; W6QDE, 13,668; W6YC, 11,842; W6LWC, 11,220; W6AM, 9.476; W6MUO, 9.204; W6CHV, 8.424; W6MI, 8,370; W6WWQ, 7.636; W6TDO, 5.626; W6UQQ, 5 502; W6ETJ, 4.025; W6WPI, 3 936; W6GPB, 3,895; W6EJA, 3,850; W6PCP, 3,280; W6VAT. 2 698; W7IRZ, 11,041; W7NLI, 10,830; W7LNG, 6,600; W7BGH, 4,860; W7ENA, 4,004; W7HJC, 1,431; VE7KC, 29,735; VE7EH, 8,352.

Zone 4 W4KVX, 172,466; W4DQH, 66,430; W4NNJ, 2,025; W4KMS, 1.326; W5LVD, 107,688; W5KC. 53,-130; W5FNA, 43,960; W5MMD, 32 204; W5PKE, 28.200; W5LGS, 12,483; W5CD, 10,528; W5NTT, 1,271; W5CEW, 486; W8JIN, 306,180; W8BTI, 186,648; W8DAW, 100.825; W8LEA, 50 941; W8CCJ, 14 190; W8DAE, 11,484; W8DQC, 10.502; W8NSS, 10,065; W8PM, 7,378; W8SDR, 7.280; W8KC, 5 916; W8BWS, 3,741; W8BUM, 3,654; W8MMC, 1,155; W9IU, 224,025; W9DUY, 206.150; W9LM, 161.814; W9RQM, 88,830; W9ROM, 67,770; W9NII, 42 496; W9JNB, 29.610; W9NZZ, 24.080; W9HUZ, 19,460; W9KXK, 17,775; W9CIA, 16.461; W9EXY, 14,364; W9AEW, 5,586; W9INL, 2.501; W9WEN, 2.346; W9KMN, 1,925; W9QLW, 950; WØDAE, 147.136; WØCU, 43 248; WØVCR, 38.784; WØFGW, 10,125; WØRXL, 8,427; WØDEA, 3,818; VE5QZ, 32,922; VE6AO, 15,544.

Zone 5 W1RY, 117,034; W1CJH, 83,578; W1JYH, 46,-680; W1CJK, 42,840; W1AXA, 39 832; W1PDF, 30 516; W1QOG, 17,457; W1EQ, 16,517; W1EOB, 13.778; W1DIT, 12.351; W1BOD, 12,283; W1ODW, 9,108; W1EWF, 7,685; W1AB, 6,579; W1AQE, 5,838; W1DDO, 3,900; W1QMJ, 3 696; W1ONP, 3.465; W1ORV, 2 112; W1RKB, 684; W1PLJ, 12; W2QCF, 128,790; W2MA, 47,352; W2GNQ, 40 920; W2CGJ, 34 686; W2WZ, 34,-112; W2EMW, 26,754; W2EWT, 22 950; W2URX, 17,-100; W2QCP, 12,166; W2AIS, 10 519; W2ICO, 10,175; W2TXB, 6 192; W2RHQ, 4 590; W2LTP, 2,760; W2UJJ, 1.800; W2BO, 1,781; W2SLU, 882; W2EYZ, 585; W2AQX, 135; W3LOE, 289.120; W3JTK, 66,780; W3JKO, 64.785; W3ARK, 42,638; W3GHD, 31,436; W3BEN, 27.160; W3NA, 19,272; W3NOH, 15,120; W3ADZ, 13,915; W3KQD, 7,008; W3OVU, 4,320;

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KG6DI could be found at the bottom of many a pile-up.

W3AFU, 4.218; W3CWD, 3.485; W3FDJ, 465; W4KFC, 310.184; W4TO, 92.232; W4FPK, 55,074; W4DXI, 23,-895; W4EV, 21,294; W4AIT, 18.920; W4GG, 11,972; W4VE, 7.540; W4EPA, 2.956; W4JUY, 429; VE1EA, 16,660; VE1IM, 9,700; VE1EK, 8,424; VE2NI, 43 052; VE2BK, 5.450; VE3AEJ, 198; W8AZD, 73,858; W8AVW, 5,504.

Zone 7 KZ5DE, 49,322; KZ5WZ, 18,921; KS4AC, 12,-207; HB1BR, 13,248.

Zone 8 KV4AA, 105,203; KP4JE, 15,200; KP4KD, 13,-104.

Zone 11 PY2NX, 72,090; PY1GJ, 21,736.

Zone 12 CE3AG, 249,480; CE4AD, 46,177; CE2DY, 28,980.

Zone 13 CX3CS, 211,420; VP8AI, 16,296; LU7CD, 55,-770; LU5BM, 47,731; LU6AX, 2,848.

Zone 14 G4CP, 147.888; G5YV, 143,385; G2VD, 142,-232; G2DLJ, 63,854; G8KP, 62,684; G3AZ, 54 718; G3BPP, 25,320; G2AO, 19,383; G2AJB, 16,872; G2BVN, 10,710; G3ATU, 9,660; G6CL, 9,460; G3DES, 6,656; G8DA, 4,950; G6NK, 2 550; F9BO, 62,992; F8NB, 40,-426; F8TM, 27,208; F9BB, 6,016; F8LD, 4,950; F8TQ, 4,023; F8ZY, 810; F9IL, 140; SM4KP, 30,094; SM6ID, 28.221; SM5UN, 22.650; SM5OL, 11.180; SM3ARE, 10,-032; SM5CO, 11,037; SM7UT, 9.568; SM6DA, 8,221; SM6APB, 8,010; SM5LL, 7,959; SM5WJ, 6,768; SM5PV, 5,700; DL7AA, 120.300; DL1FI, 85 904; DL1KB, 44.176; DL1IB, 36.630; DK8AV, 34,144; DL7AF, 32,212; DL1AU, 30.744; DL7BK, 19.936; DL1BF, 19 8"0; DL1XS, 15.594; DL7DA, 15,128; DL7AH, 14,690; DL7AD, 10,716; DL7BX, 6,968; DL7AI, 6,390; DL1FV, 5,358; DL7AB, 2,484; DL7AU, 1,040; DL7CX, 594; LA6U, 71.171; LA6PB, 41.106; LA7WA, 27.456; LA4K, 938; LA7BA, 918; GI3BZR, 11,868; GW5SL, 107.124; GW3ZV, 231,846; GC2CNC, 15 311; GM3AXR, 50.344; GM6RV, 34,648; GM3CSM, 22 220; OZ2EU, 42,000; OX1W, 30,261; OZ2NU, 1,760; PAØUN, 343,728; PAØPN, 28.815; PAØLB, 1,980; ON4QF, 302,994; ON4AZ, 58.338; ON4UF, 6.000; ON4SQ, 3.465; ON4EQ, 2,624; HB9P, 254,400; HB9DZ, 26.424; HB9EQ, 17,071; HB9BJ, 5.760; HB9CI, 1,550; EA1AB, 42,842; EA1BC, 26,730; EA5AF, 400; EA6AF, 34,816; LX1AS, 8,645; EI9J, 66,913; OY3IGO, 300.

Zone 15 OE1CD, 36 064; OE1AD, 30,096; OE5AR, 23,606; OE2CC, 1,000; OK1HI, 202.764; OK1LM, 51.525; OK1RW, 41.796; OK1NS, 37 515; OK3AL, 35 672; OK2SO, 31.773; OK1EA, 21,406; OK1AW, 20.296; OK1XQ, 14.768; OK2MA, 6.486; OK1CX, 5 564; OK1IA, 3,933; OK1KY, 3.485; OK1GT, 2.520; OK1SV, 2,520; OK1SK, 2.560; OK1UY, 1,768; OK1VB, 2,550; OK1WX, 10.146; OK1IJ, 1,'00; OK1VW, 760; OK2BX, 700; OK1GM, 684; HA4SA, 61,180; HA5BF, 30,031; OH5NF, 35,616; OH2SD, 1,550; OH2TC, 1 127; OH6EV, 42; ZB1AJ, 3.042; I1PL, 119,860; I1AIV, 70,143; I1KN, 68,375; I1IZ, 31,160; I1ER, 429; IS1FIC, 1,080.

Zone 20 SVØWH, 11,600; YO3RI, 77,945; YO2BU, 22,540; YO3RF, 16,434; YO3AG, 9,550; YO7WL, 7,360; 4X4RE, 138,061; 4X4CZ, 56,170.

Zone 22 AP5B, 15,183; VU2JP, 31,205.

Zone 24 CR9AG, 153,760; VS6AE, 16,960; VS6BA, 10,-491.

Zone 25 JA2BQ, 55,071.

Zone 27 KG6DI, 281,780.

Zone 28 VS2BD, 23,058; PK3LC, 55,913; PK3MR, 40,824.

Zone 29 VK6RU, 88,704.

Zone 30 VK2EO, 228,200; VK3OP, 114,342; VK4RC, 56,280; VK7LZ, 6,327.

Zone 31 KH6IJ, 292.734; KH6QH, 199,234; KH6CD, 135,072; KH6BA, 73,248.

Zone 32 ZL1MB, 304,560; ZL4GA, 201,375; ZL1MQ, 15,480; ZL3CP, 1,782.

Zone 33 EK1AO, 192,786; CN8AG, 12,110; FA8DA, 64,337; FA8IH, 55,352.

Zone 36 OQ5BQ, 60,900; FE8AB, 173,756.
Zone 37 VQ4HJP, 190,608; VQ4SC, 3,441.

Zone 38 ZS5LI, 94,160; ZS6OS, 61,200.

Zone 40 TF3EA, 93,390; TF3MB, 10,434; TF5TP, 7,661.

7 Mc, Single Operator, C. W. Entries

Zone 1 KL7RZ, 708; KL7PJ, 636.

Zone 3 W6AM, 8,932; W6ANN, 7,881; W6RXV, 4.147; W6CTL, 2,976; W6NKR, 1.470; W6YC, 1,380; W6SRF, 1,196; W6QDE, 1,180; W6NEX, 1,159; W6EPZ, 700; W6AMO, 624; W6BAM, 608; W6EJA, 588; W6MUO, 588; W6CQK, 520; W6KEK, 500; W6WWQ, 210; W6MI, 187; W6BJU, 36; W6ALQ, 12; W7LNG, 156; VE7VC, 2,852; VE7KC, 96.

Zone 4 W5JC, 16,376; W5BK, 8 640; W5CKY, 8,120; W5PKG, 2.560; W5FNA, 713; W5KC, 480; W5NTT, 169; W8WZ, 26,176; W8JIN, 6,477; W8BTI, 1,872; W8DAW, 1,113; W8DAE, 1,060; W8BWS, 48; W8CCJ, 2; W9DUY, 1,134; W9LM, 697; W9RQM, 230; W9QLW, 117; WØDAE, 1,100; WØCU, 608; WØFGW, 132; VE5QZ, 63; VE3ACS, 6,630; VE3IR, 3,072; VE3IJ, 735; VE3BTG, 195.

Zone 5 W1ZL, 8.568; W1DIT, 6.768; W1QMJ, 3 442; W1RY, 2,482; W1AXA, 1,300; W1RBQ, 1,248; W1BOD, 1,128; W1CJH, 966; W1JYH, 690; W1EOB, 558; W1ODW, 357; W1MRQ, 225; W1RKB, 104; W1RHU, 90; W2AGO, 15,876; W2WC, 10,199; W2AIS, 1,959; W2EWT, 1,628; W2EMW, 1,587; W2YDG, 987; W2QCF, 825; W2MA, 408; W2GNQ, 240; W2BO, 195; W2GVZ, 108; W2CGJ, 72; W3LOE, 11.346; W3MQY, 11,025; W3ORU, 8,428; W3ARK, 4.300; W3JKO, 1.757; W3PDX, 714; W3BEN, 627; W4BRB, 31,392; W4KFC, 14,274; W4FPK, 5 547; W4TO, 4.972; W4OBQ, 2,424; W4OM, 1,104; W4EV, 2; VE1IM, 420; VE1EA, 112; VE2NI, 54.

Zone 7 KS4AC, 132; HP1BR, 171.

Zone 12 CE3AG, 4,650; CE2DY, 408.

Zone 14 G2VD, 6.992; G3AZ, 3,936; G2AJB, 1 080; G3BVN, 368; F8TM, 1.340; F9BO, 4,650; SM4AWS, 609; SM5OL, 121; SM6AFK, 56; SM7UT, 32; DL1FK, 2,846; DL1YA, 1,380; DL1XS, 945; DL1FI, 76; LA6PB, 2,128; LA6U, 10,025; GW5SL, 6,800; GI3BZR, 1,000; GM3CSM, 1,296; GM3AXR, 1,176; OZ1W, 1,554;

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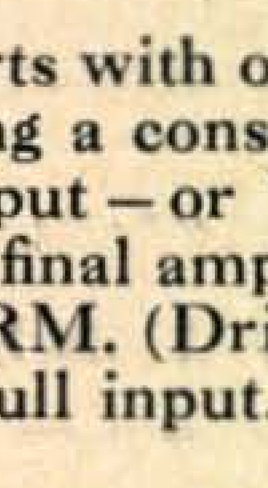

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Zone 15 OK1HI, 6,800; OK2SO, 3,008; OK1AW, 2,460; OK1SK, 408; OK2UD, 198; OK1KY, 16; OK1XQ, 6; HA4SA, 7,611; OH5NF, 1,596; OH3PK, 640; OH6NR, 100; I1PL, 13,475; I1KN, 2,880.

Zone 25 JA2BQ, 880.

Zone 27 KG6DI, 4,366.

Zone 29 VK6RU, 759.

Zone 30 VK4EL, 4,840; VK5FM, 6.

Zone 31 KH6IJ, 8,970; KH6QH, 4,332; KH6CD, 715; KH6BA, 600.

Zone 32 ZL4GA, 7,332; ZL2MM, 3,969; ZL1MQ, 858.

Zone 33 EK1AO, 4,896.

Zone 36 FE8AB, 1,044.

Zone 38 ZS5LI, 384.

Zone 40 TF3EA, 805; TF3ZM, 560; TF5TP, 130.

14 Mc, Single Operator, C. W. Entries

Zone 1 VE8AS, 5,472; KL7UM, 47,047; KL7PJ, 22,-344; KL7PB, 5,132; KL7KQ, 2,829.

Zone 2 VO6X, 43,424; VO6EP, 28,520.

Zone 3 W6PQT, 71,504; W6MVQ, 59,950; W6FSJ, 40,-050; W6EPZ, 36 670; W6EHV, 26 255; W6CQK, 20,562; W6CTL, 20,546; W6BAM, 19 600; W6JZP, 18,924; W6SRF, 13,578; W6LDD, 13,176; W6MHB, 13,098; W6EYC, 10,545; W6NKR, 10 478; W6BJU, 8,586; W6JWL, 6,435; W6NNV, 5,586; W6QDE, 4,875; W6WWQ, 3,750; W6KEK, 3,600; W6MUO, 2 584; W6TI, 2,312; W6YC, 2 000; W6AMO, 1,541; W6PCP, 1,540; W6IPH, 1,323; W6RXV, 1,246; W6ALQ, 1,144; W6BIL, 9'3; W6EJA, 714; W6UQQ, 495; W6MI, 392; W6ETJ, 315; W6AM, 3; W7ASG, 20,440; W7AC, 9,728; W7LNG, 5,200; W7LEV, 4,730; W7NLI, 4,089; VE7KC, 16,705.

Zone 4 W4PN, 29,382; W4NNJ, 1,620; W4KMS, 594; W5KC, 14,007; W5MMD, 11,832; W5FNA, 12,717; W5PKE, 8,235; W5CD, 1,534; W5NTT, 524; W5CEW, 96; W8JIN, 78,232; W8BRA, 60,775; W8BTI, 57,630; W8HFE, 43 674; W8DAW, 19,296; W8LEA, 9 882; W8PXP, 8,162; W8QZV, 3,528; W8CLH, 874; W8HA, 630; W8DAE, 600; W8KC, 522; W8CCJ, 361; W8BWS, 1,404; W9DUY, 82,173; W9LM, 48,312; W9VW, 81 760; W9TQL, 28,512; W9FID, 26,714; W9FNR, 17,633; W9HUZ, 17,472; W9RQM, 17,408; W9NII, 12,998; W9HQF, 12,120; W9FAU, 3 624; W9JNB, 1 674; W9ABA, 459; W9QLW, 300; WØDAE, 37,293; WØCU, 18,910; WØDU, 13,464; WØERI, 10,692; WØCDP, 3,822; WØTKX, 3,276; WØCDV, 2,436; WØFGW, 1,320; WØEWF, 36; VE5QZ, 15,930; VE3IJ, 24,624; VE3HB, 6,532; VE3BTG, 5,410; VE3BYJ, 130.

Zone 5 W1JYH, 34,823; W1RY, 23,680; W1DQH, 22,-185; W1MUN, 19,602; W1PDF, 16,120; W1CJK, 8,906; W1EOB, 6,032; W1AXA, 5 832; W1DHO, 5,328; W1AB, 4,860; W1AQE, 4,752; W1APA, 1,782; W1BOD, 1,600; W1ODW, 943; W1ONP, 240; W1RKB, 250; W1QMJ, 6; W2UFT, 71,008; W2IYO, 64,782; W2RQH, 45 212; W2QCF, 28,840; W2CSO, 26 356; W2ZZA, 24,846; W2ZA, 17,974; W2EMW, 15 300; W2PZM, 14,074; W2URX, 13,462; W2EWT, 12,348; W2AZS, 10,836; W2ICO, 10,175; W2MA, 8,262; W2GNQ, 8,094; W2TXB, 6,192; W2CGJ, 4,788; W2LXI, 3,960; W2DSU, 1,800; W2AIS, 1,178; W2CJM, 1,080; W2RHQ, 1,052; W2BO, 840; W2SLU, 612; W2PXR, 196; W2GVZ, 135; W2LTP, 135; W3LOE, 75,136; W3OCU, 48,048; W3ARK, 19,458; W3DKT, 16,870; W3ADZ, 13,356; W3BEN, 7,809; W3NOH, 6,844; W3CGS, 6,157; W3WU, 1,326; W3JKO, 2; W4KFC, 66,992; W4AIT, 18,920; W4TO, 17,854; W4OM, 14,336; W4GOG, 12,935; W4FPK, 9,845; W4EV, 2,640; W4LQN, 3,367; W4IZR, 1,540; W4EPA, 54; W8AZD, 15,708; VE1DB, 3,219; VE1IM, 2,912; VE1EA, 9,163; VE2BV, 16,835; VE2NI, 11,970.

Zone 7 KS4AC, 1,573; HP1BR, 4,100; VP1AA, 902.

Zone 8 KP4KD, 9,222; KP4JE, 6,451.

Zone 10 OA4J, 5,040.

Zone 11 PY2NX, 4,305.

Zone 12 CE3AG, 73,620; CE2DY, 13,414.

Zone 14 G2BOZ, 37,683; G2LB, 92,906; G2VD, 15,768; G3DOG, 11,220; G3AZ, 7,052; G8DA, 3,510; G2AJB, 2,624; G2NK, 2,378; G3ATU, 1,836; G3AIM, 1 008; G2BVN, 132; F9BO, 7,488; F8IW, 11,316; F8TM, 2 380; F9ND, 924; F9EP, 143; SM5IZ, 35 760; SM4KP, 13 727; SM5XH, 12,537; SM5OL, 7,400; SM5TQ, 5 876; SM7UT, 5,846; SM5WL, 4,972; SM5NU, 24; DL3DU, 39,130; DL1FI, 24,128; DL1DA, 13,490; DL1FK, 10,761; DL1XS, 8,802; DL3AB, 3,952; LA6U, 35,032; LA7VA, 14,592; LA8Q, 10,064; LA6PB, 7,105; LA9W, 820; LA3V, 27; GW5SL, 17,956; GI4NU, 39,780; GI3BZR, 8,260; GC2CNC, 2,542; GM3AXR, 24,244; GM5CL, 12,-726; GM3CSM, 7,622; OZ2EU, 15,912; OZ1W, 8,976; PZØCJH, 720; PAØJX, 570; ON4QF, 81,969; ON4AZ, 12 810; ON4WF, 1,426; HB9P, 51,271; HB9EU, 40,773; HB9BT, 18,003; HB9EQ, 5,456; EA6AF, 12,857; EI9N, 29,750; EI9J, 10,887.

Zone 15 OK1HI, 28,280; OK1RW, 18,480; OK1XQ, 14,145; OK1AW, 3,895; OK1KY, 2 997; OK2SO, 2 852; OK1SK, 920; HA5BF, 40,000; HA5BD, 34,000; HA4SA, 8,294; OH6NR, 10 416; OH3PK, 6,844; OH5NF, 5,390; OH2TM, 5 200; OH6OV, 42; I1PL, 20,252; I1KM, 12,-200; I1BCB/Trieste, 4,480.

Zone 20 YO3RF, 4,687; 4X4RE, 38,820.

Zone 21 MP4BAD, 52,584.

Zone 24 CR9AG, 42,174; VS6AX, 8,880.

Zone 25 JA2BQ, 14,570.

Zone 27 KG6DI, 45,000.

Zone 28 VS2BD, 18,512.

Zone 29 VK6RU, 26,928.

Zone 30 VK2PV, 1,334; VK3OP, 79,674; VK5BO, 63,-918; VK5FM, 37,014; VK7LJ, 1,652.

Zone 31 KH6IJ, 62,370; KH6CD, 43,263; KH6QH, 41,956; KH6BA, 25,286; KH6PY, 6,440.

Zone 32 ZL2CP, 66,912; ZL4GA, 54,883; ZL3AB, 34,-162; ZL3OA, 32,273; ZL1MQ, 1,764.

Zone 33 CT3AV, 36,120; CT3AA, 2,720; EK1AO, 39,-597.

Zone 34 ST2TC, 8,330.

Zone 36 VQ2GW, 11,096; FE8AB, 64,111.

Zone 37 MI3AB, 66,240; MD4GC, 19,074; VQ1CUR, 23,876; CR7AF, 14,091; VQ4SGC, 17,160.

Zone 38 ZS3R, 924; ZS6OW, 79,704; ZS6HO, 75,348; ZS6OS, 43,285; ZS5LI, 28,126; ZS5FE, 15,428.

Zone 39 VQ8AY, 6,020.

Zone 40 TF3EA, 32,091; TF3AR, 25,785; TF3AB, 8,241; TF3MB, 5,720; TF5TP, 4,080.

28 Mc, Single Operator, C. W. Entries

Zone 1 KL7BJ, 9,600; KL7KQ, 1,098.

Zone 3 W6WJX, 9,568; W6EPZ, 7,344; W6CTL, 5,160; W6BAM, 4,956; W6BJU, 4,294; W6RXV, 4,016; W6MI, 3,190; W6UQQ, 2,646; W6KEK, 2,240; W6AMO, 1,198; W6ETJ, 1,880; W6SRF, 1,647; W6YC, 1,386; W6MUO, 403; W6PCP, 350; W6QDE, 153; W6WWQ, 140; W6EJA, 114; W6MUQ, 24; W7IRZ, 5,717; W7NLI, 3,502; W7HXG, 2,070; W7LNG, 132; VE7MS, 20,066; VE7KC, 1,104.

Zone 4 W4CYC, 27,105; W4NNJ, 150; W4KMS, 144; W5KC, 7,742; W5PKE, 7,567; W5MMD, 4,992; W5FNA, 4,876; W5CD, 3,780; W5CEW, 96; W8BTI, 21,546; W8DAW, 20,212; W8JIN, 17,928; W8LEA, 15,540; W8GLK, 14,105; W8CCJ, 11,186; W8KC, 2,871; W8AL, 2,405; W8DAE, 2,366; W8BWS, 273; W9LM, 23,725; W9RQM, 22,113; W9DUY, 16,531; W9CKP, 16,740; W9JNB, 16,443; W9KXK, 13,050; W9NNI, 9,028; W9HUZ, 30; WØDAE, 23,485; WØFGW, 2,640; WØCU, 2,084; WØARH, 270; VE3BTG, 6,636; VE3AFY, 1,971; VE3IJ, 1,702; VE5QZ, 2,025; VE5UN, 640.

Zone 5 W1RY, 17,875; W1CJH, 17,316; W1CJK, 12,610; W1PDF, 2,268; W1ONP, 1,785; W1BOD, 1,364; W1AXA, 1,300; W1JIY, 738; W1OBW, 357; W1EOB, 247; W1AB, 126; W1AQE, 42; W2KUW, 30,162; W2CGJ, 11,350; W2MA, 10,764; W2GNQ, 8,610; W2QCF, 8,277; W2GVZ, 1,752; W2RHQ, 1,234; W2AIS, 595; W2NHH, 360; W2BT, 588; W2URX, 216; W2SLU, 24; W3JKL, 40,248; W3JTK, 27,813; W3LOE, 18,900; W3BEN, 2,310; W3NOH, 1,600; W3AOZ, 6; W4KFC, 30,615; W4EV, 12,256; W4TO, 11,550; W4OM, 7,344; W4FPK, 3,706; W4EPA, 2,181; W4EEO, 24; W8AZD, 21,018; VE1KN, 2,976; VE1IM, 564; VE1EA, 504; VE2NI, 7,400.

Zone 7 KS4AC, 3,400; HP1BR, 1,430.

Zone 8 KP4JE, 3,460; KP4KD, 322.

Zone 11 PY2NX, 37,098.

Zone 12 CE3AG, 25,400; CE2DY, 1,440.

Zone 14 G3DCU, 52,570; G2VD, 25,032; G2PL, 17,511; G3AZ, 7,452; G3AIM, 7,068; G2BVN, 3,654; G3ATU, 2,937; G2AJB, 1,700; G8DA, 120; G2NK, 6; F9BO, 8,888; F8TM, 5,768; F9OL, 918; SM4KP, 4,536; SM7UT, 154; SM5OL, 16; DL1FI, 24,128; DL1LH, 23,655; DL1FK, 9,676; LA6PB, 3,720; LA6U, 1,904; LA9T, 217; GW4CX, 14,196; GW5SL, 12,240; GM3CSM, 4,196; GM3AXR, 912; OX2EU, 2,620; OZ1W, 1,081; ON4QF, 29,332; ON4AZ, 5,445; HB9P, 27,608; HB9EQ, 1,688; EI9J, 7,030.

Zone 15 OE6AA, 2,884; OK1HI, 35,784; OK2SO, 4,446; OK2AT, 946; OK1AW, 885; OK1ME, 96; OK1ZM, 20; HA4SA, 4,480; OH5NF, 5,916; I1KN, 8,534; I1PL, 6,970.

Zone 20 4X4RE, 30,134.

Zone 24 CR9AG, 34,858.

Zone 25 JA2BQ, 7,050.

Zone 27 KG6DI, 57,839.

Zone 28 VS2BD, 198.

Zone 29 VK6RU, 11,016.

Zone 30 VK3OP, 3,120; VK5FM, 967; VK7GW, 16,224.

Zone 31 KH6IJ, 35,334; KH6QH, 30,034; KH6CD, 18,-176; KH6BA, 6,923.

Zone 32 ZL4GA, 15,564; ZL1MQ, 2,576.

Zone 33 EK1AO, 26,028.

Zone 36 FE8AB, 13,736.

Zone 38 ZS5U, 5,604; ZS6OS, 7,456; ZS1FD, 4,050.

Zone 40 TF3EA, 7,530; TF3SF, 4,708; TF3MB, 682; TF5TP, 98.

All-Band, Single-Operator, Phone Entries

Zone 1 KL7UM, 5,472; KL7HI, 4,223.

Zone 3 W6GRL, 49,077; W6RM, 45,313; W6DI, 24,-624; W6CHV, 15,356; W6FSJ, 12.540; W6AM, 20.335; W6EPZ, 16.401; W6BJU, 15.853; W6EHV, 5.580; W6MUO, 5.264; W6MI, 2,124; W6UQQ, 522; W7HRH, 1,440; W7CUD, 1,430; W7MOW, 962; VE7HC, 25,333.

Zone 4 W4DQH, 53,382; W4CYC, 14,525; W5HFQ, 6,370; W5MMD, 5,400; W5KC, 4.320; W8NXF, 31,824; W8ZMC, 21.973; W8GOB, 19,314; W8NSS, 14.713; W8CCJ, 2.664; W8PM, 5'0; W9EWC, 30.894; W9CZC, 15,247; W9ABA, 117; W9FAB, 2.108; WØQUV, 6,018; WØHNF, 1,770; WØFUH, 910; VE3QE, 3,708; VE4RO, 19,620; VE4XO, 12,096; VE4IJ, 2,040.

Zone 5 W1ATE, 83.664; W1PDF, 24,388; W1CJH, 19.656; W2BXA, 27,454; W2VQM, 19,656; W2IUV, 10,-074; W2SFA, 4,560; W2MA, 5.520; W3LOE, 47,056; W3NA, 44.577; W3LTU, 22,270; W3BRT, 6.678; W4OM, 22,561; W4ZD, 18.009; W4TO, 8.060; W4FGL, 3,519; W4DX1, 1,248; W8AVW, 920; VE1CR, 24,402.

Zone 7 TI2HP, 40,880; YS1JR, 3,672; HP1LA, 17,619; HP1BR, 3,811.

Zone 8 CO7RQ, 8,463; VP2GG, 1,034.

Zone 9 HK4AR, 73,932; HK4DF, 50,976; HK1DZ, 8,658; YV5AC, 29,068.

Zone 10 HC2KJ, 28,875; HC1FG, 5,723; CP5FA, 4,392.

Zone 11 PY2CK, 224,349; PY4RJ, 34,920; PY7BN, 15,181.

Zone 12 CE2DY, 9,366.

Zone 13 LU8CW, 25,380; LU5CK, 19,620; CX3BH, 34,091.

Zone 14 G2DPZ, 153,642; G2PU, 120,496; G2ALN, 82,-728; G2DYV, 20,025; G3DKR, 11.792; G2VJ, 6.615; G3AIM, 5.520; G2AO, 464; HB9DS, 145.410; HB9J, 4.576; HB9BJ, 2.583; ON4AZ, 156; EA4LA, 28.121; EA4CK, 6.413; F9BO, 24.786; LA7Y, 127.684; LA6J, 1,984; LA6PB, 570; SM4KP, 25.192; SM5WJ, 12,000; CT1FM, 12.600; CT1NT, 10,260; CT1ST, 696; DL3DO, 80.730; DL1FI, 12,276; DL1IB, 3,280; DL7AD, 968; DL7AA, 363.

Zone 15 OK2SO, 18,750; OK2SL, 2,627; OK1AW, 1,107; OK1RW, 3,636; I1RB, 124.026; I1LW, 27.384; I1AMU, 13.090; I1BNU, 1.081; OH2NB, 132,191; I1RC/Trieste, 14,006; ZB1AJ, 2,112.

Zone 20 AR8AB, 2,241; YO3RI, 3,510; 4X4AA, 60,939.

Zone 22 VS7GR, 3,745; AP5B, 15,183.

Zone 24 VS6AE, 1,144.

Zone 28 VS2BD, 2,196; PK4DA, 9,243.

Zone 29 VK6KW, 55,200.

Zone 30 VK3VQ, 4,750.

Zone 31 KH6IJ, 89,568; KH6CD, 966.

Zone 32 ZL4HP, 96,288; ZL1MQ, 23,732.

Zone 33 FA8IH, 37,065; CN8BV, 20,944; CN8BA, 18,-340.

Zone 36 VQ2DH, 60,300; FQ8SN, 5,304; CR5UP, 64,-168; OQ5BQ, 24,612.

Zone 37 VQ4SC, 55,056; MI3SC, 25,791.

Zone 38 ZS3G, 20,414; ZS3M, 476; ZS6TE, 63,547; ZS5U, 61,097.

7 Mc, Single Operator, Phone Entries

Zone 10 HC2KJ, 10.

Zone 12 CE2DY, 28.

Zone 14 G2DPZ, 638; HB9DS, 693; F9BO, 24; LA7Y, 3,813; SM4KP, 12.

Zone 22 VS7GR, 0.

Zone 37 VQ4SC, 8.

Zone 38 ZS5U, 110.

14 Mc, Single Operator, Phone Entries

Zone 1 KL7UM, 5,472; KL7HI, 2,666; KL7AAB.

Zone 2 VO6EP, 3.

Zone 3 W6DI, 24.624; W6PWR, 15.572; W6KQY, 10,-431; W6AM, 7,200; W6FSJ, 6.125; W6BJU, 5.490; W6EPZ, 3.774; W6GVM, 3.367; W6MUO, 2,006; W6LDD, 495; W6MI, 195; W6PVV, 3; W7CUD, 1,430; VE7HC, 24,675; VE7VT, 2,583.

Zone 4 W4HA, 3.198; W5JUF, 6.555; W5HFQ, 6.370; W5JC, 1.290; W5MMD, 2.144; W5KC, 418; W8VLK, 8,7'5; W8ZMC, 5.014; W8NXF, 2.967; W8SXU, 252; W8CCJ, 72; W9EWC, 7,436; W9FAB, 2,108; W9ABA, 70; WØHNF, 1.431; WØGUV, 594; WØDU, 192; WØFUH, 40; VE3HB, 2,376; VE3IJ, 1,100; VE4XO, 9,180; VE4RO, 3,332.

Zone 5 W1CJK, 8.906; W1PDF, 7.905; W2BXA, 26,-712; W2VQM, 4.950; W2IUW, 2.960; W2URX, 1.848; W2MA, 756; W2DSU, 54; W3LOE, 16.350; W3LTU, 5,632; W4OM, 10,362; W4TO, 1,890; W4ZD, 2,464.

Zone 6 XE1AC, 17,480.

Zone 7 TI1HP, 9.291; YN4CB, 900; HP1TS, 18,894; HP1LA, 1, 748; HP1LB, 1,020; HP1BR, 684.

Zone 8 CO2IC, 4,235.

Zone 9 HK4AR, 7,326; HK4DF, 516; YV5B2, 4,410.

Zone 10 HC2KJ, 5,312; HC1FG, 442.

Zone 11 PY2CK, 49,049.

Zone 12 CE2DY, 4,488.

Zone 13 LU8CW, 2,565; CX3BH, 5,181.

Zone 14 G2DPZ, 30, 660; G3DO, 20.732; G2VJ, 5.504; G3AIM, 132; G2AO, 84; HB8DS, 25.008; HB9J, 627; ON4AZ, 2; F9BO, 4, 472; EI3W, 8.775; LA7Y, 3',630; LA6PB, 252; SM4KP, 7,755; SM5LL, 608; CT1NT, 1,960; DL1FK, 5,247; DL1FI, 1,782; DL1UH, 330.

Zone 15 OK1HI, 8.643; I1ARU, 18; OH2NB, 34.775; OH6NR, 480; HA5BF, 9,696; HA5B, 3,816; OE6VB, 1,750.

Zone 20 AR8AB, 88.

Zone 22 VS7GE, 3,638.

Zone 26 XZ2SY, 30,046.

Zone 28 VS2BD, 1,537.

Zone 29 VK6KW, 15,435; VK2WD, 2,856; VK3LN, 16,244; VK3AWW, 920; VK3MX, 192.

Zone 31 KH6IJ, 14,388; KH6BA, 6,336.

Zone 32 ZL4HP, 20,888; ZL1MQ, 7,790; ZL4GA, 4,978.

Zone 36 VQ2GW, 1,922; FQ8SN, 2,070; CR5UP, 20,088.

Zone 37 VQ4SC, 7,708; MI3SC, 2,736; CR7AF, 1,092.

Zone 38 ZS6JS, 39,973; ZS5U, 3,861; ZS3G, 3,151; ZS3D, 1,751.

28 Mc, Single Operator, Phone Entries

Zone 1 KL7HI, 170.

Zone 3 W6EPZ, 4,386; W6AM, 3,230; W6BJU, 2,622; W6FSJ, 1,080; W6MI, 1,012; W6ILH, 756; W6MUO, 770; W6HG, 608; W7LBN, 1,419; W7MOW, 962; W7BGH, 247; VE7HC, 2.

Zone 4 W4NBV, 23,571; W4OYG, 8,316; W4MB, 816; W5KC, 2,030; W5MMD, 738; WBNXF, 15,022; W8NSS, 12,960; W8ZMC, 12,288; W8VOZ, 11,648; W8BPM, 3,600; W8CCJ, 2,108; W8SRS, 750; W9EWC, 7,936; W9NII, 3,741; W9HNI, 1,560; W9EXY, 651; W9BZB, 24; W9ABA, 6; WØDCB, 4,743; WØYCR, 3,132; WØGUB, 2,775; WØFUH, 540; WØRVS, 24; WØHNF, 18; VE3BNQ, 12,204; VE3ND, 16; VE3MZ, 6; VE4RO, 6,450; VE4XO, 117.

Zone 5 W1BEQ, 30,710; W1ONK, 18,830; W1MCW, 11,760; W1RZD, 7,448; W1RDR, 4,982; W1PDF, 4 520; W1MRP, 2,556; W2ZVS, 16,017; W2YOS, 15,680; W2QKJ, 15,120; W2JJI, 6,394; W2UTH, 4,920; W2VQM, 4,876; W2SFA, 4,560; W2MA, 2,184; W2IUV, 2,112; W2BT, 1,416; W2JQJ, 900; W2PFU, 510; W2BXA, 0; W3LOE, 7,808; W3LTU, 5,494; W3FQA, 1,520; W3JKO, 392; W3OCU, 882; W4KKM, 11,232; W4ZD, 10,850; W4OM, 5,848; W4LZM, 3,888; W4NYX, 3,441; W4TO, 2,196; W4EEO, 168; VE2IZ, 3,895.

Zone 7 TI2HP, 9,090; KS4AC, 380; KZ5DE, 16; HP1LA, 8,194; HP1BR, 1,206.

Zone 8 VP6SD, 48,921.

Zone 9 HK4CO, 47,034; HK4DF, 39,900; HK4AR, 34,-176; HK4EB, 147.

Zone 10 HC2KJ, 8,280; HC1FG, 2,888; CP5FB, 15,435.

Zone 11 PY2CK, 53,100; PY3QO, 14,672; PY2NX, 14,-112; PY3OJ, 3,712; PY1SA, 375; ZP5BL, 67,680.

Zone 12 CE4BP, 15,635; CE3AX, 10,290; CE2DY, 2,080.

Zone 13 LU8CW 11,781; LU8BF, 2,784; CX3BH, 12,-400; CX3AA, 2,816; CX4AB, 1,248; CX2CN, 1,092.

Zone 14 G2PU, 44,541; G2DPZ, 29,952; G8KP, 20,096; G3ANH, 16,606; G3AIM, 4,158; G8SA, 1,968; G2AO, 150; HB9DS, 35,568; HB9CV, 13,650; HB9J, 1,775; ON4AZ, 120; GW4CX, 8,904; GW3KY, 5,632; GM3DZB, 14,910; F9BO, 7,155; F8XP, 6,280; F3PW, 3,103; LA7Y, 11,132; LA4FA, 1,148; LA6PB, 63; SM4KP, 7,750; SM5YD, 3,159; OZ3Y, 28,800; OZ7SM, 3,042; CT1NT, 1 969; DL3DO, 22,176; DL1FK, 8,580; DL1FI, 4,176; PAØRU, 9,154; EA4LA, 28,121.

Zone 15 OK1FF, 31,492; OK1MB, 14,012; OK1UY, 902; OH2NB, 21,267; MF2AA, 1,972.

Zone 20 AR8AB, 1,584.

Zone 24 CR9AG, 17,928; VS6AM, 561.

When writing to our advertisers say you saw it in CQ

Zone 28 VS2BD, 56; PK3MR, 2,340; PK4KS, 19,024.

Zone 29 VK5AS, 49,446; VK6KW, 12,087.

Zone 30 VK7LZ, 2,821.

Zone 31 KH6IJ, 30,300; KH6VP, 9,675; KH6CD, 966.

Zone 32 ZL4HP, 26,266; ZL1MQ, 4,293.

Zone 35 ZD4AH, 9,071.

Zone 36 FQ8SN, 736; CR5UP, 12,250.

Zone 37 VQ4IMS, 80,370; VQ4RF, 44,304; VQ4SC, 20,294; MI3SC, 23,055; VQ5ALT, 1,218; VQ5WCP, 341; ZS6OV, 56,550; ZS5U, 29,352; ZS3G, 13,611.

Zone 40 TF3SF, 36.

The following participants, who did not tabulate their scores, sent in logs for checking purposes only, and therefore do not appear in the above listings. Their calls are included here in recognition of their contribution to the success of the contest. Thanks a million, fellows!

C.W. W6ID, W6RIQ, W6ZBY, W6FZC, W7CNM, WØAZT, W1DYV, VO1O, VE1CU, KG4AK, CO2AP, VP3YG, PY1DH, CX6AD, G3APV, G6CJ, G2XY, G5WI, G3EEN, G3CXM, G2EC, G5HH, G5JF, G8PW, F8BQ, F9SN, SM5AUP, SM5OI, SM2ABH, SM5UH, SM5KX, SM'UJ, SM5AMJ, SM5DZ, SM5CV, DL5BK, DL1YB, DL1QO, LA8J, LA9T, ON4JD, HB9II, EA4CQ, OZ5PA, HA5K, YO3GK, VK2NS, VK4CG, VK5KO, KH6LG, KH6VP, ZL1HY, FA9RW, ZS6VH, ZE2JN.

Fone KL7ZM, VE8AK, W4NDE, W5SU, W1DYV, W1IJT, W2TVQ, W2VQL, W4KCQ, VE2HM, VP9G, CO2MG, YV5AU, VP3YG, OA4Y, PY6CO, CE2AX, CE1BO, LU4MG, LU3HA, CX2BP, HB9CV, ON4UF, F8NV, F3IB, F9LK, DL1EZ, DL1HL, PAØGMU, PAØQJ, I1PM, YK1AC, KG6ET, KH6LG, ZL1CH, FF8PG, ZS1CG.

THE LYSCO TRANSMASTER

(from page 21)

and quick to change bands on the Transmaster as it is on the latest communications receiver.

The Output Circuit

The output of the Transmaster appears at a standard coax fitting which may be coupled to a transmission line of 52 ohms impedance, or to an antenna coupler designed to operate from a source of that impedance. If you don't have an antenna coupler on hand, Lysco will be pleased to sell you a neat band-switched coupler to go with the transmitter. It makes a nice combination, and the coupler can be mounted right inside the case of the Transmaster if you don't mind drilling a couple of holes.

Frankly we've had more fun playing with the Transmaster during the past few days than we've had in a long time. There is a great kick to be gotten out of working DX, traffic circuits, or just chewing the rag with a little rig as simple and straightforward as this one. We haven't been able to find any TVI on a receiver whose antenna is about two and one-half feet from our 3.5-mc doublet.

You've guessed it, we like it!

THE YL's FREQUENCY

(from page 34)

pioneers, they had to wear rubber boots in the deep-mudded streets and haul their drinking water in tanks from twenty miles away. Now several times a grandmother, one could hardly guess it from Ruth's energy and enthusiasm. Between household duties, newspaper work, hamming, and her second hobby of portrait photography, she keeps on the run.

Finally after three weeks of traveling we were back at *CQ* in N.Y.C. We still had a ways to go to get to the home QTH in New England, but the major part was over and had proved most pleasant and successful, thanks to the wonderful hospitality of the YLs and their OMs.

YL of the Month

Just a year ago two YLs swung into action in what became famous as the "Betty-Benny" team, handling traffic in one of South America's worst disasters—the earthquake in Ecuador on August 5, 1949. The "Betty" part of the team is Betty Hahn Bernbaum, HC1KX, whose OM, Maurice, is the U. S. Chargé d'Affaires in Quito.

Betty and some luncheon guests were having coffee when the earthquake began. Hours later news drifted into Quito that the town of Ambato had fallen, Pillaro had disappeared, Petate had broken off and dropped into a *quebrada* a thousand feet below. HC1KX and the other hams of Ecuador promptly organized an emergency net and for six days and nights Betty sent a steady stream of messages—until her rig actually started smoking! After it was over deaths were placed at 6,000 and countless persons were homeless, as well as there being untold damage to property. The Chief of Staff of the Caribbean Command praised the amateur volunteer work saying, "The whole emergency relief was made possible by the cooperation of amateur radio operators in the Canal Zone, Quito, and other Ecuadorean towns and elsewhere."

Betty has had other exciting experiences, too, at their post in Ecuador. One was an eight-hour canoe trip down a jungle river shooting through about twenty rapids. "We turned over in one of them," Betty adds, "and fell into a thirty-foot whirlpool, but luckily lost only our cameras. At other times we have on our radio reported fires from the interior of the country, located North Americans whose families had illness or death in them, and just plain DX'd, including some regular schedules with Japan and Macao. We also have fun talking to old friends in our State Department Foreign Service scattered all over the world. My latest experience was to win in a golf tournament a live goat with a red ribbon around its neck and its horns painted silver." Never a dull moment!

304 TLs

(from page 23)

physical construction of the rig may be of interest, however. The transmitter is essentially a 72" rack enlarged to a fully enclosed cabinet by means of aluminum angles and bronze screen wire panels. This construction provides maximum safety, complete shielding, and good ventilation and visibility.

GAIN WITHOUT HEADACHES

(from page 14)

the Wallman circuit and say, "How can a circuit develop a gain comparable to a pentode when the first tube is a triode improperly loaded and mismatched with the tube it is driving . . . and that tube merely a low gain grounded-grid affair?"

If one recalls that when driving a grounded-grid tube in a transmitter not only the power developed by the grounded-grid stage appears in the output load *but also the driving power* appears in an additive fashion, one can begin to see the light. Briefly and roughly, in this circuit the gain possible in the first triode is NOT developed across its 10,000-ohm load resistor—because of the parallel presence of the very low input impedance of the grounded-grid triode. This is usually about 400 ohms. The first triode is stable because this low load impedance limits the grid-to-plate gain of this stage to unity or less and therefore tube inter-element capacities cannot cause regeneration.

However this gain, apparently lost, is recovered in the plate load of the grounded grid stage since it appears effectively in *series* with the relatively low-gain output of the grounded-grid tube. Therefore the gain contributed by the grounded-grid stage is of little consequence; its presence is more or less like that of the catalyst in some chemical reactions. It causes the first triode to be stable[1] and makes it possible to realize most of its gain usefully. Therefore triodes having rather high transconductance should be used in the Wallman circuit to obtain best results. Normal precautions against external feedback should be taken.

NEUTRALIZATION

(from page 13)

condensers should be as short as practical. The exact value of the beam plate capacity hasn't been determined by the writer but it was found that a 1000 μμf condenser for C gave excellent neutralization for parallel 813s driven by a capacity-coupled 807.

In conclusion, the writer wishes to point out that this is a tried and proven circuit and has been used in many transmitters using 813, 4–125A, 4–250A, 4–400A and 4–1000A tubes. It is not a cure for parasites and too much stray plate-to-grid coupling, but it does an excellent job of reducing the reaction of the plate on the grid. The leads connecting to condenser C and the screen bypass condensers should be as short and direct as practical. *Fig. 3* shows the screen terminals bypassed directly to the filament terminals instead of to ground. This is not essential to capacity-bridge neutralization, but the writer recommends it because the screen to filament path can be made much shorter. Also, the common coupling from the plate to the grid circuit through the filament bypass condensers is degenerative which may improve stability.

The Social Side

MAINE—The Second Annual Down East Hamfest, held by the Portland Amateur Wireless Association, will be at the Eastland Hotel, Portland, on July 29th. The tickets are to be $3.50 each, and they will provide for everything from prizes to the ice cream at the end of the banquet. The advance sale of tickets is being handled by Manley W. Haskell, W1VV, 15 Hemlock Street, Portland, Maine. He is also the man to contact for further information—or, better yet, ask anyone who was there last year!

GEORGIA—The Atlanta Radio Club is sponsoring a hamfest on August 27th at Grant Park, Atlanta. Mr. George Hart, W1NJM, National Emergency Coördinator, will be the featured speaker of the day. A TVI film, barbeque, and all the facilities of a modern park will be available to each comer at $1.50 each. The club treasurer is Russ Law, W4FKN, 342 Lamon Ave. S.E., Atlanta, and he'll fill you in on the details. Above all, don't miss it if you're within travelling range of the gate city.

NEW JERSEY—The Hudson Division Convention will take place this year at the Berkeley-Carteret Hotel in Asbury Park on September 30th and October 1st, under the sponsorship of the Garden State Amateur Radio Association. Write P. B. Petersen, W2DME, RFD 1, Box 148, Atlantic Highlands, N. J., for full information.

ILLINOIS—The Hamfesters Radio Club of Chicago announces another typical Hamfester picnic and hamfest to be held this year on August 13th at Frankford Grove, Frankford, Ill., on U. S. Route 45 near its junction with Illinois Route 30. Food and refreshments will be available, along with many novel games. For specific information wirte to Sol Davis, Secretary, 8731 South Wabash, Chicago, Ill.

PENNSYLVANIA—The South Hills Brass Pounders and Modulators are holding a hamfest-picnic at Spreading Oaks Grove, South Park, Pittsburgh, on Sunday, August 6th. The affair is scheduled to run from dawn to dusk, and the registration fee of $2 per person will include a box lunch. Contact C. J. Lauer, 345 S. Millvale Ave., Pittsburgh, for advance reservations and further information.

TEXAS—The 20th Annual West Gulf Division ARRL Convention will take place at the Gunter Hotel, in San Antonio on August 18th, 19th, and 20th. A banquet, dance, lectures, movies, and a chance at a wide array of prizes will be included in the registration fee of $7.50. Special features are planned for the ladies. An "early-comers" party will be held Friday evening August 18th at La Villita. Registrations and hotel reservations may be made through W5EJT, Box 62, San Antonio, Texas. Get your advance registration fee in before August 10th.

MARYLAND—The third annual hamfest and picnic sponsored by the Baltimore Amateur Radio Communications Society will be held this year at Triton Beach, Mayo, Md., on Sunday, August 13th. Don't forget to bring your picnic basket and enjoy the day with the family. The fee will be $1 per adult and 50¢ for those under 12. Anyone under 6, whether or not licensed, will be admitted free of charge. W3PSP is running the show, and he'll be glad to supply any further information.

OHIO—All amateurs are invited to attend the Fourth Annual Picnic of the Buckeye Shortwave Radio Association on Sunday, August 27th, at Happy Days Camp, Virignia Kendall Park, just north of Akron on route 303. Bring a picnic lunch and plan to eat at 5 PM. Registration starts at 2 PM, and the fee is $1 per family. Prizes, contests, auctions, and swap sessions will be the order of the day. A card to R. H. Fredenburg, Secretary, 471 E. Ford Ave., Barberton, Ohio, will start you on the right path for a swell day.

OHIO—The annual Miami Valley Ham Radio Picnic will be held at the Hollow in Piqua on Sunday, August 6th, rain or shine. Write W8SWS for further dope.

AUDIO SELECTIVITY

(from page 31)

to the .01 μf condensers at the ends of the filter. These are not properly part of the filter but provide an easy way to help drop the lows.

Facts about Filters

In any filter of the constant-*k* type, the rate of attenuation beyond the edge of the pass band is always 6 db per octave multiplied by the number of reactive elements in the circuit. In this particular case, there are 3 chokes and 4 condensers, so that the attenuation rate is $6 \times 7 = 42$ db per octave. By using *m*-derived circuits, the attenuation curve can be made steeper near the edge of the pass band, but only at the expense of getting less attenuation at frequencies farther out.

The rate of attenuation outside the pass band does not depend much on the Q of the chokes. The effect of low Q is to round off the curve at the point where it starts down. The rounding-off in the curve of *Fig. 3* has no discernable effect on the ear; expensive high-Q inductances in this application would be wasted.

This filter was designed according to the regular formula:

$$L = \frac{R}{\pi f_c}$$

$$C = \frac{L}{R^2}$$

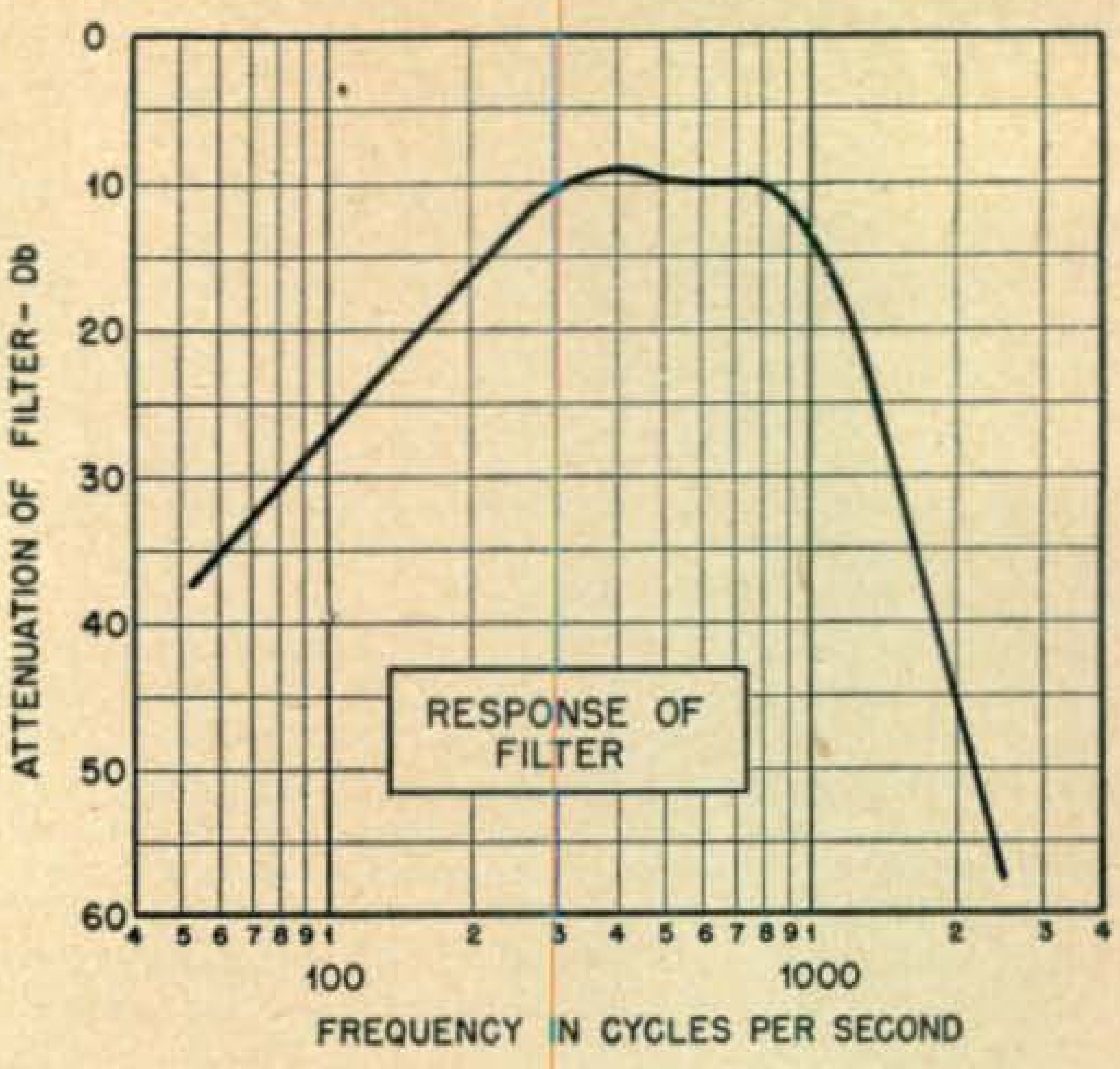

Fig. 3. The measured response of the filter.

where L is inductance in henries, C capacitance in farads, and R the terminating resistance in ohms. The shunt condensers at the ends of the filter are made $\frac{1}{2}C$, the others C. More sections can be added if desired.

Power-supply type chokes such as are used here can be adjusted in inductance over quite a wide range by changing the air gap. While it is not practicable to decrease the gap, the inductance is readily lowered (and the Q increased) by spacing the "I" laminations farther away from the "E"

W9EGQ's BEAM

(from page 19)

that his dream beam will have a push button so that it can be brought down to the ground for adjustment.

A winter in the air revealed that the weakest point of the arrays as they now stand are the insulators on the twenty-meter elements. Knowing that both KH6IJ and W9IOD have twenty-meter beams using a ladder-type metal boom with the elements clamped directly to it, and knowing the type of signal both put out, they were contacted to learn their experiences with such construction. Both said that after carefully tuning their beams, the final element lengths were those calculated by standard formulas. Therefore, a length of 1⅜" diameter aluminum tubing has been obtained to slip over the centers of the twenty-meter elements. At the first opportunity, the aluminum crosspieces and the insulators will be removed and the elements clamped to the sides of the ladder. Another coax line and a gamma match will be used to feed the revised beam.

THE MONITORING POST

(from page 35)

gang. . . . **W6OXG** divides his time between 160-meter DX and v.h.f. phone; watch for him next season when the 160 QRN abates.

W8GL, invalided for the past several years, is one who does not have trouble about TVI; his own receiver rests atop his 200-watt 7-mc rig and keying the transmitter doesn't even jar the screen images. . . . **KP4KF** and **KP4SU** are both looking for new Zones to work; KF has 71 countries using a 30-watt rig on 7 mc; he says for the benefit of those who have been wondering if **CT3AB** is a legitimate station, be assured a contact with CT3AB will bring an authentic QSL card. . . . **KP4KD, CC, QZ, KF,** and **SU** are the most active Puerto Rican stations on 7 mc and all are with the CAA at Santruce.

Some new stations and countries heard recently on 20 are: TF3SF, VQ4HJP, TA3GVU, PJ5FN, UA9CC, VB5BQ, FM8AD, VA1KFA, 4X4CR, 3V8AB, YO3GK, OE1CD, KZ1KE, GC3EBU, GL2FHN, EK1AD, and KV3AA. On 20 phone some new ones are: ET3AE, HC8GRC, CR5UP, KZ1KE, EA8XN, TA3GVU, MD7HV, FF8AH, SVØWB, FM8WE, 2E2KY, PK4AD, MI3SI, XZ2KN, VU2GB, VS6BS, ZD1PW, ZS9F, ZB2A, ZS8A, VR5GA, and ZB1FK. . . . **W7CZY** and **CKT** are hitting the high spots in traffic work. . . . **W8CSI** and **W8ZJK** covered the better part of a page in a recent issue of the *Mining Journal*, Upper Michigan's largest daily newspaper, with a splendid account of the purpose and pleasures of ham radio. Among those contacted by the former in his 26 years on the air are: Archduke Otto of Austria; Rex Bell, film star; Prince Vinh San, Reunion Island; Wilmer Allison, tennis star; and Amos, of Amos 'n Andy fame. A three-column the staff of WWJ-TV at Detroit are **W8YCK**, picture shows ZJK repairing a voltmeter. . . . On **MCD**, and **FWT**.

Birthday congratulations to: **W1PCH, W1CJD, W4VR,** and **W4MWH.**

stack, up to the point where the "I" laminations are completely removed. In this condition the inductance is usually about 10% of its original value, and the Q has increased to around 10 or 12. Further reduction in inductance can be effected by taking out some of the "E" laminations, but the Q begins to drop again as the choke begins to look too much like an air-core coil.

SCRATCHI

(from page 4)

are putting antenna on six meter rig, but it is not loading up.

I going outside to see if antenna still up in air when all out of a sudden ZZUMM! large object are hurtling past the house. Before seeing what are making big noise another ZZWOOSH! SWOOSH! and two jet airplanes are buzzing house so close that pilots can see orange-juice spot on Scratchi's tie. Looking up I can see three planes are circling over house. I thinking that if they not careful there going to be three less airplanes in air-force and one less Scratchi long-wire antenna. After a few seconds planes streaking off like madly toward east, same direction kite are.

Next day are about to try to get antenna to work on six meters when I see Army jeep driving up road like fury and coming to house. I go quick-like and open front door and there are standing Army big-shots, with enough brass on him to make one door knob for every person over 3 in United States.

General are spluttering something about am I person responsible for that floating monstrosity which seems to be tied down to this house. Scratchi are finally calming Hon. General and getting hole story. Seems that there are some airbase in New Mexico called White Sands where are conducting various special experiments, and even using radar. Operators of radar are reporting strange object showing up on radar screen while they trying to keep track of airplanes and they having to send other planes out to see what object is. You guessing it, Hon. Ed., object are Scratchi's kite.

I telling Hon. General that I also conducting very important experiment myself, and why not having airplanes fly around kite, on account I can't make kite go any other direction, but you can steer an airplane. This talk not getting anywhere, and Hon. General are citing various rules concerning interference with projects of U. S. Government Airforces and he finally convincing me that if I not taking kite down Scratchi will be cooling heels in local hoosegow. Well, like I said before, Hon. Ed., Scratchi are decent law-abiding citizen, so I are sadly disconnecting 5 KW rig from antenna and with help of jeep driver are finally hauling kite in by winding wire around winch on jeep wheel.

You know, though, I'm wondering. If next time I use two wires for kite string and feed 6-meter beam which are on kite itself do you think I getting out better?

Respectively yours,
Hashafisti Scratchi

DX AND OVERSEAS

(from page 41)

fellows, Shern and Fred. HSK has never worked Fred, as he is active mostly on 20 c.w., but he has had many QSOs with Shern on 10 phone. Now it seems that Fred has been making periodic trips down to the Gilberts, and has been operating 20 c.w. as VR1C. Fred. likewise, has apparently been telling the fellows to QSL via Navy 824. To reach Majuro, where KX6BA is located, the cards are well routed through Kwajalein. KX6BH is on Kwaj, and he knew the cards passing through there should go to Majuro, and he sent them along. Now, fate enters the picture. . . . KX6BH has returned to Hawaii, and the new man on Kwaj didn't know anything about this business of forwarding cards along to Majuro, and possibly returned some. W6HSK apparently stopped off at the Marshalls and has squared away with Frank at KG6CX/KX6, and from now on, the cards should reach their destination. It would be a good idea for everyone to be sure to put MAJURO in the address, however.

ZL2GX tells me that as of the latter part of May, fifteen W.A.P. certificates have been issued by the N.Z.A.R.T. Three of these were to W stations, namely W6MX, W6OMC and W3GHD. It might be of interest to note that all have submitted confirmations from KB6, KG6, KH6, KP6, KX6, VK, ZL, VR2, VR5, and ZK1. It is also equally interesting to see that no one has submitted confirmations from VK1. Macquarrie, ZC3, British Phoenix, Brunei, Sarawak, or Tokelau Island. ZL2GX is still adding new ones, the last three being HC8GRC, VP5BF, and FB8ZZ. Jock says his "operation QSL" which he started sometime ago has been very ineffective. One of his biggest sobs comes from not one QSL being received from Formosa, and yet he has worked five of them. The payoff, of course, is that all of his pals have cards from the same "blokes" that he has worked. Don't give up, Jock!

An interesting sidelight in WØELA making WAZ is the fact that he actually did work all 40 Zones within a period of three months using a maximum power input of 250 watts. Another way of looking at it is that Clyde worked his 40th Zones only six months after receiving his WØ call. Nice going. . . .

OE1FF is still putting in a pitch for EZ4. Well, we never know!! He says he is going to be traveling for some time, so his DX totals are not going to grow for a while.

W4CYY said he hunted for three hours trying to find a QSL card from Zones 3 and 4. He says the boys in Zone 3 don't QSL worth a hoot, so he is never again going to send any of his cards into that Zone until he gets one. Watch out, my friend, here come the W6s!

Hope you fellows are having a good summer vacation. . . . Guess I better sign off before the fever gets me. . . . See you next month. 73

QTHs

CR4AE	P. O. Box 17, Sao Vicente, Cabo Verde
FSIA	Michel Perriot, 87 Blvd. de Courcelles, Paris 8e, France
FK8AC	P. O. Box 104, Noumea, Nueva Caledonia
FY7AY	Tyrol-French Zone, Austria, Via REF
HE1JJ	To HB9JJ

HP1HW	Box 2041, Panama City
HC2LF	Box 3614, Guayaquil, Ecuador
HP1MM	Mauricio Maduro, Box 94, Panama City
KG6IE	USCG, APO 815, c/o P.M. San Francisco, California
PJ5FN	c/o W5FNA
FK6NL	c/o Post Office, Biak Island, Netherlands, New Guinea
SP5AB	P. O. Box 320, Warsaw, Poland
ST2RD	P. O. Box 99, Port Sudan, Sudan Anlo-Egipcio
VR2AS	Mr. Stan, P. O. Box 184, Suva, Fiji
VQ2AB	Box 271, Lusaka, Northern Rhodesia, Africa
VQ4BC	P. O. Box 581, Nairobi, Kenya
ZP5IB	Box 166, Asuncion, Paraguay
ZS8MK	Dr. R. L. Markham, Quachas Nek, Basutoland, Africa

V.H.F.—U.H.F.

(from page 37)

on the 18th WØIPI had worked all call areas by 1740 EST! Signals were solid for hours at a time. Ye Ed enjoyed a swell half-hour rag-chew with W5JTI, during most of which Tim's signal had the meter pinned. It was certainly the hottest opening of the season . . . . or so it seemed at the time.

June 20–23: Reports are not complete, at this time, but it is apparent that strong openings occurred on both the 20th and the 21st. On the 21st, double-hop was again reported. W8WRN reports W6OB plus a fine batch of single-hop stuff. On the evening of the 23rd, aurora openings in the Great Lakes region which affected the two-meter band were reported by W8WXV and W3RUE.

June 24: Although the whole story is not in yet, we can almost assume from the fact that the W5VY-W8WXV two-meter contact was apparently produced by sporadic-E activity, that it must have been a whale of a six-meter opening. Although this opening may not have been wide-spread, preliminary reports from W5ML and W5VY indicate that the signals from W9-land were abnormally strong at the time. Look through your logs, fellows, and see if you can add anything to our store of information regarding conditions on two and six meters during the morning of June 24. If you were not listening on either band, please indicate this fact on your reports. This is a case where we may be able to add to the store of knowledge regarding the behaviour of the ionosphere if we get enough reliable reports.

June 27th: This one was a lulu! From early evening until Morpheus took over, the ol' six-meter band was loaded with S9 signals from all parts of the country. W8QYD in Dayton (480 miles) and W7FGG in Tuscon (2059 miles) were busting in S9 at the same time here in N. J. One could log stations as fast as he could twist the dial. QRM was so bad that many of the low-powered boys found it much harder than usual to get out. Ten meters in the middle of the DX season was never like this! Although signals above 50.5 were coming in OK, most of the gang continued to butt their heads together on the lower 500 kc of the band. Ye Ed, figuring that it was now or never to beat W5VY's two-meter record, spent most of the evening searching this band, and transmitting high-powered CQs. W5VY still has the record! From our point of view, two meters was practically dead. DX TV stations were tearing up programs for many of the folks in the fringe areas—probably lots of hams got blamed for trouble they didn't produce!

How long will this sort of activity last on six meters? Your guess is as good as any other expert's. The season started late this year. There may yet be time for you to crank up a set of six-meter coils for the final and hang up a six-meter antenna (or you might borrow the antenna from the family TV receiver—those broad-band ones work OK on six!) and get in on the fun.

Two-Meter Highlights

The VHF QSO party brought a flurry of activity to two meters during the weekend of June 3–4. Many of the contestants here in the east were disappointed at the lack of competitive spirit shown by the majority of the two-meter operators. Conditions were only fair, which helped to keep the scoring low. W3QFM/3, about 60 miles SE of Pittsburgh, gave the east coast boys their best DX opportunity.

W2YT/3, near Penn State College overcame tremendous odds to get his portable rig back on the air after a winter of inactivity. He finally made it, just before the contest ended! He got into the fray in time to complete contacts with W8BFQ, W3RUE, W3LWN (80 miles north of Pittsburgh), and a few others before the closing gun went off.

On June 13 a fine opening occurred along the northeastern Atlantic seaboard. Conditions were excellent from southern Virginia to Maine. Many outstanding signals in the Boston area were copied by Ye Ed, with W1KIM and W1CTW (among others) pushing S9 signals over the 300 mile path. W1IO/1 was pushing a good signal over this distance with his mobile rig, which used a 6J6 final working into a car roof-top antenna! It doesn't take high power when conditions are right.

The first DL-to-G QSOs on 144 were made on June 9th, between G3DIV and DL4XS and DL3KE, a distance of about 365 miles. Although this does not equal the G DX record of 415 miles established by G3AHT and PAØWL this spring, it does point the way to greater opportunities for DX working by the British stations.

W8WRN reports a good opening in the Columbus, Ohio, area, on June 17th. Ken was copying WØBJL, 400 miles away, S6 on peaks. Stations in the Chicago area were pounding in S9. He managed to work at least 10 stations, most of whom were over 200 miles DX. Ken is fighting an uphill battle with TVI. His 24G final on two meters causes practically no trouble on the 7" portable TV set, except for traces of stuff on channel 10. (Have you checked the TV set for image response on channel 10, Ken?) He has more troubles on six meters, but claims he will stick with it until he gets results as good as he has obtained on two meters.

W5MWW, operating portable in SE Oklahoma, gave a few of the gang their first crack at this state on the 17th of June. With a 5-over-5 beam and a good receiver, he worked into Louisiana and Mississippi. He gave W5JTI another state, bringing Tim's total to 12.

W4HHK reports a QSO on June 20 with W5OBU/4 of Tuscaloosa, his first Alabama contact. W5OBU/4 only recently fired up on two meters, with the help of W5JTI. W4HHK is now using his new all-metal 16-element beam. W5OBU/4 also worked W5JTI, giving Tim #13. "Unlucky?" asks Tim? Well, Ye Ed has been stuck on 13 for so long he's beginning to wonder!

On the 22nd of June W8SFG and W8WJC pushed good signals over the mountains to the east

(*Continued on page 63*)

Classified Ads

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

QSL—SWL CARDS! Samples. W1HJI, Box 32B, Manchester, N. H.

BARGAINS—NEW AND USED TRANSMITTERS—RECEIVERS—PARTS: Globe King $299.00; HT-9 $225.00; Temco 75GA $250.00; Sonar SRT-75 $139.00; ART-13 $129.00; new 150 watt phone $199.00; HT-6 $85.00; 60-watt phone $89.00; Globe Trotter $57.50; new Bud VFO $39.50; new Meissner signal calibrators $29.95; HRO complete $129.00; SX43 $129.00; NC173, HQ129X $139.00; RME45 $99.00; SX25 $89.00; RME69 $75.00; S-38 $29.95; VHF152A; BC610's and many others. Large stock trade-ins. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Labs., Council Bluffs, Iowa.

WANTED: APR-4 receiver and tuning units. State condition and price. W2DB, 274 Boulevard, Scarsdale, New York.

EXPERIENCED AMATEUR, with background, good personality, desires factory or sales representative work in midwest area. Write Box 242, CQ Magazine.

FOR SALE: Amertran and numerous high voltage components, tubes. Bargains. W8ZAZ.

QSLs? SWLs? Colorful? Cartoon? State-maps? Photographic? QSL samples 3¢. Sackers, W8DED, Holland, Michigan.

FOR SALE: New Supereme AF-100 AM-FM transmitter, $315. Compact 75 meter transmitters w/built-in 300 v. power supply, complete in factory carton—a steal at $19.00. S-27 receiver, $77.00. New BC-375 transmitter $20.00 or swap for tubes. B. M. Gensler, W2LNI, 50-37 Newtown Rd., Woodside, L. I., N. Y.

QSLs. SWLs. Made the way you want them. Samples? W9BHV QSL Factory, 855 Burlington Ave., Frankfort, Ind.

W1PNY—Please contact W2BYF.

HOTTEST SURPLUS LIST in the country. Electronics—hydraulics—aircraft gadgets. Dick Rose, Everett, Wash.

NOW AVAILABLE—Revised, colorful DX ZONE MAP of the WORLD, 4 colors, 34" x 28", heavy paper suitable for framing. Send $1.00 cash, check or money order, and the map will be sent postpaid anywhere in the U. S., and possessions—CQ, 342 Madison Ave., New York 17, N. Y.

10-METER 3-ELEMENT BEAMS—$19.50. Send card for free information. Riverside Tool Co., Box 87, Riverside, Illinois.

QSLs! TAPRINT, Sumrall, Mississippi.

WANTED: PE-103 Dynamotor, new or used. State price. Dept. RG, Radio Magazines, Inc., 342 Madison Ave., New York 17, N. Y.

BARGAIN—Transmitter for sale. It used to be a Collins 30FXC, but we've modernized the r.f. section and the antenna coupler. It stands 5 feet high, in a welded steel cabinet, complete with a removable back plate. Lineup of the new r.f. deck is 6AG7 Pierce xtal oscillator, 807 buffer/doubler, and neutralized 813 final. A really good low-pass filter is included between the r.f. section and the built-in antenna coupler. The modulator (original Collins) uses a pair of 838s and will deliver a couple of hundred watts of audio to modulate the 813 final. The power supply is a dual affair delivering 400 and 1250 volts—the latter at about 500 ma. total for the final and modulators. Speech amplifier is built into the rack, as are meters for all circuits. The price, F.O.B. New York, is $150, ready to run. If you're interested drop us a line and we'll ship you a photo. Address: Robert Nathaniel, 940 Tee Court, Woodmere, L. I., N. Y.

QSLs, HIGH QUALITY, fair prices. Samples? W7GPP, 1380 F, The Dalles, Oregon.

SALE OR TRADE: 610E, speech amplifier, $400, 779 Pro $100. Want Panoramic adaptor, 152A, tape recorder, Collins 75A, 32V, 310, AR88. W6ACD, 2825 Coolidge Avenue, Oakland 1, Calif.

SELL 62 ft. heavy galvanized steel square tower, platform, ladder. Sacrifice for quick sale. Can't use here. N. Hale, WØJIH, 1040 Curran, Kirkwood, Mo.

HARVEY-WELLS fine business Bandmaster transmitters are standard stock items with W1BFT at Evans Radio, Concord, N. H.

PROP PITCH MOTORS, unused, brand new, complete instructions for conversion—packed for shipment. $12.50 f.o.b. Roanoke, Virginia. Limited quantity. Wire or write W4JFV.

BARGAINS: New and reconditioned Collins, National, Hallicrafters, Hammarlund, RME, Millen, Meissner, Gonset, others. Reconditioned S38 $29.00, S40A $59.00, SX25 $69.00, SX28 $99.00, NC57 $59.00, NC173 $139.00, NC183 $179.00, HR07 $199.00, RME-45 $89.00, RME84 $59.00, HF-10-20 $49.00, HQ129X $119.00, Meck T-60 $79.00, Meissner EX $59.00, BC221 $49.00, SX42, SX43, SX28A, SX24, S22R, SX62, S39, HT18, HT9, NC240D, NC46, HFS, HR05TA1, 32V1, 75A1, ART13, BC610, others. Shipped on approval. Terms, List free. Henry Radio, Butler, Missouri.

MISC. FOR SALE:

Parmetal 6 ft. relay rack $8. Relay rack telephone type 6 ft. $8. Peak preselector 10-160 $10. HT7 Frequency Standard $10. Dual Mallory 6 volt vibrator power supply 300V at 120 mils $15. FB7 receiver 3 sets coils, no power supply $10. Condensers 1, 2, 4 mfd. 2000V $2 each. Choke Thordarson 20 hen 500 mils $3. Transformer Jefferson 1.5 kw three phase 220V AC 60 cycle 5000 Volts $35. Meters 0-100 3" Thermo galvanometer current Square Weston $15. 0-5 amp RF 3" Weston $6. 0-20 mil 3" Weston $5. 0-1 mil 2" Weston $5. 0-7 mil triplet 3" $4. 0-1 mil AC mils 3" Jewel $3.50. 0-2000 volt 3" Jewel $7. Following meters $2.50 each: 0-150-300 DC volt 2" Jewel; 0-100 mil 3" Jewel; 0-30 mil 2" Jewel; 0-150-7.5 DC volts 3" Jewel; 0-150 AC 8" lab meter $5. Motor generator set 3000 volts DC at 750 mils $100. Briggs-Straton gasoline generator 110 AC 60 cycle 500 watt and 7.5 V DC at 100W $90. F.O.B., L. A. Benson, 7518 Cromwell, Clayton 5, Missouri.

FOR SALE: Instructograph, A.C. model with oscillator, headphones, ten tapes, instructions, $25.00. W2YYX, 602 Magnolia Ave., Elizabeth, N. J.

FOR SALE: Webster-Chicago wire recorder, model 181, $65. Electro-Voice Speech Clipper, $10. Meissner Signal Calibrator, like new, $25. JT-30 Astatic mike, $7.50. Write WØGPE, Fort Crook, Nebr.

10 AND 20 METER BEAMS $19.25 up. Aluminum tubing, etc. Willard Radcliff, Fostoria, Ohio.

SURPLUS. "What have you?" We buy at highest prices. Write GMEINC or G. & M. Equipment Co., Inc., 7315 Varna Avenue, North Hollywood, Calif.

AUDIO ANTHOLOGY, a compilation of articles on amplifiers, speakers and enclosures, phonograph pre-amps and allied subjects from Audio Engineering, May 1947 to December 1949. These issues are out of print and the articles are not obtainable elsewhere. 124 pages, bound in paper cover—$2.00, Board cover—$3.00. Order today from Dept. CC, Radio Magazines, Inc., 342 Madison Ave., New York 17, N. Y.

coast, working K2AA/2 operating about 15 miles SE of Camden, N. J.

The weekend of June 24th will probably be remembered for a long time as one of the high spots of two meter activity. We have already reported in detail the record-breaking contact between W5VY and W8WXV. However, the major part of the activity on two meters during this period was not sporadic-E, but good old-fashioned tropospheric DX. Early in the morning of the 24th, W4HHK found the band open all the way to Texas, and proceeded to work W5QIO, W5QME, W5FBT, and W5ML, all before 0815 EST! During the mid-morning period (when the record QSO was made) Paul does not show any activity. Starting the evening session at 1845 EST, W4HHK continued to knock off DX, including 13 Texas, of whom the most distant was W5VY, 631 miles; 4 stations in Louisiana, and W5EYY, in Jackson, Miss. Up bright and early at 0604 EST on the 25th, Paul found the band still open, and worked a few more Texans, plus W5HTZ of Cromwell, Oklahoma, for the first Oklahoma-Tennessee two-meter QSO, and state #13 for W4HHK. To prove this was no fluke, he went on to work W5HXK for a second Oklahoma QSO! During the evening of the 25th, conditions drifted north, and Paul worked 9 stations in Illinois and Indiana, the most distant being W9HKQ, about 500 miles. At the same time, signals from the Texarkana area were rolling into W4HHK's location.

W5AJG reports that during the big opening of the 24th he worked 7 states. Leroy says that this opening was for the "average guy," not only for the high-powered gang. By the way, we hear that W5AJG finally got Arkansas on 50 mc for state #48 through the courtesy of W5LAN portable. Leroy adds that he can work this state almost any time on two meters!

W5ML of Oil City, La., worked W9SUV and W9FVJ in Illinois on the 25th. He then worked W5DFU in Tulsa, Oklahoma. He heard W9UIA in Indiana, but conditions faded before a QSO was accomplished. Art now has 8 states on 144 mc. He is justly proud of his new 20-element double-five beam.

W7FGG passes along the information that W5ONS of Victoria, Texas, was heard calling CQ on 144.3 mc at 8:12 P.M. on the 24th by W7FLX and W7NVN at Tucson, Arizona. This would have been a distance of 865 miles, sufficient to break the former two-meter milage record of 833 miles by a comfortable margin.

No more space available this month, so guess we'd better say 73 for now. Many thanks to those who have helped keep this columnist supplied with news. I wish that we had the time to acknowledge each and every letter. To those who wonder wha hoppen to the score-board listings, the list we have on hand now is so incomplete and obsolete that we have been afraid to run it. We are gradually accumulating data for this feature and expect to make it a regular part of the column again in a couple of months. Your latest standings would be welcomed. We think that the "States-Call Areas-Other" listing is OK for two meters; for six, it seems that "States-Countries" is sufficient. Do not send QSL cards—we'll be glad to take your word for it!

See you next month.

Brownie, W2PAU

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