OCTOBER, 1949

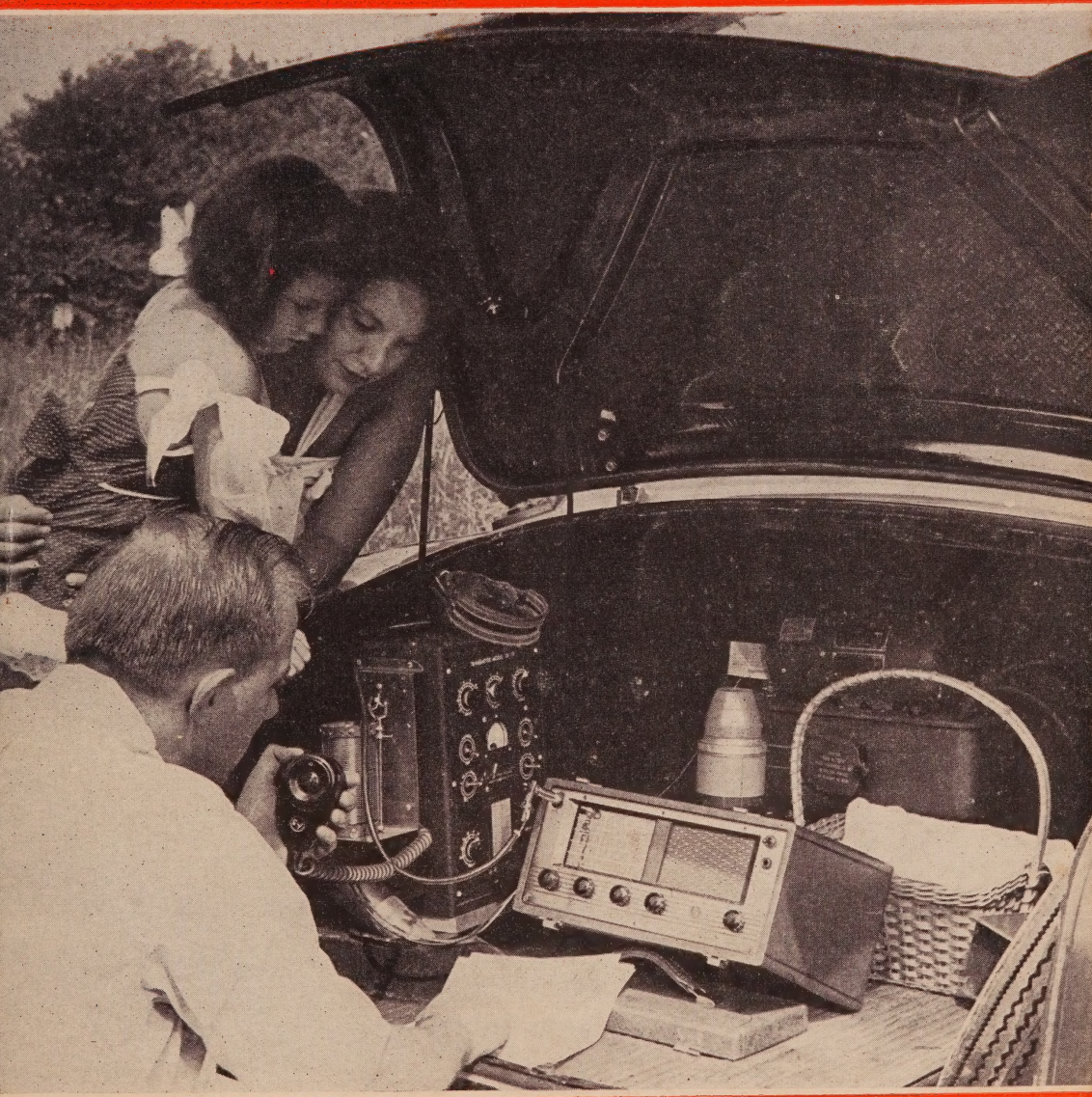
CQ

The Radio Amateurs' Journal

IN THIS ISSUE

- A TVI-Free Transmitter for 10
- Found — Outphasing Modulation!
- Gilding the Gold-Plated Special
- Selenium Supply for the SCR-274N

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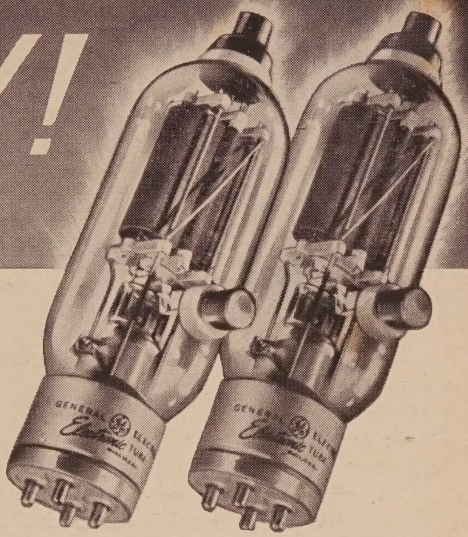
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To you triode men, looking for value in the medium-to-high-power class, Types GL-810 and GL-8000 are money in the bank . . . whether you mean to work phone or CW. The cost of either G-E tube is *less than half* that of most other types of equal input. Here's saving!

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General Electric quality standards of manufacture clinch the worth of the two tubes. At your G-E tube distributor, learn their favorable price—check it against their high-rating performance. No question but that Types GL-810 and GL-8000 are ham "best buys!" *Electronics Department, General Electric Company, Schenectady 5, New York.*

Series 5 in a listing, by areas, of tube distributors who can supply you with Ham News, G. E.'s bi-monthly magazine:

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Atlanta, Ga.: Concord Radio Corp.; Specialty Distributing Co.
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Charleston, S. C.: Radio Laboratories.
Charlotte, N. C.: Shaw Distributing Co.
Columbia, S. C.: Southeastern Radio Parts Co.
Dothan, Ala.: Signal Radio Supply Co.
Greensboro, N. C.: Johannesen Elec. Co.; Southeastern Radio Supply Co.
Jacksonville, Fla.: Kinkade Radio Supply; Thurow Radio Distributors, Inc.
Lakeland, Fla.: Radio Accessories.
Macon, Ga.: Specialty Distributing Co.
Miami, Fla.: Herman Radio Supply Co.; Thurow Radio Distributors, Inc.
Mobile, Ala.: McGowin-Lyons Hardware Co.; Nelson Radio and Supply.
Orlando, Fla.: Radio Accessories; Thurow Radio Distributors, Inc.
Pensacola, Fla.: Thurow Radio Distributors, Inc.
Raleigh, N. C.: Carolina Radio Equipment Co.; Radio Amateur Center; Southeastern Radio Supply Co.
St. Petersburg, Fla.: Welch Radio Supply Co.
Savannah, Ga.: Specialty Distributing Co.
Spartanburg, S. C.: Noland Co., Inc.
Tallahassee, Fla.: Thurow Radio Distributors, Inc.
Tampa, Fla.: Kinkade Radio Supply; Thurow Radio Distributors, Inc.
Tuscaloosa, Ala.: Allen and Jemison Hardware Co.
W. Palm Beach, Fla.: Thurow Radio Distributors, Inc.
Winston-Salem, N.C.: Dalton-Hege Radio Supply Co.

(*List as of June 25, 1949*)

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GL-802 GL-803 GL-805 GL-806 GL-807 GL-810 GL-811 GL-812-A GL-813 GL-814 GL-815
GL-826 GL-828 GL-829-B GL-832-A GL-837 GL-838 GL-1613 GL-1614 GL-1619 GL-1623

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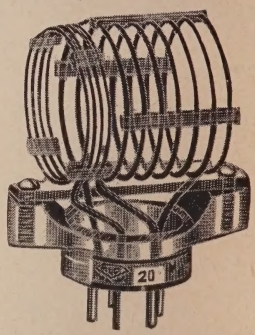
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Catalog No. Fixed End Link	Catalog No. Fixed Center Link	Cat. No. Adjustable Center Link	Cat.No. Adjustable End Link	Band	Capacity*	Dealer Cost
.....	.....	OLS-160	.....	160 Meter	100 MMFD	$1.65
.....	.....	.....	OES-160	160 Meter	86 MMFD	1.65
OEL-80	OCL-80	OLS-80	OES-80	80 Meter	75 MMFD	1.38
OEL-40	OCL-40	OLS-40	OES-40	40 Meter	52 MMFD	1.38
OEL-20	OCL-20	OLS-20	OES-20	20 Meter	40 MMFD	1.38
OEL-15	OCL-15	OLS-15	OES-15	15 Meter	30 MMFD	1.35
OEL-10	OCL-10	OLS-10	OES-10	10 Meter	25 MMFD	1.32
OEL-6	OCL-6	.....	.....	6 Meter	17 MMFD	1.08
.....	.....	OCP-10	OEP-10	10 Meter	45 MMFD	1.32
.....	.....	OCP-20	OEP-20	20 Meter	50 MMFD	1.38

*Denotes tube plus circuit plus tank plus output coupling capacity required to resonate coil at low frequency end of band.



CQ

The Radio Amateurs' Journal

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Vol. 5 OCTOBER, 1949 No. 10

In This Issue

COVER—When an amateur goes on a picnic, what is more natural than hamming along with the sandwiches. W2IOP's YL Priscilla and Jr. YL Pat wait for the OM to wind up a QSO from the portable or mobile setup. In use is a Harvey-Wells TBS on 75-meter phone, feeding a Premax base-loaded whip. The receiver is a new Hallicrafters S-72, battery operated. When in motion, a Gonset 3-30 mc converter is used. Power for the rig is obtained from a PE-103.

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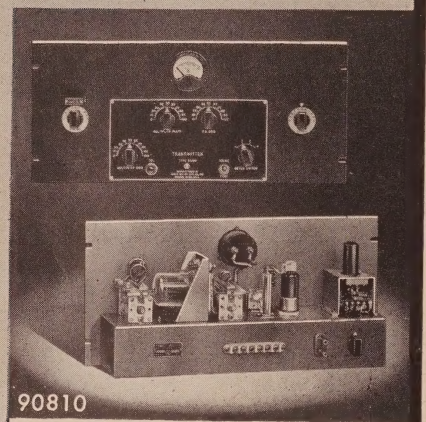
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90810 HIGH FREQUENCY TRANSMITTER

The No. 90810 crystal control transmitter provides 75 watt output (higher output may be obtained by the use of forced cooling) on the 10–11, 6 and 2 meter amateur bands. Provisions are made for quick band shift by means of the new 48000 series high frequency plug-in coils.

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★ ★ Letters ★ ★

Re Prop Pitch Conversion

107 N. Pine River, Ithaca, Mich.

Editor, *CQ*:

All due regard to Dick Saunders, W6MUO, and his very fine article (*CQ*, Aug. '49) on converting and speeding the prop pitch motor; however, I believe a suggestion is in order to simplify the job of removal of the teeth in the ring gear. Using a lathe or internal grinder makes a slick job no doubt, but it is quite unnecessary. Simply take the ring gear to the nearest welder and have that section of the gear in which the teeth are indented cut away. The job will take about two minutes. Simple, effective and it works, as mine was done in that fashion.

D. T. Kinney, W8FSA

On the FCC Proposals

38 Windsor Rd., Oradell, N. J.

Editor, *CQ*:

I have just read the June issue of *CQ*, and I am writing in connection with the newly proposed FCC regulations. I have one important question to ask. When, or about when, will they go into effect?

I have been thinking over the possibility of applying for my amateur license, but this new law has changed things. I think it would be only fair to me and to all amateurs I might contact, that I apply for the novice license first. A year's experience on the allotted frequencies would be an ideal training aid to all beginners, and in my opinion should be compulsory. Although my code speed is much better than the required 5 w.p.m. (20-25), I am not sure of theory and procedure. A year as a novice would help me considerably.

Raymond W. Hague

608 E. Mt. Vernon St., Somerset, Ky.

Editor, *CQ*:

Have just read your editorial on page 24 of the July 1949 issue. A hearty "Well done!" to you for calling a spade a spade. A magazine which does as straight thinking as yours does in the article "FCC proposals and the Amateur" deserves support from all hands. Here's my subscription for 1949-1950.

Ralph F. Denton, W4SXP

416 Pocahantas St., Norfolk 11, Va.

Editor, *CQ*:

Congratulations on W2IOP's editorial. I think that if these proposals are passed, there will be many more amateurs due to the new novice class. I, for one, will take advantage of this better way of learning the code.

Dan Flaherty, SWL

6857 N.E. Stanton, Portland, Ore.

Editor, *CQ*:

I just want to take time to compliment you on the fine article regarding the new FCC proposals. It is a wonderful piece of editorial policy; and regardless of whether or not it agrees with my views it is a nice job, well done, and expresses very clearly a basic democracy, and at the same time expresses the thought that is in the background of each and all of our minds.

Neil Baldwin, W7LJJ

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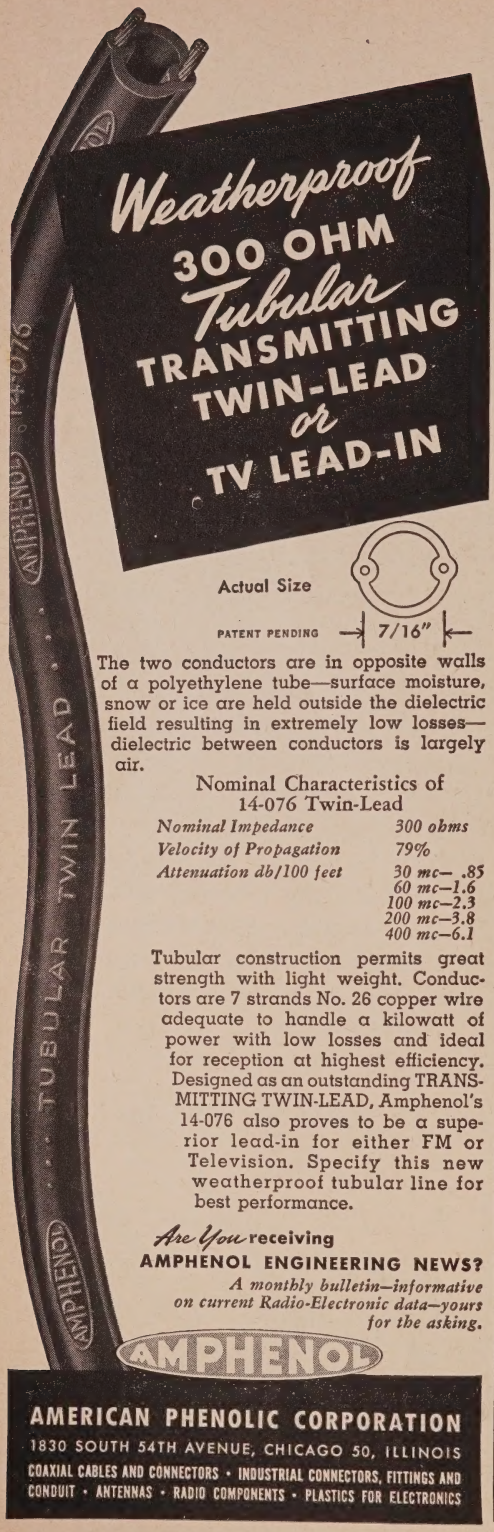
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Deer Hon. Ed:

I are hoping that you are not minding me writing this letter standing up, on acct. Scratchi in no condition to be sitting down, the reason for which are forthcoming shortly. Cupple of weeks ago I are ragchewing with the gang on five meters. Yes, that are right, five meters. You seeing, all the old Five-meter Bootlegger Club members are not wanting to go to six meters because it means changing over all the equipment. Also, figure Hon. Inspectors having enough trubble monitoring regular ham bands without bothering with old ham bands.

Scratchi being oldest Hon. Member of club in good standing, he are always getting big ribbing when talking to the young squirts over the air. This particular season is the big rodeo season, and all peeples are getting bedecked in cowboy outfits, bright neckerchiefs, big five-gallon hats, and even letting beards grow.

The gang are saying that Scratchi better blossom out in cowboy regalia soon or they going to report me to local constabulary, who having special jail all fixed up for peeples that not getting in spirit of rodeo season. I are coming right back, reel snappy Ike, and saying I'll get dressed like biggest and bestest cowboy in Arizona, if the Five-meter Bootlegger Club will go to big rodeo and take Scratchi as guest—for free, natchurly.

There are some arguing at first, but the fellows are finely agreeing to Scratchi's proposition. Aren't that a slicky way to getting to rodeo for nothing?

Five-meter Bootlegger Club are having big box, right opposite the chutes where the horses and steers are coming out. I will say this for the club, they are buying 1/c seats. After rodeo getting under way, some of the fellows are asking me if I don't thing that the bronco-busting contest are worst of all. Now Scratchi are not exactly shy, so I are saying that in my opinion, there are nothing to it. I tell them I even suspect that the horses are trained and that it are all big act. After all, Scratchi are riding horses on Brother Itchi's ranch, so I feel that I am somewhat of expert on the subject..

Most of the club members are giving me big hee-haw, saying that I would be scared to death to even try to get on a reel wild horse. This are natchurly making me slitely on mad side, so I are telling them that I would be glad to go right out then and there and show them, by riding worst old bronc they had at rodeo, except for little matter that I hadn't been entered in bronco-bursting contest. (Knowing this, sly old Scratchi are safe in making such absurding statement.)

Vice-president of club are saying that he are

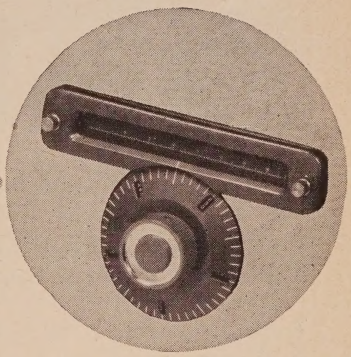
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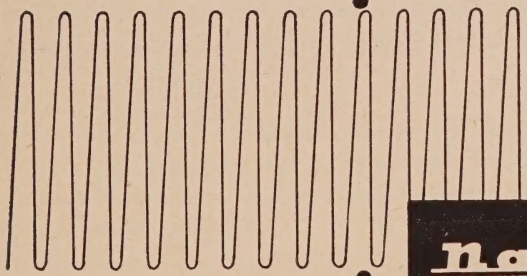
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THE CHOICE OF LEADING AMATEURS



W8BHW and 12-Year-Old Tubes Run Up 390,450 Points on CW

•

Rolf "Lindy" Lindenhayn, W8BHW, from Harrison, Ohio, earned top honors with a score of 390,450 points in the last ARRL DX contest. Lindy, consistently in the upper DX bracket, operates with a couple of 12-year-old Eimac 250T's in the final amplifier of his rig.

Tube service such as this is further evidence of the dependability and performance of Eimac tubes. It is the reason why Eimac tubes are always the choice of leading amateurs.

Today the new 250T, improved by over a decade of field experience and development, will provide higher performance over a longer period than its predecessors. Complete data on it is available in a new packet of data sheets titled "EIMAC TUBES FOR AMATEUR USE" . . . write for it today.

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ZERO BIAS

EDITORIAL

WHEN ONE WORKS with something as closely as we have with *CQ* each month, it is not too unusual that a true perspective is difficult to obtain. From its second issue in 1945 when we first contributed an article to the then infant ham magazine until this issue, it has been pretty much a case of eating, living, and breathing *CQ*. This month for the last time *CQ* will be our "baby," for with the next issue Albert E. "Doc" Hayes, Jr., comes in as Editor, as I leave to join the staff of RCA.

To take a moment to look back in retrospect, it is interesting to review the rise of *CQ* to its place in amateur radio today. We believe it has grown in stature through the years until today, in many fields of our hobby, it is without peer. This growth has been due as much as anything to the wonderful efforts of the staff and, of course, our remarkable list of contributors who include most of the top names in hamdom.

At all times *CQ* has tried to adhere to a policy of being a first rate *publication* for the amateur, and its brief excursions into such matters as politics in amateur radio has been only because of extreme urgency. In the field of editorial coverage CQ has championed the rights of the amateur unceasingly. It started the first comprehensive editorial treatment of television interference elimination, and we modestly hope that our articles on TVI have been of some assistance in convincing amateurs in TV centers that their cause is not hopeless.

In considering editorial material for each monthly issue of *CQ* we have tried to bear in mind at all times the importance of the beginner. We have gone ahead on the premise that there are two distinctive types of beginners. There are those who are already licensed, who look to established hams for leadership and will build equipment recommended or adapted by old-timers. To give this group separate text would be to no avail, hence *CQ*'s screening process. Articles are selected on the basis of interest to the field at large regardless of the relative complexity of the subject. Then each article is edited so that it will answer the needs of three classes of readers, the expert, the technical amateur who is neither professional nor novice, and the beginner. This has been possible by making articles somewhat longer than normally dictated in a technical magazine, but results in each article having far greater readership than would be possible on any other basis.

On the other hand, there is the "beginner" who is not yet a licensed amateur. For him *CQ* contains articles which are designed to lay a firm foundation for his investment of both time and money in his newly chosen hobby. Material slanted particularly at the unlicensed beginner has recommended equipment and circuits which will serve for years without any danger of obsolescense.

But we have gone considerably further in *CQ*'s editorial policy. We have attempted to adapt journalistic practices pretty much ignored in the technical field. We have made a studied effort to obtain "scoop" caliber articles to incite the maximum interest in new technical ideas and application. The policy has been notably successful, and since the war *CQ* has popularized such diversified topics as audio selectivity, narrow-band FM and phase modulation, the cubical quad antenna, the helical antenna, electronic keying and clickless keying and many others. It has popularized the most important basic transmitter designs since the war, and many of the articles which have appeared in *CQ* have been adapted by radio manufacturers for some of their leading postwar products.

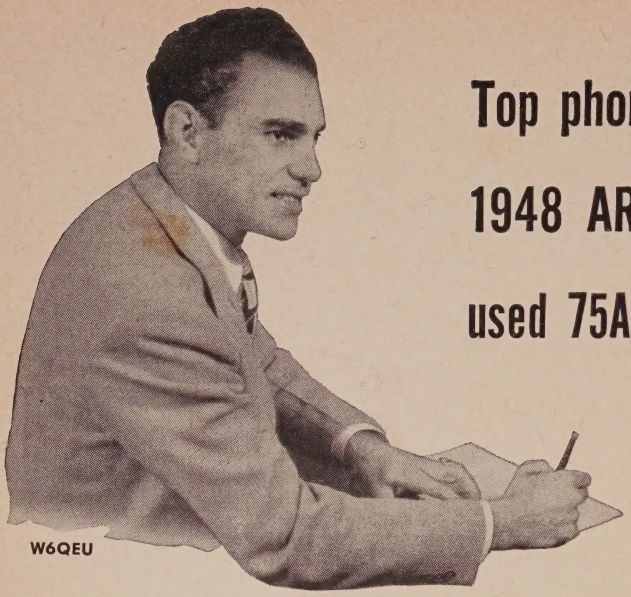
The staff of *CQ* was assembled with great care, and we believe that it represents the widest diversification of knowledge by the acknowledged leaders in their respective fields. Our columnists are without equal and our post war innovation, the YL's Frequency, has become as much a part of ham radio as the DX or VHF columns. *CQ* is the only American publication to run a monthly analysis of band conditions, a service widely used by commercial interests as well as amateurs. For the operating amateur, *CQ* is now sponsoring numerous competitive events, including the most popular DX Award made in the world, the Worked All Zones Award.

CQ has watched carefully the markets and the trends. As new ideas become more popular, we have been quick to capitalize on them not only for the benefit of our readers, but also to enable *CQ*'s advertisers to better serve our readers. Take, for example, a new department Mobile Corner, which will be devoted entirely to mobile operation, a feature which was initiated in recognition of this rapidly expanding field. *CQ* has already devoted more space to this field than any other contemporary publication, feeling that it was not only desirable editorially, but a phase of ham radio invaluable to the amateur's program of service to the community.

CQ has attempted to stress public service features. As much as possible, every month we have devoted at least one article to a topic of general interest to amateurs, hobbyists and radio people in general. Some of these have become classics, including "Life Insurance in the Shack," a brilliant piece on safety that has been reprinted by commercial companies in almost every state in the union. *CQ*'s article on "Insuring Radio Equipment and Antennas" was reprinted by insurance companies throughout the country. Now *CQ* is running one of its most important series, "Hobby for the Handicapped," articles emphasizing the thereapeutic value of amateur radio.

(*Continued on page 63*)

Top phone men in the 1948 ARRL Sweepstakes used 75A-1 receivers



W6QEU

Both W6QEU, top phone scorer with 85,896 points, and W6OGZ, who scored 78,936 to take second place, used Collins 75A-1 receivers.

Here are comments from W6QEU, Peter K. Onnigian, about receiver performance:

"Having come out of the 1948 SS Contest as top phone contestant, it may be interesting to state here what part the Collins 75A-1 played at W6QEU. For example, the accurate dial frequency calibration was a tremendous aid in staying inside the crowded band edges. To put it mildly, the 75A-1 is a frequency monitor at this station, its indicated accuracy being checked against WWV on 30mc. Its r-f stage threshold sensitivity is far superior to any other receiver used here, and needless to add, with the double heterodyne system used, its image rejection is tremendous, even on 10 meters.

"However, even with all the above, the writer believes the most wonderful feature of the 75A-1 receiver is its SELECTIVITY! It's terrific! During the peak periods of operation in the SS Contest, where on the 20 meter phone band an estimated 300 stations were trying to exchange contest data, in a 100 kilocycle band, selectivity with a capital S was mandatory for successful operation. W6QEU made 140 two-way contacts in 11½ hours of operation on this band, averaging 12.4 contacts per hour. On 10 meters time per contact was less, where 17.9 contacts per hour were made, while on 75 meters, 16.1 contacts per hour were chalked up. To accomplish this feat, the receiver selectivity requirements were severe. The Collins 75A-1 has the selectivity to make contacts at a record breaking pace, with the tremendous QRM conditions prevailing.

"In these days of high prices, the amateur like others must make his dollar go far. The Collins 75A-1 is ahead of others, in selectivity, sensitivity, dial frequency accuracy, image rejection and other features which are not found in other receivers, regardless of the price. The amateur dollar goes farther when invested in a Collins 75A-1 receiver!"

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Fountain City Bank Bldg.
KNOXVILLE

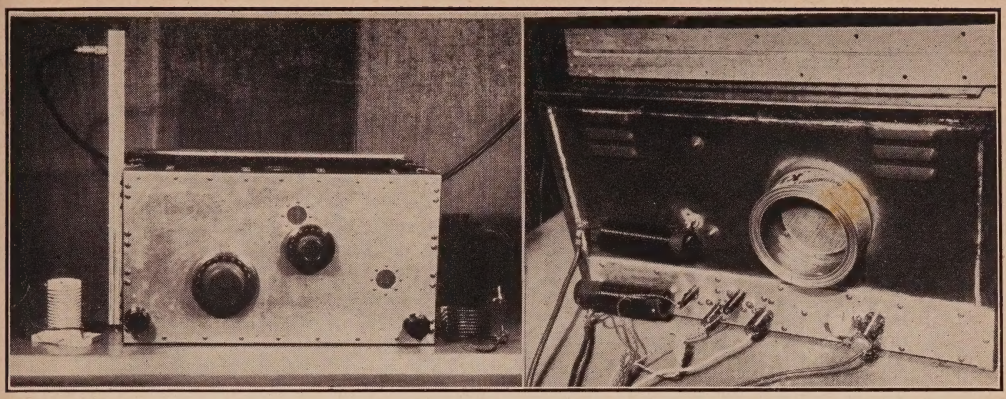


Fig. 1 (left). Front view. The screened openings on the front panel are for viewing the VR-keying tube and the v.f.o. dial. On the left side of the cabinet is a sixteen-section low-pass filter. On the table are plug-in coils for 20-meter operation, antenna pick-up coil on the left, and the 813 plate coil on the right. Fig. 6 (right). Rear view. External components of each of the supply-line filters are shown. Above them are the "Automobile Kleener" can and copper screen which form a fitting for attaching the blower. The blower and felt coupling were removed to permit photographing the filter assembly. The hinged cover-plate is balanced on the top of the cabinet so that the milled slot can be seen.

TVI-Free Rig for 10!

MACK SEYBOLD, W2RYI*

A complete design for a transmitter that lets you live with your neighbors. Details are given to permit applying its features to any size rig on any frequency. Part 1 covers the first month's work.

IF YOU HAVE TVI and a big soldering iron, here is a way to combine them to produce a happy family — and a happy neighborhood. The XYL will be able to enjoy her favorite television shows irrespective of your operating hours, and the telephone will resume its role as a social asset and not a fixture in the complaint department. The transmitter described here is designed to prevent unwanted harmonics from being radiated simply by following basic principles of shielding and filtering. The fundamental is broadcast into space, but the harmonics are soldered — up inside a cabinet where they can do no harm.

The soldering iron needed to construct this TVI-free transmitter must be a big one, a size large enough to repair garbage cans. So, if your iron is too small, borrow one or grab the tool catalogue and get ready for business. While you're at it, get some acid flux and plenty of rosin-core solder.

Steel isn't the best high-frequency shield material in the world, but it's good, and unless you want to fabricate a nearly water-tight aluminum masterpiece, the use of steel makes it possible to solder seams, corners, joints, and ventilation-screen emplacements with relative ease. If you review the data recorded in "Shielding Experiments and TVI," June, 1949, *CQ*, you will recognize the principles applied in the construction of this practical transmitter. As a matter of fact, this ten-meter transmitter (*Fig. 1*) was built chiefly to test those principles under operating conditions. It is by no means the ultimate design for the final masterpiece at W2RYI, but this transmitter has performed very well in all the tests it has undergone. So well, in fact, that a Chinese copy of the transmitter, or a reasonable facsimile thereof, could be, very possibly, the quickest solution to the TVI problem for the many who have been obliged to contribute large regions of empty spectrum during the evening hours.

*% *Tube Department, Radio Corporation of America, Harrison, N. J.*

Preparation of the Cabinet

The first step in the construction of this transmitter is to obtain a steel cabinet. The Par-Metal box I used is 19" x 10½" x 13", and is large enough to house a v.f.o., driver, and final amplifier. Remove the paint with Red Devil paint remover from all areas where soldering and jointing is to be done. Steel cabinets are usually made with spot-welded seams which, although providing a strong bond, will allow r.f. to leak out. All those spot-welded seams must be soldered to make a continuous joint. *Figure 2* shows several of the types of joints that will be encountered, and how

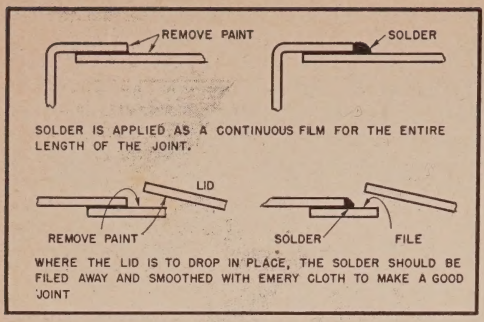


Fig. 2. Recommended method of soldering to avoid r.f. leakage.

the solder should be applied to prevent r.f. leakage. After stripping the paint, clean the joint with emery cloth to remove all remaining paint and rust. Apply a little acid flux to the joint, and proceed with the big soldering iron and rosin-core solder. When all the soldering has been completed, the excess rosin can be removed with butyl acetate or lacquer thinner purchased from a paint store. The acid flux should be washed away thoroughly by putting the whole cabinet in a bathtub full of water. Scrub all the joints, inside and out, with a brush. If acid is left around the joints, rusting will be accelerated.

Be sure that all the major soldering is completed before messing up the bathroom. It is possible to get away with this operation only once before the XYL realizes what is going on; if you try to return for a repeat performance, she will probably say no and that's that!

Louvres and Panels

Copper screen is the best material for shielding the louvres. Thirty-mesh screen made of 12-mil wire is sturdy, easy to handle, and solders well. Clean the screens with carbon-tet or Renuzit (inflammable!) to minimize grease and dirt in the joints. Tin around the edge of the screen. Flux and tin the steel around the edge of the louvre area, hold the screen in place, and solder as shown in *Fig. 3*. Cover all of the louvre groups in this way.

Copper screen should also be used to cover the opening for the blower. A hole 3" in diameter is cut in the back of the cabinet, and the screen is soldered over this hole. The area of the screened hole should be at least three times that required for an unscreened opening, because the wire represents about 70% coverage of the area. A 3" hole is cut in the bottom of a 4" diameter tin can, and the flange thus constructed is bolted to the back of the cabinet so that the 3" holes are aligned. A funnel made of heavy cloth connects the blower with the tin-can fitting, and the cloth is clamped in place with baling wire.

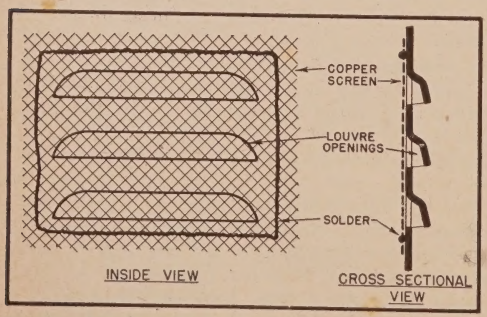


Fig. 3. Details of shielded louvre openings with copper screen.

The front panel is made of 1/16" aluminum. It is fastened to the cabinet on all four edges by bolts entering tapped holes. The contact surfaces of the cabinet flanges must be free of paint and rust. The panel is merely a part of the shielding system and is not utilized to support parts or the transmitter chassis. All control shafts passing through it are made of bakelite. One screened window is provided to view the v.f.o. dial, and another is used to view the OC3/VR105 keying tube.[1] Even though your particular transmitter might not be intended for use in c.w. bands, the VR system is handy for protection of the final amplifier and makes a grid-current meter unnecessary.

Some cabinets do not have a flange for bolting the front panel at the bottom edge. A tight fit at this joint is just as important as any joint in the box, so if the flange is missing, one can be made by bolting a length of ½" angle-brass along the bottom edge. A flange thus constructed is then drilled and tapped for mounting the front panel. Bolts spaced no greater than 2½" apart all around the panel should make a seal tight enough to be considered of good shielding quality.

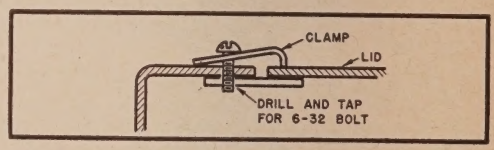


Fig. 4. Cut-away side view of lid-clamp assembly.

The lid of the cabinet is held in place around the edges by means of ten clamps. The details of this mechanism are shown in *Fig. 4*. Each clamp can swing around out of the way when the bolt is loosened and the lid is to be opened. My steel clamps were made by cutting ¼" x ¾" strips from the edges of an a.c.-outlet cover plate.

If your cabinet lid has a clasp to hold it closed, remove the clasp and solder a copper screen over the opening. All that remains to be done with the lid is to make a cover plate for the hinge.

Shielding the Hinge

There are several ways to make the hinge cover plate. The easiest way is to have a friend with a milling machine fabricate the thing out of ¼" aluminum as shown in *Fig. 5A*. I was lucky to be able to accomplish the task that way. If friendship

1 Seybold, "Clickless Keying Using VR Tubes," *CQ*, May, 1948.

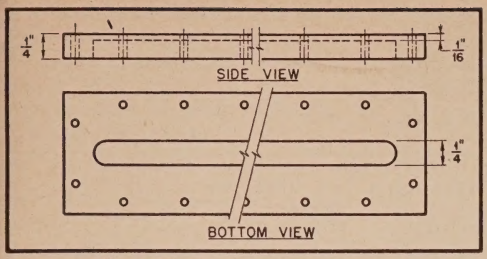


Fig. 5a. Milled plate for hinge cover requiring some machine shop facilities.

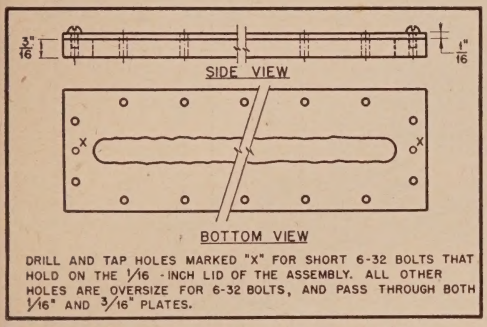


Fig. 5b. Home-made hinge cover plate. This has the advantage of doing away with machine work.

fails, drill a string of ¼" holes, cut out the intervening metal with a coping saw, and file the edges to fit loosely around the hinge. Drill and tap two holes in this rectangular doughnut to accommodate the two short bolts which hold the face plate to the doughnut and then drill holes all around the assembly on 4" staggered centers. *Figure 5B* shows the details. To finish the job, use the hinge cover plate as a template, drill and tap the corresponding holes in the cabinet and lid remove all burrs, residual rust, and paint from the surfaces that are to fit together. We now have a hinged assembly that will not permit unwanted signals to emerge from the transmitter.

In order to get into the cabinet to make changes, 10 clamps must be loosened and 15 bolts removed, but that is a lot easier than taking off the front panel. One might be ingenious and rig up clamps for the hinge plate, inasmuch as clamp bolts need only be loosened two turns as compared to the eight or ten turns that are necessary to remove each bolt from the prescribed hinge cover.

Don't ever forget the fact that the box must be tightly assembled. If the hinge cover plate on my transmitter is slightly loose, the Roller Derby on channel 7 looks as though it is being viewed through iron bars at the State Pen. When the bolts are tightened, however, our 6th harmonic disappears, and the Derby comes in perfectly.

The Line-Filter Assembly

There is plenty to say about the harmonic attenuation capabilities of the transmitter, but, before going into detail, let's finish the cabinet and get to the circuit discussion. The back of the cabinet is the location where power supply and control lines are to enter. A ⅛" thick aluminum plate is cut to fit over the open area originally provided to admit wires and cables. The contact edge around this area must be free of paint. Drill the mounting holes in the plate and drill and tap the cabinet for the mounting bolts. This tightly fitting aluminum plate serves as the support for the line filters, shown in *Fig. 6*. When the filters are mounted on this removable plate, it is possible to assemble the unit on the work bench where drilling and wiring operations can be accomplished with convenience. Some manufacturers' metal cabinets, however, have a slot for incoming wires that is too narrow to admit the internal portion of the line-filter assembly. On these models, it is best to solder copper screen over the opening and plan to mount line filters on the steel back of the box. Installing the line filters on the box itself is not quite as convenient as it is on the removable plate, but the results are equivalent.

Tube Line-Up

This far, the transmitter circuit has not been mentioned, but now we must study the electrical components so that the lay-out can be made to fit into the box. The plan for tube line-up is merely this: get up to a medium-power final from a v.f.o. with as few stages and controls as possible. For the v.f.o., use a BC-459A, or a BC-458A realigned to operate up to 7.5 mc. Modify the 1625 stage so that one of the two 1625s operates as a 7-mc amplifier and the other quadruples to 28 mc. This quadrupler drives the 813 final amplifier. Capacitive coupling is used between stages because it minimizes the number of controls, and because we don't care how bad the harmonic out-

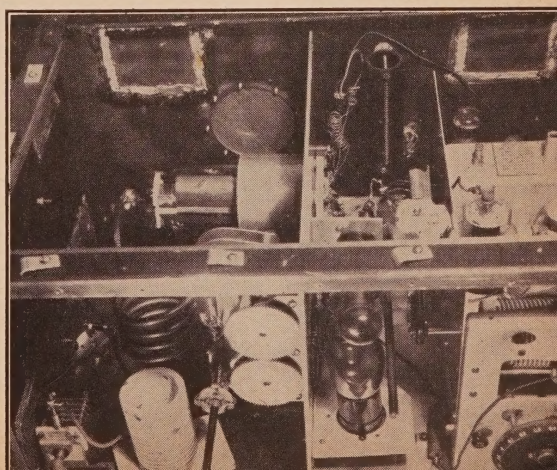


Fig. 7. Transmitter with lid open and front panel removed. All of the r.f. components except the antenna coil and capacitor are mounted on the aluminum "L" which also separates the output from the input circuits of the 813. The BC-458A v.f.o. is on the right, the center section houses the quadrupler tank and the VR-tube keying components.

put is from each stage. The r.f. at TV frequencies is going to be kept inside the box!

The RCA 813 used in the final does not have to be neutralized if the mechanical lay-out shown in *Fig. 7* is followed. One side of the filament is connected to the chassis by a short, heavy lead direct from the socket. Bypass capacitors from the screen and high side of the filament are mounted for the shortest total path to any point on the chassis around the socket. The bypass capacitor for the plate tank is mounted and

(*Continued on page 64*)

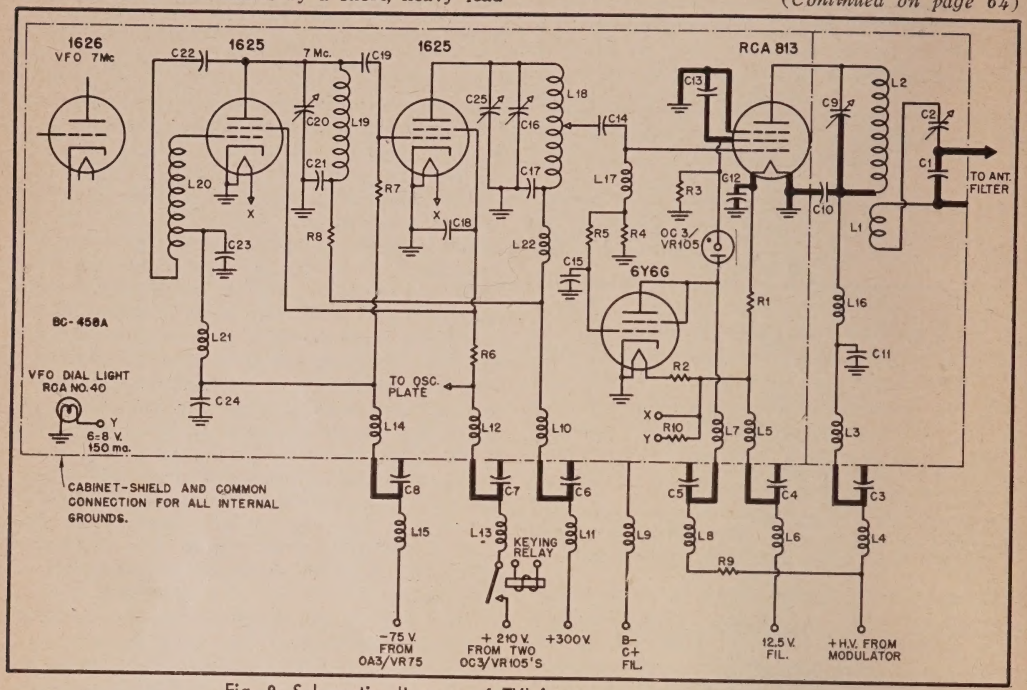
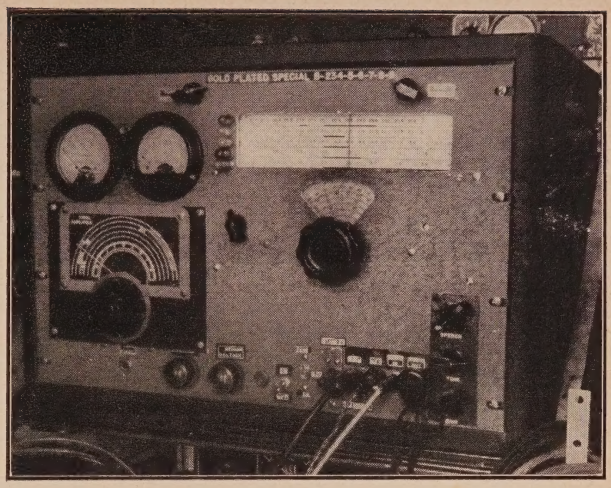


Fig. 8. Schematic diagram of TVI-free ten-meter transmitter.

C1—100 μμf, air-padder, 1/32" spacing between plates.
C2—5-15 μμf, variable capacitor, 3/16" spacing between plates.
C3—500 μμf, 10,000 volts, TV ceramic.
C4, C5, C6, C7, C8—1000 μμf, silver-mica button.
C9—25 μμf, transmitting variable capacitor, 1/4" spacing.
C10—0.002 μf, 5000 v., mica.
C11—0.001 μf, 5000 v., mica.
C12—0.01 μf, mica.
C13—0.002 μf, 2500 v., mica.
C14—56 μμf, mica.
C15—0.0001 μf, mica.
C16—5-25 μμf, variable capacitor, 1/16" spacing.
C17—0.001 μf, 1000 v., mica.
C18—0.002 μf, original v.f.o. part.
C19—100 μμf, mica.
C20—7-mc tank capacitor in v.f.o.
C21—0.002 μf, original v.f.o. part.
C22—neutralizing capacitor, original v.f.o. part.
C23—0.05 μf, original v.f.o. part.
C24—.001 μf, mica.
C25—for 14 mc only, 100-μμf air-padder set at approx. 80 μμf, 1/32" spacing.
R1—0.5 ohm, 15 w.
R2—5.0 ohms, 10 w.
R3—250,000 ohms, 2 w.
R4—7500 ohms, 5 w.
R5—50,000 ohms, 1 w.
R6, R8—50 ohms, original v.f.o. part.
R7—33,000 ohms, 2 w.
R9—35,000 ohms, 100 w.
R10—50 ohms, 2 w.

L1—28 mc, 5 turns, 2" diam., 1-1/4" long, #12 copper on ceramic form.
14 mc, 16 turns, 2" diam., 3" long, #12 copper on ceramic form.
L2—28 mc, 4 turns, 2-1/8" diam., 2-1/4" long, 1/4" copper tubing, self supporting.
14 mc, 8 turns, 2-3/4" diam., 2-1/4" long, #10 copper, ceramic spacers.
L3, L4—1-1/2" winding of #28 enameled wire on 3/4" diam. bakelite rod.
L5, L6, L9—40 turns, 1-1/4" diam., 3-3/8" long, #12 enameled wire.
L7, L8—1-1/4" winding of #30 enameled wire on 5/8"-diam. bakelite rod.
L10, L11, L12, L13—1-1/4" winding of #32 enameled wire on 3/8" diam. bakelite rod.
L14, L15—1-1/4" winding of #34 enameled wire on 1/4"-diam. bakelite rod.
L16—R.F. choke, 1 mh, 300 ma.
L17, L21—R.F. choke, 2.5 mh, 50 ma.
L18—6 turns, #12 copper, 1-1/2" diam., 1-1/2" long, self-supporting.
L19—7-mc tank coil, original v.f.o. part.
L20—7-mc grid coil, original v.f.o. part.
L22—R.F. choke, 2.5 mh, 100 ma.
Blower: L-R Mfg. Co., #2 blower with 7500-rpm motor.

Filament Supply: As shown, 12.5-volt 100-watt transformer. If the filaments are supplied by transformers mounted inside the cabinet, make L5, L6, and L9 of #20 enameled wire, 1-1/4" diam., 3-3/8" long, and duplicate L5, L6, and C4 for the other leg of the 110-Volt line.



The trap door on the front panel is replaced by a vernier tuning control for the MB-150 tank.

JIM KIRK, W6DEG*

Gilding the Gold-Plated Special

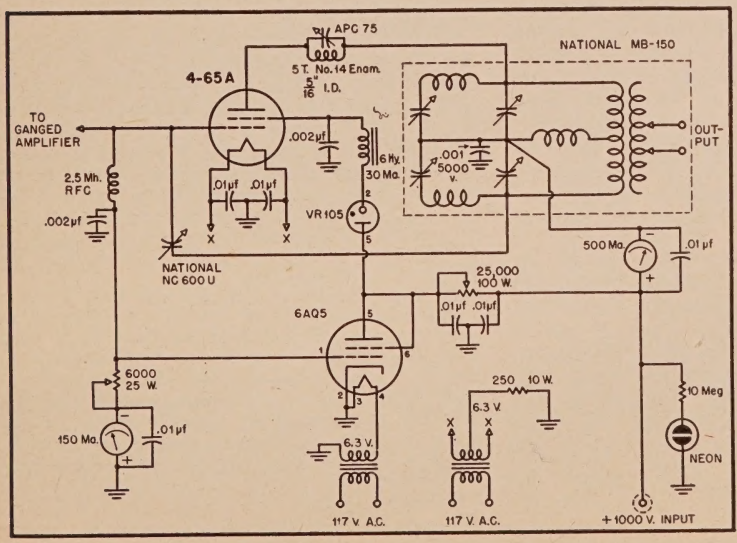
Adapting the plug-in coil power amplifier circuit of the original GPS to use the National MB-150 continuous tuning all-band tank.

THE "GOLD PLATED SPECIAL" transmitter is the most flexible, useful and enjoyable to operate transmitter I ever built. I have a daily sked with my son, W6VDR, and he reports the tone T9XXX! The way I can work anyone I call is remarkable. The PTO that controls the outfit is like a frequency meter in stability and accuracy.

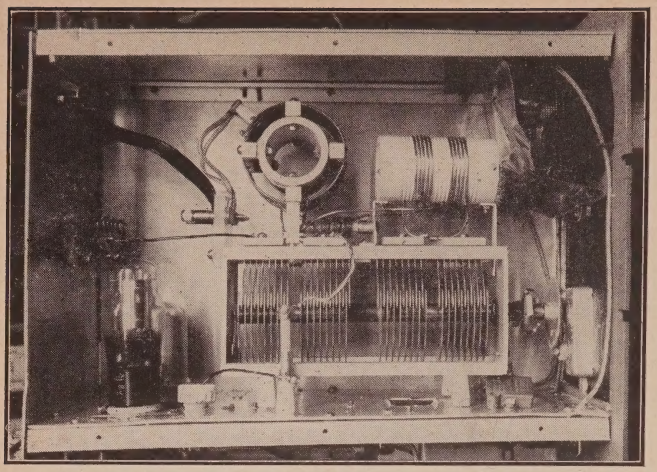
1552 Church St., San Francisco, 14, Calif.

But—I was not satisfied. Years ago I had eliminated plug-in coils for receivers I built. Why use plug-in coils for the final in the transmitter? Besides, I did not like to take the time and trouble to find the right coil, open the panel trap door, take out the coil and replace it with the one for the desired band, close the trap door (it has to be closed tightly to actuate the interlock switch) and then retune.

Announcement of the National MB-150 all-band tuner with no plug-in coils, "No turrets—just



Substitute final amplifier circuit when using the MB-150 tank unit.



The new tank unit occupies no more space than the original condenser-coil combination and eliminates plug-in coils.

tune!" solved the problem. Tuning sequence could be color coded to coincide with the dial lights indicating what band was in use. The trap door could be replaced with a panel upon which is mounted the calibrated vernier dial.

The articles describing the National MB-150 tuner have it diagrammed for use in push-pull circuits. I originally thought of adding another 4-65A tube for push-pull operation but a little reflection showed I would have to provide link coupling thereby changing the ganged amplifier, tune the grid adding another control, supply additional drive, and adding many other complications. So I ended up with a single ended 4-65A final using the MB-150, and the remainder of the transmitter was not altered.

The photograph of the transmitter shows two controls eliminated that were formerly mounted on the front panel for the final amplifier. In other words, the final amplifier has one control only and that control has to be trimmed only when shifting frequency extensively inside a band. The controls eliminated were the coupling (coupling to the MB-150 is adjusted with variable taps and is pre-set) and the plate trap control. The tank unit size prevented this latter control being brought to the front panel—but I set this with the "Dipper" from the inside of the cabinet with the power turned off. When I am rapidly skipping from band to band and from frequency to frequency, I want as few controls as possible.

The photograph of the front shows the specially drawn calibration of the dial which was inked in black—then a negative photostat made. This makes the calibration white. Then I colored each band scale the same color as the corresponding pilot light for each band. When tuning I do not have to read any figures; just turn the dial to the color of the light that is lit. The lights were colored, arbitrarily, as follows: Green, 80-meter band; Red, 40-meter band; Orange, 20-meter band; White, 15-meter band; Blue, 10 and 11-meter bands.

The photograph further shows a label reading "Gold Plated Special B-234-5-6-7-8-9" I label my equipment with name and numbers. The numbers refer to drawing numbers. When I want to shoot trouble or make changes, I can then easily look up the drawings. This transmitter was built in six sections so there are six schematic drawings for the transmitter.

The inside view of the final amplifier shows how the parts are mounted. The neutralizing condenser is the adjustable type made by National for 6L6 tubes and similar types (NC-600). I neutralized the amplifier, using a home-built absorption meter, turning the condenser almost to minimum capacity. Neutralization may not be required, or a simple homemade unit similar to the one described in the original article can be used.

Postscripts

All-European DX Contest

The third All-European DX Contest, sponsored this year by the Czechoslovakian Amateur Radio Society, CAV, will be held during these periods: C.W. section: Nov. 26, 1949, 0001 GMT till Nov. 27, 2400 GMT. Phone section: Dec. 3, 1949, 0001 GMT till Dec. 4, 2400 GMT. European hams will be calling other continents by CQ AW (CQ All World). Stations outside of Europe will use CQ EU (CQ Europe). Contest rules have been sent to amateur radio societies throughout the world. If you wish a copy write CAV, P.O. Box 69, Praha 1, Czechoslovakia.

Great Circle Map Centered on New York City

An accurate chart of the world designed to show true courses and distances from New York City to any place in the world, compiled by the U. S. Coast and Geodetic Survey, has just been published by C. S. Hammond & Co., 305 E. 63rd St., New York 21. The circle of the chart, 34 inches in diameter, appears on an overall 36 x 40 inch sheet. Degrees are marked from 0° to 360° above the circumference of the circle. The chart is printed in color and comes in several different editions, mounted or unmounted.

A Good Night for DX

KEITH S. WILLIAMS, W6DTY*

WHAT'S ALL THIS about "Basic Radio Propagation Predictions"? Some think it's hogwash and others tend to agree; but all of us, liking to be considered scientific, talk about the MUF, the E Layer and high absorption levels. And . . . all of us, after reading the latest dope on what we can work and when we can work it, go right ahead wasting hours listening for DX when the Bureau of Standards has stated in so many words that conditions will be lousy. This shows that most of us still are believers in black magic and I am not sure but what the magic is pretty good stuff.

Personally, I am going back to the old system of using extra-sensory perception. For example, awhile back I was sitting on the front porch with my feet propped up on the railing, reading *CQ*.



The monthly DX predictions were to the effect that due to the MUF being absorbed by the F layer and the noise discrimination factor being 14 db below the annual sun spot number, conditions between the west coast and Australia would be rotten on ten meters. In fact, the prediction stated that not only would W6 signals not go anywhere near VK but that chances were good that the signal would bounce back off the E Layer and put a permanent warp in the final tank.

Having finished reading this stuff, I was idly looking at the sunset while scratching an itch. A feeling struck me. It struck dead center on the old brain wrinkle labeled, "DX Conditions, Status of." I sniffed the evening air. I rubbed the old Boer War wound. The rabbit's foot on my watch fob twitched slightly. Without further ado I rushed to the shack and lighted the filaments and took a listen on ten. The only signal on the band was VK9NR and he was rattling the windows, calling *CQ*. So I hooked a new country.

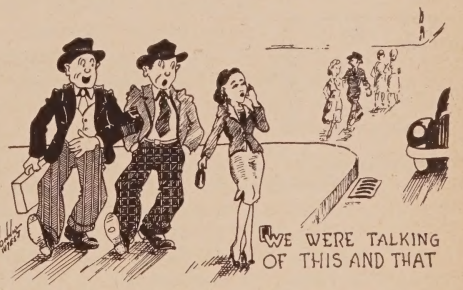
Now, see what a sap I would have been to continue sitting on the front porch, following the Bureau of Standards' bum dope like a sheep?

Although many young squirts do not realize it there was a time when the Bureau of Standards minded its own business, such as worrying about the length of a standard millimeter, and left the field of DX conditions to us hams to do with as we saw fit. And as I remember we did a pretty good job of seeing fit. Any old-timer can easily remember when a moonless night sky filled with sharp, bright stars, and a feeling of crispness in the air meant a good night for DX. And by golly, it *did*, too! As a matter of fact, most of us still follow the same hunches, regardless of the sad predictions made by the radio propagation analysts.

Down with Science

I am urging all you DX hounds to return to the old tried and true methods of determining your own DX conditions. For some of the newcomers it may be a little difficult at first, but with practice it will come easy. Old-timers who have fallen into evil ways will find it easy to re-convert to the old system. The feeling for DX conditions falls into two classes. The first includes a set of circumstances that is common to all. The second involves personal considerations that apply to each ham as an individual.

In the first class fall weather conditions and the feel of the air. Anyone with a lick of sense knows that DX will surely come rolling in on a night when the stars are bright and the air has just that right feel of sharpness. If a faint odor of burning leaves can be detected and you can hear the distant sound of someone chopping kindling wood you'd better head for the shack and fire up the junk! Some brass pounders think things will be better on a night with a full moon but I believe that the moon has little, if any, effect on DX. It's just however you feel about moonlight personally.



In addition to the crisp night air and the bristling stars, just the right amount of snow on the ground gives added pep to DX signals. The snow should be just the right depth and consistency to make the proper crunchy sound underfoot; not too squeaky and not too squashy. Since moving to California where it *never* snows (except in the winter) I have come to recognize other signs and portents which

(*Continued on page 69*)

**244 Magnolia Ave. Oxhard, Calif.*

Neglected Outphasing System

W. HERBERT HARTMAN, W7UAF*

All the advantages of high-level modulation of a Class C amplifier with its high efficiency are combined with the tremendous economies of the low level systems such as NBFM.

FOR MORE THAN a decade a system of modulation has been used extensively in Europe, but until recently has been virtually neglected in this country. Known in the texts as Outphasing Modulation,[1] this unique circuit has many advantages which will appeal to the amateur who likes to do things differently. This article describes the theory, design and constructional details of a practical transmitter utilizing this form of modulation. The outphasing technique has several interesting features. The audio requirements for complete modulation of any power from one watt up, can be met with less than one watt of audio. The plate efficiency of the final amplifier is approximately what one would expect with any Class C amplifier using high level plate modulation and the system can be adapted for band switching. Circuits are not critical to adjust and, once tuned up, enable one to operate anywhere in the band without affecting the operation of the transmitter appreciably.

For a more thorough understanding of the problem, let us see just how the basic theory works to make it possible to use Class C amplifiers at high efficiency in a low level modulated transmitter. Let us suppose two a.c. generators are connected in series, across which is connected a load, as illustrated in *Fig. 2*. Let us further

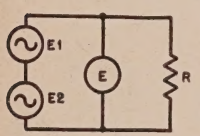


Fig. 2. Equivalent circuit of outphasing system.

qualify the example by specifying that the shafts of the two alternators can be locked together so that the rotation, and hence the frequency, will always be alike; but we shall provide the means whereby we can lock the shafts at any relative angle with respect to each armature. This will enable us to change the relative phases of the two generators at will. The voltages of each machine shall also be equal. Now let us observe the voltage across the load.

If the generators are rotated, one will produce E_1 across its terminals and the other an equal voltage E_2 with a phase displacement $\emptyset$ dependent upon the relative positions of armature alignments with respect to each other. If the phases of E_1 and E_2 are such that they are opposite, they will completely cancel, with the result that no reading will be observed on the meter. See *Fig. 3*. On

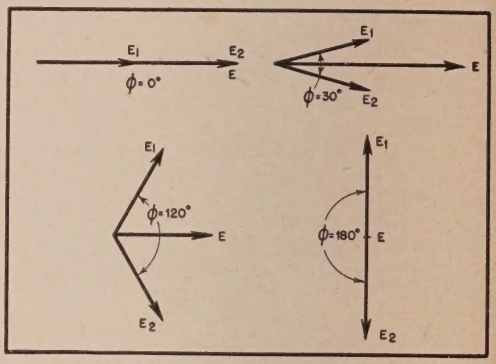


Fig. 3. Vector diagrams for different values of phase displacement, $\emptyset$, of the two generators in Fig. 2.

the other hand, if they are exactly in phase, E will be the sum of $E_1 + E_2$. When the armatures are displaced from each other by intermediate amounts it will be found that E will sum up to intermediate values. Within limits, E will have a linear relation to the angular displacement (and hence the phase displacement $\emptyset$) of the two armatures. If the shafts are initially displaced by a certain amount and this displacement is varied about this setting, the a.c. voltage E will also vary in the same manner, above and below the mean initial voltage reading. Now, if each generator is replaced by a source of r.f. such as vacuum tube amplifiers, each having the same frequency, and if means is provided to set an initial phase difference between them, then by phase modulating one or both branches of the r.f. lineups, one would obtain a modulation envelope across the output which would be proportional to the modulating voltage. This envelope will be distortionless regardless whether the amplifiers operate Class A, B or C, because the actual modulation (as far as an AM envelope is concerned) does not take place until the outputs are combined differentially, where vector addition

**Box 403, Safford, Arizona.*

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of Modulation

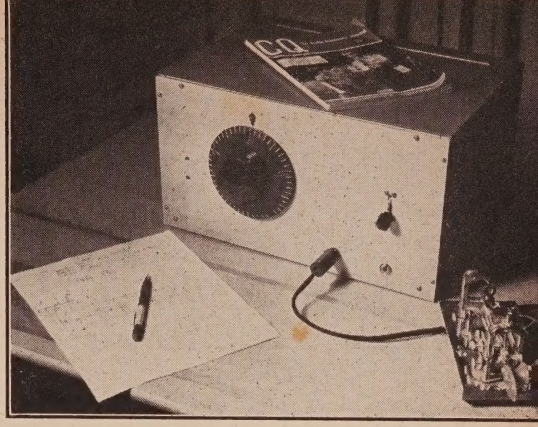


Fig. 1. Photo of the completed basic exciter and modulator for a 450 watt outphasing transmitter. The panel is ¼" aluminum, buffed with a wire wheel power tool and coated with clear lacquer. The small holes at the left provide access to the oscillator band set and dial spread condensers.

of the two phased branches can take place. *Figure 4* illustrates how modulation takes place as the two amplifiers are shifted with phase modulation. On one half of the audio cycle the two vectors rotate until they become exactly out of phase, and at this point the r.f. output of the system will be zero. On the other half cycle the two vectors approach in-phase operation and the output voltage will be double the initial carrier value. Note each vector arm must swing in opposite directions, otherwise the phase *difference* between the two will always remain the same. The resultant carrier would then be phase modulated in-

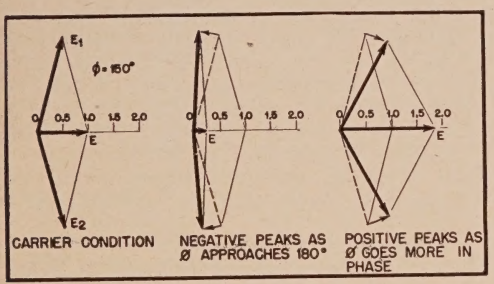


Fig. 4. Vector diagrams illustrating change in output when the two r.f. voltages are phase modulated when initial phase displacement is 150° for unmodulated carrier. Total p.m. deviation would be ± 30° for 100% modulation.

stead of amplitude modulated. AM will be obtained when the audio used to modulate one branch is 180° out of phase with the audio used for the other branch.

Now for a practical method to utilize the principles demonstrated above. *Figure 5* illustrates the basic arrangement of the various components. The output of the oscillator is split between two branches of separate amplifiers. The r.f. is brought to the desired power level and is then differentially combined in the output circuit. A small amount of residual phase shift is intentionally introduced in one branch so the carrier will not be completely cancelled out. This shift amounts to about 30°. When modulation is applied, the phase varies plus or minus 30° for 100% modulation. A tube in each lineup is selected to operate as a phase shifting amplifier, so designed that upon application of audio, its output will be phase modulated by a small amount. Where frequency multiplication is to take place further on in the lineup, the amount of this phaseshift required is reduced by the factor of the multiplication. If, for instance, an oscillator is used having 80-meter output, and 20-meter operation is contemplated, the amount of phase modulation required is one fourth that required where the ouput is to be on the fundamental oscillator frequency. It is recommended that the phase modulators operate on as low a frequency as possible and all frequency multipliers follow, rather than precede, the modulators. In this way less phase deviation is necessary for a given modulation percentage, and they are more easily made linear. The most deviation any single modulator of this type can have without distortion is about 25°. One such shifter in each branch will provide plus or minus 50° shift, which should be sufficient, but for the purpose of having more margin when fundamental output was desired (and hence more deviation required for a given modulation percentage), the W7UAF model used two shifters in succession in each branch of amplification.

Although all the phase modulation could be confined to one branch, the unit described modulates both branches. This allows more balanced circuit construction and any unaccountable phaseshift in one lineup would more than likely be compensated by a like amount in the other. Such seemed to be the case, and no trouble was ex-

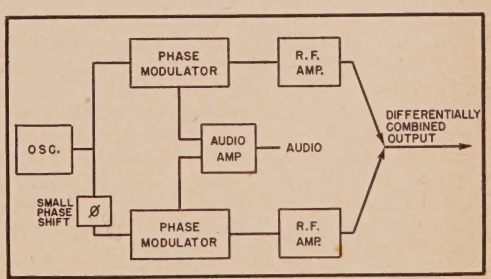


Fig. 5. Block diagram of basic outphasing system.

perienced in obtaining the desired relative phases throughout. This might not be the case if one used modulators in one branch only.

A few notes regarding the design of suitable phase modulators might be well in order. The requirements to be met are stability, ease of adjustment, non-critical operation with change in operating frequency and low distortion. The circuit employed filled the bill perfectly and is based around that shown in *Fig. 6.* A combination of

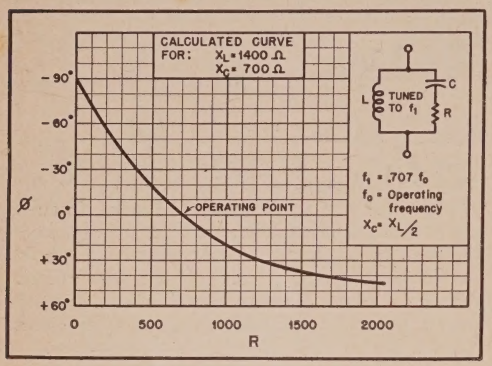


Fig. 6. Basic phase shift network for p.m. stages.

circuit parameters is chosen such that the resonant frequency of the network is .707 times the operating (impressed) frequency. In other words, for a given capacity condenser, the coil is wound so as to have twice too much inductance for the operating frequency. R is chosen to have a value equal to the reactance of the condenser. Thus, $R = X_c = X_L/2$. Now if the resistor is opened, only the coil L will be across the terminals of the network and the phase will be lagging and 90°. If the resistor were to be shorted, the circuit would become capacitive by an amount of reactance equal to $2X_c$ and the current would lead by 90°. At intermediate values of R, the phase would assume intermediate values between these extremes. This is a two-terminal, constant impedance network.

By replacing R with the internal resistance of a vacuum tube, a very effective means of changing phase with audio voltage results. A practical circuit arrangement evolves in the form of *Fig. 7.* R is replaced by the output impedance of a cathode follower and the network is used as the tank circuit of a pentode r.f. amplifier. By inserting one such phase shifter at each point where called for in the outphasing modulator unit, the remaining problem becomes the classic one of amplification and should pose no problem for the experienced amateur.

The completed circuit arrangement of the basic exciter at W7UAF is shown in the schematic of *Fig. 9.* A v.f.o. is included as an integral part of the unit and was found to be extremely stable. It has excellent keying characteristics, and the dial can be set blind to any frequency within less than 400 cycles by merely setting it to the appropriate dial reading. Following the oscillator is a dual triode isolation stage, one section connected as a grounded-plate amplifier, followed by the other section as a cathode-coupled grounded-grid amplifier. This provides good voltage gain without the necessity of neutralization, and with no possibility for self-oscillation. It affords excellent isolation for the oscillator. A single r.f. pentode might just as well have been used, but after using both circuits for such purposes the writer prefers the dual triode arrangement. The output of the isolation amplifier is fed to a phase splitting network which allows adjustment of the residual phase between the two lineups so the carrier level can be set to a predetermined value. The same result could be obtained instead by slightly detuning the tank circuits of one pair of r.f. amplifiers following the phase modulators, one tank being set just slightly above resonance, and the other just below resonance by an equal amount of capacity adjustment. The phase difference is a function of the frequency difference between the two mistuned circuits. This method has its disadvantages when shifting the operating frequency, however, and probably would work well only at one particular frequency.

Following the phase splitter are the phase modulators, two in each branch. These, in turn, each drive a 6SJ7 voltage amplifier having untuned plate circuits and are followed by the 6AG7s. A link is provided for the output of each 6AG7 to couple to the power amplifiers. Series connected links on any stage following this basic exciter may be used to couple to an antenna for intermediate levels of output power. This is a convenient method of reducing power without having to operate a large final at reduced ratings. If one so desires, the final amplifier could be deactivated completely and the antenna could be

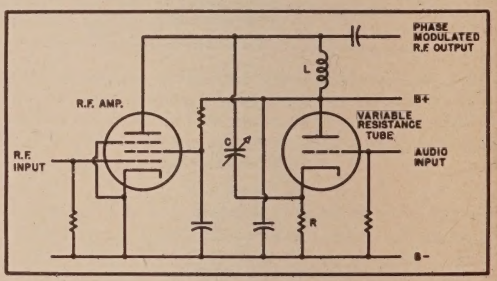


Fig. 7. Phase modulator schematic. LC is tuned to .707 of the operating frequency of the r.f. amplifier.

connected to the driver links. The driver amplifiers could then be operated at their full ratings, the percentage modulation would be unchanged, and no adjustments of the audio gain need be made.

Construction

The chassis layout should be arranged for shortest interstage leads and least possibility for coupling between the two lineups. The power

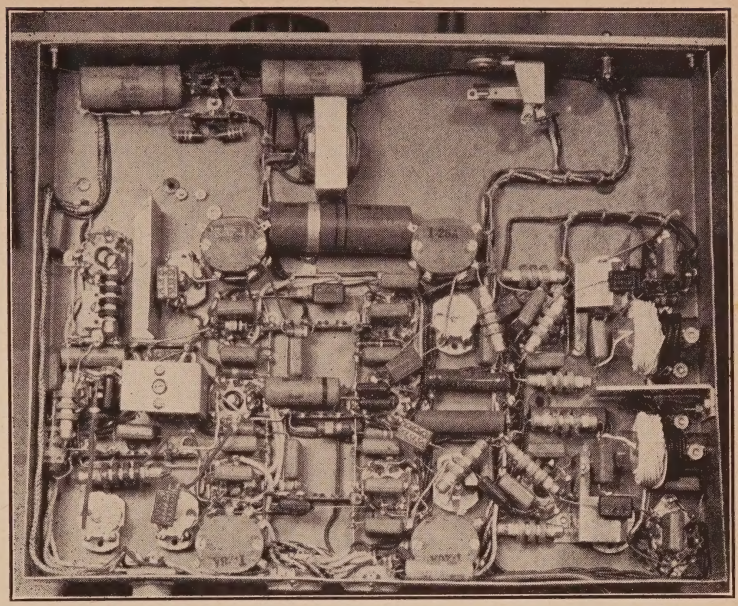


Fig. 8. View of underside of chassis. L7 and L8 are the single pie coils at far right. C13 is adjustment visible in center of U shaped bracket at left. Metal shields obscure most of C49 and C50, each mounted near L7 and L8 at far right. Powdered iron core coils are located inside round bakelite containers.

sensitivity of the stages following the PM tubes is extremely high, making it essential to eliminate all sources of stray coupling in the low level stages through shielding and placement. *Figure 8* shows the underside view of the W7UAF model. Note that small iron-core coils are used wherever possible, both to conserve space and to afford less cause for unwanted coupling. The slugs of these coils provide an excellent method of setting the circuits into the required range with the least amount of coil pruning. Short leads are used throughout and bus bar is used in r.f. circuits for stability. The writer went to an extreme in compactness of layout because of the limits in available space imposed by a cabinet that was on hand. The two strings of amplifiers are arranged side by side across the front center of the chassis with the cathode follower resistance tubes occupying the space between the two r.f. groups. All power supply leads are brought in on sockets at the rear. The oscillator keying jack is mounted on the front panel alongside the a.c. switch and the transmitter standby key switch. All tuning adjustments are made with an insulated screwdriver and the condensers are of the locking type, since they likely will not be touched after they are once adjusted.

Care has been exercised to prevent power supply leads from becoming feedback paths by the judicious use of r.f. chokes in the B+ leads and through liberal use of large mica bypass condensers. All tendency toward self-oscillation was traced to this source. Since a number of high gain tubes are used, it is necessary to build each stage compactly, with short screen bypass leads. Shielding should be used to isolate grid and plate components. The PM modulators do not tend to act up since their tanks are not tuned to the operating frequency and, due to the low-Q tanks, actually have a voltage loss instead of gain at the operating frequency. The use of tube sockets having grounding lugs on the underside is highly recommended. Use of these ground points will result in short returns and assure that all grounds for a single stage are brought to the same point.

After completion of the unit, the writer discovered there are some ready-built coil and condenser combinations available on the surplus market which with very little change would make up ideal tanks for the phase shifters. These are the i.f. cans in the BC-455A receiver (part of SCR-274N assembly) and each receiver has three of these cans tuned to 2830 kc. The addition of a small padder to the condenser will enable it to tune to the 2700-kc range needed in the modulators. Where these are not available, the coils can be wound on small forms until the required inductance is obtained. These coils should be mounted in small shield cans. Stackpole cup cores were used in the described model and were obtained from some surplus direction-finding equipment. L_3 and L_4 each consisted of 26 turns of #26 d.c.c. wire, bankwound on 7/16" x 3/8" long form over the slug of the powdered iron core, Stackpole # A-7153, or equivalent. The inductance amounted to 40 μh. L_5 and L_6 were each 34 μh, consisting of 24 turns wound on the same type forms as were used for L_3 and L_4. These values of inductance were based on a tank capacity of 60 $\mu\mu$f in addition to the electrode capacities of the tubes. The total tank capacity including all accountable stray and tube capacity amounted to the neighborhood of 400 ohms reactance. The cathode resistance of the 6SN7

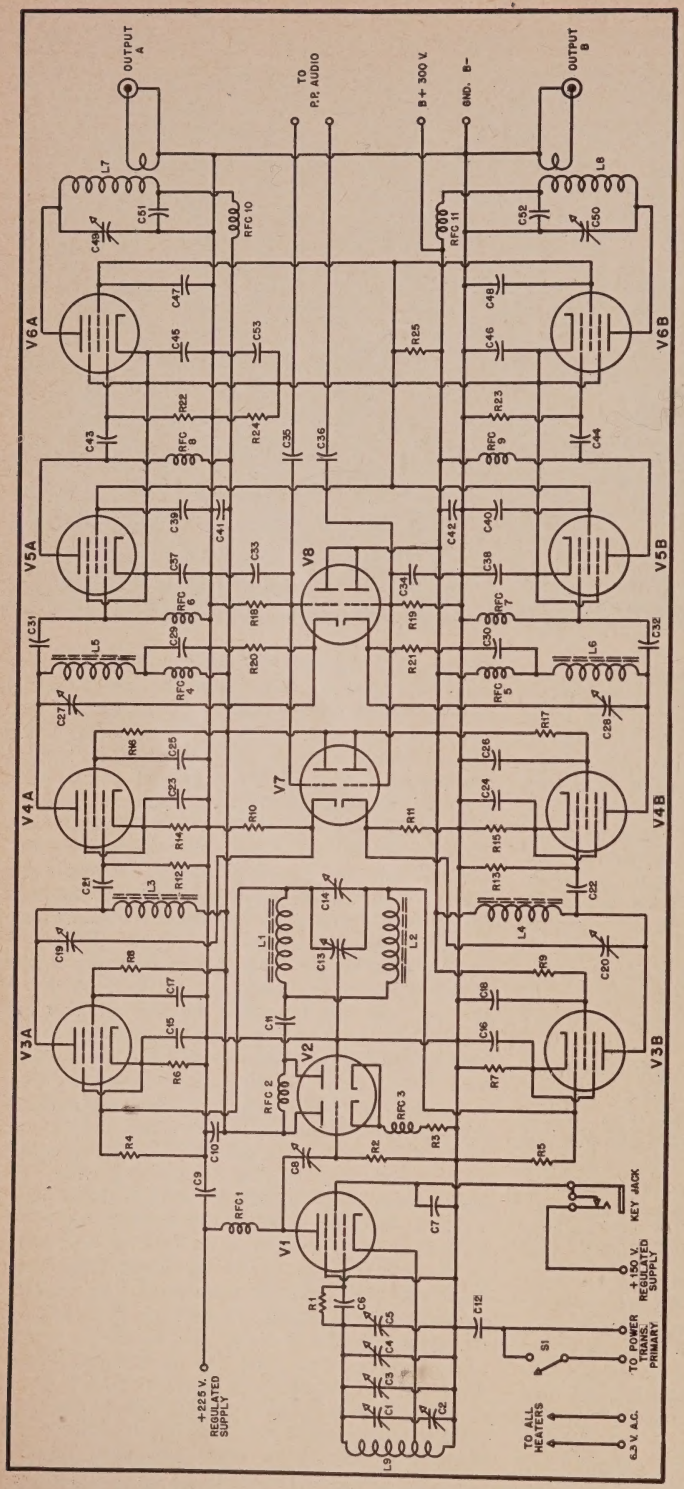


Fig. 9. Schematic of outphasing exciter.

C1 —140 μμf, midget air trimmer.
C2 —250 μμf, straightline capacity variable.
C3 —140 μμf, midget air trimmer.
C4 —30 μμf, adjustable N500 neg. temp. coeff.
C5 —100 μμf, N620 neg. temp. coeff. ceramicon. in parallel with .001 μf zero temp. ceramic.
C6 —100 μμf, zero temp. coeff. ceramicon.
C7 —.005, μf, 500 v., mica.
C8 —5-30, μμf, compression mica trimmer.
C9 —.01 μf, 600 v., paper.
C10—.1 μf, 600 v., paper.
C11—.0005 μf, 500 v., mica.
C12—.01 μf, 600 v., paper.
C13—dual 25 μμf, differential air trimmer. See text.
C14—50 μμf, midget air trimmer.
C15, C16, C17, C18—.005 μf, 500 v., mica.
C19, C20—100 μμf, midget air trimmer.
C21, C22—.0005 μf, 500 v., mica.
C23, C24, C25, C26—.005 μf, 500 v., mica.
C27, C28—100 μμf, midget air trimmer.
C29, C30—.005 μf, 500 v., mica.
C31, C32, C33, C34—.0005 μf, 500 v., mica.
C35, C36—.25 μf, 400 v., paper or "bathtub."
C37, C38, C39, C40, C41, C42, —.005 μf, 500 v., mica.
C43, C44—.0005 μf, 500 v., mica.
C45, C46, C47, C48—.005 μf, 500 v., mica.
C49, C50—50 μμf, midget air trimmer.
C51, C52—.005 μf, 500 v., mica.
C53—.1 μf, 400 v., paper.
L1, L2, L3, L4—40 μh 26 turns #26 d.c.c. bankwound on 7/16" diam. form over slug of Stackpole #A-7153 (or equiv.) winding length of form is 3/8" long. If powdered-iron forms not available, these coils may be duplicates of L7 and L8 if shielded with cans and room is available. See text.
L5, L6—34 μh 24 turns #26 d.c.c. wound same manner and on same type forms as L3 and L4. See text about war surplus substitutes.
L7, L8—56 turns (1 3/4" in length) of B & W Miniductor 1" diameter 32 turns per inch. 40μh inductance. Equivalent coils of same inductance may be used. 7-turn links are suitable for initial tests; later modified as necessary.

cathode follower tubes operating with the constants given is also approximately 400 ohms, which satisfies the conditions specified earlier regarding the design of the constant impedance phase shifting network. Strictly speaking, the relation is not exact, since the entire tank capacity is not in series with the cathode resistance of the follower due to stray capacity, but the compromise effected was entirely satisfactory.

C_{13} is a special component made up of two midget air trimmers arranged on the same shaft so that as one set of plates becomes completely meshed, the other condenser is at minimum capacity. This condenser serves as a vernier for the adjustment of C_{14} and provides smooth phasing control in the critical area of adjustment. Since this is merely a convenience, the two halves of this unit may be replaced with two fixed condensers having 15 $\mu\mu$f capacity each, then all phasing adjustment would be done with C_{14}.

Observable in the photo of the chassis underside, *Fig. 8*, is a center tapped choke and a tubular electrolytic condenser. These components, mounted nearly between L_3 and L_5 in the layout, are actually a part of the particular audio system used to drive the cathode followers and do not comprise a portion necessary to be duplicated. The described model obtains its audio from the low impedance output of a pair of cathode followers. These followers are the last stage of a very unconventional compression amplifier speech system and this choke serves as the cathode return for these tubes.

The output coils, L_7 and L_8, are the single pie, layer-wound coils visible at the far right-hand side of *Fig. 8*. They were made this way because of space limitations and due to their oddity, probably cannot easily be duplicated. It is suggested that catalog variety 75-meter coils be used. 56 turns (1¾" long) of B & W Miniductor coil 1" in dia., 32 turns per inch (or equivalent) may be used, or any coil having 40 μh inductance. It is suggested they be mounted on top of the chassis for better isolation from the lower level stages. The coils used in the phase adjusting network, L_1 and L_2, each has approximately 40 μh of inductance and may be duplicates of L_3 or L_4. They are not critical as long as they are identical. *Figure 8* reveals some padder condensers needed in the original model to obtain the full 60 $\mu\mu$f for the PM tanks. This was because only 50 $\mu\mu$f variables happened to be at hand. The parts list specifies 100 $\mu\mu$f condensers and they will have sufficient range without the use of any fixed padders.

Adjustment

Only a small amount of equipment is necessary to completely adjust and test the unit. A test oscillator is necessary—one which is capable of tuning to .707 of the operating frequency, or range of frequencies. The writer found that the r.f. obtainable from the test terminal of a BC-221 frequency meter fit the requirements. This signal can be fed to the outphasing modulator with a short piece of RG-8/U or shielded hookup wire. A receiver is used as a tuning indicator and if it has no S-meter, the b.f.o. can be used (with a.v.c. turned off), and the audio tone can be measured with an output meter or a.c. voltmeter. A scope would also be handy for observing phase shifts between the output components and for recognizing any parasitic oscillations which might occur on modulation peaks, etc.; and although not strictly needed while adjusting the low power exciter unit, it is a very valuable tool in observation and judgment of the overall performance of a high power amplifier.

The oscillator tube should be plugged in and the following stages should be deactivated by removing the tubes. After a reasonable warmup, plug in the key and start the oscillator. The range of the main tuning dial should be set with C_1 and the band limits should be adjusted with C_3. After the ranges are set and the oscillator is temperature compensated and checked for keying characteristics, etc., the isolation amplifier V_2 should be plugged in. The S-reading on the monitoring receiver should show a marked increase and no birdies or mush should appear anywhere on the receiver with key up or down.

C_{13} should now be set mid-scale and C_{14} should be turned to minimum capacity. These two adjustments should now remain undisturbed until the remainder of the tuneup is completed. Plug in all remaining tubes in their respective sockets. C_{49} and C_{50} should be set at minimum capacity. The oscillator key should be opened. A shielded test lead should now be connected to the input (ungrounded) grid of the 6SN7 amplifier, V_2. Connect the other end of this lead to the terminal of the BC-221 oscillator. Set the BC-221 dial until it indicates a frequency .707 that of the center of the desired operating range, i.e., if the mid-range operating frequency were expected to be about 3865 kc, the oscillator should be set to 2735 kc. Tune the receiver to this frequency and attach several inches of wire for an antenna. Take a two or three foot test lead and clip one end to the grid of V_{5a}, leaving the other end

L9—8 turns #28 s.c.c. on 7/8" diam. ceramic form. Space wound over 5/8" winding length. Tap 2 turns from bottom.
RFC1 through 11—2.5 μh r.f. choke, 100 ma.
R1—470K ½ w.
R2—100K ½ w.
R3—1200 2 w.
R4, R5—470K meg. ½ w.
R6, R7—1000 1 w.
R8, R9—270K ½ w.
R10, R11—2200 1 w.
R12, R13—470K ½ w.
R14, R15—1000 1 w.
R16, R17—270K ½ w.
R18, R19—470K ½ w.
R20, R21—2200 1 w.
R22, R23—470K ½ w.
R24—50 ohms, 10 w., wire-wound.
R25—10,000 ohms, 10 w., Kool-ohm (or equiv.)
S1—SPST toggle switch.
V1—6K7
V2—6SN7
V3a, V3b, V4a, V4b, V5a, V5b,—6SJ7
V6a, V6b—6AG7
V7, V8—6SN7

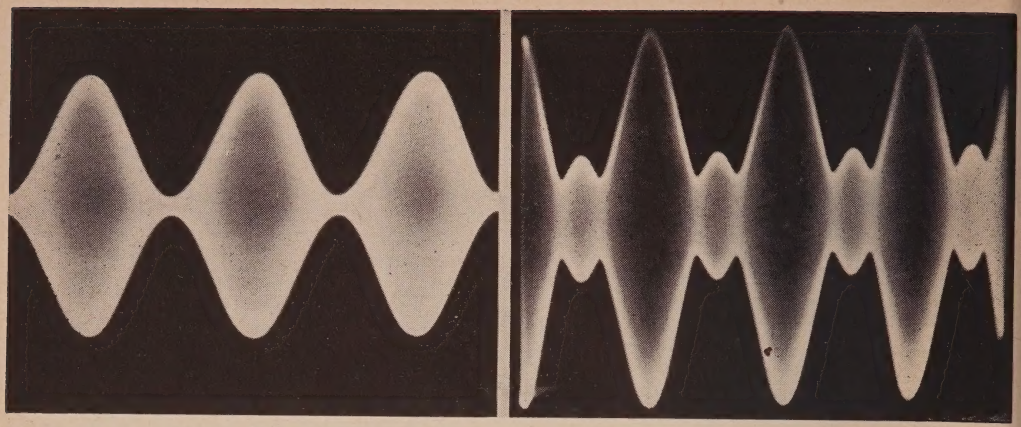


Fig. 10a (left). Scope pattern showing nearly 100% modulation when system is properly adjusted. Fig. 10b (right). Scope pattern showing system under modulation when two amplifier branches contribute unequal outputs. Note that negative peak "reversal" occurs before the output goes to zero, making it impossible to attain 100% modulation of the carrier on negative peaks.

free. This will act as an antenna and provide a signal for the receiver. Set the r.f. gain control on the receiver for a low reading of S-units or other indication if the output meter method is used. Tune the plate circuit of V_{3a} for maximum indication. The tuning will be very broad. Prune the coil, if necessary, so that resonance falls well within the range of the variable condenser. After carefully peaking up C_{19}, move the test lead antenna from V_{5a} to the grid of V_{6a}. Note that this lead is always connected one stage ahead of the one being tuned so the test signal can be obtained without disturbing the circuit constants of the stage being resonated. Peak up C_{27} just as was done on the previous stage, lowering the receiver gain as necessary so the indicating instrument will be in the range most sensitive to change in gain. Avoid overloading the receiver input with too much signal, and remove the antenna from the receiver if necessary.

Now, remove the test lead antenna and place it on the grid of V_{5b} and peak up the tank of V_{3b}. Next, change the antenna and clip it to the grid of V_{6b} and peak up the tank of V_{4b}. While making these adjustments, set the inductances of the coils so that each pair of corresponding tuning condensers will have approximately the same amount of capacity in use. If the tank condenser for V_{4a}, C_{27}, is mid-scale, set L_6 so that C_{28} is also mid-scale. This helps to maintain the same amount of phase modulation in each branch of amplifiers and reduces the possibility of extraneous unequal shifts occurring in either lineup.

Remove the BC-221 lead, also the test lead antenna, and turn on the v.f.o., set to the mid-range of the expected operating frequencies. Use a small neon lamp or flashlight bulb in series with a two turn loop of wire for an indicator and resonate the 6AG7 tanks by tuning for maximum indicated output. Quantitatively check the output of each tube and compare them. If they are not nearly equal, something is drastically wrong and bears investigation. Check over the receiver ranges again with key up and key down to observe if any birdies or other undesirable phenomena are being exhibited.

Evaluating Performance

We are now ready to test the unit with modulation. Because of the basic nature of this system of modulation, if we can manage to derive AM from the output of the 6AG7s, then we can expect to get an AM wave from the output of the combination of any pair of amplifiers that may follow. Arrange a small resonant circuit with load (flashlight bulb linked to this tank) set for the operating frequency. Connect the output coils of L_7 and L_8 in series and link this combined output to the loaded resonant circuit. Connect the vertical plates of the scope (do not use scope amplifier) across a portion of the tank so a nice deflection is obtained. Polarize the two output coils so that of the two selections, the *least* energy is coupled to the load. It will probably be found, with the unit tuned up as previously outlined, that one selection will give zero output, or nearly so, and the other way will give about double that obtainable from the output of one link alone. The bulb out, or zero condition, is the correct one, indicating that differential output is being obtained and the phases of the two links are 180° out of phase, or nearly so.

Next, advance C_{14} slowly. The bulb in the load should begin to glow and C_{14} should be advanced to the point where the bulb glows about one fourth as brightly as it would if the load tank were connected to only one link of the exciter. C_{13} may be used to make the finer adjustments for this condition after the initial setting is made with C_{14}. Feed a small amount of audio to the system. The output of an amplifier having 50 v. of swing is sufficient. If an audio tone is not available, couple some 60-cycle a.c. from a heater circuit to the audio input of the speech amplifier

used. As the audio level is increased, the scope pattern should show evidence of modulation. If the tuning procedure was carefully followed and the 6AG7 plate tanks were accurately resonated, and if the links are polarized for differential output, it should be possible to get a pattern like *Fig. 10A* which shows nearly complete modulation of the carrier. If at no time is it possible to get the envelope to ever reach zero, regardless of the amount of audio, as in *Fig. 10B,* it is indicative that the two outputs are not exactly equal and when the phase goes to 180° on negative halves of the audio cycle, the output cannot completely cancel as it should. If this is observed, adjust the coupling of the two links to reduce the output of the more generous 6AG7 until it is possible to duplicate *Fig. 10A.* Now, advance the audio a little further. A pattern similar to *Fig. 10C* should be obtained and it should be possible to make the negative peaks *overlap* considerably before any positive peak clipping is noticeable.

This is an extremely interesting and important difference between phase generated AM by the outphasing system, and other modulation circuits for obtaining AM output. Increasing the audio does not result in negative peak clipping. Instead, the peaks go "below zero" and no clipped waves result, nor do any bright lines appear on the scope to indicate negative peak clipping. Meanwhile the positive peaks rise beyond the usual twice carrier level deflection, normally encountered as the practical limit for sine wave modulation without distortion. Actually what is happening is that we have effectively generated the sideband energy separately, and by increasing the audio above normal, we have increased the sideband voltages until their sum exceeds that of the carrier. Any attempt to do this in a conventional modulator results in the destruction of the negative peaks, because the sidebands are created by the brute-force method of varying the power to the amplifier that supplies the carrier, and after this power is driven to zero on negative peaks, more of nothing becomes just more of nothing. But in the outphasing system, we do not cancel the d.c. input of the r.f. amplifier in order to drive the output to zero; we allow the two r.f. components that make up the carrier to approach phase opposition. The output will go to zero if the two voltages are exactly equal in quantity, and if the phase rotation is carried still further by increasing the audio, they will start to add up again. This resultant bit of r.f. is exactly out of phase with the original unmodulated carrier.

Upon checking with a receiver having adequate selectivity to make the test valid, it will be found that the above described "overmodulation" does not cause high order sidebands to appear on either side of the signal! In other words, *no splatter with overmodulation!* Now lest this be considered a cure-all, suppose we examine a few of the disadvantages of carrying this to an extreme, or purposely attempting to get something for nothing. In the first place, severe *audio* distortion will be observed in the receiver.[2] This is because, upon detecting the signal shown in *Fig. 10C,* the detector has no way of knowing that the r.f. phase of the hump rising out of the negative trough is different from that of the rest of the wave. Since

2 The second harmonic distortion is apparent in Fig. 10d.

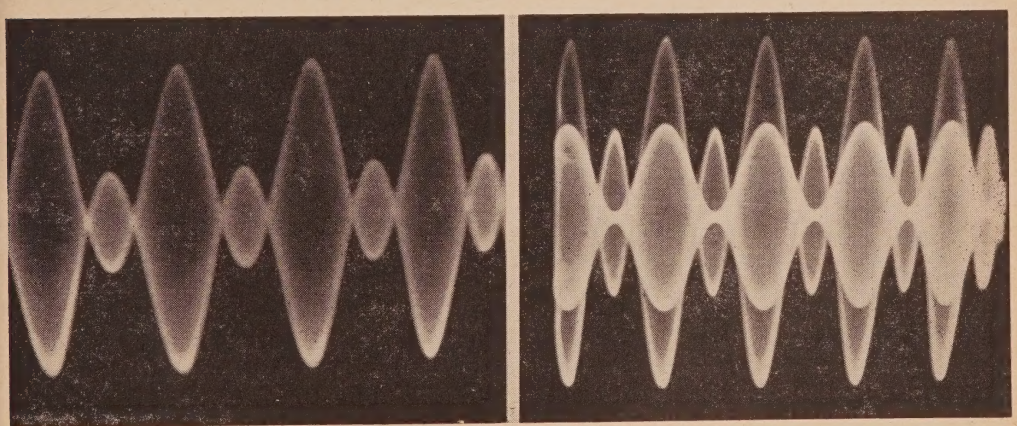


Fig. 10c (left). Scope pattern of modulated output when system is properly adjusted and the audio is advanced beyond that necessary for 100% modulation. Although severely distorted after detection in a receiver, this wave contains no sidebands other than the two produced by the sine wave audio tone at lower percentages of modulation. This envelope is obtained when the sum of the two sideband components exceeds that of the carrier. Fig. 10d (right). Two exposures from the scope, superimposed to show the relative difference between the carrier when modulated approximately 90% and the same carrier when the modulation had been increased to the limit of the linear swing of the phase shifters. The height of the positive peak is almost twice that of the positive peak of the normally modulated wave. Positive peak clipping would result at such high modulation percentages unless allowances were made in tube ratings.



Fig. 11a (left). Ellipse obtained when unmodulated. The warped appearance is due to r-f harmonic content in the amplifiers. Fig. 11b (center). Pattern obtained when the system is completely modulated. This condition is obtained at modulation percentages of the order observed in Fig. 10a. Fig. 11c (right). Pattern obtained when the audio is increased beyond that necessary for 100% modulation. This scope figure corresponds to the conditions producing Fig. 10c.

it cannot turn itself backwards or perform other gymnastics when this portion of the wave arrives, it will ignorantly add it up in the wrong direction, and the result is audio which goes the wrong way at the wrong time. But, this is strictly an audio problem and has nothing to do with sidebands and splatter. Even so, if carried to an extreme it could destroy the received intelligibility of the signal to an unwarranted extent. Another disadvantage is that a signal having more sideband energy than normal for a given carrier will experience destructive distortion from selective fading; much more so than if a normal complement of sideband to signal were transmitted.

The most appealing advantage, however, is the insurance that should speech levels get out of hand occasionally, it will not cause adjacent channel interference, and the only result will be a noticeable amount of audio distortion in the *reproduced* signal at the receiving terminal. Should the receiving operator have an exalted carrier adapter on his receiver, little or no distortion would appear, further proving our discovery that nothing extraordinary happens in the way of unwanted sidebands at the transmitter when the audio gain gets too high.

The Final Amplifier

We are now ready to turn our attention to the design of a suitable final amplifier with which to use the completed basic exciter unit. One salient feature should be pointed out which applies to all high efficiency linear and grid modulated systems which derive their increase in output under modulation by means other than change in plate voltage. With no increase in plate *voltage* under modulation, any increase in output must be obtained entirely through plate *current* increase. The reason the current rises is because the effective load impedance for each tube changes when the phase displacement between the two branches changes with modulation. As they approach in-phase operation, the load impedance offered each tube is effectively lowered, enabling each to contribute increased power output. The plate relations affecting these tubes is given in the appendix. In a plate modulated amplifier the increase in current is by a factor of 2 because the voltage is meanwhile raised by the same factor, giving the required 4 times peak power. In any scheme that does not enable the plate voltage to rise, the peak current at the modulation crest has a factor of 4.

This means that for a given sized tube, the limiting factor on the permissible power input is the available *peak* cathode emission available to supply this fourfold current increase. The tube ratings are lower for this class of service than for the plate modulated service; however this does not mean that the carrier *efficiency* is low.

Let us suppose that one desires to follow the

(*Continued on page 65*)

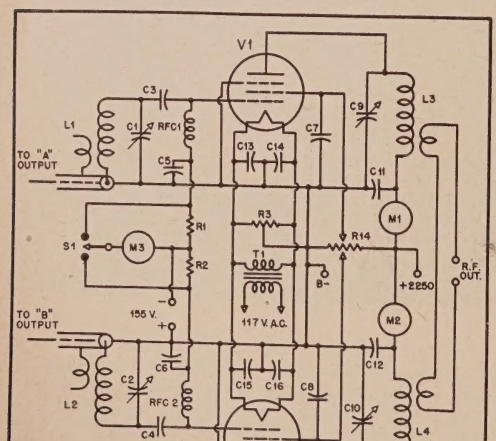


Fig. 12. Final amplifier suitable for use with exciter.

C1, C2—75$\mu\mu$f, .06" spacing air variable.
C3, C4—.001μf, 2500 v., mica.
C5, C6—.002 μf, 2500 v., mica.
C7, C8—.005 μf, 2500 v., mica.
C9, C10—75 $\mu\mu$f, .3" spacing, variable.
C11, C12—.002 μf, 5000 v., mica.
C13, C14, C15, C16—.005 μf. 2500 v., mica.
L1, L2—B & W bandhopper coil. Links used for scope only.
L3, L4—500-watt 80-meter coil. Number of turns on link dependent upon antenna load impedance and phase relations between two amplifier branches. See Appendix.
M1, M2—0—300 ma d.c.
M3—0—25 ma d.c.
R1, R2—100 ohm 1 w.
R3—100 ohm C. T. 10 w.
R4—100K, 100 w. with sliders.
RFC1, 2—2½ μh r.f. choke.
S1—SPDT toggle switch.
T1—10 v., 10 a., fil. trans. V1, V2—813 tube.

Hobby for the Handicapped

HERBERT S. BRIER, W9EGQ*

The veterans represent only a small percentage of those physically handicapped. To thousands of others, amateur radio could be no less important as a means of entertainment, education and therapy.

IN PART ONE of this article, we established the therapeutic value of amateur radio to those confined in Veterans Administration hospitals by quoting doctors, technicians, and amateurs who have introduced amateur radio to them, and the veterans themselves. Helpful as it may be to them, there is another group to whom it may be even more helpful, handicapped persons confined to their homes.

Patients in hospitals usually have the companionship of fellow patients and ward mates. Also, the hospitals have diversified Manual Arts Therapy programs even if they have no amateur radio program, as well as other activities designed to make life interesting to the inmates. However, it is often a different story for those confined to their homes. Usually, all their friends come to see them at first when they may be really too sick to enjoy company, but as the invalidism is prolonged, the visits gradually spread further and further apart until, finally, the shut-in may not see anyone, except the immediate members of his family, from one week to another.

Without visitors, the shut-in is thrown on his own resources for interest and entertainment. Letter writing, reading, listening to the radio, hobbies or "busy work" such as stamp collecting, tatting, knitting, leather working, or playing "solitary" are his usual occupations. Any of these are all right as a part-time activity, but they have their defects as a full-time occupation. They are all essentially solitary occupations, and their lack of variety soon reduces them to inefficient prods to nudge forward the snail of time.

In contrast, the infinite variety of amateur radio gives the shut-in an entire new world. The brother of one bed-fast invalid once told me, "Since he started with amateur radio, he is always busy. He tears down and rebuilds his equipment all day and operates it all night. And he always has company now." This was several years ago, and as the lad learned more and more about electricity and radio, the neighbors began bringing their radios and small appliances to him to be repaired, giving him the opportunity to earn the money to build a better station and restoring his confidence in his ability to be of some use in the world. Today, he operates a bed-side service business and complains that he does not have time enough for ham radio.

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

To get to other specific cases, so far we have talked about handicapped men, but women have their accidents and illnesses too, and amateur radio can mean just as much to them as to the men. Nita Hutch, featured vocalist with Chuck Selby's Orchestra, one of the better-known dance bands in Cleveland, Ohio, is one of them. She says:

"I became ill on October 8, 1947, and spent seven months in bed, and it wasn't until November, 1948, that my doctor allowed me to start singing again. About the second month I was in bed, Whitey, W8WKM, who is a good friend of mine, asked me how I would like to listen on the short waves. I thought it would be interesting; so he hustled up an RME-45, and I started listening on all bands. Had a lot of fun and wanted to know more about amateur radio.

"Whitey then hooked up some kind of a rig so that when I talked over the telephone, I could carry on conversations over his transmitter with anybody he called. I have a whole scrapbook of QSL cards from stations that I talked to. It was



Dorothy Willett, W8UDA, and her guide dog, Prince. Dorothy likes the feeling of confidence being an amateur gives her, because it proves that she can do things that not everybody can do.

wonderful, and I decided then to study for my own license, which I am still doing.

"I know that amateur radio hastened my recovery by giving me something constructive to do, and it allowed me to meet people that I would probably never have met otherwise. My doctor was all for it, claiming that it kept my morale up. The only thing that he objected to was when it kept me up past 9:30. I would definitely recommend ham radio to anyone in the same boat as I was."

Another young lady who credits amateur radio for aiding in her recovery from a long illness is W9JZA's daughter, Gertrude. She was confined in a sanitorium for twenty-two months, and Gil fixed up a receiver so she could listen in on the ham bands from her bed. Then, each evening, she listened in while he worked regular schedules, thereby keeping in touch with home.



Nita Hutch, vocalist with Chuck Selby's orchestra (Cleveland, Ohio), who credits amateur radio with aiding in her recovery from a year's illness.

Gertie, Gil, his wife Flo, and Doctor Becker, director of the sanitorium, are all emphatic in their belief that this had a great deal to do with her recovery by keeping her morale up during her long convalescence. In addition, it helped almost every patient in the sanitorium. The other girls soon became curious about the program that made Gertie so happy, and more and more of them began to listen too. Gertie used to tip her dad off about birthdays and such things, which he would mention in his contacts giving the girls the thrill of hearing their names mentioned over the radio. Next, the men heard what was going on in the women's wards, and they, too, began to listen. Some of them became avid SWLs, and Gil printed up a batch of SWL cards for them, which they sent to stations throughout the country.

An example of the value of amateur radio to a long-time shut-in is Joe Huber, W9PIG, bedridden since 1930. Joe, who does watch repairing, is rather unusual in that after he had accidentally discovered ham radio a few months before the war, he learned sufficient code and theory to pass the class C examination without any personal instruction whatsoever. In fact, he had met only one ham until W9RCA (later killed in the war), accompanied by W9GWS, came out to his rather isolated home to give him the examination. Joe says:

"Amateur radio as a hobby for the handicapped has more possibilities for continued interest and enjoyment than most other hobbies, because, first of all, it keeps one in contact with others, and because it is never the same from one day to the next.

"Being an amateur has affected both directly and indirectly, my earning power. Because of learning about radio, I've been called on to do radio servicing for both friends and neighbors. And, of course, some of the fellows I've come to know and others have called on me when in need of repairs on their time pieces."

Joe's reply to the question *What do you consider the most valuable feature of amateur radio* is particularly interesting. He replied, "That would be hard to say. I have met a lot of people, both personally and over the air, and that would have to be considered. The thought of it making time go faster doesn't enter too much in my case, because I have too many other things to do. For those who have a lot of time on their hands as I did when I first became interested, that could be an important factor."

That *as I did when I first became interested* emphasizes again what frequently happens when a handicapped person becomes interested in amateur radio. It seems to create a whole set of new activities which, in time, leave little time for radio. Charles Sarudy, of Gary, Indiana, is a case in point. Confined to a wheel chair since birth he became interested in amateur radio a few years before the war, progressing from it to radio servicing. Today, Charles is the proprietor of his own radio shop, in which he employs several people. And a few days ago, he told me that he no longer has time to devote to amateur radio.

John Chiuchiolo, W2LWB, with his bedside station, which has taken the loneliness out of his long convalescence from tuberculosis. He operates 7-mc c.w.



Of the many sightless amateurs, the reactions of two, Dorothy Willett, W8UDA, and John Miller, W9PBS, are typical. Both unhesitatingly endorse amateur radio as by far the best hobby for the blind. They stress that it widens the world by permitting them to meet and associate with others on an absolutely equal basis, with no one acting as if they must be given special favors. Dorothy adds, "Amateur radio allows me to do something on my own. I mean something that not everybody can do. I like the feeling of confidence this gives me." John said, "Since I've been a ham, I have met so many fellows who

treat me as an equal that it is much easier to meet the public now."

John operates a news and candy stand at the Lake County Courthouse, and since graduating from the Radio Engineering Institute, in Omaha, Nebraska, in January, 1948, another result of his amateur radio hobby, he operates a radio-service shop in the evenings and on weekends.

Jim Lisk, W8EQ, a victim of arthritis since 1917 and an amateur since 1922, has had twenty-seven years to form an opinion of amateur radio, and this is what he thinks of it: "With amateur radio as a hobby, the disabled person does not know the meaning of the word 'shut-in,' for he, in no sense of the word, is ever shut in. He can pick his friends from any part of the world, and he can choose frequencies that will allow him to become next-door neighbors with fellows ten to ten-thousand miles away. Personally, I consider the friendships it creates as being the thing of greatest value in amateur radio. Of course, it does help pass the time away, but that isn't all; while doing so, it brings the other fellow closer to you than is sometimes possible when you talk to him face to face."

YLs Welcome!

When one begins quoting handicapped amateurs on their hobby it is hard to know where to stop. W2PMA, W2RTZ, W9CRG, and W9KTX, among others, have expressed opinions similar to those already expressed by others. Instead of quoting them at length, I will repeat a story that reveals why Hope Plummer, W2RTZ, feels that she may owe a double debt to radio.

When Hope was fourteen, she came down with an earache while at a girl's camp. It was diagnosed at a local hospital as a minor illness. Her parents, accepting the verdict and preparing to return to their home, remembered that they had left a portable radio in Hope's room. When they returned to get it, a nurse told them that, in her opinion, Hope was much sicker than they had been led to believe. They rushed Hope to a specialist who offered little hope, but performed an emergency mastoid operation.

Obviously, Hope recovered, but three years later she was stricken with a mysterious ailment with most of the symptoms of acute arthritis, which one school of doctors believes was caused by the huge doses of sulfa drugs she received in her earlier illness. Fortunately, Hope is now in the position to say, "I am gradually getting better, and I doubt if I am now sick enough to serve as an example of the value of amateur radio to the handicapped." However, others have told me that her recovery is due, at least in part, to her determination to become a good ham.

The "in part" of the preceding sentence is important. As valuable as amateur radio is to the mental and physical health of many shut-ins, it is not a cure-all. Not everyone suddenly improves in health and becomes self-supporting after being introduced to it; however, there are hundreds who will agree with one handicapped amateur who



Lillian Ruocco, W2PMA, confined to her home most of the time as the result of an operation when a child, and her 10-meter station.

told me, "I've had other hobbies that helped pass the time and even brought in a little money, but ham radio is the one that brought in friends," or another who said, "Ham radio means more to me than all the other things I do put together."

It probably has been noticed that the specific handicap of those mentioned in this article has seldom been mentioned unless necessary to forward the story. This is in accordance with their wishes, because as Virgil, W9KTX, puts it, "There are too many more interesting things to talk about," and the only reason they have permitted me to quote them and use them as examples is in the hope that their experiences will help others in similar circumstances. This is the reason that many of you may have worked one or more shut-in amateurs for years without ever suspecting that amateur radio is the Aladdin's Lamp that brings the world to life for them.

As stated in part one of this article, one purpose in writing it is to encourage more amateurs to introduce their hobby to the handicapped. It is not difficult. Almost anybody will be interested in examining your collection of QSL cards, and listening to a short-wave receiver, or, better yet,

(Continued on page 68)

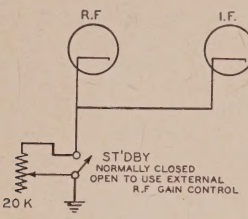
Joseph Huber, W9PIG, East Dubuque, Illinois, bedridden since 1931, and an amateur since 1941, and his complete station, arranged for convenience of operation.



Inside the SHACK AND WORKSHOP

R.F. Gain Control for the S-41

Many of the lower price models of communication receivers do not incorporate an r.f. gain control. While in many instances this is of little consequence, there are nevertheless some very strong c.w. signals that will completely block the receiver. On the Hallicrafter models S-38 and



S-41 the "standby" switch opens the cathode circuits of the r.f. and i.f. amplifiers. If leads from this switch are brought out to the back of the chassis, it is a simple matter to short the terminals with a 20,000-ohm potentiometer. This effectively places the potentiometer in series with the cathodes, and thus an r.f. gain control is devised whenever the "standby" switch is on "receive".

John F. Bunting, W2AWQ

Improving the 75A—75A-1 Noise Limiter

Vacuum tube diodes are somewhat noted for hum pickup, especially in various types of noise limiter circuits. On good receivers and very weak signals where the limiter must be used, this is quite troublesome. In receivers similar to the Collins 75A-1, the 6H6 second detector-noise limiter can be substituted for by a 12H6. This means that the tube runs at half filament voltage with a considerable drop in hum and noise pickup. Unfortunately, there apears to be quite a variation in the emission charasteristics between individual tubes and individual diode sections. It is best to have the tube tested at 6.3 volts, and at least one out of every three or four should read right up to the diode test line on the meter. A tube which gives this type of reading should last a fairly long time in such service.

Wayne W. Cooper, W3PAH

Conversion of the BC-453 to the Broadcast Band

After recently buying a new car and finding that a factory model BC radio for the same would set me back an additional $90, I decided to call war surplus to the rescue. So we converted a BC-453 to do the job. The selectivity is very good and the sensitivity adequate. The audio quality is somewhat down, but can be modified to suit individual tastes.

The following coil information was obtained experimentally from a regular BC-946, and comparisons on an inductance bridge with the stripped down BC-453 coils. The nomenclature is the same as that appearing on the original BC-453 circuit diagrams.

L1—Remove 132 turns below the tap and then add 25 turns after the tap.

L2, L3—The top coil on this form is left alone (i.e., the coil farthest from the base). The lower coil should have 195 turns removed.

L4, L5—Remove 147 turns from the top coil and remove 38 turns from the bottom coil.

1st i.f.—Remove 800 turns from both coils.

2nd i.f.—Use the existing tap for the outside end of the coil, making sure to reconnect the tap to the end of the coil. No tap connection was used.

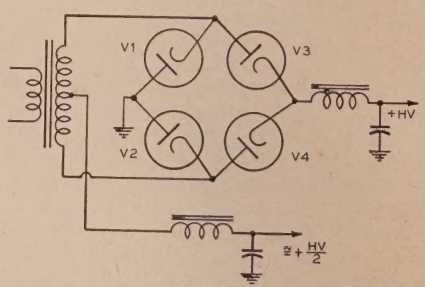
3rd i.f.—Same as the 2nd i.f.

The i.f. transformers should now tune very close to 239 kc, which is the frequency used in the BC-946 models. I would suggest removing the b.f.o. and reconnecting as the first audio stage. Let the r.f. end run wide open, and wire a volume control into the grid of the first audio tube.

John R. Immel, W6ZKJ

Low Voltage Tap on Bridge Rectifiers

Many hams and experimenters occasionally use a bridge rectifier circuit in order to obtain higher output voltages from a given transformer. Few realize, however, that a lower voltage is also available from the same rectifier if the transformer has a center tap. The necessary connection is given in several radio handbooks, ham and otherwise, but nevertheless it is still little-known.



The procedure for obtaining this low voltage output is simplicity itself. The center tap of the transformer is merely connected to a conventional filter as shown in the diagram. The output voltage will be approximately half that of the bridge circuit. The tubes *V1* and *V2* operate as a full wave rectifier for the low voltage connection, so it is necessary to include the additional current drain in determining the necessary tube and transformer ratings.

Richard H. Houston, W3MAX

Address all contributions to S & W Department, CQ, 342 Madison Ave., N. Y. 17, N. Y.

SCR-274N Selenium Supply

LLOYD V. BRODERSON, W6CLV*

HIGH ON THE popularity list of surplus equipment are the command set receivers. Few changes are necessary for conversion to amateur requirements and their cost per unit is but a fraction of the original contract price.

Unfortunately, a power supply is not included and the purchaser is confronted with the problem of designing his own. Inasmuch as there are several methods whereby one can obtain the necessary heater and plate voltages this is often a problem. Conversion to a.c.-d.c. operation was described by W8OZA in an early issue of *CQ*.[1]

The selenium power supply described is designed especially to keep these receivers as compact as possible. Ease of construction, low cost and efficent operation characterize this midget plug-in unit.

Selenium Rectifiers

Contrary to popular belief, selenium rectifiers have been in use for many years. Until recently, however, their general use has been prohibited by high cost and physical size. Seleniums are now available to the amateur at prices comparable to rectifier tubes and sockets which they replace. Their small size, low voltage drop and nominal cost class as the logical solution to a trouble-free power source.

Figure 1 shows a standard half-wave circuit with a 100-ma selenium rectifier replacing the usual half-wave rectifier tube. Capacitor C_1 across the input acts as a small filter absorbing any stray line "hash." A limiting resistor, R_1, protects the rectifier from peak voltages. Capacitors C_2 and C_3, together with resistor R_2, comprise an effective resistance/capacity output filter. Two small replacement type filament transformers, rated at 6.3 volts, 2.0 amperes, furnish heater current to the 12.6-volt tubes.

Assuming 117 volts a.c. input with values approximating those shown, the resultant d.c. output will be 100 volts. The values shown represent the best compromise between d.c. output voltage and a.c. ripple. Inasmuch as condensers C_2 and C_3 are not subjected to large peak voltages, a rated working voltage of 150 d.c. is safe. No appreciable improvement will be realized by using capacitors in excess of 40 μf.

Construction

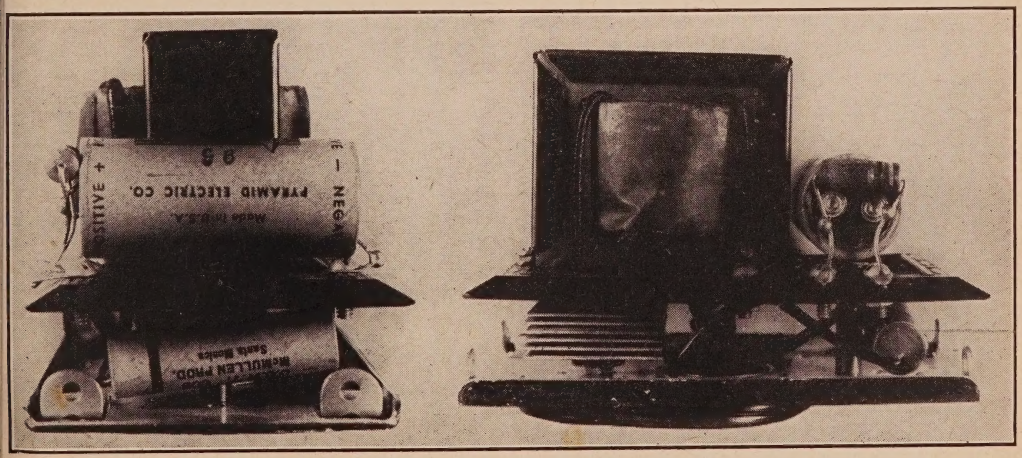
As may be seen from the photographs, the unit's foundation is the plug-in base removed from the dynamotor which originally powered the command set receiver. These bases (model D-32) may be purchased separately at some surplus outlets. If not procurable locally, one may fabricate a base plate from sheet aluminum and a modified wafer socket.

The top deck consists of an ordinary bakelite wall switch plate, obtainable at most "dime" stores. It so happens that these plates are the exact size of the dynamotor base plate which measures 2¾" wide by 4½" long.

All components are midget sized and leads consequently are short. A 6-32 machine screw through the rectifier eyelet serves to support the top

*State Dept. of Agriculture, State Office Bldg. #1, Sacramento, Calif.

1 Sievert, "Converting the SCR-274N Receiver," *CQ*, Nov. 1947.



Top and bottom view of the complete selenium rectifier power supply. Note the "sandwich" type construction permitting compact design. This supply uses a single filament transformer, the receiver filaments operating at half voltage.

deck at one end, while the remaining edge is supported by small bushings. The a.c. lead is brought through a rubber grommet mounted on the bottom front of the base plate. An on-off line cord switch is connected in series with one side of the a.c. line before its entry into the base plate.

Guide holes are drilled in both plates and all wiring is completed before the "sandwich" is assembled. Filter condenser and transformer leads should be readied with soldering lugs and guided into place after assembly. Parts placement and wiring is not critical. A good portion of those components at ground potential are easily taken care of by connections to the metal base plate.

For those contemplating a higher voltage utilizing standard voltage doubling circuits, several precautions should be considered. In any voltage doubling circuit, two selenium rectifiers will be required in addition to an extra filter condenser. This condenser must withstand the sum of the voltages across the doubling condensers and therefore should be rated at least 250 volts, d.c. working.

Where space is at a premium, these added components present a difficult problem. Furthermore, the total cost of a voltage doubling power supply employing selenium rectifiers, is almost twice that of a half-wave circuit. For headphone reception, of command receivers, the increase in signal strength at higher plate voltages is very little above that at normal rectified line voltages.

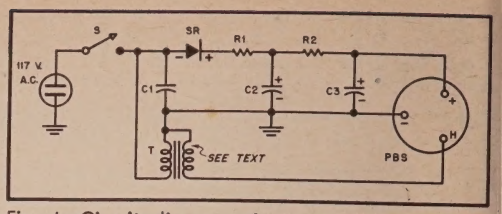


Fig. 1. Circuit diagram of 100-volt 100-ma supply.

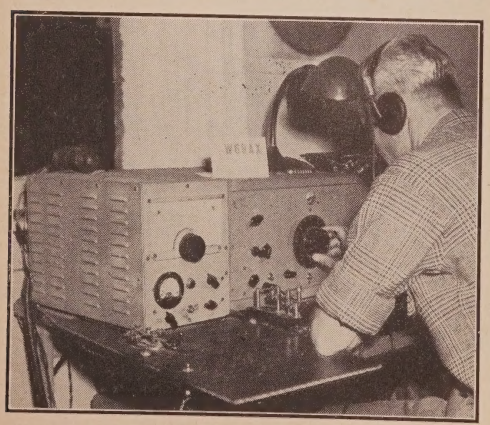
C1—.02 μf paper tubular condenser, 400 volts d.c. working (Aerovox.)
C2, C3—Double 40 μf electrolytic condenser, 150 volts d.c. working, (Pyramid).
PBS—Plug-in base, Type D-32.
R1—30-ohm ½-watt resistor. (IRC).
R2—1,000-ohm 1-watt resistor. (IRC).
SR—Federal selenium rectifier, 100 ma.
S—SPST switch.
T—Replacement type filament transformer, 6.3 v., 2.0 amp.
1—Wall switch plate (bakelite or composition).
1—Rubber grommet.
Miscellaneous: Pushback Wire, Spaghetti Tubing, 6-32 Hardware, A.C. Line Cord.

Two Zones per Watt

W6BAX's low-power W.A.Z. award:

LAST MONTH, the DX Column carried the news that O.P. Taylor, W6BAX, had been awarded WAZ certificate No. 127. Even in these days of countries galore, it is big news when someone can show proof of working all 40 zones. But when the trick is turned by a "W" with 20 to 25 watts output from a doubler-final, it's worth a second look.

It all started rather innocently. Back before the war, W6BAX bent the ether with a well-stoked 250TH. Then, as now, the call was well known among DX hounds the world over. When it became obvious that the time had come to get started on the post-war rig, "O.P." eyed the new high-power tetrodes then in the final stages of development at Eimac, where he is head man in charge of all tube pumping operations, and decided that a new exciter would be in order. The exciter turned out to be a simple gadget. It consists of a v.f.o., 6V6 doublers and an 807, all on one small chassis. To simplify matters, the 807 is used as a doubler at all times.



From left to right: the transmitter, the receiver, and the man, "O.P." Taylor, W6BAX.

At about this time, in the midst of the housing shortage, a QTH was found in Redwood City, Calif., which would allow operation in a modest way. So, with the exciter alone, W6BAX made its post war bow in May of 1947 on the 20-meter band. Using nothing more than an available broadcast antenna tied to a tree, WAC was made during the first week. This antenna was soon replaced by a couple of Vee beams. As the zone and country total mounted, the non-existent final amplifier was weighed against the results to date and the pair of No. 16s running into the new QTH. It was decided that the high power could wait. When things got tough, the Vees were replaced by a 3-element rotary 30-feet high, and the zone and country total continued to mount. Through it all, operation was confined principally to 20 meters, with only an occasional fling at 40. Less than two years from the starting date, WAZ had been made on 20 meters with the little rig.

The toughest zone turned out to be No. 34. Finally, after a wait of six months, ST2PP was grabbed on April 4, 1949, and the all-important QSL arrived in May. As of this writing, the country total stands at 157. Pretty good going for a station on a card table!

With a record like this, one might expect to

(*Continued on page 64*)

Monthly DX Predictions - Oct.

OLIVER PERRY FERRELL*

Amateurs May Be Used To Check Accuracy of Predictions

Discussions are now under way between the RASO section of *CQ* Magazine and the Central Radio Propagation Laboratory on how best to utilize amateur reports to check the accuracy of the *DX Predictions*. Similar steps in this direction have already been taken in a number of foreign countries. In Australia, for instance, the Ionospheric Prediction Service of the Commonwealth Observatory publishes a "quiz" each month concerning DX conditions over certain paths. The quiz requests information on atmospheric noise, weak signals, unusual openings, etc. In New Zealand radio amateurs are cooperating with their Government research laboratories in experiments on short haul communication and finding the lowest useful high frequency.

Recognizing the value of radio amateur observations, this writer was recently made a member of the American Section, Commission III, International Scientific Radio Union. This membership was granted in order that the American radio amateurs would have a voice in directing the lines of national and international ionospheric research. Commission III meets in Washington, D. C., during the first week of November. Attending will be your representative, and a full report will be included in the December issue.

October Conditions

The Monthly DX Predictions are based upon the following arbitrary parameters:

A. 1000 watts effective radiated power.
B. Antenna gain factor is equal to 1.
C. Noise discrimination factor is equal to 1.
D. Service gain factor c.w. to phone is 14 db.
E. Propagation over the shortest, or the direct route.

The values used in computing the maximum usable frequencies were obtained from "Basic Radio Propagation Predictions for October, 1949" (CRPL Series D-59).[1] Calculation of the optimum working frequencies (FOT) for radio amateur communication was according to methods shown in "Ionospheric Radio Propagation" (NBS Circular 462).[1] Additional material that appeared in the November, 1948 issue of *CQ* was also used.[2]

West Coast to Europe

40 meters: On days which are comparatively quiet[3] the first signals appear rather slowly between 1715 and 1800 PST. Conditions should remain fairly steady until 2100 PST when they will slowly deteriorate. Last signal drops into the noise level around 2300 PST. At very best, signals will probably only be 2 S-units above atmospheric noise level. *20 meters*: Possibility of a very short opening between 0530 and 0615 PST. Not dependable as conditions will be erratic. On quiet days the second opening should begin shortly after 1100 PST. Signals build up by several S-units before fading out between 1345 and 1415 PST. No later openings. *10 meters*: Very erratic opening on somewhat more than 50% of the days during the entire month. Band opens with fairly strong signals around 0745 PST. Conditions will fluctuate throughout the opening with the last fadeout about 1000 PST.

West Coast to South Africa

40 meters: First signals appear suddenly out of the local atmospheric noise around 1630 PST. Peak conditions with signals at least 4 S-units above the noise extend from 1730 to 1945 PST. Band closes rapidly after 2015 PST. *20 meters*: This is one of the best months for working this path. A long opening is predicted with good signal strengths starting at about 1500 PST. Peak period from 1730 to 2030 PST. Band finally closes down after 2245 PST. *10 meters*: Weak signals are heard in the background from about 0600 PST until 0900 PST when they start to slowly build up in strength. Signals will build up about 16 db with a good peak extending from 1230 PST until the band closes at about 1630 PST. The closing should be preceded by very strong signals for about a ten minute period.

West Coast to Southeast Asia

40 meters: Signals rapidly build up from under the atmospheric noise after 0115 PST. Peak conditions with signals at least 3 S-units above the noise from around 0300 to 0630 PST. Strengths drop off after 0630 PST with the band finally fading out completely between 0800 and 0845 PST. *40 meters*: Some c.w. signals and a few of the stronger phones may be heard between midnight and 0130 PST. The band will be erratic from 0200 PST until 0500 PST. First good opening occurs just after 0730 PST with signals well above the noise at the far end of the path. Band slowly drops off after 0800 PST, with fair signals persisting until closing at about 1230 PST. *10 meters*: On some extra-special days there may be signals over the direct route around 0900 PST. This opening is probably of short duration and certainly not dependable. Band opens wide rather suddenly around 1445 PST. Strong signals until closing at about 1915 PST.

East Coast to Japan

40 meters: On fairly quiet days[3] the band may allow a few weak signals to get through between 0345 and 0615 EST. Not dependable and not a good month for this frequency and path length. *20 meters*: Somewhat unusual conditions on quiet days with c.w. signals audible from 0745 EST until 0030 EST the following morning. Peak conditions from 0800 EST until 1030 EST and from 2300 EST until 0030 EST. Throughout the remainder of the day weak signals may be audible over the direct route if they are free of QRM.

(*Continued on page 62*)

**Assistant Editor, CQ*

1 Obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

2 O. P. Ferrell, "A New Method of Predicting Band Conditions", *CQ*, November, 1948, page 26.

3 Some assistance in ascertaining whether or not "quiet" conditions exist over this particular path may be obtained by carefully noting the WWV ionospheric storm warnings at 19 and 49 minutes after each hour. In these broadcasts the "N" stands for normal or quiet conditions. The "W" stands for disturbed, or a forecast of disturbed conditions.



Conducted by VINCE DAWSON, JR., WØZJB*

AGAIN THE 2-meter band has been the sole provider of v.h.f. thrills, for sporadic-E transmissions on 6 meters have practically vanished and now we are wondering if there will be any fall or winter F2 DX. How soon 50 mc will open to South America is almost anyone's guess, but the Texas lads are very much inclined to believe that conditions over that path will be better in the past. At any rate, let's don't forget that 50 mc does open during the winter and let's all be around to take advantage of any openings that may occur.

Towards the latter part of August sporadic-E on 50 mc was nearly a thing of the past, and to date so few openings have occurred that many of the old-timers started looking towards 144 mc for contacts. No doubt this has had some bearing on the more numerous openings that 2 meters has been enjoying, for many of the newcomers to 144 mc have been really rolling up their states worked total. WØEMS in Adair, Iowa, a recent addition to the band, rolled up 8 states during the July 22 melee, and has since added Missouri and Kansas, making a total of 10 states in less than two months of operating on 144 mc.

Conditions on 144 mc were very good from the middle-west to Toronto, Canada, on July 22-23, for VE3AIB was able to copy WØBIP, WØWGZ and W9EGH. WØBIP at 850 miles was the strongest station, for over an hour; unfortunately contact was not made to set an inter-country record. Of course all this was on horizontal polarization.

But what happened to the 6-meter band after the middle of July? It did not run true to tradition, for in previous years in the latter part of July the 50-mc lads always looked forward to super-dooper sporadic-E openings, when double-hop and everything else came through. But this opening did not come about and in August so few Es contacts were made by the gang that even Ferrell is pondering over the situation. Perhaps the answer is that several ionosphere storms prevented sporadic-E reflections and that during the winter months to come there will be enough auroral type openings to make up for this loss. At any rate, watch for the northern lights and point your beam towards them, for via this method those elusive states that are close in can be worked.

Adios Amigos

For the past three years we at WØZJB have done our best in bringing to you the v.h.f. news that has taken place. Now it is with regret that we relinquish the column. Traveling some 14 states as we do with our main job, it has been rough meeting deadlines. Many thanks for all your cooperation. The friends we have made through this column will be with us always. So hasta luego,

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

Radio Amateur Scientific Observations

The month of August was utilized by the Sporadic-E Observing Project[1] in extending the facilities to meet the response accorded this research program by the 6-meter operators. An additional grant for personnel and equipment was obtained from the Air Materiel Command. As of September 1, 1949, the total number of active observers was 332. Over 600 reports have been received since the start of the project. They are now being processed, and the first tabulated report will be sent in to the Cambridge Research Laboratories about the 1st of October. In order to maintain a high standard among the observers, survey cards were sent to all observers who had not submitted reports within the past two months. Three observers who felt that they would not be active throughout the remainder of the year resigned from the Project. An increasing number of SWLs are showing interest in the Project, and a special group is being set up for their benefit. All reports are now being acknowledged within ten days to two weeks after their receipt at the RASO office.

Liaison is being established with similar work groups in several foreign countries. Plans for international cooperation in the study of sporadic-E are being considered by the Scientific Observations Committee of the RSGB and others. Strenuous efforts are under way to encourage 6-meter activity in Central and South America. Schedules are being arranged for the fall DX season, and details are being published in the monthly RASO Newsletter. The matter of beacon transmitters for the 6-meter band is still under discussion, and no final actions have been taken up to this writing. Quite a number of observers have volunteered to maintain these beacons, and it is felt that they would provide one of the best means of easily checking 6-meter sporadic-E openings. Correlation data between sporadic-E openings in North America and in Australasia are being collected. Some good correlations have been observed, particularly at the equinox. Radio amateurs and SWLs interested in joining this project are urged to contact the RASO office at the address given below.

Oliver P. Ferrell, Project Supervisor.

1 The work in this project is supported in part by Contract No. AF19 (122)-72 with the U. S. Air Force, through the sponsorship of the Geophysical Research Directorate, Air Materiel Command.

*Radio Amateur Scientific Observations, Radio Magazines, Inc., 121 South Broad St., Philadelphia 7, Penna.

amigos, and we will look forward to seeing you on the air.

Is Sporadic-E a Noise Source?

After their loss of the 58-mc band in England most of the British v.h.f. enthusiasts turned their attention to either the 2-meter or the 70-centimeter bands. Using many of the equipment ideas already partially perfected by the Americans and Canadians the British have taken to the band like ducks to water. In the midst of all these doings the G's have been finding many unusual things at 145 mc which we Ws either take for granted or have skipped over. Among them is the possibility of one-way transmissions and an unusual noise effect which seems to come from the general direction of sporadic-E clouds.

During a schedule maintained between G6DH, Clacton, Essex, and ON4FG, Bornham, Belgium, 155 miles (and once in awhile by PAØPN, 110 miles) the continental stations reported a considerable increase in the general receiver noise background on June 2, 1949, at 1845 GMT. This noise appeared to peak up towards the west if their antennas were rotated. ON4FG has been using a 12-element horizontal array of three 4-element beams stacked, somewhat similar to the type used by W3GV. On checking, G6DH was able to correlate this noise with the apparent location of a strongly ionized sporadic-E cloud. Frequent checks by ON4FG on the direction of noise increses in the 2-meter band has been further checked by the F2-layer and sporadic-E MUF values recorded by G6DH. It appears that there is a definite correlation between these uncalled-for increases in the background level and the apparent locations of sporadic-E clouds. Whether this noise is due to a scattering of noise from something like solar static by the cloud itself, or whether it is a direct re-radiation remains to be discovered. No previous accounts of a phenomenon of this nature nave been uncovered, so maybe amateur radio has turned up something new again.

6 Meter News and Views

W4COS has been transferred to Okinawa and is taking his 6-meter rig along. George made quite a big splash in the few months he was on 50 mc from Eglin AFB. The RASO is going to attempt to set up schedules with the VKs and ZLs for George, so here's hoping they will pan out. The F2-layer MUF is still running fairly high out in the Pacific area while the MUF here in the Atlantic may not go above 47 mc. . . . One of the most interesting reports received in the RASO office was one from the RPL Mobile Unit of the Radio Propagation Laboratory, Canadian Research Board. Using a National HFS receiver they have been checking the sporadic-E MUF as far north as the western shore of the Hudson Bay. On the July 11th opening they heard W9ROM, WØOUE, WØDNW, and, WØOLY and WØTKX in Churchhill, Manitoba. Previous openings had resulted in hearing such stations as WØINI, WØJOL, W9NJT W9AQQ, W9LMX, W8CMS and W2RLT. This location which is about 59° (Churchill) caused some wonder as to why the KL7 skeds failed to materialize. Probably if they had been arranged for earlier in the DX season and for each evening something would have happened.

Les Wells, WØKIW, who was operating *VO2BN* writes to say that as of June 1, 1949, all the Newfoundland licenses were cancelled as VO became a part of Canada. Generally the Canadian authorities have not permitted portable operation on their territories. However, the boys are applying for calls under the MARS regulations. As soon as Les is able to get back on the air he is going to let us know. . . . *CO6WW*, Cienfuegos, Cuba, writes to say that he is still very much active with his latest opening observed on August 21. On August 6th, *CO6WW* heard LU6DO at 1600 EST. This is the first reported instance of north-south DX for the fall season of 1949 *CO6WW* also heard W3CUB on August 19 at 1750 EST.

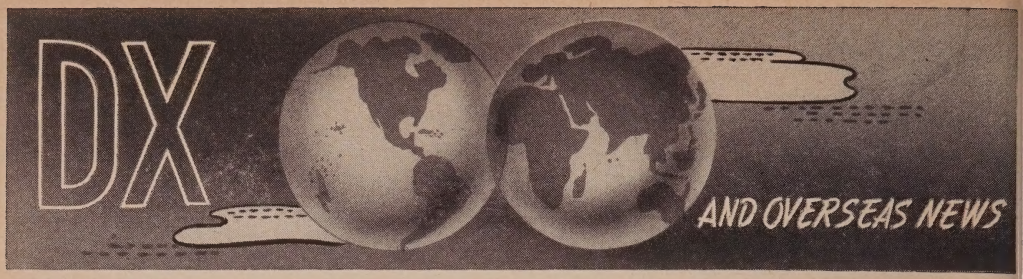
W7QLZ says that the past season was very good to him as he worked 32 states this year, compared to 27 last year. There were more openings for the Spook, but signals had no punch and faded all over the place. Some double-hop stations would fade out a dozen times in two hours, but pop back in when he thought the band had folded. Just before the Spook retired on July 20, he called a last CQ with 28 mc entirely dead, was he surprised when W5OCP in Little Rock, Ark., came back to make it 37 states for W7QLZ, no doubt a happy ending to his 1949 season.

Bish, W7HEA, says they have had quite a few openings in his neck of the woods this year but they have been altogether different from in the past. Last year's regulars were missing and a new area took over this year. The lower Mississippi valley and southeastern states were in a lot, with practically nothing from the east or northeast. North and South Dakota were not heard once, yet last year they were almost daily deals. The W6s never peaked like last year, yet W7QLZ was worked numerous times, whereas last season he was spasmodic. Bish had quite an epidemic of

(*Continued on page 58*)



From L to R: W5PFC, son and OM W5PFD; W4HHK and W5JTI; W5HHT; W5NLP



Conducted by HERB BECKER, W6QD*

THIS, IN A MEASURE, is a farewell gesture to one heck of a good editor. Larry LeKashman, sometimes known as W2IOP, is signing off as boss of this magazine. This is not an easy paragraph to write, as Larry, whom I have known for years, has had his heart and soul in the progress of the magazine. Since he took over the active managing and editing of the magazine at the end of the war, I, personally, feel he has done a swell job. I don't say this because W2IOP was principally a DX man on the air prewar, as during the postwar period, but I say it because he has adhered to a good clean policy throughout his regime. You know, and I know, that Larry, as a ham, is one of the best DX men in the business. This, of course, makes my task easier, and you might think this would greatly influence my judgment. This theory is generally true, but you cannot ignore the fact that Larry has corralled some of the best technical articles written by the hams throughout the world. When the war ended *CQ* had an uphill battle. As a ham magazine, it didn't exist. When it did get started, the going was tough. Larry, with his heart in ham radio, knew that job had to be done, and he did all within his power to do it. I am sure that I can speak for the majority of hams that he succeeded in making *CQ* a darn good magazine. (Frankly, if he hadn't beat me to WAZ, it might have been better.)

We are all striving for a step forward, and an opportunity popped up which Larry could not possibly turn down. From now on, Larry's spirit and feelings will be with us, but he will be actively engaged in the commercial field of this stuff called "radio," or should I say, "electronics." On behalf of the entire DX committee, which has backed Larry from the beginning, I want to offer our sincerest best wishes for his success, as well as our thanks for what he has contributed, not only to ham radio, but to DX in particular. I strongly suspect that W2IOP cashed in his chips so he could try for an award in the second *CQ* World-Wide DX Contest and, quite naturally, strictly on his own. This might be a golden opportunity for one of you fellows to teach this guy a lesson.

Fellows, I do hope that you feel the same as I do in wishing Larry every success in the world. I know that whatever his work will be, it will be as successful as it has been with *CQ*. Although a "slave driver," and a guy who could use his blue pencil with reckless abandon if he wanted to, I still contend that he was one swell boss. . . . . Good luck, Larry. . . . We'll not forget you.

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

To our new Editor, Albert E. Hayes, Jr., W1IIN-W2BYF, I want to say that we're 100% behind you. As National Emergency Coordinator of A.R.R.L., "Doc" has gained a great deal of experience with the magazine, and of course, with what we're interested in, the amateur field. Doc is taking over, and I am sure he will continue to do a swell job. . . . Welcome, Doc, but remember this, "Keep away from that 40th zone!" Good luck!

This month turned out to be a sort of "break the bank" month for WAZ. We are very happy to award certificates to the following nine applicants and offer our heartiest congratulations.

134	PY1AJ	Joao E. do Lago	40-196
135	W8SDR	Muriel M. Ballard	40-166
136	KH6BA	Andy R. Fuchikami	40-169
137	W6SYG	Frank Q. Newton Jr.	40-194
138	W6KEV	Raymond F. Rinaudo	40-153
139	W6TZD	Eugene C. Dvorak	40-173
140	W6UHA	Maxine E. Willis	40-167
141	KH6MI	H. McD. Brown	40-166
142	W6MHB	John R. Beck	40-130

Probably most outstanding from an unusual point of view this month is the achievement of WAZ by W6UHA, Maxine Willis. I probably should hasten to add, before ideas start forming, that she is the XYL of W6TS who is also WAZ. They both have their separate rigs, as well as separate receiving positions. They tell me that they actually speak to each other, however, when off the air.

Honors go to PY1AJ for the first WAZ in Brazil. I don't believe I have to introduce any of the fellows, such as KH6BA and KH6MI. I might add that the achievement of KH6MI was really something, because, as a Lt. Colonel stationed in Hawaii, he never knew when he was going to be transferred. WAZ was achieved while there, and fortunately, because shortly thereafter, he was transferred to the States and now has the call W4KKJ. W6TZD, W8SDR, W6KEV, W6MHB, and W6SYG all have been doing their share of brass pounding and dial twisting, and this, of course, is borne out by the number of zones and countries these fellows have worked.

DX Contest

Just a few words about the second *CQ* World-Wide DX Contest coming up the last weekend of October for phone, and the first weekend in November for c.w. I would personally greatly appreciate it if each and every one of you who participate in the contest will send in your log. *All Logs must be postmarked no later than November 30, 1949.* Just because you don't wind up in a winning position, please don't feel that your score and log is not necessary. For one

W. A. Z. HONOR ROLL

CW & PHONE

WAZ

W6VFR	225
W6ENV	221
W6EBG	220
W2BXA	218
W3BES	217
G2PL	216
W6ADP	216
W3GHD	215
W6PFD	213
W6MEK	213
W6ITA	212
W8BHW	211
W6GRL	211
G6ZO	211
W6SAI	210
W6SN	210
WØYXO	210
W2AQW	208
W8HGW	208
W3LOE	207
W4BPD	206
W6TT	204
VE7ZM	204
W6MX	202
W7AMX	201
W9KOK	200
VK3BZ	200
W3EVW	199
W7GUI	199
W4CYU	197
W6MVQ	197
W6DI	196
PY1AJ	196
W6MJB	196
W2IOP	195
LU6DJX	195
W6NNV	195
ZL1HY	195
W6SYG	194
W6GAL	193
VE7HC	193
W6FSJ	193
W6AVM	192
W6RM	192
W6PKO	192
W6ZCY	191
ZS2X	191
VK2DI	191
W6DZZ	191
W6OMC	190
W9VW	190
W6AM	188
W6AMA	186
ZL2GX	185
W2CZO	185
W6PB	185
W6SA	184
W6UCX	184
VE4RO	183
W6AOA	181
W6KRI	181
W6SRU	181
W6SC	180
VK2ACX	180
W6RW	179
CE3AG	178
W7DL	177
WØUOX	177
CX1FY	176
W1AB	175
W6PCS	174
W6WKU	174
W7FZA	174
W6RBQ	174
WØNTA	174
W6TS	174
W6TZD	173
G5YV	172
OK1LM	172
LA7Y	171
W6TI	170
W6BAM	170
KH6BA	169
W5AFX	169
ON4JW	169
W6RLN	168
W6ANN	167
W6GDJ	167
W6UHA	167
W6PZ	166
W6PQT	166
W6DUC	166
G3DO	166
W6UZX	166
W8SDR	166
KH6MI	166
W6EFM	164
W6DLY	162
W6EPZ	162
W6KUT	161
KH6IJ	161
W6IBD	161
W7BD	157
W7BE	156
W6BAX	155
G3AAM	154
W6BVM	153
W6KEV	153
W6BPD	152
VK2QL	151
W6LRU	150
I1IR	150
W6LEE	150
W6FHE	150
W6PH	150
OK1FF	148
W7DXZ	146
W6AYZ	146
W9NRB	145
W6MUC	145
W6QD	145
W6LER	145
W6LN	145
ON4TA	144
WØOUH	143
JA2KG	143
W6LDD	140
W6CEM	136
G3AZ	133
W6TEU	133
W6WWQ	133
W6RDR	133
W6MHB	130
W6YZU	129
OK1WX	129
W7GBW	127
G8IP	127
G5BJ	126
PK6HA	124
W6NRQ	123
W6MLY	123
W6BIL	115

39 Zones

W2PEO	208
WØNUC	204
W2HHF	203
W9IU	202
W4AIT	201
W8NBK	200
W2NSZ	199
W2GWE	195
W3KT	194
PY1DH	194
F8BS	194
W9RBI	192
W1JYH	191
W2HZY	191
W3JNN	191
W3DPA	191
W8JTC	191
W1ENE	190
W1BIH	187
W2CWE	187
W6OEG	187
W9ANT	185
W8RDZ	184
W4INL	183
W3EPV	179
W4GG	178
W5ASG	177
W3DRD	175
I1KN	173
W1ZL	172
W3OCU	171
WØSQO	171
W6IFW	170
W9LNM	170
W1NMP	169
VO6EP	168
W2CYS	167
KH6MI	166
W8LEC	166
W4DKA	165
W9MXX	164
W9VND	164
W2EMW	163
W6EAK	163
W4BRB	162
W3JKO	162
G5DQ	160
W9LM	159
WØGKS	158
W4OM	158
WØAIW	157
G8KP	156
W9YNB	155
WØEYR	153
G6QB	152
W2RDK	152
G2AJ	151
W9FKC	150
SM5WI	148
W2WZ	148
DL2KW	147
G2WW	147
W2COK	146
W2GUR	146
W2MEL	145
W6JZP	141
W9DUY	140
G6BQ	140
G3FJ	139
W6BUD	138
W8VLK	137
W6EHV	136
W9TQL	135
OK1CX	133
OK1AW	133
W6ID	132
KH6PY	132
G2VD	132
G5RV	132
WØOUH	131
VK4RC	131
W2BJ	131
W6RLQ	130
G2FSR	130
W5CPI	130
W6LGD	130
VR5PL	124
G5VU	124
G3AAK	122
GM3CSM	121
G8RL	120
G5WM	120
G6BS	117
W6NRZ	117
G3QD	116
W7ETK	115
G3TK	114
W6MUF	112
W7HXG	112
W7ASG	110
W7GXA	105
KG6AL	104
W6LEV	103
W7ENW	101
W6WJX	101
W6AX	93
G6PJ	76

38 Zones

VE3QD	190
W2PUD	180
W3DKT	168
KP4KD	168
CM2SW	167
W3IYE	161
W2CNT	160
W3KDP	155
WØDU	155
W8FJN	153
W4VE	147
W3LVJ	145
W8CVU	141
W2WZ	138
TF3EA	137
W6CTL	137
W9FKH	135
W4FPK	131
G8IL	131
G5CI	130
W2PQJ	130
W3ZN	129
G6LX	126
W9MZP	126
W8WWU	125
GW3AX	123
W9TB	122
GW4CX	120
W8KPL	117
W7EYS	107
G3ZI	107
W6VAT	107
C1CH	84
G3BI	75

37 Zones

W2HMJ	173
W1KFV	162
W2ZA	160
W4IWO	146
W8EYE	142
W3WU	142
W2RGV	140
W4ML	135
GM2UU	133
W2AYJ	133
W9TQL	129
WØAZT	129
W4DIA	129
W3FYS	119
G4CP	117
VE1EA	116
W7BTH	110
G4AR	108
W8HSW	104
W7PK	104
G5MR	100
W2BLS	99
G3AAE	99
KL7PJ	98
W2SGK	95
KL7KV	88

36 Zones

W4LVV	147
W4HA	141
W2GVZ	134
OA4AK	128
W3AYS	124
W9ABA	122
W2WC	119
SV1RX	119
MD5AK	118
W2BF	115
WØRBA	115
G2CNN	114
WØFET	114
ZS2AT	114
G2AKQ	112
HC2JR	109
W5CD	108
W2JA	102
G2AO	100
W5BK	99
G6WX	95
GM2AAT	75

35 Zones

W8ZMC	135
W4DHZ	132
W1BFT	130
VE3AAZ	130
W9WCE	127
W9CKP	122
CO6AJ	119
W9LI	118
VE3ACS	117
W6ZZ	114
W8AVB	113
VE1PQ	111
FE8AB	107
VE5JV	103
W2HAZ	99
WØFWW	99
W6ETJ	95
WØGBJ	94
DL3AB	79
W7FNK	71

34 Zones

W4IYT	127
W9FNR	112
W1MRP	104
W8JM	89
W9WEN	83
W8PCS	80
W6WUD	68
W6OKL	61

33 Zones

W4QN	110
W2SEI	100
OE1FF	91
W8QUS	85
KH6VP	83

32 Zones

VE3AGC	107
W2OEC	105
G6QX	102
VE1NE	91
W9DGA	80

31 Zones

VE8AS	75

30 Zones

OK1WY	103
ZL1QW	82

PHONE ONLY

39 Zones

W6VFR	162
HB9DS	145
W7HTB	143
VE7ZM	140

38 Zones

W6DI	182
W4CYU	168
W2BXA	167

37 Zones

W1JCX	170
XE1AC	169
W8REU	163
G2PL	154
W6WNH	150
W6PXH	149
W8BF	146
G3DO	144
W3JNN	136
W1HKK	136
W6TT	133
W6KQY	127
G6LX	124
G2AJ	121
F8VC	115
C1CH	83

PHONE ONLY

36 Zones

W9RBI	150
W1NWO	157
W3LTU	154
W1MCW	152
W9HB	139
W2D	135
W9BZB	130
W4ESP	130
W4INL	129
W1FJN	128
GM3UU	127
G6BW	127
G5YV	106
G6WX	105
VE3BNQ	101
W3DHM	96
W6SA	92
F8DC	87

35 Zones

VK3BZ	147
W4HA	131
W6PCK	129
G8QX	123
W6CHV	123
W2GHV	118
G3FU	115
W9CKP	114
W5LWV	108
W4OM	106
W3PA	105
W6AM	104

34 Zones

W8BIQ	120
W8ZMC	116
W6UZX	113
W9MIR	113
WØEYR	112
W2RGV	111
W4LZM	109
WØANF	106
W1BPH	105
W8UIG	100
W41WO	99
W8QBF	92
WØBFB	70
W2NXZ	65

33 Zones

W7MBX	128
W9RNX	121
W5ASG	119
W2ZW	115
W5ALA	111
W4LZM	109
WØHX	107
WØANE	106
VE3ZM	100
W2PQJ	100
W2DRH	60

32 Zones

W9MIR	113
WØEYR	112
W9WCE	107
W8BFQ	101
WØSQO	95
W1BFB	94
WØAIW	93
W2HY	85
W2SVK	84
W9GZK	71

31 Zones

W4BA	105
W9CZC	100
WØPUE	95
W1MRP	89
W7GC	64

30 Zones

WØUYC	88
OA4AK	86
W7JUO	89
WØJED	61

thing, it gives us an idea of what the participation is, together with any comments which you choose to make at the time of sending in your log. Then too, it might come in handy in giving someone else credit for either a zone or country. It is especially important for you fellows in the States to get in your logs, and I hope you will impress this point on your pals who possibly otherwise might just take the attitude, "Yeah, I got in the contest and had a lot of fun, but to heck with sending in the log. It's too much work!" As you know, we have had plenty of log forms printed which will save you no end of work. You can make a carbon copy as the contest goes along and when



Three DX men who've made a lot of their fellows mighty happy. W6IKQ, IISN and IIALU photographed during their sojourn in San Marino, MI.

it is over, there is no recopying to do. You keep one copy and shoot the other along to our New York office. It is a little late for the boys overseas to get any contest logs at this time, but there might be some of you in the States who would like to get in the contest, and you can still get these forms. Simply send a stamped, self-addressed envelope to Radio Magazines, Inc., 342 Madison Avenue, New York 17. Please state the number of forms you want, including enough for a copy for yourself.

San Marino Field Day

I1IR dropped a nice letter to Larry giving some of the details on the San Marino field day which was held by a number of Italian hams around July 4. Some of the highlights include such little gems as *I1IR* saying that the location of San Marino was so ideal, with the blue sky and water, as well as lovely girls, that a lot of the DX men forgot all about their brass pounding and went swimming, dancing, and "flirting." I1SN brought his 200-pound portable rig and went to the top of San Marino Rock. The second operator of this station was I1ALU, and later on, I1LT got on the air there. W6IKQ, who is visiting in Italy, was fortunate to be with these fellows on their field day. I1IR says that conditions were poor, however, the first CQ tossed out by I1ALU was answered by "W2IOP with an exceptionally strong signal." (Wonder how much Larry kicked through to have him write this?) They worked about 300 Ws, and it should be made clear that the only calls coming out of San Marino were I1SN, I1ALU, and I1LT. Some of the boys will journey over to San Marino during the World-Wide DX Contest which is coming up in October and November.

KL7KV is no more . . . that is, he is not a KL7 any more. He is back in the States, and has been issued the call W5EMY. Along about 1940 Bill was W6EMY, so in a way, it will seem a little like getting back home. Bill tells me that he still owes about 100 QSL cards to the boys, but if you worked him and didn't receive your card, you will have to write to him, since his logs were destroyed in a fire shortly before his departure from KL7.

OK1WY is a new one with us, and all his DX was worked on c.w. with 70 watts input, while the receiver was a single-tube regenerative. The antenna was a single wire fed affair.

W7JDX is trying like anything to make the Honor Roll. In the past, Mack had to do a lot of traveling for the good old Atcheson, Topeka, and Santa Fe, and this, naturally, decreased his operating time. As things now stand, he is spending more time in his home town of Portland, so his DX should increase somewhat. If you fellows can't help him out in DX, maybe you could buy a round trip ticket to somewhere sometime.

Some of the boys have been working *AC4YN*, and these same boys include good old W3BES, and I am sorry to say, W2IOP. . . . Some of the W6s have been working *CR1ØAA*, and preliminary guess work makes us think this guy could be the real McCoy.

This is not news, but it could possibly be to a few . . . . *VP5BD*, Cayman Island, is now on quite consistently on the high end of 40. . . . Then, there's *MS4UU* 14,090, supposedly in Italian Somaliland. Others that are not bad are *MD7BU* 14,020, *VR4AA* 14,075 and *PJ5ZZ* 7,055. So, you're not interested in any of the above, eh? Well, you can take a listen for *HS1SS* 14,062, and then get on phone and work *ZS9F* 14,334, *MP4BAC* 14,337, and, of all things, *LU2ZA*, on phone 14,356.

Some time ago, OM LeKashman sent a little transmitter down to *FB8AB*. This is none other than Paul Bour whom many will remember prewar. Anyway, we kept hearing from Paul who was wondering where his transmitter was. Apparently, the wheels of transportation to Madagascar move very slowly, but in due course, the rig arrived. Now it seems he needs a few additional parts, and W6ENV is attempting to get these to him. We still have hopes of getting the guy on the air, and we hope it won't be too far distant. One thing for sure is that FB8AB will be welcome.

ZL1QW tells me that their local branch of the N.Z.A.R.T. drew up a special certificate for *ZL1HY* in recognition of Dave's working his 200th country.

Another new one we're glad to see in the Honor Roll is *OE1FF*. . . . G3DO offers, for what it is worth, the information that the following Russian stations have been worked on phone either 20 or 10: *UA9CB, UR2KAA, UB5BF, UB5KAG*, and *UQ2AB*.

W6UZX has been concentrating on phone lately, getting such stuff as *VR3A, AC4NC, ZS9D, MB9BB*, and *HS1SS*.

W2WZ's story for the month is that 16 months after working *UG6WD*, his card arrived. With *LX1RB* it took only six days to land his card, while the one from FK8AC arrived in five days by air. It looks like WZ and I have something.

(*Continued on page 50*)



BUILDING?

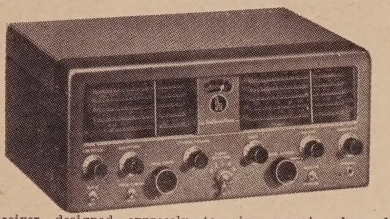


If you are constructing any gear described in any 1949 issue of QST or CQ, or the 1949 ARRL Handbook, send for our special listing of specified parts, and our guaranteed lowest prices.

Or — if you are building any other piece of gear, new or old, send us a list of parts you want and we'll be glad to quote a good price.

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DOUBLE CONVERSION RECEIVER



A receiver designed expressly to give superior ham band performance, incorporating features found only in the highest priced receivers—and then some!

Continuous AM coverage from 538 to 35 MC, and 46 MC to 56 MC—and look at that big, directly calibrated, amateur bandspread dial! Built-in limiter and balanced detector stages for hiss-free NBFM reception. Double conversion gives better than 300 to 1 image rejection on 10 meters.

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SX-71 New Double Conversion Receiver **$179.50**

LAMBDA OSCILLOSCOPE TYPE MODULATION MONITOR MM2

Don't splatter all over your neighbor's reception!

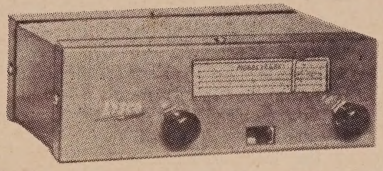
Have a visual check of your signal at all times!

Use the MM-2 when adjusting and/or checking modulation level, speech clipping, linearity, parasitics, distortion, etc.

Fits right on your operating table (Or mount in rack with punched panels listed below.) Only 3" x 5" x 10" long—2" CR tube with calibrated scale. Assemble it yourself and save $10.00!! Complete kit of all parts including tubes, power supply, cabinet, etc., and full instructions to exactly duplicate the Lambda MM-2.....Only **$14.95**

Factory wired, tested and guaranteed.....**$24.95**
Punched panel for horizontal mounting.....**$1.75**
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Complete kit of tubes for Lysco Xmtr.....	4.98
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SAME as above but fully converted! RO-10.....**$19.95**
(On RO-9 and RO-10, add 90c each for packing)
KW! 2600-0-2600 VAC at 550 MA ICAS!!! TP-18 **$28.95**
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FORMVAR #24, ¼ pound spool.....**.59**

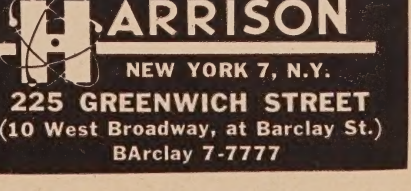
KEN-O-TAP KW Modulation Xfmr 600W Audio T-442 **$41.46**
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NATIONAL MB-150 Multi-Band Tank.....**$18.50**
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HALLICRAFTERS S-72 3-Way Portable 540KC-31MC **$79.95**
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BC610 ECO Tuning Units: 2.5 to 3.2 MC, 4.0 to 5.0 MC, and 5.0 to 6.35 MC. Brand New! Your choice only..**$1.75**
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B and W Jack Bar for above coils—No. 3321.....**$1.25**
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Club Secretaries! — How many can you use?





Conducted by LOUISA B. DeSOTO, W2OOH/7*

THAT THE YLs are becoming increasingly active is high-lighted by the growing numbers that turn out these days for hamfests and conventions. At the Washington (D.C.) Radio Club Hamboree on August 21st no less than nine YLs joined in the fun and, as you can see, smiled willingly for the cameraman—in this case W3AAW.

Many of the YLs pictured below have already appeared in these pages. One making her debut here who is of special interest is Ethel Smith, W3MSU, ex-W7FWB, for it was she who founded YLRL. Naturally, I asked "why and how" and discovered to my delight that my OM, W2IU, was indirectly responsible for YLRL. In an ad for his book "Two Hundred Meters and Down" there appeared a statement that only the YLs themselves knew how many women operators there were, and they wouldn't tell. Ethel, then W7FWB, replied, "I think they will tell," and requested all the YLs to write her. Ten responded and became charter members of YLRL. That was in 1939 and in October of this year YLRL celebrates its 10th anniversary.

During these ten years Ethel, herself, has had an even more eventful life than the YLRL she originated. For some time she had been active in AARS and in 1941 was 9th district net control in Washington. After Pearl Harbor she received a telegram calling her to the Presidio in San Francisco, but after two weeks she was transferred to Ft. Douglas in Salt Lake City, Utah, for a year. Then followed several months as a control operator for station KDYL. On a ten-day visit to New England she happened to visit friends at the Quonset Point Naval Air Station, R. I., where, it being discovered she had knowledge of radio, she was rushed into radio work, with time only to send a wire home to have her belongings forwarded. After two years Ethel was transferred to the Seattle Naval Air Station. A year later, when her former commander in the east showed up on a visit and asked her if she'd like to work in Washington, D. C., she took the opportunity and for the past four years has been at the Naval Research Laboratories in the special research section of Radio Three where she does such work as construction, testing, calculations, etc.

Another YL of interest, Helen Wilson, proved to be former DX—KP4HR. Now W3PUG, Helen had been operating for four years in Puerto Rico before she and her OM recently moved to Washington in hopes of a permanent QTH (it was Arizona before KP4-land). Helen, by the way, is one gal who doesn't need to say she *hopes* her jr. op will some day become a ham—for at the age of 11 he was licensed as KP4KI!

YLs on Voice of America

Just as a warmup for the YL get-together at the hamboree, on the previous day W3OLY, Helen, held a meeting of District area YLs, where we made a recording for the Voice of America amateur radio program (Saturdays, 4:45 p.m. EDT; Sundays at 9 a.m. EDT). W3OLY, Helen; W3NNS, Anabel; and W3MSU, (ex-W7FWB) Ethel, described YLRL and its aims, backed by support from W3CDQ, Emzie; W3AKB, Fran; W3LSX, Kay; W3PUG (ex-KP4HR), Helen; W4MZE, Dot; W4IKA, Dell, and W2OOH.

That accomplished, we rag-chewed while enjoying a royal spread W3OLY brought forth. Of the YLs, two, W4MZE and W4IKA, couldn't attend the hamboree the following day. Seems that W4MZE and her OM have boats as their second hobby and on Sunday were hoping to sell their present boat in order to buy a bigger one and set it up with a maritime mobile station. Dot, who has had her ticket for two years, runs 150 watts and works mostly 80 c.w., favorite spot 3675 kc. W4MZE works for her OM in his radio store.

W4IKA, Dell, got her ticket in 1943 and worked as a radio technician at the National Bureau of Standards in Washington until 1948, on the development of the proximity fuze. Now she has a jr. op who is her main hobby at present, but gets on 80 and 40—especially 3700 and 7150 kc.

YLRL Nets

At a meeting of YLRL officers later that same evening at W3OQF's, many plans for YLRL were hashed over. First activity coming up will be the YLRL nets, to be held weekly beginning

(*Continued on page 42*)

Verde Valley School, Sedona, Arizona.



The Washington (D.C.) Radio Club Hamboree on August 21st brought together these YLs. L. to r.: W3AKB, Fran Darne; W3OQF, Barbara Houston, editor of YLRL Harmonics; W3LSX, Kay Barclay; W3PUG (ex-KP4HR), Helen Wilson; W3NNS, Anabel Gifford, vice president YLRL; W3OLY, Helen Morrison, president YLRL; W3CDQ, Liz Zandonini; W2OOH, your column editor, and W3MSU (ex-W7FWB), Ethel Smith, founder of YLRL.

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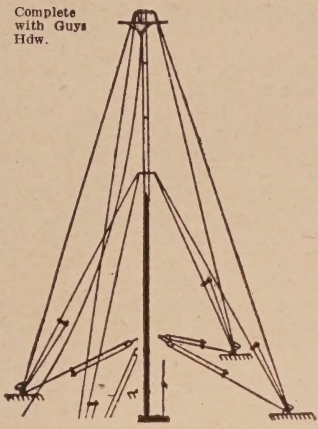
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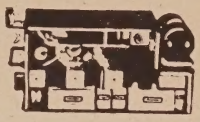


Doublet Antenna Kit used with the famous Hallicrafters BC-610, consisting of 7 steel-alloy mast sections in a handy canvas bag. Each section is 5' 6" long, 1⅛" OD with the last 6" rolled to a smaller OD to telescope into the end of the preceding section. No taper. Assemble high or shorter by any multiple of 5'. Finished in weatherproof olive drab. **Ideal for erection of FM and Television Beams!** Drop your coaxial cable right through the center! Brand new, export packed.

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Freq. 108-110 Mc. Tube complement 10 tubes—1—12SQ7, 2—12SR7, 1—12A6, 1—12AH7GT, 2—12SG7, 3—717A. USED CONDITION. Companion to the glide path receiver. Also contains 90 and 150 cycles band-pass filters. Has the best AVC system yet developed. Can use parts or use as a model for construction. 10 tubes, crystals, relays, etc. Schematic included, with dynamotor. Don't pass this up. Individually Boxed **$3.95**



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5FP7, 5BP1, 5GP1

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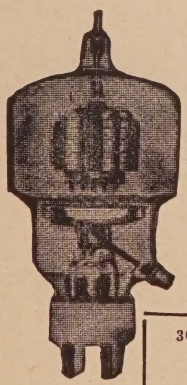
24 G	$1.00
28 D7	.29
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150 ohm Amphenol, Per hundred	2.16
75 ohm Amphenol (small. Per hundred	1.98
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Condensers—New:	
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Toggle Switch—H.D.-DPST—12 amp. 125 V	.39
Phosphor Bronze dial cable 16 str.—250 spool	.69
Cable—6 wire No. 16, glass insul. shielded, plastic covered—perfect for beam control. 15c per ft. 100 ft.	12.00
Cable—6 wire No. 18, unshielded. Per ft.	.08
Cable—4 wire No. 18, plastic—Shielded. Per ft. 100 ft.	.10 5.50
Cable—Single shielded grid wire No. 20-An Specs. Special—Per hundred foot coil	1.50

TERMS: F.O.B. Pasadena unless postpaid. No C.O.D.'s under $2.00 25% deposit on ALL Orders. All C.O.D's shipped by Rail Express. Save freight and C.O.D. fees by sending full price with order and we will ship by fast truck, transportation collect. Californians include 2½% sales tax.

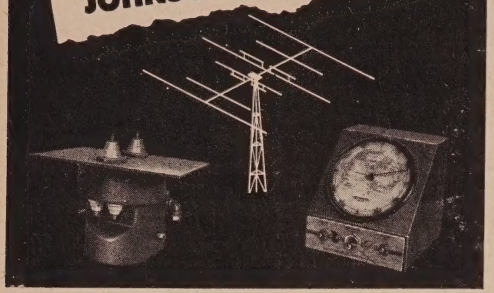
WRITE FOR OUR SPECIAL SURPLUS BULLETIN

DOW TRADING CO.

70 W UNION ST.
PASADENA 1, CALIFORNIA
Tel. Ryan 1-7944, Sycamore 3-8281

The ULTIMATE in BEAMS

the new *universal*
JOHNSON ROTOMATIC



Every desirable feature has been incorporated in the new JOHNSON Rotomatic plus the new JOHNSON Phased Array, a unidirectional beam employing driven elements. Elements are also available for conventional parasitic beams. Both arrays are furnished in two and three element beams for 10, 14 or 20 meter bands.

DUAL BAND OPERATION

DeLuxe Models of the above arrays are available for two band operation, employing two separate sets of elements but only one transmission line.

NEW JOHNSON PHASED ARRAY

The new JOHNSON Phased Array is the result of a search for an antenna with gain and front to back ratio equal or better than the conventional parasitic array, which could be erected and tuned without the usual laborious adjusting required by past beams. Due to symmetrical construction, the tuning is simple, the performance is excellent.

NEW JOHNSON PARASITIC ARRAY

When you see it you will realize it's in a class by itself! New, unique design allows an infinite variety of element lengths and spacing. Perfect impedence matching on two bands — any impedance from 50 to 600 ohms — with the same transmission line.

NEW ROTATOR and DIRECTION INDICATOR

The new Rotomatic Rotator was designed for those who want the very finest. The heavy duty drive unit will take rain, sleet and high winds in its stride — will turn on the coldest mornings. Rotation is instantly reversible, 360° at 1¼ RPM. The direction indicator is a selsyn. Motor control and antenna relay switch are contained in the indicator case.

The elements, rotator, direction indicator, etc., may all be purchased separately.

Write for ROTOMATIC folder or see it at your jobber.

JOHNSON

E. F. JOHNSON CO. WASECA, MINN.

THE YL's FREQUENCY

(*from page 40*)

the first week in October. All YLs, whether or not members of YLRL, are invited to join in these nets and get acquainted with the other YLs. Here is the schedule, alternate net control stations to be added later.

Net	Frequency	Day	Time (EST)	NCS
10 phone	28,900 (will tune entire band)	Tues.	8-9 a.m.	W3NNS
10 phone	28,900 (will tune entire band)	Tues.	1-3 p.m.	W3NNS
40 c.w.	7220	Wed.	11 p.m.	W3NHI
20 c.w.	14,100	Thurs.	6:30 p.m.	W3CUL
80 c.w.	3610	Thurs.	11 p.m.	W3AKB

Next on the calendar: The 10th Anniversary Party on the air for YLRL members to be held the weekend following Thanksgiving Day. If you've let your membership lapse, better renew it right away so you can have a chance to win the Littlefield Cup in this contest—plus getting in on the FB issues of *Harmonics* W3OQF is getting together. By the way, *Harmonics* will now be available to all interested in YLRL and its activities, whether they be licensed or unlicensed, OM or YL, on a *non-member* subscription basis. Cost: 10c per copy for Sept. through Dec. '49, issues; thereafter $1 a year beginning with Jan., '50. Send your subscription to YLRL Secretary, W3NHI, Marion Kurtzner, 823 Fairview Rd., Swarthmore, Pa.

Coming up: A YL-OM contest. Since the OMs like to work us and always seem to want to get in on our contests, they'll now have a real opportunity to do so. Not only will there be prizes for the OMs, but they'll get a good start on working WAS/YL. Also planned: A field day expedition of YL operators to West Virginia—the one state in which there are no active YLs— to put this state on the air for WAS/YL. More details as soon as they are ready.

While you're thinking of WAS/YL, don't forget your copy of the official directory of the YLRL, listing names, calls, addresses and favorite frequencies of the YLs. Available for $1 from W3NHI, Marion Kurtzner, address above.

ZL Appeal

The XYL of ZL3JA would like to receive copies of the *Ladies' Home Journal*, fashion books, etc., for which she would be happy to send exchange copies of the *Auckland Weekly News* (similar to *Life* magazine). Any YLs or XYLs interested in making the swap should write to Mrs. H. J. Rowe, Southbridge, New Zealand. Adds ZL3JA, "The fashion books are to keep the YF quiet while I work DX!"

Speaking of DX, congratulations to W6UHA, Maxine Willis, on making WAZ, only the second YL to do so to date. Maxine has confirmations from all 40 zones, and her country total stands at 167.

SK

By the time you read this your column editor will be knocking the sand out of her boots and waiting impatiently for the FCC to send a W7 call. That's right—we're leaving good old Manhattan for the wide open spaces of Arizona where there will be no TVI and lots of room for antennas. But we'll be visiting you every month via this column and looking forward to hearing from you at the new QTH: c/o Verde Valley School, Sedona, Arizona. 33, de W2OOH/ W7???.

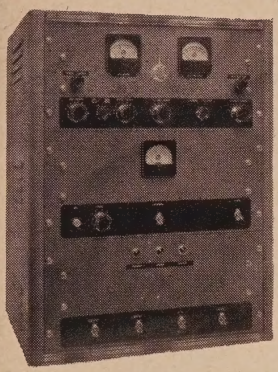
FULL YEAR GUARANTEE!

WHY BEAT YOUR BRAINS OUT

trying to build your own XMTR? Here's a rig for less than $1.00 per watt with a full year GUARANTEE! It doesn't pay to build your own — save money with me!

LEO I. MEYERSON
WØGFQ





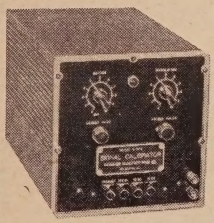
THE NEW WRL "400" GLOBE KING

The new versatile, advanced design transmitter that Hams all over the world are talking about. Brilliant performance on all bands from 10 to 160 on phone and CW. 350 watt phone 100% modulated, and 400 watt CW make this XMTR the outstanding buy on the market. Provisions for ECO. Complete with one set of coils.

$399.45 WIRED $379.45 KIT FORM

Detailed specification sheet furnished on request.

Now you can afford to own **A SINGLE CALIBRATOR**
MEISSNER PRECISION FREQUENCY STANDARD



Not a surplus item. NEW — in original cartons. A lucky purchase for us — we're passing our savings on to you!
100 KC, 50 KC, and 10 KC "markers" up to 20,000 KC — Push-button control of frequency — Delivers modulated or unmodulated signal — Easily set . . . instantly checked — Well ventilated cabinet — Precision accuracy — Now you can meet F.C.C. Regulations at low cost!
A precision type, quartz crystal operating on 100 KC is used. Model 9-1076 Signal Calibrator uses 3 type 6SJ7GT, 2 type 6N7GT, 1 type 6SK7GT and 1 type 6X5GT tubes.
Two multi-vibrators provide output on 50 KC, 10 KC and multiples thereof up to 20,000 KC. Complete with AC power supply and 7 tubes.

$29.95 . . . . . FORMERLY SOLD FOR $78.75

★ **E-Z PAYMENT PLAN.** If you want to keep your Globe King — and I'll bet dollars to doughnuts you will — it'll take only a 20% down payment with the balance payable to suit **your** convenience. It costs less to deal with me because I finance my own paper.

★ **LIBERAL TRADE-IN ALLOWANCE.** Let me know what equipment you want to trade and I'll work out a deal for you that you won't be able to beat anywhere.



GIANT RADIO REFERENCE MAP

Just right for your control room wall. Approximately 28"x42". Contains time zones, amateur zones, leading short-wave stations, monitoring stations. Mail Coupon Today and **25¢**

The most complete HAM CATALOG ever assembled. Everything in radio from soup to nuts. Send for your copy today!

FREE!

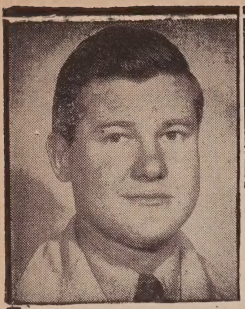


World LABORATORIES — EVERYTHING IN RADIO — Radio INCORPORATED
COUNCIL BLUFFS, IOWA

WORLD RADIO LABORATORIES, INC. C10
744 West Broadway
Council Bluffs, Iowa

Please send me:
☐ RADIO MAP ☐ New Catalog ☐ List Of Used Equipment
☐ INFO ON 10 DAY TRIAL PLAN

Name_____
Address_____
City_____ State_____



ESSE Specials!

40-42 WEST SOUTH STREET, INDIANAPOLIS, INDIANA

SCR-625 MINE DETECTOR

Brand New **Metallic Objects Only**

Used by the Army to detect buried metallic mines. Its private use suggests the location of underground or underwater pipes, cables and ore bearing rock, the location of metallic fragments in scrap materials, logs, etc., and the screening of personnel in plants for carrying of metallic objects.

The unit consists of a balanced inductance bridge, a two-tube amp. and a 1,000 cycle oscillator. The presence of metal disturbs the bridge balance, resulting in a volume change of the 1,000 cycle tone. The tubes used are low-battery drain types such as 1G6 and 1N5. The circuit may be modified for control of warning signals, stopping of machinery, etc., when metal is detected. Operates from two flashlight batteries and 103 V. "B". However, a power supply operating from 110 V. may be used. Comes complete with spare tubes, spare resonator and instruction manual—in wooden chest 8¼"x28¼"x16". Weight in operation is 15 lbs. New, complete in original overseas packing container. Originally sold by War Assets for $166.00. The U. S. Forestry Service has recommended procedure for using the SCR-625 Mine Detector to find concealed metal in tree logs and other timber products.

Price **$59.50**

Batteries ..... **$4.00** extra

A TREMENDOUS BARGAIN
Quartz Crystals without Holders

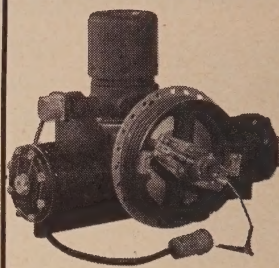
Get an assortment of these and grind to your own frequencies or use them as they are. .5x.6" B-cut lapped on faces and squared on edges. (Ready to use). We will give you an assortment of these from approximately 13 thousandths of an inch to 24 thousandths of an inch whereby you can grind to frequencies desired. These crystals are now ground to the approximate following frequencies:

3880	4640	6225	7300
3900	4900	6275	7400
4140	5300	6700	7500
4600	5580	6850	7800
4650	5800	6900	7900

Formula for converting thicknesses of B-cut crystals to frequency is as follows: F=98.4/T where F is frequency in kilocycles and T is thickness in inches.

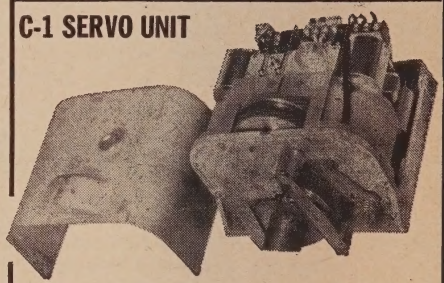
AN ASSORTMENT OF 20 DIFFERENT THICKNESSES **$1.50**

A-5 AUTOMATIC PILOT SERVO M1



Made by Delco-Remy, Has ¼ horsepower shunt type DC motor. 27.5 V. 11 amps input, speed 6000 rpm. Has hydraulic lift — (Intended use —Hydraulic lift actuates Ailerons on airplane). Overall length 16", width 12", height 11". Net weight 28 lbs. Shipping weight 35 lbs. Hardware for cable drum included. Brand new in original packing boxes. **$4.95**

C-1 SERVO UNIT

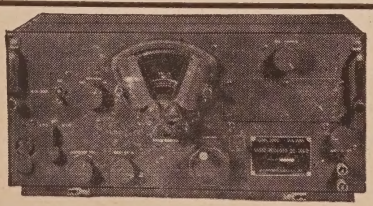


Use to rotate beam antenna, actuate boat rudder control, etc. Contains 24 V. motor, clutch, relays, etc. Reversible. Size overall approx. 10½" x 8½" x 6½" **$4.50**

AIRCRAFT BATTERY AN-3152

Brand new, 12 volts, 34 amp hours. Dry packed and charged. Add battery acid Specific Gravity 1.265 (can be bought at any drug store). Ideal for any amateur on 12 volt operations. Hard rubber case, size, 5¼" x10¼"x10¼" with bolt type connectors and with overflow. Weight 35 lbs.

Price **$12.95**



BC-348 COMMUNICATIONS RECEIVER

6 bands, 200-500 Kc. and 1.5-18 Mc. 2 stages RF, 3 stages IF, BFO, crystal filter, manual or AVC. Complete with tubes and 24 V. dynamotor. These receivers have been thoroughly checked in our work-shop and found in excellent condition. Converted to 110 V. AC 60 cycle $60.00

24 v.d.c. operated suitable for airline use..... $100.00

AMPHENOL LOW-LOSS UHF CONNECTOR for RG type cable. Rugged construction, heavily silver plated provides easy assembly and positive connection. Type 83-1AP Angle Plug Adapter polystyrene insert, pin and socket—very special..... **20c** each

ESSE RADIO CO.

RECTIFIER POWER UNIT

INDIANAPOLIS, INDIANA

ATTENTION: FOR THOSE WHO NEED 6,12,24 VOLT POWER SUPPLY

Navy Type CLG-20341

110/220 Volts, 50/60 cycle, single phase AC operated. Net weight 263 lbs. Gross weight 335 lbs. 28" high, 19⅝" wide, 23¼" deep (4.25 cubic ft.).

Will continuously deliver rated load of 15 amperes at 7 volts, 14 Volts, or 28 Volts DC.

It will furnish an instantaneous dynamotor starting current of 25 amperes at 28 Volts output.

This unit is portable and is sturdily constructed in welded steel frame. It is housed in steel case provided with louvres. 4 handles for carrying are welded to case. Controls, fuses and cables readily accessible. Input and output cables are permanently attached and stored in compartments in front of case. Spare fuses and pilot lamps are easily accessible from the front. On/off switch is mounted in recessed panel on front of case.

4 connector lengths and terminals are provided for proper connections to input and output voltages. Terminal cut-out provides protection. A sturdy blower motor fan is provided for cooling of the 15 amp. Selenium rectifiers running 1550 RPM and has 10" blades.

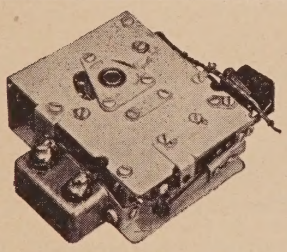
A sensitive regulating circuit keeps output voltage constant under varying load conditions or input voltage fluctuations. Adequate inductance and capacity are included for good filtering of the output voltages.

A complete operating manual accompanies the unit.

This equipment was made by Electronic Laboratories, Inc. of Indianapolis, Indiana and is really a very dependable fine rectifier power unit and can be compared with only the finest. It cost our Government approximately $500.00.



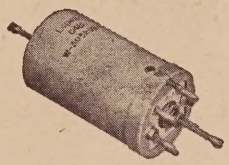
Our price, complete, BRAND NEW . . . $100.



RACHET MOTOR

Operates from 12 to 24 Volts. Similar to motor used for automatic tuning of SCR-522 transmitter and receiver. This motor measures approximately 3" x 3⅞" x 1½". Has provision for coupling ¼" shaft. Ideal for remote tuning of mobile and other equipment. Rotates approximately 1 revolution per second.

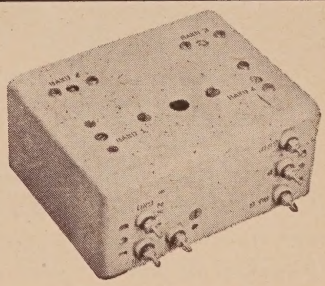
Brand new.....Price **$1.25**



LOW FREQUENCY RCA I. F. TRANSFORMER

Used for R.F. power supply or double conversion transformer, etc. 3½" x 1⅞". Brand new.

Price **35c**



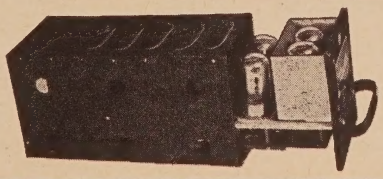
I. F. TRANSFORMER

2½" x 3-3/7" x 1⅝" marked 142.5 KC IF - 243.5 KC IF. Six connectors on bottom grid cap. Connection out of side. Trimmer condensers readily accessible. Brand new aluminul case. Price.....**75c**

TURBO AMPLIFIER

Used for parts — shipped complete with the following tubes: 2—7C5's, 1—7Y4, 1—7F7.

Price.....**$1.00 ea.**



BC-221 FREQUENCY METER

Covers 125-20,000 Kc. Battery or 110 V. AC or vibra-pack operated. A beautiful instrument. The finest we have ever had.....**$69.50**

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA

Automatic Record Changer — Recorder Combination

MODEL GI-RC 130 or RC-130L

play records - cut records



Manufactured by General Industries Company, this unit is ideally suited for installation in your phono-combination or can be used with any amplifier having approximately 5 watts output (although a power level of approximately ¼ watts is all that is required for satisfactory cutter operation.). Cutter head is an Astatic Crystal X-26.

Record player mechanism is automatic and plays twelve 10-inch records or ten 12-inch records. Pick-up head is a Shure crystal.

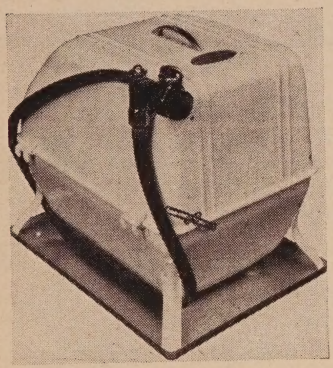
These mechanisms are brand new in original shipping boxes and we are selling them at a fraction of their original cost (original price $79.50). Our Price, complete with operating and service manual, brand new, Close-out sale.

$29.95 each

ESSE RADIO CO. *Esse's Special Offer* INDIANAPOLIS, INDIANA

HERE'S A SPECIAL BARGAIN WE ARE ABLE TO OFFER TO OUR MANY CUSTOMERS AND FRIENDS

The Famous "HER MAJESTY" Automatic DISHWASHER



Look at these Sensational Features

● Dishes Dry by Themselves! ● Easy to Use—Slip hose on faucet . . . put in dishes . . . turn on the water! ● Fits on Drainboard ● Holds 16 Dishes at once . . . Extra Basket for cups, saucers and silverware.

● No Motor . . . No Electricity . . . No Expensive Plumbing! ● Light Weight (only 12 lbs.), Rust-Proof Aluminum with Baked-on Finish. ● Double-Action Spray.

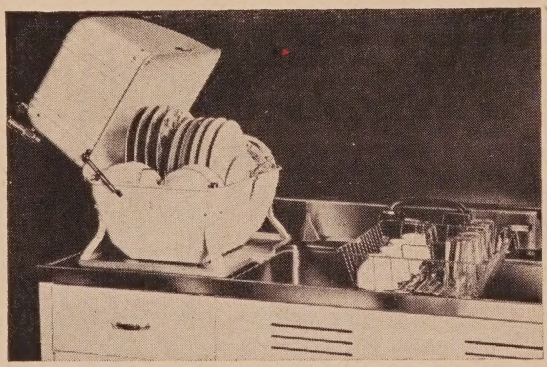
A WONDERFUL XMAS GIFT *for her - - -*

Clean, Sparkling Dishes in 2 Minutes Flat

Now you can free yourself of the everlasting drudgery of washing dirty, greasy dishes! Just put 'em in "Her Majesty" Auomatic Dishwasher for a couple of minutes and forget 'em! No more chapped, dishpan hands, no more dirty dish towels! Not only does "Her Majesty" save you lots of time and trouble, but it saves on soap. Just a thimbleful of detergent does the trick . . . thoroughly! You'll be amazed . . . and delighted at the job "Her Majesty" does. "HER MAJESTY" DISHWASHERS NOW GIVEN AWAY ON THESE COAST-TO-COAST RADIO PROGRAMS:

"Second Honeymoon,"
"Welcome Traveler,"
"Times a Wasting,"
"Take a Number"

$29.75 each



THIS IS THE MOST STUPENDOUS BARGAIN THAT WE'VE EVER OFFERED. THESE DISHWASHERS WERE MADE TO SELL FOR MANY, MANY MORE DOLLARS THAN WHAT WE ARE ASKING. THEY ARE BRAND NEW; IN FACT, STILL PACKED IN SHIPPING BOXES.

Because of the low price that we are selling these dishwashers for, we absolutely do not offer any guarantee or refund whatosever.

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA

CABLE CONNECTORS AND PLUGS

Choice .25 — All Brand New

Manufacturer	Type	Price
Amphenol	AN3101-16-10P	25c each
Amphenol	AN3101-18-18S	25c each
Amphenol	AN3101-22-5S	25c each
Amphenol	AN3102-22-15P	25c each
Amphenol	AN3102-28-10P	25c each
Amphenol	AN3102-32-5P	25c each
Amphenol	AN3106-18-11S	25c each
Amphenol	AN3106-18-18P	25c each
Amphenol	AN3106-24-6S	25c each
Amphenol	AN3106-24-7P	25c each
Amphenol	AN3106-32-5S	25c each
Harwood	AN3-08-14S-*	25c each
Aero	AN3108-14S-2S	25c each
Cannon	AN3108-14S-2S	25c each
Amphenol	AN3108-14S-2S	25c each
Amphenol	AN3108-18-12P	25c each
Amphenol	AN3108-22-5S	25c each
Cannon	AN3108-22-5S	25c each
Amphenol	AN3108-24-6P	25c each
Amphenol	AN3108-24-16S	25c each
Cannon	AN3108-24-16S	25c each
Amphenol	AN3108-32-5P	25c each
Amphenol	AN3108-28-10P	25c each

COLLINS AN/ART-13 XMTR.

A compact, light-weight, modern, highpowered transmitter. Frequency range 2-18-1 Mc. on any of its 11 auto-tune crystal controlled or master os channels. Dec. 1947 "Radio" gives conversion data for convert. V. DC operation to 110 V. AC are in exceptionally fine con. tested in our labs. Weight,

(Dynamotor included) **$234.50**

BL-SELENIUM RECTIFIER

Type 23751, half-wave. Use 2 of these for full-wave circuit converting 110 V. AC to 135 V. DC at .75 amps. or parallel for higher current ratings. Voltage output controlled by condenser across output.

Brand new. Price..... **$1.75** ea.

BC-342N RECEIVER

A Farnsworth surplus special. Covers 1500 to 18,000 Kc. Crystal filter. 110 V. 60 cycle operated. Complete with 9 tubes with 2 RF stages, mounting rack, manual. With matching LS-3 speaker.

Cannot be told from new. Price..... **$80.00**

PNEUMATIC DRILLS

Used in production of radio equipment, etc. Operate from 70-150 pounds air pressure. High starting torque, cool running, no noise interference, trouble free, lightweight. Buy at a fraction of original cost or price of electric drills. Most of these units are new and never used; however, all are sold as used.



POWER - VANE No. 301

Pneumatic drill with right angle head. Manufactured by Pneumatic Tool Co. Guaranteed good used condition. **$6.95 ea.**



ARO MODEL 22PVD

Equipped with Jacobs No. O Chuck. Manufactured by Aro Equipment Co. These units are sold as used & guaranteed in good working condition.

$6.95 ea.

ARMY PHONES LOW IMPEDANCE

Used. With short cord and plug PL-354 and cushions.

Price **$2.50**

MAGNESYN INDICATOR

To be used for beam antenna. Practically same as 1-81-A Selsyn indicator. 15-25 V. 60 cycle AC. 3" size.

Excellent condition..... **$1.25** ea.

Plug for connection..... **.50**

AUTOMATIC DIRECTION FINDER RADIO COMPASS SCR-269-G

Brand new in original crates
Made by Bendix
Complete, a truly magnificent buy for airplane owners or boat owners.
$125.50

BREEZE TYPE FLEXIBLE CONDUIT

For shielding and protecting wires in radio aircraft and marine installations. Made up of Flexible aluminum conduit covered with shielded braid. New, good condition, in ½—⅝—¾ inch inside diameters. Your cost, any size..... **$.20** per ft.

REMOTE INDICATING COMPASS

Magnesyn Indicator AN-5730-2. Use for antenna rotator indicators by using one for driver or transmitter and connecting to 12-18 Volt 60 cycle A.C. Removed from aircraft. ..... **$1.95** ea.

CD-ELECTROLYTIC FILTER CONDENSER

Capacity each condenser: 30 and 15 mfd. 450 W.V., 15 mfd. 350 W.V. 40 mfd. 25 W.V. A large purchase allows us to make these prices. New fresh stock guaranteed..... **$.45** ea.

RF TRANSFORMER

For experimental use. Covers four bands. Range unkown. Measures 4" x 4⅞" x 2¼".

Brand new..... Price **50c**

HASH FILTER

Mounted on strip 3½" x 1". Contains two hash chokes & one dual .135 MFD 400 Volt bathtub condenser.

Price **50c**

ESSE RADIO CO.

ESSE WILL BUY

INDIANAPOLIS, INDIANA

ANYTHING ELECTRONIC

Attention Factories, Hams, Dealers, Individuals

. . . just Anybody

Some of the equipment listed below is urgently needed by our company to meet the demands of customers and we will pay the highest cash prices. Send letter with full description describing condition and quote price. We will immediately answer and if we can use your equipment, we will authorize you to send it to us COD.

We are dealers in surplus electronics and we are interested in anything dealing with radio or television. We are especially interested in large quantities of surplus and anything that can be bought at a bargain price. Please don't hesitate to write us immediately. Quote us prices on what you have and give us a full detailed description. We will not answer any letter unless description and price is quoted.

WE NEED AT ONCE!

We Are Especially Interested in Large Quantities

BC-348 Receivers, AC or DC models
BC-312 Receivers
BC-221 Frequency Meters
SCR-522 Transmitters & Receivers
Hallicrafters BC-610 Transmitters
Any factory built transmitters and receivers such as Hallicrafters, National, Temco, Collins, RCA, RME, Hammerlund, Millen, Meck, Harvey-Wells, Meissner, Sonar, McMurdo-Silver, Gonset, Stancor, Bud, etc.
Amateur or commercial sets
Large stocks of tubes
Large stocks of transformers
Large stocks of condensers
Large stocks of resistors
Large stocks of speakers
BC-224 Receivers
BC-342 Receivers
Police type VHF transmitters and receivers for mobile application
Collins ART-13 Transmitters
APS-13's
SCR-269F or G Fairchild or Bendix ADF's
Headphones in quantity lots
Microphones in quantity lots
Field telephones
Sound-powered telephones

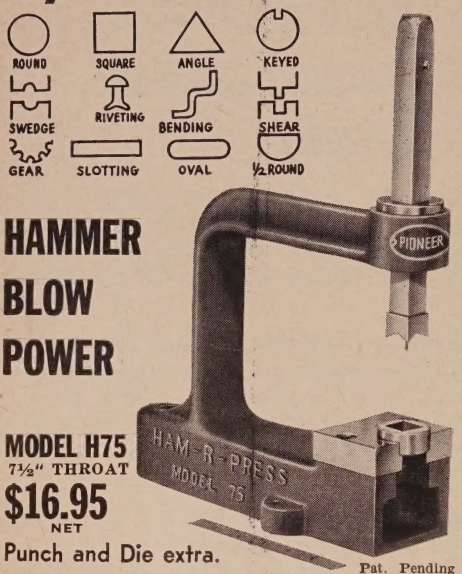
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DX

(from page 36)

in common. Says he, "I hate to think of tinkering with a 2½ element Mims up on that 70-foot tower, since half the reflector fell off last Spring."

Guess who turned up the other day . . . . none other than W1CH, Joe Grahn. Seems like they have moved out here, and one of these days, Joe will become a W6. Guess who else popped into the Compton Radio Club the other night . . . W6CXW. Now don't tell me I have to explain who he is. Henry hasn't done much on the air since the war ended; however, he has fooled around a little on 40 meters. The boys were all glad to see him, and we're trying to get the DX bug instilled in him again. Maybe some of you fellows can give Henry a shot in the arm. It would seem good to hear him again, as he was always one of the cleanest and best operators on the air. . . . W6CUH also breezed in for a visit and it wouldn't surprise me too much if he settled down on the West Coast again, and got that call of his on the air again too. I don't know why I should be soliciting more QRM, but it just seems to me that some of these calls should never leave the air. . . . W2BJ has just made his annual trek through town, and as usual we managed to miss each other by a few minutes. Guess I'll have to go East to see Ray.

We're very happy to welcome **HB9DS** into the phone section of the Honor Roll. And, take a look, will you, he has 39 zones on phone.

It's good to hear from Herb Cole, W1JCX. He says that although **MP4BAC** was supposed to have left Oman, he was still there as of the latter part of July. He puts in a good phone signal, but works mostly through G6AY who sets up schedules for him. Herb tells me, too, that **UG6AB** speaks but little English, although enough for a report. Also, UA stations in the Moscow area are getting quite plentiful. JCX received his cards from **KS4AI** and **HS1SS** within a month of the QSO. Herb turned on his b.f.o. one morning, just in time to hear **AC4YN** work "slave driver LeKashman." Oh, well. . . .

W2GVZ works one new one per month. The one for July is **CR4AD** 14,068. . . . WØRBA called the pants off of **MD2GO**, the other night, but he was after new countries himself. However, Jim adds eight new ones, so he can't kick too much. His new 8JK apparently was responsible for these new ones.

Says W4PDZ, "I have had my ticket only about three months, and have jumped into this mess called DX with all fours." At this time, he is running 30 watts to an 807, but by contest time, he hopes to be running 200 watts to a pair of 812s. It looks like this guy is catching on fast . . . increasing his power before every contest.

W4BA still works them on 20 phone, and anyone wanting VP3HAG can look for him around 14,350.

ZD6DH deserves a pat on the back for taking the time to work the boys while on a vacation in Nyasaland. Of course he is VQ2DH, and this is the guy to whom you will send your card. For about a week, he has been quite consistent on 14,083, and quite obviously has given a great many of us a new country. Yep, I said, "Us!"

W7ASG has pounded brass for about 19 years and only recently threw a little modulation into the rig so he could work a couple of his brothers who are stationed in Japan.

G6ZO has been concentrating on EA8s with the hope that one of them will be in Rio de Oro. So far, Jim has worked twelve of them. . . . G2LB is very happy about the coming World-Wide DX Contest, especially the single-band award idea. Tommy is patiently waiting for either a VQ8 card or one from VK1 in Zone 39. This is all he needs for WAZ.

South of the border, XE1AC has added **ZS9F** 14,334, **LU2ZA** 14,356, and **MP4BAC** 14,337. Al certainly is the most consistent phone operator in Mexico.

North of the border, it looks like VE4RO has not been exactly idle. One of the best, without question, on his latest list includes **AC4RF**. George, on a recent trip to Toronto, dropped in on VE3QD, and I don't have to tell you what they talked about. . . . While still north, I am glad to say that **VO6EP** (Oh, brother, do I remember Zone 2!!) is again active.

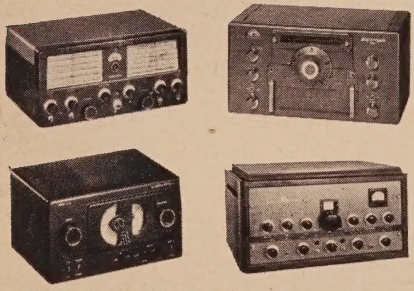
VE3AAZ has just returned from his vacation and now his time is dedicated to running down some new ones. He worked a guy sgning **UY5AK** who said he was in the new republic of Asir. I think I'll start a new republic somewhere sometime!



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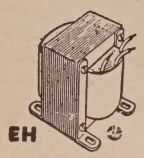
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Apparently **FK8AC** is good on his QSLing, as W6LDD received his within a month of the QSO. . . . WØFET tells me he worked **TA3AA** for his first QSO from his new QRA, and using a 6L6 . . . TA3AA, that is, not WØFET.

4X4CJ, ex-ZC6AA, is a QRP man and loves every minute of it. He runs 6-watts input to a 6V6, while the receiver is a two tuber, a 6C8G and a 6X5GT. The antenna is a 33' Windom fed a la VS1AA. Since April of this year, he has worked 49 countries, and is all for rounding up the QRP men to get together and exchange data. He also is suggesting that the boys throw away their power amplifiers, beams, and super-duper receivers, and go QRP. Don't see anything wrong with that suggestion for those, that is, who agree. . . .

W4GG still hasn't worked number 23. . . . W2BXA will be quite contented if the next month is as good to him as the past month was. Take a look in the Honor Roll, and you'll know why. . . . W6EHV in San Diego worked VS7CC, giving him a total of 39 zones. EHV, Burt Fisher, as many of you know, is an ex-W2 and has really been pouring on the coal during the past year since becoming a W6.

It is good to see DL3AB in the Honor Roll. Since being officially licensed on March 23, he has been on the air quite consistently on Sundays from 0001 to 0800 GMT. This is mostly on 20 c.w., although sometimes he does hit 40. If any of you fellows want to work a DL3 who QSL's 100%, this is your man.

W6PXH put himself into the 37 zone bracket by working AC4RF on phone. Cy wasn't worth a darn the rest of the day. . . . W7MQY is a 7-mc man and is wondering if any of the AC4s will give 40 a try. As Doug puts it, he hasn't made any rare catches, mainly due to lack of experience, a good receiver, and good DX. Think nothing of it, Doug, (incidentally, he is 16 years of age), keep at it, and you'll be in there with the best of them.

It looks like one of the most consistent stations of the month being reported is **VR4AC** who seems to be giving a lot of the phone boys, especially, a new country. . . . W7OY was recently visited by W6AM and W6ANN. W7OY claims Zone 36 as his nemesis. Eddy says his QSLs are slow coming in. For example he has worked four different ones in Zone 23, but, as yet, no card. W6AM attended a convention in Vancouver, B.C. and had a chance to meet some of the boys. W6AM called **EA6EG** on 20 phone and raised him although EA6EG came back on c.w. When Don started in to throw the Spanish at him, the EA6 was probably so surprised he didn't let go for 30 minutes. . . . Speaking of EA6EG, W6MX brings up the point which may interest some of you prewar DX men, and that is that 6EG is none other than old EA3EG who was a high scoring station in the 1936 and 1947 DX contests.

W6MX almost missed **ZC2AC**, supposedly on Cocos Island, when, due to being a bit sleepy at 2:00 a.m., he thought he was listening to ZS2AC. He apparently woke up on time, however. Now he is hoping he is not a phoney. Walt is going to taper off a bit on inducements for QSL cards, and from now on will offer Fords instead of Buicks.

W2PEO, last month, was more or less resigned to just "hoping" to work Zone 23. Well, a couple of weeks ago, he worked AC4YN, and now he is going on a fishing trip up in Maine and forget about DX for a while. Eric hastily adds, however, that when he comes back, he is going to put a new aluminum tower on top of his house and get ready for the DX contest.

From the "'DXer," put out by the Northern California boys, we latch on to the following. **VK9RH** is on Norfolk Island operating on 40 and 80, and is ex-ZL2FB. . . . **KS4AI**, Ralph Bird, is leaving Swan Island in a month or so, and will again be signing W5KWY. Guess you might say this is a Swan song for Bird. . . . **KS4AC** is back on the air and probably will remain for a while. . . . **ZD2LMF** 14,040, is a new one to look for, as is **G3AQZ/FF8** 14,080. . . . G5LI was out on the West Coast and was made an Honorary member of the Northern California DX Club. . . . . Thanks, W6PB, OM.

W1APU is getting steamed up again after a late postwar start. He and W1PWA are both going after WAZ. . . . We're glad to see **ZS2AT** in the Honor Roll for the first. time.

I1KN did a little eavesdropping and heard PY1AJ working **C8FP**. When the three-way was over, I1KN also hooked C8FP for his last zone. A lot of you have asked about C8FP and have wondered if he QSLs, and if he was really in Ninghsia Province, Zone 23. I think this can be settled, as I have a card here made out to PY1AJ, and the big red letters show C7FP. However, across these letters is typed, as is the rest of the card,

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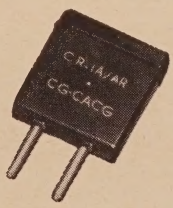
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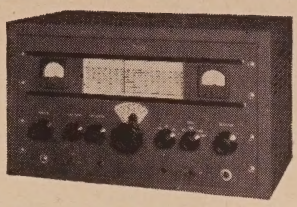
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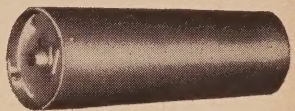
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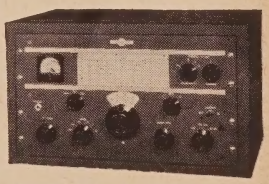
LOW-PASS FILTER



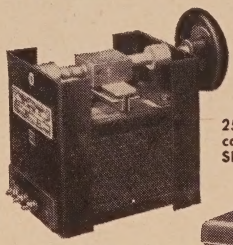
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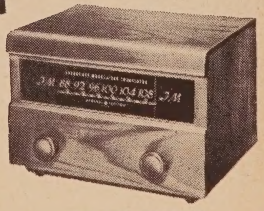


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Wherever the Circuit Says —WW—

"portable C8 in Ninghsia, Northwest China." The card likewise gives the QTH as P.O. Box 52, Peiping, China. Incidentally, this was PY1AJ's Zone 23 card in his batch of 40 which he submitted for his WAZ.

I see that W4INL worked AC4YN for his 40th zone, and in addition to this card, he only needs one from Zone 19. As George puts it, "I know AC4YN will QSL, and as soon as Ivan of the ice cap thaws out his ball-point and directs a QSL North Carolina way, I'll shoot in my 40 cards."

VK3BZ has a card from **EA6AZ**, so I guess he worked the right one. Morrie worked W6ENV, the last time, about 15 years ago, and wonders if it isn't about time for them to connect again. Phone or c.w., Morrie???

W9MIR works 10 phone only and has added three, making his total 33 and 110. Fred uses NFM and runs a kilowatt to a pair of 813s. WØSQO is elated after working **AC4NC**. He came through for only about 18 minutes that morning and Ken feels lucky to get him. Now his chances have increased for a card from Zone 23, as he worked C8FP last May. . . . W9NRS has been out on the coast for a while trying to find out where the best DX QTH is in the States. Smitty seemed to think it is pretty good out here, but I rather imagine he was a little confused because of the way Asia and the South Pacific boomed through. When a W6 goes East, he generally comes back with about the same kind of a report, only he thinks the East Coast is the only place for DX.

KL7PJ says he is having a heck of a time staying on the Honor Roll page, but it should help after adding OA4CJ in Zone 10.

W6RM dropped in the other day, and says he has been playing with phone lately. Smitty says he hasn't done anything with phone since the war but finds it relatively easy to pick up a few new countries that way. Quoting W6RM, "Competition among the wolves really gets keen, doesn't it?"

W4VE just received a letter from **TA3AA** who says he will probably make a couple more trips. One of these will be to AR8 and the other will be to a Greek Island which Jules says sounds like "Medillyne", and yet is not in the Dodecanese group. Jules mentions that he has not received cards from a lot of stations whom he worked from SV6 and TA. How about it, you guys? Don't you want to work him again?

W7GUV has been receiving a lot of cards which he is supposed to pass along to AC4AR. John would like to have it known to everyone that he knows nothing about this AC4AR, and for his dough, he is probably a phoney. . . . W6LN hit the jackpot when he worked AC4RF and AC4NC the same morning. . . . W2CNT worked a good one in HS1SS for a new zone. Ed is happy about the single-band award business in the coming DX business, as he works only 14-mc. c.w.

Well, W6QD is back on the air with a full 3-element rotary after working a 2½-element affair for several months. With the help of W6IFW, the new ½ reflector was installed on the old Mims beam 65 feet in the air without casualty. I suppose you might say this is a little step in the direction of Contest preparation. I am going to try hard to get into the 9th call area, as that zone four multiplier might be the difference between a glorious victory or an ignominious defeat. (Hey, how did that word get in here . . . and what does it mean?) Anyway, I am stocking up with a lot of "No-Doz" pills and, who knows, I might actually keep awake long enough to hit some of this 40-meter stuff.

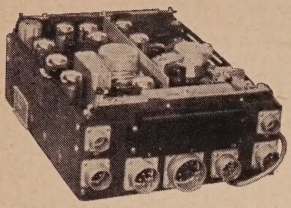
There is quite a bit of local preparation underway, and if the same amount of enthusiasm exists elsewhere, I think there will be very good participation. Let's keep our fingers crossed for reasonably good conditions. I would appreciate all the tentative scores you fellows can round up, not only of the Ws, but the overseas stations as well, and get them into me as soon as you can after the c.w. section of the contest, the first weekend in November. Maybe we can run a flock of unofficial scores as this will be in time to make the January issue. Incidentally, the deadline for all DX news is the 15th of the month.

Well, gang, have fun. Don't ride the DX man's frequency, and don't squeeze your v.f.o. out of the band. Good luck, 73.

DX QTHs

CR1ØAA	Cunha Eca, Dili, Portuguese Timbor
EA8FF	Joaquin Cacho, Jose Maria Duras No. 2, Las Palmas, Canary Is.
EA8BC	Box 8, Laguna of Tenerife, Canary Island
EK4AO	34 Goya Street, Tangier Zone
EA5AF	Box 220, Madrid

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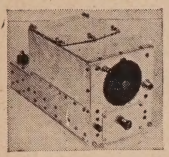
● 15 Tube Transceiver ideal for conversion to 460 Mc. Citizens Band. Freq. coverage 435 to 500 MC. For conversion info. see QST, Feb.'47 f/420 MC.; see Electronics, Aug. '48 f/460 Mc. Price NEW and BOXED.....**$16.95**

DYNAMOTOR PE-101 f/BC-645 13 or 26 V. input. Required voltage output....**$2.95**

TRANSFORMER for BC-645—110 Volt 60 cycle input; output 400 Volt 150 MA. after filter. 12, 9, & 6 VAC 4 amps and 5 V. 3 amps. #CH-645.....**$6.95**

CHOKE—15 Hy. 150 MA. #CH-646.....**$2.95**

COMMAND RECEIVERS—TRANSMITTERS—and ACCESSORIES



	USED:
BC-453 Rec. 190-550 KC....	**$12.95**
BC-454 Rec. 3—6 MC.....	**6.95**
DUAL or TRIPLE REC. RACK..	**1.50**
BC-450 Triple Con. BOX.....	**1.95**

TRANSFORMER—F/Comm. Rec. 110 V. 60 Cy. input; output 250-0-250 VAC., 60 MA., 24 AC .6 A. & 6.3 VAC., .6 A. #CH-109.....**$3.00**

DYNAMOTOR—Can be used on 6 VDC to supply 240 V., 50 MA. f/Comm. Rec. Mobile operation. USA/0515.....**$2.95**

	USED:	NEW:
BC-457 Trans. 4—5.3 MC.....	**$7.95**	**$ 9.95**
BC-458 Trans. 5.3—7 MC.....	**5.95**	**8.95**
T-18 Trans. 2.1—3 MC.....	**8.95**	
T-20 Trans. 4—5.3 MC.....		**9.95**
T-23 Trans. 100—156 MC.....		**29.95**
DUAL TRANSMITTER RACK.....		**1.50**
BC-442 ANTENNA RELAY BOX w/Cond.....		**2.95**
BC-456 Trans. MODULATOR Re-issue.....		**2.50**
BC-451 Trans. CONTROL BOX.....		**1.50**

TRANSFORMER—F/Comm. Trans. 110 V. 60 Cy. input; output 600-0-600 VAC 250 MA.; 12 VAC 3 A. & 12 VAC 3 A. & 5 VAC 3 A. # CH-108.....**$6.90**

CHOKE—15 Hy., 250 MA. # CH-121.....**$4.95**

EXTRA SPECIALS:

CO-213 CABLE—Seven Conductor # 20 AWG., two cond. separately shielded within an outer shield for all 7 cond.s. Insulated, rubber covered, 35 Ft. length.. **$1.25**
4 Cond. Cable, rubber covered, shielded, 50 Ft.....**$2.00**

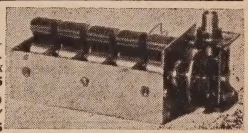


MOBILE DYNAMOTOR

680 Volts 210 MA. output at 12 VDC input. 6 VDC input; 300 Volt 150 MA. output. As Illustrated. Size: 7" x 4". #DM-680 Price: **$7.95**

DYNAMOTOR—9 VDC input; output 450 V. 60 MA. 6 VDC input; output 275 V. 50 MA. with Blower. # DM-9450.....**$3.95**
D-402—12 V. input; output 220 V. 100 MA.....**$3.95**
D-104—12 V. input; output 440 V. 200 MA., 220 V. 100 MA.....**$9.95**

CONDENSER ASS'Y



5 GANG with vernier tuning. 25 MMFD. to 450 MMFD. each section. Size: 7½" x 3½" x 3½". Price: **$2.95**

3 GANG. 25 MMFD. to 450 MMFD. each section. Size: 6" x 3-¼" x 3". Price: **$1.95**

Selsyn Transmitter & Indicator System

Ideal as radio beam position indicator for Ham, Television, or Commercial use. Complete with 5 inch I-82 Indicator, Autosyn Trans., 12 Volt 60 cycle Transformer, and wiring instructions. Prices — NEW:.....**$9.95** USED:.....**$7.95**
PL-118 PLUG for I-82: **$1.00** Autosyn Trans. only: **$2.95**

MOTOR FOR ANTENNA ROTATION—High torque ¾ RPM: 110 V. 60 cycle: 10 MFD. Cond. Size: 4¾" x 4". Normally 110 V. 400 cycle, reversible. With instructions: **$2.95**—10 MFD. Cond. only: **$1.00**—Switches: SPST **35c** DPDT **75c.**

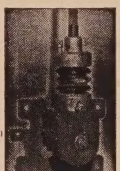
BLOWER—110 Volt 60 cycle, 4" intake, 2" outlet. Approx. 100 cu. ft. dis. Motor size: 3" x 3" 1750 RPM. Prices: NEW.....**$6.95**
Motor only.....**$3.95**

TRANSFORMERS — 110 VOLT 60 CYCLE PRIMARIES:

Sec. 12 V. 1 amp...**$1.50**	Sec. 24 V. .5 amp...**$1.50**
Sec. 24 V. 1 amp... **1.95**	Sec. 36 VAC 2.5 amp. **2.95**
Sec. 14-14 or 28 Volt—7½ or 15 amp.....	**4.95**

FL-8A FILTER—1200 CPS.....$1.95

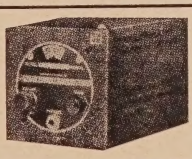
SELSYN SIZE V—No. C-78428—110 Volt AC 60 cycle. Can be used to turn small antennas or for position indicator systems. Size: 3½" x 5½". Price—Per Pair.....**$5.95**
SELSYNS 2J1G1—WITH CAPS—Can be used as position indicator for antennas. 110 Volt 60 cycle. Instructions furnished. Normally operates from 57.5 V. 400 cycle. Price: Per pair **$3.00**
Price: Caps only.....**50c Ea.**



MP-22 MAST BASE—Mounting with spring action and mounting bracket insulated at top to receive MS—53 Mast Section listed below. Bracket size: 4" x 6". Mast Base only: **$2.95**

MAST SECTIONS—For above MP-22 Mast Base: tubular steel, copper coated, painted—in 3 ft. sections. MS-53 can be used to make any length. MS-52-51-50-49 for taper. Screw-in type. Price: Any section.....**50c Ea.**

BC-1206 RECEIVER

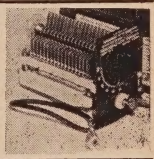


SETCHELL - CARLSON 200—400 KC. 5 Tubes. Operates from 24 — 28 Volt DC. IF Freq. 142.5 KC. Size: 4" x 4" x 6". Price: LN.....**$7.95**

A-27 PHANTOM ANTENNA

Designed to approximate load of antenna. Permits loading of transmitter without radiation. Contains 151 MMF. Variable Condenser Resistors, etc. Steel case w/calibration chart and dial scale. Used with BC-191, 375, 653, and others. Price.....**$1.75**

A-62 PHANTOM ANTENNA — Designed to approx. load of antenna. Contains var. cond. resistors, tuning dial, indicator light, etc. Used w/BC-604 Trans. Price.....**$1.50**



Limited Supply . . .



MARK II B19 TRANSMITTER AND RECEIVER SETS!

15 TUBES ● 2-8 MC., 240 MC., and INTERCOMMUNICATING!
IDEAL FOR MOBILE AND STATIONARY USE!

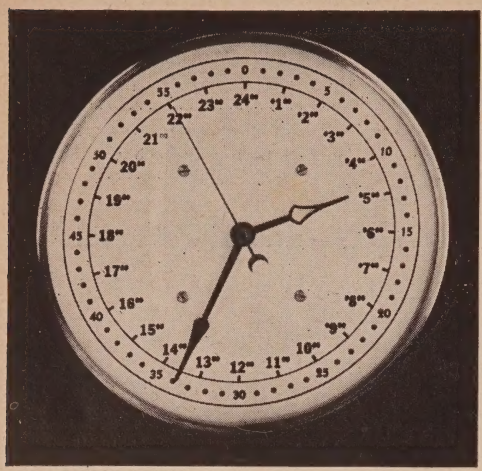
Set Transmits and Receives 2 to 8 MC. Phone, C W and M C W 25 Watt Master Oscillator Control. Transmits and Receives 240 MC. Phone. Also an Intercommunicating Set. Complete with 15 Tubes, Headset, Micro., Antennas, Control Box, 12/24 Volt Power Supply, and instructions. Ready to operate. Set size: 27" x 10" x 13¼".
Prices. NEW.....**$59.50** USED (Tested).....**$39.50**

ALSO AVAILABLE—ALL PARTS AND ACCESSORIES FOR B19 MARK II SETS!

Address Dept. CQ • Minimum Order $2.00 • Prices F.O.B. Lima • 25% Deposit On C.O.D. Orders

FAIR RADIO SALES • • 132 SOUTH MAIN ST. LIMA, OHIO

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Reads Directly to 2400 Hours

ENGINEERED BY
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SOLD EXCLUSIVELY TO
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only $10 including Fed. Tax and Shipping

- 9" Dial
- Convex Crystal
- Sweep Second Hand
- Steel Case (Black Finish)
- Chromium-Plated Bezel
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- 110 Volt - 60 Cycle A.C.
- Wall, Table or Panel Mounting

OPTIONAL
Additional Red Hour Hand for GMT
Table Mount or Panel Drilling

To AMERICAN TIME CORP.
15 Park Street, Springfield, Mass.
Please send:
☐ 2400 Hour Clock ($10.00)
☐ Stand For Table Mount (50c)
☐ Am Forwarding Panel To Drill Out (50c)
☐ Include GMT Hour Hand (50c)
Total $.....
☐ Check ☐ Money Order
Name .....Call Letters.....
Address .....

FK8AC	Felix Franchette, Box 104, Noumea, New Caledonia
FN8AD	Kath Hola, Chandernaggre, via Bengal, French India
HR1RF	Dick Fox, c/o Tela Railroad, Tela, Honduras
IS1AFM	Elmas, Sardinia, via ARI
I1NU/Trieste	P.O. Box 92, Trieste
MP4BAC	Via R.S.G.B.
MD2GO	RAF, Castel Benito, MEF1, Tripoli
PZ1QM	Box 679, Paramaribo, Surinam
ST2RA	Box 25, Malakal, Sudan
VP3HAG	Hyalene A. Greaves, McKenzie, Rio Demerara, British Guiana
W5EMY, ex-KL7KV	W. A. Pope, 204 West Curtiss Drive, Midwest City, Oklahoma
ZS9F	Box 4, Victoria Falls, So. Rhodesia

Postscripts

New York Amateur Radio Convention

The Greater New York Amateur Show, termed the "Biggest Show in Ham Radio," will be the stellar attraction of the 1949 ARRL Hudson Division Convention which is to be held October 7, 8 and 9th at the Ninth Regiment Armory, 125 West 14th Street, New York City. This is the first time in many years that a radio show has been held primarily for others than the engineering profession. A concerted effort is being made by means of the "show" to interest the younger generation in amateur radio and the convention has adopted the theme "how to get started."

There will be features for the licensed amateur operators, young and old, as well as activities specially planned for their XYLs.

The advance convention registration fee is $1.25. Registration after October 1st will be $1.75. This will cover the 2½ days of the Convention. Advance registration may be made with Registration Chairman, P. O. Box 1198, Church Street Station, New York City 7, N. Y.

New Hampshire QSO Party

The Concord, N. H., Brasspounders, W1OC, announce their sponsorship of the Third New Hampshire QSO Party, and invite all amateurs to participate. Time: Saturday, Oct. 8, 6 p.m. EST, to Sunday, Oct. 9, 6 p.m. EST; no time limit or power restrictions. N. H. stations count 5 points for each N. H. contact, plus 1 point per outside contact; stations outside the state count 5 points per N. H. contact; both multiply by the number of counties worked (10 maximum). Certificates will be issued to all participants reporting, with special endorsements for high scores both in N. H. and out of the state for phone only, c.w. only, combined phone and c.w. The same station may be worked for additional credit on more than one band. Call CQ NH on c.w.; CQ NH QSO Party on phone. Contact information required: Report and QTH (including county of N. H. stations.) Logs and scores must be received not later than Oct. 30; mail to Concord Brasspounders, Box 312, Concord, N. H.

Midwest Division Convention

The 1949 ARRL Midwest Division Convention will be held Oct. 8 and 9 at the Fontenelle Hotel in Omaha, Nebraska. There will be a buffet supper, banquet, technical discussions, movies, 2-meter transmitter hunt, Sunday morning breakfast clubs, Wouff-Hong initiation, exhibits and prizes galore. $6 per person covers all Convention activities. Send your reservations to Midwest ARRL Convention, Box 233, Omaha, Neb.

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IN MANY ITEMS WE HAVE THE WORLD'S LARGEST SUPPLY!



TBY8 TRANSCEIVER

VHF Transmitter - Receiver 28-80 MC In 4 Bands Voice or MCW XTAL Callibrated on 130 Channels. Uses 2-30 Tubes. 1-1E7, & 1-959.

Comes with Carrying Trunk, Vibropack, Headset and Mic. Ant. Spare Tubes. Instruction Book Canvas Carrying Case. Like New. Orig. $150.00 **$39.00**

COMMAND RECEIVERS

190-550 MC Used. Orig. $40. - Now	$ 8.95
6-9.1 MC Used. Orig. $35. - Now	5.50
8-9.1 MC New. Orig. $40. - Now	6.50
3-6 MC Used. Orig. $30. - Now	3.95
3-6 MC New. Orig. $35. - Now	5.50
520-1500 MC Used. Orig. $85. - Now	22.50

COMMAND XMITTERS

7-9.1 Used. Orig. $50. Now	$ 6.95
T-22 ARC-5 7-9.1 New. Orig. $50. - Now	10.50
3-4 MC Used. Orig. $50. - Now	12.95
5.3-7 MC Used. Orig. $30. - Now	3.95
T-21 ARC-5 5.3-7 New. Or. $40. - Now	5.50
4-5.3 MC Used. Orig. $30. - Now	2.95
T-20 ARC-5 New. Orig. $40 - Now	5.50
2.1-3 MC Used. Orig. $40 - Now	7.50

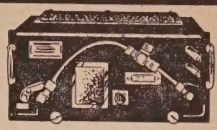
All Plugs, Racks, Control Boxes, etc. for ARC-5 274N Equipment available at slashed prices.

ARC-5 /HF SET

R-28 RCVR: Superhet operating on 4 xtal channels. 100-156 Mc. remote control to actuate turret-tuning mechanism. 12 tubes—4-717A, 1-12AE, 3-12SH7 & 2-12SL7GT. w/dyn. Originally $65.00 **$14.95**

MD-7 MODULATOR: Contains all necessary circuits & components for plate mod of T-23 xmitter. w/dyn. which supplies plate & screen voltages for mod. Used. Originally $36.00 **$9.75**

T-23 XMITTER: MCW & phone on 4 channels, 100-156 MC, automatic turret tuning, tank circuits remote controlled. 4 tubes—2-1625, 2-832A. Originally $50.00 **$13.95**



APS-13 WARNING RADAR

17 Tubes as follows: 9-6AB5, 5-6J6, 2-2D21, and VR-105. 410 to 420 Mc. and 90 Mc. IF. Brand New With Instruction Book. Originally over $100.00 **$14.50**

RL-42B Control Box **$1.49**
RL-42B Ant. Reel **$3.95**

ARC-4 VHF TRANSCEIVER

140 to 144 Mc Crystal Controlled. Xmitter has 832 final Modulated by 6L6's, 10 Watt Output. 13 Tube Receiver, containing 2 individual RF sections and A 10 Mc. IF Amplifier. Both RF sections may be operated simultaneously or either one individually. Comes with Xtal, Dynamotor and Tubes. Used, Good. Originally $150.00 ..... **$17.50**

BC-1072 XMITTER

157-187 MC. Input 117VAC 60 cy. Has parallel rod OSC using 2-826 PP, contains power supply, general radio variac 1.5A. 3½" 0-5 kilovoltmeter, 10 tubes and loads of other parts too numerous to mention. With tubes. Used **$19.75**

BC-1068 RCVR

150-210 MC, input 115VAC 60 cy. Inductance tuning for RF, ant., 'dector & OSC. Has tuning ind. with few conversions. Makes good 2 meter or FM receiver. With 14 Tubes. Used. **$22.50**
BOTH BC-1068 and BC-1972.. **$38.95**

RECEIVER BC-357 MARKER BEACON

Tunes from 70 to 88 Mc. Uses 12C8 and 12SQ7 tubes. Has extremely sensitive relay which closes at .4 ma. and opens at .2 ma. With instruction book. Excellent for conversion to capacity alarm ..... 2 for **$3.95**

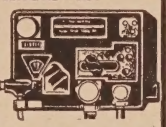
BC-1073 WAVEMETER

Tunes 150-210 Mc, uses cavity Tuner w/precision Millen gear drive tuning. Complete w/110 V AC 60 cy power supply and 19 tubes, like new **$24.50**

INCREASE TUBE LIFE

28 V Blower operates on 24 V AC or DC, ideal for cooling those Final Bottles **$1.95**

ARB-RECEIVER



6 Tube. 4 Band Super Het. Freq. Range. 196 Kc to 9 Mc.

Covering Range Broadcast. Boat and Amateur Frequencies. The Unit also has facilities for Loop Input., with Tubes, Dynamotor. Used Excellent. Originally $150.

$19.95

METERS NEW!

0-10 A DC Triplett 4½" Mod. 422-JR	$ 4.00
0-110 V AC 3½" G. E.	3.95
0-1 MA 3½" G. E.	4.95
0-20 Microamps 3½" G. E.	14.00
0-110 V AC 2½" Weston	2.95
0-7.5 V AC Square 3" Westinghouse	2.95
0-150 V AC 400 cy Hickock 2"..	2.95

BC-923 FM RECEIVER

COVERS 27-39 MC in 4 Channels. Each channel tunable on front panel throughout the full range. Has double conversion with built in freq. std. using 1000 KC XTAL. Complete with dynamotor for operation on 12 V DC.

$19.95

BC-924 FM XMITTER

Freq. range 27-39 Mc, 35 watts output 4 channels, tunable throughout entire range, band width 20 Kc, ECO controlled, 2-6SJ7, 2-6J5, 1-6AG7, 1-6V6, 1-VR-150/30, 1-6SL7, and 2-815, has 12 V. dynamotor. Output 440 V. at 400 ma., complete with tubes & dynamotor **$19.95**
BOTH BC-923 & BC-924..... **$37.50**

TUBE SPECIALS

5BP1	$1.95	6AG5	Bulk Packed 6SN7 6AG7 6N7 6SA7 69¢ each	872-A	$1.95
3EP1	$1.75	6J6		814	$3.75
12DP7	$9.95			VT127A	$2.95
836	2 for 98¢			838	$3.75
815	$2.95			805	$5.00
	3 for $7.50			810	$5.95

BC-223 AX XMITTER—Xtal controlled, w/2-3 Mc Tuning Unit, 15 Watts, w/Tubes. Brand New..... **$39.50**
BC-433 G COMPASS RCVR—Used with tubes..... **12.95**
R5/ARN-7 COMPASS RCVR—Used with tubes..... **16.95**
BC-348 RCVR—Used, excellent, with tubes **69.50**
SCR-522—VHF Transceiver, 100-156 Megs, Used Good **32.50**

CONDENSERS

Mica Type G-4 .0025 Mfd 25 KV Eff.	$14.95
5-5 Mfd 400 WV Tub.	.89
8-8-8-8 Mfd 600 WV.	1.79
10 Mfd 600 V Oil Filled	.89
1 Mfd 10,000 V DC	9.95
2 Mfd 4000 WV DC	4.00

Dumont Type 224 Oscilloscope Pwr. Transformer **11.95**

Leach Relay #1154 DPST 110 V 60 cy 10A. New... **1.25**

VARIACS

2 KVA 0-130 V AC G.R.	$32.50
5 KVA 0-130 V AC G.R.	$60.00

XFORMERS

AUTO 1KVA 110-220 AC..	$12.50
11 V 200A	18.95
5 V 60 A NEW	8.00
2.5 V CT 10A 20KV INSUL.	4.00
CHOKE 20 HY 300 MA 20 KV INSUL.	9.00
AUDIO CHOKE OUNCER TYPE, 30 HY	.49

SPECIAL

APN-1 ALTIMETER TRANSCEIVER—
418-462 MC FM. With dyn. & 14 tubes. Excellent condition. **$5.95**

APN-1 INDICATOR—
Basic movement 0-1 MA., 5 MA. shunt, 270° dial. **$1.95**

DON'T MISS THIS!

BC-966 IFF UNIT (Includes 4 Speed Motor). Has combination motor and dynamotor unit. Gear Box having four drive shafts one quarter in. is mounted on one end of dynamotor. All shafts on gear box will turn simultaneously at four different speeds. Dynamotor input 18 Volt, output 450 Volt. .060 A. Dynamotor can easily be converted to 110 Volt 60 Cycle by pulling 2 brushes and in turn driving gear box from which speeds ranging from 5 to 4000 RPM can be obtained. The range of 5 to 4000 RPM are obtained from ea. of the four shafts in different steps simultaneously. Also included in unit are 7-6SH7, 3-6H6, 3-7193 similar to HY-75, carbon pile regulator, 1 MF. 1000 V. Cond. 2 MF. 600 V. Cond. and misc. other useable parts. In good used condition. With instructions for dynamotor conversion to 110 V AC 60 cy. No cost or additional equipment needed. Only 5 minutes of your time. **$5.50**

TA-12C XMITTER—Comes with MP-28 Modulator & Tubes. New....**$45.00. Used....$32.50**
MC-519 MATCHING NETWORK matches 250 ohm. line to 52 ohm Coax. New **5.75**
SCR-274M ANT. RELAY UNIT, contains 50 mmfd 5 KV Vacuum Condenser and 0-10 AMP. RF METER. Used, excellent.... **1.95**
MC-299—Used for Replacing Dynamic mike with Carbon.... **1.95**
ARR-2 RCVR., 234-258 MC..... **8.95**

GO-9 XMITTER—Brand New with tubes for Hi Freq. & Mod. Unit only. Consists of 3 Units. **HI FREQ. XMITTER** 3000-18000 Kc Band Switching. 837 ECO, 837 BUFFER, and 803 FINAL AMP. **LOW FREQ. SECTION** uses 801 OSC., 807 Buffer, 803 Final Amp. Freq. Range 300-600 Kc. **RECTIFIER UNIT** 5Z3 Low Voltage Rect., 2 Type 1616 HI V. Rect. Refer to surplus radio conversion manual for complete write up and conversion to 10 meters **$69.50**

NO ORDER LESS THAN $5.00
IMPORTANT! Send 30% with order or full price and save C.O.D. charge. All shipments will be made via Railway Express unless other instructions given. All prices subject to change without notice. All merchandise subject to prior sale. Quantity prices on Request.
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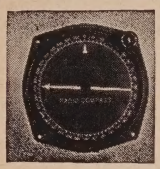
REC. & XMTR.



NEW BC-454 (3-6 mc) Rcvr, & your choice of either a 274N or ARC-5: 4-5.3 mc or 5.3-7 mc Xmtr. (slightly used) with Schematic.

BOTH FOR **$9.95**

BC-459	:7 to 9.1 mc....	(new).....	$14.95
ARC-5	:7 to 9.1 mc....	(new).....	12.95
ARC-5	:7 to 9.1 mc....	(used).....	9.95
T-20/ARC-5	:4 to 5.3 mc....	(used).....	4.95
BC-453	:190 to 550 kc..	(used).....	9.95
BC-454	:3 to 6 mc.....	(new).....	6.95
		(used).....	3.95
ARB RCVR	:.190 to 9.5 Mc.	(used).....	19.95
274N Type Rcvr	:1.5 to 3 mc....	(used).....	14.95



SELSYN XMITTER AND INDICATOR

Ideal as Antenna Direction Indicator for Ham, Television, or Commercial Use. 6 V @ 60 cy. operates it.

New **$5.95**

FILAMENT TRANSFORMERS

110 volts at 60 cycle Primary

12-24 volts at 2 amps .... $ 2.95

5, 24, and 30 volts at 20 amps 4.95

IDEAL MOBILE DYNAMOTORS

1 { 12 v input Winco puts out 400 v @ 200 ma or 200 v @ 200 ma @ 6 v dc..... $4.95

2 { 9 v input 450 v @ 100 ma output 6 v input 225 v @ 80 ma output.... $3.95

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Pacific Division Convention

The 22nd annual ARRL Pacific Division Convention will be held in Reno, Nevada, on Oct. 29-30, 1949, the host club being the Nevada Amateur Radio Assn. Pre-registration requests (until Oct. 5th) should go to P. O. Box 1003, Reno. Program will include open forum, Wouff-Hong, banquet, DX and VHF breakfast groups, hidden transmitter hunt, and pre-registration, ham and XYL prizes.

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

(from page 35)

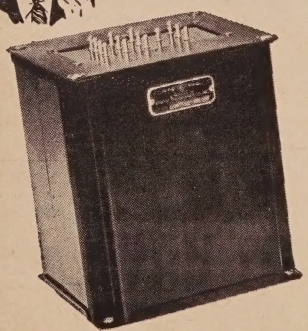
v.h.f. visitors this summer when W6's PUZ, WNN, AMD and ANN dropped in. Bish wonders where and what this vacation stuff is, his last being duty with the Navy. (Ed. Note: Navy hour please copy that for rebroadcast). Bish's latest gadget is a panoramic deal that will use any scope wth a sawtooth generator sweep circuit, a little 3 tube adapter, a command receiver and any converter for panoramic reception, for there is nothing like a seeing eye for monitoring the v.h.f. bands.

In Houston, W5FSC mentions that 6 meters is so unoccupied these days that it kinda hurts, with most of the boys on 144 mc waving verticals at each other. During one of the hot openings in July, W5FSC heard W5VY on Es reflected skip working W1s right and left yet they were unable to hear the W1s in the Houston area. . . . Now that the band has receded, W5JTI is planning on meeting as many of the gang he can at the Omaha Convention on Oct. 8-9. From the response we have had on this convention it looks like big things are in the making for any v.h.f.'er that shows up, so no doubt you will have quite a time of it, Tim!

Things are kinda dull for W5ONS since W5PKX took his vacation, and even though it's over W5PKX hasn't been heard on extended ground wave. W5ONS wonders if we could persuade the LUs to QSL the contacts he had with them last winter. . . . "Maybe my 6-meter beam is



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getting rusty," says W7DYD, for all of a sudden nothing has been coming through even though openings were plentiful before the middle of July.

During the July 25 opening, W5JAK, in Wink, Texas, spent most of the opening trying to hook the W6s and XEs up with each other, for he was reading both sides. Although W5JAK was not successful he says it was lots of fun, and he could almost hear both sides sweating each other out. . . . The St. Cloud gang sponsored a hamfest and outdoor picnic in July and 68 of the v.h.f. gang turned out for a nice time. Now some of that same gang plan to come to the Omaha Convention in October, just to see what the other fellow looks like.

The 2-meter band has certainly paid dividends to those that were active during July and August. The states worked list has grown to take its place alongside the other bands for DX. All it takes is one of those superduper nights when super-refraction takes place and even those from W6QD's column would get the bug. We know that ourselves! In vicinities where TVI is plaguing the lads on the lower frequencies, and in some cases have forced a curtailment of operation, tell them to try 144 mc if for nothing more than local work. Then when they get a taste of this long haul transmission no doubt they will thank you and might even present you with a TV set?!

Recently while we were in Dallas, we mentioned to W5AJG the success that W5DFU and W5NLZ had on horizontal polarization over the 98-mile path, whereas vertical had produced none. Not to be outdone by his Okie cousins, W5AJG switched his 16-element vertical to horizontal and started early morning skeds with the boys in Oklahoma and has had the same success, although they had tried it many times on vertical. Two-way contact hasn't been made and it appears that it is one-sided to a certain extent, and here is W5AJG's version of the story. W5AJG gets to W5DFU, not W5NLZ; W5NLZ gets to W5AJG's receiver, but W5DFU doesn't, yet W5AJG is heard anytime by W5DFU. Now the story darkens as W5DFU is busy rebuilding to higher power, and W5NLZ has gone off the air to rebuild his receiver. In the meantime, W5CVW in Ft. Worth has changed his antenna to horizontal. Despite all the furor that Leroy has caused with his change, he just sits calmly by to see what happens, if anything, no doubt not wanting to confuse the issue any further.

While we have always been a power addict on the v.h.f. bands, we thought that the 48-element array of W5DFU would overcome that. W5DFU runs 24 watts to a 522, but so far hasn't had the success he should enjoy with such an array. To those of you who have a hard time of it working out unless under extraordinary conditions just remember that the SCR-522 has a maximum of 6-watts output with the bias system it uses, and was supposedly used by the Air Force when it was within 8 miles of the field. At these frequencies feed line losses are out of this world, so if you end up with a couple of watts in the antenna you are lucky. The addition of an 829B outboard final is well worth the trouble and certainly not hard to construct. Any of the old-timers on 144 mc can vouch that power helps, as well as a stacked array, to get the most out of the band.

W5NDE in Tulsa has a miniature version of a parabolic or corner reflector antenna, using 22 half-wave reflectors spaced two inches apart,



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backing up a folded dipole and director. From the local indications it does a good job in much less space than the conventional one. W5LGW near Tulsa has a 16-element beam under construction and will run 100 watts to it on 146.4 mc. W5DFU now has a pair of HK-24Gs under way and hopes to have them on 144.45 mc before this is in print.

August 1 was good for Tim at W5JTI, in Jackson, Miss., for he was able to work into Indiana, Illinois, Ohio, and Kentucky. Nothing was heard west of the Mississippi River but at that his contact with W8WJC near Cleveland was good for 780.7 miles. Tim has a pair of 6J4s as a preamplifier and says it really perks things up for him. Many more signals were heard during the Aug. 1 opening, which brings up the issue on this band to incorporate c.w. in those transmitters. W5JTI will have 600 watts and a 32-element beam soon, taking down his 6-10 meter arrays. Just think, three years ago this guy wouldn't budge off 28 mc, now look at his v.h.f. enthusiasm.

VE3AIB in Toronto, says he has never been able to hear any really good DX on his vertical. Aug. 1 was a surprise for him as he found 144 mc good into eastern Virginia at 1030-1130 EST, his best contact was W4IKZ at 520 miles, all this so early in the morning. Les runs a 522 at 25 watts, and the front end of a 522 as a converter, with a 16-element horizontal beam up 50 feet.

On the night of July 11 WØJHS worked WØAZE, the latter reporting a friend of his had been hearing W2's on the band. Although Phil looked and called, he heard nor worked nothing, but a heard report was received from W9FPE in Wisconsin. Active stations in his area include: WØHXY, SV, FSD, RQT, JHS, AZE and WØTI and WØBJV in S. Dak.

The 144-mc band certainly is growing and going places, is the comment of W3QKI in Erie, Pa. Herb says that on July 23 during the wee hours, WØBIP 35 miles east of Omaha was good at his location for several hours, peaking S5. Dozen of calls by W3QKI produced no results, but after all it's all in fun. W3QKI did manage to get WØEHS in Adair, Ia., at 725 miles for his best haul to date. Contacts on 144 mc between the east coast and middle west are becoming more common, now that the boys on the coast have horizontals. During this July 11 opening, W3QKI mentions that W2PLU in Buffalo also heard WØBIP, a distance of 842 miles. Yet as we mentioned last month, the Kansas City gang, some 150 miles south of WØBIP heard nothing of this DX, showing the sharp cut-off of this DX.

W9AQQ in Indianapolis also had good conditions on July 22-23, when he worked WØBIP near the Nebraska line and into Illinois, Ohio and Wisconsin, mentioning that the Kansas City gang should have been on. Well, chum, we were but t'was just fate, we guess!

W9FVJ adds spice to all these words by saying that he had a 144-mc aurora opening on Aug. 3 when W3RUE was worked and W3KWL was heard. Many signals were heard with the characteristic aurora buzz, but too many of them were trying to get through on phone, which just can't be done, unless conditions are really good.

At 0030, CST, W3GKP in Silver Springs, Md., worked W9UCH for the first Indiana-Maryland contact on 144 mc. This now brings Smitty, W3GKP up to 13 states, 6 call areas, with his best DX being 610 miles.

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	10—	1.70
40-40	150	.18
	10—	1.70
40-20	150	.18
	10—	1.70
40/20	150/25	.18
	10—	1.70
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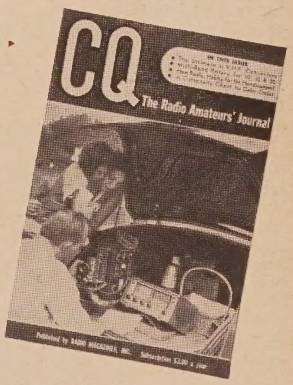
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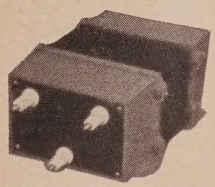
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DX PREDICTIONS

(*from page 33*)

Phone signals only during the peak hours. *10 meters*: Band should open very suddenly on quiet days with very strong signals. The time of this opening is expected to fluctuate but should be centered around 1645 EST. Band may remain open for about one hour. Last signals should be heard around 1815 EST.

East Coast to India, Burma and Tibet

40 meters: Difficult path to predict and work due to the variability of the auroral zone absorption. Some very weak signals may be heard once or twice during the month from 1630 EST until 1900 EST. Not a good opening. *20 meters*: Unusual equinox conditions with c.w. signals audible from 0545 EST until nearly 2300 EST. The best times will depend upon QRM observed on the far end and local atmospheric noise levels. Suggest 0645 EST until 0900 EST and 1830 until 2030 EST. Band should be erratic at best. WWV should be watched.[3] *10 meters*: No opening predicted this month because of the low values of MUF.

East Coast to Australasia

40 meters: Band opens rather suddenly with good signals from 0230 EST until 0815 EST. Peak conditions should be observed from 0430 until 0745 EST. *20 meters*: First c.w. signals are noted just before midnight. Phones become readable without difficulty after 0130 EST. Peak conditions extend from 0300 EST to 0730 EST. On poor days the band may close for a short period between 0500 and 0615 EST. Last c.w. signals fade out around 1015 EST. *10 meters*: Weak signals from 1515 EST until 1900 EST. Signals may start to build just before the band closes at 2015 EST. Best conditions in the first two weeks of the month.

East Coast to South Africa

40 meters: The first signals should appear rather suddenly after 1630 EST. Conditions are somewhat better on this end of the path and they may have trouble hearing our signals. Peak conditions will probably center around 1800 EST. A secondary peak may be expected after 2300 EST until closing at about 0300 EST. This latter peak may be weaker, but the noise background should be lower. *20 meters*: C.w. expect only about one-half hour before phones become readable at 1600 EST. Broad peak from 1730 until 2300 EST. Last c.w. fades into the noise around 0245 EST. *10 meters*: Band opens with fairly strong signals around 0545 EST. Signals may lose two or three S-units in the midmorning, but should build up to good strengths from 1230 until closing at about 1615 EST.

Midwest to Southeast Asia

40 meters: This is a long path that travels through a large portion of the auroral belt. Difficult to predict any possible openings in this band, although on very quiet days there may be short opening between 0515 and 0630 CST. Not very dependable, and signals will probably be very weak at best. *20* meters: Band should open suddenly with fair c.w. signals and weak phones around 0745 CST. Band will probably remain open until 1100 CST, although the phones should drop out before 0945 CST. *10 meters*: On one or two days during the month a few signals may be heard breaking through over the direct route around 0900 CST.

An erratic opening which may be very good on some quiet days is predicted for 1745 until 1830 CST.

Midwest to the Balkans

40 meters: This is another extended path that passes through a very large portion of the auroral belt. Some help may be obtained by watching the warnings from WWV, but no openings are definitely predicted. Best time to watch would be 2100 to 2200 CST. *20 meters*: Very weak c.w. breaks through around 1245 CST. Signals will build up about three S-units with the band folding between 1515 and 1600 CST. On very good days the band may stay open until 1645 CST with good phone signals until the fadeout. *10 meters*: An erratic unstable opening generally between 0745 and 0830 CST. Signals should be fairly strong from 0900 until the band closes at about 1115 CST. Better performance during the last week of the month.

Midwest to Central Africa

40 meters: Considerable atmospheric noise on their end of the path. We may hear their signals starting at about 1545 CST; however, they may not hear the Ws until after 1645 CST. Peak conditions in both directions extend from 2015 until 2215 CST. Finally fades completely out just before midnight. *20 meters*: Same as on 40 meters, although c.w. from Africa may be readable after 1315 CST. They will start reading our phones after 1515 CST. Very good peak from 1800 until 2230 CST. The phones will go out about the same time as c.w., that is, just slightly after midnight. *10 meters*: Ideal conditions for this path. The opening should be around 0700 CST. Signals will be fair at the start and should build up slowly throughout the morning hours. The closing is not predicted until 1715 CST. Peak strengths should be experienced from equatorial Africa (CR6, OQ5, ZD2, VQ3, etc.) between 1330 and 1630 CST.

ZERO BIAS

(*from page 9*)

Not only has *CQ* gained recognition in its own field, but from authorities outside of amateur radio as well.

The entrustment to *CQ* of the radio amateur scientific observation project being conducted under the sponsorship of the Electromagnetic Propagation Laboratory of the United States Air Force is a clearcut demonstration of the full stage of maturity *CQ* has reached in its five short years of existence. The RASO project does not bring any direct benefit to Radio Magazines—it does to amateur radio! It is the perfect example of the motivating thought behind much of the work done at *CQ*..

If a project or an idea benefits ham radio, we have always been willing to put our time and effort into it. Despite our commercial origin, we have worked unceasingly on behalf of ham radio, not only to give our readers a finer publication, but also a more enjoyable hobby. Public recognition of ham radio is vital, and *CQ* has expended a tremendous amount of time and effort in helping hams obtain the recognition that unfortunately they do not have in many segments of our community.

All in all, we think that it has been a very satisfying five-year growth. If our thousands of readers have received as much pleasure from reading *CQ* as we have from planning and bringing it to them,

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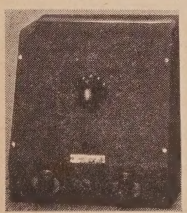
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TWO ZONES PER WATT

(*from page 32*)

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TVI-FREE RIG FOR 10

(*from page 14*)

removed from the v.f.o. unit, and the quadrupler direct from the socket. Bypass capacitors from the screen and high side of the filament are mounted for the shortest total path to any point on the chasiss around the socket. The bypass capacitor for the plate tank is mounted and grounded close to the socket on the "tube" side of the shield. Be sure to have a metal skirt around the lower third of the 813, and to orient the tank put in that position instead of the way I have it. Mounting the quadrupler tank within the confines of the BC-458A leaves enough space on the grid side of the 813 chassis to mount two filament transformers. This change is recommended, and will be discussed further, but to keep continuity in the description of the rig, we will proceed with the design as shown in the photographs.

Grid drive for the 1625 quadrupler is obtained by connecting a 100-$\mu\mu$f capacitor between the stator of the 7-mc tank capacitor and the control grid of the 1625. This connection is made inside the BC-458A chassis. Drive for the 813 is obtained from a tap on the quadrupler plate coil, and the voltage is transferred to the final grid through a 56-$\mu\mu$f coupling capacitor.

The vertical plate upon which the 813 is mounted is actually a large "L"-shaped piece of aluminum ⅛" thick. The horizontal portion of the L extends under the BC-458A. The vertical portion shields all the input circuits from the plate circuit of the 813, and also serves as the chassis on which all components are mounted except the antenna pick-up circuit. The antenna coil and capacitors are fastened to the bottom of the cabinet with insulators, and the "common" ground for the antenna system is kept as close as possible to the hole through which the signal is to be

taken from the cabinet to the antenna filter.

Figure 8 is the circuit diagram of the transmitter. Only those connections in the BC-458A that are different from the connections for normal v.f.o. operation of the unit are shown. Construction data for the line-filter coils are given, and the mechanical arrangement of the filter components should follow the recommendations made in the June 1949 article in *CQ*.

By the time your cabinet and parts for this transmitter have been obtained, and the mechanical work and wiring have been completed, a month's time will undoubtedly have elapsed, and you will be ready to build an antenna filter. The details for the construction of harmonic attenuators will be presented in the second half of this article in next month's *CQ*.

OUTPHASING MODULATION

(*from page 26*)

exciter with a pair of 813s, which is about the ultimate power level that can be driven directly with this exciter. The object will be to determine the maximum permissible input that can be run to these tubes in this service. Let us examine the maximum ratings for the 813 and find out how they apply to an outphasing amplifier.

Using ICAS ratings, we find that for modulated service the maximum plate voltage is 2000 v. and the maximum resting plate current is 200 ma. These ratings already take into account the reserve needed for peaks under plate modulation and it is assumed that the manufacturer has allowed the peak current to reach the highest permissible value for the available cathode emission. This value will be approximately,

$$I_{max} = 2I_p/k$$

where I_p is the carrier plate current, the factor 2 is the current increase at the modulation peak and k is the ratio of average to peak current in a Class C amplifier.

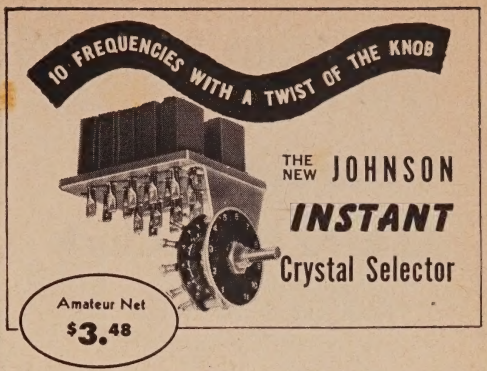
$$I_{max} = 2 \times .200/.19$$

$k = .19$ when the angle of plate current flow is 120°. Refer to footnote 3.

$$I_{max} = 2.1 \text{ amperes per tube.}$$

Since this is the crest of the r.f. cycle under modulation which cannot be exceeded, then with our current factor of 4, the current at the crest of the r.f. cycle for unmodulated conditions will be $2.1/4 = 525$ ma. The average plate current will be .525 *k* amperes, and where *k* is .19, as above, the resting current per tube will be 100 ma. Since at no time during modulation does the plate *voltage* increase above the carrier value, we can take full advantage of the maximum telegraph voltage ratings, which in the case of the 813 is 2250 v. This gives an input per tube of 225 watts, or 450 watts for the pair. Obviously, at 75% plate efficiency the tubes will run stone cold, even under sustained modulation. The rule of thumb for rating tubes in high efficiency linear and grid modulated amplifiers is to allow 50% of the *modulated* current ratings, but use full *telegraph* voltage ratings.

3 Terman's Radio Engineering Handbook, P. 446—450 McGraw-Hill.



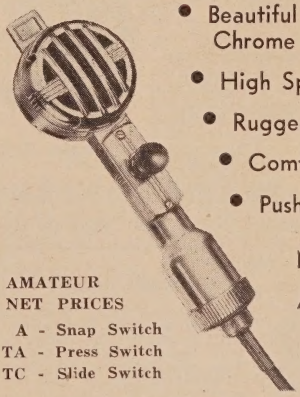
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Under these conditions it might be argued that one may as well use Class B modulators in the first place. Actually the tube cost is approximately the same for both systems. The saving, however, is in Class B input and output transformers. Also, the sideband power is generated at Class C efficiency instead of Class B, and the saving in power supply requirements is shown in the appendix. Less audio is required than is ordinarily necessary to swing the driver for a Class B modulator of comparable transmitter power ratings. A suggested schematic for the final amplifier is shown in *Fig. 12.* The same general principles of construction apply to this stage as to the preceding ones. Means are provided to meter plate and grid currents of each tube separately.

Tuning Up the Final

With the exciter operating as last adjusted, each output link should be coupled to the grid tanks of the final. With no plate voltage on the final, each 6AG7 tank should be carefully resonated by tuning for maximum grid current in the final. It might be well to loosely couple a scope to observe the relative phases of each grid circuit. The ellipse obtained should lie nearly at a 45° angle across the face of the scope, and the trace should lack approximately 30° from approaching either 0° or 180°. It doesn't matter here which, since the correction can later be made by polarizing the output link connections of the final so they add differentially. Each tube should draw approximately the same grid current, and if not, the links should be adjusted until they do. The initial carrier condition appears illustrated in *Fig. 11A.* With modulation this pattern should fill in toward the center, approaching a straight line, and also expand to the outer rim to become more circular in shape, as in *Fig. 11B.* There should be a sufficient amount of linear phase modulation to enable the pattern to overlap in the center as illustrated in *Fig. 11C.* If this cannot be done, there is insufficient phase modulation available and the initial carrier phase difference should be changed with C_{13} so that a thinner ellipse is obtained, and set so it is possible with the available amount of audio to make the pattern overlap in the center. If this is carried too far it will be very difficult to make the final draw the expected power input. It is always best to couple the plate load to the final as tightly as possible, however, and reduce the input if loaded too heavily by approaching 180° phasing as described above. Since less deviation is required of the phase modulators under these conditions, the output will be more linear.

After the grid circuits are adjusted, the plate voltage (reduced from maximum, if possible) should be applied, and the load links should be coupled slightly. Resonate each tank separately and increase the loading. Be sure the links are polarized for the least load current. Raise the plate voltage to normal and set the load on each tube until their plate currents are equal and drawing a total of 200 ma. Each tank should be pre-

cisely resonated so no undesired phase shift is encountered. Now arrange the scope to observe the output carrier by hooking a short antenna to the scope and placing it near the antenna feeders until good deflection is obtained. Apply sweep voltage to the horizontal plates and see if the pattern obtained with modulation is the same as shown in *Fig. 10A*. If the output of each tube is not equal to the other, the negative peaks will stop short and form a bar in the center as in *Fig. 10B*. The outputs of the tubes may be equalized by adjusting the screen voltages separately until the bar disappears to a fine line indicating perfect cancellation on negative peaks. The plate current will rise under modulation and the power supply should be designed to have good regulation under this change. With sine wave audio the current should rise about fifty percent for 100% modulation. Speech will not swing the plate current as much due to its lower energy content.

Overall Transmitter Efficiency

Let us compare the outphasing system with the conventional plate modulation arrangement. Assume 100 watts of carrier is generated in each case, at 75% plate efficiency.

For the plate modulated transmitter, $P_{in} = 133$ watts. Since 50 watts of sideband output is needed at 100% modulation, we must generate this power at 75% efficiency and supply it from a Class B modulator having a tube efficiency in practice of approximately 55% through a transformer to the Class C load. Assume 80% efficiency for the transformer. The power drawn from the supplies at 100% modulation is then

$$133 + \left(\left[\frac{50}{.75} \div 80\right] \div .56\right)$$

which amounts to 275 watts.

For the outphasing transmitter, $P_{in} = 133$ watts. The 50 watts of sideband energy is generated directly at 75% efficiency which makes the total power drain at 100% modulation only

$$133 + \left(\frac{50}{.75}\right) = 200 \text{ watts.}$$

The plate modulation system requires 37½% more power supply capability than does the outphasing system employing phase generated AM.

The writer wishes to express his thanks to those who assisted in the preparation of this article; to Dick Wardlaw, ham-to-be for the photography and to W7SBN and the others who provided willing ears while the ideas were germinating.

Appendix

The following relations apply to the output coupling networks when the output voltage fed to a load is obtained from the differential output of two equal voltage sources. The voltage across the load is:

$$E_L = \cos(\emptyset/2)\, E_0$$

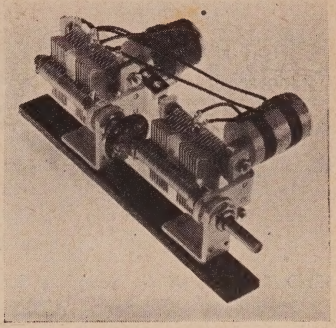
where $\emptyset$ is the phase difference between the two voltages and E_0 is the voltage developed by each source.
The power developed in the load is:

$$P = E^2_L / R_L$$

Let $\emptyset$ be 150° for the carrier condition and let the modulation for M = 1 change this phase to 180° on negative peaks and to 120° at positive peaks.
Then for the carrier,

$$E_L = \cos /75^\circ\, E_0 = .259\, E_0$$

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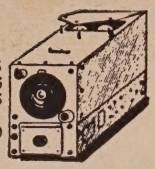
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So that the carrier voltage becomes 1 for reference, let E_0 be made a value so that $E_L = 1$. Let E_0 be 3.86. Then the carrier will be I^2R watts. If $R = 1$, $P = 1$ watt. For negative peaks, $\emptyset = 180°$ and the two voltages completely cancel.

For positive peaks, $\emptyset = 120°$.

$$E_L = cos\ /60°\ E_0 = .5 \times 3.86 = 1.93.$$

$$P = 1.93^2/R = 3.72 \text{ watts (if } R = 1)$$

This is just shy of being the required 4 times increase and amounts to 3.5% negative carrier shift, which is not excessive. This shift would become still further reduced if the phase swing with modulation were such that less than + or — 30° were required for 100% modulation. The load resistance for each amplifier is

$$R_L = \frac{2R}{cos\ (\emptyset/2)}$$

where $\emptyset$ is as defined above and R is the load resistance for the common system.

Thus if the antenna transmission line exhibited a resistance of 65 ohms, each amplifier would see a load of

$$R_L = \frac{65}{2\ cos\ (150/2)} = 500 \text{ ohms}$$
$$(\text{for } \emptyset = 150°)$$

This indicates that tighter coupling must be used in order to load the tubes to the same plate input one would expect if each amplifier were loaded instead with only 65 ohms. If $\emptyset$ were initially set to 165°, then the 65 ohm load would appear as 995 ohms to each tube. Although harder to load, the carrier shift would be only 0.8% which is negligible.

HOBBY FOR THE HANDICAPPED

(*from page 29*)

hearing a demonstration of amateur radio over a portable station will make almost any shut-in want to become a ham, although he may doubt his ability to master, "such a complicated hobby." In such an event, showing him proof that others have done so, as well as articles describing simple equipment and how to obtain a license should resolve his doubts. Even if they do not, the time will not have been wasted; it will have given the shut-in a few hours of diversion anyway.

There are a few ways to make such a mission a failure. One is to assume the attitude that it is something extraordinarily fine to give a helping hand to someone less fortunate than yourself. Equally good is to cross-examine the shut-in for full details of his ailment.

Akin to the above are the ways how not to treat the handicapped amateur on the air. A good way to make others realize your superior knowledge and helpfulness is to join his contacts whenever possible and tell the station he is working that W—— is not like other people and explain just how he is different. This is almost as good as acting as his guardian and getting in there and clearing the path for him with something like "Come on, fellows, let's give poor old W—— a break. You know he has a hang nail on his left thumb, and we should give him a break."

I can guarantee that any of the above will insure that the handicapped person involved will remember anyone using them forevermore. Seriously, the average handicapped person is apt to be somewhat self-conscious, and any unnecessary spot-lighting of his handicaps will cause him

unneceessary embarrassment. Until you have definite reason to believe that he wishes you to do differently, the wisest thing to do is to ignore them. Ninety-nine per cent of the time that is what he wants you to do.

A GOOD NIGHT FOR DX

(*from page 17*)

largely take the place of snow, but snow is still the best and the most reliable.

As an example of the effectiveness of these general conditions take the night last November when W6ZKL and I were walking home from work together. We were talking of this and that, such as whether her legs were comparable to Grable's, when Tom suddenly began sniffing the air. Tom is an old air sniffer from Portland, Maine, where I understand some of the best air sniffing in the history of radio has been carried on, and he stated, "Mike, it's going to be a good night for DX!" After a few tentative sniffs on my part I felt that he was substantially correct in his deductions. That night Tom worked an F8 on 40 meters with his 807 and I knocked off Tahiti on ten with *my* 807. See what I mean?

The second set of conditions mentioned above is purely individual and will vary from ham to ham. One fellow I once knew, for instance, found that if the temperature in his shack rose above 45 degrees he might as well shut down and go to bed. So, in order to work DX, assuming the general conditions were right in the first place, he sat in his shack bundled up like an Eskimo, gunny sacks wrapped around his feet, and with a hand like a frozen halibut rapping on his key. He had worked 39 zones by 1940 and the Lord only knows what he's done this last winter what with the weather being as cold as it was! Another friend of my acquaintance insists that in order to even hear any DX he must have the shack glowing like an oven, with a box of cigars and seven or sixteen bottles of brew roosting within reach.

How to Polish Off DX

And now, by way of illustration, an experience of my own. The first c-w transmitter I built was a very contrary little monster for a long time. In spite of the fact that the tube glowed like a blast furnace and the signal roared like a buzz-saw over the entire 80-meter band I could work nothing but locals. Then one night (a frosty one, naturally) I got out my plumber's tools, unbolted the copper tubing tank coil and gave it a good polish with fine sand paper. Immediately I was able to work a W7 and a W9 and got reports of FB RAC QSA5 R6! From then on I continued to blossom forth. Whenever reports began to drop off or the number of DX stations to decrease I would jerk out the tank coil and polish it. I still do. Just the other day I pulled out the ten-meter tank and shined it up with emery cloth and within an hour worked LU9AX and LU8EE. So, what do you think of that, National Bureau of Standards? Have you guys ever thought of polishing a tank coil? No! As your final tank

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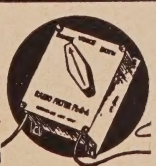
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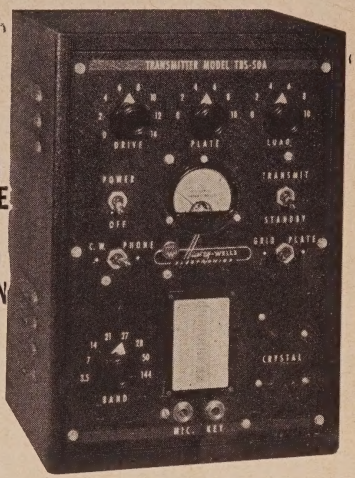
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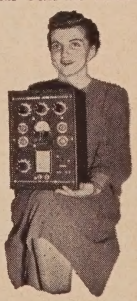
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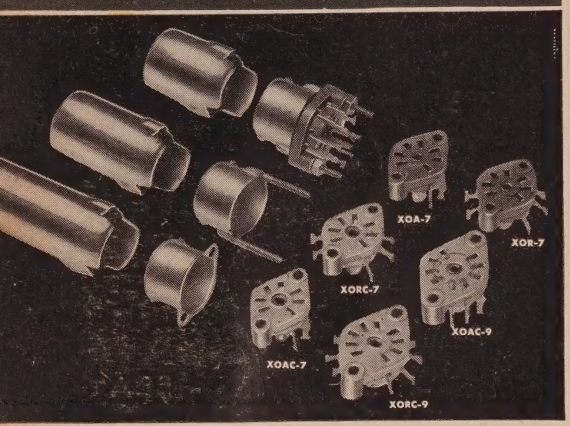
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takes on a dull, lifeless appearance you just sit down and write, "High atmospheric noise levels at the far end of the path will addle the brains of all hams in the Union of South Africa." Let's get on the ball, men! The crystal ball, I mean.

Science, applied to such things as radio conditions, may be all well and good . . . but I doubt it. After all, what do you suppose the Bureau bases its predictions on? I have it on good authority that the government is forking over a nifty salary to an old gypsy who just sits around WWV reading tea leaves. Why can't we just practise up on our sniffing of winter air, and dust off some of the old luck charms we used to keep on top of the receiver? Or . . . what's just as good . . . let's continue to sit and sit and sit . . . and listen and listen until our tongues hang out. Sooner or later we will hear some jerk in the Gobi Desert scratching two wires together and, presto, we have another country in spite of the CRPL. Say! Smell that air! Out of my way, men . . . it's a good night for DX!

SCRATCHI

(*from page 6*)

very glad to heer how I feel, on acct. he and the club had already entered me in the bronco-busting contest. Hokendoke Hackensaki, I are hardly having time to answer before the announcer on the PA system are saying that next rider up are Hashafisti Scratchi, riding a horse named Old Slicky Black Lightning.

I are climbing over wooden chute that horse are in, and letting myself down litely on back of said Old Slicky Black Lightning. I are just sitting there, five-gallon hat, orange shirt, red bandanna, fancy chaps and all, when WHAM!! the gates are opened and out shoots O. S. B. L. and Scratchi. Next cupple of seconds I are feeling like I are sitting on pneumatic drill and then—blackout.

When I are coming to I are flat of my back in a hospital, with most of the Five-meter Bootlegger Club members clustered around. When president of club are seeing that Scratchi are back in the land of the living, he are coming over to the bed and saying that he are glad to heering that I are not badly hurt, and that I will be out of bed as soon as they are fixing up all my bruises. Then he are handing me check for two-hundred bucks—cold cash. Sacremento Boulevard! It are seeming that I are winning third place in bronco-busting contest.

Now I know Scratchi are good, but he are not being such red-hots cowboy that he can win third prize cavorting around on wild horses, so I are asking how come I win third prize. At this all the club members break into big smiles, and the vice-president are saying that my chaps are getting tangled in the stirrups, and it are taking so long for horse to get me free that I automatically placing third.

Pretty good, don't you thinking, Hon. Ed? Now I using that money to taking horseback lessons, I thinking.

Respectfully yours,
Hashafisti Scratchi

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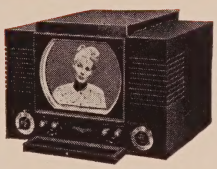
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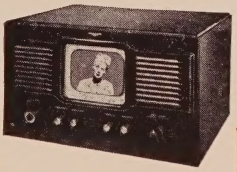
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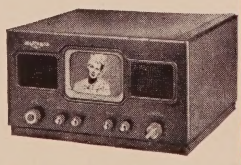
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Model TV-10W
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