CQ

JUNE, 1950

IN THIS ISSUE

- Installing and Using Low-Pass Filters
- VFO-Controlled Low-Power 28-Mc Mobile
- Using the BC-459 on 7 Mc Without TVI
- A 150-Watt Rig Featuring Built-In VFO

35 Cents

The Radio Amateurs' Journal



for the HAM, TECHNICIAN, NOVICE and SWL

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HAM PERFORMANCE

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SELECTIVITY — plenty of it. 11 tuned circuits, one r-f, two conversion, and 3 i-f stages. 2½ kc "nose" selectivity.

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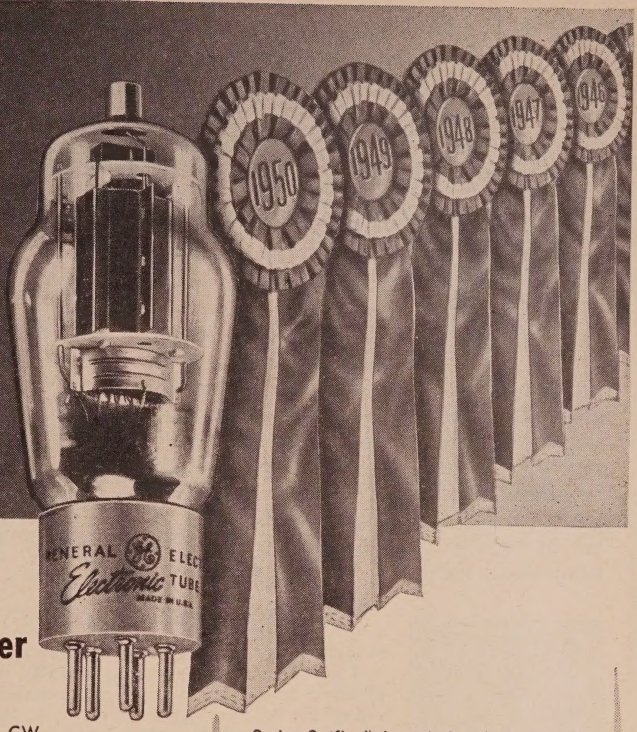
See it at your Parts Distributor or write direct to us for a spec sheet

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in its power class!



GL-807
Beam Power Amplifier

Filament voltage	6.3 v	
current	0.9 amp	
Max ratings, ICAS:	Phone	CW
voltage	600 v	750 v
current	100 ma	100 ma
input	60 w	75 w
dissipation	25 w	30 w
Freq. at max ratings	60 mc	

YESTERDAY or today, they don't come any better than the GL-807. As an active ham, you're already familiar with many of the tube's good features.

You know that the GL-807 is a jack-of-all-trades circuitwise, serving as oscillator—buffer—doubler, tripler, quadrupler—or final tube. In audio, you're aware of the tube's suitability for modulator work. A pair in Class AB_2 will put out 120 w, ample to modulate a ¼-kw rig.

General Electric design know-how and precision manufacturing stand behind this most useful of ham transmitting types. A beam power tube, special care in production is needed to assure top efficiency. Here G-E close-tolerance methods pay off directly in superior service by the GL-807 which *you* buy and install!

It will pay you to study afresh the advantages to your rig—the *economy*—that come from use of this fine and respected G-E tube. See your G-E tube distributor! The low price of the GL-807, in case you've forgotten, is less than that of a pair of average receiving types! *Electronics Department, General Electric Company, Schenectady 5, N. Y.*

Series 9 (final) in a listing, by areas, of tube distributors who can supply you with Ham News, G.E.'s bi-monthly magazine:

Alhambra, Cal.: Coast Electronics Supply Co.
Bellingham, Wash.: Waitkus Supply Co.
Everett, Wash.: Pringle Radio Wholesale Co.
Fresno, Cal.: General Electric Supply Corp.; Jack C. Arbuckle Wholesale Parts and Supplies
Glendale, Cal.: Hagerty Radio Supply
Hollywood, Cal.: Yale Radio and Electric Co.
Honolulu, T. H.: W. A. Ramsay, Ltd.
Long Beach, Cal.: Fred S. Dean Co.; Scott Radio Supply Co.
Los Angeles, Cal.: General Electric Supply Corp.; Kierulff and Co.; Papel Brothers; Radio Products Sales Co.
Oakland, Cal.: W. D. Brill Co.; Electric Supply Co.
Pasadena, Cal.: Dow Radio Supply Co.; Empire Electronic Distributing, Inc.
Portland, Oregon: General Electric Supply Corp.; Pacific Stationery
Sacramento, Cal.: E. M. Kemp Co.; Sacramento Electric Supply Co.
San Diego, Cal.: Shanks and Wright; Western Radio and Television Supply, Inc.
San Francisco, Cal.: Associated Radio Distributors; General Electric Supply Corp.
San Jose, Cal.: Frank Quement, Inc.
Santa Ana, Cal.: Radio and Television Equipment Co.
Santa Barbara, Cal.: Channel Radio Supply Co.
Seattle, Wash.: General Electric Supply Corp.; Seattle Radio Supply
Spokane, Wash.: General Electric Supply Corp.; Northwest Electronics
Tacoma, Wash.: C. and G. Radio Supply; A. T. Stewart Co.

(*List as of February 25, 1950*)

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

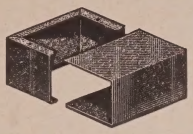
GENERAL ELECTRIC

180-JA3

FROM THE SMALLEST TO THE LARGEST

YOU'LL DO BETTER WITH BUD

MINIBOXES

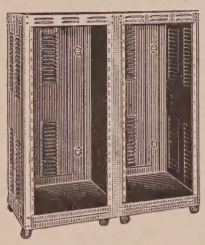


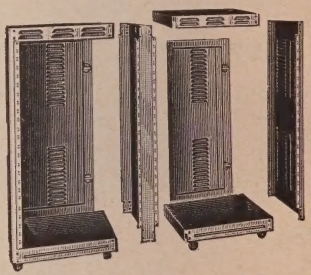
There are thousands of uses in the fields of radio and electronics for these new boxes. They are made from heavy gauge aluminum. The design of the box permits installation of more components than would be possible in the conventionally designed box of the same size. It is of two piece construction, each half forming three sides. The flange type construction assures adequate shielding. Available in etched aluminum finish and gray hammerloid finish.

Catalog Numbers					Dealer
Gray	Etched	Length	Width	Height	Cost
CU-2100	CU-3000	2¾"	2⅛"	1⅝"	$ .50
CU-2101	CU-3001	3¼"	2⅛"	1⅝"	.50
CU-2102	CU-3002	4"	2⅛"	1⅝"	.50
CU-2103	CU-3003	4"	2¼"	2¼"	.70
CU-2104	CU-3004	5"	2¼"	2¼"	.72
CU-2105	CU-3005	5"	4"	3"	.72
CU-2106	CU-3006	5¼"	3"	2⅛"	.72
CU-2107	CU-3007	6"	5"	4"	.81
CU-2108	CU-3008	7"	5"	3"	1.05
CU-2109	CU-3009	8"	6"	3½"	1.68
CU-2110	CU-3010	10"	6"	3½"	1.80
CU-2111	CU-3011	12"	7"	4"	2.34
CU-2112	CU-3012	17"	5"	4"	2.76
CU-2113	CU-3013	10"	2"	1⅝"	.78
CU-2114	CU-3014	12"	2½"	2¼"	.96
CU-2115	CU-3015	4"	2"	2¾"	.60
CU-2116	CU-3016	4¼"	2¼"	1¼"	.66

Prices 10% higher west of the Mississippi River

ADD-A-RACK SERIES





It has always been necessary to buy special racks without louvers on one side to obtain a maximum of panel space with a minimum of floor space. Now, you no longer need to buy a whole new cabinet when you want additional panel space. Through our new and exclusive Add-a-Rack series, BUD not only offers additional racks at a lower cost, but provides you with a sturdier, better looking assembly.

The illustration above at left shows two Add-a-Rack cabinets assembled together. The illustration above at right shows the unique and ingenious method of adding a unit to your present equipment. Instead of buying an entire new outfit, you purchase only four parts; (1) a door (2) a top (3) a bottom and (4) an Add-a-Rack coupling unit. The right (or left) hand side of your present relay rack is removed and replaced by the Add-a-Rack coupling unit; next, a top and bottom is fastened into place, and the side taken from the first rack is fastened onto the second rack which has been added. Place the additional door into position and you have two racks properly and efficiently coupled together. In the same simple way, more racks can be added at any time and every one will be in a CONTINUOUS ONE-PIECE assembly.

This series is available in two ways. (1) a double unit consisting of two racks and the Add-a-Rack coupling unit, (2) Add-a-Rack unit, consisting of a door, a top, a bottom and an Add-a-Rack coupling unit. These units are furnished with all necessary assembling and panel mounting hardware.

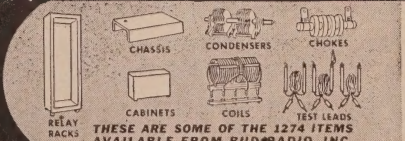
BUD RC-7756 Casters will fit this unit. Casters are not included in price of cabinet.

Add-a-Rack Unit	To Add-a-Rack to	Overall Height	Panel Space	Dealer Cost
AR-1778	CR-1774	46-1/16"	36¾"	$26.25
AR-1775	CR-1771	47-5/16"	42"	32.50
AR-1776	CR-1772	66-9/16"	61¼"	40.75
AR-1777	CR-1773	82-5/16"	77"	48.00

Complete unit, consisting of the knocked-down parts necessary for two relay racks coupled together.

	Dealer Cost
CR-1779 two coupled relay racks same size as CR-1774	$54.75
CR-1780 two coupled relay racks same size as CR-1771	67.95
CR-1786 two coupled relay racks same size as CR-1772	83.05
CR-1799 two coupled relay racks same size as CR-1773	98.40

Prices are 10% higher west of the Mississippi River.



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BUD

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Vol. 6 **June, 1950** **No. 6**

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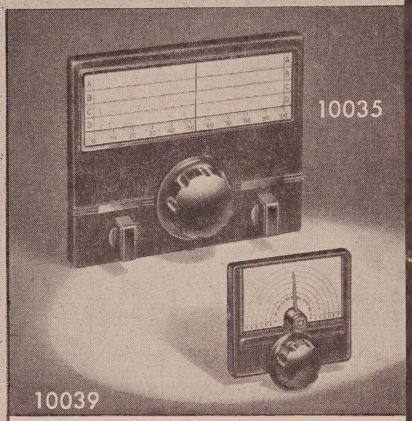
OUR COVER—The operating position at W3DF. A BC-459 drives an HK 354E to 400 watts on 40. The receiver is an SX-28A. Note the business of sending with the right hand and servicing traffic with the left. This is an old commercial op trick. If you think it's easy, try it sometime! (See page 13 for the full story on W3DF.)

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Application



Nos. 10035 and 10039
Multi-Scale Dials

A pair of truly "Designed for Application" controls. Large panel style dial has 12 to 1 ratio; size, 8½" x 6½". Small No. 10039 has 8 to 1 ratio; size, 4" x 3¼". Both are of compact mechanical design, easy to mount and have totally self-contained mechanism, thus eliminating back of panel interference. Provision for mounting and marking auxiliary controls, such as switches, potentiometers, etc., provided on the No. 10035. Standard finish, either size, flat black art metal.

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MAIN OFFICE AND FACTORY
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MASSACHUSETTS

M



Feenix, Ariz.

Deer Hon. Ed:

Scratchi are running across most pecooliar thing that are maybe having sooper-secret uses for government, and knowing you are long-time friends with some government big shots I are letting you in on big secrets. You are understanding that I too are buddy-buddy with peeples in Washington, but I thought that it would be better if sterling character like same you, Hon. Ed., are presenting my story.

This started a while ago when I are rummaging in cellar and I came across some old surplus radio gear I had bought about a year ago. One long black box are radar transmitter that is supposed to operate on eleventy-forty megacycles, or some frequency so high that it not even included in radio allocations.

I am thinking of tearing it apart for the parts but decided to try it out first, so are lugging it upstairs. This last are sounding much easier to do than it was. How are they making these things so heavy when they are so small?

Transmitter are finally getting put on operating table and I are connecting it to a-c line. The meters are going up scale in an encouraging manner, no fuses are blowing, and nothing is smoking very much, so Scratchi are deciding he are on the air. Inasmuch as I are standing in front of the waveguide antenna with my back to it, it are soon painfully evident that the rig are on the air. Wow! These waveguide antennas are reely putting out a hunk of r-f. In order to not getting hot seat again I am pointing the antenna out the window, then I continued to fuss with the rig for another half-hour or so.

Next morning my Brother Itchi are getting me out of bed and he are acting rather excited. He are rushing me downstairs outside the house to the window of my shack. Hackensaki! the whole lawn are covered with bugs, zillions of them, and all as dead as ten meter band at 3 AM in the morning. Itchi are asking how come, but I are not having slite idea even of how come.

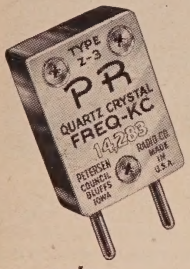
After breakfast small glimmer of light are glowing in Hon. Noggin, so I rush into shack, open the window, and turn on the radar transmitter. Sure enough, a cupple of bugs are flying in toward transmitter, then keeling over. Shortly there are many more bugs. In factly, before I are thinking of turning off the transmitter it are so covered with bugs I can't finding on-off switch, so I are wading through several tons of very dead, very squashy bugs and pulling a-c line cord out of the wall.

Scratchi at this point are rather dumbfounded as to why stupid bugs are knocking their brains out against transmitter until I noticing that bugs are all same kind. I picking up a cupple of handfuls and are examining them closely. Hokendoke! all bugs are having same length antennae on their heads.

(*Continued on page 52*)

NETS

FOR PLEASURE!.. Says W2ZKT



Channel operation is old stuff. We have had "nets" since the days of the spark gap. Lately, though, *new phases of net operation are developing* . . . particularly on VHF.

John Osterberg, W2ZKT, writes: "There is a growing demand among hams for local nets on six, two and higher bands. A group of us in this vicinity are considering going on the same frequency with a sort of 'channel' arrangement on two meters. Whenever we are in our shacks we will leave our receivers on net frequency . . . immediately available for a call from any of the gang."

Yes, sounds like a lot of fun . . . and handy, too. A very stimulating sideline to regular operating.

Spot frequency net operation for portable mobile offers interesting possibilities as well. A specific frequency on eighty or ten would be mighty handy when operating from the car . . . especially cross-country.

Whatever your plans for channel operation . . . PR is prepared to furnish groups of crystals for spot frequencies on short notice. *Take your net problem to any PR jobber.* He will get you PR Crystals in a jiffy for any integral frequency within amateur bands — AT NO EXTRA COST.

20 METERS, Type Z-3, $3.75 • 40, 80 AND 160 METERS, Type Z-2, $2.75

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construction results in COOLER OPERATION

GREATER DISSIPATION
LONGER LIFE
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*Pat. Pending

Note new plate structure for improved heat dissipation.

450 TL/
HK-854L

Tested under exceptionally high overloads without tube failures

This new plate structure in Gammatron tubes has resulted in very efficient dissipation of radiant and infra-red energy. Internal electrode temperature is lowered 150 to 200° F. by this design, and the lower visible plate temperature at maximum ratings is within the ideal range for the dissipation of heat through the Nonex envelope.

In test runs, Duplate tubes have been safely operated considerably above their rated plate dissipation. Consequently Duplate Gammatrons may be the best answer to your transmitting, R.F. heating, or general purpose application.

Ask for Duplate *Gammatrons*
Tube data gladly supplied on request

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★ ★ Letters ★ ★

Delaware-Lehigh Amateur Radio Club

717 Porter St., Easton, Penna.

Editor, *CQ:*

After seeing your recent article on amateur public relations, I thought you might be interested in the enclosed photograph of a display of the Delaware-Lehigh Amateur Radio Club in one of the local store windows as part of a community hobby show held last year.



With the advent of television in this fringe area, and the bad publicity given to the hams by unscrupulous service men and dealers, this display did much to increase the stature of radio amateurs in this and surrounding towns.

Much message traffic was handled via the 80-meter traffic circuits, and phone QSOs with local hams were carried to the public by way of a p.a. system. Co-öperating hams were: W2TKV, W3MAC, W2ZQK, W3NF, W2KFR, W2TAV, W2RXL, W2WXK, W2ZPF, W3PYF, W3NTT, W2SFV, W3IPS, W3LHD, and W2PXU.

Clarence Snyder, W3PYF

Heat Reduction in the Command Transmitter

109 W. Emma St., Tampa 3, Fla.

Editor, *CQ:*

I just read the interesting article by Clarence West, W2IYG, in the February issue of *CQ*, on stabilizing the VFO. It was very interesting to me since I use a BC-696A here, and have a little kink that may help the hams who like to soup them up a bit.

Mr. West says he removed a tube and decreased the heater voltages to drop the heat generated by the rig. What I did was to take the original metal cover and cut a paper pattern to fit it. I then cut a sheet of regular window screening to fit the pattern, and soldered it to form a new cover. It works swell, and the ventilation is all that could be desired.

Right now I am running about 100 watts input to the BC-696A alone, and have not had a bit of trouble. It really runs cool!

H. T. Brown, W4JVJ

Word from a Novice

Hillisburg, Indiana

Editor, *CQ:*

I read with great interest your editorial in the March issue of *CQ* concerning the Novice Class license. Perhaps it is because I consider myself a future ham that I take such interest. I am only 18, and a senior in high school. So far I have delved into the technical side quite heavily, but I am just learning the code. What I need now is a helping hand. I need an experienced amateur to answer the many questions which only a beginner can ask. Whether I will obtain a Novice license or a Class B license remains to be seen. Keep up the good work.

Freddie Myers

ZERO BIAS

EDITORIAL

With about a month left before the June 30th deadline on the *CQ* $1000 Cash Prize "Home Brew" Contest, there is still time to get your Initial Entry in to the New York office. The complete rules appeared in the March and May issues of *CQ*, so we won't repeat them here. If you have any questions about the contest, drop us a line, but don't waste any time! If you want to be in the big money it is time to get to work now, without further delay.

It doesn't have to be big, fancy, or expensive to be a winner—it just has to be a well-engineered and well-built piece of ham gear. If it is something your friends have admired there's a more than outside chance that our judges will be impressed, *too*!

No box tops—no statement in 25 words or less—just an open contest for all of our readers. May we hear from you?

In the Public Eye

It takes a lot of doing to present the radio amateur to the non-ham public in such a manner that his true importance will be recognized. Every time one of us delivers a message from a distant loved one, every time we clear up a TVI case in a businesslike and expeditious fashion, every time we are able to render public service during a period of emergency, we help the public to understand the reason for our existence—our true basis and purpose. These things most of us do our best to accomplish in our own community, and we've been doing a pretty good job on this score. If we hadn't been successful in selling amateur radio to our neighbors it's a fairly safe bet that we'd have been legislated out of existence many years ago. It is fortunate for us that the ideology of "majority rule" is only a politician's catch-word and not a political fact. The protection of the rights and privileges of the minority has always been a part of the American way of life.

On a broad scale, however, looking at amateur radio from the viewpoint of the population as a whole, the amateur's case has not been presented as well as it might be. The frequent unwarranted attacks on amateur radio, made by those who *should know better,* and which are generally retracted when the true facts are put before their author, are a case in point. It seems to us that it is our duty as hams to see that the public is educated about us to such an extent as to make the publication of mis-statements about us virtually unheard of. You know the type of mis-statement we mean: "False distress call traced to *radio amateur* . . . " is one which crops up from time to time. Although such statements are proven to be untrue every time they appear in print, it seems to us that it is our own fault for allowing a situation to exist where they *can* get into print. Our news people should be trained to be as cautious about libelling ham radio as they are about libelling individuals. It is up to us to bring about this state of affairs.

On the local scale one solution would seem to involve a little less reticence on the part of all of us when it comes to making ourselves known as hams. The leading business man of a community should not regard his ham radio as something for him to enjoy in the confines of his home, but could well be brought to the attention of the public in a dignified way. The next time he addresses his Rotary Club or American Legion meeting why not talk on amateur radio? Our editorial in the April issue of *CQ* may provide a good starting point. Is there any reason why the town physician, a ham, should not carry his ham call at the rear of his car? You'd be surprised how much good it could do ham radio, and we'll bet it won't hurt his practice a bit. We know of newspaper editors who are hams who rarely, if ever, print anything about amateur radio in their editions. Is that any way to help the rest of us? Let us never forget that we are licensed hams, and let us keep that fact before the public at every opportunity. If you are a person of major importance in your community, let your townspeople know that you are a ham *too.*

Staff Note

Our continued growth is marked this month by the addition of a new member to our editorial staff. Robert Green, W4KKM, presently operating /2 at Woodmere, N. Y., joins us as Editorial Assistant. Licensed since 1946, Bob's main ham interest at the present time is 28-mc phone. Look for him when the band is open to New York in your area, since it seems to us that he is always to be found behind his 150-watter.

Bob's special duty at *CQ* is the expansion of our public relations program in behalf of ham radio. You'll be hearing from him before long.

—W2BYF



Do you jump every time the doorbell rings?
Do you shudder when a new TV antenna goes up next door?
Or have you given up and gone off the air because your wife thinks wrestling matches are more important than DX?

If so, now's the time to get back on the band-wagon and lick those TVI problems the easy way . with Eimac tetrodes . . and at the same time you'll enjoy the advantage of operating a truly modern rig.

Actually just plugging an Eimac 4-250A, 4-125A, or a 4-65A into a socket won't eliminate your neighbor's wrath, but transmitters built around Eimac tetrodes are definitely the simplest to de-bug.

Inherent stability of Eimac tetrodes reduces VHF parasites to a minimum and their high power-gain enables them to be practically driven by a peanut whistle.

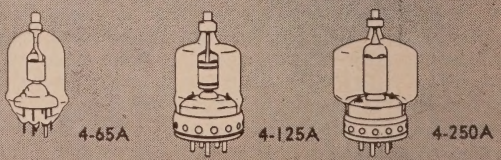
Rebuild now with Eimac tetrodes . . . then crank up the power and really enjoy operating again.

COMPLETE TUBE DATA AVAILABLE FREE . . . WRITE TODAY

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The Latest Techniques for the Elimination of Ham TVI

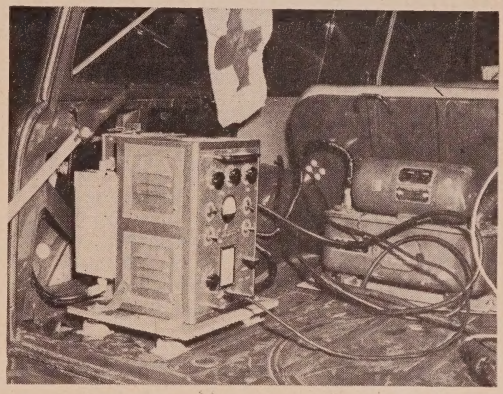
PHILIP S. RAND, W1DBM*

One of our leading authorities on TVI reduction tells how to clean up your mobile transmitter.

It started as a description of the steps Phil took to clean up the TVI caused by his 50-watt mobile rig, and it ended up as what we feel to be the best manual yet written on the subject of the use of low-pass filters for TVI reduction. Phil Rand has made another important contribution to the solution of the TVI problem which besets amateur radio today.

A GREAT MANY AMATEURS are turning to 10-meter mobile operation as an out to TVI. Rarely is anything ever done to prevent TVI from these mobile units. It is just assumed that the low-powered mobile transmitters will not cause TVI, or, if they do, it will not last for long on any particular TV set as the car is constantly in motion. Both of these assumptions are apt to be incorrect. In the first place, as pointed out by the author in both *CQ*[1] and *QST*,[2] the power of the transmitter does not necessarily have any relation to the harmonic output; and, secondly, many mobiles hunt out a good high location and proceed to park and work the gang. In such a high location, of course, the second harmonic also gets out well.

The damage to Channel 2 that a 20-watt mobile can do was forcibly brought home to me the other night. I was in contact with a friend in his car about 10 miles away, and invited him to drive over. When he was about two miles away on the Boston Post Road, I noticed cross hatching on Channel 2 that came and went with his transmissions. On my next "over," I told him what was happening, and, of course, he thought I was pulling his leg, so while my 600-watt rig was still on, he kicked his little 20 watter on and off a couple of times, and each time—out went Channel 2. When I told him that I could tell when his rig was on or off even though I was transmitting at the same time on the same frequency with 30 times the power, he was even more mystified.



Side view of Harvey-Wells TBS-50 installed in Plymouth station wagon, showing copper screening over louvres.

At one mile, this 20-watter turned Channel 2 into a negative picture, and what happened at one-half mile shouldn't even happen to a TV looker. I pleaded with him, "Please don't turn that thing on again or my neighbors will begin to wonder."

Here was a 20-watt mobile that took out Channel 2 over an area enclosed by a circle four miles in diameter—almost the size of the en-

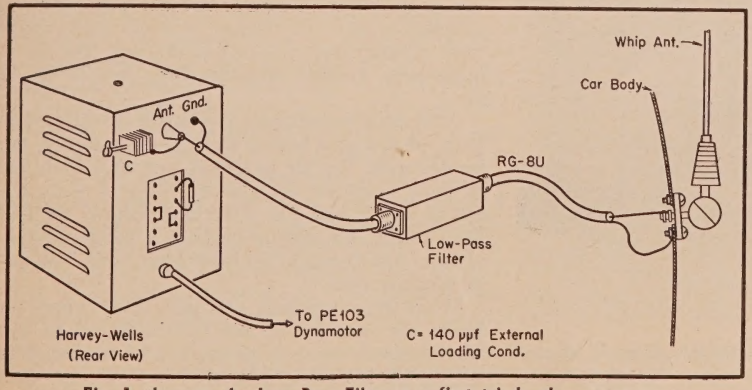


Fig. 1, the way the Low Pass Filter was first tried—the wrong way.

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* *Laboratory of Advanced Research, Remington Rand, Inc., South Norwalk, Conn.*

[1] P. S. Rand, "TVI—Three Easy Lessons," *CQ*, May 1949.

[2] P. S. Rand, "TVI—Can be Reduced," *QST*, May 1948.

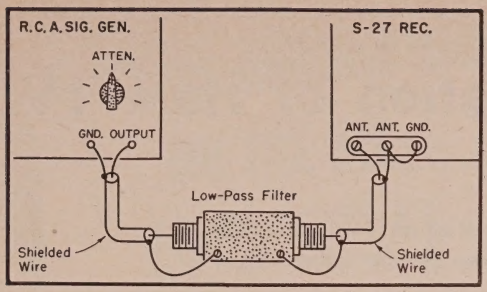
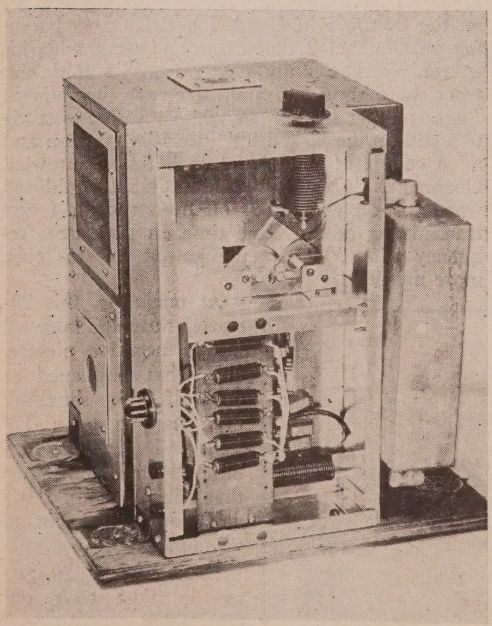


Fig. 2, showing the original setup made to try to measure attenuation of low-pass Filters—also wrong way.

tire city of Norwalk, and the owner was not aware that he caused any TVI, except possibly as he passed directly in front of a house—Oh Brother!

Having a Harvey-Wells TBS-50 in my car, I decided to make some checks. First, we measured the field strength of the fundamental and of the second harmonic to establish how good or bad the situation was. The fundamental measured 235,000 μv/m, while the second harmonic read 500 μv/m. Not too bad, but still strong enough to take out Channel 2 on a couple of dozen TV receivers, especially if I was parked in a poor TV area.

A situation like this called for a low-pass filter. The transmitter was reasonably well shielded, and the antenna was fed through a 50-ohm coax line, so it looked like duck soup. Just stick in a low-pass —that's all there was to it.



Rear view showing harmonic type r.f. filters in all control and supply leads. Large choke at bottom is in filament lead.

A filter kit was purchased, and after it had been assembled according to directions, it was spliced in the coax between the rig and the antenna.

Field strength measurements were again made, and to our surprise, the second harmonic had been reduced barely 20 db. The instructions claimed 65 to 80 db—something must be wrong. We next tried several other filters, including the Collins, Niagara, Eldico, G. E. Harmoniker, and one of our own design, with the same results—between 10 and 20 db attenuation.

Measuring Low Pass Filters

Obviously, either all the filters were all wet, or we weren't using them correctly. *Figure 1* shows our original hook-up. We decided to make a setup

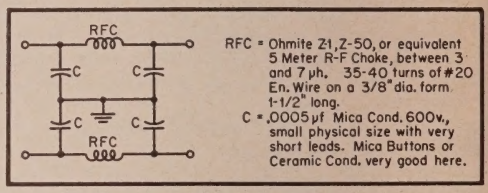


Fig. 3. Hook-up of TVI a.c. filter as installed in both the RCA Signalist and S-27 Receiver.

to measure the attenuation of the filters in the laboratory, and, at the same time, determine the correct way to use them.

An RCA r.f. Signal Generator with fundamental output up to 110 mc was selected, along with a Hallicrafter S-27 receiver, the latter to be used as an r.f. voltmeter.

In setting up the gear preparatory to making the measurements, it was a little disconcerting to find that the leakage from the signal generator read S9, even when its attenuator was turned to 0. However, this leakage was traced to the a.c. line cords of the signal generator and S-27 receiver. Installation of TVI-type a.c. line filters[1, 2] in both units cured the trouble. The signal generator could now be run wide open and could not even be found on the receiver as long as there was no connection between them. *Figure 2* shows the setup. *Figure 3* shows the a.c. line filters as installed under the chassis in each unit. (Both units already had a.c. line filters, but they were apparently entirely unsatisfactory for 28 to 60 mc.)

A set of measurements was made on the assortment of low-pass filters, and, needless to say, the results were for all practical purposes identical to those made on the Harvey-Wells. A comparison of *Fig. 1* and *Fig. 2* certainly shows we had been consistent, and probably is a good example of how *not* to use a low-pass filter, and how *not* to measure one.

What was happening was this: Everywhere we broke the coax cable and fanned it out to two binding posts we were giving the r.f. a chance to get on the outside of the shield. If the low-pass filter could stop all the harmonics travelling on

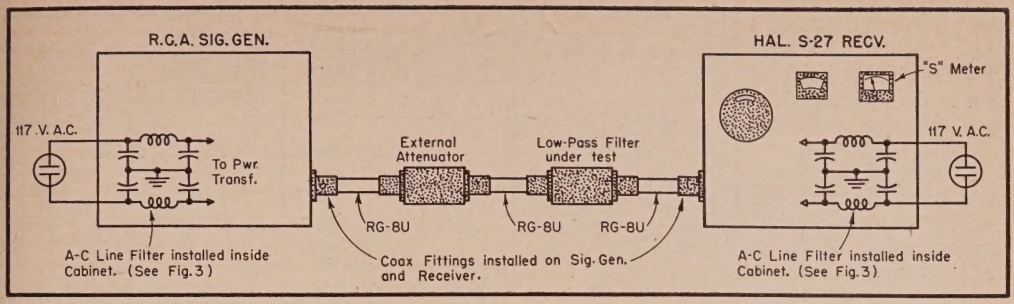


Fig. 5. This is the correct use of RG-8/U with coax fittings for all connections.

the inner conductor, it could stop only 50% of the total, assuming it was equally divided on the inside and the outside of the coax. This means that the best filter may only reduce your harmonics 6 db if you let the stuff get on the outside of the coax.

With this thought in mind, we installed coax fittings on the signal generator and S-27 receiver and on the RG-8/U cable used. Now we began to get some measurements that meant something. However, we were troubled with leakage in the attenuator on the signal generator, and so an external attenuator was built up as shown in *Fig. 4.*

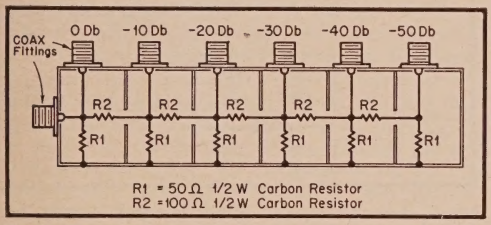


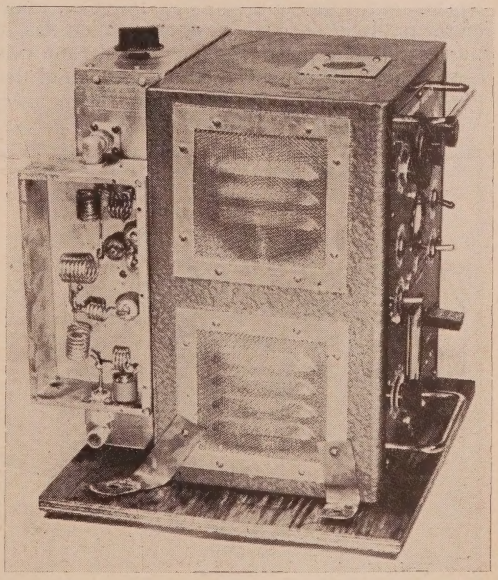
Fig. 4. The construction of the external attenuator. The actual amount of attenuation provided is only approximate and must be measured by other laboratory means.

The new measurement setup is shown in *Fig. 5.* It was now possible to measure the difference in attenuation between the various filters and to get readings of 50–80 db attenuation.[3]

Impedance Matching

One point that has not been mentioned so far, and which is very important, is the fact that the value of the coils and condensers in a filter are calculated from a formula that takes into consideration both frequency and terminating impedance. Now, obviously no one would put a low pass filter that cuts off at 40 mc into the feed line of a 50 mc transmitter; however, many will put a 50-ohm low pass filter into a feed line marked by the manufacturer "52-ohm, RG-8/U"—blindly assuming that the manufacturer is correct. Now, RG-8/U, 52-ohm coax is only 52-ohms when it has a 52-ohm resistor or its equivalent in the form of a correctly matched and tuned antenna, or antenna coupler, connected across its far end. The standing wave ratio is quite easily measured and will tell you whether or not it is matched correctly. It is quite easy to have a standing wave ratio of 10/1, or higher, which means that the 52-ohm coax may be 5 ohms or 500 ohms instead of 52 ohms, and so all the coils and condensers in the filter are ten times too big or too small. Your low-pass filter now becomes a "no pass" filter, and defies you to get any r.f. through it.

You are referred to an article by Pattison, Morris, and Smith in July *QST,* 1947, page 41, for constructional dope on a simple sure-fire SWR bridge. No amateur using a low pass filter should be without one. Works fine for matching that beam to RG-8/U coax too. Incidentally, coax feed to that 10 or 20 meter beam helps prevent BCI as well as TVI due to fundamental overloading. Just run it from the house to the tower underground, and then up the center of the tower to the beam. It may be easily matched to the antenna



View of low-pass filter. Note center coil turned at right angles to end coils to reduce coupling. It would be better if all sections were shielded from one another.

[3] It is very difficult to get accurate readings in the range of minus 80 db, so all readings are only relative. See *QST* for April 1950, article by George Grammer on TVI.

with a "Gamma Match"[4] (½ a "T" match). The antenna itself must be cut to the right length if you want a real low standing wave ratio.

In view of the above, the RG-8/U coax was terminated in a 52-ohm carbon resistor *in* the S-27 receiver. The antenna coil was tapped across part of this resistance.

Measuring the Attenuation

The procedure used in measuring the attenuation of the various low-pass filters was as follows:

First, the signal generator was tuned to 30 mc and directly connected with RG-8/U coax to the S-27 receiver through the external attenuator. The signal was tuned in on the S-27 and the attenuator was adjusted so that it read some convenient value, such as S8 on the S-meter. Next, the low-pass filter was inserted in the RG-8/U, and the S-meter was again observed to see if there was any attenuation of the 10-meter signal. No attenuation was observed on any of the filters.

The second step was to tune the signal generator and receiver both to 57 mc, and with the low-pass filter in the coax line, adjust the attenuator for maximum signal which was around an S2 with the full output of the signal generator. Next, the low-pass filter was removed from the line, and the attenuator was adjusted to give the same S2 reading on the receiver. The amount of attenuation that it was necessary to put in the line to make the two S-meter readings equal was the attenuation of the particular filter under test, and, in most cases, this exceeded 65 db. Most of the filters started to cut off between 35 and 45 mc, and all had 80 db or higher attenuation on the third and higher harmonics.

[4] "Gamma Match," *QST*, Sept. 1949.

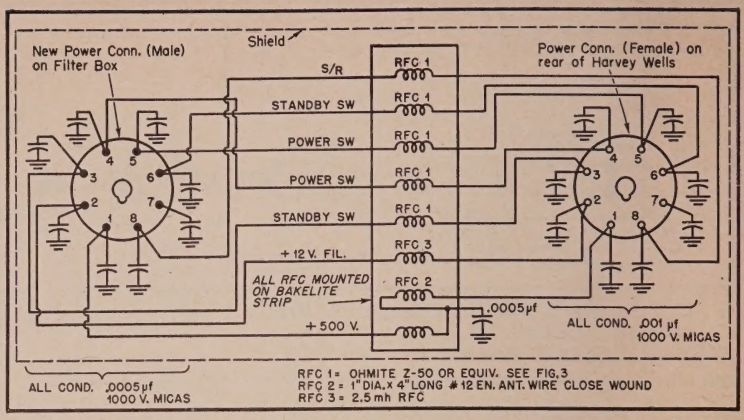


Fig. 7. The installation of r.f. Filters in the power supply leads inside the inverted chassis bolted to the rear of the TBS-50 cabinet.

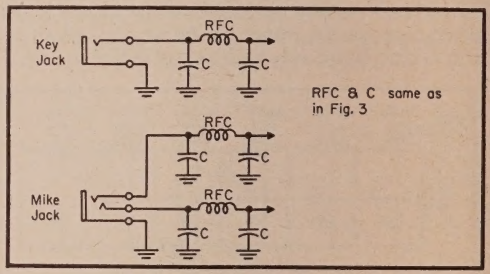


Fig. 6. Harmonic-type r.f. Filters installed in mike, key, and send/receive leads.

Filters with shielding between sections had higher attenuation than those built in a single box. A 50-ohm single-ended G.E. Harmoniker designed for 10 meters only had 30 db attenuation on 57 mc, while a double 50-ohm Harmoniker (two regular units in series in a single box with partitions between the four coils) measured 60 db attenuation. One of the best tested was the Collins $40.00 job. This was undoubtedly due in part to the excellent shielding between sections that their particular type of construction provides.

(*Continued on page 59*)

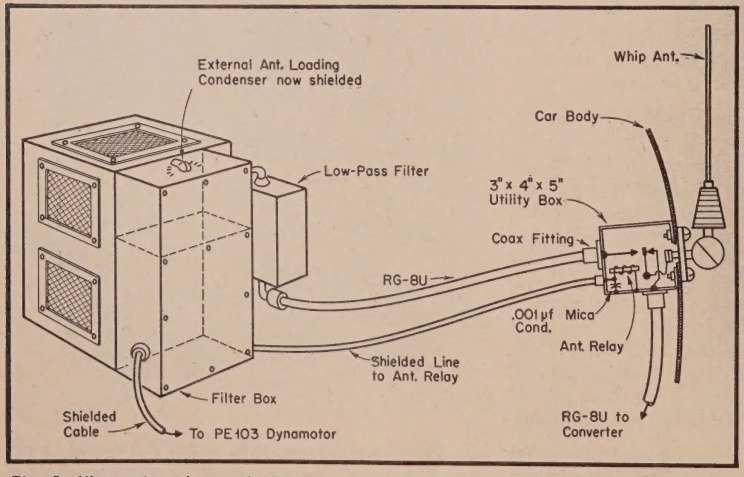


Fig. 8. Illustrating the method of mounting filter box and low pass filter, as well as method of terminating RG-8/U at antenna. Note antenna relay is also in the box.

FCC Commissioner W3DF

JACK TERRY*

Saying, in part: "There is indeed cause for deep concern. Amateurs should do everything within their power to consolidate and bolster their position. . . ." Commissioner Sterling supports the statement by Commissioner Webster which appeared on page 15 of last month's CQ. These two statements are vital to the future of every amateur.

WHEN THE AVERAGE HAM THINKS OF FCC commissioners, the picture is that of an outstanding Presidential appointee with a business, legal, political or engineering background. But it is all a pretty remote proposition—top-level, brass hat sort of stuff. Today, though, Ham Radio can point with a great deal of pardonable pride to its very own — none other than Commissioner George Sterling, W3DF, an active ham continuously since 1908!

Let's skip past how nice it is to have this ham on the bench of FCC (he is the first and only one to date) and visit W3DF to see the rig.

As we swing around the corner on a Sunday afternoon, we have no need to search for house numbers. The antenna-farm over one house identifies our goal. A mast at the peak of the roof supports a veritable spider web of center-fed doublets for 80, 40, 20, and 10 meters. The chimney mounts a rotatable, high-gain TV antenna. As we park in the driveway, there is Commissioner Sterling himself. He is surrounded by an almost completed 3-element rotary for 10 meters, a home-brew job. The good old ham welcome warms the heart; it is a fine tribute to the universal fraternal spirit of our hobby.

The main ham shack is on the second floor in a room crammed with ham gear and other electronic apparatus. The transmitter runs a conservative 600 watts input on phone and c.w. to a pair of 813s driven by an 807 and an HT-18 VFO. The modulator uses Class B 838s and is driven by a speech amplifier that includes the latest techniques. Everything is homemade except the VFO. Receiving is handled by an SX-42 and a new SX-71, a recent addition. This outfit is generally used on 75, 20, and 10 meter phone.

Our host apologizes when we find the 813 amplifier pulled out of its accustomed position. Says he, "Sundays are about the only time I can take a few hours off and work on the ham gear. Right now, a funny thing has started to happen in the final. The 813s neutralize perfectly on ten, but when I shift to twenty—unless I reneutralize —they take off!"

Also in the ham shack are other interesting items. There is a professional type recorder. An FM receiver and hi-fidelity speaker provide music for the most discriminating. A ten-inch TV set is in another corner. A first-rate place for the Commissioner to check the woes of TVI, it is temporarily diverted to color TV, being fitted with a homebrew adapter for the CBS rotating disc system.

The W3DF license is posted on the loudspeaker grill, and lists of Q-sigs and ham prefixes are posted conveniently nearby. The walls are covered with diplomas, certificates, pictures, QSLs and other momentos of 42 years in the radio industry. We note pre-war and postwar QSLs of the late W1EH, Ken Warner, ARRL's firm guiding hand for so many years.

Sterling is proudest of the straight key he uses with this main rig. It is one he has had since he was one of the first sea-going radio-ops in the days before World War I. A sturdy affair, it has pounded out countless words of traffic and ragchew. Perhaps it shares honors with its owner who is both member and director of the Veteran Wireless Operators Association.

But this isn't all of the electronic installation. Downstairs in the living room we find two more TV sets. One is the Commissioner's family set—a 16-inch beauty. We are told that his wife won't permit him to touch anything about this set except its knobs!

The second is for color, this time the RCA system. It is one of a group temporarily installed in the homes of the Commissioners in connection with the FCC hearings on color TV—that sixty-four dollar question. As the test for the day is about to start, both sets are turned on. For the next hour color TV is found enjoyable—including the blonde. Tuning ease, effect of rotating the antenna, color fidelity and many other details are compared. We are not surprised to find that Commissioner Sterling makes a point in consulting his



"You see, the 813s neutralize perfectly on ten, but look what happens on twenty."

* *c/o CQ, 342 Madison Ave., New York 17, N. Y.*

friends and neighbors in order to get a layman's reaction.

But this isn't hamming and we reluctantly tear ourselves away. Shack number two is in the basement. This time it is a 400-watt 40-meter special. A surplus BC-459 drives an HK-354-E in a typical ham lashup. The receiver is an SX-28. And of course the basement contains the workshop where construction and experimentation take place—at least when a crowded and hurried official life will permit.

A brief visit to the family car is final evidence of George Sterling's ham enthusiasm. You're right—he has a ten meter mobile rig installed in it. But you didn't guess that it also contains a VHF job on 152.03 mc, used in the postwar "Common Carrier Service."

And he maintains another amateur station (not as extensive!) at the family home on Peak's Island, Maine. Here he signs W1AE. It is a familiar call to Sterling for it was first assigned to him in 1912 when the government decided hams should have licenses and regulations of a sort.

Today he spends his vacations operating W1AE and enjoying his boyhood home and companions. Last summer he petitioned his fellow Commissioners for an STA (special temporary authorization) and spent two weeks operating with NBFM throughout the 20- and 75-meter phone bands. This is just a modern version of his "let's check it" policy used for many years. In 1927 he wrote his famous *Radio Manual*. Everything included in this book had been personally checked by Sterling, a great deal of it in his own ham station!

Sterling really glows when the conversation turns to Maine lobsters. Other than "hamming," he is happiest when he is out with his friends in the lobster business, pulling and setting traps in the waters off Peak's Island. He has vivid recollections of a trip to the "woodshed" brought on as a result of his fondness for lobster. Peak's Island harbored a large summer colony and young George aided the family budget by selling vegetables from his Dad's garden. Noontime, one day, overtook him at the home of a lobster fisherman and he used the profits from the day's sales to purchase a lobster for lunch. He avers with feeling that parental discipline was administered in accordance with truest Maine traditions.

In 1908, the 14 year old took up wireless along with a couple of young friends. Everything had to be homemade, spark coils, tuners, condensers, and the like. Crystal detectors were found in the woods—iron pyrites. Aerial wire was borrowed from an "abandoned" telephone line in the woods. Only headphones had to purchased.

The aerial wire caused some confusion. As the Commissioner tells it: "We thought that aerial wire had to be bare to let the radio waves through. So we took it down in Al Ranger's cellar (his dad was the minister) and started to burn the insulation off. We almost set the house on fire. We caught it good because of that and the terrific smell which drove the parson from his study where he had been preparing the next Sunday's sermon!"

Many years later, his Uncle Bill was to epitomize this youthful training when he said, "Always deeply interested in radio, always a worker, George is the quiet sort; deep, you know. But he's always thinking and no matter what it costs him in time and work, he puts his dreams into action. He's a typical Yankee, George is!"

Sterling is a former Chief Engineer of the FCC, having been appointed to the bench from that post. He is extremely proud of his wartime work as head of RID, the Radio Intelligence Division. This organization, manned largely by hams recruited by the knowing Sterling, was so effective that the enemy never once successfully employed clandestine radio for espionage in the United States.

Some 50,000 copies of the *Radio Manual* have passed into the hands of the industry. The new, postwar edition for "Amateurs, commercial operators and engineers" has just been released and is both authoritative and exhaustive in its treatment of the communications field. Sterling is also a Fellow of the Institute of Radio Engineers.

The $64 Question

As we prepare to leave his home after a most cordial visit we ask, "Rumblings are being heard of serious unrest in the frequency allocation field —everybody wants more channels. How does this affect the amateur?"

Commissioner Sterling hesitated, carefully sighted on his ham antennas, and then replied,

"There is indeed cause for deep concern. Amateurs should do everything within their power to consolidate and bolster their position.

"The demand for channels is staggering and far exceeds the available supply. The heaviest pressure is in the high frequency region where are located our most valuable ham frequencies, the 3.5, 7, 14, and the proposed 21 mc bands.

"The claim of each service to its frequencies is today being scrutinized carefully by many who seek to fill their own urgent requirements. This means that the users of frequency space must justify their need for continued occupancy; they must make the fullest and most efficient possible use of it; and the use must be in the public interest—to a degree sufficient to be adequately competitive with other claimants. Justification must inevitably be in terms of present and potential worth of a service.

"Amateurs should consider how to strengthen their position today and now, both in the United States and internationally. Present and future international telecommunications conferences will be worked out not only on engineering principles as in the past, they must now consider powerful political, economic and social forces.

"The outcome of the High Frequency Conference, now convened in Florence, Italy, as well as the Special Administrative Conference to be held in Geneva, Switzerland, this September will give ample evidence of the magnitude of the battle the amateur will be confronted with in 1952 to maintain his status quo!"

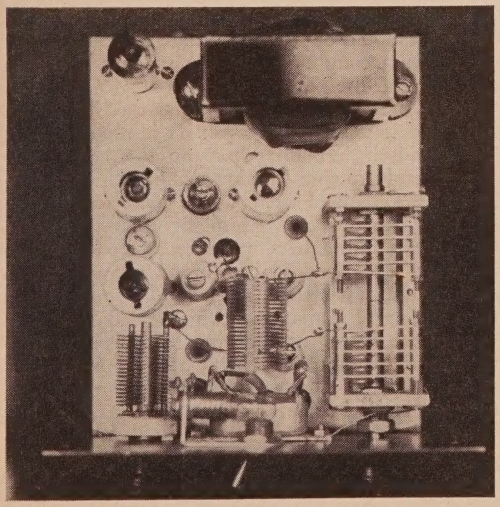
A Flea-Powered, VFO Rig For 10-Meter Mobile Operation

GILBERT C. VOYLES, W9THD*

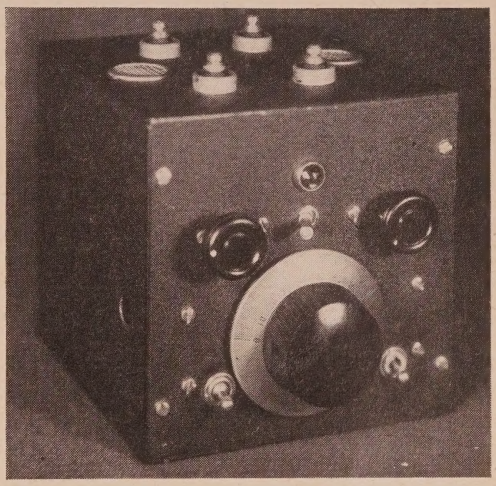
THIS LOW POWERED RIG provides VFO controlled phone on ten, and may be used for either mobile or home operation. The power input to the final amplifier is only eight watts.

This transmitter should appeal to the ham who wants to get on the air with a mobile rig without inheriting a flat pocketbook and dead battery. The complete transmitter is only six inches square and may be mounted up near the driving position for ease of operation. A switch is provided for turning the VFO on by itself for the purpose of moving up on the desired frequency unbeknownst to the general ham fraternity. Parts required for the construction of this rig are easily obtained, the junk box supplying the major portion. The circuit consists of the old standby Hartley oscillator with electron-coupled harmonic output using a 6AK5. All tubes used are miniature type to conserve space. A 6C4 serves as frequency doubler driving a single 6AQ5 in the class C final. A single 6AQ5 operating class A serves very nicely as the modulator with an ordinary filter choke serving to keep the audio from being lost back through the power supply. A single button carbon mike, such as the surplus T-17B will drive the modulator to full output. Theoretically, this hook-up is incapable of full 100% modulation; however, checks with other hams using panadaptors have proved the carrier modulated close to the maximum desired amount.

* *740 East Powel Ave., Evansville, Ind.*



Everything above the chassis can be seen in this view. The layout is described in detail in the text.

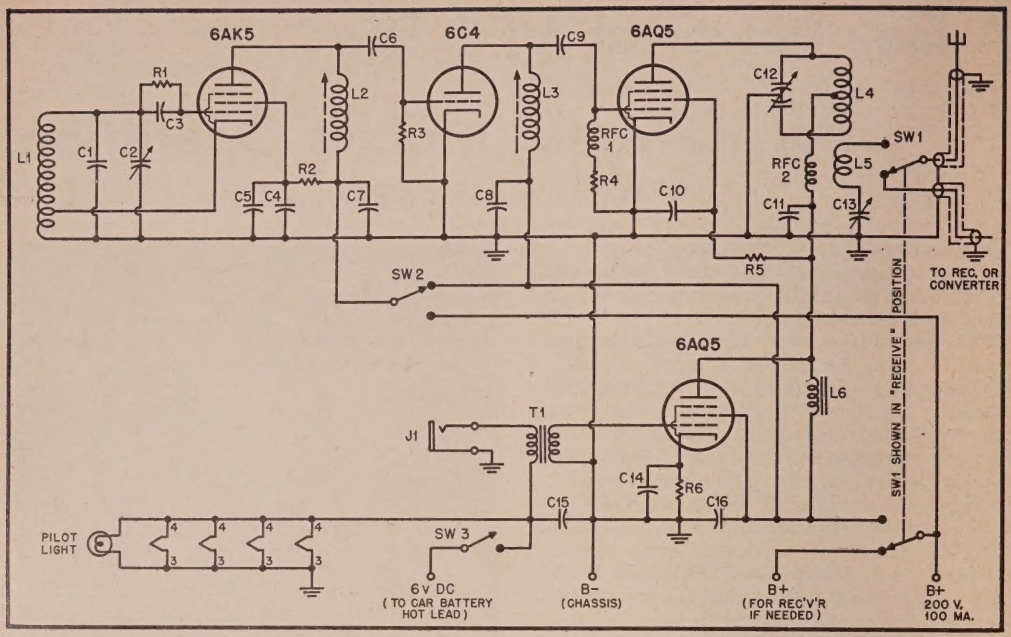


The shock mount at the top (burgled from an ARC-5) provides a convenient vibration-proof mounting. The slow-motion dial, by National, gives enough spread to make tuning easy.

Construction

The rig is built on an aluminum chassis 5 X 6 X 1½ inches and is housed in a black crackle-finished metal utility cabinet six inches square. Rubber shock mounts removed from a surplus ARC-5 receiver dynamotor well are fastened to the top of the cabinet, the motor mount base is then fastened up under the car dash for easy installation or removal when desired. The rubber mounts are easily removed from the surplus item and are seldom used with it anyway after conversion.

In the oscillator circuit a variable condenser of the double rotor support type construction is to be desired to prevent any frequency instability due to mechanical vibration. The one used by the author was a Hammarlund with heavy rotor and stator plates. This rigid construction contributes to the overall stability of the oscillator and is a very necessary feature. The oscillator grid coil is wound on a ceramic coil form and is spread out to cover the ten-meter band. As there is no band *set* condenser, it will cover approximately ¾″ of the form. When completed and adjusted to cover the desired frequency range, the coil turns should be secured with a good coil dope application. The



C1—170 μμf, silver mica or Ceramicon
C2—20 μμf, variable, use 2-bearing unit
C3, C6, C9—100 μμf, ceramic
C4, C16—Dual electrolytic, 8 μμf per section, 450 volts
C5, C7, C8, C10, C11—.001 μf, mica
C12—20 μμf per section, dual midget variable
C13—50 μμf variable
C14, C15—20 μf, 25 v., electrolytic
R1, R2, R3—50K, ½w.
R4—25K, ½w.
R5—25K, 10w
R6—400 ohms, 10 w.
L1—14 turns #24 enamelled wire, on ½-inch form, tapped 4 turns from ground end. See text for spacing details
L2—34 turns #30 enamelled wire, on ⅝-inch slug-tuned form
L3—9 turns #16 enamelled wire, on ⅝-inch slug-tuned form
L4—17 turns, ¾-inch diameter, (B&W #75-326). Leave three turns on one end for L5
L5—3 turns on same form as L4. (part of B&W miniductor)
L6—7 hy, 100 ma filter choke
T1—Midget single-button-mike-to-grid transformer
RFC1—Ohmite type Z-28
RFC2—Ohmite type Z-14
SW1—D.p.d.t. toggle switch
SW2—S.p.d.t. toggle switch
SW3—S.p.s.t. heavy duty toggle switch
Power required: 6 v. d.c. and 200 v. d.c. at 100 ma.

coil is mounted underneath the chassis near the 6AK5 tube socket to keep all leads as short as possible. The cathode tap is four turns from the ground end and the coil is turned in such a position as to keep the grid and cathode leads as short as possible. In this case they were 1″ and ½″ long respectively. A brace constructed from ⅜ X 1/16″ aluminum was connected from the grid end of the coil form to the chassis side wall to help make the coil more rigid.

It must be kept in mind that all leads must be made as secure from flopping around as possible and, after the wiring is completed and checked, they should all be seceured to tie posts or the chassis with coil dope or a good cellulose acetate cement. C_1 is mounted on the stator frame of C_2 by placing a drop of this cement at either end. C_3 is a small ceramicon with R_1 connected across it and both are fastened to the bakelite tie post placed there for the purpose. L_2 is the Oscillator plate coil and is wound on the same size and type form as L_3 and is mounted underneath the chassis between the 6AK5 and the 6C4. The L_3 is mounted between the 6C4 and the 6AQ5 final tube. Turns data for all these coils may be found in the coil table which is a part of the parts list. L_4 is an airwound type and three turns are clipped loose at the end opposite the plate to be used for the antenna coupling coil. The spacing between this coil and the plate tank is about ⅛″, or two turns. A B&W Miniductor coil was used by yours truly and it makes a nice job. It is mounted on ½″ stand-off insulators between the tank condenser and antenna tuning condenser directly behind the filament switch. The plate lead from the 6AQ5 to this coil is brought up from below the chassis through a polystrene feed-through insulator. This lead also connects to one stator section of C_{12} which is a small Cardwell taken from a piece of war surplus equipment. Facing the front of the transmitter, this condenser is mounted on the right hand side near the front of the chassis with the rotor shaft extending through the front panel. The filament switch is mounted in the center of the panel with the final tank located directly behind it. This switch is a heavy duty type taken from surplus also. To the left of this switch is the antenna tuning condenser and behind this is the 6AK5, L_2 and 6C4 in the order named.

(*Continued on page 56*)

The Air Force Interest in Sporadic E Ionization

N. C. GERSON*

For the progressive amateur, for the amateur who believes in the furtherance of his hobby, for the amateur who wants to help in the National Defence of his country and of the free countries of the western hemisphere—this is a MUST READ. Instituted a little over one year ago, 425 amateurs in 15 countries are presently engaged in this cooperative effort. The observations they are collecting are forming an important link in understanding the ionosphere. Now for the first time since this project has been formed, here is the official story of what will be accomplished. Read it—absorb it, and if possible get behind it. It is a task especially cut for the amateur—let's all do our share to ensure a successful outcome.
—*Editor*

OF THE VARIOUS REQUIREMENTS OF THE U. S. AIR FORCE, one of the strongest is that of obtaining a comprehensive knowledge of the medium through which it operates today and will operate in the future. In addition to understanding how both men and machines will perform at extreme altitudes above the earth, a thorough knowledge of the properties of the gaseous envelope must also be determined. It is insufficient to investigate only those atmospheric regions which are currently traversed by aircraft; the vehicles of the future may be quite different in form from those presently in use and may even traverse any portion of the atmosphere from the surface of the earth to the boundaries with interstellar space.

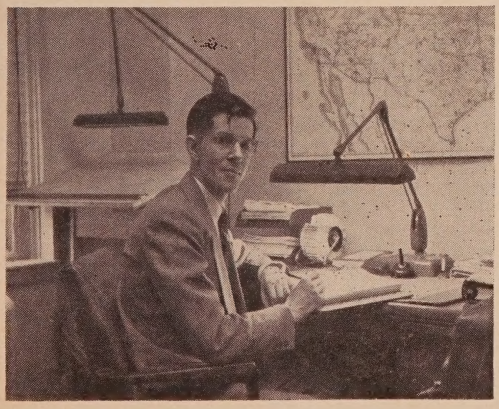
The properties of this thick gaseous mass surrounding the earth—an envelope which may extend outwards to a distance of several earth radii —is meagerly known. By far the greatest majority of observations, and the greatest extent of knowledge is confined to a comparatively thin membrane termed the troposphere.[1] Even within this zone many processes and actions occur, the complete development of which is far from understood.

As a case in point, the present knowledge of weather mechanisms is far from adequate. Explorations of higher gaseous shells nevertheless is progressing. By means of balloon borne apparatuses, sampling may be undertaken of the stratosphere.[1]

Although direct investigations by means of rockets have been in progress for some time, such work is still in its infancy and examination of the higher regions is still mainly dependent upon indirect probing techniques.

Thus, the ozonosphere may be studied by means of ground based ultraviolet transmissions; the ionosphere,[1] by means of radio wave transmissions; and the mesosphere,[1] which includes the region of auroral activity, by means of the infrared, visible and ultraviolet emanations occurring within it.

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O. P. Ferrell, Project Supervisor for CQ.



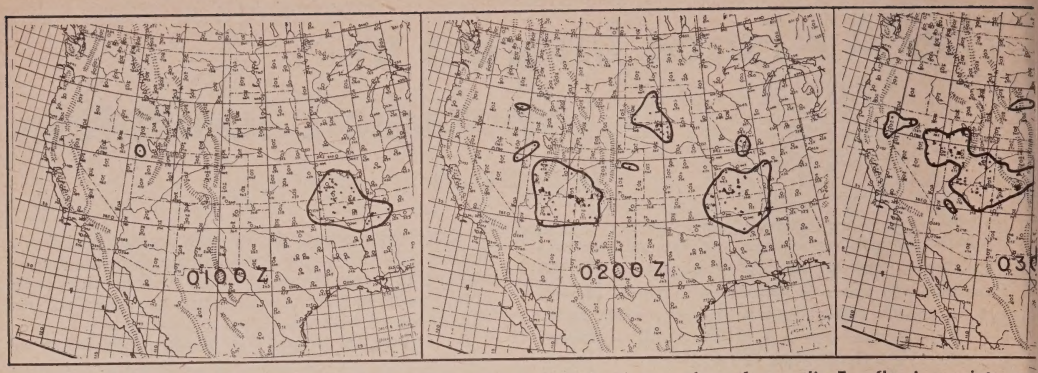
RASO maintains a separate file for each observer.

From the various studies being undertaken by spectrographic and radio techniques, considerable knowledge may be gained on the density, temperature, constituents and general state of the mesosphere. Radio probings indicate ion densities at several altitudes within this region, and also provide information on the minimum densities and temperatures possible. Such deductions may be confirmed to a large extent by means of spectrographic observations on the glow of the night sky and aurora.

Existing Ionospheric Knowledge

At the present time the main body of knowledge

[1] The Air Force study of the earth's atmosphere or troposphere is considered to be the portion of the atmosphere extending from the surface to a height of 11 km (surface to 6.8 miles), the stratosphere from about 11 to 32 km (6.8 to 20 miles), the ionosphere from about 70 to 400 km (43 miles to 250 miles). The mesosphere extends from 70 to 3,000 km (43 to 1,860 miles).



The appearance, growth, and drift of a number of sporadic-E reflecting points ma

regarding ion densities in the mesosphere is obtained chiefly from vertical incidence ionospheric stations. Information from such networks, however, is confined solely to the electrical state of the atmosphere vertically above or in the immediate vicinity of the vertical from the station involved.[2] It is possible to undertake "back-scatter" measurements, indicating the condition of the ionosphere at a distance, by means of oblique incidence transmissions, but usually such examinations are not made throughout 360° in azimuth from the transmitter. In both instances, however, information is obtained in a spacially restricted region; i.e., at a point or along a single propagation path emanating at the station. Thus, the system is not flexible insofar as obtaining data at other sites or over a greater azimuth is concerned.

In the investigation of Sporadic E ionization, a fixed station is similarly restricted. Contrarily, a network of oblique incidence stations operating at the proper frequency would have the immense advantage of delimiting the extent of the Sporadic E reflecting region, especially if the network were sufficiently dense in number of stations. Movements of the reflecting volume would be recognized by the fact that some stations would lose radio contact with specific localities while in turn new stations would gain contact with the same or different localities. A plot of the rate of movement would be possible from such observations. Each observing station would not be confined to obtaining information at essentially one point or a comparatively small area of the ionosphere, but could obtain information on the ionospheric state anywhere within a circular zone from about 600 km to 2200 km (375 to 1360 miles) away and centered at the transmitter (providing, of course, other transmitters were operating within that zone). In this fashion a network of stations provides tremendous and almost immediate flexibility and within their interlocking radio contact range can provide a wealth of detailed information regarding ionospheric changes.

On the North American continent, there is yet no such officially established network. Nonetheless, the need for such an observational system is obvious. Information supplied by such stations is invaluable, not only from a scientific, but also from the practical viewpoint. The Air Force requires information on winds, subsidence, turbulence, large-scale circulatory systems, diffusion and other transport phenomena in the vicinity of 100 km (60 miles) and higher. Such information is also of tremendous benefit for propagation purposes. The initial approach for the study of such phenomena lies through examinations of the lower ionosphere, particularly the E region, both normal and sporadic.

[2] In the Northern Hemisphere, vertical incidence ionospheric stations are located at Baton Rouge, La.; Boston, Mass.; San Francisco, Calif.; San Juan, Puerto Rico; Washington, D. C.; White Sands, N. M.

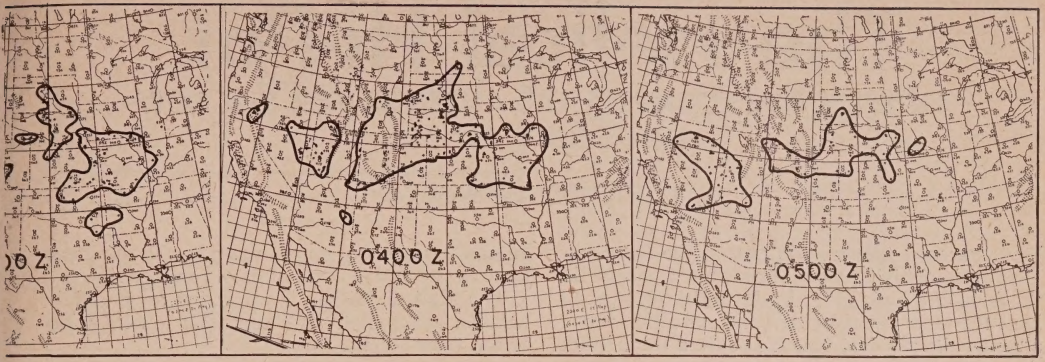


Mary T. Bergen evaluates the reports for the RASO 6-Meter Project.

Sporadic E Movements

A concentrated network of conscientious observers may easily furnish rather detailed information regarding the movement of Sporadic E reflection points. Whether such reflection points are caused by gross clouds of high ionic concentration or by scattering from a layer having large, random variations of ionic density (a rather patchy appearance) has not yet been conclusively established. The methods of genesis and dissipation of such Sporadic E regions are not fully understood, nor are the motions or the diurnal and seasonal occurrence. However, it is hoped that with the cooperation of the radio amateurs, sufficient information on the prevalence and occurrence of Sporadic E reflections may be obtained so as to allow the preparation of suitable theories for these mechanisms, and permit some conception of diurnal, seasonal and annual trends.[3]

[3] A description of the tentative method of plotting and analysis of the Sporadic E 6-meter contacts is given in the article "The Radio Amateur and Upper Atmosphere Research," Oliver P. Ferrell, *CQ*, February, 1949, page 25. *Ed.*



may be seen in this series of maps, made at hourly intervals. See text for details. (*Official photos U.S.A.F.*)

A very interesting case of Sporadic E reflections occurred on 20 May 1949 over the United States. This instance was reported by the amateurs in the RASO group, and was plotted as depicted in the map plots 0100–0500 GMT, inclusive. Some indication of motion is evident, particularly in the case of the reflection area over Missouri, where the "center of mass " of the reported points moved from SSE to NNW (SE Missouri to west central Iowa) at an average velocity of about 125 km/hr.

The occurrence of a large number of new reflecting points in the hour centering on 0200 GMT should be observed. At 0200 GMT there may be identified several "centers of reflection" which may be differentiated by the continuity of motion shown in the succeeding figures. It should also be observed that whereas the density of points during 0200 GMT is high and closely packed, later time periods indicate a general diffusion over the areas involved. At 0300 GMT and 0400 GMT a considerable area is covered by the reflecting points. The last observations of Sporadic E in this sequence were observed on 0500 GMT, where the concentration of reported contacts has already decreased considerably.

In general, an electron drift from the SSE or SE is indicated, but the limited number of observations and the wide area which each group covers, does not permit an unambiguous selection of a "center of mass."

It might be remarked that meteoric ionization has been found on several occasions. In such instances the radio amateurs concerned reported a single contact lasting perhaps several minutes or longer. As meteoric ionization has already been shown to persist for as much as perhaps four hours under some circumstances, it undoubtedly is possible to account for isolated "Sporadic E reflections" by a somewhat persistent burst of meteoric ionization. Such cases would be reported on rather rare instances because of the fact that this cloud must lie at the center of the great circle path between two operating amateurs—a condition which is far from fulfilled in most cases.

The results portrayed above, which give some indication of a drift or movement in the vicinity of 100 km, are, of course, limited by the number of observers and the period during which they operate. In the ideal case, with at least a minimum number of observers properly spaced, it would be possible to observe all cases of Sporadic E over the continent. As the number of cooperating observers increases, such observational bias will correspondingly decrease.

If sufficient information becomes available on Sporadic E reflections, not only will it be possible to undertake studies on drift motions occurring on specific days and hours, but it will also be possible to undertake some type of statistical analysis indicating the percentage of time Sporadic E is observed over various portions of the continent. It is also hoped, if sufficient information becomes available, that some attempt may be made towards classifying the various types of Sporadic E; some progress has already been made in differentiating meteoric-produced "Sporadic E." Other studies can also be made from the raw data, particularly in the field of radio propagation.

Acknowledgment

The U. S. Air Force desires to thank those amateurs who are actively cooperating in the Sporadic E Project. Their active and voluntary contribution may truly be considered as a tribute to the cooperative spirit of the amateur radio fraternity as a whole.



Evelyn Uhl operating the key punch machine at the RASO office.

HAM CLUBS!

See page 9,
May 1950 CQ

The Helical Hi-Pot

AN EFFECTIVE "COMPRESSED" ANTENNA FOR THE LOW FREQUENCY BANDS

TAFT NICHOLSON, WØCKR*

THE HELICAL HI-POT ANTENNA, as the name implies, is a high potential antenna arranged in the form of a helix (*Fig. 1*). It can be adjusted to have the same voltage distribution as a sine wave, although its physical length is only a small fraction of a wavelength. For example, one of these antennas will be described which has a quarter-wave voltage distribution on the 75-meter band but is only 9 feet long (*Fig. 2*). As a one-terminal antenna it must, of course, be operated against a good ground, counterpoise, or another similar antenna. Two of the quarter-wave Helical Hi-Pots, horizontal, and fed with a piece of resonant RG-8/U, appeared to be less than 2 S units below a reference horizontal antenna. In fact, in 24 contacts there was only an average difference of 3 db. The reference antenna is a special antenna with a slight vertical gain (desirable on 75 meters) and is stretched out over a plot 90 × 40 feet and is well removed from the house. The over-all length of the Hi-Pot is 15 feet and it is 6 feet above the roof of the house. A method of reducing loss in the Hi-Pot will be suggested for further development. The Hi-Pot should not be expected to out-perform a normal half-wave antenna, but may approach this condition if the losses can be further reduced. For the amateur with limited antenna space it should prove useful in increasing the effective length of short antennas. It may be used as a counterpoise to work against a normal quarter-wave antenna, thereby reducing the space requirements by 50%. In this application it will work better than the average run of amateur ground systems. In many Marconi antenna systems most of the power is lost in the ground connection unless the ground system is large in size and in earth of good conductivity.

The Helical Hi-Pot is attractive as a mobile antenna and will work better than a solid whip of the same length.

* *3614 E. 57th Street, Kansas City, Mo.*

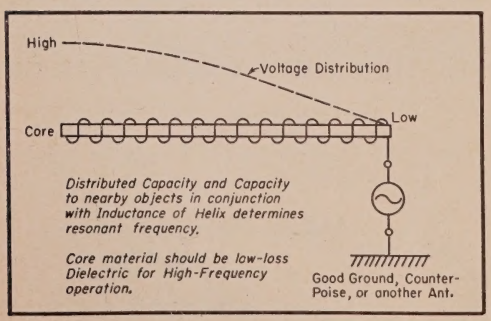


Fig. 1. The voltage distribution of the Helical Hi-Pot is similar to that of any quarter-wave radiator.

Theory

Most radio men are familiar with the pattern of a half-wave dipole in free space (*Fig. 3*). This pattern may be found in the average text or antenna handbook. As the wire is shortened, the configuration of the pattern changes but very little and, for practical purposes, may be assumed to have the same pattern. It also follows that a short wire would be just as good a radiator, provided power can be put into it. This is the difficulty; as the length is shortened, the radiation resistance becomes very low so that eventually all the power is dissipated in the coupling circuits. Quite a bit

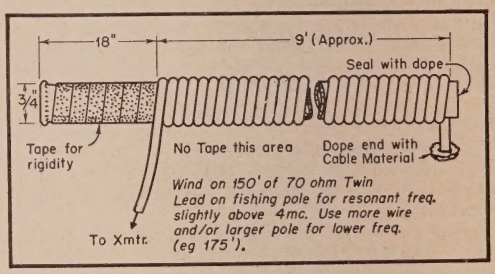


Fig. 2. Details of a nine-foot antenna for use on the 3.5-mc band.

can be done with low-loss coupling circuits, and the reader is referred to the design work that has been done on aircraft transmitters and their associated antenna circuits. There is a practical limit to this approach, however, and other means have been resorted to.

The effective length or the radiation resistance of a short wire can be increased by a capacity end or top. The old "Tee" antenna is an example. In this case the flat top prevented the current from becoming zero at the top of the vertical down lead. Without the capacity top, the effective length of the vertical section is approximately 50% of the physical length (average of early part of a sine wave). With the capacity top, the effective length will approach 100% of the physical length, although never attaining this value due to radiation losses and electrical losses in the flat top. A quarter-wave vertical without flat top has an effective length of 63% of the physical length,

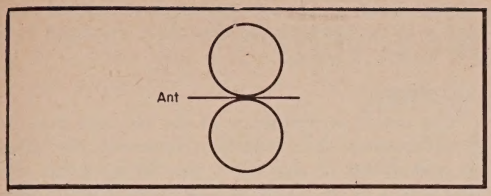


Fig. 3. The theoretical pattern of a half-wave radiator in free space.

but has a radiation resistance which can be handled easily.

Another example of the capacity top antenna is the top-loaded antenna which is used extensively by the standard broadcast stations. A smaller capacity top is used, but the same loading effect is obtained by using an inductance just under the capacity top—the inductance increases the effective capacity of the device, etc. In some respects this is a better antenna, inasmuch as the loading device does not distort the pattern of the vertical section, as does the flat top of the "Tee" antenna.

The half-wave dipole sets up a composite electric field by two means, namely, electrostatic and electromagnetic. The voltage is zero in the center and maximum at the ends, and therefore a voltage gradient of a given number of volts per meter exists along the antenna. This voltage gradient has the same dimensions as electrostatic field strength and contributes to the radiated field. The current in the half-wave dipole sets up a magnetic field which contributes to the radiated field. From transformer theory magnetic field

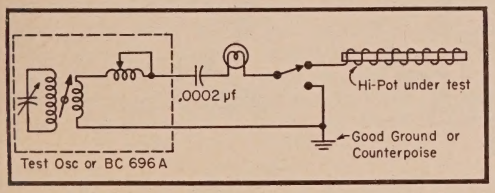


Fig. 5. Connecting the test oscillator to the Hi-Pot.

may be measured in ampere turns with certain assumptions. If the turns are less than one, as in the case of the antenna, the magnetic field is proportional to the length times the current flowing. If the current is not constant along the length, the field is proportional to the current times the effective length as discussed above. It will be recalled that the term "meter amperes" has been used as an expression of magnetic field strength. Thus, the half-wave dipole sets up a field in space about it by electrostatic and magnetic means.

Capacity-loaded short antennas make use of the magnetic field as the principal vehicle for radiation. The current is heavy and the voltage gradient is small. This may seem confusing at first, since all these antennas are "hot" with voltage. The voltage gradient is small because the voltage does not vary appreciably over the entire length. The short shunt-fed antenna, which has been recently described for mobile use, falls into the magnetic category but is not particularly "hot" with voltage. The author has been using a large shunt-fed horizontal antenna for the past three years, and the performance has been excellent on the lower frequency bands.

The Helical Hi-Pot falls into the electrostatic category. The voltage gradient may be controlled and can be made to have a sine wave distribution if desired. The "volts per meter" along the antenna is much greater than that of a half-wave dipole, and this fact compensates to some extent for its extremely short length. Although the current is heavy in the helix near the generator, this current is at right angles to the length and is confined; therefore, very little magnetic field exists in close proximity to the antenna. One of these Helical Hi-Pots wound out of #18 wire without end protection caught on fire with less than 200 watts input to the 75-meter phone transmitter at WØCKR. This will give some idea of the voltage built up along the antenna. When the Helical Hi-Pot is used to load a short wire, both induction fields are made use of. The magnetic field results from the heavy current flowing in the short wire feeding the helix and the electrostatic field from the helix itself. This combination was used successfully in 1939 by the author (W5ANB), and one is in use at the present time at WØCKR. One nearby local reports this antenna 30 db stronger than the regular horizontal antenna at this station. This ground wave is only good for a few miles at 4 mc, however.

The two Helical Hi-Pots recently constructed at this station were 9 and 6 feet in length. It would be possible to reduce this length by using smaller wire and on a larger diameter form and yet obtain an antenna with zero voltage at the generator and a very high voltage at the far end. The largest available length for the helical form should be used, however, in order to reduce losses to a minimum. In addition, the resistance of the antenna decreases as the length is reduced; therefore the coupling losses go up.

Harmonic operation of the Helical Hi-Pot has not been thoroughly investigated. The 9-foot antenna referred to above was excited at 28.5 mc and found to have 2½ standing waves of voltage. It remains to be seen whether a useful antenna can be developed using the device as a multi-lobe element.

If the losses can be overcome, the device could be used in a vest pocket rotary beam.

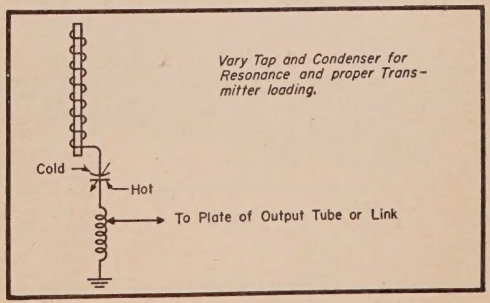


Fig. 6. A suggested coupling system for mobile use.

Construction

One of the Helical Hi-Pots will be described. The 9-foot antenna referred to above was made by winding 150 feet of 70-ohm twin lead on a bamboo fishing pole. See *Fig. 2*. This particular pole was slightly over ¾ inch in diameter at the base end and 16 feet long. The first 18 inches of the pole should be reserved for mounting arrangements and the winding started 18 inches from the base. The 150 feet of twin lead will cover about 9 feet of the pole. The one constructed resonated at approximately 4100 kc and was considered satisfactory since it was to be used eventually with a 25-foot lead-in for the 80-meter band. A lower resonant frequency may be obtained by winding on more wire and/or using a pole of larger diameter. A slightly larger fishing pole is suggested with 175 feet of 70-ohm twin lead. Both conductors should be placed in parallel connection at the starting end. The far end of the helix or coil should be turned back for about an inch and the bare wire end covered with twin lead dielectric or similar material to reduce the tendency for corona. The above antenna as described has not broken down with 200 watts of modulated power. The 6-foot antenna was wound with #18 enamel wire and did ignite with this power. With 10 inches of burned fishing pole at the end of the coil, the r.f. resistance of the element increased several times its former value. The burned portion was cut off and the resistance returned to a low value!

Adjustment

The resonant frequency of the element may be determined with a variable frequency oscillator or transmitter. A BC-696A was used at this station with a fixed 0.0002 μf condenser in series with its output. See *Fig. 5* for the test set up. Proceed as follows: With a good ground on the oscillator chassis, and with minimum output coupling, adjust the output tuning for maximum current with the flashlight bulb only in the circuit. The chassis connection of the flashlight bulb is then lifted and connected to the Helical Hi-Pot. Increase output coupling for medium brilliancy. If the current does not come up, the oscillator should be tuned throughout its entire range until the element does take current. When this frequency area is found, the above procedure should be repeated 2 or 3 times in order to cancel out the reactance of the tuned coupling circuit. When all adjustments are correct, and the oscillator frequency is the resonant frequency of the element, the setting of the loading coil for resonance will be the same for either the flashlight bulb alone or with the antenna in the circuit. If this frequency is below the

(Continued on page 53)

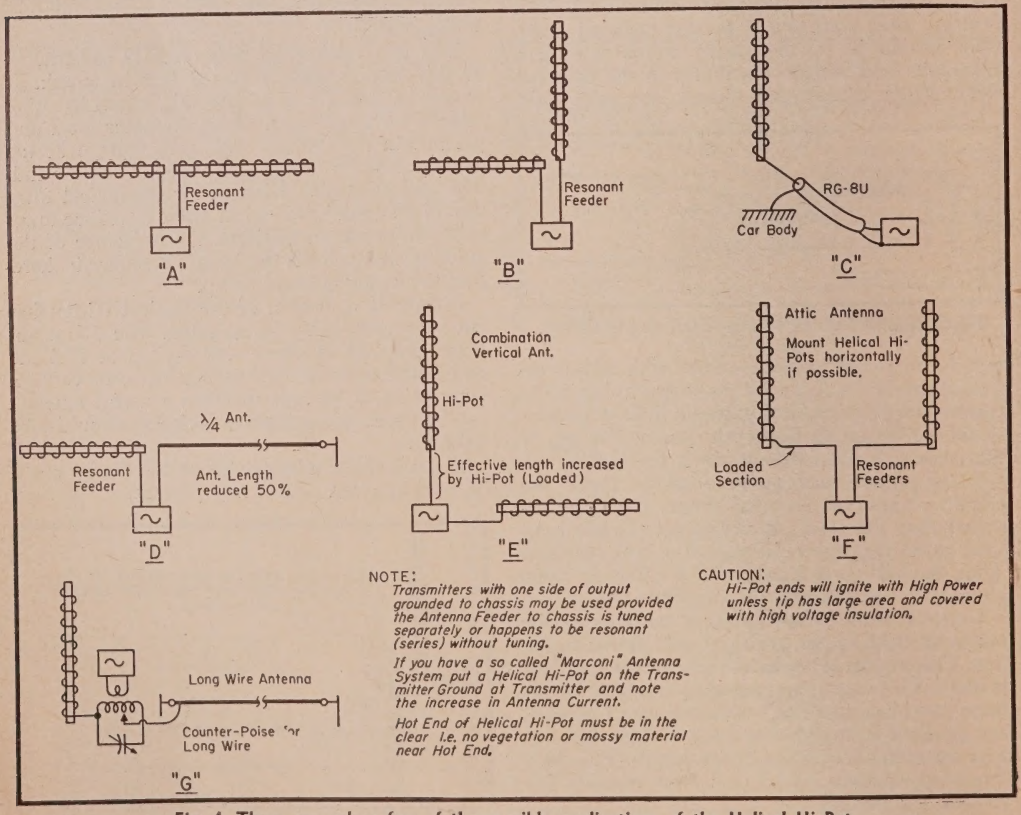


Fig. 4. These are only a few of the possible applications of the Helical Hi-Pot.

A Flexible 150-Watt Transmitter

GLENN E. ROOF, W8OPG*

Here's a neat little 150-watt VFO rig for general operation on all bands from 3.5 to 28 mc. The use of an 826 in the final helps keep the dimensions down.

BUILDING A TRANSMITTER that is both compact and flexible enough to be convenient is more often desired than achieved. Such features as variable frequency control, multi-use stages and multi-band operation make a transmitter an attractive piece of equipment but such design tends to spread the construction out on a large chassis or even to several chasses, thus making cabinet construction difficult and costly. Bandswitching and component accessibility for servicing are also desirable but further complicate construction. It is usually necessary to make compromises during the design stage and, if necessary, later in the layout stage, to gain the main goal.

The transmitter to be described started out as 150 watts with every imaginable operating convenience on two moderate size chasses. To compromise with space requirements, bandswitching fell by the wayside, but the rest of the features stated above are all built into the finished job. By making use of surplus parts as much as possible the cost is well under a dollar a watt.

The line-up, as shown in the wiring diagram, starts out with a 6SK7 ECO followed by two 6F6 isolation stages. The 6V6GT buffer/doubler/crystal oscillator follows, driving a triode-connected 6V6GT or 6L6 neutralized amplifier/doubler. The 826 output stage is neutralized for straight-through operation only. Three separate power supplies are used. A regulated supply feeds the first three stages, a low voltage supply feeds the next two stages, and a 1000- or 1100-volt supply is employed for the 826 amplifier.

As indicated by the photographs, the two chasses used are fairly small, $7'' \times 15'' \times 3''$ to be exact. They fit into $9'' \times 16'' \times 12''$ cabinets and, when the r.f. cabinet is stacked on top of the power supply cabinet, they may be installed on top of an operating table or desk, leaving plenty of room for receiver and operating equipment. The r.f. section chassis holds quite a bit of equipment, but it is not badly crowded, and construction is not difficult. The ECO is mounted in a $3'' \times 4'' \times 5''$ box at the left of the r.f. chassis to shield it from the following stages and stray fields. The two 6F6s are behind the ECO box with their associated wiring in shielded leads under the chassis. ECO output is on 80 meters from 3500 to 4000 kc, and normally the 6F6s both operate on 80. For 10-meter output, it is necessary to double in the output 6F6 as detailed later. The two 6V6GTs and their coils are mounted on top of the chassis with other components underneath. No particular layout of these two stages is necessary, provided that the leads are short and the parts all fit in. The 826 and antenna tuner are at the right end of the chassis and, due to the larger components, consume the most space. The filament transformer for the 6V6GTs and the transformer for the 826 are mounted under the chassis. The operating frequencies of the 6V6s and 826 depend on the output frequency.

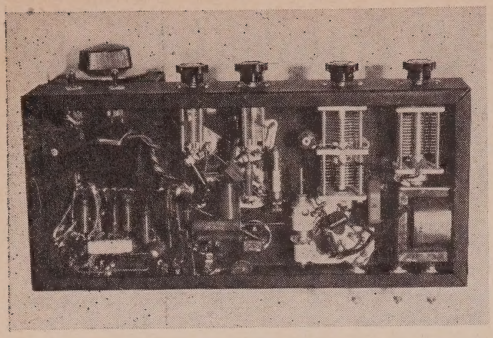
* *Harper Road, Solon, Ohio*

The Variable Frequency Exciter

The VFO is a modified model of one described by Don Mix, WITS, in *QST*. A few changes were made to adapt it to this circuit. The 6SK7 operates as an electron-coupled oscillator, fed with regulated voltages on plate and screen. The grid coil L_1 and capacities C_1, C_2, C_3, C_4 tune the grid circuit over the 80-meter band. The lumped capacities in C_1 are surplus zero-temperature ceramic condensers, manufacturer unknown. The total capacity is 300 μμf. C_2 is the main tuning and should be chosen for as sturdy construction as possible. Loose or vibrating plates will show up promptly if subject to mechanical shock, (thumping from keying on the same operating table, etc.). Also across the grid coil is C_3. This capacity is used to compensate for positive temperature changes in the coil and wiring, and its function is simply to balance the positive capacity drift as the components heat up. Finally, C_4 is used to set the band on the main tuning dial and, after being initially set, is changed only if the circuit becomes detuned for some reason or the components age to the extent that calibration does not hold. The regulated 150 volts is fed directly to the plate and the screen. The same regulated voltage also



The National dial on the penthouse at the left controls the operating frequency. The multipliers and their attendant coils are visible just to the right of the VFO box, and the final tank and antenna coils are at the right.



The condenser at the extreme right is the antenna condenser, C_{32}, while the 2-gang job is the final tank condenser. Most of the components can be identified by reference to the circuit diagram.

feeds the first 6F6 stage and the screen of the second 6F6.

The output 6F6 is operated as an untuned amplifier except when the 826 final amplifier output is on 10 meters. On 28 mc the 6F6 plate is tuned by means of a plug-in tank circuit, to 40 meters. When running untuned the plate is jumpered to the following grid. As indicated in the circuit diagram, the tuning capacity is mounted inside the coil form and consists of a small variable padder.

As the photos show, all bypasses and bias resistors are returned to a #12 bare copper bus along with the cable shields and tube shields.

The 6V6GT Stages

The first 6V6 serves any one of three functions, crystal oscillator, amplifier, or doubler. As an oscillator it is either a tri-tet with an untuned cathode or a straight oscillator with the cathode jumpered. When used as a straight amplifier, the crystal socket is jumpered, as is the cathode socket, and the 80-meter output coil is plugged into the plate circuit. Since the tube is not neutralized, it is not practical to tune the 6F6 plate in this mode of operation, or the result will be tuned-plate-tuned-grid self-oscillation. The plate voltage is dropped by means of R_7 and further reduced for the screen by R_8. Both bypasses are returned to the #12 grounding bus. Capacity coupling by C_{13} is used into the grid and out of the plate to the following 6V6. The 50,000-ohm grid resistor provides bias and, since the stage is keyed, no fixed bias is required.

The second 6V6GT is used as a high-mu triode and, because it is run somewhat over ratings, a 6L6 may be used in its place for longer tube life. The triode connection provides a much better match to the final amplifier grid and, although somewhat more drive is required, plenty is available. As far as grid drive goes, the output of this triode 6V6 is the only critical spot, as explained later. The high-mu connection is favored over a low-mu connection (plate and screen tied together) because of increased doubler efficiency. R_9 provides bias, and its value is correct for optimum doubling efficiency. C_{23}, the micrometer type neutralizing condenser, is mounted under the chassis. C_{26}, the output coupling capacity, is variable to compensate for variations in output on different bands. However, it is set at maximum capacity most of the time.

Since it was the starting point in the layout, the choice of a suitable output tube was not too difficult. In order to squeeze the amplifier and antenna tuner into less than 6 inches of chassis space, the components must be stacked either on top or on top and below the chassis. If the tube were a beam tetrode or triode with the plate brought out to a cap, the plate inductance would be mounted on top of the tank condenser, which would complicate cabinet installation. In order to

COIL TABLE

All coil forms 1″ diameter (Millen 45000 series)

L3

80 Meters	15 turns #22 d.c.c. (C17 in form)
40 Meters	10 turns #22 d.c.c.

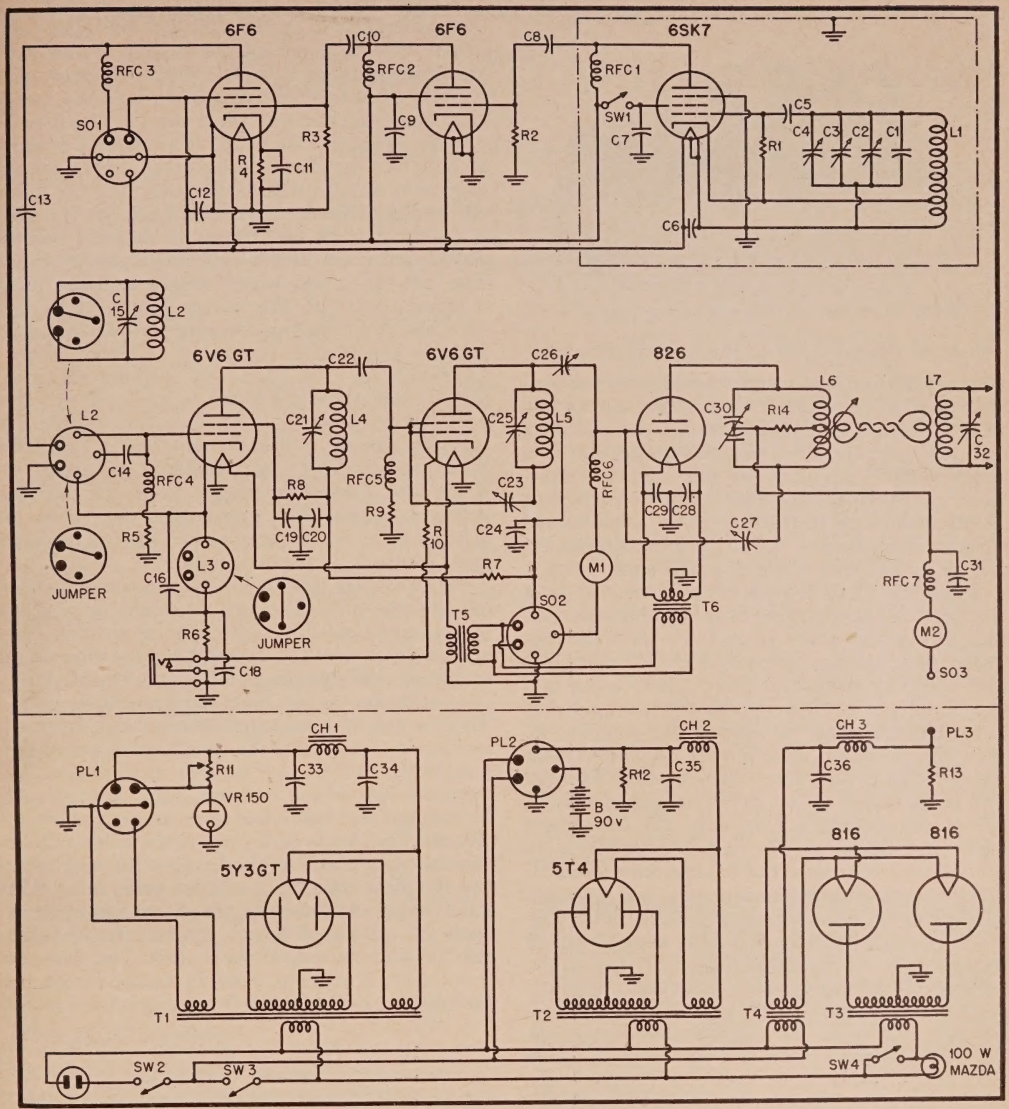
L4

80 Meters	40 turns #24 d.c.c., closewound
40 Meters	18 turns #22 d.c.c., closewound
20 Meters	9 turns #20 d.c.c., ¾″ long

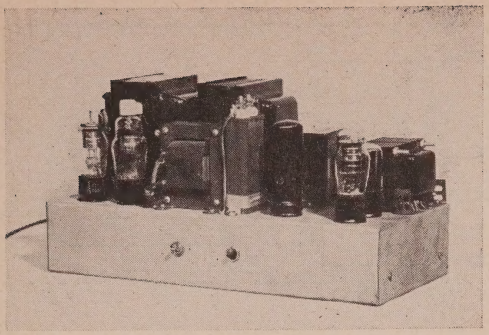
L5

80 Meters	40 turns #24 d.c.c., closewound, center tapped
40 Meters	17 turns #22 d.c.c., closewound, center tapped
20 Meters	10 turns #22 d.c.c., ¾″ long, center tapped
10 Meters	6 turns #18 enamelled, ¾″ long, center tapped

C1—3 100 μμf zero temp., ceramic
C2, C21, C25—100 μμf variable (Bud LC 1646)
C3—35 μμf neg. temp. trimmer (Centralab)
C4—50 μμf variable (Bud LC 2079)
C5, C8, C10, C14, C16, C22—100 μμf, mica
C6, C7, C9, C11, C12—.01 μf, 450 v., paper
C13—.001 μf, mica
C15—75 μμf variable (Bud LC 2080) mounted on L2.
C17—100 μμf mica, mounted in L3
C18—.01 μf, 600 v., paper
C19, C20—.005 μf, 600 v., paper
C23—.5-4 μμf, (Bud NC 1928)
C24—.002 μf, 600 v., paper
C26—100 μμf variable (Bud LC 1646)
C27—1-6 μμf (Bud NC 1929)
C28, C29—.002 μf, mica
C30—100 μμf per section (Bud CE 2035)
C31—.002 μf, 2000 v.
C32—150 μμf variable (Bud CE 2005)



C33, C34—8 μf, 450 v.
C35—4 μf, 1000 v.
C36—2 μf, 1500 v.
R1, R2—50K, ½w.
R3—100K, ½w.
R4—300 ohms, 1 w.
R5—50K, ½w.
R6—300 ohms, 2 w.
R7—2500 ohms, 10 w.
R8—50K, 10 w.
R9—15K, 5 w.
R10—150 ohms, 5 w.
R11—5K, 25 w., adjustable
R12—25K, 25 w.
R13—25K, 100 w.
R14—200 ohms, 10 w., wire wound.
RFC1, RFC3-7—2.5 mhy. r.f. choke
RFC2—200 turns #30 d.c.c. on a 5 w. resistor
CH1—12 hy., 80 ma (Thordarson T-44C02)
CH2, CH3—10 hy., 200 ma.
M1—0-100 d.c. miliammeter
M2—0-300 d.c. miliammeter
L1—17 turns #20 enamelled, 1″ long, 1″ dia,: tapped 5½ turns from bottom
L2—15 turns #20 d.c.c., 1½″ long, 1½″ dia. form
L3-L5—See coil table
L6, L7—Bud OLS series
SO1—6-prong socket
SO2—5-prong socket
SO3—High voltage connector
PL1—6-prong plug
PL2—5-prong plug
PL3—High voltage connector to fit SO3
B—2 45 volt batteries (Minimax)
T1—700 v., c.t., 70 ma, with 5 v. and 6.3 v. windings (Thordarson T-13R12)
T2—500 v. each side of c.t., 200 ma (Thordarson T-6878)
T3—1000 v. each side of c.t., 200 ma (Thordarson T-19P56)
T4—2.5 v., 10 amp. (Thordarson T-19F89)
T5—6.3 v., 2 amp. (Thordarson T-19F81)
T6—7.5 v. (UTC FT-7)



The power supply fits the 7 x 15 x 3 chassis very nicely.

get the tank condenser under the chassis, the final tube had to have all leads brought out to the base. Only two of the small size triodes qualified, the 10Y and the 826. Obviously, the 826 is a much better proposition in this application because of its greater ruggedness and power handling ability. Although it requires quite a substantial amount of excitation, the drive requirements are not out of line with other characteristics.

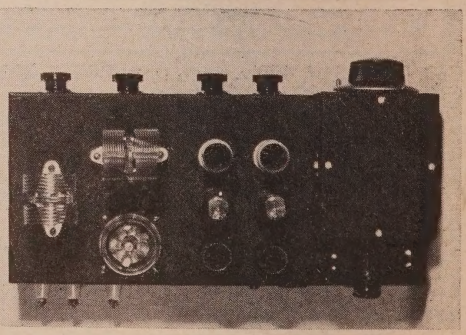
Series plate feed is used in this stage with both the rotor and stator of the tank capacity, C_{30}, running full voltage above ground to reduce the condenser plate spacing necessary for 1000 volts. The grid and plate meters are permanently wired into the circuit and are mounted on the front panel of the cabinet. As may be seen in the diagram, 90 volts of fixed bias is used to hold the plate current down during keying and standby periods. The battery is contained in the power supply chassis. A micrometer neutralizing capacity, C_{27}, is mounted under the chassis on C_{30}, the tank capacity, to shorten the leads. Since the transmitter is intended only for c.w., and for the sake of space economy, 75-watt plate coils are used. During long key-down periods, the coils will heat somewhat, but over an evening's operation it is hardly noticeable. Link coupling conveys power to the antenna tuner, C_{32} and L_7. 75-watt coils were also used for L_7. One set of 75-watt coils was purchased and the turns shorted and pruned to allow the coil for the next *higher* band to be used for L_7. After the whole job of cutting and trying was finished, I realized that a second set of coils for the antenna would have been the easy way out, minus the satisfaction of making it work, of course.

Construction

In any piece of equipment where space is limited, it is wise to plan the layout first and then start construction according to that plan. In the case of this transmitter, both the top and bottom of the chassis should be laid out and the two layouts made to coincide. As may be seen in the photographs, the parts are fitted in neatly with short leads and with the component parts grouped around their associated tubes. After the chassis is laid out, punched, and drilled, the sockets are mounted and a #12 ground bus is positioned in each stage and soldered in place. The oscillator is then assembled in the $3'' \times 4'' \times 5''$ box with particular care to make all connections secure and avoid any loose or moveable parts. Changing the position of almost any part or lead in the oscillator compartment will effect the frequency calibration. When the oscillator is assembled, it may be bolted to the chassis, using small rubber grommets as spacers to reduce vibration, and the various oscillator leads may be brought out through a hole in the box and chassis to their tie points. Shielded wire is used for all the oscillator leads. The two 6F6s are wired almost entirely with shielded wire with the shields grounded to the #12 bus. All bypass condensers and bias resistors are also grounded to the bus at as central a spot as possible for each stage. The shielded wire and direct leads make it difficult to maintain eye appeal, but performance is the first consideration. In planning the rig it was thought that a partition shield across the chassis would be necessary to shield the first three stages from the higher-powered stages, but apparently the mass of shielded wire served the purpose, because reaction from feedback is at a minimum.

No particular precautions are necessary in wiring the two 6V6GT stages. It might be a good idea to trace out the connections on the two sockets at the rear of the chassis before wiring them to get an understanding of how the circuit functions with the various coils and jumpers in place. The two tuning condensers have full d.c. on them and are insulated from the chassis by means of the tapped bushings in the ceramic face plate. The holes through which the two shafts enter should be checked for burrs that may cause a short to ground. Finally, the 826 stage is wired in, with its antenna tuner, the grid circuit push-back wire and the plate circuit and antenna tuner using #14 solid copper. As shown in the photos, the antenna leads are connected to two ceramic feed-through insulators at the rear of the chassis. The filament transformer is mounted after the antenna leads are soldered in, due to their relative position on the

(*Continued on page 49*)



The oscillator tube projects from the rear of the VFO can, while two isolation stages fit between the can and rear edge of the chassis. The multipliers and the 826 final stage leave plenty of clear space above the chassis.

Modifying the BC-459 for TVI-Free 40-Meter Operation

HERBERT S. BRIER, W9EGQ*

Curing TVI and cleaning up the keying go hand in hand when we're working with the BC-459 and others of the Command Set series. If you want to clean up your pebble crusher, here's a complete course.

THE THOUSANDS of "war surplus," Army 274-N transmitters (BC-459, BC-696, etc.), and the ARC-5 equivalents, used by amateurs speak highly for them. Unfortunately, as does most "surplus" equipment, they have their faults. Two of them are their propensity to cause television interference and their less-than-perfect keying characteristics. This article will outline methods for eliminating one and improving the other.

There is a good reason for discussing together such apparently unrelated subjects as television interference and keying. There is often an unsuspected relationship between the two. TVI is usually caused by harmonic or spurious-signal output from the offending transmitter in or near locally-assigned television channels, overloading of the input stages of the television receiver by the strength of the fundamental signal, or undesired signals bypassing the input stages to appear directly in the receiver i.f. channels, or keying transients or "clicks." Any of the above may be radiated directly from the transmitter or power supply, as well as by the antenna.

The 274-N series of transmitters have caused interference in every manner listed, although not every one does so. One does, and another does not, depending on the separation between transmitter and receiver, strength of the television signals, the design of the television receiver, and dozens of other variables.

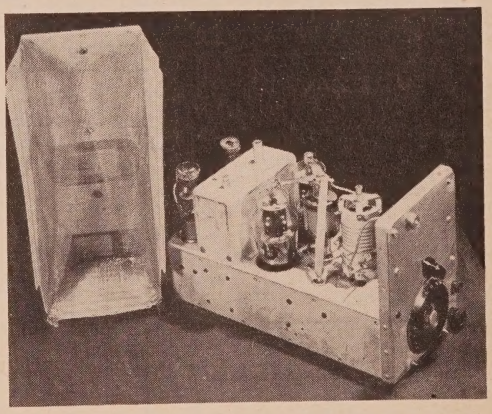
It is the variables that make the problem difficult, making it impossible to say, "Do this, and your TVI troubles are over." Instead, it is necessary to list remedies for as many of the probable causes as possible and offer the hope that only in the most severe cases will it be necessary to incorporate all of them. This is the procedure followed in this article, although all modifications can be made in a single evening. The modifications suggested refer specifically to the BC-459 (7 to 9.1 mc) unit, but apply to the other transmitters in the series as well.

The Original Layout

Looking at the original diagram, *Fig. 1,* and the physical layout of the BC-459, it is obvious that little effort was made to design a transmitter with low harmonic output. Tubes like 1625s generate parasitic oscillations at the slightest provocation, and putting a pair of them in parallel is a gilt-edged invitation for them to do so. Then to place the tuning capacitors below the chassis, necessitating long leads, unrolls the velvet carpet for parasitics in the v.h.f. region. The parasitic suppressors in each plate lead are mute evidence that the 1625s took advantage of the opportunities presented.

If the suppressors actually eliminated the v.h.f. output, all would be well, but they do not. Several local amateurs who can operate on ten and twenty meters with several hundred watts input to their regular transmitters without television interference report that a BC-459, with 250 volts on the 1625 plates and no antenna connected, blanks out one or more of the lower-frequency television channels on nearby receivers. The havoc created when an antenna is connected and higher voltages are applied can easily be visualized.

Parasitic suppressors in tube plate leads often eliminate high-frequency oscillations only to increase output at other equally-undesirable frequencies, which is what is apparently happening in the BC-459; therefore, we will remove the suppressors and attempt to eliminate the parasitics and harmonics through the methods shown in the



The placement of the vacuum condenser and the use of wide copper strap for plate circuit leads to achieve maximum attenuation of all but fundamental frequency output from the 1625s is clearly shown. Also visible is the piece of aluminum to cover the holes in the front panel. Output is from the "mike" connector in the upper corner of the panel.

Photo by S. J. Kozan

* *385 Johnson Street, Gary, Ind.*

photographs and the revised diagram (*Fig. 2*).

The most obvious difference between the two diagrams is the 50-$\mu\mu$f vacuum condenser in *Fig. 2*. Obtained from a BC-442 antenna unit, another part of the 274-N, and still available at "surplus" prices, its purpose is to bypass the plates of the 1625s directly to ground for frequencies in the television region. In order to mount it in the most effective spot, the unused antenna loading coil is removed and the amplifier plate coil moved forward.

The screws that fasten the coil to the chassis also support one side of a variable condenser below the chassis. By moving the center of the coil in line with the screws supporting the other side of the condenser, one of them will fasten one side of the coil in its new position. Rather than removing the condenser to drill a hole to fasten the other side, a small strip of metal clamps the coil bracket to the chassis with aid of a nearby screw.

Moving the coil forward requires a slight modification of the control for the variable link. With the antenna loading coil removed, it is no longer necessary to "offset" the link control; I therefore removed the gears and brought it to the front panel through an insulated coupling. Not having a spline wrench to remove the knob, I first sawed it with a hacksaw and then split it with a screw driver. A knob with a conventional set screw later replaced it.

Again, to avoid dismantling part of the transmitter to drill a hole, one end of the vacuum condenser is fastened to the chassis by bolting its mounting clip to the center of a three-quarter inch wide strip of stiff aluminum. Holes near the ends of the strip serve to fasten it to the chassis with the original coil-mounting screws. The head of the screw in the center of the strip is thus pressed firmly against the chassis, making a firm, low-resistance, electrical connection.

One-half inch wide strips of flexible copper strap connect the other side of the vacuum condenser to the 1625 plate caps. Another strip of the same material connects the condenser to the insulated stud, which is connected to the variable condensers under the chassis. A wire between the top of the coil and the vacuum condenser and another from the bottom of the coil to the stud, bringing the plate voltage through the chassis, completes this phase of the conversion.

Before these changes were made, the plate-circuit wiring, plus the parasitic suppressors, resonated in the low-frequency television channels. After they were completed, this secondary resonant frequency was raised beyond the range of my grid-dip meter.

Adding the 50-$\mu\mu$f capacity of the vacuum condenser to the plate tank circuit requires that the capacity of the amplifier padding condenser be reduced accordingly. Originally, it requires slightly less than half capacity on the padder to achieve resonance. With the vacuum condenser added, resonance is achieved with the padder condenser plates meshed about fifteen per cent.

For maximum harmonic attenuation, it would be better to remove the slug from the amplifier

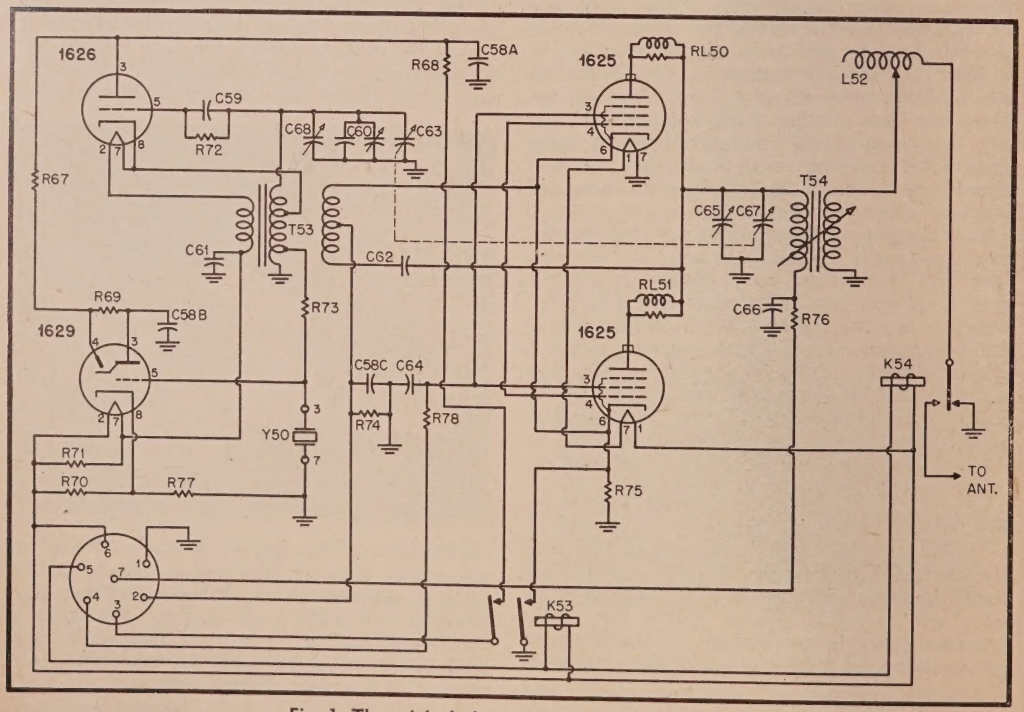


Fig. 1. The original circuit diagram of the BC-459.

coil and/or remove a turn or two from the coil so that the capacity required to achieve resonance is increased. Such a move may be desirable when it is suspected that third-harmonic (21 mc) energy is getting into the i.f. channels of nearby receivers. If either is done, it may be necessary to readjust the padder whenever the operating frequency is shifted appreciably. This should be done anyway in the interest of minimum harmonic output; therefore, it is not too much of a handicap.

Should the vacuum condenser be unavailable, either a mica or a ceramic condenser, with a d.c. voltage rating equal to four times the plate supply voltage, may be substituted with almost equal results if leads are kept short.

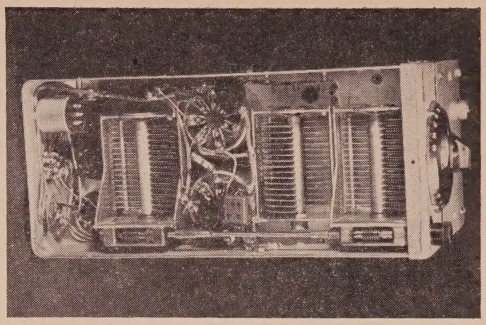
Below the Chassis

Below the chassis, the first thing noticed is that bypassing and grounding the 1625 cathodes and screens is done at one tube socket, with a jumper several inches long to the corresponding terminal on the other socket. Such construction leaves the second terminal floating for high frequencies. The photograph of the bottom clearly shows the placement of the added bypass condensers to bring them to zero r.f. potential. Also seen are the shielded wires replacing the jumpers between the cathode and screen terminals respectively, the shielded key lead, and those replacing the old leads between the power plug and the 1625 sockets. Each shield on these leads should be grounded at each end and wherever possible throughout its length. Although not necessary in this unit, it may be advisable to bypass each terminal of the power plug by 500-$\mu\mu$f condensers, and continue shielding of the power leads right to the power supply.

It would have been even better to ground the cathodes directly through wide copper strips, had it not been desired to key the cathodes. As said before, clicks can cause television interference, thereby nullifying efforts to remove other causes. Stabilizing the 1625s and shielding keying and power leads help in eliminating clicks, but whenever electrical circuits are suddenly broken, a power surge is developed which can cause a click independent of what is connected to the switch. (For example, turning on a nearby light often makes a click, causing a momentary loss of picture "sync.")

B-negative keying of the entire transmitter is particularly bad from this standpoint, and a filter sufficiently large to remove the click usually greatly accentuates the chirp accompanying this type of keying. Keying the B-plus supply for the oscillator plate and the amplifier screens is better, because the current and voltage keyed are less; however, the same difficulty with chirps is found. In addition, a keying relay is required to protect the operator.

Cathode keying of the amplifier permits using enough "lag" to eliminate clicks without increasing the chirp. The constantly running oscillator does prevent working "break-in;" therefore an alternate system permitting keying the amplifier alone, or with the oscillator by snapping a switch, is included in *Fig. 2*.



Shielded leads and the additional mica bypass condensers to stabilize the 1625s are clearly seen. Amplifier padding condenser (second from front) is still set at its original capacity. With the vacuum condenser in place, resonance is achieved with the padder near minimum capacity. The neutralizing condenser is mounted on the wall of chassis behind the padding condenser.

Photo by S. J. Kozan

Shielding

Although the shielding of the BC-459 looks quite complete, there is much room for improvement. Lining the cover with copper screening makes it more nearly r.f.-proof than before, while still retaining ventilation. The fine-mesh screening designed for strainers, etc., is best, but ordinary copper (or bronze) window screening is satisfactory and much cheaper.

Bend a piece about twelve by fifteen inches into a long trough to fit against the sides and top. Then solder another piece across the open back of the trough. The screening should extend to the edges of the cover on all sides, and when the cover is screwed to the chassis, it is firmly clamped between the two.

Covering the openings in the top of the cover makes it necessary to remove it completely to change tubes. This is not much of a handicap, because tubes are changed so infrequently.

A small piece of aluminum, with a cutout at the bottom to accommodate the dial, covers the holes in the front panel. To remove the two "locks," drive out the pins fastening the knobs to the shafts with a small finishing nail.

Tuning

Tune up the transmitter in normal fashion and check the neutralization of the 1625s. The easiest way to do so is to connect a 50- or 100-volt, high-resistance voltmeter between the chassis and pin number 2 of the power plug to measure amplifier d.c. grid bias. Carefully tune the amplifier plate padding condenser slightly each side of resonance while observing amplifier plate current and grid voltage. If neutralizing is complete, minimum plate current and maximum grid voltage will occur at the same setting of the condenser. If

this does not occur, attempt to reneutralize the 1625s by squeezing together or spreading apart the plates of the two-plate condenser mounted on the side of the chassis behind the amplifier padding condenser.. (Caution! The condenser is "hot.")

If television interference persists after these changes have been made, your fundamental signal is probably overloading the input channels of the affected receivers. This very common receiver fault is a problem for the television receiver technician. Suggest to him that a pair of traps tuned to your operating frequency or a high-pass filter inserted in the television receiver feed line right at the receiver antenna terminals is an almost positive cure, *if the television receiver is in good operating condition.*

To be as pessimistic as possible, let us assume that one receiver still has interference, even with antenna traps installed. Substitute a dummy antenna for the transmitting antenna—an ordinary 115-volt bulb will do, preferably shielded—and load the 1625s to their normal input. If interference disappears, your greatly-reduced harmonic radiation is still sufficient to cause interference. An antenna tuner, if not already used, connected to the BC-459 through a shielded line, may be sufficient to eliminate the interference, or a low-pass filter or "harmoniker" in the feed line to the antenna or tuner may be necessary. If the interference persists, even with a dummy load on the transmitter, direct radiation or r.f. energy feeding back into the power lines is probably occurring. Sprague, 0.1-$\mu\mu$f, high-pass condensers in the 115-volt supply line at the power

(*Continued on page 53*)

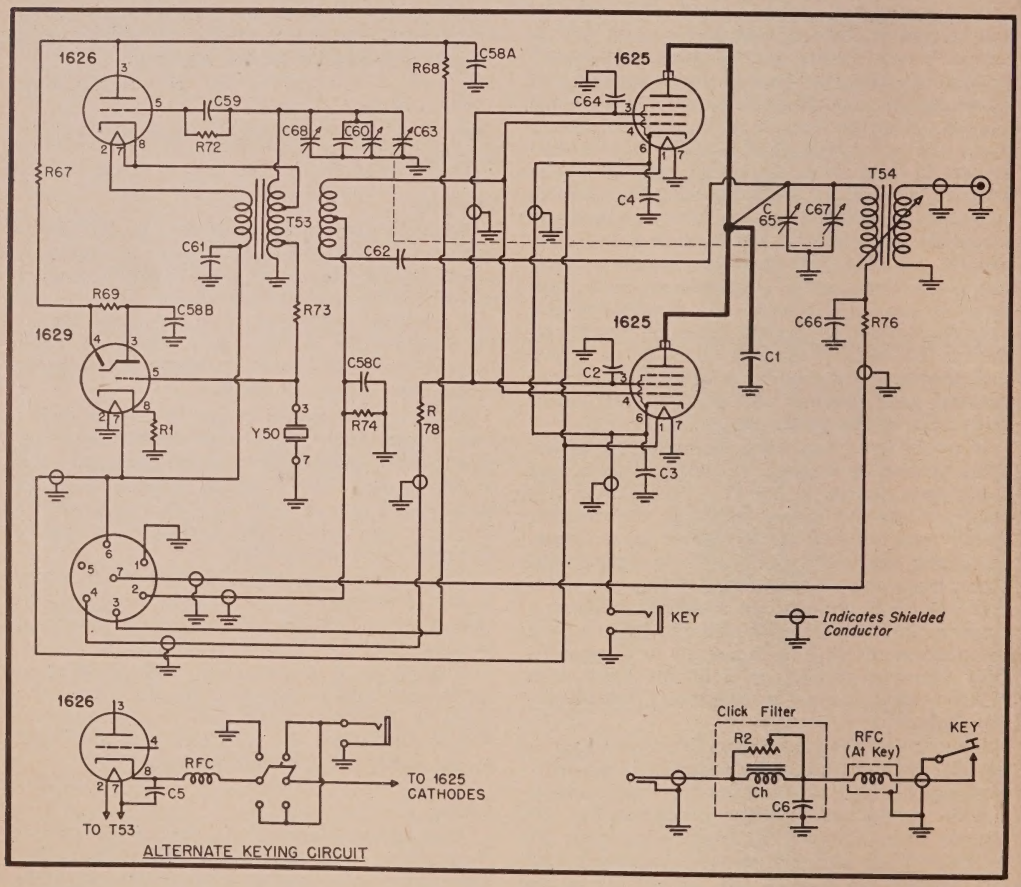


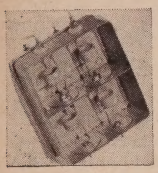
Fig. 2. Diagram of modified BC-459. Filaments have been rewired for 12-volt operation, and unused parts have been removed. Power requirements: 500-600 volts at 150 ma (pin 7), 250-275 volts at 20 ma (pin 4), 200 volts at 20 ma, regulated (pin 3), and 12 volts at 2 amp (pin 6).

C1—50-$\mu\mu$f vacuum condenser, see text.
C2-C5—.001 μf, mica.
C6—0.5 μf, 1,000 volts, paper.
R1—2.5K, ½ w.
R2—2K, 10 w., with slider.
RFC—2.5 mhy. r.f. choke.
Ch—150-ma filter choke (between 1 and 10 hy.)
Sw—D.p.d.t. toggle switch.
Other parts same as Fig. 1.

NEW PRODUCTS

TVI Filters

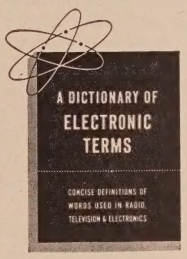
Two new harmonic filters for the alleviation of TVI troubles are announced by R. L. Drake. The new job designated TV-300-20HW is patterned after the w-k G. E. "Harmoniker." It attenuates all harmonics of a 20-meter transmitter, and is designed for use in twin-lead or open wire line of impedance between 200 and 600 ohms. A similar model bearing the suffix "10HW" does the same job for 10-meter transmitters.



A new harmonic filter for use on all bands from 15 to 160 meters, designated the TV-52-20LP, features the extra-low cutoff frequency of 22.5 mc to help you keep out of those i.f. strips when operating on the lower-frequency bands. This particular job is designed for use in 52- or 72-ohm coax lines. Drop a line to R. L. Drake, 11 Longworth St., Dayton 2, Ohio, for complete information on their line of TVI helps.

Electronics Dictionary

Allied Radio Corporation announces the publication of a "Dictionary of Electronics Terms" containing over 2,500 words used in television, radio, and electronics in general. This publication, edited by Harry L. Van-Velzer, associate professor of electrical engineering at the University of Illinois, answers the need for an accurate, up-to-date reference in our game.



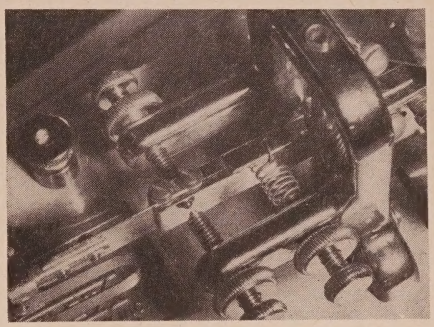
Over 125 illustrations and diagrams of components, equipment, and circuits are included, as well as an appendix containing useful data. This handy book is available from Allied Radio Corp., 833 West Jackson Blvd., Chicago 7, Ill. for only 25¢, so write for your copy now.

Tube Tester Adapter for 829-B

A handy gadget for club or "community ownership" is an adapter now being marketed by V.H.F. Labs, Box 333 Boonton, N. J., for testing 829-Bs or 832s in a conventional tube tester. The test for "balance" between sections should be of interest to the v.h.f. gang since an awful lot of TVI can be traced to unbalanced "balanced" amplifiers. The complete details of this interesting gadget can be obtained from the manufacturer.

Glamor Plus Utility

Too many of the gang think of Vibroplex's "presentation model" as simply a gold-plated version of the standard key. This is far from the whole truth, as can be gathered from inspection of the accompanying photograph. The adjustable



main spring, which is effectively of variable length, at last provides a bug which can go down to reasonable speeds without putting three weights and a clothespin on the vibrating shaft. With the two weights at the end of the shaft, and the adjustable main spring set to its greatest length, the presentation model will send excellent code at 15 w.p.m. A postal card to The Vibroplex Co., 833 Broadway, New York 3, will bring full particulars.

Crystal Calibrator

Measurements Corporation, Boonton, N. J., has announced the production of their new Model 111 Crystal Calibrator. This instrument is designed for the calibration of signal generators, receivers, transmitters, grid-dip meters etc., in the range from 250 kc to 1000 mc. The frequency accuracy throughout this terrific range is 0.001%.



The Model 111, a dual-purpose calibrator, not only provides a test signal of crystal-controlled stability, but also has a self-contained receiver with a sensitivity of 2 microwatts. A new circuit arrangement for the signal-generating portion utilizes the cross-modulation products of three separate oscillators operating at the fundamental frequencies of .25, 1.0, and 10 mc. This system extends the usable range of harmonic frequencies far beyond the 40-mc limit of most previously-available calibrators.

Ham Radio and the Press

ROBERT M. RYAN, W7GWA*

Have you ever wondered about the garbled accounts of ham activities which sometimes appear in your newspaper? Here's one explanation.

"Mr. Dibble?"

"Roger. What can I do for you, young lady?"

"I'm Beulah Fishwheel of the *Journal*. The city editor sent me out to get a story from you concerning your short wave contact with the South Sea Explorer."

"Sit down Beulah, and we'll begin at the beginning."

"Thank you."

"I was born in a log cabin during the year of the big flood. My parents were poor, and I had to educate myself by the light of the big stone fireplace. I learned to read by studying the labels on the food packages in the cupboard. Since that humble beginning, I've risen rapidly, until today. . . ."

"What I had in mind, Mr. Dibble, was more or less a story of your contact with the South Sea Explorer. Just how do you amateurs accomplish these feats of communication—I mean, what kind of equipment do you use, and how do you go about it?"

"Well, I'd been tuning around twenty-meters for a week before I heard this operator's fist calling CQ. I knew it was the ship's operator because he sent eight dots for everything from an "e" to an *error*.

"Since I am allowed to use only a kilowatt, I turned the plate rheostat down to low power and wound the E.C.O. down on the ship's frequency."

"Excuse me. Is that a pilot light there on that panel?"

"That's right."

"Go ahead with your story."



"As I was saying, I got ready and called the ship. I sent his call for fifteen minutes before I signed my call, so's I'd be sure to hook him. Even so, the QRM on twenty was terrific, and I wasn't sure I had him until I heard him send an RST 575 report. Then I knew he was hearing my distinctive note."

"How were conditions aboard the South Sea Explorer?"

"Fine. They have a seventy-five watt rig working on all bands, and a brand new receiver."

"I mean, how about the food supply and the water? Are they faring all right aboard the ship?"

"They're putting out a good signal, if that's what you mean."

"At what time did you talk to the ship?"

"Four fifteen a.m. yesterday."

"I think that's enough to make a good story, Mr. Dibble. It'll be in tomorrow's *Journal* . . . and thank you loads."

"Glad to be of service. Come around any time."

NOTE: Here is the story written by Beulah Fishwheel as it appeared in the *Journal*.

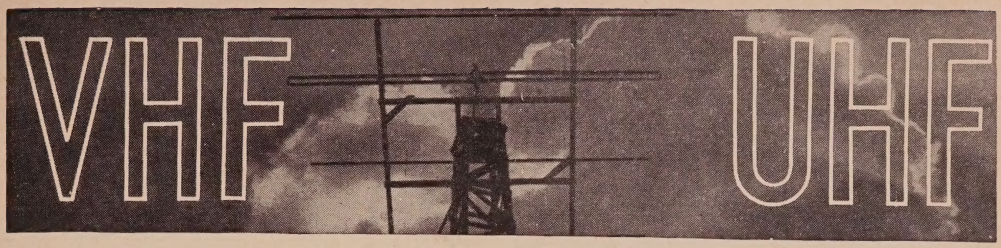
George Dibble, a local radio amateur who lives at 1415 Slippery Elm Street, this city, early yesterday became the first North American amateur to contact the South Sea Explorer off the Great Barrier Reef, when he established radio communication at four fifteen a.m., after a week's vigil in his backyard radio room.

Mr. Dibble told his story to this reporter today:

"I was listening on the kilowatt band," said Mr. Dibble, "when I heard this operator, named Fist, calling QRM. I warmed up my pilot light and called him. Since the maximum power allowed amateurs is 20-meters, I turned a knob which I keep for that purpose, and tightened up the sending band."

Mr. Dribble was enthusiastic as he continued: "Conditions aboard the South Sea Explorer were good, if you call RST-575 good. They seemed to be putting out plenty of frequencies with their equipment. I could hear lots of dots and several dashes," he concluded cheerily.

As this reporter left the amazing Mr. Dibble's radio room, he was busy developing a new electronic method of sound recording on sensitized grapevines.



Conducted by E. M. BROWN, W2PAU*

DURING THE PAST MONTH the six-meter band again demonstrated its unpredictable nature. At a time when we might have expected a series of sporadic E openings, and a flurry of aurora storms, the band almost failed to produce. Many of the gang in the northern sections of the country are beginning to wonder "Wha hoppen?" The few scattered reports of long range QSOs are quite a bit below par for this season. However, all was not gloomy. The generally excellent conditions which have prevailed over South America this spring seem to be drifting northward, and the patient six-meter stalwarts in our southern states at last got a chance at some international DX. During the early days of April the W4s and W5s made hay, and many picked up new South American countries. Conditions continued to be "hot" over South and Central America, with frequent long-haul evening openings.

Activity on the two-meter band is holding up fairly well, although, as most of the regulars on the band realize, it is not up to the high level which could be maintained if even a small percentage of the stations equipped to use the band would get on the air and operate habitually. Several good band-openings have already come and gone over the north-eastern section of the country without producing many long-range QSOs. Apparently the gang has not yet started using real "DX tactics". Most of the "faithful few" seem content to listen across the band a few times every evening, perhaps tear off an occasional QSO between TV shows, and maybe work a schedule now and then. Others, we know, are working on the equipment, trying to get it in tip-top shape for the summer season.

Better get on your toes, gang. There have been wasted opportunities already. The thing to do is to get back in the habit of operating, not just occasionally, but consistently, just as you did when you first got on the band. There are plenty of other hams out there ready to come back to a long "CQ."

And try *both* polarizations. The gang in the mid-west seem to be firmly settled on horizontal, as are the VE3s, the W4s on the middle Atlantic seaboard, the Gulf Coast stations and the operators at the foothills of the Rockies. On the other hand, the New England states, and the other north-Atlantic states down to the District of Columbia, are almost 100% vertical. So are the stations on the Pacific coast, although there is a tendency toward experimentation, especially in the far Northwest. Several reliable authorities have demonstrated that there is really very little difference between the two types of polarization on long-range contacts—so long as both stations use the same mode. So why not be smart, flip the antenna, aim it into the "enemy's" territory, and steal a march on your neighbors who are stubbornly waiting for the other group to shift!

Skipping over the 220-mc band, which, for some unexplained reason seems to have very few supporters, (Let's hope that crack stirs up some comment!), we find that 420 mc has suddenly become the center of attention for a great many experimenters. The excellent results obtained in England by G5BY and G3EJL (reported last month) have served as an inspiration to the uhf workers in the U. S. A., and every day we hear reports of new successes on this band. Paths are being opened up which might have been considered tough for two-meter signals a few years ago. There are more stations coming on the air every day, especially around the big cities where there are more opportunities to test with locals. We can expect to see headlines made when the first good band-openings hit 420 mc this summer!

Already there are signs that there will be plenty of heated discussion on 420 regarding the type of equipment and antennas that should be "standardized." There are experimenters who are building narrow-band receivers which use conventional communications-receivers as the i.f. strip. There are others who maintain that the hams are not yet ready for stabilized techniques on 420, and they claim that to standardize on narrow-band techniques would prevent many potential 420-mc operators from using the band. The same old fuss about polarization is rearing its ugly head, with the geographic distribution of the horizontal and vertical camps even more scattered than it was on two meters at this stage of the game. Why can't we avoid this sort of thing by deciding, *now,* which system should be standard for this band? Personally, although I do have a positive opinion on the subject, I would rather see this matter settled by the toss of a coin that go through the damaging struggle which has, in the past, split the efforts of the six, five, and two meter operators.

More on VHF TVI

It is about time for some frank talk on the subject of TVI—especially regarding the problems faced by the VHF operators which are not similar to those faced by the operators on the lower-frequency bands. The situation is getting worse, not better. The six-meter band is practically deserted during the early-evening hours except when a band-opening occurs. Speaking from experience, we feel that TVI has been largely responsible for this situation. Perry Ferrell relays the news that several of the members of the six-meter reporting project have indicated that TVI is a factor in keeping them off the air, and he thinks that

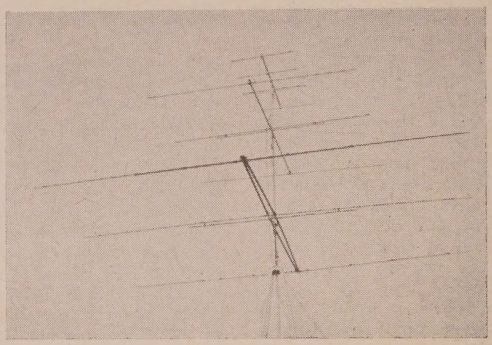
* *Send all contributions to E. M. Brown, W2PAU, 88 Emerald Ave., Westmont, Collingswood 7, N. J.*

the effectiveness of the project may be impaired unless something can be done about it.

TVI on the VHF bands, as on any other bands, falls into two general categories. The first, and easiest to deal with, is the type of interfecence generated within the transmitter. The second, over which we have no control, is that generated in the receiver by the fundamental-frequency output signal of the transmitter.

The Rig

We do not intend to devote much space to the first category. There have been plenty of articles telling us how to treat our rigs so that they radiate only the desired output signal. The VHF boys have it pretty easy on this score. We can put the lowest frequency stage of the rig on a relatively high frequency, and thus have less to worry about the undesired harmonics of the oscillator riding thru the tuned circuits of the final stages. We have a fairly simple problem in dealing with harmonics of the output signal. Six-meter transmitters can produce QRM on the f.m. broadcast band with their second harmonic and on TV channel 11 with their fourth harmonic. The other overtones do not fall inside any TV or broadcast band which is in use at this time. Two-meter transmitters should cause no serious trouble even though their output is fairly rich in harmonics—harmonics of the 144-mc signal, that is. 420 mc rigs *should* produce no troubles at all, especially since most of the gang are using self-excited oscillators on this band.



VE3ANY's antennas, showing the ten, six, and two meter arrays. The assembly is manually rotated by means of a worm and pinion at the base. It has survived two winters without maintenance.

But, before assuming that the rig is above reproach, let's do a little checking. Write down the frequency of the lowest-frequency stage of your rig—generally the oscillator grid circuit. Then multiply this frequency by *every* number from 2 to about 25—and, if *any* multiple falls in a TV channel, there is a pretty good chance that your rig *could* be responsible for interference on that channel. Don't assume that, just because you are not tuning some stage in your rig to the 13th harmonic of the oscillator frequency, that it cannot be present. It can, and it can ride through on the skirts of the selectivity curve of the tuned power amplifier stages of the rig and wind up in the antenna. Or, it can be radiated by the wiring of any stage, sometimes quite efficiently. We found, for example, that copious quantities of the 16th harmonic of our 12-mc VFO were floating around on the metal shell of the 6AG7 multiplier, and the signal from this source was messing up TV channel 10. A ground strap soldered to the shell of the tube was the cure, in that case. The famous 522 and ARC-5 two meter transmitters cause plenty of trouble on channel 10 in our area because of radiation from the 832 tripler stage of the undesired 4th harmonic of the 48-mc signal.

The best procedure to eliminate the type of QRM described above is either to redesign the rig so as to eliminate the undesired signal entirely, by choosing another harmonic progression; or prevent the signal from radiating by providing extra shielding around the signal source and by placing band-pass traps in the antenna lead. Do not assume that because you cannot locate the spurious signal with a simple wavemeter that it can't cause trouble. Serious TVI can be caused in some cases by signals so weak that only a sensitive receiver can pick them up.

If the TVI is of the direct-harmonic type, which should affect only transmitters operating on six meters and lower, the harmonics must be eliminated or bottled up by the usual procedures.

So, after a few evenings of work, you have eliminated the possibility of TVI! By changing one of the triplers to a doubler, by changing over to a high frequency rock, you figure that the rig *cannot* be producing any radiations within the local TV bands. Just for a test, fire it up on two meters some Sunday night right in the middle of all the best programs! WOW! It didn't take long for the 'phone to start ringing, did it?

The TV Receiver

Comes the revelation! Some of the TVI, at least, was not due to spurious signals in the TV bands at all. Jones, down the street, who has an Admiral TV set, complains bitterly that he hears "CQs" on all channels, worst of all, he hears 'em even when the volume control is turned fully off. The only way he can quiet things down is by turning the set off! In the next apartment, there is a little R.C.A. table model. Those folks never even know when you fire up on two meters. So, just about as you are ready to tell everyone that the R.C.A. is a good set, the people across the hall, who have an R.C.A. 16" console, finally figure out where all the voices are coming from and start beating on your door. The guy with the Motorola service franchise calls and tells you that you must be operating on channel 10! So, figuring that two meters must be jinxed, you QSY to six. This time you can't be wrong. You've sent away for a 50 mc rock, and have only two stages in the rig! On your first CQ you get an answer right away, from those folks with the little R.C.A. set who never complained when you were on two meters! You hear from quite a few TV DX fiends, who take great pleasure in pulling through channel 2 from a city 50 miles away. What you do to channel 2 with your 50 watts on 50 mc shouldn't even happen to Arthur Godfrey.

From here on in, the only question is whether you are more stubborn than your neighbors. Most of the troubles described above can be cured, but without exception they are best cured at the receiver. Generally, the only possible cure at the transmitter end is to use lower power. Sometimes re-location of the antenna will help. And, occasionally, power line filters and the like will tend to reduce troubles in sets located very near the transmitter. But in most cases it will be necessary to operate on the receivers.

6-Meter TVI

On six meters most of the trouble is due to fundamental overload. It is necessary to add sufficient selectivity to the TV set front end to remove the six-meter signal from the input. Traps in the TV antenna feed line will produce remarkable cures. Open-ended stubs cut to quarter-wave resonance at six meters will produce a deep suck-out in the receiver response. Such traps have the failing that they often produce undesired suck-outs on some of the higher TV channels. For this reason, a simple series-tuned trap made up of a coil and a capacitor in series is a better bet, especially where there are weak signals on the higher channels which might be affected. It won't hurt to try the simple open-stub trick, though. A good high-pass filter would be nice, but at this time, there are no such filters commercially available which provide a good rejection notch at 50 mc. This is just too close to channel 2 to be an easy filter design problem. However it can be solved and the filter system has the advantage that it also protects the set from overload from strong signals on the lower ham bands. Six-

meter TVI is tough to clear up completely, since some signal is certain to be picked up in the wiring of the TV set past any filters which you may add. In some extreme cases extra shielding around the TV tuner may be required.

Two-Meter TVI

Two-meter signals present some different problems. A large percentage of the complaints regarding this band seem to be caused by direct detection of the ham's signal in the audio wiring of the TV set. This is also a common complaint in BC sets, high-gain phonograph pre-amplifiers, hearing aids, electronic organs, etc. The best and most permanent cure is to dig right into the chassis of the affected set and add an r.f. bypass capacitor, using the shortest possible leads, from the grid to ground at the first audio-frequency stage. A few hundred micro-mikes will remove the r.f. signal almost 100% without seriously affecting the a.f. response. In stubborn cases a two-meter r.f. choke in series with the leads to the socket grid terminal will supplement the work of the r.f. bypass. If these do not do the trick, r.f. bypassing of the filament, screen-grid, or cathode of the first a.f. stage may be required. Sometimes it is necessary to apply the same treatment to the second a.f. stage. However, a simple grid-to-cathode bypass will do wonders, and, speaking from experience on R.C.A. and Admiral consoles, I can almost guarantee results. Be sure to point out this trick to the serviceman responsible for the affected set. Most TV technicians have never run into a situation where the volume control of the TV set is completely ineffective! Often stop-gap measures will help alleviate this "r.f. in the audio" condition. For example, W2DAJ found that he could calm down his R.C.A. 12" console by wrapping the long leads to the loudspeaker and pilot bulb with a strip of kitchen-variety aluminum foil. He didn't even have to ground the foil. Sometimes a line filter will help this type of TVI, but seldom permanently. Traps in the TV set antenna feeders are usually not effective in curing this type of interference.

Images present a serious problem in some types of TV sets. While our two-meter band is fortunately located above the low-channel image bands of most conventional TV receivers, there are certain inter-carrier system TV receivers which operate the local oscillator on the low side of the desired signal frequency when they are tuned to the higher channels. Many of these sets have relatively poor r.f. selectivity. On this type of set, if the i.f. band is in the normal 25-mc region, our two-meter band lies close to the image response of TV channels 9, 10, and 11. Hoping for TV sets with higher i.f. channels may not be the thing to do, because when we get TV sets with i.f.s in the order of 40 mc we can expect a new wave of troubles with images from the lower channels!

The only cure for image TVI is to add selectivity to the TV sets. Traps arranged to remove the fundamental ham signal may help. Switching to vertical polarization won't do any harm! In some cases the best cure is to add a good tunable r.f. booster amplifier ahead of the TV set. This will build up the desired signal and cut down the QRMing one. There will be some heated debates on who is going to bear the cost of the pre-amp, but a successful demonstration will, at least, arouse the seeds of doubt in the mind of the set-owner.

Any two strong signals which can beat together and produce a heterodyne signal on a local TV channel can cause trouble. One of the two signals may be from the receiver local oscillator. Or, it may be a strong TV signal. For example ,the picture carrier of a local TV station on channel 6, beating with a carrier on 146 mc, will produce a heterodyne beat right in the middle of channel 3 which will show up as "TVI" on channel 3. Again, more selectivity, through traps or a pre-amplifier, will help.

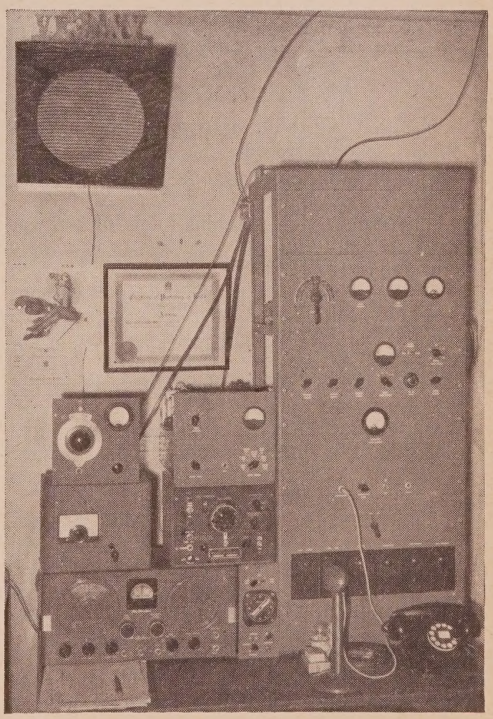
The Diplomatic Problem

When you are faced with the problem of TVI your course of action will probably depend on whether you are a man or a mouse! As we have attempted to show, it is not likely that much relief can be expected from changes in the rig.

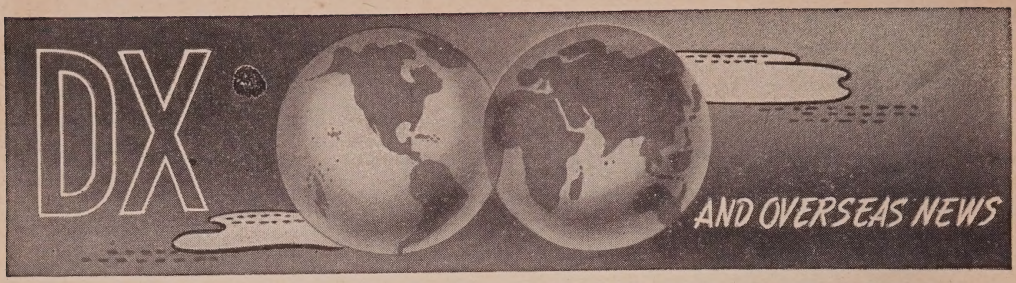
And, when that first official "complaint" form arrives from the local FCC office, you will probably feel like throwing in the towel. But think it over. . . . The trouble *can* be cured. Maybe the servicemen responsible for the set won't do a thing about the situation, and refuse to let you tamper with the set while it is protected by their service policy. Maybe the set-owner will insist that there is nothing wrong with his receiver because he gets good pictures except when you are on the air. But if you are convinced that there is nothing wrong with your transmitter there is no good reason why you should not continue to operate. Although we may have heard plenty of rumors about FCC action in these matters, have you ever heard of a case where a ham was actually forced to shut down by the FCC if he could demonstrate that his signal was clean? Several v.h.f. operaters in our area have had visits from the FCC inspectors, but there are no documented cases of undeserved disciplinary action. The present attitude of our local FCC office is that the manufacturer of the TV set, or his authorized service representative is responsible for correcting these cases of TVI. If you can afford it, get a TV receiver of your own. Clear up your own TVI, by purifying the rig and by adding any necessary filters or traps to the TV set. Or, locate a nearby neighbor who is not having trouble. Point to such sets as examples of what can be done. In time, the number of sets that you do not QRM will grow, and they will constitute your most potent argument that TVI can be licked.

Above all, *operate,* even if you must use low power

(Continued on page 47)



The "shack" at VE3ANY. This neat layout includes a band-switching rig with an 813 final, a v.h.f. ARC5 with an outboard 829 final for six and two meters, a modified BC221 serves as VFO and frequency standard. The receiver layout includes a ten-meter converter, a band-switching six and two meter converter, and an S-20R.



Conducted by HERB BECKER, W6QD*

THIS MONTH, we see five more DXmen achieving WAZ, and we are extremely happy to extend our congratulations to them.

199	KH6VP	Col. William R. Shuler	40–145
200	ZS2CR	A. W. White	40–131
201	W6JK	Hal Nahmens	40–160
202	WØPNQ	Donald H. Deppe	40–209
203	WØDU	R. L. Keller	40–186
204	G8IG	C. G. Allen	40–175
205	G2VD	Leslie F. Viney	40–167

KH6VP has done an excellent job since he moved to Hawaii. Most of you will remember that he also made WAZ while he was W7BE. Then, we have ZS2CR who has been hot after a couple of elusive ones for some months. Of course, a pair of WØs like PNQ and DU cannot be ignored, as both of these boys have been working hard to get in their last cards. W6JK is an old timer who now lives in Northern California, but many of us in Southern California remember Hal in the old days as W6HT and SCM. We are glad to see G8IG and G2VD making the grade. G8IG had quite a time pinning down the correct card from Zone 19. Most important, however, is that they made it. Once again, congratulations, fellows!

G6QX has found that the local authorities object to lattice towers, so he is putting up a nice 36′ dural pipe on top of which is a 22′ dural boom holding his 20 meter dipole. The whole thing is motor driven, and he feeds the dipole with two 150′ lengths of 80-ohm coax. . . . It looks as though VK2DI is signing off temporarily due to change of QTH. Better not make it too long, Gordon, or your pals will leave you down the list.

W6RBQ finds it hard to work new ones nowadays. . . . Who wouldn't with 190 tucked away!!

W6MX ran across old YM4AA who is now DL1IB. He said he lost everything when he used to be in Danzig, but he started over last May and now has worked about 147 countries. . . . In case you haven't heard, VQ1CUR is now G2CUR. . . . G6ZO tells me that with much sweating and good fortune, he has logged three new ones—*CR1ØAA, FB8XX,* and *KJ6AH*. What makes this especially good is that this brings his total to 221. He is still using the same pair of 807s. . . . Incidentally, some of you may have heard that DL4ND was trying to get on the air in Monaco, but he didn't make it. G6ZO says he got the call *3AA1A* issued since CZ is no longer in effect. Even sent backwards, that call is a lulu. . . . Last, but not least, Jim works 80 c.w. once in a while, and his last two victims were W6ZAT and W6CEM, the latter being a very susceptible victim to anyone on 80.

W3KQD has been trying like the dickens to make the Honor Roll, but his 32Z and 85C has just left him a little short. We want Bob, and everyone else in about the same category, to keep pitching, because, when you get 32Z, it shouldn't take too long to pick up a couple of additional zones.

VQ4SC, according to W6AOR, is going to sign off around the end of July and return to England and will then sign G8SC. All QSLs will go through R.S.G.B., of course. . . .

W6AM adds something to the Monaco situation. He said that DL4ND went to Monaco for a few days, but he couldn't get on the air. It seems that until the Prince of Monaco signs the Atlantic Treaty, there will be no ham radio. Anyway, he is going back to Monaco sometime in July, and if the Prince has signed his "John Henry" to the

WAZ HONOR ROLL

To enter the Honor Roll, fill out one of the Zone and Country List forms which we will supply on request. Please send a stamped, self-addressed envelope.

The Honor Roll contains totals of postwar contacts only, that is, contacts made since November 15, 1945.

It is not necessary to submit combinations until you are eligible for a WAZ certificate. To be awarded a WAZ certificate, send confirmations for the 40 zones, as well as a list of them, direct to the DX Editor. If a Country List has not been previously submitted, then one must accompany the WAZ certificate application. For these lists, please use one of our standard Zone and Country List forms, and it will then become our permanent record.

The Honor Roll is in two divisions; the c.w.-phone section, which gives the current total of zones and countries any station has worked while using c.w. or phone, or both; the other section contains a list of "phone only" stations. All contacts claimed in this section must be on a "phone-to-phone" basis.

All-time WAZ certificates will be issued upon presentation of proper confirmation. The Certificate will be similar to the postwar certificate, although no listings of all-time WAZ certificate holders is anticipated at this time.

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

W. A. Z. HONOR ROLL

CW & PHONE

WAZ

W1FH	234
W6VFR	231
W2BXA	227
W6EBG	225
W3BES	224
W6ENV	224
W6GRL	224
W6MEK	222
W6ADP	222
W3GHD	221
G6ZO	221
WØYXO	220
W8BHW	218
W6PFD	218
W3LOE	217
G2PL	216
W6SN	214
W6ITA	214
W4AIT	213
VK3BZ	212
W2PEO	212
W3EVW	211
W6TT	211
W6SAI	210
W6FSJ	210
W6AM	209
W6SYG	209
W9VW	209
WØPNQ	209
W2AQW	208
W8HGW	208
W6MX	208
VE7ZM	206
W4BPD	206
ZL2GX	206
ZL1HY	206
W6MJB	206
VE7HC	206
W7GUI	205
W6NNV	205
LU6DJX	205
W6DI	204
W6PKO	204
VK2DI	204
W4CYU	203
ZS2X	203
VE4RO	203
W6RM	202
W6SC	202
W6OMC	202
W6PB	202
W7AMX	201
PY1DH	201
W6DZZ	201
W9NDA	201
W6OEG	201
W6BPD	201
W6MVQ	200
W9KOK	200
W6PQT	200
VK2ACX	199
W2IOP	197
CE3AG	197
PY1AJ	196
W6WB	196
G2FSR	196
G4CP	195
W5KC	195
KH6IJ	194
W6GAL	193
W6DLY	193
W6AVM	192
W6HX	192
W6ZCY	191
W6GDJ	191
VK2DI	191
W6RW	190
G6OB	190
W6RBQ	190
VK3JE	189
ON4JW	189
WØNTA	188
W6TI	187
W6EFM	187
WØDU	186
W6AMA	186
W2CZO	185
W6SA	184
W6UCX	184
G3ATU	183
W6RLN	182
W6AOA	181
W6KRI	181
W6EPZ	180
W6IFW	180
OK1FF	180
W8SDR	178
W7DL	177
WØUOX	177
I1KN	177
VK6KW	177
WØELA	176
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W61BD	176
W1AB	175
G3DO	175
G8IG	175
W6WKU	174
W6CIS	174
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W7FZA	174
W6PCS	174
W6KUT	174
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W6UZX	173
G5YV	172
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W6SRF	171
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WØSQO	171
PY1AHL	171
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W6PZ	169
VK4HR	169
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W6EAK	163
W6YZU	163
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W6PH	162
ZS6DW	162
W7ENW	162
W6PDB	161
W6BVM	161
W6PUY	160
W6LN	160
W6JK	160
W6BUD	160
I1IR	158
W6WWQ	158
W6CYI	157
W7BD	157
WØOUH	157
W7BE	156
W6BAX	155
G3AAM	154
W6KEV	153
W6BPD	152
G3YF	152
VK2QL	151
OK1SV	151
W6LEE	150
W6FHE	150
W6EYR	150
W6LDD	150
OK1CX	147
W7DXZ	146
W6AYZ	146
VE6GD	146
W6LS	146
W9NRB	145
W6MUC	145
W6QD	145
W6MUC	145
W6LER	145
KH6VP	145
ON4TA	144
G3BI	144
JA2KG	143
KH6PY	143
W6RLQ	140
W6ONZ	139
W6ID	138
ZC1CL	138
OK1WX	135
G3AZ	133
W6TEU	133
W6RDR	133
W6OBD	131
ZS2CR	131
W6MHB	130
W7ASG	129
W7GBW	127
G8IP	127
G5BJ	126
PK6HA	124
G5VU	124
W6NRQ	123
W6MLY	123
W6BIL	121
ZS6CT	113
KG6AL	103
VK6SA	103
W7KWA	98

39 Zones

W3KT	217
W3DPA	214
W9ANT	212
WØNUC	211
W3IYE	209
W2NSZ	209
W2HHF	208
W3JTC	208
W1JYH	208
W9RBI	206
W1ENE	205
W1BIH	204
F8BS	204
W8NBK	203
W9IU	201
W2HZY	200
W5ASG	198
W2EFV	197
W3OQU	196
W2GWE	195
VE3QD	195
W4GG	193
W2CWE	192
W3JNN	191
W1HX	191
W2AGO	191
W1AWX	191
W9LNM	186
WØEYR	186
W9MXX	185
W8RDX	184
W3DKT	184
W3DRD	183
W4INL	183
W1ZL	183
W8SYC	182
W1DQH	181
VO6EP	180
W2EMW	179
W2WZ	179
KP4KD	177
W2WZ	174
W8CVU	172
W3JKO	171
W9LM	170
VE3IJ	170
W6CTL	169
W1NMP	169
W9VND	169
W3JTK	169
PY2AC	168
W6EHV	168
W2CYS	167
OK1VW	167
W8LEC	166
W2CNT	166
W4DKA	165
W4LVV	164
W7PGS	164
F9BO	163
W9FKC	163
W2BJ	163
W3KDP	162
W4BRB	162
W2RGV	161
G5DQ	160
W4VE	160
WOGKS	158
W4OM	158
WØAIW	157
I1AY	157
G8KP	156
W9YNB	155
DL1FK	155
I1AIV	154
W9TQL	154
W4AZK	154
G6QR	152
W2RDK	152
G2AJ	151
W4RBQ	151
W6BZE	149
W8VLK	149
VE3AAZ	149
SM5WI	148
DL2KW	147
G2WW	147
W2COK	146
W2GUR	146
GM3CSM	146
W2MEL	145
KH6VP	145
OK1AW	144
TF3EA	142
W8WWU	142
W9DUY	140
G6BQ	140
W6LGD	140
G3FJ	139
W9ABA	138
I1XK	137
W6ATO	135
OE1CL	134
G2BD	132
G5RV	132
W7ETK	132
VK4RC	131
W6TE	131
CR9AG	131
ZS2CR	131
W6WJX	131
W5CPI	130
DL1DA	125
VR5PL	124
W6MI	124
VE7KC	124
W6NTR	123
G3AAK	122
G8RL	120
G4WM	120
W7BTH	120
W6MUF	118
DL3DU	118
G6BS	117
W6NRZ	117
KL7UM	117
W9NZZ	117
G3QD	116
ZS2EC	116
W7HXG	115
G3TK	114
W6JWL	114
W6EYC	114
KL7GG	114
W6VAT	110
W7GXA	105
KG6GD	104
W6FBC	104
W6LEV	103
W7LEE	91

38 Zones

W2HMJ	185
W2PUD	180
CM2SW	174
W8KPL	166
W8FJN	160
W2RGV	156
LU7CD	155
W2GVZ	154
W3LVJ	145
W8ZMC	143
ZS2AT	143
WØAZT	143
W9FKH	135
VE3ACS	134
W4FPK	131
G8IL	131
G4CI	130
W2PQJ	130
W3ZN	129
WØRBA	127
G6LX	126
W9MZP	126
FE8AB	126
GW3AX	123
W9TB	122
GW4CX	120
WØFET	118
W6ETJ	114
W7EYS	107
KL7PJ	107
G3ZI	107
W6CAE	98
W6FXL	92
C1CH	84

37 Zones

W1KFV	168
W2ZA	160
W3WU	148
W4IWO	146
ZL3CC	143
GM2UU	142
W8EYE	142
W4ML	138
W3FYS	136
W2AYJ	133
W7HKT	130
W4DIA	129
W1APA	118
VE1EA	116
WØFWW	108

36 Zones

HC2JR	156
W4HA	149
W9WCE	136
OA4AK	128
W3AYS	124
W2WC	124
W9LI	124
VE1PQ	123
SV1RX	119
MD5AK	118
W2BF	115
G2CNN	114
VE5JV	113
G2AKQ	112
4X4BX	112
W5CD	108
W2JA	102
W6ETJ	102
G2AO	100
W5BX	99
G6WX	95
VE8AS	93
OH3OE	85
GM2AAT	75

35 Zones

W1EFT	141
W2OST	139
W4DHZ	132
W9CKP	132
W6ZZ	120
W9RQM	119
CO6AJ	119
W8AVB	119
G6QX	115
W9FNR	112
W9DGA	108
KZ5IP	108
FE8AB	107
W2HAZ	107
W9HUZ	102
WØGEJ	101
WØFWW	99
ZL1QW	99
KL7CZ	66

34 Zones

W8NSS	133
W4IYT	127
W3MZE	121
W1MRP	118
W5NTT	107
W8JM	102
OE1FF	99
W9WEN	83
VE8AS	82
W8PCS	80

33 Zones

W4QN	110
G6QX	109
W2SEI	100
W8QUS	85
G2VBN	80

PHONE ONLY

39 Zones

W6DI	192
W6VFR	165
W7HTB	161
VQ4ERR	160
HB9DS	145
VE7ZM	145
DL1FK	125

38 Zones

W2BXA	175
W4CYU	173
W9NDA	157
W1HKK	153

PHONE ONLY

G8IG	149
W6KQY	145

37 Zones

XE1AC	187
W1JCX	170
W3LTU	169
W9RBI	168
W8REU	163
W7MBX	155
G2PL	154
W6WNH	153
G3DO	153
W6PXH	152
W8BF	146
F9BO	137
W3JNN	136
W6TT	136
G6LX	124
F8VC	124
G2AJ	121
W6AM	111
W7MBU	97

36 Zones

W1MCW	167
W1NWO	166
W1BEQ	164
VK3BZ	155
PK4DA	150
W4ESP	144
W2DYR	140
W9HB	139
W9BZB	136
GM2UU	135
W6POB	130
W4INL	129
W1FJN	128
G6BW	127
W8AUP	126
W9HP	124
WØHX	118
VE3BNQ	115
G5YV	106
G6WX	105
W3DHM	96
VE7HC	94
W6SA	92
F8DC	87

35 Zones

HC2JR	152
W4HA	140
W6PCK	135
W9RNX	135
WØEYR	131
W2RGV	128
W6CHV	128
W2GHV	126
WØPRZ	124
W9CKP	124
G8QX	123
W8ZMC	122
CE3AB	121
WØPUE	117
G3FU	115
WØPUE	114
W5LWV	108
W4OM	106
W3PA	105

34 Zones

W5KC	125
W2ZVS	122
W6UZX	120
W8BIQ	120
W9BVX	119
W4LZM	117
WØANF	115
W4LZM	114
W1BPH	105
W8UIG	100
W4IWO	99
W8QBF	92

33 Zones

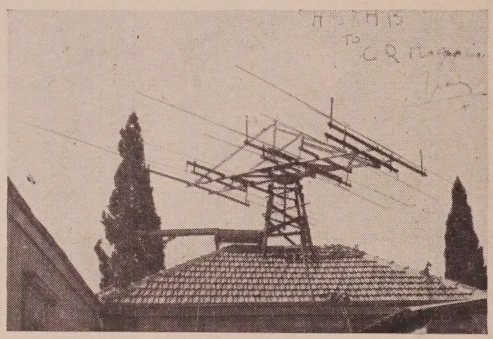
W5ASG	134
W9MIR	127
W5ALA	121
W9WCE	119
W2ZW	115
W8BFQ	114
W8NSS	112
VE3BQP	108
WØANE	106
W2PQJ	100

Treaty, DL4ND will get on the air and sign *3AAIA* and *NOT* with a prefix "CZ." If any of you boys have any influence with the Prince, how about giving a lift?

CR9AG, while QSO W6ZY, told him that he had sold out his station to *CR9AB.* However, for a while, AG expects to operate from CR9AB. After he shoves off from Macau, he will get on the air again in Hong Kong, signing his old call *VS6AG.*

I received a card from W2BMX who is spending a few months in Europe. He expects to visit F8EO and from there go to Italy where he will visit various and sundry stations. Prose was highly tempted to put a rotary on top of the Eiffel Tower while he was in Paris.

W2KDS has never been much of a DX-man, but he decided to take a fling at it during the recent DX contest. Running 200 watts into a 4-65A, and the antenna being a folded dipole strung up in the attic, he worked WAC in five hours, as well as working a mess of other stuff. He says he hopes to get something up outside some day, and when he does, he will probably add a little more to his collection of DX.



The Antenna at AR8AB

Our handwriting experts were called in last month to see if we could find out who sent in five new countries to be added to their list. No call or name was on the page. Anyway, this mysterious stranger worked *ZS3R, VK9WL, VS9AL, VP5BF,* and *UL7BS.* Who could this guy be anyway? Normally, I don't like to take the space to put in the work of someone we don't know, but this is a good spot to point out that sometimes it is pretty hard to keep Zone and Country totals up to date when the name or call is not given. There isn't too much of this . . . usually, just one or two a month.

You 7-mc. night owls might be interested to know that conditions are good in VS6 and both *VS6JH* and *VS6AX* will be on 40 meters regularly. VS6AX prefers 7014, but he also has crystals on 7007, 7040, and 7050.

XE1AC worked *FS8PR,* who is supposed to be on Clipperton Island, and if this proves to be o.k., it will be a good one to have put away. Other stuff for Al in March were *MD7HV, MP4BAO* on Bahrein, *KC6WC* on Palau, and *CR4AC.* Read on for the QTHs. . . . VE2BV, after a long hard struggle, says he now has 38Z and 132C and wants to enter the Honor Roll. When we get a flock of new ones for the Honor Roll in any one month, it keeps W6ENV out of mischief for a few hours. This, of course, takes time away from his nightly game of canasta with his XYL and their friends.

GM3CSM is having a dickens of a time getting a card from *EP2B.* He says it seems as though everyone gets them but him. Ian hooked W7EOI in Montana during the recent DX Contest for his 48th state.

W4AZK has been doing quite a job of sending out the QSL cards from FM8AD. It is rather rough in the first place to get all the dope from 8AD, and it adds to the problem when many of the boys fail to send in postage for their return QSL card. At this point, Dave has spent about 25 bucks of his own money, and he doesn't feel that he should continue at this rate. In view of this, those who haven't sent in return postage may have to wait for a while to get your card. W4CEN spent many long operating hours helping out, and he has all of the 1950 DX Contest log of 8AD's. Both of these fellows deserve credit, but for the love of Mike, don't forget to send return postage if you want your card.

During some of the dead spots in DX conditions, W6BIL plugs in his 40-meter coils and goes after working all California counties which they call "W.A.C.C." There are so many "alphabetical" type certificates now existing throughout the world, it sounds like the former New Deal's various and sundry agencies.

VK/ZL International DX Contest, 1950

The rules for this year's VK/ZL Contest have just been received, and most of the details will be printed in next month's *CQ.* Most of us know about this contest, but in order to help you reserve the dates, we are running them in this issue.

1201 GMT September 22 to 1159 GMT September 24		c.w.
1201 GMT September 29 to 1159 GMT October 1		Phone
1201 GMT October 6 to 1159 GMT October 8		c.w.
1201 GMT October 13 to 1159 GMT October 15		Phone

From the above, it looks as though there will be one intervening weekend between the VK/ZL Contest and *CQ's* World Wide DX Contest for this year. We are tentatively planning our contest for the last weekend in October and the first weekend in November.

W1FH had to wait about ten days after getting his new final on the air before snagging a new one. Tough! Ain't it? Anyway, Charlie's new one was *CR5AD,* 14,009. . . . W9CKP complains in a mild sort of way about not having very much operating time due to his youngster. Things like that do happen, and you just can't expect to work DX forever.

W6SFS worked a guy on 14,075, signing *C8DD,* and he is wondering if he is o.k. So are we! I might add that this is the only report, thus far, on the guy, if that means anything. . . . W6LGD is happy after getting a card from *AC4RF,* and he is now waiting for one from Zone 34. LGD wants no more dirty cracks from me about vertical antennas. Can't understand what he means. . . . All I said once was, "Vertical antennas are equally poor in

all directions." Guess I was wrong! Make it, "Equally good!"

ZS2X kicks through after being out of the letter-writing mood for a year. Rex keeps a sked with *FB8XX,* 14,200 phone, but since he can't speak English, Rex gets his XYL to do all the talking. 8XX told him that *FB8AX* is supposed to pack up and get out of Antarctica around the end of April or the first part of May. Another one being heard at ZS2X is *EQ2AB* 14,002, however, Rex's eyebrows were also raised at *VQ9ON,* as he didn't peak up when he really should have.

From W6TI, we hear that *VS1BX* is again in Malaya after having been in England for two years. . . . It is good to see one of the real old time Zedders in the Honor Roll; this one being good old ZL3CC. Many of us will remember him in the 30s coming through on 40 in the wee small hours. . . . Another new one we are glad to see in the Honor Roll is LU7CD.

WAJAD Certificate

Here's another certificate you can go after. The F.E.A.R.L. have announced the availability of the WAJAD certificate. To be eligible, the applicant must work at least one station in any seven of the JA districts. These districts are listed below:

JAØ Iwo Jima area
JA2 Tokyo area
JA3 Nagoya area
JA4 Osaka area
JA5 Hiroshima area
JA6 Matsuyama area
JA7 Kumamoto area
JA8 Sendai area
JA9 Hokkaido area

Contacts may be made on phone or c.w., and any contacts made *after* January 1, 1949 may be counted. QSL cards or written confirmations must be submitted for each claimed contact. These should be mailed to the: Secretary, Far East Amateur Radio League, APO 500, c/o Postmaster, San Francisco, California. After examination, if all conditions are met, the WAJAD certificate, along with your confirmations, will be sent to you by registered mail.

W8TTS is another one of the lucky ones to hook *AC4RF,* and this was his last zone. . . . VQ3JTW told W6AM that *ZS6DO* hopes to take a portable rig to *FB8* on his holidays which will be for one month. That is, providing he can get permission from the authorities there to operate. Keep your fingers crossed, boys!

W6PB has been so busy working DX, editing the Northern California DX Club Bulletin, as well as earning a buck, that he hasn't had time during the last year to bring his country totals up to date. . . . TVI is cramping W9VW's style, but he did manage to work *VK1DR* and *VK1AJT* on c.w.

Looking at W6VFR's scratch pad, I see where W9NRB is now in North Carolina. . . . *TA3AA* and *TA3GVU* are reportedly going to QRT soon . . . and, a new one is *EA8LP* on the low end of 20. . . . *UA4HI* has a good sounding phone signal and speaks good English. . . . *FY7YA* is none other than ex-FY8AA. . . . *VP8AR* on South Georgia is ex-VP8AP. . . . Another one on phone is *3V8BB* who operates on 14,310 and 14,390. . . . *TF3SF* is on 10 phone and told Marv that *TF3EA* and *TF3MB* are both on 20 phone. . . . CT3AB, AC, AD, AK, and AV are all on phone too. . . . *VR1C* is on Makin Island. Another one heard on is *VR1A,* who, some ZLs say, is o.k. Don't know if he is in the same group as VR1C or not. . . . Some of the boys have been working *FL8AC,* but to most, he sounds NG on account of beams heading toward French Indo China. Could be that the FL8 has developed a new bank shot, however.

W6RLN hooked *VK3AMR/VK9* on New Guinea. . . . W3JTK lacks one Zone, this being Zone 23. . . . At the rate the boys are knocking off *AC4RF,* it probably won't be too much of a wait for Jack. Incidentally, he tells me that LUØ is a mobile prefix and he worked LUØAI mobile on 10 c.w.

In a letter from *MD7XP* I see where he lists the licensed hams at the present time: MD7HV, WE, DC, JW, and XP. A new one to come on shortly will be MD7FM. Sid says that there never have been any ZC4 calls licensed on Cyprus, and apparently there are a flock of W cards there addressed to ZC4AC. Sid also says that other phonies known to be active are MD7AD, AM, PJ, AN, and SU. Whether or not these are on the island, but unlicensed, or not even on the island, is not stated. MD7HV and WE are on phone and c.w., while the rest of them are on c.w. only. The most active seems to be MD7DC. Sid says that most of the boys run around 25 watts, but MD7HV is somewhere between 60 and 80 watts.

W1HX is listening hard for Zone 23. That will make Norm's 40th. . . . W6EFM was having no TVI problems until channel 4 opened up and now, as he puts it, he is giving code practice on that channel.

W7MBX received a letter from *AC4NC,* who tells Les that he has sent all W QSL cards to the ARRL, so by this time, you fellows who have worked him should have your cards. As I understand it, W7MBX donated the cards for AC4NC. . . . W9RNX said the Easter Bunny was good to him and brought VS9AH—this was on phone.

About the time the July column should be written, I will be at various points around the East, so I strongly suspect that W6ENV will do the usual good job of pinch hitting for me. In other words, next month, Andy will have the double burden of the Honor Roll and the column. Who knows, maybe I will gather in some hot information while in the land of W9s. Keep up the good work fellows and let's hear from you. . . . See you in a couple of months. 73.

QTHs

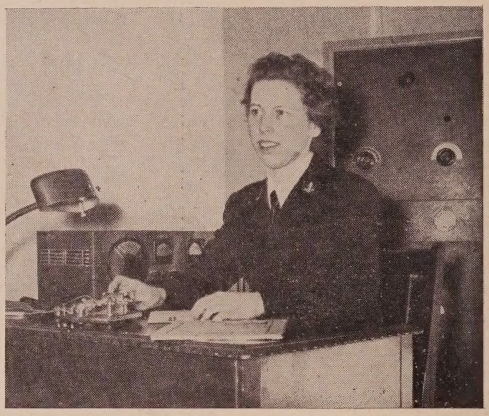
CR4AC	Box 61, Praia, Cape Verde Islands
EA8LP	Luciano Perez, Box 175, Las Palmas Gran, Canary Islands
EQ2AB	Via ARRL
FS8PR	Pierre Roblin, c/o R.E.F.
KC6WC	c/o Box 100, Guam, Marianas Islands
KG6FAA	APO 334, c/o Postmaster San Francisco, California
KJ6AF	APO 105, c/o Postmaster San Francisco, California
MD7HV	P. O. Box 451, Nicosia, Cyprus Islands
MP4BAO	P. O. Box 333, Awaly, Bahrein Islands
VS1BX	Victor H. Thorne, Braddell Hill, Singapore 11, Malaya
MD7 QSL Bureau	P. O. Box 451, Nicosia, Cyprus
ZP5IB	Box 166, Asuncion, Paraguay
KU4AAT	Via G3AAT
LU1FAE	Manuel Gonzalez, Montevideo 1920, Rosaria, R. A.



Conducted by LOUISA B. SANDO, W7OOH*

CONGRATULATIONS to W8ATB and W8QBO—on June 10th Esther and John will celebrate their silver wedding anniversary! Both are avid hams—proof of which we gleaned the last time we talked with Esther on the air when she told about attending the mid-winter hamfest at Grand Rapids. When they left Flint it was 6 below zero, and by the time they drove the 110 miles to Grand Rapids the temperature had dropped to 14 below! It takes ham spirit to crawl out in that kind of weather. Over three hundred attended, but W8GJX, Helen, and W8ATB were the only two YLs.

Another anniversary of note coming up, on June 1st, is that of W7KOY and W7MAE. It will make nineteen years for Gert and Ken—congratulations! By the way, the 10-meter beam that Gert made for herself, which we mentioned in an earlier issue, really got publicity recently—though we're afraid few people knew to whom it belonged. Came *The Arizona Republic* for Sunday, March 26th and the first page of the second section was a full spread of pictures of Arizona hams, with a 10-meter beam smack in the top center. As we perused the page gleefully the OM looked over our shoulder and commented, "Say, isn't that Gert's beam?" A query to W7KOY via W8ATB on the following Tuesday 10-meter net brought a "Yes, it's mine," though nowhere in the writeup was there mention of W7KOY, nor for that matter of *any* YLs. Later Gert added, "The spread in the *Republic* was a pretty good deal. Guess the reporter didn't believe in licensed YLs, though. Ken all but asked him why he didn't take a picture of my rig. I got a laugh out of it because I sure wasn't about to have a picture taken. If he'd known that beam was mine when he took the picture, I doubt if he'd have shot it!" Looks like ye YLRL publicity chairman should get busy in her adopted state!



Miss Ethel Mae Smith, W3MSU, dons Navy blue as the first YL-ham active in the Naval Reserve Electronics Program. She is a member of Company W-1, Washington, D. C.

Ethel will be remembered as ex-W7FWB (Wenatchee, Washington) and as founder of the YLRL. Her record for "firsts" doesn't stop with USNR and YLRL, however. She also is the first WAVE in MARS-Army. A ham since 1936, her prewar activity included AARS and ORS.

That bug in Ethel's nimble fingers is not window-dressing. She is a proficient operator at speeds up to 35 w.p.m. W3MSU operates on 3.5, 7 and 14 mc. c.w. with a 6L6-6L6 and pair of 809s running about 125 watts. Ethel holds a Class "A" ticket, is a member of the Washington Radio Club, and spends her working hours as an engineering aide at the Naval Research Laboratory. In addition to hamming and pounding brass on USNR and MARS drills, MSU spends her leisure with motion picture photography and oil painting.

While congratulations are in order, here's to W1QJY and W1KYG. Olga and Tim are proud parents of a daughter born March 26th.

Welcome Mat in Detroit

The W8 YLs are for the first time undertaking an official YLRL luncheon. The occasion is the convention to be held in Detroit on May 27–29. From W8UDA we learn there will be big YL doings with a luncheon and special meeting. The luncheon will be at twelve noon on Sunday the 28th, and all YL operators are invited whether or not they belong to YLRL. There will be a door prize, a prize for the YL who has had her ticket the longest period of time, and one for the YL who has had hers the shortest time, one for the YL from the greatest distance, etc. Hope you have a good turnout, gals!

Speaking of W8UDA, all of you must have seen the photo of Dottie Willett with her seeing-eye dog in the October, 1949, issue of *CQ* in the article by Herb Brier. Since Herb didn't have space for many details, maybe you'd be interested to know how W8UDA got into this game.

"I first fell in love with ham radio when I was a senior in high school," writes Dottie. "I, of course, attended the Michigan School for the Blind in Lansing, which is about sixty miles from my home. I came home only for holidays and summer vacations, so my brother gave me a BC set for a Christmas gift. One day I be-

(*Continued on page 55*)

* *Associate Editor, CQ. Send contributions to L. B. Sando, Verde Valley School, Sedona, Arizona.*

HARVEY *for variety—for bargains*



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A conservative 300-Watt phone and c.w. rig 6V6-6V6-6L6-813, Class B 811 modulators. All bands, 80, 40, 20, 15, 11, and 10. Exciter broad band, single control PA tuning. Three power supplies delivering 1500 v.d.c. at 350 ma, 500 v.d.c. at 200 ma, and bias supply. Punched aluminum chassis, tubes, transformers, capacitors, resistors, antenna changeover relay, meter, wire, hardware and coils included, but final tank coil for one band only. Electro-Voice 915 high level crystal microphone part of the package. Plug in the crystal and line cord and you're on the air. Shpg. Wt. 180 Lbs.....Only **$179.50**



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Shpg. Wt. 80 Lbs.

TR-75 as above, TVI-proofed. $49.95

Shpg. Wt. 85 lbs.

NEW IMPROVED GRID DIP OSCILLATOR KIT



The most valuable piece of test equipment in the ham shack is the Grid Dipper. Build one with this kit and save countless hours in building, improving and de-bugging your rig. The GDO Kit builds an exact duplicate of the "Grid Dipper", now with regeneration. Includes everything from the special handy case permitting one-hand operation down to a complete application and instruction book. With tube and internal power supply, range 3 Mc to 250 Mc in 6 steps, size 5½" x 2⅜" x 3". **Complete Kit $24.50**

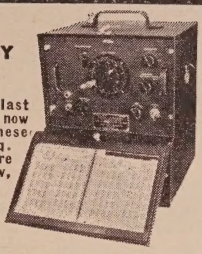
COPPER MESH SHIELDING

Heavy Duty, tightly wound, expensive but it really does the job right, the only screening we've found that will. 36" wide, minimum order 6 sq. ft. **Per sq. ft. $.85, plus $.50 per order packing.**

See our April ad for complete information on Eldico equipment.

Write for your FREE copy of our TVI book.

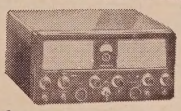
BC-221 FREQUENCY METER



These won't last long so order now for one of these famous freq. meters. They are just like new, with original calibration charts. Range 125-20,000 kc, with crystal check points in all ranges. Complete with crystal and tubes.

Special Price $79.50

HALLICRAFTER SX-71

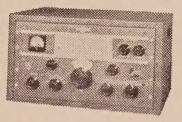


Calibrated bandspread, double-conversion, built-in NBFM, xtal filter, S meter. Range—538 kc to 35 Mc and 46-56 Mc. Many important features.

Less Speaker.....$179.50

Shpg. Wt. 40 lbs.

COLLINS 75A-1



80, 40, 20, 15, 11 and 10 meter ham receiver. Automatic noise limiter, high sensitivity, double conversion. With speaker in matched cabinet. *Shpg. Wt. 93 lbs.*

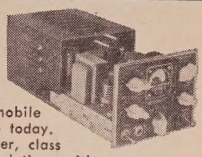
$375.00

HIGH VOLTAGE POWER SUPPLY KITS

All standard brand, new components, power supplies designed to take it. Conservative as the big commercial jobs, you can safely count on trouble-free performance from the day you solder the last connection. Each supply comes complete (less chassis and rectifier tubes) with plate transformer, separate filament transformer (for HV1500-866A fil. trans. —other models supplied with 872 fil. trans.), control switch, pilot light assembly, smoothing chokes — two matched huskies—two oil-filled condensers, bleeder, rectifier sockets and safety plate caps, Jones strip for chassis connections, and heavy-duty a.c. line cord. Voltages available are:

Kit No.	Output	Price	Transformer only
HV-1500	1500 v. 350 ma.	$29.50	$19.50
HV-2000	2000 v. 500 ma.	69.50	39.50
HV-2000SP	2000 v. 700 ma.	89.95	49.95
HV-2500	2500 v. 500 ma.	99.95	69.95

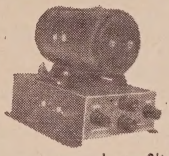
THE NEW SUBRACO MT 15X



The finest in mobile rigs available today. 30 watts power, class B 100% modulation, with push-to-talk and built-in coaxial type antenna relay. Xmttr complete with tubes, coaxial antenna connector, mounting brackets, etc. *Shipping weight 15 lbs.*

$87.50

BRAND NEW—MT15X for 20 meters $87.50



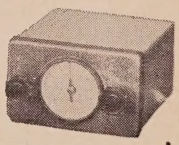
SUBRACO DS400

Dynamotor supply. 6 V. DC input, 400 V. at 175 ma. output. Complete with built-in control relays, filter, etc. *Shpg. Wt. 10 lbs.*.....**$59.95**

AC Supply for operation of any of above Subraco xmttrs indoors. Complete with rectifier and built-in control relay..**$39.50**

GON-SET CONVERTERS

3-30 Gon-Set Converter; 10-11 Gon-Set Converter; 20 meter Gon-Set Converter; 75 meter Gon-Set Converter. *Shpg. Wt. each 4½ lbs. each,* **$39.95**



Gon-Set Noise Clipper, *Wt. ½ lb.* **$8.25**

MASTER MOBILE MOUNTS and ANTENNAS

All-band, center-loaded mobile antenna. 10-20-40-75 meter operation. Complete with coil for one band (specify) but less mount. **$7.95**



Extra Coils (not required for 10), **each $2.95**



Master Mobile Mount Stainless Steel 96" straight whip, Model 100-96S.....**$4.77**

Master Mobile Mount Universal Body Mount, swivel type, 126 straight spring, 132 double-taper spring, either model.....**$7.95**

Bumper Mount with spring **$5.97**

Bumper Mount without spring **$2.97**

Shpg. Wts.: Each mount and antenna 3 lbs.

NOTE: All prices are Net, F.O.B. N.Y.C. and are subject to change without notice.

Telephone: LUxemburg 2-1500

HARVEY RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

The Monitoring Post

gleaned by THE BRASSPOUNDER

ANSWERING A DIRECTIONAL "CQ New York," W2LHF found that CE2BQ desired information from W2HIQ regarding the procurement of a new drug, chloromycetin, from the American Red Cross, to combat typhus in Chile. Skip prevented HIQ and LHF getting together, so W2KLD was called for assistance; a short time later HIQ, who had received CE2BQ's transmission, but could not QSL because of QRM, telephoned LHF with the reply that the ARC could not deliver the drug and that it had to be obtained thru regular Chilean channels. Apparently nothing could be done at the other end and the following night the W2s could not get thru to CE2BQ though the latter was heard; W5QS stepped in as a relay station; arrangements were made so that HIQ would purchase the drug and ship it by plane the following day; subsequently acknowledgements and thanks were received by the W stations for their coöperation; when two stations cannot, for any reason, do the job at hand, there are always more—one, two, or a dozen if necessary —ready to move emergency traffic and complete the business; score one more for American hams.

University of Virginia Hams

Local BCL and TV fans know that in Ivy, Va., ham radio plays a big part in the lives of some of its inhabitants who attend the U. of Virginia—**W4KNV**, engineering student, has 250 watts to a single 814, and his antennae include a V beam pointed east, a two-wave long wire, and a ground plane vertical; **W4NCN** has 150 watts with a 500-foot long wire; **W4OFQ** with 70 watts on 40 and 80; **W4NXF** with an 813 on ten feeds a 3-element rotary; **W4OVH** on 20 c.w.; **W4LRG** on 2, and **W4NSM** on 40, all add to the noises heard in Ivy BC receivers. . . . **W1STK** is a new ham in Monson, Me., and has started on 80 c.w. . . . Many of the gang in E. Mass. have hit the road with 10-meter mobile jobs—among those heard recently are: **W1GAC, RKD**, and **RHA**. . . . **W1IXJ** came to 80 and finds it's a great band for collecting QSL cards.

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



The shack at W9CKU.

VE2YM is portable—watch for him—he makes many trips. . . . Since **VE2YH** has rebuilt he is heard regularly. . . . Those active of the boys at WGN, Chicago, are: **W9GDI, CKU, ERO, WEA, OAL, EWR, PGW, LI,** and **NN**, all c.w. . . . **W1BVB** will be on 7110 kc at 2330, EST, every Monday night to meet movie projectionists interested in forming a net of movie ops. . . . **W1CSN** is back on the air after an 18-year silence, and after a 19-year absence from ham radio **W1BZF** is again heard, both coming back with their original calls. . . . **W2DSM** just licensed and is located at Hillside, N. J. . . . **W6WGF**, who was W8DEQ before the war, is rebuilding his 600-watt rig—TVI trouble. . . . A Morse op since 1910, on c.w. since 1931, having worked all continents several times with a total of 98 countries, **WØDMY** claims greater enjoyment than ever with his present rig—VFO 6L6-807, 275 volts, with a built-in electronic keyer, on 160, 80, 40, and 20.

Good Signals Merit Recognition

W4KFT feels that stations with outstanding good signals should be recognized in some manner; of course, he agrees that all should put out a signal worthy of the ticket issued by the FCC, but because so many neglect to endeavor to transmit what is termed a good, clean signal, those who do so should be commended; he believes a good signal on the air is as much of an achievement as a high score in a contest. . . . All too seldom do we have such appreciation voiced that credits a ham with unselfish effort in getting others started; the time given by **W1NHI** is gratefully acknowledged by **W1SEC** and **W1SRP** now on 10 phone, and **W1SFZ** and **W1SQV** on 10 phone and 40 and 80 c.w.; The Brasspounder also wishes to contribute his thanks for the hospitality shown by hams of the home town of W1NHI, Ellsworth, Me., and to the Chief of Police for assistance in locating **W1TU/1** last year while visitiing there. . . . **VE2ALG** (Lucy) had the thrill of a lifetime on her first QSO; she is the first YLRL member from her area. . . . **VE2ALH** is sporting a new HQ-129 and a Collins 32-V. . . . **VE2RA** finds c.w. a treat after years of phone work. . . . The New York State Net now has 45 active stations reporting—should be no trouble getting traffic to any place in the state on 3720 kc every night. . . . **W9AO** is now rebuilding, and as soon as the job is finished and a new antenna strung up we'll be hearing him on 40 with a kw.

L'Association des Amateurs de Radio du Saguenay members are keeping activity at a high peak on all bands, doing their share to keep the Province of Quebec alive. . . . **VE2ACC** with a TBS-50 is on day and night chasing DX—and yls. . . . **VE1ZV** back from Venezuela and on 40 till he gets another ship. . . . The Rochester (N. Y.) ARA welcomes three new members: **W2FMH, PSQ**, and **CZT**. . . . Too many Latin phones on 40 for the W5 gang to get any good DX contacts, reports **W5MRS**. . . . **W1NWH** started up the mountain after joining a ski club and something went wrong with the ski tow—the management returned NWH's initiation fee explaining he was a trifle overweight. . . . Schenectady ARA announces four new members: **W2ZPZ, YIK, TVR, PHS**. . . . **W7AIU** is in charge of radio for the State of Washington Forestry Service—his job is mountain climbing, and **W7GUI**, 200-country DX man, works at the U. S. Forestry Service Labs. . . . **W9VPQ's** cat learned that a 400-watt power supply is nothing to sniff at—the cat recovered, and it's mentioned that it's a good thing the cat don't inhale.

The Southern Nevada ARC offers an achievement certificate to any ham submitting to the club's secretary satisfactory evidence of working 25 Nevada ham stations—send your Nevada QSL cards along to J. H. Kelley, 409 Ash St., Boulder City, Nev., with return postage to cover cost of mailing them back to

(Continued on page 51)

SEE LEO FIRST . . . for THE BEST TRADE-IN DEAL



Ask the Fellow Who Deals with Me!

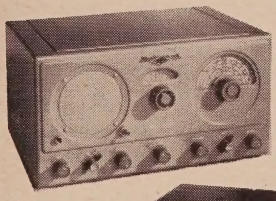
Leo I. Meyerson, WØGFQ

Trade for a new NATIONAL—I'll allow you more for your present equipment. WRL buys more equipment—WRL sells more equipment. *Our large volume of sales means faster turnover, greater savings for you!* We finance our own paper—no red tape!

LOW DOWN PAYMENTS — NAME YOUR OWN TERMS — LET'S GET ACQUAINTED!

Guaranteed Satisfaction From The World's Largest Distributor Of Amateur Radio Transmitting Equipment

NATIONAL NC-57 and SELECTO-O-JECT



A sensitive band-switching receiver complete with speaker & power supply in one cabinet. Unusual selectivity achieved with the addition of the Select-O-Ject. A superb receiver for the beginner.

NC-57	SELECT-O-JECT
$89.50	$24.95

LOW DOWN PAYMENT

NC-183 (with matching speaker) $282.00
NC-173 (with matching speaker) $199.00

CU ON 20 - 10 & 75 METERS



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Just right for your control room walls. Approximately 28" X 36", Contains time zones, amateur zones, monitoring stations. Mail coupon today and **25c**



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Deal with the "World's Most Personalized Radio Supply House". Send for your new complete WRL Catalog containing everything new in radio.

NATIONAL HRO-50 RECIEVER



Built-in power supply on separate chassis. Front panel oscillator compensation control. 20 to 1 precision gear drive. Provisions for NBFM adapter. Push-pull audio output. Speaker matching transformer built into receiver with 8 and 500/600 ohm output terminals. Packed with important new features.

$335.00 (less speaker)

HRO—TS, 10" PM Speaker in matching cabinet $14.00

LOW DOWN PAYMENTS

Write for detailed XMTR specification sheets.

WRITE - WIRE **PHONE 7795**

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The M. A. R. S. Page

OPERATION OF THE MILITARY AMATEUR RADIO SYSTEM in the Pacific has enjoyed a steady growth since the program first was inaugurated. At the present time more than 100 active members keep the signals coming from all the Pacific areas now inhabited by the U. S. Military.

Activities are split between major commands, divided by the 180th meridian. East of the 180th USARPAC (U. S. Armed Forces, Pacific) and MATS (Military Air Transport Service) divide the honors. AB6USA, at Ft. Shafter, and AG6FAA, at Hickam Air Force Base, are net control stations for the Hawaiian Island group.

Close coöperation between Captain James A. Long, MARS Command Director for USARPAC, and Lieutenant Louis M. Brockly, MARS Command Director for MATS Pacific Division is evidenced by the periodic conferences between these two on MARS supply and distribution problems and in procuring material for construction and operation.

Activities as reported by the two Chiefs MARS for Pacific amateurs follows:

MARS—Army

The first anniversary of MARS operation in Aloha land was recently observed at Fort Shafter, Oahu, T. H. A six-hour celebration, highlighted by a MARS radio-teletype demonstration between AB6USA and AB6UM (ex W4IUR) and a display of typical gear in use by USARPAC MARS members, was climaxed by the traditional saber carving of a birthday cake. Wielding the saber was Mrs. Marion Stewart of the USARPAC Signal Section.

The 25-mile short-haul RTT demonstration was effected with BC-610s and Super Pros with half-wave doublet antennas and was on 20994 kc frequency.



The gang in Tokyo get in their hamming along with the operation of the MARS station, AI1AF, NCS for Far East Air Force. Sgt. Cartright talks to his mother in Grant, Michigan while Pfc. Herman looks on waiting his turn at the mike.

Three nets, Oahu MARS Net #1, #2, and the Schofield Net, are now in operation here. The first two meet Thursdays on 6997.5 kc; the last named meets Saturdays on 27994 kc. Oversea schedules are kept with ZI stations: WAR, A9USA, A5USA, A6USA, and A4USA. Most USARPAC MARS members utilize their ham calls and ham frequencies for stateside contacts. MARS nets are used mostly for relay and short-haul work. This puts live traffic on training nets and provides practice in the processing of messages from military to civilian systems and vice versa.

A proposed inter-island net is expected to be in operation soon. Key stations will include AB6DK personal station of Sadami Katahara of WWVH on Maui, and AB6WNG, National Guard at Wahiawa.

MARS—Air Force

AG6FAA nets include AG6AF at Johnston Island, 800 miles WSW of Pearl Harbor and 700 miles east of the 180th meridian, AI5BH on Kwajalein, coral atoll in the Marshall Islands, 415 miles SW of Hawaii, and AI4FL and other stations on Guam in the Marianas Islands. Eastern terminus for this far flung network is Fairfield Suisun Air Force Base in California, AF6FAL. Direct contact is also maintained with AF3FMC, Andrews Air Force Base near Washington, D. C.

In the Far East Command, Lieutenant Colonel M. E. Wanamaker, MARS Director Far East Air Force, operates AI1AF as net control station FEAF, from the Meiji Building in downtown Tokyo. AI1AF works AIR in the Pentagon Building, Washington, D. C., daily at 1300Z on 14405—and AF6AIR daily at 1600Z on the same frequency. The local nets operate every Thursday with Fifth Air Force at Nagoya, FEAMCOM (Far East Air Materiel Command) at Tachikawa, and local Army units at 1430 hours Item (local) time on 6997.5 kcs; long haul nets become active an hour later on 14405 kcs with the 13th Air Force at Clark Air Force Base, Philippine Islands; the 19th Bomb Wing at Anderson Field, Guam; and the 20th Air Force, also on Guam, participating.

Lieutenant Colonel Hugh D. Avary, AI3AB, MARS Director, 13th Air Force, and Captain O. Blankenship, who runs AI3AF as 13th AF net control, have a major problem on their hands trying to handle all of the morale traffic for the GIs stationed at Clark Air Force Base. The ex KA1s are entitled to first priority on MARS "free" time from 0500Z through 1200Z each week day and over the weekend. Give them a listen on 14405. There's a good chance for some good DX for Martians and an excellent opportunity to do the gang out on the rocks a good service. AI 3 prefixes are Philippine Islands; AI2s, AI4s are Guam, and of course AI1 and AD1 indicate the Japanese main islands.

The Far East gang also is some months ahead of ZI brother MARS hams in teletype operation. Lieutenant "Doc" Wiley broke the ice on 11 meters from JA3RO last year with several hours of solid copy with W6ITH. Both 20994 and 27994 have been cleared by MARS chiefs for teletype.

PRICES SLASHED 25%, 50%, 75%.

Here's the chance of a lifetime to load up on surplus gear at ridiculously low prices. Many of these items we are selling below cost. Unless otherwise stated within the ad, all equipment is sold as used. No order accepted less than $5.00. Cash required with order. Please do not include money for shipping. We ship—shipping charges collect. Rush your orders because many of these items won't last long; however, we believe that if you order early, we will be able to supply you with all you want of any certain item. You will notice that we are not attempting to describe any certain item because most of you know what this equipment is. If you don't, look it up in Esse's previous ads.

PP-51/APQ-9 Rectifier Power unit, complete with tubes $4.95
T-28/APT-1 Radar Transmitter, complete with tubes . 12.50
CS-46ABG (of A1A radar equipment), complete with tubes 9.50
Here's a scoop—a steal, a red-hot item. T-39/APQ-9 Radio Transmitter 9.50
AM-63/APA-36 Radar Unit. Contains video and sync circuits. Complete with tubes and 2 sensitive relays 9.50
ASB-6 Antenna Switch Unit CJP-14AAC. Contains WL532S/R tube in cavity, I.T. and T. Co. Selenium rectifier No. 4B32CM1 and 24 V. DC 1800 Rpm. motor driven co-axial antenna switch relay power transformer 6.00
Radar Transmitter for VHF, AM-18/APT, complete with rectifier and RF tubes. Beautiful tank circuit. Filter condensers, resistors, transformers. 16.00
PP-72/APQ-7 Power Supply with 20 tubes. 6—5R4GY, 6—6Y6G, 1—6SN7GT, 2—6SL7GT, 2—VR105, 2—VR150, 1—6L6GA. Has transformers, chokes, condensers, resistors, blower motor, etc. 14.95
T-51/ARQ-8 Transmitter. 30-100 Mc. range. Made by Hallicrafters Company. Comes with 2—6V6GT, 3—6AC7, 1—931A, 2—5R4GY, 1—829B, 1—832A tubes, 3 coil turrets and variable condensers for tuning 14.50
Rectifier RA-88-A, with tubes 5.00
Less tubes 3.50
BC-1268-A Control Unit. Contains 5" scope tube shield with 3 dual 2.5 mfd. 600 V., 12 mfd. 5000 V. condensers, timing coil, potentiometers, resistors, sockets, complete with tubes 20.00
Less tubes 12.00
Indicator 1-221-A. Contains several 110 V. 60 cycle transformers, 110 V. selsyn and numerous switches, circuit breakers, condensers, etc. Less tubes 12.50
Centrifugal blower with 24 V. 1/12 hp. 6000 rpm. AC-DC motor. Ideal for powered transmitter cooling. Has approximately 2" diameter air opening. 3.00
ATR-DC to AC inverter. 110 V. DC input, 110 V. AC output 50-60 cycle, 500 watts capacity. Brand new 12.50
Aircraft Battery AN3152. 12 V. 34 ampere hour. Shipped dry-charged. Brand new. 8.00
APN-1 Radio Altimeter. Ideal for conversion to 420 Mc. or citizens band transmitter-receiver. Complete with tubes 6.00
Brand New, complete with tubes 12.00
PE-112A power unit, complete with tubes 6.00
R-70/APS-15 Radar Indicator, complete with tubes, meter 30.00
Transmitting tuning units TU-17 or TU-18. Choice, brand new ea. 3.50
BC-745 Radio Receiver and Transmitter or Horsie-Talkie Receiver-Transmitter, complete with tubes. Brand new 12.50
Used 7.50
T-39 Chest Unit for use with BC-745 Horsie-Talkie, New 3.50
PP 104/APT-5 Power Supply with tubes 5.00
Less tubes 4.00
Willard 6 V. Dry-charged plastic enclosed batteries. Brand new 2.00
Same as above, except in metal carrying case 3.50
Willard Plastic storage batteries BB-54-A. 2 V. dry-charged. New 2.85
Grimes Aircraft Landing Light. As removed from airplane. 24 V. 600 watt 3.95
Dynamotor PE-101-C. Made to order for BC-645 420 Mc. citizen's band transmitter-receiver. Input 13 or 26 V. DC, output 400 and 800 V. DC and 9 V. AC. Brand new 3.00
Radio Headset Navy type CDC. Mfg'd by Dictograph. Complete with rubber ear cushions and cord. High impedance dynamic type. New 3.00
Dynamic headset Navy type 49455. Mfg'd Permoflux Corp. High impedance type. Ear cushions 3.00
Do you still want that BC-348 communications receiver? Here it is. Excellent condition. DC dynamotor incl. 80.00
Converted to 110 V. AC 60 cycle 100.00
Motor Generator, gasoline driven GN39-D. Output 14.6 V. 25 ampere and also 1000 V. 350 Mc. Brand new 100.00
HRU DC Power Supply. 24-28 V. at 70 amps. 2000 watt gasoline generator with electric starter, thoroughly checked 70.00
GE-Argon Glow Lamps. 2 watts. Box of 10, New . . . 1.20
Blasting Machines. Originally manufactured for United States Army by White-Rodgers Electric Co. Detonate electric blasting caps. 10 Cap capacity 3.00
Sound-powered Microphone. Chest type. Complete with bracket and long cord. Brand new 5.00
PE-103 Dynamotor 17.50
Tuning units for BC-375 Transmitter. TU-10B, brand new 2.00
TU-7B, TU-26B, TU-9B, TU-8B, choice 2.00
Sperry A-5 Autopilot Amplifier rack. Contains 115 V. AC voltmeter and 350-450 cycle frequency meter. A total of 4 amplifier chassis, complete with tubes in each rack. 2—1631, 6—1632's, 3—1633's, 3—1634's and 2—1644's. Numerous transformers. A very hot parts item that you can't fail to pass up at 5.00
Ratchet Motor. Operater from 12-24 V. Similar to motor used for automatic tuning of SCR-522 transmitter and receiver. Ideal for remote tuning of mobile and other equipment. Rotates approx. 1 revolution per second. Brand new 75
Command set modulator BC-456A. Complete with tubes 3.00
FL-5C Radio Range Filter. Similar to FL-8 except used with remote range voice switch 1.25
Navy Type RAK-8 Radio Receiver, complete with power supply. Frequency 15-1600 Kc. New 60.00
HS-23 Headsets. Excellent condition. Pr. 1.50
HS-33 Headsets. Excellent condition. Pr. 1.50
Stanley No. 4001 5" Navy type screwdriver. New 25
Phillips Cross-point size #1 screwdriver. New. Doz. . . 1.25
SCR-274N Mounting Racks. Single, double or triple. Choice 1.00
Indicator Scope ID-41/APQ-13. Contains 1—5FP7, 1—6AK5 tubes, 5 grain-of-wheat 3 V. pilot lights, magnetic deflection yoke, condensers, resistors, potentiometers, sockets 3.95
Tuning heads for command sets. Single, double or triple. Choice 75
BC-158-A Radio Modulator, complete with tubes and tuning meters 17.50
Detrola Aircraft Receiver. Badly used but complete . . 2.50
BC-357 Marker Beacon Receiver. You know what it is. Here's our price 1.50
BC-1033B Marker Beacon Receiver. Again you know . . 2.50
BC-457 Command Set Transmitter. 4-5.3 Mc. with tubes 4.95
BC-458 Command Set Transmitter. 5.3-7 Mc. 6.00
RT-19/ARC-4 Western Electric Transmitter-Receiver for 110-152 Mc. operation. Similar to 522 except more compact. Complete, while they last 24.95
BC-314 Radio Receiver 50.00
C-1 Auto Pilot Amplifier. Convert one of these for radio controlled models, doors, etc. 24 V. operation, compl. 5.00
BC-312 Receiver. 1500-18,000 Kc. operation. 110 V. operated 69.50
BC-344 Radio Receiver. 150-1500 Kc. 110 V. AC . . 69.50
BC-322 Walkie-Talkie (52-65 Mc. operation). Complete with antenna. Used, as is, serviceable condition . . 12.50
BC-222 Walkie-Talkie (28-52 Mc. operation). Complete with antenna. Used, as is, serviceable condition . . 12.50
Scoop! Scoop! Scoop! BC-221 Frequency meter. Covers 125-20,000 Kc. Battery operated. These are beauties 60.00
With modulation 80.00
Microphones. Brand new 2.00
T-17-B Microphones. Brand new 2.50
Relays. 18-30 V. DC. Pick-up voltage 14 V. maximum DC. RBM Manufacturing Company 25
Intervalometer. Electric timing device. Contains relays, switches, pilot lights, resistors, knobs, etc. 2.00
C-1 Auto Pilot Assembly. New. Contains 3 servo units, 1 gyro unit and 1 dashpot. Housed in metal container 24.50
BL-Selenium Rectifier, Type 23751. 110-120 V. AC input. 110-135 V. DC output at .75 amps. Connect in parallel for higher current requirements. We have sold thousands of these. Use to convert AC to DC. New 1.25
Turbo amplifiers. We have had them advertised ever since we have been in business. Now we sell them to you without tubes . . . . . 10 for 2.50
AN/PRS-1 Mine Detectors. If you need something to find pipes or metal buried underground or in a log, here it is. Close out price 12.95
Mine Detector SCR-625. There are but a few of these in the country. Esse has about 700 of them. Here's the finest detector that we know of that was ever built. When we price them the way we do within this ad, frankly, we are looking for dealers, exporters —in other words, quantity buyers. Yes, we will sell singly. Brand new, export packed 49.50
Receiver Tuning Head CRV-23253. Used with ARB receiver. You have seen them advertised before in previous magazines. Brand new. This month's price . .75
Pilots Control Box CRV-23254. Also used with ARB receiver. Original packing. New 75
Quick-set vise. 3" adjustable jaws. Clamp for bench mounting. Does your bench need a vise? New 3.50
Field telephone wire. 3-conductor stranded. Ideal for inter-communication systems, telephones, selsyn indicators. Use it inside or outside. 525 ft. roll, new . . 4.25
Collins AN/ART-13 Transmitter. We have been selling them previously at $234.50. These are tops, especially fine. Without 24 V. dynamotor 150.00
With 24 V dynamotor 180.00

Don't think, because of these prices, that Esse is going out of the surplus electronic business. What have you to sell? Describe it in a letter with full details and Esse will try to buy.

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The Social Side

◆ ◆ ◆

NEW YORK CITY—The sixth semi-annual dinner meeting of the Quarter Century Wireless Association will be held on Friday, June 9th, at 6:30 P.M. at the 71st Regiment Armory, 34th Street and Park Avenue. Famous hams of yesteryear will be present as guest speakers. Entertainment and lots of fun. Reservations are $3.50 per person. Non-members should communicate with John DiBlasi, W2FX, 259 West 14th Street, New York City.

ALBERTA—The fifteenth annual hamfest of the Alberta gang will be held this year at Waterton Park, Alberta, on July 14th, 15th, and 16th. For complete details communicate with Joseph J. Dobry, VE6DR, Cardston Associate Clinic, Cardston, Alberta.

GEORGIA—A hamfest Sunday, June 18th, at Lithia Springs Golf Club, Austell, Ga., sponsored by the Kennehoochee Amateur Radio Club of Marietta. A dinner of fried chicken and a well-rounded program including transmitter hunts, speakers, and contests, are the highlights. Admission is $2.50 for adults and $1.00 for children under 12. Information and tickets may be obtained from Bob Hudson, W4MCM, 155 Hedges St., Marietta.

CALIFORNIA—The San Mateo County Amateur Radio Club will hold its fourth annual hamfest on June 11th at Coyote Point, San Mateo. The program will get under way at 10 A.M. and conclude at 5 P.M. There will be activities for all, including the Junior Ops. An "Auction and Swap" table will be set up, so bring along your surplus gear. Bring the family and a picnic lunch for a nice outing. Admission: Free! Registration for prizes: $1.00. Contact Norman E. Brown, W6ZBS, Box 625, San Mateo, for latest info.

ILLINOIS—The annual hamfest of the Peoria Amateur Radio Assn. will be held this year at Pleasant Valley Park, 1.5 miles south of Dunlap and 10.5 miles from Peoria, on June 11th. Reserve your tickets at $1.50 each by sending a check or money order to P.A.R.A. 1018 W. McClure St., Peoria.

ILLINOIS—July 16th. Weldon Springs Picnic, 4 miles east of Clifton, just off state route 10 or U. S. route 51 at Weldon Springs State Park. This is a picnic for all the family. Bring your own basket lunch. Positively no charge! Free soft drinks. Sponsored by Cenois Amateur Radio Club, Central Illinois Radio Club, Clinton Radio Club, Twin-Cities Radio Club, and Sangamon Valley Radio Club. W9KQL can supply further info.

INDIANA—The annual picnic of the Indiana Radio Club Council will be held this year at Turkey Run State Park on June 18th. A major feature of the picnic will be the award of a plaque to Indiana's outstanding amateur of 1950.

V.H.F.—U.H.F.

(*from page 35*)

or resort to mobile work. Our v.h.f bands need activity—*your* activity!

Notes From Six Meters

Most of the reports of six-meter DX during the past month have come from below the equator. "South American Special" conditions were prevalent almost every night. These openings, which usually start shortly after sunset, bring in signals from stations well over 1000 miles away with good strength. At present we do not seem able to dig up a good explanation for this sort of six-meter propagation. A lot of the operators in the northern latitudes wish that the "good neighbor" gang would ship up one large load of these conditions for a thorough analysis!

Another good F-layer opening almost slipped by on the afternoon of the 26th of March. W4FNR was in there, and caught OA4AE and OA4BG, both of whom had "overload" signal strength. W5VY was also in there pitching.

The northern lights were lit on April 1, with aurora regulars VE1QZ, VE3AET, W1PWW, W1FTX and others reported active. True to form, the F-layer built up during the daylight hours of the 2nd, and once again the band sounded like ten meters on a mid-winter week-end. Among those stations reporting DX contacts we find W4FNR, W4FI, W4IUJ, W5ESZ, W5DSB, W5FSC, W5JBW, W5JLY, W5IYG, W5QIO, W5QI, W5VY, XE1QE, XE1GE on the northern end of the opening, with HC2OT, OA4BG, and a long list of LU's holding forth in the south. Just to demonstrate that there is no rule without an exception, the aurora came in again on the night of the second, and on the third—you guessed it—the band was dead!

On the sixth of April W5VY caught LU9EV and LU5CK. W5ML hooked HC2OT. The next day, W5VY broke through again for a QSO with LU3BD. Some F-layer back scatter was noted by W5ML. That evening, KH6NS located an opening to Buenos Aires and lined up a half-dozen LUs. All this was just a warm-up for an opening on the 8th which was almost a repeat of the big show of the 2nd. Some of the Ws who had missed the first round got another chance. Among these were W5BDT, W5IAR and W5ONS.

No more reports on hand, so we'll have to wait until next month to see how the closing days of April turned out. There were too durned few signals buzzing around this part of the country to suit Ye Ed. We heard one strong carrier (unidentified) which seemed to come from Philadelphia! Heard a 'phone bell ring in the background and off it went!

We hear that W2QVH (ex W3HOH) had a close call the other day when his shiny new automobile was involved in a fracas with another car. Ken has been heard on the air since, claiming that he will recover. In fact, he got another new car out of the deal!

Two Meter Stuff

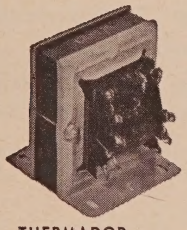
W9ZHL reports that the Wabash Valley Amateur Radio Club sponsored a group-construction project, and 14 models of the "W1KIM-Wallman" converter were the result. This should produce a few new calls to be heard on two meters.

W2ER passes on the thoroughly unofficial rumor that the FCC and important private interests are conducting a survey of activity on the two-meter band in the metropolitan areas, to produce evidence that the amateurs do not need such a big slice of the spectrum. Let's hope that this rumor spreads, and the gang decides to do something about it! (By getting on the air, that is!)

From W4HHK we hear that the two-meter operators got another chance to demonstrate the worth of this band for emergency operations. A high-tension power wire fell across the 'phone and telegraph lines, cutting off all communications between Sommerville and Memphis. W4FWX and W4DI established contact over

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ALL NEW—FULL WAVE VICKERS SELENIUM RECTIFIERS

Code No. Rectifier	d-c Output Volts	Amps.	Ship. Wt. Lbs.	Amateurs Net Pr.
S-295A	14	2	1.25	$ 6.95
S-458A	14	4.5	1.75	7.25
S-167A	14	10	3.75	10.95
S-292A	14	40	12	29.95
S-296A	28	1.8	1.25	5.75
S-344A	28	5	5.75	11.50
S-172A	28	10	6	16.50
S-291A	28	20	12	29.95
S-297A	28	40	23	52.25

ALL NEW—THERMADOR TRANSFORMERS 50/60 Cyc—117 Volt Primary Rating (For Taps, see Note A)

Code No. Transformer	Secondary Volts	Amps.	Ship. Wt. Lbs.	Amateurs Net Pr.
RPS-8883	18	3	3 5	$ 3.75
RPS-8884	18	5.2	5.5	4.25
RPS-8885	18	12	12	6.15
RPS-8886	18	46	35	19.65
RPS-8888	36	2	5	4.15
RPS-8889	36	6	12	6.75
RPS-8892	36	12	25	11.65
RPS-8890	36	23	32	19.25
RPS-8891	36	46	78	51.25

NOTE A: All transformers have 3 extra taps—for example: 20, 19, 18, 17 volts and 38, 37, 36, 35 volts.

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the 40-mile link using 522 transmitters on each end. W4BAQ, W4PWX, and W4HHK got into the net a litle later. Despite the fact that 75-meter equipment was available, the two-meter gear handled the bulk of the traffic, with solid phone signals, no QRN, QRM, or QSB.

The Two Meter and Down Club (which meets on the first and third Wednesdays of each month at Plummer's Park, 7973 Santa Monica Blvd. Los Angeles . . . Advt.) is building v.h.f. activity by inter-club contests, organized networks, etc. It is largely through their efforts that the excellent turn-out for the v.h.f. Sweepstakes was recruited. Over 200 stations in the L.A. area were on the air. W6NGN, W6BHG, and W6WKO were high men, each with over 100 QSOs. . . . W6ZL and W6WKO are running a "straight c.w. net" on 147.5 mc. Since so few of the boys are rigged up to receive c.w. they are permitting m.c.w. participation for the time being.

W6HAP (ex W2YSK) seems to think that the San Diego to Los Angeles hop (112 miles) is made more often than the Philadelphia to N. Y. haul (85 miles) on the 144-mc band. Wonder if this is due to better activity or better equipment?

W7FGG in Tucson talked W7KWO into giving 144 mc a try in addition to his 420-mc activity. They hooked up on the first try, for the first Phoenix-Tucson contact, since then have found the signals a consistent Q5, at all hours of the day. W7KWO is going to try a parabolic antenna for 144 mc to see how it compares with his wide-twin-five. . . . W2YZC, now W7YZC, who imported his two-meter enthusiasm from New Jersey, is spurring the gang on.

The Amateur UHF Club of Jamaica, N. Y., has devoted serious thought to the posibility of transmitting two-meter signals across the Atlantic, and by a resolution, has presented the subject to *CQ* and the A.R.R.L. for comment and possible support. They believe that the time has come to set up formal tests of communications between the United States and England on the 144-mc band. How do you two-meter operators feel about this project?

W8WRN sends in a list of about 15 stations now active in the Columbus, Ohio, area. The frequencies most popular are the local emergency net channels, 144.138 and 146.34.

Have you propagation experts read Prof. Booker's latest theory on v.h.f. signal scattering in the troposphere as set forth in his paper in the April *I.R.E. Proceedings*? Good stuff! Whether our two-meter signals are guided by atmospheric ducts, or re-radiated from turbulent "blobs," there'll be good conditions more often, from now on!

420-mc Tid-Bits

G5BY's 420-mc converter, described last month, uses a tunable two-meter oscillator, ½ of a 6J6, coupled through a sharply-resonant coaxial tank into the input circuit of the silicon-crystal detector, which consists of a similar coax tank. Loose coupling is used between the two tank circuits. The crystal mixer feeds through a single 6AK5 i.f. stage at 8 mc into a BC-455 (ARC-5) 8-mc receiver. . . G3EJL has a new converter which he claims is about 6 db better than the one he was using when he made the 119-mile contact with G5BY. It uses a 1N23A crystal mixer with Lecher-line input. The i.f. signal feeds into an HRO which he tunes over the range from 27 to 30 mc. The local oscillator of the converter is crystal controlled, and the 430-mc band is covered by switching crystals. The tuning range is restricted to 432 to 438 mc!

These experimenters have found what many other v.h.f. workers have discovered, that, at 420 mc, it is easier to get a good signal-to-noise ratio from a crystal mixer operating into a good quiet i.f. amplifier than it is to get good noise performance from most of the r.f. amplifier tubes available at this time. It is debatable as to whether *any* commercially-available tubes can match the performance of a good u.h.f. crystal mixer working into a triode i.f. stage. Try a 1N21 or 1N23 (*not* a 1N34!) working into a cascode or neutralized 6J6 i.f. amplifier—it may surprise you!

No more room for this month. . . . 73 for now.
Brownie, W2PAU

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150-WATT TRANSMITTER

(*from page 26*)

chassis, the antenna leads running closer to the chassis top. As mentioned before, the main tuning condenser operates at full plate voltage so that it is insulated from ground as are the preceding tuners. All r.f. connections go to feed-through bushings at the rear along with the high voltage lead.

No description of the power supply is necessary since it is entirely conventional. The high voltage filter, which does not show in the photograph, is a can condenser mounted underneath the chassis. The only reason for the difference in finish on the two chasses is that only one crackled and one cadmium plated unit were available when these were purchased.

Tuning and Operation

The heart of the transmitter and the most critical spot with regard to tuning is the ECO. A poor note or a drifting signal will ruin all the sock in the world. Care in construction and tuning will pay off.

To start the tuning, plug in the 6SK7, the two 6F6s, the 5Y3GT, and the VR150. Move the slider on R_{11} to put full resistance in the circuit and apply filament and plate voltage. To set the regulated voltage, reduce the resistance in R_{11} by moving the slider toward the B-plus side until the VR150 ignites with a dim purplish glow. Turning the voltage off and on several times and checking the glow will insure that the VR150 is functioning. With voltage on the oscillator, it should oscillate and the signal may be checked on a receiver or monitor. Any one of several methods are practical for calibrating the ECO. A 10-100 kc multi-vibrator oscillator in conjunction with a 100 kc crystal will provide check points through the 80-meter band, and a chart of dial setting vs. frequency may be prepared. Another method involves the use of a heterodyne frequency meter and a receiver. If the calibrating occasions the use of a superheterodyne receiver, it is wise to make doubly sure that images are not creeping into the operation. After the signal is located in a receiver, the cover is screwed down on the oscillator compartment and C_4 is set with a screw driver so that the 80-meter band falls within the range of the main tuning condenser. During the setting thus far a certain amount of drift will probably be noted. To correct this drift, the oscillator box cover is removed and the tuning screw

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OUTPUT: 600-0-600 V.A.C. at 250 MA. 12 V.A.C. at 3 amps; 12 V.A.C. at 3 amps; and 5 V.A.C. at amps. Designed for Army surplus transmitters. CH-108 ..... $7.75
OUTPUT: 250-0-250 V.A.C. at 60 MA. 24 V.A.C. at .6 amps; 6.3 V.A.C. at .6 amps. Designed for Army surplus Receivers. CH-109 ..... $3.50

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Sec. 24 V. 2 amp... 2.25

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CH-116—5-20 Henries at 500 MA. swinging choke, 5,000 volt insulation $10.95
CH-121—13 Henries at 250 MA. filter choke, 1,500 volt insulation $4.95
CH-412—4-12 Henries 81 ohm. Gov't conservative test voltage 2500 V. $4.95

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	220 V.	100 MA.	D-104	9.95
12 V. DC.	600 V.	300 MA.	BD-86	7.95

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	240 V.	50 MA.		

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on the compensating capacitor, C_3, rotated to increase the capacity. The cover should then be replaced and the drift again checked. Once the frequency is nailed down, C_4 must be adjusted slightly to restore calibration.

The two 6F6 amplifiers are both checked at once by testing the output from plate to ground on the second tube. Lack of output will indicate errors in wiring or defective parts.

To tune up the 6V6GT crystal oscillator/doubler, open the screen switch in the 6SK7 screen, plug the cathode coil into the cathode socket, an 80-meter crystal into the grid socket, and plug the 80-meter coil into the plate socket, L_4. Apply plate voltage and rotate the tank condenser, C_{21}, for an indication of r.f. in L_4 to check for crystal oscillation. To tune the stage as a harmonic crystal oscillator, plug the 80-meter crystal into the grid socket, the 80-meter cathode coil into the cathode socket, the 40-meter plate coil into the plate socket, and tune C_{21} to resonance on 40. For going down to 20, with a 40-meter crystal, coils for the next higher band are plugged in and the plate tuned in the same way. To operate the 6V6GT as an amplifier or doubler plug the jumper coils into the grid and cathode sockets, an 80- or 40-meter coil into the plate, turn on the ECO (SW_1) and tune C_{21} for resonance. For 20-meter ECO output, it is necessary to use the plug-in 40-meter tank in the grid socket with the cathode socket jumpered and the 20-meter output coil at L_4. During all of this tuning, it is helpful to break the high voltage lead and use a 0-100 ma meter to make sure the stage is operating properly, after which the meter may be removed, since no meter is permanently wired into the circuit.

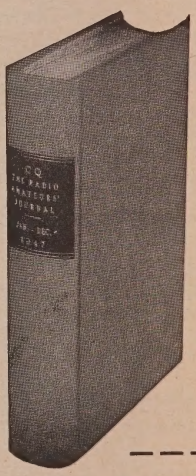
As with the usual triode amplifier, the triode-connected 6V6GT must be neutralized for straight through operation. For neutralizing, open the high voltage lead and tune the preceding 6V6 to 20 meters, and plug the 20-meter coil into socket L_5. For the sake of accuracy, open the grid bias circuit between R_9 and ground and temporarily connect in a 0-20 ma meter. C_{25} is then resonated as indicated by a dip in the grid meter and the micrometer neutralizing condenser adjusted until rotating C_{25} produces no change on the grid meter. The grid meter is then removed and the high voltage lead connected. The plate circuit is then checked with a 0-100 ma meter for a current reading and, if normal, the meter may then be removed.

Tuning the final amplifier is exactly the same in that it is first necessary to neutralize the 826 and then connect the high voltage. In tuning the amplifier, one important caution is necessary. DO NOT RESONATE THE PLATE CIRCUIT WITH THE HIGH VOLTAGE CONNECTED AND THE ANTENNA DISCONNECTED. The plate spacing of C_{30}, the tank tuning condenser, is

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not sufficient to withstand the unloaded r.f. in the tank circuit, and a flash-over will most certainly result. The method used in this transmitter is to open Sw_4, which reduces the plate voltage enough to prevent flash-overs. With reduced plate voltage the plate circuit is resonated, an antenna feeder connected to the output terminals and the antenna tuner resonated. The two links are adjusted to provide 150 ma plate current (150 watts input).

As mentioned previously, one method of installing the rig is to place the r.f. cabinet on top of the power supply cabinet on the operating desk. If space is extremely limited, an inverted U frame may be built over the receiver and the transmitter mounted on it.

For a simple crystal controlled transmitter, the first three stages may be omitted along with the regulated power supply.

THE MONITORING POST

(*from page 42*)

you; the certificate will be sent to you at no cost. . . . Three Pittsburgh newspapers suggested that ". . . it could have come from some ham operator who tuned to the proper wavelength" when a radio alarm on police frequencies announced that a policeman had been shot, sending four prowl cars and two ambulances scurrying to the scene of the reported shooting to find nothing but absolute serenity. **W3VQF,** a member of the Owl's Club, followed the item through, which resulted in the Pittsburgh Post-Gazette carrying a two-column story the following day explaining the hams' angle; VQF is quoted as stating: ". . . the ethics of the ham is far above any such hoax; if the stunt was pulled by an unlicensed operator, he's not a ham!"

W5AC, Texas A. & M. Radio Club, has chosen 7.270 and 29.08 mc. for the official c.w. and phone freqs, respectively, for the purpose of QSOs with ex-Aggies; these two freqs are monitored while the station is in operation; students with ham tickets spend a great deal of time at the club transmitter and are anxious to QSO former students and graduates, so all you Texas A. & M. fellows make a note of the freqs and give W5AC a call—**W5OER,** club sec., will be glad to answer any queries on the present radio club and operations. . . . **W9IQY,** off the air for the past 32 years, returned to 40 with 40 watts recently; he's been told that an east-west antenna will produce the best signal to the north and south, but most of his contacts are to the east and wants to know "How come?"—his experience with antenna in the old spark days was limited to just a piece of wire hung up outdoors. . . . **W4ERP,** formerly W9ERP, is one of those who takes advantage of the early morning hours for DX after returning from work as a switchman. . . . **W4KLP** back from a Florida vacation. . . . **W2BSS** has 79 countries to his credit after a layoff of 11 years that terminated in 1948; he's had that call since 1927. . . . The Meridan ARC installed new officers: **W1RGB,** pres.; **W1OOC,** v-p.; **W1QPD,** sec.; **W1SBF** will be the club station and will be heard very soon.

Word comes through KZ5PC that the **Canal Zone Traffic Watch** monitors 28,900 kc, Monday through Friday at 1215 and 1700 EST. It is urged that all traffic for the Canal Zone, and all traffic desired to be routed via the Canal Zone be dispatched on this frequency whenever possible.

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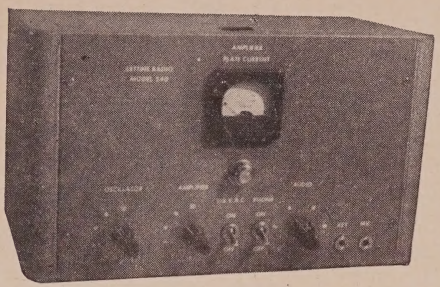
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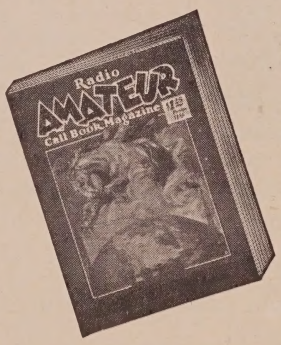
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SCRATCHI

(*from page 4*)

Hon. Ed., evidentally what are happening is that the feelers of these bugs are acting as resonant half-wave anetnnas to microwave frequency.

This are causing bugs to get pleasant buzzing in heads and they are heading toward transmitter waveguide antenna. As they getting too close the power are so great that the current in the center of the antenna, that is, the current through their Hon. Brain, are getting so high that it blowing fuse in their head.

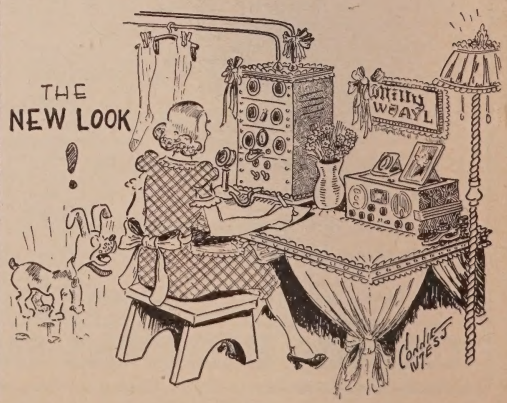
At this point you are thinking maybe that Scratchi are having reel sooper bug exterminator, but you are not seeing how government using this idea. Hah so, you are counting on Scratchi, the Genius. When having sharp intellect like me idea are simple. All you have to do is capture millions of these bugs and feed them, each one, some small quantity of U-269 or whatever that chemical is that makes atom bombs.

Next, if you are wanting to bomb some not-so-nice other country you are sneaking to other country in high speed plane and dropping small radar transmitter which are already turned on. Next thing you are knowing these bugs are attracted like fury to transmitter, where they knocking self out. As they pile up, layer by layer, bit of U-269 by bit of U-269, first thing you know are having enough U-269 to having critical mass of atom bomb material and WHOOM! large piece of country are taking off for parts unknown.

What are you thinking, aren't this a slicky? Of course Scratchi are not wanting to patent this idea on acct. I are giving it to posterity. Mum's the word, Hon. Ed., but getting your Hon. Congressman on phone post hasty and letting me know how soon I should start collecting bugs.

Respectively yours,
Hashafisti Scratchi

The Other Side



MODIFYING THE BC-459

(*from page 30*)

supply will eliminate the latter, and a little judicious juggling of bypass condensers at the BC-459 power plug will cool off the lead that is radiating.

If this article makes it appear that eliminating television interference from the BC-459 is an almost hopeless task, this is not so. In the majority of cases, stabilizing the 1625s and eliminating key clicks is all that is necessary. To be complete, however, it was necessary to discuss the more difficult cases. Besides, the changes suggested will improve the unit as an amateur transmitter, even where television interference is not a problem.

THE HELICAL HI-POT

(*from page 22*)

operating frequency, a series condenser may be used for tuning. If the frequency is high, use a series loading coil, etc. The antenna element should be mounted in the clear, especially the far end. Stray capacity at the far end will lower the resonant frequency of the element. A small whip or metallic object may be placed at the far end to lower the resonant frequency if this is desired.

Further Developments

Losses in the Helical Hi-Pot may be reduced by using larger wire and winding it on a low loss core such as the "poly" materials. For a given length of pole and frequency, there should be an optimum diameter, and this diameter would be somewhat dependent upon the dielectric losses of the pole. It should be possible for a wire manufacturer to produce the Helical Hi-Pot by the foot in any desired length. There may be a market for helically-loaded cable of this sort for low frequency radio work. It may also be possible to use magnetic core material with an insulating binder for low frequency work.

The voltage gradient of the device may be adjusted by changing the turns per inch along the length, however, this complication may not be warranted.

If the Helical Hi-Pot is operated against a good ground, car body, or similar element, lower losses will be obtained if the antenna system is tuned separately and direct coupling used to the transmitter. *Fig. 6* is an example of this type of coupling.

Results

The most practical uses of the Helical Hi-Pots are to increase the effective length of a short wire or its use as a counterpoise or low impedance reference point to reduce antenna length 50%.

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18v	450v-.06A	1.95
28v DM32	250v-.06A	3.00
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12v BD77	1000v-.35A	9.95
12v winco	440-.200A	4.95
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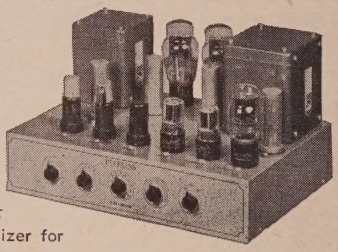
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Since its impedance is low, it serves either of these purposes well. Refer to *Fig. 4* for suggested arrangements.

It has been noted recently that long distance daytime contracts on 75 meter phone are worked better with vertical polarization. This has not been found true for stations within 150 miles or any stations at night. The 9-foot Hi-Pot referred to above has been mounted vertically with a leadin having a 15-foot vertical drop. This antenna is usually worked against a 66-foot horizontal antenna to give a Bi-polarized effect. Some daytime signals which are unreadable in the noise with the regular all-horizontal antenna are readable with the vertical antenna, in spite of the fact that power line noises have a higher level in the vertical antenna. The same stations are stronger at night using the horizontal antenna. Most local contacts are better with the vertical antenna.

The work of Mr. Wade Spears, W5GCB, on this type of antenna is acknowledged. Mr. Spears and the author conceived the idea for the antenna in 1939. One was designed and used at W5ANB. Mr. Spears applied the design to an automobile whip for police operation in the 1700 kc band. The design was used extensively in the Oklahoma Highway patrol radio service and has since, I believe, been used in other states. At that time, Mr. Spears reported outstanding improvements over the conventional whip.

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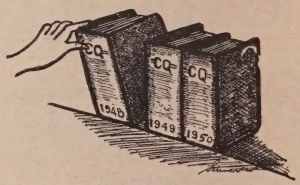
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THE YL FREQUENCY

(*from page 40*)

came curious and switched on short wave to see what was going on. I was surprised to hear a fellow talking so I listened. What he was saying I don't remember, but what he said at the end of his transmission got me for he signed, 'This is W8AHV in Lansing turning it over to W8PXF in Flint.' Flint is my home town, so that sold me on radio.

"I lived in a dorm with other girls and whenever a tube burned out or anything went wrong with my radio they would say, 'No wonder she has trouble with that radio for she listens to those amateurs all the time.' I didn't, of course, but it seemed that way to them. I made up my mind that after I graduated I would get my license. If I had started studying while in school I hate to think of what my marks would have been. Shortly after graduating in 1938 I went to visit W8PXF, whom I found to be a bed-ridden fellow, and then and there started a friendship which lasted till he passed away in 1942.

"On New Year's Eve of 1939 W8RTN (a friend of my brother) was visiting us and he started me out on the code. He finally became too busy to continue, so W8EHD in Millington, Mich., began sending me code over the air. Incidentally, I copied it on my BC set on 160 meters with no beat oscillator. I bought a license manual and had it dictated to me so I could copy it in Braille in order that I might study at my leisure. On October 13, 1939, I went to Detroit to take my exam. I copied the code in Braille and read it back to the inspector. He looked it over a second, then calmly said, 'You have 85 characters solid copy right.' I sat a second more before it sunk in, and then shouted, 'I passed!' I went on and took the written exam in type, and received my license on November 14, 1939. What a day that was—I'll never forget the thrill!

"It was about this time I met W8AUT, who was instrumental in getting me on the air. I started out with a Sky Buddy, a little 6L6 and a straight key, but I was gloriously happy pounding brass on 40 meters. In about six months the Genesee County Radio Club here presented me with a beautiful Speed-X bug and I have been pounding brass now for ten years last November. It's still my first love, and the friends I have made through ham radio are numerous.

"I joined YLRL in 1940; have been V.P. once, was district chairman during the war, and at present I am again D.C. You can see that I just stumbled over radio quite by accident and not because it was suggested as a good hobby because of my handicap. In fact, that is why I like radio and the people that go with it, because handicaps just don't exist in this hobby. I have other hobbies, such as swimming, bowling, dancing and others, but radio will always be tops on my list. It's hard to keep it from becoming an obsession, but I do manage it somehow. By the way, Barbie, W3OQF, did a very lovely thing for me. She had the YLRL Call Book Brailled for me, and I am very thrilled with it."

At present Dottie teaches the adult blind in Flint during evening classes, and does house to house canvassing during the day, as well as helping out at home, holding daily skeds, and handling the YLRL QSO net on 80 Thursday evenings. She also is secretary of the Michigan Council of the Blind.

"Oh, yes," adds Dottie, "I have a beautiful German Sheperd Leader-Dog named Prince. Several of my friends had the pleasure of meeting him when I recently visited relatives and ham friends in New England. And he likes radio, too!"

Changes in YLRL

Anabel, W3NNS, who has been doing a grand job as V.P. for YLRL, has now taken over for the remainder of the term as president, due to the resignation of Helen, W3OLY/7, caused by the great separation between her and the rest of the officers in the East. Jean Hauff, W3INL, has been appointed Veep. After getting out

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.02	400	.25	.10	.02	600	.30	.12
.05	400	.30	.12	.03	600	.35	.14
.1	400	.35	.14	.04	600	.35	.14
.25	400	.45	.16	.05	600	.40	.16
.001	600	.25	.10	.1	600	.45	.18
.002	600	.25	.10	.15	600	.50	.20
.003	600	.25	.10	.25	600	.55	.22
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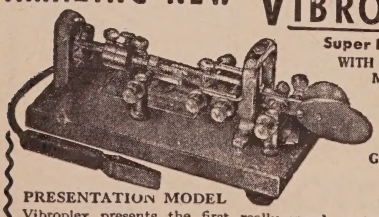
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some grand issues of *Harmonics*, Editor Barbie, W3OQF, was in a near state of collapse, so carrying on in this department is Mae Burke, W3CUL. Congrats on your FB first issue, Mae. Incidentally, we'd like to remind you readers that non-member subscriptions to YLRL *Harmonics* are available. Write to W1OAK, Ann Chandler, Box 108, Barre, Vt.

Although she, herself, has been laid up for some time with illness, W2PMA sends word of the N.Y.C. YL club activities. Latest doings included a theater party to see "Gentlemen Prefer Blondes," and a luncheon at the Taft Hotel, complete with floor show and Vincent Lopez as MC. W2RAQ, QWL, PUY, OWL, QGK, MEG, JZX, RTZ, SEH, PZA and others attending all reported a grand time. Thanks for the news, Lil, and we hope you'll be feeling tops again soon. Incidentally, in reporting new officers for the N.Y.C. club a couple of months ago, we incorrectly listed W2TTO as treasurer. Should have been W2BTU—sorry, Kit.

The hobby show held in Los Angeles during the last week of March included a ham exhibit and station. Managed by the OMs for the most part, YLRL took over for one night and "manned" the exhibit and handled the traffic. We hear it was a popular spot with scads of messages for the traffic nets.

W5 40-Meter Net

W5PTW, Peggy Libbe, is starting a c.w. net on 40 meters for YLs in the 5th District. The tentative day, time and frequency has been set as Tuesday, 10 a.m. CST, on 7150 kc. Peggy would like any YLs who are interested to write her at Box 931, Port Isabel, Texas.

DX Notes

Lass White, ZS2EC, writes: "I get *CQ* magazine every month and am very keen on your contribution, the YL's Frequency. It was through my OM, ZS2CR, that I became licensed, getting my ticket in July, 1947. I got tired of sitting watching him have all the interesting QSOs whilst I sewed or knitted. Radio is a very absorbing hobby and now I have even become a DX hound, with nearly 100 countries and 36 zones worked to date. I hold WAC, WBE and WBCN certificates, but am keen to get DXCC, WAS and WAZ, just to show Wally (my OM) that we YLs can do things, too, apart from cooking! I need only a few more States for WAS, so please tell the Ws to look out for me on 20 and 40 c.w., where I use 100 watts into a pair of 809s."

DX the Hard Way

When last we dropped notes for this column in the mail to *CQ* we were on our way to XE-land for a week, with almost the entire school group here. Our path led from the border town of Nogales south to lovely Hermosillo, capital of Sonora, and to the little fishing village of Guaymas on the Gulf of California. Thinking it a likely opportunity to visit some DX in person, the OM and ye column ed took up the search in Hermosillo. Being evening and too dark to look for rotary beams, we dropped in on a BC station, fortified with a QSL card and the OM's slender knowledge of Spanish. We received a cordial welcome, and an invitation to participate—in an amateur *BC* program!

Well, better luck next time. . . 33

VFO MOBILE

(*from page 16*)

To the right of 6C4 is L_3, and next to it is the 6AQ5 final amplifier tube socket. This brings the plate lead out near the C_{12} stator and final tank coil. L_6 is an ordinary power supply filter choke and is mounted to the rear of C_{12} near the right side back edge of the chassis. The modulator tube socket is mounted on the opposite side of the chassis. T_1 is mounted in the center of the inside rear chassis wall with the core at right angles to

L_6 to prevent feedback. The *transmit-receive* switch is mounted in the lower left corner of the front panel and the VFO switch SW_3 is in lower right hand corner. This switch, as explained before, is for zero beat adjustment of the oscillator with any desired spot on the band. The VFO dial is located near the center of the panel and is a National type vernier action.

Adjustment

After wiring has been completed the rig may be fired up. Insert all tubes in their proper sockets and apply filament voltage. Remove all tubes except the 6AK5 and set the VFO dial to half scale by adjusting the turns on L_1. The stage may be made to oscillate on approximately 7275 kc. A communications receiver with an S-meter, and accurately calibrated, is necessary at this point. Switch the receiver to the 20-meter band and adjust L_2 for maximum output on 14,550 kc as indicated by the S-meter. Follow the same procedure on 29,100 kc. All tubes are operating within their dissipation ratings with only 200 volts on the plates, so there is no danger of damage to them before all stages are peaked to resonance. Now the stages are peaked in the center of the 10-meter band and the VFO may be swung from 28,500 Kcs to 29,700 with full output on all frequencies without readjustment of any controls but VFO and final tank. The author uses a frequency meter which is mounted on the car dash for adjusting the final tank and antenna condensers while in motion, and it consists of an 0-to-1 milliameter, xtal diode, and coil/condenser combination mounted in a small meter case. It is loosely coupled to the antenna through a length of insulated wire, the antenna end of which is mounted close to, but not connected to, the base of the whip. The antenna itself is connected to the transmitter by means of push-in type auto aerial connectors located on the sides of the chassis near the front panel, one for antenna on the left and one for output to the receiver when not transmitting. Coax fittings would work here but we had these on hand and saw no need to use anything else. The rig is now ready for installation in the car after first trying out the modulator by plugging in the mike. A length of type RG-8/U Coax serves very well for the collecting link between transmitter and whip antenna.

Operation

With a reasonable amount of care in construction, this little rig is capable of giving very good results. Yours truly has made numerous contacts with it with Puerto Rico, Canal Zone, Canada, B.W.I., and many maritime mobiles. All of these countries have been worked at least twice, so the element of luck has been whittled down considerably. All of my contacts have been made from average highways, and no hills or elevated sites have yet been tried. Undoubtedly the success of this little job has been due, in large measure, to the use of VFO control—a rarity on 28 mc.

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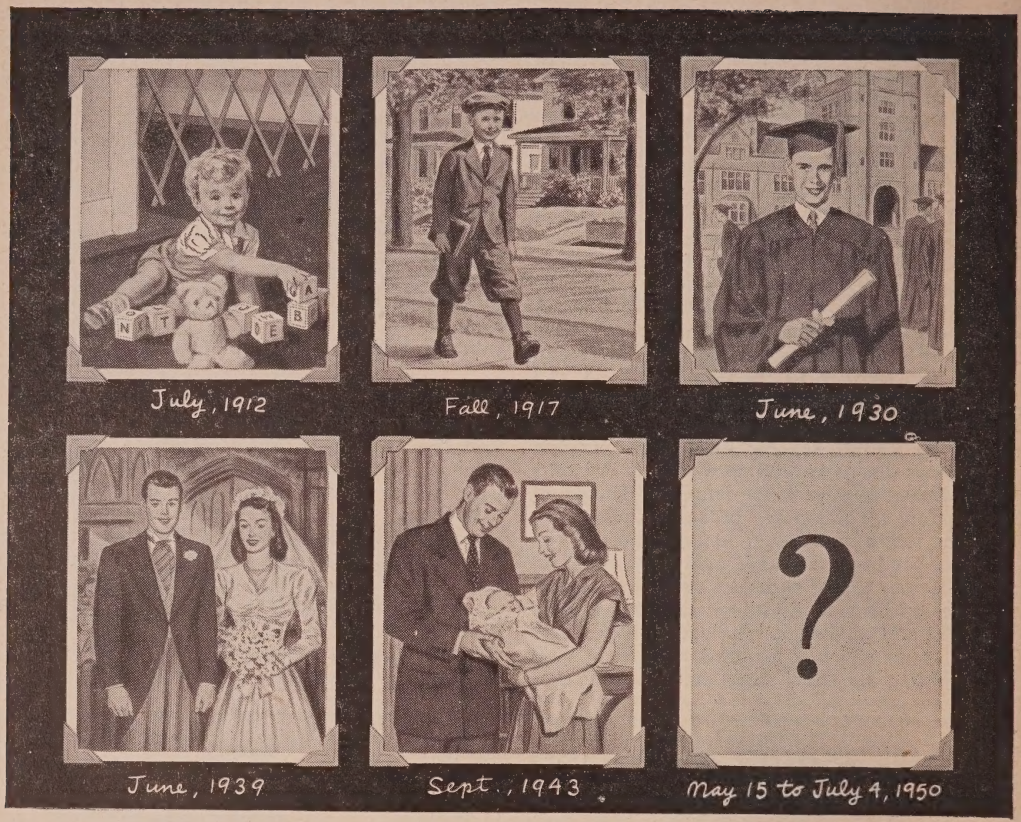
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ELIMINATION OF HAM TVI

(*from page 12*)

What does all this have to do with using a low pass filter? Just this: If you expect a low pass filter to attenuate harmonics in your transmitter feed line to the same extent that it will in a laboratory test set up, you must take the same precautions in your transmitter as were necessary in the laboratory set up. Namely:

1. Absolutely complete shielding of entire transmitter.[5, 6]
2. Absolutely complete filtering of all wires that leave the shielded enclosure. This includes mike, key, a.c., send-receive, antenna relay leads; in fact, any wire of any sort that leaves the "r.f.-tight" box.[1, 2, 6]
3. The filter must be used in a coax line that is properly terminated in its characteristic impedance. (Your standing wave ratio must be low, 2 to 1, or better)

It is practically impossible to attain the requirement set forth in Item 3 without a standing wave bridge. With such a bridge it is only a matter of a few minutes work. Symptoms of an excessive standing wave ratio are the melting of all the soldered connections in the low-pass filter due to the coils running red hot, blowing up of the condensers due to the high voltage developed, and the inability of passing your fundamental. Methods of obtaining a low standing wave ratio have been covered by Grammer,[7] and need not be repeated here.

TVI-Proofing the TBS-50

In applying the above principles to my Harvey-Wells, the first thing was to check the standing wave ratio, which turned out to be around $1\frac{3}{4}$ to 1. The next thing was to remove the unit from the car for the addition of filters in all the external leads, and the addition of more complete shielding. Let me once more, at the risk of becoming boring, point out that a nice, new, shiny cabinet is no guarantee of good shielding.

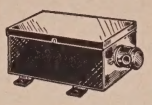
In improving the shielding, the first step was to remove all the paint from the back edge of the panel and the front edge of the cabinet to insure a good contact. Additional holes were drilled and tapped for 6-32 machine screws and the original screws were discarded. We ended up by using twice as many screws to bolt the front panel on as before. While the unit was out of the cabinet, we installed r.f. harmonic filters at the mike and key jacks, as indicated in *Fig. 6*. The next step was to make the power plug on the rear, and the antenna

[5] P. S. Rand, "Shielding for TVI," *Radio and Television News*, Sept. 1949.

[6] Mack Seybold, "TVI-Free Rig for 10," *CQ*, Oct. and Nov. 1949.

[7] George Grammer, "Low Pass Filters," *QST* 1950.

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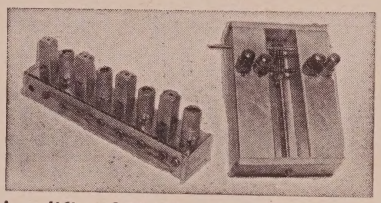
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stand-off insulator, "plug-in" using a banana plug and jack and an Amphenol octal socket. The banana jack and the octal socket were mounted in an inverted 3-inch deep chassis that was bolted to the rear of the Harvey-Wells cabinet. This chassis contains the antenna components in the top half, and the supply lead filters in the lower half, separated by a partition. The r.f. filters in these leads are shown in *Fig. 7*, and are all mounted on a terminal board. A bottom pan on this chassis completes this unit. A standard low-pass filter made up from a kit is bolted on one side, as shown in the photographs, and is complete with standard coax fittings.

The shielding of the main cabinet was further improved by covering the louvres on the outside with copper screening, including the hole in the top. This is also apparent from the photographs. To improve servicing and adjusting, a hole about 4×5 inches in size was cut in the right hand bottom side of the cabinet and was then covered by a removable plate. This allows access to the 6AQ5 tubes for replacement as well as to their tuning adjustments.

About this time it is apparent for any work of this nature it is necessary to have a 6-32 tap, a no. 28 drill for clearance, and a no. 36 drill for tapping, as it is impossible to put nuts on the screws when the unit is in the cabinet.

The Harvey-Wells cabinet was securely bolted to a piece of $\frac{1}{2}$" plywood to which had been attached four surplus Lord shock mounts. Each shock mount was bonded to the steel floor of the car and to the cabinet with heavy copper braid, thus grounding the cabinet at each corner.

In keeping with the idea of not allowing any r.f. to get on the outside of the RG-8/U coax, a $3" \times 4" \times 5"$ utility box was mounted over the antenna feed-through on the inside of the body of the car (see *Fig. 8*). Of course, the paint was removed from all joints on this box and it was put back together with twice as many screws to insure a good shield. Two coax fittings were mounted on the box, one for the transmitter coax and one for the coax feeding the 10-meter converter up front. An antenna change-over relay was mounted inside the box, and its leads were bypassed and shielded.

The power cable from the transmitter to the PE-103 dynamotor was shortened up to a minimum and shielded. The battery leads from the PE-103 to the separate 12-volt battery were also shortened. The over-all effect of this was to increase the output power considerably due to the higher filament voltage on the transmitter, and the higher primary voltage on the dynamotor.

Harmonic Field Strength Measurements

With the job completed and the rig installed in our new 1950 Plymouth all-metal Station Wagon, we once again made field strength measurements to see if we could attain the harmonic attenuation we had been able to measure in the laboratory.

With the increased fundamental power, the field strength measuring equipment, Measurements Corp, Model 58, 15-150 mc, had to be placed

considerably farther away to keep the meter on-scale when measuring the 10-meter signal, and yet the car had to be backed up to within 20 ft. in order even to find the second harmonic. This was then checked at 15 μv/m at this distance. The over-all attenuation was in excess of 85 db now, and the low-pass filter was being given a chance to show what it could do. Needless to say, the rig does not cause any harmonic-type TVI even when parked in front of a house with a TV receiver. However, with its plate power input of 60 watts, it can cause fundamental overloading of TV sets not equipped with a high-pass filter[1] for a radius of 100 ft. or more. It is sincerely hoped that more manufacturers will follow RCA's lead and incorporate high pass filters in their TV sets. It is also hoped equally as sincerely that amateurs with mobiles will stop being "hit and run" TVI artists, and will do a little filtering of the power leads and antenna feeders on their mobiles.

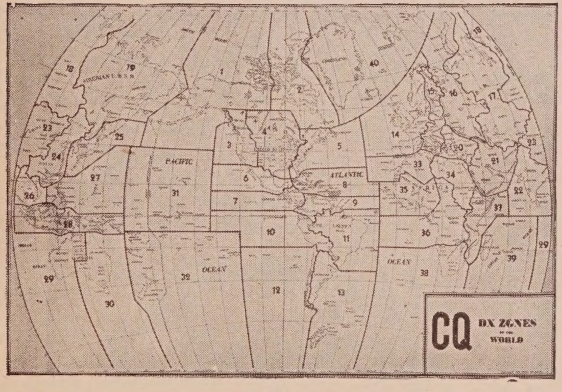
In concluding, let me say that the above principles work equally well in eliminating TVI not only on all types of mobiles but on home stations as well, regardless of design or power.

Reducing Spark Plug Interference

No mobile article is complete without treating spark plug interference. Here is what we had to do:

1. Use "Autolite" resistor-type spark plugs.
2. Solder all connections to ends of all high-tension wires to prevent additional spark gaps.
3. Install a carbon resistor suppressor at the center of the distributor.
4. Install a Sprague High Pass condenser, .1 μfd, 20 amp., at the cold side of the spark coil.
5. Remove the generator armature and field leads to the voltage regulator from the car cabling and replace same with RG-59/U coax cable.
6. Install a 10-meter wave trap in the generator armature lead right at the generator.
7. Install a 10-meter wave trap in the ignition lead just before it passes through the fire wall.
8. Install a 0.1-μfd paper condenser on the voltage regulator at the armature connection, and another one on the battery side. Do not put one on the field tap.
9. Bond the motor to the fire wall with heavy copper braid.
10. Bond the fire wall to the front fenders and the body, on each side, with heavy copper braid.
11. By-pass all instruments and switches on the dash-board with 0.1-μfd condensers.
12. Be sure all antenna lead-in cables are completely shielded and attached with proper shielded fittings.
13. Install r.f. filters in filament and B-plus leads of the converter, and be sure these leads are well shielded.

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FOR SALE: Super-Pro SP-400-X post war model complete, like new, $250.00. BC-221-AK frequency meter latest model with modulation brand new, never used, $75.00. OSS type Navy RBZ pocket portable receiver like new with phones etc. $15.00. Simpson 260 VOM meter with leather case, brand new, never used, $30.00. BC-654-A xmitter-recvr with tubes, used condition, $15.00. PE-103 dynamotor, brand new, with cables, $10.00. AN-GSC-T1 code training set like new, in case, $10.00. G813 McElroy keying unit in case, like new, $10.00. TG-10 gray keying unit like new in deluxe cabinet $10.00. Only reason for selling, have moved to small apartment. J. R. Winterbottom, 738 N. Highland Avenue, Pittsburgh, Pa.

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WANTED: Speech amplifier unit for BC-610 (any model). For Naval Reserve Company. Will pay cash, but please give us a break. W1DFS.

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BARGAINS: New and reconditioned Collins, National, Hallicrafters, Hammarlund, RME, Millen, Meissner, Gonset, others. Reconditioned S38 $29.00, S40A $59.00, SX43 $119.00, HQ120X $99.00, HQ129X, $129.00, SP400X $219.00, NC173 $139.00, NC183 $199.00, HT18 $69.00, HF-10-20 $59.00, RME 45 $89.00, DB20, DB22A, VHF152A, SX42, SX62, HT19, NC240D, HR05TA1, HR07, HT9, Collins 32V1, Collins 75A1, Temco 75GA, BC610, others. Shipped on trial. Terms. List free. Henry Radio, Butler, Missouri.

LM 13 Frequency meter, new, calibration book, power supply. Make offer. W6VWA, 10306 Otis Street, South Gate, California.

SELL: Meissner signal shifter. Latest no drift model EX. Factory wired. Excellent condition. Best cash offer over $55.00. Phil Smith, W8HUD, 1756 Yosemite, Birmingham, Michigan.

ART-13, unconverted, used 20 hours, 28 V 10 A filtered dc supply connectors, cable, instructions, $199. C. E. McDougall, W10TU, 9 Druid Lane, Riverside, Connecticut.

SELL: Meissner 150B transmitter with signal shifter. Excellent condition, $175. J. E. Spiegel, W4MEL, P. O. Box 1011, Lake City, Fla.

SELL: BC-221, VHF 152A, DB 22A, BC-696, BC-459, 813's, BC-453, Vibroplex, Millen exciter, Millen frequency meters, Meissner signal shifter, Meissner 80 FM tuner, Meissner 150B transmitter, L. C. Smith typewriter, modulation oscilloscope. WANTED: Slide rule, drafting equipment, electrical engineering books, machinist's tools. W9DPL, 2924 Station Street, Indianapolis 18, Indiana.

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FOR SALE: HT 18 v.f.o., HT9 Hallicrafters 150-watt transmitter. Complete coil set. Best price. Harold Knoll, W8DTP, Holland, Mich.

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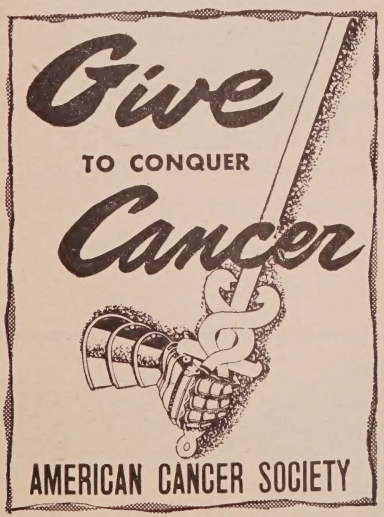
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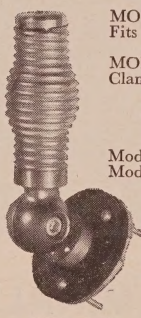
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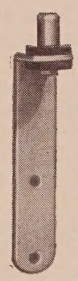
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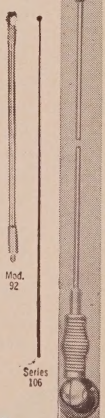
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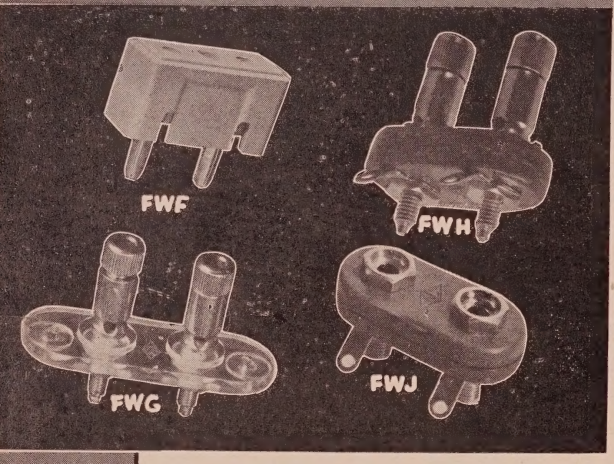
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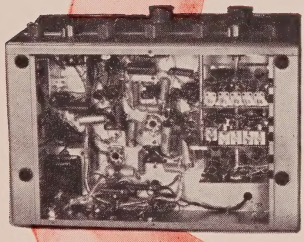
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A Panoramic Adaptor with a Circular Base Line

By W. E. Babcock*

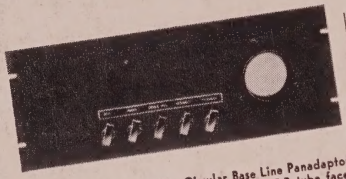


Figure 1. Panel view of the Circular Base Line Panadaptor showing position of the front controls and CR tube face.

SIMULTANEOUS visual reception of a large number of radio signals over a broad band of frequencies is provided by the panoramic adaptor. It may be used with almost any type of receiver and provides an indication of the frequency, type, and strength of all signals within a given bandwidth (centered at the frequency to which the receiver is tuned). When used to spot unoccupied channels in the band it can be an invaluable aid in avoiding interference problems. When used with a calibrated scale it becomes an accuracy frequency meter. The amateur who owns a panoramic adaptor will no doubt find many additional uses for it.

Basically, a panoramic adaptor is a super- with a broadly tuned r f stage in the

as a pip on the screen is determined by the position of the pip on the circumference of the circle as shown in Figure 2. The center frequency (to which the receiver is tuned) is shown at zero, while other signals are shown in proper frequency relationship to this zero.

General Circuit Description

A circuit diagram of the panoramic adaptor is given in Figure 3. The signal input to the adaptor is taken from the plate of the converter tube in the receiver. The 6AU6 r f stage is tuned to the intermediate frequency of the receiver and has a rising frequency characteristic either side of th center frequency to compensate for the droop frequency characteristic resulting from the se tivity of the r f sp-stage in the receiver. The p circuit of the 6BE6 mixer stage is tuned to kc, while the oscillator section is varied ove range of 50 kc above and below 616 kc (456 the usual receiver i f, + 160 kc) at the rate of times per second. The sawtooth voltage driving the reactance modulator tube, and the circular sweep voltage for the cathode-ray tube are both derived from the 60-cycle line voltage.

Plate and screen voltages for all tubes except the cathode-ray tube are obtained from a conventional full-wave rectifier. The anode voltage for the cathode-ray tube is obtained from a circuit in which the output volt- rectifier

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