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A PUBLICATION OF THE RCA TUBE DIVISION

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Components for Pi-Coupled Amplifiers

By

Mack Seybold,* W2RYI

Most of the references on this subject present data for the determination of values of the components for pi-coupled amplifiers in terms of curves or formulas. To simplify the design procedure for the amateur, W2RYI has compiled this data in easy-to-use tabular form.

The use of a pi network to couple the plate of an rf amplifier tube to the antenna provides several advantages over the use of a conventional parallel-tuned, inductively-coupled tank circuit. The ease with which a multiband transmitter employing a pi-network tank circuit with rotary or tapped coils can be operated on several bands, in addition to its harmonic-attenuation feature, has made this circuit appealing to designers of amateur transmitters. The circuit is also popular because front-panel controls can be used to compensate for reasonably large variations in transmission-line reactance.

The function of the pi network is to match a transmission line having relatively low characteristic impedance to the plate of a tube which must "see" a relatively high resistive load to produce optimum power output. *Table I* lists the estimated plate loads for the various operating conditions of several popular tubes used in amateur transmitters. To determine the plate load for a given tube type, refer to *Table I* and select the operating condition that most closely fits your requirements; the estimated plate-load value for that operating condition is given in the last column in the table. The exact load for tubes not listed in *Table I* can be determined from a set of complicated calculations; however, a good approximation can be made with the formula:

$$\text{Estimated Plate Load (ohms)} = \frac{E_b}{2I_b}$$

where E_b is the plate supply voltage, and I_b is the dc plate current in ma.

The estimated plate load is then used as the key to *Table II*. This table lists the actual values of the pi-network components for the estimated plate loads; *Fig. 1* shows the location of these components in the circuit.

Example

An RCA 6146 is to be used in a 7-Mc, cw transmitter with 750 volts on the plate, and the signal is to be fed to a 50-ohm, coaxial line. *Table I* shows the estimated plate load to be 3,100 ohms. As shown in the 3,000-ohm column of *Table II*, 7-Mc operation requires 90 $\mu\mu$f for C_1, 6.2 μh for L, and 700 $\mu\mu$f for C_2.

When a 50-ohm, non-reactive load is applied to the coax output connector, optimum loading at 7 Mc will occur with components

*RCA Tube Div., Harrison, N. J.

approximating the above values. In a practical transmitter, a capacitor of 1,000 $\mu\mu$f should be used for C_2 so that the loading can be reduced when desirable, and so that compensation can be made for variations in antenna reactance. Capacitor C_1 should be capable of tuning through resonance at 7 Mc; all variations in reactance considered, a capacitance of 150 $\mu\mu$f would be considered to be a safe design value for C_1.

Recommendations

Design and constructional details for pi-coupled finals are amply covered in the articles listed in the accompanying bibliography. These articles should be examined thoroughly for ideas and suggestions before construction is begun.

In addition to the many valuable suggestions in the literature on the design of multiband rigs using pi-coupled finals, there are two precautions to be observed: (1) The driver should be a straight-through amplifier employing a conventional tuned tank circuit. (2) The final amplifier should not be operated as a doubler. These recommendations are important because the pi-coupled amplifier, in addition to attenuating harmonics effectively, will pass signals at frequencies below the fundamental more readily than an amplifier employing a parallel-resonant plate circuit. If the low-frequency signals from preceding multiplier stages are not permitted to reach the control grid of a pi-coupled final amplifier, successful operation will be assured.

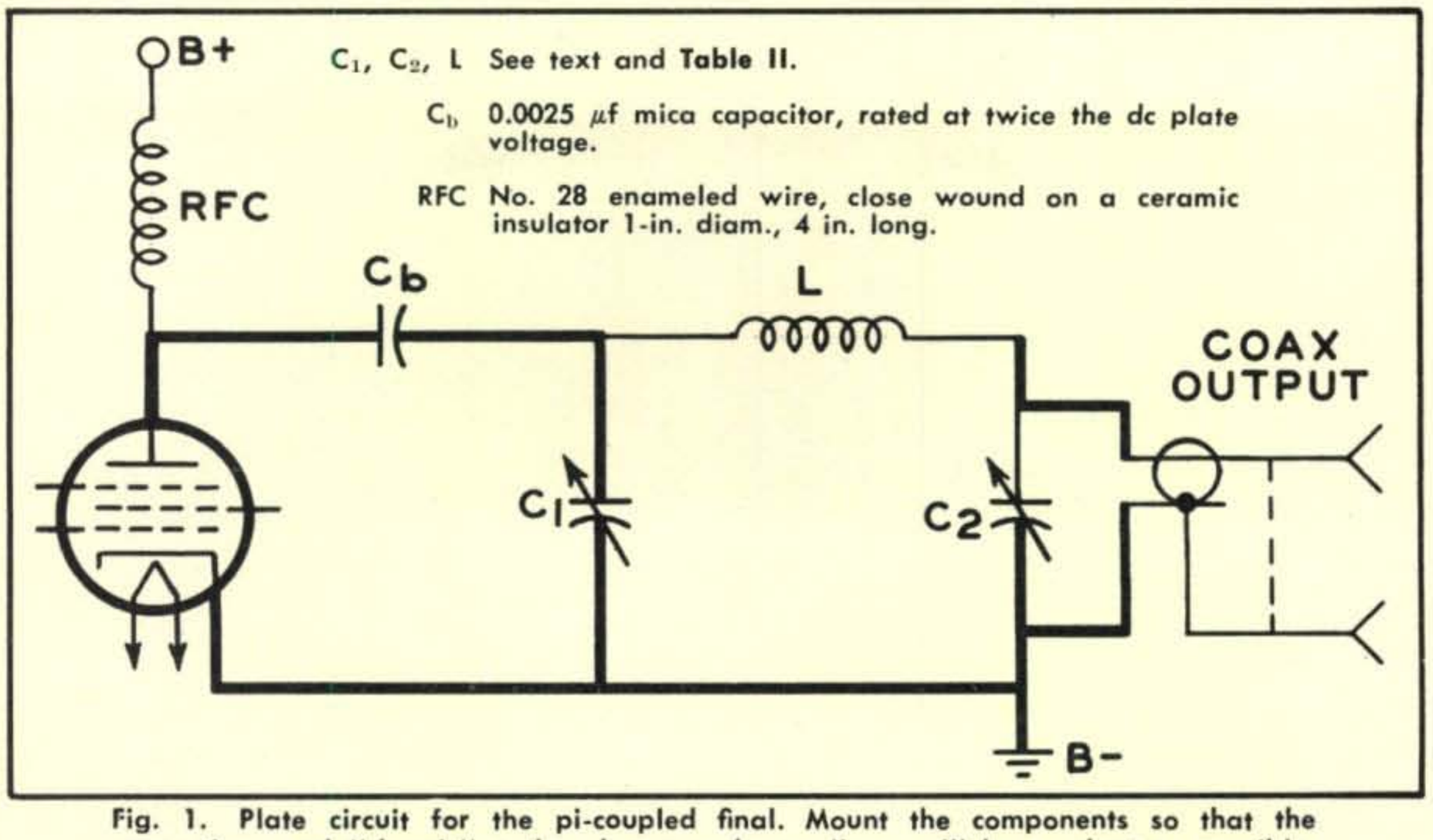
Table I

Estimated Plate Loads for Typical Operating Conditions

Tube Type	Service	Emission	E_b	E_{c_2}	I_b	P_o	Plate Load
			volts	volts	ma	watts	ohms
813	ICAS	CW	2,250	400	220	375	5,100
	CCS	CW	2,000	400	180	275	5,500
	CCS	CW	1,500	300	180	210	4,200
	ICAS	Phone	2,000	350	200	300	5,000
	CCS	Phone	1,600	300	150	180	5,300
813's (Parallel)	ICAS	CW	2,250	400	440	750	2,600
	ICAS	Phone	2,000	350	400	600	2,500
807	ICAS	CW	750	250	100	54	3,700
	CCS	CW	600	250	100	40	3,000
	CCS	CW	500	250	100	32	2,500
	ICAS	Phone	600	300	100	44	3,000
	CCS	Phone	475	250	83	28	2,900
807's (Parallel)	ICAS	CW	750	250	200	108	1,900
	ICAS	Phone	600	300	200	88	1,500
6146	ICAS	CW	750	160	120	70	3,100
	ICAS	CW	600	180	150	66	2,000
	CCS	CW	600	150	112	52	2,600
	ICAS	Phone	600	150	112	52	2,600
	CCS	Phone	475	135	94	34	2,600
812-A*	ICAS	CW	1,500	—	173	190	4,300
	CCS	CW	1,250	—	140	130	4,500
	ICAS	Phone	1,250	—	140	130	4,500
	CCS	Phone	1,000	—	115	85	4,300
4-65A**	CCS	CW	1,500	250	150	170	5,000
	CCS	CW	600	250	140	54	2,100
	CCS	Phone	1,500	250	120	145	6,200
	CCS	Phone	600	250	117	50	2,500
4-125A/4D21	CCS	CW	2,500	350	200	375	6,200
	CCS	CW	2,000	350	200	275	5,000
	CCS	Phone	2,000	350	150	225	8,200
	CCS	Phone	2,500	350	152	300	6,700
4-250/5D22	CCS	CW	3,000	500	345	800	4,300
	CCS	CW	2,500	500	300	575	4,100
	CCS	Phone	3,000	400	225	510	6,700
	CCS	Phone	2,500	400	200	375	6,200
2E26	ICAS	CW	600	185	66	27	4,500
	CCS	CW	500	185	60	20	4,200
	ICAS	Phone	500	180	54	18	4,600
	CCS	Phone	400	160	50	13.5	4,600

*Grid Neutralization

**Typical operating conditions at higher plate voltages are published, but plate impedances are too high for convenient pi-network operation.



C_1, C_2, L See text and **Table II.**

C_b 0.0025 μf mica capacitor, rated at twice the dc plate voltage.

RFC No. 28 enameled wire, close wound on a ceramic insulator 1-in. diam., 4 in. long.

Fig. 1. Plate circuit for the pi-coupled final. Mount the components so that the connections and "chassis" paths, shown as heavy lines, will be as short as possible.

Table II Components for Pi-Coupled Final Amplifiers*

Estimated Plate Load (ohms)		1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000*	NOTES
C_1 in $\mu\mu$f,	3.5 Mc	520	360	280	210	180	155	135	120	110	90	The actual capacitance setting for C_1 equals the value in this table minus the published tube output capacitance. Air gap approx. 10 mils/100 v E_b.
	7	260	180	140	105	90	76	68	60	56	45	
	14	130	90	70	52	45	38	34	30	28	23	
	21	85	60	47	35	31	25	23	20	19	15	
	28	65	45	35	26	23	19	17	15	14	11	
L in μh,	3.5 Mc	4.5	6.5	8.5	10.5	12.5	14	15.5	18	20	25	Inductance values are for a 50-ohm load. For a 70-ohm load, values are approx. 3% higher.
	7	2.2	3.2	4.2	5.2	6.2	7	7.8	9	10	12.5	
	14	1.1	1.6	2.1	2.6	3.1	3.5	3.9	4.5	5	6.2	
	21	0.73	1.08	1.38	1.7	2.05	2.3	2.6	3	3.3	4.1	
	28	0.55	0.8	1.05	1.28	1.55	1.7	1.95	2.25	2.5	3.1	
C_2 in $\mu\mu$f,	3.5 Mc	2,400	2,100	1,800	1,550	1,400	1,250	1,100	1,000	900	700	For 50-ohm transmission line. Air gap for C_2 is approx. 1 mil/100 v E_b.
	7	1,200	1,060	900	760	700	630	560	500	460	350	
	14	600	530	450	380	350	320	280	250	230	175	
	21	400	350	300	250	230	210	185	165	155	120	
	28	300	265	225	190	175	160	140	125	115	90	
C_2 in $\mu\mu$f,	3.5 Mc	1,800	1,500	1,300	1,100	1,000	900	800	720	640	500	For 70-ohm transmission line.
	7	900	750	650	560	500	450	400	360	320	250	
	14	450	370	320	280	250	220	200	180	160	125	
	21	300	250	215	190	170	145	130	120	110	85	
	28	225	185	160	140	125	110	100	90	80	65	

* Values given are approximations. All components shown in Table II are for a Q of 12. For other values of Q, use $\frac{Q_a}{Q_b} = \frac{C_a}{C_b}$ and $\frac{Q_a}{Q_b} = \frac{L_b}{L_a}$. When the estimated plate load is higher than 5,000 ohms, it is recommended that the components be selected for a circuit Q between 20 and 30.

Bibliography

1. "Pi-Network Calculator," Bruene, **Electronics**, May, 1945.
2. "Pi-Network Tank Circuits," Pappenfus and Klippel, **CQ**, Sept., 1950.
3. "Further Notes on Pi and L Networks," Pappenfus and Klippel, **CQ**, May, 1951.
4. "Practical Applications of Pi-Network Tank Circuits for TVI Reduction," Grammer, **QST**, Jan., 1952.
5. "Pi-Network Design Curves," Grammer, **QST**, April, 1952.
6. "Pi-Network Tank Circuits for High Power," Grammer, **QST**, Oct., 1952.
7. "A Wide-Range, High-Power, Pi-Network Final," Farrar, **QST**, Oct., 1953.
8. "Simplified Pi-Network Solutions," Hoefer, **CQ**, Nov., 1953.

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The RCA type 80 full-wave vacuum rectifier was recently changed over from a size ST-14 bulb to a T-9 bulb, like that used for the 5Y3-GT. This was done in order to utilize RCA's modern tube manufacturing techniques and equipment more effectively, despite declining replacement demand for the type 80.

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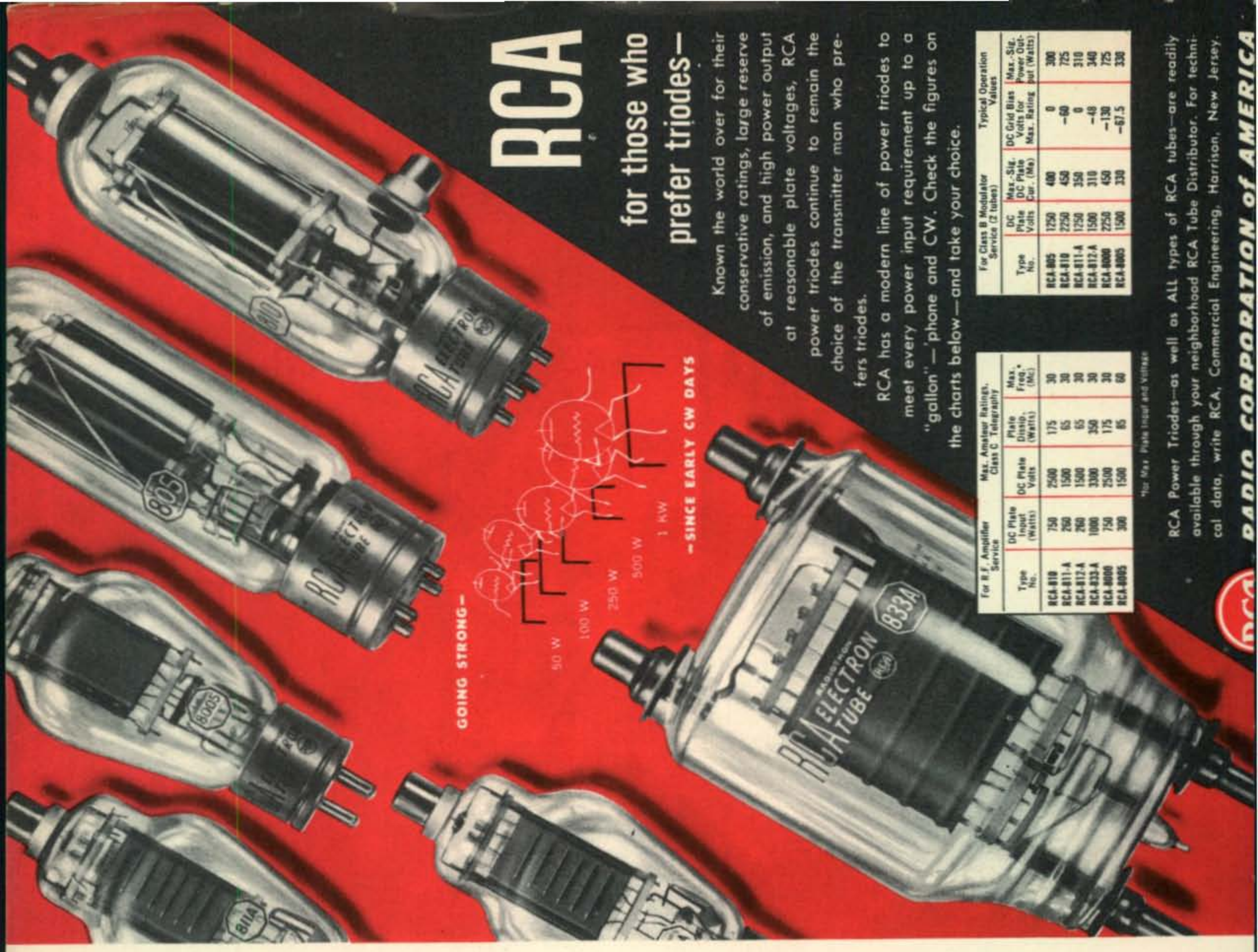

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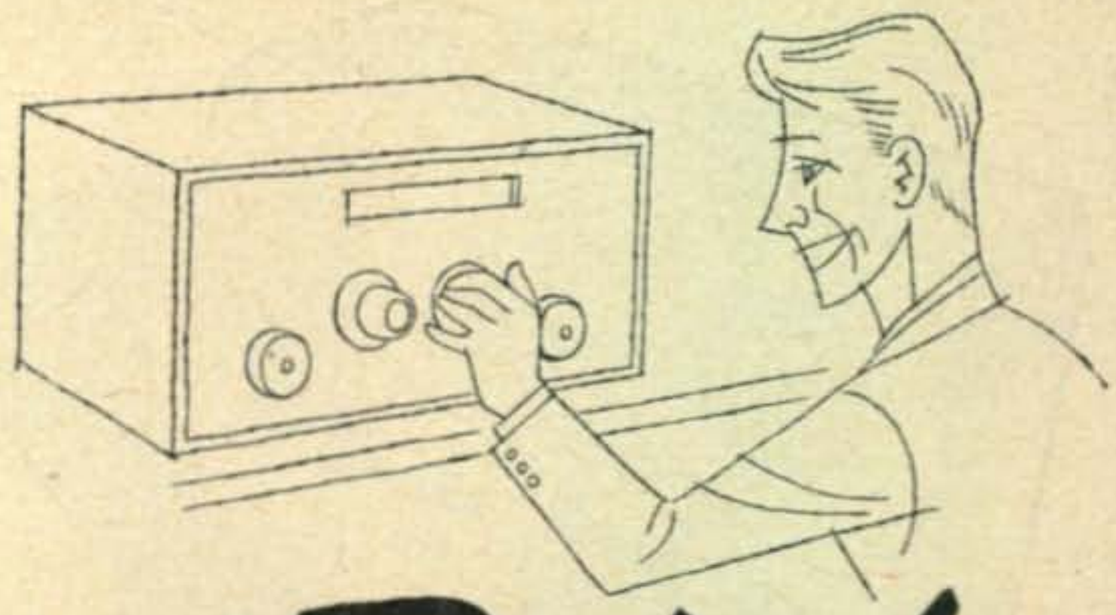

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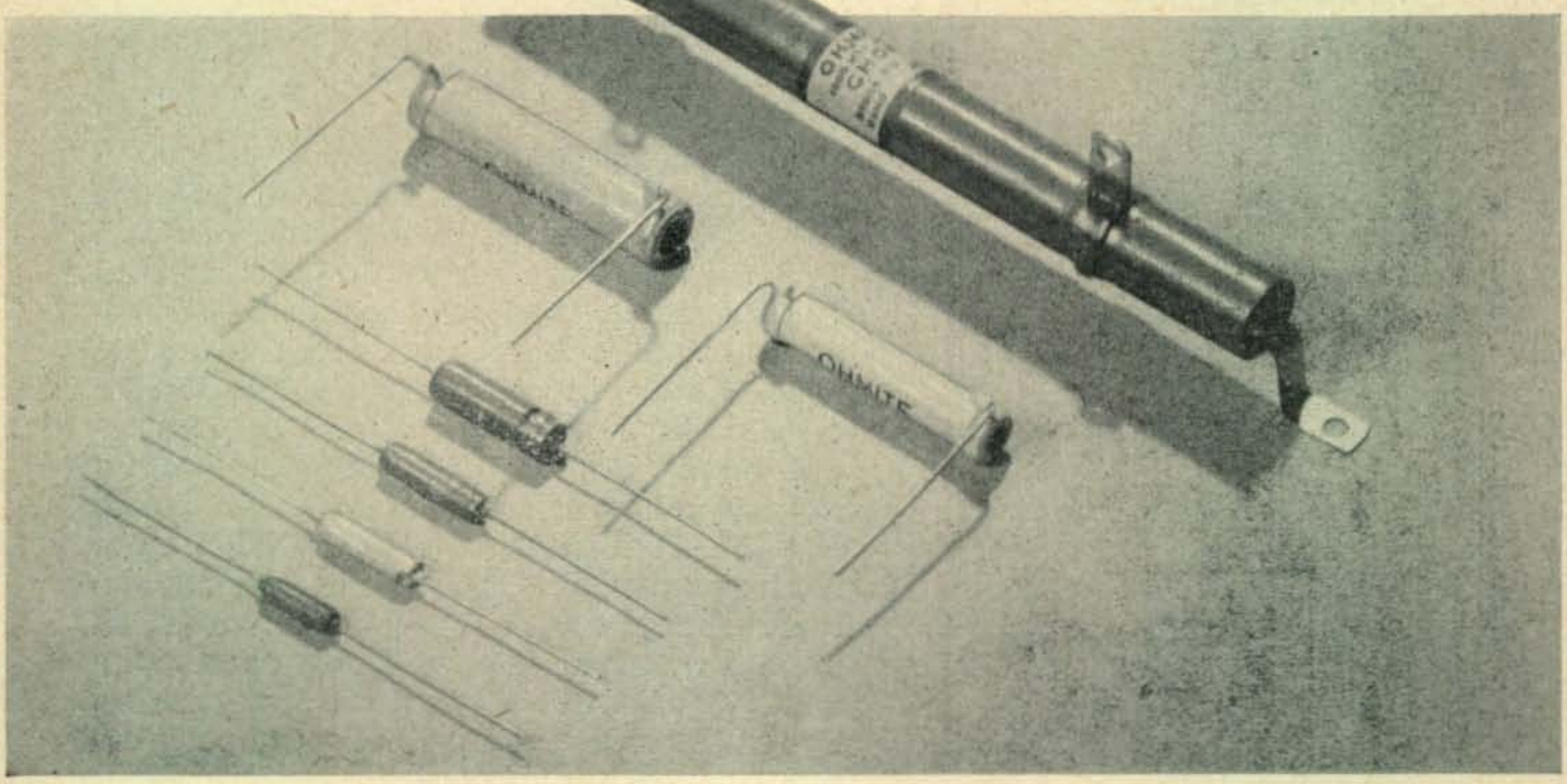

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Deer Hon. Ed:

It are happening again. Yes indeedy. Good old lucky old geenyus Scratchi are falling in mud puddles and coming up smelling like posies—and this closer to truth than you thinking, Hon. Ed., when you heering what happening. It all starting when local sivil defense peeple reelizing that H-Bumb are nocking present sivil defense plans into cockatoo hat.

You may be recalling what sivil defense chiefsman from Washington are saying after H-Bumb being discovered. He saying that either having to dig down deeps or getting the hecks out. Our local peeples thinking this over, and on acct. are very difficult to digging down deep in Feenix, are desiding to getting the heck out. Only problum are that if getting out, should be having sum two-way radio to using after getting where you are going.

So, everybuddies looking like madly for place to putting control center for sivil defense radio. Place what are far enuf from Feenix to being safe, yet close enuf to Feenix to being useful in case—just in case. When Hon. Brother Itchi are offering space on his Hon. Ranch for control center, sivil defense peeple accepting like gladly.

From then on fevered acktivity are order of day at sivil defense hedquarters. Everybuddies wanting to get in on act. Local amchoors all promising to help. Local business peeples all volunteering. Plans are for making big hole in ground about 100 feets by 50 feets. In this are putting concreet sides and floor, then putting big cement slabs over top for roof. This way, even if sum navvygator making big mistakes, and bumb falling to neer, control center still being on air, needing maybe only cupple new antennas.

So, for last cupple weeks, Hon. Brother Itchi's ranch looking like Grand Central station, without trains. There are trucks all over the place, hawling dirt away, bringing peeple in to help. Big bulldozers are scraping and hacking away at desert. Even having two-way radio on bulldozers. This are so when local contracktor, who lending bulldozer for sivil defense work, are needing self-same bulldozer sumplace else, he can radioing to bulldozer, telling him to stop digging and coming back. Poleece cars, taxis, private cars—like Honest Sam's used car lots.

Local amchoors are busy hammering and sawing and cutting lumber for forms for pooring concreets in. Scratchi's Gal-Friend Lil Watanabe are keeping busy handing out icy-water and sunburn lowshun to crowd, and Brother Itchi standing by with first-ade kit if anybuddy stepping on nail or otherwise getting indecapitated.

How's that, Hon. Ed? You saying howcomes Gal-

(Continued on page 6)

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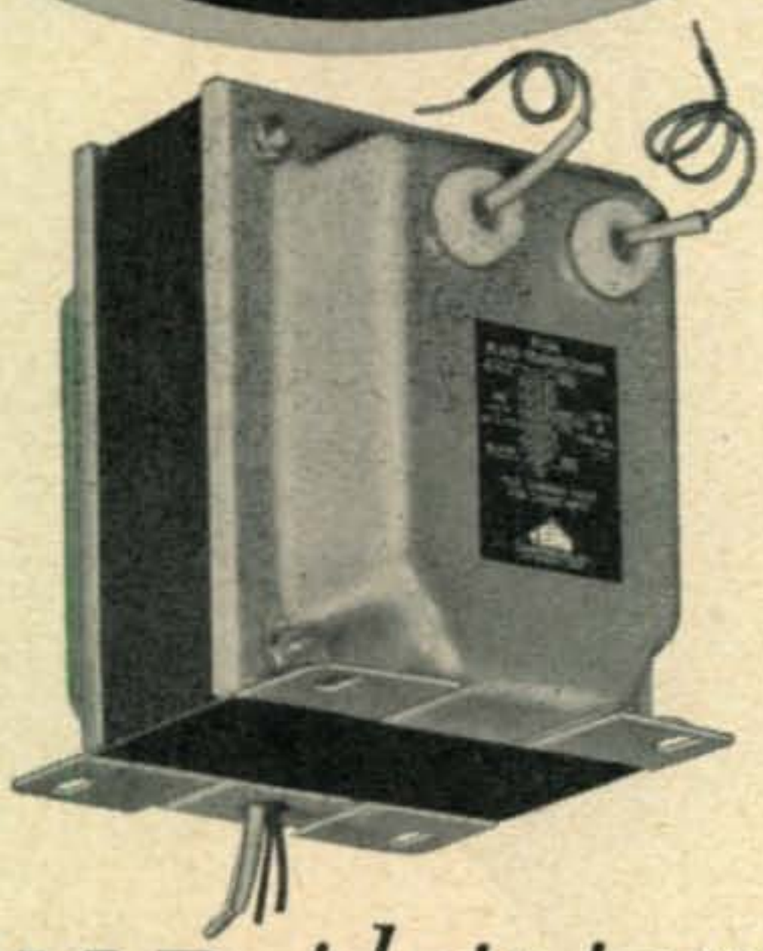

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(from preceding page)

Friend Lil handing out sunburn lowshun? It are easy to see you are not being in Arizona in August. It are hotter than 807 with kilowhat input. Which meening everybuddy working in as little clothes as possible. Which meening Hon. Sun are getting chance to working on peeples skin. Yes indeedy, Hon. Ed., we using more sunburn lowshun than cacktus jooce.

Things are fastly coming along so that cupple days ago we are having hole all dug, with concreet floor and walls all finished. It are this same nite that the gloom are desending. Hon. Brother Itchi are getting tellyfone call from sivil desfense peeples, and they saying they are so sorry, but no longer can planning on having control center at Itchi's ranch. They saying there are two Hon. Reasons. Firstly, they finding can't put control center on private proppity, and secondly are discovering that needing to go undergrounds more than they firstly thinking. Meening hole in our ground not deep enuf. They are saying they hoping Itchi not minding 100 feets by 50 feets hole in his land, but maybe he can finding use for it.

Well, Hon. Ed., when I heering that, I are burning up. Here I are spending so much time digging, sawing, hammering and planning to having 1/c control center rite on ranch when Poof!! it all blowing up in Hon. Face. All having to show for work is hole in ground. Are going to bed so early that nite, being so mad, that I are missing big storm.

Gollies, and are we having a storm. Rain, rain, rain. In fack, it are raining all nite. Next morning, Hon. Brother Itchi are exuberant, saying how nicely the water be for the crops and how making grass green for cattle. He also saying sumthing else, but I not heering, as wandering out to look at hole in ground. When getting there and looking into hole, getting even madder. Hon. Ed., it are six feets deep full with water. What can doing with abandonned control center with six feets of water in it?

Sacremento!! I so mad I aiming hefty kick at stone which are on edge of hole. Only, on acct. it not a stone, but a peece of firmly fastened concreet, I falling heels over hed right into hole full of water. There I are, swimming back to side of hole—Hon. Ed!!! you getting it? Swimming!! Sacremento Boulevard! Wowiee! Our own private swimming pool—100 by 50 feets. I quicklike climeing out of pool, rushing to tell Brother Itchi. When finding him, and explaneing, he laffing like crazy, and telling me he having same idea last nite. In fack, man are coming today to putting in drain and pumps and stuff.

Now what you thinking, Hon. Ed? Aren't sivil defense grate stuff? Liking to come visit us? Bring your baything suit.

Respectively yours,
Hashafisti Scratchi

Novice Crystal Bank

The **AK-SAR-BEN Radio Club** (Box 626, Omaha, Nebr.) has taken steps to initiate a "crystal bank" for their Novice members. Crystals will be made available on a purely loan basis to Novices upon their pledge to return them once their license has expired or when they graduate into the General Class ranks. It sounds like a valuable proposal for many clubs with a possible large Novice membership.

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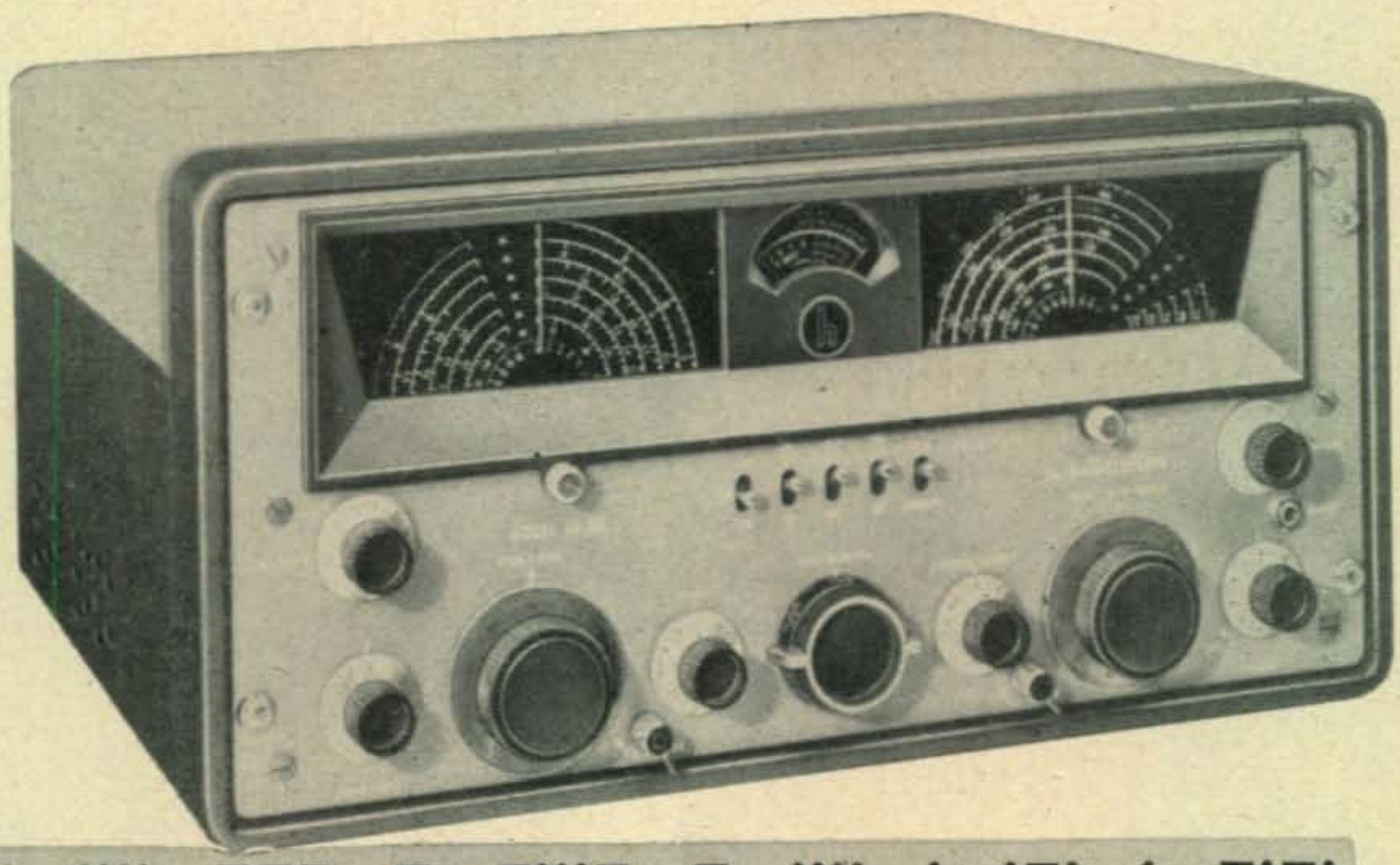
"I started on the air with a Hallicrafters Sky Buddy. I still have it and it functions well. Later I got a Hallicrafters S-40 and it really performed for me. I don't think you can beat any Hallicrafters equipment at the price. I'm certainly impressed with the many features of the SX-88, such as the main tuning and band spread locking device and the built in crystal calibrator."

FO8AJ



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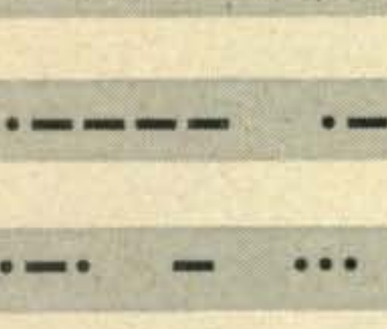

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FREE—Send me World-wide Time Conversion Dial Calculator and all band frequency allocation chart plus a fund of other handy data.

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☐ Ham (call letters_____) ☐ Listener

Occupation_____

Hallicrafter equipment I would like to know about:

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hallicrafters

Chicago 24, Illinois

Used by 33 governments, sold in 89 countries.

SPARE PARTS

Southern Cal RTTY-ers Meet

The RTTY Society of Southern California met recently at the plant of the Western Gear Works in Lynwood, California. The photograph above was taken during a tour of the plant and shows some of the interested RTTY-ers. From left to right in the front row we see; Art Addaway, W6LSG, W6CND, W6AEE; in the next row are W6RZ, W6PZV, W6CL, W6NAT, W6ILW, W6EV; next row, W6EGZ, K6CHU, W6DYW, W6FLW, W6WYH, W6CNF, W6IEU, W6MRO; and in rear are W6UPY, W6DLG, W6ZBV, W6IIV and W6PJF.

Free Advertising

The Rochester Amateur Radio Association (Box 1388, Rochester 3, N.Y.) uses a novel plan of "advertising" the value of the Ham to public. Their 8-page monthly club bulletin (on 8½x11 paper) is folded in half and one side appears the mailing address and on the other appears this message:

AMATEUR RADIO
Constantly Serves In
Disasters
Communications
Development

Undoubtedly this is read with interest by many others than just the postman.

Spec Barker, Sales Manager of the National Company demonstrates the new NC-98 to Sandy Cowan, publisher of CQ, at the "Ham Shack" of the World Radio Laboratories, Council Bluffs, Iowa.

Heathkit
GRID DIP METER KIT

MODEL GD-1B
$19.50 Ship. Wt. 4 lbs.

The invaluable instrument for all Hams. Numerous applications such as pretuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, design procedures, etc. Receiver applications include measuring C, L and Q of components—determining RF circuit resonant frequencies.

Covers 80, 40, 20, 11, 10, 6, 2, and 1¼ meter Ham bands Complete frequency coverage from 2—250 Mc, using ready-wound plug-in coils provided with the kit. Accessory coil kit, Part 341-A at $3.00 extends low frequency range to 350 Kc. Dial correlation curves furnished.

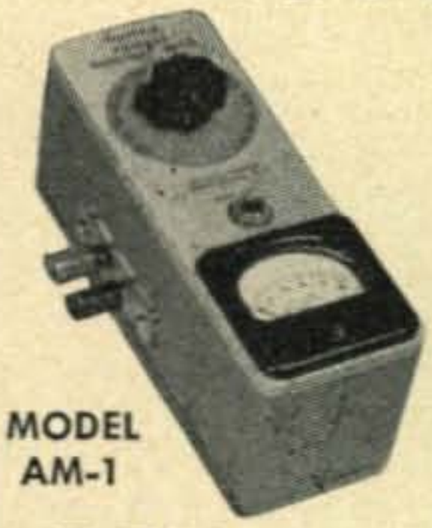
Compact construction, one hand operation, AC transformer operated, variable sensitivity control, thumb wheel drive, and direct reading calibrations. Precalibrated dial with additional blank dials for individual calibration. You'll like the ready convenience and smart appearance of this kit with its baked enamel panel and crackle finish cabinet.

Heathkit
ANTENNA COUPLER KIT

MODEL AC-1
$14.50 Ship. Wt. 4 lbs.

The new Heathkit Antenna Coupler Model AC-1 was specifically designed to operate with the Heathkit Amateur Transmitter and will operate with any transmitter not exceeding 75 watts RF input power Rugged design has resulted in a sturdy, well shielded unit featuring a copper plated chassis and shield compartment. Coaxial 52 ohm receptacle on the rear of the chassis connects to a three section Pi- type low pass filter with a cut-off frequency of 36 Mc Tuning network consists of a variable capacitance and tapped inductance in an impedance matching unit. Capacity coupled neon lamp serves as a tuning indicator and will also provide a rough indication of power output.

Heathkit **IMPEDANCE METER KIT**



MODEL AM-1
$14.50 Ship. Wt. 2 lbs.

The Heathkit Antenna Impedance Meter is basically a resistance type standing wave ratio bridge, with one arm a variable resistance. In this manner it is possible to measure radiation resistance and resonant frequency and antenna transmission line impedance; approximate SWR and optimum receiver input. Use it also as a monitor or as a field strength meter where high sensitivity is not required Frequency range of the AM-1 is 0–150 Mc and range of impedance measurements 0–600 ohms The circuit uses a 100 microampere Simpson meter as a sensitive null indicator. Shielded aluminum light weight cabinet. Strong self supporting antenna terminals.

HEATH COMPANY
BENTON HARBOR 6, MICHIGAN

Zero Bias . . .

Certainly not through desire, or intent, by the ARRL, this editorial desk is often graced by that informative tidbit, the "Directors' Letter." For benefit of the uninitiated, these are the communiques issued by the ARRL General Manager to "inform" the League Directors of current happenings in the field of Ham radio. They are supposed to provide the necessary official liaison to coordinate an organization the size of the ARRL. In addition, they prove an effective means of influencing the thinking of the Directors by cloaking all information as sub rosa to be kept from the eyes of the rank and file membership.

In the past we have often noted serious discrepancies between events pictured or portrayed in these "Letters" as opposed to the true facts of the matter. The Minutes of the 1954 Special Meeting of the Board of Directors (*QST*, July 1954, page 45) clearly indicates that at least 12 of the 16 Directors accept these "Letters" as gospel truth.

It is time the ARRL Directors awaken and become fully aware that they "run" a million dollar corporation. To put it down simply, they have responsibilities to their diivsion membership and to Ham radio in general. *CQ* used this as a theme two years ago when we said that the Directors must not only be "good Joe's" but must be willing to search a question through and not accept dictates from West Hartford.

Within the past few weeks a "Directors' Letter" (No. 988) was issued which dealt with the Acapulco Convention sponsored by the *Liga Mexicana de Radio Experimentadores*. This was not the first "Directors' Letter" on this subject since several pages of letter No. 978 had been used to explain in a preposterous story why the LMRE had not advertised their convention in *QST*, but instead had only advertised in *CQ*.

Letter No. 988 contains some exceptionally clever wording which is apparently designed to save face for the General Manager and Advertising Manager of the ARRL and QST, respectively. The two paragraphs from Letter No. 988 on the LMRE subject are reprinted below. On the right hand side of the page we print the facts based on signed records, photostats and personal accounts. The facts differ from the version sent out by the General Manager of the ARRL in six distinct instances.

Regardless of whether or not the General Manager says it was "reported," or, "I am told," the dues of the ARRL members are being wasted to distribute these "Letters," which are obviously an attempt (unfortunately mostly successful) to influence the individual Directors into believing they need not think for themselves. When it comes to the statement regarding Dr. Polak we can only recall a recent television appearance of a certain senator and his story about a young lawyer in Boston.

West Hartford 7, Connecticut

June 24, 1954

Directors' Letter No. 988

ALL DIRECTORS:

. . . . . .

In view of the discussion at your informal meeting Thursday night at Denver, you will be interested to learn that the LMRE convention in Acapulco was held on schedule *with an attendance of some 350 (less than 100 of whom are reported to have been licensed amateurs)*. There were about *16 U.S. Hams present*, including Director Marriner and, for part of the time, Director Griggs. Except for XE1JK, a Colombian resident in Mexico City on consulate status, *no other foreign "delegates" were present*, I am told. LMRE officers are reported to have said *they had nothing to do with any efforts to represent this as anything other than the usual LMRE convention, and that any talk about its having internationat*

(first italicized line): The total attendance at Acapulco was exactly 400. The total number of *active* Hams was 116, the total number of *inactive* Hams was 128, or a total of 244.

(second italicized line): 66 Americans registered and 26 were licensed.

(third italicized line): Delegates attended from Guayaquil, Ecuador to establish the Pan-American IARU branch and proxies were on hand from Costa Rica, Cuba, Argentina, Chile, Peru, Brazil, etc., etc.

(fourth italicized line): The Board of Directors of the LMRE supported the inter-American aims from the very first announcement of the convention. Special efforts were made by the officers to induce as large an American attendance as possible.

or inter-American aims or significance was originated on this side of the border and publicized without their knowledge.

Reports are that everyone had an exceedingly enjoyable time, with many expressions of good feeling on both sides. Our good friend, Dr. Medina was unanimously re-elected as president; *Dr. Polak was defeated (about 20-1) for re-election*, the new vice-president being Gen. Najera, XE1H, with whom Director Marriner, on his way back to the States, paid a visit in Mexico City at the General's invitation. We had sent a goodwill message to the convention, which was read, and President Dosland is writing congratulating the new officers on their elections.

Sincerely yours,
s/ A. L. Budlong
General Manager

Some readers, upon reaching this point in this editorial, are going to be looking for "constructive" thoughts—so here they are.

From the above it would appear that the ARRL Directors are not supposed to know all the details regarding the LMRE Acapulco convention. According to this "Director's Letter" the LMRE came under discussion on Thursday, May 13 during an informal "meeting." But the Minutes of the Board Meeting also report that the LMRE convention was discussed on Friday, May 14 (item 36). Observant *CQ* readers will recall that considerable advertising on this convention appeared in our March, April and May issues. Why did the LMRE solely advertise in *CQ?* Why did it become necessary for the ARRL General Manager to disseminate two "Director's Letters" to discuss a convention that he did not (as editor) even mention in *QST?* Why didn't this "Letter" clarify the report that Director Marriner refused to pay the registration fee at Acapulco and that it was picked up and paid for by the LMRE president ("good friend" Medina), because Marriner claimed a "free" ticket had been given the LMRE representative at the Houston ARRL convention in 1953. By the way—XE1GE (representing the LMRE) paid straight across the board at Houston.

If this is the calibre of information that 38 La Salle Road sends out to your League Directors, one can only conclude that the individual Directors are being held in pretty low regard otherwise how can facts be so blatantly distorted. Either it is assumed that La Salle Road can get away with it, or that the Directors just don't care—which is it in your division?

Thank You! Thank You!

To the many many readers who recently sat down and wrote extensive letters on just what they did and did not want to see in *CQ*.

We hope to answer or acknowledge all of these letters, but it will take quite a bit of time. Just in case we don't get around to your letter *(fifth italicized line)*: Dr. Jose Polak, XE1VA, who supervised the steps taken in the United States to publicize this convention and who after being insulted by certain advertising representatives refused to advertise in *QST*, did not even run for re-election as Vice President. His few votes were written in as a means of appreciation for his efforts.

---

until the very last, please be assured that one and all were greatly appreciated.

Next month we will have some figures (percentage-wise) on what Hams prefer in the way of reading material. Believe me, they are both interesting and surprising.

"Single Sideband Techniques"

The publisher of *CQ* is pleased to announce the early release of the first volume in the new *CQ Technical Series* entitled, "Single Sideband Techniques." The author is Jack N. Brown, W3SHY, ex-W4OLL of the *CQ* Contributing Editor Staff.

Built along the lines of our successful "Radio Amateurs' MOBILE HANDBOOK," the new book on SSB will be the only text covering the complete field. It greatly enlarges with new material upon the progressive theme established by W3SHY, ex-W4OLL in his "Getting Started in Single Sideband." It carries it to a logical conclusion—the design and step-by-step construction of several types of SBB exciters.

Order your advance sale copy now (see page 51) and have one mailed directly to you as soon as they come off the presses. The present release date is around the end of September.

75 Meter Privileges in Pacific

The FCC on June 2 released its order authorizing the use of the 75-80 meter band by stations in certain U.S. Possessions. These new provisions were in accordance with the Atlantic City Radio Regulations of 1947.

Effective July 2, 1954 amateurs on Midway Island (KM6), may operate in the entire band 3500 to 4000 kc. Amateurs on Palmyra and Jarvis (KP6), however, will lose the top 100 kc. of the band and will be restricted to 3500 to 3900 kc. Operators on Baker (KB6), Canton and Enderbury (KB6), Guam (KG6), Howland (KB6), American Samoa (KS6) and Wake (KW6) may operate 3500 to 3900 kc. For the latter stations this is a new band.

o.p.f.

take your pick from the Eimac BIG SIX...

EIMAC BIG SIX:
4-65A,
4-125A,
4-250A,
4-400A,
4X150A
and
4E27A

...for CW or phone, 160 meters to 2 meters

EIMAC Big Six radial-beam power tubes with their six incomparable features have proved the popular choice of amateur radio operators in all types of service. For phone or CW, 160 meters through 2 meters, an Eimac Big Six tube means 1) Low driving power and high power gain 2) Low grid-plate capacitance and low inductance leads 3) Simple circuit needs 4) Easy TVI suppression 5) Pyrovac plate and non-emitting grid wire and 6) Unmatched reliability and performance. To be sure of Eimac quality, ask your distributor for Eimac — the mark of excellence in electron-power tubes for twenty years.

For further information, contact our Amateurs' Service Bureau.

Eimac TUBES

EITEL-McCULLOUGH, INC. SAN BRUNO CALIFORNIA

on the subject of----------KEYING

A few novel ideas from our readers

VT Keyer for the VIKING

T. A. PREWITT, W9UKT

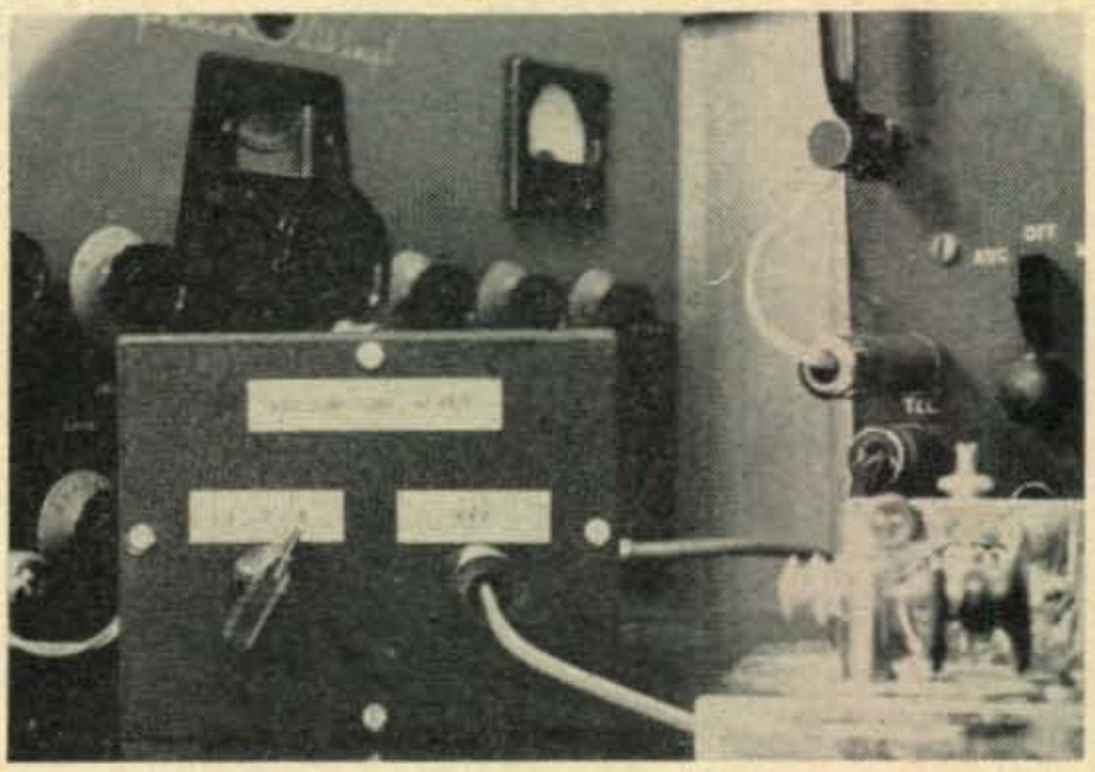
c/o Delco Radio Division, G.M.C., Kokomo, Ind.

Many CW operators prefer amplifier keying to other methods because of its characteristic clean note. When used in conjunction with a foot-operated switch which turns the oscillator on and off, it provides most of the advantages of break-in operation with none of the clicks.

When the popular *Johnson Viking* transmitter is used with a v.f.o., the first 6AU6, normally a crystal oscillator, operates instead as an amplifier. Since the 6AU6 cathode lead is brought out at the front panel key jack, it is a simple matter to build a vacuum-tube keyer which can be attached to the transmitter by merely plugging it in. This system has the advantage that no modifications need be made which might reduce the future trade-in value of the transmitter. The keyer, shown in the photograph, requires but one tube and very few parts, yet completely eliminates all traces of key click interference to TV, radio, or nearby Hams.

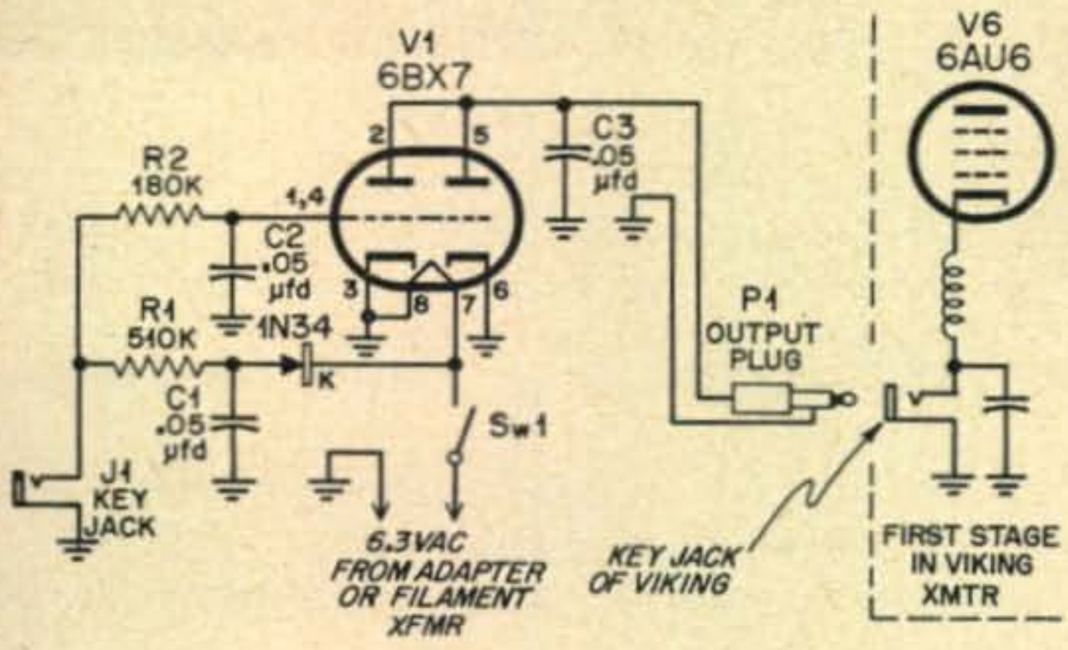
The Design

The circuitry of the keyer is quite straightforward. As shown in *Fig. 1,* plugging *PL1* into the front panel key jack of the *Viking* places *V1* in series with the cathode return of *V6,* the first amplifier in the *Viking.* The few volts of negative bias required for the 6BX7 are obtained from a germanium-diode bias rectifier which works off the 6.3-volt heater supply. With the key up, this bias charges *C2,* cutting the 6BX7 off, preventing it from passing



VIKING users will find that they can construct this VT keyer in only one or two hours.

the cathode current of the controlled stage. When the key is closed, the junction of *R1* and *R2* goes to ground potential immediately, but *C2* discharges gradually through *R2,* rounding off the leading edge of the character. When the key is opened, *C2* recharges through *R1* and *R2,* shaping the trailing edge of the character. The circuit constants shown on the schematic permit keying speeds of up to 35 wpm without clicks or excessive softness. The original model of the keyer, shown in the photographs, was provided with a three-position switch to permit selection of different values for *C2* as an aid in optimizing keying characteristics and to permit demonstrating the keyer on the air. Those



R1—510,000 ohms, ½w.
R2—180,000 ohms, ½w.
C1—0.05 µfd., 200v.
C2—0.05 µfd., 200v. (see text)
C3—0.05 µfd., 200v.
Sw1—SPST switch
PL1—Phone plug
J1—Single-circuit phone jack
V1—6BX7 or 6BL7
Case—3x4x5 inch utility box, with attached chassis

Fig. 1. Wiring schematic of the vacuum tube keyer. No power supply is required—only a small amount of bias that may be easily obtained from a germanium rectifier and filament supply.

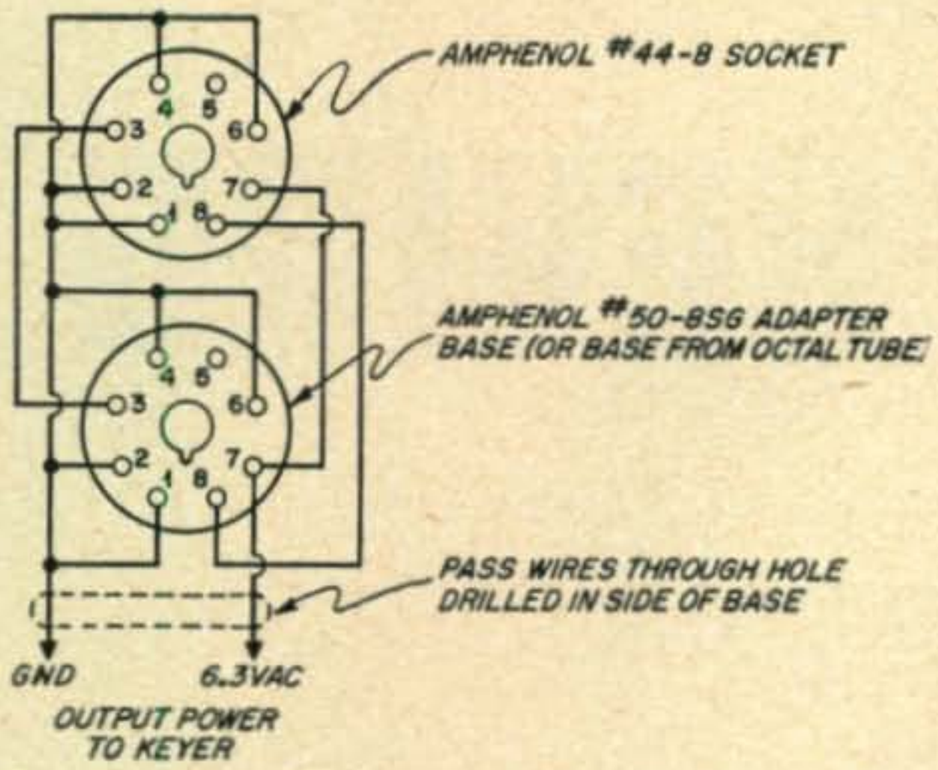


Fig. 2. This adapter provides heater voltage to the keyer from the internal supply in the VIKING.

who prefer a note without clicks yet with no trace of softness may use a value of 0.01 μfd. for *C2;* at the other extreme, a value of 0.1 μfd. should be used if a very soft note is desired for slow keying. All capacitors may be 200-volt ratings, since no voltage in excess of a few volts appears anywhere in the keyer.

The 6.3 v. @ 1.5 amp. required to power the keyer may be obtained from a small filament transformer, or taken from the accessory socket on the rear of the *Viking* through the use of an adapter as shown in *Fig. 2.* If the adapter is used, the keyer will always be turned off with the transmitter. Switch *S1* is provided to remove the needless power drain of the keyer when the transmitter is used for phone operation.

Connecting Things Up

Fig. 3 illustrates the manner in which the keyer, v.f.o., and transmitter are inter-connected. The switch shown plugged into the key jack on the rear of the v.f.o. is necessary; without it, the circuit transfer jack on the rear of the v.f.o. will transfer control of the v.f.o. to the key jack on the front panel of the transmitter, and amplifier keying will not then be possible. A foot switch is suggested for this use. With it, the v.f.o. may be turned on for zero-beating with a received signal, leaving both the operator's hands free for tuning adjustments. Here at W9UKT, the foot switch is also used to control an antenna transfer relay. When it is desired to use crystal control instead of the v.f.o. for working near band edges, it is necessary to disconnect the keyer by removing plug *PL1* from the front-panel key jack of the *Viking,* replacing it with the key. When the *Viking* is crystal-controlled, its first stage, *V6,* operates as an oscillator, which cannot be keyed properly by a keyer of this type.

When tuning up the transmitter with the keyer connected, it will be noted that the current reading obtained in the "OSC" position of the meter switch is considerably lower than that obtained when the key is plugged directly into the key jack of the *Viking.* This effect is caused by the added resistance introduced by the keyer. Adequate grid drive and power output will still be obtainable on all bands, however.

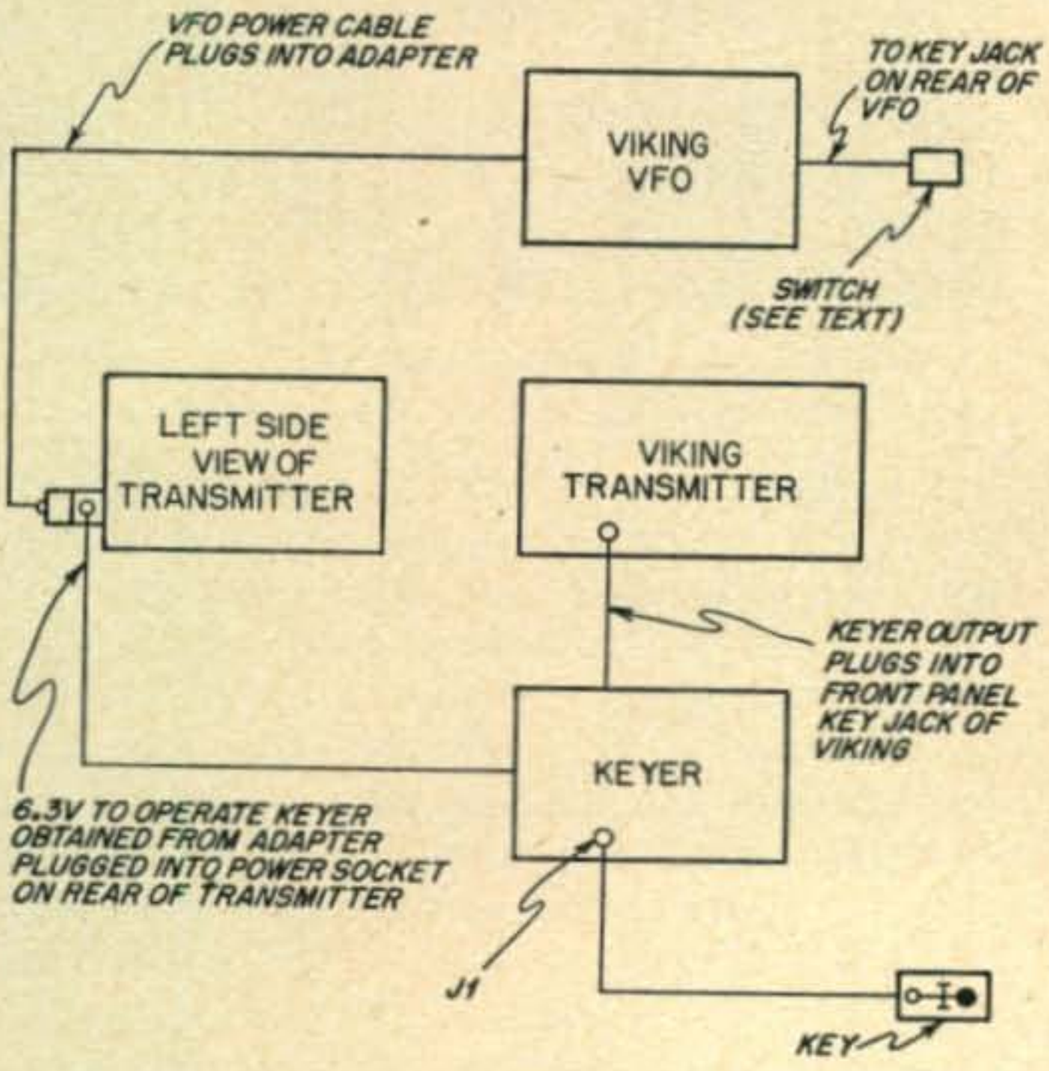


Fig. 3. Interconnection diagram to insure proper operation. The keying is accomplished in the VIKING with the v.f.o. being turned on and off through a foot switch. If desired the adapter may be replaced with a 6.3-volt filament transformer.

Break-in With the 274N

FRANK A. MOHLER, W2IAZ

187 Broad St., Eatontown, N. J.

After converting an *ARC-5* "Command" transmitter by following standard procedures,* I first keyed it in the common B+ lead to the oscillator plate and amplifier screens. This arrangement produced a noticable keying chirp. Next, I tried straight cathode keying of the 1625 tubes. This system worked well, but the constantly-running oscillator prevented working "break-in."

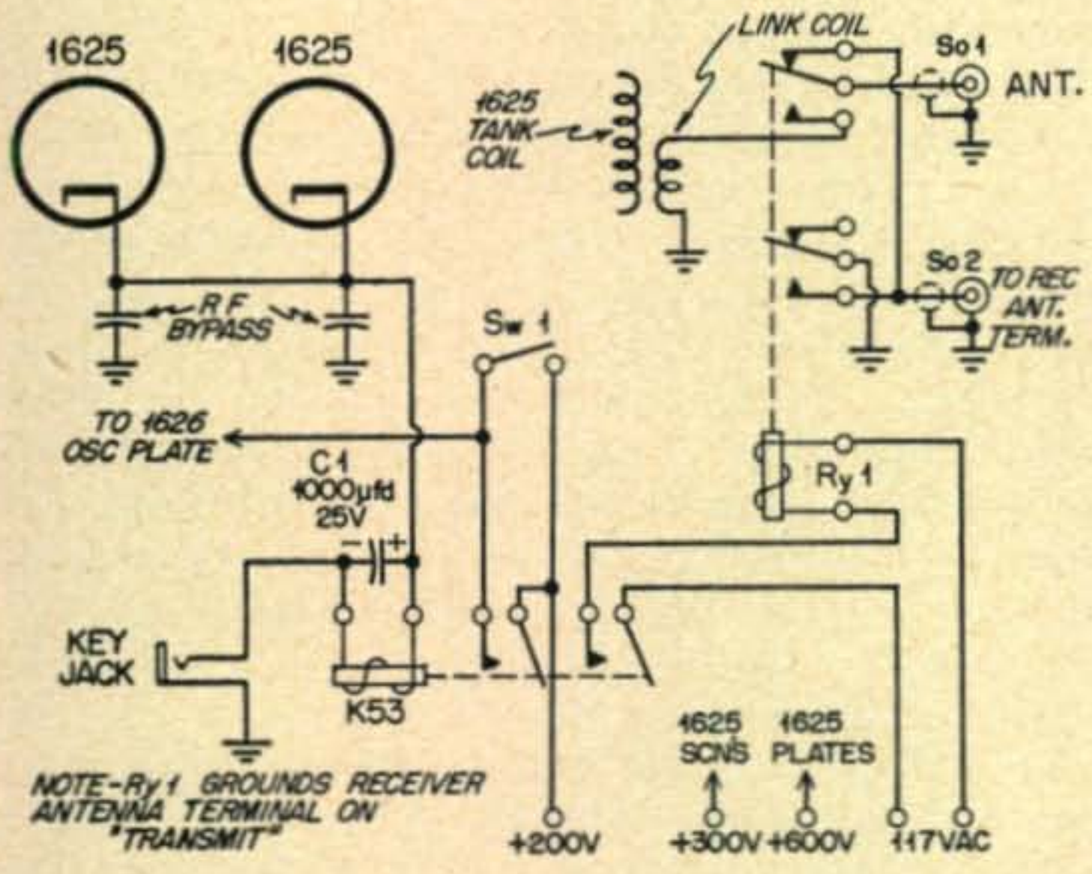
My next step was to combine the advantages of the two keying methods. This was done by the method sketched in *Fig. 1.* I connected the coil of the original transmitter selector relay, *K53,* between the cathode terminals of the 1625's and the key jack. I fed the oscillator plate current through the same set of relay contacts originally used for this purpose. The other pair of contacts control a 117-volt, a-c, antenna changeover relay, which is mounted near the amplifier plate coil. In addition, I

* See "Command-Set Round Up," H. S. Brier, W9EGQ. CQ, February, 1954

connected a 1000 μfd., 25-volt, electrolytic condenser across the relay winding.

Operation

Upon pressing the key, the 1625 cathode current flowing causes *K53* to close. This, in turn, actuates the antenna changeover relay, which switches the antenna from the receiver to the transmitter, and applies plate voltage to the oscillator. The condenser across the relay coil quickly charges up, and its charge holds the relay closed during normal keying pauses, so that the keying is essentially cathode keying



C1—1000 μfd., 25v. electrolytic (**Sprague** TVL 1230 or equiv.)
K53—Original "selector" relay rewired as shown.
Ry1—DPDT antenna changeover relay, 117v. a-c winding (**Advance** K1504 or equiv.) installed in position previously occupied by old d-c antenna relay.
So1, 2—Coaxial chassis fittings mounted on panel near **Ry1**.
Sw1—SPST toggle switch mounted on side of transmitter near **K53**.
Other components normal for a "Command" transmitter converted for amateur use.

Fig. 1.—Simple circuit changes required to achieve chirpless, break-in keying with "Command" transmitters. Full details in text.

of the 1625's. However, a 2 to 4 second pause allows the condenser to discharge through the relay coil. The relay then opens, the oscillator ceases to function, and the antenna is automatically switched back to the receiver.

The "non-swish" *Spot-Tune* switch, *Sw1* across the oscillator plate-voltage contacts of the relay permits checking the transmitter frequency and zero-beating a signal without putting a signal on the air. Also closing the switch allows operating the transmitter without the "break-in" feature.

A minimum cathode current of 100 milliamperes is required to operate *K53*. On the other hand, the cathode current should not exceed about 150 milliamperes; otherwise the voltage drop across the relay winding will exceed the 25-volt rating of *C1*. Note that the voltage drop acts as cathode bias on the 1625's; therefore it prevents the plate current from soaring when the key is pressed and the oscillator is not functioning.

This keying system has been in operation for several months with entirely satisfactory results. At keying speeds of five words per minute and over, *K53* stays closed during normal spacing between letters and words, but a slightly longer pause automatically shuts off the oscillator and connects the antenna to the receiver, so that I can listen for "breaks."

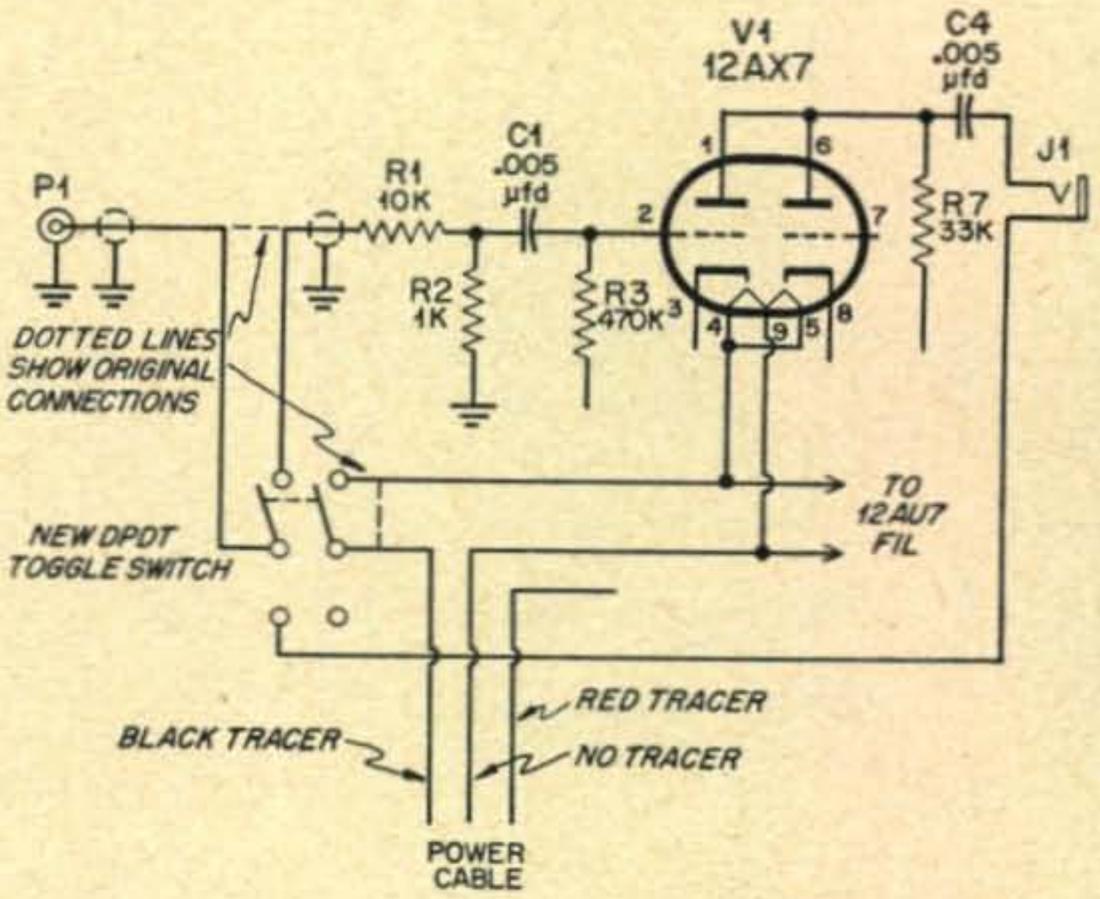
Switching the SIGNAL SENTRY

W. A. M. WOOD, VE3CMW
London Terrace, Alvin Heights, Ottawa, Canada

The versatility of the *E. F. Johnson* "Signal Sentry," phone/CW monitor can easily be increased by adding a DPDT switch as shown in the partial diagram. In one switch position, the *Sentry* operates normally. In the other position, it is by-passed, and the output of the receiver is fed directly to the phones.

The advantage of this modification is that, to just listen, it is not necessary either to apply power to the *Sentry* or to disconnect it and plug the phones directly into the receiver. In addition, when the "Sentry" is by-passed, its filament circuit is opened; therefore, it draws no power, even if the power is obtained from the receiver power supply.

The new switch is mounted on the front panel, between the "volume" control and the "tone" control. To provide sufficient mounting room, the switch must be the type with a



The addition of this switching arrangement will increase the versatility of the SIGNAL SENTRY.

long shank, so that the body fits behind the controls.

To wire the switch, disconnect the center conductor of the input cable from the 10,000-ohm resistor, *R1*. Connect it to one of the

(Continued on page 46)

Comments

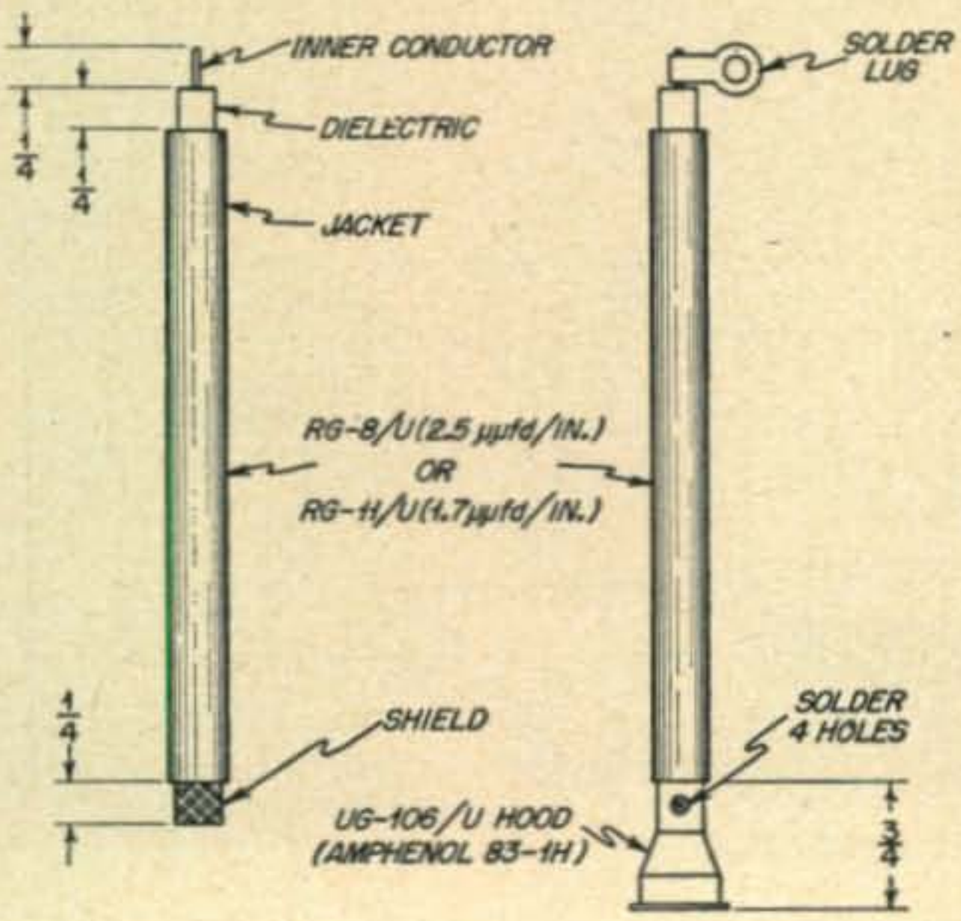
------from the----------

Shack and Workshop

Effective Co-ax Bypass Capacitor

A simple and inexpensive capacitor for bypassing harmonics and v-h-f parasitics, at the plate of an r-f amplifier, can be made in less than 15 minutes from a short length of coaxial cable, a solder lug and a coaxial-receptacle shield hood. The capacitor may be used in circuits employing potentials as high as 2000 volts.

As shown in the accompanying figure, either RG-8/U or RG-11/U cable may be used. The choice of cable is dependent upon the amount of bypass capacitance desired and by the length of cable required between the plate cap of the tube and the chassis ground. RG-8/U has a nominal capacitance of approximately 2.5 $\mu\mu$fd. per inch, while that of RG-11/U is approximately 1.7 $\mu\mu$fd. per inch. Since a total capacitance of 10 $\mu\mu$fd. is an acceptable value, the choice of cable can easily be resolved by the length required to mechanically fit between the plate and ground.



Cut the cable to the desired length, being careful to cut through cleanly and not to distort the cable cross-section. At one end, cut back the vinyl jacket about ¼-inch; do not nick or fan out the shield braid. At a point about ½-inch back from the other end, carefully cut through both the jacket and the shield, but not through the dielectric, and trim the strands of remaining braid neatly at the cut edge of the jacket. Then bare the inner conductor for a distance of about ¼-inch.

Using a pair of pliers, carefully pull the inner conductor so that an additional ¼-inch is exposed. This encloses the opposite end of the conductor in the dielectric, and prevents arcing between the conductor and the shield. Apply a soldering iron lightly to the lower end to seal, with the dielectric, the hole left by the inner conductor. Then insert the bared shield into the hood and solder it in place through the four holes in the collar of the hood. Be careful not to melt the dielectric by applying too much heat.

Cut a solder lug down so that it can be clamped around the bared inner conductor at the top and soldered in place, as shown in the figure. Trim the excess wire above the lug. The lug should be as short as is practicable, to minimize strain on the exposed conductor.

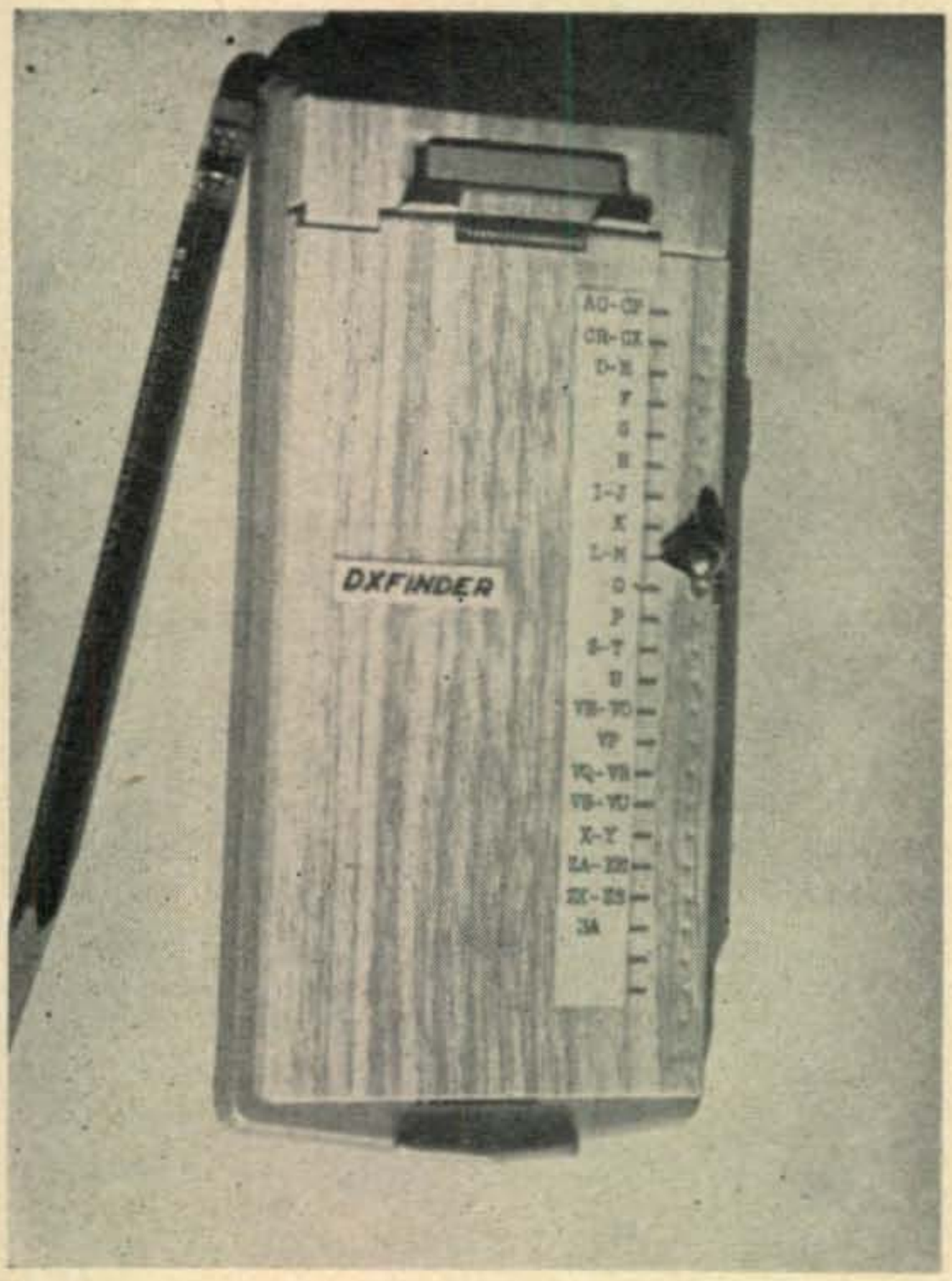
The hood now forms one terminal of the capacitor, and may be mounted directly on the ground plate or chassis. The solder lug is the "hot" terminal and should be connected as close as possible to the plate of the tube, using a screw and nut at the hole of the lug. A relatively rigid conductor (heavy bus or strap), should be used between the lug and the tank circuit to provide additional support for the coax capacitor. The connection between the lug and the plate cap can be made with a short piece of flexible strap or braid.

Two capacitors of this type have been installed in a push-pull, 500-watt, plate-modulated final with the usual advantages of such bypassing. For low-powered stages, RG-58/U or RG-59/U cable might be used in a similar arrangement (using a UG-177/U hood), provided that some means were incorporated to support the smaller, less rigid cable.

Robert S. Stein, W2LWK

DX Finder

During a mild recurrence of that well known and rather contagious disease peculiar to amateur radio, sometimes called DX-itus, this victim again became irritated by the lack of a facility for rapidly *finding* the name of the country, the zone number, etc. of an unfamiliar



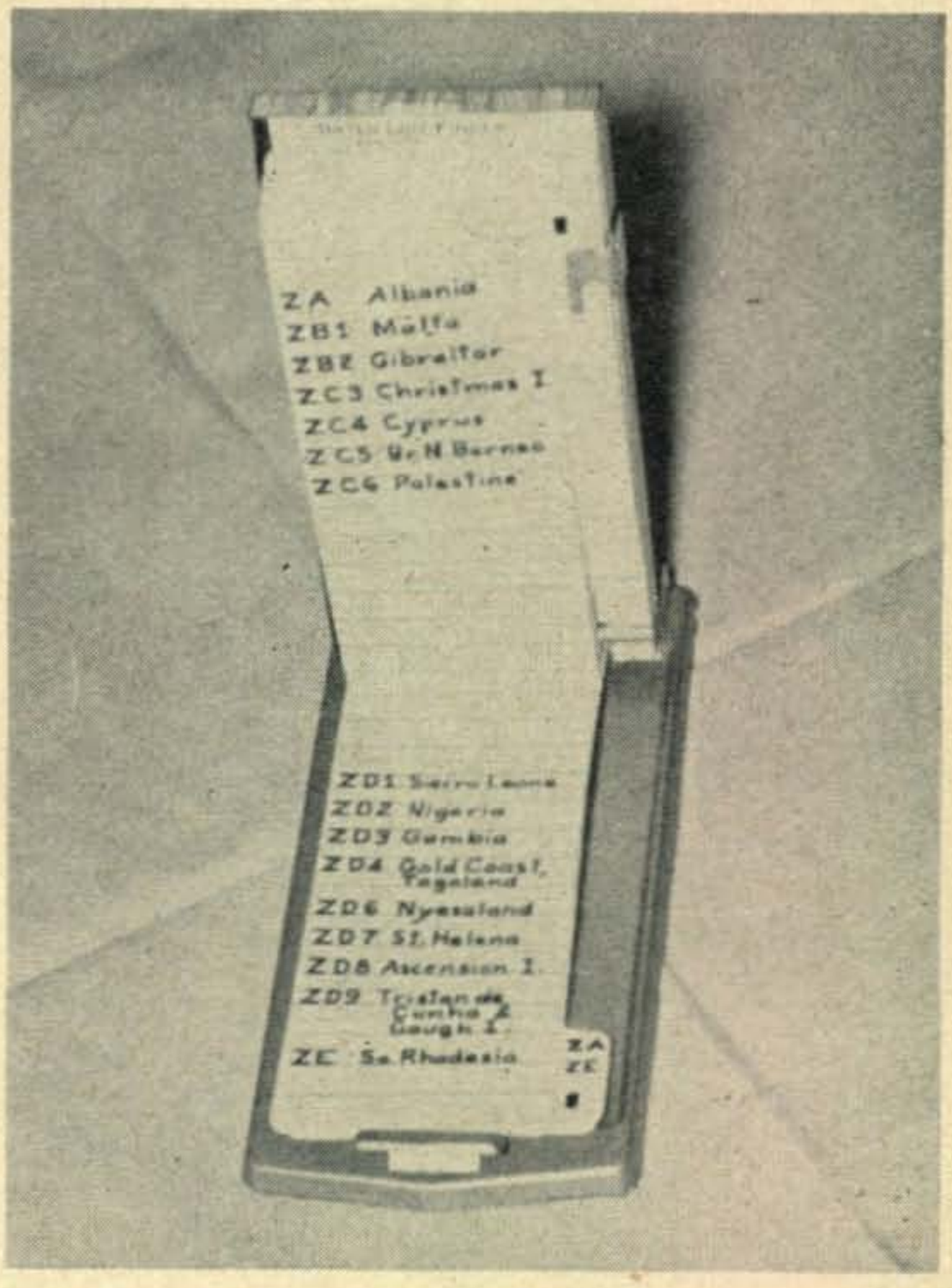
prefix. Searching through the Call Book for the country, while calling the DX was distracting to say the least.

Things rocked along this way for a while, when lo and behold, a certain DX man apparently in the same boat announced the manufacture of a device which promised to be the answer. One was ordered and when received it was immediately put to use. While it was well worth the buck expended for it, it was found to be too large to leave on the operating desk and it took some time and both hands to work it. Then, one day at the office, a gadget on the desk snapped open with the answer—a telephone *list finder!*

A quick trip to the stationers revealed that a variety of these *list finders* were available at prices ranging from $2.00 to $6.00. The lowest priced version had the most index settings and was found to have about 700 lines of space available for entries of the desired DX information. Needing about 275 entries, this allowed between two or three lines for each DX prefix.

The low priced model was purchased and a countries-prefix list was studied. The list was broken into some 21 groups, mainly for convenient separation as to prefix, but limited at the most to not more than 20 or 25 countries per group. Since the country prefixes now in use are not evenly distributed throughout the alphabet, a new index was prepared and fastened over the original index on the *list finder* cover. Next, the cards were removed from the cover and the groups of prefixes and countries entered on the proper cards. Upon re-assembling the cards in the *finder* it was immediately put to use and the rapidity with which the desired information could be determined was found to be well worth the time and effort expended in creating the DX-finder. Space was left between each entry for zone and other pertinent information (such as particularly rare calls of DX-peditions, etc.) but so far time hasn't permitted entering additional information.

The make-up of the *DX-finder* can be tailored to individual preference and need. Some of the more deluxe models of *list finders* may be deemed worth the higher cost, since they can be operated in one motion as contrasted to the two motions (setting the index pointer and tripping the catch) required for the model used



by the author. The usefulness of the *finder* need not be limited to this single purpose but could serve as a convenient contest log where duplication of contacts or countries is to be avoided. A set of used cards can be replaced with a new set at a nominal cost.

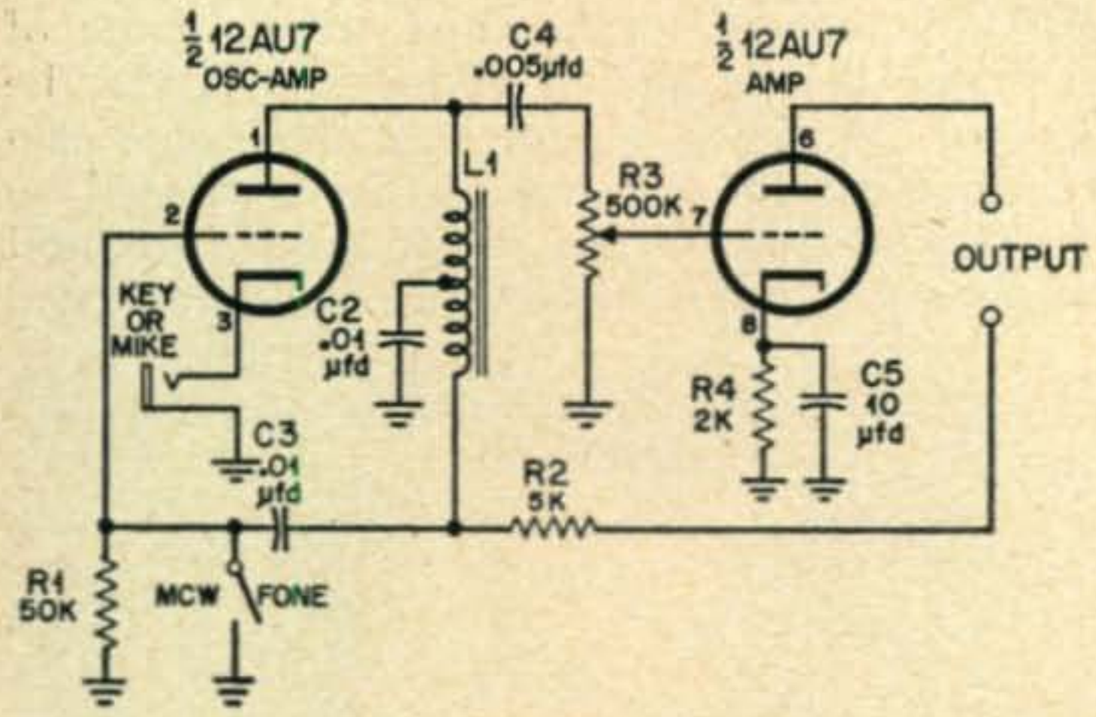
William S. Grenfell, W4GF

Combination Microphone Amplifier and Tone Generator

Here's a circuit in keeping with the present day trend to extract as many "stunts" out of a single tube as possible. Not in the least tricky, being merely a logical extension of two well-known hookups, a grounded-grid amplifier for

carbon microphones and a Hartley audio oscillator, it permits the selection of either function by means of a single SPST switch. On the lower frequencies, installed in either the home set or the car set, it provides a handy sine wave for modulation testing, while on the higher frequency bands it gives excellent MCW (modulated continuous wave A-2) by inserting a key in the microphone jack.

A tone of approximately 1000 cycles will be obtained with the constants shown, but this can



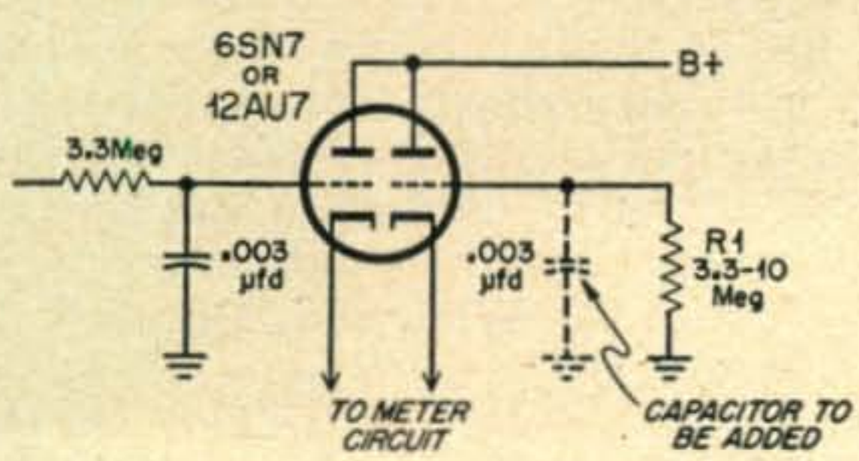
be easily altered to suit the builder's preference by changing the value of either *C1* or *C2*. The value of *L1* is not at all critical. The primary of any push-pull plates-to-voice coil (or grids) transformer will work satisfactorily.

Don't forget that while an audio tone for test purposes is legal on *any* amateur phone band, modulated CW of the type generated by this method is permitted only on the 11-meter band and amateur frequencies above 50 Mc.

Robert B. Kuehn, WØHKF

Your VTVM and R.F.

Many VTVM users soon find they cannot always trust readings taken on these instruments if the measurement is made in close proximity to an operating transmitter.* A study of *Fig. 1*, showing a typical bridge circuit used in the popular *Heathkit VTVM*, reveals the reason. Earlier models used a 6SN7 in this circuit, while



current models employ a 12AU7; but the circuit is essentially the same.

R.f. from the transmitter swings the unbypassed grid positive on the positive portions of the carrier cycles. Electrons attracted to the grid during these intervals can only reach the ground by flowing through *R1*, which may be 3.3 or 10.0 megohms, depending upon the particular model. This flow of electrons places a negative voltage on the grid and unbalances the bridge. This, in turn, can result in an increased, reduced, or actually reversed reading, depending upon the amount of r.f. reaching the grid and the polarity of the measured voltage being applied to the probe.

All that is needed to correct this condition is the addition of a good mica .003 µfd. capacitor from the unbypassed grid to ground. Leads, of course, should be as short as possible. After this capacitor was added by the author to both a V4 and a V6 Model *Heathkit* VTVM, accurate measurements could be made with the VTVM only six inches from an end-fed 75-meter transmitting antenna carrying the output of a 50-watt transmitter. The pointers did not even flicker when the transmitter was switched on and off.

This change still will not allow a-c readings to be taken near an operating transmitter because the a-c rectifier rectifies the r.f.; but such readings are seldom necessary.

John T. Frye, W9EGV

Battery Charger Safety Hint

One of the problems of mobile radio is the often rather rapid discharging of the car battery. This necessitates charging the battery at home in addition to the charging obtained by the car generator.

The usual practice is to either mount a battery charger on the wall of the garage and clip the output to the battery or temporarily place the charger in the car and connect it to a-c power by an extension cord. Either method means a specific job to be done morning and night when the charger is disconnected or connected. W4LL has installed the set-up shown in the schematic.

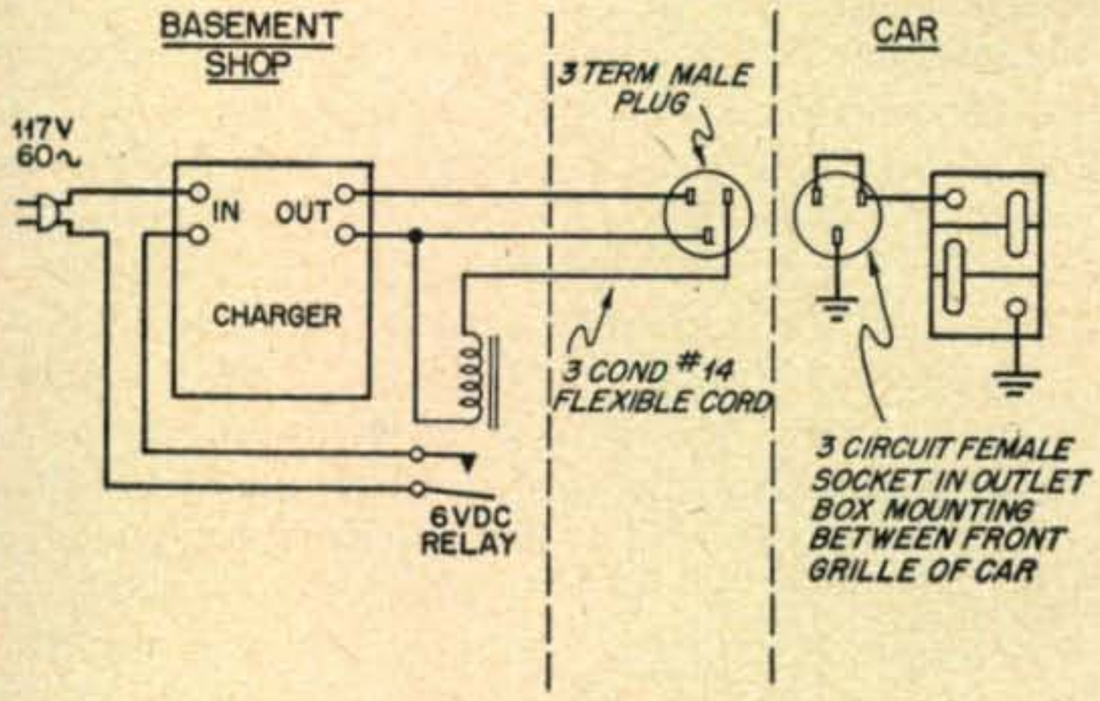
It will be noted that the flexible cord is completely dead when not plugged into the socket on the car and, therefore, is no safety hazzard. When plugged in, the car battery furnishes 6 volts to activate the relay at the charger and thus close the a-c input circuit to the charger.

The female socket used was a *Pass 8-Seymore* 3-conductor duplex convenience outlet with one outlet sealed with *Duco* cement. Any 3-circuit socket capable of carrying 10 amp. at 10 volts would be satisfactory when used with the corresponding male line plug. The *P8S* outlet is a standard however, which mounts in a solid wall outlet box and uses a stock item cover plate. The box was mounted between the front grille sections of an aluminum bracket. A gasket for the cover plate was made of an auto innertube cut to provide about 3 inches extra on one side of the box When the cord is not

* See also "Test Equipment in the Ham Shack," Burgess, CQ, Aug. 1954.

plugged in, the "flap" (extension of the gasket) is pulled down over the face of the socket and buttoned to a *6-32* screw protruding from the bottom face of the cover-plate, thus protecting the outlet from ice, snow, rain and wind.

Incidentally, the end of the cord and male plug can be retained in a loose-cover box on the wall of the garage or side of the house. When the cord is plugged-in, the box cover is

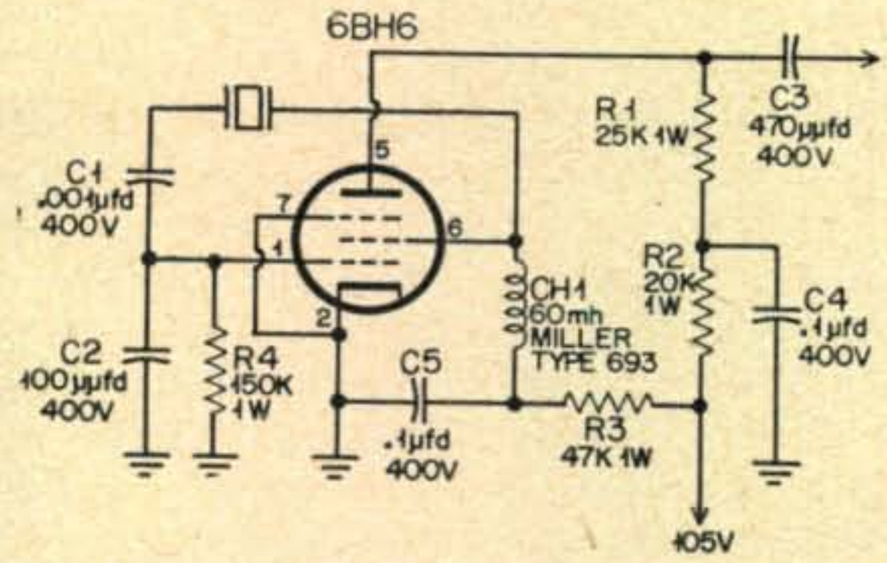


placed under the windshield wiper blade to flag the connection. However, at W4LL the car is parked in line with the cord so *if* the connection is forgotten the cord is readily pulled out when the car is backed.

Walter H. Campbell, W4LL

Low Frequency Oscillator

Many amateurs have been discouraged trying to find a low-frequency crystal oscillator circuit that will operate. It is frequently difficult to make a crystal oscillator circuit function using low frequency crystals, such as the *FT-241-A* surplus rock. Experimenters on SSB who have had difficulty making the triode section of the 6K8 in the Edmonds exciter oscillate will wel-



C1—0.001 µfd. Silver mica. 400 w.v.d.c.
C2—100 µµfd. silver mica 400v.
C3—470 µµfd. 400v.
C4—0.1 µfd. 400v.
C5—0.1 µfd. 400v.

R1—25,000 ohm 1w.
R2—20,000 ohm 1w.
R3—47,000 ohm 1w.
R4—150,000 ohm 1w.
Ch1—60 mh. choke. Miller type 693

come this circuit. A triode tends to load the crystal, and often it will not oscillate.

This circuit will take off without any difficulty using crystals in the 400-500 kc. range. If used in the Edmonds exciter it may be used to drive the triode section of the 6K8 by connecting *C3* directly on to the 6K8 grid.

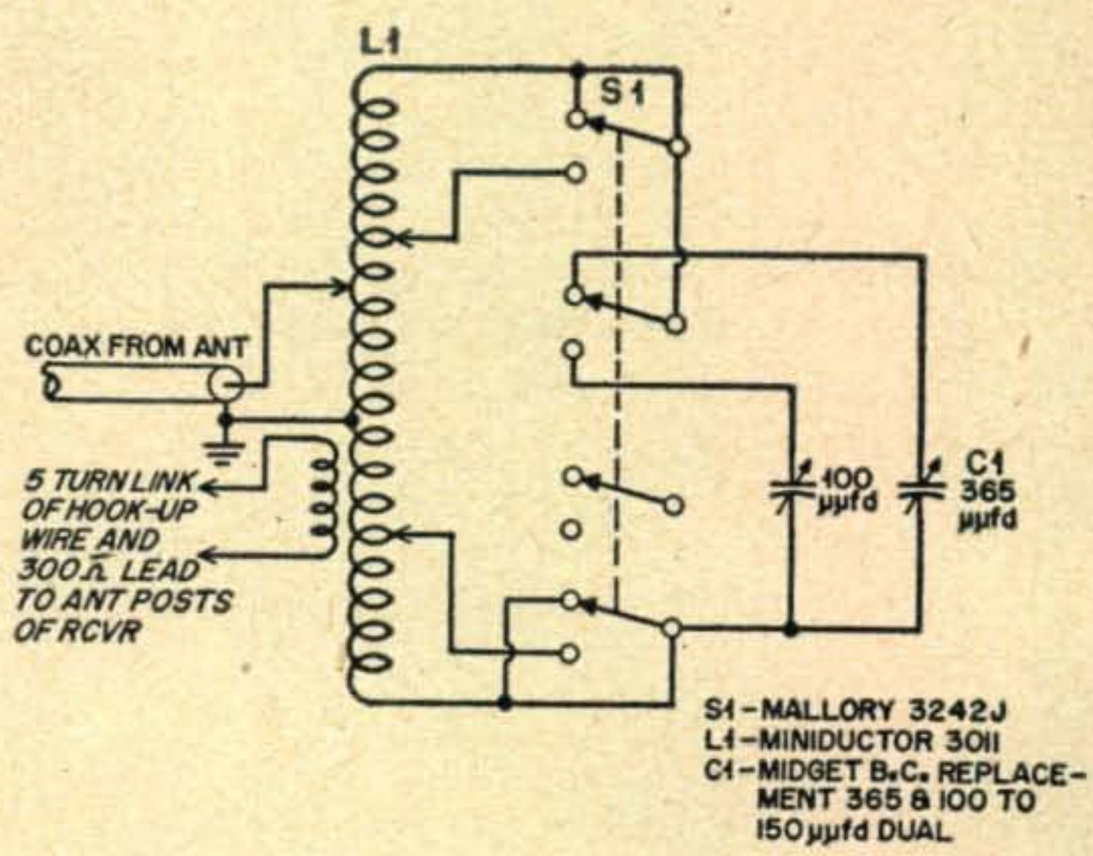
The function of the oscillator is a modified Pierce, using the screen as the plate. Do not substitute *L1* for a smaller value of inductance or the circuit will not function properly.

Edmund H. Marriner, W6BLZ

$1.69 Receiver Gain

Band-hopping a modern communications receiver would make it goofy if it could think. Luckily, perhaps, a receiver can't think, but simply folds up sometimes when shifting from one band to another. Sensitive on 40 meters, calloused as a dog's paw on 10, and mostly so-so on 75. The reason is obvious: the wide range of frequencies involved an antenna impedance range often extending from 75 to 3000 ohms or more.

Manufacturers can build a receiver that is the ultimate on any one frequency. When an



all-band affair is demanded, usually covering everything from the broadcasting band to six meters, a front end compromise has to be made. This compromise gives a receiver input impedance somewhere in the range of 200 to 500 ohms. Often an additional aid is incorporated through the use of an antenna trimmer condenser. It helps matters considerably, but at best it is part of the necessary compromise.

During the years with many receivers all of the suggested antenna coupling tuners for purported matching have been built and tried. All of them improved all band reception somewhat, sometimes as much as one S point and sometimes a shade more. Some arrangements work very well on 20 meters, if an S point or so means anything, and promptly were worse than nothing on 75. What was desired was a device which would hop things up by actually matching the antenna to the input of the receiver.

(Continued on page 44)

World Wide DX Contest Results

Combined phone and CW results of the 1953 contest with a tabulation of first-place winners in each country

The first *International DX Contest* (formerly the *World-Wide CQ DX Contest),* sponsored by the *International DX Club,* has been a huge success and a massive reporting job. Apparently, this contest combines all of the ingredients that DX men throughout the world find ideal for a competitive event. Thousands of logs were received from over one hundred countries. Considering that DX conditions throughout the world are generally at a low ebb, the results are nothing short of phenomenal.

The *International DX Contest* is an extension of the *DX Contest* originally started by


1953 The Contest Committee of 1953

The International DX Club

takes pleasure in awarding this Certificate of Merit to

in recognition of his outstanding achievement in winning the

World Wide DX Contest

for the _____ division in

his total score of _____ points was computed on the basis of _____ countries (prefixes) and stations worked. In witness whereof, the Officers have affixed the signatures of two of them hereto on this 1st day of July, 1953.

This is the certificate issued by the International DX Club to all contest winners

the *CQ DX Committee.* In 1952, because of the every increasing burden of work connected with sponsorship of this operating activity, *CQ* magazine felt they could no longer continue sponsorship of the event. In order to perpetuate a contest, which was then on its way to becoming one of the most popular amateur events in the world, a group of DX-minded amateurs formed an organization known as the *International DX Club.* Specifically, this group combined to sponsor the *1953 International DX Contest.* As a secondary objective, the worldwide promotion of amateur and DX operation has been subscribed to by membership of the IDXC.

Because of the short time available between the IDXC formation, and the necessity for announcing the 1953 competition, not all of the details could be attended to in the manner which would have been ideal. Despite these many obstacles, some of which seemed insurmountable, tens of thousands of log sheets were distributed throughout the world. In the ensuing months since the 1953 competition, an organization of some greater strength has developed. The dates for the 1954 contest have already been established and are listed in a box elsewhere in this article. Rules in their entirety will appear in September *CQ.* Awards for the 1953 contest have been made prior to this formal compilation of the contest results.

It is not possible in this single report to give full credit to all of the amateurs who did an outstanding job. It should be pointed out that this contest could not possibly have been the success it was without the wholehearted cooperation of amateur organizations throughout the world, particularly the *Potomac Valley Amateur Radio Club.*

Some of the typical comments picked up on DX logs indicate what a close bond of kinship binds the DX men in every land. Some of these typical comments are quoted: From *4X4BO,* "These contests are landmarks in the life of a Ham and when you come to think of it, why not have two each year?" From *SWLI120006T* in Trieste, "I am an SWL but have worked hard during the contest with my two-tube regenerative receiver and logged 9 zones, 32 countries." It is to perpetuate these bonds that the IDXC exists.

A word about the scoring on the contest. Because the rules and regulations for the contest were sent out in English only, many DX stations had difficulty in fully understanding them. An effort is being made to simplify the explanation of the scoring of the contest and to have the rule translated into every common tongue. However, the problem of figuring scores was such a monumental job that it could not be handled by two or three people. The *Potomac Valley Amateur Radio Club* volunteered to handle this project as a Club assignment. Not only was every single log checked, but hundreds of logs were refigured for the contestants. While it is not hoped that every single error has been rectified, no detail was overlooked to make the final logs as accurate as possible. Because of the confusion in scoring it was not possible to list the number of QSO's by each winner, since QSO points and not actual number of contacts contribute to tide final multiplier.

Looking at some of the foreign logs presents a perfectly fascinating picture to the American DX men. Keeping in mind that the great feature of the *International DX Contest* is the one that encourages DX station to work DX station, a run down of some of the logs is enough to make many a DX man forsake wife and home to operate overseas for one of these events.

In a *World Wide DX Contest,* it is to be expected that the highest scores will not be made by American stations. Many foreign countries are far more ideally suited geographically in relation to countries and zones, to turn in a better performance. Coupled to this is the natural desire of DX men everywhere to work the "rare ones" first. You can almost certainly count on the highest score being an unusual foreign prefix.

CW Scores

Measuring up to every requirement, world high CW score with a phenomenal **497,458** points, **4X4RE** probably becomes one of the very first Asian stations to ever dominate such an event. 692 QSO's and a multiplier of 247, 68Z and 179C is a record that will be hard to beat. **Eagon** turned in this performance in 40 hours, operating time being limited due to illness. All bands were used, 80 through 15 with the bulk of the work being done on 20 and 15. Letting the performance speak for itself, **4X4RE** did not submit a station description. Outstanding as is the score of **4X4RE**, only slightly less extraordinary is the second world-high score submitted by **4X4BX** with **450,058** points, achieved on all bands from 80 to 10 meters; 63Z and 238C. **4X4BX** used 125 watts with half-wave dipoles on 80, 40, 20 and a ground plane for 15 meters; 3 elements on 10.

In summarizing the results of this contest, it is our intention to review the outstanding scores on each continent. A third extraordinary score is that submitted by **ZC4IP** at **228,363** points. Whether by design or coin-

(Continued on page 24)

NOTE: Space limitations do not permit listing of all scores. You may have a full tabulation for your country or prefix area by addressing a request to W9VW, Harold Brooks, R.F.D. 2, La Porte, Indiana. Please enclose a stamped self-addressed envelope.

Tabulation of Contest First Place Winners by Country and Operation

SINGLE OPERATOR CW

United States		
W1RY	All Band	137,070
W1RWP	3.5	874
W1NHJ	7	798
W1DSF	14	20,544
W2WZ	All Band	240,660
K2EDL	7	42,039
W2SVF	14	7548
W3GRF	All Band	327,360
W3EIS	3.5	560
W3ADZ	7	4708
W3JTC	14	114,684
W4KFC	All Band	338,517
W4AIX	14	50,666
W4KRR	21	12,312
W5CKY	All Band	45,347
W5QKZ	7	1820
W5FXN	14	20,856
W6RW	All Band	184,527
K6CIT	7	17,464
W6BAX	14	120,663
W6BYB	21	11,016
W7PQE	All Band	68,864
W7JLU	7	3201
W7HYW	14	19,950
W8JIN	All Band	300,312
W8KIA	3.5	1856
W8WZ	7	32,121
W8NBK	14	85,842
W8BHW	21	41,895
W9NDA	All Band	164,160
W9MEM	3.5	1242
W9VIN	7	9130
W9FJB	14	36,742
WØDAE	All Band	88,672
WØIBZ	14	2904
WØJZX	21	3237
Alaska		
KL7EVR	All Band	5300
KL7RZ	7	144
Algeria		
FA8DA	All Band	152,490

SINGLE OPERATOR CW

Anglo-Egytian Sudan		
ST2AR	14	31,430
Argentina		
LU3EX	All Band	121,635
LU8FBH	14	22,533
Australia		
VK2GW	All Band	84,332
VK3AWW	14	12,596
VK4HR	21	11,319
Azores		
CT2BO	14	1224
Bahrein Island		
MP4BBD	All Band	14,716
Balearic Island		
EA6AF	All Band	57,344
Belgium		
ON4AU	All Band	35,224
ON4CK	14	14,560
Belgium Congo		
OQ5CP	All Band	105,600
OQ5VN	14	26,019
Bermuda		
VP9BF	All Band	299,250
Bolivia		
CP5EK	All Band	172,572
Brazil		
PY1ADA	All Band	148,878
PY6FI	14	8282
PY3QX	21	10,812
Canada		
VE1ZZ	All Band	64,260
VE2WA	All Band	41,640
VE3CCK	All Band	106,824
VE3IG	3.5	1428
VE3AAZ	7	3880
VE3HB	14	2145
VE4RO	All Band	133,927

MULTI OPERATOR CW

VE5AJ	14	1552
VE6MN	All Band	5280
VE6ZR	14	1281
VE7VC	All Band	63,690
VO6U	All Band	18,668
Chile		
CE3AG	All Band	329,572
Cook Islands		
ZK1BG	All Band	1702
Czechoslovakia		
OK1MB	All Band	306,078
Denmark		
OZ2PA	All Band	131,040
OZ5UF	3.5	6
OZ7PH	14	32,637
Eire		
EI9Y	All Band	25,137
England		
G4CP	All Band	104,483
G4XC	7	5922
G2LB	14	83,096
G2BW	21	5782
Finland		
OH3RA	All Band	46,168
OH3TM	3.5	345
OH5PB	7	1863
OH2ZE	14	31,266
French Eq. Africa		
FQ8AF	All Band	18,100
French West Africa		
FF8JC	All Band	9381
France		
F9RM	All Band	59,488
F9RS	7	468
Germany		
DL1AU	All Band	240,097
DL1FF	3.5	10,764
DL4EF	7	29,425
DL4YZ	14	53,483
DL3RM	21	13,266
Greece		
SVØWE	All Band	43,228

SINGLE OPERATOR CW

Greenland		
OX3GL	14	180
Guantanamo Bay		
KG4AN	All Band	23,838
Haiti		
HH3DM	All Band	414
HH2OT	7	408
Hawaii		
KH6IJ	All Band	285,420
KH6ER	7	82,556
KH6LG	14	31,569
Honduras		
HR1AT	All Band	36,938
Iceland		
TF3AB	All Band	47,888
Israel		
4X4RE	All Band	497,458
Italy		
I1ALU	All Band	97,515
I1CIH	14	19,530
I1KN	21	5143
Japan		
JA1CJ	All Band	31,768
JA1AA	14	18,054
Lebanon		
OD5LX	All Band	85,956
Kenya		
VQ4RF	All Band	107,933
VQ4ERR	14	2106
Macau		
CR9AH	14	11,286
Maderia Island		
CT3AB	All Band	18,768
Mariana Island		
W5QDF/KG6	All Band	94,754
Mexico		
XE1SA	All Band	9455
Monaco		
3A2BM	All Band	33,784
Mozambique		
CR7AF	All Band	9148
Netherlands		
PAØUN	All Band	182,093
PAØGIN	3.5	4964
PAØOI	7	1200
PAØKW	14	55,524
Northern Rhodesia		
VQ2GW	All Band	42,952
Netherlands West Indies		
PJ2AJ	All Band	9102
New Caledonia		
FK8AO	All Band	11,904
New Zealand		
ZL1BY	All Band	153,180
ZL2MM	7	12,690
ZL3OP	14	23,816
North Ireland		
GI3FJX	All Band	37,200
GI5HZ	21	8640
New Guinea		
VK9WZ	All Band	3502
Norway		
LA6U	All Band	54,889
LA4KD	14	4280
Poland		
SP3AN	All Band	251,728
Puerto Rico		
KP4CC	All Band	68,365

SINGLE OPERATOR CW

Pakistan		
AP2R	14	18,666
Peru		
OA4C	All Band	20,148
OA4J	14	1456
Portugal		
CT1DJ	All Band	80,827
Saar		
9S4AX	All Band	62,073
Southern Rhodesia		
ZE3JP	All Band	194,310
Roumania		
YO3RF	All Band	92,192
Ryukyu Is.		
KR6AA	All Band	15,660
Sardinia		
IS1AHK	All Band	5500
Saudi Arabia		
HZ1HZ	All Band	102,311
Scotland		
GM3EOJ	All Band	21,929
South Shetland Islands		
LU3ZS	All Band	68,973
LU5ZO	14	3588
Spanish Morocco		
EA9AP	All Band	116,850
Spain		
EA1AB	All Band	123,074
EA1CS	7	285
EA3GF	14	11,439
Sweden		
SM3AKM	All Band	127,908
SM4KL	7	3950
SM3HC	14	23,730
SM5CO	21	5682
Switzerland		
HB9KO	All Band	76,720
HB9NN	7	2574
HB9KU	14	11,050
South Africa, Union of		
ZS5U	All Band	39,714
ZS4AK	14	702
Trieste		
I1NU	All Band	34,272
Uruguay		
CX1FB	All Band	28,670
Venezuela		
YV5AB	All Band	154,656
YV5AK	14	2424
Virgin Islands		
KV4AA	All Band	117,720
Wales		
GW3JI	All Band	60,500
GW3ZV	14	49,929
Yugoslavia		
YU1AD	All Band	113,337

MULTI OPERATOR CW

United States		
W2MNN	All Band	1344
W5ZD	All Band	38,912
W6AM	All Band	212,128
W6MUR	14	1075
W7DL	All Band	123,032
W9AVJ	All Band	168,350
Argentina		
LU9EV	All Band	87,312

MULTI OPERATOR CW

Bulgaria		
LZ1KPZ	All Band	25,228
Canada		
VE8OG	All Band	32,696
England		
G2BOZ	7	20,128
Eritrea		
ET2US	All Band	239,121
Germany		
DL1IN	All Band	73,320
Iraq		
YI2AM	14	69,560
Libya		
5A1TZ	14	78,470
Marianas Is.		
KG6ADY	All Band	221,494
Marshall Is.		
KX6BF	All Band	217,700
Netherlands		
PAØNN	All Band	4250
Scotland		
GM8MJ	All Band	41,612

SINGLE OPERATOR FONE

United States		
W1ATE	All Band	155,742
W1LQQ	14	9576
W1NHJ	21	80
W2SKE	All Band	57,810
W2ICE	3.5	190
W2VWN	14	7950
W2JDE	21	21,630
W3VKD	All Band	4720
W5SFW	14	5808
W3CHH	21	225
W4OSU	All Band	18,249
W4OM	14	10,912
W4NQM	28	1250
K5FCG	All Band	335
W5WQI	14	306
W3MFW	21	3570
W5ZFS	28	12
W6YY	All Band	39,416
W6HNX	14	25,404
W6SWE	21	726
W7HAD	All Band	8280
W7JLU	7	150
W7JUO	14	777
W7ENA	21	4
W8NXF	All Band	27,000
W8JIN	7	1148
W8BHW	21	15,142
W9NDA	All Band	48,510
W9MEM	3.5	340
W9EZD	14	6148
WØGEK	All Band	2688
WØJZK	21	1377
Alaska		
KL7AON	All Band	10,707
KL7AWB	14	1224
Algeria		
FA9VN	All Band	1209
Argentina		
LU9MA	All Band	5040
LU2NC	14	11,288
Australia		
VK4EL	All Band	2024
VK5XN	14	9350
VK4EE	21	238
Bahama Islands		
VP7NS	All Band	6825
Belgian Congo		
OQ5DZ	All Band	95,172

SINGLE OPERATOR FONE

Belgium		
ON4PJ	All Band	31,746
ON4CH	14	880
Bermuda		
VP9BG	All Band	93,288
Bolivia		
CP5AB	All Band	37,511
Brazil		
PY2AHS	All Band	53,280
PY6BN	14	1452
Canada		
VE1ZZ	All Band	7524
VE2IZ	All Band	2400
VE2SU	14	7800
VE3HB	14	999
VE5HR	All Band	490
VE7AIH	All Band	12,096
VE8YT	All Band	5716
VO6N	All Band	2241
Canal Zone		
KZ5WZ	21	11,280
Canary Islands		
EA8AX	All Band	24,888
EA8BK	14	248
Colombia		
HK4FV	All Band	43,018
HK3HY	14	2772
Costa Rica		
TI2TG	21	5875
Cuba		
CO2OZ	All Band	57,658
Ceylon		
4S7LB	All Band	4998
Czechoslovakia		
OK1HI	All Band	17,927
Cyprus		
ZC4IP	All Band	10,045
Denmark		
OZ5KP	All Band	33,824
OZ7OP	14	1426
Ecuador		
HC1MB	All Band	57,057
England		
G3FXB	All Band	19,758
G3AFM	14	5289
G2WW	21	5459
Eire		
EI3Y	All Band	19,975
Finland		
OH5NQ	All Band	33,292
OH2ZE	14	6235
France		
F9RM	All Band	64,325
F3NG	14	1032
F3PW	21	1100
Germany		
DL1AU	All Band	48,575
DL1LH	3.5	540
DL1UX	7	204
DL4YZ	14	30,030
DL1VR	21	8944
Greece		
SVØWE	All Band	15,478
Guantanamo Bay		
KG4AN	All Band	38,184
Guatemala		
TG9RB	14	20,922
Haiti		
HH3DM	14	1824

SINGLE OPERATOR FONE

Hawaii		
KH6AWM	All Band	52,726
KH6IJ	21	1251
Honduras		
HR1AA	All Band	35,280
India		
VU2RC	All Band	4940
VU2EJ	14	9030
North Ireland		
GI5HZ	21	8400
Isle of Man		
GD3UB	14	13,018
Iraq		
YI3WH	21	18,290
Israel		
4X4DK	All Band	102,760
Italy		
I1AIJ	All Band	31,411
I1CSP	3.5	300
I1CWX	14	13,216
I1ALU	21	6110
Jamaica		
VP5SC	All Band	30,667
Japan		
JA3AQ	All Band	4940
KA2OL	14	19,142
Kenya		
VQ4RF	All Band	154,721
VQ4TOT	14	24,440
Lebanon		
OD5AD	14	45,917
Madeira Island		
CT3AN	All Band	4690
Marianas Islands		
W6ONP/KG6	14	28,556
Marshall Islands		
KX6BB	All Band	1217
Mexico		
XE1TR	All Band	2501
XE2WE	28	660
Morocco		
CN8MM	All Band	146,142
Netherlands		
PAØVB	All Band	31,080
PAØOI	7	200
PAØWWP	14	6987
PAØKE	21	192
Neth. West Indies		
PJ2AF	14	9480
New Guinea		
VK9YT	All Band	13,728
New Zealand		
ZL1BY	All Band	46,761
Nicaragua		
YN4CB	All Band	5080
Norway		
LA4DD	All Band	8607
LA5YE	14	5084
Palestine		
ZC6UNJ	14	902
Panama		
HP3FL	All Band	72,765
Paraguay		
ZP5CF	14	4100
Peru		
OA4CL	All Band	15,822
OA6C	14	836

SINGLE OPERATOR FONE

Portugal		
CT1FT	All Band	268,796
Puerto Rico		
KP4WA	All Band	17,020
KP4TA	21	13,468
Poland		
SP9KAD	All Band	8151
Saar		
9S4AX	All Band	5606
Southern Rhodesia		
ZE3JP	21	912
Roumania		
YO3RF	All Band	9639
Scotland		
GM3DHD	All Band	49,152
Spain		
EA2CQ	All Band	137,600
EA4CX	14	4524
Switzerland		
HB9MX	All Band	7834
HB9KU	14	23660
Sweden		
SM3LK	All Band	30,888
SM5FA	14	24,893
SM5CO	21	6076
Tanganyika		
VQ3ES	14	12,801
Turkey		
TA3MP	All Band	23,092
Union of South Africa		
ZS1MP	All Band	111,452
ZS6OM	14	13,554
ZS6DW	21	22,160
Uruguay		
CX3BH	All Band	12,775
CX3BT	28	2557
Venezuela		
YV5AB	All Band	25,596
YV5AK	14	24
Yugoslavia		
YU3RC	All Band	14,931

MULTI OPERATOR FONE

United States		
W2WZ	All Band	70,650
W6AM	All Band	78,472
W6GIZ	14	34,496
W7DL	All Band	86,223
W8NGO	All Band	18,312
W9AVJ	All Band	44,805
Germany		
DL4OV	All Band	64,158
England		
G3BTG	All Band	47,424
Eritrea		
ET2US	All Band	107,158
Iraq		
YI2AM	All Band	39,680
Italy		
I1CCO	All Band	2272
Japan		
KA7RC	All Band	54,834
Marianas		
KG6AEX	All Band	92,760
Marshall Is.		
KX6BF	All Band	50,484
Turkey		
TA3AA	All Band	282,918

cidence, this score, 41Z, 122C and 480 QSO's included only 3 American stations. The extraordinarily high number of foreign amateurs participating in this event are apparent when you review a log of this magnitude, which is made up of page after page of only DX prefixes. George used the modified BC459A series, running 100 watts on 21, 7 and 3.5 Mc. and 140 watts on 20. A 14-Mc. folded dipole and 138′ end-feed wire were used along with a modified HRO.

Conditions from Asia apparently did not favor the United States as evidenced by an examination of other Asian logs. For example, the log of **4S7LB** did not indicate a single W contact.

No international contest would be much of an event without **ZE3JP, FA8DA** and **EA9AP**, so it is little wonder that they finished up in that order for Africa. Conditions in Africa were not particularly good, as a review of the logs indicated. **ZE3JP** with 463 contacts on all bands had a multiplier of 53Z, 100C, for **194,310** points. Equipment was quite similar to that used in previous events, two separate band switched 813PA transmitters, VFO or crystal controlled an HRO and AR88 receivers, Q5-er and other miscellaneous accessories. A 558′ long wire to an 80′ gum tree and a ground plane constructed of brass tubing for 21 Mc., performed extremely well.

FA8DA with 152,490 points contacted 377 stations; 34Z and 104C multiplier, running a pair of 807's at 50 watts with a BC348Q modified and a long wire. **FA8DA** commented on extremely poor conditions with the exception of a fairly good opening on 7 Mc. **EA9AP**, who has put a rare country well into the front ranks of DX men, worked 324 stations; 34Z and 89C multiplier, for **116,850** points. Adolfo used an 807, SX43 and a folded dipole and Zepp. Only poor conditions prevented **EA9AP** from running up an even higher score for the entire world was out looking for this multiplier.

No matter how poor conditions are, South Americans are always able to work into the United States, so it's an unusual day when world conditions permit them to do considerably more than that. Taking advantage of favorable conditions into South America, contest perennal **CE3AG** turned in the leading South American score and one of the world high scores of **329,672** points, with a multiplier of 78Z, 125C and 570 QSO's. One of the few really high powered foreign DX stations, Luis used a 304TL running 600 to 1000 watts input; Collins 75A2, 3-element rotary for 10 and 20, long wire on 15, 40, and 80. While performance on 10 was relatively modest, the 13 countries worked there was far above the average.

Second highest score in South America made many a DX man happy, since it was a prefix too seldom heard on the air. **CP5EJ** turned in a score of **172,572** points. Conditions in Bolivia were not particularly good and Hans echoed the complaint of many of the participants that noise conditions were unusually high. Third highest South American score was that of **YV5AB.** His 490 contacts in 37Z and 71C added up **154,656** points. A 35T final running at 125 watts with an English "Commander" receiver and a folded dipole, plus a 3-element beam for 20 meters provided the extraordinarily potent signal of **YV5AB.**

High scores in North America represent probably the maximum effort because of the extremely competitive nature, of American DX men, and because of rules of the contest which remove any advantage the W's might have. Highest American score was **W4KFC** with 491 contacts, 88Z, 173C, Vic had **338,517** points. All bands were used from 80 through 10. By now, all contest men should be familiar with **W4KFC's** station, which uses a kilowatt into a pair of 4-250As; BC348 with a converter and Selectojet; 138′ end-feed Zepp; 2-element rotary on 20 and 15; and ground planes on 40 and 10. Vic worked 85 different countries during the single weekend of the event. Total elapsed operating time 44½ hours. . . . truly an outstanding performance.

Breathing closely on Vic's neck and a force to be reckoned with in every operating event was **W3GRF** with the identical number of QSO's, 491; but Zone multiplier of 77 and a country multiplier of 163 for a final score of **327,360** points. Len employed a 32V2, driving four different finals on 80, 40, 15 and 20; 75A2 receiver; 133′ long wire on 40 and 80, 3-element beams on 20 and 15. It was a refreshing experience to read the two logs of **W4KFC** and **W3GRF**, both who commented on good conditions, particularly to Europe.

Jim Ringland, **W8JIN**, had the third highest American score with 434 QSO's; 82Z; 176C, **300,312** points. He used push-pull 250THs in the final; HRO with a 23-kc. i-f strip; 900-cycle band pass; ground planes and doublets on 80; vertical beam on 40; wide space 3-element on 20 and 15. This score is particularly outstanding since **W8JIN** had to work a great many of his contacts through the east coast wall of QRM.

1954 WORLD-WIDE DX CONTEST SCHEDULE

Time Zone	Starting Time	Ending Time
Greenwich Mean Time (GMT) (London)	Saturday Oct. 23, 0200 Saturday Oct. 30, 0200	Monday, Oct. 25, 0200 Monday, Nov. 1, 0200
U.S.A. Eastern Standard Time	Friday, Oct. 22, 9:00 PM Friday, Oct. 23, 9:00 PM	Sunday, Oct. 31, 9:00 PM Sunday, Oct. 31, 9:00 PM
U.S.A. Pacific Standard Time	Friday, Oct. 22, 6:00 PM Friday, Oct. 29, 6:00 PM	Sunday, Oct. 24, 6:00 PM Sunday, Oct. 31, 6:00 PM

Out on the West Coast where the **International DX Contest** had its birth, leading the pack was **W6RW** with an extremely creditable performance of 341 contacts, 74Z, 129C for **184, 527** points. Roger used a kilowatt final; AR88 receiver; rotaries on 20 and 15; and on 40 and 80 phased half-waves. All of the Americans commented on comparatively good conditions, particularly with some splendid openings to Europe. There was an outstanding European opening on 21 Mc. from the West Coast and 14 Mc. was good from all parts of the United States to Europe, accounting for some of the particularly good scores. Top Canadian scores were those submitted by **VE4RO** and **VE3CCK. VE4RO** with **133,927** points operating from the middle of the continent is an outstanding score, but is nothing less than would be expected from such a long-time DX man. **VE3CCK** (ex-FP8AJ) followed with over 300 QSO's for **106,824** points. Ronald kept the eastern part of Canada well represented on all bands from 80 through 10.

The score of **VP9BF** is certainly worth mentioning as one of the outstanding world scores, totalling **299,250** points. Since the scores have been listed by continent, and only the top handful have been individually singled out, **VP9BF's** sterling performance might have been overshadowed by the big guns of North America. . . . which barely edged out 9BF. Thoroughly steeped in contest tradition, **VP9BF** can be counted on keeping Bermuda well represented in all future events.

Participation from the Oceania continent was not as great as many of the world contestants would like to have seen, but you can almost predict the winner from that part of the world. **KH6IJ** with **285,420** points was high for the continent with a combined multiplier of 142. With his broadside exposure to the United States, **KH6IJ** really has to work hard to build up his country multiplier. But thumbing through the log are many of the rare prefixes of the world, particularly in the Far East and Asia. And along with **KH6IJ**, nothing seems more proper than to have that ascending star in Hawaiian DX competition, KH6MG with 175,250 points. Third in line for Oceania was ZL1BY with 153,180 points based on a multiplier of 148. Using 100 watts and three 555′ V beams, NC240D receiver with various filters and preselectors, **ZL1BY** was one of the consistently strong signals from that part of the world.

In Europe competition was unusually keen and two of the three high scores represent less than common prefixes. Leading the entire continent was **OK1MB** with **306,078** points. Graphically demonstrating the advantage of central location, Beda had a country multiplier of

(Continued on page 48)

Test Equipment..... ... in the Ham Shack

HOWARD BURGESS, W5WGF

925 Adams St., S.E., Albuquerque, New Mexico

Part VII Of This Series

Vacuum Tube Voltmeters . . .

During the past twenty-five years the vacuum tube volt-meter has been going through a continuous process of development and improvement. This combined effort on the part of many workers has resulted in instruments of greater stability, better accuracy and less loading of the circuit being measured.

Like many pieces of equipment, the VTVM was created of necessity. As recent as the late 'thirties, the most sensitive meter movement found in the average amateur station was of the one milliamp variety. A voltmeter designed around such a movement gives very serious loading on high resistance circuits, and many resistance coupled amplifiers cannot supply the 1 ma. required for a full scale reading.

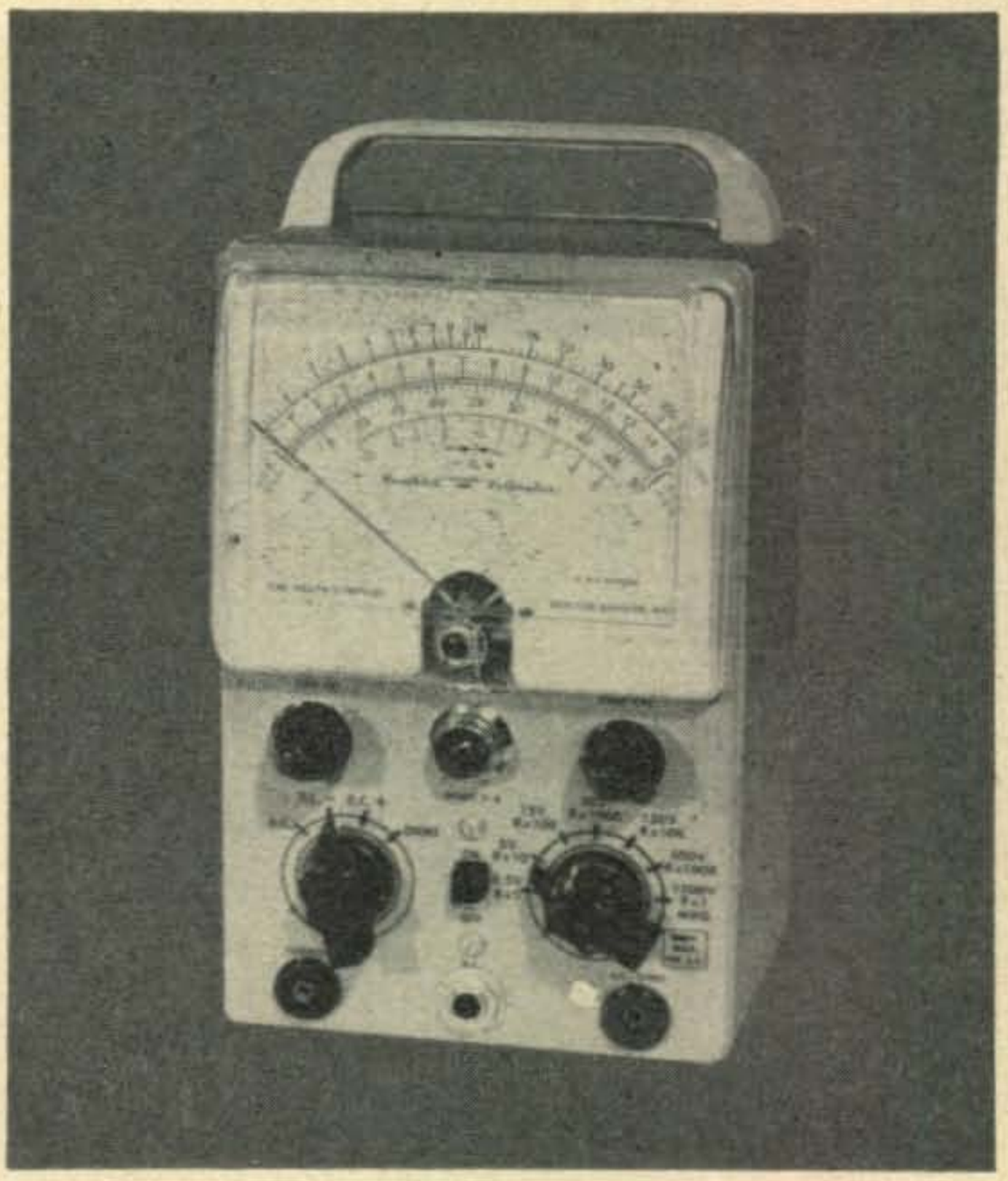
The ability of the vacuum tube to give a large plate current change with only a small voltage change on the grid and no current required from the measured voltage, made it the only practical answer to the problem. With this method a relatively insensitive meter could be used to read plate current change and the proper tube combination would boost the sensitivity to unbelievable figures. But the problem was not quite so simple as this and many circuits have been devised in attempts to overcome the various shortcomings. Through usage, many of the circuits have been discarded because of failure to meet one or more of the desired features.

Although many ingenious circuits are in use today for specialized uses, we will concern ourselves at this time with the problems and use of the ordinary general purpose meter.

Several of these problems are natural to the vacuum tube type of instrument. The following are not in the order of their importance, however, because in many cases their effects are overlapping. Any one of these can ruin an otherwise satisfactory instrument.

LOADING——The most important reason for using the average VTVM is to reduce loading on the circuit being measured. This loading is usually determined by the total resistance of the input voltage divider and unlike the ordinary voltmeter usually remains the same on all voltage ranges. The loading can be reduced by raising the values of the input multiplier resistors, but there is a limit to which this can be carried. Except for special purpose meters the d-c input resistance should be at least 10 megohms. This generally eliminates wire-wound precision resistors. The carbon and low priced deposited metal types become very unstable in the very high ranges. This limits present instruments to values between 10 and 100 megohms input resistance.

STABILITY——In this case we mean freedom from drift. This can mean either the slow drift of the zero position or a slow drifting of the calibration. When no voltage is applied to



An example of present day design and appearance is this Heathkit V-6 used the author.

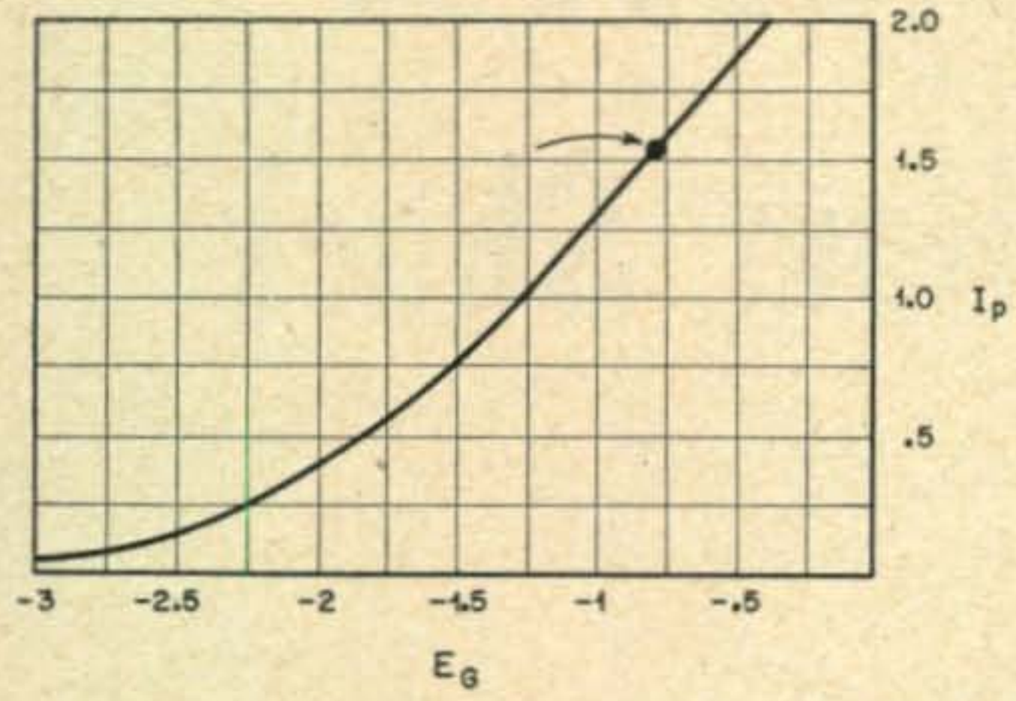


Fig. 1. Plate current curve characteristic of the average triode, showing amount of static plate current required to operate along the straight portion of the curve.

the VTVM it reads zero only because there is a condition of balance between a number of factors. The vacuum tube in this case is the most likely offender.

LINEARITY——In this case linearity means a dial scale that is not cramped at the lower end of the range. A scale which is compressed at the low end becomes difficult to read and the chance of error is increased. Because nearly all functions of a vacuum tube work on a curve, special consideration must be given in design to overcome non-linearity. Recent advances in meter movement design are help to overcome this trouble.

FREQUENCY RANGE——Early vacuum tube voltmeters were built using just one tube. When used to measure a.c. these were operated on a portion of the curve which gave a self-rectifying or detection action. Present models which are far superior are basically a d-c meter with a rectifier preceding it for a-c measurements. When high frequencies are to be measured the rectifier is mounted at the end of a probe for the sake of short leads at the test frequency.

ACCURACY——Precision is something which we usually do not expect in a vacuum tube voltmeter. Even the best VTVM cannot be expected to hold an accuracy much better than the average volt-ohm-meter. In this case we have no choice as there is no substitute for the vacuum tube instrument. This poor showing is brought about by the adding of all errors such as poor stability, non-linearity, voltage divider

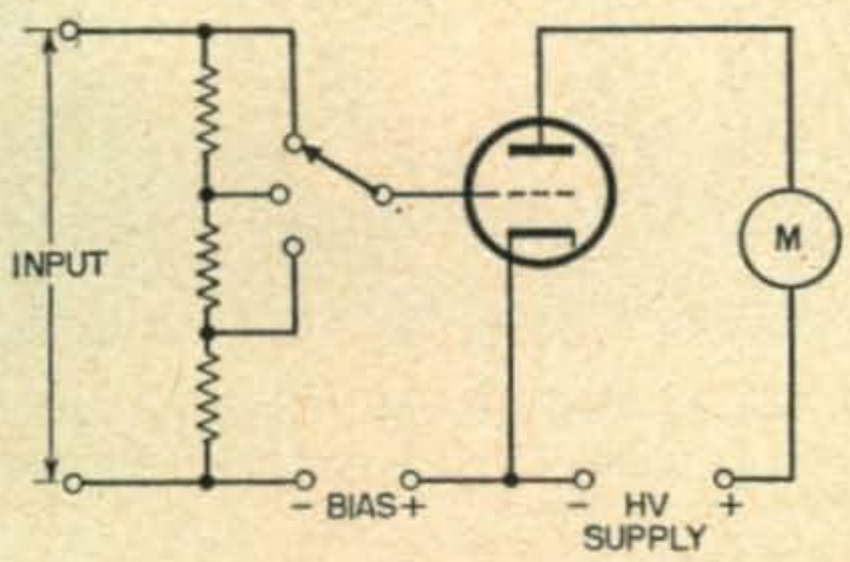


Fig. 2. Simplified circuit of a VTVM.

error and those also found in the meter movement itself.

Except for specialized uses the single tube voltmeter has passed out of general usage. Nearly all of the meters on the market today are of the balanced variety and are very similar in many respects. For the newcomer to the radio game a quick run down on the development of the balanced tube circuit may be of interest.

Developing The VTVM

A quick look at the characteristic curves of any of the triode tubes will show that when plate current is plotted against grid voltage, the result will be a curve. The straightest portion of this curve is a small section somewhere near the center. For the best linearity, operation should be confined to this flat portion.

If a circuit such as *Fig. 2* is used with a bias to place the operating point in the flat portion of the plate current curve, there will be considerable static plate current flowing in the meter, so much in fact that only a few per cent of the meter scale would be usable for measuring purposes.

Several instruments appeared using the scheme of *Fig. 3*. A separate battery supplied just enough current to the meter, flowing in the opposite direction to plate current flow, to buck out all static current in the meter. The tube could now draw several ma. but the meter would read zero. Any change in plate current

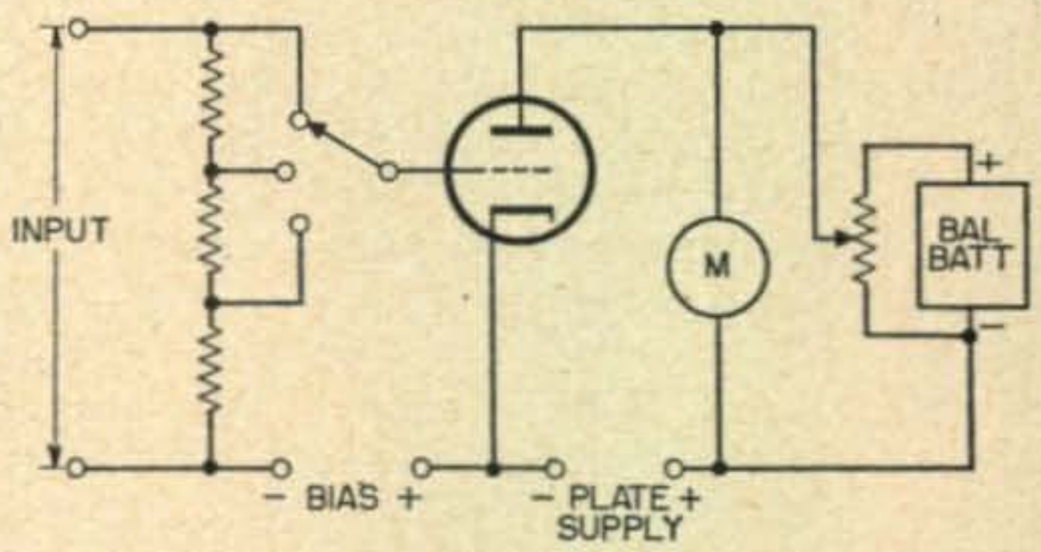


Fig. 3. Method of balancing out the static plate current in a simple VTVM.

would show on the meter. This was an improvement, but the shift in tube characteristics and battery voltage required constant readjustment of the zero point.

The combining of batteries and a-c operation can have its bad points and the circuits of *Fig. 4* soon replaced that of *Fig. 3*. Basically it is the same but a small portion of the power supply voltage is used to buck out the plate current. A part of the drift due to fluctuation of battery voltage is eliminated, as well as the battery itself. It can be seen from *Fig. 5* that the circuit is now a form of bridge with the tube acting as a variable resistor. This leaves us with the disadvantage that any change in tube characteristics with supply voltage change or aging will cause a continuous shifting of the zero.

The Balanced Bridge

To cure this another tube is substituted in *Fig. 6* for *R1*. This tube is kept at the same bias as the voltmeter tube but is used only as a balance resistance whose value will shift up or down in the same amount as the voltmeter tube . This gives two like tubes balanced against each other and two similar resistors matched with each other. With a little care the circuit now becomes very stable with variation in components actually compensating for themselves.

When a circuit such as this is used some form of balance control is needed to compensate for

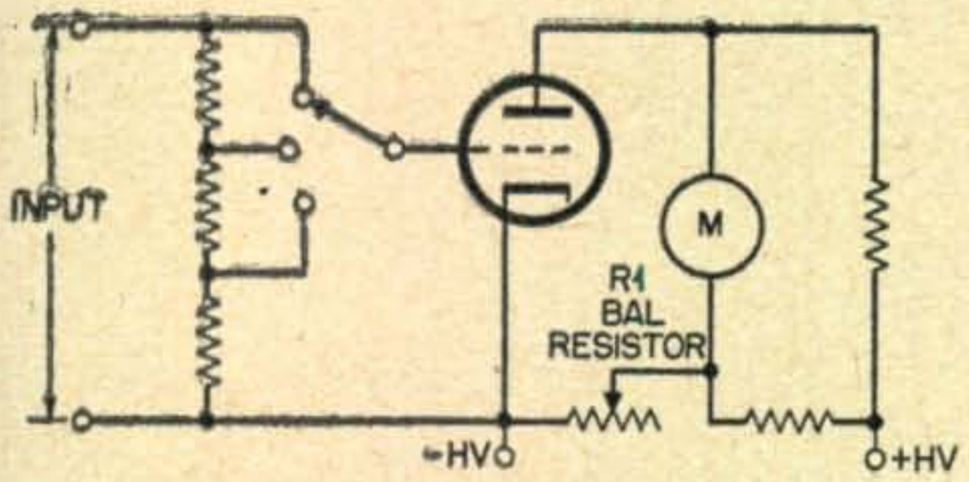


Fig. 4. A resistor type balance replaces the battery used in Fig. 3.

the slow aging of parts and tubes. This can take the form of a variable resistor in the cathode of one or both of the tubes.

In present commercial versions of this circuit, advantage is taken of the balance that can be maintained and very sensitive meter movements are being used. This helps to give calibration linearity and, to improve the circuit even more, degeneration is added in the cathode circuit of the tubes.

A VTVM of this kind is suitable for d-c only and must be preceded by some form of rectifier if a-c is to be measured.

Before getting involved in the problems of a-c measurement it might be well to point out one commercially available version of the balanced tube type of voltmeter. This is the *Heathkit Model V-6*. A portion of the diagram of this instrument is shown in *Fig. 7*. The d-c section of this instrument uses a dual triode type 12AU7 in the balanced bridge. The meter is a 4½ inch 200 microamp movement which

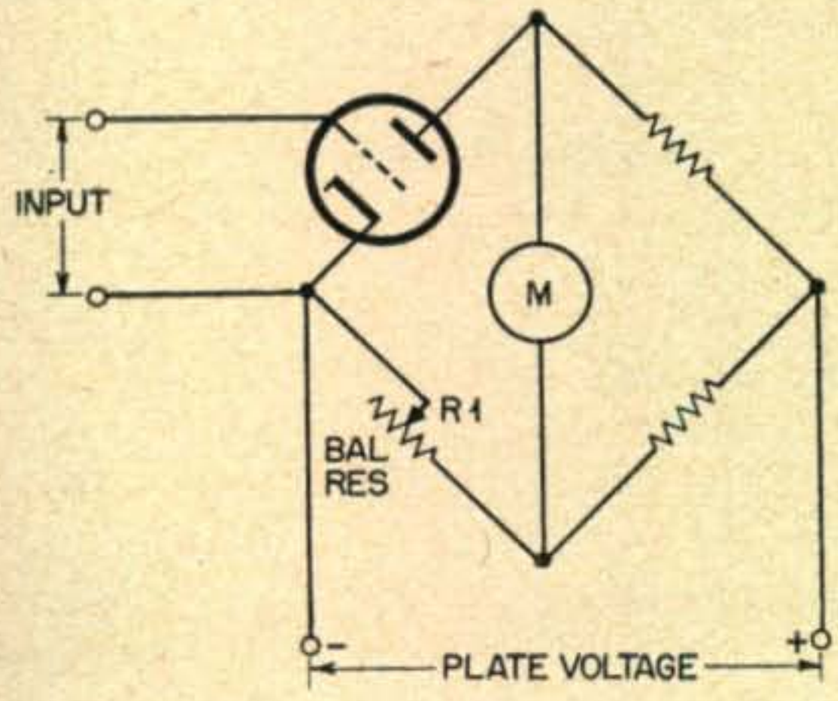


Fig. 5. The resistor balancing method is similar to a bridge network.

gives a very linear scale even on the a-c ranges. Advantage is also taken of degeneration in the cathode circuit. Little more need be said concerning the d-c portion as this is a good example of how simple a good VTVM can be with today's tubes and parts.

A.C. Measurements

The measurement of a.c. can cause no end of headaches and measurement without loading presents more of a problem than on d.c. At the present time the most logical answer for ordinary measurements with moderately priced equipment is by use of a rectifier.

When rectifiers are used the question of wave form comes up. If sine waves only were to be measured the problem would be simple, but in radio and communications work any known type of wave may be encountered. A compromise must be made somewhere and the only thing which these varied wave forms have in common is peak value. It has become accepted practice by a large portion of the industry to use a peak type rectifier and to calibrate the scale in r.m.s. values which are 0.707 of the peak value. By using this approach the meter will indicate the commonly used r.m.s. value of of all sine wave and near sine wave voltages.

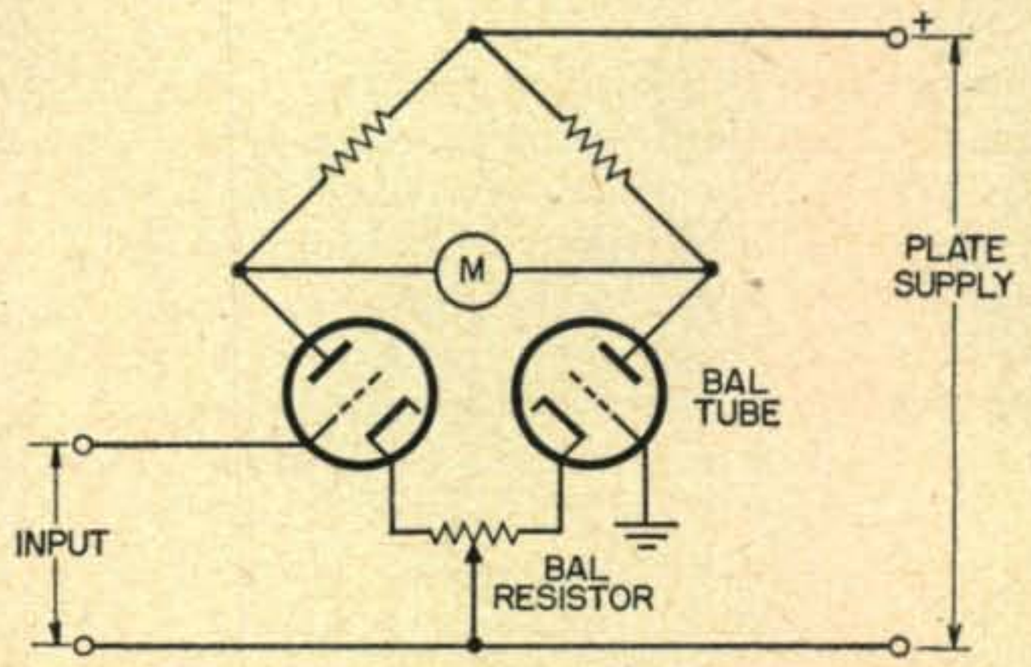


Fig. 6. The critical balancing resistor may be replaced by a vacuum tube to insure stability and ease of operation.

On voltages which are known to be other than sine wave, a reasonable approach to the peak value can be had by multiplying the meter readings by 1.414.

In measuring a.c., both the high and low frequency limits and the loading are determined by the type of rectifier and the circuit in which it is used. The high frequency limit is usually determined by the type of rectifier. In the range from low audio extending into the r-f region, a tube such as the 6H6 or 6AL5 mounted in the meter case is sufficient. By placing a high frequency diode of the acorn or subminiature variety in the probe the range may be extended to almost 2000 megacycles. Diode crystals are being used to good advantage in probes, but their limiting factor is the voltage which they will stand. This is usually less than 50 volts.

The low frequency limit of the rectifier is

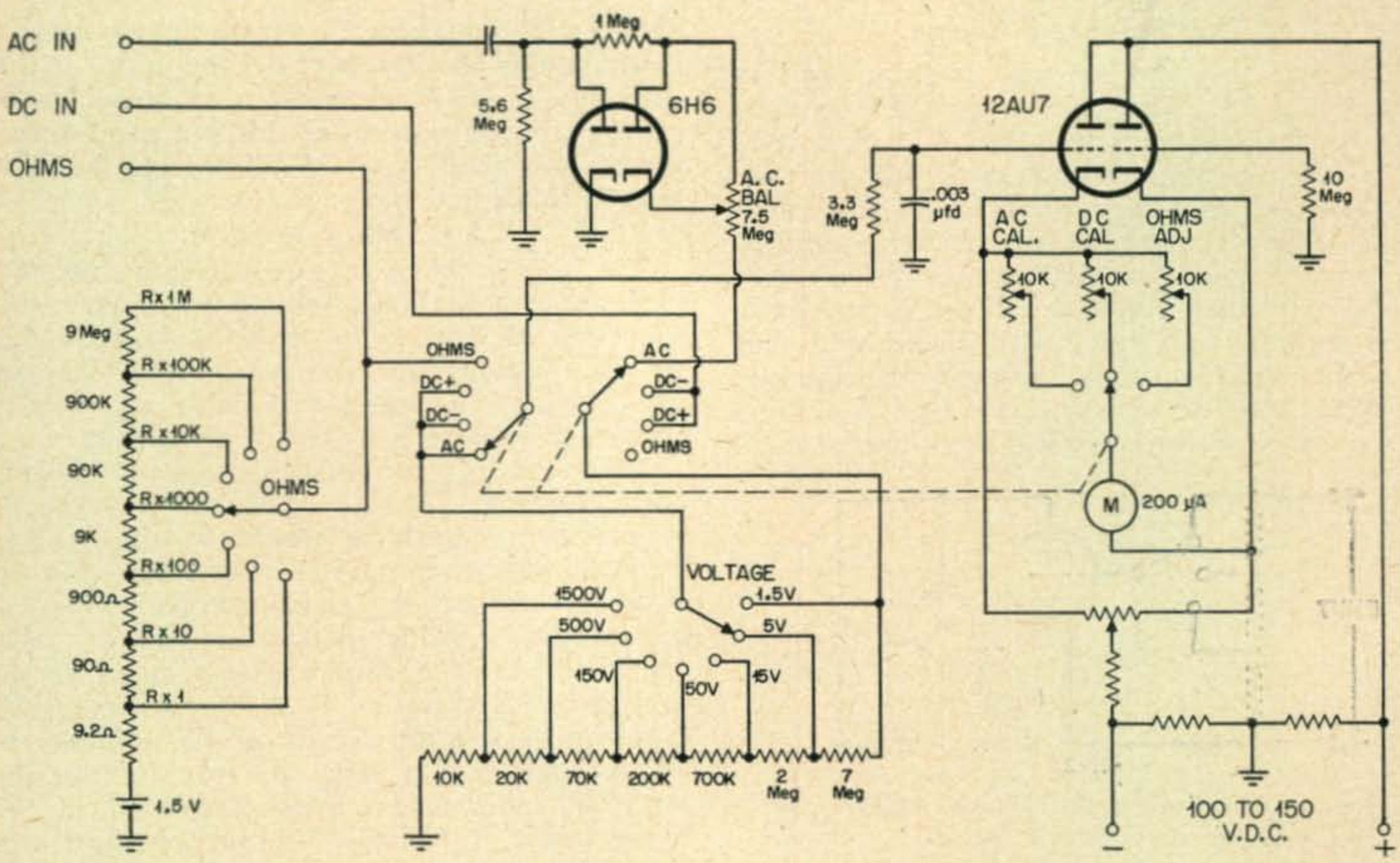


Fig. 7. Simplified schematic of the Heathkit VTVM. Power supply and meter reversing switch are omitted.

the time constant of the circuit. In *Fig. 8* are the two common forms of rectifier circuits, that in *A* being the shunt and that in *B* being the series type of rectifier. To function as a peak rectifier the condenser *C* must be large enough to hold its charge from peak to peak of the incoming wave. This can be accomplished also by making *R* large enough that it will not discharge *C* below a given value during the period that the rectifier is not passing current. As normally figured the time constant of an *RC* circuit is

$$T = RC$$

T in seconds
R in megohms
C in microfarads

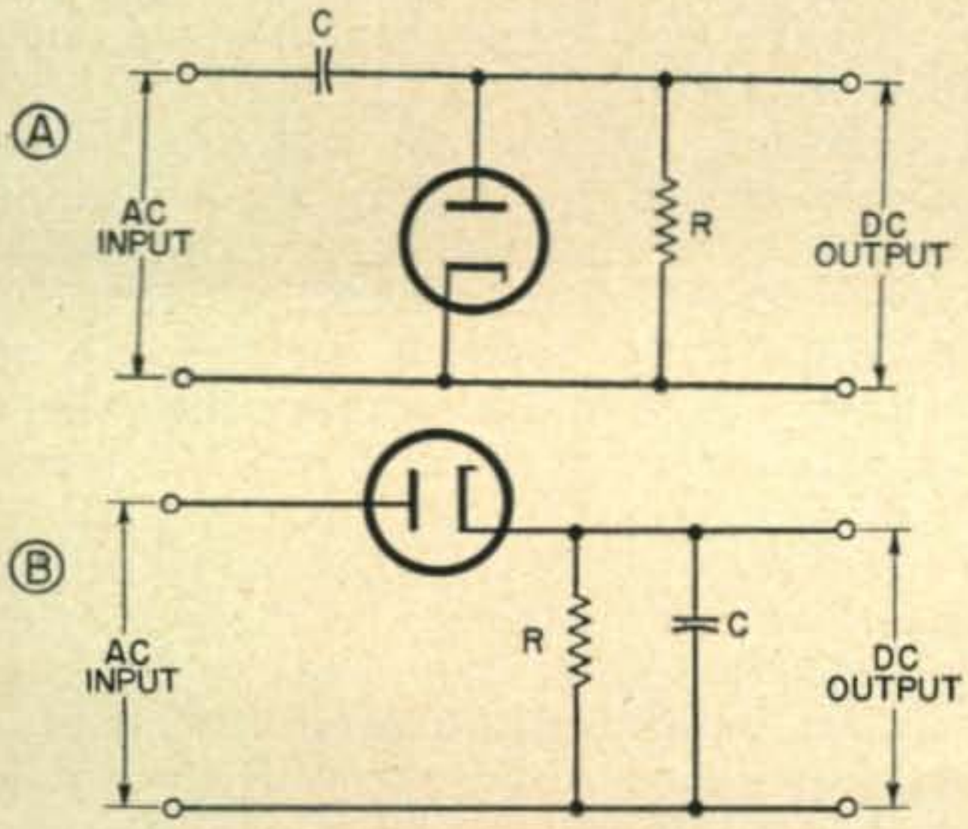


Fig. 8. Series and shunt rectifiers suitable for use with a VTVM.

This will give the time required for *C* to discharge to 63% of peak value. If the capacity is allowed to fall to this value in the voltmeter rectifier, the meter will not read full peak value. A rough rule of thumb is to find the time constant for the lowest frequency under measurement:

$$\frac{1}{\text{frequency}} = \text{megohms x microfarads}$$

This value is then multiplied by a factor of 100 which will just about eliminate the 37% fall allowed in the usual time constant formula mentioned earlier. There is, of course, a certain *fudge* factor if extreme accuracy is desired.

When figuring the value for *R* in *Fig. 8*, the loading effects are also involved. In these types of rectifiers the loading effect is equal to approximately one half of the value of *R*. For this reason *R* should be kept as high as possible. This of course will also reduce the size of *C*.

Contact Potential

Another effect which is encountered when using a vacuum tube as a rectifier is contact potential. When the diode is heated the drift of electrons through the tube to the plate will develop a voltage difference between cathode and plate. The actual value will vary with the size of load resistor although remaining somewhere near one volt. This puts a d-c bias on the tube and will interfere with proper rectification at low levels. For best results this volt-

(Continued on page 52)

New Heathkit VFO KIT

MODEL VF-1

$19.50

Ship. Wt. 7 lbs.

- Smooth acting illuminated and precalibrated dial.
- 6AU6 electron coupled Clapp oscillator and OA2 voltage regulator.
- 7 Band coverage, 160 through 10 meters—10 Volt RF output.
- Copper plated chassis—aluminum cabinet—easy to build—direct keying.

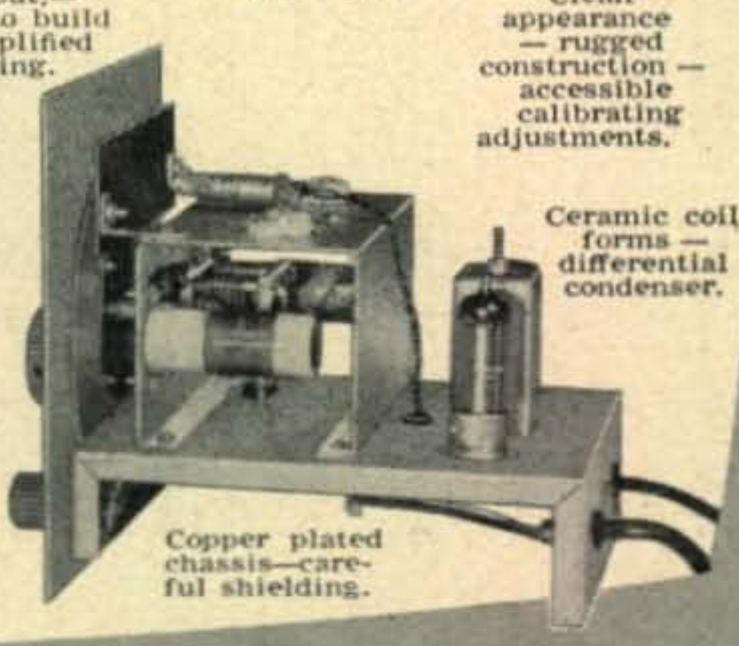
Here is the new Heathkit VFO you have been waiting for. The perfect companion to the Heathkit Model AT-1 Transmitter It has sufficient output to drive any multi-stage transmitter of modern design. A terrific combination of outstanding features at a low kit price. Good mechanical and electrical design insures operating stability. Coils are wound on heavy duty ceramic forms, using Litz or double cellulose wire coated with polystyrene cement. Variable capacitor is of differential type construction, especially designed for maximum bandspread and features ceramic insulation and double bearings.

This kit is furnished with a carefully precalibrated dial which provides well over two feet of calibrated dial scale. Smooth acting vernier reduction drive insures easy tuning and zero beating. Power requirements 6.3 volts AC at .45 amperes and 250 volts DC at 15 mills. Just plug it into the power receptacle provided on the rear of the AT-1 Transmitter Kit. The VFO coaxial output cable terminates in plastic plug to fit standard ½" crystal holder. Construction is simple and wiring is easy.

Open layout,— easy to build — simplified wiring.

Smooth acting illuminated dial drive.

Clean appearance — rugged construction — accessible calibrating adjustments.



Ceramic coil forms — differential condenser.

Copper plated chassis—careful shielding.

Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1

$29.50

Ship. Wt. 16 lbs.

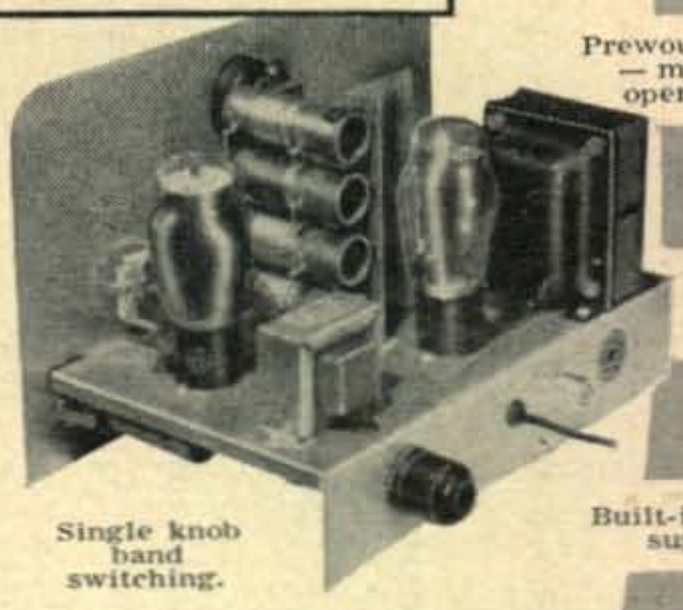
SPECIFICATIONS:

Range 80, 40, 20, 15, 11, 10 meters.
6AG7 .....Oscillator-multiplier.
6L6 .....Amplifier-doubler
5U4G ..... Rectifier.
105-125 Volt A.C. 50-60 cycles 100 watts. Size: 8⅛ inch high x 13⅛ inch wide x 7 inch deep.

Crystal or VFO excitation.

Prewound coils — metered operation.

Rugged, clean construction



52 ohm coaxial output.

Single knob band switching.

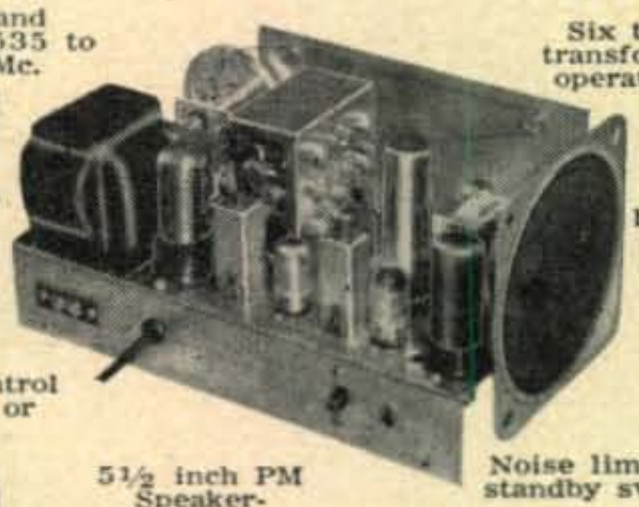
Built-in power supply.

Here is a major Heathkit addition to the Ham radio field, the AT-1 Transmitter Kit, incorporaring many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand-by switch, key click filter, A. C. line filtering, good shielding, etc. VFO or crystal excitation—up to 35 watts input. Built-in power supply provides 425 volts at 100 MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual.

NEW Heathkit COMMUNICATIONS RECEIVER KIT

Four band operation 535 to to 35 Mc.

Six tube transformer operation.



Stable BFO oscillator circuit.

Electrical bandspread and scale.

RF gain control with AVC or MVC.

5½ inch PM Speaker-Headphone Jack.

Noise limiter—standby switch.

SPECIFICATIONS:

Range.....535 Kc to 35 Mc
12BE6 .....Mixer-oscillator
12BA6 .....I. F. Amplifier
12AV6 Detector—AVC—audio
12BA6 ....B. F. O. oscillator
12A6.....Beam power output
5Y3GT .....Rectifier
105-125 volts A. C. 50-60 cycles, 45 watts.

A new Heathkit AR-2 communications receiver. The ideal companion piece for the AT-1 Transmitter. Electrical bandspread scale for tuning and logging convenience. High gain miniature tubes and IF transformers for high sensitivity and good signal to noise ratio. Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.

MODEL AR-2

$25.50

Ship. Wt. 12 lbs.

CABINET:

Proxylin impregnated fabric covered plywood cabinet. Shipg. weight 5 lbs. Number 91-10, $4.50.

HEATH COMPANY
BENTON HARBOR 6, MICHIGAN

ALL TIMES IN E S T

EASTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Western Europe	1430-1700 (1)	0630-1400 (3) 1400-1600 (4) 1600-1830 (1-2)	1800-0130 (3-4)	1930-0030 (2-3)
Central Europe & Balkans	Nil	0700-1400 (2-3) 1400-1700 (3-4) 1700-1900 (1-2)	1830-0030 (3)	1930-2300 (1-2)
Southern Europe & North Africa	1430-1700 (1)	0630-1500 (3) 1500-1700 (4) 1700-1930 (1-2)	1830-0100 (3-4)	1930-0000 (2)
Near & Middle East	1330-1530 (0-1)	0600-1400 (1) 1400-1730 (2-3)	1900-2330 (2)	2000-2300 (1)
Central & South Africa	1500-1800 (0-1)	0600-1200 (1) 1200-1500 (1-2) 1500-2000 (2-3)	1830-0100 (2-3)	1930-0000 (1-2)
South America	1500-1700 (0-1)* 1200-1800 (2)	0600-1600 (1-2) 1600-1800 (2-3) 1800-2000 (3-4) 2000-0000 (1-2)	1830-0500 (2-3)	1930-0430 (1-2)
South East Asia	Nil	0800-1100 (1)	0300-0600 (0-1)	Nil
Australasia	Nil	0700-1000 (0-1) 1600-2000 (0-1) 2000-2230 (1-2)	0000-0730 (2)	0100-0700 (1-2)
Guam & Pacific	Nil	0730-1100 (2) 1500-1900 (0-1) 1900-2130 (2)	2300-0730 (2-3)	0030-0600 (1-2)
Japan & Far East	Nil	0700-1000 (1-2) 1600-2030 (0-1)	0200-0700 (1)	Nil
West Coast, USA	Sporadic E	1000-1600 (3-4) 1600-2030 (2-3)	2100-0000 (4) 0000-0300 (2) 0600-0800 (2)	2200-0600 (3-4)

ALL TIMES IN C S T

CENTRAL USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe	Nil	0700-1630 (3) 1630-1830 (1-2)	1800-0030 (2-3)	1930-2330 (1-2)
Southern Europe & North Africa	1430-1600 (0-1)	0600-1400 (2-3) 1400-1600 (3-4) 1600-1800 (1-2)	1800-0100 (3)	1900-0030 (2)
Central & South Africa	1400-1700 (0-1)	0600-1330 (1) 1330-1530 (2) 1530-1900 (2-3)	1800-0000 (2-3)	1930-2300 (1-2)
Central America & Northern South America	1500-1730 (0-1)* 1400-1800 (2-3)	0630-1600 (3-4) 1600-2030 (4-5) 2030-2200 (2)	1700-0500 (4-5) 0500-0730 (2-3)	1800-0500 (2-3)
South America	1330-1700 (1)* 1230-1500 (2) 1500-1800 (3)	0600-1600 (2-3) 1600-2100 (3-4) 2100-0000 (2)	1800-0430 (3)	1900-0400 (2)
Japan & Far East	Nil	0700-0900 (1-2) 1400-2000 (1) 2000-2200 (1-2)	0200-0630 (1)	0300-0600 (0-1)

ALL TIMES IN C S T

CENTRAL USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
South East Asia	Nil	0730-1000 (1-2) 1000-1930 (0-1) 1930-2100 (1)	0400-0630 (0-1)	Nil
Hawaii	1800-2100 (0-1)	1000-2000 (2-3) 2000-2200 (3-4)	2130-0300 (4) 0300-0800 (2-3)	2300-0600 (3)
Australasia	1800-2100 (0-1)	0700-1000 (0-1) 1500-2000 (0-1) 2000-2230 (2)	2300-0700 (2-3)	0030-0600 (1-2)

ALL TIMES IN P S T

WESTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Europe & North Africa	Nil	0700-1300 (1) 1300-1600 (1-2)	1900-2300 (1)	2000-2130 (0-1)
Central & South Africa	1300-1500 (0-1)	0630-1230 (0-1) 1230-1730 (1-2)	1800-0000 (2)	1900-2230 (1-2)
South America	1500-1700 (0-1)* 1300-1800 (2-3)	0600-1400 (2) 1400-1700 (3) 1700-1900 (3-4) 1900-0000 (1-2)	1830-0500 (3)	1830-0330 (2)
Okinawa	1600-2200 (0-1)	0700-0900 (1-2) 1030-1900 (2) 1900-0030 (3-4)	0100-0630 (2-3)	0200-0530 (1-2)
Guam & Mariana Islands	1800-2200 (1)	0700-0900 (1-2) 1100-2000 (2-3) 2000-2300 (3-4) 2300-0100 (1)	0000-0500 (3-4)	0030-0400 (2-3)
Australasia	1400-1800 (1-2) 1800-2030 (2-3)	1100-1300 (2) 1300-1900 (1) 1900-2100 (3-4) 2100-0000 (1)	2130-0600 (3)	2200-0500 (2)
Japan & Far East	1400-1900 (0-1) 1900-2200 (1)	1030-1900 (2-3) 1900-0100 (3-4)	0000-0530 (3-4)	0100-0500 (2-3)
Philippine Islands & East Indies	1900-2200 (0-1)	0700-1000 (2) 1300-2100 (0-1) 2100-0100 (2)	0200-0600 (1)	0330-0430 (0-1)
Malaya & South East Asia	1900-2200 (0-1)	0700-1030 (1-2) 1500-2200 (0-1) 2200-0100 (2)	0300-0700 (0-1)	Nil
Hong Kong, Macao & Formosa	2000-2300 (0-1)	0700-0900 (1) 1300-2100 (1-2) 2100-0000 (2-3)	0230-0600 (2-3)	0300-0530 (1-2)

Symbols for Expected Percentage of Days of Month Path Open:

(0) None (1) 10% (2) 25% (3) 50% (4) 70% (5) 85% or more.

* Indicates time of possible ten-meter openings.

These tables are based upon a radiated CW power of 150 watts and are centered on Washington, St. Louis and Sacramento. These forecasts are, for the most part, made using basic ionospheric data published by the CRPL of the National Bureau of Standards, and are valid until August 15.

Ionospheric Propagation Conditions

Forecasts by

GEORGE JACOBS, W2PAJ

144-40 72nd Ave.

Flushing, Long Island, N.Y.

General Propagation Conditions

6 METERS: The fairly frequent sporadic E openings observed during May, June, July should continue through August.

10 METERS: Very little DX expected, but very frequent sporadic E, short skip openings expected up to 1400 miles.

5 METERS: DX improving towards the end of August and early September. Frequent short skip openings expected.

0 METERS: DX fair to very good to most areas of the world from shortly after sunrise to a few hours after sunset. Almost daily short skip openings from a few hundred miles up to 1400 miles.

40 METERS: DX fair to good from shortly before sunset to shortly after sunrise despite higher atmospheric noise levels.

80 METERS: Static levels still high. Fair DX possible during hours of darkness on days when static level is low.

160 METERS: No DX but short skip possible during the dark hours.

This overall picture of band conditions is intended to indicate qualitative changes in each band from month to month. For specific times of band openings for a particular circuit, refer as usual to the *Propagation Charts* on the opposite page. This month's *Propagation Charts* are based upon a predicted smoothed sunspot number of 5, centered on August, 1954. The observed monthly Zurich sunspot

"Ionospheric conditions have been extremely stable the past few months, with no ionospheric disturbances recorded at all during the months of May and June. Based upon the 27 day recurrence tendency, ionospheric conditions during August are predicted to be quite stable with the probability that no significant disturbances will occur."

number for May, 1954 was 0.7, resulting in a smoothed sunspot number of 8.6, centered on November, 1953. The smoothed sunspot numbers continue to decrease.

Propagation Charts

The monthly **Propagation Charts** are centered on Washington, D.C., St. Louis, Mo., and Sacramento, California. These three locations have been selected because they are each located at about 38 degrees North Latitude, which represents the approximate center latitude of the United States. In general, the accuracy of these predictions will hold for distances up to about 500 miles from the locations used **as a center** for the calculations. **The predictions are therefore usable throughout most of the United States. For locations within the United States, but outside the range of these predictions, path openings can usually be determined by averaging the readings of the two nearest centers.**

Many overseas readers of CQ have shown an interest in this column. Since it usually takes up to a month for magazine mail to reach many of these overseas readers I have calculated the Charts so that they are reasonably accurate until the middle of the month following the issue of CQ that they appear in. For example, this month's predictions can be used until about Sept. 15.

In forecasting short wave propagation conditions, two important factors must be determined (1 The degree of ionization of the layers of the ionosphere and (2 Whether the signal strength is high enough to override the atmospheric noise level at the receiver.

The solution to these two factors can be shown pictorially on what is usually referred to as a circuit analysis graph, such as the graph shown in Fig. 1.

By calculating the maximum usable frequency (MUF) between two locations, the times that reflection will take

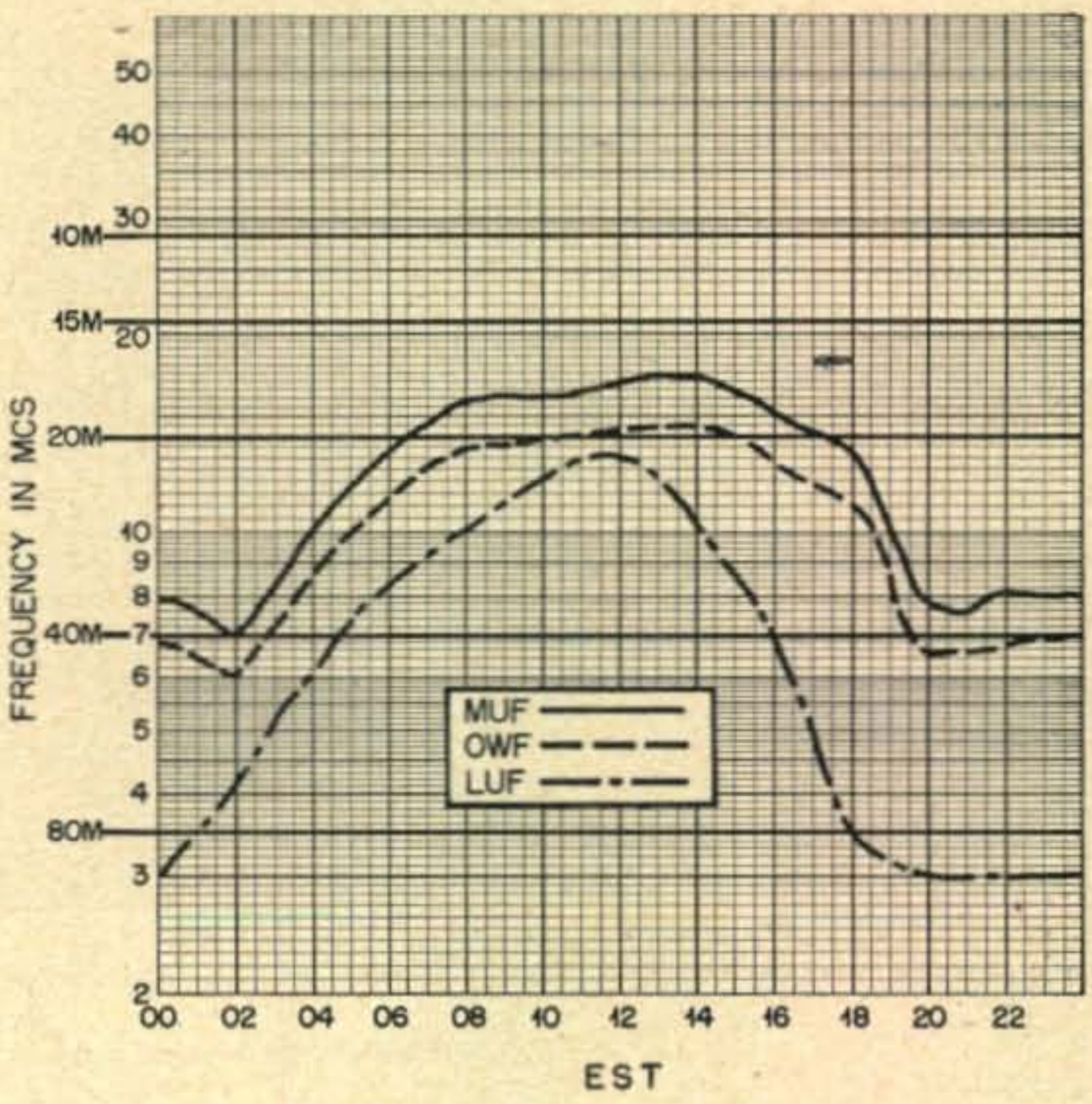


Fig. 1. A typical circuit analysis graph. See text for detailed explanation.

place for a particular frequency can be determined. This results in the curve marked MUF on the circuit analysis graph. Actually, the MUF curve indicates the times that a frequency will be reflected for 50% of the days of the month. In order to determine the times that reflection will take place 90% of the days of the month it is the practice, on long distance circuits, to deduct 15% from the MUF values. This frequency is called the optimum working frequency (OWF) and is also shown in Fig. 1.

By determining the OWF we find the frequency that will be reflected from the ionosphere, for a particular circuit, on at least 90% of the days of the month. However, as we stated previously, in addition to reflection from the ionosphere, the signal must be strong enough to override the existing atmospheric noise level at the receiver. For a given circuit, signal intensity is a function of radiated power and ionospheric absorption. Ionospheric absorption varies directly with the amount of sunlight on the path, being minimum during the night time hours. It also varies with frequency, being minimum at the OWF and increasing rapidly at frequencies below the OWF. Atmospheric noise, which is noise propagated from the tropical thunder storm centers, also varies with frequency and time and season of the year. The frequency at which a desired signal is strong enough to overcome the atmospheric noise level so that it can be received intelligibly at least 90% of the days of the month is called the lowest useful high frequency (LUF). The LUF is also shown on the circuit analysis graph. It can now be seen that a circuit is possible 90% of the days of the month on frequencies that lie between the

(Continued on page 54).

Monitored by LOUISA B. SANDO, WØSCF

c/o General Delivery, Cortez, Colorado

Another first for the YLs—the first time in the history of the Rocky Mountain Division that enough YLs attended an RMD convention to hold a special meeting of the licensed YL ops. Eleven of us (out of a total registration of 200), joined forces at Elkhorn Lodge in beautiful Estes Park, high in the Rocky Mountains of Colorado on June 12-13. The roll: WØ's ERR, KQD, BKM, MMT, RNO, SCF; WNØ's TYB, SVY, SWK; W3LSX/Ø, and W7HDS.

It was a memorable occasion for your column editor—our first visit (other than flying), to that part of Colorado (and it left us slightly dizzy from driving over passes on so many snow-capped mountains at 10, 11 or 12-thousand foot altitudes!.) It also was our first RMD convention and our first opportunity to meet a number of WØ YLs. *And* to our surprise and delight we were lucky enough (again!) to win the top ladies' prize, a Westinghouse electric deep cook-fryer. Other prizes were won by WØMMT, BKM, and W3LSX/Ø.

WØERR, Ann, was in charge of the YL and XYL activities and she did a bang-up job. After the greeting by RMD Director WØIC, the gals retired to the Lodge ballroom for a get-acquainted session, prizes and refreshments. That evening there was a big dinner and entertainment for all. Sunday morning, following the hidden transmitter hunts and before the banquet, the YLs got together for their special meeting. Director WØIC spoke to us, as did WØCDX, the SCM. The rag-chewing as we all got acquainted would have merited an RCC certificate.

Recently elected D/C for YLRL's 10th district, WØERR, Ann, is now the most active YL op in Denver. Seems her OM (who is not a Ham), works nights for the *Rocky Mountain News*, so she keeps the same hours he does; most of her operating occurs during 11 p.m. 'till 2 a.m. Ann started out with a Novice ticket in Aug. '51. This was when the Novice licensees were just getting on the air and Ann says she had to work hard for contacts on 80 CW. She got her General in May '52 and now works 10, 40 and 75. She uses a Viking I, VFO, NC243-D and 120-ft. all-band antenna. Other activities include being secretary and a director of the Denver Radio Club, caring for her OM's 87-year old mother, and teaching her parakeet, "CQ", to talk.

The girls at the YL meeting chose WØMMT, Marie, to represent the YLs of the Rocky Mountain Division as Assistant Director to WØIC. Marie, who is located at Fort Collins, had already been fulfilling the duties of SEC for Colorado. She is NCS of the Colo. Emergency Net which meets on 3890 kc. Tues. and Thurs. at 5 p.m. and Sun. at 7:30 a.m., with as many as 52 check-ins. Marie became interested in Ham radio when her brother, WØHHR, parked his house trailer next to hers and set up his station in a breeze-way between the two trailers. She took the Novice in Dec. '52, the General in March and received that license in May '53. In addition to her EC work on 75, she also does a little on 40 meters, using a Viking I, homemade VFO, SX-43 and a 137-ft. all-band antenna. Marie's OM is not a Ham, but she says he has no objections to her operating—so long as *she* doesn't want a mobile rig in the car—hi!

WØKQD, Irene, is the other most active YL in Colorado. To date all of her operating has been done from WØRTA, the Sky Hi Radio Club station at Adams State College (where her OM is chairman of Science and Math Division), in Alamosa. WØRTA received its license last December and, thanks to Irene, has made BPL each month since. She has also regularly checked into the Colo. Emergency Fone Net, Colo. Slow Speed Net (now folded), High Noon Net, and since May 1, Tenth Regional Net (CW) and Pacific Area Net (CW) on Mon., Wed., and Fri., and she also is active as Station H in TCC with Wed. night skeds with W1NJM. She also participated in the Rocky Mountain QSO Party in May and placed third. All these activities, plus those of being a wife and mother (she has a 7-year-old daughter), keep Irene hopping. She has been a mainstay of the Sky Hi club, serving as secretary, refreshment committee chairman, traffic manager and trustee of the club station. Irene also is EC for the San Luis Valley and is active in Civil Defense. Her OM, WNØOXR, is building a 500-watt CW rig for their home station.

The YL at the convention who had the distinction of having held a Ham license for the greatest number of years was WØRNO, Ada, of Denver—and many other points around the world—for her OM is an Army officer. Ada was first licensed as W9CCN all of twenty-nine years ago. She was then at the tender age of eleven when her older brother made her put away her dolls and learn the code. She also has another brother who is a Ham, but her OM has never been interested. Ada has lived in Arizona, Texas, Virginia, Korea, and elsewhere. She operates only 40 CW and has a small Lettine rig for ease in portability. A son (21) and daughter (18) now grown up, leaves Ada with time to enjoy her pet parakeets.

The YL who won the prize for coming the greatest distance to the convention was WØBKM, Sallie, of North Kansas City, Mo. Sallie and her parents had been on a vacation trip for several weeks, and her destination was Boulder, where she planned to attend the University of Colo. to work on her M.S. in education (her major is music). Sallie's dad is WØDTN, her brother is WØTDC, and she has held her call seven years. She works 10 and 75, and has a mobile 10-meter rig.

Coming from an even greater distance was W3LSX, Kay, of Washington, D.C. But it couldn't quite count as Kay is now /Ø at Boulder, where she works for the CRPL of the National Bureau of Standards. Kay had been with the Central Radio Propagation Laboratory in D.C. for nearly twelve years (the length of time she's had her Ham call), so when this branch of NBS made the move to Colorado, Kay decided to go along in order to continue her work in the quartz crystal section. Housing was her big problem at that time; her aunt, along with household furnishings and all her radio gear, were still awaiting her in D.C.

(Incidentally, another YL long-time CRPL employee, W3CDQ, Liz, did not make the move to Boulder, but was able to transfer to the Radioactivity section of NBS, doing essentially the same work she had been doing in CRPL. This July Liz will have been with NBS for 33 years!)

The only W7 YL to attend the convention (the RMD includes Wyoming and Utah), was W7HDS, Lizette. Lizette also is a long-time Ham, having received her Class A ticket in 1938 at the same time her OM, W7EUZ, got a license. She has been a member of YLRL for 14 of its 15 years of existence, and has served as 7th D/C. She also has been EC for Cheyenne, Wyo., and is active in its radio club. Lizette operates on 20, 40 and 75 meters, but right now she is not on the air a great deal for she is busy with Red Cross work as chairman of home nursing instruction.

Among the Novices, WNØSWK, Dorothy, of Longmont, Colo., has been very active. She received her call in February and already had 22 states confirmed. She works 40 CW (7189) from 8-10 a.m. and 1-3 p.m. daily using a rig her OM, WØRUG, put together and an SX-24 receiver. We marvel at her ability to be so active for she has four jr. ops—girls 7 and 5 and boys 4 and 2 years old. Maybe keeping house in a trailer helps!

WNØSVY, Marge, of Sidney, Neb., also has had her ticket since Feb. '54, but her only operating has been from the club station, WØRTC, at the Sioux Ordance Depot. Her OM, WØGDZ, works at the Depot and it was through club classes that Marge became interested and got her license. Her OM is putting together a Heathkit for her.

Another Novice, so new she had to stop and count the weeks she'd had her call when we asked her how long she'd been licensed, was Betty, WNØTYB—for which she uses the catchy phonetics "Tie Your Bonnet." Betty is from Denver and her OM is WØGQY. Since getting her ticket in May she had worked seven states on 40 CW (7190) using a TBS-50 transmitter and the Collins receiver she shares with her OM.

YLRL Appointments

YLRL President W6CEE, Vada, announces these new appointments: W9YBC, Gloria Matuska, to be Publicity Chairman; W3RXV, Peg Ferber, **Harmonics** Editor; W6WSV, Carol K. Witte, 6th D/C.

Los Angeles YLRC

The Los Angeles YLs held their June meeting on the 13th with installation of new YLRC officers. Taking over for the coming year: W6PJU, Mildred, president; W6QGX, Harryette, vice president; W6QOG, Helene, treasurer; W6DXI, Gladys, recording secretary; W6AKE, Lorraine, corresponding secretary; W6LBO, Mary, pub-

(Continued on page 53)

The YLs who attended the Rocky Mountain Division Convention at Estes Park, Colorado, June 12-13. From left to right: WØKQD, W3LSX/Ø; WØERR, WNØTYB; WNØSVY, WNØSWK (top center); WØBKM, WØMMT; WØRNO, W7HDS.

SHACK AND WORKSHOP

(from page 19)

Here is an obvious arrangement which is simple to handle and cheap to make. It handles all popular bands, it involves no monkeying with the innards of the receiver, and it makes for receiver sensitivity on all bands.

The components are a *Miniductor* at 54¢, a four-pole, two-position rotary switch at 71¢ and a midget broadcast receiver replacement two-gang condenser at 39¢. With a nickel's worth of hook-up wire the cost is $1.69. A 300-ohm ribbon connects this tuner to the receiver. Input to the tuner may be co-ax, from which the gain attained is greatest on most receivers, 300-ohm or 600-ohm line. One side of the switch handles 75 and 40 meters, the other side 40, 20 and 15 meters.

Construction procedure is simplified by using *B&W Miniductor #3011* (16 turns per inch, ¾" dia.). From one end loosen one full turn for a lead; from the other end remove turns until the coil has exactly 32 turns. At the center solder a lead, and at 9 turns each side of center solder leads. Solder these leads to the switch which will then adequately support the coil. Mount the condenser adjacent to the switch and be sure the condenser is insulated from the panel, can or mounting box.

The single difficulty in getting things connected properly for maximum gain is to check the polarity of the link wound around the center of the coil with hook-up wire. If the gain is very slight remove the line and rewind it in the *OPPOSITE* direction from where it was originally.

Connections shown are for 52-ohm or 73-ohm co-ax lead from the antenna as used to a dipole, ground plane, vertical or beam. Attach the hot lead of the co-ax to *turn #6* from center of the coil and try it. Then try it at *turns #7* and *#8* and subsequently closer to the center of the coil; one particular turn will be optimum. The shield side of the co-ax goes to the center tap of the coil and ground.

For 300-ohm lead-in tap both sides on the switch going to the 9th turn each side of center. For 600-ohm line use these 9 turn taps or the ends of the coil at 16 turns each side of center.

For comparative results using co-ax lead from a 40-foot vertical, 60-watt phone DJ is *S2* and unreadable on 20 meters direct to the receiver, but *S9* plus 10 with the tuner carefully adjusted. On 75, a 100-watt KH6 phone is unreadable without the tuner but readability *5* and *S8* with the tuner. With a horizontal folded dipole and 300-ohm lead the gain averages 2 to 3 *S* points, not as pronounced as with the low impedance co-ax but sufficient to make the difference between readability and nothing.

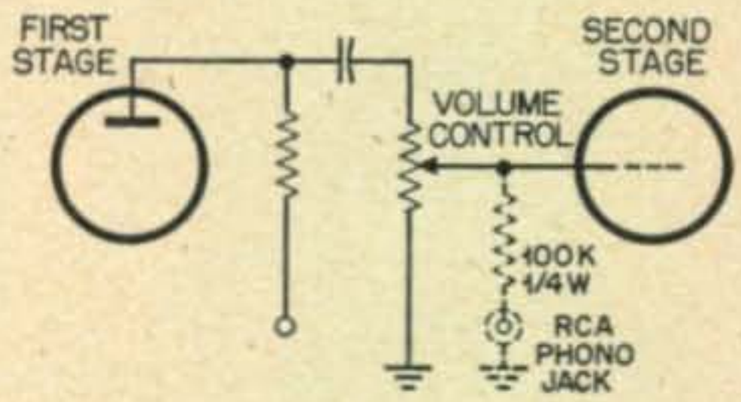
Ham Station Tape Recordings

The present high interest in tape recorders has spread to the amateur bands. You can hardly call "CQ" on 75 meters these days without some amateur making a recording of your transmission and playing it back to you. A few of these transmitted recordings are quite good; most of them, though, are pretty awful and give the listener a badly distorted and depressing idea of the quality of the original transmission.

The difference is not in the recorders. Almost any type recorder can do full justice to the limited range of frequencies handled by amateur voice-operated transmitters. The distortion is introduced by the methods used to transfer the signal from the receiver to the tape and from the tape into the speech amplifier of the transmitter.

The most common—and worst!—way of doing this is by acoustic transfer: that is, the recorder microphone is simply held in front of the receiver speaker while making the recording, and then the transmitter microphone is held in front of the recorder speaker while playing it back. This invariably results in a hollow-sounding, echoing transmission that bears only a very faint resemblance to the original signal picked up by the receiver.

All that is needed to do a good job of transferring the signal from the receiver to the tape is a patch cord that can be clipped across the



speaker voice coil and run into the "Radio-Phono Input" jack found on most recorders. Such a patch cord is usually furnished by the recorder manufacturer as either standard or optional equipment; but in any case one can be easily made by equipping a length of ordinary lamp cord with a couple of small battery clips on one end and a phone plug on the other. In a few instances, a single jack is provided for both microphone and high-level input levels. In this case, a special patch cord, containing a voltage divider network, must be used; and such a cord is invariably offered by the manufacturer.

Once you have *the signal* faithfully transferred to the tape, the job is half done. All

(Continued on page 44)

Leo I. Meyerson, WØGFQ
C.U. on 10-20-40 & 75 Meters.

LEO GIVES THE BEST DEAL ON . . .

National NC RECEIVERS

Now it is easier than ever to buy from WRL. Pay as little as 10% down and the balance in 18 months. No red tape—we handle our own financing. We will give you a generous trade-in allowance on your present equipment. We have over 600 reconditioned used items—with new factory guarantee. Send for free list. You will profit most when you deal with WRL—"THE WORLD'S MOST PERSONALIZED RADIO SUPPLY HOUSE and ONE OF THE WORLD'S LARGEST DISTRIBUTORS OF AMATEUR RADIO TRANSMITTING EQUIPMENT."

Announcing the *NEW*

500 Watt Complete Band Switching

GLOBE KING XMTR

In keeping with WRL's policy of always giving you **MORE WATTS PER DOLLAR,** we now offer you a complete 500 watt bandswitching 160 through 10 meter transmitter using the popular husky 4-250 A tube in final. Complete TVI shielding and bypassing of RF section and meters. Includes co-ax antenna change-over relay and push-to-talk features. Pi-network final tuning will match any antenna system from 52 to 600 ohms with output impedance selector switch on front panel. This arrangement serves as an ideal antenna tuner. Several safety features included for protection of final tube which is forced air cooled. Has provision for VFO. High level 100% plate modulation. XMTR designed for future use with single sideband exciter. Hammertone finished cabinet approximately 31" H x 21¾" W x 15" D.

MODEL 500

$36.78 Per Month (18 Months)

67.50 CASH DOWN

675.00 CASH

GLOBE SCOUT XMTR

Model 40A (50 Watts CW 40 Watts Phone)

$8.95 per mo. (12 mos.)

Kit — $89.95
Cash Down — $10.00
Wired — $99.95

Complete bandswitching 160 thru 10 M. Combination pi-network antenna tuner. 3 stage modulator allows 100% modulation of final. Complete power supply. TVI screened cabinet.

NATIONAL NC-98 RECEIVER

$8.19 Per Mo. (18 Months)

$149.95 Cash

$15.00 CASH Down

Here's unbeatable value!
Now for the first time a crystal filter, an S-meter, choice of electrical bandspread on amateur-or SWL bands, an RF stage and 2 IF stages and dozens of other high priced features for only $149.95! SPEAKER for NC 98—only $11.00.

NC-88 (Built in Speaker) $119.95

$9.54 Per Month 12 Months

$12.00 CASH DOWN

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MODEL NO.	Monthly Terms	Cash Down	Cash Price
NC-125 Receiver	$15.89 (12)	$20.00	$199.95
SW-54 Receiver	3.97 (12)	5.00	49.95
NFM-83-50 Adapter	1.43 (12)	1.80	17.95
NC-183D Receiver	20.90 (18)	38.35	383.50
HRO-60 Receiver	29.08 (18)	53.35	533.50
Speaker for HRO-60 or NC-183D			16.00

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Rush Info ☐ _____ (Equipment Wanted) ☐ Reconditioned List

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Gathered by DICK SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands, USA

We welcome the following newcomer to the HONOR ROLL:

W1CLX 39-235

Our slow freight developed a "hot-box" in the vicinity of Frog Hollow so we dropped in at the FHARC where a session was in progress. *Broad-Band* McGatz had the floor and our ears resonated to the following harangue, "You guys may remember me mentioning my cousin *Grid-Leak* McGatz, yep he is my cousin, tho twice removed (the third time it will be for keeps), wal old GL was "all-gone" on DX mobile operation. I can recall when he got his first ticket back in '47 by going through three red lights in a row. This led to his mastering of the code in simple but sturdy surroundings during the subsequent sixty days and to his Ham license a few weeks later .

"Now *Grid-Leak*, and by the bye, he acquired that moniker not because he was always drooling, which he was, but because of his unfortunate habit of repeating the phrase 'You may fire when ready *Grid-Leak*' on the slightest provocation, was never happier than when he was barrelling down the turnpike in his old jalopy at about 55 per and chewing the fat with some DX station.

"Now I just got a letter from GL and he says he is off mobile for life. It seems about three months ago he was winding up a QSO with an SM phone when he heard YI2AM calling him. This was not only a new one for GL but it completed his mobile WAC too! This double windfall, in one swell foop, hypnotized GL to such an extent that he failed to notice one of these ten-foot wide, block-long trailer trucks, toting a full load of cement, which had parked just ahead to change a tire! Into this combo *Grid-Leak* plowed with undiminished velocity. The results were rapid and certain. The jalopy was converted into a heap of junk which we won't attempt to describe, suffice it to say that the steering wheel was sticking out the rear end like a propeller. *Grid-Leak* sailed on, through the top, until his flight was intercepted by the crossarm of a nearby electric pole where he hung, suspended by the south end, amidst a shower of sparks.

"Witnesses would have said that GL's chances for survival were lower than those of a chorus girl in a submarine but strangely enough his only injury was a ruptured petroleum which the sawbones cured by standing *Grid-Leak* on his head for three weeks.

"Yep, no more mobile for him, or at least, until he gets that radar warning outfit installed in the new bus alongside the new rig!"

ST2UU Hoax

From time to time the DX world is beset by one or two Hams who seem to be incapable of restraint and must become "famous" DX calls, or must own as many of the DX awards as possible. Forgery of DX QSL's for WAZ and DXCC is unfortunately not unknown, pirating someone's call is considered a big joke by these individuals and faking a call must raise gales of laughter. Master of the latter category was Jamie, ST2UU.

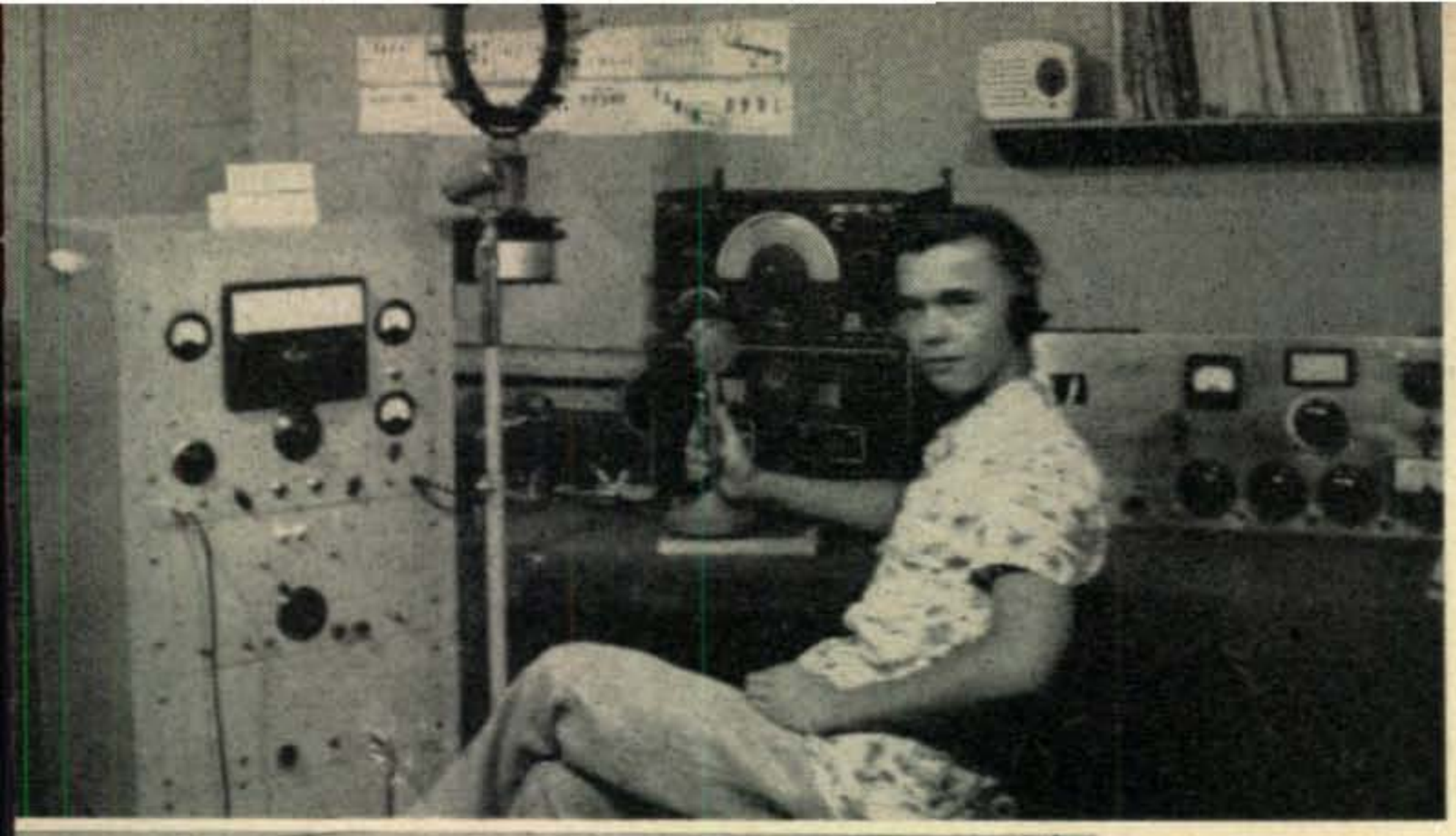
Acting on information they could scarcely believe, G2MI and G6CL contacted the British Trade Commissioner in Khartoum to ascertain if ST2UU had been away during the past year. Their answer was NO! All contacts with VQ6UU, VQ7UU, VQ9UU, HZ1UU, FL8UU, VS9UU and FF8UU are in fact contacts with ST2UU while sitting in Khartoum. Subsequent information has proven beyond any doubt that the above calls were faked and that even YA3UU is extremely doubtful. SU1UU and EQ3UU are valid, however, as Jamie was seen in these spots by G6ZO.

At Time of Writing

SARAWAK, BRUNEI, VS4RO/VS5RO: One of those rare spots which we believe, had not been represented in Ham radio circles (at least it has not appeared as "worked" on the lists of W1FH, W8HGW and W6ENV) was put on the air when Bob Roberts opened up from VS4RO in Sarawak on June 5. His 15 watts put good signals into the West Coast and W5-land and he was heard, with varying strength, in most parts of the globe. First W QSO was with W6MX at 1350 GMT on the fifth. Other contacts were noted, to mention a few, as follows: W8HGW, W5UX, W5UC, W6DLY, W6BAX, W6KSF, W3CRA, W6EFV, W7KVU, WØELA, W4DQH, VK5BY, ZS2BC, TI2TG, W6MUR, W4CEN, W6TI, W7BD, W6AM, W6DZZ, W6ENV, W9HUZ and SM5LL.

Bob moved to Brunei, signing VS5RO, on June 14. First W contact was with W6DZZ at 0612 GMT June 15. Other QSO's: W3CRA, W4CEN, OH2RY,

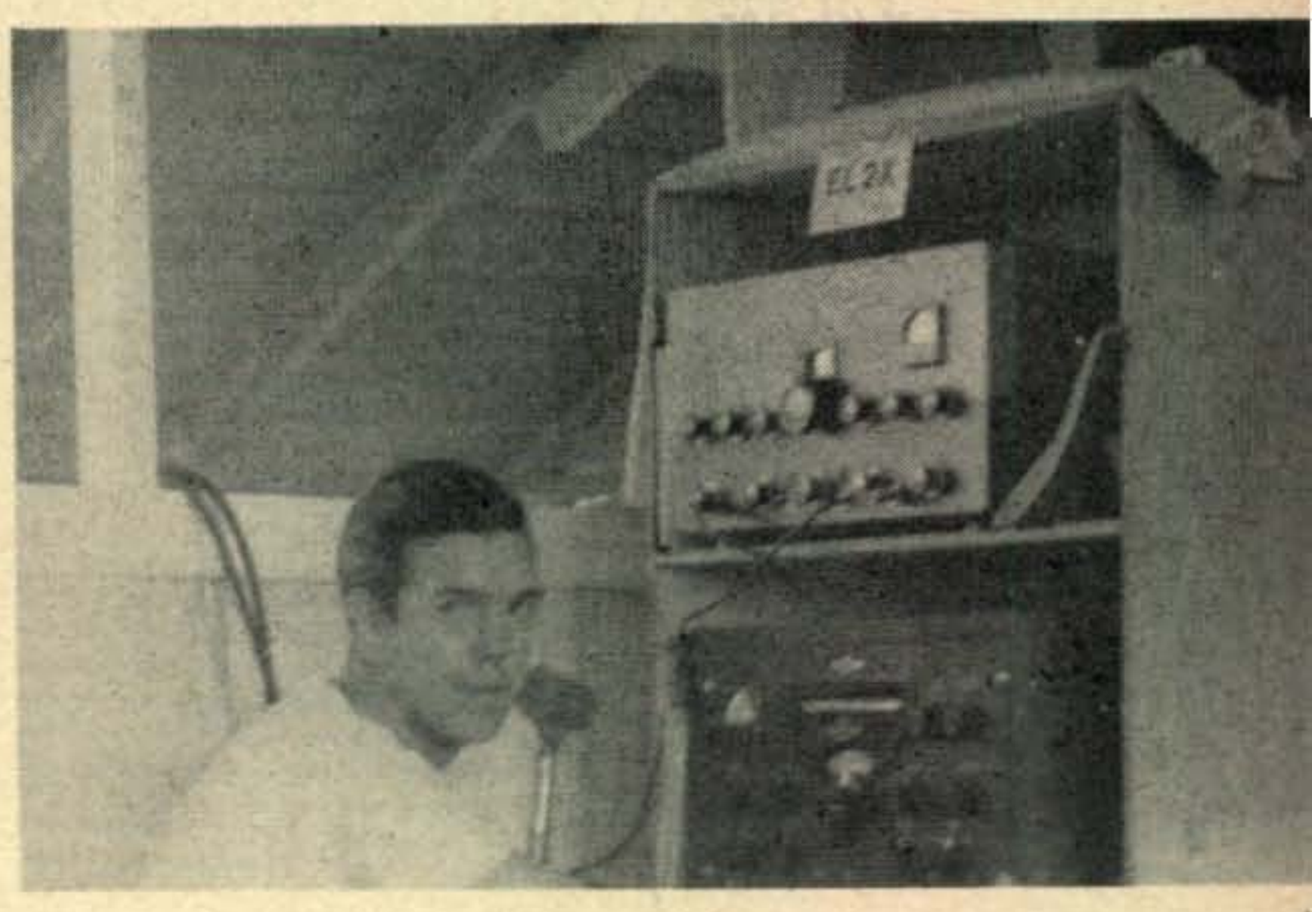
(Continued on page 55)



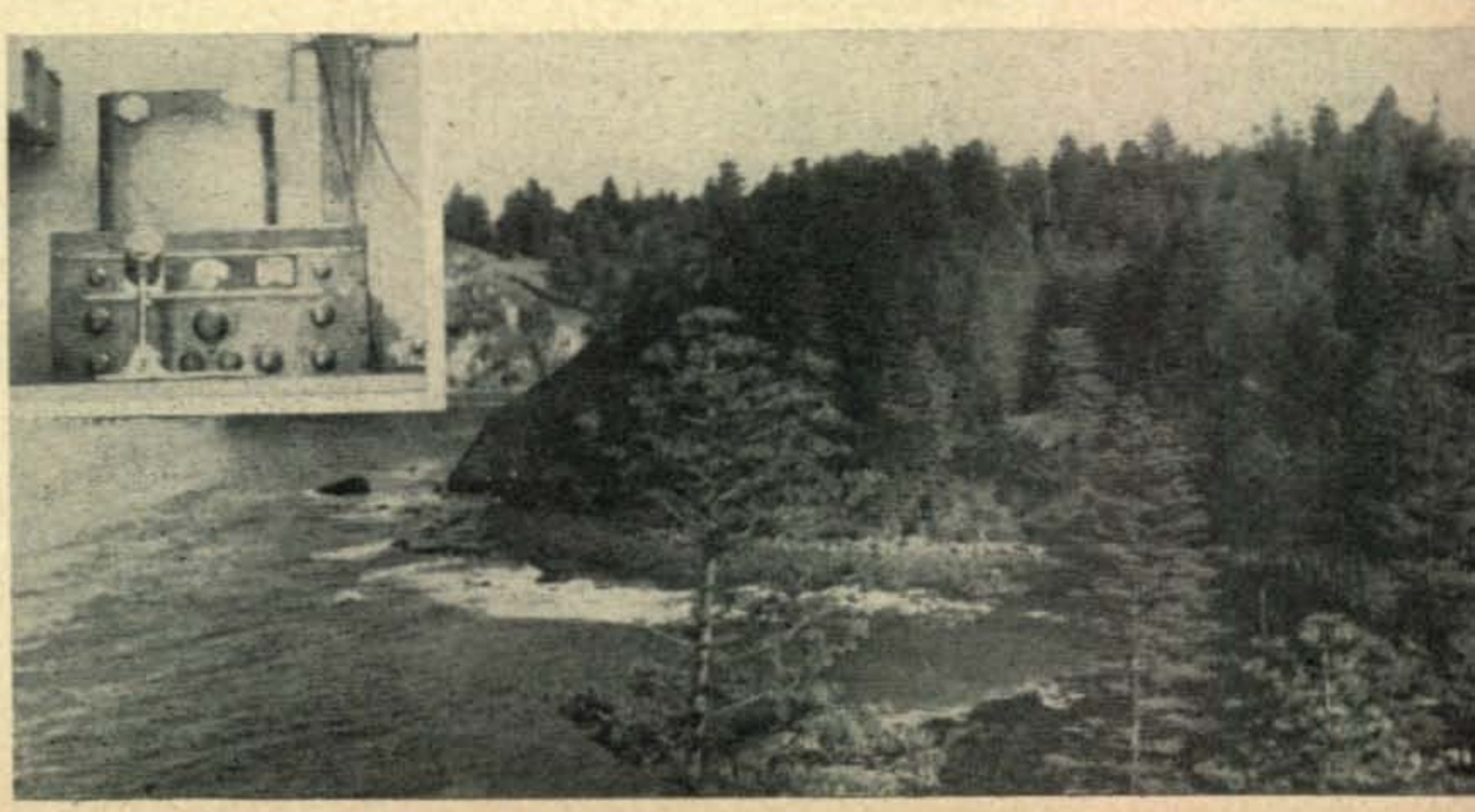
FK8AL, Noumea, New Caledonia, op Jean Garbe, may be seen above. FK8AL may be found every week-end on 14 Mc. between 0300 and 0600 GMT. Jean is also active on 3.5, 7 and 28 Mc. Parallel 807's are run on CW and phone. Receiver is a BC-342. This station is also operated by "brother" Robert Garbe under the call of FK8AH.

OK1AEH, Prague, Czechoslovakia, operator Emil Hlom, runs 50 watts input. Emil is up to 92 countries.

NORTHERN CALIFORNIA DX CLUB OFFICERS OR FIRST HALF OF 1954. L to R: W6GIZ Director, V6TI Secretary-Treas., W6LW Vice Pres. and Y6MHB Pres. W6GPB, Director, was absent.



(Right) EL2X, "Ray" Raymond of Robertsfield, Liberia. Transmitter is a VIKING II and antenna a 40 meter center fed dipole. All band activity for the fall season is planned as follows: 1812 kc. (Starting in Nov.) every Sat. and Sun. at 0500 GMT. 3504 to 3511 every week-end 2400 to 0500 GMT. 7003 to 7014 for short periods every evening at 2200 GMT and morning 0630 to 0730 GMT; weekends, 2200 to 2400. 14 Mc. 1800 to 1900 GMT. 21 Mc. weekends 1500 to 1800 GMT.



Operating position at VK9OK, Norfolk Island, may be seen above. 3.5, 7 and 14 Mcs. phone and CW are available. During ZL1AJU's vacation on Norfolk, WAC was made and all W districts worked. Other photo shows Norfolk's pine clad coastline. The island is five miles long and three miles wide. Some of these pines rise 150 and 200 feet high. Photo courtesy ZL1AJU.

KV4AA, etc. VS5RO was due to QRT on June 17 and appear as ZC5RO, British North Borneo, on June 18. Other stops will be: VS6, June 29/July 8; VS1, July 8/18 VS2, July 18/31; 4S7, August 1/7 and VU2, August 7/12. QRG is 14058 kc.

NAVASSA ISLAND, KC4: Much interest has centered on this small island, off the southwestern tip of Haiti. W1PST has been given the call of KC4AA and an expedition to this spot was planned for the week-end of June 18, accompanied by W1ENE and CM9AA. This trip has been delayed, however, due to reported landing difficulties at this time of year. It seems that 40-foot cliffs surround the island and the only landing spot plays host to a 30-foot ocean swell. A Coast Guard tender services the unattended lighthouse on the island every four months and a landing attempted on June 9 also failed. Hams from KG4, KP4, W4 and W6 are also contemplating such a trip and we feel reasonably certain that a KC4 will appear in the not too distant future. W1PST is also exploring the possibilities of a trip to Great Corn Island (near KZ5) and would like to hear from any Ham interested in tagging along.

ALAND ISLANDS, OHØ: Helge, OH2ZE, accompanied by OH2LX, visited this island group from June 2 to June 6. Calls used were OH2ZE/Ø and OH2LX/Ø. 105 contacts were made. We believe the Aland Islands have possibilities of separate status. The population is Swedish and we are advised that: "Aland Islands are a neutralized zone according to international guarantees and Aland possesses self-government under the suzerainty of Finland.

ZANZIBAR, VQ1AC: Doug, VQ4EI (ex-VT1AC), was scheduled to have been active in Zanzibar from July 20 to July 29 with the call VQ1AC. 14 Mc. only.

TRISTAN DA CUNHA, ZD9AB: This station has been active, of late, on 14068 kc. running 300 watts to a V beam. The name is Tommy and QSL's go via ZS1FD.

GAMBIA, ZD3: An unidentified G station is reported to have flown to Gambia in mid-June. He will be active there for a three-month period. (This may be G3CDD). It is hoped that we will all be able to snag this much needed spot.

MONACO, 3A2: HB9LA was scheduled to appear from this QTH during July. Transmitter is a 200-watt portable rig.

LIECHTENSTEIN, HE: HB1MQ/HE planned activity from this spot during July.

ETHIOPIA, ET3: Rumors have it that ET3Q and ET3R will soon be providing contacts from this country.

DODECANESE ISLANDS, RHODES, SV2RI: This station has recently been active from Rhodes. QRG was 14050; name, Karch and QSL's should go via RSGB. (FA8SS also reports one XA1AB as active from Rhodes.)

ANDORRA, PX1AR: This station appeared on June 7 and three-band activity was noted. At the key was W6IKC who said QSL's go via W4BRB. QSO's were reported with W8PQQ (The original PX1AR), W6DZZ, KV4AA and, on 3.5 Mc., with VE1ZZ.

CRETE, SV9UN: This station put on a brief appearance on June 6, 14088, missing us neatly. Only QSO reported was W8JBI. This could have been the planned trip of SVØWK.

PITCAIRN ISLAND, VR6AY: This station caused quite a flutter on the night of June 10. He gave his name as Andy and worked several W6's plus W2WZ. Beam headings seemed to jibe.

NEW CERTIFICATES

The Amateur Radio Association of Trieste (A.R.A.T.) has instituted an award known as the F.T.T. Certificate. To obtain this award amateurs in the Western Hemisphere must submit proof of QSO's with the following:

6 stations with prefix of I1—/Trieste
2 stations with prefix AG2
2 stations with prefix MF2

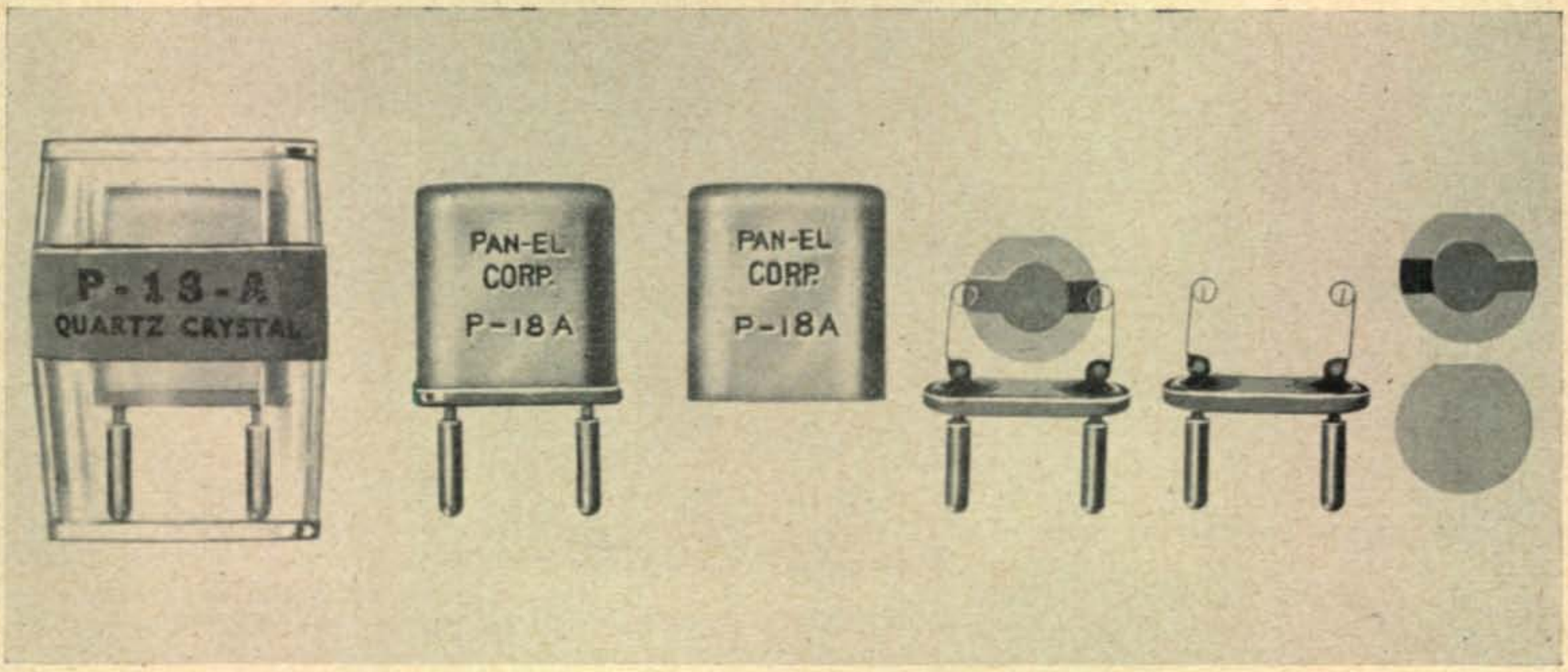
Each station must be worked on TWO bands, phone or CW. QSL's should be mailed to: A.R.A.T. Box 301, Br./US Zone, F.T.T., Trieste. Five IRC coupons should accompany QSL's plus sufficient postage for return of confirmations by registered mail.

The *Delano Amateur Radio Club* will award a certificate to any amateur who contacts five, or more members of the Delano (California) Radio Club. Contacts must have been made any time after February 1, 1953. QSL's are not necessary. Just send your list, showing date and time of QSO, to P.O. Box 552, Delano, Calif. Club members are as follows: W6ARI, W6BVM, KN6ECB, K6ELZ, W6GNR, W6HYK, W6WNX, W6ZVP, K6BLL, W6BRP, W6BYH, W6EFV, W6FHC, W6HT, W6JOU and W6ZEK.

DX Notes in General

A station signing **LB7UE** and claiming to be on Bjoernoeya Island (Bear Island), near Spitzbergen, was worked recently but looks very doubtful . . . Activity from Spitzbergen, by **LB9IC**, this summer is possible . . . **FG7XA** visited Miami in June. He should now be back in Guadeloupe and promises activity from a new, QRM-free, QTH there . . . OK1MB reports activity from **EA9DF** (Rio de Oro), 14067 and from **PK7H** and **CR1ØAC**, both near 14045 . . . **FB8ZZ** puts in a 400-watt

(Continued on page 56)



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When you buy it, your Pan-El quartz crystal is sealed in the plastic case shown here; clearly labelled, and with the frequency stamped on top of the holder clearly visible through the plastic. We have taken one apart to show the jeweller-precise, shock-resistant mounting, and how the electrodes, of gold or silver, are bonded directly to the crystal. Each crystal is carefully brought to frequency, triple flushed with dry nitrogen, hermetically sealed in a nitrogen atmosphere, and packed as pictured, ready for you to choose your desired frequency at your dealer's counter.

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P-18A 3500 to 4000; 7000 to 7400; 8000 to 8400 to the nearest integral KC.....$2.75 each
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P-23 27255 (.05" pins) Citizen Band..... 3.95 each
All with .09" pins spaced .486" to fit FT243 sockets, except as noted.

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Every prospective amateur must learn to manipulate a certain minimum of mathematical formulas; so that he can pass the FCC written examination. Unfortunately, many seem to have an undue amount of trouble in obtaining the required knowledge.

In the following paragraphs, I will discuss the questions in the FCC study guides for the *Novice Class* and the *General/Conditional/Technician Class* examinations requiring the use of mathematics to answer.* While I intend to be as explicit as possible, in studying for an amateur examination, especially after being out of school for several years, you can help yourself immensely by digging out your old High School Algebra textbook or Grade School Arithmetic. Review particularly the use of decimals, percentage and how to set up simple Algebraic equations. You will probably be surprised about how much you have forgotten, but do not let that discourage you. It will come back after a little study.**

Mathematics In The Novice Examination

The questions in the Novice study guide requiring mathematics of any sort to answer will be discussed in turn.

WHAT IS THE RELATIONSHIP BETWEEN A CYCLE, A KILOCYCLE AND A MEGACYCLE?

1 kilocycle = 1,000 cycles.

1 megacycle = 1,000,000 cycles = 1,000 kilocycles.

This question brings up the importance of knowing the meaning of the terms *kilo*, *mega*, *milli*, and *micro* constantly recurring in radio.

Kilo—means 1,000: 1 kilocycle = 1,000 cycles; 10 kilohms = 10,000 ohms; 22 kilowatts = 22,000 watts, etc.

Mega—means 1,000,000: 7 megacycles = 7,000,000 cycles or 7,000 kilocycles; 5 megohms = 5,000,000 ohms, etc.

Milli—means 1/1,000th or 0.001: 1 milliampere = 0.001 ampere or 1/1,000th of an ampere; 20 millihenries = 20/1,000th of a henry or .020 henry, etc.

Micro—means 1/1,000,000th or 0.000001: 1 microampere = 1/1,000,000th of an ampere, or 0.000001 ampere = 1/1,000th of a milliampere or 0.001 milliampere, etc.

The importance of being thoroughly familiar with these terms is apparent in that a good bit of the trouble students have in solving various problems is in putting the decimal point in the right place when kilocycles must be changed to megacycles, amperes to milliamperes and the like.

WHAT IS THE RELATIONSHIP BETWEEN THE FREQUENCY AND THE WAVELENGTH OF A RADIO WAVE, IF ITS VELOCITY IN SPACE IS 300,000,000 METERS PER SECOND?

Radio waves do travel at a velocity of 300,000,000 meters (186,000 miles) per second. When either frequency or wavelength is known, the other quantity is determined by dividing 300,000,000 by the known quantity. Doing so gives the wavelength in meters and the frequency in cycles. When the frequency is given or desired in kilocycles, use 300,000. When the frequency is given or desired in megacycles, use 300.

Example: What is the wavelength of a 3,500-kc wave?

300,000/3,500 = 85.71 meters.

Example: What is the frequency in megacycles of a 40-meter wave?

300/40 = 7.5 Mc. (The answer in kilocycles is 7,500 Kc.)

HOW IS THE ACTUAL POWER INPUT TO THE TUBE OR TUBES SUPPLYING ENERGY TO THE ANTENNA OF AN AMATEUR TRANSMITTER DETERMINED?

Measure the direct-current plate voltage and plate current (in amperes) of the final amplifier tube (s): then multiply the current by the voltage. This will give the power input in watts. Expressed as a formula, $P = EI$. Where P = power in watts; E = e.m.f. (potential) in volts; and I = current in amperes.

Example: What is the power input when the plate voltage is 600 volts and the plate current is 0.1 amperes? $P = EI = 600 \times 0.1 = 60$ watts.

The only difficulty in applying the above formula is that plate current in vacuum tubes is invariably measured in milliamperes, while the formula requires that it must be expressed in amperes.

Example: What is the power input when the plate voltage is 550 and the plate current is 115 milliamperes? $P = 550 \times 115/1{,}000 = 63.25$ watts, or $550 \times 0.115 = 63.25$ watts.

WHAT IS OHM'S LAW?

Ohm's Law expresses the relationships between current, voltage, and resistance in any electrical circuit. Expressed in words, it takes one volt of electrical potential to push a current of one ampere

(Continued on page 42)

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* These study guides are what the **License Manual** and similar booklets are based upon. Except for the Novice study guide, they are not available to the general public.

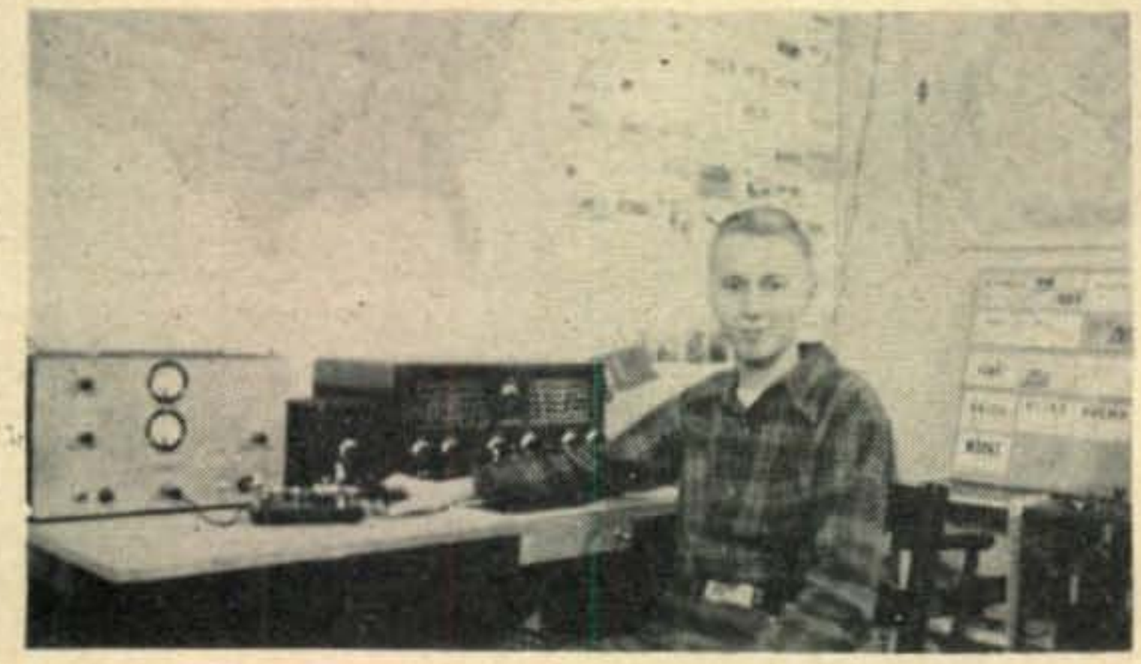
** A good book for more serious study is **Mathematics For Radiomen And Electricians** by Nelson M. Cooke, available from most amateur supply houses. It starts out at the level of Fourth-grade arithmetic and carries the student right up to trigonometry and vectors as used in solving radio problems.

Jack Laurain, 16, KN6DNM, Fresno, Calif., and his dog, "Troubles." Jack runs 45 Watts input to a 6V6-807 rig and uses an S-53A receiver. So far, he has worked 20 states, Hawaii and Canada.

Using this equipment on 7 Mc., "Cal" Hunter, W5ZUS, worked 38 states, Puerto Rico, and Mexico in nine months as a Novice. Cal offers to help anyone obtain a license who writes to him at 711A Franklin Ave., Waco, Texas.

Tommy Watts, WN4CVX, Taylorsville, N.C., had to wait two months while the FCC straightened out a small mixup in his license, but when this picture was taken he had worked 24 states.

Everett, WN5CTY, Biloxi, Miss., is a 1st Lieutenant (a Pilot) in the Air Force. When he is not on the air he is in it. Three months, on 3.7 Mc. has resulted in 28 states, Canal Zone, and Canada on the Trophy list.



In 6-1/2 months of operation, Gary, WNØQDP, Winona, Minn., has worked 42 states.

(from page 40)

through a resistance of one ohm. Expressed Algebraically:

$E = IR$, which may be transposed to $I = E/R$ and $R = E/I$, where E = potential in volts, I = current in amperes, and R = resistance in ohms.

Knowing any two of the quantities, the third is easily calculated with the aid of these formulas, as few examples will show.

Example: How much current is required to cause a current of 2.5 amperes to flow through a resistance of 5 ohms?

$E = IR = 2.5 \times 5 = 12.5$ volts.

If a current of 15 milliamperes flowing through a certain resistance causes a voltage drop of 75 volts across it, what is the value of the resistance?

R = E/I; therefore, remembering to convert milliamperes to amperes, R = 75/.015 = 5,000 ohms.

How much current will flow through a 50,000-ohm resistor connected across the output terminals of a 300-volt power supply as a "bleeder" resistor?

I = E/R = 300/50,000 = 0.006 amperes, or 6 milliamperes.

Mathematics In The General Class Examination

In the **General/Conditional/Technician Class** examination, there are several questions based upon the diagram, **Fig. 1** and the following question, with different values of voltage, current, and resistance.

In the circuit diagram, Fig. 1, what is the value of the bias voltage? What is the value of the bleeder resistance, R2?

First, we find the voltage drop across **R1**. Its value is given as 300 ohms. Also given is the 15-milliampere plate current of the tube, which must flow through **R1**; therefore, **Ec** = 300 X .015 = 4.5 volts. The bias voltage is 4.5 volts.*

The current through **R2** is given as 10 milliamperes, and the voltage across it (**Eb**) is 300 volts; therefore, **R2** = 300/.010 = 30,000 ohms.

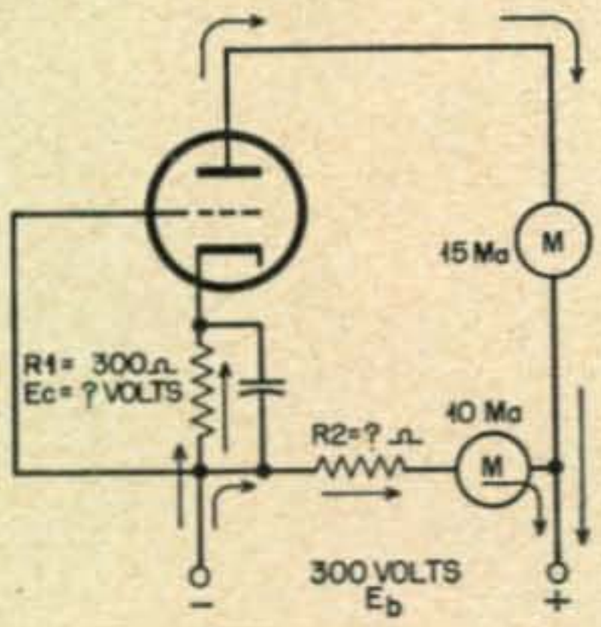


Figure 1. The diagram upon which Ohm's-Law problems in the General Class examination are based. The arrows show the current flows through two separate paths in the circuit. Although not asked for in the examination, the total current drawn from the power supply is the sum of these currents.

* Direct-current voltage applied to the control grid of a vacuum tube is usually called the **bias** voltage. In the circuit of **Fig. 1**, the grid is connected directly to the B- point, while the cathode is connected to the same point through **R1**. The voltage drop across **R1** makes the cathode 4.5 volts positive with respect to the common B- point. Thus the grid is biased negative with respect to the cathode. This is called **cathode bias**. Its main disadvantage is that it decreases the effective plate voltage by the amount of the bias voltage. The condenser connected across **R1** provides a low-impedance path for alternating-current signals around the resistor.

There are seven questions relating to calculating frequencies in the **General/Conditional/Technician Class** study guide, but basically they are of two types.

A 2000 Kc., low-drift crystal having a negative temperature coefficient of 5 cycles per megacycle per degree Centigrade is started in operation at 40 degrees Centigrade. If the temperature-frequency characteristic is linear, what will the oscillation frequency be at a temperature of 60 degrees Centigrade?

The phrase "negative temperature coefficient of 5 cycles per megacycle per degree Centigrade" is the key to this question. It means that the crystal frequency **decreases** 5 cycles per million cycles for every degree Centigrade of temperature rise. 2000 kilocycles is equal to 2 megacycles (2,000,000 cycles), therefore the frequency decreases 10 cycles per degree of temperature rise, or a total decrease of 20 x 10 = 200 cycles.

200 cycles equals 0.2 kilocycles; therefore the oscillation frequency at 60 degrees Centigrade will be 2000 kilocycles minus 0.2 = 1999.8 kilocycles.

Variations in this type of problem include specifying a **positive** temperature coefficient instead of a negative one, so that the frequency increases with temperature and giving the frequency change directly in cycles per degree of temperature change, without reference to the change per megacycle. When the latter is true, the frequency change per degree is multiplied by the number of degrees of change and the result added to or subtracted from the original frequency, depending upon whether a positive or a negative temperature coefficient is specified.

A low-drift crystal for the 3,500-4,000 kilocycle band is guaranteed by a manufacturer to be calibrated to within 0.04% of its specified frequency. Desiring to operate as close to the lower band limit as safely possible, for what whole-number kilocycle frequency should you order your crystal, allowing one kilocycle additional for variation in temperature and circuit constants?

3,500 kilocycles is the lower band limit. Assuming no error, we could theoretically order a 3,500-kc. crystal, because there would be no difference between the actual and the specified frequency. This would be the equivalent of dividing 3,500 kilocycles by 1. thus:

Fx = 3,500/1, where Fx = the unknown frequency.

But an error of 0.04% is possible. Because we must stay inside the band limit, we must choose a higher frequency than 3,500 kilocycles. Therefore, we subtract the calibration error from our divisor of 1, getting:

Fx = 3,500/(1 -0.0004) = 3,500/0.9996 = 3,501.4 kilocycles.

Adding one kilocycle as a safety factor gives a frequency of 3502.4 kilocycles, and the nearest whole-number kilocycle frequency safely within the band is 3503 kilocycles, **not** 3502 kilocycles.

In addition to solving the problem, we have evolved a general formula for solving similar problems. It is:

$Fx = F1/(1 - n) + K$

where:

Fx = unknown frequency
F1 = lower band limit
n = calibration error expressed as a decimal
K = safety factor.

The formula for calculating how close to the upper band limit it is safe to operate is evolved in a similar manner. It is:

$Fx = Fu/(1 + n) - K$

where:

Fx = unknown frequency
Fu = upper band limit
n = calibration error expressed as a decimal
K = safety factor.

Substituting the words "upper band limit" for "lower band limit" in the question and solving the second equation gives:

Fx = 4,000/1.0004 — 1 = 3,997.4 kilocycles,
and the required answer is 3,997 kilocycles.

These formulas are also used to calculate how close to the edge of a band a transmitter frequency may be set with the aid of a frequency meter with a possible calibration error of a known percentage. Omit **K**, if no additional safety factor is specified.

How to solve the problems referring to power input have already been discussed.

Naturally, the questions in the actual examinations are different than the ones used here, and so are the figures. But, if you can work these, you need not fear any

(Continued on page 59)

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Henry Radio Stores

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(from page 34)

that remains is to put the recording on the air without introducing distortion.

The first step is to make a small modification of the speech amplifier as is diagrammed in the schematic. The solid lines in this diagram show the standard input to the second speech amplifier stage usually found in amateur transmitters. The output of the pentode microphone amplifier works into a 1.0-megohm volume control, and the grid of the second stage is fed from the variable tap on this control. The dotted lines show the two new parts added: a 100,000-ohm resistor and an *RCA-type* phono jack. The jack, its shell grounded to the chassis, is mounted as close as possible to the gain control; and the resistor is connected between the ungrounded jack connection and the variable tap of the control.

The next and final step is to prepare a special patch cord for connecting the tape recorder to this new input jack. It consists of a convenient length of shielded microphone cable with an *RCA-type* phono plug on one end and a *Mallory* type 85 plug, its shield cover discarded, on the other. A one-watt resistor, with a resistance as close as possible to the voice coil impedance of the speaker used in the recorder, is soldered directly across the connections of the Mallory plug. As an example, the *Ekotape 205* recorder used by the writer has a speaker voice coil impedance of 3.2 ohms!; so a 3.3 ohm resistor is used. The surplus resistor leads are not clipped off for reasons given later.

The *Mallory* plug is inserted in the "External Speaker" jack of the tape recorder, and the other end of the cord is plugged into the jack just mounted in the speech amplifier. The transmitter is turned on and the speech amplifier gain control adjusted to give normal modulation with the microphone. The gain control will usually have to be set slightly higher than before. Then the tape recorder is turned on and its volume control adjusted so that the tape recording modulates the transmitter satisfactorily. By adjusting the speech amplifier gain control and the recorder volume control, mixing of the two input levels is attained; and various relative levels between them can be established. For example, the microphone can be set so that it will override the tape recording and permit comments to be made on the tape recording as it is being played.

Only two precautions need be observed: first, the gain control of the speech amplifier will affect the level of the recorder input if it is reduced to too low a level. In practice, however, this seldom occurs, because the gain control will usually be set at least one-third open; and from this point up the setting of the control has negligible effect on the recorder input level. Second, it is a good idea to keep the recorder as far as practicable from the transmitter while a recording is being played to prevent the possibility of r-f feedback getting into the input circuit of the recorder.

To monitor the output of the recorder, fasten small battery clips to the cord tips of almost any set of earphones and clip them across the ends of the plug-mounted resistor that were left long for just this purpose. Whatever is being transmitted from the recorder can be clearly heard by this means.

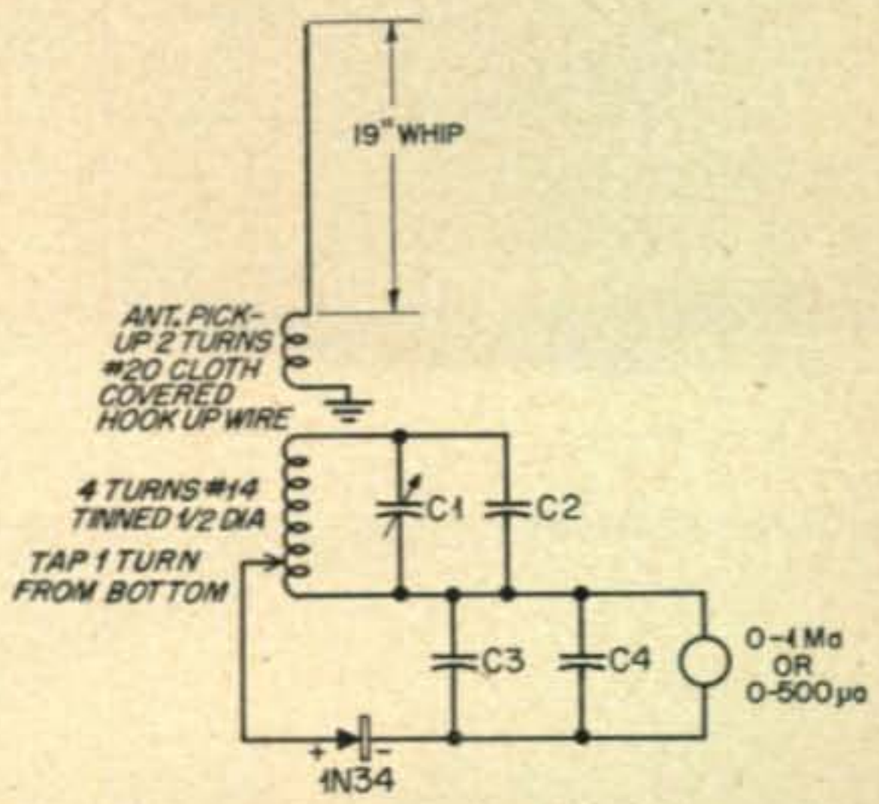
This method of connecting the recorder is admittedly of the "quick and dirty" variety and doubtless would not receive the blessing of a broadcast engineer or a high-fidelity enthusiast; but it has proved eminently satisfactory in actual practice at the writer's station. Several amateurs have stated it is extremely difficult to distinguish between an original transmission and one recorded and played back as described above. These things may be said in favor of the method:

(1) It costs little and is simple to install. (2) Minimum changes are made in the transmitter. (In fact, when the cord is removed from the speech amplifier, the latter will perform exactly as it did originally.) (3) The fidelity is perfectly adequate for the material being handled. (4) The recorder can be left connected while not being used and so is ready to be put into action at a moment's notice. (5) The ability to mix the two inputs permits several interesting arrangements to be made.

John T. Frye, W9EGV

Two Meter Handy Dandy

It is essential to have some type of indicator around the shack to tune a two-meter transmitter. The schematic shows a very simple device for this purpose. It was constructed in a



C1 SMALL 2 PLATE APC TYPE VARIABLE.
C2 2 μμfd SILVER MICA, PADDER.
C3 100 μμfd SILVER MICA.
C4 12 μμfd SILVER MICA.

(Continued on page 46)

Another First for INTERNATIONAL CRYSTAL

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.01% TOLERANCE—Crystals are all of the plated, hermetically sealed type and calibrated to .01% or better of the specified frequency when operated into a 32 mmf load capacitance.

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International
TYPE FA-9

(fits same socket as FT-243)

RANGE (kc)	TOLERANCE	PRICE
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12500-13615 14000-14850	.01%	$3.90
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HOW TO ORDER

In order to give the fastest possible service, crystals are sold direct and are not handled by any jobber. Where cash accompanies the order, International will prepay the Air Mail postage; otherwise, shipment will be made C.O.D. Specify your exact frequency and the crystal will be calibrated to .01% or better of this frequency with the unit operating into a 32 mmf load capacitance.

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BOX 5035 • LONG BEACH, CALIF.

(from page 44)

2"x4"x4" utility box. The meter is an inexpensive 0-1 ma. unit. Using this meter, it is possible to tune a 3-watt 144-Mc. transmitter, six feet away from its vertical whip.

The gadget is handy when tuning up a beam. Mount it in front of the beam and tune the transmitter for maximum radiation. This system is better than using the dip in the plate meter, as the dip is not always the point of maximum output.

The parts are mounted as shown and if centered correctly will just fit into the box. The tuning condenser will clear the meter terminals, but as a precaution some electrical tape should be wound on the terminals.

To calibrate, make a rough check with your transmitter, using several crystals, or a grid-dip meter. The variable condenser can be padded with 2.0 $\mu\mu$fd. silver mica condensers if necessary. Using a drawing set compass and India ink, the dial is complete.

Edmund H. Marriner, W6BLZ

Book on Ground Conductivity Available

Only within the past few years have radio engineers conceded that ground conductivity and soil types do not go hand-in-hand. The wrench in the gear box was noted some time ago when broadcasting stations on the lower frequencies with identical equipment were unable to radiate identical field strengths—even if the soil types near the antenna were the same. Sure enough, the files of the FCC has revealed that soil types and ground conductivities are not always the close parallels they were thought to be.

To straighten out this mess, the National Bureau of Standards has released their "Circular 546" which is available from the Government Printing Office for 65c. It contains 84 maps of the United States showing exactly was the measured ground conductivity is in most urban and semi-urban areas. This is a handy thing for the fellow on 160 or 75 who wonders why some guys get out and he doesn't.

KEYING

(from page 15)

center terminals on the switch. Connect *R1* to the corresponding top switch terminal. Connect the corresponding bottom switch terminal to the "tip" terminal of the output phone jack.

Disconnect the wire with the *black tracer* in the power cable from *pin 9* of the tube sockets. Connect this wire to the remaining center terminal of the switch. Connect *pin 9* of the tube sockets to the remaining top terminal of the switch. This completes the modification.

With the switch up, the *Signal Sentry* works normally. With it down, the filaments are shut off, and the output of the receiver is fed directly to the phones. I marked the switch *"Fils.," "On," "Off,"* with letters obtained from a panel-marking decal set.

CRYSTALS

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NOTE! Every crystal tested for activity before shipment! All nos. listed are fundamental frequencies in kilocycles.

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Lots of 5 or more. Ea. 79c
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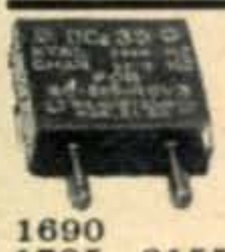
		2715	3015	3455	6362	7500	8000
		2720	3020	3465	6373	7510	8006
1110	2450	2725	3025	3500	6375	7520	8008.3
1129	2455	2730	3030		6405	7530	8010
1150	2460	2740	3035	3525	6406	7540	8016.7
1195	2465	2745	3040	3540	6425	7550	8020
1525	2470	2750	3045	3580	6440	7560	8025
1900	2475	2755	3050		6450	7570	8030
1915	2480	2760	3055	3640	6473	7580	8033.3
1930	2485	2765	3060	3655	6475	7590	8040
1940	2490	2770	3065	3680	6500	7600	8041.7
1950	2495	2775	3070	3700	6506	7610	8050
1965	2505	2780	3075	3760	6525	7620	8058.3
1977	2510	2785	3080	3800	6540	7630	8060
1980	2515	2790	3085	3825	6550	7640	8066.7
1985	2520	2795	3090	3885	6573	7650	8070
2010	2525	2815	3095	3940	6575	7600	8073.3
2015	2530	2825	3100	3955	6600	7666.7	8075
2017	2535	2830	3105	3980	6606	7670	8080
2020	2545	2835	3110	3990	6625	7680	8083.3
2025	2550	2840	3115	3995	6640	7690	8090
2035	2557	2845	3120	6000	6650	7700	8091.7
2040	2560	2850	3125	6006	7000	7710	8100
2055	2565	2855	3130	6025	7006	7720	8106.6
2060	2570	2860	3135	6040	7025	7730	8108.3
2065	2575	2865	3140	6042	7040	7740	8111.0
2090	2580	2870	3145	6050	7050	7750	8116.7
2105	2585	2875	3150	6073	7073	7760	8125
2125	2590	2880	3155	6075	7075	7770	8130
2130	2595	2885	3160	6100	7100	7780	8133.3
2135	2600	2890	3165	6106	7106	7783.3	8140
2140	2603	2895	3170	6125	7125	7790	8141.7
2145	2605	2900	3175	6140	7140	7800	8150
2155	2610	2905	3180	6142	7150	7810	8158.3
2165	2615	2915	3185	6150	7160	7820	8160
2175	2620	2920	3190	6173	7173	7830	8163.4
2180	2625	2925	3195	6175	7175	7840	8166.7
2195	2630	2930	3200	6185	7200	7850	8170
2300	2635	2935	3202	6200	7206	7860	8173.3
2305	2640	2940	3205	6206	7225	7870	8180
2320	2645	2945	3210	6225	7240	7880	8183.3
2350	2650	2950	3220	6235	7273	7891.7	8190
2355	2655	2955	3225	6240	7275	7890	8191.7
2360	2660	2960	3230	6250	7306	7900	8200
2365	2665	2965	3235	6273	7300	7910	8206.6
2370	2675	2970	3240	6275	7325	7920	8208.3
2375	2680	2975	3290	6300	7340	7930	8210
2390	2685	2980	3300	6306	7350	7940	8216.7
2415	2690	2985	3310	6315	7375	7950	8220
2430	2695	2990	3320	6325	7400	7960	8225
2435	2700	2995	3340	6335	7406	7970	
2440	2705	3005	3410	6340	7425	7980	
2442	2710	3010	3420	6350	7440	7990	

DC-34 & DC-35

PIN SPACING ¾"



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1705	2155	2435	2764	3161	3650	3895	4135
1720		2446	2775	3190	3655	3905	4150
1738	2175	2466	2776	3201	3665	3920	4155
1746	2195	2467	2807	3270	3680	3925	4175
1770	2202	2478	2816	3279	3695	3935	4177.5
1790	2215	2491	2831	3280	3700	3940	4192.5
1810	2220		2851	3297	3702.5	3950	4210
1830	2235	2510	2853	3311	3705	3960	4215
1850	2240	2514	2894	3317	3710	3965	4235
1870	2255	2527	2895	3365	3730	3985	4240
1890	2258	2540	2899	3385	3745	3995	4255
1910	2275	2559	2925	3390	3750	4012.5	4275
1930	2280	2586	2926	3395	3760	4015	4280
1950	2295	2587	2960	3412.5	3765	4020	4305
1970	2300	2605	2971	3422.5	3770	4030	4310
1990	2315	2625	2980	3462	3775	4035	4325
2010	2326		3000	3480	3790	4050	4335
2030	2335	2643	3010	3485	3792.5	4055	4345
2050	2340	2665	3023	3500	3807.5	4065	4350
2075	2355		3027.5	3520	3825	4080	4370
2082	2360	2685	3055	3540	3830	4085	4380
2090	2375	2710	3077.5	3550	3850	4090	4397.5
2105	2390	2711	3095	3575	3855	4095	4415
2106	2395	2725	3117	3580	3870	4097.5	4435
2131	2415	2732	3149	3610	3885	4115	4440

FT-241 LOW FREQUENCY CRYSTALS

Lots of 10 or more. Ea. 79c
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		451	456	461	465	470	476
		452	457	462	466	472	477
446	448	453	450	463	468	474	479
447	450	454	459	464	469	475	480

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327.8 KC No. D-168342. (Used in TS-102/AP)	9.95	2647 KC FT-243	2.99
500 KC FT-241	1.99	2670 KC DC-34	2.99
1000 KC FT-241	2.49	2738 KC type 1-C	2.99
1000 KC Type DC-9, in octal tube holder	3.45	2738 KC FT-243	2.99
2000 KC FT-243	1.99	2738 KC MC-7	2.99
2142 KC DC-34	2.99	3000 KC FT-243	1.99
2174 KC DC-34	2.99	3088 KC FT-243	2.99
2182 KC FT-243	2.99	3093 KC FT-243	2.99
2500 KC FT-243	1.99	3098 KC FT-243	2.99
2632 KC FT-243	2.99	3103 KC FT-243	2.99
2637 KC FT-243	2.99	3188 KC FT-243	2.99
		3193 KC FT-243	2.99
		3198 KC FT-243	2.99
		3203 KC FT-243	2.99
		5000 KC FT-243	1.99
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BRAND NEW! COMPLETELY SHIELDED! HERMETICALLY SEALED! Schematic diagram affixed to each unit.
1 POWER TRANSFORMER: Input, 117 VAC, 60 cycles. Output, 660 VCT at 85 MA; 5 V. at 2 amps; 6.3 V. at 7.5 amps; 6.3 V. at 0.3 amps.
1 DUAL FILTER CHOKE: to match above transformer. 9.5 henry @ 85 MA
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78-B MEASUREMENTS CORP. TEST SET
Modulation 400 and 8200 cycles. Two bands: 15-25 MC. and 190-230 MC. Operates on 110 VAC 60 cycles.
New condition $49.95
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Head Band: Fits standard dual headset units.
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7BP7 . . . . . 3.95

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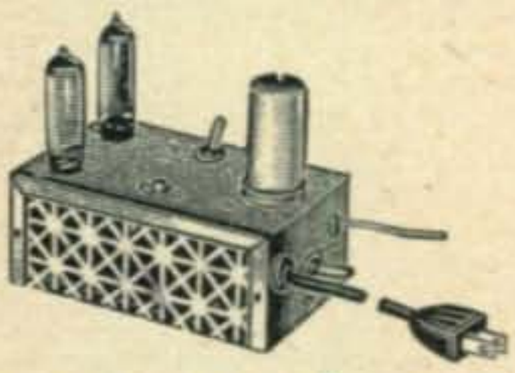
NEW BUD 2-Tube Frequency Calibrator FCC-90A



The elimination of drift is a vital responsibility of every amateur operator. To comply with Federal Regulations some means of accurately checking transmitter frequency must be available at every "Ham" station. You can avoid a "pink ticket" for off-frequency operation by using the BUD self-powered frequency calibrator. The new, improved BUD FCC-90A uses 2 tubes—50C5 and 35W4. It consists of a 100 kc crystal oscillator that is completely self-powered and will give 100 kc check points on all bands to 30 megacycles. This enables you to determine the exact band edges.

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DX CONTEST RESULTS

(from page 24)

203 and a Zone multiplier of 75. The 203 multiplier is one of the highest turned in by any station in the world. With a 75A1 receiver; 813 power amplifier and eight different antennas, **OK1MB** had a field day into W6 land with over 44 contacts. It is only fair to point out that with no restrictions between "iron curtain" countries, OK1MB's log shows dozens and dozens of contacts with all of the rare Russian prefixes. Almost all of the Russian countries are represented in his log, including several Zone 19 contacts and many of the old standbys, such as UI8KAA, UQ2AB and a host of UBs, UCs, etc.

Second highest European score was a prefix too seldom heard in recent years, but now ably represented by **SP3AN** with 251,728 points; the result of 55Z, 169C and almost 400 contacts. An outstanding operator with a splendid signal, **SP3AN** represented a new country to a surprisingly large number of contestants. Third highest European score was **DL1AU** with **240,097** points. Just prior to the test his beam broke down and the XYL had to give beam directions with a compass. Rig: 100 w., modified SX17, long wire on 3.5 and 7 Mc., rotaries on 21 and 14 Mc. Strong support of the IDXC by the DARC resulted in unusually fine participation by the DLs.

Phone Scores

Generally speaking, in any DX contest held over more than one weekend, conditions are not uniformly favorable. For some years now, the phone men seem to have been beset with poor luck when it comes to conditions and the **1953 World-Wide DX Contest** was no exception. Conditions were tolerable, but definitely inferior to the CW weekend. Coupled with less DX activity, the A3 scores ran lower in every single category for the phone competition.

World-high phone score was **CT1FT**, operated by **CT1BW**. Under any conditions the outstanding score of **268,796** points is impressive. 80 through 10 were employed with surprisingly good results on both the top and low band. The multiplier was 216C, 82Z and 902 QSO points. Operator **CT1BW** worked 14 countries on 28 Mc, one of the best performances on that band. Push-pull T55's at 250-watts input provided the r.f. A 24-tube, double conversion superhet and an SX42, plus ten separate antennas further helped . . . ranging from a half-wave Zepp and two half-waves in phase on 80, down to fixed beams in the N-S E-W directions on 40, 15 and 10. Congratulations to **CT1BW** and to **CT1FT** for his fine station.

Southern European signals had a very definite advantage over the rest of the continent as evidenced by the fact the three top leaders were located in that portion of the continent. Second highest European score was **EA2CQ**, **137,600** points, with a multiplier of 50Z, 150C and 688 QSO points amassed on all bands on 80 through 10. Third highest European score and one of the top world scores, was another well-known Portuguese DX man, **CT1QG**: Raul has a multiplier of 48Z, 136C and 275 contacts for **112,608** points.

How did the Americans make out in the phone contest? A lot of points separated the high American from the rest of the U.S. competition, and **W1ATE** proved that he could hold his own with any DX station located anywhere. Chad turned in the outstanding score of **155,742** points with a total multiplier of 69Z and 133C worked on five bands from 80 through 10. Chad comments that conditions were worse than any contest to date: 75 meters being exceptionally poor and 40 extremely inactive. 15 meters **was the** bright spot at **W1ATE**, but did not show the same promise in the rest of the world. Chad pointed out that between 1948 and 1952, no W ever had a higher world position than sixth, but this year he moves into **Second World High!** Despite the generally poor conditions, **W1ATE's** score is still the highest American phone score ever submitted for the **World-Wide DX Contest.**

W1ATE's equipment used on 3.5 Mc., two switchable 3-element vertical half-wavelength beams and one half-wave folded dipole vertical; 7 Mc. 2-element rotary, 0.1 wave spacing and a half-wave folded dipole, both over 110' high; 14 Mc., 3-element rotary and 6-element Sterba curtain; 21 Mc., 3-element rotary; 28 Mc., 3-element rotary and a 540' utility antenna, long wire 100' high. A kilowatt on all bands with a Collins receiver rounds

(from preceding page)

out an outstanding station. Second high U.S. score is **W2SKE**, Bill Leonard, who took time out from his TV shows to turn in 57,810 points, based upon 53Z and 88C and 410 station points. Bill uses a 75A3, 65' ground plane on 80 and 40 and rotaries on 15 and 20; transmitter is a Collins KW1. Bill also comments on extremely poor conditions on all bands except 15. Third highest U.S. score and outstanding because it comes from the mid-west where DX is considerably more difficult under adverse band conditions, **W9NDA** got 48,510 points with a multiplier of 53Z, 94C and 330 points. It is an operating achievement of far greater magnitude than the number of points might indicate and raises the hopes of all DX men in the mid-west "island."

Highest West Coast score is that of **W6YY**, achieved without the benefit of a strong 21-Mc. opening. Conditions definitely worked against the interest of the West Coast gang who put in a mighty effort, but just couldn't hear the stuff to work. 176 QSO's and a multiplier of 43Z and 61C gave John **39,416** points. Equipment used: 4-1000A driven by a 32V3, Collins 75A2, RME-69, two RME DB-23 preselectors, vertical on 80 and 40, 2-element phased array on 20 and a piece of "haywire" on 21 Mc.

Two other scores are particularly worth commenting on in the Central American-North American competition group. **VP9BG** turned in **93,288** points with a multiplier of 49Z, 107C and 598 QSO points. While, of course, there are a lot of North American QSO's in his log, there's an extraordinarily large amount of choice DX despite adverse conditions. **HP3FL** with **72,765** points had a multiplier of 54Z, 81C and 539 QSO points. A prefix that isn't heard too often, Frank made a lot of DX men very pleased to get the contact.

In the **World-Wide DX Contest** with conditions good, bad or indifferent, Asians can do well because of their strategic location. High score for the continent of Asia was **4X4DK** with **102,760** points followed by 4X4BO with 88,172 points resulting from a multiplier of 26Z, 83C and 809 QSO points on 14 and 21 Mc. only. Equipment consisted of PP 6L6s, 2-element fixed 14-Mc beam; and two folded dipoles; SX-23 receiver. Ample evidence that only conditions prevented some "adding machine" scores are the large number of rare prefixes in the logs of the individual country winners. In the log of **4X4BO**, for example, there are over fifteen prefixes that do not appear in the 14-Mc. log of W1ATE.

Third high Asian score was a prefix that meant a new country for a lot of DX men, **OD5AD**, who confined his operation to 14 Mc. and had 222 QSO's in 21Z, 52C for **45,917** points. The W's who worked **OD5AD** can count themselves mighty fortunate since there are less than a dozen stateside contacts in the whole log.

Oceania usually supplies more than its fair share of contestants, but not so this year. Leading this area was **KH6AWM** with **52,726** points, consisting of a multiplier of 35Z, 47C and 645 QSO points. Russ would have turned in an even bigger score, except for a misunderstanding of the rules, resulting from his first participation in this event. You can look forward to hearing the big signal of KH6AWM next year, adding up to a lot more points.

ZL1BY proves again that he can handle a microphone as well as a key by turning in a score of **46,761** points; 48Z, 61C and 429 QSO points. Those same three 550' V beams fed by an 813, modulated by 807's put out an equally potent signal on A3. An NC240D completes the station of **ZL1BY**. Only lack of operating time also prevented Bill from turning in a larger score. Third high for Oceania is **ZL1MQ** with **36,487** points, 48Z and 59C. Cliff's 95 watts, double conversion receiver and V beam plus 3-element fixed beam on 14 Mc. is one of the best known ZL sigs active.

South Americans who have in past years run away with the **World-Wide DX Contest** didn't fare as well this year. Leading the continent was **HC1MB**, operated by Lt. Col. W. G. Boyd, another American enjoying the satisfaction of being on the receiving end of a DX event. 225 QSO's, 35Z and 56C gave Willis **57,057** points. This score was followed very closely by **PY2AHS** with **53,280** points, 36Z, 75C and 480 QSO points. Contrary to what you might expect in going through a South American log, i.e., page after page of W's, openings from that continent favored the rest of the world and there are only a scattering of American contacts. Unusual conditions to say the least.

(Continued on next page)

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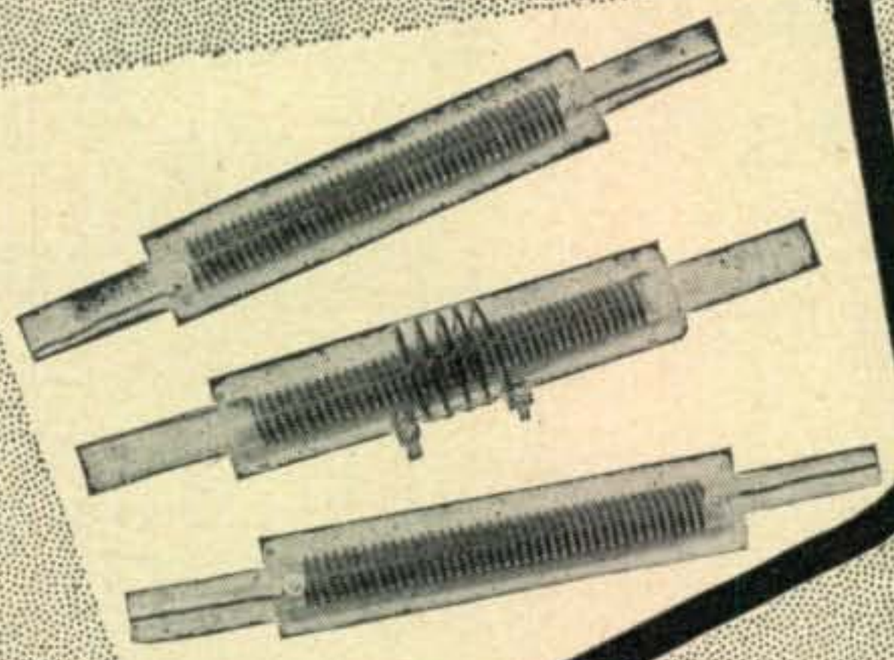

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Africans suffered less from the conditions than some of the other continents, and leading the field is **VQ4RF** with **154,721** points representing 36Z, 83C and 907 QSO points. A versatile CW operator, **VQ4RF** provided a new Zone and Country multiplier to many of the phone contingent this year. Top band for **VQ4RF** . . . 21 Mc., of course, with three times the score that he made on 14 Mc. Second highest African score was **CN8MM** with **146,142** points; 40Z, 93C and 1,174 QSO points. Except for a fair 21-Mc. opening to the United States, American contacts represented a very minor portion of the log. Third highest African score was **ZS1MP**, 57Z, 92C and 748 QSO points for **111,452** points. Don used 100 watts and an SX71 receiver. His very effective antenna is a rhombic designed for 21 Mc., 275' per leg, 60' high with a 70° angle, fed with 600-ohm line. With performance good on all bands from 80 through 10, its dimensions might be of interest to some of the DX fraternity. Since **ZS1MP** will shortly be in Canada, this is the last **World-Wide Contest** where that call will be presented. **OQØDZ** operating from Ruanda-Urndi deserves a special vote of thanks since he depended solely upon a gasoline power plant. His **95,172** points represents one of the outstanding African scores and made 277 DX men happy.

Multiple Operator Participation

Not all DX men have the stamina or the time to participate in a DX Contest as a single operator station. For this reason, and to welcome club operation, the multi-operator category has been established, which not only can earn an award for the station, but for each operator. An increasing number of stations are participating in this class and the results of such combined activity show up in some outstanding scores. In the phone category, one of the extraordinary scores of the entire contest was turned in by **TA3AA** in Turkey; operated by **W6OME** and **W1VQG**, not only is this one of the sterling operating performances of the contest, but also the highest phone score turned in by any class of contestant. Andy and Ed had 527 QSO's, 43Z, 140C and a final score of **282,918** points. To do it, they used a rhombic pointed on the United States, a BC610 running on a half kw. and a Collins 75A1. To quote them, "We believe that this type of contest is the only truly DX contest, as all countries are trying to work all others rather than most countries trying to work a certain one." If you look at their log you will see what they mean with page after page of mouth-watering prefixes in all continents. The stateside rhombic earned them considerably more contacts with W's than might have been expected under the very adverse conditions. When old-time DX men think back to the years when Turkey was among the rare of the rare countries, they appreciate what the effort of TA3AA and TA3MP means to DX men.

Another prefix rarely heard until a local club went in for contest operating, is **ET2US**, operated by nine club members on phone, 40Z, 91C and 818 QSO points earned the **Kagnew Station Amateur Radio Club 107,158** points. All bands were used from 7 Mc. to 28 Mc. with 20 and 15 turning in equivalent performance. Interesting to note is an opening into Asia on 10 meters with Malaya, India and several choice countries represented. Third highest multi-operator phone score submitted was **KG6AEX** with three operators turning in **92,760** points, 46Z, 74C and 773 contact points. Single 833A's running 400-watts input with a separate rig for each band were employed. An HRO with crystal control converters; NC183, 7-Mc. ground plane and an unusual multi-band beam provided the signal. On 20, 15 and 10 a triple stack 8JK, whose fundamental is 14 Mc., with 22' spacing is employed. Switchable phasing is used to give uni-directional or bi-directional characteristics as desired. Incidentally, 80-meter operation was not yet permitted on Guam during the contest. **KG6ADY** and **KG6AEV** were the operators.

When a W7 turns in the high American multi-operator score, that's news! Bob Hoffman, **W7DL**, one of the top West Coast DX'ers with the assistance of **W6VUW** did exactly that; **86,223** points, 271 QSO's 48Z and 75C. Push-pull 450TH's at a kilowatt, 75A1 and 75A2 receivers; ground planes on 75, 40 and 15 with a 3-element 20-meter rotary complete the equipment. From any part of the states, it is a fine performance; from the far Northwest, it is outstanding.

Following W7DL, is **W6AM** with **78,472** points, 238 QSO's, 53Z, 83C; operating at Don's station was **W6BXL, 6JID, 6KPC** and **6QMC** as well as **6AM.** With separate finals running a kilowatt and receivers by

(Continued on next page)

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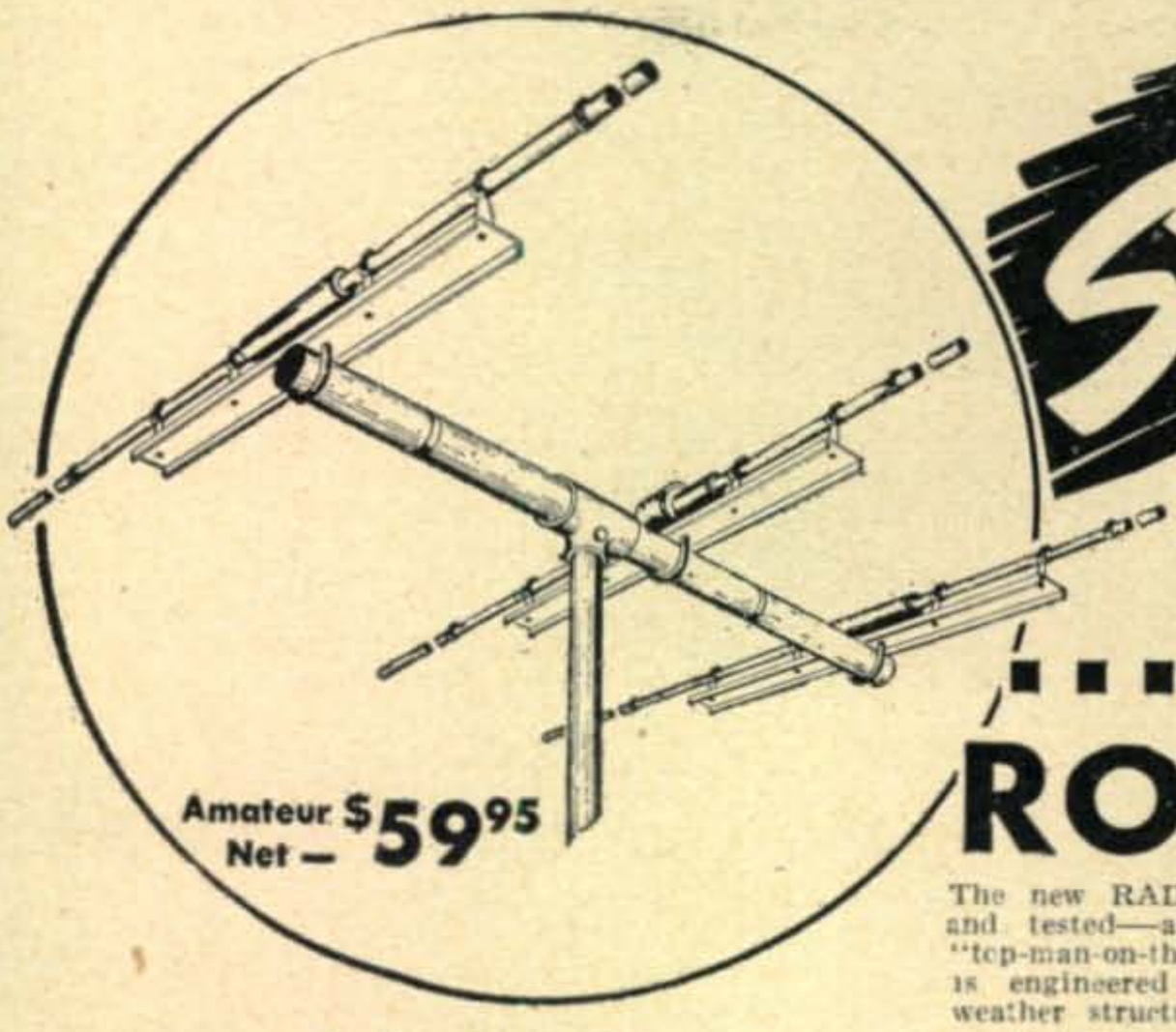

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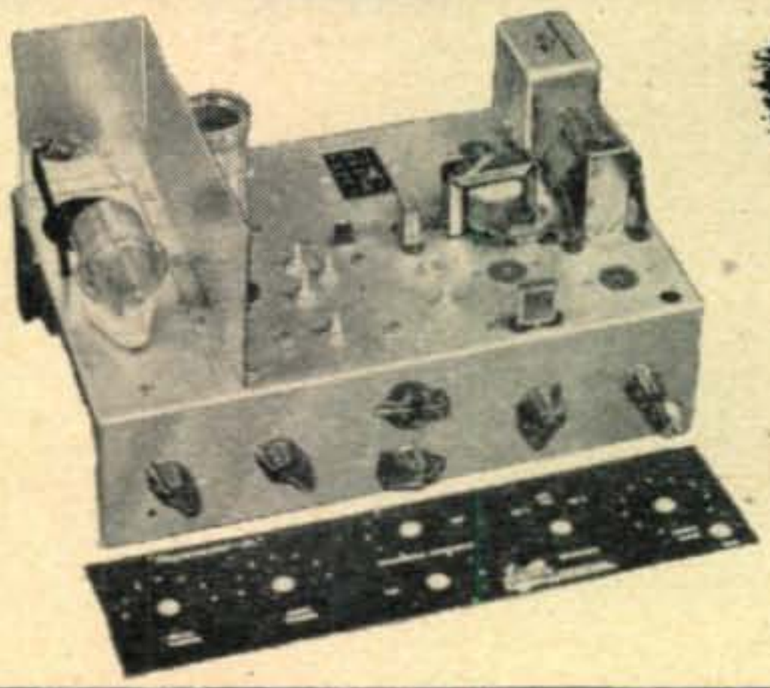

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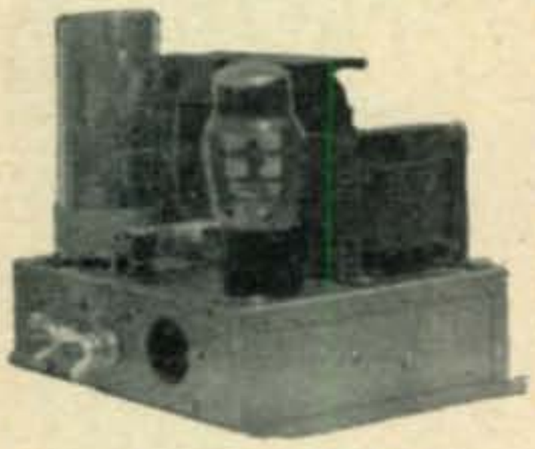

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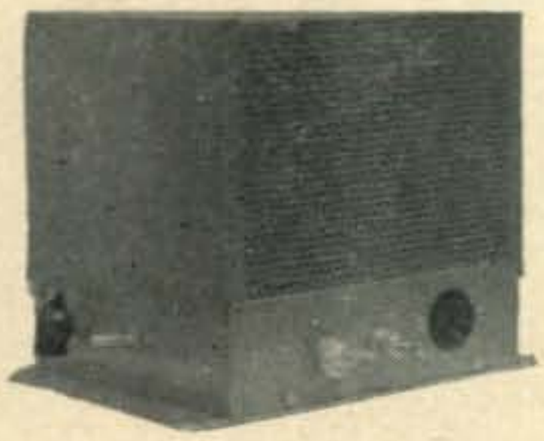

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(from preceding page)

every standard brand manufacturer, 12 rhombics and a Sterba curtain, plus a dozen miscellaneous operating aids, W6AM is always near the top of a contest.

The multi-operator CW group took advantage of favorable conditions and unlimited stamina to turn in a group of extraordinarily high scores very closely grouped together. Leading the world was **ET2US** with **239,121** points, represented by 53Z, 110C and 1,467 QSO points. Writes secretary C. W. Green of the Kagnew Station Amateur Radio Club of Asmara, "Have had much fun participating in both the phone and CW sections of this contest." So did the over 1000 DX stations throughout the world that worked them on phone and CW. The outstanding performance of this station on both phone and CW certainly emphasizes the versatility of their operators. Congratulations to all nine of them!

Amazingly close on the heels of ET2US is **KG6ADY**, operated with the assistance of **KG6AEX**; **221,494** points, the result of 66Z, 116C and 1,217 QSO points. Had 3.5 Mc. been permitted, KG6ADY might have been in the top spot. As it is, no apology is necessary for this splendid performance. And so close behind KG6ADY that it is almost a tie, is **KX6BF. 217,700** points, 57 zones, 83 countries at 1,555 contact points. Operators at KX6BF were **W5TIY, W5RGA, W6VIG** and **KX6BG.** Based upon listening for the past six months, the operators report extremely poor European conditions with no phone opening and only a very mediocre CW opening. Conditions were rated about average for the CW contest and below par for phone.

For the U.S. **W6AM** did it on CW with the help of **W6BXL, 6GFE, 6JID. 6KPC** and **6QMC.** They amassed **212,128** points, 370 QSO's, 85Z, 139C. A tremendous score for the West Coast and ample demonstration of 6AM's powers, if it is still needed. A new multi-operator American group shows up this year with **W9AVJ.** The **Northwest Amateur Radio Club,** operated by **9PKW, 9GVZ, 9NZM** and appropriately enough, **9DX.** This group has taken over the station of the late W9LM and now uses separate push-pull RK63 finals on all bands, 75A3; SX88: Super Pro; 3.5 Mc. ground plane and rotaries on 40, 20 and 15. 362 QSO's, 68Z, 107C for **168,350** points is a performance that rates cheers, particularly considering the extremely unfavorable conditions to the Mid-West during this competition.

TEST EQUIPMENT

(from page 28)

age should be bucked out with a d-c voltage of the same value but of opposite polarity. There have been devised a number of ways to do this and one of the simplest is to use a double diode. One section is used as a voltmeter rectifier and the second section used only for its contact potential which is applied to and in opposition to that of the first section.

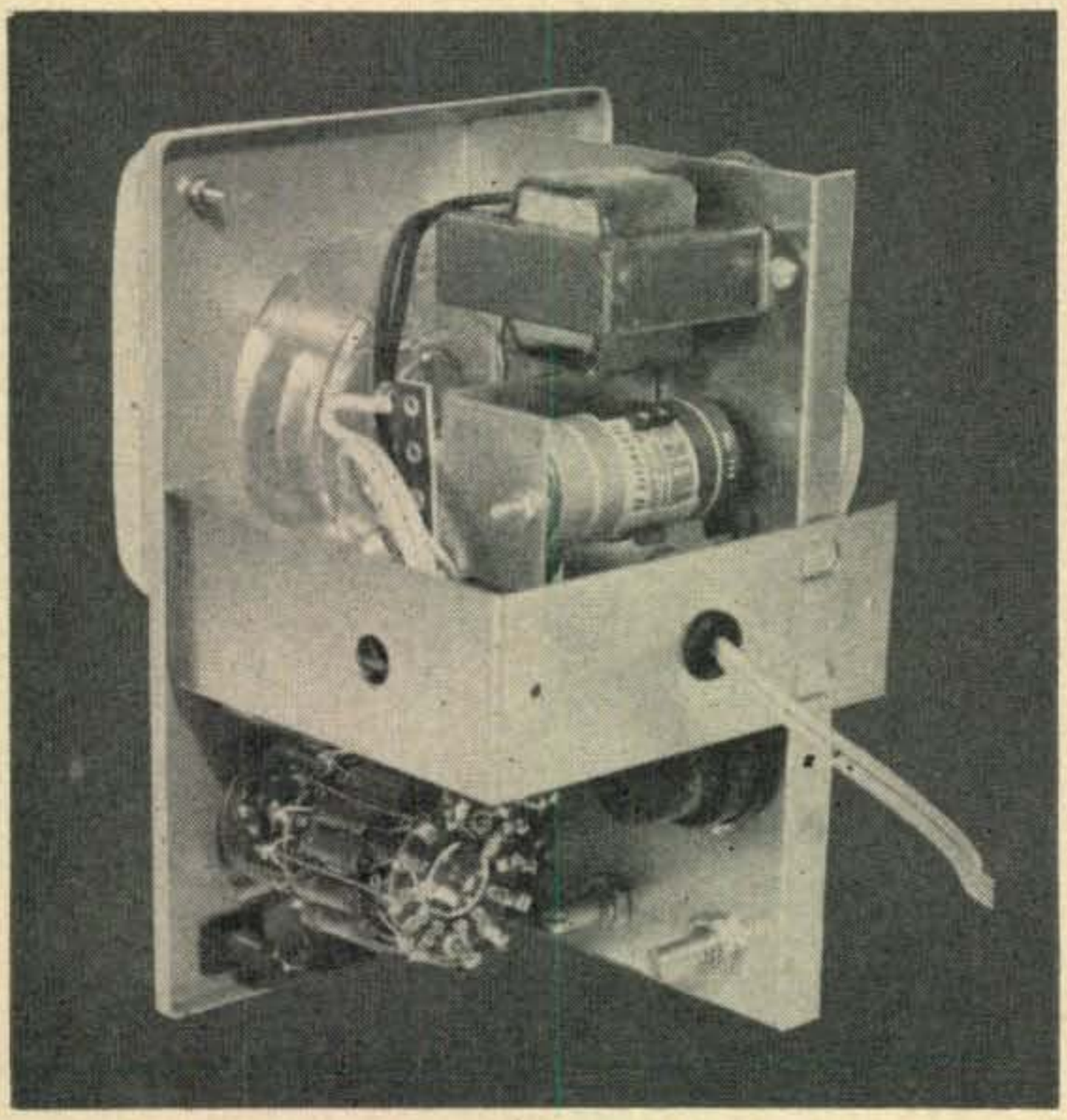
This method of eliminating the contact potential is used in the *Heathkit VTVM* and gives very good results. In this case a 6H6 tube is used. In the specs for the meter as given by the *Heath Company,* the response of the a-c portion of the meter is given only for the audio range. However, in checking one of these meters we find it to be much better than this, with good response into the lower r-f region with the exception of several spots which seemed to show small peaks. These perhaps could be removed with a little work.

For those who are about to acquire a VTVM either by building or buying, a small point may

(from page 28)

be in order. It is suggested that for use around the Ham shack or in places where strong external fields exist that it is wise to get a meter with a metal case or with shielding. A strong r-f field can completely upset the balance system and calibration on an otherwise good meter.

Unlike many other instruments, there is very



The rear view of the Heathkit VTVM shows the neat construction possible with the well planned out kits supplied by that company.

little that needs to be said regarding the operation of a VTVM. With normal care and sensible operation they will give long and dependable service. In most cases the VTVM is less susceptible to overload damage than the ordinary volt-ohm-milliameter because the plate current swing of the tubes is limited to a value which will not damage the movement.

When measuring a-c voltages it is always a good plan to ground the meter case if possible and to ground the piece of equipment which is being checked. If this is not done, capacity pick-up will give many false readings. With the increased sensitivity you now have, you will be measuring voltages that you never knew existed.

YL's FREQUENCY

(from page 34)

licity chairman. W6WRT, Ruby, tells us over thirty members turned up for the special meeting with all but one of the past eight presidents of the club attending. Especially welcomed was W6QYL, Martha, who was presented with a nice casserole from the club. As of June 27th Martha will be Mrs. W6RDQ. Martha

(Continued on next page)

LOOKING FOR DX? GET A GOTHAM BEAM AND WORK THE WORLD!

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10 M. BEAMS

S103T - Std. 10m 3-El. T match, $18.95. 1—8' Boom, 3/4" Alum. Tubing; 3—6' Center Elements, 3/4" Alum. Tubing 6 — 6' End Inserts 5/8" Alum. Tubing; 1 — T Match (4'), Polystyrene Tubing; 1—Beam Mount.

D103T - DeLuxe 10m 3-El. T match, $25.95. 1—8' Boom, 1" Alum. Tubing; 3—6' Center Elements, 1" Alum. Tubing; 6—6' End Inserts, 7/8" Alum. Tubing; 1 — T Match (4'), Polystyrene Tubing; 1—Beam Mount.

S104T - Std. 10m 4-El. T match, $24.95. 1—12' Boom, 1" Alum. Tubing; 4—6' Center Elements, 3/4" Alum. Tubing; 8—6' End Inserts, 5/8" Alum. Tubing; 1 — T Match (4'), Polystyrene Tubing; 1—Beam Mount.

D104T - DeLuxe 10m 4-El. T match, $30.95. 1—12' Boom, 1" Alum. Tubing; 4—6' Center Elements, 1" Alum. Tubing; 8—6' End Inserts, 7/8" Alum. Tubing; 1 — T Match (4'), Polystyrene Tubing; 1—Beam Mount.

15 M. BEAMS

S152T - Std. 15m 2-El. T match, $22.95. 1—12' Boom, 1" Alum. Tubing; 2—12' Center Elements, 3/4" Alum. Tubing; 2—5' End Inserts, 5/8" Alum. Tubing; 2—7' End Inserts, 5/8" Alum. Tubing; 1—T Match (6'), Polystyrene Tubing; 1—Beam Mount.

D153T - DeLuxe 15m 3-El. T match, $39.95. 1—12' Boom, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 2—5' End Inserts, 7/8" Alum. Tubing; 2 — 6' End Inserts, 7/8" Alum. Tubing; 2—7' End Inserts, 7/8" Alum. Tubing; 1—T Match (6'), Polystyrene Tubing; 1—Beam Mount.

20 M. BEAMS

S202N - Std. 20m 2-El. (No T), $21.95. 1—12' Boom, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 7/8" Alum. Tubing; 1—Beam Mount.

S202T - Std. 20m 2-El. T match, $24.95. 1—12' Boom, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 7/8" Alum. Tubing; 1 — T Match (8'), Polystyrene Tubing; 1—Beam Mount.

D202N - DeLuxe 20m 2-El. (No T), $31.95. 2—12' Booms, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 7/8" Alum. Tubing; 1—Beam Mount. . .

D202T - DeLuxe 20m 2-El. T match, $34.95. 2 — 12' Booms, 1" Alum. Tubing; 2—12' Center Elements, 1" Alum. Tubing; 4—12' End Inserts, 7/8" Alum. Tubing; 1 — T Match (8'), Polystyrene Tubing; 1—Beam Mount.

S203N - Std. 20m 3-El. (No T), $34.95. 1—12' Boom. 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 7/8" Alum. Tubing;1—Beam Mount.

S203T - Std. 20m 3-El. T match, $37.95. 1—12' Boom, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12', End Inserts, 7/8" Alum. Tubing; 1 — T Match (8'), Polystyrene Tubing; 1—Beam Mount.

D203N - DeLuxe 20m 3-El. (No T), $46.95. 2—12' Booms, 1" Alum. Tubing; 3—12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 7/8" Alum. Tubing; 1—Beam Mount.

D203T - DeLuxe 20m 3-El. T match, $49.95. 2—12' Booms, 1" Alum. Tubing; 3 — 12' Center Elements, 1" Alum. Tubing; 6—12' End Inserts, 7/8" Alum. Tubing; 1 — T Match (8'), Polystyrene Tubing; 1—Beam Mount.

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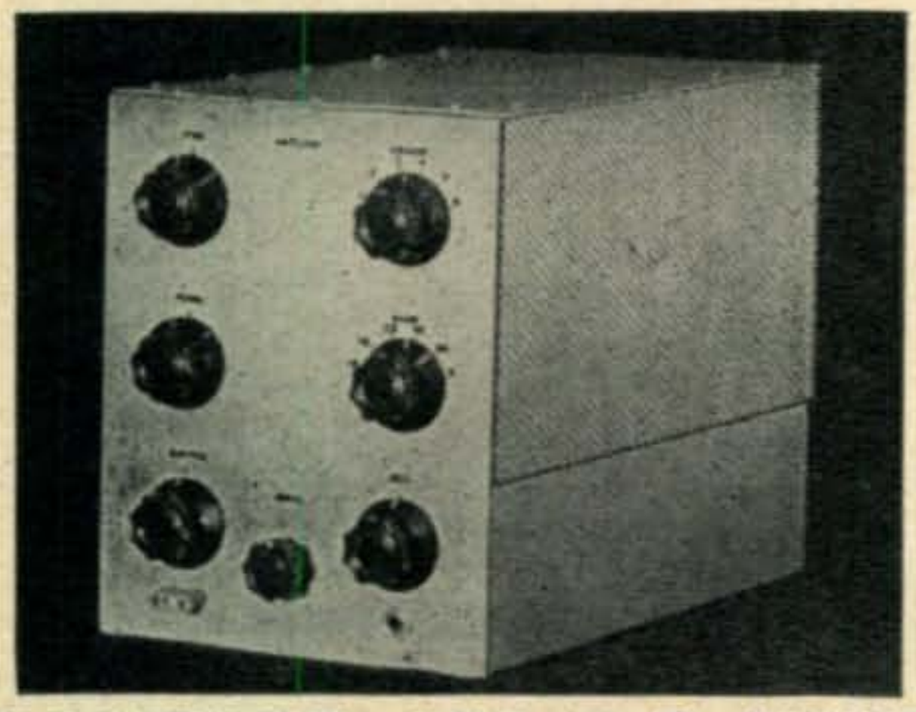

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Relocation of applicant must not disrupt an urgent military project.

(from preceding page)

credits W6JZA, Elsa, for introducing Noel to her, via Ham radio, of course.

Here and There

NYLON members are planning a picnic for August 15, at Deep Lake near Olympia, Wash. W7FWR, Mary Ann, is in charge. OMs and jr. ops have been invited, and the YLs will welcome any others who might be visiting the area.

In Arizona the Hamfest at Montezuma Well in May drew about 200, with five licensed YLs: W7RIJ, PMQ, OUE, OJT, and KOY. . . . W7PMQ and W7OUE also made it to the New Mexico State Hamfest at Silver City June 5-6 where they met YLs W5RFK, TYX, BZB, DRA and PLK.

Congratulations are in order for W2GPK, Sylvia, on the arrival of a jr. op, Alan, on April 23. This makes W2EEO, Madeline, a proud grandma. . . . Congratulations also to I1ADA, Ada, on becoming the bride of I1MM on April 24.

W2PZA, Jean, writes from Italy that she is having a marvelous time. . . . W2QGB, Anne, leaves June 30 for six weeks in the Scandinavian countries. . . . W6UXF, Enid, goes to Europe in July for three months. . . . W6LBO, Mary, and the all-Ham Eastman family (W6AWI, Lee; W6DXI, Gladys; KN6EJE, Frances, and KN6DRZ, Ronnie) went to Acapulco, Mexico, for the LMRE Convention.

7th Anniversary

This August '54 issue of CQ is a milestone for your column editor. It was just seven years ago with this issue that we began conducting the YL's column (W2OLB had handled it for 15 months prior to that). Then we were W1OOH. Since that time we've held calls W2OOH, W7OOH, W5RZJ, and now WØSCF. During these seven years, while attending conventions from Maine to California and in our travels across the continent and from Canada to Mexico, we have met **in person,** by actual count, 188 different YLs. With these, all those we've corresponded with and written up in these pages, plus the ones we've QSO'd on the air, we've had contact with a great number of the licensed YLs. Here's hoping we'll meet many more of you, one way or another, in the years to come!

'Till next month, 33—WØSCF

PROPAGATION

(from page 31)

LUF and OWF. Circuit analysis graphs of this type are used for forecasting the band openings appearing in the **CQ Propagation Charts.**

The following are some of the assumptions made in preparing these **Charts:**

a) A CW radiated power of 150 watts is assumed, where radiated power is equal to the power fed into an antenna, multiplied by the gain of the antenna over a halfwave dipole a halfwave above ground.

b) Propagation is assumed as skywave, considering F2 reflection only, unless indicated.

c) Assuming that an additional 6 db. of signal is necessary to maintain equivalent intelligibility between an amateur type radiotelephone circuit and a reference CW circuit, these **Charts** can also apply for a phone radiated power of 600 watts.

d) For other values of radiated power, add or subtract one from the circuit reliability rating indicated next to the time of opening for each 4 db. difference in radiated power from the reference of 150 watts CW or 600 watts phone. For example, if a rating of 3 is given in the **Charts** (opening expected 50% of the days of the month) and your transmitter is radiating 60 watts CW, then you may generally expect openings on this particular circuit for only 25% of the days, a rating of 2, etc.

The accuracy of these predictions is carefully checked each month. A very careful check is made of available commercial circuit data, and from circuit data made available from the logs of readers of this column as well as various short wave listener logs. In this respect I want to again state my appreciation to Mario, I1ER, for his very complete monthly circuit data reports from Italy; to Norm, G3CEU, for the propagation bulletins that he makes available to me from England; to Gene, W2ESO, for the many checks he makes of the predictions, to the **Bulletin of the Newark News Radio Club** for its fine monthly logs on amateur and short wave DX reception and to the many readers who send in reports concerning the forecasts.

Odds and Ends

In the February and March issue of **Radio REF**, official publication of the French amateurs, there appears an excellent article on the propagation of short waves. It is written by Serge Canivenc, FQ8AP and I recommend it to readers of this column who can read French. In a response to a number of requests, I intend, in a future column, to review some of the present day literature on the subject of radio propagation.

As expected, a sharp increase in sporadic E type propagation has been observed during May, June and July. While on this subject I would like to mention that I have been receiving a bulletin issued by an organization called the American Ionospheric Propagation Association (AIPA). This group is interested in **television** DX. It is extremely interesting to note the large number of long distance TV reception reported by members of the AIPA that can be attributed to sporadic E propagation. Most of these reports are of reception of television channels 2-6 at distances up to 1400 miles and occasionally multi-hop reception at much longer distances. These TV channels are within the frequency range of 54 to 88 Mc. On May 17, what appears to be some sort of record for sporadic E propagation was reported when two AIPA observers in Ithaca, New York, claimed reception of TV station PRF-3 located in Sao Paulo, Brazil. PRF-3 operates on channel 3, between the frequencies of 60-66 Mc. and is about 5000 miles from Ithaca, N.Y. Reception was reported as quite good between the hours of 2100-2130 EST. It would appear that this was 4-hop sporadic E reception, which is quite unusual. AIPA members have also reported fairly consistent reception of stations located in Cuba, Mexico and the Dominican Republic. Anyone interested in TV-DX and desiring to become a member of AIPA can contact Robert B. Cooper, Editor In Chief, 1016 Sunnybrook Drive Lafayette, California, for further information.

DX NEWS

(from page 38)

signal to Europe on 7039 kc. around 2300 GMT . . . **CEØAD** (Easter Island) has been putting out a very strong signal around 0000 GMT on 14007 kc. (Not too experienced on pile-ups) . . . WØQBA nabbed **MD4YL**, 14055, 0100 GMT . . . **MP4KAC** should now be back on the air (phone) . . . Evan, **TI9UXX**, visited TI2TG and advised that return trip to Cocos is quite possible if his boat operates in that area . . . W2RDK reports activity from **ZK2AB** (Niue) . . . **VR3A** QSL's will catch boat in July . . . On June 6 **YJ1AA** was reported on 14061.5 between 0300/0400 GMT . . . **I5SG**, 1815 GMT, 14039 . . . W6LN ponders **KD6AT** QSO'ed on 7 Mc. May 21 . . . Wiktor, YO6AW, reports, **YA1US** and **AC4NC** as

(Continued on page 56)

BRAZILIAN CONTEST

The LABRE holds its annual contest as follows:
CW Section—0001 GMT, Sat. Sept. 4 to 2400 GMT. Sun. Sept. 5. Phone Section—0001 GMT, Sat. Sept. 11 to 2400 GMT. Sun. Sept. 12. Six numeral serial numbers will be exchanged between contestants. The first three being the RST and the second three the contact number starting at 001. Contacts between stations in the same country, for multiplier purposes, shall count 0 points. Contacts between different countries in the American area count 2 points. Contacts between the Americas and all other countries count 3 points. Multipliers are the sum of all American countries worked on each band plus each PY call area. Certificates will be awarded to first and second place stations in each country for SINGLE BAND and MULTIBAND (3 bands) high scorers. Logs must be mailed before November 30 to *LABRE, Caixa Postal 2353, Rio de Janeiro, Brazil.*

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(from page 55)

pounding into his QTH in the morning hours (That's what the man says!).

EA6UU/MM is aboard a coastal ship running to West Coast and Central American ports . . . **FY7YB** returns to Cayenna, Fr. Guiana in July . . . **F9UC** is active as **F9UC/FC** in Corsica . . . **EA9DD, DE** and **DF** plan Ifni trip in September . . . Activity is possible from **FB8BK** on Tromelin Islet (Near Madagascar) . . . **FB8BC** is QRT and returns to France . . . **FF8AY** is located at Fort Miribel, French Sahara, about 810 miles south of Algeria . . . FD8AB is now **FF8BE** in Niger, F.W.A. . . . W5KBU reports **VK1HM, VK1DJ** and **ZC2AC** are active on Cocos Island, 14 phone, looking for W5's from 1300 to 1600 GMT daily . . . **AB1US** (Formosa) skeds KA3RR, 1200 GMT, daily on about 14115 . . . Activity from Togoland, FD, is predicted soon by CN8MM (Via W5ALA) . . . **AC3PT** is due to become active again, 1200/1300 GMT, skeds may be made via VK6MR (Via W5ALA) . . . Bill McAninch of **ZC6UNJ**, is now with Army G2 Washn. D.C. He advises that ZC6UNJ will be off the air after May 17 unless operated by commercial ops with UNTSO. If ZC6UNJ is worked and the QTH given as Govt. House, "No-Man's Land," between Israel and Jordan then you have the genuine ZC6UNJ. Any missing QSL's may be obtained from Box 585, Mingo Junction, RFD #1, Ohio . . . The "AG2" prefix of Trieste is now alive again and represented by **AG2LN** (W7MVU), **AG2GY** (W4MVB), **AG2DX** (W1QPX ex-OE13DC) and **AG2AA** (W7SEI ex-W5TBQ and DL4UI). First QSO's were made on May 12 with 4X4DX A3, CN8HJ A3, TA3AA A3 and G6FQ A3. First CW QSO was with W8EKK. QSL's may go via Box 301, Trieste, F.T.T. or via Signal Office, Hdqtrs. TRUST, APO 209, c/o PM, N.Y. . . . **VP8AJ** (G3AXN) Grahamland goes home on leave this year, but this QTH will be kept on the air via **VP8AA** and **VP8AZ**. Any missing QSL's can be had by applying to G3AXN.

HONOR ROLL ENDORSEMENTS

(To June 15, 1954)

W6ENV	40-250	W6EFM	40-217	W6CAE	39-146
W6AM	40-246	W6WWQ	40-192	TI2TG	38-221
W2AGW	40-244	KV4AA	39-237	WØTKX	38-186
W8PQQ	40-244	W2WZ	39-235	W4EPA	37-158
W6MX	40-242	W1CLX	39-235	W9WCE	37-149
W3JNN	40-239	W9HUZ	39-208	W5FXN	35-166
W6DZZ	40-238	W1ZL	39-206	PHONE ONLY	
W7BD	40-229	W4RBQ	39-196	W3JNN	37-199
W6TI	40-222	W2RGV	39-178	W1MCW	36-212
WØDU	40-218	W6LGD	39-162	W2RGV	35-148

Last complete HONOR ROLL appeared in the May issue. Next complete HONOR ROLL will appear in the October issue.

New Addresses

AG2 Bureau—Box 301 Trieste, FTT. or, Hdqtrs Sigs, TRUST, APO 209, PM, N.Y.
FF8AJ—Yves Bijault, Box 396, Abidjan, Ivory Coast, FWA.
FF8AY—J. P. Dentan, DECCA, Fort-Miribel, via C.P.A. 7 Rue Daguerre, Alger.
FF8BE—Pierre Dubourdieu, Box 44, Niamey, Niger, FWA.
FF8BF—Charles Tenot, 25 Avenue Roume, Dakar, FWA.
FF8BG—Dr. Lucien Perrot, Hospital de Niamey, Niger, FWA.
FK8AO—Georges Birepinte, Airport, TONTOUNA, Fr. New Caledonia.
HZ1AB—Dave, 1414th G.P. Airbase Comm. APO 616, P.M. N.Y.
KA2AK (ex-KJ6AY)—Bill Slep, 1503rd Ops. Sqdn. APO 226. PM. SF Calif.
KF3AB—M/Sgt Cyril Hull, 1983D AACS, Sq. APO 23 T/3, PM. N.Y.
KS6SB—Box 14, Navy 935, FPO, SF. Calif.
KV4BI—Otto Latimer, Christiansted, St. Croix, V.I. USA.
OD5AX—Box 1202, Beirut, Lebanon.
PX1AR (June '54)—Via W4BRB.
SU1BB—Terry, c/o APO S/215 Aqaba Jordan, MELF 18. GPO London.
SU1MR—Box 672, Cairo, Egypt.
SV2RI (Rhodes)—Via RSGB.
TI Bureau—Radio Club of Costa Rica, Box 2412, San Jose, Costa Rica.
UB5CF—Box 52, Odessa, USSR.
VK1AC (Macquarie)—Via VK3RJ.
VK9OK (Apr. 26/May 8 '54)—Via ZL1AJU, 6 Roose Ave., Pukekohe, New Zealand.

(Continued on page 58)

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(from page 56)

VK9SP—c/o A.P.C. Omati, Papua Territory.
VK9YT—Via W8EUR
VP2GX—Clifford Palmer, Education Dept. St. Georges, Grenada, BWI.
VS6CT—Box 541, Hong Kong.
W3ORO/2 (ex-DL4EF)—Major A. L. Hamel, Box 324X, Rte 1, Browns Mills, N.J.
ZB1AUV—Hugh, 35/2 Inguanez St. Rabat, Malta.
ZC5SF—G. H. Harrison, Harbourmaster, Sandakan, Br. North Borneo.
ZC7DO—Via G4CP.
ZD9AB—Via ZS1FD.
Thanks to West Gulf Bulletin, KP4JE, VK3FH, W9EU, W5ALA, W5BNO, W6YY, W5KUC, W5UCQ, G2MI, W5UUK, F9RS, TI2TG and WØFID.

DX-Ploits

Andy, **W6ENV**, advances to a solid 250 with FO8AJ and VS4RO and passes G6ZO and W3BES . . . Don, **W6AM**, hops to 246 with FL8MY and VS4RO. This jumps him over W6SN, G6RH and W3GHD . . . Howy, **W2AGW**, nabbed MP4QAH for No. 244 and kept pace with Al, **W8PQQ**, who also hit 244 with PX1AR . . . **W6MX** went to 242 with VS4RO . . . Oscar, **W3JNN**, came up to date with 24 additions setting him on 239. His A3 total rose to 199 . . . Ed, **W6DZZ**, pulled in VS4RO, PX1AR and EA9AP raising him five positions to 238 . . . El, **W7BD**, went to 229 thanks to VS4RO while Horace, **W6TI**, also nabbed Bob for No. 222 . . . Ray, **WØDU**, added seven including VR3A, FO8AJ and OD5AV to reach 218 . . . **W6EFM** was right behind with 217 thanks to FO8AJ and VS4RO . . . **W6WWQ**, Bill, added 20 to rest on 192 while **KV4AA** finally nabbed MP4QAH for No. 237 . . . Al, **W2WZ**, upped to 235 with VR6AY while Van, **W9HUZ**, went to 208 with VS4RO and JZØKF . . . Carl, **W1ZL**, nabbed SV2RI for his 206th as Buck, **W4RBQ**, went to 196 with VR3A . . . Jack, **W2RGV**, came up to date and advanced 7 to 178. His phone total went up 12 to reach 148 . . . Clay, **W6LGD**, moved to 162 with AB1US while **W6CAE** moved to 146 with new list . . . **TI2TG**, Tom, now rests on 221 with the addition of PX1YR, MP4QAH and VS4RO . . . Bob, **WØTKX**, upped to 186 with VR3A while **W4EPA** scored with LZ1KDP, KR6OS and VR3A to reach 158 . . . **W9WCE** advanced to 149 with such as EA9DF, EA9AP, ZC4RX and FO8AC while Jim, **W5FXN**, rested on 166 with OD5XX . . . In "phone only" Lou, **W1MCW**, added FO8AJ for No. 212 . . . **W8JGU** went to 145 with VR3A, MP4BBL and UA3KET! . . . **VK2QL** snagged VR3A on 3.5 Mc. . . . **W2SUC's** new two-element phased beam resulted in MF2AG, YU2CO, SU2BZ and I5LV (Box 605, Magadiscio) . . . **W3RXM** A3's to VK9YT and FO8AJ and also pulled in VR3A and KR6OS . . . **K1FCM** hooked LB4ZC, 025, 0100 GMT.

Hal, **VE3IEG**, creeps closer to DXCC with VP2GX, AG2DX, 4X4FF and OD5AX. He seeks cards from VQ4CM and HC2FC . . . **W2UNR** added MP4QAH . . . **OK1MB** finally nabbed XE1AX for Zone 8 . . . **W7KVU** reached 243 with VS4RO, MP4QAH, I1BNU/T and LZ1KDP . . . **VR3A** was No. 200 for Bob, **W2CTO** . . . Beda, **OK1MB**, was No. 1 man in Europe for the '53 **CQ** contest . . . Ted, **TI2BX** (CP1BX), has 47 countries and 44 states to show for two months of operation . . . **PY2JU** goes to 83 on 21 Mc. with such as ZD6RD, EA6AR, VP1GG, CT3AE, XZ2KN, SVØWO and EL2X, All A3 . . . **W6YY** nabbed HKØ's DF, ER and EX . . . Joe, **W2HQL**, went to 63 with EA9DF, EL2X, CR6CS, VK9RH, KM6AX, PJ2CE, HH2OT and ZB1AUV . . .

Here and There

VR2BJ advises (via W2QHH) that his call was pirated on 160 . . . **W6AM** visited WØELA and says that Clyde may head for Brunei (or Sarawak) again within a year's time . . . We trust that Chas, **W5RX**, has now completely recovered from his operation. He may soon be stationed in KV4-land . . . **W5FXN** seeks present whereabouts of Henry Greenville, op of EL2R, Feb. '52 . . . **ZD9AA** visited G2MI in May . . . Roy, **MP4BBD**, visited W6BAX. He will go to DU-land and hopes for license there . . . Lightning removed **W4EPA's** folded dipole but he continued with attic job . . . Jim, **G6ZO**, visited ST2AR in Khartoum . . . OK-land now has 21-Mc. band and OK1MB will be heard on CW above 21,100 . . . **W6AUG** keys from K2USA . . . **KP4TF** dropped in on KV4AA . . . We recommend W3AXT's "DXERAMA" for the "Award-minded" Ham. It provides logging space and complete info on some 32 operating awards. Price is one buck ($1.25 foreign).

73, Dick

NOVICE SHACK

(from page 42)

mathematics in the examination. For practice, make up and solve similar problems, until you can solve them effortlessly.

Letters And General News

It is probably just as well that Ray, **EL2X**, does not list calls in the following letter. "**Dear Herb:** I have been hearing Novice stations throughout the States for the past several months on the 3.7-Mc. band. The WN9's have the most outstanding signals, with the WN4's next in line. I have called them time after time on a crystal frequency of 3750 kc. with no results. A quick CQ will always get a 'W' reply though.

"It seems as if the Novice operators are picking the loudest signals they hear and letting the weak ones go by. Will you pass on this information to them so that I can give some of the WN boys a new country (Liberia) on 3.7 Mc.? The best time is between 0100 and 0700 GMT (1:00 to 3:00 a.m, CST), and I am on nearly every morning. The 7-Mc. WN band is no good here, because of heavy commercial interference."

Dan, **W9VYX**, writes; "Enjoy reading **Novice Shack** even though we dropped our 'N' over a year ago. Remembering that Novices are QSL conscious, I'd like to sked a Utah Novice on either 3.7 Mc. or 7.175 Mc. I have worked all states, but I cannot beg, borrow, or steal a QSL from Utah. I am VFO, so I can 'zero' on any Novice frequency. . . . Still use Novice rig (65 watts input) and **S-20R** receiver. Can testify that low power gets out, since I worked ZL1CI on 3,515 kc. My address is 3221A North 81st St., Milwaukee 16, Wisc. 73."

Martin, **K2GBJ/2** (he just moved) asks a question which has puzzled others. "Since call letters belong to the station license, is it proper to use your own call when visiting a friend's station, or are his call letters demanded?"

(**Answer:** Use his call letters and sign his station log book opposite all entries of transmissions for which you are responsible. You must have your operator's license in your possession at the time, and you must operate within the limitations of your operator's license. A Novice, for example, can operate the station of a General Class operator, but only in the Novice bands with a power input not exceeding 75 watts.)

From Honolulu, Jack, **WH6BFM**, says, "I want to tell you of my set-up here in Hawaii. I run ten watts to a single 6L6. The antenna is a doublet, 66 feet long and 40 feet high. In two weeks I have had 60 QSO's in five states and Alaska. I operate daily on 3722 kc. up to 11:00 p.m. and to 3:00 a.m. on weekends. . . . I will soon be on with a 35-watt, 6AG7-6L6 job. Plan to construct a 40-meter, vertical ground-plane antenna over the summer and really work that DX, hi."

Frankie Maxwell, **WN4FED**, Box 147, Danville, Georgia, says, "I haven't yet completed my 40-watt rig, but I have had four fine contacts, thanks to **WN4ATZ** in Macon. He was kind enough to bring his 70-watt rig down one afternoon for me to use. One of the contacts I had was with James, WN4BKK, in Dublin, Georgia. Hearing that I did not have a rig of my own, he kindly offered to let me use a 10-watt rig with which he has worked 44 states on 3.7 Mc. . . . I am 15 years old and **am not** a YL. I would like to hear from other Hams running up to about 15 watts, to learn about their antennas and receiving equipment. My receiver is an **NC-88.**"

Dave, **KN6DNY**, says, "Just thought I'd drop you a line before I leave on my vacation in Alaska. Boy, I've surely had a lot of fun since getting this Novice ticket. I have had over 400 QSO's in 41 states and five countries during my three months on the air. Forty meters is my beat. Too much QRM on eighty. My station consists of a **TR-75** transmitter, an **NC-240D** receiver, and a ½-wave doublet about 45 feet high. Next time I write, I'll have my 'General.'"

Help Wanted

Robert P. Hartman (26), 1730 N W 85 St., **Miami, Fla.**

Louie Donnet (15), 1214 Ontario St., **Burbank, Calif.** Needs help on the code and would like to

(Continued on next page)

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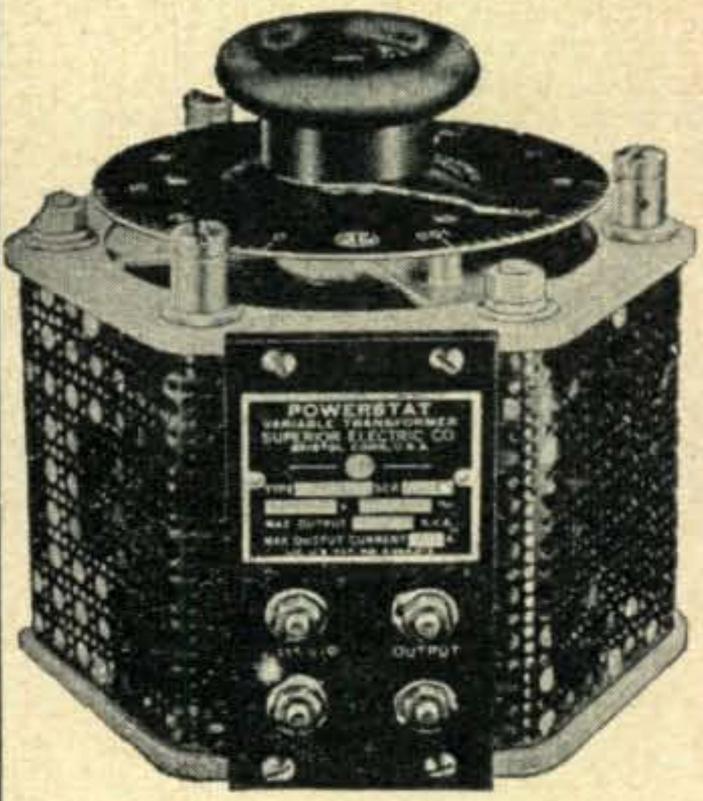

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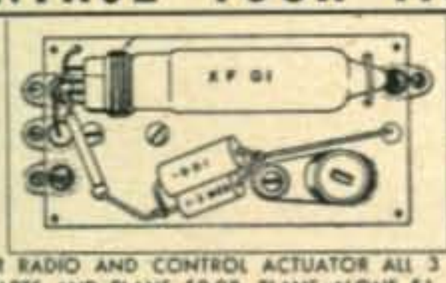

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(from preceding page)

hear from anyone with a **Heathkit** AR-2 receiver.

Thomas Dismachek (17), 400 Commonwealth Ave., **Duquesne, Penna.** He is the spokesman for himself and three friends.

John Lyon (13), 1208 S. Vine St., **Urbana, Ill.** Wants to hear from Novices about his age with AT-1 transmitters or AR-2 receivers.

Bill Drager, 6 Florence St., **New Brunswick, N. J.** Phone: CH-7-3045.

Mark Marshall (14), 530 Hazel Ave., **Millbrae, Calif.** Phone OXford 7-5013.

Robert Detmer (17), R.R. #2, **Chillicothe, Ill.**

Don Forbes (12), 80 Lawndale Ave., **Norwood, Manitoba, Canada.** Phone: 422684.

James Greer, Box 346, **Camp Wood, Texas.** Needs help with code. Has a small radiosonde transmitter he is willing to trade to anyone with any use for it.

John E. Blyler, R.D. #1, **Ashville, Pa.** Was WN3TXJ. Needs help in General Class theory.

More Letters

The first of several offers of help received this month is from Lawrence Wood, **K2CSD,** 1067 Fifth Ave., New York 28, N.Y. "Dear Herb, The main reason I am writing is to offer my help to anyone in the New York Area who wishes to get started. I am 17, and would especially like to hear from the 13-19 age group, YL's preferred! Many Hams were very helpful in getting me started. W2JIO, "Cover Boy" for **CQ,** June, 1954, was one. I only hope that I can do half as much as these wonderful guys did for me. . . . I always get a little envious when I read of Novices who work 30 states in two or three months. Because we have d-c house current, I decided to go on 145 Mc. with about fifteen watts. More power would overload the d.c. to a.c. converter. I have made about ninety contacts in almost a year. But, since I am a ragchewer from 'way back, few of them have been for less than a half hour."

From M/Sgt. Harry L. Mossor, **W8PHA,** 920 South Franlin St., Mt. Pleasant, Mich., "This is a small town, but we have a club going with about fifteen licensed members, the majority being Novices. Anyone desiring help to get started could contact the club or myself. The club address is: Mt. Pleasant Amateur Radio Club, 201 North Main St., Mt. Pleasant, Mich."

From ex-Novice Jim Morrell, **W4DQI,** 709 North Illinois St., Arlington 5, Va. Phone: JA 7-9564. "I'll be very willing to help some 'Ham to be' around Arlington to get his license. I am 15. In the June **Novice Shack,** Dave, **WN7TUV,** says he had to wait twelve weeks for his Novice license. I had to wait only 31 hours for my General Class to come. Nice going on the FCC's part."

From William G. Welsh, **W1SAD,** Waltham, Mass. (UN-8880), "The **El-Ray Amateur Radio Club** conducts free code, theory, and FCC regulations classes from 8 to 10 p.m. each Tuesday evening. Although the club is a **Raytheon**-sponsored group, it is not necessary to be a **Raytheon** employee or a club member to join the classes. W1's BOD, EIQ, NXY, PAW, PNW, RSR, TSN, and YSY assist me with these classes, and we always have two or three instructors present at each meeting."

Stephen Silverman, **WN1ZPT,** says, "I am writing this letter, because I don't think Rhode Island has enough letters in the **Novice Shack.** I have an **AT-1** transmitter, running about 25 watts and an **S-38B** receiver. I operate 80 and 40 meters and will make skeds with anybody needing a QSL card from Rhode Island. I am 11 years old and would like to hear from other amateurs my age. I promise to answer all letters. My address is 121 Spencer Ave., East Greenwich, R.I."

Dick, **W7QEV,** writes, "In the April column, Lennie, W6SJR, asks if there are any other Hams as young as he (8 years old, July 7, 1953). Sharon Pakinas, WN7UOH, Bothell, Wash., was 7 years old when licensed last fall. Since I am pushing 70 and boning up for my General (I now hold a Technician ticket), we might say that amateur radio pulls them in from 7 to 70."

Claude Gardiner, **W5AGM,** President, Aeronautical Center Amateur Radio Club, Oklahoma City, Oklahoma, writes, "We were quite amused by comment in the June issue of **CQ,** relative the oldest Novice. The **Aeronautical Center Radio Club** boasts the oldest Novice operator in the USA. He is Leonard Schooler, **WN5EGW,** Wheatland, Oklahoma. He was past 73 when he received his Novice ticket a few months ago."

I have information about other Novices of "mature" years, but that will have to wait until next month. In the meantime, I invite you to write and send a picture of yourself and station to me. **73, Herb.**

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RATES: 25c per word per insertion for commercial business organizations.
5c per word per insertion for individuals on a non-commercial basis.
CLOSING DATE: Aug. 25, for the Oct. issue.
WRITE: CQ Magazine, 67 West 44th St., N. Y. 36, N.Y. Attention, Jeanne C. Gillespie.

For Sale:

FREE AUTOMOBILE with purchase of Collins 75A-3 and 32V-3. Selectronic Supplies, Inc., 1230 Madison Ave., Toledo, Ohio. Phone FU-3361.

RTTY, MODEL 12 complete, W6DOU, 1558 "B" St., Hayward, Calif.

BARGAINS: WITH NEW GUARANTEE: Gonset Triband $29.50; VHF-152 $39.50; S-72 $59.50; S-40 $65; NC-57 $69; RME-45 $99; HRO Senior $99; Lysco 600 $99; S-27 $109; SX-43 $129; S-76 $149; SX-71 $169; HRO-50 $275; 75A1 $275; HT-17 $32.50; EX Shifter $69; Globe Trotter $59.50; Harvey Wells Sr. $79; DeLuxe $99; Viking I $189; new SS-75 $199; Elmac A-54 $99; HT-9 $189; Globe King $295. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

75 WATT TWO METER station, AX9903 final, PP807 modulator, high-level speech, Turner U9S microphone, unused VEE-DX rotator factory built Techcraft converter. Best offer. M. J. Fein, 5414 Arlington Ave., New York 71, N.Y.

SELL—Heath AR-2 receiver with cabinet. Good condition. $30.00. KN2HDR, Tom Quinlan, 17 Zeliff Ave., Little Falls, New Jersey.

NATIONAL HFS $110; HRO-3 $125; HRO-Sr. $119.95; NC-81X $49.95; NC-46 $69.95; NC-125 $129.95; NC-100 $75; NC-88 $89.95; RME MC-H4 $29.95; VHF-152 $59.95, 69 $84.95; DB-23 $39.95; Babcock MT5A $75; B & W 504 $49.95; Collins 32V2 $495; Deltronic CD-144 $129.95; Harvey-Wells TBS-50A $79.95; TBS-50B $64.95; TBS-50C $79.95; TBS-50D $89.95; APS-50 $29.95; Meissner FMX $7.95; Millen 90811 $34.95; Sonar AMP-50 $29.95; VFX-680 $39.95; CFC $29.95; MB-611 $19.95; SRT-120P $149.95; other used items available, write for latest list to W1BFT, Evans Radio, Concord, N. H.

FOR SALE: Complete Ham station Supreme AF-100 transmitter 80, 40, 20, 15, 10, 100-watts output, VFO and crystal RME-45 with speaker DB-20 Preselector. $250. W2BNE, 647 Central Ave., Massapequa, New York.

SELL: 829B final with all-band turrets, 807 modulators 3-power supplies, wood rack, masonite panels, meters, cables, antenna tuner, etc. Byron Engen, WØEBA, Northwood, North Dakota.

SSB STATION 1JEO improved exciter VC VFO 75 meters 807 output $75; grounded-grid linear 75 meters 811 final on 1250 v power supply chassis $70; SSB-CW-AM receiver (National cabinet) 20-40-80 with 6-10 meters converter, 100 kcs. crystal standard, Q5-er (BC-453) $100; BC-221 with regulated power supply in metal cabinet $95; Triumph 841 oscillograph $29; Vibroplex and case $8; transmitter phone-CW equivalent Lysco 600 $85; heavy duty filament and 500 v plate transformers $5. each; misc. FOB. K6CFK, 246 F Ave., Coronado, California.

FOR SALE SX71 receiver, perfect condition, used about 5 hours, $200. Frank Fetzer, 16 Shelley Ave., Valhalla, New York.

REAL BARGAINS: New and reconditioned Elmac, Gonset, Morrow, Collins, Johnson, Hammarlund, National, Hallicrafters, RME, Millen, Lysco, others. Reconditioned S38 $29; S40A $69; S76 $129; SX71 $169; SX42 $179; SX62 $179; SX88 $499; SW54 $29; NC57 $59; HFS $79; NC125 $129; HC138 $199; SX25 $69; HQ129X $169; VHF152A $39; Harvey-Wells TBS50C $69; Meissner EX $49; S40B, HT-120, Collins 75A1, 75A2, 75A3, 32V2, 32V3, Viking I, Viking II, Viking VFO, many others. Shipped on approval. Easy terms. Satisfaction guaranteed. Write for free list. Henry Radio, Butler, Missouri.

VIBROPLEX blue racer $7; BC696 $19; variable inductor with turns counter $7. Want MC53 or Gonset. K2BPG, Hillside, Monsey, New York.

Miscellaneous:

INCREASE CODE SPEED. New method. Free particulars. D. H. Rogers, Fourth Street, Fanwood, N. J.

GILFER ASSOCIATES offers 140-page "Radio Control for Model Ships, Boats, and Aircraft." Paper bound—$1.60, cloth bound $2.10. Also from England, "The Radio Constructor." 6-month trial $1.25; 12-month subscription $2.50. Make checks payable Gilfer Associates, at P.O. Box 239, Grand Central Sta., New York 17, N.Y.

KWickPatch the one hand fone patch still $14.95. For literature write: Erv Rasmussen, Box 612, Redwood City, California.

10, 15 & 20 METER BEAMS, aluminum tubing, etc. Perforated aluminum sheet for shielding. Radcliff's, Fostoria, Ohio.

Swedish Ham enthusiast 17 yrs old would like YL penpal same age. Write Box 7, CQ Magazine.

NEED urgently, QSTs for March, May & July 1916. Old Timer. Box 11, CQ Magazine.

PORT ARTHUR COLLEGE, Port Arthur, Texas, provides training in radio, radar & television necessary to pass FCC exams for phone and tel. licenses. 12-14 months. Start any level, low tuition with board & room at cost in dorm. Advanced students on-the-job KPAC (500-watt station) training. Approved for Veterans. Write "Registrar" for catalog and info. New courses start every 5 weeks.

Wanted:

WE WANT your used gear. Highest trade-in allowance on National, Hallicrafters, RME, Hammarlund, Gonset, Morrow, Johnson, etc. Write or call, C & G Radio Supply Co., 2502-6 Jefferson Ave., BR-3181, Tacoma 2, Wash.

WANTED: BC-348 receivers. Write James S. Spivey Inc., 41908 Hampden Lane, Washington 14, D.C.

WANTED: QSTs for March, May, June, & July 1916. Simpson, 85-39 152 St., Jamaica 32, N.Y.

WE NEED used receivers: We give highest allowances for S-20R; SX-71; NC-100; S-40B; NC-125; SX-24; SX-25; HQ-129X; and similar receivers. WØGFQ. World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

WANTED used National 183D receiver. L. D. Chipman, W4PRM, 816 Melrose St., Winston-Salem, N.C.

WANTED: ARC-1. Bill O'Connell, 4908 Hampden Lane, Bethesda, Maryland.

WANTED: 10 meter transmitter & receiver. Power supply? Reasonable. What have you got? Fred Madden, W8PFW, DeGraff, Ohio.

AN/APR-4 RECEIVERS and tuning units urgently needed! Engineering Associates, 434 Patterson Road, Dayton 9, Ohio.

WANTED: AN/ARC-3. Write R. Ritter, 4908 Hampden Lane, Bethesda, Maryland.

WANTED: War surplus and amateur equipment. Cash or trade for new Viking, Ranger, National, Hammarlund, Hallicrafters, Gonset, Elmac, Barker & Williamson, etc. Especially want complete or any part of: ART-13, ATC, DY-17, CU-25, BC610-E, BC614-E, BC939, BC729, BC312, BC342, BC348, APN-9, RTA-1B, ARC-1, ARC-3, TCS, TDQ, BC221, LM, RA-34, RA-20, RA-62, RA-87, anything made by Collins Radio. Test equipment. Technical manuals, teletype APR-4, APR-5A, panadaptors. Alltronics, Box 19, Boston 1, Mass. RIchmond 2-0048.

WANTED: Information relative to receiver included in front cover illustration of March 1951 CQ magazine. Mr. Brant, 1161 Delaware, Detroit 2, Michigan.

NEED BC-348 receiver. W. Richards, 4908 Hampden Lane, Bethesda, Maryland.

WANT—CQ complete back years 1946 and before. Must be reasonable. C. Storch, 5 Winfield Terrace, Great Neck, New York. W2DUC.

WANTED: Pair of walkie-talkies or other portable communications equipment. Write: Dean Allen, Baldwinville, Massachusetts.

NEED BC610-E. C. Hoffman, 4908 Hampden Lane, Bethesda, Maryland.

ALL SURPLUS equipment for cash. BC-221, I-56, TS-13, TS-148/AP, TS-263, etc.; and receivers. BC-348, BC-312, BC-342, AR-88, RBL, RAO, RBG; also TCS, BC-610, BC-614, R5A/ARN-7, ART-13, DY-17. We buy or swap technical manuals. Amber Company, 393 Greenwich Street, New York 3, N.Y. BEekman 3-6509.

For Sale:

SSB—tubeless VFO covering 80-20 meters for use with Multiphase Exciters 10A, 10B and 20A, stable operation $35. Kit for plugging into rear socket with instructions $3. Eastern Electronics, P.O. Box 308, Putnam, Conn.

BUILD 24-ft. TV antenna. See page 20, Nov. 1953, CQ. 4-band vertical. We have 2" dia. ⅛" wall 61 S aluminum tubing 24-ft long; @ $10 for 24 ft. A-1 Steel Co. 11 W. Divn., Chicago, Illinois.

SELLING: BC-312 $70; Millen power supply $65; new Millen oscilloscope with new 2BPI $32; 1000 v 300 ma. supply $22; BC-454 $10; BC-458 $10; 150-watt commercial CW transmitter 1.5-18 Mc. $80; transformer 1245-0-1245 @ 500 ma. $1500; 5BP4 $1.50; 1625 $1.00; also many new and used parts, units, tubes, etc. For additional information and list send card. W1RVR, 14 Mt. Ida Terrace, Waltham, Massachusetts.

HAMMARLUND (HQ-129X) in excellent condition. Best cash offer takes it. J. A. Lynch, 216 Lincoln Ave., Newark, New Jersey. Tel: HU 3-1526.

FOR SALE: Collins 32V2. Laboratory job of built-in coax relay, illuminated final plate meter, external and meter circuits well filtered against TVI even more than the 32V3. Very best B & W low pass filter attached to rear, commercial brute force filter. Spare 4D32. Shielded cabinet. All in perfect condition. $500. John A. Krammerer, W2WRI, 23 New St., Katonah, New York.

SELL: 32V-1, 32V-2, 32V-3, KW-1, 75A-2-A, HRO Sr., S40-B, S-53A, HRO-7, SX-42. All good used condition. Arrow Appliance, 38 Exchange, Lynn, Massachusetts.

BEAMS, ball bearing rotary heads and components. Send power card for literature. Bernard Belt, 631 15th Ave., Menlo Park, Calif.

SELL: Collins 600-watt input 30-J transmitter $275; Boehme automatic keyer and McElroy three-key tape puncher for Morse code $145; #241 Dumont scope $245; HRO Sr. $95; 32V-1 $385; 12,000 ohm d.p.d.t. 110 dcv relays $1.75. Want technical manuals, 310B exciter. Tom Howard, W1AFN, 46 Mt. Vernon St., Boston 8, Mass. RIchmond 2-0048, 2-0916.

MEISSNER EX Shifter, with NBFM modulator and external power supply. Used very little $50. Taylor, W7BX, 1618 Washington, Chehalis, Washington.

CLEANING OUT—all brand new material left over from business venture. 600 plastic U/L line cords, tinned and hanked, brown or white, 19c each. 73 Drake neon Post-Lites 35c each. 75 Alden miniature chassis-type ac outlets, 10c each. 600 plug-in type 100 watt Christmas light flashers 25c each. All items FOB. Gates, W8VWK, 4517 Taney Ave., Apt. 201, Alexandria, Virginia.

MOBILE TRANSMITTER and receiver. Trans. has carter 500v 200 ma 6 v input dynamotor. Receiver has synchronous vibrator 6v. Tunes between 30 and 40 Mc. 8-tube receiver trans. uses 6v6 osc. 6v6 buffer, 807 final, two 6L6 mods. Ideal for 10 meters. Both for $25. Delivered at 506 Orange Ave., Long Beach 12, California.

SELL: War surplus transmitters, receivers, accessories, parts, at prices considerably below lowest current prices to insure quick sale. Write for list. H. Wray, 482 Old Farm Road, Pittsburgh 34, Pennsylvania.

FREQUENCY METER: BC221-M with power supply. In top condition. Best offer over $70 and shipping. W4SAQ, 403 Arnold Rd. Bristol, Tenn.

BC221, original crystal and calibration chart with instruction book and built-in voltage regulated AC power supply $65; Regen grid dipper (unsurpassed tracing TVI, pg 473 of 52 handbook) with coils, power supply and 3" 500 micro-amp meter $16; McMurdo Silver model 701 fifty watt fone/CW crystal rig with 500 v power supply, ant. tuner and 10 meter coils built into custom desk rack 14" wide x 25" high $50; new BC221 cabinet $2; 350 v 100 ma (after filter) plate transformer $3; two Merit C-2993, 110 ma filter chokes each $1.25; dual 12 h 100 ma chokes (two in one casing) $2.25; unused National 697 (similar to 5886) 25/60 cycle power supply, $8; Collins 310-B exciter modified for rack mounting with five band turret in output $205; R44/ARR5 Hallicrafters 27 to 146 Mc. receiver with power supply $50; Bud code practice oscillator/monitor #128, new but not in original carton $10; Triplet model 3256 absorption type freq. meter (80 thru 10) $10; new Amphenol 40 meter folded dipole antenna $10. Parker, W8NKK, 1240 Bedford, Detroit 30, Michigan.

SWAP: Heathkit A-T-1 30 watt transmitter. 50 hours operation for mobile rig. Excellent condition. Phil Clements, Box 59, Belton, Texas.

For Sale:

NOMINAL TRADE-IN will bring you $90 allowance on new Barker & Williamson transmitters or Concertone Tape Recorders, $60 on new Viking II, $40 on Viking Ranger, or Elmac AF-67, $30 on Elmac receivers or Pentron Tape Recorders, 20% on Lansing, Stephens, Fisher, etc. hi-fi components. Telcoa, Azurelee Dome, Malibu, California, Tel: Globe 6-2611.

SELL ALASKA ONLY, all excellent, Harvey-Wells Bandmaster Senior, AC power supply, VFO, crystal mike preamplifier $170; Rack mounted SX-28 $90; Astatic dynamic "G" stand $20; 1200 vdc 350 ma. transformer #30 crystals $1.50. 110 vac power supply for AN/ART-13 $100. Trade Ampro 16mm sound projector or Shopsmith with accessories for late communications receiver. KL7AZL.

FOR SALE: Television set 7" $30, suitable for monitor. Have couple larger. Want TV camera equipment. W4API, 1420 South Randolph, Arlington 4, Virginia.

FOR SALE: Collins 32V3 in new condition, Johnson low pass filter, spare 4D32—all $625. Would consider taking in trade: Variable vacuum capacitor, Precision E 200 C Signal Generator, Emerson 10" television. W5FZB, 2101 Washington, Waco, Texas.

SELL: SX43 receiver, recently overhauled, new tubes, etc., with speaker $100. P. E. Dixon, W5YCD, 3317 Parker Road, Ft. Worth, Texas.

QSL Cards:

QSL samples 10c. Plenty styles. W4AYV. Box A155, Umatilla, Florida.

QSL Samples. Reasonable. W3QCC, Frackville, Penn.

QSL's TWO COLOR, $2.00 hundred. Samples for stamp. Rosedale Press, Box 164 Asher Station, Little Rock, Ark.

QSL's SWL's. High quality. Reasonable prices. Samples. Write Bob Teachout, W1FSV, Box C124, Rutland, Vt.

QSLs of DISTINCTION. Three colors and up. Uncle Fred. Box 86, Lynn, Pennsylvania.

QSLs! "America's First Choice!" Samples 10c Tooker Press, Lakehurst, New Jersey.

QSLs. Ham's "Super-Speed Special." The best darn wallpaper you've ever seen! Samples 10c. Robinson, W9AYH, Dept. O, 12811 Sacramento, Blue Island, Illinois.

QSLs?? Unbeatable!! Samples 20c. Sackers, W8DED, Holland, Michigan.

QSLs—"Brownie" W3CJI, 3110 Lehigh, Allentown, Pennsylvania. Samples 10c with catalogue 25c.

QSL's SWL's. Sample free. QSL Press, Passaic, N. J.

Hamfest Announcements:

The 20th Annual Picnic and Air Mobile Meet of Hamfesters Radio Club will be held on the second Sunday of August, AUGUST 8, at Mance Park, ¼ mile east of Route 45 and ¼ mile south of Route 66 (Stinson Airport). Food, ice cream and beverages available. Games for the kiddies. Hammo and Hamfesters style prize table. Donations are $1 in advance, $1.25 at the gate. Tickets from John J. Ruth, W9GVO, 4460 Oakenwald Ave., Chicago 15, ILLINOIS.

Labor Day Weekend—Saturday night dance, SEPTEMBER 4th at Lenfants Air-Conditioned Boulevard Room. Baby sitters available. Free soft drinks and ice. Sunday SEPTEMBER 5th—transmitter hunts. Hamfest Picnic with hot dogs, beer, soft drinks. Special entertainment, contests, events for the ladies and children with prizes and special preregistration prize all for $3.00. Preregistration closes August 10. $4.00 thereafter. Children 6-16 $1.00. Write to "Weekend in New Orleans" P.O. Box 899, New Orleans 4, Louisiana. (Checks payable to Greater New Orleans Amateur Radio Club)

Seventeenth Annual "Stag Hamfest" sponsored by the Greater Cincinnati Amateur Radio Association is to be held Sunday SEPTEMBER 12. The location is Kopling Grove (formerly Ash Grove) on Winton Rd. at Compton Rd. two miles south of Greenhills. Registration $2.50 at the gate and here's what you get: hot dogs on bun served all day, donuts & coffee served until noon, beer & pop served all day, full picnic dinner & supper (all you can eat) rain or shine. Lots of prizes, games, hidden transmitter hunt, etc. For additional information contact Byrum Henry, W8QBJ, 1120 Elberon Ave., Cincinnati, Ohio.

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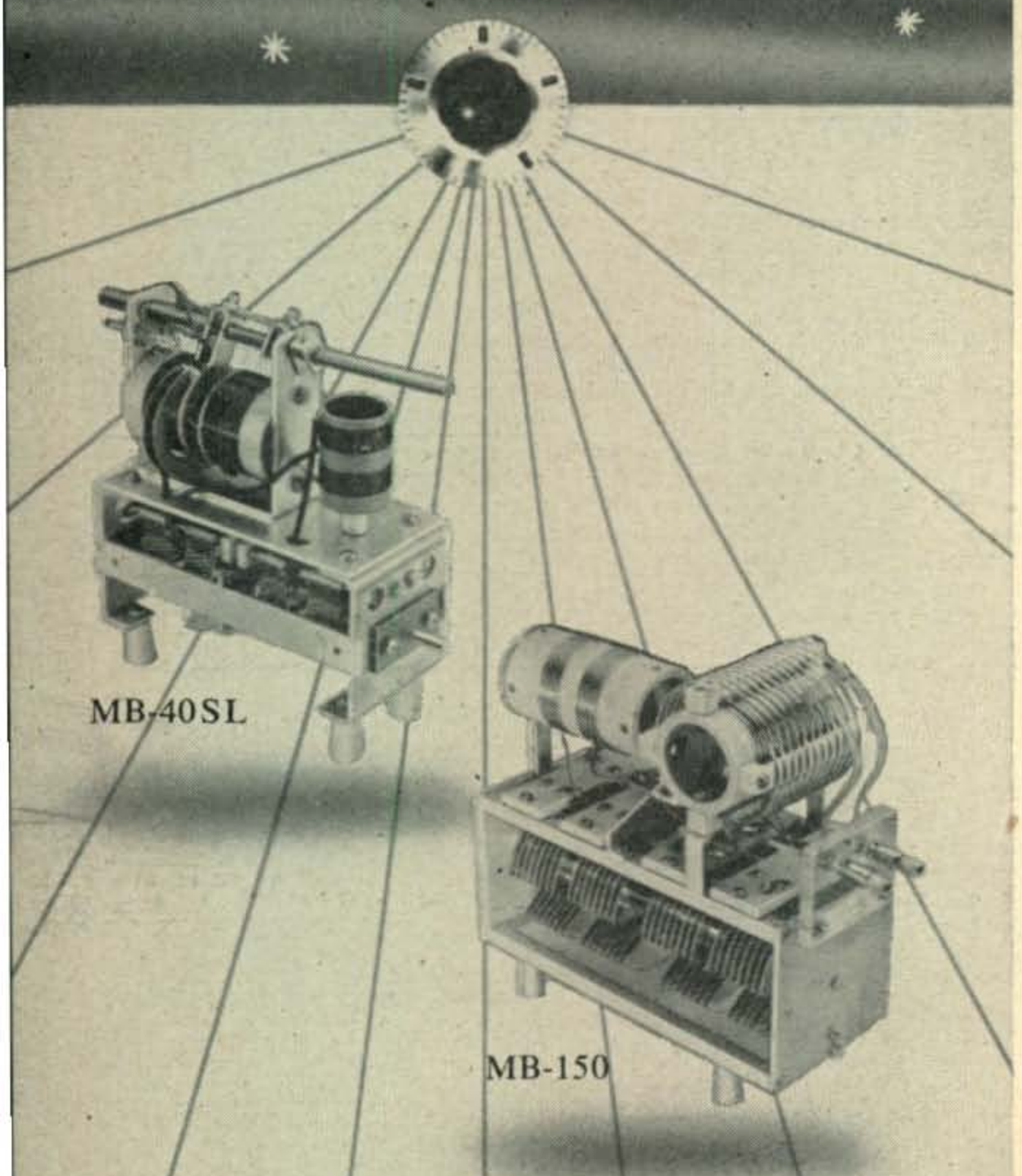

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The unique MB-150 high power and low-power multi-band tank assemblies will tune all bands from 80 to 10 meters with a single 180° rotation of the capacitor without changing coils.

The MB-150 is intended for use in plate tank circuits having an input up to 150 watts. It is ideal for a pair of 807's, 809's or a single 829 B.

The MB-40SL may be used in the grid circuits of tubes employing the MB-150L in the plate circuit. Will handle 40 watts if link is kept loaded. Incorporates new swinging link to vary coupling. Output can be taken from the variable shielded link when coupling to the antenna or to the next stage.

Write for new NATIONAL catalog of dials and knobs to Dept. C-854

National

NATIONAL COMPANY, INC., 61 Sherman St., Malden 48, Mass.

CQ Ad Index

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2" Model TC2 **$3.90** 3" Model TC3 **$4.20**

See page 141 April QST.

Order or Write for descriptive literature.

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Feature for feature, dollar for dollar, nothing on the market even comes close to the new NC-98! Compare and prove it! Complete with crystal filter and an S-meter at this modest price. No other offers this, plus these additional performance features:

550 kcs to 40 mcs range · calibrated amateur bandspread (or SWL bandspread for short-wave listening) · new miniature tubes · an RF stage · two IF stages · edge-lighted dial scales · noise limiter · separate high-frequency oscillator · 3-position selectivity · antenna trimmer · phasing control · sensitivity control · accessory socket ·

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Highly regarded by radio amateurs for their high power output at moderate plate voltages, RCA-designed power types are the answer to real transmitter economy when you plan to raise your input. Here's how these types reduce transmitter construction costs:

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Check table for the power you want and see how little plate voltage it takes to get it.

Your local RCA Tube Distributor can supply you with a complete line of RCA tubes for amateur use.

Get technical bulletin(s) from RCA, Commercial Engineering, Section H 15M Harrison, N. J.

Typical Power Input and Plate-Voltage Values for popular Class C Telegraphy

RCA No.	Type	DC Power Input (watts)	DC Plate Volts
810	High-perveance triode	500	2000
811A	High-perveance triode (High Mu)	520*	1500
812A	High-perveance triode (Low Mu)	520*	1500
813	Beam Power	500	2250
833A	High-perveance triode	1000	2250
8000	High-perveance triode	500	2000
8005	High-perveance triode	600*	1500

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