SEPTEMBER, 1949

CQ

The Radio Amateurs' Journal

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- The Ultimate in V.H.F. Converters
- Multi-Band Rotary for 10, 15 & 20
- Ham Radio, Hobby for the Handicapped
- A Composite Chart for Color Codes

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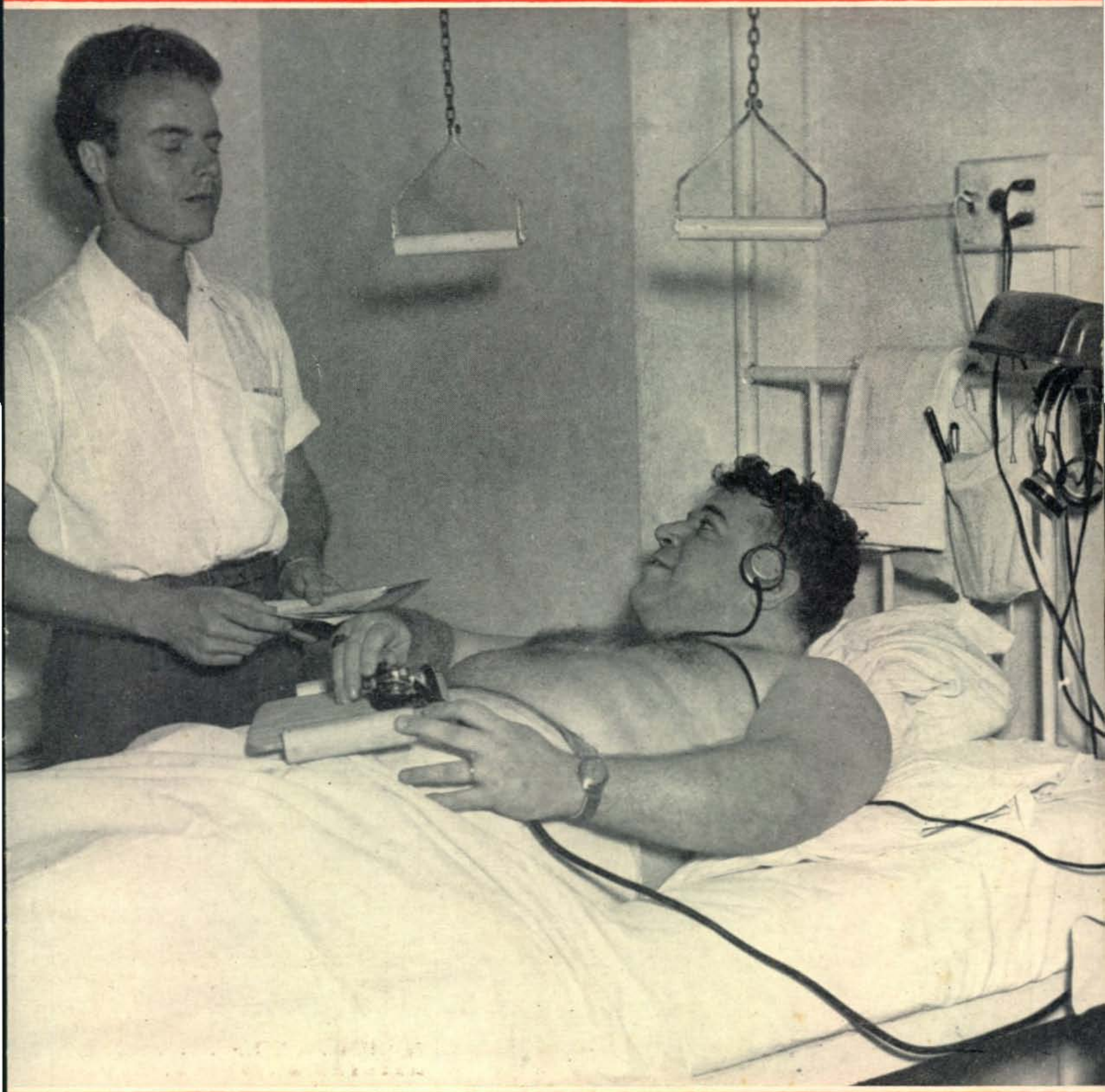

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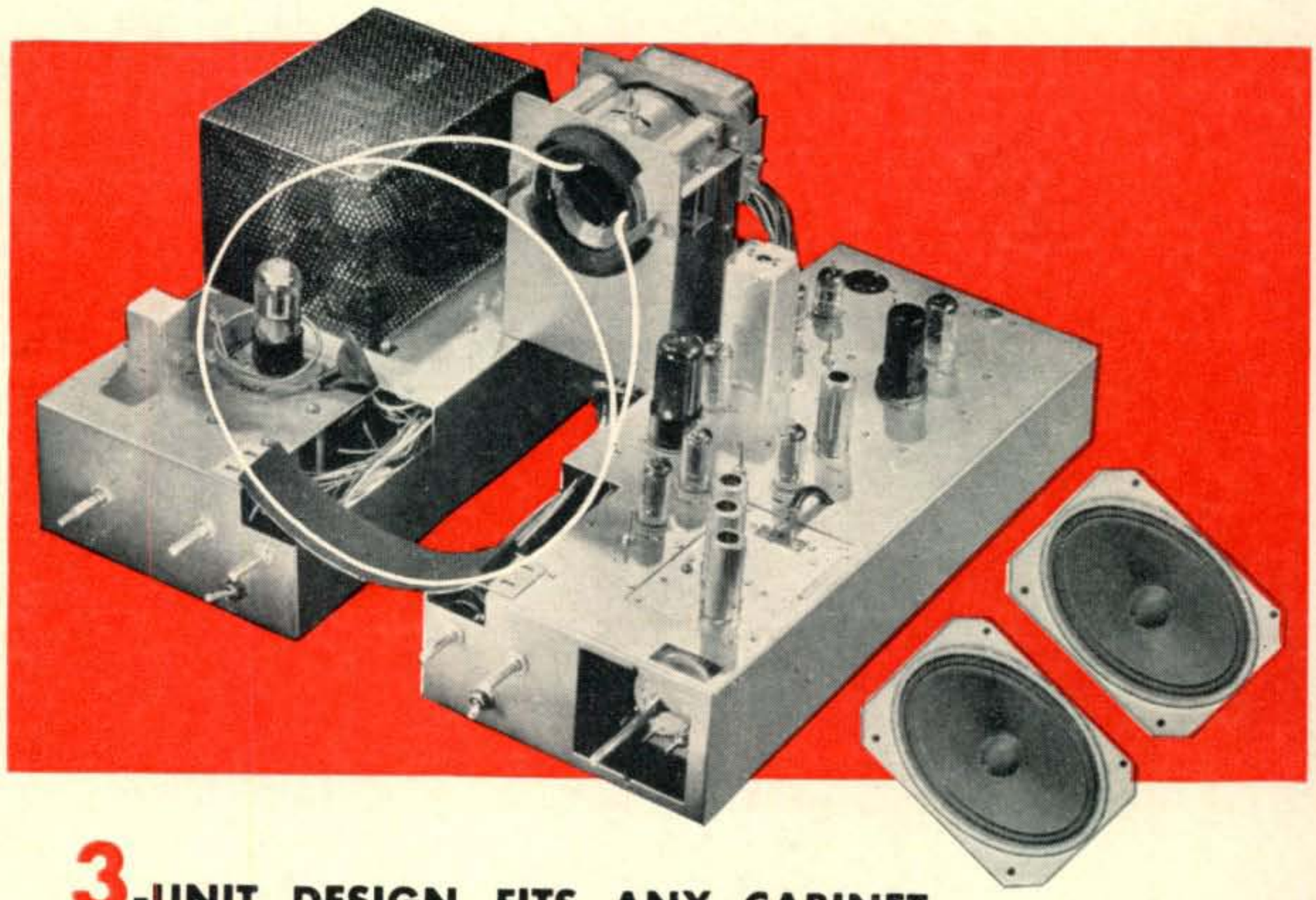
NATIONAL TELEVISION chassis



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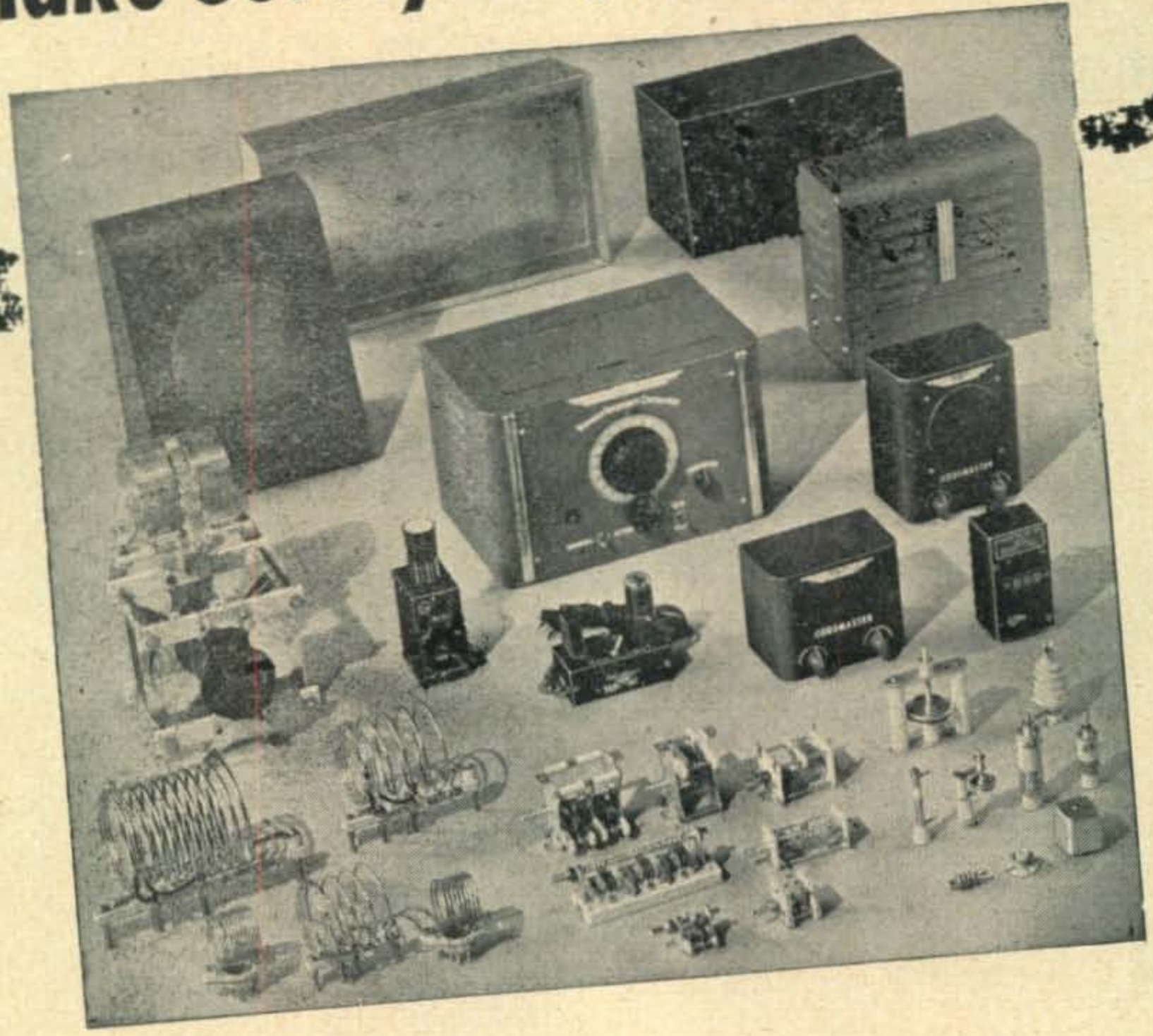

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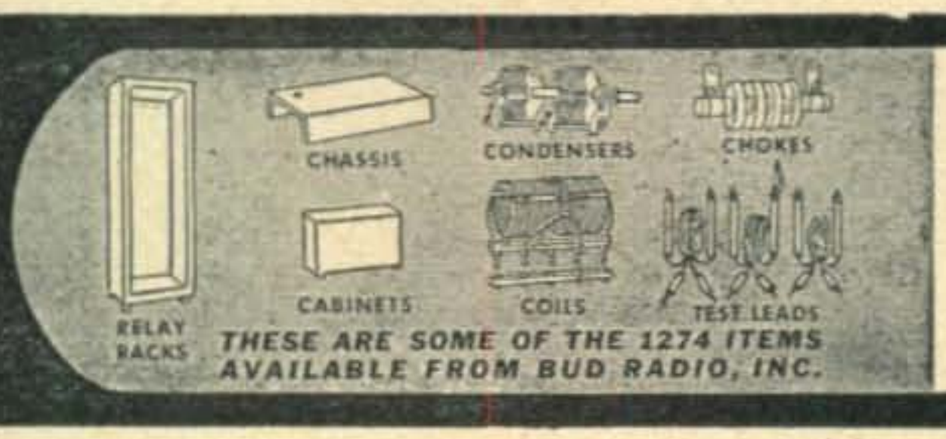

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The Radio Amateurs' Journal

Published monthly by RADIO MAGAZINES, INC., at 342 Madison Ave., New York 17, N. Y. Telephone MUrray Hill 2-1346. Entered as Second Class Matter Oct. 10, 1947 at the Post Office, New York, N. Y. under the Act of March 3, 1879.

Subscription Rates: in U.S.A., U.S. Possessions, Canada and Pan American Union—1 year $3.00, 2 years $5.00. Elsewhere $4.00 per year. Single copies 35 cents. (Title Reg. U.S. Pat. Off.)

Foreign Subscription Representatives: Dale International Publications Ltd., 105 Bolsover St., London, W. 1, England; Radio Society of Great Britain, New Ruskin House, Little Russel St., London, WC 1, England. Technical Book & Magazine Co., 297 Swanston St., Melbourne C1, Victoria, Australia.

Vol. 5 SEPTEMBER, 1949 No. 9

In This Issue

COVER—Amateur radio can serve no greater calling than bringing aid to stricken communities in times of emergency. Without a great deal of imagination this community service can be extended to aid individuals stricken through sickness or accident. It is a phase of the hobby that should receive increasing attention from hams and amateur clubs. Work already accomplished and future possibilities are outlined in the series "Hobby for the Handicapped" starting in this issue. Shown on the cover are fellow hams Sam Lee, W6COI (teacher), and Robert Buyea, W4MGV, successful student.

★ ★ Letters ★ ★

Hams Lend a Hand

4422 Silsby Rd., University Heights,
Cleveland 18, Ohio

Editor, *CQ*:

May I tell you about a ham radio experience that is heartwarming.

Recently my father suffered a heart attack while visiting at Lake Worth, Florida, and was confined in the Good Samaritan Hospital, West Palm Beach, Florida. After several weeks of heartening convalescence, he suddenly took a turn for the worse, and I made a hurried flight to Florida to comfort Mother and be with Dad before the end. However, though a very sick man, Dad showed some improvement and after a few days I had to return to Ohio to attend to my business. The night before I left, however, I had attended a radio club meeting in West Palm Beach and at my request for a schedule with someone who could send along reports on Dad to me, Hurshell Turner, W4MVJ, volunteered. We worked on 7290 kc.

Though our schedules were limited by Dad's passing away about a week and a half later, I will always be grateful for the fine cooperation of this fine amateur, W4MVJ, who I know took time from his family and other duties to see that I got news of my family at a time of anxiety and care. That's what really makes ham radio worth while and that's the real ham spirit!

W4MVJ is a CAA operator at the West Palm Beach International Airport and pushes a beautiful bug fist. After Dad's death, Hurshell helped me make arrangements for services, insurance, announcements, etc., as well as keeping me in touch with my wife who went to Florida to be with my Mother and help drive the car back.

It's sure nice to know that such fine people exist in the ham radio ranks!

Paul M. Cornell, W8EFW

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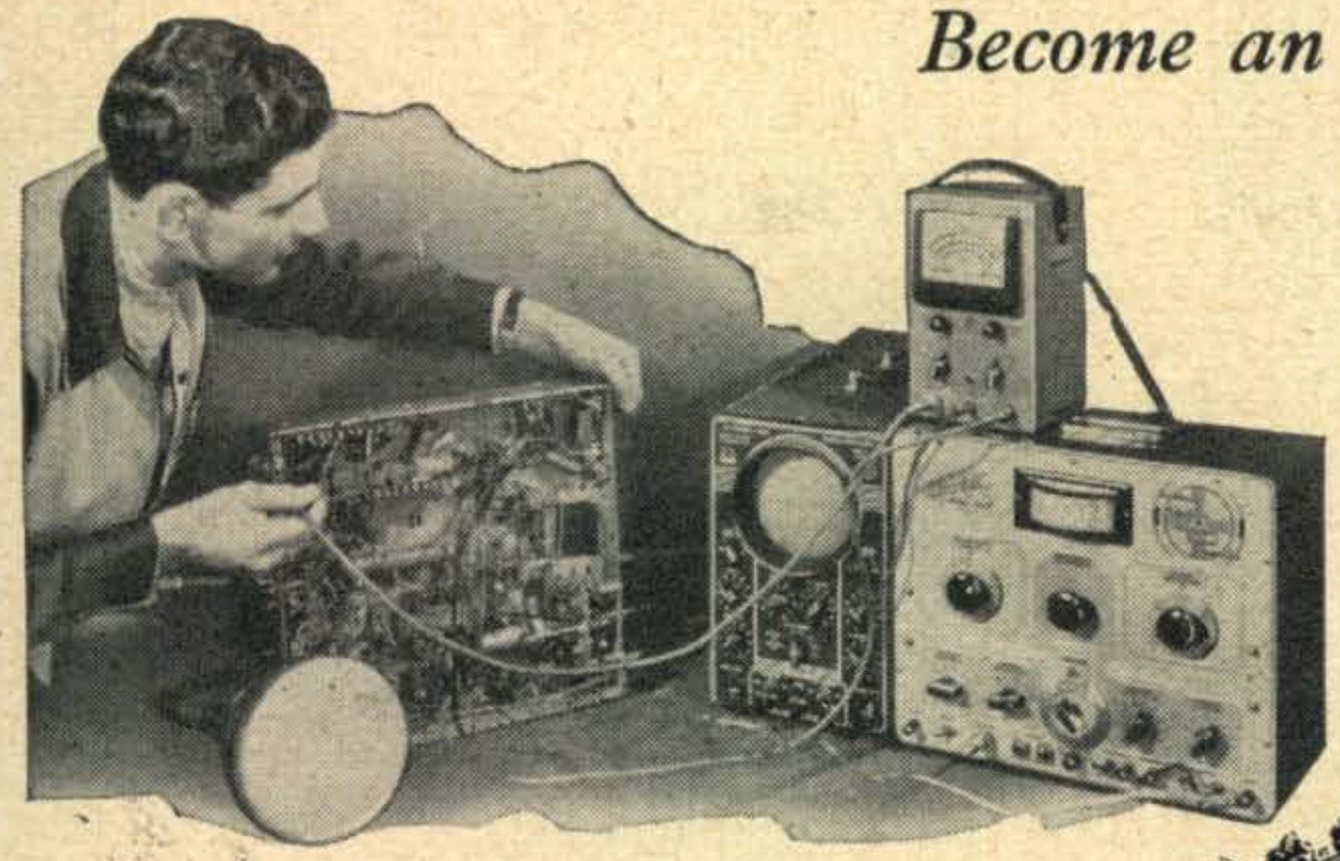
533 N. 8th St., Weatherford, Okla.

Editor, *CQ*:

About eighteen months ago your magazine printed a letter written to you by a fellow amateur from the U.S. Marine Hospital, Neponsit, Long Island. The letter asked for help in getting a station on the air so that some of the slack hours could be spent at "hamming." I was one of the fellows who benefited by the generous response to that letter.

I have been out of the hospital nine months now, and there hasn't been a day pass that I haven't thought of the generosity of the fellows. Now I want to do a little something for some needy amateur. And while I still have the desire to help one, a bigger desire to help many is also present.

For every fellow amateur who is financially unable to buy equipment to get himself on the air, because of some prolonged illness or disability, there are hundreds of amateurs who have spare parts and possibly a little spare time to donate towards helping them get on again. There must be others like myself who have had the experience of getting a "helping hand," and would really enjoy the chance to return the favor. Of course there are those too who would just like to help because they don't have to go through something



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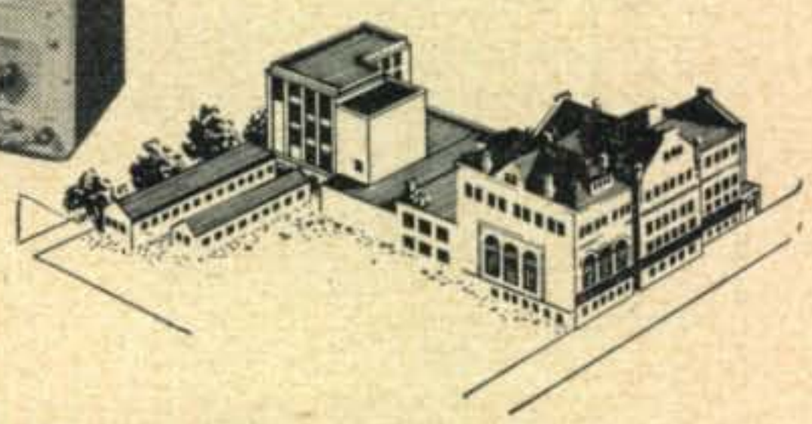

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like that to realize what it would mean. Well, regardless, I have a BC348 and a BC458 that I should like to pass along to someone who really needs it. Some one who is a "shut in" and financially unable to buy his own. Now if readers will just come forward with the name and address of some needy amateur I will appreciate it. This isn't much, but it could lead to bigger things, and I would like to have as many names as possible. I also would like to hear from some of you fellows who would like to participate in activity of this kind either with gear, parts or time, or what have you. Just write and let me know, but please do not send any parts! We can work out the details later when we find out who needs what, and who has what to offer.

I myself want to do all that I can along this line, and will be doing so, but how much nicer if it could be made a real project. This is not an offer of charity. I don't feel that it was when we received help, but rather that we are one big family ready to help one another. Besides others may get the chance to help when they are back on their feet.

Any suggestions will be appreciated.

Art McMullen, W5PHO, ex-W6YDO

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535 E. Platte, Colorado Springs, Colo.

Editor, *CQ*:

Have been corresponding for some time with a fellow in England, who, with a group in his city, is studying for his ticket. These chaps are badly in need of any publications that will aid them in their theory study, etc. Would you ask any of the fellows who have old Handbooks, copies of *CQ*, *QST*, License Manuals, or any other material to spare, to send them to Fred Flay, 90 London Road, Calne Wilts, England. I know it will be deeply appreciated.

Otto Woolley, WØSGG

Citizens' Radio Service

Box 3917, University Sta., Lexington, Ky.

Editor, *CQ*:

As a result of my article in the May issue, regarding the new Citizens' Radio Service, I've had over seventy letters and cards, asking the names of the two manufacturers of citizens' band gear, which I mentioned in the article. Since I can't possibly answer these individually, I am using this indirect means of answering.

The only manufacturer of Citizens' band equipment, as of May 17, 1949, who has actually received a type approval certificate, is, according to FCC records: The Citizens Radio Corp., 1865 Prospect Ave., Cleveland 15, Ohio.

The Link Radio Corporation, of 125 West 17th St., New York, N.Y. is reported to have a transmitter which can be modified to operate in this service, but I have no data on it. Also, there is a report that a company in Cincinnati is planning a camera-sized unit but neither the FCC nor any of my acquaintances in Cincinnati can tell me just who, or where, they are. If any readers do know of this, or any other company in the field, I'd certainly appreciate it if they'd let me know.

A second question, found in about half the letters, asked when the FCC would begin issuing licenses on a regular basis. June 1, 1949, was set as the big day.

Bill Valentine, W4LDW

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Feenix, Ariz.

Deer Hon. Ed:

I are mad. In fact, Scratchi are good and mad. In factly I could not be any madder if someone were to sneaking in and changing the weights on my bug during DX contest. And what are causing all this? One word. Women. To be more exactly, it are Lil, my XYL-to-be. Most of the time Lil are very interested in amateur radio and are being good old pal to Scratchi, but other times she are acting just like woman.

It are all starting a cupple of weeks ago. I had been reading about the hats made with a radio in them, and I are thinking that this sort of thing would be FB to wear to the local baseball games, on acct. the announcer are always making the games sound much better than they actually are. So, I are digging around in pile of old clothes and coming up with reel nice straw hat, just peechy to putting little radio on.

After thinking about situation Scratchi are getting reel brainstorm. Why not fixing it with extra pair of earphones? That way Lil, who are usually going to baseball games with me, can also hear what going on. After deciding to do same, I are having to keep the idea big secret from Lil, so I can surprise her.

First thoughts are being to mount toobs right on top of hat, but when I get to figuring on the circuit, in order to be ables to drive a cupple pairs of earphones are going to have at least three or four toobs. I are not wanting to be mistaken for porcupine with lots of toobs sticking out of hat, so are deciding to use chassis. Not being any room underneath hat, are having to mount chassis on top of hat.

Next are deciding that it would be nice to having radio work either on batteries or from a. c. line, so are managing to squeeze power supply in one corner of chassis. Scratchi next planning to mount earphones on hat, but this are seeming like lots of trouble so are merely putting earphone jack on chassis. In use, when wearing hat, can put earphone band under Hon. Chin.

I are trying set out, and finding it works reel fine business, except that are not having enough volume. Are deciding this due to mismatch in amplifier toobs, so are adding one more toob and output transformer. This are doing the job, only except that now volume are too louds, so are adding volume control on chassis. Everything now perfect, except getting too many stations, all at one point on dial. So, having to put r. f. stage on chassis. Not exactly on the chassis, but are putting bracket on output transformer and mounting r. f. toob on it.

Brother Itchi coming in about then to see how radio set are working, and he asking me

(*Continued on page 72*)

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EDITORIAL

As EVERY editor knows, or should know, unless a manuscript is carefully edited several connotations of the author's original thoughts are possible. There have been mildly reproving words bandied about by different people as to interpretations of the ARRL Board's action during its May 28th meeting. Assuming that the resolution condemning FCC document 9295 was carefully edited (and it reads as if it was) we like to think we are capable of understanding it thoroughly and that there was only one inference to gather. If we had any doubts in our minds there was the full report of the Board meeting in the official organ of the ARRL (which we read carefully even though we weren't privileged to attend the meeting) and there is the subsequent editorial comment in the current issue. Opposition to the proposals is on philosophical grounds and not on the value of the proposals to the amateur service. In a fiercely competitive materialistic world such as ours is today we still feel that it is unsound logic to base any arguments on what has happened in the past when we can substitute for it today a dynamic vigorous program of action with positive results.

As we stated editorially, "We feel that the prerogative of the hams to decide among themselves what is best for their service is desirable. . . ." We emphatically believe that to be the case, but we cannot accept the argument that it would be wise to throw out the FCC proposals merely because they did not come from within ARRL. Argue the individual proposals on their merits, modify, amend or remove, but let each stand on its own value to amateur radio.

As we further stated in July, "If the action of the FCC is delayed until the ARRL Board again meets, that Board will have another great opportunity to restore the League to its former prestige as a leader in amateur affairs." If you read public notice 1043 of the FCC, reproduced on this page, you will see that the ARRL has been given that opportunity, for which everyone is thankful since even the severest critic of ARRL believes in its fundamental value. If the Board now meets in special session and comes forth with a better set of proposals, with a more constructive program than the Commission's, then to that Board amateur radio will be permanently in debt. But if they do not, there is still the FCC document which stands as an important basic tool (with minor exceptions) for the perpetuation of amateur radio.

To facetiously pass off constructive criticism, as apparently some of the defenders of the Board's action are doing, can only serve to alienate affection and deprive the amateurs of counsel that is well worth considering. No ham who dares to call himself a dyed-in-the wool adherent will deny the magnificent record of achievement of the amateurs, but those achievements were made yesterday. Our consideration now must be not for yesterday, but today—and tomorrow. *W2IOP*

Informal Conference To Be Held on Proposed Amateur Rules (Docket 9295)

The Commission, on July 27, 1949, designated October 10, 1949, as the day on which an informal conference would be held at the Commission's Offices, Washington, D. C., to discuss various portions of the proposed amendments to the amateur rules set forth in the Commission's Notice of Proposed Rule Making (Docket 9295) dated April 20, 1949.

Numerous comments, both pro and con, have been received by the Commission on the proposed rules. Some of these comments have opposed the proposals in their entirety. Other comments have approved all of the proposals. Many of the comments have expressed approval of parts of the proposals, while at the same time expressing disapproval of other portions of the proposals.

The Commission believes it desirable that all interested parties should be afforded an opportunity to sit down with each other and with the Commission's staff informally to discuss specifically each of the proposed rules to the end that such rules as may be adopted by the Commission should assume the best possible substance and form within the principles set forth in the Commission's Notice of Proposed Ruling Making.

In line with the purpose of the informal conference, the Commission requests that all parties attending the Conference be prepared to address themselves to each of the specific proposals set forth in the Commission's Notice of Proposed Rule Making, and if revisions or modifications of wording are desired by the parties, to be prepared to present the specific language considered to be desirable.

All interested persons or organizations may participate in the informal conference. However, in the interest of providing an orderly procedure, the Commission requests that all persons desiring to attend, file with the Commission prior to October 3, a notice of intention to participate and an estimate of the amount of time necessary to present the material desired to be placed before the conference.

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Brill Co., 10th & Jackson Sts.; Electric Supply Co., 149 12th St. SAN DIEGO—Electronic Equipment Distributors, 1228 Second Ave.; Western Radio & Television Supply Co., 1415 India St. SAN FRANCISCO—San Francisco Radio & Supply Co., 1282-1284 Market St.; Zack Radio Supply Co., 1426 Market St. **COLORADO:** DENVER—Radio Products Sales Co., 1237 16th St. **DISTRICT OF COLUMBIA:** WASHINGTON—Electronic Wholesalers, Inc., 2010 14th St., N.W. **FLORIDA:** HOLLYWOOD—Carl's Radio Shop, 2323 Hollywood Blvd. JACKSONVILLE—Kinkade Radio Supply, 1402 Laura St. TAMPA—Kinkade Radio Supply, 402-04 W. Fortune St. **GEORGIA:** ATLANTA—Specialty Distributing Co., 425 Peachtree St., N.E. MACON—Specialty Distributing Co., 513 Arch St. SAVANNAH—Specialty Distributing Co., 223 E. Broughton St. **ILLINOIS:** CHICAGO—Chicago Radio Apparatus Co., 415 S. Dearborn St.; Montgomery Ward & Co., 618 W. Chicago Ave.; Newark Electric Co., 323 W. 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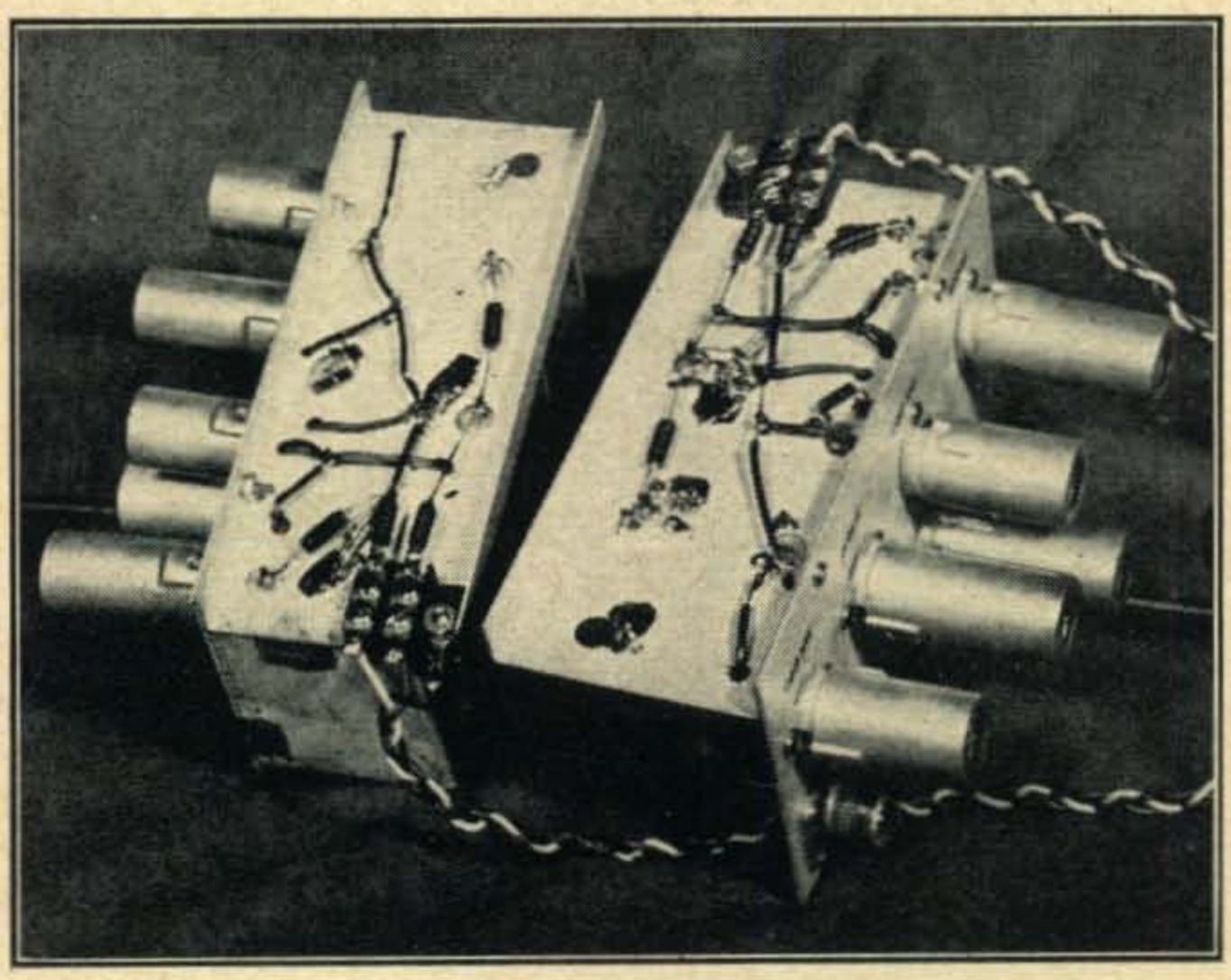
The Ultimate in Converters

JOHN E. STACY, W1KIM*

By employing the Wallman cascode circuit the author has developed a converter that gives unparalleled performance on the very high frequencies. For the serious experimenter on these bands this unit is destined to become the basic tool in his shack.

RECOGNIZING THAT internal set noise is a limiting factor in receivers at v.h.f., another converter with an extremely low noise figure has been developed. The converter is similar to the one previously described[1] except for the low-noise r-f amplifier. This amplifier was chosen after considerable experience with it proved its worth. The circuit is a development of Henry Wallman[2] and is conveniently referred to as the "Wallman Circuit." It has been suggested that it be called the cascode, but this nomenclature is somewhat confusing since the term cascode has been used in connection with d-c amplifiers for some time. The circuit consists of two triodes cascaded to give almost unbelievable performance for a given set of characteristics. The most notable virtue of the cicuit is its low noise content. As a consequence, it is being used in many i-f applications and it is extended as an r-f amplifier in the v-h-f converter to be described here.



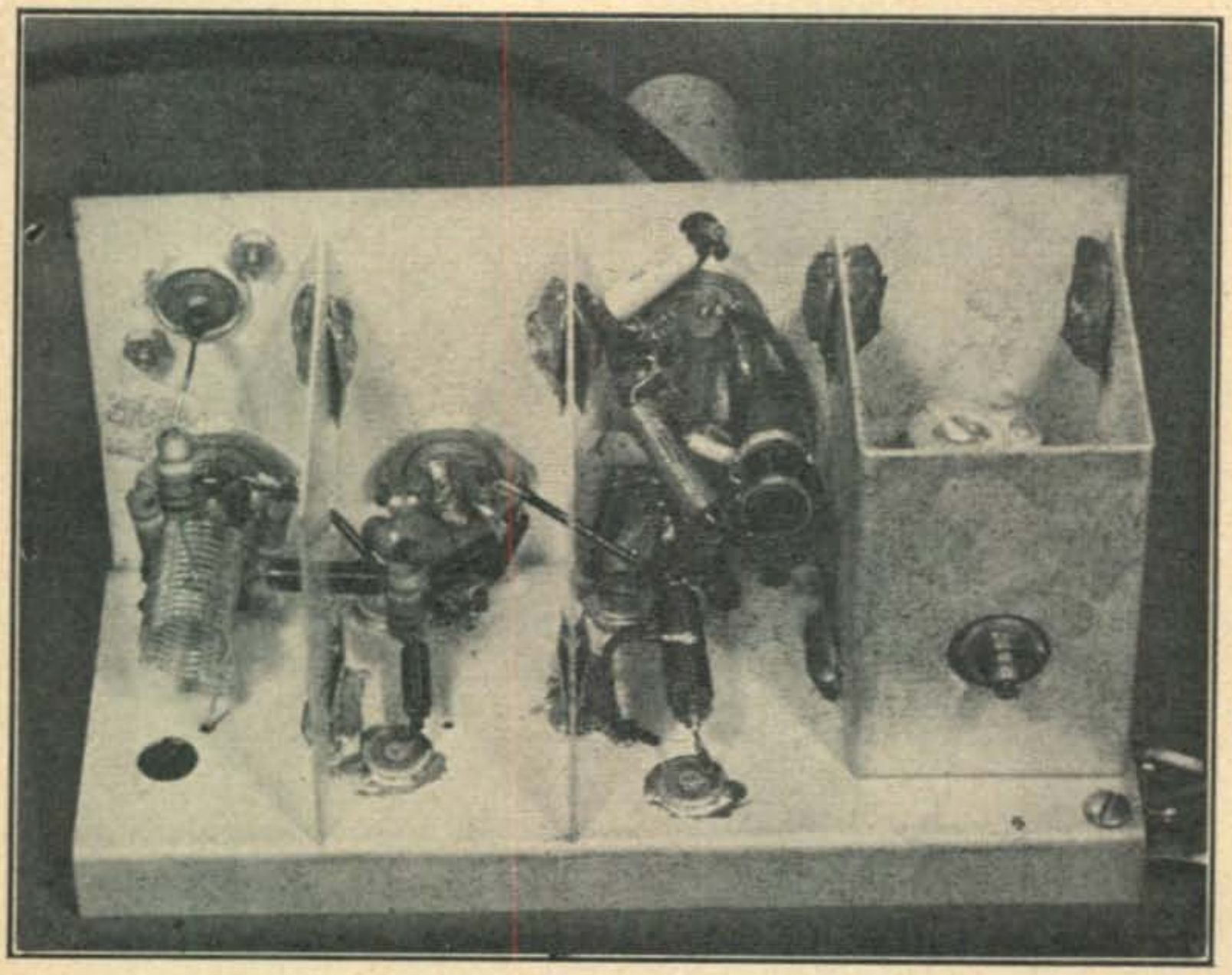
Underside views of the 50-mc (left) and 144-mc converters.

It can be seen that the first triode is operated as a conventional grounded cathode stage, while the second triode is a grounded grid stage. Looking into the cathode-driven second stage at point *XX*, the input resisence is approximately $1/gm$ or some low value such as 200 ohms for a half section 6J6. Looking back from the same point, the plate resistance of the stage is evident; it may be several thousand ohms. Due to the very large loading of the plate circuit of the first stage, the amplification of the initial stage is extremely small. Hence, stability is definitely insured. Simultaneously, the noise figure of the second stage is low, due to the high plate impedance of the first stage. Wallman has shown that the amplification of the first stage is given by the ratio of the transconductances gm_1/gm_2; if both gm values are equal, the voltage gain is unity. This is the sole criterion for stability, and so, no neutralization is required. The overall amplification can be demonstrated very simply. If a signal of 1 volt is applied to the input, then the plate current will be gm_1 amperes. Since this current is common tc the cathode and plate circuits of the second stage, the voltage output developed across R_2 will be gm_1R_2. So the overall gain is equal to gm_1R_2. This is the same order of gain obtainable from a pentode having a transconductance of gm_1! It should be noted that the gm of the grounded grid stage does not figure in the overall gain. The result is two triodes cascaded to give an overall gain of a pentode, but the noise figure of a triode! The optimum noise figure of the input stage is realized only for certain values of source resistance, R_s. Bypassing any theoretical explanation, it may be said that for a given tube type and a given signal frequency, there is an optimum source resistance to give the best noise figure. Rather than develop the

c/o Laboratory for Electronics, Inc., 11 Leon St., Boston 15, Mass.

1 J. E. Stacy, "A Low Noise V-H-F Converter," *CQ*, March, 1949.

2 H. Wallman, A. B. MacNee, and C. P. Gadsen, "A Low Noise Amplifier," Proceedings of I.R.E., Vol 36, No. 6, June, 1948.



Construction details of the 50-mc Wallman circuit converter.

general forms, the values of R_s will be given later for some applications. Since most antenna systems offer rather low values of R_s, it is necessary to use an input transformer. For a given tube the value of R_s will decrease with increasing frequency. Some difficulties may arise since the input circuit should be designed for lowest noise figure rather than proper bandpass. The resultant bandwidth must be accepted as a consequence of low noise figure, although double-tuned inputs may be used if greater bandwidths are needed. The neutralizing inductance, L_6, is necessary not for stability purposes but rather for improvement of noise figure (NF). Experiments have shown that degradation of the NF is evident when neutralization is omitted.[3]

Choice of Tube Types

The proper selection of tubes for the Wallman circuit is of prime importance. The input stage is by far the most critical since it determines the NF and gain of the circuit. The second tube should be selected such that its *gm* is equal to or greater than the *gm* of the first tube. Of course, its plate-to-cathode capacity should be low for grounded grid operation. Some suggested types for the first stage are 6AK5. 6J4, 6J6, 6N4, 12AT7, etc. Values of R_s for three types have been calculated and used successfully and are shown in *Table 1.*

The various values given in *Table I* are only approximate and should be referred to accordingly. The fact that the 6J4 is somewhat below par, relative to the 6AK5 triode connected is not generally understood, and the original experimenters[2] with the Wallman circuit are at loss for a definite engineering explanation. It was found that the NF for the 6J4 could be improved slightly if the bias were increased. The *gm* was somewhat lower under this condition but apparently a small drop in gain can be tolerated. In general, it is felt that the 6J4 type should be neglected in favor of the 6AK5 triode in the input circuit. The lower cost of this tube type further justifies this thought. Although the 6J4 is ideal in the second stage (due to the very high *gm*

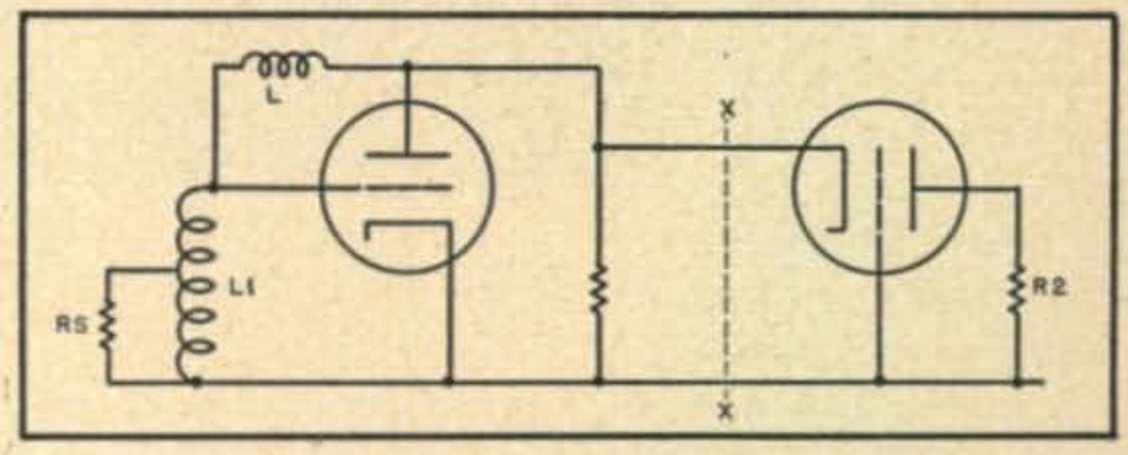


Fig. 1. A.c. diagram of the basic low noise Wallman circuit.

3 Neutralization is beneficial in a cascode v.h.f. amplifier (above 30 mc) in providing lowest noise factor.

TABLE I

		30 mc	50 mc	144 mc	220 mc
6AK5 (Triode)	R_s	2400 ohms	1400	550	300
	BW*	7 mc	12 mc	29 mc	55 mc
	NF	1.4 db	2.5 db	5.0 db	8.5 db
6J4	R_s	2700	1800	650	350
	BW*	6 mc	11 mc	26 mc	50 mc
	NF	1.8 db	2.8 db	5.0 db	7.5
1/26J6	R_s	2500	1450		
	BW*	8 mc	14 mc		
	NF	2.0 db	3.0 db		

* Bandwidth single tuned circuit @ 3 db points.

and low C_{pk}), the substitution of a ½6J6 is also suggested for economic reasons.

Both types are stable in grounded grid circuits. For example, if a 6AK5 were followed by a 6J4, the amplification of the first stage would be:

$$A_1 = \frac{gm_1}{gm_2} = \frac{6700}{12000} = 0.56$$

and if the 6J4 were replaced with a 6J6

$$A_1 = \frac{6700}{5300} = 1.25$$

In either case, the value of A_1 is low enough to insure stability. Before continuing, it should be understood that all tubes mentioned in this paper are *triodes* and when a 6J6 is mentioned only one section is inferred.

The v-h-f converter presented here is quite similar to the equipment previously described[1] with the exception of the r-f amplifier portion. The low noise r-f amplifier uses a triode-connected 6AK5 and ½6J6. It is broad-banded so that the amateur band in question falls within the 3-db points. The mixer is a triode 6AK5 with its plate circuit tuned to the i.f. A 6C4 is used as a cathode follower for coupling purposes to a low-frequency communication receiver tuned to the i.f. The oscillator is a converted Colpitts and is the only tuning control used on the equipment. The power requirements are 105 volts, preferably regulated, at 35 to 40 ma and 6.3 volts a.c. or d.c. at 2.0 amperes. The actual layout of the converter can best be seen in the photographs. The circuit diagrams for the 50 and 144 mc models are shown in *Fig. 2.* and *3.*

R-F Amplifier

The input circuit of the r-f stage is the only portion of the complete equipment requiring extended effort in adjustment. As previously mentioned, it is important that the source resistance be made to appear close to the values listed in *Table I.* Assuming that most antenna systems have a radiation resistance of 100 ohms or less, then the proper transformation may be made by tapping up on the input coil, L_1. For example, on the 50-mc coil, perfect match will be about two turns from the ground

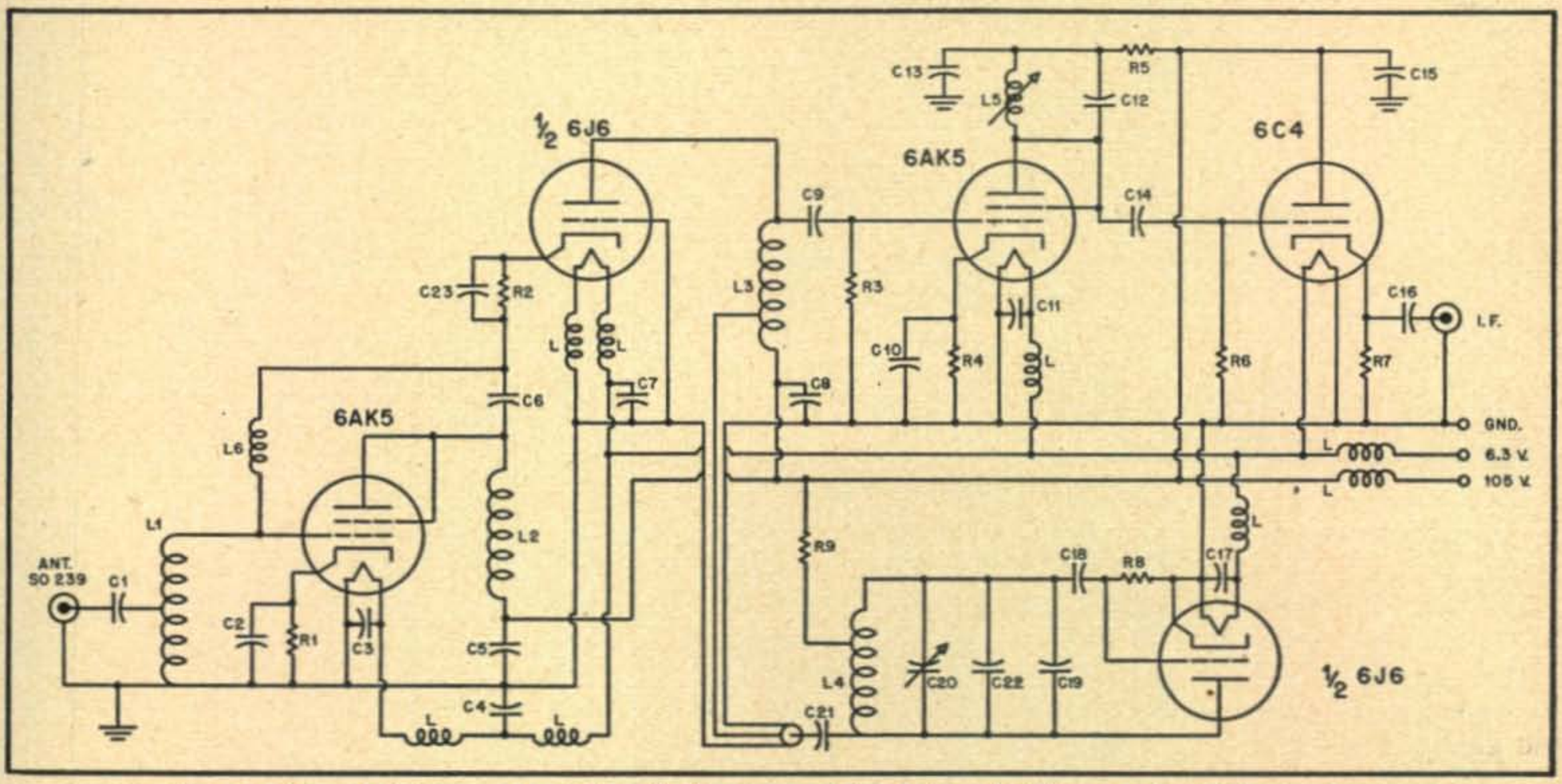


Fig. 2. Circuit diagram for 30 and 50-mc model of the Wallman circuit converter.

50-54 mc

C1, C2, C3, C4, C6, C9, C11, C23—470 $\mu\mu$f, ceramic (Erie).
C5, C7, C8, C10, C17—500 $\mu\mu$f, silver button (Erie).
C12—47 $\mu\mu$f, mica (Cornell Dubilier).
C13, C14, C15, C16—1000 $\mu\mu$f, ceramic (Erie).
C18—200 $\mu\mu$f, mica (El Menco CM15).
C19—3-45 $\mu\mu$f, trimmer. NPO
C20—1.7-8.7 $\mu\mu$f (Johnson 104).
C21—2 $\mu\mu$f, ceramic (Erie).
C22—5 $\mu\mu$f, ceramic (Erie NEG 750).
R1—68 ohms, ½ w.
R2—100 ohms, ½ w.
R3—4300 ohms, ½ w.
R4—2200 ohms, ½ w.
R5, R9—820 ohms, ½ w.
R6—47K ohms, ½ w.
R7—1000 ohms, 1 w.
R8—22K ohms, ½ w.
All resistors Allen Bradley or equivalent.

30 mc

C1, C2, C3, C4, C6, C9, C11, C23—1000 $\mu\mu$f, ceramic (Erie).
C5, C7, C8, C10, C17,—1000 $\mu\mu$f, silver button (Erie).
C12—47 $\mu\mu$f, mica (Cornell Dubilier).
C13, C14, C15, C16—1000 $\mu\mu$f, ceramic (Erie).
C18—200 $\mu\mu$f, mica (El Menco-CM15).
C22—5 $\mu\mu$f, ceramic (Erie NEG750).
C19—3-25 $\mu\mu$f, trimmer. NPO
C20—3-19 $\mu\mu$f (Johnson 110).
C21—2 $\mu\mu$f, ceramic (Erie).
R1—68 ohms, ½ w.
R2—100 ohms, ½ w.
R3—4.3K ohms, ½ w.
R4—2.2K ohms, ½ w.
R5, R9—820 ohms, ½ w.
R6—47K ohms, ½ w.
R7—1000 ohms, 1 w.
R8—22K ohms, ½ w.
All resistors Allen Bradley or equivalent.

end, and the impedance looking into L_1 from the grid will be approximately the grid input impedance minus circuit losses. If the antenna tap is moved up toward the grid end, the impedance will appear proportionately lower. The tap position for 50 mc, as determined experimentally, is 8 turns, but this tap should be varied until the best NF is realized. Of course, the transformation point resulting in the proper R_s is not the exact match for maximum transfer. Even so, it is possible to obtain some step-up in the input circuit to aid the overall gain. The gain of the first stage is given by:

$$G_1 = \frac{u_1^2 R_s}{r_{p1}}$$

for a triode connected 6AK5 u^1 represents the first region amplification factor which is about 30 then:

$$G_1 = \frac{900 \times 1400}{4700} = 268$$

at 50 mc which is ample gain to discount successive stage noise. The gain G_1 at 144 mc = 115, and at 30 mc = 475. It follows that the overall NF of the r-f amplifier is practically equal to the noise factor of the first stage alone. Noise-wise the 6J6 contributes nothing. The overall gain of the two stages is given by:

$$G_{12} = gm_1^2 R_s R_2$$

TABLE III

Coil Tap Data

L_1	L_3
144 mc	
3 turns from ground end	2/3 turns from ground end
50 mc	
8 turns from ground end or 6.5 turns for BW miniductor	6 turns from ground end
30 mc	
5 turns from ground end	8 turns from ground end

where R_2 is the loading of the 6J6 output circuit. This form includes the contributed gain of the input circuit. At 50 mc the gain is:

$$G_{12} = (6.7)^2 \times 10^{-6} \times 1400 \times 4300 = 270$$

At 144 mc and 30 mc, the value of G_{12} is 125 and 480, respectively.

Since the amplification of the first stage is about unity, there need be no worry as regards stability. The neutralizing coil, L_6, must be included for previously mentioned reasons. This coil should have a no-load Q as high as possible. The coil as used in the converter was wound on standard Speer forms as given in the coil table. If no Speer forms are available, it is suggested that any good material be used, such as polystyrene or Mycalex. L_6 should

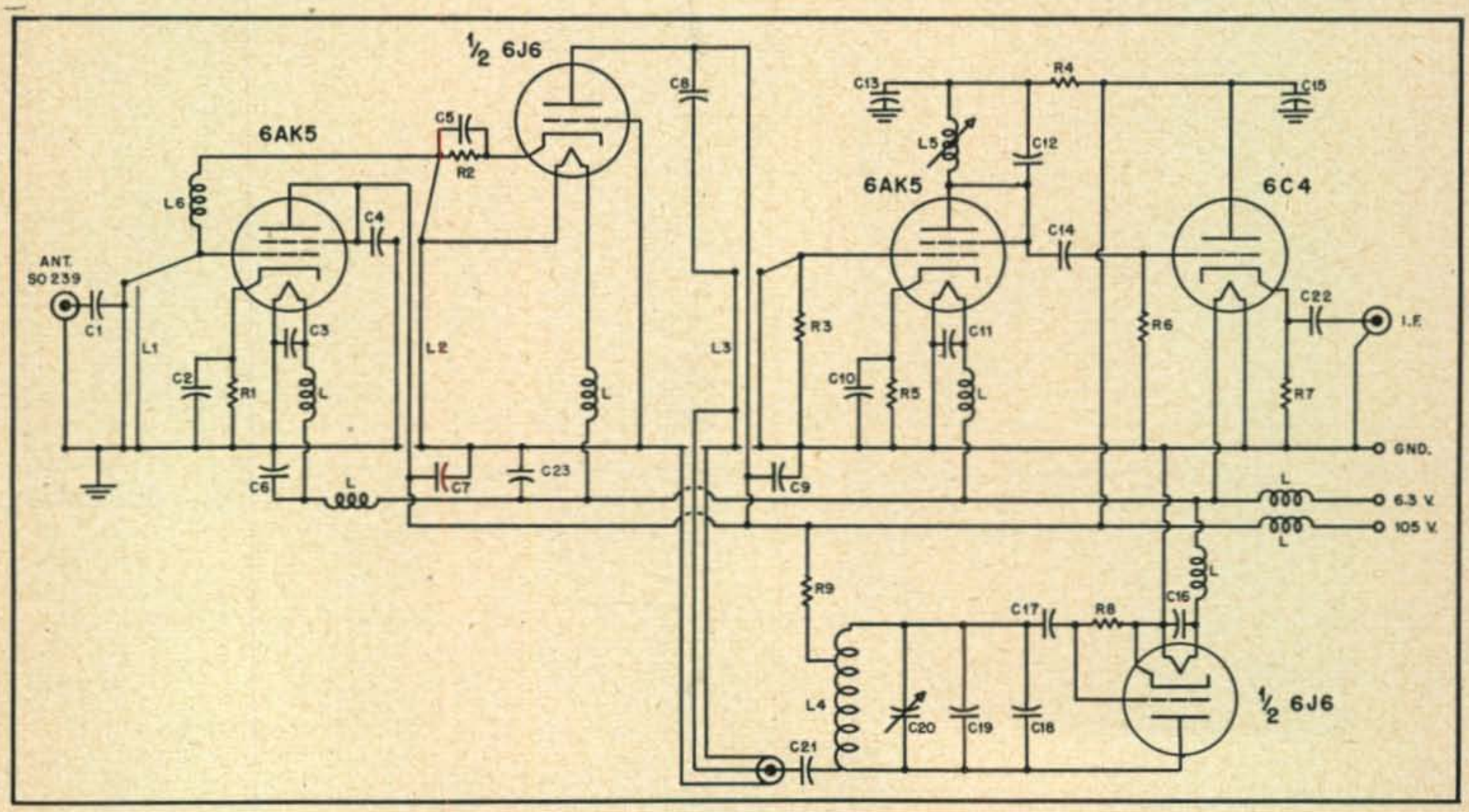
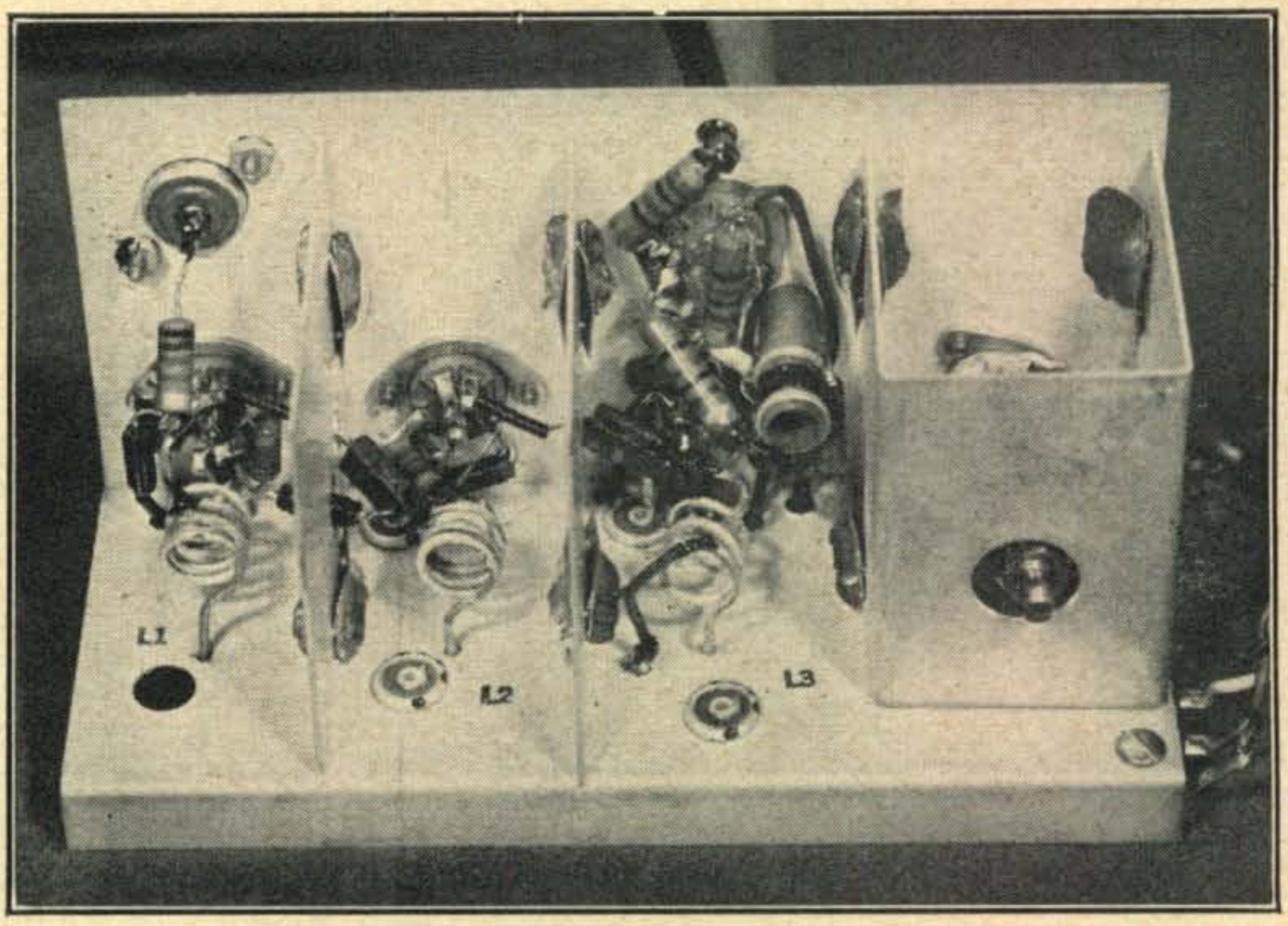


Fig. 3. Circuit diagram for 144-mc model of the Wallman circuit converter.

C1, C2, C3, C4, C5, C6, C8, C11—220 μμf, ceramic (Erie).
C7, C9, C10, C16, C23—200 μμf, silver button (Erie).
C12—47 μμf, mica (Cornell Dubilier).
C13, C14, C15, C22—1000 μμf, ceramic (Erie).
C17—100 μμf, mica (El Menco CM15).
C18—5 μμf, ceramic (Erie NEG 750).
C19—3-13 μμf, trimmer. NPO
C20—1.5-5 μμf (Johnson 102).
C21—2 μμf, ceramic (Erie).

R1—68 ohms, ½ w.
R2—100 ohms, ½ w.
R3—4.3K ohms, ½ w.
R4, R9—820 ohms, ½ w.
R5—2.2K ohms, ½ w.
R6—47K ohms, ½ w.
R7—1000 ohms, 1 w.
R8—22K ohms, ½ w.
All resistors Allen Bradley or equivalent.



Construction details of the 144-mc Wallman circuit converter.

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be made to resonate with the 6AK5 feedback capacity of 1.5 pf. The input coil, L_1, also must have a high Q to assure a good NF. At 144 mc this coil is made of 1/16-inch copper tubing, while at 50 mc #24 enameled wire is used on a ⅜-inch Speer form. At 30 mc, it is rather difficult to obtain a Q of 200 or better without making the coil rather gruesome. No suitable coil for 30 mc has been devised although one is suggested in the coil table which worked quite nicely.

The interstage coil, L_2, is not critical in any respect, and the bandwidth of the network is quite large due to the loading of the second stage. At 144 mc, the coil L_2, is a coaxial bifilar type as described in the earlier paper. L_3 is also of this type at 144 mc. The differences can be seen in the two circuit diagrams. The output of the 6J6 is loaded with a 4.3K resistor for purposes of obtaining the proper bandpass. At 50 and 144 mc, the overall bandpass is about 4 to 5 mc at the 3-db points.

Wallman has developed a form by which it can be shown what order of NF can be approached. This optimum noise figure can be shown as:

$$NF_{opt} = 1 + 2\frac{R_{eq}}{R_s}$$

Although this expression shows the minimum NF one could expect, in practice it is not quite valid. One reason is that all the factors contributing to grid loading were not included in the development of this form. It is, nonetheless, an excellent guide even at the very high frequencies. At 50 mc in our instance the NF is:

$$NF_{opt} = 1 + 2\left(\frac{385}{1400}\right) = 1.55 = 1.9 \text{ db}$$

The actual NF as determined by test was 2.25 db. And at 144 mc:

$$NF_{opt} = 1 + 2\left(\frac{385}{550}\right) = 2.4 = 3.8 \text{ db}$$

The measured value was 5.0 db. It can be seen that the recorded values of noise figures for a bandwidth of four megacycles are extremely good. Another point to be remembered is that the form for the optimum NF given above deals only with the grounded cathode input stage. But since none of the succeeding stages contribute appreciably to the overall NF, the expression is quite valid in our instance.

A form which may be used to further approximate the overall noise figure is:

$$NF = \frac{a^2R + R_g}{R_g} + \frac{R_{eq}}{a^2R}\left(\frac{a^2R + R_g}{R_g}\right)^2$$

where a = input transformer ratio
R = Antenna impedance
R_g = Effective input resistance
R_{eq} = equivalent noise resistance of input tube

Differentiating with respect to a^2 shows that minimum noise figure occurs when the transformation is:

$$a^2 = \frac{R_g}{R\sqrt{\frac{1+R_g}{R_{eq}}}}$$

Although it is possible to determine the proper value of a^2 from the latter form, it is rather difficult to apply this value to our auto transformer input circuit. The main difficulty is that the value of mutual inductance is tedious to evaluate, and consequently the value of the coupling coefficient is questionable. Probably the best way of determining a^2 is experimentally. Since the bandpass is known for different values of R_s, it is possible to observe the bandpass on a scope and so adjust the coil tap to give proper value of R_s. The resultant value of a^2 should then be equal to the theoretical value given by the form above. The Megasweep sweep oscillator was used for these experiments and the data is compiled in *Table III*.

Mixer, Oscillator, and Follower

The remainder of the Wallman circuit converter is very much the same as described in the previous paper. In this respect very little can be mentioned except for the oscillator. It was found that the local oscillator (LO) is best operated on the high side of the signal frequency, except at 144 mc. Besides the usual reasons for this, it is possible at 50 mc to realize a smaller size tuning condenser for the same bandwidth due to the rather high i.f. (14 mc).

At 50 and 30 mc it becomes possible to use the Clapp oscillator,[4] although at 50 (actually 66 mc if LO is above the signal frequency) it is still difficult to use the circuit properly. The author does not recommend this type of oscillator, but for those who insist on very high order of stability in the LO a suggested circuit is shown in *Fig. 4*. It is possible to use the circuit shown for both 50 and 30 mc if the LO is below the signal frequency at 50 mc and above for 30 mc. The circuit shown is for a frequency of 38 mc (52—14 mc), but it requires only slight changes to adapt it to 43 mc (29 + 14 mc). At both frequencies the magnitude of the components begins to be large enough to contend with. It is principally this reason which almost prohibits the use of such an oscillator at the higher frequency. Note that both sections are used in the 6J6 in order to realize greater *gm*. This makes the capacitors C_1 and C_2 much less critical.

4 J. K. Clapp, "An Inductance—Capacitance Oscillator of Unusual Frequency Stability," Proceedings of the I.R.E., Vol. 36, No. 3, March, 1948.

Assembly and Tuning

The layout of the subchassis is shown in the photos. Material may be plated brass, copper, or steel approximately 20 gauge. The plate should be silver for the 144-mc converter but is not really necessary except for anti-corrosion purposes. If steel is used for the subchassis, it is best to copper strike and plate about .0005 inches before silver plating to assure good anti-corrosive properties. A mechanical drawing of the chassis which can serves as a pattern appeared in the March 1949 *CQ* article on the original low-noise figure converter.

The mounting of the sockets (ceramic or mica-filled bakelite types) is best with the following polarization (facing the socket pins). For the first 6AK5, pin *1* should be at the bottom with the heater pins, *3* and *4*, to the left side. The second tube is just the converse; pin *7* at the bottom, *3* and *4* to the right side. The next socket—6AK5 mixer—pin *1* is at bottom left and output pins *5* and *6* to the top right. Directly above, the cathode follower socket has the heater pins, *3* and *4*, at the bottom with pins *6* and *7* to the left. At the extreme right,

COIL DATA

144 mc

L_1	L_2	L_3	L_4	L_5	L_6	L
5 TT* - 1/16" copper tubing 3/8" ID	4 TT - 1/16" copper tubing 3/8" ID threaded with #24 Formvar	3½TT - 1/16" copper tubing 3/8" ID threaded with #24 Formvar	2 TT - 1/16" copper tubing 5/16" ID LO freq. = 130-134 mc	15 TT - #28-CW enamel wire on suitable 3/8" OD form - slug tuned such as LS-3 14 mc	30 TT - #28 enamel wire spaced one wire dia. on 1/8" x 3/4" form Speer CF125 or equivalent	24 TT - #28-CW enamel wire on 1/8" x 1/2" form Speer CF125 or equivalent

50 mc

22 TT - #24 enamel wire on 3/8" form x 1" long Speer CF4-375 or equivalent spaced one wire dia. or 12 TT-B&W miniductor #3003	22TT-#28CW enamel wire on 1/8" x 1/2" long Speer CF125 or equivalent	17 TT - #24 enamel wire on 1/4" x 1" long Speer CF250 or equivalent spaced one wire dia.	4 TT - 1/16" copper tubing 11/32" ID LO freq. = 64-68 mc	15 TT - #28-CW enamel wire on suitable 3/8" OD slug tuned form LS-3 or equivalent 14 mc	45 TT - #28 enamel wire on 1/4" x 1" form spaced one wire dia. Speer CF250 or equivalent	24 TT - #28-CW enamel wire on 1/8" x 1/2" form Speer CF125 or equivalent

30 mc

23 TT - #20 enamel wire spaced one wire dia. air wound 9/16" ID or 19½ TT - B&W miniductor #3004	36 TT - #28 enamel wire CW on 3/16" x 3/4" form Speer CF187 or equivalent	25 TT - #24 enamel wire on 3/8" x 1" form Speer CF4-375 or equivalent	5 TT - #18 plain copper 3/8" ID LO freq. = 41-44 mc	15 TT - #28-CW enamel wire on suitable 3/8" OD slug tuned form LS-3 or equivalent 14 mc	48 TT - #28 enamel wire spaced one wire dia. on 3/8" x 1¼" form Speer CF4-375 or equivalent	24 TT - #28-CW enamel wire on 1/8" x 1/2" form Speer CF125 or equivalent

* TT = total turns

the oscillator socket is mounted in like fashion to the CF socket. All signal grounds may be made firmly, directly below all the sockets. The button capacitors fit into the 3/8-inch holes. The 1/8-inch holes are for the shielded wire carrying the local oscillator injection voltage. The 1/16-inch holes are used on the 144-mc converter for the tuned circuits which are wound of 1/16-inch copper tubing. The remaining holes are for leads and may or may not be protected with rubber grommets. The wiring is quite conventional and after the heater circuits are completed no preferred system can be suggested. This is best left to the discretion of the individual. The Johnson tuning condenser is mounted after the oscillator is completely wired. A right-angle bracket of simple design is all that is needed. It should be better than #20 steel for ruggedness, and the shaft hole should be one inch above the subchassis. The oscillator housing has a clearance hole one inch high to take the condenser shaft. The housing may be put in place immediately after the oscillator wiring is complete. The two interstage shields may be placed in position when only the plate leads are left for soldering.

Tuning the equipment is best done with the aid of an accurate signal generator, a sweep oscillator, and a frequency marker. However, since the coils as given in the table are approximately on frequency, the converter may be tuned quite nicely without the elaborate equipment. To start with, the i-f frequency may be adjusted by hunting for the most noise on the low-frequency communications receiver. Of course, this is done with the converter output connected to the receiver. Tuning of the front end may be done with the aid of one or two strong signals whose approximate frequency is known. If these signals can be identified as amateur signals, then the problem becomes one of peaking for best performance. In hunting for a signal, the procedure is to rotate the ceramic trimmer on the oscillator. Tuning or trimming the tuned circuits is accomplished merely by spreading or

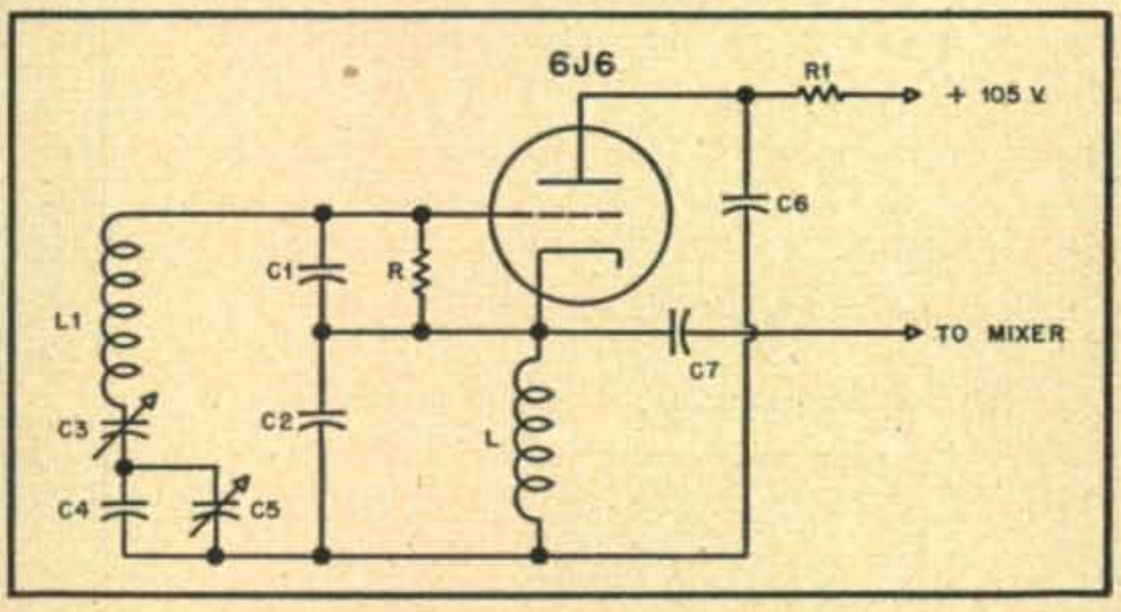
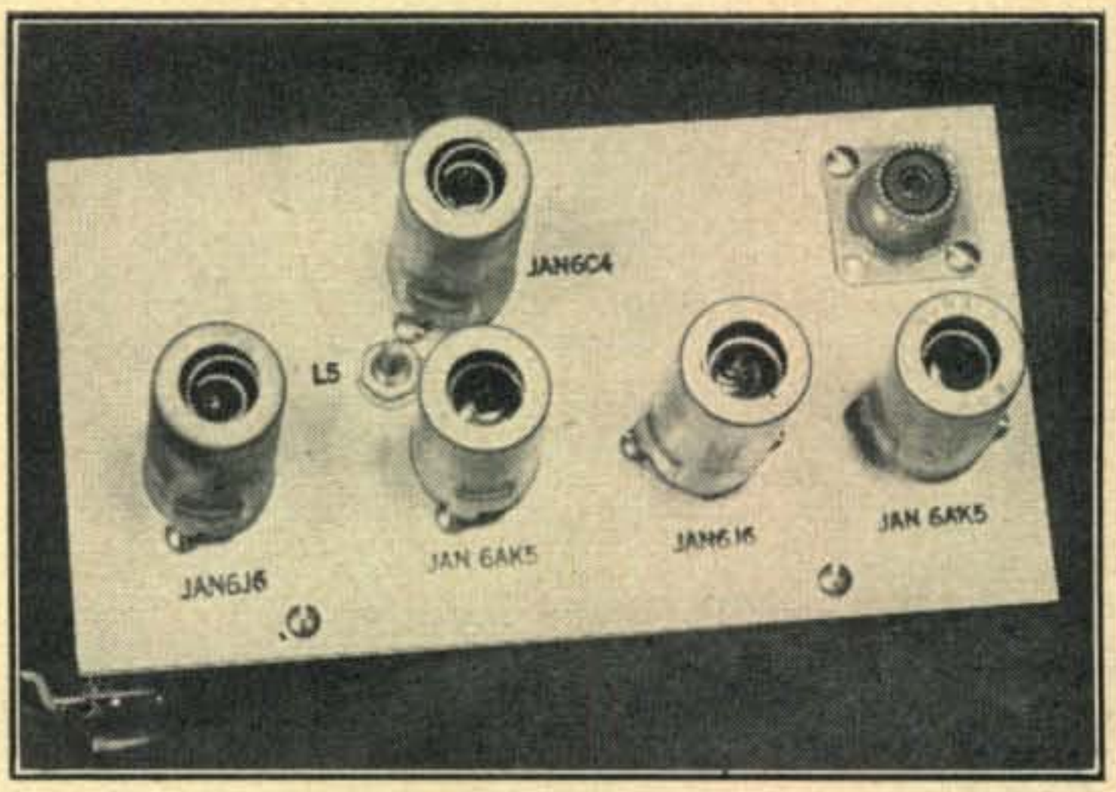


Fig. 4. Local oscillator of high order of stability.

C1, C2—100 μμf, mica (Cornell Dubilier).
C3—3-25 μμf, air variable trimmer.
C4—33 μμf, mica (Cornell Dubilier).
C5—3-25 μμf, air variable tuning.
C6—1000 μμf, ceramic (Erie).
C7—50 μμf, ceramic (Erie).
R—22K ohms, 1/2 w. (Allen Bradley).
R1—680 ohms, 1/2 w. (Allen Bradley).
L—36TT CW #28 EN. Wire on 3/16" x 1" form.
L_1—10TT BW #3003.



Front view of the Wallman circuit converter emphasizes its functional simplicity.

squeezing the turns on the coils. The available tuning range of this method is such that the coils given in the coil table will hit the desired frequencies. This amounts to about 10 per cent. Although this method is rather crude, it will be sufficiently adequate if the coils are made as given in the table. Undoubtedly, many persons have some signal source which is calibrated that can be used for tuning of such equipment, in which case the problem of alignment may be solved by the individual. When the converter is properly aligned, the band in question will be spread over about 180 degrees of the oscillator tuning condenser. The problem of oscillator drift should not be a troublesome one, for if good components and careful layout are used the drift should be far from annoying. It must be remembered that in this type of tuning, where each signal can be positively tuned, drift will be more pronounced.

After the equipment has been completely tested, it may be mounted behind a suitable panel. The author has mounted this converter on a 7" x 11½" x 2" chassis which also contains a regulated 105-volt power supply. This chassis is in turn mounted behind the front panel of the Bud C-1747 cabinet. The tuning dial is a National ACN type which can be calibrated by the individual. The coupling from the dial to the tuning condenser consists of a standard flexible coupling with an insulated ¼" to 3/16" reducer. Since the shaft of the tuning condenser is d.c. hot to ground, it must be borne in mind that the coupling must be insulated. Directly below the dial, a.c. and standby switches may be mounted. Undoubtedly there are various ways of mounting the converter and this will be a function of one's personal taste. In one instance, the owner has three converters for three bands mounted on a single chassis. All three have separate dials on the front panel and the power is switched, along with the i.f. output, with a single switch so that three bands are available almost instantly.

The performance of these converters is truly superb. The best commendation is perhaps the satisfaction of those few who have and are using such equipment today. The value of a low-noise amplifier is well demonstrated today by way of its prolific use in some of the best receivers for ex-

tremely high frequencies. Indeed, most radar receivers of various types use such low-noise amplifiers, and some types could not perform well without low-noise inputs. The author has demonstrated these converters to some hundreds of amateurs and engineers with the most gratifying results. Yes, these converters have been compared with present day equipment, and if performance is any criterion then contemporary pentode circuits have no place in v.h.f. The sensitivity as recorded in the laboratory was found to extend into the sub-microvolt region with a minimum of noise content. With a good low frequency receiver, the overall v-h-f receiving system should be about ideal.

Conclusion

There are several interesting thoughts regarding this converter and low noise theory which will be given in conclusion in random fashion. One of the first thoughts is clarification of a misunderstanding. Many persons believe that noise includes ignition, vacuum cleaners, oil burners, electric razors, etc. This is not true, and time out should be taken to comprehend the distinction between signals and noise. True, ignition signals are not wanted in our system of communication but it must be realized that it is not a contribution by way of the general mechanisms of noise sources. As a result, one should not measure the merit of a receiving system by how aptly it detects ignition signals. The so-called noise silencers and limiters in the low-frequency receivers should be used to eliminate such interfering signals. No low-noise amplifier ever conceived will discriminate between signals, but they will surely do so between signals and noise.

The double conversion system theory is to utilize all of available low-frequency receiver gain below its threshold of noise as determined by the r-f gain control. The rest of the gain required to reach the ultimate sensitivity is supplied by the low-noise figure converter. This principle will eliminate the use of the S-meter on some types of receivers, but this is not too serious a loss. Actually, some operators have devised a system whereby the S-meter may be quickly switched into use for checking purposes. Experience with double conversion will undoubtedly yield an optimum setting of the low-frequency receiver controls rather different from the example cited above. Use of the low-noise figure converter may be astonishing and novel to some at first. Let it be said right now that for those who like to know that their receiver is working as evidenced by copious amounts of background noise, this type of converter should be overlooked in favor of the conventional types. As used by the author and others, there is little if any evidence of noise in the audio system for sensitivities of one microvolt or better.

Regarding the converter proper, here are some notes which may be helpful.

Be sure to make L_1 and L_6 as high as possible in Q (100 or better at 144 mc).

Keep heater grounds away from signal grounds.

Adjust input transformation ratio carefully for optimum value.

(*Continued on page 77*)

A Composite

ALFRED SHAFFER*

THE ILLUSTRATED composite color code chart was undertaken to bring into a convenient and usable form the bulk of the various and often confusing color codes that are used at present.

The chart is not only concerned with the simplest capacitor and resistor types, but features the various ceramic capacitors and mica feed-through units which are coming into general use. The composite chart shows similarities at a glance.

The material included in this chart is based on data from the Radio Manufacturers' Association standards, the Joint Army Navy and Air Corps specifications, and individual manufacturers' literature. Reference to any of these sources will yield details on quality, temperature coefficient, etc. This data may also be obtained from a series of articles on components being printed in *CQ*.

Basic color coding is not new. It consists of the identification of the colors of the spectrum and neutral tones with the digits 1 to 9 and zero. Numerous mnemonic devices have been used to commit this identification to memory, such as following the gradations of the spectrum or rainbow or going from "hot" to "cold" colors. Many people, however, still rely on charts and tables for this information. The accompanying chart presents identification with digits, tolerance, multiplier, quality, voltage rating and temperature coefficient . . . *all* in one chart.

Following the simple direction listed at the top of the chart, more than 90% of the color coded capacitors and resistors used today may be rapidly identified by similarity to one of the types shown in the four columns at the bottom section of the page. Using the similar component as a guide, reference to the upper section of the page rapidly shows the significance of each color. Note that among the mica capacitors not listed are the simple three-dot code, and the six-dot code using three digits and a multiplier. In place of this latter type, the new code employs the first dot to distinguish between an RMA and a JAN unit.

*c/o Radiomarine Corp. of America
75 Varick St., New York 13, N. Y.

Postscripts

Radio Amateur Scientific Observations

Through an oversight, a footnote was omitted from the article "Radio Amateur Scientific Observations" in the August, 1949, issue of *CQ*. The following clause is a footnote to the above title: "This work was supported in part by Contract No. AF 19(122)-72 with the U.S. Air Force, through sponsorship of the Geophysical Research Directorate, Air Materiel Command."

Chart of Standard Color Codes

A single reference source for all of the generally employed color codes on resistors and capacitors.

APPLICABLE COLOR CODES

DIRECTIONS– Identify similar component type in the proper column on the lower section of the page. Read across the rows at the top to determine the significance or value of the various colors.

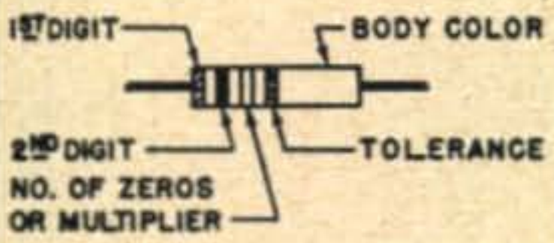
COLOR	DIGITS OR NO. OF ZEROS	RESISTORS RMA & JAN		CAPACITORS MOLDED MICA RMA & JAN			CAPACITORS MOLDED PAPER		CAPACITORS CERAMIC RMA & JAN				COLOR	DIGITS OR NO. OF ZEROS
		MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE	CLASS OR CHARACTERISTIC	MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE C>10 μμf	TOLERANCE C≤10 μμf	TEMP. COEFF. PTS./MIL./°C.		
BLACK	0	1		1	20%	A	1	20%	1	20%	2.0	0	BLACK	0
BROWN	1	10		10		B	10		10	1%		-30	BROWN	1
RED	2	100		100	2%	C	100		100	2%		-80	RED	2
ORANGE	3	1000		1000	3% (RMA)	D	1000		1000	2.5% (RMA)		-150	ORANGE	3
YELLOW	4	10000		10000		E	10000	5%	10000 (RMA)			-220	YELLOW	4
GREEN	5	10^5			5% (RMA)	F (JAN)				5%	0.5	-330	GREEN	5
BLUE	6	10^6				G (JAN)						-470	BLUE	6
VIOLET	7	10^7										-750	VIOLET	7
GRAY	8	10^8				I (RMA)			.01		0.25	+30	GRAY	8
WHITE	9	10^9				J (RMA)		10%	.1	10%	1.0	-330 ±500 JAN +120 -150 RMA	WHITE	9
GOLD		.1	5%		5% (JAN)		.1	5%					GOLD	
SILVER		.01	10%		10%			10%					SILVER	
NO COLOR			20%					20%					NO COLOR	

RESISTORS

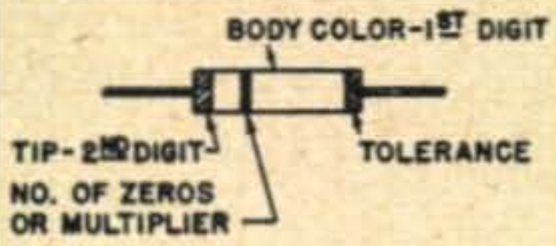
RMA & JAN COLOR CODING FOR FIXED COMPOSITION RESISTORS ARE IDENTICAL.
COLOR CODE GIVES THE RESISTANCE IN OHMS.

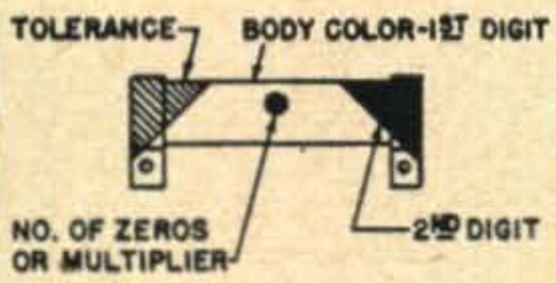
COLOR BAND SYSTEM

RESISTORS WITH BLACK BODY COLOR ARE COMPOSITION, NON-INSULATED.
RESISTORS WITH COLORED BODIES ARE COMPOSITION, INSULATED.
WIRE-WOUND RESISTORS HAVE THE 1ST DIGIT COLOR BAND DOUBLE WIDTH.



BODY, TIP, DOT OR NARROW BAND SYSTEM



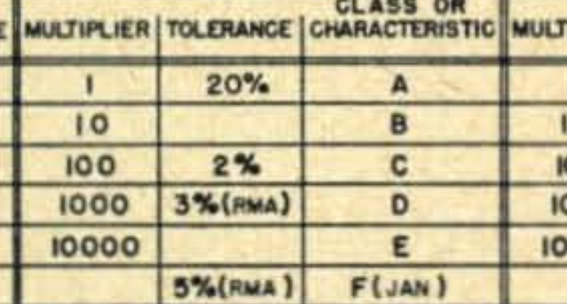


EXAMPLE–
BROWN-GREEN-RED = 1500Ω ± 20%

CAPACITORS, MOLD. MICA

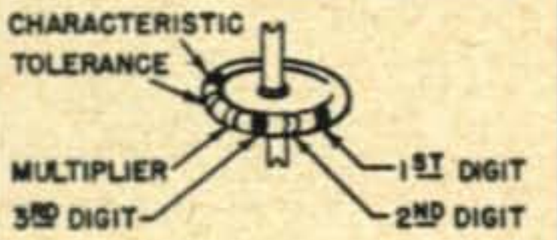
ALL AXIAL LEAD MICA CAPACITORS HAVE A VOLTAGE RATING OF 300 TO 500 VOLTS. THE MAXIMUM CAPACITY OBTAINABLE IS 10,000 μμf.
THE COLOR CODE GIVES THE CAPACITY IN μμf.

RMA 6 DOT SYSTEM

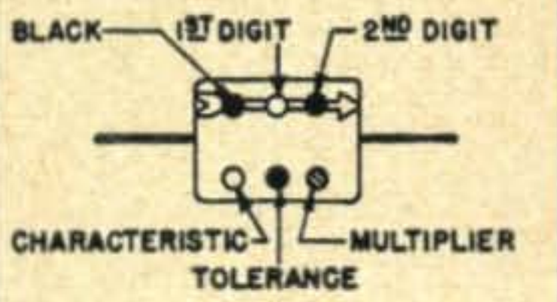


CLASS WAS PREVIOUSLY VOLTAGE.

BUTTON SILVER MICA



JAN 6 DOT SYSTEM

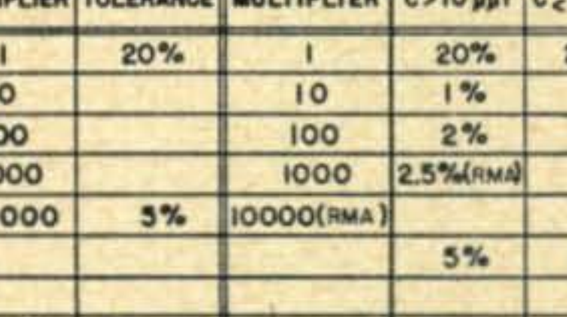


EXAMPLE – RMA 6 DOT
WHITE-ORANGE-BLUE } 360 μμf ± 2%
WHITE— RED—BROWN } CLASS J

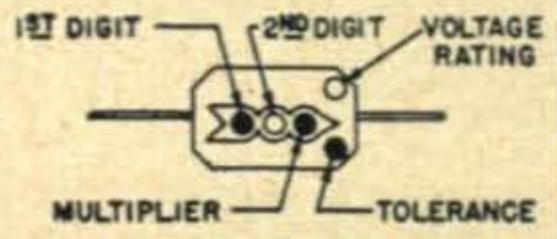
CAPACITORS, MOLD. PAPER

VOLTAGE RATINGS IN HUNDREDS OF VOLTS. ONE COLOR BAND EMPLOYED FOR RATINGS UNDER 1000 VOLTS.
THE COLOR CODE GIVES THE CAPACITY IN μμf.

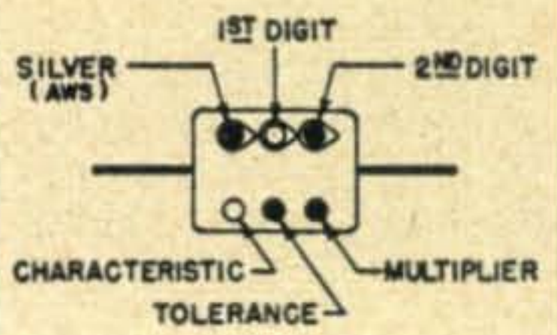
BAND SYSTEM



DOT SYSTEM



ARROW POINTS TO OUTER FOIL END

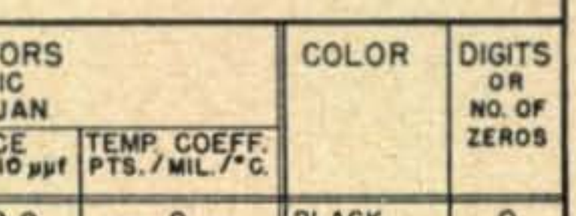


EXAMPLE –
RED-GREEN-ORANGE-BLACK-BROWN-RED
25000 μμf ± 20% 1200 Volts

CAPACITORS, CERAMIC

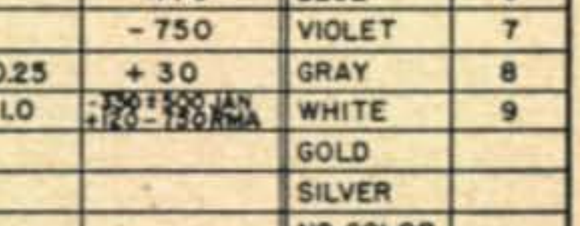
ALL TUBULAR CERAMIC CAPACITORS ARE RATED AT 500 VOLTS.
THE COLOR CODE GIVES THE CAPACITY IN μμf.

MOLDED INSULATED

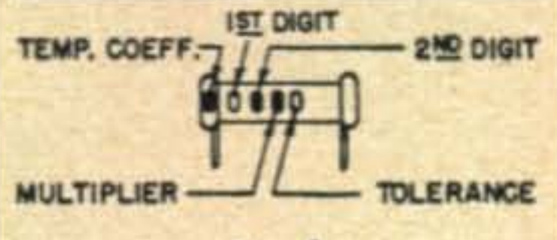


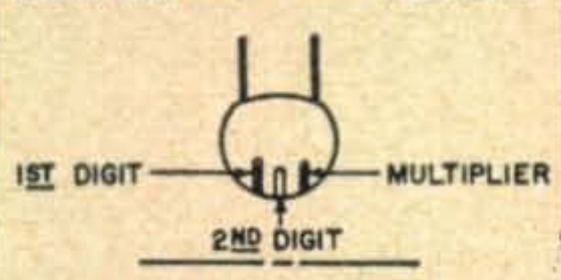
NOTE– DO NOT CONFUSE WITH RESISTORS. FIVE COLOR BANDS USED, (ONE BROAD, FOUR NARROW), WHILE RESISTORS USE FOUR BANDS.

STANDOFF CERAMIC

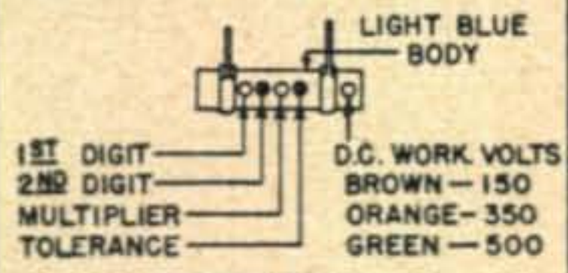


DIPPED PHENOLIC INSULATED OR NON-INSULATED





HI-CAPACITY CERAMIC TYPE (NOT TEMPERATURE COMPENSATED)



EXAMPLE–
BROWN-BLACK-ORANGE = 10000 μμf

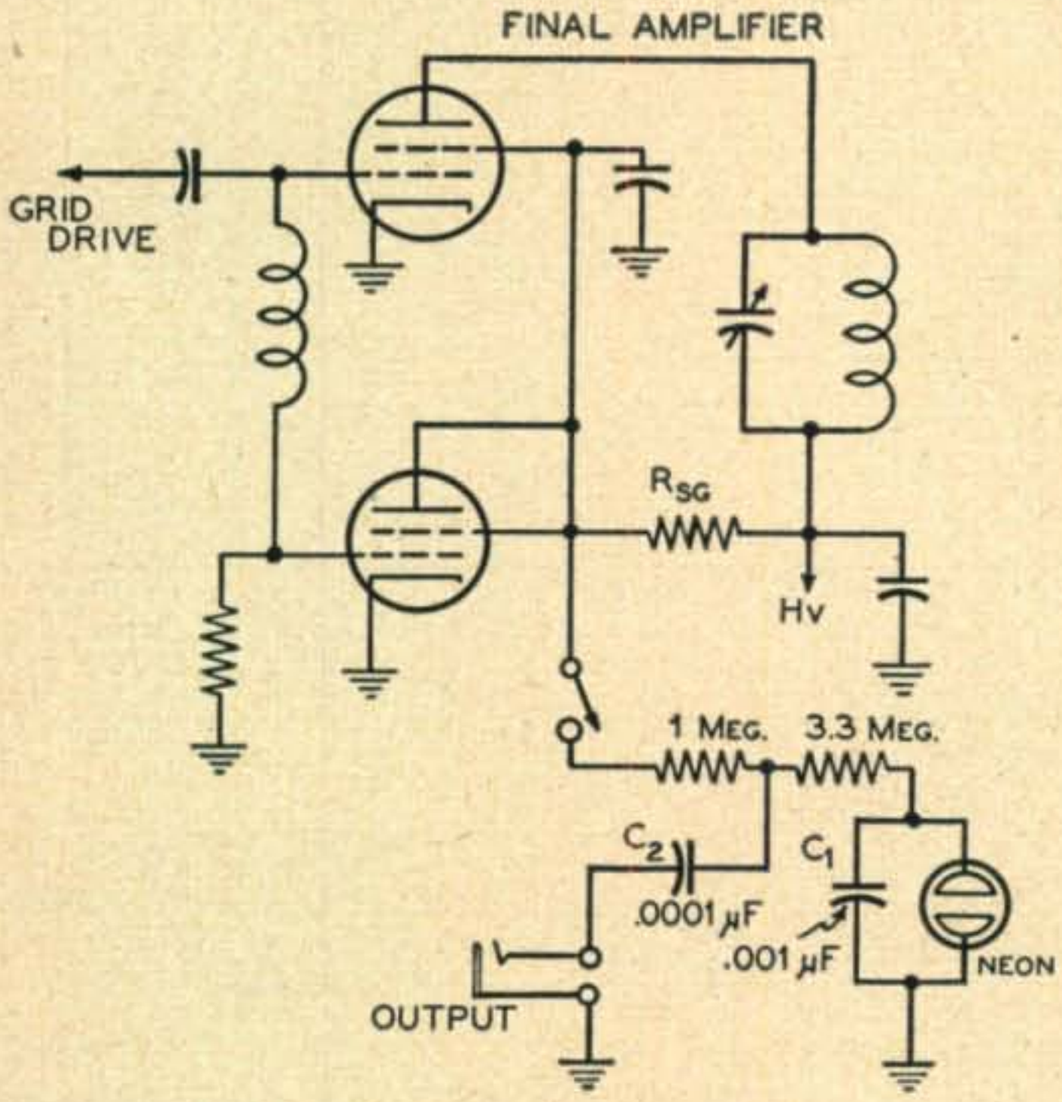
(T-1540) (Date – 5/9/49)

Chart produced courtesy of RMC.

Inside the SHACK AND WORKSHOP

Audio Keying Monitor

Many amateurs are using the ballast tube method of reducing the screen voltage on their transmitters during key-up conditions. The voltage drop across the ballast tube can be readily used to control a small neon relaxation oscillator.



The output of the oscillator may be fed into the audio section of the receiver and a low-cost foolproof audio keying monitor is the result. While audio monitors have their limitations, they are still better than looking at blinking lights, or listening for clicks and transformer hum to see if you have that "machine fist."

The few parts in the monitor may be mounted on a thin strip of insulating material and placed in the exciter cabinet. A jack may be used to terminate the output so that it may be patched into any receiver audio system, or a pair of earphones may be plugged in while testing. Slight changes in component part values may be required to compensate for different power supply voltages, but with a little cut and try a very pleasing tone will be found.

The circuit operates as follows. When the grid excitation is applied to the 807 the drop across the ballast tube rises to a value high enough to allow the neon tube to oscillate. The frequency of the audio is determined by the circuit constants R_1, R_2 and C_1. When the excitation is removed from the 807 grid, the voltage drop across the ballast tube is too low for the neon to sustain oscillation. Thus, the audio neon oscillator will follow the keying.

C. E. Gangawere, W3GRZ

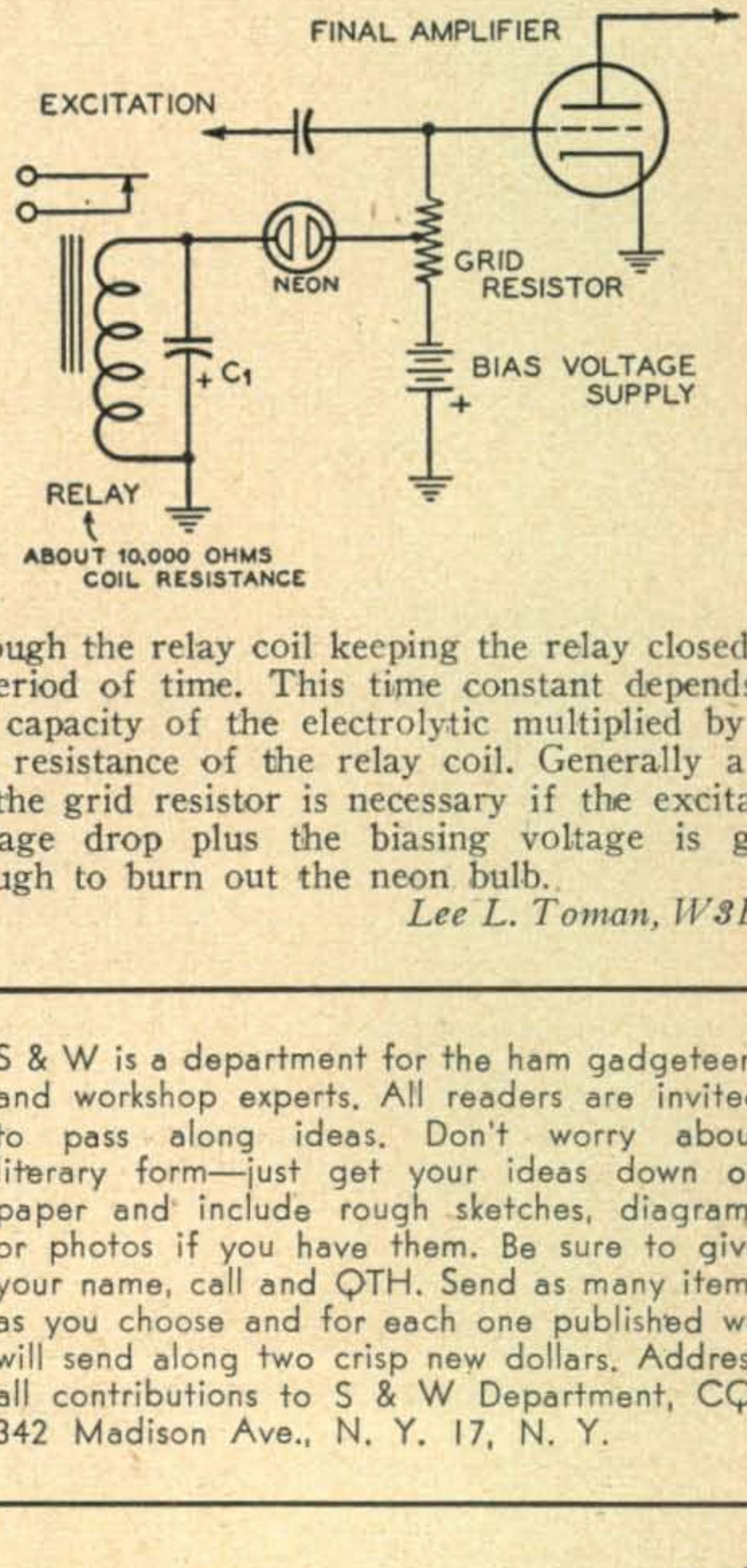
Removing Rivets

In converting or repairing manufactured equipment, occasionally the need arises to remove a component that has been riveted to the chassis. The usual procedure is to drill out the rivet by counterboring with an oversize twist drill. While the idea is good, generally about half way through, the rivet itself begins to turn with the drill. If the rivet head is accessible, this method can be made 100% fool-proof by backing up the head with a flat file before starting to drill.

Eugene Black, Jr., W2ESO

Delayed Break-in Operation

This circuit is in use at W3BIM for the purpose of delayed break-in. It features very simple operation and very few parts. Under key-up conditions the neon bulb will not fire due to the low voltage supplied by the grid bias source. However, when the key is down the excitation causes grid current to flow and the voltage drop across the grid resistor is large enough, when added to the battery bias voltage, to fire the neon tube. Current flowing through the neon and the relay coil closes the relay and charges the electrolytic condensers across the relay. When the key is released the neon ceases to fire, due to the lower voltage, but the electrolytic condenser discharges



through the relay coil keeping the relay closed for a period of time. This time constant depends on the capacity of the electrolytic multiplied by the d.c. resistance of the relay coil. Generally a tap on the grid resistor is necessary if the excitation voltage drop plus the biasing voltage is great enough to burn out the neon bulb.

Lee L. Toman, W3BIM

S & W is a department for the ham gadgeteers and workshop experts. All readers are invited to pass along ideas. Don't worry about literary form—just get your ideas down on paper and include rough sketches, diagrams or photos if you have them. Be sure to give your name, call and QTH. Send as many items as you choose and for each one published we will send along two crisp new dollars. Address all contributions to S & W Department, CQ, 342 Madison Ave., N. Y. 17, N. Y.

Data on the BC-610 Tank Coils

EUGENE BLACK, JR., W2ESO*

Now that you've got them, here's what to do with 'em.

ONE SATURDAY afternoon some time back, as I sat by my receiver, listening to a W4 and a W9 commiserating on the current lack of DX at that moment on 20, the postman rang my bell. Without much reluctance—there wasn't even a G trickling through at the time—I killed the receiver and went out to find the current issue of this notable magazine in the mailbox. Starting as usual at the back of the book, my trained eye skipped and squirmed through the surplus ads, finally alighting on one which read "BC-610 500 Watt Tank Coils—Set of 14 for $5." Even the untrained eye opened at this one! Thought they were sharp, those California fellers—but they couldn't fool a real Manhattan surplus-sniper, toughened by the harsh realities of Cortlandt Street. I *knew* this must mean *7 plate coils and 7 link coils equals* 14, but even so it looked like a bargain. So I went back to the shack and wrote out a check, first turning on the neon sign which spelled out in letters three feet high the following considerate message to my neighbors: "W2ESO OFF THE AIR. RESUME LOOKING AT YOUR TELEVISION RECEIVERS."

About five Saturday afternoons later, the doorbell sounded off again. This time it was a truckman, leaning on a large wooden crate and waving a bill for something like $8.00 worth of shipping charges covering transportation of said piano box and contents from California. Noting out of the corner of my eye (the sharp one), that the box was branded "DOUBLET KIT FOR SCR-399," and secretly conjuring up a vision of how those West Coast slickers had slipped up and had accidentally included a pair of thirty foot masts along with my seven coils, I quickly paid the man off, refraining from any comments which had anything to do with his keeping the change.

With the help of two neighbors, who did not own television sets, I eventually got the box into my apartment. As I attacked the iron bands on the outside with a crowbar, I made rapid mental calculations on how many pairs of masts plus complete antenna assemblies could be contained along with a mere handful of modest 500-watt coils in a thing of this size. By the time the last 3/4-inch plank from the top and the handle of my prybar had given way simultaneously, my delusions had risen to somewhere in the altitude of four masts lashed end to end, carrying a 14-mc dipole above the rooftops of the two 12-story buildings which towered about a hundred feet above my humble dwelling.

Clearing away the timber, I reached incautiously into the yawning depths of the box and split the shoulder of a new shirt. On the second try, I dredged up a foil-wrapped carton big enough for a Super-Pro, but strangely lighter. Within were a number of objects, also overseas wrapped in metal foil. I ripped open one, unwound a few yards of waxed paper, and found a glistening tank coil, apparently suitable for a guy with enough nerve to operate around 1 megacycle, but labeled "2.0-3.5 mc." Another try uncovered its twin brother. As the third coil began to emerge from its wrappings, it looked as though I had drawn three of a kind, and as the prospect of owning 7 shiny 2-3.5 mc coils bore down on me, I began to oscillate violently (mentally, that is) between the alternatives of (1) peeling down these monsters for 14 or 28 mc, etc, or (2) finding six other birds who had somehow gotten in the same fix, involving the remaining six coil types. The improbability of the latter reminded me of a story about a magician[1], so I calmed down and unwrapped the other four coils, to find that I didn't have three of a kind after all, but rather three pairs covering from 2.0 to 5.7 mc., and a single marked 5.7 to 8. Very odd, I thought, but at least I had 80 and 40 under control, so back to the wooden box for those masts. Nothing doing there—empty—when suddenly inspiration gave me a swift kick. Suppose there was another layer of stuff packed in that corrugated carton? A quick look showed that I had only gotten down to a false bottom halfway down, and underneath what do you think I found? *I wuz robbed! No masts in there, but seven more coils—making two full sets!*

All kidding aside, I don't regret my bargain at

*130 East 24 St., N..Y. 10, N. Y.

1 The story, probably apocryphal, concerns a young magician doing his first club date — I heard it told about Thurston. It seems he was put on the spot by the Master of Ceremonies, who after introducing him, said "Of course, you don't depend on marked cards and trick decks for your effects, do you, Mr. X?"

"Of course not," Mr. X lied indignantly.

"In that case," the MC continued, "you won't mind if we add an additional note of interest by using a deck of our monogrammed cards," and had an attendant bring up a new sealed deck to our hero on the stage.

While Mr. X fumbled around with the cards, stalling for time and probably wishing he knew how to make himself disappear, he suddenly discovered that by some weird chance, he had been given a faulty deck, consisting of 52 aces of spades—and with a setup like that, he pulled some card tricks that night that nobody has duplicated since.

all, and on occasion have put the duplicate coils to good use in a separate antenna tuner. However, in using these coils I have been made aware of the fact that the BC-610 design involved somewhat lower *LC* tank ratios than is usual amateur practice; as a result, when using any one of a number of high-voltage medium-current tubes, including the 810, 813 and 250TH, with accepted values of tank capacity, I have wound up using a coil marked for a lower frequency range. For example, with a tank condenser of 50-$\mu\mu$f per section (Cardwell XG-50-XD), the 4.5—5.7 mc coil resonates on 7 mc with the condenser just about fully meshed, while the 8-11 mc coil tunes to 14 mc with the tank condenser set at about 75% of maximum capacity.

After discussing this with some of the local gang who had run into the same thing, I prepared the accompanying table, which should be a time saver to any buyer who has not yet made his own calculations. While I made my initial determinations of tuning ranges by plugging the coils into the rig and checking frequency coverage with a grid-dip meter, most of the tabulated data was taken with the use of Boonton 160A and 170A *Q*-Meters. The average ham will be interested primarily in the listed values of capacity required to tune a coil to a given ham frequency; as is customary, the values given are the sum of the tank capacity, tube output capacity plus stray circuit capacity (wiring, etc.). In some cases, additional listings are made where coils were altered. The 14-18 mc coil is made usable on the 28-mc band in this manner. My 50-$\mu\mu$f-per-section tank condenser is too small for 3.5-mc operation, of course, so it is padded up with a surplus 50-$\mu\mu$f vacuum condenser for this band. Since this restricts the possible tuning range drastically, it is necessary to cut the coil to rather close tolerances, and at that only the c.w. part of the band is covered. This fits in with my operating preferences here, as I learned prewar why not to use 75 phone in the middle of New York City, but the chap who wants 4.0 mc coverage will either have to trim the coil a bit further or start out with a larger tank condenser.

The significant *Q* readings are those taken at the operating frequency where the coil is to be used. Coil manufacturers do not generally publish this kind of information, but I have some manufacturers' literature on a similar type of prewar origin, and these figures are in good agreement, showing the same drop off in *Q* with increasing frequency. Knowledge of coil *Q* is of use in calculating tank circuit efficiency which in turn helps in estimating the allowable power level at which the coils can be used. The tank efficiency[2] is equal to $\frac{Q \text{ coil} - Q \text{ loaded circuit}}{Q \text{ coil}}$, where the loaded *Q* is of the order of 12 to 15. For example, the modified 14-18 mc coil has an unloaded *Q* of 170 at 28 mc. If we assume a loaded *Q* of 15,

$$\% \text{ Eff.} = \frac{170-15}{170} \times 100 = 91\%.$$

2 Terman, Radio Engineer's Handbook, p. 450.

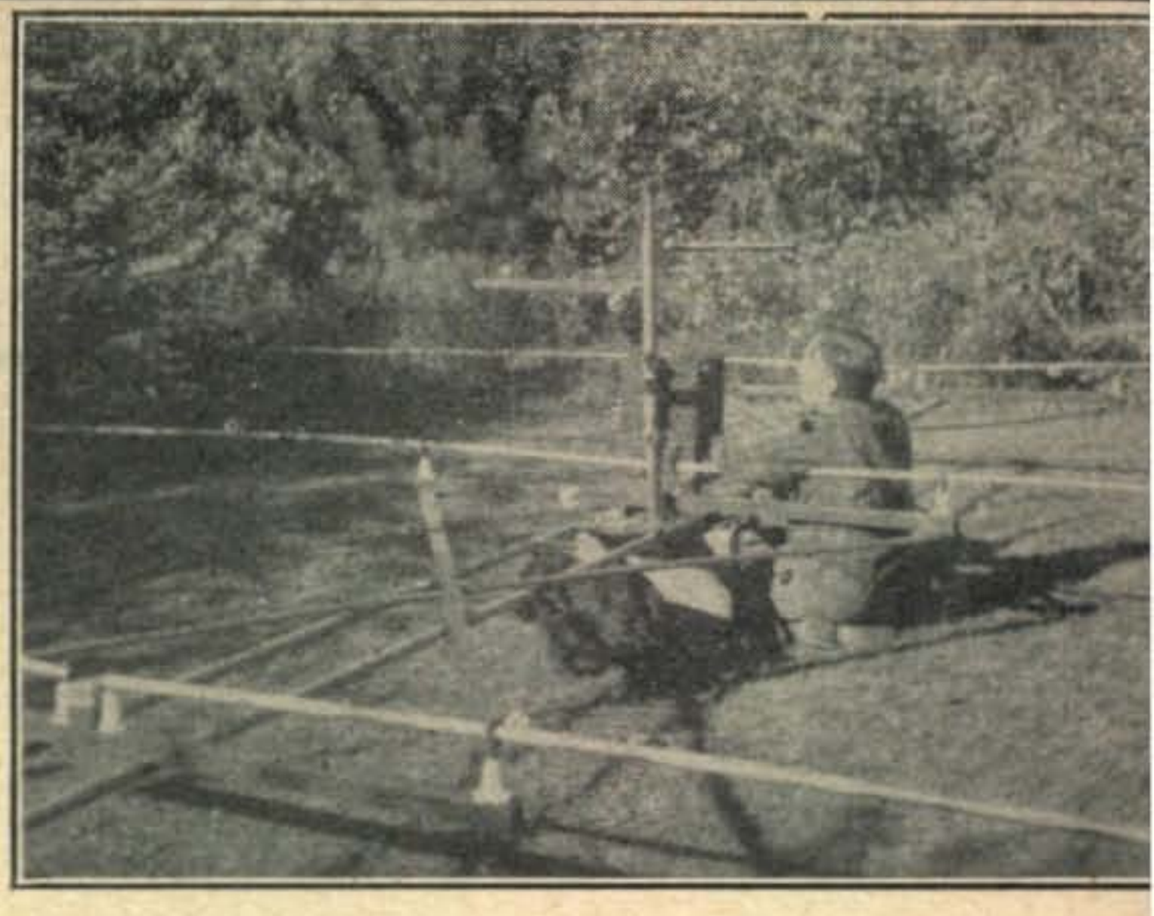
TABLE I

Coil No.	Marked Freq. Range mc	Test Freq. kc	Capacity Required for Resonance $\mu\mu$f	"Q"	Description of Alterations
1735	2 - 3 .5	1800	131	340	none
		2000	105	345	none
		3500	41.5	240	3 turns off each end
		3700	36	240	3 turns off each end
1736	3.5 - 4 .5	3500	61.5	375	none
		3750	53	375	none
		4000	46	375	none
		3500	70	375	1 turn off each end
		3750	60	375	1 turn off each end
		4000	52.5	375	1 turn off each end
1737	4.5 - 5 .7	7000	Appx. 25*		none
1738	5.7 - 8. 0	7000	37	375	none
1739	8 -11	14000	Appx. 22*		none
1740	11 -14	14000	31	140	none
		21000	Appx. 16*		none
1741	14 -18	14000	54	150	none
		21000	Appx. 25*		none
		21000	37	150	1 turn off each end
		28000	19	170	1 turn off each end

***Note:** Calculated value. Minimum capacity setting of Model 160-A Q-Meter is 30 $\mu\mu$f.

MULTI-BAND ROTARY

BOB HANER, W2FBA*



Three's usually a crowd, but not with this approach to high gain on 20, 15, and 10.

IN THESE DAYS of increasing use of multi-band transmitters and operation on several bands by the average amateur, the problem of beam antennas for each of the several bands operated becomes somewhat difficult. Especially since the days of hanging up a 130' Zepp and thus having as good a signal as the other fellow seem to have gone forever due to increased competition for DX.

One solution commonly employed is to have two or three beams stacked one above the other on the same mast, each for a different band. This system was tried at W2FBA for 10 and 20-meter operation and was not too satisfactory.

The second idea tried met with much more success. It was tried first at W2AFQ and was then adopted by W2MA, W2PUD, W2VRZ, to mention a few, as well as the writer. It has been very successful at all stations.

This idea is not a new one by any means, having been used as far back as 1939. However, previous applications have all involved some compromise such as having to climb the tower to change bands, operating with a tuned feedline, high standing wave ratio and so forth. The antenna used at W2AFQ, W2FBA, et al, has none of these disadvantages—the feedline is reasonably flat (coax cable is used at all stations) and the antenna frequency can be selected from the operating position.

The arrangement consists fundamentally of a 20-meter beam, either 2 or 3 elements, which has tuning or phasing stubs which are inserted by means of relays or mechanically actuated switches in the center of the parasitic elements and the radiator to allow the beam to be operated either on 15 or 10 meters. When the beam is operated on 15 or 10 meters each element becomes two half-waves in phase. This affords greater forward gain and a sharper horizontal beam pattern than can be obtained from the average 3 or 4-element beam. In other words, this method of operation is not a compromise and actually gives superior results on 10 and probably also on 15 meters.

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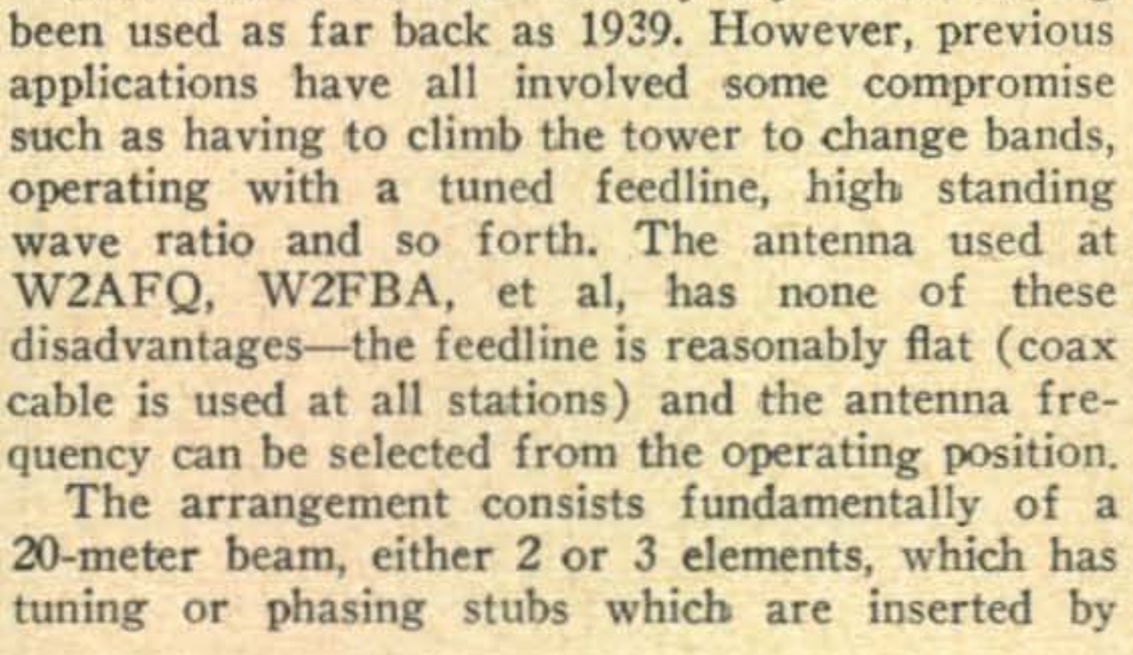

Fig. 1. Electrical diagram of a single parasitic element.

Resolving the Basic Problem

Referring to *Fig. 1*, an electrical diagram of a parasitic element, it can be seen that when *SW1* is closed the element is a 20-meter half-wave. For 10-meter operation *SW1* is opened and *SW2* is closed which tunes the stub for 10 meters. The element is now two half-waves in phase on ten meters, with the phasing stub being used to tune the element to exact resonance. The phasing stub is used for the dual purpose of phasing the two halves of the element and adjusting the entire elements to the correct length for 10-meter operation. For 15-meter operation both *SW1* and *SW2* are opened and the phasing stub length is established by the permanent shorting bar. The element is now two half-waves in phase on 15 meters. On 15 meters, an appreciable part of the element is folded back in the phasing stub as the two halves are much too short to resonate on 15 meters as a half-wave. However this should not affect the operation of the beam appreciably as the current loop still occurs well out in the element proper.

The method of feeding the radiator and matching the feedline on all three bands is somewhat more complicated. At W2FBA this has been successfully accomplished by the use of three separate matching networks—one for each band of operation—and relays to connect the networks, as desired, to the feedline and the radiator.

Figure 2 shows the schematic diagram of electrical connections for the matching system used. When relays *1* and *4* are energized, the feedline is connected to the radiator through the 20-meter matching network which is a quarter-wave 33-ohm coax matching transformer. When relays *2* and *5* are energized, the line is connected to the

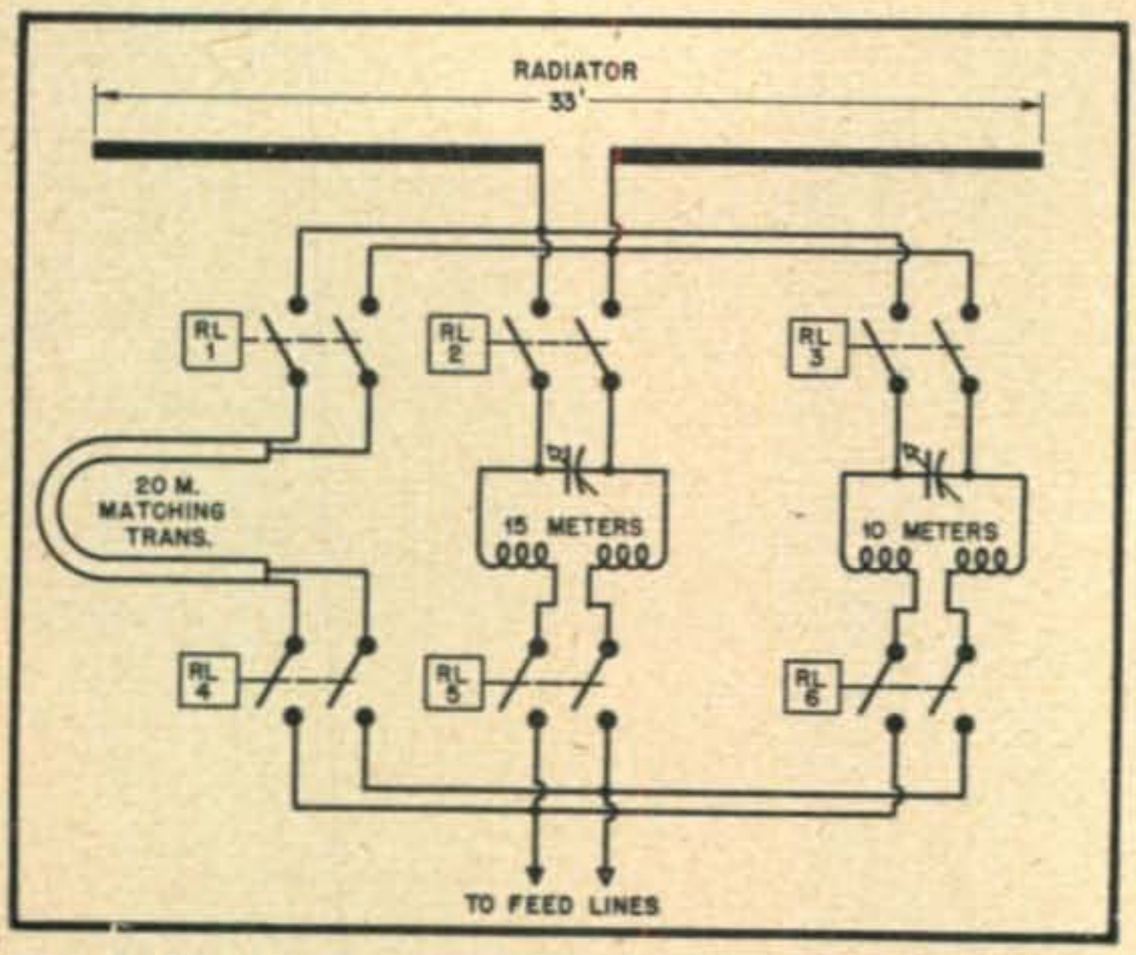

Fig. 2. Electrical connections for three-band matching system.

radiator through the 15-meter matching network. When relays *3* and *6* are energized the line is connected to the radiator through the 10-meter matching network. These networks will be described in detail.

W2AFQ proposes to handle the line matching problem in a slightly different fashion. This will be an extension of the method successfully used in his present 10-20 meter beam. It consists of using an open wire quarter-wave matching transformer or stub for matching the line to the radiator for 15 and 10-meter operation.

Figure 3 shows the schematic diagram of electrical connections for the matching system to be used at W2AFQ. When the line is connected to the radiator through *SW1* it is matched for 20-meter operation through a conventional quarter-wave coax matching transformer. When the line is connected to the open-wire matching transformer by *SW2* it is matched for 10-meter operation. The 20-meter quarter-wave coax transformer does not effect the operation on 10 meters because it becomes a half-wave 1:1 transformer and therefore does not change the line impedance. For 15-meter operation the feedline is connected to the open-wire transformer through *SW3*. It's hoped that the 20-meter transformer can be left in the circuit without adverse effect on 15 meters as this obviously simplifies the switching.

The 10-20 meter beam now in use at W2AFQ and the 10-20 meter beam previously used at W2FBA used the above method of matching the feedline very successfully. Of course for this two-band beam the additional switch and stub length for 15 meters was omitted on the parasitic elements as well as the radiator.

Constructional Details

This article is intended primarily as an explanation of the overall antenna, not an exact "how to build it" description. However, the constructional details involved such as switching methods, types of relays used and so forth, are explained to assist in duplication.

Mechanically, the antenna is built in any conventional fashion to suit the builder's own ideas. Of course the "plumbers delight" type of uninsulated beam cannot be used. For obvious reasons the elements have to be insulated at the points of support. The phasing stubs are strung along the beam support boom from the outside ends back toward the center and are supported in any convenient fashion. The phasing stubs are made of No. 14 or No. 12 wire spaced 3 or 4 inches by feeder spreaders. Any surplus length which will not fit in the boom length can be coiled up in a large diameter loop or hung down from the boom.[1]

Relay Mounting

A picture of the beam in use at W2FBA shows the method of mounting the phasing stubs for the parasitic elements (*Fig. 4*). The relay for 20-meter operation is mounted on the 2 x 2 which supports the parasitic element. The relay is mounted at the center of the element and as close to the ends of the 16' pieces of tubing as is practical. The relay is connected with short and heavy leads to the center of the element. The phasing stub is also connected to the center of the element and runs along the beam boom toward the center of the beam, to the 10-meter relay which is mounted on a cross-piece on the beam boom. From the 10-meter relay the phasing stub is run upwards in a semi-circle to a cross-piece fastened to the umbrella guy wires which are used to support the beam boom at the far ends. (Incidentally these guy wires have proven to be worth their weight in gold during severe icing.) From this support point the phasing stub continues on in a semi-circle, back down to the beam boom, where it is fastened at the point where the 15-meter shorting bar is connected. The phasing stubs for both the reflector and director are handled in a similar manner.

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1 **Do not make the cross arms which support the elements of metal. Use wood (2 x 2 or equivalent), as metal cross-arms will upset the beam badly on 10 and 15 meters. Apparently there is enough capacitive coupling between the hot ends of the elements and a metal cross-arm to completely upset the beam.**

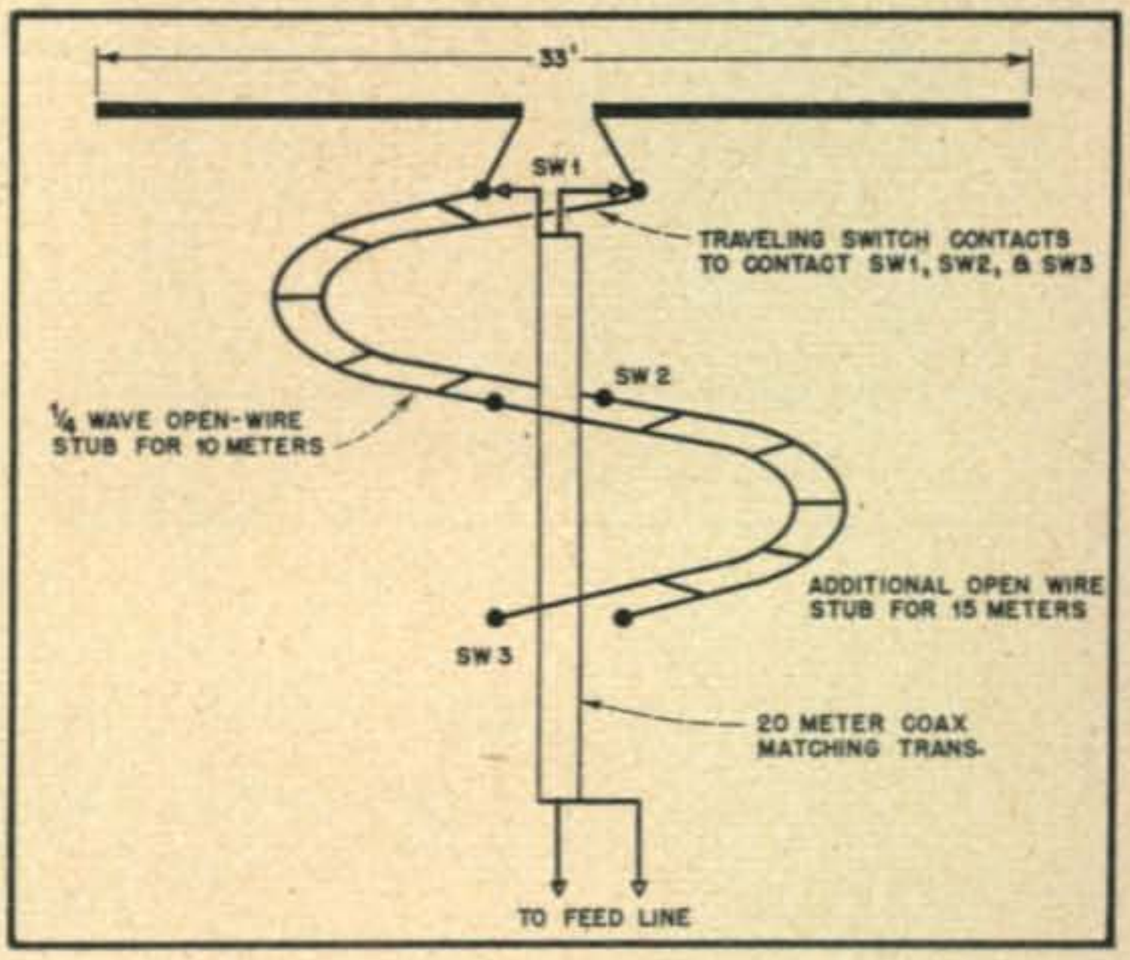
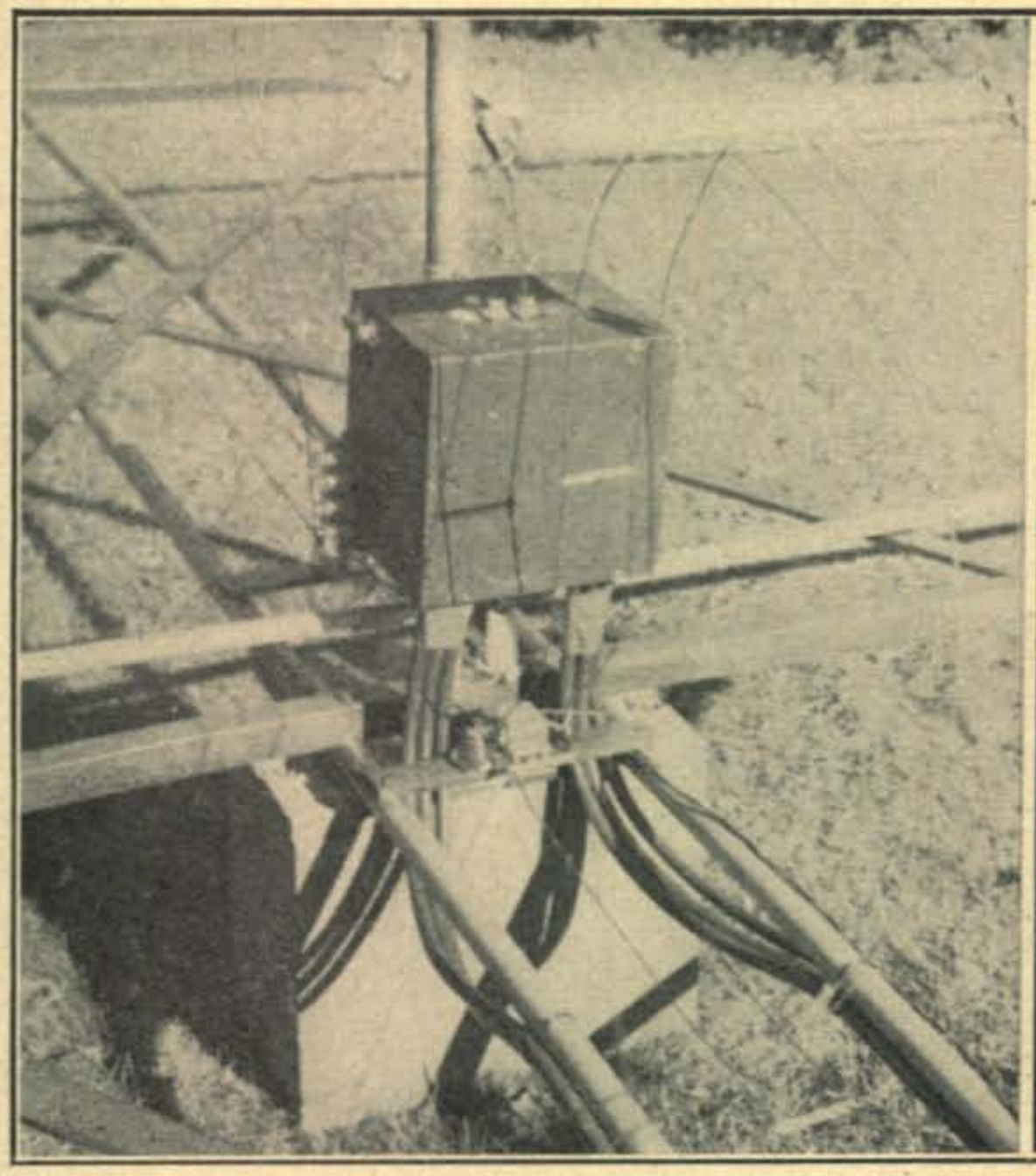


Fig. 3. Electrical connections for alternate three-band matching system.



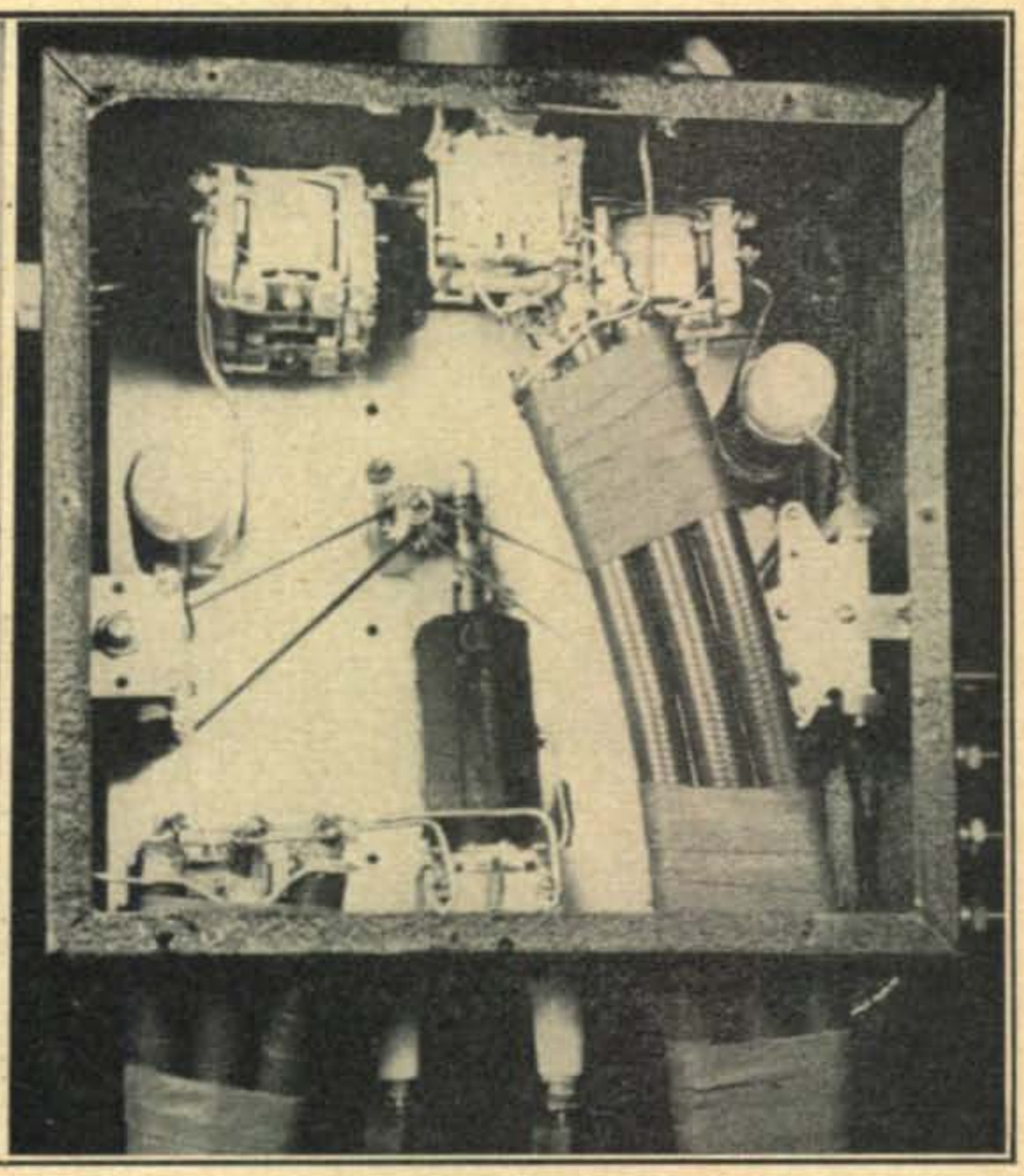


Fig. 4 (left). Network box mounted over radiator in center of beam. Phasing stubs can be seen in foreground and background. Relays visible are for 10-meter operation. Connections for relay power in network box are made to terminal board on side of box. Coax connectors on top of box are for feedline. Those on side are for 6-meter beam which is mounted above 20-meter unit. Fig. 5 (right.) Interior of network box. Relays are included to switch 6-meter beam mounted above 20-meter beam. The small motor is to be used to resonate 15 and 10-meter matching networks to the exact operating frequency from the operating position. Because of the 175' long feedline at W2FBA it should save about 3 db increase in line attenuation when changing to 11 meters with the beam tuned to 10.

The matching networks for the feedline-to-radiator matching are contained in a metal box fastened to the guy wire support pipe at the center of the beam boom. No difficulty has been experienced in almost two years' operation with rain water getting into the box. Some drain holes were drilled in the bottom of the box to let the water that gets in get out!

Figure 5 shows the interior of the box. It will be noted that the 20-meter matching network is coiled up and tied to the beam boom outside the box as it is a little too bulky to be placed inside the box. Incidentally, if desired, one might include another set of relays and a loading coil to resonate the radiator for use on 40 meters as a half-wave rotatable dipole. This was tried in the early stages of the beam tune-up and worked out quite well. Very high voltages will occur on the radiator proper and insulation troubles might arise if a kw were employed.

The only precautions to observe in the placement of parts is to keep the leads involved in r.f. switching as short and direct as possible. The leads should be of fairly heavy wire, #12 wire being used in the set-up illustrated. In addition, the networks should be mounted so the coupling between coils is at a minimum.

The relays used for network switching are all surplus 24-volt d.c. aircraft type relays which were obtained locally for a very reasonable cost. The network switching relays are all antenna change-over relays which do not have particularly heavy contacts but do have good r.f. insulation. This has proven to be entirely satisfactory as the currents involved are quite low, except in the center of the radiator on 20 meters. Therefore the one relay used in this part of the circuit has heavier contacts, approximately 1/8" diameter contacts. The small relays are General Electric 2791-D101F3. The heavier relay is a Leach 1077.

The relays used for switching the parasitic elements are also surplus 24-volt d.c. aircraft type relays and are of the heavy-current low-voltage type which were used for motor or dynamotor starting relays. The type used at W2FBA is a GE CR2792-B116-A3 which is a s.p.s.t. double-break relay with a contact rating of 24 volts 50 amps. The relay in its original form does not have good enough insulation on the fixed contacts for r.f. service and was modified by mounting the fixed contacts on polystyrene bushings or by making a new side out of polystyrene. The moving contact was not modified because when any of the element switching relays are closed the r.f. voltage on them at that time is very low because they are then at a current loop. When the relay contacts are open they are usually at a voltage loop—such as the 20-meter relay when the beam

is on ten meters. When the relay is not energized the moving contact is not in the r.f. circuit and thus only the fixed contacts require good insulation. These particular relays are enclosed in a plastic cover and have been operating with no additional protection.

Of course standard antenna relays may be used if they are available in quantity. Another possibility might be electric stove relays which could be provided with good r.f. insulation. These are 117-volt 60-cycle relays and are not too expensive.

At W2AFQ a mechanically actuated switch is used on the present 10-20 meter beam. This switch is actuated by turning the beam against a fixed stop on the tower from either a clockwise or counter-clockwise direction depending on whether the beam is being switched from 20 to 10 or 10 to 20. *Figure 6* is a sketch showing the mechanical details of this switch.

The proposed mechanical switch for the new three band beam at W2AFQ is built around a driving motor taken from an SCR-522 band changing mechanism. With this type switch it will be necessary to arrange the stubs so that the switching points will all occur at a central point where the switch will be mounted. This will require a certain amount of folding up of the stubs so that this condition can be obtained. Incidentally a quarter-wave open end (unshorted) stub will be used to tune the 20-meter parasitic elements so that the entire beam can be tuned at the switch, which will be located at the center of the beam.[2] This switch also will include a switch point for 11-meter operation.

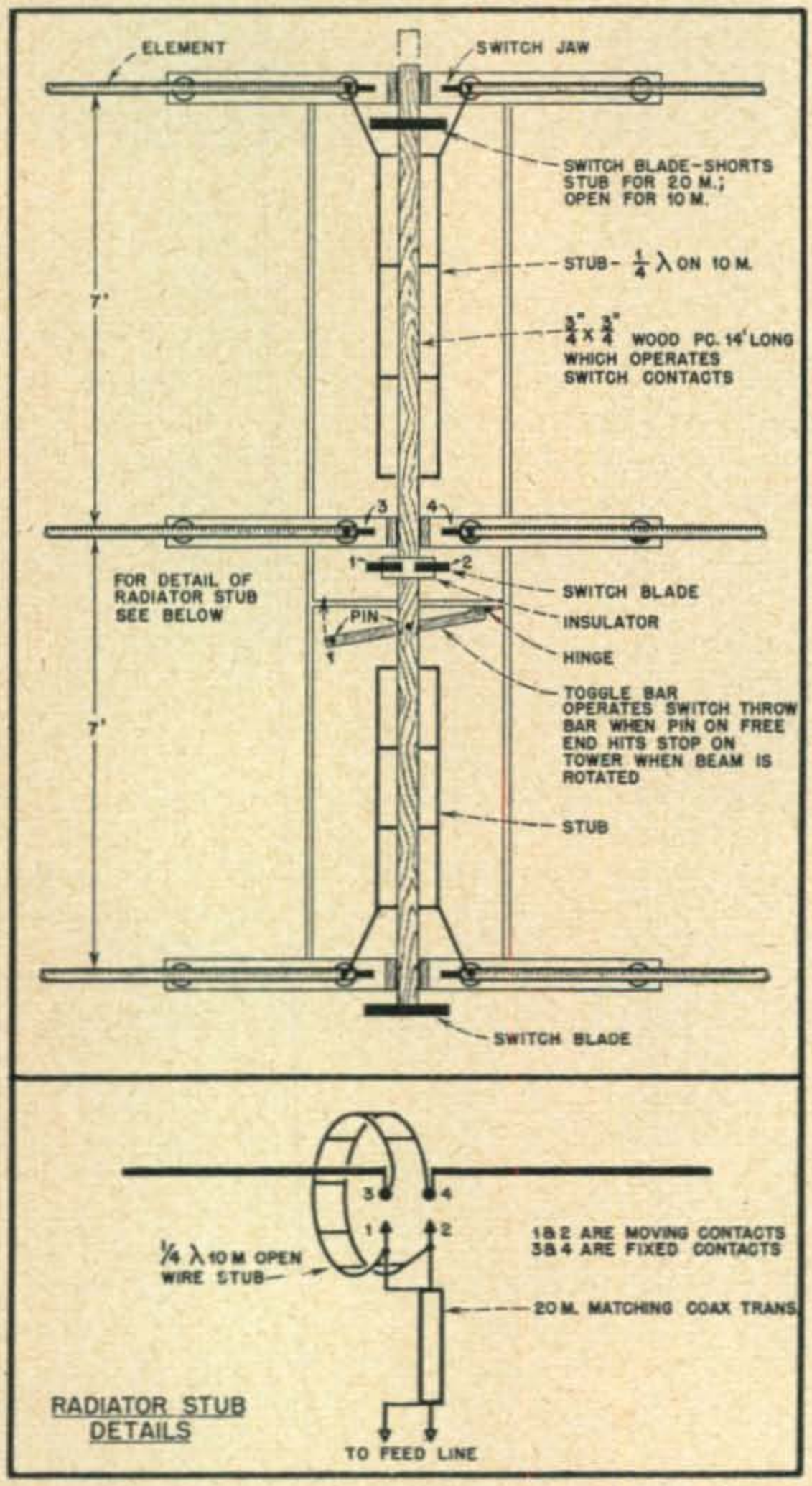


Fig. 6. Mechanically actuated switch for going from one band to another as used at W2AFQ. Details of the complete beam and radiator stub are shown below the beam drawing.

Matching Networks

Matching the radiator to the feedline presents a problem in that the impedance varies from 10 ohms on 20 meters to many thousand ohms on 10 meters, plus the additional problem of having to resonate the radiator as well as match it on 15 meters. This may be done by at least two different methods. At W2AFQ it is done by the use of a resonant open-wire transformer, with the transformer including the additional length necessary to resonate the radiator on 15 meters. Coax line RG-8/U is used for the feedline and no ill effects have been noticed by the omission of line-balancing transformers. The open wire transformer is constructed in the same manner as the phasing stubs for the parasitic elements.

The matching networks for 10 and 15 meters used at W2FBA are parallel resonant circuits with the *L* and *C* values adjusted to obtain a match between the feedline and the radiator. These networks are completely described by W2JO, Dr. T. M. Gadwa, in Feb. 1943 *QST*. They have proven to be very satisfactory and are easy to construct and adjust. The 15-meter network cannot be easily calculated in advance as the radiator is not resonant on 15 meters and the network serves as both a matching and loading circuit. Although this type of use is not recommended by Gadwa (the radiator should be resonant for the best match) the network seems to work and a reasonably good match has been obtained. The constants for the 15-meter network are best determined exactly by experiment.[3] This can be done by varying the coil inductance and capacity of the tuning condenser during the beam tune-up till the combination is found that gives the highest field strength. This is not hard to do and a very definite peak or best combination of coil and condenser will be found. Once the correct values are found the network can then be assembled in permanent form. The performance of the 10-meter network can be checked in the same manner. The 20-meter matching transformer is a conventional

(*Continued on page 76*)

2 Ed. note: Not too good an idea; losses probably cut efficiency.

3 Tests on 15-meter band may be conducted using equipment such as a grid-dip oscillator or signal generator. It is illegal to use a transmitter, however, until such time as 21-mc operation is authorized.

Winning Three Falls from Gorgeous George

WILLIAM I. ORR, W6SAI*

Case history of a successful 14-mc TVI housecleaning job.

ONE OF THE most virulent forms of TVI comes from radiated harmonics of transmitters operating on 20 and 40. This unpleasant fact was forcibly brought to my attention when my next door neighbor purchased a television set. When W6SAI "went on the air" the poor TV set choked and turned black in the face! What an ironic situation! For months I had been chuckling at the woes of my friends on 28 mc with their harmonic problems and now I was getting reports of TVI from my 7 and 14-mc transmitter. The shoe was certainly on the other foot!

As more television sets appeared in the Los Angeles area, more of the "low frequency" boys were troubled with TVI. LA was practically turned into an armed camp during the last DX contest! The causes and cures of TVI have been pretty well covered in past articles in *CQ*, but repetition of this topic seems very much in order, hence this case history.

The causes and cures of lower frequency TVI are the same as for 28 mc. The idea is suppression of harmonics and the use of suitable circuits to prevent the harmonics from being radiated. However, because a higher order of harmonics is involved, generally, but not necessarily, only a few simple cures need be applied to the transmitter.

The problem changes from one of rebuilding the whole rig to that of deciding which remedy is the most effective and the easiest to apply to the existing rig. As usual, the fly in the ointment is to know *where* to start and just *what* to do. As a "channel jammer" from 'way back, I feel well qualified to put in my two cents' worth and guide the reader past my many pitfalls of TVI elimination. OK? Lets go!

Harmonic generation, as has been repeatedly pointed out, can take place in any stage in the average transmitter. Practically all 14-mc transmitters have one or more doubler stages. Like a great many fellows, we use an 807 as a final doubler. No TVI was caused up to the 807 stage hence our operation started at this tube.

To eliminate the extra harmonics generated by this stage we did three things. First, eliminated parasitics! Second, provided a low impedance path to ground for generated harmonics, and finally, provided a reasonable amount of *C* in the doubler tank. The circuit shown in *Fig. 1* is what we ended up with.

The usual mica capacitor, while effective at 14 mc may not be effective at high frequencies due to the inherent inductance of the leads and internal connections. This lead inductance may resonate with the capacity of the condenser at a relatively low frequency. Substantially above the resonant frequency the capacity is about as effective as a block of wood when it comes to bypassing effects because the condenser is actually an inductance. This imperfect bypass action allows parasitics and harmonics a fertile field to wreak their havoc. In order to minimize this condition, the cathode of the 807 is grounded directly at the tube socket by a short, heavy piece of copper strap. Bias for the tube is inserted into the grid network instead of the cathode circuit. The screen is bypassed to ground by means of a special three terminal "feed-

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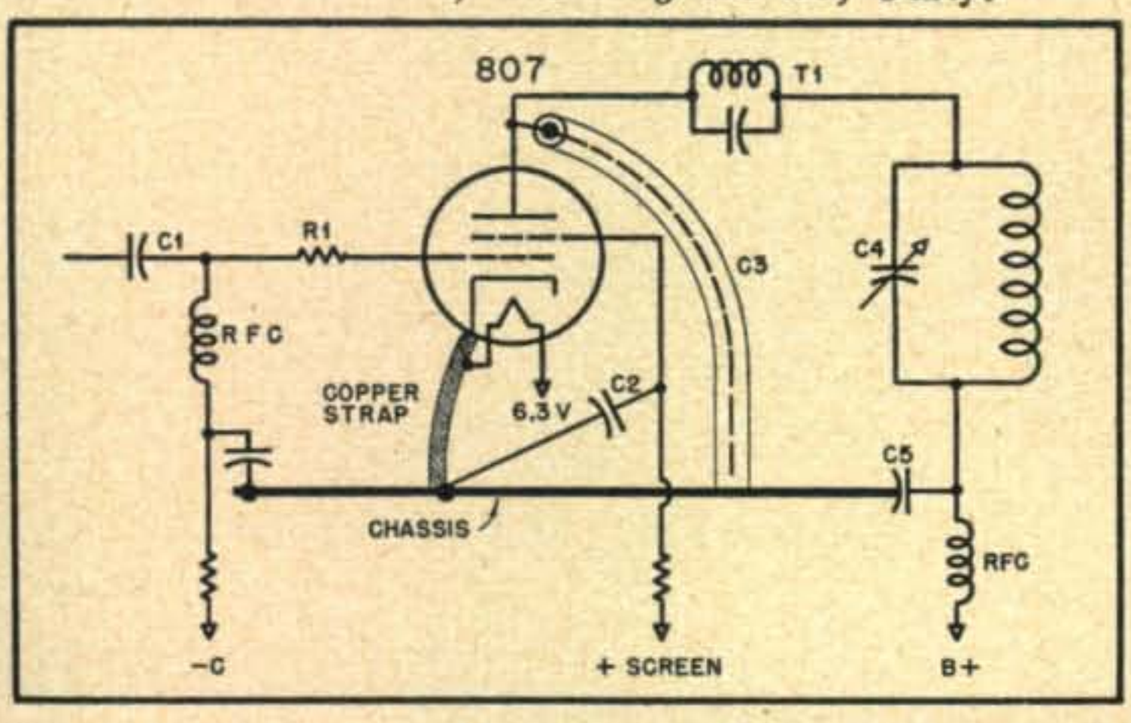


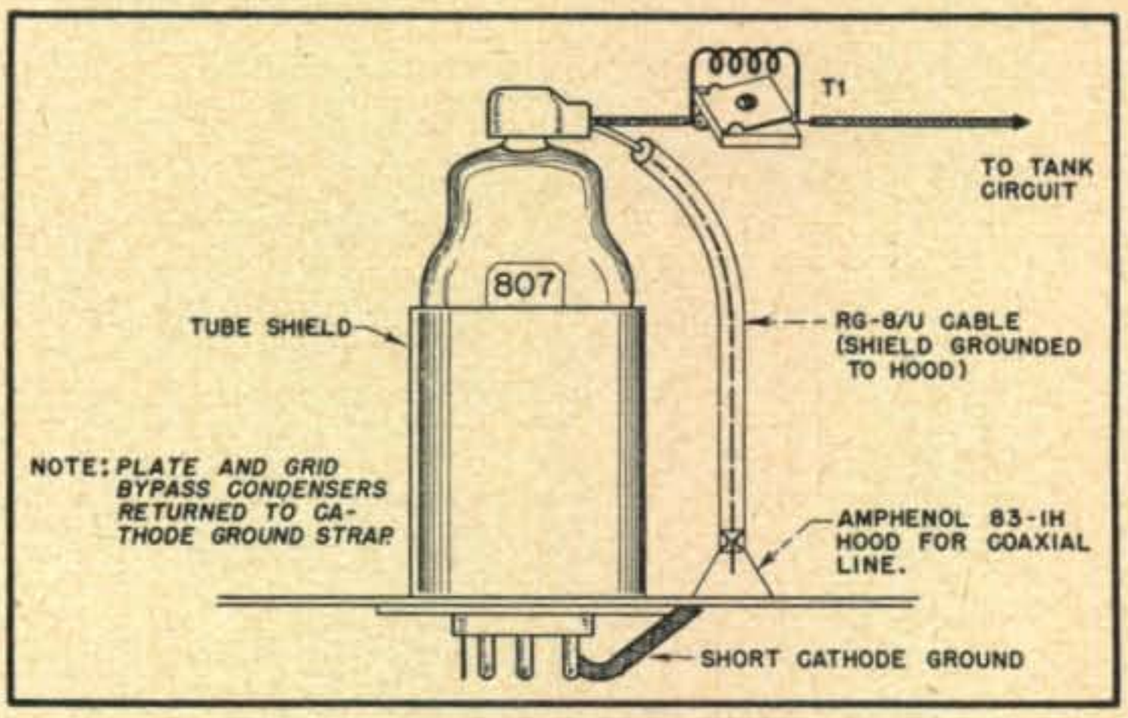


Fig 1 (left). 807 doubler stage after receiving the full treatment. Fig. 2 (right). Actual physical layout of TVI-proofed 807 stage.

through" bypass condenser which is resonant above 150 mc. This condenser (Sprague HYPASS 46P8) provides a low impedance path to ground through the critical harmonic range. To isolate the screen from any r.f. that may be introduced in the wiring, a small 100-ohm 1-watt carbon resistor is placed in series with the screen supply directly *after* the bypass condenser.

To further suppress undesired harmonics of this stage and to prevent them from being coupled to the next stage a plate harmonic bypass condenser, C_3, and a plate trap, T_1 were found essential. C_3 provides a low impedance path from plate to the cathode at harmonic frequencies and T_1 introduces a high impedance between the tube plate and its coupling circuit.

C_3 as well as the screen bypass condenser must have low reactance. A short piece of RG-8/U coaxial cable was used as the condenser, with excellent results. It has a capacity of 29.5 $\mu\mu$f per foot and a short length sufficient to reach from the plate cap of the tube to the cathode provided satisfactory bypass action at a frequency of 50 mc or so. The inner conductor is connected to the plate cap of the 807 and the outer braid is grounded by means of an inverted 83-1H cable hood fastened to the chassis next to the cathode ground point. The harmonic trap, T_1, is tuned to the fourth harmonic of 14 mc by means of a crystal pickup device described later.

Parasitic suppressor R_1 was added to the circuit to discourage the tube from taking off on its own when no excitation is applied. It may not be necessary in every rig, but it is inexpensive and good insurance. The 14-mc tank of our 807 is conventional except that it is of fairly high *LC* ratio. The doubling efficiency suffers only slightly and the additional harmonic rejection gained is of great importance. About 50-$\mu\mu$f circuit capacity proved satisfactory.

A doubler observing these precautions will provide minimum harmonic excitation to the following stage.

Harmonic Generation in Amplifier Stages

With the doubling equipment of the transmitter operating as it should, attention was turned to the succeeding amplifier stages. Before any attempt was made to check the harmonic content of these stages, they were checked for parasitic oscillations. If there is any slightest sign of instability, you must eliminate it, or your TVI de-bugging is just a waste of time!

A buffer or final stage following the doubler should have these features in it:

1. The plate tank (and grid tank, if it is link coupled to the doubler) should be of medium *C*. Low *C* is definitely "out."
2. Excitation to the p.a. should be kept to a minimum level consistent with adequate drive to the final amplifier.
3. The filament bypass condensers should be of the three-terminal feed-through type as used on the 807 screen. The grid return condenser also should be of this type. (Sprague 46P8 is a .005-μf 600-volt condenser, suitable for filament and low-voltage grid circuits.)
4. Grid and plate bypass returns should be made directly to the filament condenser ground point. We want no circulating harmonic currents, especially in a single-ended stage!

As in the doubler, medium *C* grid and tank circuits should be used, and three-terminal filament and grid bypass condensers are essential.

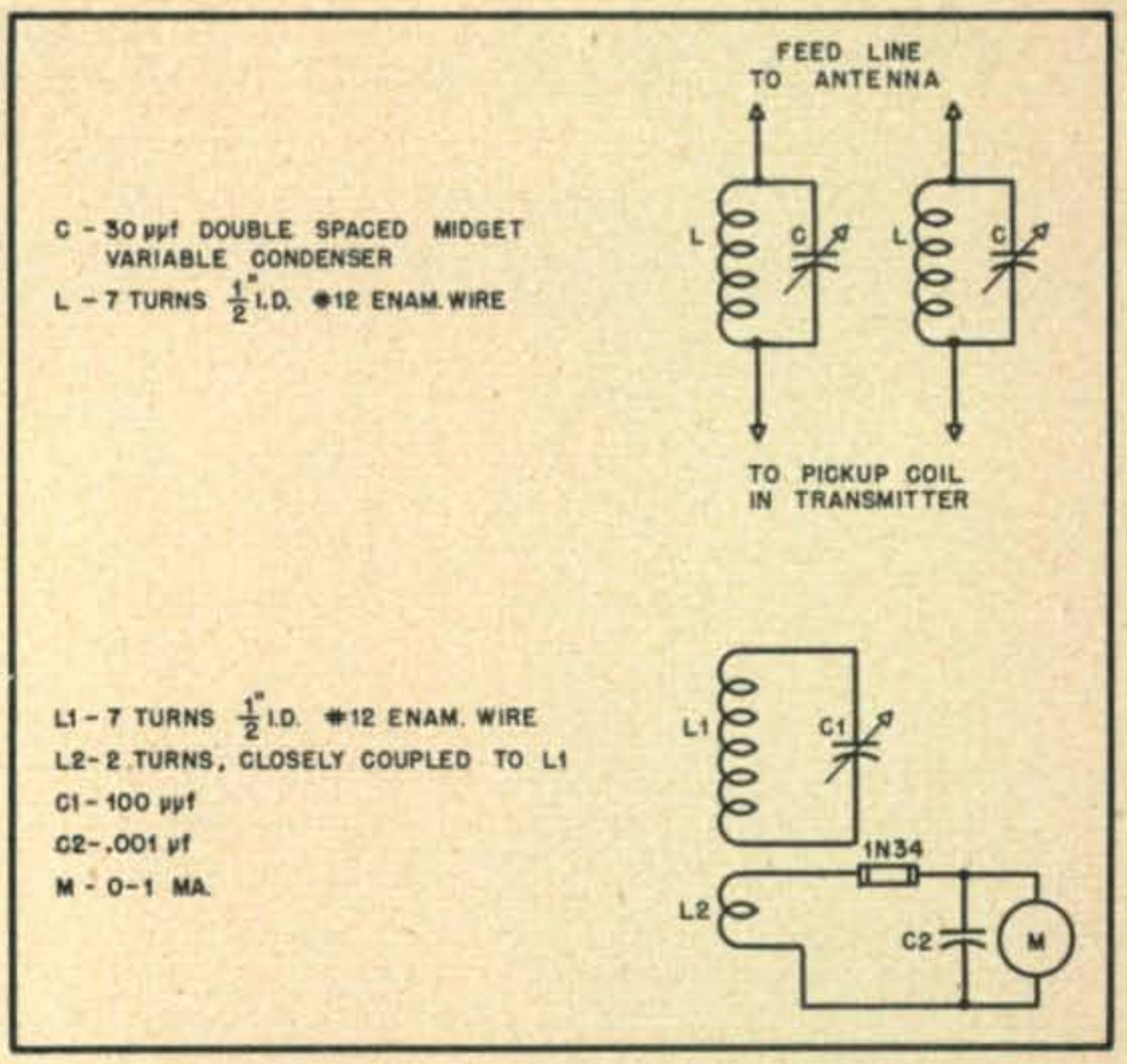


Fig 3 (top). Fourth harmonic trap for 14 mc to be inserted in each feeder at the transmitter and tuned to the fourth harmonic.

Fig. 4 (bottom). Harmonic pickup device designed to tune 28 mc with C_1 entirely meshed. This simplifies selection of correct harmonic reading, since the fourth harmonic is read at about 15% capacity.

Harmonic Radiation

At this stage of the game, the transmitter still emitted a measurable fourth and sixth harmonic. But by our manipulations it was a weak and anaemic one and was putty in our hands! We did the following:

1. Shielded all high voltage leads. Ran high voltage to the final amplifier and buffer in RG-8/U coaxial line. The RG-8/U will operate safely at 4000 volts r.m.s. (For the benefit of the Los Angeles boys). The smaller RG-59/U may be used for a thousand volts or so. The coaxial braid was grounded at both the power supply end and the amplifier end.

2. Both sides of the 117-volt line to the transmitter were bypassed with a pair of three-terminal condensers. (Sprague 48P8, 0.1 μf, 600 v.) Bypass the line to a good ground point, or to the metal transmitter rack. Series line chokes *may* be necessary in some installations.

At this point our TVI problem was 99% licked. All we had to do was squelch the harmonics running up the feedline and into the antenna . . . and this was the easiest job of all! Two parallel tuned traps, resonating at the fourth harmonic (Channel 2) are used, one in each feedline. The harmonic rejection these midget traps gives is amazing.

(Continued on page 74)

On a Cycle Right for You!

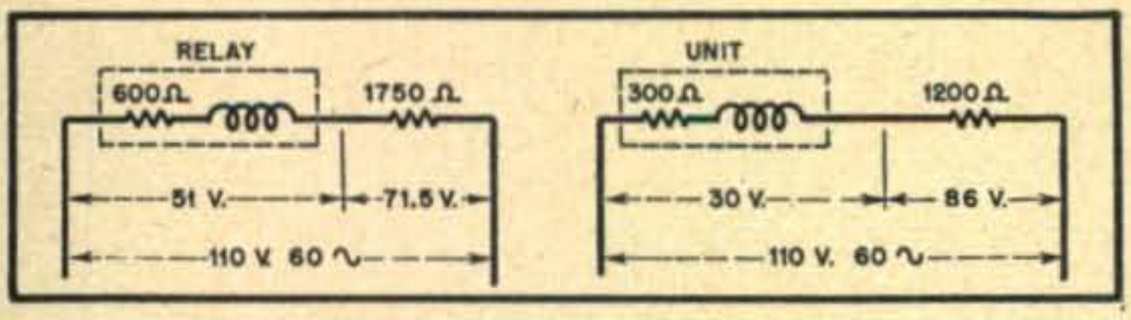
W. H. ANDERSON, VE3AAZ*

Compensating for variations in power supply operating frequencies.

IT IS OFTEN DESIRED to operate equipment from a supply whose frequency is different from that for which the unit was designed. For instance, 400-cycle transformers and Selsyns on 60 cycles; 60-cycle relays on 25 or even zero cycles (d.c.). All such operation has one point in common, the operating frequency is lower than the design frequency. Generally speaking, when the operating frequency is *higher* than the design frequency nothing more serious than a slight loss in efficiency occurs. In the more common case—operating frequency lower than designed—precautions must be taken to prevent the equipment from serious overheating.

60-Cycle Relay on D.C.

Take the last example—a 60-cycle relay to be operated on d.c. At 60 cycles it has a certain impedance (inductance and resistance). The latter can be measured directly with an ohmmeter (and in this case found to be 600 ohms) but finding the



Figs. 1 and 2. Circuitry involved in adapting relay for off-frequency operation.

former is rather difficult unless an inductance bridge is available. Suppose then a fixed resistor is inserted in series with the coil and the combination is plugged into 110 volt 60 cycle. A typical case will give readings such as in *Fig. 1*. Note that the voltages do not add up, as the voltmeter is not sensitive to phase. Now it follows that the current can be determined by the voltage across the resistor and furthermore that the impedance of the relay and the resistance of the external resistor are in the same ratio as the voltages across them. In other words, the relay has an impedance of $\frac{51 \times 1750}{71.5} = 1240$ ohms at 60 cycles. From this value we know immediately that 1240—600 = 640 ohms external resistance will have to be added if the relay is to be used at the same voltage on d.c., or on the other hand that the voltage must be reduced to $\frac{600 \times 110}{1240} = 53$ volts d.c. if no external resistor is used.

All this follows from the premise that the power and heating in the relay are developed in the resistive term and that the current through this resistance should be kept at the designed value.

Before proceeding further, it should be pointed out that ordinary lamp bulbs cannot be used as series resistors in this application due to the fact that they vary in resistance from cold to hot so it is impossible to ascertain their d.c. resistance by conventional means.

400-Cycle Relay on 60 Cycles

Suppose instead that our problem was of operating a 400-cycle unit on 60-cycle power. Using a similar line of attack, we could get a set of measurements such as those in *Fig. 2*. As in the above method, we ascertain that the impedance of the unit at 60 cycles is 420 ohms. Since we know that the resistance of the coil is 300 ohms, it is now only necessary to solve for the inductive reactance from the established relationship Impedance $(Z) = \sqrt{(\text{Resistance } R)^2 + (\text{Reactance } X_L)^2}$

This can be done most conveniently by reference to a simple nomograph of the form of *Fig. 3*, which is a type of vector diagram. Any scale may be used (1 inch = 100 or 500 ohms, etc.) as long as both horizontal (R) and vertical (X_L) use the same scale. Only then will the hypotenuse (Z) be to this arbitrarily selected scale. Continuing with our example, it is now necessary to make an arc with $R = 300$ as the center and a radius of $Z = 420$. Note where it cuts X_L, which in this example will be in the vicinity of 300 ohms.

Now the reactance of a coil is a direct function of frequency, so on 400 cycles the reactance would

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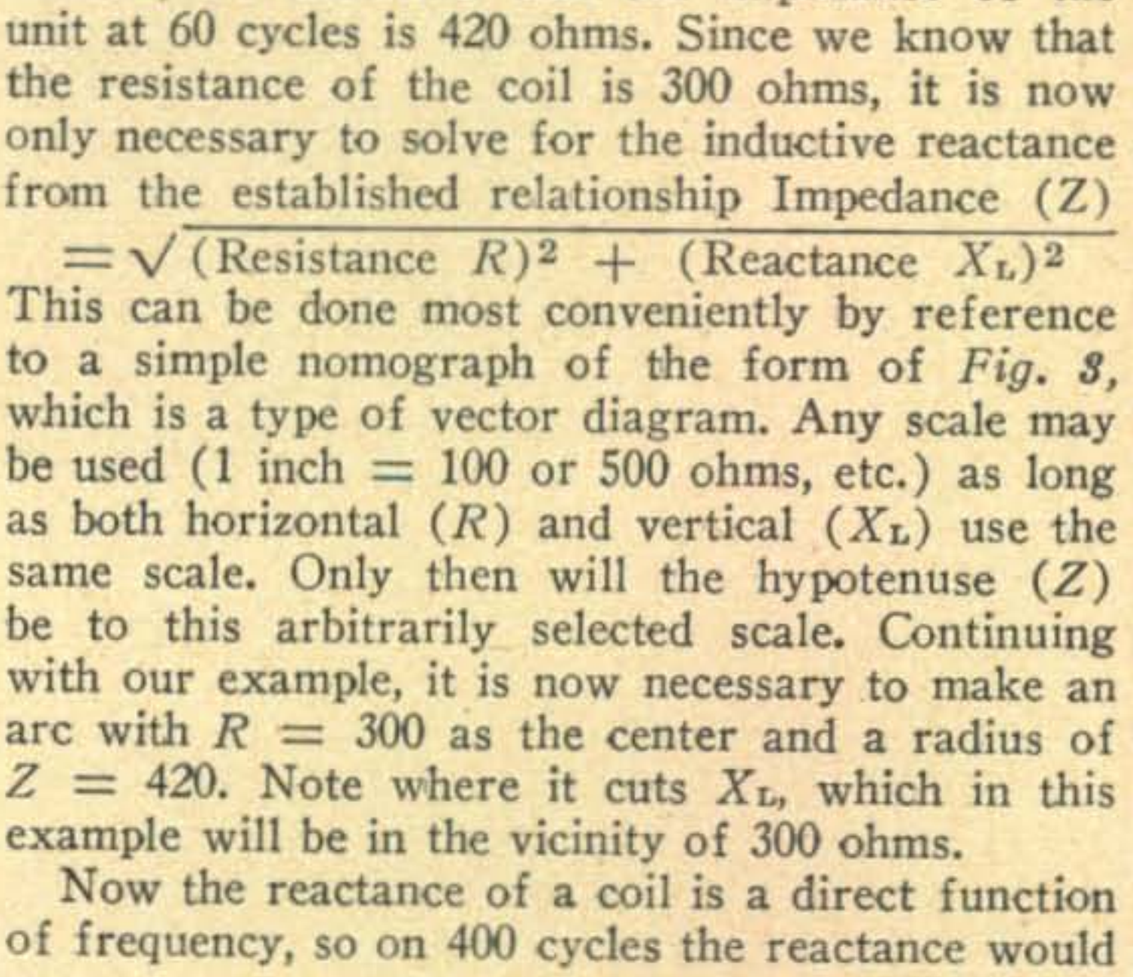

Fig. 3. Nomograph for determining inductive reactance of relay coil from the relationship of the coil resistance and reactance.

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Hobby for the Handicapped

HERBERT S. BRIER, W9EGQ*

The therapeutic value of amateur radio is inestimable. Its importance to war veterans and civilians alike is discussed in this series of vital articles.

AMATEUR RADIO made me want to get out of bed." "It saved me from becoming a nervous wreck." "It has been responsible for the release of many men from hospitals." "It has brought about an improvement in every case." These are not claims of patent medicine salesmen, but rather, are comments by doctors, technicians, and hospitalized war veterans when asked their opinion of the value of amateur radio to the handicapped.

Obviously, amateur radio must have therapeutic value, and this article is an attempt to call its value to the attention of the amateur fraternity and other interested parties in order that still more handicapped persons may have the opportunity of enjoying the benefits of amateur radio. To start, we will quote a few of the many doctors and technicians who answered questions on the subject.

Doctor A. V. Isherwood, chief of the paraplegic section of the Kennedy Veterans Administration Hospital at Atlanta, Ga., replied, "Amateur radio is considered an exceptionally appropriate activity, both as a psycho-therapeutic and as a motivating force."

Harry Eisenberg of the V. A. hospital at Butler, Pa., said, "I have found radio work being done here by our chronic ill patients who are able to move about freely has helped considerably in motivating their thinking, giving them an opportunity to test themselves and relieving themselves of hours of boredom. It has also been a great factor in mental therapy by relieving both physical and mental tensions."

Two doctors at the Walla Walla, Washington, V. A. hospital, recommend amateur radio thusly:

Doctor A: "It is my candid opinion that the amateur radio program in our hospital offers much of therapeutic value to our patients. It not only gives them an opportunity of studying and actually learning the mechanics of the radio program, but offers much in the way of vocational opportunities for arrested TB cases.

"It has been my observation that when men become interested in and take an active part in an activity, the satisfaction that they receive from any measure of progress towards its successful completion gives them a tremendous mental uplift, and a self-confidence that carries over in their determination to defeat their physical handicaps." quoting them, we will draw on the experiences of fers an opportunity for bed patients to participate is, alone, enough to warrant its place in a rehabilitation program. It is very evident that patients who engage in such activities as would divert their minds and keep them mentally active, respond much more satisfactorily to treatment. For this reason, I am all for the radio program."

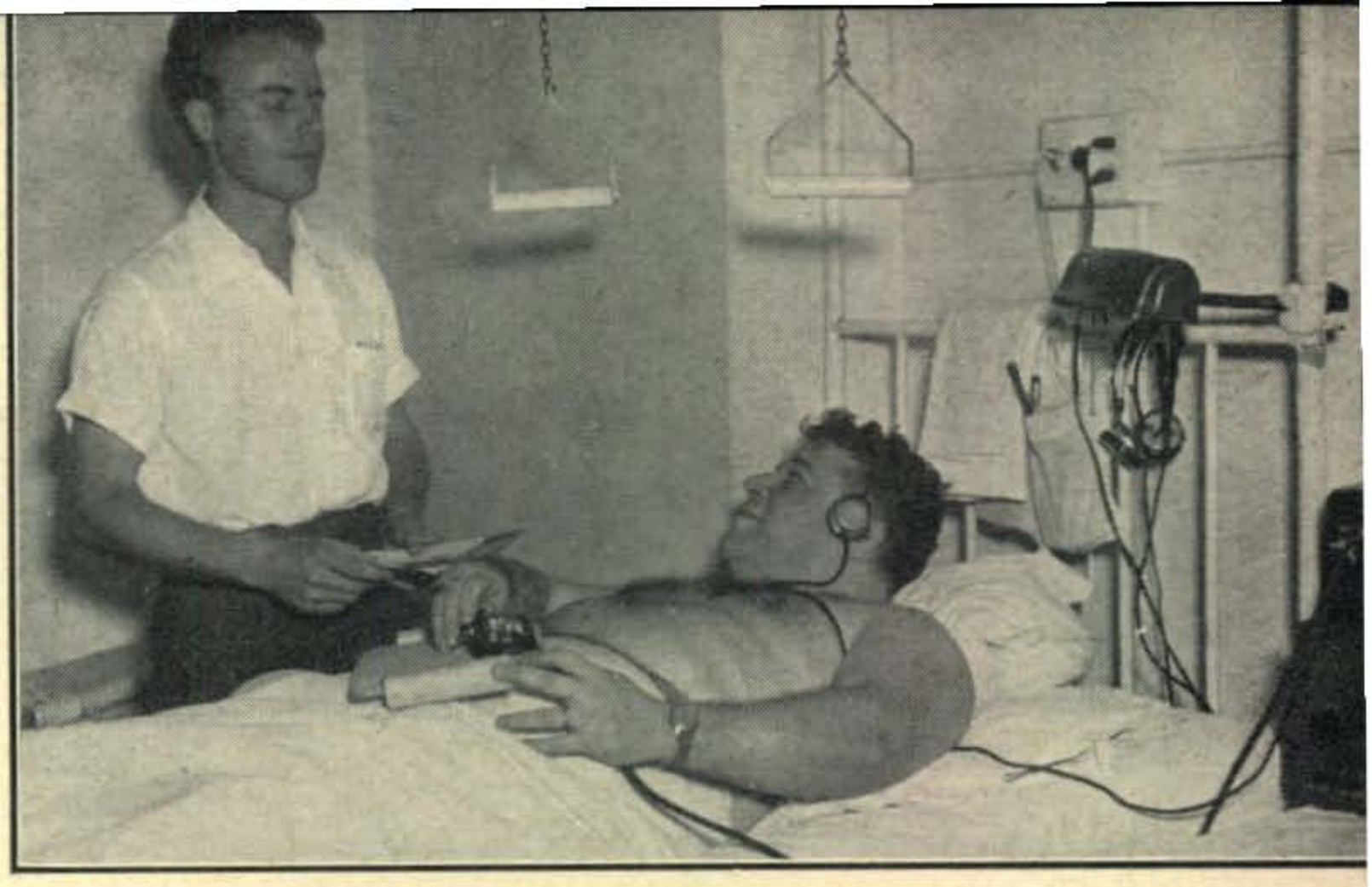
Experience as a Teacher

Members of the staffs at V. A. hospitals at Coral Gables, Fla.; Cleveland, Ohio; Fort Harrison, Ind.; Hines, Ill.; Staten Island, N. Y.; Lake City, Fla.; Legion, Texas; Van Nuys, Calif., and others have made similar statements, but instead of quoting them, we will draw on the experiences of two of the many amateurs, who include W4IQV, W5AKE, W9ZBY, and WØVMO among many others, who have been active in introducing amateur radio in our veterans' hospitals.

One of the first to realize the possibilities of amateur radio in veterans' hospitals was Sammy Lee, then W4GUY, now W6COI. While with the

*385 Johnson St., Gary, Ind.

John L. Higginbotham, patient at V. A. Hospital, Van Nuys, California, studying amateur radio and radio servicing with equipment furnished by the hospital.



S/Sgt. Robert Buyea, patient at Pratt General Hospital, Coral Gables, Florida, being given his Class C amateur license examination by Sammy Lee, W4GUY (now W6COI). At the time this picture was taken, Bob had been in bed for two years. Yes, he passed and received call of W4MGV.

ATC, flying wounded soldiers home from the European and CBI battle fields, he visualized the difficulty many of them would have adjusting themselves during convalescence and rehabilitation. As a result, in 1945, through Sammy's instigation, the newly organized Tropical Radio Club of Miami, Fla., of which he was vice-president, presented a plan to the staff of Pratt General Hospital (now a V. A. hospital) for introducing amateur radio to the patients.

From Francis W. Pruitt, Commanding General, down, the staff was enthusiastic about it. The hospital furnished a room, tables, chairs, and antenna facilities, and the Army from its surplus stocks supplied receivers, test instruments, code oscillators, text books, and, in fact, everything required to assure the success of the program except a phone transmitter. As phone was considered essential to demonstrate the fun that can be derived from amateur radio, Sammy furnished one himself.

Regular station hours, with a Tropical Club member on duty, were set up, both during the day and in the evenings, for the convenience of patients and staff members who wanted to study or just to listen to ham chatter. Club members also gave code lessons and discussed theory whenever desired. Bed patients received code machines and text books from the Army Information and Education Department, and received individual instruction as they desired.

Was the program worth the effort? Let Sammy answer. "Let me vehemently state that ham radio definitely has a value in opening an entirely new thought pattern and associated mental outlook for those who are bedridden, handicapped due to loss of limb, or depressed because of conditions causing their hospitalization. . . . I believe that the most satisfying experiences at Pratt General were with men from the psychoneurotic wards. There was a definite inmprovement in *every* one who participated in the radio program, and the eventual complete recovery and release from the hospital of at least one case."

What the hospital thought of the program is shown by the citation which was presented to Sammy when Pan-American Airways, for whom he is a Radio Flight Officer, transferred him from Florida to California. The citation read:

> *Presented to Mr. Sammy Lee for so generously devoting your time and talents in the interest of bringing entertainment and relaxation to our wounded.*
>
> *The staff and patients of Pratt General Hospital wish to express their appreciation to you in rendering this great service.*
>
> *Francis W. Pruitt, Commanding General, Pratt General Hospital.*

Accompanying the citation was a letter, which said in part, "We cannot put in words our appreciation for the work done by Sammy Lee at Pratt General Hospital." And one of the photographs il-

◆ ◆

Bill Guimont, ex-W9JID, W9KEE, W5GHQ, (present call unknown) operating from hospital bed at Van Nuys, Calif., V. A. Hospital.

◆ ◆

Ernest Musgrove, patient at Hines, Illinois, V. A. Hospital, working on volt-ohmmeter. Mrs. Richardson, Occupational Therapist, watching. This picture is an example of how working on radio may help retrain a crippled hand or arm. At the time this picture was taken, Ernie had received his amateur operator's license, and later he became a radio instructor.

lustrating this article shows Sammy giving the Class C examination to S/Sgt. Robert Buyea at the hospital. Bob passed, and received the call of W4MGV. His opinion of amateur radio is given a little later in this article.

Charles Redwine, W5GDV, instructor-Therapist, installed a radio program similar to the one at Pratt at the Waco, Texas, V. A. Psychoneurotic Hospital, and says:

"I think it is safe to say that the educational value of amateur radio is without equal. The most valuable asset of it, therapeutically, is its aura of mystery, and its promise of useful accomplishment. The effect on a patient of being able to talk with a friendly voice outside (of the hospital) is sometimes little short of miraculous. Many patients have been motivated out of inactivity and depression and into objective endeavors by these experiences. In lots of cases, after a few turns at the mike, a patient immediately starts studying radio fundamentals, code, etc., visioning, of course, the time he can build and operate his own station. This activity opens the possibility of increasing his earning power or of leaving an occupation which may have become unsuitable to him.

"Our chief objective is to make sick men well. If, in addition, we can start them off towards self-re-education and improvement, that is clear profit. Towards these ends, amateur radio has served us admirably.

"Incidentally, the transmitter here, which is completely band-switching, with a 100TH at 300 watts in the final, modulated by 811s, was built one-hundred per cent by the patients from scavanged parts and sheet metal."

Documenting the claims made of the benefits of amateur radio are two case records of patients at the Cleveland, Ohio, V. A. Hospital. Patient number one was hospitalized with a kidney ailment, and the actual administration of drugs took only a few hours of his day. At first, he was quite concerned and depressed about his physical condition, but after he started working in radio in Manual Arts Therapy, which he did for from four to five hours a day during his ten-month stay in the hospital, it became apparent that as he made progress in the field, he was gaining much more confidence, not only technically, but in his relations with other patients and the instructors. Upon his discharge from the hospital, he secured a class B license, and is now pursuing the hobby extensively. In addition, he is earning some extra money doing radio repair work in his spare time.

Patient number two, hospitalized for a psychoneurotic condtion, was very tense and hyperactive, and very irritating to the other patients. Then he became interested in radio communication and worked two to three hours a day on it in Manual Arts Therapy from October through December. In addition to the psychotherapy he received, he gradually responded to the calm, accepting, and understanding attitude of his instructor. He received his class B license before he left the hospital, and during the last few weeks, he was an excellent patient, working steadily, helping other patients with their work, and getting along well with patients and personnel.

Now, let us ask the handicapped veterans themselves what they think of amateur radio. S/Sgt. Buyea, W4MGV, shown passing his Class C examination, had been bedridden two years at the time from a broken leg that refused to heal. He reports, "In comparison to other hobbies I've had, ham radio is the best one for the handicapped that there is. It makes one forget his troubles and makes the world a better place to live in. . . . I built a *mighty-mite* transceiver which helped me get my strength back. When I first started working on it, a half hour at a time was all I had strength for, but when I finished it a month later, I could work three hours at a time. I've spent four years in hospitals and have had seven operations, but I will be fitted with a brace soon and discharged from the hospital (probably before this appears in print) and then I'll get on the air with a real station."

Roy Neal Johnson, WØDQY, says, "I feel that amateur radio had a great deal to do with my recovery. While in the hospital eighteen months, most of the time in bed, I studied for and received my license. I had no time to get gloomy or downhearted as long as I applied myself to these things I was enjoying so much. A few months before I was released I was allowed to spend a few hours a day in the hospital radio lab under WØVMO, a capable instructor. While there I saw many patients become interested in amateur radio, and all of them were looking forward to the day when they would receive their licenses. This, I am sure, helped many a fellow over the bumps while confined in the hospital, and will continue to help them in their homes."

(*Continued on page 73*)

Screen Grid Modulating the Command Rigs

ROBERT R. HALL, WØCRO*

Complete modulator and power supply. Controls are, from left to right: Adjustable screen dropping resistor; c.w.-phone switch (to lower power input from 200 to 100 watts); mike input, and audio gain control.

THERE SEEMS to be no end to the uses that may be made of the popular command transmitters. But one obvious application seems to have been overlooked and that is operation of the BC-696 or converted BC-457 as a screen grid modulated phone.

Screen grid modulation can be accomplished with very low audio power and with a very simple modulation transformer. Furthermore, adjustment of the circuits is simple. Examination of the accompanying circuit diagrams will show that the components are small and relatively inexpensive and can be easily obtained. Any speech amplifier that will deliver two and one half watts or more of audio can be used and matched to the screens with a suitable transformer.

The modulator shown in the photographs is the one now in use at WØCRO. It has a 6AU6 input tube, a 12AU7 phase inverter feeding into a pair of Class A 6AQ5s. In the original setup a factory built PA amplifier was used which had an 8-ohm output. It was coupled to the transmitter with a universal output transformer and a load resistor placed across the 8-ohm line. In this modulator a small universal modulation transformer was used and matched with its highest ratio (10,000 ohm primary to 14,000 ohm secondary). This impedance is not critical.

**3340 39th Ave. S., Minneapolis 6, Minn.*

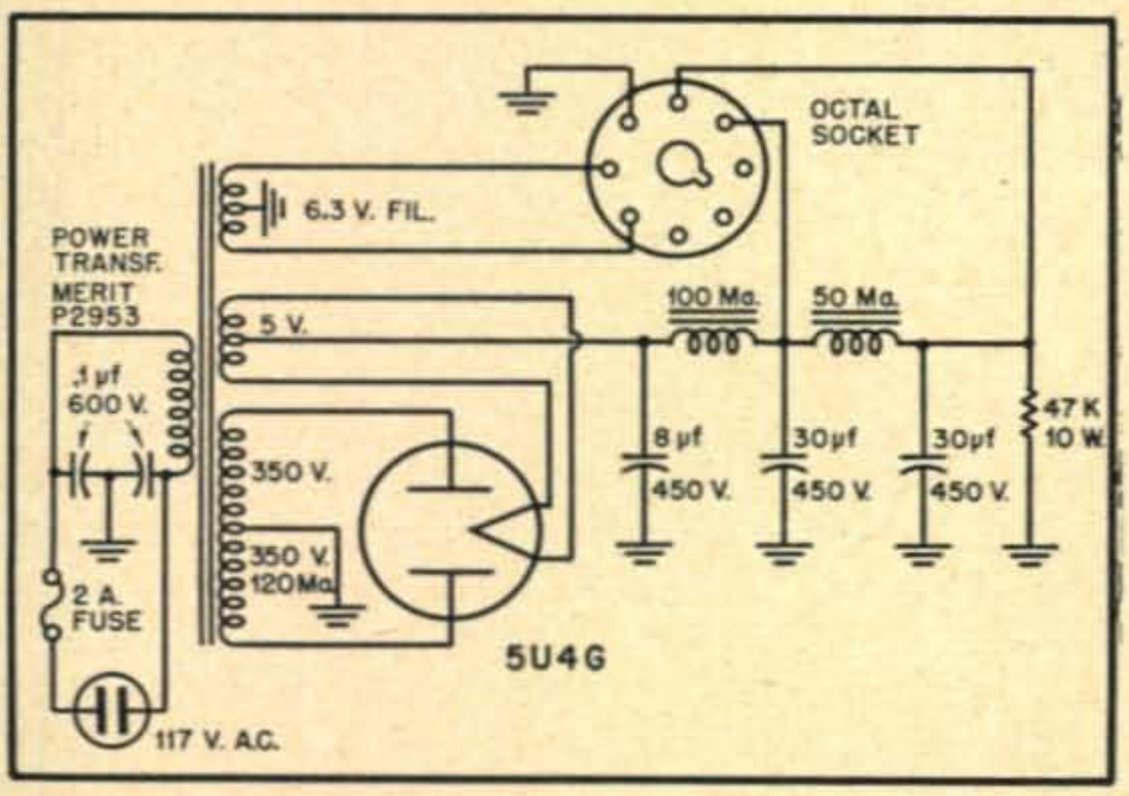


Fig. 1. Modulator power supply is built on a 7 x 9 inch steel chassis. The rectifier tube and power transformer are mounted toward the rear of the chassis to leave a clear space on the front to accommodate the 5 x 7 modulator chassis. There is an octal socket on back for output voltages. The chokes, condensers, etc., are mounted under the chassis.

Since we know a number of hams using the BC-696 for 100-watt phone rigs, modulating them with Class B modulators, conditions in this article have been set up to duplicate this performance.

Instead of the usual 400-volt power supply as used with the BC-696 when Class B modulated, a supply capable of delivering 800 volts under load was chosen. The supply must be capable of delivering 250 ma average power to the final, plus bleeder and screen current. The transformer in this particular installation has a rating of 1040 volts a.c. each side of center at 400 ma and is used with a 16-µf single-section filter. The screen voltage is obtained from this supply through a suitable dropping resistor to develop 450 volts of regulated supply across three VR150s in series. This 450 volts is used on c.w. and when tuning up on phone, but is further reduced in the modulator before modulation is applied. A separate oscillator supply delivering 300 volts is regulated by two VR150s in series. With 300 volts on the oscillator it will deliver the 7 ma of drive required.

Modulation is accomplished by reducing the screen voltage to about one half of the value used on c.w. and then applying suitable audio voltage to swing the screen between zero and the 450 volts applied on the average peak c.w. condition.

Tuning Up

To accomplish the proper modulation of the carrier and to adjust the screen voltage to the proper portion of its operating curve a definite tuning up and adjusting procedure is used. Referring to the

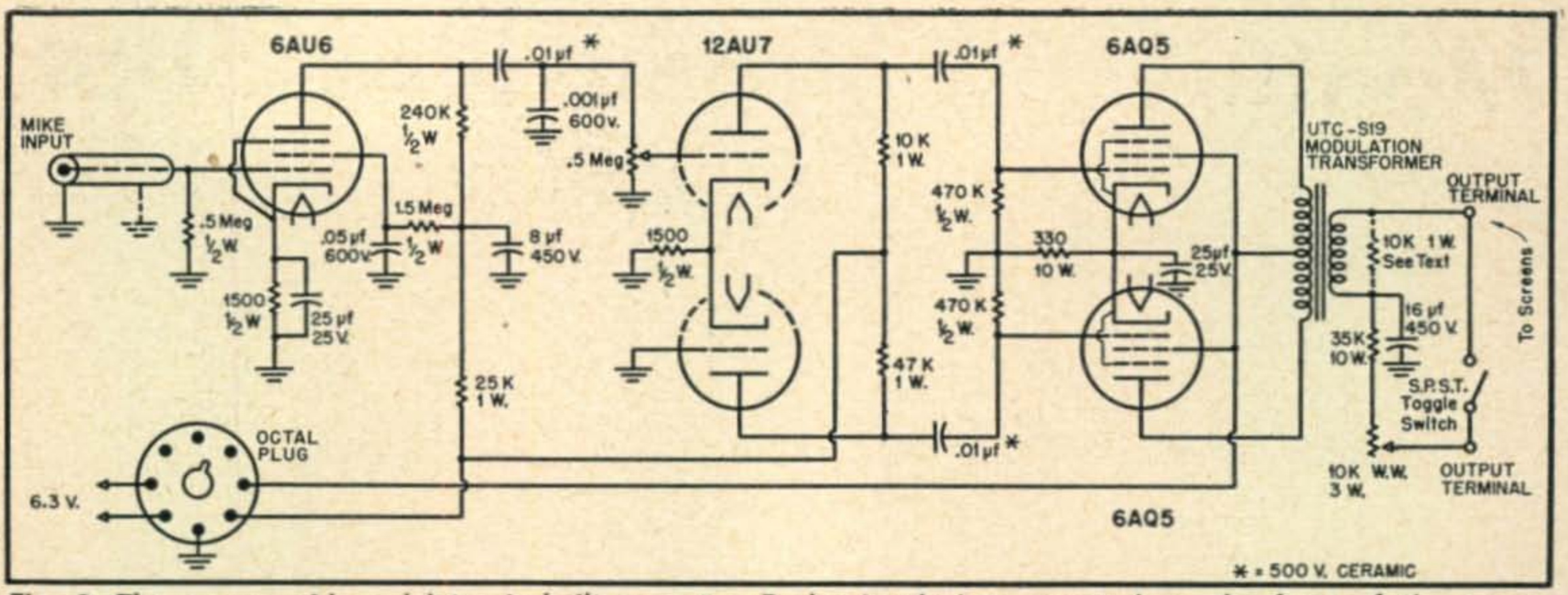


Fig. 2. The screen grid modulator is built on a 5 x 7 chassis which is mounted on the front of the power supply chassis. A cable with an octal plug comes out of the rear of the chassis and plugs into the octal socket on the back of the power supply. The audio output of the modulator, which is terminated with two feed-through insulators, is connected in series with the screen voltage feeding the transmitter.

diagram of the modulator the control switch is closed for the initial tune up. The transmitter is then loaded up to 200 watts input or 800 volts at 250 mills which is an average carrier wattage whose instantaneous peak power is 400 watts. The switch is then opened and without changing anything else, the screen voltage is reduced so the plate current drops to one half, or 125 mills, which is 100 watts and is the phone carrier average power. Then apply enough modulation to cause the plate meter to move slightly; if the meter kicks upward it indicates the screen voltage is a little too low, if the meter kicks downward the screen voltage is a little too high. Attempt to adjust the screen voltage for minimum kick in either direction as a final adjustment. Just enough modulation to make the meter barely move is close to 100% modulation.

As an added refinement the d.c. was removed from the modulation transformer winding as shown in *Fig. 2* requiring the use of the choke and condenser, although the modulator works nicely without this modification.

With screen grid modulation and 100 watts power there has been no sign of BCI. An a.c.-d.c. midget can be operated right alongside the transmitter or within inches of my vertical antenna without any sign of blasting or signals beyond those characteristic points where a signal can be heard as a function of the receiver oscillator harmonics producing 455 kc i.f. beats.

A standard type 47 pilot lamp can be connected across about a foot of the antenna wire at a current point for a modulation indicator. Using this method of tuning and by making suitable changes there should be no reason why other rigs employing screen grid tubes cannot be similiarly modulated with excellent results.

MARS Activities

A BIG STEP forward, at least in the opinion of the Air Force amateurs, is the release of considerable quantity, enough for every present member and then some, of obsolescent Air Force communications equipment, to the membership for modification and adaptation to work in the amateur spectrum and on MARS frequencies.

This has been a time consuming job since the Chief, MARS, Air Force, first had to capture the material from War Assets Administration and from surplus Air Force stocks in Air Materiel Depots and then initiate necessary paper work to obtain permission from the Deputy Chief of Staff, Materiel and the Director of Finance, Comptroller, of the Air Force to modify the equipment and to drop accountability when modified to the extent that it loses its original identity.

Screening of this materiel was begun on July 19 at Warner Robins Air Force Base at Macon, Georgia, by the Chief, MARS, USAF and a number of Air Force MARS Directors. These Air Force and Major Command MARS Directors will be the final authority as to the types and quantities of equipment each member is entitled to receive, with authorized issues being based on the individual's interest and his ability to modify and make optimum use of the equipment. For instance those interested in u.h.f. gear will get first priorities on any surplus of this type.

It is not the intent to furnish the MARS member with a complete store bought station to take home and plug in the wall and be on the air forthwith. But for those interested in design and construction, it is desired to make the components available with free rein to do whatever the Handbook or his imagination dictates.

Most of the equipment will be given to the member on an issue slip and accountability dropped therewith. The Air Materiel Command, the supply agency for the Air Force, has informed all supply officers of the special handling of this type of MARS materiel so that the members actual needs do not wind up in an accountability snafu. The MARS Air Force or Major Command Di-

(*Continued on page 69*)

Monthly DX Predictions - Sept.

OLIVER PERRY FERRELL*

THE DX PREDICTIONS are based upon the following parameters:

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

Values of maximum usable frequencies were obtained from "Basic Radio Propagation Predictions for September, 1949" (CRPL Series D-58).[1] Calculation of the optimum working frequencies (FOT) for radio amateur transmission was according to methods shown in "Ionospheric Radio Propagation" (NBS Circular 462).[1] Additional material appearing in the November 1948, issue of *CQ* was also used.[2]

East Coast to Australasia

40 meters: Band opens rapidly after 0130 EST with signals of fair to good strength. Peak conditions between 0345 and 0530 EST with signals well above the noise level. Band closes slowly after 0730 EST. *20 meters*: First c.w. signals come through the noise just before local midnight. Band gradually builds up to a broad peak extending from 0230 EST to 0645 EST. Band closes with c.w. finally going out just after 0900 EST. *10 meters*: Considerable absorption over this entire path during the period of the opening. Signals should be readable, but very weak. Band opens around 1500 EST with only c.w. readable. Possibly a sharp buildup with phones readable from 1815 to 1930 EST. Band closes suddenly, probably with best signals of the opening.

East Coast to Japan

40 meters: Depending largely upon the auroral zone conditions, this band may open with weak signals from 0330 to 0645 EST. The best period probably will be from 0430 to 0530 EST. *20 meters*: Band should open suddenly on quiet days (i.e., ionospherically speaking, or without ionosphere storms) between 0515 and 0530 EST. Signals at that time should be exceptionally strong. Band slowly deteriorates after 0800 with c.w. finally going out after 1015 EST. *10 meters*: No probable openings as the MUF should not exceed 25.0 mc over this path.

East Coast to India

40 meters: Possibly a few very weak signals between 1745 and 1915 EST on very ionospherically quiet days. This opening far from dependable as the atmospheric noise may completely blot it out. *20 meters*: Weak c.w. signals from 1500 EST to 1730 EST. Possibility of a few phones breaking through from 1800 to 1930 EST, if not QRM'ed by the Europeans. C.W. goes out after 2130 EST. *10 meters*: No probable openings as the MUF should not exceed 23.0 mc over this path.

East Coast to Middle East

40 meters: Gradual buildup with signals breaking through the atmospheric noise after 1730 EST. Peak conditions from 1930 to 2230 EST. Conditions will vary considerably from day to day as this path passes along the main aurora belt. *20 meters*: First c.w. after 1330 EST. Conditions build up throughout the afternoon with fair to good phones from 1745 to 2200 EST. C.W. drops down and finally fades out after 0300 EST the following morning. Certain areas may find best phone conditions from 2130 to 0100 EST if they are working into high atmospheric noise areas. *10 meters*: No openings probable as the MUF should not exceed 26.0 mc. Some scattered signals during last week of the month around 1200 EST.

East Coast to South America

40 meters: Band opens swiftly after 1815 EST. Signals remain strong throughout the entire night with the last c.w. going out around 0500 EST the following morning. Lowest atmospheric noise from 2300 to 0400 EST. *20 meters*: Generally an all night opening starting around 1700 EST. Band fades out suddenly around 0630 EST. *10 meters*: Band opens rapidly after 0645 EST with good signals. These drop down about 10 db during the day, but build up to very good strengths from 1530 EST to closing around 1830 EST.

Midwest to Central Europe

40 meters: On some ionospherically quiet days the band may open with very weak signals from 1800 to 2200 CST. The peak should occur between 1915 and 2030 CST. *20 meters*: C.W. comes out of the noise shortly after 1300 CST. Slow buildup with phones finally becoming readable after 1600 CST. Band will probably close very suddenly after a short period of very strong signals, generally around 1745 CST. *10 meters*: No probable openings this month as the MUF should not exceed 26 mc over this path.

Midwest to South Africa

40 meters: Somewhat rapid buildup in signals starting after 1630 CST. Peak conditions extend from 1900 to 2200 CST. Band finally fades back into the noise just before midnight. *20 meters*: C.W. starting from 1345 CST. Phones become readable after 1630 CST. Broad peak conditions with fair to strong signals from 1830 to 2200 CST. Band may close suddenly shortly after midnight, or on days of higher than normal values of MUF the band may stay open but gradually close between 0100 and 0200 CST. *10 meters*: Erratic openings mostly after the middle of the

(*Continued on page 71*)

**Assistant Editor, CQ*

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

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

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

Conducted by HERB BECKER, W6QD*

EACH YEAR about this time, I think the sack of mail from you fellows is going to be light due to the so-called summer slump in DX. Before the war, this condition actually existed, in fact, there was no DX column at all during July and August. However, since the war, I'll be darned if the summer months don't bring forth as much stuff from you fellows as almost any other one period. That's a good healthy sign, and if you guys can read this for twelve issues, I guess I can take it too. Years ago, a number of the fellows who worked a flock of DX never would contribute anything because they thought it might be blowing their own horn too much. At times, I've gone to some length to explain that this column is supposed to contain stuff that, I hope, would be of some interest to the majority of the DX gang. I think the present-day DX man doesn't particularly feel that he is bragging too much but simply contributing in order to make this department something that will, in a measure, give the DX fraternity a rough idea of what's going on. The tremendous increase in contributions seems to speak for itself. I am sure all of you fellows can offer constructive criticism about the way this department is handled, but we're doing the best we can with the limited time available. If you have derived a certain amout of enjoyment from following this column, don't forget that it can be attributed especially to the excellent cooperation that you fellows have given. . . . Now, let's put aside the soapbox and dive into what we're all interested in . . .

WAZ certificates were issued to the following of our DX clan and we want to offer our heartiest congratulations.

130	W6EFM	John W. Pesely	40	164
131	W6TEU	George K. Bigler	40	133
132	W6WWQ	William Mauzey	40	133
133	W6EPZ	Horton C. Kessler	40	169

Nice going, fellows, but don't stop now . . . keep after them!

In just about two months, we'll be in the middle of the second World-Wide DX Contest, and at the moment, it looks as though the participation will be much greater than last year. We have had many requests for log sheets and copies of the rules from overseas stations, as well as from boys Stateside. The August issue contained a complete write-up of the forthcoming World-Wide Contest, including a full set of the rules. Additional reprints of the rules will be gladly sent you upon request, and as last year, probably many of you will want to send them to your pals in other countries. Don't forget that there will be single band awards for those who want to concentrate on one band, as well as the usual all-band awards. Then, too, multiple operator stations are certainly not frowned upon, in fact, we would like to see more of them. Since all winning operators will be given awards and proper recognition, I am leaving it up to you fellows to designate on your log sheet whether it is a multiple operator station or a single operator station. Some fellows prefer multiple operator stations, as it gives a little companionship, and each operator spurs the other one on; or, in other words, each operator tries to do a better job than his pals in the same shack.

A bunch of the boys have been working *F9QU/FM8* on phone. Let's hope he turns out to be the real McCoy, since there has been some difficulty in getting confirmations out of other FM8s. Other good ones being consistently reported are *W6ATB/KC6* on Palau, and *W6CRE/KC6* in the Carolines.

It looks as though a few of the Italians got on the air in San Marino during field day junket, and the ones being reported most are *I1ALU/M1, I1LT/M1,* and *I1SN/M1.*

A few of the latest and best for W2WZ are *LX1RB, CT2AB* (both on 20 phone), and *VK9ML, FK8AC, W6GGT/KW6* and *VK1FE* (these on 20 dot and dash) . . . . W6MX added *I1SN/M1* 14,040, *HR1RF* 14,060, *UM8KAA* 14,080, and *PJ1X.*

W8REU has been in voice of late which helped him get F9QU/FM8, W6ATB/KC6, *HS1SS, KS4AI, W6CRE/KC6,* and *VS1AY*. . . . Speaking of other phone work, W4HA added *4X4AD, VK9KT,* and *YK1AC,* the latter, of course, being in Syria. Both W4HA and W4CYU worked *F9QU/FM8.*

SM5WI was all excited after working his last zone who happened to be our friend south of the border, XE1A. Now he is working like a mad man trying to get cards from *AC4YN, HS1SS,* as well as one from VQ8-land.

W5LVD tells us that *HB9EO* is going to HE1 again in October. Let's hope he is there the last weekend in October and the first weekend in November. . . . ZL1MB told LVD that he thinks *VR3AB* is NG. W5LVD also listened to a station who peaked from Africa and seemed to sign four different calls; *VS7RA, HS1FB, ZS7X,* and *HS1SS.*

W9VW added seven new ones, three of which looked like hot ones; *ZC4AC, VK1RA,* and *KC6WA* on Palau. . . . W4OBQ in Hollywood, Florida (but I assure you, the only similarity between that one and Hollywood, California is the spelling. Nothing could be the same as Hollywood, California!), at present, is a one band operator using 40 meters and running 35 watts.

(*Continued on page 62*)

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

W. A. Z. HONOR ROLL

CW & PHONE

WAZ

W6VFR	225
W6EBG	220
W6ENV	219
W3GHD	215
W6ADP	214
W3BES	214
W2BXA	213
W6PFD	213
G2PL	213
W6ITA	212
W8BHW	211
W6GRL	211
W6SAI	210
W6MEK	210
WØYXO	208
W2AQW	208
W8HGW	208
G6ZO	207
W6SN	207
W4BPD	206
VE7ZM	201
W6TT	201
W7AMX	201
W9KOK	200
W6MX	199
VK3BZ	199
W4CYU	197
W3EVW	196
LU6DJX	195
W6MVQ	195
W6NNV	195
ZL1HY	195
W6MJB	194
W3LOE	194
W2IOP	194
W7GUI	194
W6DI	193
W6GAL	193
VE7HC	193
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W6AVM	192
W6ZCY	191
ZS2X	191
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W6OMC	190
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W6AMA	186
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W6AM	185
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W2CZO	185
W6RM	185
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W6SA	184
W6AOA	181
W6KRI	181
W6SRU	181
W6SC	180
VK2ACX	180
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W7DL	177
VE4RO	177
WØUOX	177
W6UCX	176
CX1FY	176
CE3AG	176
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W6WKU	174
W7FZA	174
W6RBQ	174
WØNTA	174
W6TS	174
G5YV	172
OK1LM	172
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W6TI	170
W6BAM	170
W5AFX	169
ON4JW	169
W6RLN	168
W6ANN	167
W6GDJ	167
W6PZ	166
W6PQT	166
W6DUC	166
G3DO	164
W6EFM	164
W6KUT	161
KH6IJ	161
W6IBD	161
W6DLY	160
W6EPZ	159
W6UZX	158
W7BD	157
W7BE	156
W6BAX	155
G3AAM	154
W6BPD	152
VK2QL	151
W6LRU	150
I1IR	150
W6LEE	150
W6FHE	150
W6BVM	149
OK1FF	148
W6PH	147
W7DXZ	146
W6AYZ	146
W9NRB	145
W6MUC	145
W6QD	145
W6LER	145
ON4TA	144
WØOUH	143
JA2KG	143
W6LN	139
W6LDD	137
W6CEM	136
G3AZ	133
W6TEU	133
W6WWQ	133
W6RDR	133
W6YZU	129
OK1WX	129
W7GBW	127
G8IP	127
G5BJ	126
PK6HA	124
W6NRQ	123
W6MLY	123
W6BIL	110

39 Zones

W2PEO	205
WØNUC	204
W9IU	202
W4AIT	201
W8NBK	200
W2HHF	199
W2NSZ	199
W2GWE	195
W3KT	194
PY1DH	194
W6SYG	192
F8BS	191
W1JYH	191
W2HZY	191
W3JNN	191
W3DPA	191
W8JTC	191
W1ENE	190
W9RBI	189
W9ANT	185
W8RDZ	184
W1BIH	184
W2CWE	183
W6OEG	181
W3EPV	179
W4INL	177
W5ASG	177
W3DRD	175
W4GG	174
W1ZL	172
W3OCU	171
WØSQO	171
W6IFW	170
W9LNM	170
I1KN	169
W1NMP	169
W2CYS	167
KH6MI	166
W8LEC	166
W4DKA	165
W2EMW	163
W6EAK	163
W4BRB	162
W3JKO	162
G5DQ	160
W9LM	159
W9MXX	159
WØGKS	158
W4OM	158
W8SDR	157
WØAIW	157
G8KP	156
W9YNB	155
G6QB	152
W2RDK	152
W9VND	151
G2AJ	151
SM5WI	148
DL2KW	147
G2WW	147
W2COK	146
W2GUR	146
WØEYR	145
W2MEL	145
W9FKC	144
W6JZP	141
W9DUY	140
G6BQ	140
G3FJ	139
W6BUD	138
W8VLK	137
OK1CX	133
OK1AW	133
W6ID	132
KH6PY	132
G2VD	132
G5RV	132
WØOUH	131
VK4RC	131
W2BJ	131
W6RLQ	130
G2FSR	130
W6LGD	129
VR5PL	124
G5VU	124
G3AAK	122
W6MI	122
GM3CSM	121
G8RL	120
G5WM	120
G6BS	117
W6NRZ	117
G3QD	116
W7ETK	115
G3TK	114
W6MUF	112
W7HXG	112
W7GXA	105
KG6AL	104
W6LEV	103
W7ENW	101
W6WJX	101
W6AX	93
G6PJ	76

38 Zones

VE3QD	190
W2PUD	180
W3DKT	168
CM2SW	167
KP4KD	162
W3IYE	161
W3KDP	155
WØDU	155
W8FJN	153
VO6EP	151
W4VE	146
W8CVU	141
W3LVJ	141
W2WZ	138
TF3EA	137
W9FKH	135
W4FPK	131
G8IL	131
G5CI	130
W2PQJ	130
W3ZN	129
W6EHV	128
G6LX	126
W9MZP	126
W8WWU	125
GW3AX	123
W9TB	122
GW4CX	120
W8KPL	117
W5CPI	113
W7EYS	107
G3ZI	107
C1CH	84
G3BI	75

37 Zones

W2HMJ	166
W1KFV	162
W2ZA	160
W2CNT	153
W4IWO	146
W8EYE	142
W3WU	139
W4ML	135
GM2UU	133
W2AYJ	130
W9TQL	129
WØAZT	129
W3FYS	119
G4CP	117
VE1EA	116
W6CTL	111
W7BTH	110
G4AR	108
W8HSW	104
G5MR	100
W2BLS	99
G3AAE	99
W2SGK	95
KL7KV	88

36 Zones

W4LVV	147
W2RGV	136
W2GVZ	133
W4DIA	129
OA4AK	128
W3AYS	124
W2WC	119
SV1RX	119
MD5AK	118
W2BF	115
G2CNN	114
W9ABA	114
G2AKQ	112
HC2JR	109
W5CD	108
WØRBA	107
W2JA	102
G2AO	100
W5BK	99
G6WX	95
KL7PJ	94
W7PK	91
GM2AAT	75

CW & PHONE

35 Zones

W4HA	136
W8ZMC	135
W4DHZ	132
W1BFT	130
W9WCE	127
VE3AAZ	123
W9CKP	122
CO6AJ	119
VE3ACS	117
W6ZZ	114
W8AVB	113
W9LI	112
VE1PQ	111
WØFET	108

PHONE ONLY

39 Zones

W6VFR	162
W7HTB	143
VE7ZM	132

38 Zones

W6DI	179
W4CYU	168
W2BXA	164

37 Zones

XE1AC	166
W8REU	160
W1JCX	158
G2PL	154
W8BF	146
W6WNH	146
G3DO	142
W3JNN	136
W1HKK	136
W6TT	130
G6LX	124
W6KQY	122
G2AJ	121
F8VC	115
C1CH	83

36 Zones

W9RBI	157
W1NWO	156
W3LTU	154
W1MCW	152
W6PXH	148
W9HB	139
W2DYR	135
W9BZB	130
W4ESP	130
W1FJN	128
GM2UU	127
G6BW	127
W4INL	125
G5YV	106
G6WX	105
VE3BNQ	101
W3DHM	96
W6SA	92
F8DC	87

35 Zones

VK3BZ	143
W6PCK	126
G8QX	123
W6CHV	123
W2GHV	118
G3FU	115
W9CKP	114
W5LWV	108
W4OM	106
W3PA	104
W6AM	102

PHONE ONLY

34 Zones

W4HA	125
W8BIQ	120
W8ZMC	116
W1BPH	105
W2RGV	110
W8UIG	100
W4IWO	99
W8QFB	92
WØBFB	70
W2NXZ	65

33 Zones

W7MBX	128
W9RNX	121
W5ASG	119
W2ZW	115
W5ALA	111
WØHX	107
W4LZM	104
W6UZK	104
WØANF	102
VE3ZM	100
W2PQJ	100
W2DRH	60

32 Zones

W9MIR	110
W9WCE	107
WØEYR	101
W8BFQ	101
WØSQO	95

31 Zones

W7GC	64

30 Zones

WØUYC	88

Conducted by VINCE DAWSON, JR., WØZJB*

LOOKING AROUND for words to describe the v.h.f. activities of the latter part of June and the month of July is a pretty difficult proposition. However, many of the 6-meter gang are rapidly closing in on that coveted W.A.S. while the 2-meter boys have been out breaking all types of records. Leading the parade on 144-mc is W8WJC with 17 States and 7 districts. With the possibility of working into Mississippi or Arkansas from Everett, Ohio, we begin to wonder if 8 districts and 20 States are not entirely possible on this band before the end of the year.

On 6-meters there were so many openings in the period starting June 9, that around the end of July the band was practically dead from inactivity, although it was still open for sporadic-E skip. The most common comment was—"Say, I wasn't on last night, anything good come through, or just the regulars?" Regulars apparently meaning anyone less than 1000 miles out. The predicted peak around the 21st to 24th of July failed to appear and once again sporadic-E defies prediction. Now it can be told that that period had been selected only after very careful consideration of a great deal of data and after very close examination of the trends throughout the spring. Oh well that's what the # 1 RASO project is for.

Getting the RASO organized so late in the season cut down the chances of sporadic-E openings from the northwest into Alaska. But KL7NT and KL7UH agreed to keep Saturday and Sunday schedules during the evening hours throughout the month of July. Up to this writing nothing has been heard in either direction, although plenty of stations were on looking for this DX. Strangely enough, while there were plenty of openings into Florida, the schedules with CO6WW did not pan out either. W5ELL reports hearing CO6WW on June 25th, while Jose has heard plenty of stations in W3, W4 and W5. Just why two-way work has not been possible is an open question.

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

New 144-mc Record

The jinx that held the 144-mc records down to the vicinity of 650 miles received a good kicking around during July. On July 22 at 2354 CST, WØBIP, Elliott, Iowa, worked W3CUM, Butler, Pa. (about 40 miles north of Pittsburgh), a distance of 794.5 miles. Propagation was strictly via an oversized "duct" or multiple grazing incidence reflection, whichever you'll have.

Radio Amateur Scientific Observations

The month of July was utilized by the sporadic-E observing project* in extending the 6-meter coverage throughout as much of the United States, Mexico and Canada as possible. The number of active and participating observers increased by 62, bringing the North American work group totals to 322, as of August 1, 1949.

The first Newsletter of the 6-meter project was mailed on July 5. This letter incorporated notes on the W7QLZ 4-element beam and a frequency list of all observers active of that date. A special insert told of the schedule with CO6WW. A special notice to all observers west of Mississippi River was mailed later that week concerning a 50-mc schedule with KL7NT. The questionnaire requesting specific location of the QTH was also mailed around the middle of July and at this writing 75% of the observers have replied. Observations of sporadic-E during January, February and March 1949 are also being collected and the final tabulation began August 15.

The second project Newsletter was mailed around August 5th. This letter contained information on the new Workshop 3-over-3 stacked 6-meter beam, use of the G.E. 6AB4 triode in grounded-grid circuits, data on the W2IDZ Model 10 converter, conversion of the Millen R9-er to a cathode-coupled stage, etc. Although the test schedules with CO6WW and KL7NT have so far been unsuccessful, more tests are being arranged with stations in Central and South America for the fall months. Details appear in all copies of the project Newsletter. Special notices are also being mailed to areas where tests are most likely to be successful. The plan for the operation of the beacon transmitters has been unofficially reviewed and some action on it is expected within the near future.

It has been impossible to contact through the mails every 6-meter operator who might be interested in joining this project. Many who heard about it over the air and by reading the August issue of *CQ* volunteered their services. Those who read this and who might feel inclined to join are welcome. However, in certain areas a saturation point has been reached and only temporary members are being accepted at this time. Contrastingly, more observers are needed in Nevada, Utah, North Dakota, Arkansas, Virginia and Nebraska. Canadian participation from Alberta would also be very welcome. Any interested parties may contact the RASO Project office for further details.[1]

Oliver P. Ferrell, Project Supervisor

* This work is supported in part by Contract No. AF 19(122)-72 with the U. S. Air Force, through the sponsorship of the Geophysical Research Directorate, Air Materiel Command.

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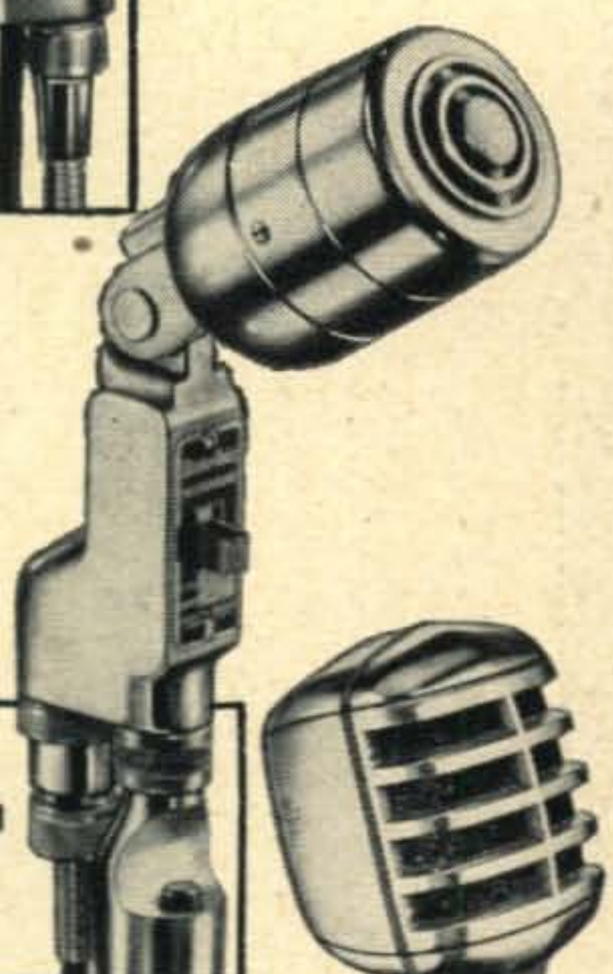

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Plenty of stations were heard along the path from both ends, although at the extreme ranges there appears to have been some restriction in the areas. What makes this conductor mad, is that about ten days before, WØMNQ and WØZJB had both heard stations in the Cleveland, Ohio area, a span of about 710 miles. W8UKS, W8BFQ and W8WSE all broke through into Kansas City. Stations were also heard out of K.C. from Illinois, and Wisconsin, but nothing from Indiana. Then on the 22nd, WØHQA about 180 miles north of Kansas City called on the landline to say he was working into Michigan, Indiana and Ohio while the K.C. gang could hear no DX.

100 Kc of 6 Meters

As a part of Docket 9295 before the FCC there is a proposal to allocate the band 50.0 to 50.1 mc for the strict use of c.w. This idea was originated by the ARRL in 1948. The plan was that this band would be used by the rare DX stations and would thus keep the high power American phones off their frequencies. The general concensus was that the idea, while good in certain respects, was not fairly considered beforehand by the majority of active 6-meter operators. This aroused considerable ire and as a result it was obviously necessary for the 6-meter men to make a united stand on the question. The job of actually polling 50-mc operators fell to Bill Carley, W4WMI, W3PCB and Charlie Wright, W4HVV. These two boys sent out, or otherwise contacted 311 amateurs known to be active on this band.[1] The results of this poll which are now available (submitted to the FCC as a statement from W4WMI and W4HVV of July 5, 1949) show that 201 ballots were returned. Of these 67% were against the division of the band. It had been argued that this division was a necessity for working DX, but when the ballots of the poll were broken down to just include those fellows having worked 24 or more States the percentage was 64% against the division. If the dividing line was drawn at 40 or more States this rose to 70%.

Only when the poll was scaled at having worked 5 or more countries was there a significant change from this 2 to 1 ratio. At this point the poll showed 50% for and against. Thus, it is apparent that the majority of the American 50-mc operators want no part of this proposed change in the 6-meter band.

To Bill and Charlie we owe a lot for devoting a large amount of time, expense and effort in uncovering something that should have been properly ascertained before the proposal was made. Setting aside personal feelings, for it is a well-known fact that I considered the proposal worthwhile, I also am of the opinion that the 6-meter band is self-regulatory and had the suggestion been placed on a fair basis, many if not all the fellows would have gladly moved up out of the lower 100 kc. It is noteworthy, that in England the 2-meter gang is starting to work on a division scheme for splitting up the band where section parts of the country use only certain frequency bands. If they can do it, we certainly could have done something in that order here.

On July 4, W4FBJ and W4MKJ operated portable on both 6 and 2 meters from White Top Mountain, Va. This was at an altitude of 5430 feet above sea level. Fortunately, the 6-meter band was open on the 4th and quite a few DX stations were worked who were looking particularly for Virginia. The location was ideal, as it was near the WOPI-FM transmitter and commercial power was available. 125-watts input was used on both bands, plus a 16-element on 2 and a 4-element on 6.

Quite a few tests and schedules had been arranged for 144-mc and the time for rag-chewing was limited. Eight States were contacted on 2-meters including W4CPZ, W4HVT, W4OXC, W4JDN, W4MKJ, W4KLP, W4JFV, W8WJC. W8UKS, W8WRN, W8CYE, W8ZUR, W8WSE, W9JMS and W9FVJ. Tests were made with W4HVT on both vertical and horizontal polarization. Vertical was inaudible, while horizontal was running S8 or better. Ho hum!!

50-mc Chatter

Joel Moss, W6BQR, comes through with a most interesting letter he received from W6AJF, Frank Jones, regarding their attempts on 56 mc, in 1925!! Frank at that time was attending the University of California, and in his letter to W6BQR, advised him to use an outside antenna away from the house, and that long wires worked the best. The rig at W6AJF was a 50 watter in a tuned grid-tuned plate oscillator, the condensers being two plates mounted on glass. W6BQR used a C-302, the granddaddy of the 210, by removing the base and winding basket-weave r.f. chokes. Leacher wires were used to check the frequency but with all this effort put forth, the gap between Los Angeles and Berkeley (350 miles) was never spanned.

Jeff, XE1GE now has worked up 20 States and 7 countries and is trying to keep as active as B.J. had been in Mexico. Jeff is doing a nice job, and we suspect feels bad about the results of the W4WMI/W4HVV poll. Plenty of new States have been heard in Mexico City, but the QRM is terrific there on some of these openings. On June 20th for example 37 stations were worked in all districts but the 6th and 7th

Paul Robbins, Jr., W4MKT, Winston-Salem, N. C.

1 The files of the RASO 6-meter project show that last spring there were 384 active or fairly active American 6-meter stations. There were also 100 plus fellows who could get on the band if needed. The 201 figure thus represents a majority under the activity parameter.

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during an opening of 13 hours in duration. The first VE--XE contact was also made on this date. On the 23rd VE1TR was heard, but faded before contact could be established. . . . From Tulsa, Oklahoma we learned that W5LEI has just recovered from a siege at the hospital. It is reported that the brass rail that had been pressing the sole of his foot was removed. At any rate, Bill is back at them again, although missing some of the best openings.

Speaking of hospitals, Bill Copeland WØYKX has recovered completely. As you may recall we asked some time ago for the gang to pass along greetings to Bill as he was in bad shape and was getting daily blood transfusions. However, Bill weathered the storm and says many many thanks to all the gang who thought of him and who wrote to him. Glad to see WØYKX back with us . . . According to WØSHW the St. Louis 6-meter gang meets each Wednesday on the air at 1830 CST. Present participants are WØJNG, WØJRP, WØKYF, WØSHW and WØVMY. Fellows interested in 6-meters in this area are invited to take notice.

A new addition to 6 meters is W4MKT, Winston-Salem, N. C., Paul is 12 years old and has been an invalid since he was 2½ years old. Recently he has mastered the art of maneuvering a wheel chair and can now move around himself. W4MKT has WAS and WAC on 28 mc, Canal Zone Certificate and RCC, but says that he is really enjoying himself on 50 mc. Unable to attend school, Paul has been educated by his mother and next year will be in the 8th grade, in the meantime he has spent this summer mastering an electric typewriter which was a gift from the grandmother of W4OEK. With your spunk, Paul you no doubt will go a long way on v.h.f. and the gang operating these bands will be looking forward to contacting you very soon. Keep up the good work and let us hear from you.

The W8s had an exciting day on July 4, besides shooting off fireworks and finding the band plenty hot; W8TOB in Lorain, Ohio heard a CN8 in French Morocco, N. Africa. The CN8 was talking in French and working another station on his same frequency, 50.8 mc. The signals of both stations were in from 1319-1331 EST, peaking over S9. A W5 in La., also heard the same two stations, but the rapid French made identification impossible. Can anyone throw more light on this?

The news from the Minneapolis gang is supplied this month by WØSII. WØTKX is leaving for KL7 land, and will be there for 6 weeks; he is taking receiving gear and if conditions look good he will get a rig on the air. Shorty, WØDZM, is not very active these days, but the gang is working on him. The gang is worried over the disappearance of WØYSJ, has he moved or is he inactive these days? How about some light on yourself chum? The gang around the Twin-Cities have been talking up the v.h.f. gathering to be held at the Omaha convention on October 8-9. Don't miss this affair as plenty of the boys you QSO on 50 mc will be there in person.

KL7NT in Anchorage, Alaska ran tests with the W boys, on each week end during July, but to date no one has reported hearing him, nor did he hear any signals. KL7NT is on 50.580 kc and first hop sporadic-E should put him into Wash., Ore., Idaho and with double hop on into the middle-west. Perhaps these tests should continue through August with conditions appearing so poor during the latter part of July.

W4QN says that he might as well be listed with the other unmentionables in the 50-mc honor role, so he sends us his latest standing which is 43 states. Harold still thinks S. Carolina is elusive, as he should have worked into there by now, but not so, as yet!

Up north-west way, W7BQX says that he hasn't been too active this year, but did manage to get on and snag S. C., and Tenn., for states 46-47 respectively. One little opening was had to W1 on June 23 at 1930 PST, when W1GJO was heard, that's all.

While a little over a year ago everyone was screaming for activity in South Carolina (there are now 6 stations on regularly) the accent seems to be shifting out to Nevada. Some of the boys seem to think that no one is ever on, but the RASO files show that W7KLK and W7TJY are both on the air. The first on 50.054 and the latter 50.800 mc. Much the same applies for Utah with only Zim, W7SP on the air. Zim was one of the few who complained this month about the few openings. I guess it is partially due to the high noise level caused by a local power leak. RASO reports show that he is getting out and that fellows are calling him. . . . Another ideal spot is up there near Lake Superior with W8YLS. Wally spends only a limited amount of time on the band, but easily had 50 swell QSOs during the month of June.

Quite a bit of sporadic-E rebound scatter has been reported this month, together with quite a few instances of straight sporadic-E skip around the 350 mile mark. WØTKX writes that he wonders if the WØRAJ and WØJOL contact was not the first Minnesota-Iowa sporadic-E hop. Then on the 15th of July W9ALU heard W8QYD and W8CMS with his beam to the southeast. This seemed to be scatter coming back from the edges of the sporadic-E cloud as the W8s were working into W4 land. Worth looking for carefully if you need some of these close-in States.

W4COS wants someone to institute a WAT, or rather, Worked All Toronto. The gang around VE3 sure roll into Florida whenever the band is open. . . . Reno, W9RQM hit a heyday on the 25th of June with 54 contacts, bringing his April to July total up to 269 DX QSOs . . . . VE7NM is now busily engaged in building up a TV receiver from surplus parts. It is going to be a one channel affair, capable of pulling in KRSC-TV in Seattle which is 140 miles to the south. Vancouver area activity is still pretty high with VE7AEZ, VE7OE, VE7BQ, VE7AAH, VE7ALL, VE7DU and VE7NM, all RASO project members, too.

W7QLZ, better known in some parts as old "Ham Parts" says that this year the sporadic-E has been far above anything in the past twelve years. Signals have been in there on just about every opening, but many times they are fluttery and lack the real sock. On July 9, Clyde worked W5FLH in Albuquerque, N. Mex., a distance of 320 miles across some rugged territory. July 11 was another exceptional day as double hop from the W3s and W4s was in for over 5 hours . . . . TVI has gotten one of our number completely down and that is W3OR. Alan is setting up anew

(*Continued on page 70*)

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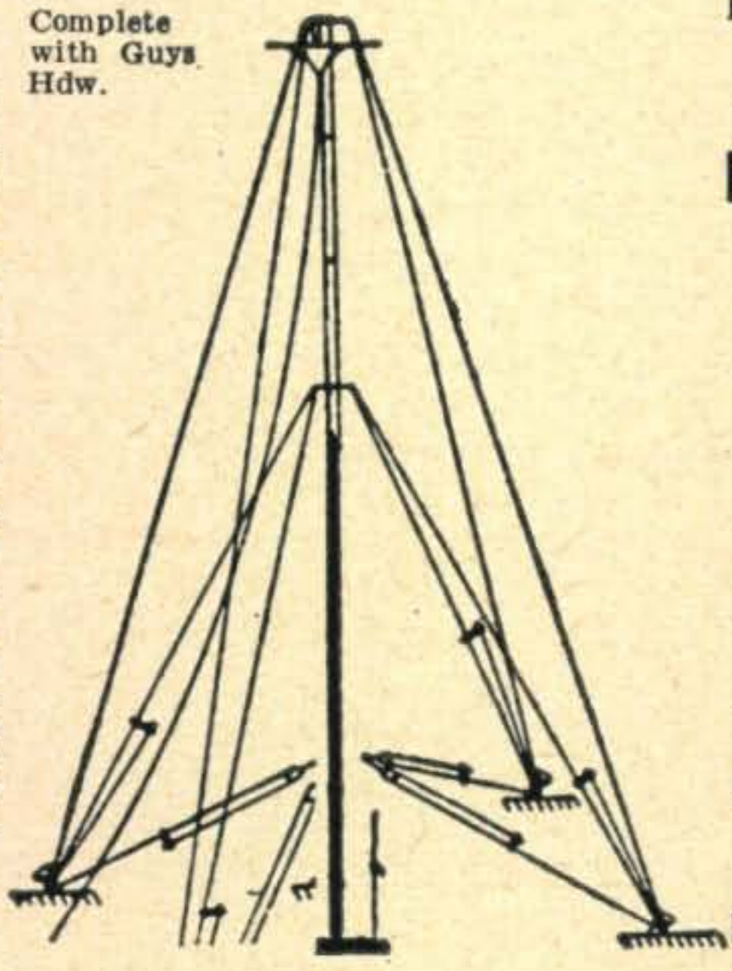

Doublet Antenna Kit used with the famous Hallicrafters BC-610, consisting of 7 steel-alloy mast sections in a handy canvas bag. Each section is 5' 6" long, 1½" OD with the last 6" rolled to a smaller OD to telescope into the end of the preceding section. No taper. Assemble high or shorter by any multiple of 5'. Finished in weatherproof olive drab. **Ideal for erection of FM and Television Beams!** Drop your coaxial cable right through the center! Brand new, export packed.

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BC-733 D Localizer Receiver

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

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150 ohms twin lead in 50 ft. coils with eyelets on one end..... 49c ea.

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Cable—6 wire No. 16, glass insul. shielded, plastic covered—perfect for beam control. 15c per ft. 100 ft.	12.00
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100 ft.	5.50
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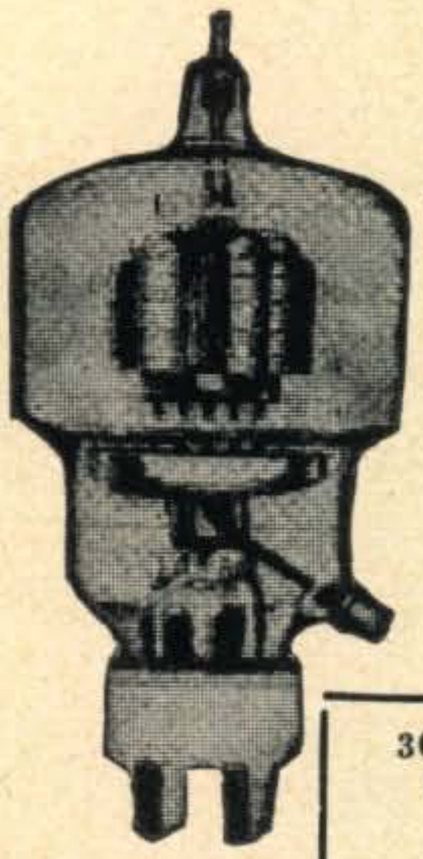

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Conducted by LOUISA DeSOTO, W2OOH*

AS PROMISED last month, here is the list of newly elected District Chairmen of YLRL:

1st: W1QON, Eleanor L. Wilson, 425 A. South Franklin, Holbrook, Mass.

2nd: W2PMA, Lillian Ruocco, 1630 Undercliff Ave., New York 53, N.Y.

3rd: W3CUL, Mae Burke, Box 238, Folsom, Penn.

4th: W4LKM, Annette Thompson, P.O. Box 187, Ft. Lauderdale, Fla.

5th: W5OTU, Anne Maring, Route #1, Box 590, Brownsville, Tex.

6th. W6UHA, Maxine Willis, 11260 Brookhaven Ave., Los Angeles, Calif.

7th: W7JFB Miriam Brown, Route 5, Box 859, Everett, Wash.

8th: W8UDA, Dorothy Willett, 3513 Fleming Rd., Flint 5, Mich.

9th: W9JPT, Helen Thompson, R.R. #1, Edwardsville Ill.

10th: WØGOJ, Alice-May Stewart, 3718 Blow St., St. Louis 16, Mo.

Canada: VE1ZM, Mary Snell, Astley St., Cape Breton, Box 648, Sydney Mines, N.S.

England: G3ACC, Margaret Mills, 59 Upland Rd., East Dulwich, London, S.E. 22.

YLRL Officers

Also as promised for this issue, we have some highlights on the YLs who are the officers of YLRL this year. W3OLY, Helen Morrison, our new president, is a product of Ellwood City, Pa., from which town she was "liberated" in 1936 by OM "Si," an ex-Navy radio operator who became W8UHX in 1940. Helen then began to have an interest in radio and stayed up with him in the wee hours listening to 80-meter c.w. In November of 1941 she went to Washington when the OM became an operator for WAR and with the declaration of war she became a Navy wife when Si rejoined the Navy. Shortly after the war W8UHX/3 took to the air on 10 phone and Helen really liked that. Handicapped by Si, and now four harmonics, she mastered the code and gave Brookmont, Md., a second active ham in May, 1948. Helen brought her call to 10 phone last November for the YLRL contest and came so close to WAS that the OM gave her the station key and retired to his mobile rig with W3MKS. She was the Washington outlet for the Marine Corps Net on 29,400 kc, the only YL member, until 10 closed for the summer. She operates 10 phone and 40 c.w. According to the OM, Helen's time is divided thusly: Occupation: amateur radio; hobby: housewife.

Vice President W3NNS, Anabel Gifford, made her appearance in these pages in the January '49 issue and we suggest that you dig out your files for a look-see. Since that writeup, Anabel has completed her WAS on 10 phone, and has worked YLs in 43 states, so you can see she has been as active as ever. By the way, her daily skeds with Ruth, W5IZL, have progressed to the point where if the gals are otherwise occupied they leave their receivers tuned to each other's frequency and if anything comes up it's, "Are you there, Anabel?" or "Hello, Ruth, are you listening?"—practically a private line!

In contrast to the other officers, YLRL Secretary-Treasurer, W3NHI, Marion Kurtzner, is a dyed-in-the-wool c.w. operator. When her ticket came in April, 1947, she started out on 10 phone, but after a few months her OM, W3KBP, built her a little c.w. rig for 40 meters and later one for 20 and 80. C.w. stuck and although the phone rig is always available she rarely has a phone contact. According to Marion, "I like to listen to it but I talk much better with my hands than I do through a microphone—hi!" Marion was interested in radio from the time her OM got his license about 13 years ago, but at that time they were living in Brockton, Mass., where she had a lot of friends and family to occupy her

Assistant Editor, CQ. Send all contributions c/o CQ, 342 Madison Ave., New York 17, N. Y.

Seven of the ten licensed YLs who attended the 17th annual convention of Oregon Amateurs Radio Assn. Left to right: Beth McKay, W7NJS; Mary Davis, W7ENU; Lucille Allingham, W7FXE; Doris Munkres, W7-JFM; Bea Austin, W7HHH; Mildred Wildman, W7FKS; and Violet Bargabus, W7EIU. Others attending and not in the photo: Dot Dickey, W7GLK; Margaret Start, W7ECC, and Edith Roden, W7GPO.

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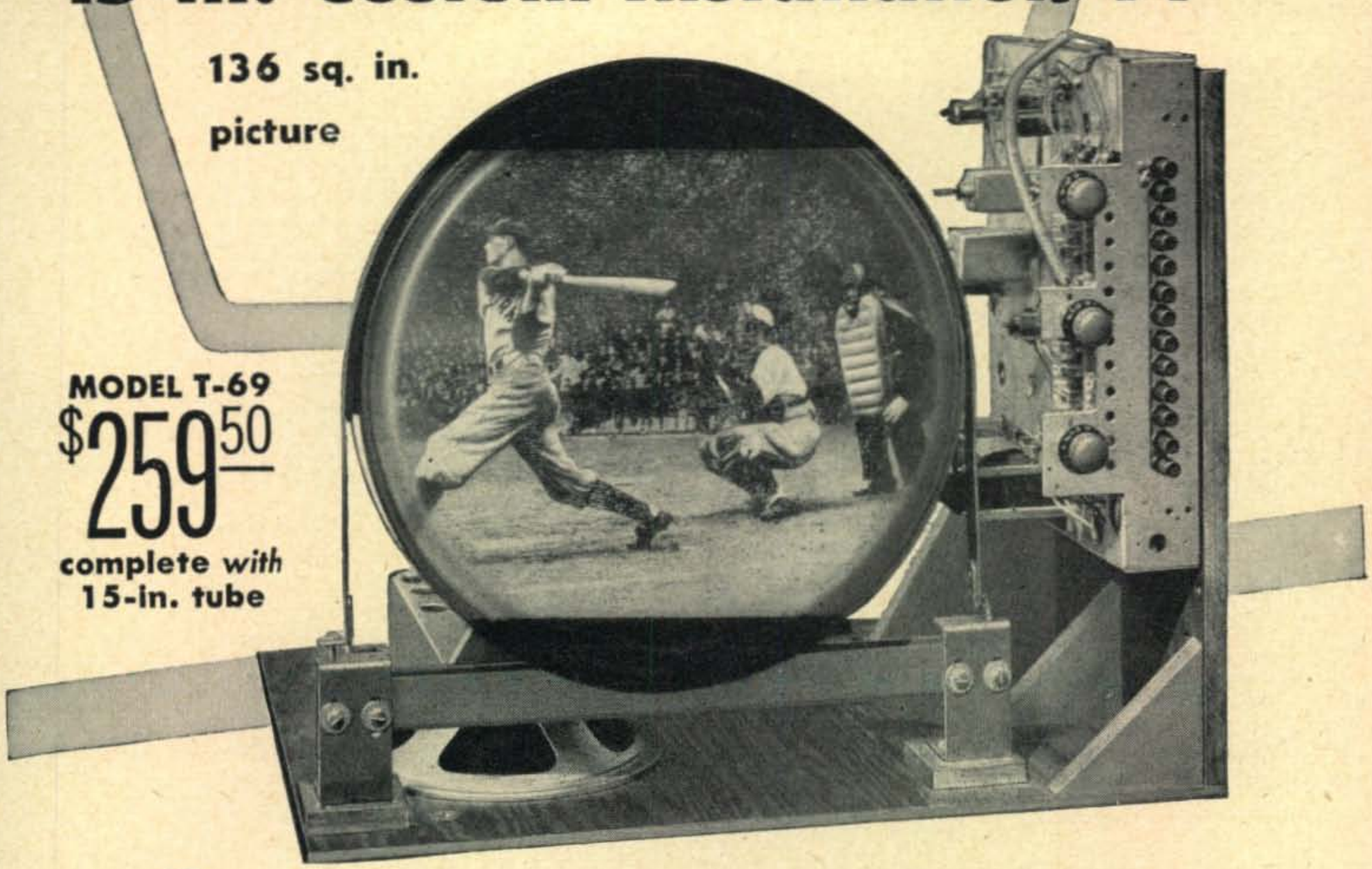

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A *new* chassis, specially designed for big picture-tube operation. Completely aligned and tested. Regular RMA 90-day guarantee applies to all parts. See your local parts distributor for details.

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time. When they moved to Pennsylvania three years ago she didn't know a soul and to keep from getting lonesome decided it was time to get busy on her ticket. Now she wishes she'd done it 13 years ago! Most of Marion's time is spent on 40 meters where she is tangled up in two traffic nets—ESN (Eastern Shuttle Net) and SSN (Swing Shift Net). She has been acting as NCS on ESN for just about a year. At the present time she handles the net only about once a week but for quite a spell she took net control seven days a week. Add a few skeds and QSOs and she, too, could list occupation: amateur radio; hobby, housewife! Marion says she guesses she's certificate happy because she gets a great kick out of trying for them. To date she has seven: ARRL, SSN (Swing Shift Net), RCC, ORS, CP 30 w.p.m., WAS, and A-1 Operator. She's also working for WAS/YL, with 15 states confirmed. Her rig consists of an HT-18 v.f.o. with an 814 final, running about 130 watts. Receiver is a BC-224. The rig is bandswitching for 80, 40 and 20 and she has three long wire antennas, one for each band, so that it takes only seconds to change.

Harmonics editor, W3OQF, Barbara Houston, became indoctrinated in amateur radio through WERS in 1944. She attended the Washington Radio Club meetings—"more from an interest in males than in radio, I must confess. Hi!" Dick Houston, W4GPW, was there and became her code instructor. Later he and Barbara started the D.C. Notes—the Washington Radio Club paper—together. "One thing led to several others including our marriage," says Barbara, "but funny thing—I never did learn the code! Met Dick in May, 1944, and we were married in Oct., 1945. Took the exam in '46, '47 and '48—four times in all, and finally made the grade on July 2, 1948." Barbara uses her call for mobile operation only, and Dick's for the home station, both of which are on 10 phone. They have a dozen other hobbies, main ones being photography and contests (they won a $1,000 prize once!), so they don't get on as much as they'd like. "Guess our main interest in ham radio is the social side anyway—rag-chews and antenna hunting on trips," explains Barbara. "Have had so many wonderful experiences thanks to ham radio; makes friends for us everywhere—ain't it wonderful?"

YL roundup at the Down-East Hamfest in Portland, Maine. Left to right, front row: Esther Routhier, W1RYJ; Eunice Loyzim, W1NJJ (W1BEQ); and Olga Apostolos, W1QJY. Back row: Eunice Thompson, W1MPP; Lou Littlefield, W1MCW; W2OOH, and Dot Evans, W1FTJ. Present but not in photo: Louise Bruya, W1MDV. Photo courtesy W1KYG.

YL Get-Togethers

It surely is, Barbie, and if anyone reading this could have been present at the meeting of the YLRL officers at the QTH of W3NHI the second weekend in July, they'd have seen an example par excellence. Helen, W3OLY, came up from Washington as did Barbie, W3OQF, with Kay, W3LSX. Anabel, W3NNS, with W2OOH in tow, joined them, as did district chairman Mae, W3CUL. Such QRM resulted that the OMs had to retire to the shack upstairs until Marion called a halt for a midnight weenie roast out under the stars—and the antennas.

YL get-togethers seem to be much in evidence these days. From Bea, W7HHH, we received the accompanying picture of seven of the ten YLs attending the 17th annual convention of the Oregon Amateurs Radio Association held in Eugene, Ore., on April 30 and May 1. "It was quite a momentous occasion," writes Bea, "for to my knowledge it is the largest number of licensed YL operators ever to attend any amateur gathering in the Pacific Northwest. I had them all together once but then we couldn't find a cameraman! It was a grand convention with about 300 hams and their XYLs attending."

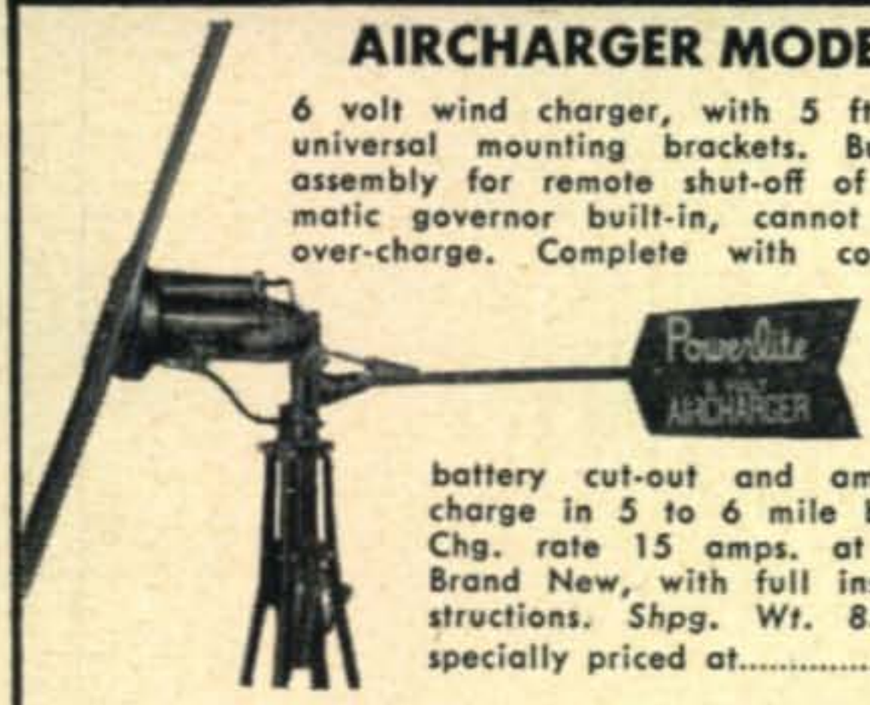
Not to be outdone by the W7s, the gals in New England turned out in force for the Down-East Hamfest in Portland, Maine, on June 25th, as you can see from the photo. From Maine, New Hampshire, Massachusetts and Connecticut they came, and your column editor also had the privilege of attending. There was much rag-chewing in the afternoon and during the banquet, climaxed by Eunice, W1MPP, literally walking off with the championship in the *foot* code sending contest, for which she received a miniature model of the huge 4-ft. foot key. 'Twas a grand weekend for we also had the privilege of visiting the QTHs of W1FTJ/W1BFT, W1MCW/W1CRU and W1MPP/W1PS. The latter, by the way, left us spell-bound. Located high on the side of Christian Hill in Lovell, Me., it overlooks miles of forests and Lake Kezar, while in the background is the full sweep of the White Mountains. No wonder Eunice and Ken left Boston for this QTH; they don't have to work DX—they can see it!

The ZSs have their conventions too, and twelve YLs managed to get together during the last, called a conference, held in Durban, S.A., over Easter weekend, including: ZS6KK, Marie; ZS2AA, Iris; ZS1YL, Mavis; ZS6YL, Toni; ZS6LK, Mae; ZS5DZ, Bee; ZS5DF, Meg; ZS1SA, Joy; ZS5MC, Esme; ZS4AZ, Annie; ZS6BD, Edie, and ZS6GH, Diana. Diana tells us that as one part of the conference activities a magician entertained them Sunday afternoon, many hams helping him with his tricks. Adds ZS6GH: "I broke the 100-yard record when he asked me to hold a white mouse—someone photographed that famous dash by Galloping Ham! On top of it all, I sang 'Daisy, Daisy' with him in a T4 note!"

By the way, gals, don't forget the New Hampshire State Convention at Manchester on September 17th—they're looking for a big YL turnout. For tickets write W1QJY, Olga Apostolos, 75 Medford St., Manchester, N.H.

HARVEY for variety for bargains

AIRCHARGER MODEL 616



6 volt wind charger, with 5 ft. tower and universal mounting brackets. Built-in brake assembly for remote shut-off of unit. Automatic governor built-in, cannot over-run or over-charge. Complete with control panel, battery cut-out and ammeter. Will charge in 5 to 6 mile breeze. Max. Chg. rate 15 amps. at 1100 RPM. Brand New, with full installation instructions. *Shpg. Wt. 85 lbs.* Very specially priced at.....**$34.95**

MILLEN 90651 GRID DIPPER

Versatile test and design unit. 1.5 to 270 mc. Transformer power supply plus battery operation. Frequency calibrated drum dial. Measures only 3⅛" x 3½" x 7" plus inductor length. Complete with tube and inductors. *Shpg. Wt. 5 lbs.*.....
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For fall vacations or year-round use. BC and ham use, 4 bands—540 kc to 31 mc. Extra sensitivity for weak signal areas. AC, DC or batteries, whip or loop antenna. 8 tubes plus rectifier. *Shpg. Wt. 16 lbs.*..... **$79.95**

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Filtered DC supply has hundreds of uses. All parts conservatively rated. Transformer, 36 V, 10 amp; 2400 mfd, 50 V condenser; filter choke; 5 amp full-wave rectifier. Ample capacity for practically all surplus 24 V. devices. Output may be increased to 10 amps by adding a rectifier in parallel.

Complete kit, net **$18.74**
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Transformer only **5.95**

Type 1616 tube; Half wave, high vacuum rectifier. Filament 2.5 volts, 5 amps; peak inverse 5500 volts; peak current .8 amps; surge current 2.5 amps; average plate current .130 amps. **List price $7.50, Harvey special price, *while they last*.....95c**

All in stock for immediate delivery.

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Amphenol	AN3102-32-5P	25c each
Amphenol	AN3106-18-11S	25c each
Amphenol	AN3106-18-18P	25c each
Amphenol	AN3106-24-6S	25c each
Amphenol	AN3106-24-7P	25c each
Amphenol	AN3106-32-5S	25c each
Harwood	AN3108-14S-*	25c each
Aero	AN3108-14S-2S	25c each
Cannon	AN3108-14S-2S	25c each
Amphenol	AN3108-14S-2S	25c each
Amphenol	AN3108-18-12P	25c each
Amphenol	AN3108-22-5S	25c each
Cannon	AN3108-22-5S	25c each
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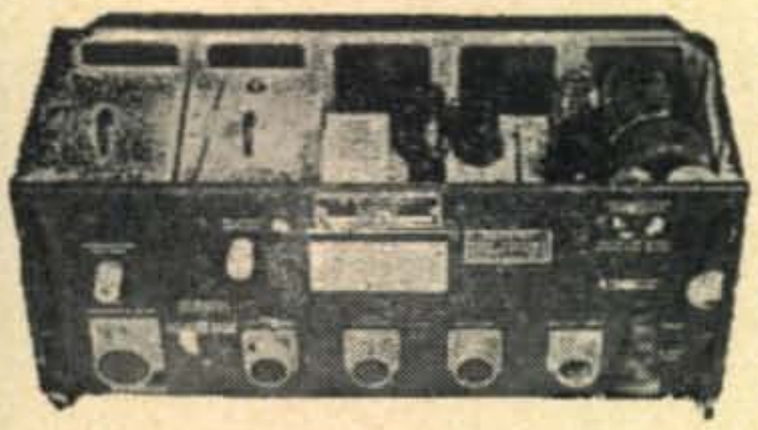

A complete 460 mc. radio receiver and transmitter which can be converted for ham or commercial use. Tubes used and included,: 4-12SH7, 3-12SJ7 2-6H6, 1-VR150, 2-955, 2-9004. Other components such as relays, 24 volt dynamotor, transformers, pots, condensers, etc., make this a buy on which you cannot go wrong. Complete in aluminum case 18" x 7" x 7¼".

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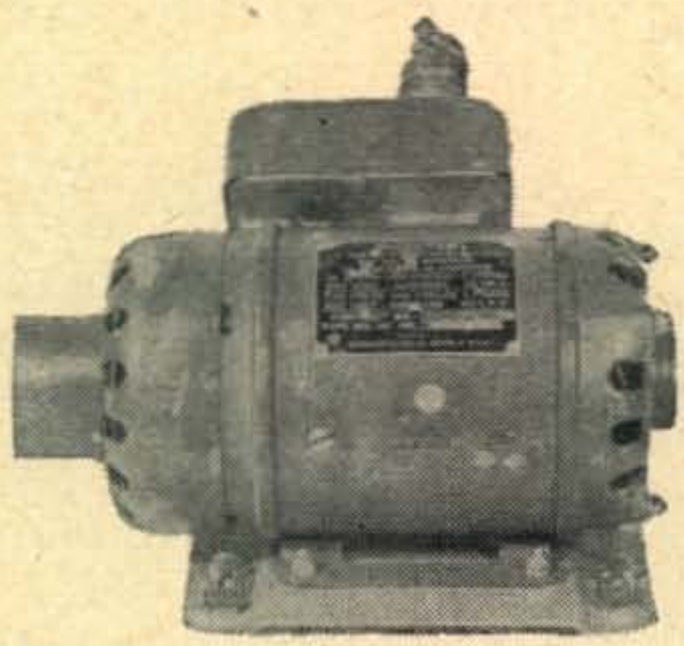

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Output at 90% P.F.....**$5.95**

These have been abused but are in working order.

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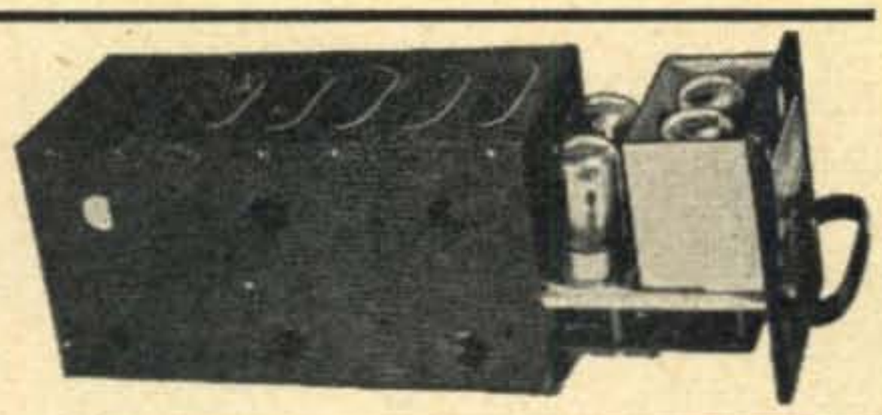

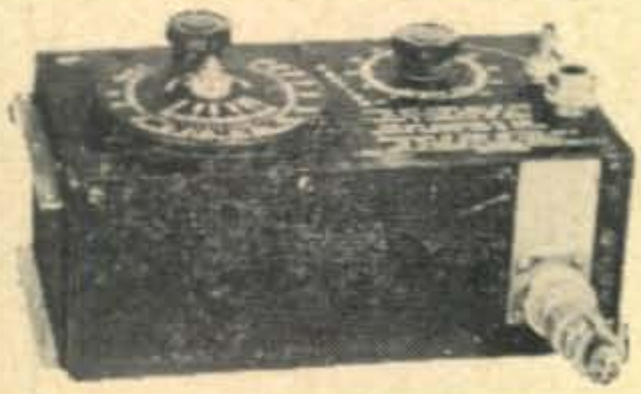

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Brand new packed in six boxes, total weight approx. 600 lbs. Limited quantity and in much demand. Place order now.

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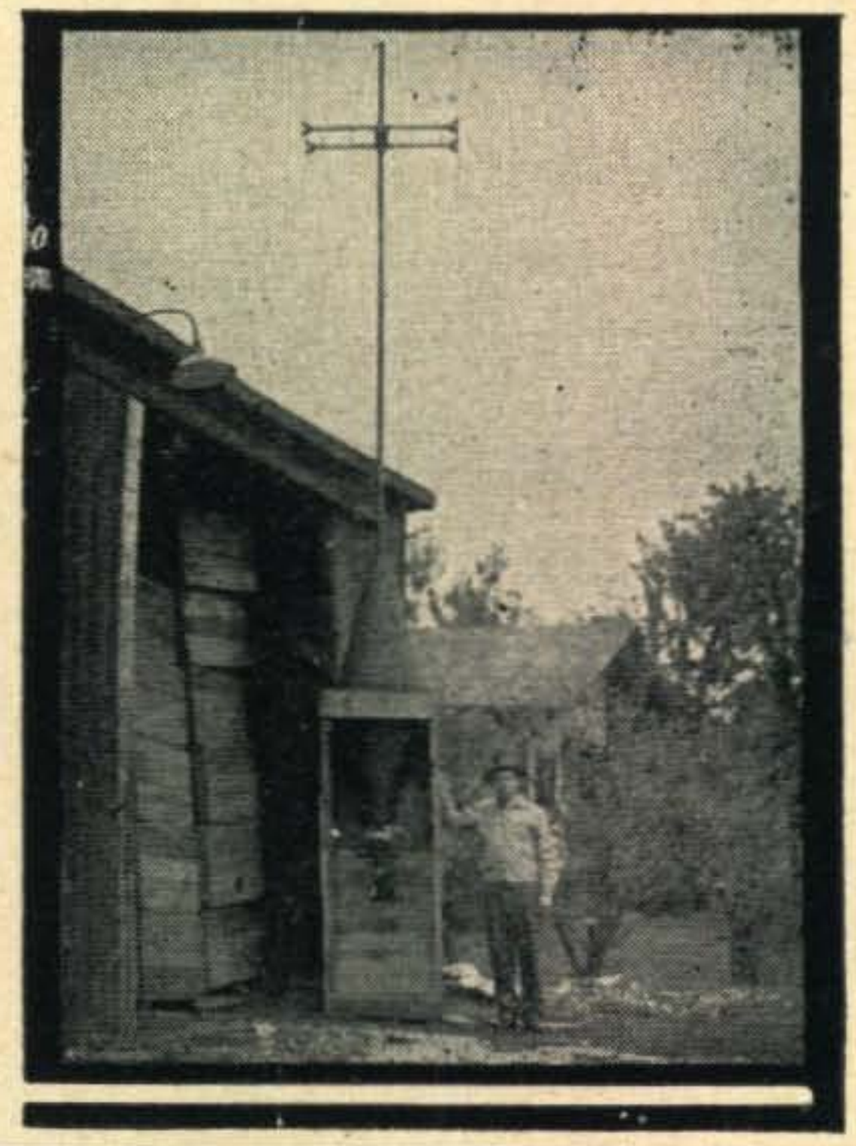


ANTENNA KIT 2A-264-126

Canvas bag containing 20 ceramic insulators each 3" long (1¼" dia. with screw-in type eyelets), covered wires each 5' long, 10' long, 35' long, 2 each 25' long, 5 each 20' long, 150' long, (all having ⅓" thimbles and 6" connecting leads at each end and all stranded copper covered with weather proof insulation.) Brand new. Original crates. Useful to any ham, serviceman, or experimenter. Each kit.....**$4.95**

ESSE RADIO CO.

RECTIFIER POWER UNIT

INDIANAPOLIS, INDIANA

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

Navy Type CLG-20341

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

Will continuously deliver rated load of 25 amperes at 7 volts, 14 Volts, or 28 Volts DC.

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

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

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

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

A complete operating manual accompanies the unit.

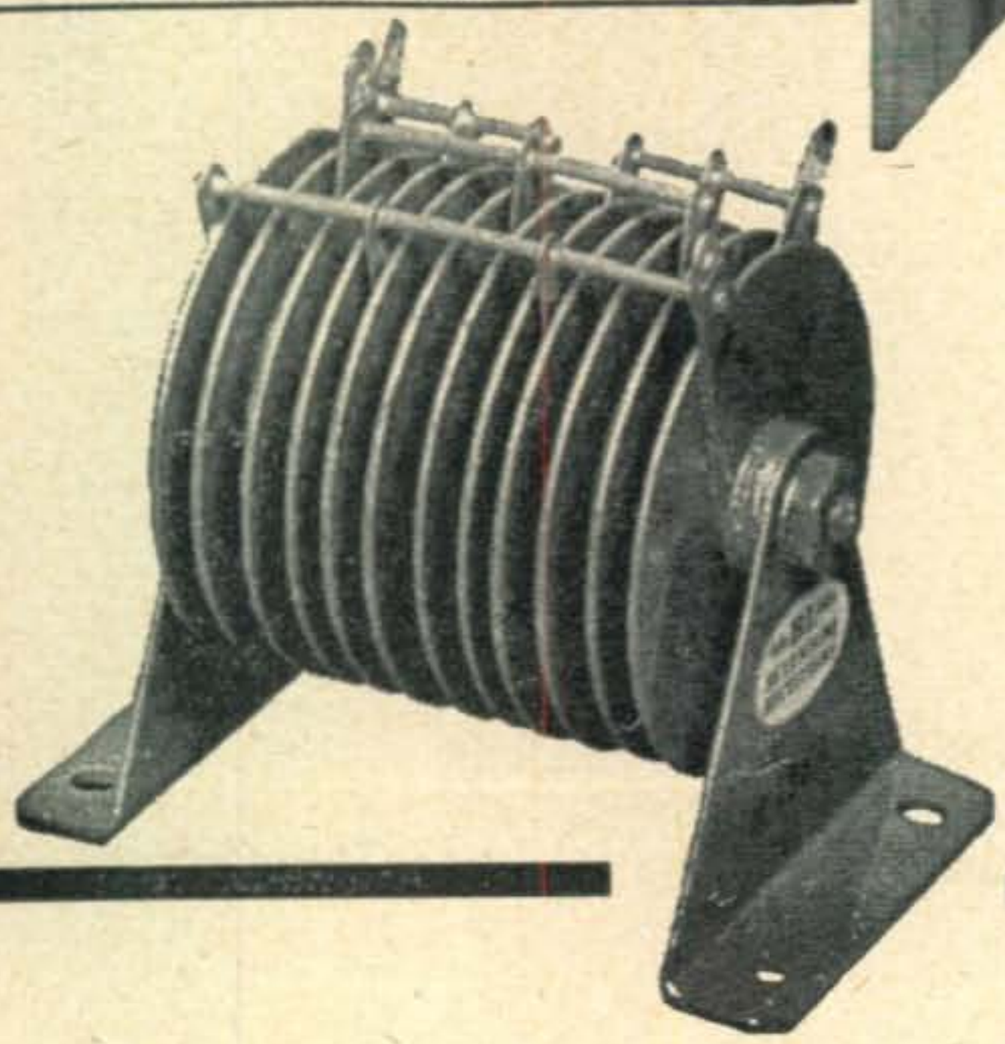
This equipment was made by Electronic Laboratories, Inc. of Indianapolis, Indiana and is really a very dependable fine rectifier power unit and can be compared with only the finest. It cost our Government approximately $500.00.

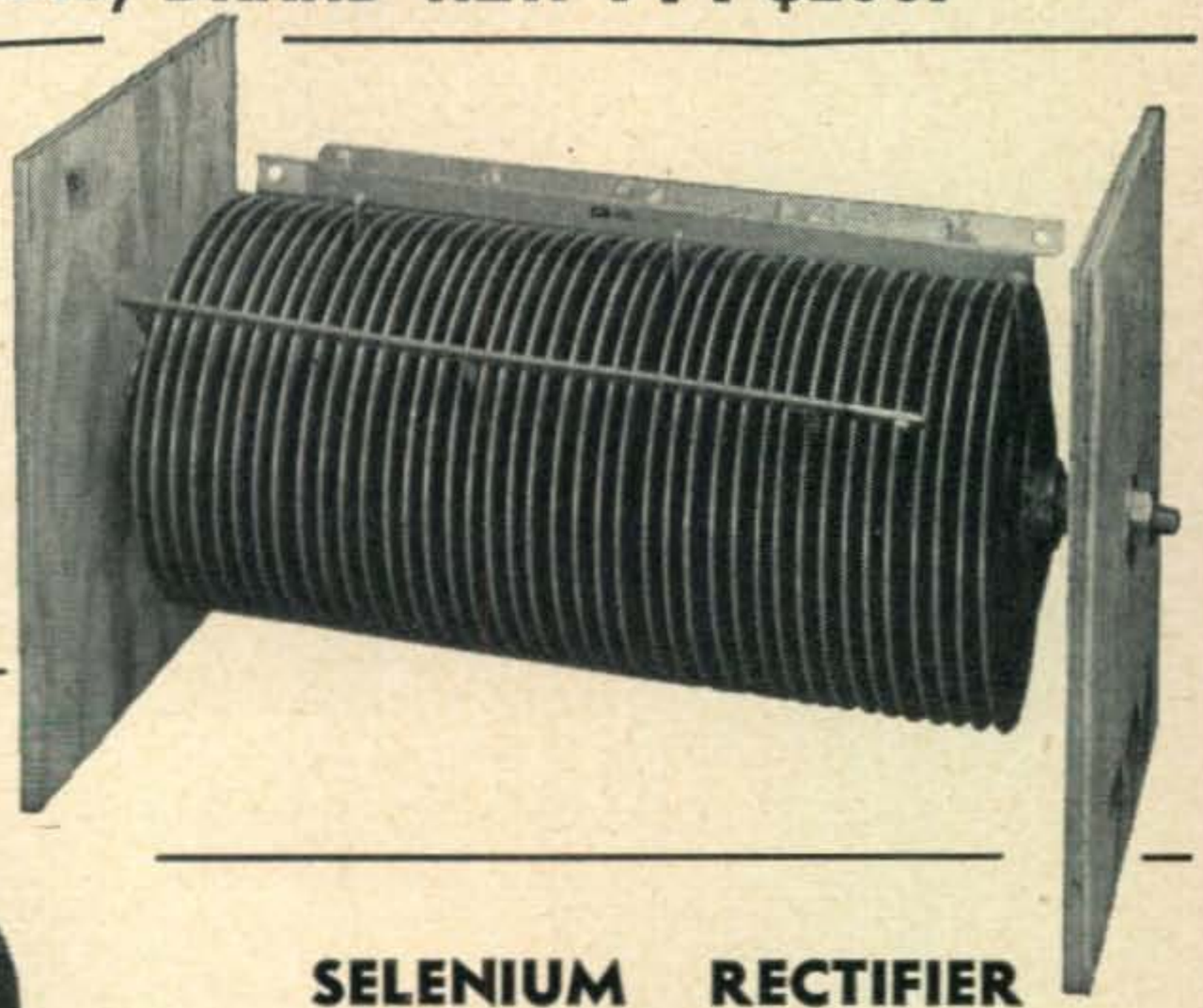
Our price, complete, BRAND NEW . . . $100.

RECTIFIER ASSEMBLY

Selenium 15 amps. maximum continuous DC current inductive load for continuous duty. Maximum AC input 46 V. RMS single phase. DC output maximum 34.9 Volts. These rectifiers were used in Navy type CLG-20341 rectifier power unit which delivered 6-12-24 Volts DC current at 15 amps. Maximum dimensions 4⅜" dia. x 12 ¾" long.

Price New..... **$12.50**





SELENIUM RECTIFIER

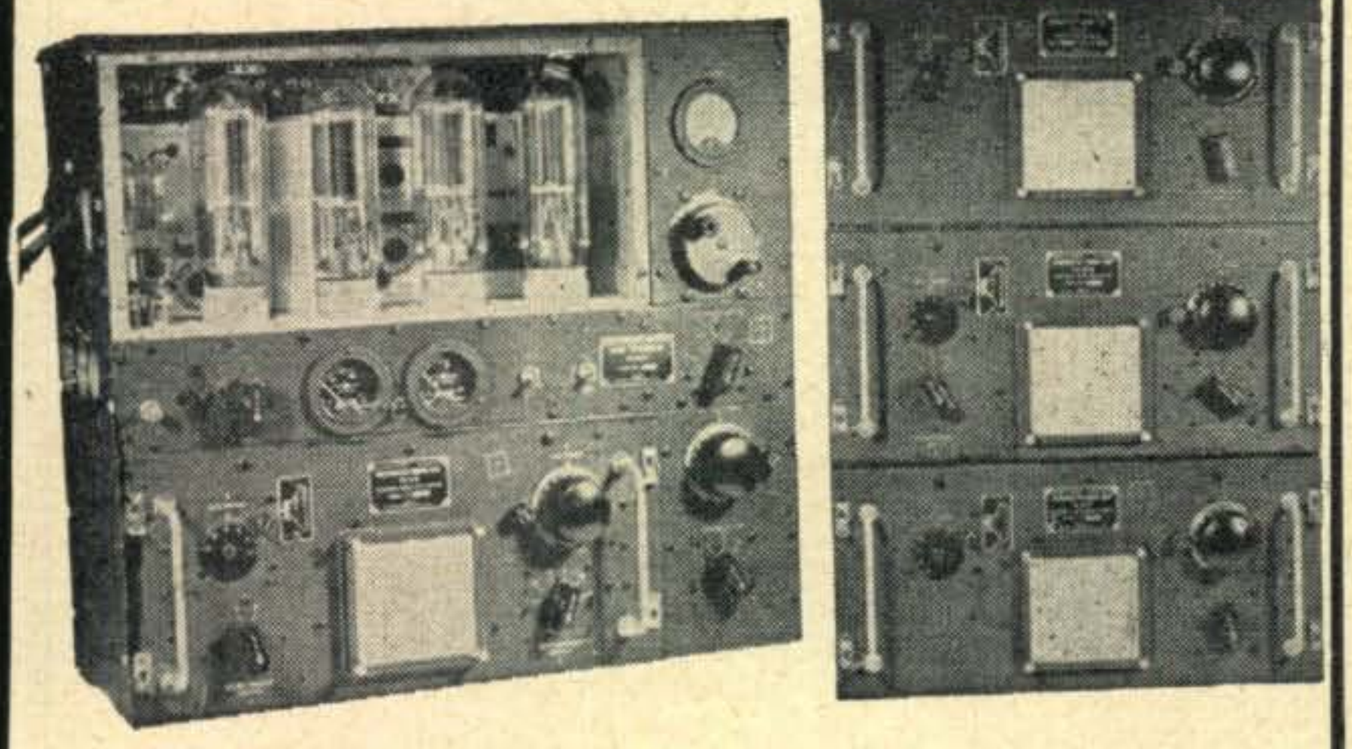
Maximum AC 60 cycle sine-wave. Input 13 Volts; output 9 Volts. Continuous current rating 2 amps. with inductive or resistive load. Maximum dimensions 3⅛" x 1 11/16" x 1 11/16". 12 square plates bridge circuit. (New).

Price..... **$4.00 ea.**

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA



BC-375 GE MOPA TRANSMITTER

The most famous of all surplus transmitters. Was used by the Army bombers and ground stations durng the War. Frequency range is covered by means of plug-in tuning units as shown below. Each tuning unit has its own oscillator and power amplified coils and condensers, and antenna tuning circuits all designed to operate at top efficiency within its particular frequency range. Transmitter and accessories are finished in black crackle, and the milliammeter, voltmeter, and RF ammeter are mounted on the front panel. **Frequency Range:** 200-500 Kc. and 1500-12,500 Kc. (Will operate on 10 and 20 meter band with slight modification). Oscillator: self-excited, thermocompensated, and hand calibrated. **Power Amplifier:** neutralized class ""C" stage, using 211 tube, and equipped with antenna coupling circuit which matches practically any length antenna. **Modulator:** Class ""B"—uses two 211 tubes. **Power Supply:** Dynamotor which furnishes 1000 V. at 350 Ma. **Conversion** instructions and diagram for 110 V. AC furnished upon request for **$1.00**

PRICES: As follows—

Transmitter only	**$12.50**
Tuning units TU-7B, TU-8B, TU-9B TU-10B, TU-26B, choice	**$2.50**
Dynamotor PE-73C	**$3.95**
Antenna tuning unit (BC-306A)	**$4.95**

SCR-625 MINE DETECTOR

Brand New **Metallic Objects Only**

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

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

The U. S. Forestry Service has recommended procedure for using the SCR-625 Mine Detector to find concealed metal in tree logs and other timber products.

Price	**$59.50**
Batteries	**$4.00** extra

MINE DETECTOR AN/PRS-1

The detector is designed to detect metals, non-uniformities (rocks, tree-roots) and may be used to detect metal buried in logs, to locate cables, pipes, sewer tile and etc. It is widely used by lumber camps, miners, prospectors, plumbers, treasure hunters and explorers.

A portable device used in the detection of both metallic and non-metallic by aural (ear) and visual (eye) means. These are brand new outfits, complete with instruction book and spare tubes. Shipped in original overseas moisture-proof container.

The set consists of the detector head with antenna and reflector meter, a meter housing and lower section of exploring rod, amplifier assembly, exploring rod extension, bag designated to carry equipment while operating, and wooden case for storing or transporting the complete unit when not in use. This detector is not nearly as sensitive as the SCR-625 Mine detector. However, because of its price and its simplicity, you cannot go wrong on buying one for $14.95. Shipping weight, 125 lbs. Weight in operation only 22 lbs.

Batteries are not included but we can supply them for $8.25 per set.

Our Price $14.95

Shipping Weight 125 lbs.
Weight in Operation Only 22 lbs.

AIRCRAFT BATTERY AN-3152

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

Price **$12.95**

BC-314 RECEIVER

Frequency coverage 150-1500 Kc. in 4 ranges. Two RF stages, 1st detector, two IF stages, second detector, RF oscillator, CW oscillator and audio. Total, 9 tubes. 14 V. DC at 5.8 amps, input to dynamotor. Easily converted for 110 V. AC. Use headphones or speaker or both.

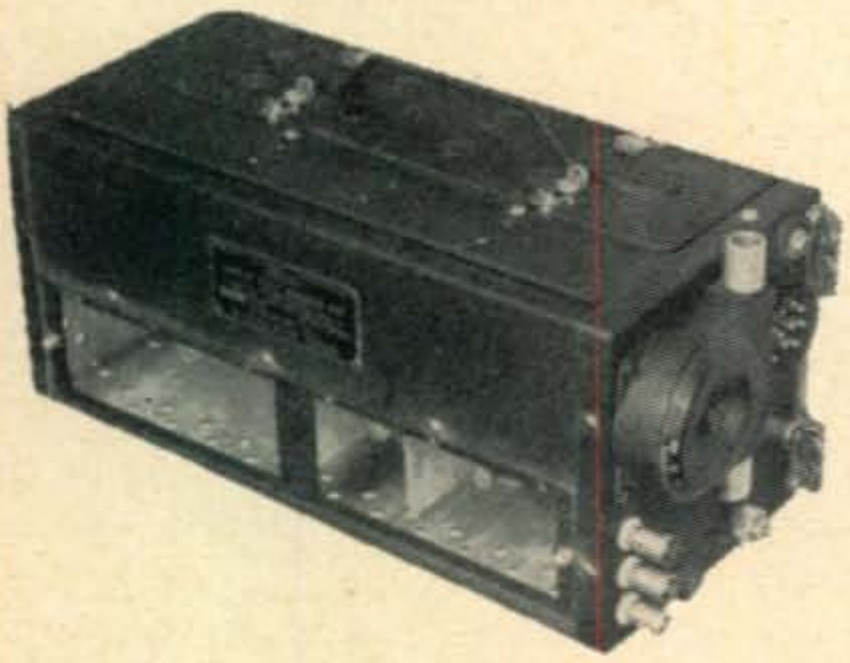
New, with manual	**$89.50**
Used	**$69.50**

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA

RECEIVER RU-19



With plug-in coils (not included) covers a frequency range of 195-13, 575 Kc. Contains 6 tubes. Size 6½" x 6½" x 15". PRICE

$5.00

HONE and WHETSTONE

HUNTER'S and FISHERMAN'S SPECIAL! ALSO FOR HOME WORKSHOP and MACHINE SHOP

ORDER NOW

Fine quality, high-grade knife, fishhook, tool and hand-axe sharpener and polisher. U.S. Government surplus. Light weight (weight less than 1 ounce). Size ½ inch wide x 4 inches long. One-half of instrument is finest possible whetstone and other half is cork rust remover and polisher. Any trapper, hunter, fisherman, hobbyist or machinist cannot afford to pass up this bargain.

15c EACH

$1.00 doz

MARKER-BEACON RECEIVER

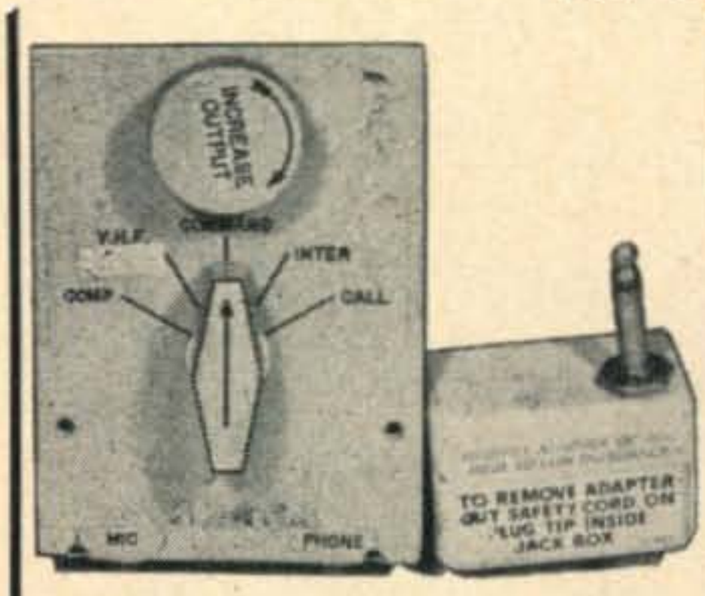
Can be adapted to radio controlled devices. Was used by pilots to flash a signal lamp on aircraft instrument panel when in range of a beacon transmitter. Responds to modulated signals over a variable range of 62 to 80 Mc. Tube plates and filaments operate directly from 24 V. DC. Can be adapted for radio control of experimental apparatus opening garage doors, etc. Circuit diagram and parts list included on either model shown below:

BC-357 — contains 12C8 and 12SQ7 tubes and sensitive relay (size 5⅝" x 5¼" x 3¼").
Price **$2.95**

BC-1033 — contains 6SH7, 6SL7 and 12SN7 tubes, sensitive relay (size 5⅜" x 5¼" x 3¼").
Price **$3.50**

LIP MICROPHONE

Lip microphone, made by Western Electric, Navy type CW-51071, with instruction sheet, brand new.
75c each



JACK BOX BC-1366

Contains 2-pole 5-position switch, rheostat, two phone jacks, etc. In aluminum case 3¼" x 4⅜" x 2¼". Complete with headphone set adapter to match high to low impedance.
Price **$1.25**

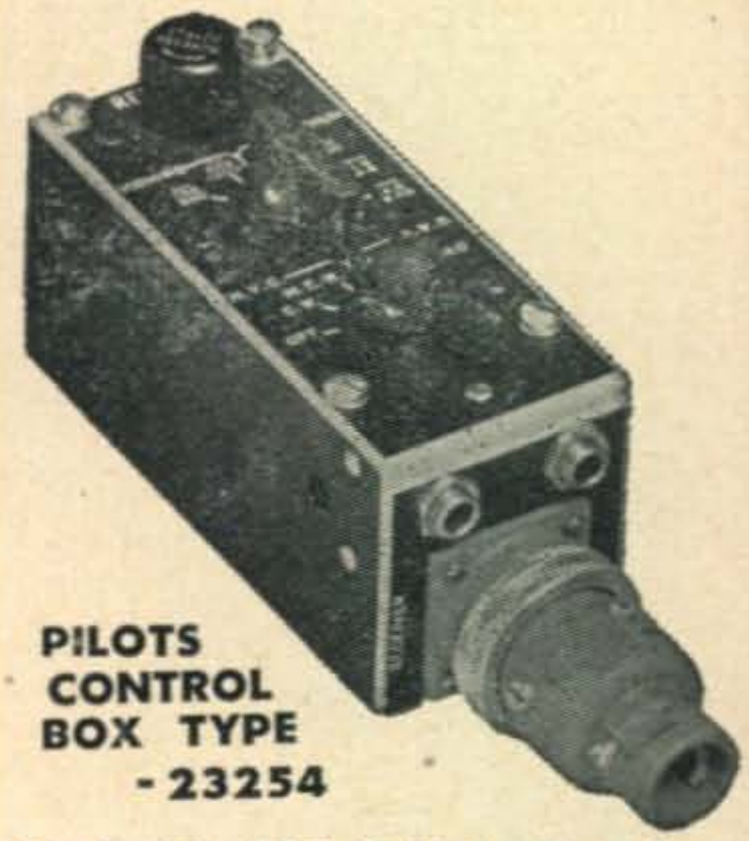
NAVY CRV 46151 AIRCRAFT RADIO RECEIVER

Four bands, including broadcast (195-9,050 KC). Circuit is six-tube superheterodyne with mechanical band change or remote operated electrical band change. Remote band change and tuning controls included, making this set readily adaptable to mobile ham use. Powered from self-contained 24 V. DC dynamotor.

The sets are complete with tubes, mounting rack and remote controls. No tables or plugs.
Including case..... **$19.50**

RECEIVER TUNING HEAD CRV-23253

Used with CRV-46151 Receiver for vernier tuning. Has beveled dial with hairline cursor. Bands are 200-560, 560-1600, 1600-4450, 4450-9050 Kcs. Each band spread over about 280 degrees of dial edge. Has provision for flexible tuning shaft or can be adapted for direct drive on any tuning shaft. Black crackle finish. Size 5" x 3" x 2" overall. Brand new 75c



PILOTS CONTROL BOX TYPE -23254

Used with CRV-46151 Receiver for remote control of volume, selection of any one of six frequency bands, as off/on switch or selection of C.W. and M.C.W. and M.V.C. or A.V.C. Black crackle finish. Size 2" x 2¼" x 5" high. Brand New. 75c

ESSE RADIO CO.

Esse's Special Offer

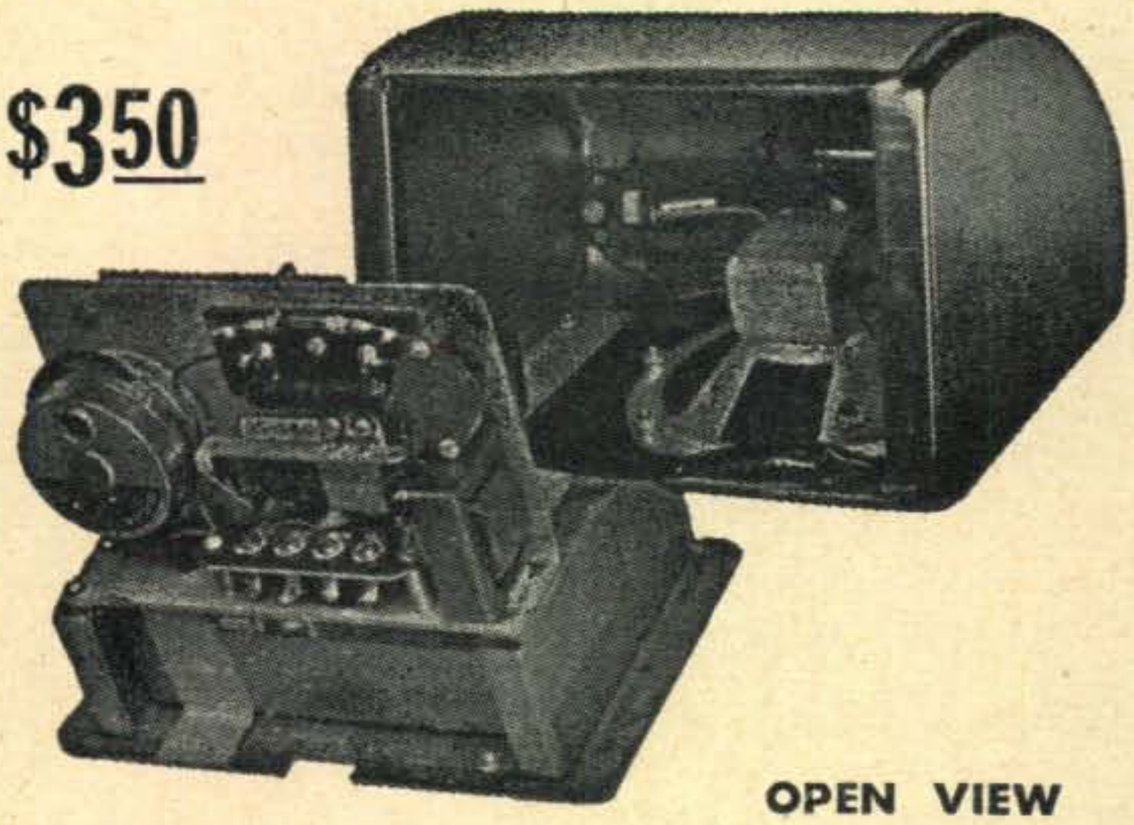
INDIANAPOLIS, INDIANA

COIN INSERT BOX & REMOTE SPEAKER

CLOSED VIEW

- Sloping front
- PM Speaker 5" size
- Has 2 Pilot Lights for illumination
- Finished in chrome metal and grill with red plastic
- Accepts 1 to 6 nickels
- Each 5c coin gives about two phono records of music
- Should be mounted on a flat base
- Has Haydon Mfg. Co. timer
- Has provision for locks (not furnished)
- Easily removable coin box. size 6" x 3½" x 1½"
- Requires 4 wires from power unit
- A beautiful piece of equipment that could be built to house coin operated radio.
- Worth several times our asking price.
- Price brand new

$350

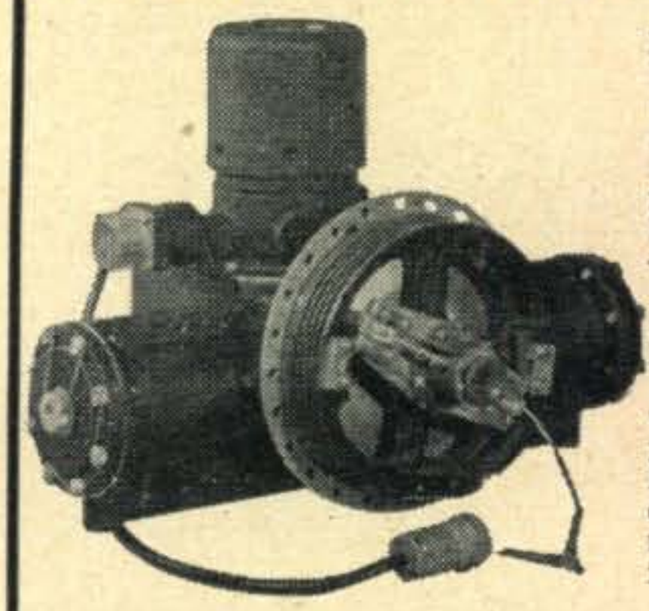


OPEN VIEW

GLASS TELEPHONE-POLE INSULATORS

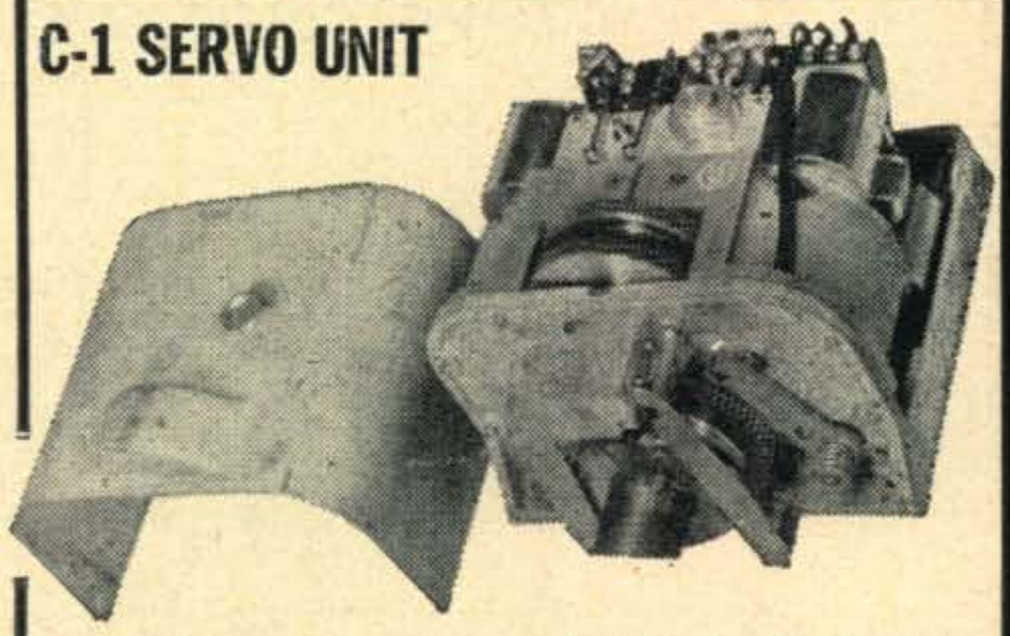
Hemingway size 680. Fits ¾' wooden crossarm pin. Overall height 5", diameter 4". Will hold two single steel wires, or two pair of stranded wire cables. Brand new .....Ea. **20c**

A-5 AUTOMATIC PILOT SERVO M1



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

C-1 SERVO UNIT



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

NEW RESISTORS—CARBON

100 ohms,	½ watt	...per	hundred	**2.00**
120 ohms,	½ watt	...per	hundred	**2.00**
220 ohms,	¼ watt	...per	hundred	**2.00**
270 ohms,	1 watt	...per	hundred	**2.00**
470 ohms,	¼ watt	...per	hundred	**2.00**
480 ohms,	½ watt	...per	hundred	**2.00**
1200 ohms,	½ watt	...per	hundred	**2.00**
6800 ohms,	2 watt	...per	hundred	**2.00**
12,000 ohms,	2 watt	...per	hundred	**2.00**
21,000 ohms,	¼ watt	...per	hundred	**2.00**
56,000 ohms,	¼ watt	...per	hundred	**2.00**
85,000 ohms,	¼ watt	...per	hundred	**2.00**
150,000 ohms,	1 watt	...per	hundred	**2.00**
270,000 ohms,	½ watt	...per	hundred	**2.00**
830,000 ohms,	¼ watt	...per	hundred	**2.00**
1,200,000 ohms,	½ watt	...per	hundred	**2.00**
5,600,000 ohms,	¼ watt	...per	hundred	**2.00**

24V-L3 50 AMP LEECE NEVILLE AIRCRAFT GENERATOR for HEAVY DUTY WORK

24 V L-3—50 Amp—Leece Neville aircraft generator for heavy duty work. Can be used on automobiles, etc. for that 24V rig. Weight 24 lbs. — 5" diameter—11" long — (¾" diameter; 1" length shaft). Brand new.....**$17.50**

BC-348 COMMUNICATIONS RECEIVER

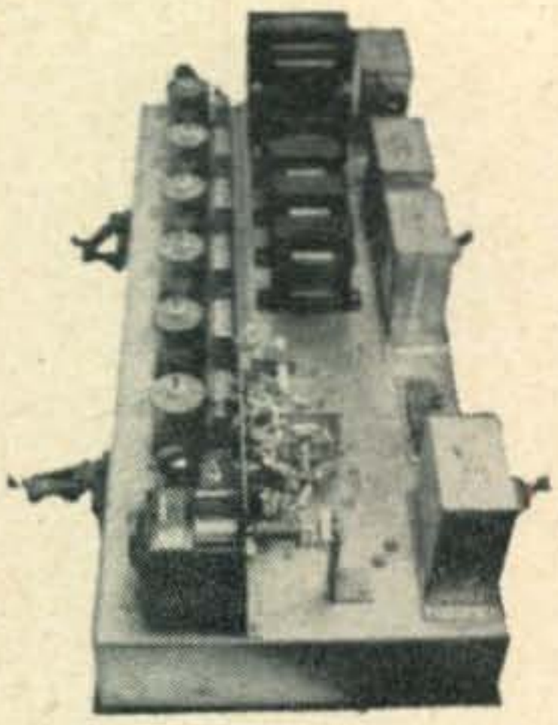
6 bands, 200-500 Kc. and 1.5-18 Mc. 2 stages RF, 3 stages IF, BFO, crystal filter, manual or AVC. Complete with tubes and 24 V. dynamotor. These receivers have been thoroughly checked in our work-shop and found in excellent condition. Converted to 110 V. AC 60 cycle **$60.00**

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

ESSE RADIO CO.

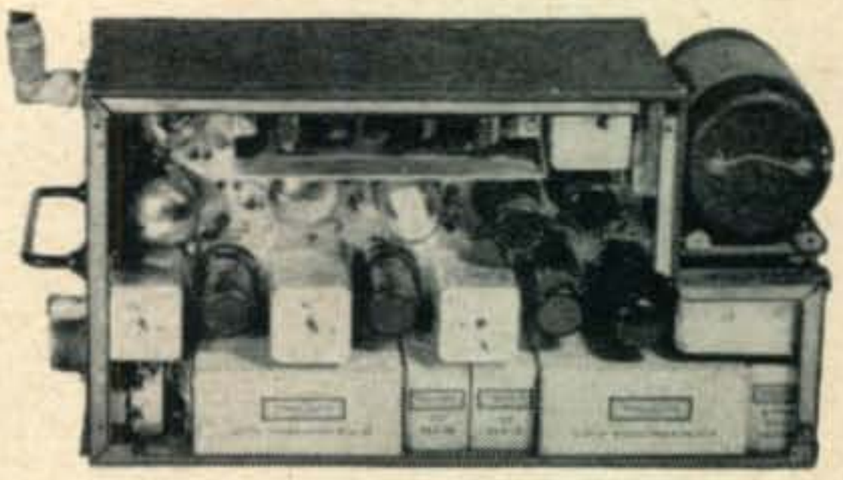
Esse's Special Offer

INDIANAPOLIS, INDIANA



BC-733D LOCALIZER RECEIVER

A part of aircraft blind landing equipment. Operates on any six of its predetermined crystal controlled frequencies in the range of 108-120 mc. Contains 10 tubes, three of which are WE-717-A's—and crystals. Ideal receiver for conversion to 144 mc. ham band or mobile telephone bands. For 24 V. DC operation. Size 14½" x 7" x 4⅝".
Price with dynamotor.....**$5.95**
Price without dynamotor.....**$4.95**



BC-406-A Receiver—Brand new. Manufactured by Western Electric. 165 to 205 mc operation. IF frequency 19.5 mc. IF band width .7 mc. Easily converted for operation on other ultra-h'gh frequencies. Operates from 110 V., 60 cycle, A.C. Worth many times this amount for tubes and parts.

Tubes——one 5T4, two 68J7, four 6SK7, one 6N7, five 954's, one 955, one 6F7, one 6N7. Also contains small 110 V. operated motor.....**$24.50**

A—Resistor kit composed of 150 or more assorted wattages. Containing various resistors of up to 10 megohms. Many with gold bands. An honest-to-goodness bargain.
Box **2.65**

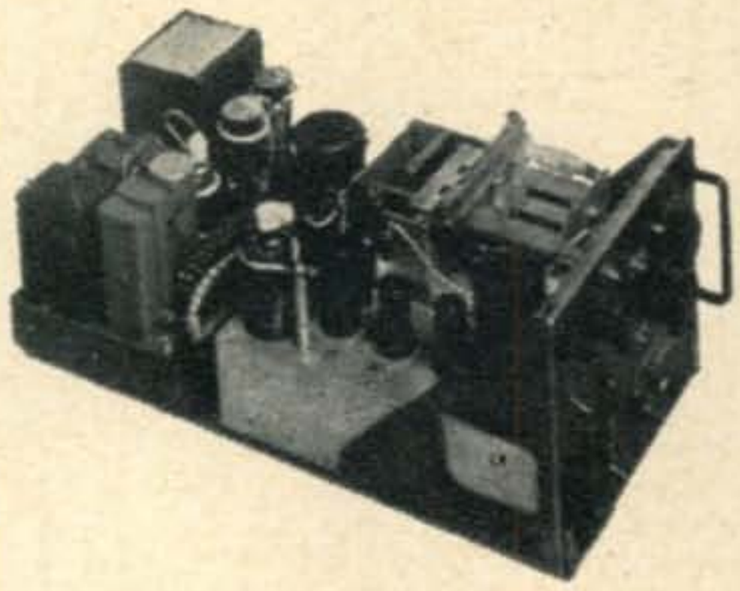
B—Condenser Kit. Contains assortment of 25 various condensers including 2-2 Mfd. 600 V. filters, 1-1000 Mfd. 15 V. filter 4-1 Mfd. 400 V. paper by-pass, 3-3 gang midget trimmers, etc.....**2.65**

C—Hardware Kit containing about 5 lbs. of radio hardware including nuts, bolts, washers, shafts, gears, grommets, lugs, screws, spacers. It is a gold-mine of invaluable parts.....**1.95**

D—Resistor mounting lugs and terminal strip kit. Assorted sizes and shapes. Many, Many, Many.....**1.00**

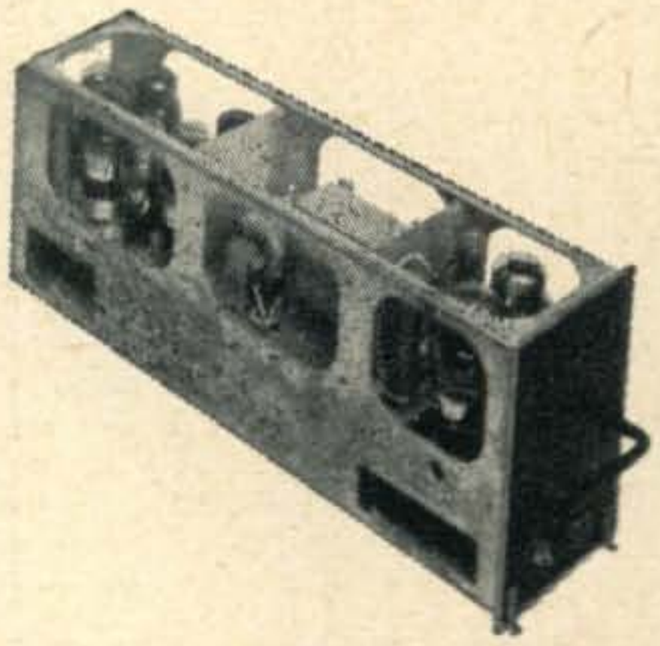
E—Tube Socket Kit 25 or more assorted sockets having various usable sizes....**1.50**

F—Switch Kit consisting of assortment of 10 rotary and toggle switches. Price....**1.25**



T-26 APT-2 RADAR TRANSMITTER

Contains tunable VHF circuit using 2 JAN CTL 703A's or 368AS tubes. Other tubes are: 2—5R4GY's, 1—2x2, 1—807, 1—6AG7, 2—6AC7's and 1—931A. Other parts such as 24 V. DC motor and blower, HV. condensers and transformers, terminal strips and Amphenol connectors, knobs, fuse holders, etc. make this unit invaluable for parts alone. Weight approx. 45 lbs. Size 21" L x 10½" W x 7¾" H. in



PP-2/APQ-5 POWER UNIT

metal case.....**$9.75**
400 cycle, 115 V. Contains 10 tubes as follows: 2—5U4G's, 1—6A5GT, 4—6Y6G's 1—6SL7GT, 2—VR150-30 and numerous condensers, transformers and resistors. Weight 17 lbs. Size 21" L x 5¼" W x 7¾" H. Price....**$5.75**

A TREMENDOUS BARGAIN
Quartz Crystals without Holders

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

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

Formula for converting thicknesses of B-cut crystals to frequency is as follows: F=98.4/T where F is frequency in kilocycles and T is thickness in inches.
AN ASSORTMENT OF 20 DIFFERENT THICKNESSES **$1.00**

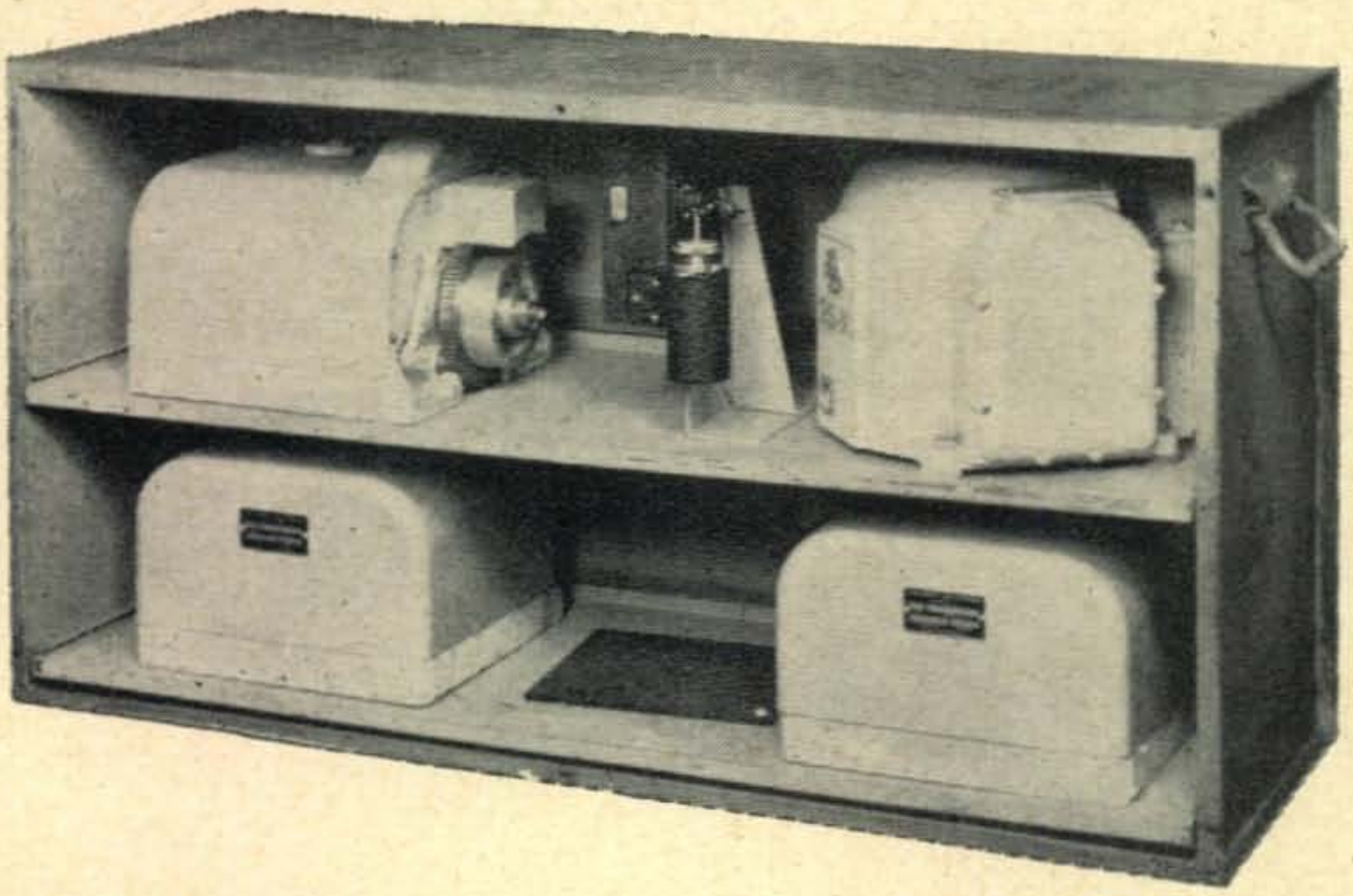
AMPHENOL LOW-LOSS UHF CONNECTOR for RG type cable. Rugged construction, heavily silver plated provides easy assembly and positive connection. Type 83-1AP Angle Plug Adapter polystyrene insert, pin and socket—very special.....**20c** each

ESSE RADIO CO.

C-1 AUTO PILOT ASSEMBLY

Made by NORDEN

INDIANAPOLIS, INDIANA



Stabilized bombing approach equipment type M-7. All the following units come high x 12" deep. housed in a steel case, size 36" long x 17" Weighs approximately 160 lbs. net.

Consists of (3) C-1 SERVO UNITS **and (1) C-1 GYRO**

C-1 SERVO UNIT

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

C-1 GYRO

Part of the C-1 Auto Pilot which is sold separate and may be used to conduct many interesting and amusing experiments. Operates from 24 V. DC or may be operated for short periods on 110 V. AC. Gyro will run for approx. 15 minutes after actuating. Size—approx. 8" x 8½" x 8½".

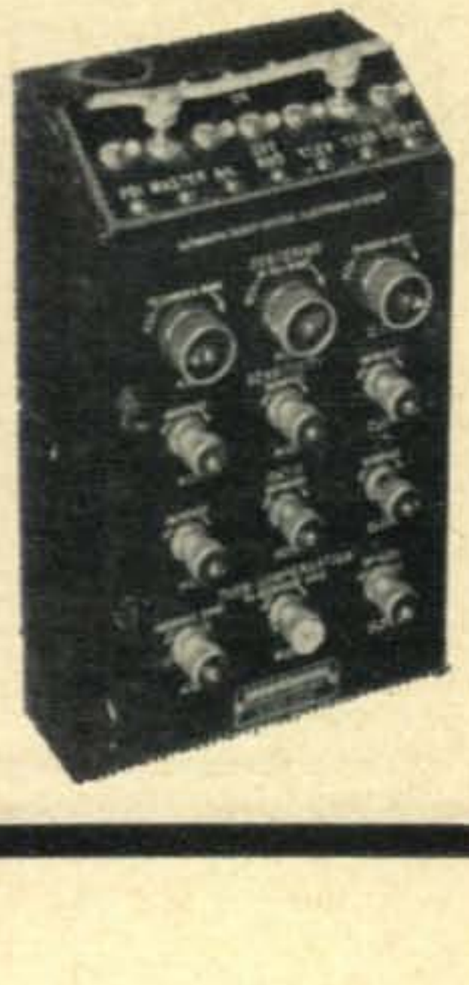
And 1 **DIRECTIONAL PANEL** with dashpot action (not pictured).
All five of these units as described individually and as pictured at top, priced, brand new, at..... **$49.50**

PART of AUTO PILOT — BUT NOT INCLUDED IN ASSEMBLY AS SHOWN ABOVE

C-1 AUTO PILOT AMPLIFIER

Used to control operation of servo unit in response to signals received from gyro unit and control unit. The complete amplifier includes one rect. 7Y4, 3—7F7's for amplification and control, 3—7N7's for signal discrimination, 1 power transformer, 6 relays, 4 control pots, chokes, condensers, etc. Convert for use on radio controlled models, doors, etc. Operates from 24 V. DC. Sze, 9¼" x 6¼" x 7⅝".

$6.00



C-1 AUTO PILOT CONTROL BOX

Used for aligning control of C-1 Auto Pilot or use for parts, etc. Contains many useful pots., toggle switches, plugs, etc. Size, 11" x 6" x 4½".

PRICE

$6.75

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA

ARMY PHONES LOW IMPEDANCE

Used. With short cord and plug PL-354 and cushions.
Price **$1.50**

MAGNESYN INDICATOR

To be used for beam antenna. Practically same as 1-81-A Selsyn indicator. 15-25 V. 60 cycle AC. 3" size.
Excellent condition..... **$1.25** ea.
Plug for connection..... **.50**

AUTOMATIC DIRECTION FINDER RADIO COMPASS SCR-269-G

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

BC-221 FREQUENCY METER

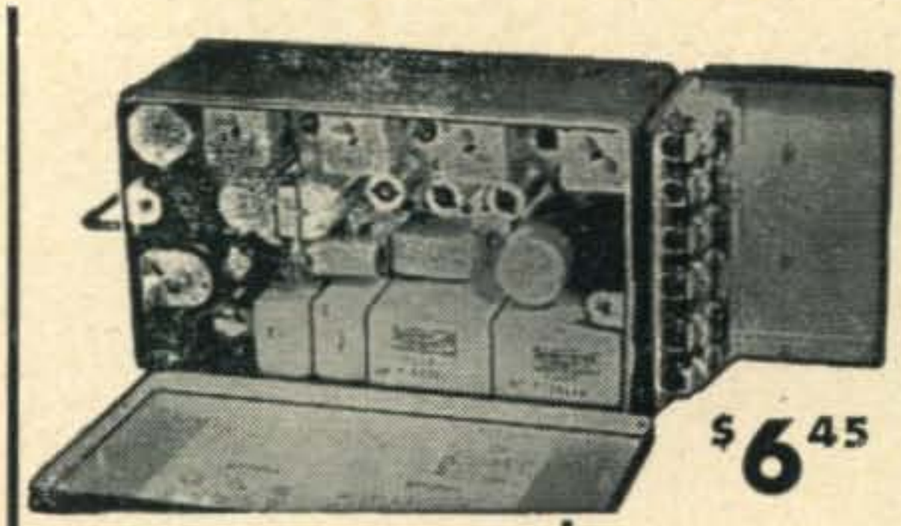
Covers 125-20,000 Kc. Battery or 110 V. AC or vibra-pack operated. A beautiful instrument. The finest we have ever had..... **$69.50**

ARGON BULBS

2 watt, 110 V., Edison base. Ideal for R.F. indication, night light. Brand new. Box of ten.
Price per box..... **$1.25**

TELRAD 18-A FREQUENCY STANDARD

Checks signals in the range of 100 Kc. to 45 Mc. with a high degree of accuracy. Self-contained power supply is 110, 130, 150, 220, and 250 V 25-60 cycle AC. Complete with tubes, dual crystal and instruction book. Brand new. Price.... **$24.95**



$6.45

SCR-522 TRANSMITTER-RECEIVER

Operates from 100-156 Mc. Easily adaptable to amateur radio, fire department, taxi-cab purposes, for mobile or fixed station installation. A redhot item for the amateur 2-6-10-11 meter rig. In excellent condition. Complete with all tubes, dynamotor, and remote control, and not beat-up. Shipping weight 45 lbs.
$35.00

Same as above except not in excellent condition and not guaranteed condition.
$20.00

Dynamotor for SCR-522. Size about 13" x 8" x 5" high. Shipping weight about 35 lbs. Delivers all necessary power for the SCR-522 transmitter & receiver. Can be operated from 28 V. DC or coupled to gas engine or electric motor mechanically.....
$4.95

TUBE HEATERS

110V. AC or DC 100 Watt Heater. Ideal, many uses —such as line resistance, glue heater, baby bottle warmer, etc. Brand new —packed two per carton 2¾" diameter.
Price per pair.... **$1.00**

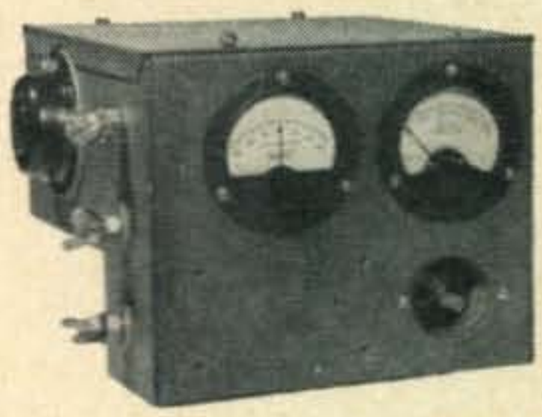
LANDING LIGHTS-AIRCRAFT

24 V. retractable, 600 watts **$3.95**

R-89/ARN 5A GLIDE PATH RECEIVER

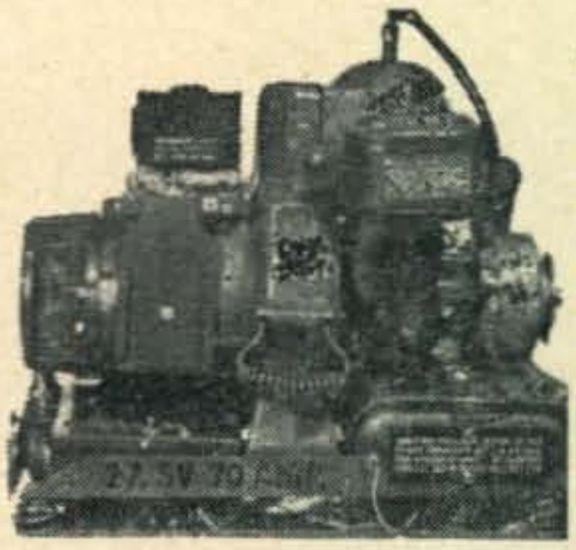
Formerly used for blind landing but adaptable to many other uses such as receiver for new police or citizens' band. Band of operation 326-335 mc. on any of three pre-determined crystal controlled frequencies. Contains eleven tubes, 6 relays, and other valuable parts. For 24 V. DC operation. Size 13¾" x 5¼" x 6⅜".
Price, complete as shown.

GENERATOR CONTROL BOX



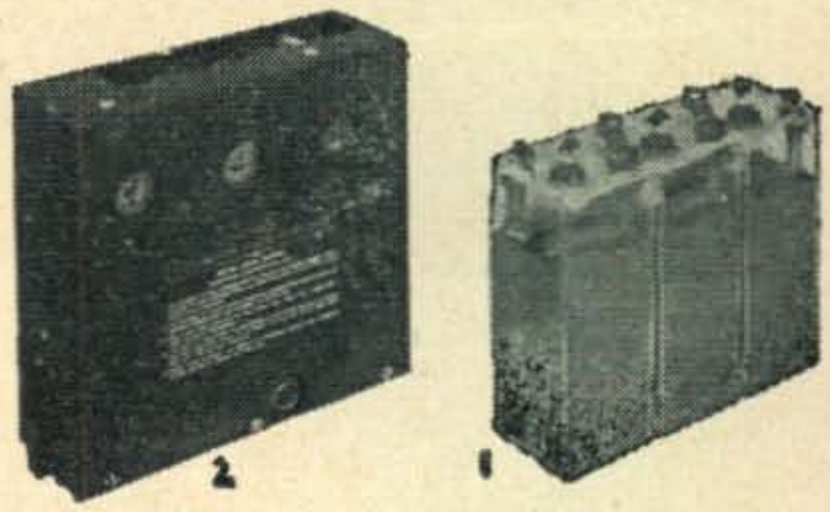
Contains one 2½" round 0-300 AC voltmeter and one 2½" round 30-0-30 DC ammeter. Also plug, switch, relay, condensers and choke coil. (New)..... **$5.85**

(HRU) DC POWER SUPPLY



24-28 V. at 70 amp. 2000 watts gasoline engine generator with electric starter. Power supply which can be used to operate 24-28 V. equipment, start airplane engines, charge batteries, as a welding machine, lighting system, or or amateur radio station. 21½", 17½" x 24⅝". Wgt., 115 lbs..... **$79.50**

WILLARD BATTERIES



6 V. (New) (Dry-charged)..... **$.300**
6 V. (In metal carrying case) (Add electrolyte specific gravity 1.625) (Drug-store) .....

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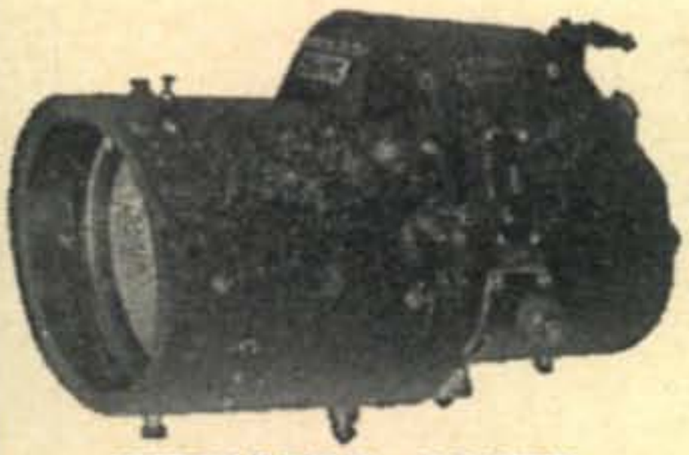
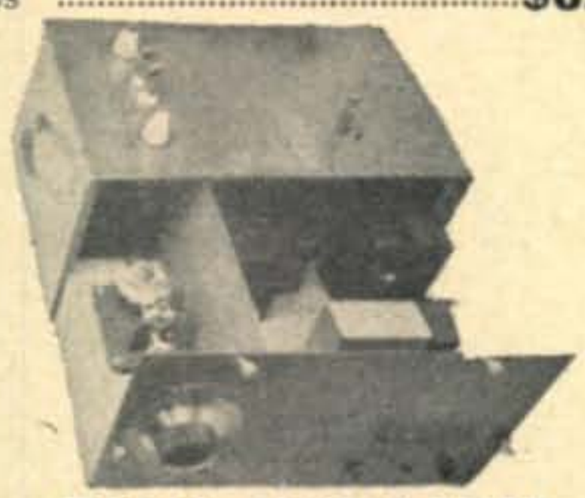


INDICATOR SCOPE ID-41 APQ-13

About 6" diameter by 15" deep. Contains 1—5FP7, 1—6AK5 tube, 5 Grain of Wheat, 3 V. pilot lights, magnetic deflection yoke, condensers, resistors, potentiometers, sockets **$6.95**

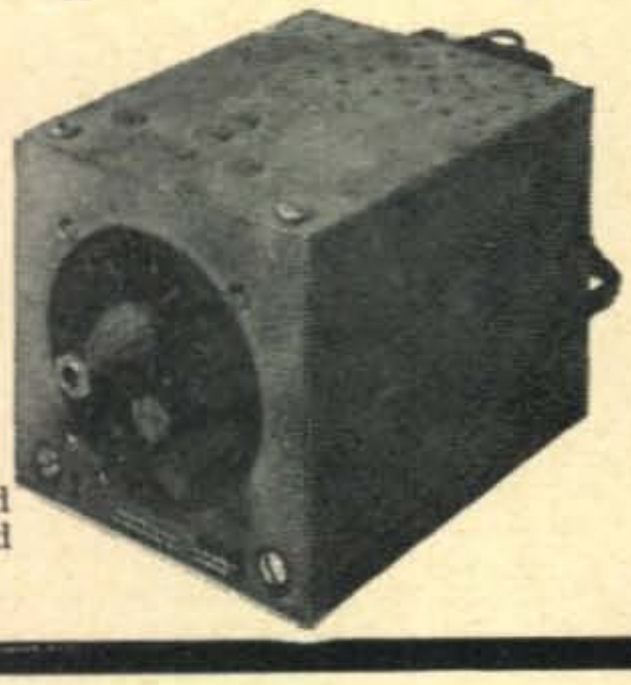


RADIO MODULATOR

BC—124, made by Westinghouse, 110 volt 60 cycle AC operated. Size 9" x 14" x 9" high, weight about 30 lbs. packed. Has National Velvet Vernier Dial, Thordarson power transformer & chokes, tubes used and included are: 6F6, 6J7, 6J7, 5W4 and 955. Frequency about 190 megacycles. Comes with heavy steel case..... **$12.50**

OXYGEN TANKS

Aviators oxygen breathing bottles. Non-shatterable. Choice of two types.
(A) Withstands 2000 lbs. pressure.
(B) Withstands 500 lbs. pressure.
$5.95 ea.
A B

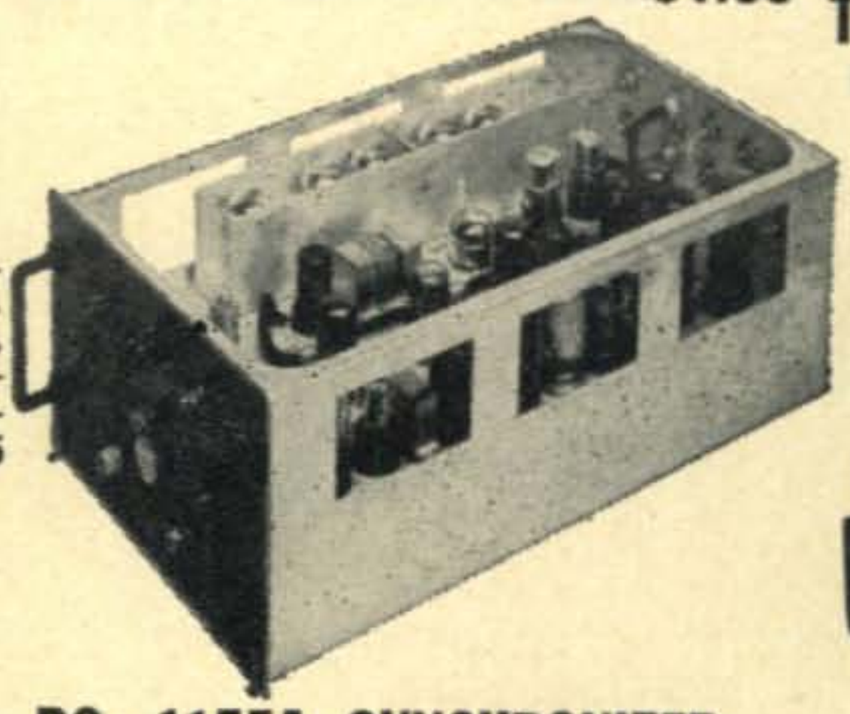


DETROLA AIRCRAFT RECEIVER

28 V.DC operated 200-400 Kc. Good condition.
$3.75

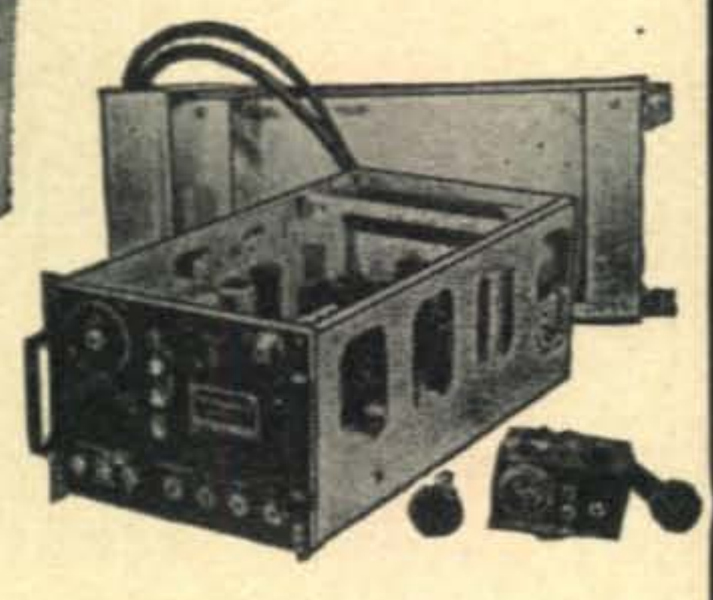
ULTRA-VIOLET FLUORESCENT COCKPIT LIGHT ASSEMBLY

Air Corps type C-5, 28 V. DC Operated. Black plastic case about 1¼ dia. x 3" long. Has adjustable mounting flange, 3 foot two conduct shielded cord and plug. Includes bulb. Brand new. Each..... **$1.00**



BC - 1155A SYNCHRONIZER

Another invaluable unit for the Television and VHF experimenter. Contains 19 Mc. IF strip using 5—WE717A tubes. A total of 24 tubes included, consisting of 6—WE717A's, 2—6SL7GT's, 2—6AC7's, 5—6SN7GT's, 2—6N7GT's, 2—6L6's, 1—6V6GT, 2—6AG7's, 1—6AC7, and 1—6H6GT. Other parts included are 6 pots. 10 Amphenol 831R chassis connectors and numerous condensers, resistors, and transformers. Weight 22 lbs. Size 21"Lx11½"W x7¾"H. Price..... **$10.00**



ARC-4 Transmitter & Rcvr.

Operates on any of its 4 predetermined crystal controlled frequencies in the range of 140 MC. Complete with tubes, remote control, junction box, shock mounting base and connecting plugs. This unit is ideal for amateur UHF or mobile telephone. Operates from self-contained 24 V DC dynamotor..... **$17.95**
INCLUDING CASE

COLLINS AN/ART-13 XMTR.

A compact, light-weight, modern, highpowered transmitter. Frequency range 2-18-1 Mc. on any of its 11 auto-tune crystal controlled or master os channels. Dec. 1947 "Radio" gives conversion data for convert. V. DC operation to 110 V. AC are in exceptionally fine con. tested in our labs. Weight, (Dynamotor included) **$234.50**

BL-SELENIUM RECTIFIER

Type 23751, half-wave. Use 2 of these for full-wave circuit converting 110 V. AC to 135 V. DC at .75 amps. or parallel for higher current ratings. Voltage output controlled by condenser across output. Brand new. Price..... **$1.75** ea.

PP-51/APQ-9 RECTIFIER-POWER UNIT

400 cycle 115 V. Contains 4—5R4GY tubes, 2—4 Mfd. 1000 V. DC condensers, 2—1 Mfd. 1500 V. DC condensers, 400-2600 cycle transformers, power resistors, etc. Weight 38 lbs. Size 21"L x 5⅓"W x 7¾"H **$4.95**
etc. Weight 38 lbs. Size 21"L x 5⅓"W x 7¾"H **$4.95**

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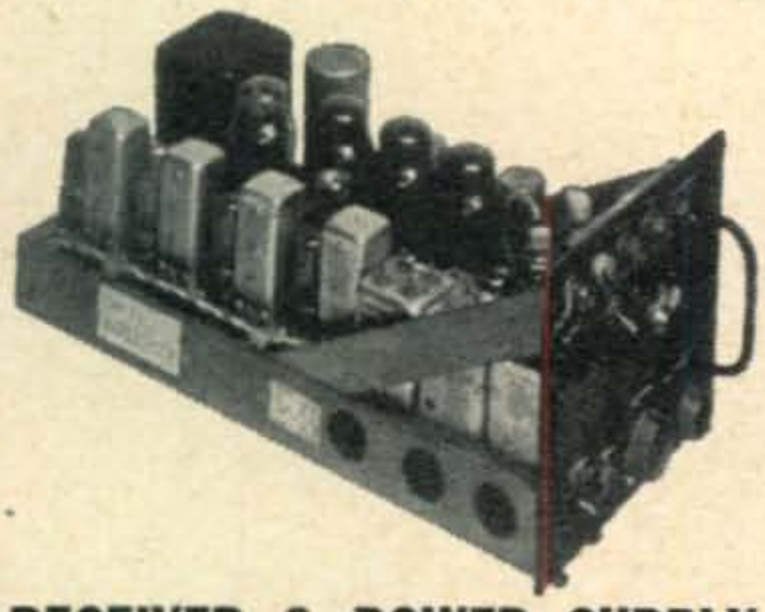


RECEIVER & POWER SUPPLY FOR APN-4 (NEW)

Contains 16 tubes: 1—6SN7, 1—6SL7, 1—6H6, 4—6SK7, 1—VR105-30, 1—6SJ7, 2—2X2, 1—5U4G, 3—6B4G, 1—6SA7. Shipping weight 32 lbs. NEW.....**$12.50**

32 FT. MAST

And complete antenna kit. Four round wooden poles (1½" dia.) each 8 ft. long; when fitted together makes a 32 ft. mast. Can be erected to a height of 8, 16, 24 or 32 ft. Complete with guy ropes, hardware, 100 ft. PB antenna wire, 80 ft. PB ground wire, hand reel and heavy Army canvas carrying bag — suitable for use as sleeping bag. An excellent kit for field use. FM or TV antenna supports, flag poles, etc. Our low price complete, only....**$18.95**

MN-26 RADIO COMPASS

Brand new in original cartons. Should sell for several times the amount that we are asking. Complete with type MN-20 rotable loop and azimuth indicator, left and right indicator, remote control, except for part of the connecting cable which can be purchased elsewhere or for which you could substitute other cable.....**$69.50**

ELECTRIC WATER HEATER

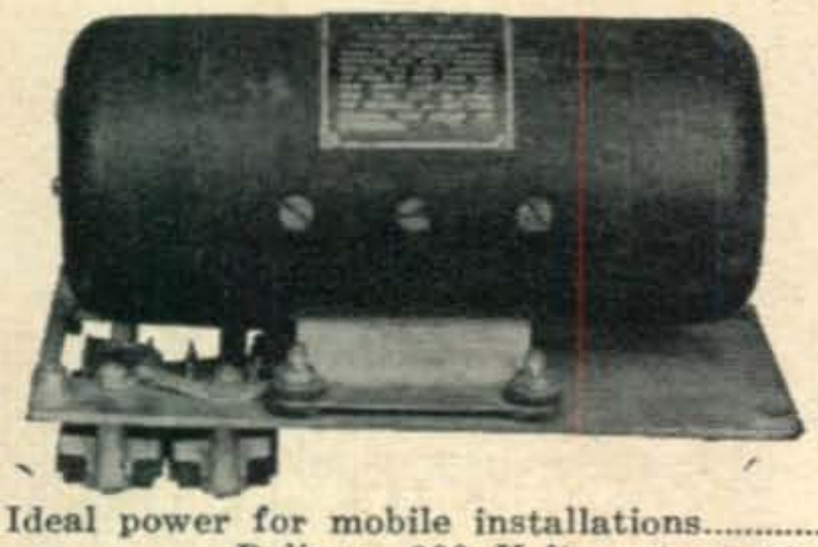
Made by Sodak, Model 107. 15 gallon capacity, gravity feed. 110 Volt 60 cycle operated, 800 watts. Thermostatically controlled. Entirely automatic in operation. Has drain valve. Withstands 100 lbs. gauge pressure. Sets on 3 legs. Overall height 3'8" diameter 16". With AC cord and plug.....**$35.00** ea.

PORTABLE TRANSMITTER

Navy Department Model M1-2462 (made by RCA). Sound powered microphone transmitter with push-to-talk switch. Metal formed chestplate with adjustable strap for support about operator's neck. Pivot adjustment for placing of microphone. Has 7-wire color-coded rubber covered heavy duty cable, 20 ft. long. Units will work up to several thousands of feet apart, no batteries or external supply needed. Several units may be connected together on same circuit. Indispensable for television antenna installation, electrical wiring work, plumbing contractors and other point to point work. Transmitter only. Receiver not included.

Brand new .....Ea. **$7.50**

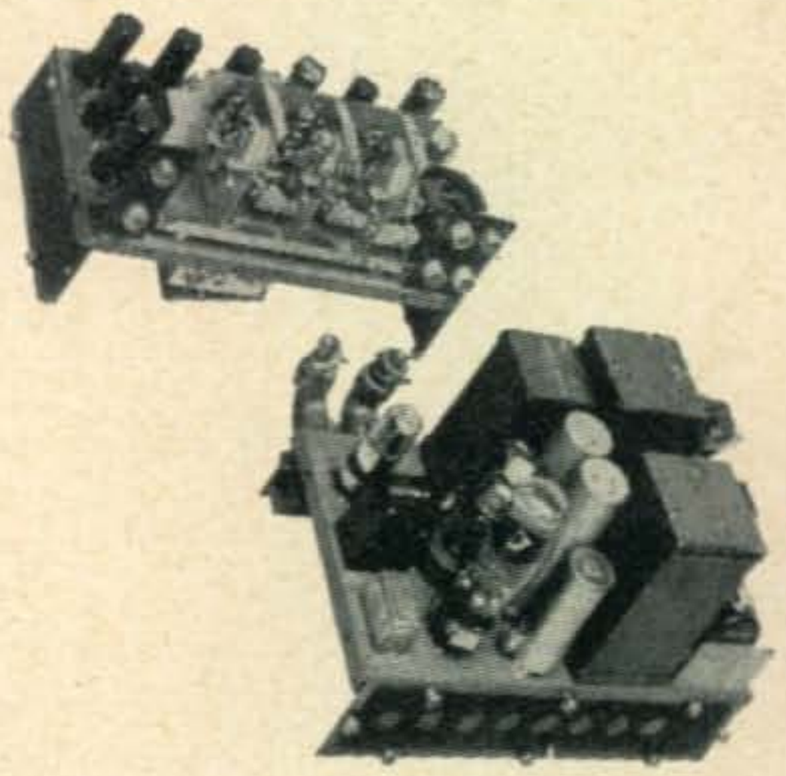
DYNAMOTOR DM-35-D



Western Electric Model No. 5DY83AB7. Manufactured by G.E. for Signal Corps, U.S. Amy.

Input 12.5 volts DC at 18.7 amps. Output 625 volts DC at .225 amps. Diameter 3½", length 7½", mounting rack 8½" long.

Ideal power for mobile installations.....**$6.95**
Delivers 300 Volts output at 6 Volts Input



BC-800A RADAR TRANSMITTER & RECEIVER

Loaded with tubes and components for the VHF experimenter. Contains 19 tubes including 1—955, 3—956's, 1—2C26, 1—5U4G, 1—2X2, 1—6SN7, 7—6AC7's, 2—6SL7GT's, 1—6V6GT, and 1—6H6GT/G. Several HF tuned circuits, 7 amphenol chassis fittings, sockets, 24 V. blower and motor (will operate on 110 V. AC), 2—4 Mfd. 600 V. condensers, and many other resistors and parts. Weight approx. 40 lbs. In metal case 12½"W x 11½"H x 8"D.....**$14.95**

BC-1158 TRANSMITTER AND MODULATOR

Made by Bendix for airborne operation. Designed for remote control. Power source 28 V. DC input (not included). Operates in any place in the 53-60 Mc. and 80-88 Mc. frequency band. Is crystal controlled (crystals not included). Has RF stages, amplifier and driver section, contains 4-815's and 10-12SN7 tubes, 1-0/150 DC milliamp Weston meter which can be switched to various circuits. Has exhaust fan for ventilation. Can easily be converted to operate on several frequency bands. Size 12" x 8" x 18". 45 lbs. Limited quantity **$27.50**

RF TRANSFORMER

For experimental use. Covers four bands. Range unknown. Measures 4" x 4⅞" x 2¼". Brand new.....Price **.50**

HASH FILTER

Mounted on strip 3½" x 1". Contains two hash chokes & one dual 135 MFD 400 Volt bathtub condenser.....Price **.50**

ESSE RADIO CO.

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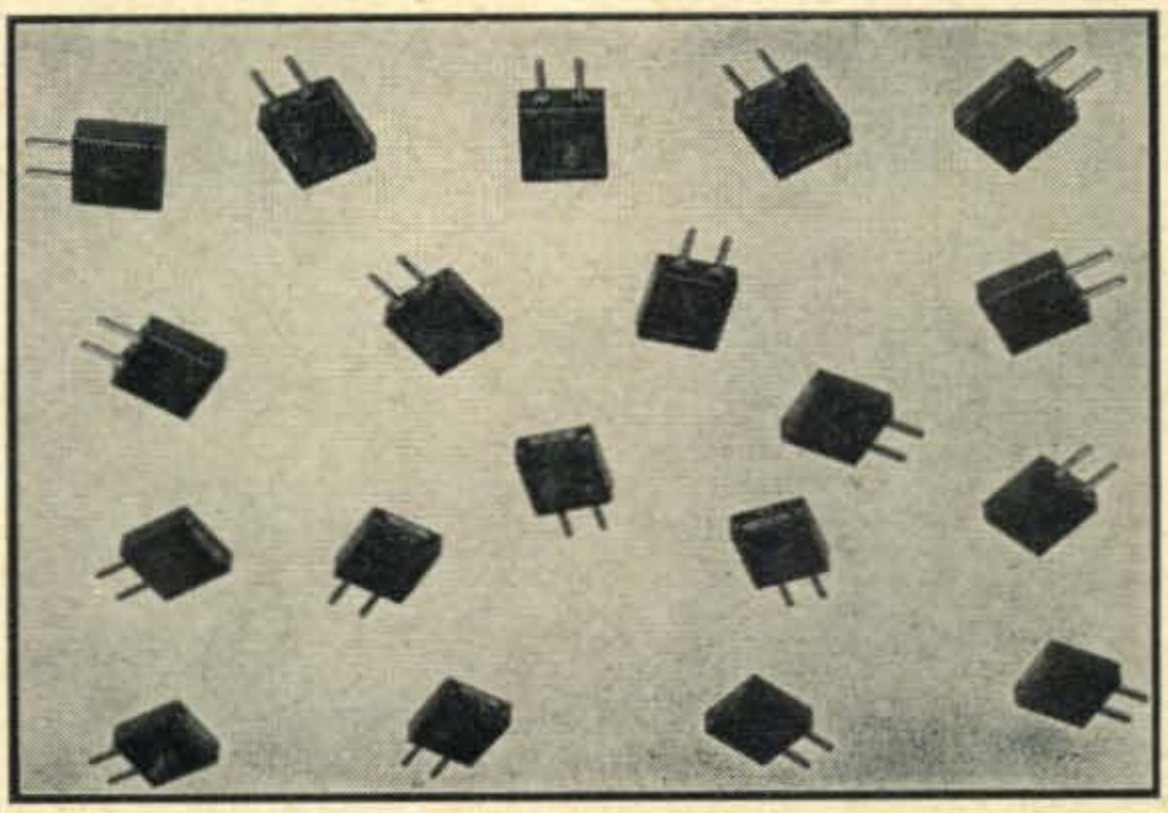
INDIANAPOLIS, INDIANA

CRYSTALS IN STANDARD 5-PRONG SOCKET HOLDERS

5560	7690
7120	7700
7210	7710
7240	7940
7250	7950
7260	7970
7270	7990
7280	8103
7290	8105
7300	8110
7320	8115
7330	8120
7340	8124
7660	8126
7670	8130
7680	8245



8248	8451
8250	8452
8251	8476
8252	8477
8351	8480
8356	8486
8357	8488
8360	8529
8361	8530
8362	8540
8367	8541
8400	8547
8450	

Choice

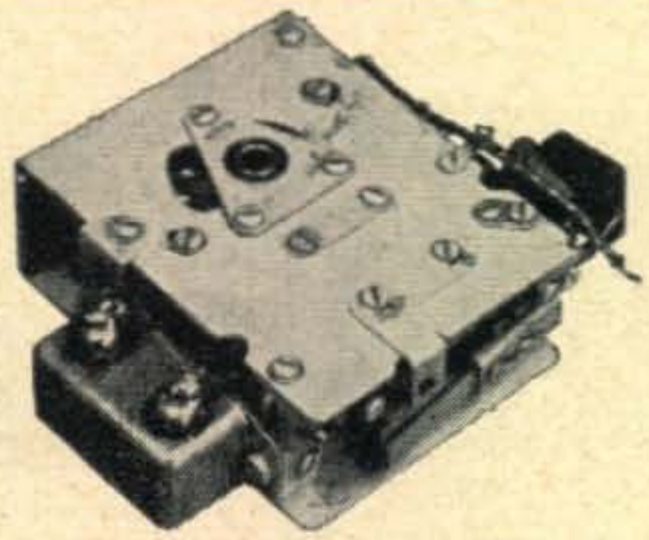
50c each

BRAND NEW INDIVIDULLY BOXED RADIO TUBES

OZ4	*3B7	*6AK5	*6D6	*6R7	6X4	12F8GT	25Z5	47	*117N7
1A5GT	*3D6	6AL5	6D8	6R7	6X5GT	12J5GT	25Z6GT	50	117P7
1A7GT	3Q4	*6AL6	6F5GT	6S8GT	6Y6GT	12J7GT	10	*50C5	117Z3
1C5GT	3Q5GT	6AQ5	*6F8	*6SA7	*6Y7	12K7GT	26	50B5	182B
1C6	3S4	6AT6	*6H6	6SA7GT	6ZY5	12K8	27	50L6GT	183
1G4GT	3V4	*6AT5	*6H6GT/G	6SC7	7A7	12Q7GT	30	51	482B
1H5GT	5T4G	6AU6	6H6GT	6SF5	7C4	*12SA7	*30/VT67	53	483
1J6GT	5U4G	*6AU6	6J5	6SG5	*7C5	12SA7GT	31	56	*717A
1L4	5V4G	*6AV6	6F6GT	6SG7	7E5	12SF7	32L7	*56	*955
*1L4	5W4	6AV6	6F8G	6SH7	*7F7	12SH7	35	57	*956
1Q5GT	*5W4	6B4G	6J6	6SJ7GT	*7H7	12SJ7GT	35B5	58	*957
*1R4	5X4G	6B6G	*6J6	6SK7GT	*7K7	12SK7GT	35L6GT	70L7	*1005
1R5	5Y3GT	6B8G	6J7	*6SL7GT	*7Q7	12SN7GT	*35W4	*70L7	*1619
1S5	5Y4	*6BA6	6J8G	6SL7GT	*7Y4	12SQ7GT	35W4	71A	*1625
1T4	5Z3	6BA6	6K6GT	6SN7GT	*7Z4	12SR7	35Z5GT	75	2050
1T5	5Z4	6BE6	6K7	6SQ7GT	*12A6	14A7/12B7	36	76	2051
1U4	6A3	*6BE6	*6K8	6SR7	12A8GT	*14Q7	37	77	*9003
1U5	6A6	*6BF6	6K8G	6SS7	12AT6	14X7GT	38	78	*VR150
1V	6A7	6BJ6	6L6G	6ST7	12AU6	19T8	39/44	80	
2A3	6AG8	6C4	6L7	6T7	*12AU7	24A	40	81	
*2A4G	6AC5GT	6C5GT	6N7	6U6G	*12AV6	25A6GT	41	84/6Z4	
2A5	6AC7	6C6	6P5GT	6U7	12BA6	25A7GT	42	85	
2A7	6AG5	6C8G	6Q6	6V6	12BE6	25AC5GT	43	89	
3A4	*6AG5	6D6	6Q7	6W7	12C8	25L6	46	117L7GT	

Choice

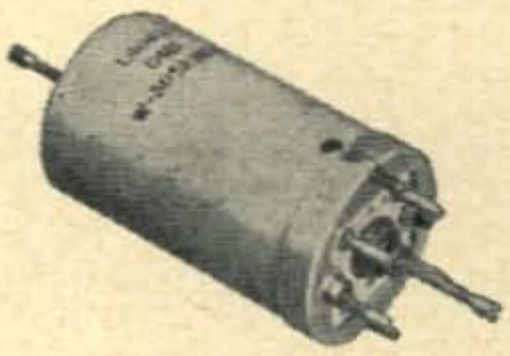
45c each



RACHET MOTOR

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

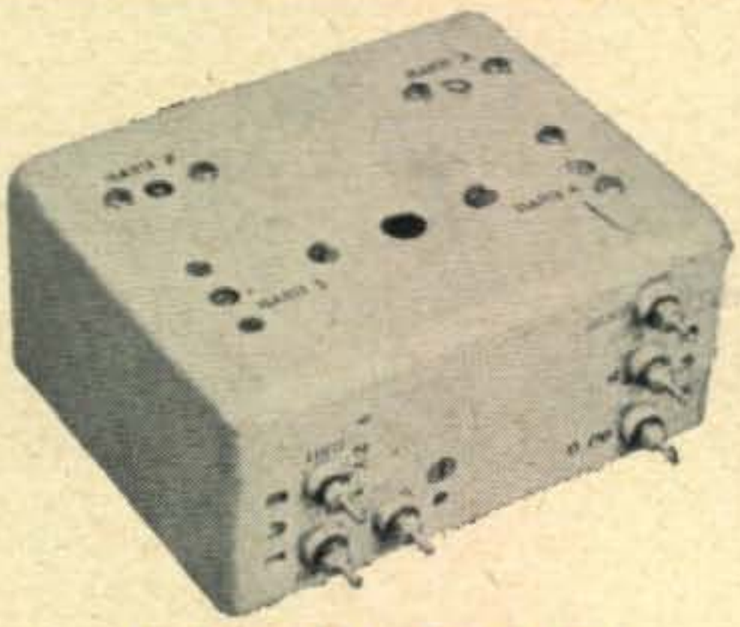
Brand new.....Price **$1.25**



LOW FREQUENCY RCA I. F. TRANSFORMER

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

Price .....**$ .35**



I. F. TRANSFORMER

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

ESSE Radio Co

40-42 W. SOUTH STREET
INDIANAPOLIS 4, IND.

Unless Otherwise Stated, All of This Equipment Is Sold As Used
CASH REQUIRED WITH ALL ORDERS
Orders Shipped F.O.B. Collect

DX

(*from page 38*)

Nevertheless, he is getting right in the DX swing and has worked five continents on 40.

G3DO recently was visited by W6IKQ of Oakland, California, and they had a fine personal chat. They had previously worked each other over 200 times. Doug has added a lot of stuff to his total including the following on 20 phone: *VP2KM, HV1A, YK1AC*, and *UQ2AB*. On 10 phone, he picked up *W6WVJ/KW6*.

WØDU tells me the reason he hasn't been very active lately is because of too many ball games. Now, Ray needs only zones 23 and 26.

This month, an unusually tiny envelope arrived from F8BS. Upon opening it, we found the announcement of the birth of a baby girl, Anne Marie. Congratulations, Paul . . . and, as we have said before, if you're up at the two o'clock feeding, give a listen on 40 meters.

Andorra C. of C.

W7AMX, along with a dozen others or so, has sent QSL cards to various PX stations with, of course, the hope of getting, in return, a QSL card from them. The funny part of the whole deal is that they all get the same card, about 7" x 9", and pictured on it is the regular commercial Andorra shortwave broadcasting station. There is nothing on it to indicate any kind of a QSO, but it does show that maybe the Andorra Chamber of Commerce works anyway. . . . W7AMX has been doing a lot of phone work lately and is practicing up on a few Russian words, hoping that it will get him some of the Russian phone stations. Better watch out, Art, some guy might think you're "pink"!

ZL1HY wants AC4NC to get on the air before he hits the sack some night. Well, Dave, I think that could be arranged!! . . . G8IP writes in to say that he has his WAZ certificate in a place of honor in his shack, and at times it makes him so light headed that he even gets thoughts of raising his folded 20 meter dipole "way up" to 33 feet, and getting his 10 meter antenna out of the attic and into the open.

A few of you may have worked *VS2VC* and *VS1CO*. It is the same station, the latter call replacing 2VC.

W9FKC has just received word that *HE1EC* is definitely NG. He happened to be on to some extent during the last A.R.R.L. DX contest. . . . I1KN has received his card from Zone 19, and now he needs Zone 23. Keep plugging, Doc, you'll make it.

4X4BX, who is ex-ZC6SM, has worked 33 zones and 102 countries. This represents a lot of DX in a short period of time for Sam, but this isn't quite enough to make the Honor Roll. He is QSL manager of the I.A.R.C. and says he QSLs 100%. His rig is a modified Command transmitter, running 50 watts to a pair of 1625s. Antenna is a half-wave dipole, while the receiver, at present, is an SX-28. Sam operates on 14 and 28 mc c.w.

HC2JR has done most of his DX since February of this year principally on 10 and 20-meter phone. John is president of the Guayaquil Radio Club, and in addition to his DX, he has worked all states, sending out 1,340 QSL cards. The rig is a Collins, the receiver is a 75A1.

FULL YEAR GUARANTEE!

WHY BEAT YOUR BRAINS OUT

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

LEO I. MEYERSON
WØGFQ

THE NEW WRL "400" GLOBE KING

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

$399.45 WIRED $379.45 KIT FORM

Detailed specification sheet furnished on request.

MY GUARANTEE

I guarantee my new WRL "400" Globe King for one full year from purchase date against all defects in workmanship or materials. I unconditionally guarantee all parts except tubes and crystals.

★ **10 DAY FREE TRIAL.** Let me send you the New WRL "400" Globe King; so you can install it in your shack and give it a real test. If at the end of 10 days you don't think it's the best XMTR you've ever worked, ship it back to me — AT MY EXPENSE.

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

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

GIANT RADIO REFERENCE MAP

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

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☐ RADIO MAP
☐ LIST OF NEW EQUIPMENT
☐ INFO ON 10 DAY TRIAL PLAN

Name_____

Address_____

City_____ State_____

It looks as though Japan is going to lose their one and onlp DX man to make WAZ. I am speaking of JA2KG, Lloyd Colvin. He and his wife, Iris, should be back in the States by this time. Who knows, maybe JA3AA, JA2AZ, or some of the other DX men will kick through with their 40 cards one of these days. Tom Rothwell, JA3AA, another top-notch DXer is also leaving Japan and should be home by the time you read this.

W5ALA passes along the news that *ZP9FA* confirms all his QSOs via airmail. He works a lot of 10 phone, and Jack thinks he might work other bands too. This might be a good one to look for if you're having trouble getting a ZP card.

OK1LM doesn't fool around. He sent in a list of 35 additional countries. It looks as though he found some in his old log books of a couple of years back. . . . LU8BF said something about the South American 10-meter phone stations wishing the KZ5s would listen between 28,100 and 28,400. It seems that they have quite a time working KZ5s, since it looks as though they concentrate and listen between 28,500 and 29,000. Maybe the KZ5s should have South American night once a week.

G3CSM needs Utah and Montana; GM6MD needs North Dakota, while GM6MS needs Utah and Arkansas. CSM would like to have you DXers know that he would be very glad to meet any W hams who happen to be on vacation or business in Scotland. He says he will help them get into the right "spots" . . . whatever that means? CSM now has 39 zones by working

WØUOX was told by *TA3AA* that he plans a *UAØKFD* in Zone 19. Now, he is looking for 23. little operation on the island of Khios near SV5. By the way, don't any of you ever send QSL cards directly to TA3AA . . . SEND THEM VIA A.R.R.L. In case you have forgotten, *MP4BAJ* is on Bahrein Island and *MD4GC* is in Italian Somaliland.

F8EO has worked 40 zones and about 187 countries, but he is having a heck of a time while waiting for a QSL card from either *AC4RF* or *C8FP* for Zone 23. F8EO says most of the French hams seem to be on phone, and in the evenings, spend much of their time "talking," as he puts it, "from house to house." This, of course, causes QRM on the 14-mc DX band. Francois also says that two of the most outstanding DX men in the French colony are *FE8AB* and *FO8AC;* both of them QSL, and work a lot of DX in spite of their low power. He says he can't figure out why *FM8AD* and *FU8AA* don't QSL. *FF8GP* is good as gold, and his cards have been arriving lately at R.F.F. He then adds that *FD8RG* is back in France, but he doesn't seem to QSL either.

As mentioned before, *HL1AA* has left Korea and is now operating portable as W9ESM/W2. He will be signing this until he gets a new call, and, at present, he is operating 10 and 20 phone. Guy says that he has had many of his cards returned to him for lack of complete addresses. According to this, there must be many fellows who did not receive cards from him. He still has a quantity on hand, as well as his logs, and if you didn't receive your card, he will be glad to oblige.

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ZC1CL is now QRT and is awaiting a "G" call. Dan has sent cards for all QSOs up until March 1949 but if some of you haven't received yours he'll be glad to oblige with a repeat. Dan feels that some of you may have either lost your card or that it went astray. He especially mentions that some of the W7s may have lost theirs in the Vanport flood. You may remember Dan was operating *LI2CL* as well as *MD1D* and the same offer applies to these, too.

You might ask W8HUD some time how he works DX via the ironing board method. Something new all the time! Then, of course, there is W6ENV who sneaks the mike out of moth balls when a juicy one shows up on phone . . . . or as Grand Island would say "A3 emission."

W2PUD says he doesn't know much about MS4UU, but he sounded O.K. to him. He claims to be in Italian Somaliland. . . . VE7ZM worked a guy signing *EA6EG*, who, he says, *appears* to be genuine. Bill worked *PK6CS* in the Celebes on phone, and tells me he is none other than PK6TO.

W7HXG, after seeing in print that he was taking down his old antenna and putting up a new 4-element close spaced array, writes to tell me that he feels duty bound now to follow through. Accordingly, by the time you finish reading this epistle, I imagine the 4-element affair will be resting on top his tower in all its glory.

While speaking of W7s, the new QSL bureau is W7EYS, Bob Donovan. . . . KL7PJ wants someone to tell him how he can get *LX1AS* to tune his ear for the KL7s. . . . A little behind the scenes activity at W1AB might produce some odd sounding signals. . . that is, odd for W1AB. The whole point is that he is cooking up a little gear for some phone work. He will probably try NFM with the hope of snagging some of the good phone stuff.

JA9AC told W6AM that there were only two JA9 stations in existence; *JA9AC* and *JA9AD*.

G3ACC, a DX YL of G-land, has sent in a list of 34 zones and 110 countries, all on c.w. Unfortunately, this isn't quite enough to make the Honor Roll, but I wouldn't be a bit surprised if things will be different in the next issue or two, and she will take her place along with the best of them. Incidentally, Meg is district chairman for the YLRL.

CE3AG is all enthused about the coming "CQ" contest and will be in there punching it out, as usual, the first weekend in November. He thought it was a good idea for some of the I's to go to San Marino, as he worked *I1SN/M1* and *I1LT/M1*. CE3AG needs only a UM8 to make a clean sweep of all 18 USSR countries.

Things are looking up for XE1AC, as on July 5, he worked *AC4NC* for his Zone 23 contact, and on phone, of course. . . . W6ZZ claims something peculiar is happening on 20, because, many times lately, he has received answers to his CQ's from practically every direction except where his beam is pointed. When this condition exists, his 137′ center-fed Zepp does better than his 3-element beam.

OY3IGO gave some W6s good sized palpitations recently when he came through and worked a flock of them. Yes, W6QD was NOT one of them. . . . There are apparently three stations licensed in the Faroes, the other two being OY2RD

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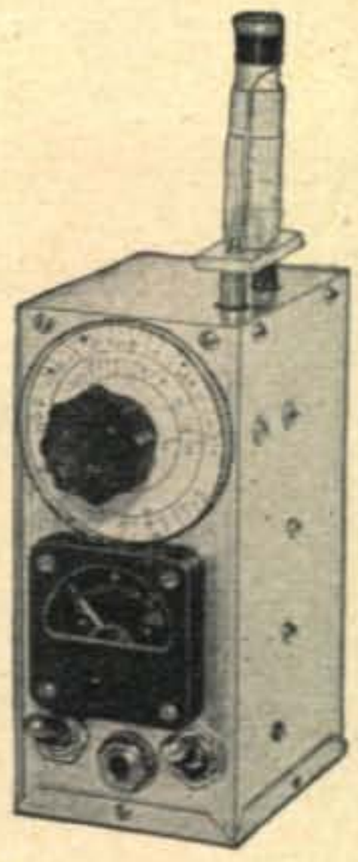

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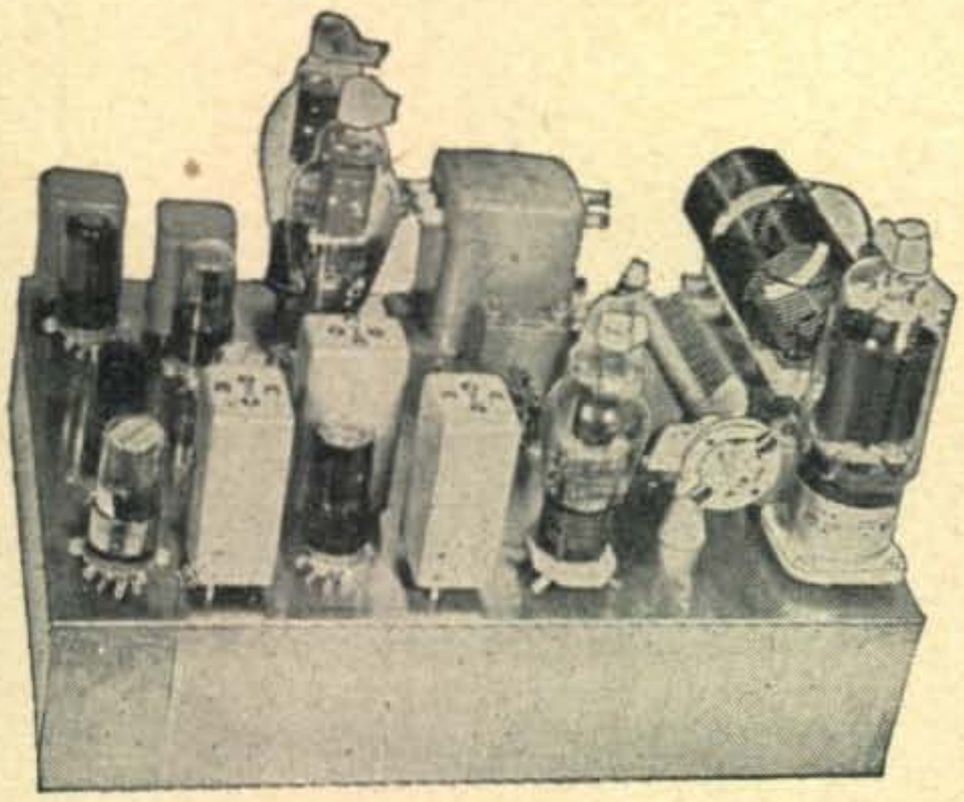

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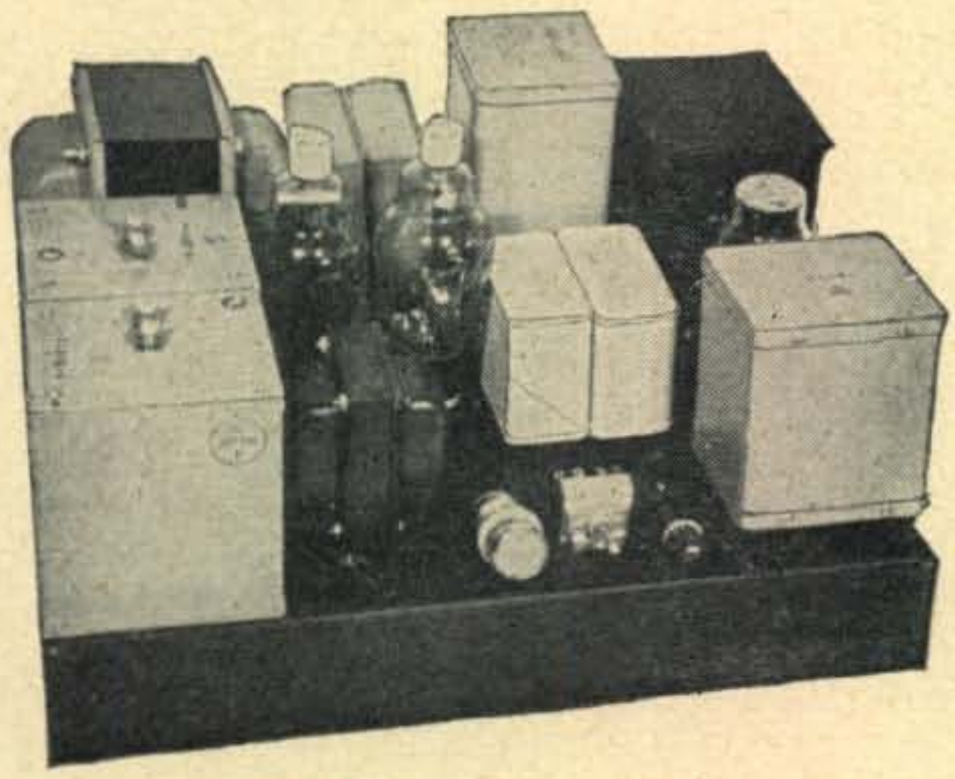

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and OY5WS. The latter seems to spend a great deal of his time at sea on a fishing trawler. OY3IGO said that 2RD plans on building a new rig. Let's hope this will work out on 10 and 20.

W8NBK still doesn't believe it was the real AC4YN he hooked on May 11. He won't believe it, that is, until he sees the card. . . . W6MI, who, incidentally, is FCC inspector in San Diego, is stuck with 39 zones. I say, stuck, because Zone 21 seems to be his nemesis. For some reason or another, he can't even hear a guy in Zone 21. Can you imagine that? He has all 39 zones confirmed, too. It seems like we ought to get him a Zone 21 contact someway . . . . but let's not let the FCC connection enter into it!!

OA4AK is returning to the States and will soon be heard on again with his old call of W3CJI. Don't send any more of his cards to Peru. If you have not received your card from him, Brownie will be very glad to oblige.

HB9DS said he received an especially good prize for competing in the World-Wide DX contest last November. Here's what happened: Three hours after the contest ended, he rushed to the hospital with his XYL, and the prize was a Jr. Op. Everybody is doing well!

W2PEO worked *VU7AH*, and also has been flirting with *AC4NC*. By that he means that they have heard each other. Keep it up, Eric.

W6UZX assures us that *PJ5KO, PJ5X, PJ5SD,* and *PJ1X* are genuine, but definitely very much undercover. When you QSL, please put your card in a plain envelope, and DO NOT MENTION ANYTHING ABOUT RADIO on it.

PK6CS, PK6XG, and *PK6NQ* QSL cards should all go through W6ZEN. Do not send your cards direct to any of the PK6s. At this time. PK6CS works phone, as well as c.w., and he is usually on 14,350-kc phone on Mondays and Wednesdays from 6 to 9 a.m. PST.

W6CRE/KC6 and *W6ATB/KC6* have been on the move, and you are likely to hear them on Yap, Truk, Koror, Palau, or Ponape. . .W7MBW has printed 1000 QSL cards for AC4NC and says the boys should be good to him on the air, otherwise, he will not send him these cards. Sure thing, MBW has worked AC4NC on 20 phone. . . . VE7HC worked *VR1C* on 14,370 phone. He is located on Tarawa. . . . ON4QF told Gord that *EA6EG* is perfectly legitimate.

I hope you have had a chance to go over the World-Wide DX contest rules very thoroughly, and more important, I hope you like them. The comments received so far have been darn gratifying, and if the interest continues to build up, you should have a contest with a heck of a lot of participation. If any of you boys work some of the gang overseas and they are not familiar with the contest, let's know about it, and we'll send them a reprint of the rules, as well as the log sheets.

If you fellows would like a supply of the rule reprints so you can send them out, just drop a line to the New York office. Let me remind you again that we have contest log sheets all printed. Simply send a stamped, self addressed envelope to New York, stating how many forms you will need. Don't forget to include enough for a carbon copy for yourself.

Guess that's about it . . . . see you on the low end. 73.

DX QTHs

CR4AD	Box 16, Praia, Cape Verde Island
DL4AWA	Via W4KZQ
DL2NU	Celle, Germany, 1966/1 AACS, APO 147, c/o P. M. New York, New York
DL1QW	Katharanistr, 41, Hildesheim
DK8AU	Via DL1RK
EA6EG	Box 324, Palma, Balearic Islands
F9QU/FM8	c/o FM8AA
HA4SA	Via M.R.R.E.
HZ1KE	Via R.S.G.B.
HL1AA	S. G. Blencoe 030245, Major Signal Corps, Assistant Signal Officer Post Signal Office, West Point, New York
KB6AJ	c/o C.A.A., Canton Island
MD2NA	c/o QPO 231, P. M. New York, N. Y.
MD7BU	Via G3BUX
OE3LN	Via W2NFR
OE8II	Via G2MI
ON4ET	Rue du Sable 92, Ghent
OA4AK	W3CJI, 1725 Frankenfield, Allentown, Pennsylvania
PK6CS, PK6XG,	PK6NQ all via W6ZEN
SVØWH	USAGG, APO 206, New York, N. Y.
VR1C	Don Woods, Navy 3234, Tarawa Island, c/o FPO San Francisco, California
VR2AZ/VR1	Don Schroeder, P.A.A. Mascot Airdrome, Sydney, Australia
VE8SI	Via VE8 Bureau
VE8PG	Via VE8 Bureau
VK1ADS	VK3ADS as in Call Book
W6ATB/KC6	c/o W6TI
ZC1CL	Didfa, Dangoed, Beaumaris, Anglesey, North Wales

MARS

(*from page 36*)

rector is in for all the work load and is the keeper of the jacket file. Don't impose on him or give him a bad time if he doesn't give you a couple of spares for your little brother.

It isn't necessary for the MARS member to be on active duty to draw the equipment. So it follows that it may be taken off the base. If it were not for this provision, it would be impossible for the reservist to get much benefit out of the equipment. This is the beginning of the expansion of the MARS program into fields other than just straight c.w. net operation.

A lot of the equipment will be suitable for c.w. operation on the ham bands but there will be bits and pieces suitable for such things as single sideband filters, code practice oscillators and cathode ray tubes to build scopes, panadaptors and television receivers. While most of the cathode ray tubes have a persistency too great for television reception, the hams who live in a sunny climate may leave them out in the bright sunshine for a few months and have one just made to order.

As a matter of reciprocity the MARS members are expected to send in their hints and kinks and modifications to the Chiefs, MARS to be published in the MARS Bulletin.

Any MARS member who has been assigned a MARS call with an AF prefix is eligible to draw this equipment. Do not initiate any requisitions. See your MARS Director in person or over the nets on regular schedule.

MARS members who are on inactive reserve and a far piece from the Air Force Headquarters will be required to pay express charges on any materiel shipped to them since there are Air Force transportation funds for this purpose.

This doesn't go on forever, fellows. There is just one year of grace. The special privilege ends on 30 June 1950.

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

(*from page 44*)

on about 5 acres of farm land he bought near Grady Ville, Pa. . . . Out where TV is still in the novelty stage, W7DYD says he is low in activity since he likes to watch the pretty (and fuzzy) pictures. Imagine deserting 6 for that!!

Bob, W4GMP has grabbed a Philco job and is now working at the Mine Craft Base in Charleston, S. C. Bob is building up a special 50-mc receiver with a motor driven oscillator tuning arrangement sweeping from 50 to 51 mc. The receiver is going to be a double conversion super with a 12-mc first i.f. and a 456-kc second i.f. The front end will consist of 6J4s and a 6AK5 into a 6BA7 mixer. The r.f. end is broad band and if a signal breaks through while the receiver is scanning, the squelch will trip and then the operator may switch over to manual tuning with a separate calibrated oscillator. The scanning rate will be about 15 r.p.m. and the receiver is being designed to operate 24 hours a day. This sure sounds swell and should result in some invaluable assistance in catching those weak openings, especially if the RASO beacons can be placed into operation.

The 144-mc Happenings

For the past month, your columnist has been running skeds with WØHQA in Des Moines at 180 miles, and not once have we failed to make contact. WØNFM at 248 miles is also very good, but skeds with W5DFU in Tulsa, 214 miles to the south have only panned out once. At any rate it is interesting to note that there are those who don't seem to realize just what can be done in the middle-west on 144 mc. Perhaps when TVI has driven more of the lower frequency gang to the v.h.f., we will see a more populated band that has lots of good local coverage if the boys would just get on and use it as such.

In addition to daily contacts with the Miss., gang, W4HHK Colliersville, Tenn., is now working WØZIS in St. Louis, that is when ZIS isn't out courting! W4HHK says that conditions were normal the night of the big happenings on July 10-11.

W5NLZ in Tulsa and W5DFU in Oklahoma City, a distance of 98 miles have held skeds for over a year on vertical. W5DFU has a 48-element beam and W5NLZ a 4-element, but contact was never made. The day they switched to horizontal, contact was made and has been repeated daily. Just food for thought fellers, now how about you verticals giving us your experiences?

July 6-7 were good for the vertical Texans. Signals from as far as 400 miles rolled in and with W5DXB-W5ML changing to vertical, many of the Texas lads finally added a new state to their list. The longest haul appears to be from W5ML, north of Shreveport, to W5VY in San Antonio Texas, a distance of 352 miles. W5AJG says that W5JTI must have had something to do with it for he was in Dallas, visiting on July 6, prior to that things had been quiet on 144 mc. During all this, only 4 of the 103 stations on in Houston, were around to take advantage of conditions. W5ON mentions that all the lads of Texas were rolling in to the Houston area dur-

ing the three days of July 6-7-8. W5ON, W5FSC all had 10 contacts over 300 miles, with the 150 watt boys S9 plus over the 300 mile path.

On July 10, W2BAVs XYL told him to let the other boys uphold the 2-meter band, and they did in great style for WØTKL worked into W3GKP and W3AIR near Washington, D. C. a distance of 607 miles. The next night, Bill, W2BAV was ready for it as the weather map showed good indications. W8UKS near Cleveland was contacted, then W8RS and W8UB were worked to wind it up. July 12, knowing W8UKS's frequency, W2BAV made it with him, but heard nothing else. That raised W2BAV to 14 states and it is rumoured that VE2FO heard him on July 9. Bill used a 48-element horizontal on all this DX, and has a 32-element vertical in the side-pocket.

During the contact between WØNFM and W5JTI, WØWGZ dropped into WØNFM's shack, heard the DX, jumped into his car and drove the 65 miles to his home, only to get there just as the band went out, although W4HKK sent Arnold a heard report.

The 144 mc Ears Net of St. Louis meets every Tuesday at 1830 CST. WØKYF acts as net control with these active: WØAJU, AOU, BJL, BZN, DMB, IHD, SHW, VAV, VMY, ZIS, ZJG and W9NSD. Why don't you guys look towards the west once in a while?? Might make it into the Kansas City area, maybe!

As mentioned, W9TKL contacted W3AIR and W3GKP for the first Ill., Md., contacts on July 10. W9TKL also heard W3BLF, W3KBA and W3HWN, but was unable to raise the W3s.

Hope to see all of you in Omaha, Oct. 8-9. Many of the W5s and lots of the middle-west gang will be there. So don't forget it make the Mid-West Convention a must on your list.

DX PREDICTIONS

(*from page 37*)

month. Band probably will open between 0630 and 0700 CST. Conditions poor until after 1200 CST when signals become fair to good. Band closes suddenly just after 1600 CST on good days.

West Coast to Europe

40 meters: First c.w. signals break through the noise around 1815 PST. Peak conditions from 1900 to 2115 PST. Band folds after 2230 PST. Not a too dependable opening. *20 meters*: Possibly on some days there will be a few weak signals audible around 0500 PST. There should be a short opening starting at 1345 PST and lasting until 1530 PST. The band will close suddenly due to the MUF on the far end of the path. *10 meters*: No probable openings this month as the MUF should not exceed 24.0 mc.

West Coast to South Africa

40 meters: Band opens rapidly with increasing signal strengths after 1600 PST. Peak conditions around 1830 to 2015 PST. Band closes just before 2200 PST. Generally speaking this should be a fairly regular opening. *20 meters*: C.W. starts breaking through the noise level around 1430 PST. Gradual then a rapid buildup with conditions becoming fair to good for phones from 1830 to 2030 PST. On poor days, band may drop out before 2100 PST, but on good days of higher MUF values the band may stay open until 2315 PST. *10 meters*: Weak and erratic signals from

0715 to 1000 PST. Signals then build up to fair strengths from 1115 to 1230 PST. Band may stay open on good days until 1415 PST with much better signals after 1300 PST.

West Coast to Australasia

40 meters: Signals come out the noise over this path around 2215 PST. Peak conditions extend from 0100 to 0515 PST. Signals drop down after 0530 and finally disappear into the noise around 0715 PST. *20 meters*: Band opens rapidly with good signals after 2045 PST. Good phone signals from 2330 PST to 0800 PST the following morning. C.W. goes out after 0915 PST. *10 meters*: First signals around 1145 PST. These signals should be fairly strong, but drop down throughout the mid-afternoon. Very strong signals from 1830 PST till band closing around 2200 PST.

West Coast to Southeast Asia

40 meters: Fair to good signals from 0200 PST to 0700 PST. Peak conditions probably from 0345 till 0515 PST. Band closes down very rapidly after 0700 PST. *20 meters*: C.W. signals and some of the stronger phones will probably be audible from local midnight until 0215 PST. Band should close gradually after 0230 PST and reopen around 0645 PST with very strong signals. Last c.w. fades into the noise around 1015 PST. *10 meters*: Gradual and erratic opening starting between 1200 and 1330 PST. Probably stronger signals during first several hours of the opening. Band closes after 1915 PST.

SCRATCHI

(*from page 8*)

how come I using my big outdoor antenna on it. Dumb old me, not always having big antenna handy, especially at baseball game. Howsome ever, trying little antenna and guess what, Hon. Ed., not getting any stations. So, are adding another r.f. stage, mounting this stage on bracket which are mounted to bracket which are mounted on output transformer. Quick computation are showing that two 45-volt batteries only lasting hour or so on acct. having big current drain, but I figuring this ok because can charging them up by putting them in rig as bias batteries.

Finally radio reely perking fb. I wearing it out to back yard to show to Itchi. While walking out it feeling like Scratchi carrying 100 pound bale of cotton on head, but this will be all right, as will be sitting down at ball game.

Next day, when it are time for Lil to be picking Scratchi up to go to ball game, I are dashing madly in shack to get hat. Hokendoke Hackensacki—no hat! I are running out of room just as Lil are coming in front door wearing—you'll never guessing in a million years—my hat. Only now it are looking much different. Lil are using nice wide blue ribbon, tied under chin, to hold hat on. There are no chassis on hat, and where the antenna had been are nice feather sticking up.

Before I can saying a word, Lil are asking me how I liking her new hat. She say she are seeing it in my shack under some old radio stuff, and are deciding there no sense ruining nice hat by piling chassis on it, so she taking it and making herself a new hat. Scratchi are still so mad he can't speak, but just then Itchi come in and ex-

plain hole situation to Lil. She are trying to apologize, but I are telling her that if she pulling one more stunt like that, I will get myself disengaged from her.

Next day I deciding maybe to stay engaged to Lil awhile longer, because she are taking money she saved by not having to buy new hat, and are giving me nice new microphone. So, tomorrow we are going to the baseball game, and with a radio. Itchi are finding little cabinet and he are putting radio in it, so now are having new microphone and a new portable radio. But honest to goshly, Hon Ed., aren't women more than you can bear at times?

Respectfully yours,
Hashafisti Scratchi

HOBBY FOR HANDICAPPED

(*from page 34*)

Rather than quoting at length other handicapped veterans who have received or are studying for their amateur licenses, we will take significant excerpts from their statements, but first another way in which amateur radio helps the handicapped veteran is illustrated by the following:

C. A., a paraplegic patient at the Hines, Ill., V. A. Hospital, became intrigued by amateur radio and started the radio course. Next, he got interested in the projector repair course, and before his discharge he had bought his own projector. After his discharge, he went to California, took his own movies to show at clubs, churches, and schools, and is now self-supporting. The staff at Hines consider him completely rehabilitated and give amateur radio much of the credit for motivating his rehabilitation.

To get back to the handicapped veterans' opinions of amateur radio, the following from veterans suffering from almost every conceivable disability are typical: "I can recommend amateur radio one-hundred per cent to the disabled and handicapped . . . worth every minute and dollar invested.". . . "Believe me, after I set my receiver and transmitter up alongside my bed, I was never alone for a minute.". . . "I have looked over all the courses offered in this hospital, and I find amateur radio the most interesting of all.". . . "Amateur radio has served a useful purpose in my recovery.". . . "After my discharge from the hospital, I hope to continue it as a hobby and a business.". . . "Amateur radio made me want to get out of bed. It is now my chief interest, and will remain my chief interest after my discharge from the hospital.". . . "Amateur radio is one of the best hobbies a patient can take up.". . . "It gets your mind off your condition, leaving you with a less troubled mind, which is essential for a quick recovery." Of the many, many more statements at hand, I will select just one more: "After I came to this hospital and had to spend so much time in bed, I found ama-

teur radio was the one really constructive thing I could really carry on."

Now that we have seen that everyone concerned agrees as to the value of amateur radio to the chronically ill, it remains to introduce it to as many of them as possible. Unfortunately, there are several difficulties in doing so. Probably the most important one is the average Manual Arts Therapist's ignorance of amateur radio. Even when it is part of an institution's Manual Arts program, they may not recommend it, because they doubt their ability to handle it as well as some of the better-known therapy programs. Too, many institutions have no funds allotted for radio, and coupled to this is the general belief that amateur radio is a very expensive hobby.

The answers are largely in the hands of individual amateurs and their clubs. Practically any Veterans Administration institution will welcome amateur assistance to introduce amateur radio to their chronically ill patients, especially after a demonstration to the staff and patients of its peculiar advantages, which, alone of all hobbies, not only brings the world to the hospital, but also carries the individual from his bed or wheel chair out to the world, not as a spectator, but as an active participant. It is no problem to show how reasonably a practical, low-powered station can be assembled, and almost any amateur or club can easily collect enough usable parts to start one or more patients on a hobby promising to be a source of pleasure and possibly a means of renewed health.

It sometimes happens that if just one person in a ward develops an interest in amateur radio, it seems to give renewed interest in life to everyone in the ward—but more about this next month, when we will examine the value of amateur radio to the person confined to his home or a private institution.

Part II of this article will be published in the October issue of CQ.

WINNING THREE FALLS

(*from page 30*)

They tune rather broadly, and once tuned may be forgotten, regardless of the frequency the transmitter is working on. In my own case, with the traps detuned, my transmitter completely jammed all low frequency channels. With the traps tuned to the fourth harmonic (50 mc) all channels were completely clear. The receiver was at a distance of 110 feet, and I ran a kilowatt with the 3-element beam aimed directly at the television antenna.

In some instances, if trouble is experienced with the higher frequency channels, two traps in each feed line may be used, one tuned to 50 mc and the other tuned to a higher harmonic frequency. It apparently makes no difference what the feedline is—tuned or untuned line, any impedance, the traps work with equal effectiveness.[1] Placed near the pickup coil we took reasonable care to see that they were not inductively coupled to the final tank coil. The traps were tuned with an insulated

fibre screwdriver, using a TV set as a monitor. The voltage drop across the traps is small, and midget receiving type condensers may be safely used. (*Fig. 3*).

That's about all there is to it. The only drastic action we took was the reworking of the doubler stage. Otherwise the old rig is pretty much the same as before with one exception, no TVI!

Postscripts

Mount Shasta Club Hamfest

The Mount Shasta Amateur Radio Club will hold its third annual hamfest on Sept. 10-11 at City Park, Mount Shasta, Calif. This will be the year's biggest get-together for Northern California and Southern Oregon hams. Grand prize will be a 50-watt mobile all-band transmitter complete with power supply and 3-30 mc converter. There will be scores of other prizes, games and entertainment. Registration at $3.75 covers dance on Saturday and hot lunch Sunday. For information or tickets write Paul Chitwood, W6EWG, P.O. Box 805, Mt. Shasta, Calif.

New Hampshire State Convention

The Annual New Hampshire State ARRL Convention this year will be sponsored by the Manchester Radio Club, and will be held at the Masonic Temple in Manchester. The date is Saturday, Sept. 17th. The program will include prominent speakers, plus excellent entertainment and food, and $1000 worth of prizes! Tickets are $4.50, or for those not desiring to attend banquet $2.50. Registration starts at 11 a.m.; banquet at 6:30 p.m. For tickets, hotel reservations or information write W1QJY, Olga Apostolos, 75 Medford St., Manchester, N.H. Or contact W1QJY through the N.H. Traffic Net on 3685 kc at 8 p.m.

Cincinnati, Ohio, Hamfest

The annual Stag Hamfest of the Greater Cincinnati Amateur Radio Association will be held September 11, 1949, at Ash Grove on Winton Road, a few miles north of Cincinnati.

Plenty of prizes. Cost will be $1.50 per person, which includes two meals.

Key Clicks

In the article "Balanced Feed Systems with Coax," by Scherer in the July, 1949, issue, *Fig. 1D* shows the inner conductors at the bottom of each half of the quarter-wave matching section both connected to the inner conductor of the single coax line to transmitter. Instead, one of the quarter-wave line's inner conductor should be connected to the outside ground shield of the single coax line to transmitter. This is correctly shown in *Fig. 2B*. Also, in *Fig. 2B*, a connection should be made between the outer ground shells of receptacles *G* and *H*.

— . . . —

In the article "Discone—40 to 500 mc Skywire!," by Boyer in the July, 1949, issue, in *Fig. 2* the dimensions listed for Model C and B Discones are correct but *interchanged*.

Contest Errata

An additional error in the published results of *CQ*'sFirst World-Wide DX Contest has been noted. The winning c.w. score in the Canal Zone, 17,485 points, was credited to KZ5AY. This should have been KZ5AX operated by H. D. Vorhauer, W6WOQ.

MULTI-BAND ROTARY

(from page 28)

quarter-wave coax matching transformer of 33 ohms surge impedance.

The feedline used at W2FBA is a 100-ohm line made by connecting two runs of RG-8/U coax in series. That is, the outer braids are tied together and grounded and the two inner conductors are used as feeders. This gives a shielded line which is balanced to ground and has resulted in a great reduction of BCI.

The constructional details of the 10 and 15-meter networks are as follows:

For 10 meters:
Coil 11 turns #12 wire on 1" diameter. Length winding 3½".
Condenser: Split stator 70 $\mu\mu$f per section. Cardwell MT-70-GD

For 15 meters:
Coil 28 turns #12 wire on 1" diameter. Length winding 4".
Condenser: Split stator 30 $\mu\mu$f per section. Cardwell ET-30-AD

The condensers used have been satisfactory for 500 watts input. It may be advisable to increase the air-gap for higher power.

The 20-meter coax-transformer is made by connecting three 10'11" lengths of dual 90-ohm coax in parallel to give a surge impedance of 33 ohms. One or two lengths of RG-8/U will give an equally acceptable match, but since the dual coax was available it was used.

Tuning Procedure

The beam at W2FBA was tuned by the usual method of exciting the beam from the transmitter at low power level and reading the field strength with a field strength meter located several wavelengths away.

The first step was to set the element lengths by formula to the correct dimension for 20-meter operation. The radiator length was calculated and the reflector and director were made 5% longer and 5% shorter respectively. The radiator was made 33 feet, 3 inches long, the reflector 34 feet, 10 inches and the director 31 feet 8 inches. The spacing between elements is 8'3" or one eighth wave on 20 meters. This has worked out very well, with 20-meter performance in regards to gain and front-to-back ratio being all that is claimed for a 3-element beam.

Having established the element lengths, the next step is to tune the beam on 10 meters. The trans-

mitter is tuned to ten meters and very loosely coupled to the feedline. The matching network for 10 is then tuned for maximum field strength with someone at the transmitter keeping the power input level constant through the tuning changes. Next with the beam aimed at the field strength meter, the 10-meter director stub relay is replaced with a temporary shorting bar, the position of which is varied on the director stub until the field strength reading reaches a new maximum. Next, the beam is turned so that the back is on the field strength meter. The reflector stub relay is replaced with a temporary shorting bar which is adjusted for minimum field strength. This procedure is repeated until the beam is peaked for all three adjustments —matching network tuning, director stub length and reflector stub length. The temporary shorting bars are then replaced by the relays which are mounted in the correct position as determined by the shorting bars.

This procedure is then repeated for 15 meters. The shorting bars when adjusted, are soldered in place as they are not replaced by relays.

Results

The results given by this beam have been very satisfactory. Some rough measurements were made by observing the current in a half-wave dipole located about 100 feet from the beam. A half-wave dipole was first set up on the antenna tower and the current in the measuring dipole was noted. Then the beam was set up and tuned and the current in the dipole was measured again, using the same power input to the transmitter in both cases. The gain on 20 meters was approximately 6 db, on 10 meters approximately 9 db. No actual measurements were made on 15 meters; however, its gain should be between the 10 and 20 meter values. The front-to-back ratio on 10 and 20 meters is also satisfactory, on the order of 30 db on 20 meters and 18 db on 10 meters. These figures are the average of many checks made with other locals both on transmitting and receiving.

ULTIMATE IN CONVERTERS

(*from page 20*)

Be certain that 6AK5 and 6J6 tubes are good. Try several in circuit if no way of testing is available.

Do not use too little or too much LO injection.

Be certain all decoupling is efficient.

Use only top-grade components.

Make i-f output cable as short as possible.

Do not use more than 150 volts for d-c supply (105 v. is recommended).

For 30 mc use the 50-mc circuit diagram and increase bypassing capacitors accordingly.

Other tube types may be tried—a 6N4 should be quite good in either stage or one 12AT7 may be used for both stages.

Remember that the best noise figure results in a mismatch.

It may be asked how the Wallman circuit compares with the cascaded 6J4 grounded-grid job. A

(*Continued on page 80*)

Classified Ads

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

BC 348 with dynamotor, $55; BC 348 a.c. converted, $70; BC 224 with dynamotor, excellent condition. $40; SCR 522 transceiver $30. or trade for ten mtr mobile equip.; Rider Chanalyst sell $75. or trade for ham equip.; electronic keyer and champion bug, both $20. BC 342 about the finest surplus receiver. Make offer. Want NC173 to buy or trade. June Armstrong, 533 N. 8th St., Weatherford, Okla.

SELSYNS GE 2J1G1, unused and guaranteed. Instructions for 115 v.a.c. $2.00 pair postpaid. John Good, W7TFF, Box 1042, Boulder City, Nevada.

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

QSLs. Samples for stamp. Henry L. Carter, Jr., W2RSW, 747 S. Plymouth, Rochester 8, N. Y.

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

QSL's. SWL's. MADE the way you want them. Samples? W9BHV QSL Factory, 857 Burlington, Frankfort, Ind.

WANTED: AN/ART-13, BC-348, RTA-1B, AN/APN-9, R5A/ARN-7, AN/ARC-1, AN/ARC-3, BC-788-C, I-152. MN-26, test sets with TS- or I- prefix, dynamotors, control boxes, transmitters, receivers, power supplies, etc State quantity, condition and best price first letter.HI-MU Electronics, Box 105, New Haven, Conn.

FOR SALE: Collins 30K transmitter, complete. Used about 40 hours. Cannot be told from new both inside and out. Guaranteed perfect. First $1200. F.O.B. Wakefield. R. I., Transmitter Exchange.

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FOR SALE: RME45, late model, complete with speaker. Completely reconditioned—$110.00. Herbert W. Gordon, 12 Sunnyside Ave., Wellesley 81, Mass.

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SEMI-MULTI-MATCH MODULATION TRANSFORMERS, 600 watts $29.95 for 304 etc. 300 watt $13.85. Plate transformers 2000-2500-3000 volts 325 ma. $32.95. All new fully cased. Frampton Transformer Shop, Box 109, Blackwell, Oklahoma.

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FOR SALE: At bargain prices, command receivers 190/550 Kc. 1.5/3 Mc. 3/6 Mc. 6/9 Mc. Command xmitters 4/5.3 Mc. 5.3/7 Mc. Also have all accessories. Frank Nagy, Rt. 3, Box 243, Kannapolis, N. C.

CONTACT Carl Evans, W1BFT, for your requirements in new and used amateur receivers, transmitters, and test equipment. Evans Radio, Concord, N. H.

SELL OR SWAP: "Globe King" xmitter, mobile receivers, VHF-152-A. Many low-priced items. Send for list. Need FM tuner, 6 volt battery eliminator. Good TV set. W5KIE, 713 Woodland Court, Hattiesburg, Miss.

FOR SALE (Southern Calif. only): Complete station of W6HI. Kilowatt rig, phone or c.w., in totally enclosed Par-Metal cabinet. Uses 4-125's in PP final and 4-125's in PP modulator. Compression type speech amplifier. Tower with latest heavy duty Gordon rotator with station indicator, driving double beam. Folded dipole type with 4 elements on 10 and 3 elements on 20. Hammarlund SP400X with speaker. All new post-war equipment. No surplus. Station value $1550. Sell entire layout for $1,000. Inspection Sundays 8:30 to 11 a.m. only. No trades. H. L. Bumbaugh, 724 No. Crescent Hts. Blvd., Hollywood, Calif.

SWAP OR SELL: BC-221, BC-348-0, a.c., TA-12 xmitter converted and power-supply. New tubes 250TH, 833A, 813, 829, 811, 4E27, 3C24, 327A, 5BP4. Recording oscillographs M-166A. Large stock of radio repair replacement parts. Tubes, vibrators, coils, condensers, line cords, transformers, and chokes. Supreme 585. Dumont 3" scope. VTVM. GE VOMeter. Interested in quality recorders, tape, wire, disc; record changers, pickups, any Hi-Fi equip. movie or still equip. Bench saw. Classical records. FM and/or AM tuners. Power supply or parts to run 1 KW final., or what have you? All inquiries answered. W5OHY, 7424 Gaston Ave., Ft. Worth, Texas.

W1HJ1 PRINTS fine QSL-SWL's. Samples. Box 32, Manchester, N. H.

WANTED: Several copies of "200 Meters and Down" and "Calling CQ" by Clinton DeSoto. Write, giving price desired, to: Louisa DeSoto, W2OOH, c/o CQ, 342 Madison Ave., New York 17, N.Y.

BARGAINS—NEW AND USED TRANSMITTERS, RECEIVERS, PARTS: Globe King $299.00; new 150 watt phone $199.00; 60 watt phone $99.00; Globe Trotter $57.50; R9'er $15.00; Millen exciter and VFO $25.00; TR-4 $19.95; MB-611 $39.00; Pierson KP-81 $219.00; HRO5TA1 $199.00; SX43, NC173, HQ129X $139; NC200 $129; RME45, SX25 $99; Howard 430 $29.50; S38 $29.95; S41 $22.50, latest signal shifter $59; DB22A $49; BC610's, 32V1's, and many others. Large stock, trade-ins. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Labs. Council Bluffs, Iowa.

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CQ Ad Index

comparison has been made at 144 mc for both equipments and the recorded difference was very slight. For this reason, it is felt that the cost of tubes would favor the Wallman circuit. Above 150 mc the 6J4 grounded grid circuit is preferred unless a somewhat superior tube to the 6AK5 is used in the Wallman amplifier. It should be mentioned that the improvement over conventional equipment at 30 mc is not as pronounced as at 144 mc when using this converter. It is for this reason that it is highly recommended for v.h.f. For illustrative purposes, the low-noise circuit as compared with the conventional 6AK5 pentode amplifier is better by 1.5 db at 30 mc, 2.5 db at 50 mc, and 4.0 db at 144 mc. These are approximate figures of merit of the two circuits.

Since the input circuit bandwidth must be taken as a consequence of the proper value of R_s it may be rather large above 50 mc. To facilitate tuning at, say, 144 mc, a suitable amount of variable capacitance may be added across the input. The bandwidth will decrease with increasing amounts of capacitance and the gain of the circuit will remain unchanged. For those who would rather have a selective front end, it is entirely possible to adapt the physical layout so that a ganged tuning condenser may be used. No tuning will be needed in the interstage (between 6AK5 and 6J6), and it should be optional in the input circuit for reasons just mentioned. There will be no increase in the overall gain in the converter. Perhaps now it is somewhat obvious why the front end is broadbanded and tuned only by the oscillator.

The author wishes to express his thanks for the helpful contributions and suggestions given by A. B. Macnee, of the Research Laboratory of Electronics at M. I. T., and many of his fellow associates at the Laboratory for Electronics, Inc.

CYCLE RIGHT FOR YOU

(*from page 31*)

be $\frac{400 \times 300}{60} = 2000$ ohms. Re-entering the nomograph at $X_L = 2000$ and $R = 300$, Z will be found as approximately 2020 ohms. This is the impedance at 400 cycles, and a reasonable line of attack is to make the impedance of the unit plus external resistor at 60 cycles equal to this value. Now shifting back to $X_L = 300$ and using $Z = 2020$ as radius, R will be found to be 2000 ohms. Since 300 ohms "resides" within the coil itself, 1700 ohms will have to be added externally. Alternatively, the voltage across the unit may be reduced to $\frac{420}{2020}$ of its rated value and no external resistor used.

Now it must be realized that other factors such as chatter in relays, lower primary voltage giving lower secondary voltage in transformers, etc, reduce the usefulness of such equipment off its design frequency but the calculations above will provide a starting point in experiments toward utilization of "off-frequency" units.

CQ

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