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CQ RADIO AMATEURS' JOURNAL

JULY
1954
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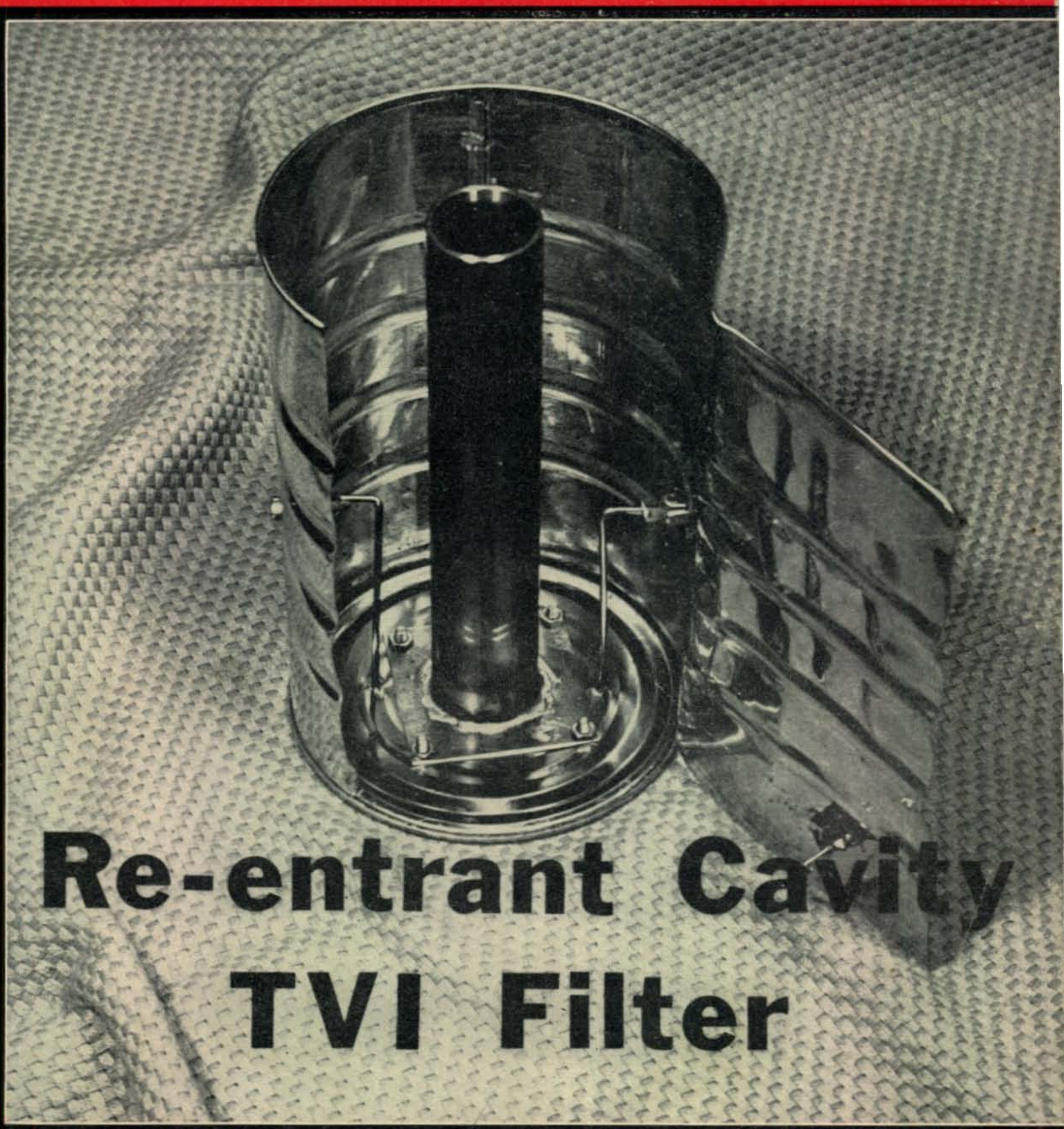
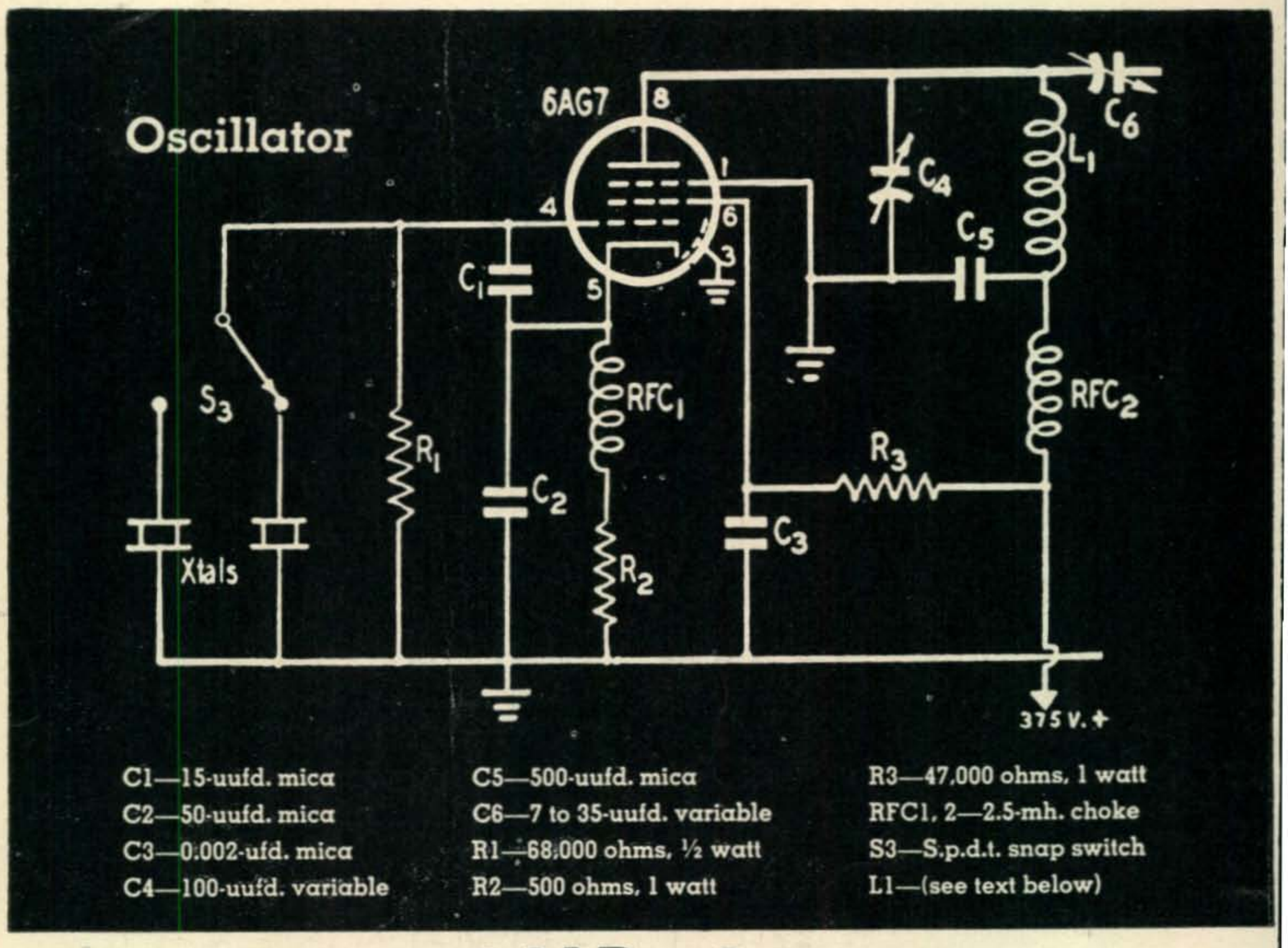


Re-entrant Cavity TVI Filter



C1—15-uufd. mica
C2—50-uufd. mica
C3—0.002-ufd. mica
C4—100-uufd. variable
C5—500-uufd. mica
C6—7 to 35-uufd. variable
R1—68,000 ohms, ½ watt
R2—500 ohms, 1 watt
R3—47,000 ohms, 1 watt
RFC1, 2—2.5-mh. choke
S3—S.p.d.t. snap switch
L1—(see text below)

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Never underestimate the driving power of a crystal oscillator . . . providing *you have the right circuit* and the right crystal. Here's one that will give ample output on 40, 20, 15 and 10 meters, utilizing a low-cost PR 7 MC. Crystal! It will drive a 2E26 or even an 807 clear down to 10 meters. *The circuit is not tricky*. Crystal oscillates at all times regardless of whether plate circuit is at resonance. The inductance L1 should resonate at the frequency on which output is desired. Do not substitute another tube for the 6AG7. Use a minimum of 375 volts and as high as 390 volts for best results when doubling, tripling or quadrupling. Try this oscillator. Additional copies of the circuit may be obtained from your PR Jobber, or directly from the factory.

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CQ RADIO AMATEURS' JOURNAL

Vol. 10, No. 7
JULY, 1954

CQ—(title Reg. U.S. Post Office)—is published monthly by Cowan Publishing Corp. Executive and Editorial offices, 67 West 44th Street, New York 36, N. Y. Phone MUrray Hill 7-2080. Reentered as Second Class Matter February 6, 1951 at the Post Office. New York, N. Y. under the Act of March 3, 1879. Subscription rates in U.S.A. Possessions, APO & FPO, 1 year $3.00; 2 years $5.00; 3 years $7.00. Elsewhere add $1.00 per year for postage. Single copies 35 cents. Printed in U.S.A.

POSTMASTER: SEND FORM 3579 to CQ. 67 WEST 44th ST., NEW YORK 36, N. Y.

FEATURE ARTICLES

Departments

Miscellaneous

Clipperton

Chicago Daily Tribune F** Fri., March 19, 1954

5 IOWANS HEAD FOR PACIFIC IN RADIO HAM TEST

Newton, Ia., March 18 [Special]—Five radio hams left Newton today for an uninhabitated coral atoll in the Pacific from which they will try to contact as many as possible of the world's 230,000 licensed radio amateurs.

The unique expedition was financed by contributions from radio hams all over the country, by the five participants, and by the Hallicrafters company of Chicago, which is lending the necessary equipment.

The island on which they will be located will qualify as "a new country" in the rivalry among hams who try to excel each other in establishing contact with the most foreign countries.

The atoll is French owned. [illegible] miles and is

amateur radio station. They expect to drive the 2,200 miles to Acapulco in three or four days, where they will load their equipment aboard a chartered 83 foot motor vessel for the trip to the atoll.

Use All Wave Bands

The group is comprised of Robert Denniston, a Newton building supply dealer; two employes at his lumber yard, Tom Partridge and Vern Hedman; Gene O'Leary, who operates a radio and television shop here, and Leo Olney, who has a television service in Des Moines.

At the end of the experiment all radio hams who contacted the "new country" will receive confirmation cards mailed by the Hallicrafters company. The group on the atoll will op[illegible]te on all wave bands—160, [illegible]nd 10 meters.

Chicago Daily Trib
Saturday, April 3, 195
Part 1—Page 4 F**

SEXTANT LOS SO 'HAMS' CA FIND THEIR

Five radio amateur
Newton, Ia., March
up a powerful radio
ter on Clipperton is
South Pacific, 650
of Acapulco, Mex
day reported to th
ers company her
were not able to
land.

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and the sextan
the ocean.

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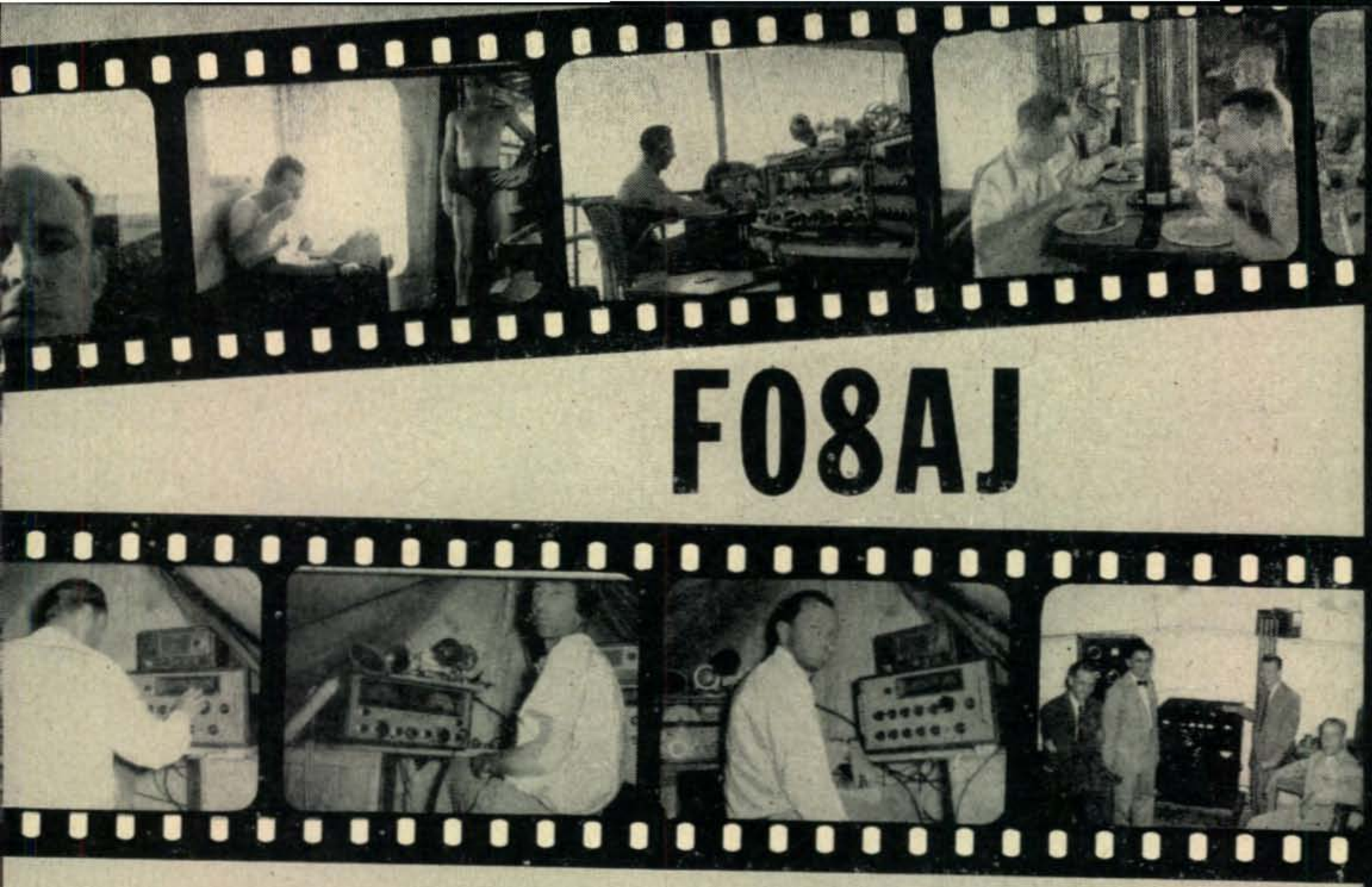

FO8AJ

Adventure

THIS RECEIVER WENT TO CLIPPERTON. Hallicrafters SX-88, the most wanted piece of ham equipment in years. Exclusive sensitivity from 10 Kc to 250 cycles in 6 steps. 1108 contacts on Clipperton from 28 countries—5 continents.

ONLY $595.00.

HERE'S THE TRANSMITTER THAT WENT TO CLIPPERTON. TVI Suppressed 100 Watter. Hallicrafters HT20. Continuous coverage from 1.7 Mc to 30 Mc—full band switching. Choice of 10 crystals. Shielded, filtered r-f compartment plus low-pass 52 ohm coaxial line output filter cuts anything over 30 Mc.

ONLY $449.50.

...go Daily Tribune
...rday, April 24, 1954

...A RADIO 'HAMS' ...ACH DESTINATION, UNINHABITED ISLE

...Five radio amateurs who ...t Newton, Ia., March 18 ...ached the uninhabited island ... Clipperton in the Pacific ...cean yesterday, and reported ...heir arrival to radio "hams" ...f the Chicago area.

The group reached Clipper-ton island, 600 miles southwest of Acapulco, Mexico, after a hazardous voyage in which they lost their sextant, then had their schooner virtually disabled thru loss of sails in a squall and mechanical troubles, and finally got caught in the Humboldt current and drifted 90 miles from the island.

The Hallicrafters company of Chicago said the group re-...as towed to the is-

Feenix, Ariz.

Deer Hon. Ed:

Ever are finding sum days that are just purfect—aren't Hon. Sumthing? Boy oh boys. Like take today. Hon. Brother Itchi and I going into town for all day like shopping trip. We getting into car, and sun are shining like million bux. We stepping on starter, and motor turning rite overs, instead of grinding round like most same always. We zooming along hiways, motor sounding like pooring cat likking creem.

Scratchi turning on mobile rigs in car, tooning across band, and heering fellows calling QRZ? I grabbing mike and giving quick call, and back he cuming! Having nice QSO, sineing off, and fellows from Sirraques New York calling me. What you thinking? He giving me S-9 plussedeyplus report. Wowie!! Sum DX on 160 meter mobiles, not you thinking?

When hitting town, not running into any red lites. No sirree, all lites seeming to be green. We cuming to place to shopping, and what are we finding but place to parking rite in front of store. We going in store and finding big sale goings on. We saving monies hand over fist. Leeving store and going down block and finding new store opening. Itchi and I going in, buying few things, and as leeving man are telling us we win door prize. Free lunch for Brother Itchi and Scratchi and all groceries can possibly using for hole weeks.

Itchi and I staggering back to car, loded down with ham, turky, sugar, flour and all sorts stuff, and when getting to car—Hon. Ed, you not bulleeving it. There are car, sitting there so pretty and shiny it looking like new car. It are polished so looking like microwave antenna. What happening? Sum company are putting out new car polish, and they using Scratchi's car for showing how fine can looking with there compliments.

Well, Hon. Ed, it are likesame way all day. We can doing no rong. Fineally Itchi and I are dun shopping, getting in car, and starting home. We are both smiling so much Hon. Jaws are akeing. In fack, Itchi are saying how lucky we are. Not only having 1/c day, but are even having free housekeeper. Yes indeedy. For past week having reel top-notchy free housekeeper. You see, my Hon. Ant Fuie Watanabe are cuming over from Sandy Ayego to visiting for awhiles, and she deciding we needing helping hand around house. She are being as handy to having around house as VFO in DX contest. If

(Continued on page 8)

(from page 6)

she leeving we not knowing how to getting along without her.

We arriving home at Itchi's ranch about dusk, and as driving in driveway and alongside rubbish can, are seeing sumthing looking like my 6-Meter Bootlegger Club Certifikat sticking out from rubbish can. Are not humerus how eyes can deseeving ones? Still, Scratchi are curryus, so going to see what *are* sticking out of ashey can.

Sacremento Bullevard!! It *are* my 6-Meter Bootlegger Club Certifikat. But how . . . it can't . . . last time this mornings it are hanging on wall in Hon. Shack. Shurely Hon. Ant Fuie are knoeing who committing such outrage. Are rushing like madly into house and running up to Ant Fuie. Before can getting word into sideways she telling me she happy I home, an acct. she wanting to show me how nice my shack are looking since she Spring Homecleaning it. Are asking her howcomes what persons are throwing away Hon. Certifikat. She saying sumthing about that old things and explaning she using picshure frame for other purposes. Just then we cuming into shack.

Hon. Ed., you never seeing so many pickshures in life. All over wall are pickshures. Ant Fuie pointing out pickshure of Hon. Grate-Grandfather Saki, Hon. Grate-Uncle Messysuki, Hon. Grate-Grate Ant Tukisoy, and just then my eyes are looking over rest of shack. Hon. Horror of Horrors!!! My shack! My nice dirty, messy, lived-in shack! What a catastrofey!

Furnitshure are moved all whichways. Operating table on rong-side room, with control wires dangling on floor. Antenna conneckshuns no longer going thru window, on acct. window are having pretty curtain over same. All a-c wiring I having run around room on thumbtacks are down and neetly coiled in corner. All nobs of xmitter are neetly tied with ribbons, and all nobs detooned and pointing same way. All scrap-paper cleened off desk—my log for past to years—all gone! New reseever sitting on stand neer window, drying. Are just evidently getting fresh cote of lavendar paint, to matching curtains.

And, the wall where keeping QSL cards. Hole wall, inklooding cards, all freshly scrubbed. All scrubbed so cleen that are no ink on QSL cards. Only printing left. Hon. Ed., what can saying? What can doing?

Respectively yours,
Hashafisti Scratchi

P.S. By chance, Hon. Ed., are not big inflewenshul man likesame you needing 1/c housekeeper. Are knoeing one who can cleening like furies, are neet, hard worker. What you saying? Writing posthasty if needing. Money no object.
Hashafisti Scratchi

Servo Controller Available

In response to several requests, the Editors have ascertained that the Harold H. Powell Co., 2102 Market St., Philadelphia 3, Pa. has a stock of the surplus Barber-Colman aYLc-5091 aircraft controllers. The most recently announced price was $5.95. These units were utilized in the article by W2JKH (Nov., 1953, CQ, page 13) entitled, "Antenna Rotation with a Servo-Mechanism."

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4-65A	1.7w	345w	1.9w	270w
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4-250A	2.6w	1000w	3.2w	675w
4-400A	6.1w	1000w	3.5w	1000w
4X150A	1.0w	200w	2.0w	200w
4E27A	1.6w	500w	2.0w	380w

For additional information write our Amateurs' Service Bureau.

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Zero Bias...

Read This Before Going Any Further In CQ

This may be the most important Docket issued by the FCC on the regulation of Amateur Radio

This is a notice of proposed rule making Docket 11060 in the matter of amendment of *Part 12* of the Commissions rules concerning eligibility to hold amateur radio operator licenses.

1. Notice is hereby given of proposed rule making in the above entitled matter.

2. In accordance with the Commission's statuatory authority to prescribe the qualifications of amateur radio operators, the Commission proposes to amend *Section 12.21* of its rules so as to make ineligible to hold an amateur radio operator's license any person who is a member of the Communist Party, of any organization which has been required to register as Communist-action or Communist-front organization under the provisions of the *Internal Security Act of 1950 (50 USC786)*, or any organization which advocates or teaches the overthrow of the United States Government or the Government of any sub-division thereof by force or violence.

3. It is also proposed to amend *Section 12.21* so as to provide that only a person of good moral character will be eligible to hold an amateur radio operators license. Factors which the Commission proposes to consider in determining the character qualifications of applicants for amateur radio operators license include:

(1) Whether or not the person has been a member of the Communist Party or any organization which has been required to register as Communist-action or Communist-front organizations under the provisions of the Internal Security Act of 1950, or any organization which advocates the overthrow of the Government by force or violence;

(2) Whether or not the person has been convicted of any crime which is a felony under the laws of the jurisdiction in which the conviction was secured.

4. In addition, it is proposed to amend the forms for applying for amateur radio operators licenses to include questions with respect to membership in organizations which teach or advocate the overthrow of the Government by force or violence, to provide that all applicants must submit finger prints with their applications and to provide that holders of amateur radio operators licenses shall be required to answer questions from the Commission during the terms of their licenses concerning any of the eligibility sections set forth in the Commission rules.

5. (This section omitted by editor as it deals with authority of the FCC to make this rule—o.p.f.)

6. Any interested party may file with the Commission on or before July 19, 1954 a written statement or brief setting forth comment in favor or opposed to the proposed amendment. The Commission will consider all such comments, briefs, or statements before taking final action. If any comments are received which appear to warrant the Commission in holding Oral Argument before the final action is taken, notice of the date and place of such oral argument will be given.

7. In accordance with the provision of Section 1.764 of the Commission Rules, an original and 14 copies of all statements, briefs, or comments shall be furnished the Commission.

Adopted June 10, 1954
Released June 11, 1954
(Applies to all class of licenses)

Signed:
Federal Communications Commission
Mary Jane Morris, Secy.

This material was received via telephone on 14 June 1954 and is not a complete verbatim copy of Docket 11060. This material is, however, a full account of the important sections. Note particularly that all Amateur Radio Operators would be finger printed and that they must be ready to answer questions (unidentified, but assumed to be related to this Docket), at any time during the term of their license. No quarrel or objection can be raised with the provisions that would preclude the granting of a license to a known Communist. However, it is the reaction of this editor that the Docket does not sufficiently spell out the extent to which this authority would be carried. It is my hope that by the time you read this the ARRL will have taken action to set the closing date for filing comments further away, or will have appealed for an oral hearing. This Docket provides too many sweeping powers through its loose wording.

o.p.f.

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Cavity TVI Filter

ROBERT SCHLESINGER, K2CWO

1009 Madison St., Syracuse, N.Y.

A Radical Departure in the Field of TVI Suppression. This Easily Constructed Filter Passes Only the 144-Mc. Band, Attenuating Those Frequencies Above and Below

The use of filters in the output of 2-meter transmitters has been generally limited to the low-pass type. The low-pass filter, of course, does nothing to suppress the 48 or 72 Mc. signals that invariably appear in the output, in varying degrees, as the result of the transmitter multipliers. These signals can be the source of v-h-f TVI in the sets of neighbors by mixing in the front end and ending up on a channel frequency. For example, the 4th harmonic of 48 Mc. is 192 Mc. or Channel 10. The harmonics resulting from multiples of the fundamental 144-Mc. signal can cause interference both in the VHF and UHF TV bands. It therefore becomes apparent that a band-pass filter would be far more desirable to use than a filter of the low-pass type.

One form of a band-pass filter in common use at ultra-high frequencies is the re-entrant cavity. These cavities are generally not employed below 500 Mc. due to the large physical size needed at the lower frequencies. The design and use of these cavities is little known to the 2-meter enthusiast. Many of those who are familiar with this technique have discarded it on the grounds that the construction problem is too cumbersome. In reality, however, the design of these cavities is quite simple.

The two major considerations of such a filter are:

1. Its band-pass characteristics.
2. Its insertion loss.

If the cavity must be electrically foreshortened with a large loading capacity, it was felt that the first of the above points might be adversely affected. Also since the material used in the construction of tin cans is not recommended for r-f work it was felt that perhaps the second point, the insertion loss, might be too great. However, we designed, built and tested one of these cavities using an ordinary large size (1.44 qt.) orange juice can, with very encouraging results.

Theory of the Re-entrant Cavity

We will outline the theory of the design procedure so that the builder will have the background necessary to use any available type of cylindrical can and will not be confined to the exact type used in this article. As a matter of fact there may be some advantage in using some large paint cans if space permits.

An optimum Q is equal to the ratio of b to a of 3.6 (see *Fig. 1*). For any can of given diameter we may determine the inner conductor size by letting $a = b/3.6$. Notice that a and b are radii and must be multiplied by 2 to give the correct diameter. Remember that we deal with the outside diameter of the inner conductor and inside diameter of the outer conductor.

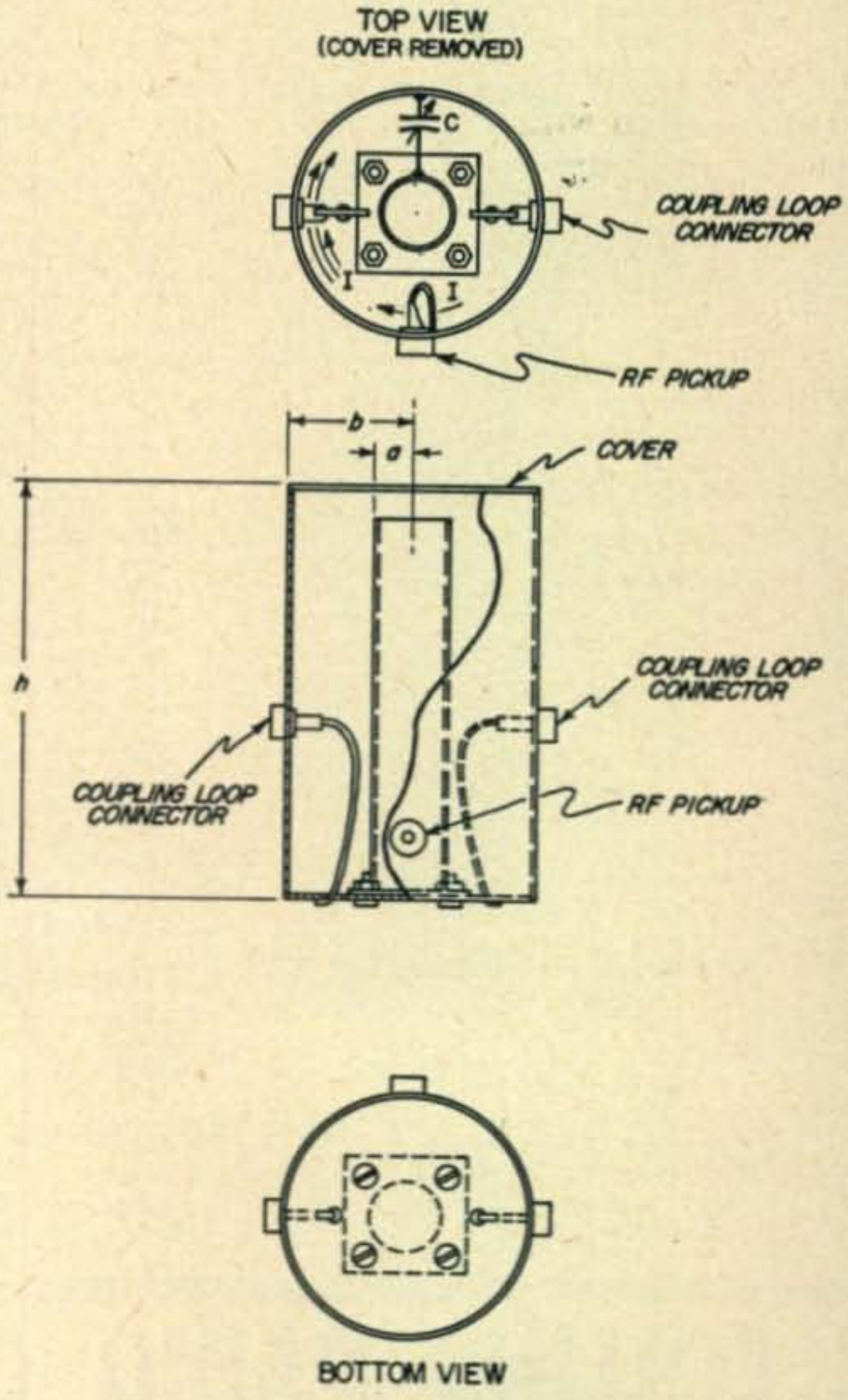


Fig. 1. The re-entrant cavity filter makes use of distributed constants rather than lumped circuit constants to tune to the 144-Mc. band.

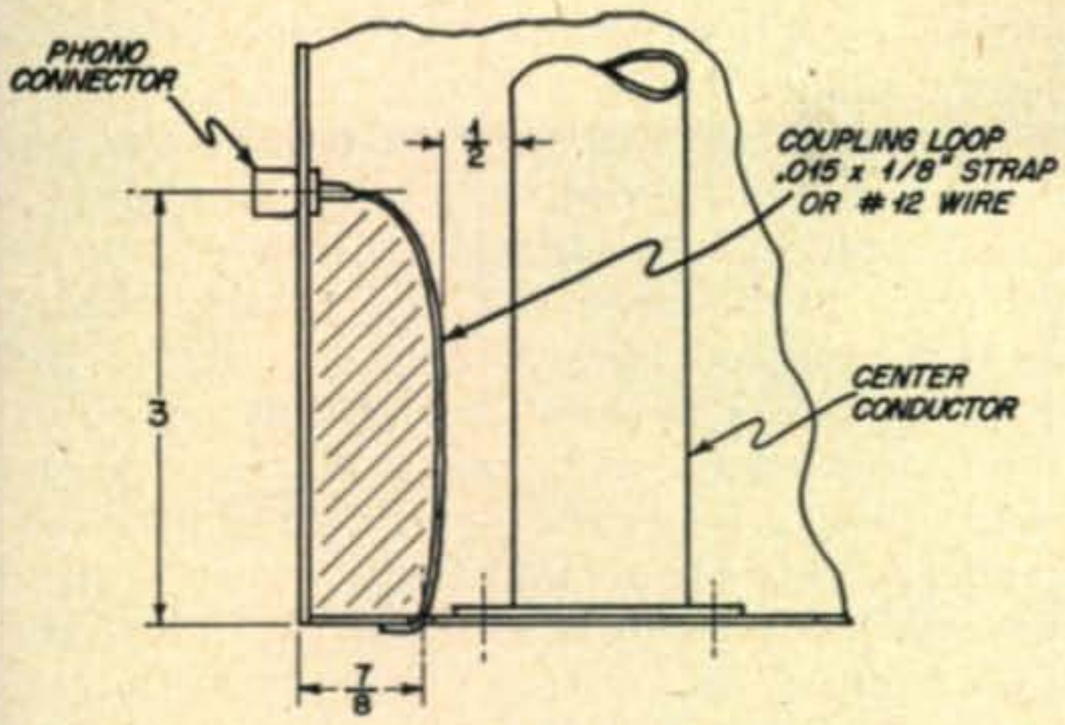


Fig. 2. The coupling loops are rigidly mounted inside the cavity. The proximity of the loop to the center conductor and the pickup area (shaded) determine the amount of coupling. See text for details.

The can we chose had an O.D. of 4.25 inches therefore, 2a = 4.25/3.6 = 1.18 inches. Since a piece of brass pipe 1.25 inches in diameter was on hand this was used for the center conductor.

The surge impedance of a cylindrical concentric line cavity with air dielectric is $Z_o = 138 \text{ Log } 10 \times b/a$, where b and a are the respective radii just referred to. For a ratio of $b/a = 3.6$, $Z_o = 77$ ohms. This will give an unloaded Q in the order of 5000,* depending on the exact material from which the can is made. Although it was not found necessary, silver plating will increase the Q considerably.

The next step is to determine the necessary loading capacity to make the cavity look like an electrical quarter wave at the middle of the band. This is only necessary if the can is less than ¼ wave length to begin with. A wave length being 81.5 inches, a quarter wave length is therefore 20.4 inches. The can we used was only 7 inches long. The capacitive reactance is given by:

$$X_c = Z_o \tan \beta\eta \text{ where:}$$
$$\beta = 360°$$
$$\eta = h/\lambda = 7/81.5$$
$$Z_o = 77 \text{ ohms}$$

Hence $X_c = 77 \tan 360 (7/81.5) = 46$ ohms

The capacity needed is therefore:

$$C = \tfrac{1}{2}\pi f X_c$$
$$= \tfrac{1}{2}\pi \times 146 \times 10^6 \times 46$$
$$= 23.5 \ \mu\mu\text{fd.}$$

This capacity electrically appears as C in *Fig. 1* and physically is connected from the non-grounded end of the center conductor to the can wall. In theory it would be desirable to have this multi-path return. This, however, is not physically possible, so that the best that can be done is to use good r-f connections at each side of the condenser. Actually, we used a small *Johnson type 20M11* miniature condenser rated at 19.7 $\mu\mu$fd. maximum, and a little ceramic tuner of 1.5-7 $\mu\mu$fd. diagonally opposite to give some vernier tuning to the cavity. These condensers were used successfully with a transmitter rated at 62 watts input to the final. With transmitters running higher power inputs, heavier condensers might be needed. This is due to the fact that a high voltage is developed across the cavity at this point, just as high voltage is developed across a parallel resonant circuit.

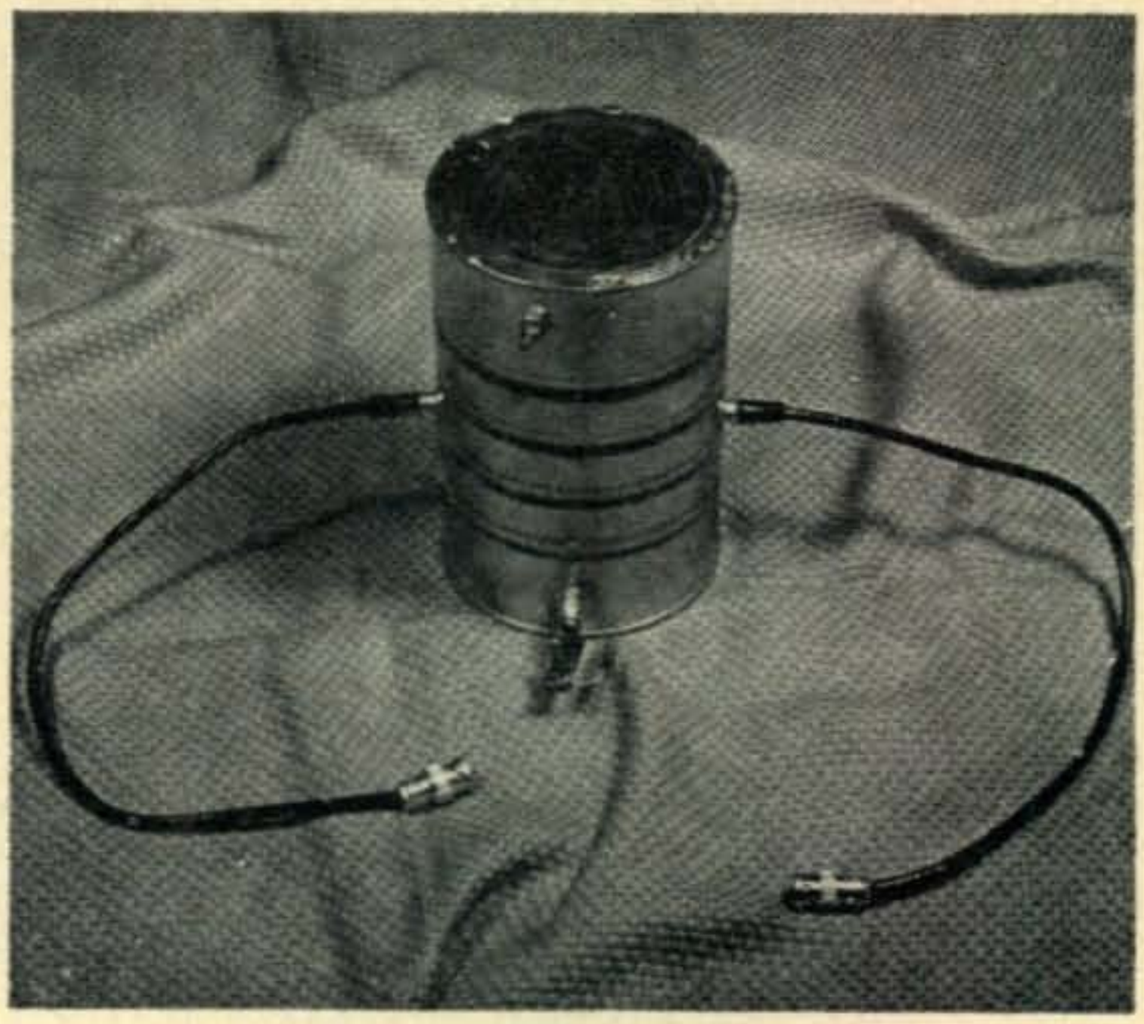
* Terman, "Radio Engineer's Handbook," p. 192.

Coupling Loop Details

The concentric current lines are shown in the top view of *Fig. 1*. The size of the shaded area in *Fig. 2* will determine the degree of coupling. Maximum coupling would result if the dimension marked ½" in *Fig. 2* were reduced to zero since this would permit all the current circulating in the cavity to pass through the coupling loop.

The area of the coupling loop is not too critical and a close approximation of the dimensions shown on *Fig. 2* for any can about the size of the one we used will give good results for 50-ohm or 75-ohm terminations. Do not try to make the coupling too tight since this will result in capacitive coupling rather than inductive coupling. Both coupling loops are identical in construction. Electrically the cavity is a bilateral network when loaded into 50 ohms. It makes no difference which side is connected to the transmitter or to the load.

With the coupling loop shown in *Fig. 2* the insertion loss of the cavity is 0.4 db. If the builder desires to make a cavity whose dimensions are greatly different from the ones we used, the insertion loss is one criterion by which he can adjust to the proper degree of coupling. A figure between 0.3 and 0.6 db. insertion loss is desirable since an insertion loss of less than



This is the complete cavity with the top re-soldered in place. The cavity is bilateral and either side may be used as the input or output. The r-f probe assembly is shown in the foreground. This is a useful indication device when the cavity is installed in the feedline.

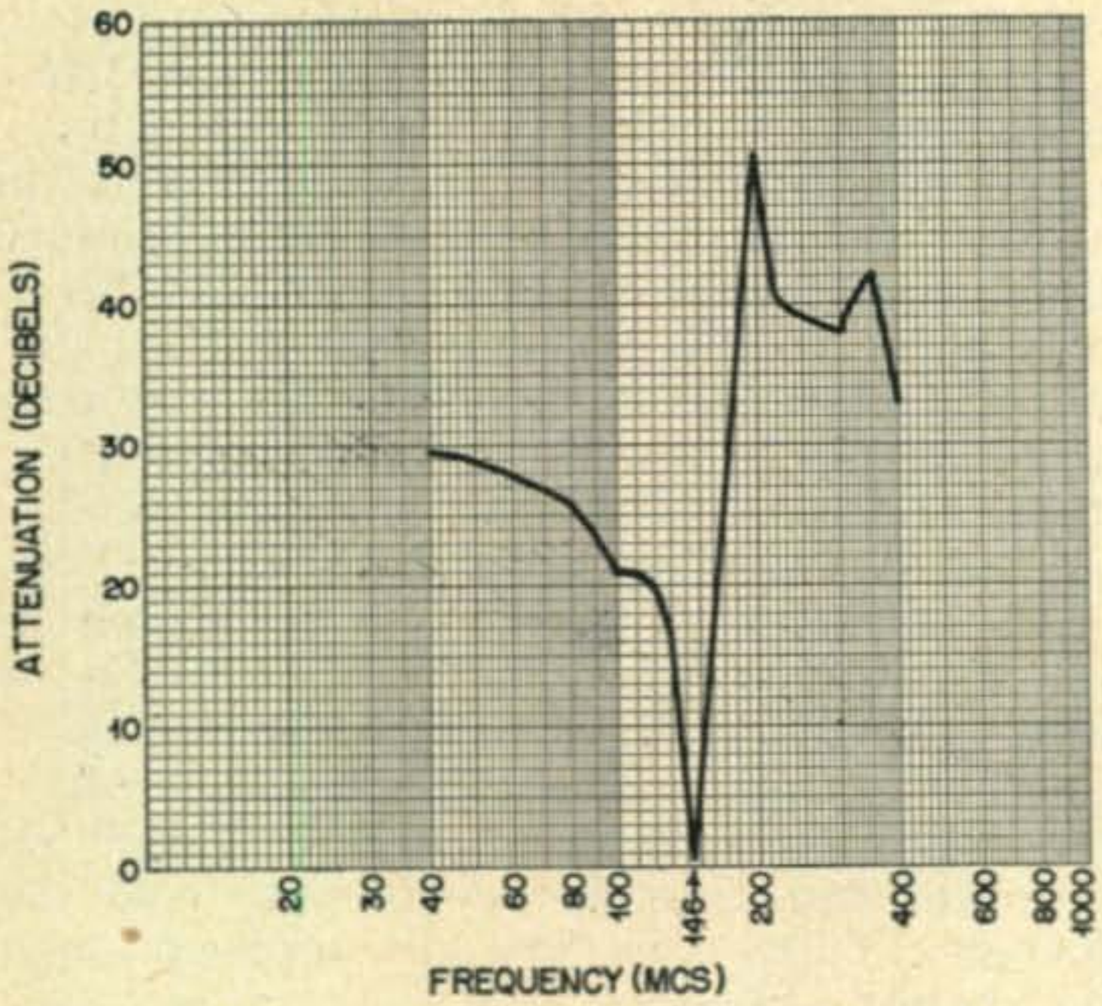


Fig. 4. This graph shows the attenuation above and below the 2-meter band. Note the absorption in the range of TV channels 7 through 13.

0.3 db. will result in the over-coupling difficulties mentioned above.

The exact method of measuring the insertion loss, although quite simple, requires some means of measuring antenna power. We had available a *Bird Termaline* wattmeter which is a good 50-ohm resistive load at this frequency.

To determine the insertion loss when power is the measured quantity proceed as follows:

Insertion loss in $db. = 10 \log_{10} P_1/P_2$

where P_1 = power with no filter

P_2 = power with filter

in our case for final adjustment $P_1 = 40$ watts

$P_2 = 36$ watts

$db. = 10 \log_{10} 40/36 = .4$ db.

It is therefore obvious that the losses within the cavity is 4 watts. In terms of *S*-units this is $.4/6 = .066$ *S*-units.

This same procedure could be followed using voltage, if one has available a pure 50-ohm load resistor at 146 Mc. and an r-f voltmeter capable of accurate measurement at this frequency. In this case db. $= 20 \log_{10} V_1/V_2$. Here V_1 is the voltage across the resistor without the filter and V_2 is the voltage with the filter inserted.

Tuning the Cavity

The problem of knowing when the cavity is tuned to resonance once it is connected to the transmitter and antenna is solved by the insertion of a small r-f pick-up loop and crystal detector. The circuit is shown in *Fig. 3*. A female phono-connector was used to mount the pick-up loop in the side of the cavity. It should be placed one inch from the bottom of the can and mid-way between the axis passing through the two coupling loops. The size of the pick-up loop should be kept as small as possible so as not to absorb any power. We were able to solder a wire from the center conductor of a female phono-connector back to its outside case and get a 1-volt reading on the 3-volt scale of a 20,000 ohms-per-volt voltmeter at 40 watts to the antenna when the cavity was tuned correctly. The reading of the meter may be increased or decreased as needed, depending on the transmitter power, by changing the size of the loop, changing the 68K. resistor or changing the orientation of the loop with respect to the current passing through it. Be careful not to exceed rated crystal current for the type of crystal used. The detector unit may be left in at all times or removed after the cavity is tuned. If left in and metered it makes a good indicator of transmitter output to the antenna.

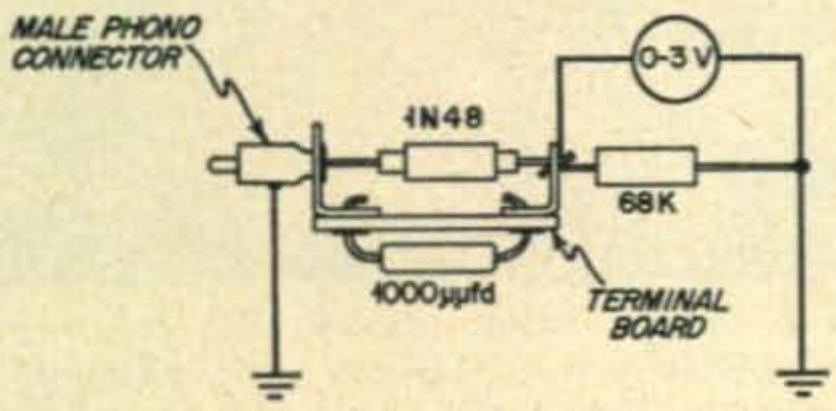
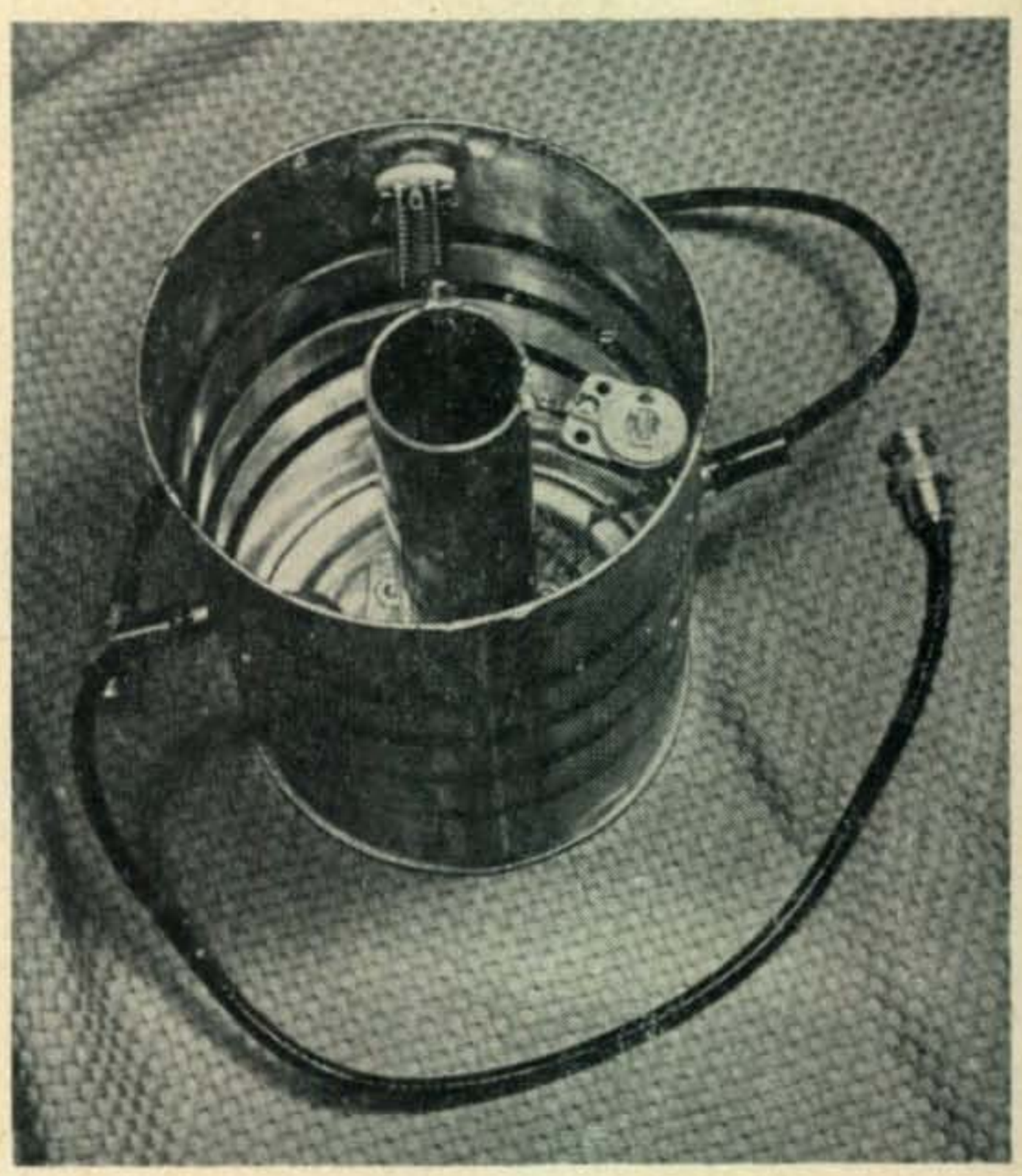


Fig. 3. Some of the r-f in the cavity may be sampled to enable tuning and later to monitor your "on-the-air" transmissions.



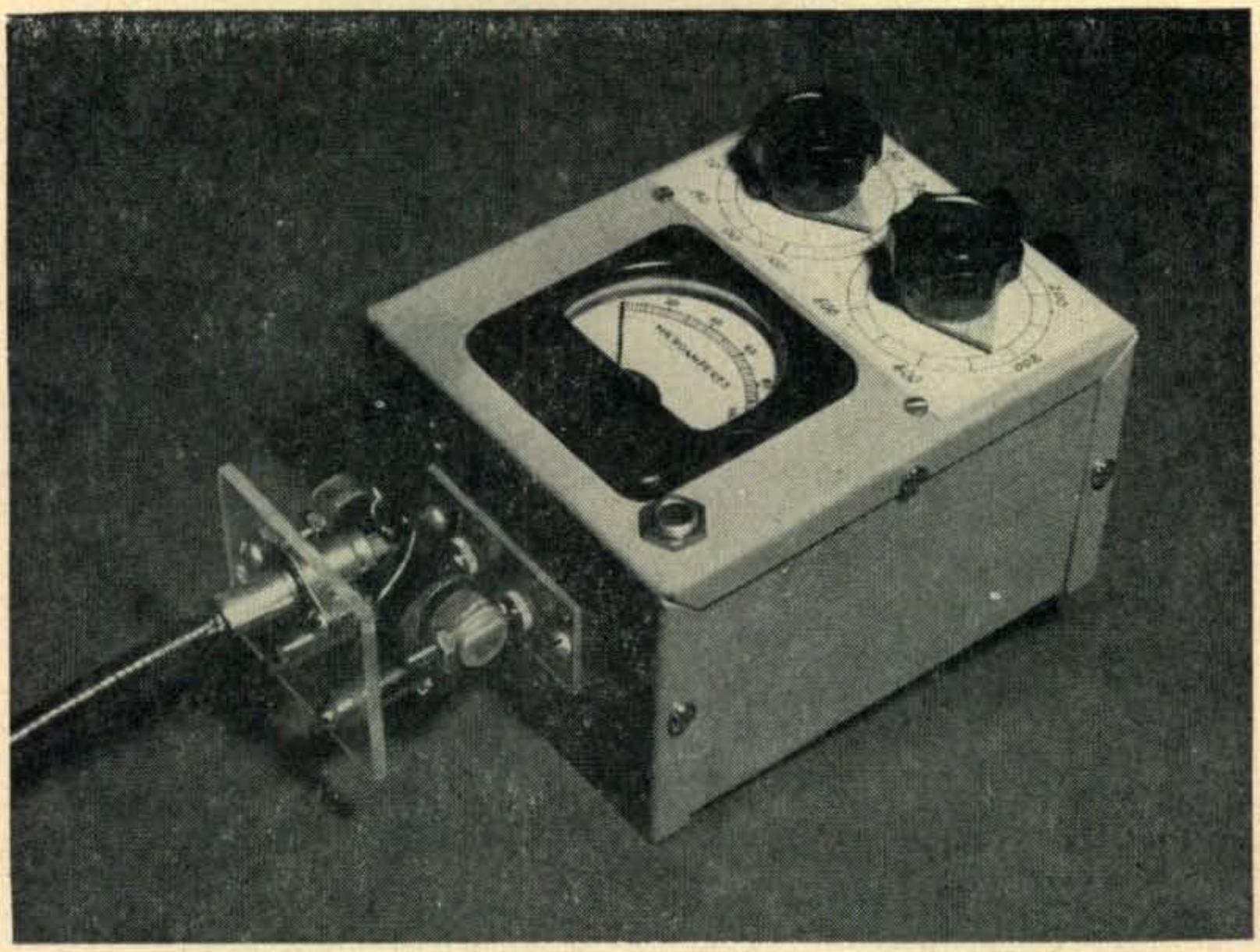
Looking down into the cavity the two variable capacitors are visible. The air padder is used to approximately set the band and the ceramic is used as a vernier adjustment.

All connectors are inexpensive little phono-plugs and seem to have a very low VSWR when used with RG-58/U up to 500 Mc. In fact, they are very much better than some u-h-f connectors at frequencies above 200 Mc.

Assembling the Cavity

The mechanical work requires that the center conductor be fastened to the bottom of the can. This we did by soldering it to a little flat

(Continued on page 52)



Antennascope-54

WILFRED M. SCHERER, W2AEF

Contributing Editor

Part Two of a Two Part Article

In the first part of this article, which started on page 23 of the June, 1954, issue of *CQ*, I described the construction of the *Antennascope-54*. In this part, I shall describe the simplified *Antennascope Jr.* and some of the many uses of both instruments.

The *Antennascope Jr.* performs essentially the same functions as the *Antennascope-54*. However, it incorporates only one impedance range, and it is designed to be used with an external indicating meter.

Referring to *Fig. 1*, when *R1* has a maximum resistance of 500 ohms, the impedance range of the *Antennascope Jr.* is 10 to 500 ohms, but the scale becomes quite crowded at the low-resistance end. *R1* may be made 100 ohms in an instrument which will be used exclusively with low-impedance loads. The more sensitive the meter used with the *Antennascope Jr.*, the better. A 20,000 ohms-per-volt multimeter set on its lowest d-c voltage range works excellently.

Constructional Details

Figure 2 makes step-by-step building instructions unnecessary. Follow this layout closely, and you will have no trouble. Note carefully the mounting of *R1*. It is mounted upon a block of polystyrene (part *B*), which is supported ¼-inch away from the top of the metal box by means of two *6-32* screws through the

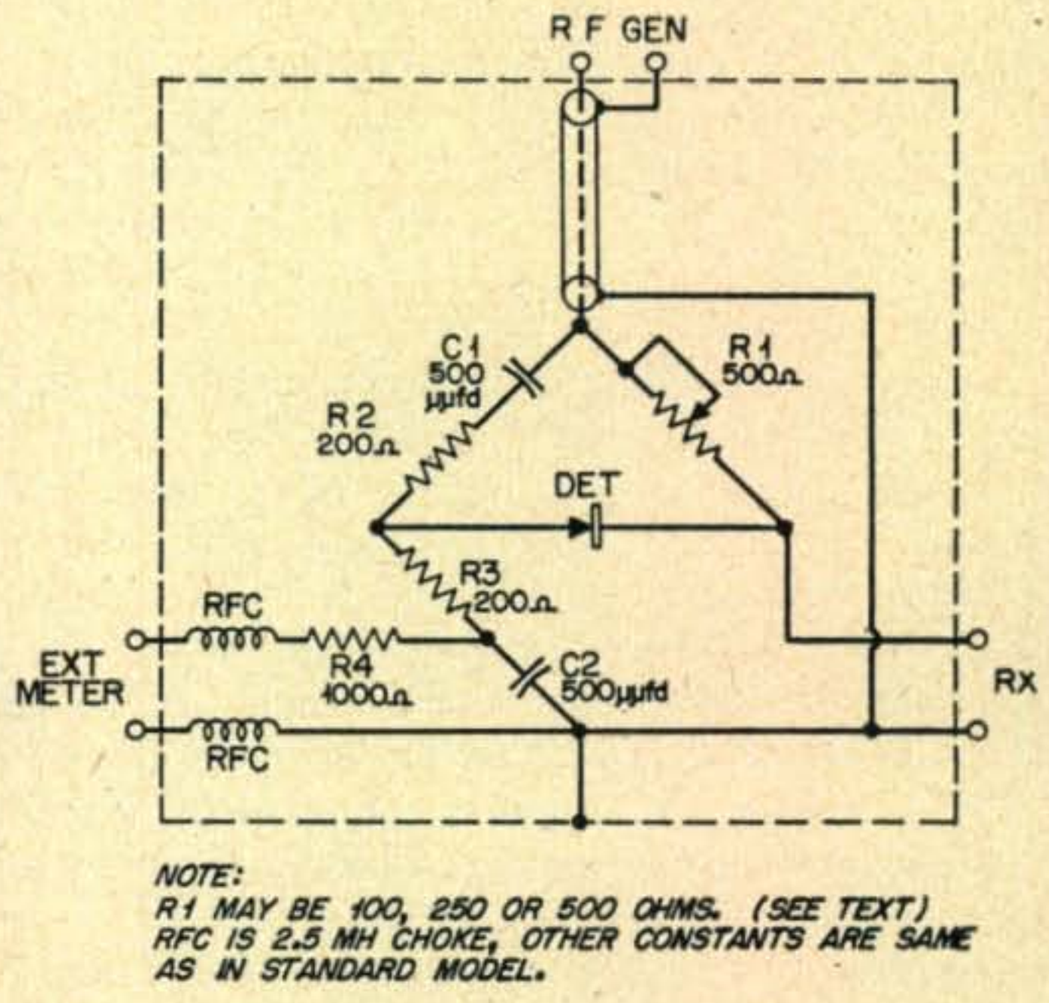


Fig. 1. Wiring schematic and parts list of the Antennascope Jr. This unit is designed for use with an external meter.

C1, C2—500 to 1000 µµfd. "buttons." Exact capacity unimportant, but must be matched. **Centralab ZA-751.**
R1—100-ohm or 500-ohm potentiometer. **Allen Bradley J** or **Ohmite AB.** See June text for choice of resistance.
R2, R3—200 ohms, ½ w. non-inductive. Exact resistance is not critical, but resistors must be matched.
R4—1,000 ohms, ½ w.
RFC1, RFC2—2.5 mh., 50 ma. r-f chokes.
Det—G.E. G7A or **Sylvania 1N23B** crystal diode.
External meter—50 to 200 µa. range. (See text).
Built in 2¼x2¼x4-inch **Minibox.**

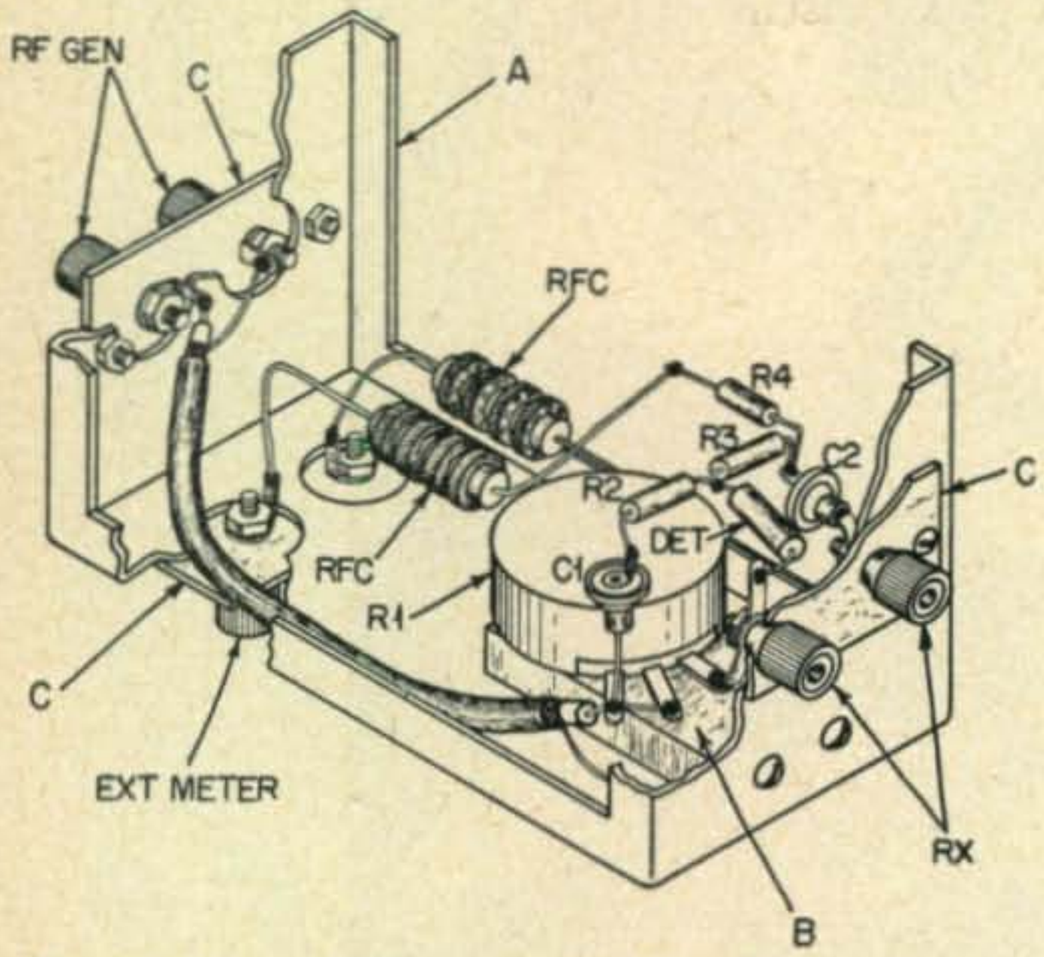


Fig. 2. Internal wiring view of the Antennascope Jr. described in this text.

end of the box into tapped holes in the end of the polystyrene. It is hardly necessary to stress the importance of short leads, which *Fig. 2* makes obvious.

Upon completion of the instrument, test and calibrate it as described last month.

Using Either Model Antennascope

The *Antennascope-54* and the *Antennascope Jr.* may be used for every purpose for which a fixed-ratio, r-f resistance bridge may be used. It can also be used for determining the resonant frequencies of antennas and feed lines, antenna radiation resistance, the *V*elocity-of-*P*ropagation factor of feed lines, standing-wave ratios, and the input impedances of receivers, to name but a few.

The *Antennascope* is conveniently used in conjunction with a grid dipper by virtue of the latter's wide frequency coverage and portability, although it may be used with any r-f generator covering the desired frequency range at a power level not exceeding one watt.

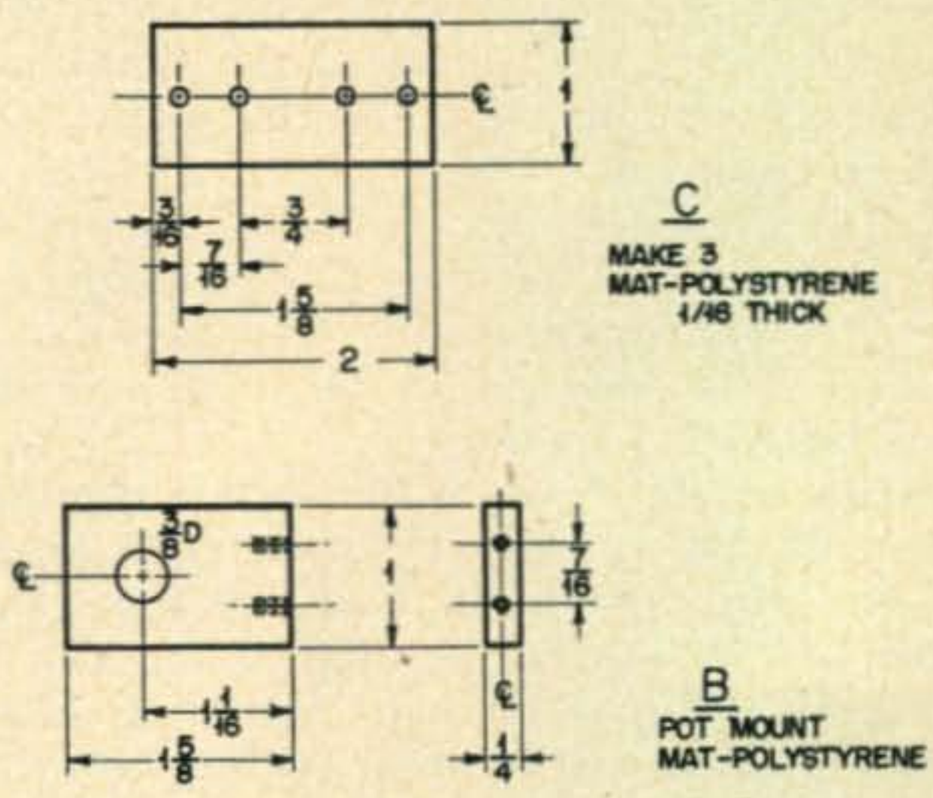
Couple the *Antennascope* inductively to the r-f generator, which will be called the "Dipper" in the following discussion. Coupling should be sufficient to develop a full-scale meter reading with the *Rx* terminals open and *R1* set approximately to the expected impedance of the device being tested. One turn around the *Dipper* coil should be sufficient above 15 Mc; Two or three turns may be required on lower frequencies.

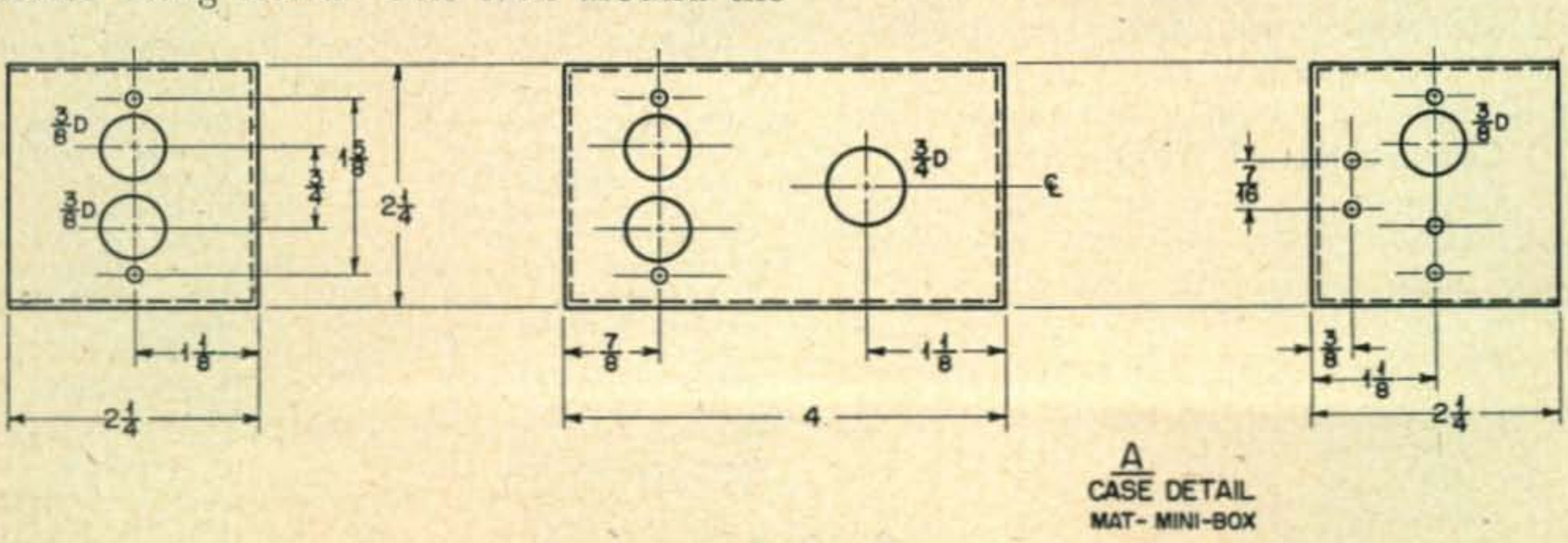
Sometimes, when varying the coupling between the *Dipper* and the *Antennascope,* an apparent variation in the measured impedance occur. This is an indication of excessive capacity coupling. One cure is to use an electrostatically shielded coupling loop.[1] Another is a coupling transformer with an electrostatic shield between the windings. See *Figs. 3 and 4.*

Transformer coupling is especially helpful when working with balanced lines In addition, the *Antennascope* and the line should be isolated from ground and large masses of metal to reduce capacity unbalance. It is also helpful to put a loose twist in the line about every two feet. Always connect the shield of coaxial line to the grounded *Rx* terminal.

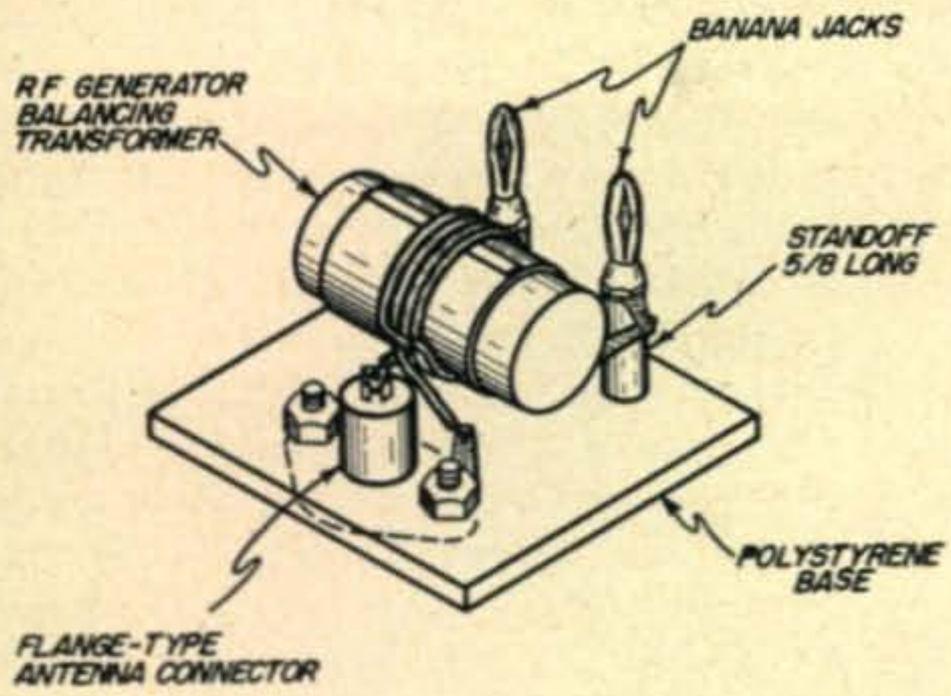
For maximum accuracy, always check the actual frequency of the *Dipper* by monitoring it on a calibrated receiver. Also, in adjusting the *Antennascope* to produce a null, it may be necessary to retune the *Dipper* a trifle, to compensate for slight frequency shifts resulting from varying load. Incidentally, variations of the meter on the *Dipper* have no significance in this application. However, when a null has been achieved on the *Antennascope,* glance at the *Dipper* meter to be sure that overcoupling has not pulled the current down to zero. If it has, slightly loosen the coupling.

1. Robberson, "Faraday Shield for the Antennascope," **CQ**, Feb., 1954, p. 50.





Layout drawings of the Antennascope Jr. chassis box and mounting strips of polystyrene.



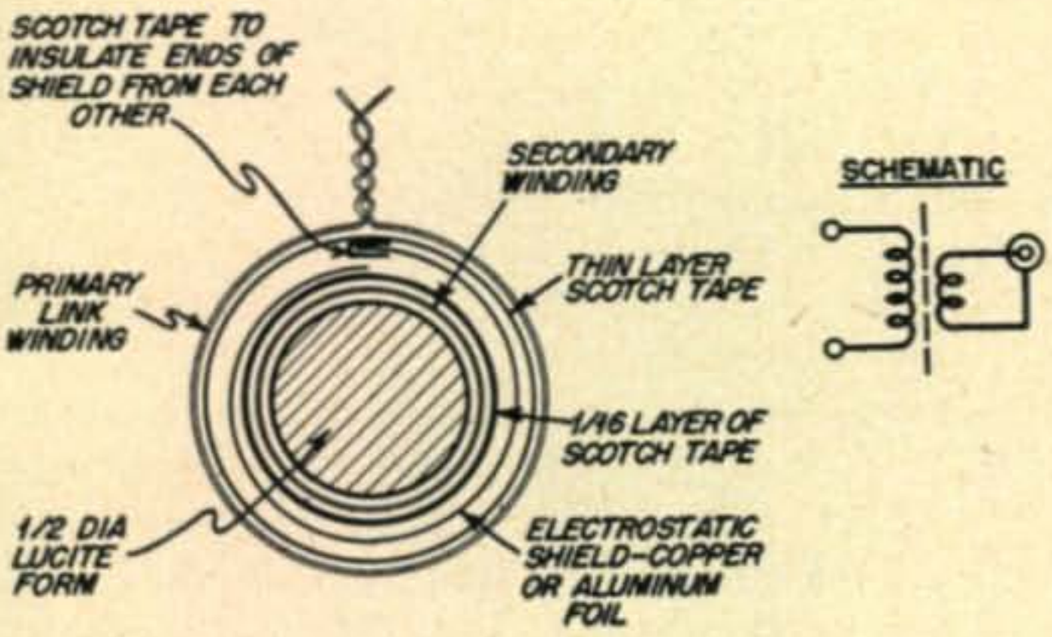


Fig. 3. Detail of the electrostatic coupler. Use 3 or 4 turns on the primary and 25 turns on the secondary depending on frequency.

Determining Feed Line Characteristics

QUARTER-WAVE LINES: Set *R1* to "0" and with the *Rx* terminals open, adjust coupling to the *Dipper* for full-scale meter deflection. Connect the line to the *Rx* terminals. Leave the opposite end of the line open. Tune the *Dipper* to the *lowest* frequency which produces a complete null on the meter.

At this frequency, the line is electrically ¼-wavelength long. Its dimensions will satisfy the formula:

$$F_{Mc} = 246/L_{ft} \times V.P. \qquad (1)$$

when F_{Mc} is the frequency, L_{ft} is the line length, and *V.P.* is the line *V*elocity-of-*P*ropagation factor.

Any fittings to be used on a line being resonated for a specific purpose should be in place, because they may affect the electrical length on the higher frequencies.

Nulls will also be found at odd integral multiples of the frequency just determined, because any resonant line "repeats" itself every electrical half wave. The same effect will occur if the frequency is held constant and the line length is multiplied.

IMPEDANCE TRANSFORMATION IN QUARTER-WAVE LINES: Leave the *Dipper* set at the null frequency and connect a non-inductive resistor across the output end of the line. Rotate *R1* for a new null, retuning the *Dipper* very slightly, if necessary.

The resistance shown on *R1* will be related to the test resistance in the following manner:

$$Z_s = (Z_o)^2/Z_r \qquad (2)$$

Where Z_s is the input resistance (*R1*), Z_o is the line impedance, and Z_r is the terminating impedance (test resistance).

This formula reveals that a ¼-wave line always reflects to its input terminals a geometric inversion, based upon the line impedance, of what is connected across its output terminals. This property is the basis of the operation of ¼-wave, linear matching transformers.

Formula (2) may be rewritten to solve for line impedance, thus:

$$Z_o = \sqrt{Z_s \times Z_r} \qquad (3)$$

with the symbols having the same meanings as above.

Should it be impossible to obtain a null by rotating *R1*, the inverted impedance is probably beyond its range. Try a different value of test resistance. Suitable values when the approximate line impedance is suspected, are either half or double the estimated line impedance.

HALF-WAVE LINES: Duplicate the setup for finding the resonant frequency of a ¼-wave line, except that the output terminals are now shorted together. The lowest frequency at which a null can be obtained, with *R1* at "0" is the frequency at which the line is electrically ½-wave long. Similar nulls will be found at integral multiples of this frequency.

The applicable formulas for calculating ½-wave lines are:

$$L_{ft} = 492/F_{Mc} \times V.P., \text{ or } F_{Mc} = 492/L_{ft} \times V.P. \qquad (4)$$

Substituting a non-inductive resistor for the short will require setting *R1* to its resistance value to produce a null. This proves that the load connected across the output terminals of a resonant line is repeated every ½ wave along the line.

VELOCITY OF PROPAGATION: The *V.P.* constant of a line can be determined by substituting the line length and the frequency in formulas (1) and (4) and solving for *V.P.* Rewritten, they

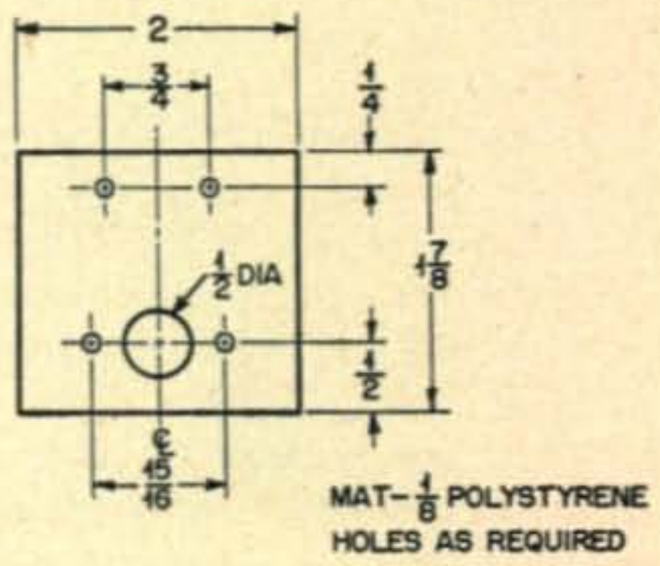


Fig. 4. Mounting for the electrostatic coupler. See the detail drawing above for further information.

become:

$V.P. = F_{Mc} \times L_{ft}/246$ (¼-wave lines) (5)

$V.P. = F_{Mc} \times L_{ft}/492$ (½-wave lines) (6)

V.P. varies from about 0.95 for open-wire lines to about 0.68 for polyethylene-insulated coaxial line.

Antenna Measurements

Although a *Dipper* may be used alone to determine antenna resonance, when combined with the *Antennascope* it will reveal the antenna radiation resistance at the same time.

HALF-WAVE DIPOLES: When the center of the antenna can be reached it may be checked as shown in *Fig. 5. (June issue)*. Open the antenna in the center and connect in the *Antennascope* with very short leads. Support the instrument

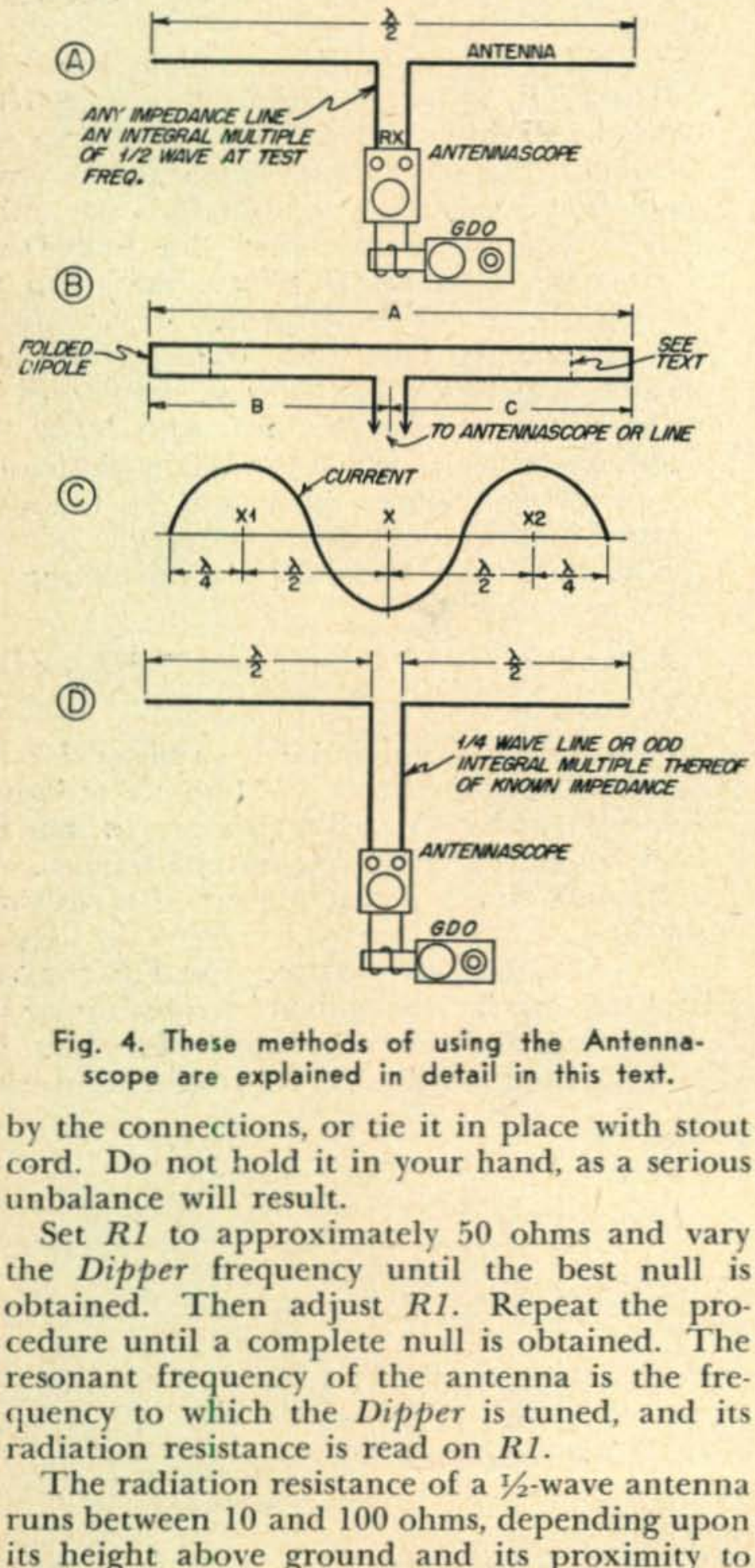


Fig. 4. These methods of using the Antennascope are explained in detail in this text.

by the connections, or tie it in place with stout cord. Do not hold it in your hand, as a serious unbalance will result.

Set *R1* to approximately 50 ohms and vary the *Dipper* frequency until the best null is obtained. Then adjust *R1*. Repeat the procedure until a complete null is obtained. The resonant frequency of the antenna is the frequency to which the *Dipper* is tuned, and its radiation resistance is read on *R1*.

The radiation resistance of a ½-wave antenna runs between 10 and 100 ohms, depending upon its height above ground and its proximity to other objects. The same factors affect the resonant frequency. For a close approximation, the length of a ½-wave antenna reasonably in the clear is equal to:

$$L_{ft} = 492 \times 0.95/F_{Mc} \quad (7)$$

When the center of the antenna cannot be reached, the scheme shown in *Fig. 4b* should be used. It is also recommended for use on frequencies above 75 Mc., where the presence of the equipment in the field of the antenna degrades the accuracy of the measurements. Use the *Antennascope* to cut a feed line to a length of a ½-wave (or integral multiple thereof) at the desired frequency. Connect it between the antenna and the *Antennascope* and proceed as above.

If the antenna is too long, the *Antennascope* will null below the desired frequency. Conversely if the antenna is too short, the *Antennascope* will null above the desired frequency. Make appropriate adjustments in the antenna length to obtain a null on the desired frequency. Do not vary the line length for this purpose.

A line of any impedance may be used for this test, as long as it is an integral multiple of a ½-wave. Your regular feed line may be used, if cut to the proper length. After the antenna is properly resonated, the line length can be increased or decreased as required to reach the transmitter.

Run the line at right angles to the antenna for at least ¼-wave before bending it. This will prevent the field of the antenna unbalancing the line and introducing errors. Line unbalance can be checked by reversing the connections to the *Rx* terminals. Little difference in readings should be observed.

FOLDED DIPOLES: Folded dipoles are adjusted in the same manner as other dipoles. Impedance to be expected will be between 100 and 400 ohms . Also, you may find a second null at a resistance of about 500 ohms and at a slightly different frequency. Referring to *Fig. 4b*, the length *A* determines the natural frequency of the antenna. But electrically the sections *B* and *C* resonate to a lower frequency, determined largely by the insulating material in the antenna.

This effect is unimportant in air-insulated folded dipoles. However, in 300-ohm* ribbon dipoles the difference between the two null frequencies becomes quite pronounced. The result is that some of the broad-band characteristic of the antenna is lost.

One cure is to put the high-frequency null on the desired frequency and connect shorts across the antenna wires equally distant from each end to make the null frequencies coincide. The shorts are usually placed about 7 per cent of the antenna length from each end in 300-ohm folded dipoles.

HARMONICALLY OPERATED ANTENNAS: The current and impedance distribution of a harmonically-operated antenna changes from har-

(Continued on page ??)

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

HOWARD BURGESS, W5WGF

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

Condenser Checkers

Part VI of This Series

Once upon a time, long, long ago, when radio was young, tubes were soft and Zepps hung high, condenser testing was a simple matter. With a pair of headphones and dry battery it was practiced somewhat like the lost art of watermelon thumping. One loud "click" meant it was good and the capacity was large. One weak "click" and the capacity was low. But a "plop" every time it was touched indicated a shorted capacitor.

In those days condensers were simple, too. There were the "big ones" and the "little ones." The big ones were hung across the B supply and the small ones were used to hold up the grid leak.

It seems that progress has its price, though, and today one instrument may have over a hundred capacitors ranging from the small ceramics of less than one micro-microfarad to electrolytics of more than 1000 microfarads. To add to the confusion, proper operation depends upon holding many of these components to close tolerance.

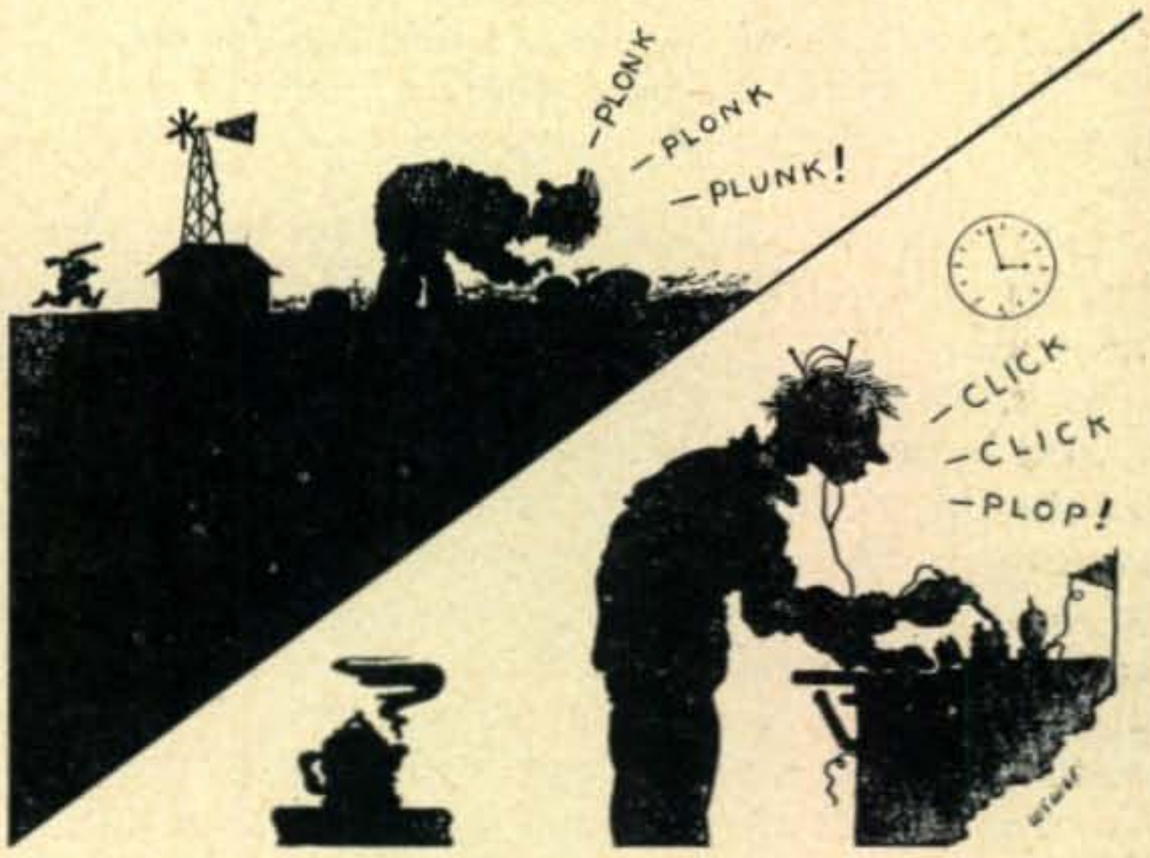
All of this adds up to the fact that although a condenser tester may not be as interesting as some pieces of test equipment, it is one of the more important pieces. Fortunately they are one of the simpler units to construct.

How To Check a Capacitor

A number of methods have been devised for checking capacitors which include measuring the amount of alternating current of a known frequency which flows through the condenser at a given voltage. Another approach is to resonate the condenser with a known value of inductance. When the resonant frequency is found the capacity can easily be determined. A third method is the well-known bridge circuit. Because of the simplicity of the circuits involved, the wide range of values which it will measure, and the precision which can be obtained, this is the most widely used method of measurement.

Before going into the use of the bridge a few words regarding its operation may be of value to the beginning Ham. As shown in *Fig. 1* the bridge is essentially a pair of voltage dividers across a voltage source. When the resistors in one divider bear the same ratio to each other *(R1* to *R2)* as the resistors in the other divider do to each other *(R3* to *R4)* the voltage division will be the same in either divider regardless of the ohmic values used. The bridge is balanced, as shown in the diagram, because there is no voltage difference between *A* and *B* points.

In *Fig. 2* the circuit remains the same but a potentiometer has been substituted for *R1* and *R2*. In this way the ratio may be changed at will. If the value of *R3* is known then the value of any unknown inserted at *RX* is easily found.



"... condenser testing ... was practiced somewhat like the lost art of watermelon thumping ..."

If the pot is adjusted until there is no reading on *V* the bridge is balanced and *RX* bears the same relationship to *R3* as the corresponding sections of the potentiometer do to each other.

When condensers are connected in series in an a-c circuit the voltage drop across each condenser will be in proportion to its reactance. In *Fig. 3*, the resistors *R3* and *RX* have been replaced by *Cs*, which is a condenser of known value, and *Cx* which is an unknown. The voltage applied must now be a.c. The potentiometer can now be adjusted for a balance just as

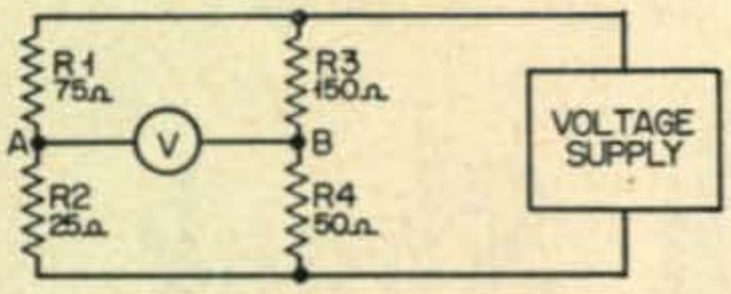


Fig. 1. The simple bridge is just a pair of voltage dividers.

in *Fig. 2*. This gives us a ratio between the unknown and a known value and our problem is solved.

This, then, is a condenser bridge in its simplest form. A pair of headsets can be substituted for the a-c voltmeter and the a-c supply may be a filament transformer. To make a more usable instrument several features should be added. As shown in *Fig. 3* extremely small and very large values of capacity will be read so close to the ends of the potentiometer that the readings will be unusable for all practical purposes. To avoid this, several values of *Cs* are

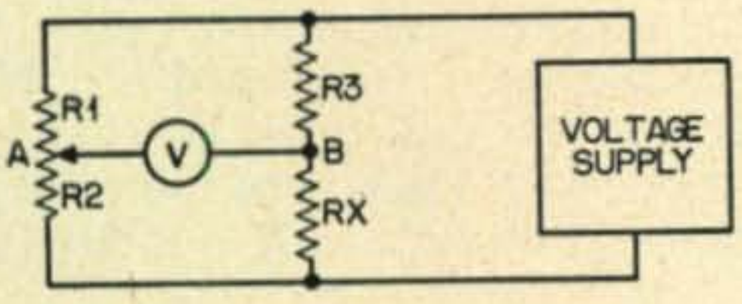


Fig. 2. A variable divider is substituted for one of the fixed dividers.

switched in for various ranges. This keeps the desired reading in the less cramped portion of the scale.

As shown in *Fig. 4*, another feature which should be added in *R3*. In theory our condensers should contain only capacity and very little resistance. However, in practice many condensers, especially those of the electrolytic variety, contain considerable resistance in addition to capacity. This will reduce the efficiency of a condenser and make a true null impossible in the simple circuit. To get a good sharp null the same amount of resistance must be added at *R3* as contained in the unknown *Cx*. This variable resistance is usually labeled "power factor" and will seldom be required except for electrolytics.

With the features we have added, the circuit of *Fig. 4* will give a very good idea of the size

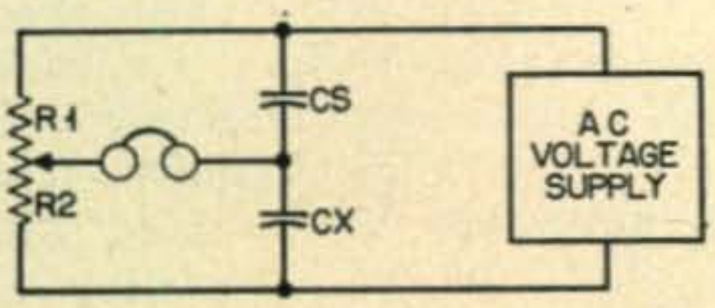


Fig. 3. Capacitors may be used as voltage dividers in alternating current circuits.

and worth of a condenser. Although nearly all of the common checkers use 60-cycle line voltage as the a-c source, a much better indication can be obtained on the smaller capacities if a higher audio frequency is used.

Calibration

When a circuit such as this is constructed by the average Ham the problem of calibration rears its ugly head. In this case the calibration of the potentiometer will be non-linear. With several capacities of known value, an ohmmeter, and patience, the ratios can be worked

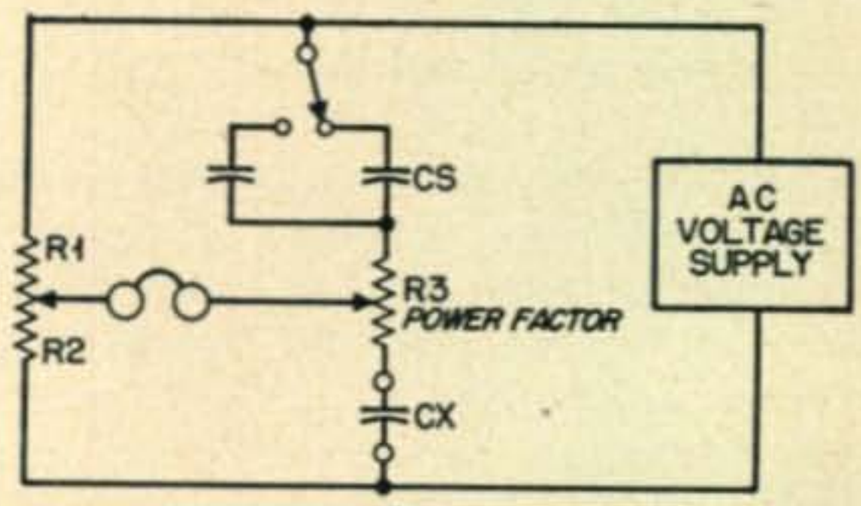


Fig. 4. This is the modification of Fig. 2 suitable for checking capacitors.

out and the scale plotted. If one is willing to add several more components to accomplish greater ease of calibration and a linear scale, the circuit may be altered to one such as that in *Fig. 5*. Electrically the circuit is the same but balance is accomplished in the *R1* leg.

With this type of circuit the calibration scale is linear and the coverage of each range is determined by the ratio of the fixed resistor to the full range value of the variable. To illustrate, as shown the *1K* resistor is in the circuit. The variable *R1* can be adjusted up to 10 times this value. Moving across to the capacity side, when

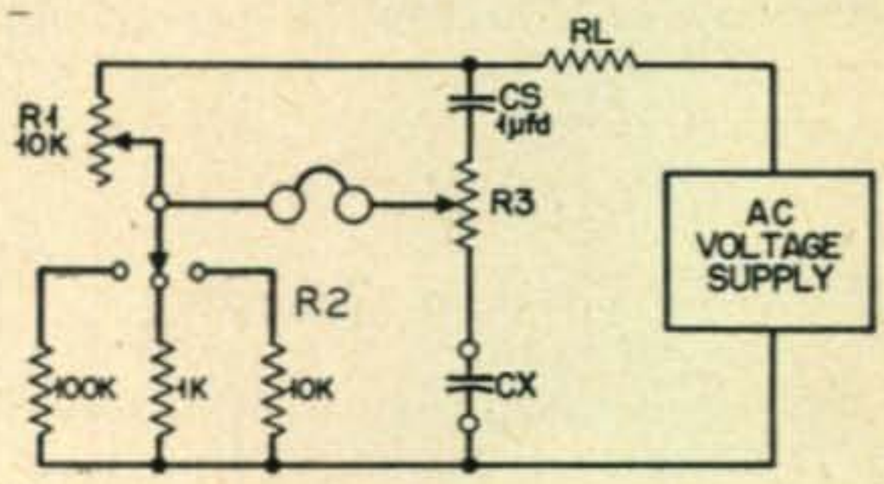


Fig. 5. These circuit revisions provide a linear calibration characteristic.

R1 is 10 times *R2*, the reactance of *Cs* will be 10 times that of *Cx* (assuming the bridge is balanced). Because capacity is inversely proportional to reactance, the largest condenser which can be measured with the taps shown will be 10 μfd.

The resistor *RL* is a limiting resistor. Without it, if the leads to *Cx* were to become shorted while *R1* was in the position of minimum resistance, full a-c voltage would be applied to the indicating instrument or phones.

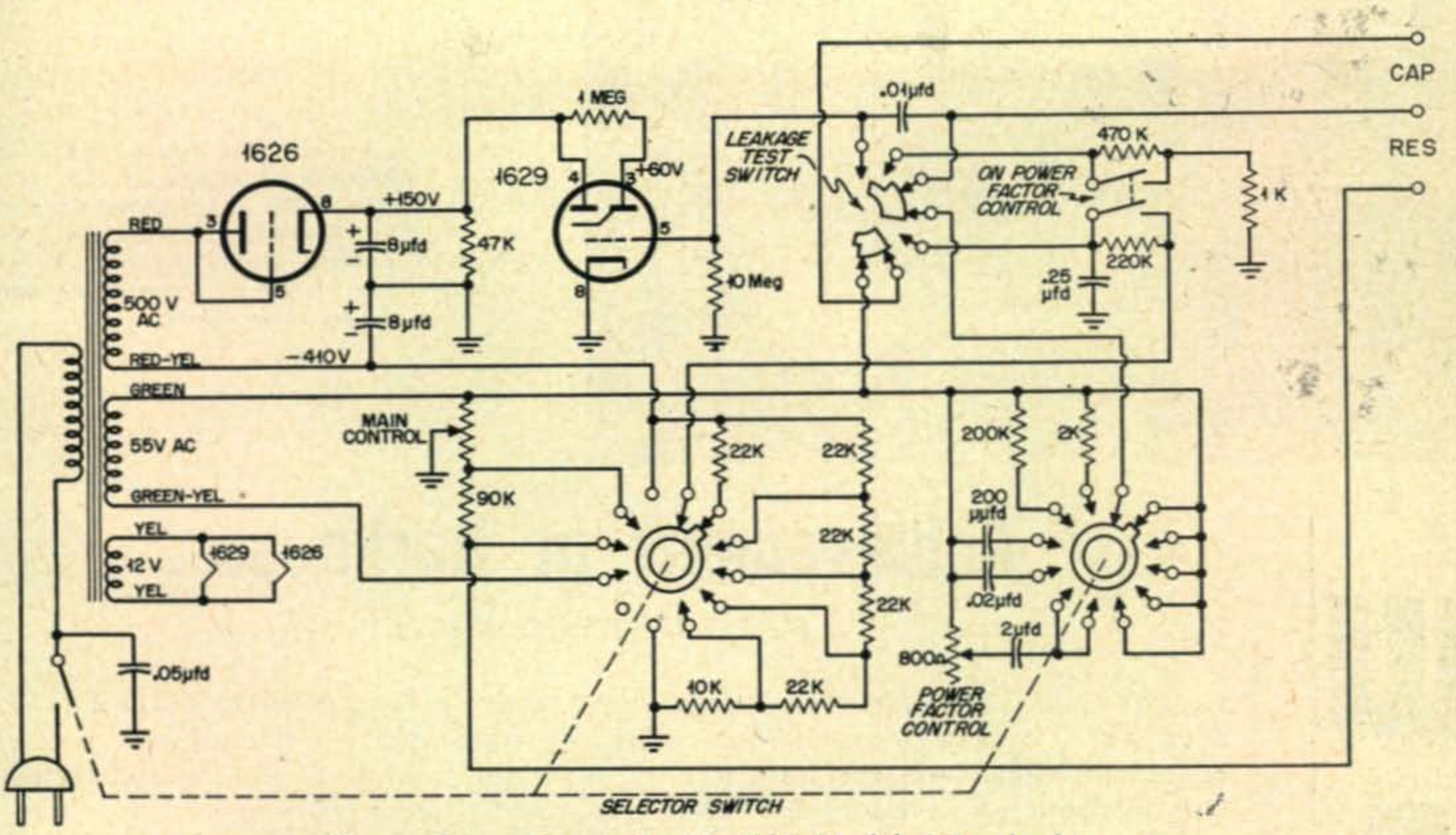


Fig. 6. Schematic of the Heathkit Model C-3 checker.

Of course there is the possibility that by now the reader has become discouraged by thoughts of calibration, power factor and the like, even though he may need just such a tester. In that case there is always the easy way out. By this we mean one of the ready-to-assemble kit versions of capacity bridges. After building many home style versions we have added one of the *Heathkit Model C-3* condenser checkers to our collection and are very well pleased with the results of this little unit.

The Heathkit Model C-3

The schematic in *Fig. 6* shows it to be similar to the type discussed in *Fig. 5*, with added features. The a-c voltage for the bridge proper is furnished from a winding on the power transformer. The null indicator is an electronic eye tube which is much more convenient to use than a pair of headphones. As to ranges, four switch positions give coverage from 10 μμfd. to 1000 μfd. Included in the bridge are two resistance ranges spanning the range from 100 ohms to 5 megohms. These are just tossed in for free, but are mighty handy especially when the batteries in the ohmmeter go flat in the wee small hours, to say nothing of the fact that they are more accurate than most ohmmeters.

When checking electrolytic condensers a leakage test is very important. If the condenser has been on the shelf for some time without use it should be polarized before testing. Both of these functions have been included in this tester by incorporating a 450 volt d-c supply in the unit. Voltages such as 25-150-250-350 and 450 may be selected and placed on the condenser on test. This will show up any leakage as well as polarize or reform an electrolytic which has been idle.

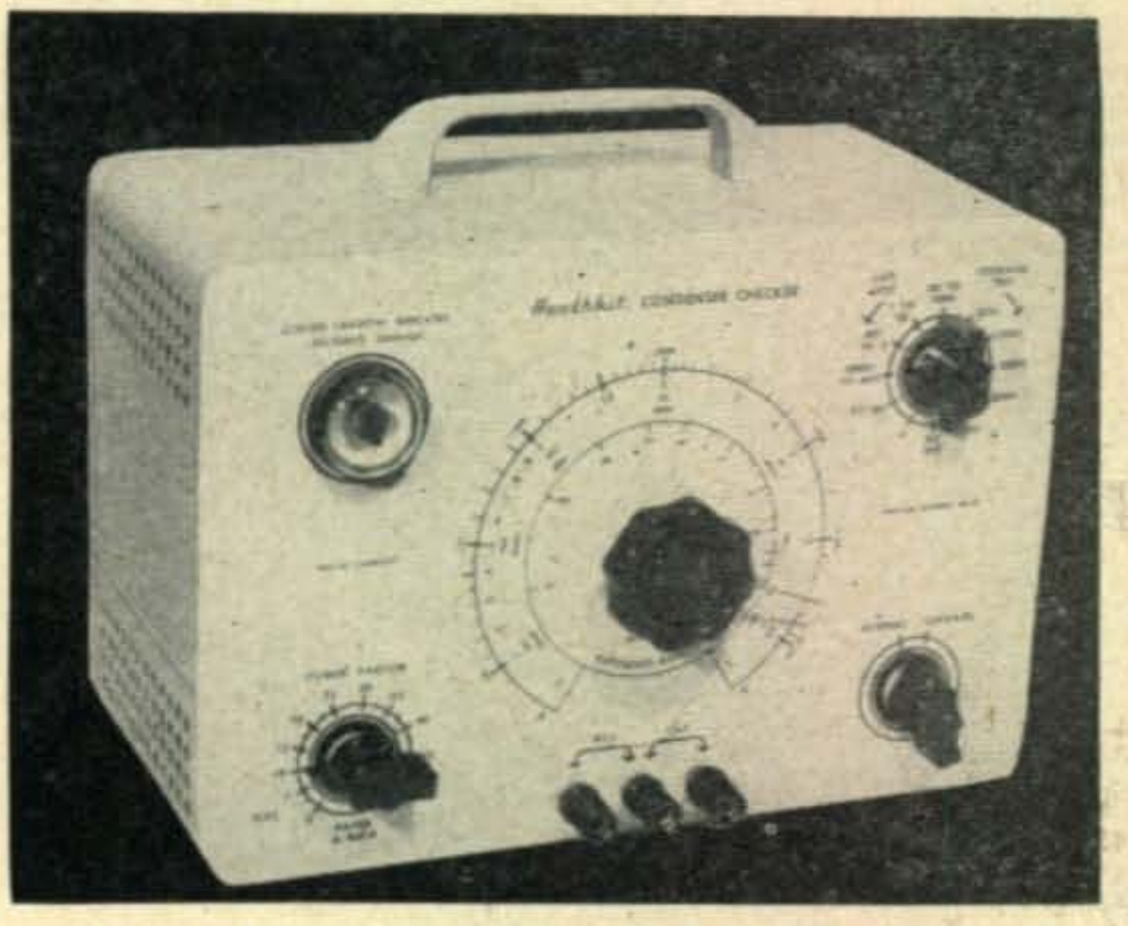
In making this test the desired voltage is selected on the range switch. When this voltage is first applied to the condenser the eye will close momentarily but reopen if the condenser is good. A partial opening of the eye or continued fluttering indicates leakage or an intermittent short.

A power factor balance control such as mentioned in *Fig. 4* is included in this instrument, and calibrated in percentage.

Types of Condensers

In the selection and testing of condensers there are several factors which enter into their proper usage. Perhaps the greatest usage for a capacity bridge, in terms of quantity, is for

(Continued on page 55)



A useful item around the Ham shack is a condenser checker. The Heathkit model can also be used as an ohmmeter in a pinch.

Three days a week, Bob has a regular job as an "information" expert in the stores of the Hudson Radio & Television Corporation in New York and Newark, N.J. His advice is eagerly sought by hundreds of regular visitors, whom he recognizes readily by their voices.

W2JIO

Achievement in Darkness

ROBERT HERTZBERG, W2DJJ

Up on the east side of the Bronx, one of the boroughs of the City of New York, lives a Ham who makes his own transmitters and receivers, strings antennas over the roof, fixes ailing radio sets for neighbors, and collects test instruments, components, tubes, etc.

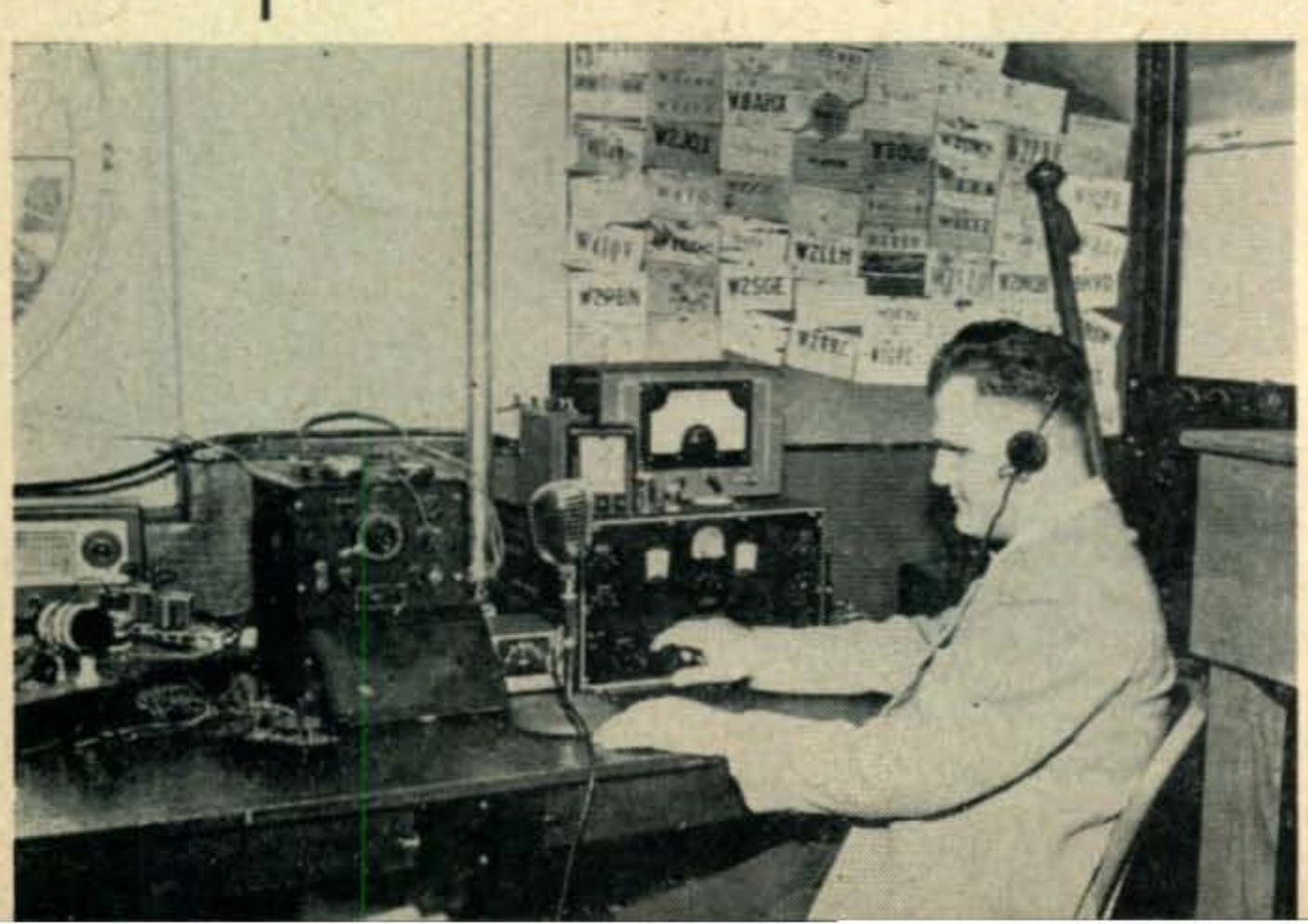
"So what?" you say. "There are thousands of such Hams all over the country. What's so unusual about this guy?"

Nothing much . . . except the fact that he has been totally blind since birth.

After the impact of this bit of information has expended itself, most people react by expressing deep sympathy for Robert W. Gunderson, better known over the air as "Bob," W2JI0. He doesn't ask for it or need it, for he is a thoroughly adjusted, self-reliant, gainfully employed and completely cheerful individual. He is happily married, has his own comfortable apartment, and leads a far more normal life than do some other people I know.

A couple of years ago Bob was invited to describe and demonstrate some of his tricky test equipment at one of the semi-annual dinner meetings of the Quarter Century Wireless Association in New York. He has done a very clever job of converting visual-meter conditions into audio signals, which he is able to monitor and interpret with uncanny accuracy. While he was handling a pile of equipment with unerring deftness, I happened to glance across the table at a well-known Ham who is president of a large manufacturing firm. He was furtively wiping his eyes with his napkin. Realizing that I saw what he was doing, he leaned over and whispered, "Damn it, that man is giving me an inferiority complex, and rightly so!"

Like many other Hams Bob broke into the game by making a crystal receiver at the ripe age of 10. That was exactly twenty-five years ago. After graduating from the New York



Bob Gunderson at the receiving position of W2JIO. He works both phone and CW and skips around the bands.

Institute for the Education of the Blind in 1937, he stayed on as the school's radio instructor, a position he still holds in addition to others. He has taught several hundred blind students enough electronics to qualify them for factory and service work and Ham licenses.

His classrooms at the Institute and his own apartment are cluttered with the usual gear found in Ham shacks everywhere. The only difference is that all the knobs, dials and other controls are fitted with little bumps, over which he presses his educated fingers when he adjusts them.

When I visited the school for the first time and Bob showed me through it floor by floor, room by room, table by table . . . get this, *he* showed me . . . I hesitated a long time before asking him a question that was straining at my tongue, "Uh, how do you manage the soldering part of all this construction?"

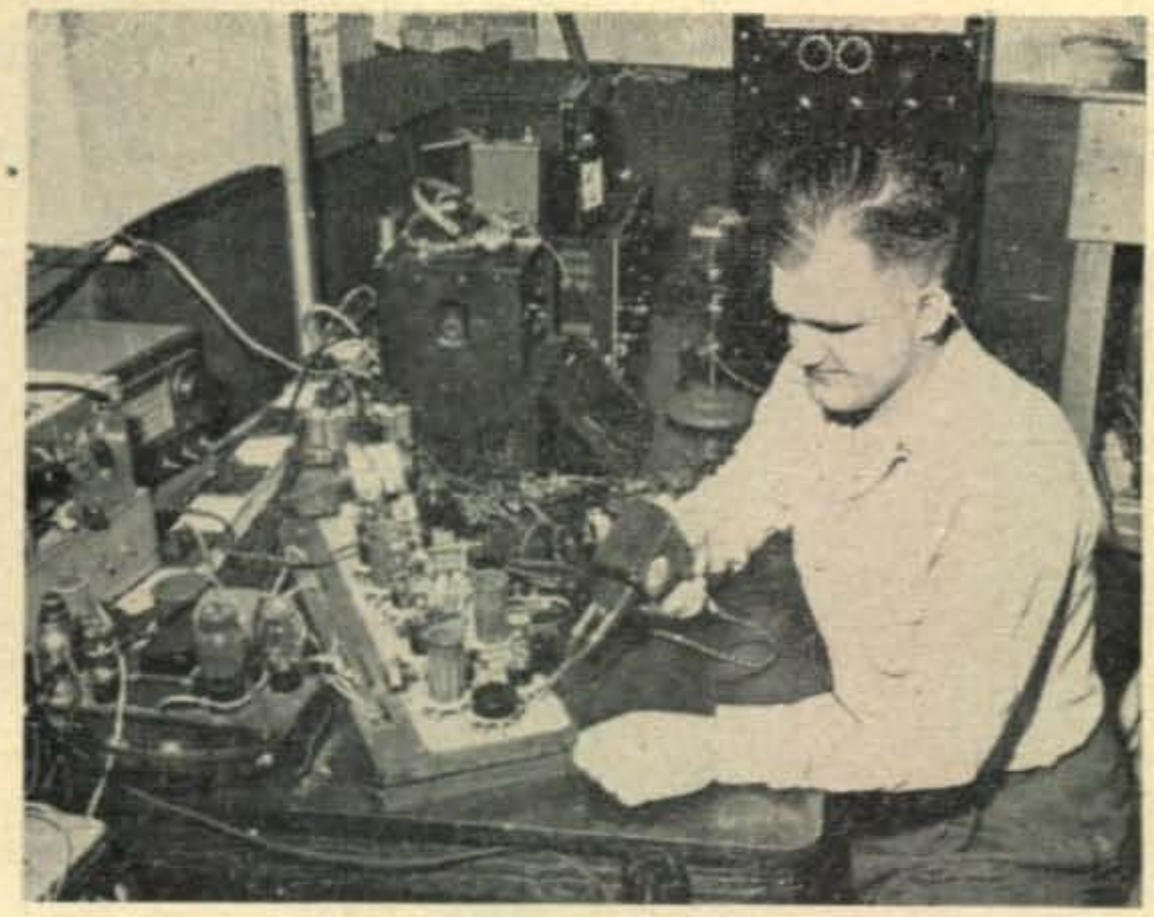
He laughed, then led me to a big work bench. He pulled a "breadboard" transmitter toward him, plugged in a gun-type iron and soldered a few joints while I watched, bug-eyed.

Bob lives at 984 Waring Avenue, Bronx 67, N.Y., just around the corner from the Institute. This makes it easy for him to get back and forth, not that distance to a destination is any handicap to him. For instance, in his capacity as technical consultant for the Hudson Radio & Television Corporation, he spends one day per week in each of the firm's three stores at 48 West 48th Street and 212 Fulton Street, in New York, and 35 William Street, Newark, N.J., and he makes the trips by subway unassisted. No seeing-eye dog, no dark glasses no white cane . . . he just goes his way His friends swear that Nature has endowed him with human radar sensibilities!

Gunderson's job at Hudson is to answer technical questions and dispense general advice. He's been at it now about eight years, and David H. Ormont, president of the firm, is highly pleased with his services. He knows hundreds of regular visitors from their voices.

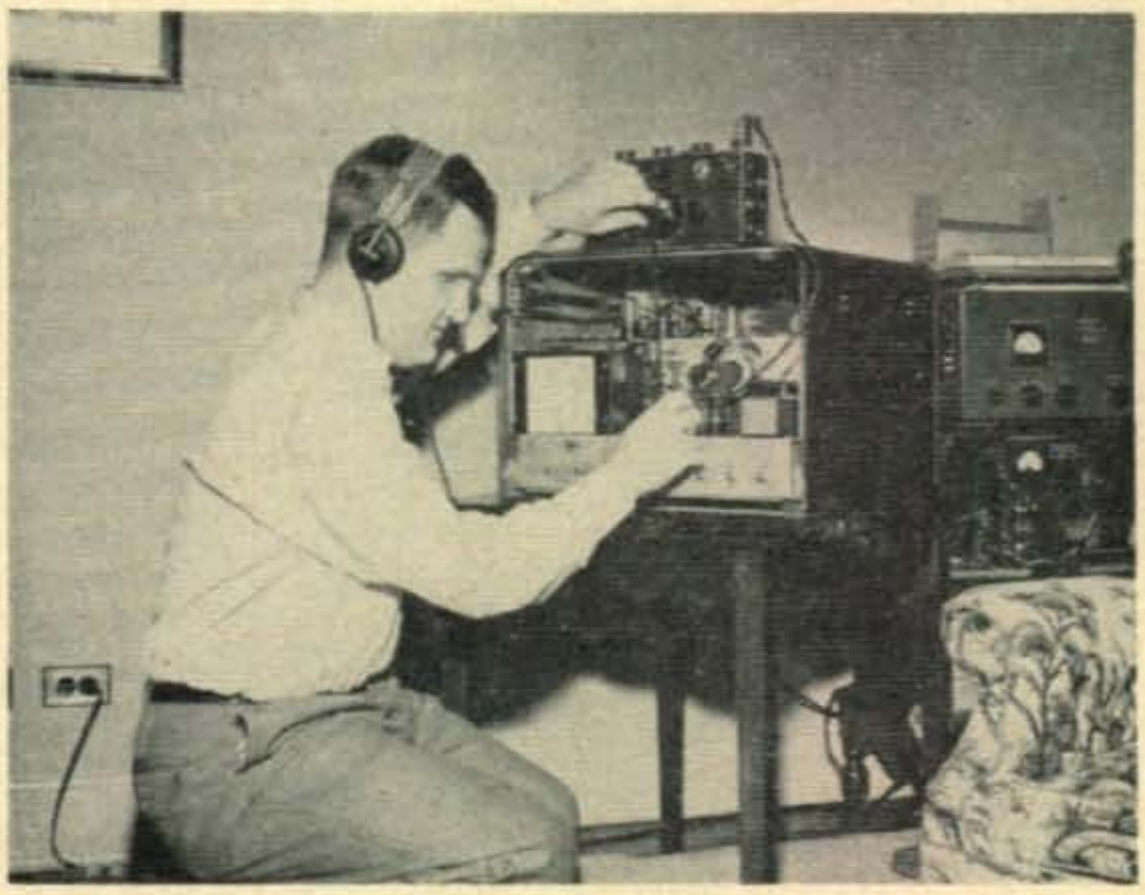
New customers who are shunted to Bob for technical dope by the floor salesmen often don't realize immediately that he is blind. They'll ask him questions, discuss some circuit feature or trouble-shooting procedure, thank him for his suggestions, walk away, and then stop suddenly, their faces the picture of astonishment. "Why, that fellow must be . . . ."

Bob's pet project is the Braille Technical Press, a radio-electronics guide that he publishes monthly. He tries to collect a small subscription fee for it, but he never turns down a request from a blind person who can't afford to pay. This "magazine," complete even to schematic diagrams, has enabled numerous sightless people to enjoy one of the world's greatest hobbies, Ham radio. Practically all the money Bob earns goes into the Press, and he is grateful for any contributions from outsiders to ease his burden. How about it, gang?



Wiring up a breadboard transmitter is no problem for Gunderson. The gun-type soldering iron greatly simplifies the job, although Bob used a regular iron for years without suffering more than a few initial minor burns.

A blind person "reads" a copy of his Braille Technical Press by passing his fingers over the embossed bumps on the pages. Published monthly, this guide has enabled numerous "readers" to become good radio men . . . and women.



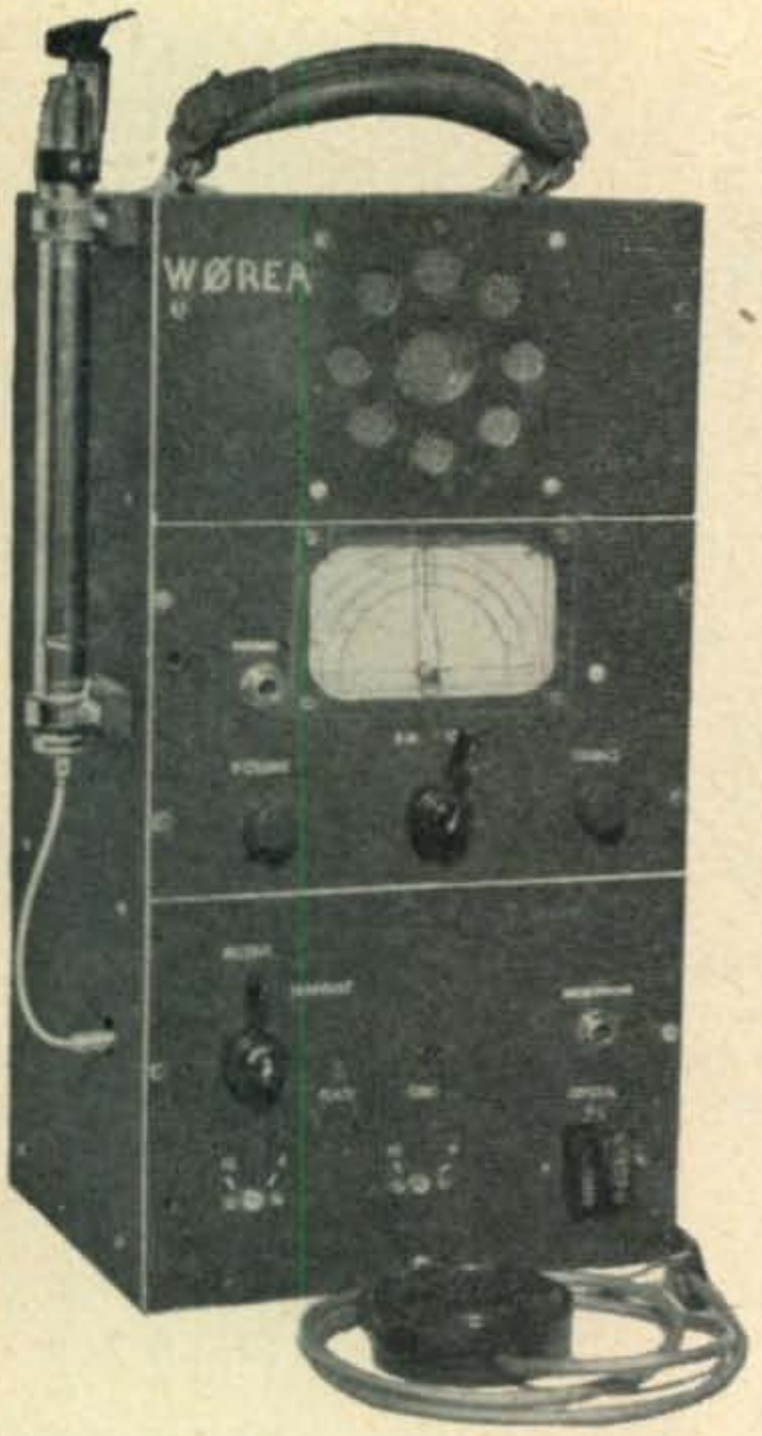
If you think this is a gag, you're very much mistaken. Bob Gunderson can and does shoot trouble in television receivers, up to the point, of course, of adjusting the picture. This set, in the living room of his apartment, is for the benefit of his wife Lillian.

10/6 Packset

CLIFFORD C. JOHNSON, WØURQ

1258 Van Buren St., St. Paul E-4, Minn.

Part II of this two-part story on the CD and emergency unit designed for the St. Paul/Minneapolis gang. The first part appeared in the May 1954 'Mobile Issue.'

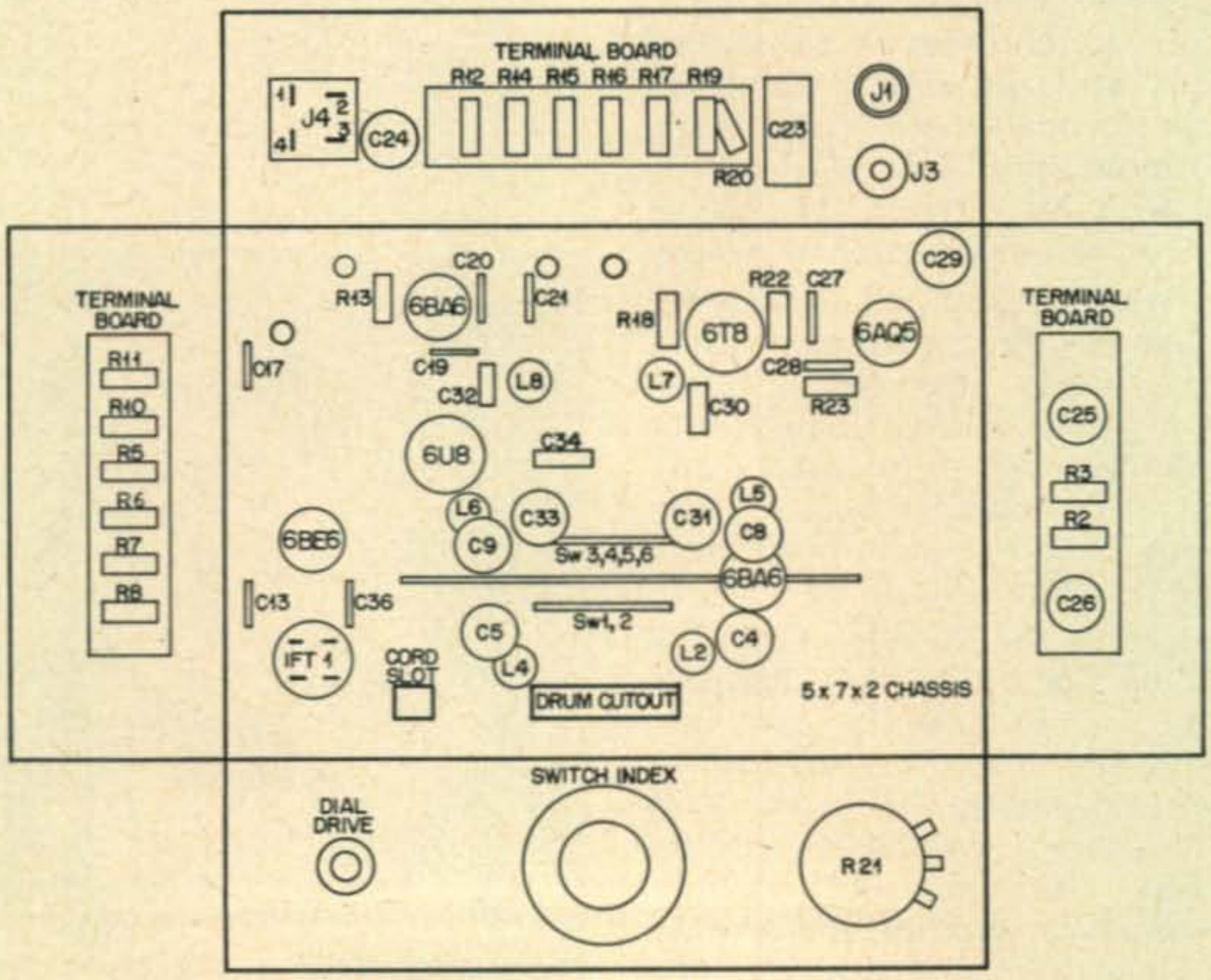


Receiver

The receiver is small—on a 5″x7″x2″ chassis—but its performance belies its size. It is a six-tube dual conversion superhet with noise limiter, full a.v.c., adequate speaker output, and band switching for ten and six meters. Fair selectivity was deemed necessary for optimum simultaneous operation of several nets in one band such as planned for RACES and Civil Defense operation. Dual conversion is also a must in a high-frequency receiver to eliminate images and still maintain a degree of selectivity.

The design was made as simple as possible without any special parts so it could be easily constructed. The r-f stage is a 6BA6, the mixer a 6U8, the conversion oscillator and first i-f stage a 6BE6, the second detector, noise limiter and first stage of audio are combined in a single triple diode 6T8, while the audio output tube is a 6AQ5. The speaker plugs into a jack on the rear of the chassis, but headphones can be plugged into the jack on the front panel. Only three controls are on the panel—tuning knob, volume control and bandswitch.

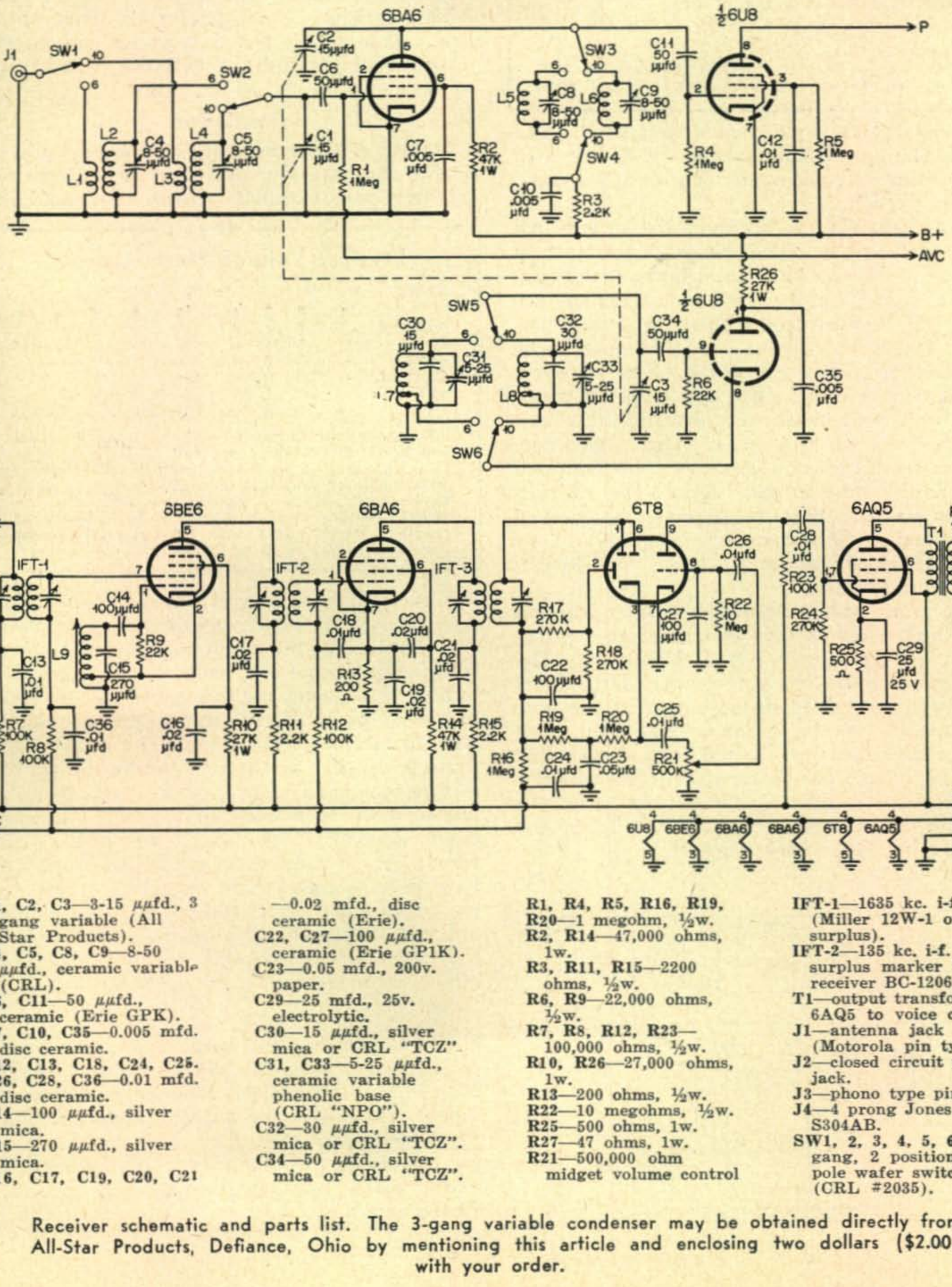
The i-f channels used were chosen because surplus 135-kc. transformers were available in quantity from the "Marker Beacon" receiver, BC-1206. Standard 262 kc. or 175-kc. transformers would be almost as suitable. The frequency of the conversion oscillator was made 1500 kc. so that its harmonics would not fall in any usable part of the ten-meter band. The 18th harmonic falls on 27 Mc., the 19th on 28.5 Mc., while the 20th falls on 30 Mc. Shielding



Receiver chassis bottom layout diagram.

of this oscillator coil and the addition of a small copper shield over the bottom of the 6BE6 tube socket reduces these harmonics to a low value. The harmonics falling in the six-meter band are of such a high order that they are too weak to cause any trouble. The higher i-f channel had to be either 1365 kc. or 1635 kc. The latter frequency was selected to limit the possibility of strong broadcast stations feeding through the i-f system. Standard 1500-kc. i-f transformers can be made to tune to this frequency while many surplus i-f transformers are available that can be easily modified for the purpose.

The layout and method of construction was planned for ease in assembling. The tuning mechanism is a cord and drum type that gives smooth vernier tuning. The dial proper is a recessed piece of white cardboard behind a Lucite window in the panel, the pointer being



C1, C2, C3—3-15 µµfd., 3 gang variable (All Star Products).
C4, C5, C8, C9—8-50 µµfd., ceramic variable (CRL).
C6, C11—50 µµfd., ceramic (Erie GPK).
C7, C10, C35—0.005 mfd. disc ceramic.
C12, C13, C18, C24, C25. C26, C28, C36—0.01 mfd. disc ceramic.
C14—100 µµfd., silver mica.
C15—270 µµfd., silver mica.
C16, C17, C19, C20, C21—0.02 mfd., disc ceramic (Erie).
C22, C27—100 µµfd., ceramic (Erie GP1K).
C23—0.05 mfd., 200v. paper.
C29—25 mfd., 25v. electrolytic.
C30—15 µµfd., silver mica or CRL "TCZ"
C31, C33—5-25 µµfd., ceramic variable phenolic base (CRL "NPO").
C32—30 µµfd., silver mica or CRL "TCZ".
C34—50 µµfd., silver mica or CRL "TCZ".
R1, R4, R5, R16, R19, R20—1 megohm, ½w.
R2, R14—47,000 ohms, 1w.
R3, R11, R15—2200 ohms, ½w.
R6, R9—22,000 ohms, ½w.
R7, R8, R12, R23—100,000 ohms, ½w.
R10, R26—27,000 ohms, 1w.
R13—200 ohms, ½w.
R22—10 megohms, ½w.
R25—500 ohms, 1w.
R27—47 ohms, 1w.
R21—500,000 ohm midget volume control
IFT-1—1635 kc. i-f. (Miller 12W-1 or surplus).
IFT-2—135 kc. i-f. from surplus marker beacon receiver BC-1206.
T1—output transformer 6AQ5 to voice coil.
J1—antenna jack (Motorola pin type).
J2—closed circuit phone jack.
J3—phono type pin jack.
J4—4 prong Jones socket S304AB.
SW1, 2, 3, 4, 5, 6—2 gang, 2 position, 4 pole wafer switch (CRL #2035).

Receiver schematic and parts list. The 3-gang variable condenser may be obtained directly from All-Star Products, Defiance, Ohio by mentioning this article and enclosing two dollars ($2.00) with your order.

Coil Winding Data

Receiver section

Six meters:

L1—3 turns #30 at bottom of L2
L2—4 turns #22 on ⅜-inch polystyrene rod spaced ¾-inch.
L5—3½ turns #22 on ⅜-inch polystyrene rod spaced ¾-inch.
L7—3½ turns #22 on ⅜-inch polystyrene rod spaced ¾-inch tapped 1 turn from cold end.

Ten meters:

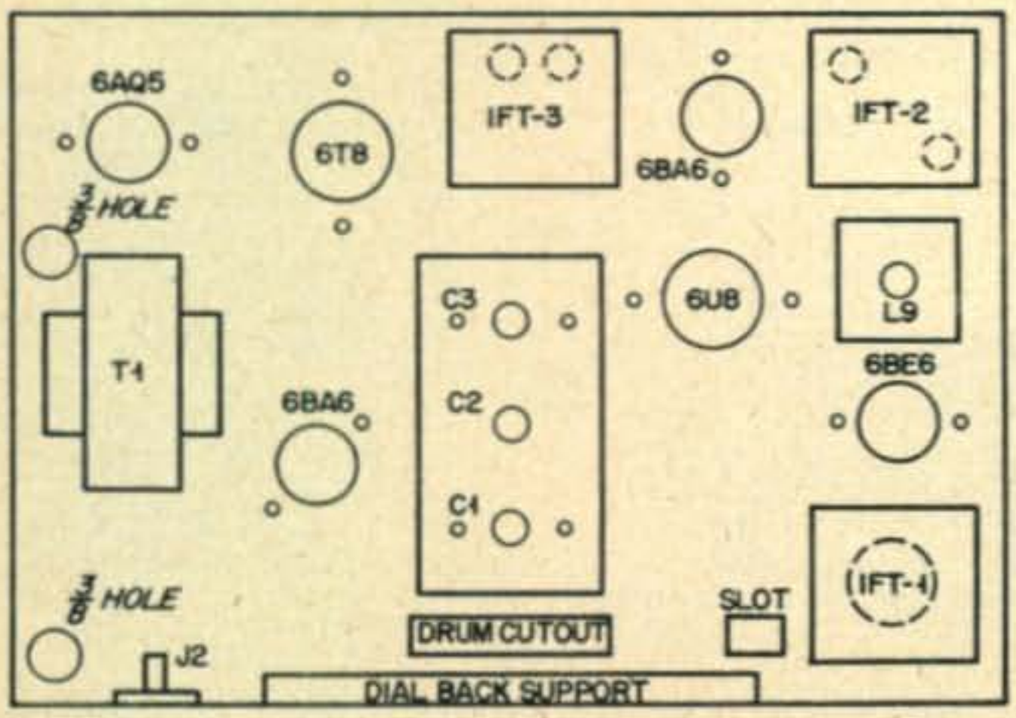
L3—4 turns #30 at bottom of L4.
L4—9 turns #22 on ⅜-inch polystyrene rod spaced ¾-inch.
L6—same as L4.
L8—9 turns #22 on ⅜-inch polystyrene rod spaced ¾-inch tapped 3 turns from cold end.

attached directly to the condenser shaft. The dial is thus protected from being damaged or the pointer being bent or torn off when carrying the packset.

Most of the resistors are mounted on terminal strips and preassembled before being put in place as units near their location in the circuit. The bandswitch and the ceramic trimmer condensers are mounted on a small aluminum partition, which also acts as a shield between the grid and plate sections of the 6BA6 r-f stage. This assembly is installed last, after all major parts have been mounted and wired, thus leaving plenty of working space. The by-pass condensers are all ceramic types and are mounted right at the tube sockets. Before the r-f coils are put in place, the i-f system can be checked and tuned. The last step is installing the r-f coils and checking the tracking, and, finally, calibrating the dial.

The front panel from the cabinet was cut into three sections and two of them used as panels for the transmitter and receiver. The top section is drilled with several large holes and the speaker is mounted behind it, fastened permanently to the cabinet. Two shelves of sheet aluminum were bolted into the cabinet dividing it into compartments for the two separate units that make up the packset. The rear panel of the cabinet is also cut off at the top one third. It is hinged back together again to make a door to the top compartment which is used for the storage of accessories such as extra cables, headphones, mike, and maybe a screwdriver or two. The rear of the speaker is covered with copper screen to prevent damage to the cone.

A short cable is used to connect the two units in the cabinet and the antenna plugs into the transmitter section through a hole in the side of the cabinet. The antenna is a fully collapsible type that is mounted on the side of the cabinet and extends to 52 inches when in use. This length is about right for six-meter operation. Although it is too short for ten meters, it will load up and the radiation is adequate for local work over several miles.



Layout plan for the top of the receiver chassis.

Conclusion

Several of these *Packsets* have been built up during the past year and used in a variety of activities with excellent results. The acid test was given during several hours of continuous operation in 90 degree temperature supplying communications for a golf tournament with no equipment failure. A *Packset* makes an ideal hidden transmitter for hunts and can be taken to almost any unlikely location even if you do have to take a battery along. The total battery drain is less than ten amperes and a storage battery lasts a good many hours. Another use is talking back to a fixed station when running down some TVI. Although no special pains were taken to make these units TVI-proof, they have been operated right next to TV sets with no outstanding interference. With an outside antenna they make ideal stations for local rag chewing over considerable distance, and when either six or ten meters are open you are all set to go.

The transmitter and power supply for the receiver and transmitter were featured in the May 1954 issue of CQ. This issue may be obtained from our Circulation Manager, Back Issues Dept. for 40c. For those who did not see this issue, the transmitter consists of a 10 and 6 meter unit (no bandswitching) with a 12AU7 and 6AQ5 output. It is modulated by a single 6AQ5 driven by another 12AU7. Power supply is a vibrator with selenium rectifiers.

Receiver Voltage Measurements

TUBE	PIN NUMBER—VOLTAGE								
	1	2	3	4	5	6	7	8	9
6BQ6 r.f.	-.75	0	0	6	180	50	0		
6U8	100	-2	35	0	6	150	0	0	-.75
6BE6	-1.5	0	0	6	225	75	-*		
6BA6 i.f.	-*	1.5	0	6	210	80	1.5		
6T8	-1	-*	+*	0	6	-1	0	-.5	
6AQ5	0	15	0	6	210	225			

All measurements taken with a Simpson model 260 VOM, 20,000 ohms per volt. Polarity is positive with respect to chassis ground unless otherwise indicated. Voltages marked (*) are too small to be read with any significance other than to show probable correct operation by polarity of reading. Source voltage was 225 and total current for the receiver is about 60 ma. at this voltage.

Gathered by DICK SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands, USA.

We welcome the following newcomers to the HONOR ROLL:

VK3XO 39-166
ZL4BO 39-147
DL1YA 38-153
KV4BB 35-187

New DX Committee

CQ is happy to announce the formation of a new "DX Committee." This will replace the old committee which resigned last year.

In forming this committee, *CQ* wanted a group of DX men who would be representing many active areas of the U.S.A. and one which would be democratically selected. To this end we approached eight amateur radio associations and requested that they select one of their members to serve on our "DX Committee." Their cooperation was immediate and we are very pleased to present the new "DX Committee" who, with your writer, will shape *CQ's* DX policies in the future:

W1MCW, Mrs. Lou Littlefield,
New England DXCC'ers.
W3BES, Jerry Mathis, *Frankford Radio Club.*
W3JTC, Larry Eisler, *Potomac Valley Radio Club.*
W5FXN, Jim Price, *West Gulf Radio Club.*
W6FSJ, Wendell Pierce,
Southern California DX Club.
W6TT, Elvin Feige, *North California DX Club.*
W8FGX, Jake Schott, *Ohio Valley Radio Ass'n.*
W9NN, Bob Baird, *W9 DXCC Club.*

Members will serve for a period of one year, after which the incumbent may be re-elected, or a new member chosen by his respective club.

Our aim is to promote any action in the DX field which has popular demand and which would be to the betterment of Ham radio in general. To this end we solicit your ideas and suggestions and promise each will receive careful consideration by the "Committee."

At Time of Writing

SARAWAK, VS5RO, BRITISH NORTH BORNEO, ZC5RO: We have word that Bob Roberts, G2RO/VQ5RO/VP2GRO, etc., was due to leave for Sarawak on June 1. He will be active from this spot for two weeks, especially on weekends. After Sarawak, Bob will proceed to British North Borneo and on to the locations in the above box.

Itinerary of G2RO in Esia and Probable Calls

June 4 to June 18: SARAWAK—VS5RO
June 18 to June 28: BR. NORTH BORNEO—ZC5RO
June 29 to July 8: HONGKONG—VS6RO
July 18 to July 24: KUALA LUMPUR, MALAYA—VS2RO
July 24 to July 31: PENANG, MALAYA—VS2RO
Aug. 1 to Aug. 7: CEYLON—4S7RO
Aug. 7 to Aug. 12: NEW DELHI, INDIA—VU2RO
HOME.

SAN ANDRES, HKØ: As reported in the June CQ, some 75 Colombian Hams visited this QTH between May 4 and May 8. Three separate stations were set up and each operator took over for a two-hour period. Various calls were heard as each HK Ham signed his home station call letters preceded by the HKØ prefix. It is estimated that 90% of the operation was on phone and about 3000 contacts were made. Stations contacting five, or more, HKØ stations will be awarded a certificate. One Ham is "permanent" on San Andres. He is Victor Abraham, HKØAI (See March CQ).

CRETE, SVØWK: SVØWA advises us that SVØWK planned to put Crete on the air some time in June.

COCOS ISLAND, TI9RCCR: The Radio Club of Costa Rica hopes to make an expedition to this spot in July or August. The call will be TI9RCCR.

ST. PIERRE, MIQUELON, FP8AA: We hear that Jack, W3BXE, now K2CPR, plans a return trip as FP8AA this summer.

GOA, PORTUGUESE INDIA, CR8AB: This station came on the air on May 15. He is the son of CT1CB and operates on 14020 kc.

LIECHTENSTEIN, HB9MX/HE: Operation for this station is planned for the second part of July or August. 400 watts CW and phone will be used on the 7, 14 and 21-Mc. bands. Operators are HB9MX and HB9JK.

COMORO ISLANDS, FB8: Scuttlebutt has it that Jim, ST2UU, plans to appear from this QTH in August.

SPITZBERGEN, LB5ZC: A report from LA4ZC says that there is a possibility of activity from this rare spot in the near future. The call will be LB5ZC.

TRINIDADE ISLAND, PYØ: Word from PY4IE advises us that good news regarding this long awaited expedition should be available soon.

MAWSON BASE, AUSTRALIAN ANIARTICA, VK1EG: Bill Storer, ex-VK1BS, is now active from this QTH. Not much DX'ing has been done as yet, but schedules are maintained with VK1DY on Heard Island, 1600 GMT, 7040 kc. Bill is Postmaster there.

JORDAN, ZC7DO: This prefix fell on many startled ears in May. However, Paddy gives his QTH as Jordan and, no doubt, this one will count the same as the ZC1 and JY prefixes. See QTH's.

NORFOLK ISLAND, VK9OK, VK9RH: These stations have been quite active. VK9OK's stay was apparently cut short and he advised us that he is returning to New Zealand (May 1954), and QSL's should go via ZL1AJU.

FORMOSA, AB1US: This station, ex-C3EA, has been handing out contacts on phone, VFO 14175, 0700 GMT, etc. Operator is Sgt. 1/C Al Hatlestead and all QSL's go to the USA via airmail. See QTH's.

DX Notes

The **Clipperton** gang is now back home for a well earned rest. On the way back they were entertained by the San Antonio, Dallas and Tulsa Hams. A total of 1108 stations were worked from Clipperton, mostly W's. Only one European was worked (OK1MB), two Africans and no Asians. Due to generator breakdown, 21-Mc. operation netted only 28 contacts. They reported that XE1PK was on the Mexican Islands of Revilla Gigado when they left. It seems that XE4PK works 7-Mc. phone. (Thanks to West Gulf Bulletin) . . . W6YY advises that **VR2CG** can arrange skeds with FW8AB if approached right. Also, solar observers at the Mount Wilson Carnegie Observatory seem to think that we are now past the bottom of the sunspot cycle . . . **X1NP**, is a self-confessed pirate, he operated from a ship recently off the Australian Barrier Reef . . . **VR6AC** is definitely a phoney as the real VR6AC, on Pitcairn, tells ZK1AB that he has only been on 75-meter phone for the past months and has only worked ZL's and VK's . . . Another one, **ZK4AC**, claims to be on Tonga Reva. This is an island in the northern Cook Island group (Penrhyn Islands), and falls under the ZK1 prefix. ZK1AB also reports this one as NG . . . Lastly, TI2TG, reports **TI3EP** as a pirate 1/c. Possibly one or more of these calls may emanate from the same misguided gentleman ——so much for our rogues gallery.

Several reports on Albanian contacts have been made, but not confirmed, as yet, as "legal." YU1AD says there is NO legal Ham activity from ZA and he is close enough to know. OK1MB said there would be activity from ZA1KAA, ZA1KAB and ZA1KAC during the Russian contest of May 8 (none were heard here—— **KV4AA**). **ZA2MU** was heard in QSO with DM2ABL. The latter reports that two stations are licensed there, ZA1AC and ZA1KAA. Thus, with conflicting reports we just "hope for the best" . . . The **RSGB Bulletin** says that the Sultanate of Oman, as VS9, will be dropped from the lists. This is somewhat obscure, but it may mean that an independant prefix will apply . . . **ZC6UNJ**, Palestine, has been active on 14015 with ex-HS1UN at the key . . . **MP4QAH**, Tony (Qatar), is due to QRT on July 1 and return to England . . . **EAØAC** was due to leave for home on May 16 . . . PJ2AA reports **JZØKF** will be QRT and return to Holland in June. W2KMZ, who handles JZØKF's cards, just received 50 from him. He also has the logs of VK9YY covering the period from Dec. 1952 to May 2, 1954 if any QSL's are missing . . . **KF3AB** has been active on 14030 (Fletchers Ice Island near North Pole).

Roy, **W3CHV/ex-SVØWG**, should now be in Manila. For any missing DU QSL's please advise W3AXT, who will forward to W3CHV who will do his best to obtain same . . . **LB6IE** is active from Jan Mayen and has been heard on 7 Mc. . . . W9ABA says **LB8YB**, also Jan Mayen, may be heard Sundays, 2100 GMT, 14040 . . . VS1FM was QRT on June 1 and heads back to G3JOE . . . **ZD1SS** has been heard on 14132 and 14078, CW, 2000 GMT . . . **AP2N** should be in VU-land now . . . **SV1AB** is the second, native, Greek station licensed. He is on phone and speaks good English . . . The following Austrian Hams have been licensed and may be contacted by W stations: **OE1ER** (ex-OE1CD), **OE1WB**, **OE1NP** and **OE3RE** . . . W and VE QSL's for EL2P and EL2X may go via W1JOJ . . . **VR3A** continues activity, 14052, 0300 GMT onwards . . . **FK8AL**, Johnny, wishes it known that he is on each day from 0400 to 0600 GMT, 14060 to 14100 VFO. See QTH's . . . ZK1AB was overheard working Andy, **VR6AW** on 7 Mc.

QSL Averages of DL1YA

Area	Stations Worked	QSL's Received	Percent
W1	107	58	54
W2	142	70	49.5
W3	84	48	57
W4	75	35	46.5
W5	31	17	54.5
W6	21	14	66.5
W7	22	17	77
W8	59	27	45.5
W9	27	17	63
WØ	24	15	62.5
All USA	**592**	**318**	**53.5**
Other North America	93	62	66.5
South America	70	36	51
Africa	157	79	50
Asia	94	59	62.5
Oceania	71	33	46
Europe	2322	1352	58
Totals	**3399**	**1939**	**57%**

Endorsements to Honor Roll

W8NBK	40-246	W6BUO	40-148	W6CAE	39-145
W6SN	40-245	W8KIA	39-239	TI2TG	38-218
W6AM	40-244	KV4AA	39-236	W1HA	38-202
W8PQQ	40-243	W2WZ	39-234	WØTKX	38-184
W2AGW	40-243	W3EPV	39-230	DL1YA	38-153
W6SYG	40-242	W1BIH	39-223	W4EPA	37-155
W3EVW	40-242	W2QHH	39-223	W2ZVS	36-163
W8BHW	40-242	W9FKC	39-216	W3AXT	36-157
W6MX	40-241	W9HUZ	39-206	KV4BB	35-187
W6ADP	40-241	W1ZL	39-205	W5FXN	35-165
VE4RO	40-238	W3KDP	39-200	W6ZZ	35-135
W6DZZ	40-235	W4RBQ	39-195		
W6GDJ	40-231	W6GPB	39-193	PHONE ONLY	
W7BD	40-228	W9ABA	39-179	W6AM	38-171
W6TI	40-221	W8VLK	39-177	W1MCW	36-211
W6DLY	40-219	VK3XO	39-166	W1NWO	36-206
W6EPZ	40-214	ZL4BO	39-147	TI2TG	36-182
W6BUD	40-208	TF3SF	39-145	W3EVW	35-166

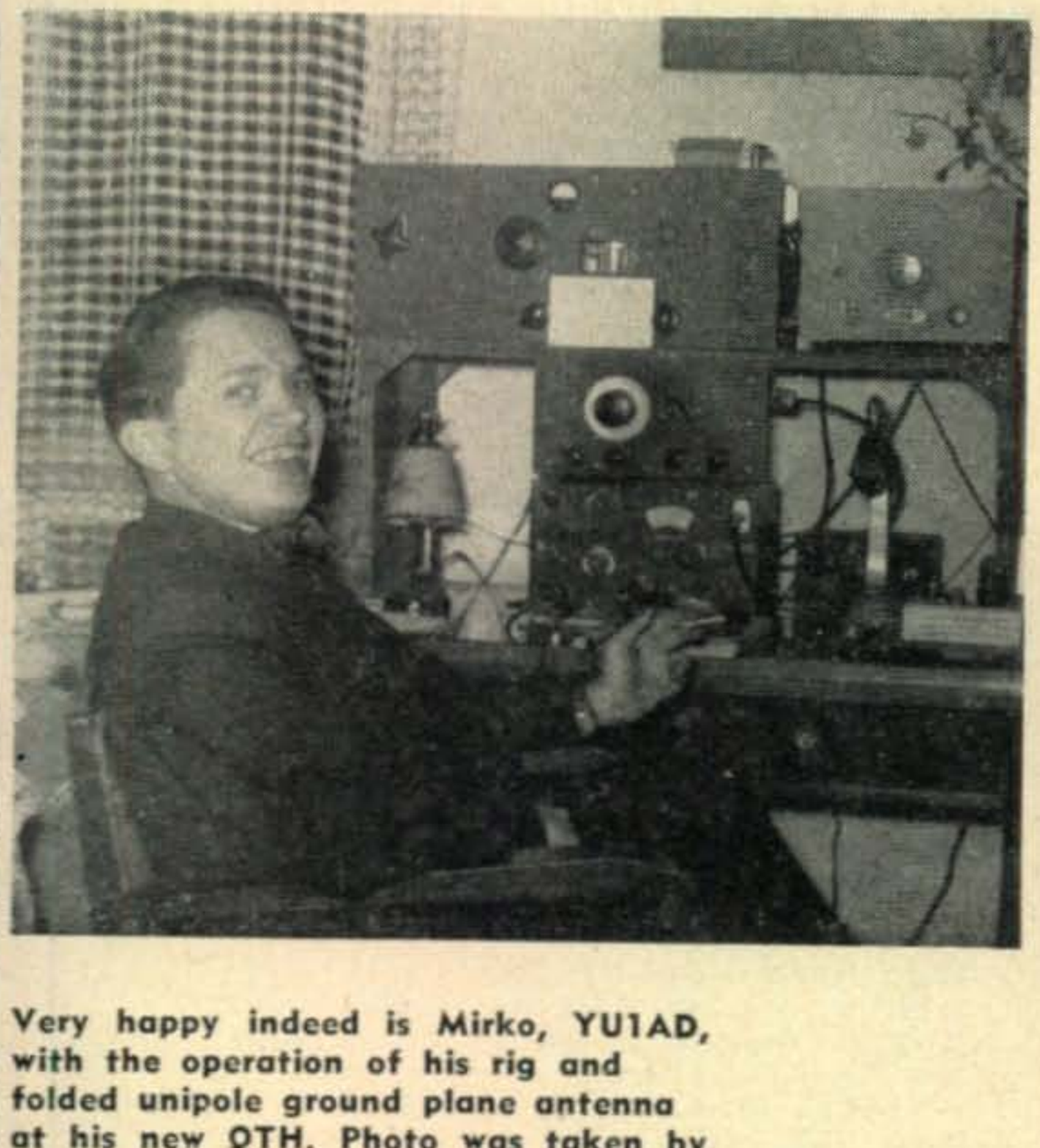
Last complete HONOR ROLL appeared in the May issue.
Next complete HONOR ROLL will appear in the September issue.

DX-ploits

FO8AJ was No. 246 for Arkie. **W8NBK**, moving him ahead of W3GHD . . . **W6SN** added 8AJ for No. 245 jumping him over G6RH . . . Don, **W6AM**, went to 244

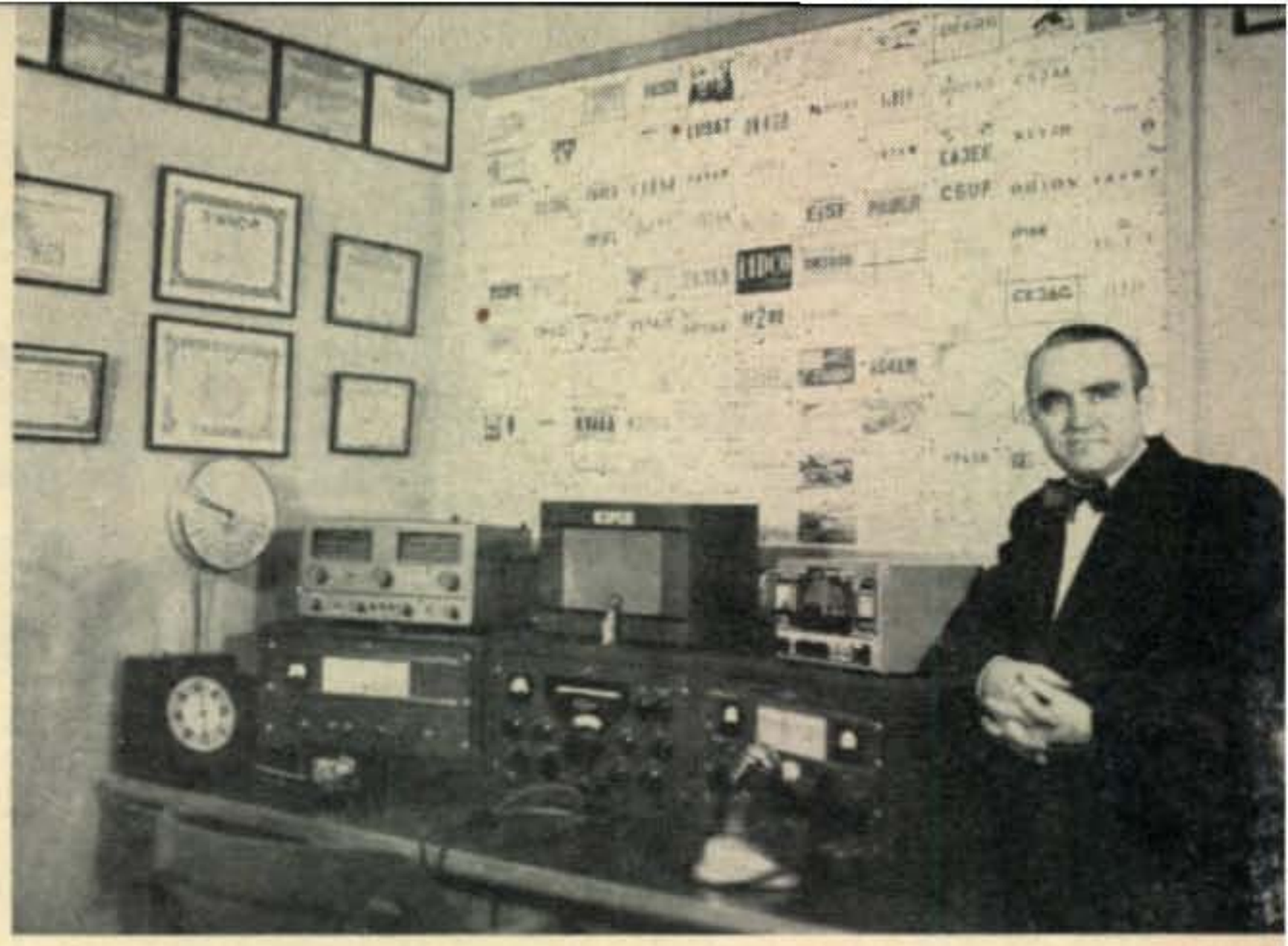
(Continued on page 53)

W4TK, Bob Reid, Jacksonville, Fla., has been active from this QTH for 29 years. Bob runs a KW on Phone and CW on the 7, 14 and 28 Mc. bands. He is an engineer at WMBR-TV.



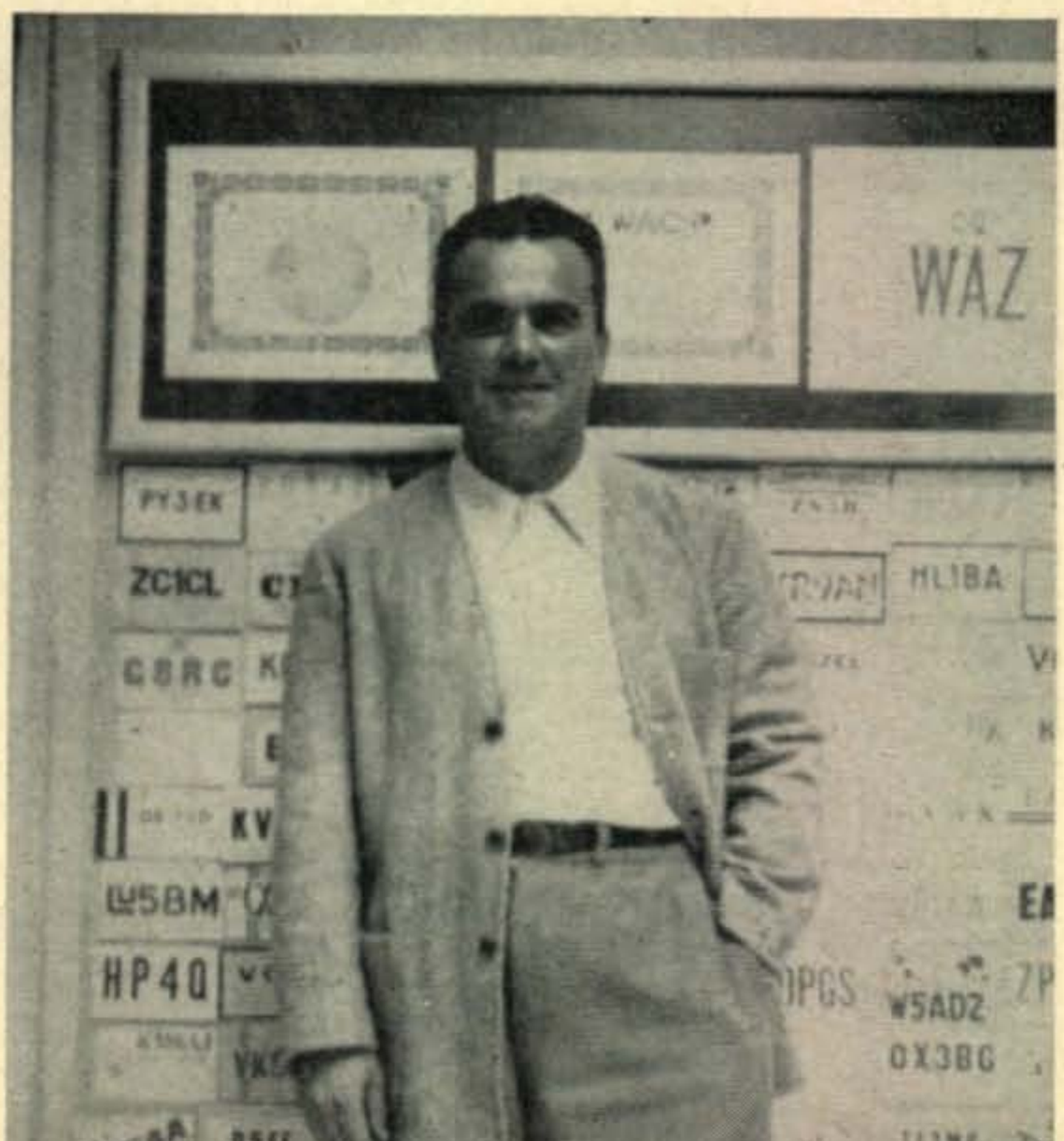
Very happy indeed is Mirko, YU1AD, with the operation of his rig and folded unipole ground plane antenna at his new QTH. Photo was taken by Bob, YU1GM/W4GMP. We wish him and YL Lela our best on their coming hook-up. Mirko is up to 208 countries.

Needing no introduction is Julio Badin, CX1FY, of Colonia, Uruguay.



The neat layout of W3PGB, Lee Scott, "Scotty" of Silver Spring, Maryland. Collins equipment is used and emergency gear is on top. Scotty has that perfect "El-bug" fist and operated as NU5ANY in 1922 and W5BOW in 1930.

L to R are JA1NQ, JA1EG, JA1GS and JA1HG, who were snapped during a meeting of their local radio association, the Akabane Club. Photo courtesy W6GPB.



Monitored by LOUISA B. SANDO, WØSCF

c/o General Delivery, Cortez, Colorado

Once again the reins of YLRL change hands. Our congratulations to all of the officers of the *Young Ladies' Radio League* who will be serving during the 1954-55 term, and who take office on July 1. Our new president is W6CEE, Vada M. Letcher. Vada received her Ham ticket in February, 1948, and a month later joined the YLRL. This was the year all three top officers were W6s, and little did Vada dream that she would be the next W6-district president. Her Class A came along in Sept. '51. Her OM, Al, is W6HWM. Their station is a *Viking I* and VFO, *HRO-50T1*, and a 136-ft. longwire all-band antenna. They also use a *Gonset Communicator* and *Master* ground plane antenna on two meters. Four YL nets take most of W6CEE's operating time each week. Vada is a past president of the *Los Angeles YL Radio Club*, present secretary-treasurer (second term) of the *Los Angeles Council of Amateur Radio Clubs*, and past treasurer of the *Inglewood Amateur Radio Club*. Although a Nebraskan, she has lived in California since '41. Her present QTH: 1214 A Franklin St., Santa Monica.

Our new vice president is W6KER, Gilda Shoblo. This makes both top officers in W6 and since they live quite near each other and both are members of the *Los Angeles YLRC*, it should make it much easier for them to handle YLRL business. The girls are happy at the prospect of working together to see "what the West can accomplish"—hi!

Gilda has been on the air since November '50, starting out with a *TCS-6* on 10-meter phone. This blew up a year later, just after she got her "Class A." Then she went on 40 CW for a while. Now she and her OM, W6MES, are using a home-built transmitter running up to 800 watts, VFO, using 813's and 838's. Their receiver is an *HQ129-X* and they have a dipole antenna on 75. Gilda hopes to be on 20 by Fall. They also operate mobile using an Elmac on 75, 20 and 10. Gilda has just retired as president of the local YL club, but she says she will continue to dress up the club's *Lad 'n Lassie* certificates. Her second love is sewing and she also keeps a garden growing at the home QTH: 3715 Liberty Blvd., Southgate, Calif.

W6KER, Gilda Shoblo, YLRL's new Vice President.

The other three officers of *YLRL* have been re-elected for a second term. They are: secretary treasurer, W3UUG, Miriam Blackburn; publicity chairman, W3OQF, Barbara Houston, and editor, W9SJR, Bernice Schmidt.

A photo and write-up on **W3UUG** appeared in our September 1953 column. Miriam tells us there are now about 500 paid-up members in YLRL. If you are not a member and would like to join, write for information and an application blank to your column editor, or directly to Miriam, W3UUG, Box 2, Ingomar, Pa.

W3OQF has been in these pages a number of times. Her special interest at present is her new little daughter. As P/C she is anxious to have photos of YLs for the YLRL album—which, we may remind you, is available for conventions and YL get-togethers if you'll request it in advance from Barbie at 109 Seneca Dr., S.E., Washington 20, D.C.

W9SJR was featured in this column in October 1953 but we are happy to present her here with most of her "editorial staff." Bernice and the members of LARK have worked hard this past year on **Harmonics** and with help from all the girls the paper has improved with each issue. With reduced finances its scope must be curtailed, but as soon as the money is available Bernice and staff expect that **Harmonics** will again assume its place as a growing source of YLRL information. YL news for **Harmonics** should be sent to your District Chairman, but other material can go direct to Bernice at 3849 N. Kedvale Ave., Chicago 41, Ill.

YLRL District Chairwomen

District Chairwomen for the 1954-55 term are:
W1VOS, Marjorie Snow, 218 East St., Plainville, Conn.
W2JZX, Viola Grossman, 18 Phipps Ave., East Rockaway, N.Y.
W3—To be appointed.
W4RLG, Frances Shannon, Cottondale, Ala.
W5TTU, Patricia M. Parks, Rt. 1, Rotan, Tex.
W6—To be appointed.
W7SBS, Luryne Conner, Lake Shore Dr., Klamath Falls, Ore.
W8SPU, Helen Smith, Sycamore, Ohio.
W9LOY, Alice Bowlin, 6563 N. Tahoma, Chicago, Ill.
WØERR, Anna Belmonte, 2720 South Dahlia, Denver, Colo.
Canada: **VE3AJR**, Olive Daykin, 124 Erie South, Leamington, Ontario.
Canal Zone: **KZ5DG**, Grace Dunlap, Box 28, Balboa Heights, C.Z.
Hawaiian Islands: To be announced.

There were no nominees for the 3rd district. Incoming president W6CEE will appoint a W3 D/C. W6KER was on the ballot for D/C but since she won the election as VP, Vada will appoint another W6 YL to be D/C. The address above for W4RLG is her home QTH. For the next few months write to Frances at the U.S. Army Hospital, Ward 28, Ft. McClellan, Alabama. Frances is "taking it easy" while the doctors do battle with tuberculosis, but she writes she is making progress, and we hope she will soon be well again. Remember, these D/C's will be happy to receive news from you for YLRL **Harmonics.**

YL-OM Contest Cups

When the rules for this year's **YL-OM Contest** were issued, only first place winners in each category were eligible for cups. This was because the cups issued last year for second and third places were incorrectly inscribed. At the time the rules for this year's contest were being formulated, W2OWL did not know whether these cups could be redone so they could be issued again this year, as **YLRL** could not incur the additional expense of purchasing new cups. It now appears that the second place cups can be redone and these are being issued to the following: 2nd place YL phone, W1SCS; 2nd place YL CW, W9JUJ; 2nd place OM phone, W8AJW; 2nd place OM CW, W9VBZ.

With the Clubs

At its April meeting three new girls joined the **Los Angeles YLRC—K6BXX,** Ruth; **K6ALZ,** June; **KN6BBM,** Verdena. The club now numbers forty-two members. Another member has received her call, **KN6EIA,** Ellen. First timers for that meeting were KN6DRS, Jean; KN6EJE, Frances, and KN6DPY, Pat. VK2US entertained the girls with colored slides taken in Australia.

The Chicago **LARKs** are all set for conventions or other Ham doings. They have club pins, triangular in shape with **LARK** in script across the wide end. They also have kerchiefs with a bird and **LARK** on them, as well as their blouses just alike to wear to Ham affairs. Two club members recently received their General Class tickets; W9YXX, Rita, and W9SPI, Marge.

The **LARK's** vice president, **W9MYC,** Gladys Jones (fourth from left, top row, in group photo) is a gal from whom we could all take a tip. Gladys writes, "Most of my rigs I have built myself; in fact, I would rather build than operate." And her OM isn't even interested in Ham radio! There are two other Hams in the family, however, a son, Bob, W9DWD, and a brother-in-law, W9DOU. Besides Bob, their family consists of another son, a twin to Bob, and a daughter who is a freshman in college. Gladys has been on the air for a little over three years. She operates mostly 80 and 40, both CW and phone, and can get on 160, 10 and 2. All of her rigs are under 60 watts in power, and she really enjoys putting them together. W9MYC also operates as W9ZUZ at her summer home in Wisconsin.

Congratulations

To **W1QON,** Eleanor, on the arrival of her second jr. op, a daughter, on April 23rd. . . . And to **W7RSA,** Chris, who also took time out to have a baby, but is back with the NYLON net. . . . To **W7RHM,** Lana (another NYLON member), who is CD coordinator for the Gray's Harbor (Wash.) area. Lena has been so enthusiastic about her Hamming that she now has her mom, Ceil, on the air as W7RVG. Lana, crippled by polio, is going to Portland for eight or nine months to attend a rehabilitation school.

W6CEE, Vada M. Letcher, newly elected President of YLRL.

To Jeanne, **KL7RN,** and her OM Dick, **KL7IS,** on their rescue from a crash landing on Mt. McKinley. Jeanne and Dick were flying supplies to a mountain climbing party when a down draft caught their plane and forced them to crash land, 7000 feet up on the mountain. After five days they were rescued by an Army helicopter. Winds up to 120 miles an hour detained their rescue, and though their plane was not badly damaged in the landing, it was reduced to a pile of rubble by the wind. W7HHH, Bea, who talked with Jeanne on 20 meters soon after her rescue, says Jeanne was terribly burned by the wind and sun and that her hair was so badly tangled she had to have most of it cut off. Otherwise she is okay and went back to work right away. Jeanne credits the other Hams who were right in there pitching to help with their rescue.

Till next month, 33, *WØSCF.*

Were You in the Far East?

The Far East Amateur Radio League has served notice that unclaimed QSL cards for J, JA and KA call-signs issued to former occupation personnel will be destroyed around the first of the year (1955). The FEARL QSL Bureau has several thousand QSL cards on hand and desires to clean house. If you held a J, JA or KA call and want your occupation QSL cards, please write to the: FEARL QSL Bureau, P.O. Box 111, APO 500, c/o Postmaster, San Francisco, Calif. A large self-addressed, stamped envelope should be included with your request.

Editor of YLRL HARMONICS, W9SJR, Bernice Schmidt (second from left, front row), and her staff of helpers, all members of the Ladies Amateur Radio Klub (LARK) of Chicago. L. to r., front row: W9YBC, Gloria; W9SJR, Bernice (also LARK president); BCB, Helene; SYX, Peg, and YXK, Rita. Second row: W9IKS, Edna (club secretary-treasurer); LOY, Cris; YWH, Evelyn (membership secretary); MYC, Gladys (LARK vice president), and AYX, Jackie. Other LARK members include: W9BCA, Helen; DXX, Alice; KQC, Virginia; SPI, Marge; SSL, Shirlene; TIX, Kathleen; WOI, Vera; and WN9's BJH, Stella; TME, Rosemary, and YKV, Sue.

ALL TIMES IN E S T

EASTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Western Europe	Nil	0630-1500 (3) 1500-1700 (4) 1700-1930 (1-2)	1900-0000 (3-4)	2000-2300 (2-3)
Central Europe & Balkans	Nil	0700-1400 (2-3) 1400-1730 (3-4) 1730-1930 (1-2)	1900-2330 (3)	2000-2300 (1-2)
Southern Europe & North Africa	Nil	0600-1400 (3) 1400-1800 (4) 1800-1930 (1-2)	1830-0030 (3-4)	1930-2330 (2)
Near & Middle East	Nil	0600-1400 (1) 1400-1800 (2-3)	1930-2300 (2)	2030-2230 (1)
Central & South Africa	1600-1900 (0-1)	0600-1200 (1) 1200-1500 (1-2) 1500-2030 (3)	1830-0100 (2-3)	1930-0000 (1-2)
South America	1230-1830 (2)	0600-1600 (1-2) 1600-1800 (2-3) 1800-2130 (3-4) 2130-0100 (2)	1900-0430 (2-3)	2000-0400 (1-2)
South East Asia	Nil	0700-1000 (1) 1000-2100 (0-1)	0300-0600 (0-1)	Nil
Australasia	Nil	0700-1000 (0-1) 1800-2030 (1) 2030-2300 (1-2)	0000-0700 (1-2)	0130-0700 (1-2)
Guam & Pacific	Nil	0700-1100 (2) 1500-2000 (0-1) 2000-2200 (2-3)	2300-0730 (2)	0030-0600 (1-2)
Japan & Far East	Nil	0700-1000 (1-2) 1700-2100 (0-1)	0200-0700 (1)	Nil
West Coast, USA	Sporadic E	0930-1630 (3-4) 1630-2100 (2-3)	2130-0030 (4) 0030-0300 (2) 0600-0700 (2)	2300-0530 (3-4)

ALL TIMES IN C S T

CENTRAL USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe	Nil	0700-1730 (3) 1730-1900 (1-2)	1900-0000 (2-3)	2000-2300 (1-2)
Southern Europe & North Africa	Nil	0600-1400 (2-3) 1400-1630 (3-4) 1630-1830 (1-2)	1830-0030 (3)	1930-0000 (2)
Central & South Africa	1400-1800 (0-1)	0600-1400 (1) 1400-1600 (2) 1600-1930 (3)	1800-2300 (2-3)	1930-2200 (1-2)
Central America & Northern South America	1400-1800 (3)	0630-1600 (3-4) 1600-2100 (4-5) 2100-0100 (2)	1700-0500 (4-5) 0500-0700 (2-3)	1800-0430 (2-3)
South America	1400-1700 (1-2)* 1200-1500 (2) 1500-1830 (3)	0600-1500 (2) 1500-2100 (3-4) 2100-0100 (2-3)	1830-0400 (3)	1930-0330 (2)
Japan & Far East	Nil	0630-0930 (2) 1630-2030 (0-1)	0200-0600 (1)	0300-0500 (0-1)

ALL TIMES IN C S T

CENTRAL USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
South East Asia	Nil	0730-1030 (1) 2000-2200 (1)	0400-0600 (0-1)	Nil
Hawaii	1930-2200 (0-1)	0930-1900 (2-3) 1900-2300 (3-4)	2130-0400 (4) 0400-0800 (2-3)	2330-0600 (3)
Australasia	1900-2200 (0-1)	0700-1000 (0-1) 1500-1800 (0-1) 1800-2100 (1-2) 2100-2330 (2-3)	2300-0600 (2)	0030-0600 (1-2)

ALL TIMES IN P S T

WESTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Europe & North Africa	Nil	0700-1330 (0-1) 1330-1630 (1-2)	1900-2200 (1)	1930-2130 (0-1)
Central & South Africa	Nil	0600-1330 (0-1) 1330-1600 (1) 1900-2100 (1)	1830-2330 (2)	1900-2230 (1-2)
South America	1300-1830 (2)	0600-1500 (2) 1500-1700 (2-3) 1700-2000 (3-4) 2000-0100 (1-2)	1900-0330 (3)	2000-0130 (2)
Okinawa	1400-2300 (0-1)	0700-0900 (1-2) 1100-2000 (2) 2000-0130 (3-4)	0200-0600 (2-3)	0300-0500 (1-2)
Guam & Mariana Islands	1800-2200 (1-2)	0700-0900 (1-2) 1100-2000 (2) 2000-0000 (3-4) 0000-0200 (1)	0100-0430 (3)	0130-0400 (2)
Australasia	1300-1800 (2) 1800-2030 (3)	1200-1900 (1) 1900-2100 (1-2) 2100-2300 (3-4)	2200-0500 (3)	2300-0430 (2)
Japan & Far East	1300-1700 (0-1) 2200-0100 (0-1)	1130-2000 (2-3) 2000-0300 (3-4)	0100-0430 (3-4)	0130-0400 (2)
Philippine Islands & East Indies	1900-2300 (1)	0700-1000 (2) 1200-2130 (0-1) 2130-0130 (2)	0300-0600 (1)	Nil
Malaya & South East Asia	2000-2300 (0-1)	0700-1000 (2) 1000-2300 (0-1) 2300-0100 (2)	0300-0700 (0-1)	Nil
Hong Kong, Macao & Formosa	Nil	0700-0900 (1-2) 1200-2100 (1-2) 2100-0130 (3)	0230-0600 (2-3)	0300-0530 (1)

Symbols For Expected Percentage of Days of Month Path Open:

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

* Indicates time of possible ten-meter openings.

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

Ionospheric Propagation Conditions

Forecasts by

GEORGE JACOBS, W2PAJ

144-40 72nd Ave.

Flushing, Long Island, N.Y.

General Propagation Conditions

6 METERS: Some good Sporadic E openings should occur during the month.

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

20 METERS: Fair to good world-wide DX from shortly after sunrise to a few hours after sunset. Daily short skip openings up to 1400 miles.

40 METERS: Good DX to most areas from shortly before sunset to shortly after sunrise, but considerably higher static level.

80 METERS: Static level generally high on most days. DX possible during hours of darkness on day static level is low.

160 METERS: Higher atmospheric noise levels and summer absorption will not permit DX on this band until early Fall. Short skip QSO's possible during dark hours.

This overall picture of band conditions is intended to indicate qualitative changes in each band from month to month. For specific times of band openings for a particular circuit, refer as usual to the *Propagation Charts* on the opposite page.

Sunspot Cycle

The July **Propagation Tables** are for a predicted smoothed sunspot number of 6. The observed monthly Zurich sunspot number for April, 1954, was 1.8, resulting in a smoothed sunspot number of 10.7, centered on October, 1953. The smoothed sunspot numbers continue to decrease as we approach the minimum of the present cycle.

Propagation Technical Conference

Scientists and engineers are continuously investigating the solar system and the earth's atmosphere in hope of solving some of the secrets concerning radio transmission. In early May, the spring joint meeting of the **International Scientific Radio Union (URSI)**, and the **Professional Group of Antennas and Propagation** of the **Institute of Radio Engineers** was held at the National Bureau of Standards, Washington, D.C.

A number of talks were given concerning the propagation of v-h-f signals far beyond the horizon. Newman, Ames and Rogers of the **Air Force Cambridge Research Center** delivered a paper entitled "VHF Feld Strength Measurements Far Beyond The Radio Horizon." They discussed measurements that have been made at 220 Mc., on a 200-mile overwater path extending along the New England Coast. The median signal level in August, 1953, was about 50 db. below free space; in January 1954, the median decreased to 75 db. below free space. While these are relatively weak signal levels, it is significant that the signal was always present and did not fade out. Photographic records of back-scattered signals indicate that the higher summer signals were largely a result of super refraction.

In other experiments, fields at 220 Mc. have been explored at distances far beyond the radio horizon with an airborne receiver. The transmitter was located in the vicinity of Boston and about 80 feet above sea level. Measurements were made on flights over the Atlantic Ocean. Signals have been consistently recorded out to distances of 350-400 miles.

Observations made on "the big signal" on 49.6 and 49.8 Mc. were discussed in a paper by Dyce of Córnell University. It was disclosed that the 49.6 and 49.8 Mc. signals transmitted continuously from Cedar Rapids, Iowa, have been monitored for almost 2 years at Ithaca, New York, using a 6-element Yagi antenna pointing northward. The purpose of this experiment was to observe the signal reflected from the aurora. The signals heard during a visible aurora have an extremely rapid fading rate characteristic. When auroral propagation occurs, it appears to reach a double-humped maximum centered on midnight. The azimuth angle of arrival during aurora was generally found to be from the northwest. Dyce mentioned that radio amateur auroral observations have played an important part in his studies of auroral propagation, and that the reports received from Amateurs were in good agreement with the data obtained at Cornell. It was also reported that on April 11, 1954, the first 220 Mc., amateur QSO via auroral propagation took place.

Peterson and Leadabrand of Stanford University delivered a paper entitled "Long Range Radio Echos from Auroral Ionization," and discussed radio echos believed to originate from auroral ionization that are consistently observed at Stanford University, California. The observations were unusual in that the signals were being received over greater distances than previously reported. Stanford is between 1000-2900 miles south of the auroral zones. The reception was observed on frequencies in the 6, 12 and 17-Mc. bands, which are lower than those on which auroral reception has previously been observed.

Prediction Flash

Ionospheric storminess is usually at a minimum during July. No ionospheric disturbances are forecast, but night-time conditions may be unstable throughout July 11-13. Good propagation conditions are expected during most of the remaining month.

The strength of the echos were found to be surprisingly strong and can be distinguished by their amplitude fluctuation (flutter), and Doppler shift (change of tone when received with the b.f.o. on). Bearings taken on the echos indicate reflection from ionization at points along the auroral zone all the way from Eastern Canada to Alaska.

K. L. Bowles, of the Geophysical Institute, discussed auroral and meteor echos observed at College, Alaska on a frequency of 106 Mc. College is close to the center of the auroral zone and visible aurora is commonly seen overhead. Bowles found that the echos seemed to come from the direction of the geomagnetic North Pole, and from a distance of 300-650 miles north of College. This appears to be in good agreement with the observations made at Stanford since Stanford is about 1800 miles south of College, Alaska.

R. Dyce also spoke about auroral echos observed at College, Alaska on 50 Mc. His results were very similar to those obtained at 106 Mc. The auroral echos were obtained only from azimuth angles within 60 degrees of magnetic North and at ranges chiefly between 250 and 450 miles north of College.

Sporadic-E

Probably as puzzling as aurora to propagation researchers is the mystery of sporadic E. Peterson of Stanford University discussed the results of scatter soundings taken throughout the past year and a half. Peterson stated that it appears that the average occurrence rates of sporadic E throughout the world can be surprisingly predictable. The monthly average daily rate is very strongly dependent upon geomagnetic latitude. In the auroral region most of the sporadic E is observed during the hours around midnight while in equatorial regions sporadic E is primarily a daytime phenomenon.

Seasonal variations in occurrence rates are likewise found to be a function of geomagnetic latitude. At middle latitudes, a pronounced summer maximum of occurrence is observed while near the Poles and the Equator relatively little seasonal variation is found. A minimum of sporadic E occurrence is found during the equinox periods (March/April and September/October), at middle latitudes, but about twice as much is observed in the Fall as in the Spring. The scatter soundings indicate that during much of the time, both polar and equatorial types of sporadic E are observed in the United States. Peterson suggests that the marked seasonal variations at middle latitudes may result from a northward shift of

(Continued on page 58)

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A standard method of eliminating television interference (TVI) caused by harmonic energy is to install a low-pass filter between the transmitter and the antenna. In theory, installing a low-pass filter is easy, but in practice, doing so sometimes introduces complications difficult for the new amateur to solve, especially if he does not have grid-dip oscillators, standing-wave bridges and similar gadgets. This month I shall discuss low-pass filters and simplified methods of using them.

Low-Pass Filters

A low-pass filter is designed to reject frequencies in the television channels. It consists of a number of tuned circuits resonant at those frequencies to be attenuated, which are connected in cascade and

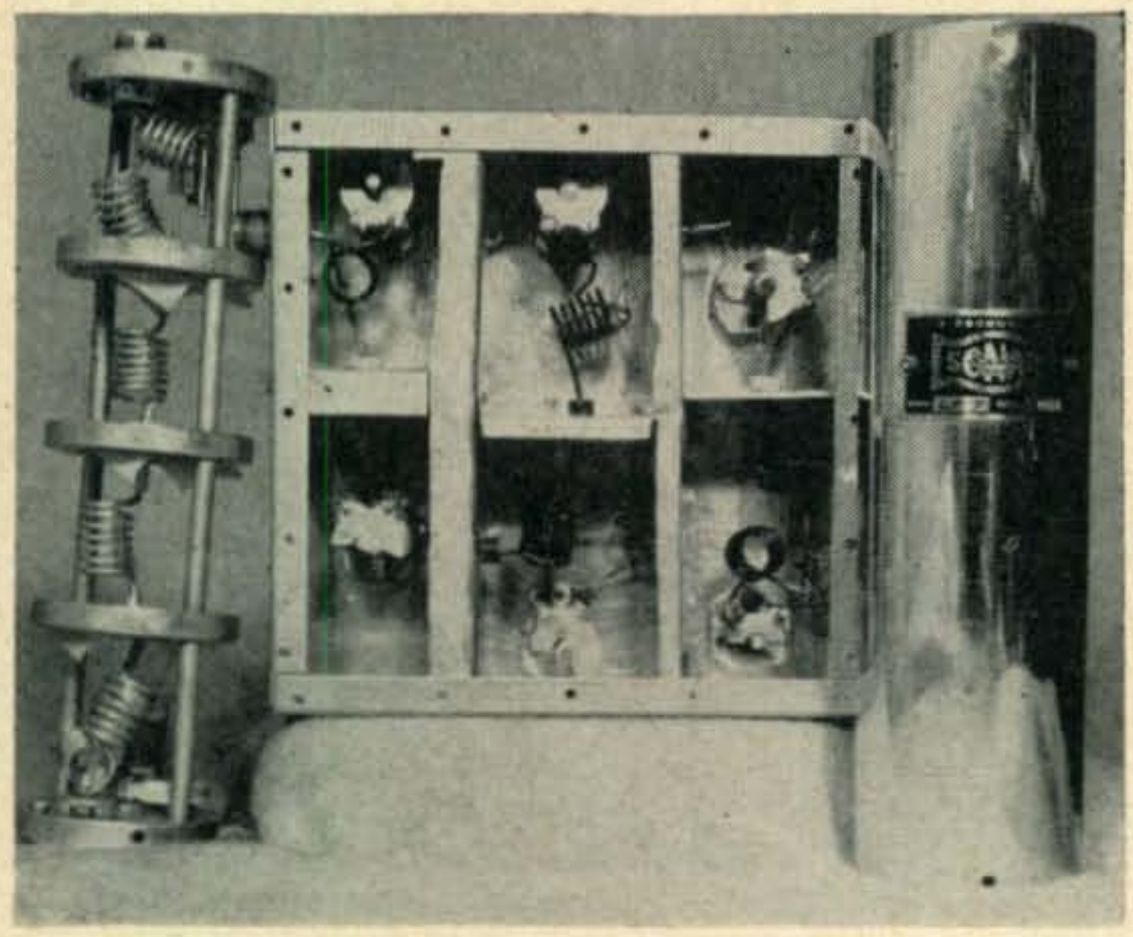

Fig. 1. Internal views of two low-pass filters for the prevention of harmonic radiation directly through the antenna. The square box is a home-made version of the tubular filter (Sonar LP-7). The jacket for the Sonar filter is on the right. When the shield is replaced on the box, or the jacket on the LP-7 filter, they become r-f tight.

mounted in an r-f tight box. All frequencies below cut-off frequency of the filter are passed with practically no attenuation, while higher frequencies find the going tough, if not impossible.

Modern, commercially manufactured low-pass filters will safely handle the full output of a 1000-watt transmitter when properly installed. They pass frequencies up to 30 Mc. with less than ¼-db. attenuation. while frequencies above approximately 50 Mc. are attenuated at least 70 db.* They are usually designed for use with 50-ohm or 75-ohm coaxial cable feedlines. If you are using an antenna with a different kind of feed system, don't let this worry you; they can be adapted for use with any antenna or feed system.

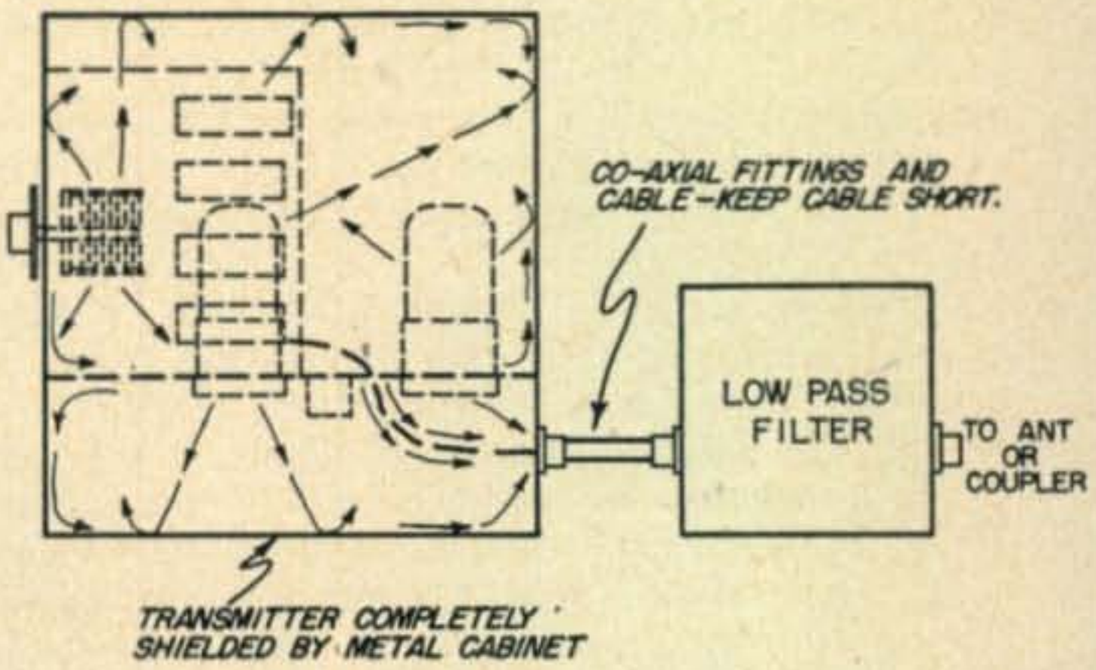

Fig. 3. This is the effect that the Novice should strive for. Note that the r-f energy (indicated by the arrows) is confined inside the shielding. Compare this with Fig. 4.

Figure 1 is interior of a modern, commercial low-pass filter, the *Sonar LP-7*, and of a home-built unit.

Probably the first thought that comes to mind, is why should a Novice, limited to 75 watts input, buy a 1000-watt filter. The answer is easy. Actually, it costs very little more to build an effective 1000-watt filter than it does to build a 50-watt one. And a filter with adequate power-handling capabilities does not have to be "babied." Of course, this is a feature well worth having. In fact, the suggestions to follow are based on it. With a low-pass filter of adequate power rating, it is not absolutely necessary to have it matched perfectly to prevent it from blowing up.

Installing A Low-Pass Filter

Figure 2 is a photograph of the proper way to connect a low-pass filter to a transmitter, no matter what is connected to the other end of the filter. Incidentally, it makes no difference which end of the filter is connected to the transmitter.

The sketch, *Fig. 3*, will quickly show why this is a good installation. The entire transmitter is shielded right up to the output of the filter, and all r-f output must go through the filter; thus it can do the job it was designed for with maximum effectiveness.

* Equivalent to a power ratio of 10,000,000 to 1.

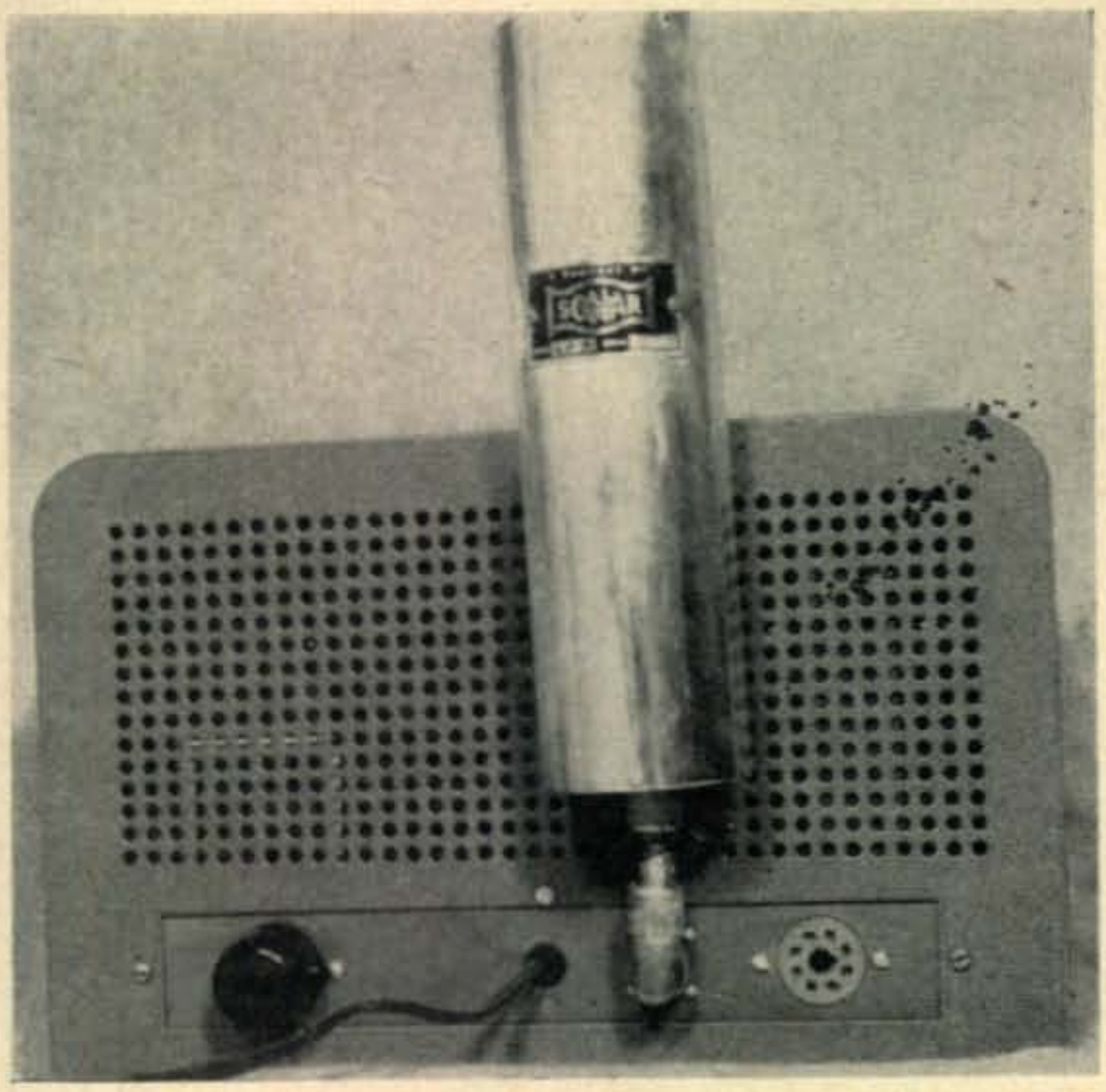

Fig. 2. A filter properly installed on a shielded transmitter. See text and Fig. 2 for details. The connector between the transmitter and the filter is constructed of two 83-1SP fittings and a length of RG8/U cable, with its outer vinyl coating removed, just long enough so that the backs of the fittings touch. A bead of solder around the joint makes a rigid unit. The right-angle connector is an 83-1AP. Fastening the filter firmly to the transmitter with a metal strap is also recommended.

In contrast, in an arrangement like *Fig. 4*, TVI can be radiated directly from the unshielded transmitter output terminal and from unshielded components in the transmitter. Even worse, interference can flow around the filter to reach the antenna.

The important thing here is to realize how little power has to get by the filter to nullify much of its effectiveness. If only 1% of the interference gets around the filter, it will reduce the effectiveness of the filter to a maximum of 20 db.

Moral: keep that r.f bottled up, if you expect much from a low-pass filter. However, it is not usually necessary to knock yourself out to shield a low-power transmitter operating on the 3.7-Mc. and 7-Mc. bands. For example, putting a bottom plate on the chassis and shielding the coil in a can at least double the coil diameter, and installing a coaxial fitting for the output terminal would go a long way towards eliminating the objectional features of *Fig. 4*, especially if the transmitter uses metal tubes. Once you have the big leaks plugged up, you can start on the small ones.

The transmitter pictured in *Fig. 2* is the *Heath AT-1* 35-watter reviewed in the April column. As mentioned in the review, there was enough direct harmonic radiation from it on 14 Mc. and higher to cause interference to a television set a few feet away, even with no antennna connected to the transmitter. Later, I discovered that touching the dials or running my hands along the a-c power cord increased the interference.

I pulled the transmitter from the cabinet and grounded the bottom rotor contacts of the variable condensers to the chassis ¼-inch below them. These grounds were in addition to the original ones. Then, noting that the tinned wire between the bandswitch and the coaxial output connector passed near the a-c cord under the chassis, I replaced the wire with a length of coaxial cable, grounding the outer braid to a mounting screw on the coaxial connector and to the chassis near the bandswitch.

These changes eliminated all TVI from direct radiation after the transmitter was replaced in the cabinet. In addition, the low-pass filter does a much better job of keeping interference off of the transmitting antenna. Only on 21 Mc. and 28 Mc. is there any TVI now—and it is very slight.

Connecting The Antenna To The Filter

The simplest type of antenna to feed through a low-pass filter is undoubtedly a ½-wave doublet (or a properly adjusted beam) fed in the center with coaxial cable. It is only necessary to put a coaxial fitting on the end of the cable, screw it to the low-pass filter, and adjust antenna coupling for the same power input as obtained without the filter.

Both low-pass filters and coaxial cables are usually available in either 52-ohm or 75-ohm impedance ratings. I would suggest standardizing on the 52-ohm types. Nevertheless, using a 52-ohm filter with a 75-ohm cable, or vice versa, will not prevent the filter from doing the job it was designed for.

3.7-Mc. and 7-Mc. doublets fed with 75-ohm "ribbon" can also be fed in the same manner. Theoretically, doing so should increase radiation from the line, but repeated tests have never indicated to me that it affects antenna performance on these bands. But I do not recommend such unbalanced operation on higher frequencies or with high-impedance feed lines.

Probably the most-used antenna by Novices is a random length of wire fed directly from a transmitter with a *pi*-network output tank circuit. Unfortunately, this simplicity evaporates when an attempt is made to insert a low-pass filter between the transmitter and the antenna. The usual result is very high amplifier plate current combined with practically no r-f energy reaching the antenna.

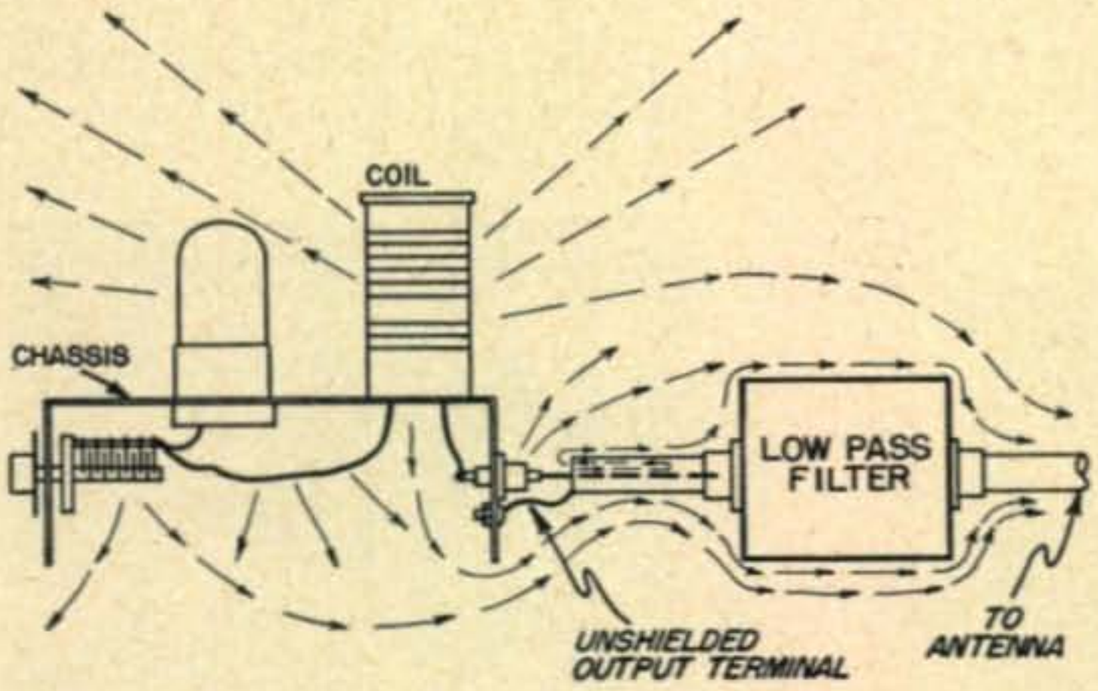

Fig. 4. A low-pass filter used in this fashion is almost valueless. The undesired harmonic r-f energy radiates directly into TV sets, or flows around the filter to the transmitting antenna.

The only practical solution is a link-coupled antenna tuner. See *Fig. 5*. To adjust it, first set the output condenser of the *pi*-network to maximum capacity and tune the input condenser to resonance, as indicated by the plate current dip. Next, connect the tuner to the transmitter through the low-pass filter. Set *C1* to maximum capacity and clip the antenna to the top of *L2*. Turn on the transmitter

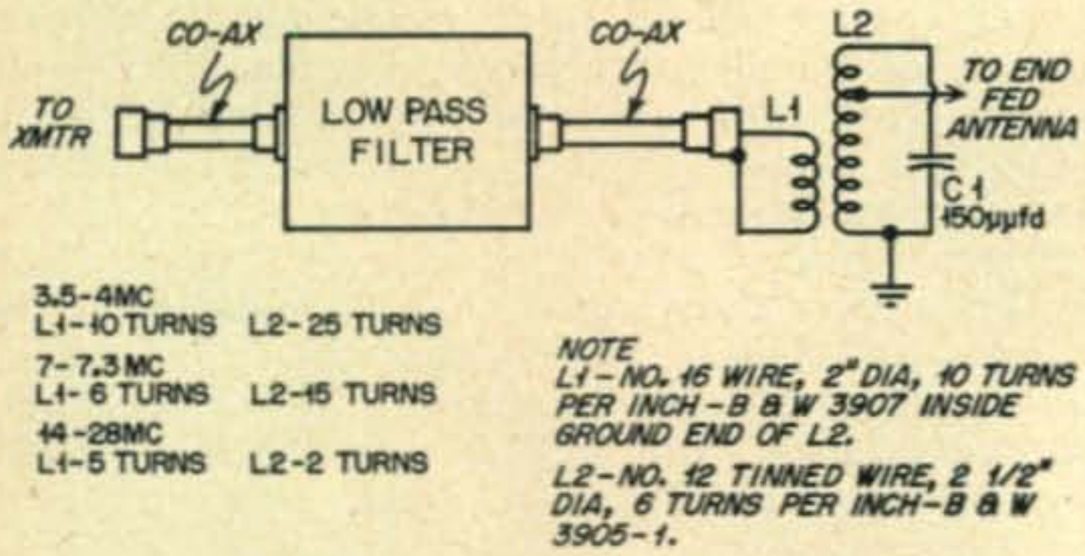

Fig. 2. Simple antenna coupler designed so that a low-pass filter may be used with an end-fed antenna.

and retune the input condenser of the *pi*-network for minimum plate, which may be higher than before. Tune *C1* for maximum plate current and again resonate the *pi*-network input condenser. Then, without touching *C1*, decrease the capacity of the *pi*-network condenser to bring the transmitter input up to normal, retuning the input condenser to resonance after each adjustment of the output condenser.

Should it be impossible to find a setting of *C1* that causes the final amplifier plate current to rise, tap the antenna down a few turns on *L2* and try again. Eventually you will find a position that will permit loading the antenna. In general, the closer the antenna is to being an integral multiplier of a ½-wave long, the closer to the top of *L2* the antenna may be tapped.

On the other hand, if the amplifier plate current goes to a very high value, which cannot be reduced; as soon as the coupler is connected, add capacity in parallel with the *pi*-network output condenser until you can resonate the network with the input condenser.

Increase the capacity in steps equal to the maximum capacity of the output condenser. It may take quite a large amount of extra capacity to control the loading.

Other types of multi-band antennas are usually tuned up with the aid of a link-coupled antenna tuner. If you have such a tuner, it is a simple matter to insert a low-pass filter in the link circuit. Should the addition of the filter cause the tuning to become erratic or parts of the link circuit to run warm, try winding a new link coil around the antenna coil. The link winding may contain between a third and a half of the turns on the antenna coil. Vary loading to the transmitter at the input link.

An antenna coupler may also be used with a folded dipole antenna fed with 300-ohm ribbon and with the off-centerfed "Windom" antenna* which is currently so popular with many amateurs. Either of these antennas may also be fed through a set of *B&W Balun* coils. Full instructions for using these coils are packed with them.

Next month I hope to go into some other types of low-pass filters and supply some details on their mountings, etc. By the way, don't adjust the condensers in a filter to secure better loading—it just doesn't work that way.

Letters And General News

Regarding obtaining **Novice** and **Technician Licenses** by mail (the only way they are now issued) as described in the May column, the FCC has suggested a clarification regarding those eligible to administer the code examination. The following may administer it: Holders of an amateur "Extra Class," "Advance Class" or "General Class" license. Also those who shall have held, within the five years prior to the date of the examination, a commercial radiotelegraph license issued by the FCC, or within that time shall have been employed in the service of the United States as the operator of a manually operated radiotelegraph station. Novice, Technician, or Conditional Class licenses are not eligible to administer the code test.

In four months of operation, Tommy, (15), WN3WST, has worked 38 states, Canada and Puerto Rico, with the equipment shown in this picture.

Elgible persons who desire to be examined for these licenses should request the examination papers from the Engineer-in-Charge of the FCC radio district in which the applicant is located. The examination should be completed within fifteen days of the date it is received. If, for some reason, the examination cannot be completed within this time, the papers must be returned unopened. In either case, the papers are returned to the FCC office from which they were received.

Dick, **WN9EJF**, also asks two questions that may puzzle other Novices. **"Dear Herb:** Must a Novice licensee desiring a "Technician Class" license take the examination by mail? Also, if you have a "Technician Class"

Ed, KN6BTY, Redding, California, and his 7-Mc. Novice station. Ed can hardly wait for his "General" so that he can call rare DX he hears outside the Novice Bands.

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* See CQ, March, 1954, page 18.

Leo I. Meyerson, WØGFQ
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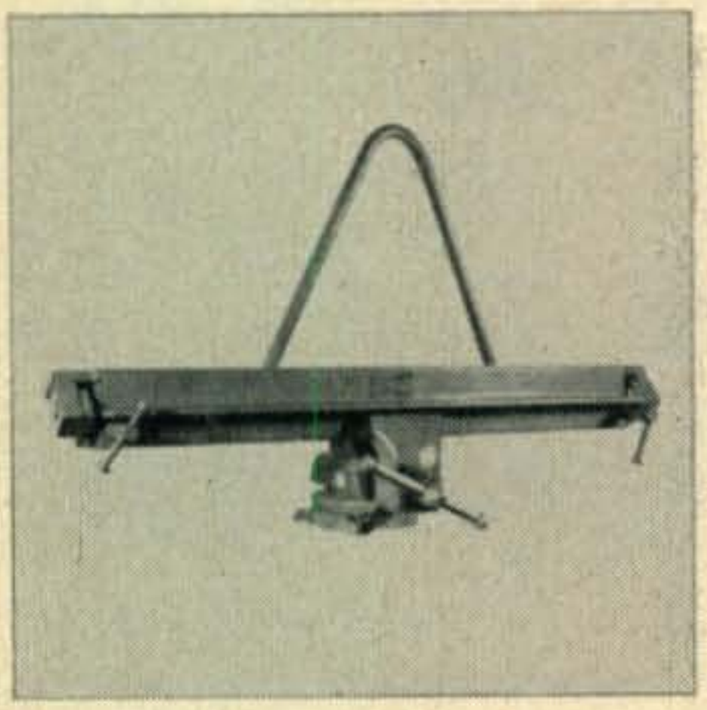
What's NEW in HAM RADIO

Parts Products Catalogs

(Tell them you saw it in CQ)

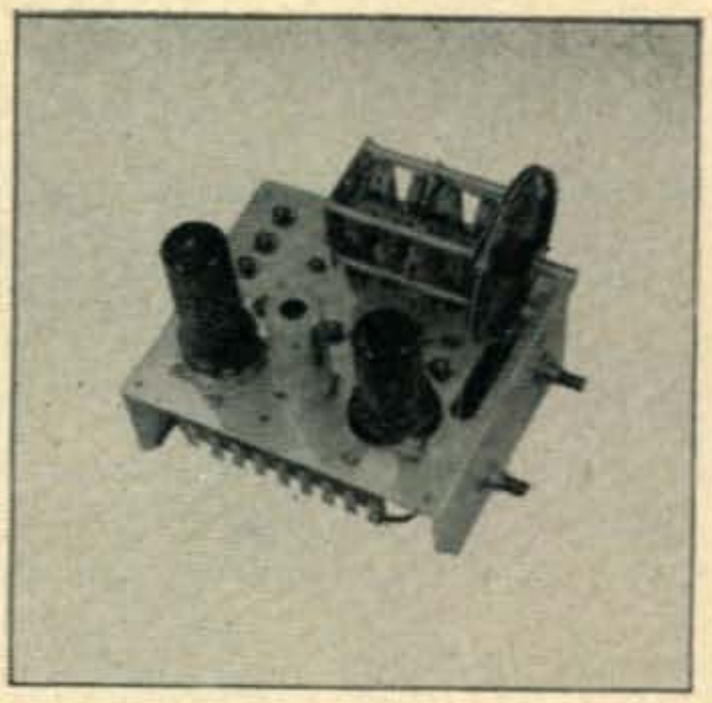
By Jove, why didn't some chappy think of this before? Here is an imported English sheet metal brake! Now you can bend aluminum, copper, brass and light steel to form boxes, chassis and brackets without having to use a hammer and the edge of an apple crate! This **A. B. Parker** sheet metal folding machine clamps in any heavy workshop vise and is ready to go. This is a "natural" for any Ham that does any construction work at all, and is a "must" for small shops, schools and laboratories. Want one? I thought so! Just write to their representative for all the details: **Television Accessories Co., Dept. 11, Box 6001, Arlington 6, Va.** The retail price is $14.95, F.O.B.



All the Hams at **Barker & Williamson** put their heads together with the engineering staff, and when the smoke and fury had cleared away, the preliminary design of the **B&W Model 5100** had been sketched out. As you well know, it takes ardent amateurs to fully realize what the average Ham wants in the way of a transmitter, and **B&W** really hit the bull's-eye in their latest design: The **Model 5100** is a 150-watt CW (135-watt phone transmitter) designed for v.f.o. operation on all bands! Yessir, the **5100** has a built-in calibrated v.f.o., is fully band-switched and contains all the latest engineering advances to effectively minimize TVI. Intended for permanent station operation, the transmitter may be used to drive a high powered r-f final amplifier and class "B" modulator. The **Model 5100** employs a pair of 6146 tubes in a pi-network output circuit. A string of 6AQ5 doubler stages follow the 6BJ6-6BJ6 v.f.o./buffer unit. Unitized construction is used throughout for easy servicing.

The CW men will be interested in the beautiful keying waveform provided by the blocked-grid keying system. No chirps, no pops, no cracks! It really sounds beautiful. The phone men will be glad to know that **B&W** is bringing out a matching adapter for single-sideband operation of the **Model 5100.** Sure sounds like a good little rig, doesn't it? See a **B&W 5100** transmitter NOW at your local Ham store!

Want a v.f.o. exciter the easy way? Tired of building up chirpy-blurpy VFO's and parasitic-infested doubler stages? Disgusted with TVI? Well, just cast your eyes on this little gem. The **GELOSO** v.f.o. exciter. This imported unit employs a 6J5 Clapp oscillator, 6AU6 isolation stage, and a 6V6 frequency multiplier, providing sufficient output on 80, 40, 20, 15 and 10 meters to drive any of the popular pentodes (807, 2E26, 6146, etc). A full vision, calibrated dial covering the above bands is supplied. Measuring only 5½x6½", the exciter provides the basic heart for your new rig, fixed or mobile. No sir, it's not a kit—fully wired and aligned—all set to go the moment you hook it to a suitable power supply. It certainly looks like an easy way of getting on the air.



The exciter is manufactured in Italy by **Geloso Electronics Co.,** one of the largest manufacturers of electronic equipment in Southern Europe. The exciter has been in use in many foreign countries for some time (See JY1US, page 58, Jan. 1954, **QST**), and arrangements have now been made to import it into the United States. For the full story on this popular little exciter, write to **Gilfer Associates, Box 239, Grand Central Station, New York 17, N.Y.**

Attention all SSB fans! Now hear this! A new, improved model of the popular Multiphase 10A SSB exciter has been announced by **Central Electronics, Inc.** This new job is known as the **Model 10B,** and contains several new operating features, such as carrier insertion, and "tune" operation of the exciter. A new audio input circuit has been added for two-tone tests or phone patch input. A new voice controlled relay is also provided with a receiver muting circuit.

The new **Model 10B** provides 10 watts of peak output on all phone bands, 10 to 160 meters, using plug-in coils. Those Hams still sticking to AM will be happy to know that it has over 40 db. of unwanted carrier suppression. You can't copy this baby without using your b.f.o.! Further information on the **Model 10B** and other **Central Electronics** products is available by

(Continued on page 44)

The VHF-UHF News

FURMAN C. COBB

c/o CQ Magazine, 67 West 44th St., New York 36, N.Y.

Well, there is no question about the first transcontinental 144-Mc. relay being a success, but it is fairly difficult for this columnist to write it up. Although it is June 7, we have no reports from west of Dallas, Texas on the problems that faced the crews in W6 and W7 land. Since the eastern terminal of the message turned out to be W1HDQ we can scarcely expect any news from that quarter. Inasmuch as *CQ* was the instrument of getting this thing started (see the January and March issues) we feel obliged to say many thanks to those who appreciated all of our efforts. No claim is being made that we were the only people involved, but it would appear reasonable to have expected some cooperation from the many fellows that proclaimed interest. I expect that it looked like "too good a thing" for the "come latelies" not to crowd out a newcomer with a good idea.

On the credit side of the ledger I do want to express my warm thanks to W2ORI, W2UK, W5AJG, W8WXV and W9WOK for their thoughtfulness in immediately dispatching to me carbon copies of their activity reports. Much credit is due to the *Two Meter and Down Club* which sparked the effort from west of the Mississippi River. In this regard, I believe that Bill Myers, W6IHK, did an outstanding job through his bulletins and letters.

The Messages

By my count there were twelve messages that covered over 1000 miles. These included messages from W1HDQ, W2QED, W5CA/7, W6EMM, W6IHK/7 and WØZJB. Not all of them were directed from coast to coast. The principal coast-to-coast message was #2 from W6EMM. I am given to understand without possible confirmation from W1HDQ that it took a total of 15 hours. However, there is a rumor that the delay was here in the east due to the absence of W1HDQ. No message was received at *CQ* so I'm not in a position to state the actual flash elapsed time.

A newspaper report appeared in the *New York Times* on Tuesday, June 1 and seems to have been initiated by W5CA/7 from atop Capillo Peak, New Mexico. It stated that good conditions enabled the success of the venture, although this seems to disagree with other observations.

J. C. Miller, W2ORI (Lockport, N.Y.) was listening in on both W2UK and W8WXV and standing by in case they should have trouble over their 440 mile path. Conditions are reported by W2ORI as being above normal on Saturday morning and until approximately 6:00 p.m. that evening. Then conditions rapidly changed to the poorest observed in over a year. . . . *R. E. Thomas, W2UK (New Brunswick, N.J.)* handled ten messages and credits the excellent cooperation of W2ORI as being of tremendous value in keeping things moving. . . . *Leroy May, W5AJG (Dallas, Texas)* handled nine messages on May 29 when conditions were poor, although they improved during the evening. As might be expected

(Continued on page 46)

This was operating position of W6EMM while originating the first trial message on May 22. In the back row are: W6IHK, Jr.; W6IHK, W6GUE, K6BXV and KN6EGP. Seated are W6AEA, W6MJ and W6LJC. This was another photo by "Max."

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1110	2450	2725	3025	3500	6375	7520	8008.3
1129	2455	2730	3030	3510	6405	7530	8010
1150	2460	2740	3035	3525	6406	7540	8016.7
1195	2465	2745	3040	3540	6425	7550	8020
1525	2470	2750	3045	3580	6440	7560	8025
1900	2475	2755	3050	3583	6450	7570	8030
1915	2480	2760	3055	3640	6473	7580	8033.3
1930	2485	2765	3060	3655	6475	7590	8040
1940	2490	2770	3065	3680	6500	7600	8041.7
1950	2495	2775	3070	3700	6506	7610	8050
1965	2505	2780	3075	3760	6525	7620	8058.3
1977	2510	2785	3080	3800	6540	7630	8060
1980	2515	2790	3085	3825	6550	7640	8066.7
1985	2520	2795	3090	3885	6573	7650	8070
2010	2525	2815	3095	3940	6575	7600	8073.3
2015	2530	2825	3100	3955	6600	7666.7	8075
2017	2535	2830	3105	3980	6606	7670	8080
2020	2545	2835	3110	3990	6625	7680	8083.3
2025	2550	2840	3115	3995	6640	7690	8090
2035	2557	2845	3120	6000	6650	7700	8091.7
2040	2560	2850	3125	6006	7000	7710	8100
2055	2565	2855	3130	6025	7006	7720	8106.6
2060	2570	2860	3135	6040	7025	7730	8108.3
2065	2575	2865	3140	6042	7040	7740	8111.0
2090	2580	2870	3145	6050	7050	7750	8116.7
2105	2585	2875	3150	6073	7073	7760	8125
2125	2590	2880	3155	6075	7075	7770	8130
2130	2595	2885	3160	6100	7100	7780	8133.3
2135	2600	2890	3165	6106	7106	7783.3	8140
2140	2603	2895	3170	6125	7125	7790	8141.7
2145	2605	2900	3175	6140	7140	7800	8150
2155	2610	2905	3180	6142	7150	7810	8158.3
2165	2615	2915	3185	6150	7160	7820	8160
2175	2620	2920	3190	6173	7173	7830	8163.4
2180	2625	2925	3195	6175	7175	7840	8166.7
2195	2630	2930	3200	6185	7200	7850	8170
2300	2635	2935	3202	6200	7206	7860	8173.3
2305	2640	2940	3205	6206	7225	7870	8180
2320	2645	2945	3210	6225	7240	7880	8183.3
2350	2650	2950	3220	6235	7273	7891.7	8190
2355	2655	2955	3225	6240	7275	7890	8191.7
2360	2660	2960	3230	6250	7306	7900	8200
2365	2665	2965	3235	6273	7300	7910	8206.6
2370	2675	2970	3240	6275	7325	7920	8208.3
2375	2680	2975	3290	6300	7340	7930	8210
2390	2685	2980	3300	6306	7350	7940	8216.7
2415	2690	2985	3310	6315	7375	7950	8220
2430	2695	2990	3320	6325	7400	7960	8225
2435	2700	2995	3340	6335	7406	7970	
2440	2705	3005	3410	6340	7425	7980	
2442	2710	3010	3420	6350	7440	7990	

DC-34 & DC-35

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1690		2422	2745	3155	3630	3890	4130
1705	2155	2435	2764	3161	3650	3895	4135
1720		2446	2775	3190	3655	3905	4150
1738	2175	2466	2776	3201	3665	3920	4155
1746	2195	2467	2807	3270	3680	3925	4175
1770	2202	2478	2816	3279	3695	3935	4177.5
1790	2215	2491	2831	3280	3700	3940	4192.5
1810	2220	2500	2851	3297	3702.5	3950	4210
1830	2235	2510	2853	3311	3705	3960	4215
1850	2240	2514	2894	3317	3710	3965	4235
1870	2255	2527	2895	3365	3730	3985	4240
1890	2258	2540	2899	3385	3745	3995	4255
1910	2275	2559	2925	3390	3750	4012.5	4275
1930	2280	2586	2926	3395	3760	4015	4280
1950	2295	2587	2960	3412.5	3765	4020	4305
1970	2300	2605	2971	3422.5	3770	4030	4310
1990	2315	2625	2980	3462	3775	4035	4325
2010	2326		3000	3480	3790	4050	4335
2030	2335	2643	3010	3485	3792.5	4055	4345
2050	2340	2665	3023	3500	3807.5	4065	4350
2075	2355		3027.5	3520	3825	4080	4370
2082	2360	2685	3055	3540	3830	4085	4380
2090	2375	2710	3077.5	3550	3850	4090	4397.5
2105	2390	2711	3095	3575	3855	4095	4415
2106	2395	2725	3117	3580	3870	4097.5	4435
2131	2415	2732	3149	3610	3885	4115	4440

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Lots of 5 or more. Ea. 89c
Individually. Ea. 99c

		451	456	461	465	470	476
		452	457	462	466	472	477
446	448	453	450	463	468	474	479
447	450	454	459	464	469	475	480

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		10,000 KC Type SR-5	**1.99**

FT-243

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Lots of 5 or more. Ea. 39c
Individually. Ea. 49c

4035	4540	5090	5675	5892	6400	6973	7975
4045	4580	5127.5	5687.5	5900	6406.6	6975	8240
4080	4610	5165	5700	5906.7	6425	7450	8250
4095	4620	5180	5706.7	5907.5	6673.3	7473.3	8273
4110	4635	5205	5725	5925	6675	7475	8275
4135	4680	5235	5730	5940	6700	7506.6	8300
4165	4695	5245	5740	5950	6706.6	7525	8306
4175	4710	5285	5750	5955	6725	7573.3	8325
4190	4735	5295	5760	5973.3	6740	7575	8340
4215	4780	5300	5773.3	5975	6750	7606.6	8350
4220	4785	5305	5775	5995	6773.3	7625	8375
4255	4815	5327.5	5780	6206.6	6775	7673.3	8400
4280	4820	5335	5782.5	6225	6800	7675	8425
4295	4840	5385	5800	6240	6806.6	7706.6	8450
4300	4845	5397.5	5806.7	6250	6825	7725	8475
4330	4852.2	5435	5820	6273.3	6840	7773.3	8500
4340	4880	5437.5	5825	6275	6850	7775	8525
4395	4900	5485	5840	6300	6873.3	7806.6	8550
4397.5	4930	5500	5850	6306	6875	7825	8575
4445	4950	5545	5852.5	6325	6900	7873.3	8600
4450	4980	5582.5	5860	6340	6906.6	7875	8625
4490	4995	5587.5	5873.5	6350	6925	7906.6	8650
4495	5030	5645	5875	6373.3	6940	7925	8675
4535	5035	5660	5880	6375	6950	7973.3	8690

FT-171

Lots of 10 or more. Ea. 79c
Lots of 5 or more. Ea. 89c
Individually. Each 99c

1151.8	2150	2415	2911	3510	3807.5	4050	5225
1562.5	2155	2435	2940	3520	3810	4080	5492.5
1738	2191	2442.5	2967	3550	3812.5	4097.5	6000
1746	2220	2467	2990	3562	3825	4110	6210
1940	2258		3010	3569	3870	4112	7165
2010	2260	2500	3010.5	3570	3880	4177.5	7950
2030	2280	2532.5	3175	3580	3945	4245	8000
2040	2282.5	2545	3202.5	3637.5	3950	4255	9200
2045	2290	2550	3205.5	3660	3955	4280	9590
2065	2300	2557	3215	3667.5	3966.5	4310	
2082	2305	2582	3237.5	3682.5	3970	4345	
2105	2320	2630	3250	3695	3975	4350	
2123	2340	2665	3322.5	3700	3980	4360	
2125	2360	2725	3400	3712.5	3995	4400	
2131	2390	2780	3422.5	3760	4012.5	4735	
2145	2405	2835	3500	3790	4037.5	5200	

Indicate second choice freqs. wherever substitutions may be made.

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(from page 40)

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VHF NEWS

(from page 42)

conditions on the 30th were much better and DX was worked in all directions. CW was used between W5AJG and W5UZW. The WØZJB Msg. #9 to the Mayor of Houston was put on the air from KPRC AM during their 2200 CST newscast. . . . *Al Burson, W8WXV (Shiloh, Ohio)* says that there was too much traffic for the poor conditions, but is very glad that everything turned out o.k. . . . *John Landeck, W9WOK (Bensenville, Ill.)* was busy on both the 29th and 30th and adds that W8SRW, W8SFG, W9BPV, WØIHD and WØETJ should also be given credits for valuable assists.

V.H.F. Scatter

The attention of a certain contemporary writer is directed to the "World's Record" on the 420-Mc. band which is held by **F9BG** and **FA8IH** over a distance of 610 miles. . . . The first XE to XE 144-Mc. contact took place on May 16 between **XE1VA/mobile** (using the rig pictured in **CQ**, May 1954 on page 62) and Jeff Lord, **XE1GL** near Cuernavaca. . . . Speaking of 144-Mc. operation in Mexico. A recent visitor to the **CQ** editorial offices was Roberto Villasenor, **XE2FC**, of Tampico. Roberto is putting finishing touches on a rig for this band with 100 watts input. He will use it with a 12-element beam. Quite a bit of TV DX has been reported in Tampico and Roberto hopes for contacts across the Gulf. . . . Can you imagine the surprise of Don Knock, **VK2NO**, a few months ago when he received an SWL report from Dimiter Sibirsky, Sofia, Bulgaria on his 50-Mc. CQ. The report was for May 8, 1947! It checked out to within two hours and seems to be on the up and up. Oddly enough, the report not only took seven years to reach Don, but was also postmarked Proctorville, Ohio. Can any of our readers explain?

What the Gang Is Doing

Louie Cox, W7ACD (Shelley, Idaho), says that more fellows should've paid attention to the "Piggy-Back" pre-amp that was described in the June 1953 issue of **CQ**. Lou reports that he is using one on 6-meters and it really helps out on those weak signals. W7ACD has also heard or worked the following on 50-Mc. during the month of May; W5SFW, W5HVP, W5MJD, W3PCB, WØHVW, WØZJB, W6ANN, WØWKB, W9VZP, W6ABN, W6EIB, W6BWG, W9QUV, WØYUQ, W9WOK, W9MVG, W4CPZ, W4OXC, W6TM and W6TTB. The band was open on May 18, 22 and 26 from Shelley.

Sam Thompson, W7POL (Klamath Falls, Oregon) reports that he is getting ready to fire up on both 6 and 2 meters. He plans on a 600-watt rig with a **Teckraft** converter ahead of his NC-183 on 2 meters. A "Piggy-Back" ahead of the receiver will be used on 6. The antennas will be a 12-element beam on 144 and a 4-element job on 50 Mc. Good luck to Sam on stirring up activity in a rare spot.

Hartzell Boren, W9FVI (Greenwood, Ind.) sends in a long letter complaining about the lack of "Joe-works-John" dope in the column, but not one word on anyone in his area. I must admit to some confusion at this point. How is this department to obtain said information? Maybe W9FVI can supply some carrier pigeons, his letters don't have anything "printable" in them!

C. G. Hoffman, W9ZHL (Terre Haute, Ind.) says not to forget the annual *VHF Picnic* at the Turkey Run State Park on July 25th. This has always been the outstanding VHF meeting in the mid-west and is very well attended. If possible, be sure to come and meet those you've been working on the air. Chuck also reports that the 6-meter CD net is moving along and now has 14 mobiles and 10 home stations with activity throughout the entire day.

ANTENNASCOPE-54

(from page 20)

monic frequency to harmonic frequency. *Figure 5c* shows the current distribution of a 3rd-harmonic antenna, also called three half-waves. Notice that it contains as many high-current points as there are ½-waves in the antenna. The *Antennascope* may be connected at any of them to analyze the antenna. Also, a low-impedance feed line may be connected at any of them, although better balance is obtained by feeding it as close to the center as practical. In general, the first maximum current point in any antenna occurs ¼-wave from the end, with subsequent, high-current points occurring each odd ¼-wave from the end.

If the *Antennascope* meter should indicate current flow when the *Antennascope* is connected to a long antenna and before the *Dipper* is connected, then, in all probability, r-f energy is being picked up by the antenna from a powerful broadcast station. By plugging a pair of phones into *J1* of the *Antennascope-54* or connecting them in series with one meter lead on the *Antennascope Jr.*, the interfering signal can be identified aurally.

Often, reversing the antenna connections to the *Rx* terminals will drop the strength of the undesired signal to zero. Or, if it is not too strong, the *Dipper* may be tone modulated*, and the *Antennascope* nulled for minimum strength of the tone in the phones. Otherwise, you will have to wait until the interfering station leaves the air before testing the antenna.

High-Impedance Measurements

On occasion, it may be necessary to measure a very-high impedance, such as the feed point of certain co-linear arrays *Fig. 5d*. A ¼-wave line may be used to bring the impedance within the range of the *Antennascope*. Knowing the line impedance (Z_o) and the resistance of *R1* (Z_s) required to produce a null, the unknown impedance is easily calculated by rearranging formulas (2) or (3):

* Most grid-dip oscillators can be tone modulated by inserting the output of a small audio oscillator into their phone jacks.

(Continued on next page)

(from preceding page)

$$Z_r = (Z_o)^2 / Z_a \qquad (8)$$

A ¼-wave, 300-ohm line will invert 1,000 ohms to 90 ohms; 2,000 ohms to 45 ohms, and so on.

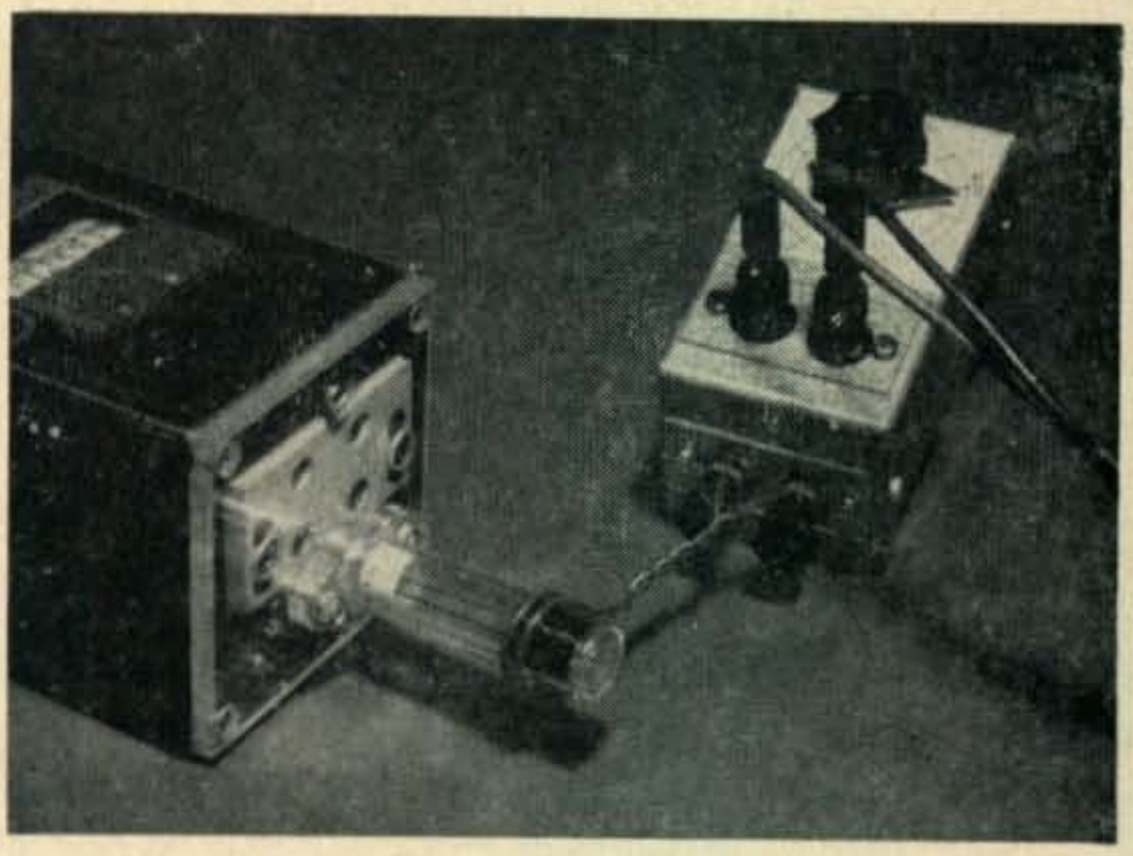
For accurate results, the line must be ¼-wave long at the test frequency, and each half of the antenna must resonate to the same frequency.

Quarter-wave lines (or odd integral multiples thereof) may be used, instead of ½-wave lines, in the antenna tests already described, but the line impedance must be known, and the actual antenna impedance calculated with the aid of formula (8).

Measuring Very Low Impedances

The feed-point impedance of parasitic arrays and low-frequency mobile antennas may be less than ten ohms. Although this low-impedance may be inverted through the use of a ¼-wave line, there is a simpler way of measuring it.

Just connect a non-inductive resistor between



Method of using the Antennascope Jr.

the "hot" *Rx* terminal and the load. The measured impedance will be the load impedance, plus the added resistance. For example, if a 50-ohm resistor is used and the *Antennascope* reads 54 ohms, the actual load resistance is four ohms.

Vertical Antennas

To determine the characteristics of a ¼-wave antenna, connect the *Antennascope* between the antenna and ground or the ground-plane radials and proceed as before. The radiation resistance will be in the 30 to 35-ohm range.

The impedance at the feed point of a ground-plane antenna may be increased by "drooping" the radials downward. The *Antennascope* will indicate when the impedance has reached the desired value, which is usually about 50 ohms, to match 50-ohm coaxial cable.

(Continued on page 50)

(from page 48)

Mobile and other loaded antennas may be analyzed in the same manner as other verticals. Their feed-point impedance may be as low as five ohms. Therefore, an added series resistance may be required to measure the exact value.

Parasitic Arrays

The driven element of a parasitic array is adjusted with the aid of the *Antennascope* in the same way as any other dipole. Impedance readings will normally fall between a few ohms and 100 ohms. Do not be surprised if two apparently identical arrays show up considerable differences on the *Antennascope*. Also, it is not unusual to discover more than one null in a close-spaced array. In a 3-element array, for example, there may be partial nulls at the self-resonant frequencies of the reflector and director, as well as at the resonant frequency of the radiator. Careful attention to the standard length formula (7) will eliminate confusion from these multiple nulls.

Normally, the reflector runs 5 per cent longer and the director 4 per cent shorter than the radiator. Varying their lengths seldom increases the gain of the array, but doing so will shift the resonant frequency and the center impedance of the radiator. Changes in their length can only be made intelligently with the the aid of a field-strength meter.

Measuring Standing-Wave Ratios

The actual standing-wave ratio of a feed line can be measured in several ways with an *Antennascope*. If the *Antennascope* shows a complete null with *R1* set to the line impedance and the *Dipper* set to resonant frequency of the antenna, the *SWR* is 1:1.

When the line is not flat, comparing the line impedance (Z_o) with the setting of (Z_s) required to null the *Antennascope* will also indicate the *SWR*, thusly:

$$SWR = Z_o/Z_s \text{ or } Z_s/Z_o \qquad (9)$$

Also the *Antennascope* may be calibrated to read *SWR* directly. Set *R1* to the impedance of the line upon which measurements are to be made. Adjust coupling to the *Dipper* for full-scale meter deflection with the *Rx* terminals open. Without disturbing any of these adjustments, connect different non-inductive resistors across the *Rx* terminals and note the current on the meter.

A resistance equal to *R1* will, of course, produce zero current. Higher and lower resistances will cause the meter to indicate. Prepare a curve of *SWR* vs. current readings up to about 10 to 1. In the future to read *SWR*, set *R1* to the predetermined value and determine the line *SWR* by comparing the meter deflection with the calibration curve.

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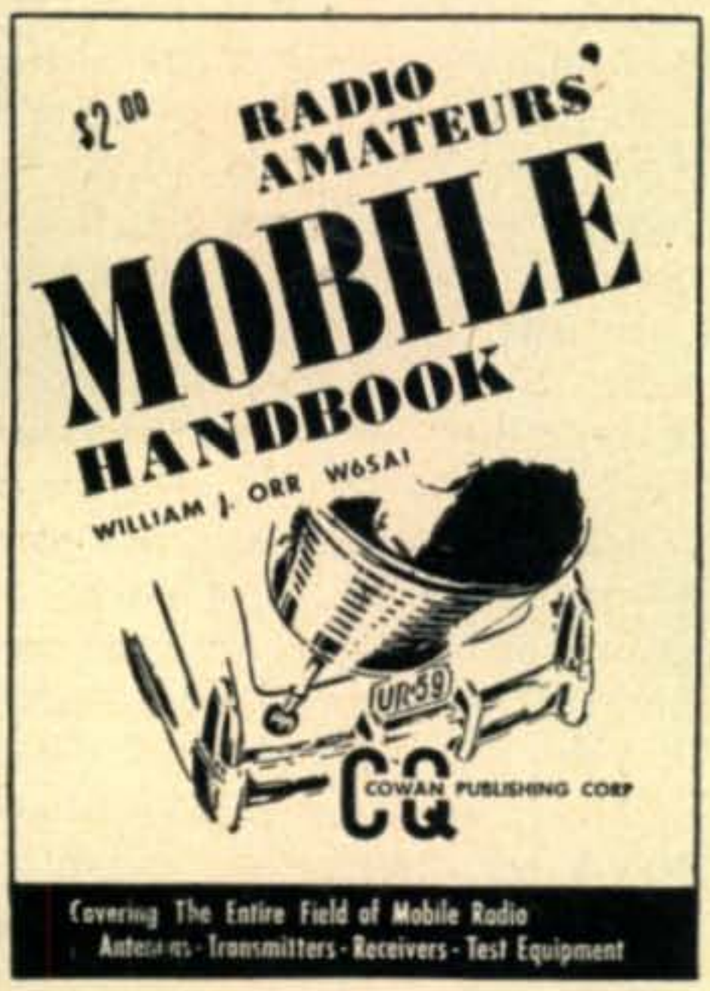

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(from page 50)

In common with other resistance-type, r-f bridges, these last two methods of determining line *SWR* give entirely accurate results only when the antenna is resonant and the line is an integral multiple of a ½ wave* at the test frequency, because they are not capable of properly evaluating the reactive components introduced by non-resonant operation.

Other Uses Of The Antennascope

Many additional uses for the *Antennascope-54* and the *Antennascope Jr.* will suggest themselves to the reader.

* or of a ¼ wave—Editor.

TVI FILTER

(from page 16)

plate about 2 inches square and bolting with 4 bolts to the bottom of the can. At the base of the cavity the r-f current density is high. For this reason care should be taken to see that a good electrical connection is made between the center conductor and the bottom of the can.

The connectors for the input and output can be either soldered or bolted into place, depending on the type used. The location is shown on *Fig. 2* as about 3 inches up from the bottom of the cavity for the can we used. The height of the center conductor is 6.75 inches, or just high enough so that the end capacity effects are not too great when the top is soldered back on to close up the can. The can should be opened with as clean a job of "can opening" as you or the XYL can do. The top should be soldered back on when all parts are inserted.

The cavity will work best when connected to the output of the transmitter through a piece of co-ax cable about one-quarter wave in length. At no time should the output of the cavity be left unloaded. The voltages developed due to the high VSWR produced by an open line may damage the connectors.

With the cavity connected the tuning procedure in the transmitter will not change. However, the point of "dip" may change on the final plate circuit dial. This is due to a very slight reactance term in the insertion impedance of the cavity.

The best tuning procedure is to dip the final and uncouple it slightly. Then resonate the cavity as indicated by the r-f crystal probe. The transmitter may then be fully loaded and tuned as usual. The results measured on our cavity are shown in *Fig. 4*. It can be seen that we realized as high as 50 db. attenuation at 200 Mc. We did not bother to measure any-

thing above 400 Mc. or below 40 Mc. since we feel that most of the "junk" coming out of a 2-meter transmitter will fall in that range. The curve speaks for itself giving both the loaded Q of the cavity from $Q = f/\Delta f$; where Δf is the bandwidth at the 3 db. points, and the attenuation we can expect at any point. For example, if you know a transmitter has an undesirable 72 Mc. response you can easily see that 27 db. attenuation can be expected at this frequency. When we consider the ease of mechanical construction and the low electrical power loss of the cavity, the results in terms of attenuation of undesirable signals are most gratifying.

DX NEWS

(from page 31)

with Clipperton, passing WØYXO. FO8AJ also put W6AM on 171 A3 . . . Al, **W8PQQ**, and Howy, **W2AGW**, are neck and neck at 243 with FO8AJ under their belts . . . **W6SYG, W3EVW** and **W8BHW** stand at 242 with Clipperton and W8BHW's EA9DE and CEØAA. **W3EVW** hits a phone total of 166 with FO8AJ, EA9DD and VP8AN . . . **W6MX** goes to 241 with FO8AJ while **W6ADP** also lands on 241 by coming up to date with FO8AJ, EA9DC, VS5ELA, ZC2MAC and CEØAA . . . George, **VE4RO**, now roosts on 238 thanks to Clipperton while **W6DZZ** jumps to 235 with OD5AX, 4W1UU, EA9DF, FR7ZA, VK1HM and FO8AJ . . . **W6GDJ**, with FO8AJ, makes it 231 . . . El, **W7BD**, goes to 228 with CEØAA, ST2AR, EA9DE, FO8AJ and VP2DA . . . **W6TI** goes to 221 with FO8AJ while **W6DLY** added FO8AJ and VR3A to reach 219 . . . Epsie, **W6EPZ**, hits 214 with additions of YJ1AB, OD5LX, CEØAA, EA9DF, FO8AJ and VR3A . . . **W6BUD** also adds six to reach 208 . . . **W6BUO** adds FO8AJ, VR3A, FX8AC, VK9OK, EA9DF and VP2GX for 148 . . . **W8KIA** leads the 39 zoners with a modest 239 thanks to Clipperton QSO. This jumped him over W5ASG's 238.

KV4AA went to 236 with FO8AJ and Al, **W2WZ**, jumped to 234 with ZA1KAC, FL8UU and FO8AJ . . . **W3EPV** comes up to date with FB8BB, ZD7A, FB8ZZ, SVØWG, CEØAA, EA9DD, VQ9UU and FO8AJ giving him 230 . . . **W1BIH** adds 15 new ones to give him 223 . . . Howy, **W2QHH**, tags along, with 223, courtesy of FO8AJ . . . Mike, **W9FKC**, adds EA9DD, VP2GRO, FO8AJ, VK9OK and VR3A to reach 216 while **W9HUZ** reaches 206 with HI6EC and FO8AJ . . . Carl, **W1ZL**, adds FO8AJ for No. 205. FO8AJ also pushed **W3KDP** to an even 200 . . . Buck, **W4RBQ**, came up with Clipperton and JZØKF to hit 195 while **W6GPB** goes to 193 with EA9DF, ZB2A, I1BNU/T and FO8AJ . . . **W9ABA** rises to 179 with EA9AP, OD5XX and FO8AL . . . **W8VLK** submits 17, overdue, additions to land on 177 . . . **TF3SF** nabbed FB8ZZ and FB8BB for 39 zones . . . **W6CAE** moves to 145 with 32 additions . . . Tom, **TI2TG**, grabbed FO8AJ, and lengthened his lead as No. 1 man in the 38 zone group . . . Bill, **W1HA**, added ZS8D, VP8AI, MP4BBE and VS9AD to reach 202 while Bob, **WØTKX**, came up with CEØAA, SVØWA, EA9DD and FO8AJ to rest on 184 . . . **W4EPA** went to 155 with FO8AJ and ZC4IP . . . Dixie, **W2ZVS**, reached 163 with EA9DF while Sam, **W3AXT**, nabbed VK9OK, ZS7D and FY7YC for a 157 total . . . Jim, **W5FXN**, rests on 165 with VP2GRO, VR3A and FO8AJ while the latter two also helped Miles, **W6ZZ**, to reach 135.

Lou, **W1MCW**, ran her phone total to 211 with ZC5VR while Willard, **W1NWO**, was close behind with 206 helped by FO8AJ . . . FO8AJ also moved **TI2TG** to 182 on phone . . . **KV4BB** gets in the act with 35-186 to lead the 38 zoners and then, whoops, adds MP4QAH for 187! . . . **W1FH** hooked HKØEV, A3 . . . **W8JGU** added FO8AJ, HI6EC, VK9RM, JZØKF and MP4BBK . . . **W2MOJ** nabbed FO8AJ, A3, I5LV and MP4BBK . . . **TI2TG** nabbed 26 HKØ calls!! . . . **W9UKG** reached 100 with FK8AL and VQ5DZ . . . First W2 for VR3A was **W2AGW** . . . **SM5AQW** is up to 70 on 3.5 Mc. with EI2X,

(Continued on next page)

(from preceding page)

AP2K, KZ5DE, VP9BK and 4S7NG . . . **W8BHW** went to 124 on 21 Mc. with VP1GG, KW6BB, VP3YG, KJ6BA and FO8AJ. Lindys phone total for this band is 103 . . . Max, **W6ALQ**, with new wooden frame beam, nabbed ZC5VS, ZP5AY, EA9DF, ZE3JP, OQ5CP, VP8AJ, YN1AA and others . . . **W6YY** rec'd A3 QSL's from VK1HM and ZC5VM . . . 160 meter QSO's at **W9FIM** this season included 15 with ZL3RB, 2 with ZL1WW and one with ZL1BY. Walt runs 150 watts to a 160-meter ground plane antenna, top section loaded, 93 feet up . . . **VE3IG** has an even 50 on 3.5 with GW3ZV and EA4CH . . . Mickey, **W8YIN**, nabbed MP4QAH, ZD6BX and FO8AJ for new ones . . . Bill, **W2SDB**, has 79 to show for a year on the air. He has nabbed IT1AGA, CX4CZ, ZD4BQ, 5A2FA, HK4AB and EA9DF . . . **W3CGS** is up to 178 with such as CR5SP, ST2NW and EA9DE on phone. Harry nabbed 72 countries on 21 Mc. in '53 with 64 cards to show for it. Not a bad average . . . **W6ZAT** has worked VR3A on 3.5! . . . Bill, **W6OHX**, only runs from 25 to 40 watts, but that was good enough to drag in such as FK8AO, VR3A, VS6CG, KX6BU, KR6AA and many others.

Here and There

W5PPI has the log of **KF3AB** covering the period from Nov. 29, 1953 to Feb. 19, 1954 and will be glad to replace any missing QSL's . . . It appears that the rumor that Russian amateurs might be allowed to contact W stations, after May 1, had no basis in fact. We have heard nothing to indicate that their restrictions have been loosened . . . **VQ4DW** is now on a six-month leave in England and may be contacted at 28 Kings Ave., Carshalton Beeches, Surrey . . . **4S7XG** is due home from Ceylon shortly . . . ZS6ACD is now **ZS1ACD** . . . TI2TG received his **WFJS** and **WAJAD** awards after a six-month wait . . . **ZD6RD** was heard on 21,257, A3, working KV4BB . . . **G6ZO** received visits from ST2AR and W3LYK/Antarctica . . . W1OMY is now **K2BIB** . . . W3AXT seeks QSL from CM1AR . . . **W1WLW/1** will operate from Gilmanton, N.H. each week-end during the summer . . . KV4AA was No. 60 for **W1TSP** . . . **ZD2S** visited K2BZT, he now works for BOAC and hopes to get his old call of G3CZT back. He plans 160 and 2-meter operation . . . W2AOS/KG6 now keys from **W3ENK** . . . We regret to report the passing of **VK5FL** . . . **GM3EYP**, ex-VP8AP, may become a U.S. citizen . . . **K6CST** is none other than old W4ABY . . . **W4ODM**, Sparky, now keys from **SVØWA** . . . WØKBD seeks cards from **VP7NB** and **OE13USA** for 100% average . . . TI2TG reports rumor that **VU7BX** is active from Dieg Garcia Island. Location unknown . . . **W8VLK** received WAA Certif No. 115.

Japanese Award

The Japan DX Radio Club (JDXRC) will present a "WJDXRC" Certificate to any amateur station submitting proof of contact with five, or more, JDXRC members. Some active members are: JA's 1AAW, 1AB, 1AF, 1CC, 1CR, 1KF, 2DO, 3IW, 5BQ, 6AO, 7CS, 8AA, 9AB (ex-2WB), ØAA, ØAB, etc. QSO's should date after September 1, 1952. Contact Kiyoshi Mizoguchi, JA1BK, Box 7, Nerima, Tokyo, Japan for further details.

New Addresses

AB1US (Formosa)—APO 63, c/o P.M. San Francisco, 16, Calif.
EL2P, EL2X—Via W1JOJ (EL2P, c/o P.A.A. Box 36, Harbel, Liberia).
HKØ Expedition—L.C.R.A. Apartado Postal 584, Bogota, Colombia.
VQ4CF—Sailor, Box 5163, Nairobi, Kenya.
W8DUY—Don Holzapfel, R.F.D. 5, Ashland, Ohio (New QTH).
YU1AD—Mirko Voznjak, 152 Baje Sekulica, Belgrade, Yugoslovakia.
ZC7DO—Paddy, Box 01, APO MELF 12, GPO, London, England.

Thanks to W2WZ, W6MUR, W6BIL.

TEST EQUIPMENT in the HAM SHACK

(from page 27)

checking electrolytics. From the time an ordinary electrolytic is manufactured, its days are numbered. Heat and overload increase its mortality rate. However, to offset this disadvantage they carry the widest tolerance of any common condenser. Because they are most suited for audio bypass and filter use they can be considered acceptable with variations as great as minus 25% or plus 200% from their rated values. Even this range can be exceeded with caution. And a word to the new Ham, always keep the electrolytics in low frequency uses. If r.f. is present in the same circuit shunt the electrolytic with a mica or ceramic condenser.

Checking Paper Capacitors

Though robbed of some of its popularity by the new ceramics, the paper condenser is still used in great quantities. Paper capacitors seldom change much in value. A good "open-intermittent-short" check will usually tell the story except when sorting unmarked lots. The bulk of paper units today are non-inductive, that is, they are constructed in such a manner as to keep the internal inductance of the foil roll and leads to a minimum. This increases their efficiency at the higher frequencies. Unless one is sure that a particular paper condenser is of the noninductive type, its use should be limited to the broadcast, audio and intermediate frequencies. Even for these frequencies they should be used only for bypass and blocking purposes.

In using condensers make sure the breakdown voltage rating is sufficient for the job that they must do. Recently we had occasion to check a code practice oscillator of the usual variety using a battery tube, an interstage transformer and 45 voltage of "B" battery. In this particular case re-occurring peaks of 1200 volts were measured on the plate. While this is not common, don't belittle the voltages which can occur across the common plate to grid coupling capacity. It is a good rule to have the voltage rating of the condenser at least twice the value of the d-c voltage across it and more when practical.

The mica, which is one of the oldest condenser types, and the ceramic, which is one of the later additions to the family of condensers, have two things in common. Their use can be ex-

tended into the ultra-high frequency ranges, and they can be manufactured in various forms which are very stable. The present popularity of slug tuned circuits depends to a great extent upon the stability of mica and certain types of ceramics when used as the capacitive element in the resonant circuit.

However, for this type of work the (red) silvered mica is much preferred. When the ceramic types are used in resonant circuits, never use the general purpose varieties which

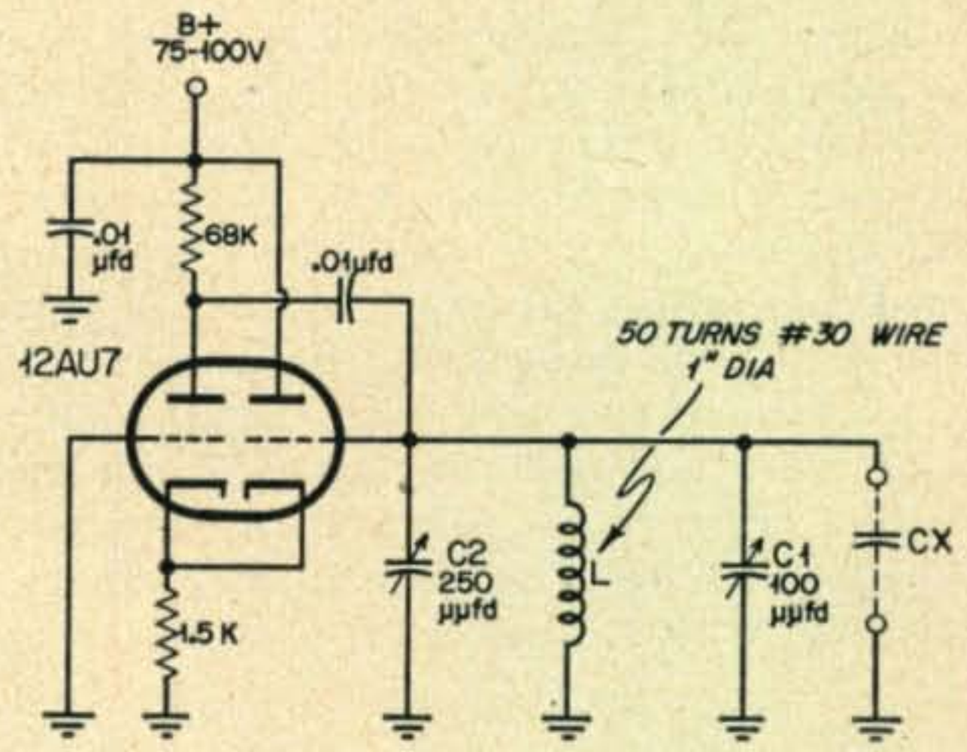


Fig. 7. A simple oscillator circuit for use in checking small value condenser at radio frequencies.

are intended for bypass and blocking only. The temperature coefficient of many of these is so poor that the only tolerance specification which can be given them is a minimum capacity below which they will not fall. This is of little importance, however, in reference to the bypass purposes for which they are intended, and should be taken into consideration when they are checked for capacity.

For those who use fixed condensers in tuned circuits, the small values from 1.0 µµfd. to 100 µµfd. are very important. The reactance of the very small values is so great at the 60-cycle frequency used in most ordinary bridges, that the accuracy of measurement begins to decrease in this range. For this reason we have found the little gadget diagrammed in *Fig. 7* to be very handy around the shack.

Measuring Very Low Capacities

This tester consists of a stable one-tube oscillator which can be operated from any small power supply and will deliver in the vicinity of 75 to 100 volts at 5 to 10 ma. The operation is as follows. A broadcast receiver is tuned to a local station at the high frequency end of the broadcast band and adjusted to a comfortable level output.

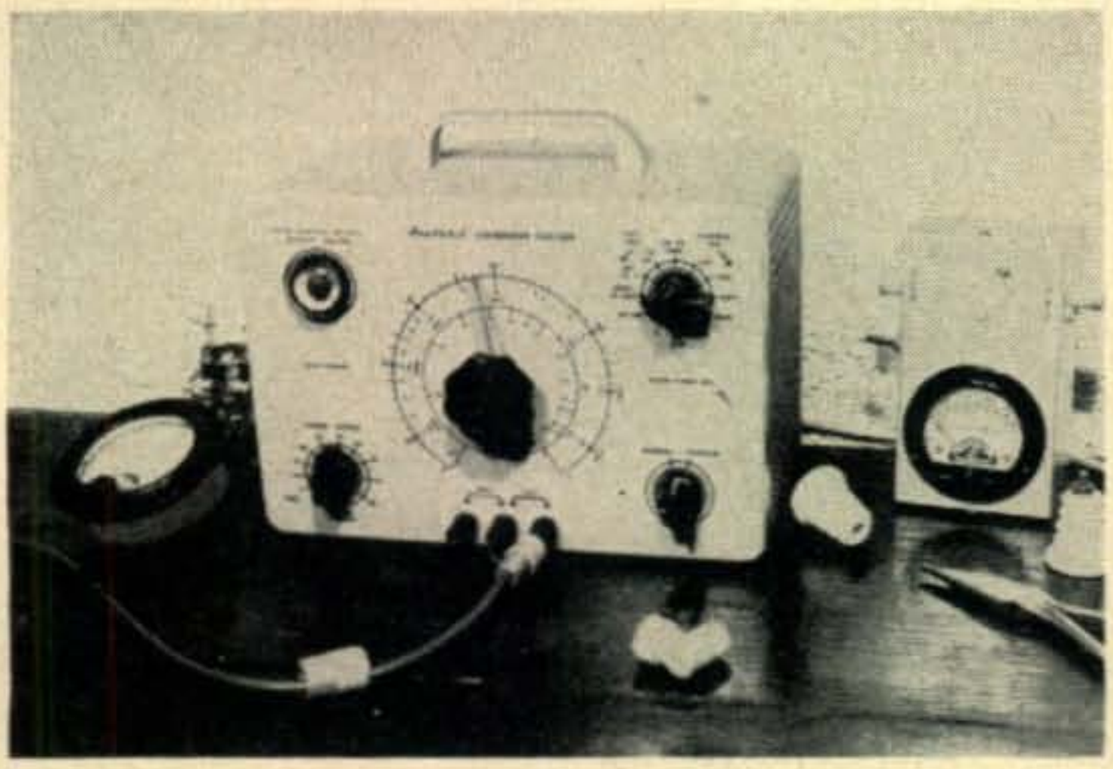
After warming the little tester up, Condenser *C1* is set with its plates closed or fully meshed. This condenser is a straight line capacity or circular plate style. This setting should correspond to the zero setting on the dial used on

C1. After this is done tune *C2* until a beat is heard with the broadcast station. Then carefully zero in the test oscillator until it is at zero beat on the receiver.

If the small value of capacity being tested is now connected at the terminals marked *Cx*, the frequency of the test oscillator will be lowered, producing an audio beat in the receiver. If the system is restored to zero beat by opening *C1*, the amount of capacity removed from the circuit by opening *C1* will equal the amount in *Cx*. In making a scale for *C1* the calibration will be in reverse to those normally used, or, the 100 $\mu\mu$fd. point on the scale will occur when the condenser is wide open and the zero $\mu\mu$fd. point will be reached when the condenser is closed. The leads to *Cx* should be as short and rigid as possible although lead capacity will be cancelled out when *C2* is zeroed.

Calibration may be accomplished by testing several small condensers of known value and then plotting a curve. This will be accurate enough for most Ham work. It is surprising what a linear scale even the low priced tuning condensers will give. Of course, *C2* is only for zero setting and can have any style of plate shape.

This method is usable up to values of 1000 $\mu\mu$fd. or more until *C1* becomes rather bulky. One advantage of this little tester is that it



Wondering if there is a short or break in your co-ax feedline? Just measure the capacity with the checker and figure the distance from the manufacturer's specifications on $\mu\mu$fd./ft.

checks the capacity at radio frequency which is closer to the actual operating conditions. Even higher frequencies can be used if desired by merely changing the coil.

Although much of the material in this portion of our test equipment series has been concerned with developing the basic principals of capacity checking, we hope to have material of interest to the more advanced amateur in the near future. Of course, we're speaking of the impedance bridge which gives a more complete test of inductance, capacity and resistance.

PROPAGATION

(from page 35)

the equatorial sporadic E during the summer months. The data also clearly indicates that sporadic E occurs in patches. These patches were seldom found occurring simultaneously at points closer together than a few hundred miles. Additional observations made at Stanford by Helliwell, accurately placed the predominant height of the sporadic E layers at 100 kilometers above the earth (62.5 miles) in winter and near 110 kilometers (69 miles) in summer. Sporadic E was also found to peak in occurrence at night, with another peak noticed near noon on the sporadic E occurring during the winter months.

NOVICE SHACK

(from page 38)

license and want a "General Class" license, do you have to appear before the FCC examiner to take the code test?"

The answer to both of these questions is "yes." However, if you live more than 75 miles from a point where the FCC holds amateur license examinations at least four times a year, or can certify by a doctor's certificate your inability to appear at such an examination point, you are eligible to apply for the "Conditional Class" license, which grants the same privileges as the "General Class"

HELP WANTED

(to obtain a Novice license)

Johnnie Jones (16), 1012 Madison St., **Valparaiso, Ind.**

Bob Pence (13), 406 Center St., **Valparaiso, Ind.**

Francis L. Jacobs, 4 Wilson St., **Anson, Me.,** Box 57. Phone Madison 6-3293.

Richard Bush (15), 1538 N. Volustia, **Wichita, Kans.**

Russell Canten (32), 56 Brooklyn Ave., **Buffalo 8, N. Y.**

Carl D. Stier, III (17), 5816 Lafayette Ave., **Omaha, Nebr.** (Also wants pen pals.)

Jim Le Monds (15), 11212 Miloann St., **Arcadia, Calif.,** phone FO 04001.

K. J. Farnsworth (35), 3708 South 23rd East, **Salt Lake City, Utah.**

Yvan Deputter, 40 Denison, **Granby, Que., Canada.** Tel. 7650 (Just starting).

Duncan C. Sinclair (13), 402 3rd St., S.W., **Moultrie, Ga.**

Don Reynolds (13), 5613-16th North East, **Seattle 5, Wash.**

Jack Perkins (16), 423 Bentley Ave., **Beverly, N.J.** (Is waiting for his Novice license. Wants pen pals. Will answer all letters.)

Howard Gomes, 96 Main St., **Pawtucket, R. I.**

Peter Butler (13), 88 South Ave., **Whitman, Mass. Phone 1352.**

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license, but is issued by mail. Those in the Armed Services who can show inability to appear at an examination point by presenting a signed statement from their Commanding Officer are also eligible to apply for a "Conditional Class" license.

George, **WN3YJG,** writes from Philadelphia, **"Dear Herb:** I have had my ticket for about three months, and I have had about 175 contacts in 14 states and Canada. I run 17 watts to a 6L6 on 3740 kc. My antenna is 130 feet long, and the receiver is an **S-38C.** I am 14 years old and would like to hear from other teen-age amateurs in the Philadelphia area. My address is 914 Napfle Ave., Philadelphia 11, Pa."

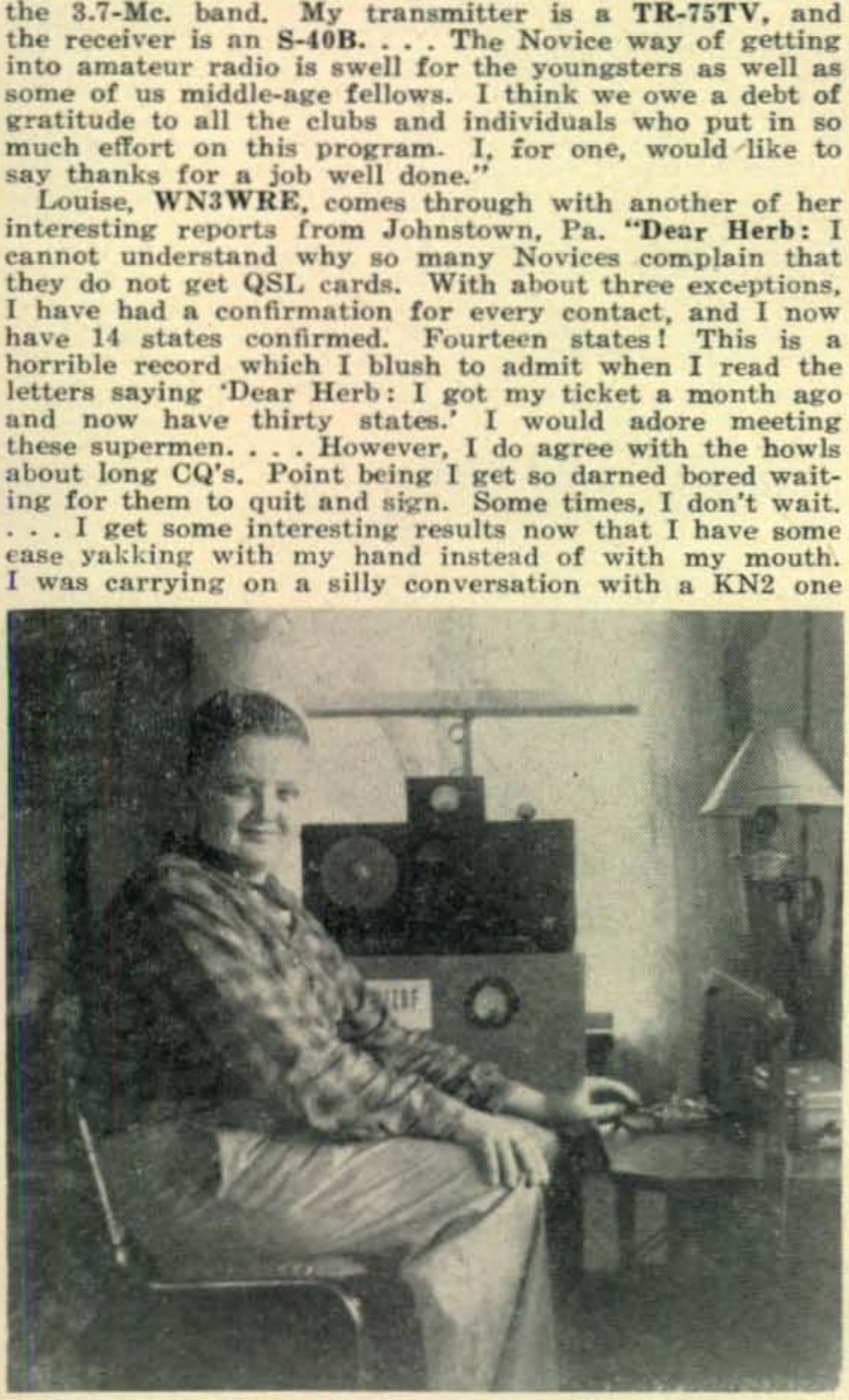
Ex-Novice Roy, **W3WAF,** reports on his activities since dropping the "N" from his call. **"Dear Herb:** My latest DX has been KZ5CI, CO8HB, DL4EN, HH3RC, KV4AA, KP4WA, and CN8FL, all with 20 to 25 watts input. HH3RC and CO8HB were in the 7.2-Mc. Novice band. Also, I have worked 43 states. Still need Wyo., Nebr., Utah, Nev., and Mont. I would like to make a sked with any WN's in those states. . . . I have worked one YL,

Margaret, WN5AXC in Dallas, Texas. I sure got a big surprise one day, when her dad, W5EJV, called me on the telephone!" (Why did he call? **Editor**)

Dick, **KN2HLA**, certainly has not wasted much time. He reports; "I have been on the air for five weeks and three days. So far I have worked 25 states and Canada, with 19 confirmed, all on the 7.2-Mc. band. My best DX is California. My transmitter is a **Heath AT-1**, the antenna is 67 feet long, end fed, and the receiver is an **S-40B**. I am 15 years old and am on the air every morning until 10:00 a.m."

Glenn, **WN5BWV**, writes: "The enclosed photograph is proof positive that I take my amateur radio seriously. New Mexico is one of the states that allow amateurs to purchase call-letter license plates for their cars, but mine is the first Novice call-letter license plate I have seen. . . . I have made over 100 contacts in the few months I have been a Novice. I have worked 16 states, mostly on the 3.7-Mc. band. My transmitter is a **TR-75TV**, and the receiver is an **S-40B**. . . . The Novice way of getting into amateur radio is swell for the youngsters as well as some of us middle-age fellows. I think we owe a debt of gratitude to all the clubs and individuals who put in so much effort on this program. I, for one, would like to say thanks for a job well done."

Louise, **WN3WRE**, comes through with another of her interesting reports from Johnstown, Pa. "**Dear Herb:** I cannot understand why so many Novices complain that they do not get QSL cards. With about three exceptions, I have had a confirmation for every contact, and I now have 14 states confirmed. Fourteen states! This is a horrible record which I blush to admit when I read the letters saying 'Dear Herb: I got my ticket a month ago and now have thirty states.' I would adore meeting these supermen. . . . However, I do agree with the howls about long CQ's. Point being I get so darned bored waiting for them to quit and sign. Some times, I don't wait. . . . I get some interesting results now that I have some ease yakking with my hand instead of with my mouth. I was carrying on a silly conversation with a KN2 one



Russ, WN1ZRF, Sherborn, Mass., "couldn't get out of New England" on 3.7 Mc. He is now on 7177 kc. and has over 100 contacts in fifteen states.

midnight. Two days later, I got a letter from my Mother telling me that I should not flirt with strange men—not even Hams—while Bill was working. Seems W3WET sat and copied our contact and entertained my family with it at breakfast the next day. No privacy."

Dave, **WN8PXK**, says, "Each month when **CQ** arrives, the first thing I turn to is the **Novice Shack**. All the Novices want to get their two cents worth in; so I would like to know how much it would cost a word. . . . Every day, I am hanging around 7180 kc. I run 70 watts and have an **SX-71** receiver. I have worked 42 states, WP4, KL7, CO2, VE7, VE8 in a few months. I am trying for WAS. I am 12 years old."

Steve, **K2EOF**, offers his help to anyone in the New York City seeking a Novice license. His address is: Stephen M. Aug, 175 West 93rd St., New York 25, N. Y. Phone: RIverside 9-5523. He can be reached by phone most evenings.

(Continued on page 60)

(from page 59)

Don, **KN2GKK/K2GKK**, writes, "I have started a new Ham club in the Jamestown, N. Y., area. We are holding Novice classes in code and theory. Anyone interested, please contact me. The address is: Chautaugua Lake Amateur Radio Association, Don Macdonald, KN2GKK/K2GKK, 100 West Fairmount Ave., Lakewood, N. Y. . . . My rig runs 25 watts input on 3724 kc. and 7187 kc., and my receiver is a one-tube regenerative. I have worked ten states, and my best DX is 950 miles. I want to QSO with some WN1's. One of my problems is that my address is not yet in the Call Book and neither are the addresses of some of the stations I work; so we cannot exchange QSL cards. Anybody I have worked who has not received a card from me can send his to my address above, and I will answer it."

H. L. McPeak, **W2SHT**; Jim, **W9HCQ**; and R. G. Kuck, **W6EBR/2**, all took time to point out that there was an error in the formulas for calculating db., which appeared in the May column. The correct formulas are: db. = 10 $\log_{10}$ W1/W2, or 20 $\log_{10}$ E1/ E2. At the last moment, I reversed the multipliers for no reason that I can think of. Fortunately, the error does not affect any of the figures or conclusions in the discussion of db.

Burt, **WN9DIK**, tells his story in a very few words. "**Herb:** I want to thank you for putting my name in the **Novice Shack** 'help' list a few months ago. At first, I was on 3.7 Mc., but now I am on 7.2 Mc., and I like it a lot better. My transmitter is a **TR-75** and the receiver is an **S-53A**. I am now waiting for my **General.**"

Jerry, **WN1AES**, reports from New Haven, Conn. "I have had my license for two months. Although I have been spending most of my time experimenting with antennas, I have made about 15 contacts on 3.7 Mc. and 7.2 Mc. with a **Lettine 240** transmitter and an **S-38C** receiver. I have also done a little 147-Mc. work, thanks to the Yale University Radio Club. . . . I am 12 years old. Two of my friends have Novice licenses and two more are just about ready to take the examination."

Glenn Howard, WN5BWV, Artesia, New Mexico, submits this picture in proof that he takes amateur radio seriously.

I wish to thank, most sincerely, the members of the Soo Radio Club, Sioux Ordnance Depot, Sydney, Nebraska, for honoring me with their "**Courtesy Award.**" I shall try to live up to it. The club also offers a "**Certificate Of Achievement and Honorary Membership**" to any amateur working all members of the club. Earning that certificate will be a real achievement for anyone outside of Nebraska!—**Herb.**

Jerry, **W9DKR**, gets the honor of being anchor man this month. "**Hi Herb:** WN9CUT installed a **Heathkit AT-1** in his car, 8:30 p.m., April 28. W9QBD, W9PXZ, and myself helped Jim adjust it. Then he and W9QBD took it out for a trial run. I copied them for four miles, when the signal quit. . . . In a little bit, they called for help. The transmitter key had fallen apart; so they had had to put it together in the dark, without a flashlight—to report that they ran out of gas. So W9PXZ and I took them a gallon of gas and got them back to town. Without radio, it would have been a long walk."

Here's hoping that I receive a letter or a picture from you before next month. Incidentally, please address all mail to me to 385 Johnson St., Gary 3, Indiana. I get it, o.k., if it is sent to New York, but there is an unavoidable delay. 73—Herb.

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CLOSING DATE: July 25, for the Sept. issue.

WRITE: CQ Magazine, 67 West 44th St., N. Y. 36, N.Y. Attention, Jeanne C. Gillespie.

Wanted:

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

WANTED: Complete sets or any parts used with: APR-4, BC-610, BC-614, BC-939, BC-729, ART-13, ATC, DY-12, DY-17, CU-25, loading coil, BC-312, BC-342, BC-348. Cash or trade for new or used equipment. Arrow Appliance Co., 38 Exchange St., Lynn, Massachusetts.

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

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

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

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

JOHNSON VIKING I transmitter. Advise price, condition, final, etc. John Olson, W7TYW, Philipsburg, Mont.

WANTED: ART-13 ATC, DY-12, DY-17, CU-25, BC-342, BC-312, BC-348, BC-221, TS-173, TS-174, APR-4 and tuning units, RA-20, RA-87, TG-7 teletype, keyboard perforators, TCS and parts, BC-939, BC-614, BC-610, APN-9, ARC-1, ARC-3, 32V, 75A, 310 exciters, ARN-7, manuals. Will buy for cash or trade for new amateur equipment, Johnson, Viking, Ranger, Hammarlund, Hallicrafters, National, Elmac, Gonset, etc. All types electronic equipment taken in trade. Alltronics, Boston 1, Massachusetts. RIchmond 2-0048, 2-0916.

WANTED: Set of "AA" coils for HRO50T1. Reasonable. Will swap something or purchase. W3GHD, Box 34, Philadelphia, Pennsylvania.

WANTED: BC-348 receivers. Write James S. Spivey Inc., 4908 Hampden Lane, Washington 14, D.C.

Miscellaneous:

TRANSMITTER HUNTERS: We have a complete line of transmitter hunting equipment which is the product of many years experience of hunting and finding 10-meter hidden transmitters. Postcard brings information. W5NFC-W5QZZ, 2024 Ford St., Austin, Texas.

CRYSTALS? 2-meter? Etch surplus easily, cheaply. Instructions 35c W4ATE, 1001 Merritt, Old Hickory, Tenn.

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

REPAIR on all makes of TEST EQUIPMENT, and kit construction, starting September First. Write now for free information. Bigelow Electronics, 135 North Pioneer Road, Beulah, Michigan.

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

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

Beautiful HANDPAINTED NECKTIES with your handle, call and antenna towers. Henry Schanding, W3RRF, Harrington, Delaware.

For Sale:

FOR SALE: NC183D National Receiver. Used 6 hours. Perfect condition. $295 or best offer. F. W. Lindsay, Jr., 1523 West 9th St., Hastings, Nebraska.

DYNAMOTORS: 6 V input 425 output @ 375 mils. Limited quantity. $24.95. R. Mersey, W2TXI, 118 Franklin Ave., Lynbrook, L.I.N.Y.

SELLING OUT: Super-Pro SP-200 w/pwr/spkr/rack $90; Meissner 150 B wo/exctr $85; LM-15 w/pwr/book $75; 4E27 $5 (4); UTC #S-60 5v 22a 10 kv ins $5 (4); UTC LS12X line-grid $10; hundreds other tubes/parts. Heavy gear local only, rest FOB. K2BEX, 102 Roosevelt Court, Carle Place, L.I.N.Y.

FREE AUTOMOBILE with purchase of Collins 75A-3 and 32V-3. Selectronic Supplies, Inc., 1320 Madison Avenue, Toledo, Ohio. Phone FU-3361.

FOR SALE: RME 45 Calomatic dial model $100. BC-604 DM NBFM transmitter unconverted $25. SCR-274 transmitter units $15. W2CIT, 3919 William St., Seaford, N.Y.

SURPLUS SPECIALS! RG-8/U cable 100 ft. $5.95; 250 ft. $13.25; 500 ft. $25.00. Coaxial connectors—PL-259 5 for $2.25, SO-239 5 for $2.00. New tubes—807 $1.65, 811A $4.25, 812A $3.50, 813 $10.50, 866A $1.48, 304TH $8.75, 872A $3.95, 24G $1.85. Postage extra. Request free bulletin and visit our new store for thousands of bargains. Want to buy or swap. Selsyns, Synchros, Servo Motors, Amplidynes, RTA-1B Aircraft Radio. Lectronic Research, 717 Arch Street, Philadelphia 6, Pa.

FOR SALE: 1951 Oldsmobile—4-door deluxe sedan—equipped with complete mobile station, Sonar SRT-120 transmitter, Morrow 5-BR converter, Sherrick Antenna, excellent performance of station and car, price $1,575. Gonset Communicator used very little $125; 2-meter mobile antenna new $4.00; Mallory dual vibrapack mobile power supply $22; Gonset mobile VFO $10; Gonset Super Six Converter $30. Reply to: C. Gallo, W2AWI, c/o Lincoln School of Radio & TV, 1851 Broadway, New York 23, N.Y.

SELL: HRO-50T1, perfect including 21Mc. coils, first money order $230. KW, BC221 VFO, bandswitch exciter, PP 813 final, TVI filter, antenna tuner, cannot pack or ship, $250. W5QLY.

FOR SALE: Complete mobile unit. One Leece-Neville 80 Amp alternator and 100 Amp regular. Elmac 54 H 50w. transmitter with dynamic push-to-talk mike. 10-20-75 Morrow converter with noise limiter. Sky line 20 & 75 M mobile antenna with heavy duty mount. PE-103 dynamotor with relays, etc. Transmit and receiver switch. Assortment of coax-cable and fittings. Over $485 worth of equipment. Make me an offer. Phil Summers, W8ERW, 410 Maple St., Delphos, Ohio.

75A3 less speaker, excellent, $400. Pentron tape recorder less mike $40. Ray Megirian, W4WZV/2, 169-63 25th Ave., Whitestone, New York.

WE ARE NOW IN our ultra modern building with fresh stocks to serve you. Bargains, with new guarantee: S-72 $69.50; S-40 $69; RME-45 $99; HRO Senior $99; Lysco 600 $99; S-27 $109; SX-43 $129; S-76 $149; SX-71 $169; SX-42 $189; HRO-50 $275; 75A1 $275; HT-17 $32.50; EX Shifter $69; Globe Trotter $59.50; Harvey Wells Sr., $79; Deluxe $99; Viking I $199; Elmac A-154 $99; HT-9 $199; Globe King $295. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deals to World Radio Labs., 3415 W. B'way, Council Bluffs, Iowa.

QSL Cards:

QSLs—New—Beautiful. Samples 10 cents. Graphic Crafts, Route 12, Ft. Wayne, Indiana.

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

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

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

QSLs, two colors, three dollars, three days, who else. Ham's "Super-Speed Specials." Samples dime. W9AYH, Dept. S, 12811 Sacramento, Blue Island, Illinois.

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

QSL samples. Dime, refunded. Gale Press, W1BD, Waterford, Connecticut.

QSLs, SWLs, Special! 2-color card $4.25. Free samples. Acme Printers, 707 West 8th, Los Angeles 17, Calif.

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

QSLs??? Samples 20c Sackers, W8DED, Holland, Mich.

For Sale:

JOHNSON VIKING II with Viking VFO, commercially wired, A1 condition, $300. Harvey Wells TBS-50D, partly de-TVI'd $95. Stancor ST203A on 20 meters with dynamotor power supply, remote control box, connecting cables $60. Sanford Weiss, Tamiment, Tamiment, Penn.

JOHNSON VIKING Ranger Kit Form $179.50 less tubes; with complete set of tubes $199.95; also available wired and tested; write for details. We trade and offer terms. Largest inventory of used Ham equipment in New England. Write for latest list to W1BFT, Evans Radio, Concord, New Hampshire.

FOR SALE: Hallicrafters SX-42 in excellent condition. L. K. Hussar, Box 143, Oak Hill, West Virginia.

SELL: Boehme automatic keyer for Morse code $145. Boehme Driver unit $55. Boehme portable automatic ink recorder $175; SX-42 $145; HRO Sr. $125; NC100X $95; Viking I TVI'd $185; 32V-2 $485. Want: Collins 310B, BC-342 or BC-312, 75A2 or 75A-1. Tom Howard, W1AFN, 46 Mt. Vernon St., Boston 8, Mass. RIchmond 2-0048.

SELLING OUT: power supplies, speech equipment and modulators, walkie-talkie units, one KW generator, transformers power and modulator some are new, ECO with 807 final, three transmitters complete phone transmitter 300 watts input ready to operate only $175. Send for list. W5HXC, Box 109, Blackwell, Oklahoma.

FOR SALE: All equipment like new: HRO-50, coils AABCDEF Xtal. calbr. Viking I and VFO, TCS-14, AC and 12 volt DC supply. Remote and cables. Unused PE-103. New Variac 7.5 amp. B & W grid dipper. Collins 70E8 VFO. Send card for complete list of power supplies, etc. W6HVI, 2207 48th Ave., Oakland, California.

SELL: Like New: 1 S-38-B receiver $25; 1 Browning Freq. meter model S-4 $50; 1 Carter dynamotor 6v input 600 v output @ 170Ma. 1 Solar Examiter Cond. checker $35. 1 clean PE-103-A dynamotor $20. All FOB. WØJZP, 1506 Sunset St., Albert Lea, Minnesota.

REAL BARGAINS: New and reconditioned Collins, National, Hallicrafters, Johnson, Elmac, Gonset, Babcock, Morrow, RME, Millen, Lysco, others. Reconditioned S38 $29; S40A $69; S76 $129; NC57 $69; NC88 $89; NC125 $129; NC183 $199; HRO50T1 $299; HRO60 $399; HQ-129X $169· SP400X $249; VHF152A $39; RME45 $99; Gonset Tri band $29; Super-Ceiver $89; Commander xmitter $89; S40B, SX71, SX28A, SX42, SX62, HFS, HRO5, HRO7, Collins 75A1, 75A2, 32V2, 32V3, Viking II, Harvey-Wells Bandmaster transmitters, others. Shipped on trial. Easy terms. Satisfaction guaranteed. List free. Henry Radio, Butler, Missouri.

FOR SALE: Collins Exciter 310B1 excellent condition $200. WØNGM, 509 Idaho Ave., Huron, South Dakota.

RTTY, Model 12 complete. W6DOU, 1558 "B" St., Hayward, California.

MALLORY VP557 Vibropack, 400 vdc—150 MA. Electronic Laboratories model 2606 vibrapack, 300 vdc-100 Ma. Gonset 2-meter mobile converter, Gonset Noise Limiter. D. Baake, W2GJP, 750 Pelhamdale Ave., New Rochelle, New York.

BARGAINS: Stock up with these assortments. 12 rotary switches; 40 ceramic condensers, 20 wire wound resistors; 40 mica condensers; 20 toggle switches; 10 volume controls. Your choice of assortments $1.49; any 3 assortments $3.99. Also giant 20-pound assortment of parts $2.49. Aviation Accessories, Inc., Box 4178, Forth Worth, Texas.

COLLINS 32-V3 transmitter, like new, used less than 10 hours $600. W5LBD, Box 323, Uvalde, Texas.

SALE: TBS-50-D $85. W4TVE, Box 8693, Lantana, Fla.

COMPLETE STATION including recently built all-band 500 w. rack and panel transmitter with 813 final and Sonar CFC VFO with NBFM, NC-81X receiver; Astatic T-3 microphone, etc. Sell complete for $200 or in parts. Richard Applegate, W8ESJ, 19 Maple St., Berrien Springs, Michigan.

MOVING, MUST SELL. NBFM, 130-watt all-band transmitter (Sonar VFX-680, 24,T55, 1000vct. 230Ma. power supply, crystal mike). Plus TV52-40LP filter, co-ax, large assortment of tubes, condensers (.5μfd 500v., etc.) cable & resistors. $50 Bob Rodieck, Ft. Totten 59, N.Y.

RU-18 2 coils $10. Shipped collect. Harold Burdick, 619 South Adams, Sapulpa, Oklahoma.

CLEANING SHACK: Eico 5" scope model 425 new condition $45; Sonar VFX 680 NBFM VFO exciter with tubes and set coils, good condition $50; Millen 90800 75-watt exciter with tubes and set coils, good condition $20; BC-454 3-6 Mc. Command receiver brand new $11; BC-457A 4-5.3 Mc. Command transmitter, excellent condition with spare tubes $12.50. Postage extra. George Jacobs, W2PAJ, 144-40 72nd Avenue, Flushing 67, N.Y.

Hamfest Announcements:

Remember Blossomland Amateur Radio Association's Hamfest Picnic, JULY 25 at Warren Dunes State Park, 15 miles south of St. Joseph, MICHIGAN on U.S. 12. Ten-meter transmitter hunt. Bring gear for swap & shop. Registration fee $1.00 in advance or $1.25 at park. Advance registration through Al Carpenter, WN8ORM, Secy-Treas., St. Joseph, Mich.

The annual IRCC "Hoosier Hamfest" will be held on Sunday, JULY 18, at TPA Park, Frankfort, INDIANA. Registration begins at 10:00 a.m. with activities continuing throughout the day. Wanta sell that surplus Ham gear? Bring it along. Prizes-awards-games-entertainment for all. Don't miss it!

WYOMING Hamfest JULY 24-25 at South Fork Inn. Watch for mobiles on Highway 16 west of Buffalo, Wyoming. Call any Wyo. Ham for info. W7QPP.

Augusta and Camp Gordon Radio Clubs will hold their Second Joint Hamfest on JULY 24 & 25 at Lake Olmstead near Augusta, GEORGIA. Prizes, food, good cheer and all the trimmings. Contact O.K. Mixon, W4DJF, Masonic Building. Augusta, Georgia; or K4WAR, Camp Gordon, Georgia, for reservations. Y'all come!

South Hills Brass Pounders and Modulators 16th Annual Hamfest, Spreading Oaks Grove, South Park, Pittsburgh, PENNSYLVANIA. Sunday, AUGUST 2, 1954 —Noon till??? Prizes-refreshments-games. For further information contact W3LDB, 4949 Roberta Drive, Pittsburgh 36, Pennsylvania or phone WI 1-7025.

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

Instruction:

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

Trading Corner:

SWAP: BC221, calibration perfect, cabinet slightly scratched, for Hallicrafters S-72 portable. W5QLY.

TRADE OR SELL: Model 12 teletype with synchronous motor, table, cover, stand and polar relay. Tape perforator, distributor, and tape transmitter with three polar relays. All converted, wired and ready for operation. Excellent condition. W4EBH, 328 West Whitlock Ave., Winchester, Virginia.

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

SELL OR TRADE: LM12 freq. meter and AC supply $45. New PA107 UTC transformer $50. Astatic KC mic and push-to-talk Stand $25. Precision E-200-C Signal Generator $30. Model 203 Clough Brengle AC, resistance, capacitance, turns ratio bridge $15. Pair of 813's $15 new surplus. Rider manual VII thru XIX $50. A. McMullen, 2800 Montclaire Dr., N.E., Albuquerque, New Mexico.

FOR SALE OR TRADE: Transformers, coils, meters, etc.—too much to list here. Want mobile gear (only factory built) or photographic equipment, such as camera or accessories, darkroom gear, etc. Send self-addressed stamped envelope for list. I. E. Aston, R.D. #3, Lancaster, Pennsylvania. W3FMZ.

FOR SALE OR TRADE for 16 mm or 35 mm camera and equipment. T-23/ARC-5 new WO/tubes or crystals $10; RT-19/ARC-4 two-meter transceiver, excellent, with tubes, xtals, and conversion data $12; BC433G receiver, excellent, tubes, instruction book, control head, BX22E relay $15; BC-453 Q5er excellent $8; BC-779B Hammarlund Super Pro (Army) like new $100; 274N transmitters—5.3-7Mc and 3-4 Mc. complete with tubes and crystals $5. each; transformer 3200 V CT 350Ma, Navy rating, new $12; 2-813 tubes, new, $7 each; 4-304TL, new $1.50 each; 5-807, new, $1.00 each. Write for list of power supplies and other parts. Carlos O. Love, 11009 Tascosa Drive, Dallas 28, Texas.

CQ Ad Index

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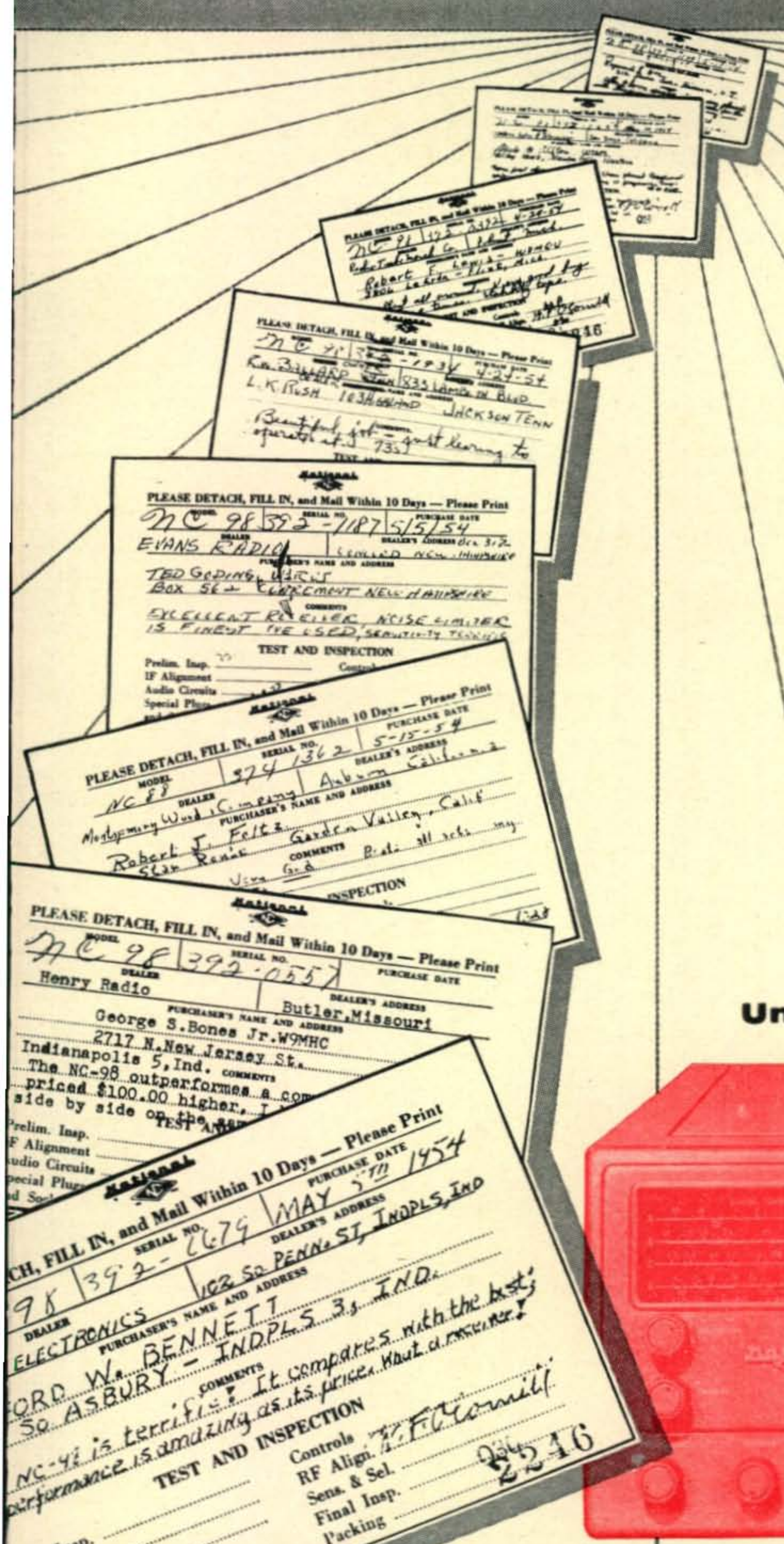

The real test of a receiver, is the test of use. As the old expression goes, "You've got to 'winter' it and 'summer' it" before you know how good it is. Part of the guarantee card shipped with each of our receivers is returned to us. On it is space for the owner's comments. As these cards pour in by the thousands, the enthusiastic comments we read never fail to give us a warm glow of pride. Here is a small sampling of the cards we've received commenting on the NC-98. No wonder this superb receiver is blushing!

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CRYSTAL FILTER · S-METER · 550 KCS. TO 40 MCS. RANGE · CALIBRATED AMATEUR BANDSPREAD OR CALIBRATED SWL BANDSPREAD (FOR SW LISTENING) · NEW MINIATURE TUBES · AN RF STAGE · ACCESSORY SOCKET · TWO I F STAGES · EDGE-LIGHTED LUCITE DIAL SCALES · NOISE LIMITER · SEPARATE HF OCS. .3- POSIT. SEL. · ANT. TRIM. · PHASING CONTROL · SENSITIVITY CONTROL.

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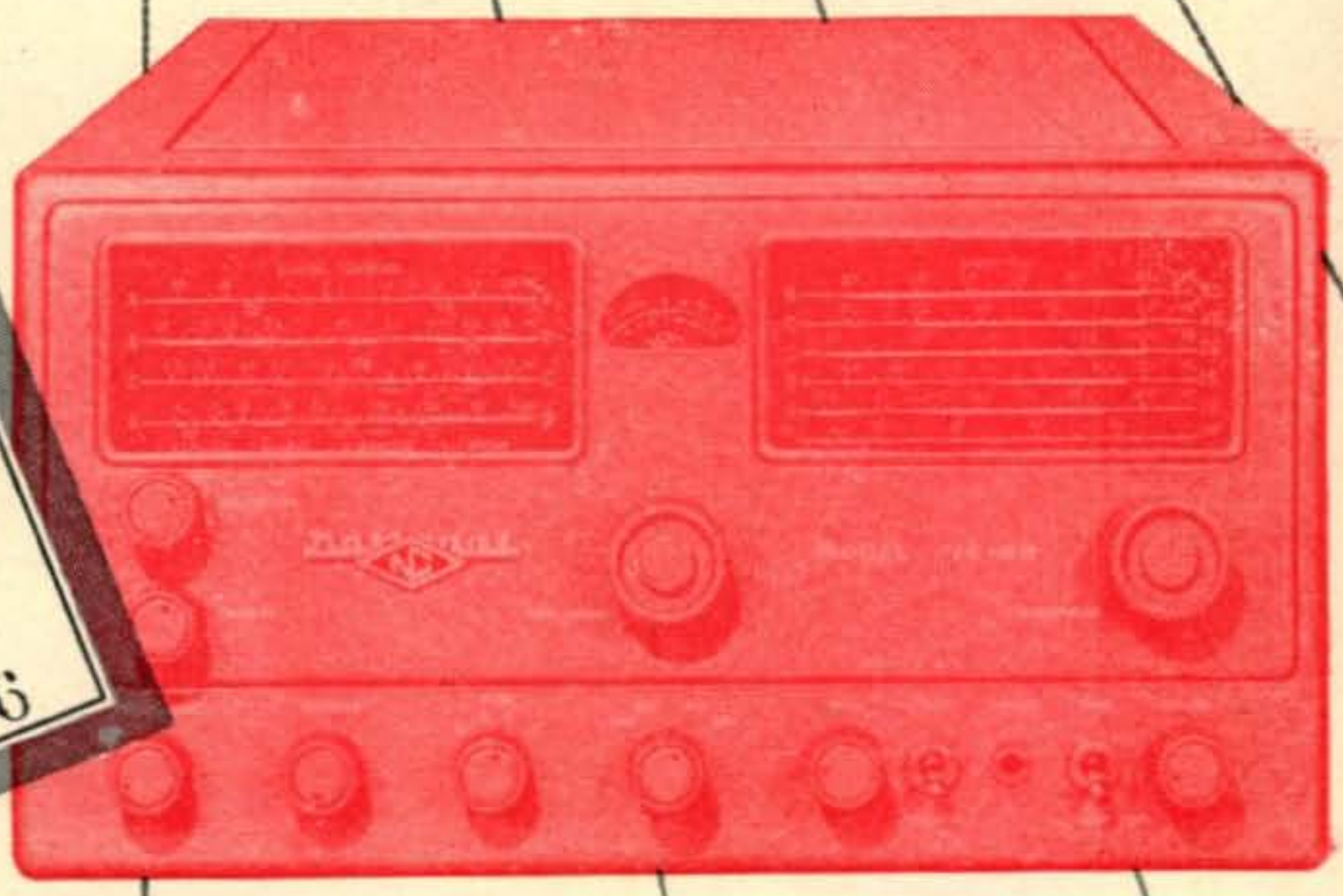

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NATIONAL COMPANY, INC., 61 Sherman St., Malden, Mass.

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for those w prefer triodes

Known the world over for t conservative ratings, large rese of emission, and high power ou at reasonable plate voltages, F power triodes continue to remain choice of the transmitter man who p fers triodes.

RCA has a modern line of power triode meet every power input requirement up t "gallon"—'phone and CW. Check the figures the charts below—and take your choice.

For R.F. Amplifier Service		Max. Amateur Ratings, Class C Telegraphy		
Type No.	DC Plate Input (Watts)	DC Plate Volts	Plate Dissip. (Watts)	Max. Freq.* (Mc)
RCA-810	750	2500	175	30
RCA-811-A	260	1500	65	30
RCA-812-A	260	1500	65	30
RCA-833-A	1000	3300	350	30
RCA-8000	750	2500	175	30
RCA-8005	300	1500	85	60

*for Max. Plate Input and Voltage

For Class B Modulator Service (2 tubes)			Typical Operatic Values	
Type No.	DC Plate Volts	Max.-Sig. DC Plate Cur. (Ma)	DC Grid Bias Volts for Max. Rating	Max. Powe put (W
RCA-805	1250	400	0	3
RCA-810	2250	450	−60	7
RCA-811-A	1250	350	0	3
RCA-812-A	1500	310	−48	3
RCA-8000	2250	450	−130	7
RCA-8005	1500	330	−67.5	3

RCA Power Triodes—as well as ALL types of RCA tubes—are readily avail through your neighborhood RCA Tube Distributor. For technical a write RCA; Commercial Engineering, Section G15M, Harrison, New Je

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