CQ

MARCH, 1947

The Radio Amateurs' Journal

25¢

Published by RADIO MAGAZINES, INC. Subscription $2.50 a year

the RME 84 excels in all three

FOR HOME
115 VOLT AC

FOR PORTABLE
VIBRAPACK

FOR MOBILE
BATTERIES

Being a ham, you've often wished for a portable receiver. The RME 84 was engineered with this in mind and is equipped with a special socket connection on the rear of the chassis apron making possible connections to either a B battery and an A battery supply or a similar source of power such as an external vibrapack.

Because of its modern loctal tubes, the RME 84 will operate at full power on 135 volts of B and 6 volts of A battery. Drain on the B battery is only 22 milliamperes at 135 volts and the 6 volt A battery provides 1.5 amps, including the two dial lights. Disconnecting the dial lights reduces the A battery drain to but 1.2 amps.

For those many field days, for mobile use or for home use, this modestly priced, 8-tube communications receiver is an outstanding value because of its high quality, precision construction.

Features

- Self Contained Shock Mounted 5" PM Speaker
- Four tuning ranges .54 to 44 MC
- One Preselector Stage
- Smooth Vernier Tuning Control
- Bandspread, positively geared to main tuning control for accurate logging—no backlash!
- Automatic Noise Limiter
- Beat Frequency Oscillator—continuously variable by panel control
- Headphone Jack
- Antenna Input Terminals, provision for doublet or single wire.
- Eight tube superheterodyne circuit

Write for illustrated folder.

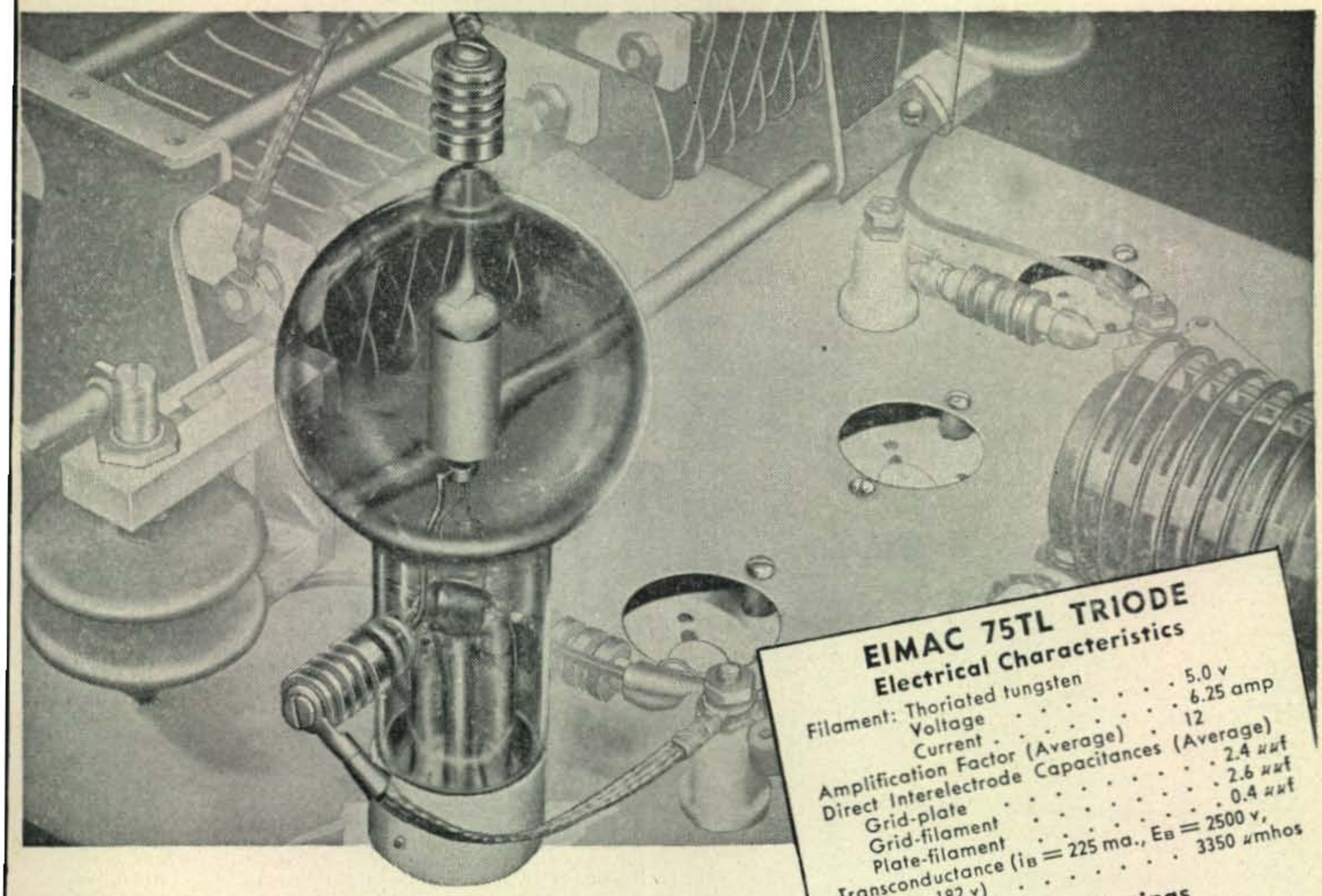
TIME WILL TELL

RME

FINE COMMUNICATIONS EQUIPMENT

RADIO MFG. ENGINEERS, INC.

Peoria 6, Illinois U. S. A.



EIMAC 75TL TRIODE

Electrical Characteristics

Filament: Thoriated tungsten	
Voltage	5.0 v
Current	6.25 amp
Amplification Factor (Average)	12
Direct Interelectrode Capacitances (Average)	
Grid-plate	2.4 μμf
Grid-filament	2.6 μμf
Plate-filament	0.4 μμf
Transconductance (i_B = 225 ma., E_B = 2500 v, E_c = —182 v)	3350 μmhos

Maximum Ratings

Plate voltage, d-c	3000 v
Plate current, d-c	225 ma.
Plate dissipation	75 w
Grid dissipation	13 w

EMPTY SOCKETS with a purpose

These spaces are reserved for three more Eimac 75T triodes.

Putting a transmitter together by the following steps cuts several financial corners. Starting from 250 watts input and going to 1000, there is no need to discard any parts as you go along:

1. As illustrated above, space is left in the original layout for four Eimac 75T triodes but only one is used—input: 250 watts.

2. A second Eimac 75T is added to operate in push-pull with the first—input power: 500 watts.

3. Finally, another 75T is put in parallel with each of the original pair and the ultimate kilowatt of input is attained.

Whether a transmitter is built by this system or with full power right from the start, Eimac 75T's offer a number of remarkable advantages. These include:

★ Exclusive emission-controlled grids for stability and efficiency.

★ High power gain.

★ Low interelectrode capacitances.

★ Low plate-voltage operation.

★ Optimum grid, plate, and cathode geometries from aspects of transit time, electron migration, and thermionic efficiency.

★ Ability to withstand momentary overloads without damage.

★ Moderate cost — $10.50.

Write for full details on the Eimac 75T triode and the add-a-tube transmitter.

EITEL-McCULLOUGH, INC.

1294N San Mateo Ave., San Bruno, Calif.

Export Agents: Frazar and Hansen, 301 Clay St., San Francisco 11, Calif., U.S.A.

Follow the leaders to

Eimac

REG. U.S. PAT. OFF.

TUBES

CQ

The Radio Amateur's Journal

Published monthly at 28 Renne Ave., Pittsfield, Mass. by RADIO MAGAZINES, INC. Executive and Editorial Offices: 342 Madison Ave., New York 17, N. Y. Telephone: MUrray Hill 2-1346. Entered as Second Class Matter March 28, 1946 at the Post Office, Pittsfield, Mass.

Subscription Rates: in U. S. A., Possessions and Canada 1 year $2.50, 2 years $4.00, 3 years $5.00. Single copies 25 cents. Elsewhere $3.50 per year. CQ (title Reg. U. S. Pat. Off.) printed in U. S. A.

Foreign Subscription Representatives: Radio Society of Great Britain, New Ruskin House, Little Russell St., London, W.C.1, England; Harris & Floyd, 297 Swanston St., Melbourne C. 1, Victoria, Australia.

Vol. 3. MARCH, 1947 No. 3

In This Issue

COVER

The portable mobile station to end them all. Joe Patterson, W5EHM, has a right to be proud of this installation. 250 watts crystal controlled on 50 and 20 mc. Power is supplied by the gasoline generator. Additional notes on W5EHM appear in the V.H.F.-U.H.F. column.

ANNOUNCING THE NEW...

MEISSNER *Signal Shifter*

The Number One requirement for the complete "Ham Shack," this new Meissner Signal Shifter has built in band switching.

No coils to change—6-position switch. Normally equipped with five sets of coils for 10, 15, 20, 40 and 80 meter bands plus a blank strip for any additional new band. All controls placed on front panel. Reduced warmup time...Minimum power output 6 watts on all bands. Choice of built-in or separate power supply. For complete specifications write to the address below.

THORDARSON
TRANSFORMERS

The name Thordarson is your assurance of transformer quality... backed by 51 years of outstanding transformer manufacture. For every electronic requirement.

Export: Scheel International, Inc., 4237 N. Lincoln Ave., Chicago, Ill., U.S.A. Cable Address: Harscheel.

ELECTRONIC DISTRIBUTOR AND INDUSTRIAL SALES DEPARTMENT

MAGUIRE INDUSTRIES, INCORPORATED

936 N. MICHIGAN AVENUE • CHICAGO 11, ILLINOIS

ARE YOU A...

GYPSY ON TEN?

More and more the boys with "know how" on crowded phone bands are saying: "I've learned to stay put. No more of this gypsy business for me." Take 10 meters for example! On weekends trapesing up and down the band just doesn't do the trick. Usually a move puts you in a worse spot than before. Smart 10 meter operators are using three or four PRs for spot frequencies—low end, middle, medium high and near the top. Try it for a month! See if your luck doesn't improve—on 10, 20 or 75! *For accuracy, stability, low drift and high output use PR Precision Crystals.* Unconditionally guaranteed. Your EXACT FREQUENCY (integral kilocycle) WITHIN AMATEUR BANDS, AT NO EXTRA COST! See your Jobber. — Petersen Radio Company, Inc., 2800 West Broadway, Council Bluffs, Iowa. (Telephone 2760.)

SINCE 1934

PR Precision CRYSTALS

10 METERS PR Type Z-5.	Harmonic oscillator. Ideal for "straight through" mobile operation. High activity. Heavy drive without damage in our special circuit $5.00
20 METERS PR Type Z-3.	Harmonic oscillator. Low drift. High activity. Can be keyed in most circuits. High power output. Just as stable as fundamental oscillators $3.50
40 & 80 METERS PR Type Z-2.	Rugged, low drift fundamental oscillators. High activity and power output with maximum crystal currents. Accurate calibration $2.65

· · Letters · ·

American QSL Bureau

P. O. Box 7075, Roseville Station, Newark 7, N. J.

Editor, *CQ:*

I should like to call to the attention of *CQ* readers the existence of the *American QSL Bureau.* The Bureau is a non-profit organization founded in April 1939 for the purpose of forwarding QSL cards to amateurs throughout the world. Primarily it offers a service to DX stations enabling them to QSL their American contacts with ease and dispatch.

The following rules and regulations govern mail directed via this bureau from radio amateurs:

1. QSLs directed via the bureau should be addressed in the following manner:

Amateur Radio Station
℅ American QSL Bureau
Post Office Box 7073
Roseville Station
Newark 7, N. J., U. S. A.

2. For the convenience of the originator, cards may be sent in packets.

3. A rate of three cents, to cover the cost of handling and postage, will be levied on each batch of QSL cards forwarded via the bureau. This cost being absorbed by the addressee.

4. Each QSL is forwarded, not via another QSL Bureau, but direct to their respective destinations. All cards will be forwarded on the first day of each month and any card undelivered within a period of sixty days will be returned to the originator.

The American QSL Bureau will also forward American cards to foreign amateurs on this same basis. A batch of cards can be sent to the Bureau which will handle them from that point on. It is recommended that amateurs who anticipate using the Bureau ascertain what countries are now served by our organization. We will be glad to supply additional information to any of your readers.

M. F. Williams, Director

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

677 Euclid Ave., Brooklyn 8, N. Y.

Editor, *CQ:*

Just a short note to let you know how interesting the newly titled V.H.F.-U.H.F. column is. Reading about all the activity on the high frequencies throughout the country is an inspiration to do bigger and better things on these bands.

Michael J. Gonda, W2JBM

We hope other readers feel the same as W2JBM. The ultra high, very high frequencies and microwaves are the last frontiers of amateur exploration. It should be the hams who continue to point the way to maximum utilization of these once "worthless" bands.—Ed.

Is The Class D License Dead?

120 S. LaSalle St., Chicago 3, Ill.

Editor, *CQ:*

. . . How to learn the "dah dahs" when your age prevented you from personally knowing the youngsters who could apparently learn and ate the code up . . . became my problem. An attempt to interest a few oldster neighbors failed.

[*Continued on page 8*]

GET YOUR SIGNAL INTO THE ANTENNA WITH

the New

IMPEDACOUPLER

U. S. A.

Here's the most versatile and practical antenna insulator-connector ever offered the radio amateur or the professional operator. The IMPEDACOUPLER makes a secure and weatherproof junction between Amphenol coaxial line and any current fed antenna or array. It also can be used in many other ways: for connection to flat lines, to an open wire line and to serve as a center insulator of a ½ wave doublet.

Equipped with an Amphenol type 1R receptacle, the IMPEDACOUPLER provides quick, positive connection without fanning and without disrupting terminal impedance of the line.

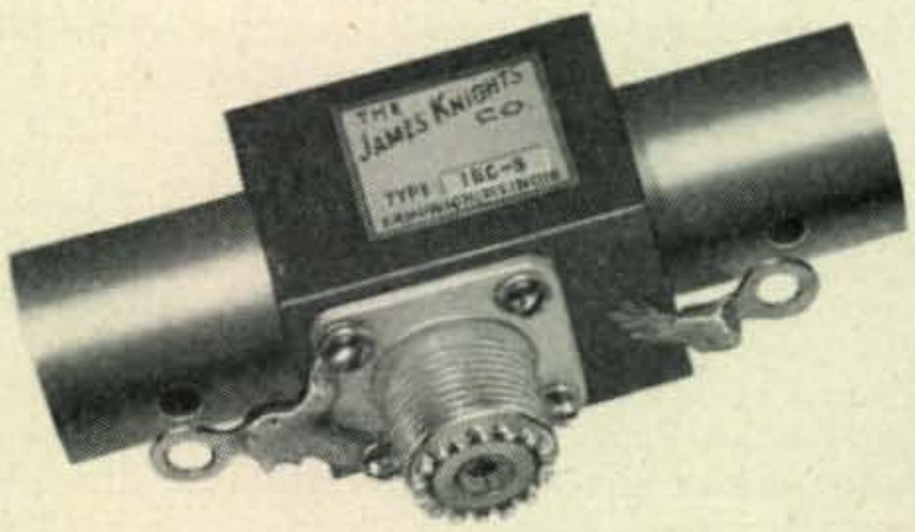
INSULATION PLUS STRENGTH

A genuine MYKROY center insulator block provides optimum dielectric properties, has ample strength to withstand the pull of the antenna and to support the weight of the coaxial line.

The insulator is drilled at both ends for bolt or rivet for holding tubing and connections, or for looping wire if latter is to be used.

The insulator ends are machined to fit the inside diameter of standard aluminum or dural tubing having 1" outside diameter, commonly used for rotary beams. However, the user can easily turn down the insulator ends to fit his particular needs.

With the IMPEDACOUPLER, losses from moisture, deterioration at antenna end of the line and resultant insulation breakdown are eliminated.



Write for IMPEDACOUPLER folder illustrating fifteen practical applications, or see the IMPEDACOUPLER at your dealer's.

Weight Only 6 oz.
Net Price Less Amphenol 1SP Connector **$3.50**

Other J-K Products Include Quartz Crystals, Crystal Ovens, Frequency Standards.

The **JAMES KNIGHTS** *Company*

Sandwich, Illinois

We next secured a set of records and supplemented this with a tape machine and diligently approached the unit daily with boredom and misgivings knowing there were few memory channels left in the old grey head to retain the sound characters for the transfer of coded intelligence. We kept doggedly at it and attained the unbelievable speed of five words per minute and then seven and there we stuck. The records wore out, the dashes on the tape wore to an unintelligible blur, but the seven word hurdle was still there.

We found that efforts to learn the code were taking valuable time away from the fundamental interest of the workings of radio. Time that could have been spent in valuable study of parts and their function was being absorbed in a boring process of code practice which we questioned we would ever use if permitted a license to operate phone . . .

F. J. Stephens

Reader Stephens' problem is, unfortunately, almost as old as ham radio itself. The Class D license may certainly be considered a closed issue for the time being. But perhaps some amateur has found a sure-fire method for learning the code. A host of would-be amateurs might be much happier if this amateur, allowing that he does exist, makes himself known.

BC 406 Conversion

29 Milburn St., Bronxville, N. Y.

Editor, *CQ:*

There are several points that may be cleared up in the BC 406 conversion article that appeared in February, 1946, *CQ* under the title "High Frequency Superhet." For the information of readers who may have had some trouble in completing their conversion I am listing these points:

1. C1, C2, C3 and the one across the oscillator coil L5, are 15 $\mu\mu$f, three plate variable condensers The photo in the article shows five plates, but they do not give as good a bandspread action.
2. C4 is the 30 $\mu\mu$f mica padding condenser mentioned in the first paragraph under the heading "Increased Selectivity."
3. Referring to page 47, "Additional Parts for Conversion," L4 should have the same number of turns as L2 and L3 (13 turns).

The one-megohm resistor which is not shown in the diagram on page 22, is employed as a grid-leak between the control grid of the mixer tube and ground.

4. It is recommended that the right side of the receiver as pictured on page 22 be completely shielded for greater stability and also elimination of direct pickup of signals not wanted.

D. B. Whittemore, W2CUZ

CR9AG

G. P. O., Macao, Asia

Editor, *CQ:*

... I lost all my gear including *Radios* and *QSTs* in Hongkong when the Japs came and my present station is brand new. I wonder whether any of the Ws have any back copies of *Radio* or *QST* that they could send. They will be shared with the other local hams and be put to good use.

John Alvares, CR9AG

Well known DX station CR9AG is in the same fix as many other foreign amateurs. Before disposing of any old radio magazines, books, etc., ask some of your DX friends whether they know a deserving recipient. You'll be doing some fellow-ham a big favor.

SOON . . . THE NEW NATIONAL NC-173

The NC-173 is the wholly new product of months of post-war research, prompted by war-time advances in radio technique.

The new "Double Diode" noise limiter and the new AVC system are effective on both phone and CW. The voltage-regulator oscilator circuits are extremely stable. The frequency range includes the 6-meter amateur band. (0.54 to 31 and 48 to 56 MC.)

The NC-173 offers all the features you expect in a fine receiver. A glance at the illustration below will suggest the versatility on its adjustments and the handiness of its controls, but only a trial will prove its thoroughbred qualities. Study the advanced design of its 13-tube circuit, appraise its modern styling and challenge its performance with the toughest conditions that crowded amateur bands can offer.

Here is a receiver a man can be proud to own. See it at your dealer's within the next 30 days.

EST. NC 1914

NATIONAL

COMPANY, INCORPORATED
MALDEN, MASS.

THE MOST DISTINCTIVE NAME IN RADIO COMMUNICATIONS

GET YOURS NOW!

SYLVANIA'S NEW TECHNICAL MANUAL

DESCRIBING 378 RADIO RECEIVING TUBES

Bigger, better-than-ever—the new Sylvania Technical Manual is available now.

The large number of tube types listed (old and new) — almost four hundred — has been made available as a result of the solution of extensive and elaborate tube engineering problems.

Contents of this descriptive manual include: Fundamental Properties of Vacuum Tubes; The Characteristic Curves; General Tube and Circuit Information; Typical Radio Receiver and Amplifier Circuits; Interchangeable Tube Chart — and many more.

We urge you to get a copy right away — because we know you'll find this volume chock-full of invaluable information.

Available from your Sylvania Tube Distributor or direct from Radio Tube Division, Emporium, Pa.

SYLVANIA ELECTRIC

MAKERS OF RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; ELECTRIC LIGHT BULBS

. . . Zero Bias . . .

50-mc Transpacific DX Contact

Flash! J9AAK worked KH6DD and W7ACS/KH6 on January 26 Okinawa time (nine hours before GCT) from 1047 to 1234. Signals were S9. J9AB X heard both ends of the QSO. This two-way contact approximately 4700 miles closely follows DX predictions. KH6DD has also been heard by W6VDG/KW6. Additional details will be found in the V.H.F.-U.H.F. column.

Mobile Operations

Many months ago, in June 1946 to be exact, we discussed the difficulties some amateurs were encountering when operating portable and portable-mobile. The difficulties ranged from relatively minor irritations to being hauled off to the precinct house. Various groups of interested amateurs tried to arrive at some solution to this problem that would satisfy law enforcement agencies and at the same time respect the rights of the amateur.

The problem has remained complex because of the many conflicting ordinances dealing with "shortwave" radio that were loosely written, deliberately in many instances and because of improper information in others. Anyway, to make a long story short, we found that local red-tape, official indifference, etc., made it just about impossible to accomplish anything definite.

The Commissioner of Police in New York made the only constructive move when he ordered photostats of the FCC amateur license distributed to all parties concerned in order to familiarize police officers with the license and thus enable identification of duly licensed amateurs. The idea of familiarizing local authorities with amateur radio is good, although it is hard to conceive any municipal protection agency not being well acquainted, after WERS, with the amateur. We can't report a clear-cut decision in this matter nor can we report a particularly enlightened public official when it comes to matters of radio. While hams are widely placed in the actual radio work, much of the legislation is written by people who know nothing whatsoever about the technical phases of the art. We would welcome hearing from amateurs who have perhaps found an adequate solution to this problem.

Utilizing Our Bands

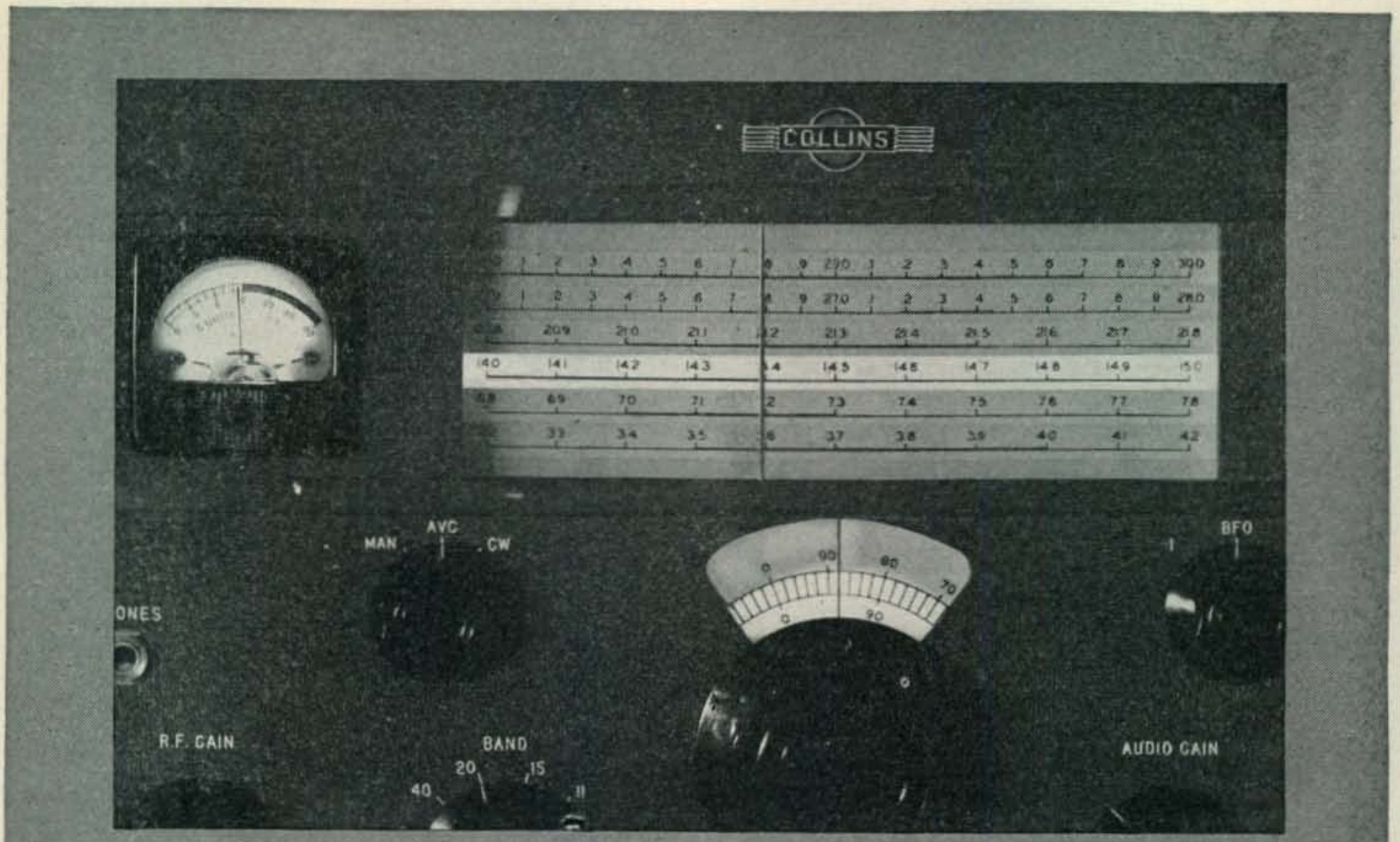
We have received a lot of interesting comments on our editorial recommending more diversified operations on the part of most amateurs. One skeptic, and they numbered in the minority, wanted to know if we had tried working any DX on 40 lately . . . or, as a matter of fact, done anything better than short-haul work on 80. The answer to this chap would hardly be worth editorial comment except that during the past two weeks we have confined our operations to 80 and 40.

Forty can be summed up in just one word "terrific!" Over 50 countries have been logged during intermittent operation. Working DX on 40 is as easy as QSOing Ws. Chewing the fat with HB9AG one evening, who incidentally had an R8 signal, I overheard two W8s on the same frequency complaining about the lack of DX on 40. Everything rolls through on 7 mc if you dig under the top layer of U. S. stations.

Eighty naturally isn't the hot DX band that 40 is, but Europeans are quite consistent and W5, 6, and 7th district contacts were relatively easy to make. The west coast was heard as early as 6:30 p.m. PST. It is no pipe-dream; you can have plenty of fun working DX on "non-DX" bands with less competition. If you are contemplating any changes in your station, don't forget the byword is "flexibility." And flexibility extends right down to 6 meters. Occupancy on these higher frequency bands is a very serious matter and should not be lightly dismissed as just another topic for editorial discussion. Six meters should be one of the regular operating bands of the modern amateur station.

QRM

It seems that we always get more letters when complaining than when applauding, so we'd like to register another complaint. All too frequently our fellow amateur is inclined to be careless about radiating unnecessary QRM when testing his rig. How many QSOs have been broken up by someone thoughtlessly holding down the key to tune up a rig? How many QSOs have been a failure because someone was doodling his bug to make sure the adjustments were correct? Courtesy on phone and c.w. is increasingly important every day. It is pretty easy to recall some time or other when transmissions that couldn't be properly identified have spoiled a contact for you. A little judicious listening on a channel will go a long way to prevent unnecessary interference.



The Collins Band-Lighted Dial Gives You

Added Pleasure

Wherever the Collins 75A receiver is shown—hamfests, fairs, club meetings—the band-lighted dial wins enthusiastic endorsement from all who can crowd close enough to see it. And no wonder! It's so easy to use, both visually and mechanically, that once you've used it you'll see why it ranks high among the many new features of this receiver.

Here's how it works. The dial amply covers six amateur bands—80, 40, 20, 15, 11 and 10 meters. When you turn on the filament supply, the dial lights are turned on. *But only the band selected for use is lighted!* There's no band pointer to get out of adjustment, no feeling for the detent action, *and no scanning the dial to see where the frequency indicator is!* With only one band lighted at a time you just naturally read the correct figures at first glance.

The vernier dial, which gives you directly the exact frequency to within 1 kc (2 kc on 11 and 10 meters), works the same way. Only the band you're listening to is lighted. The frequency shown in the photograph is 14,394 kc.

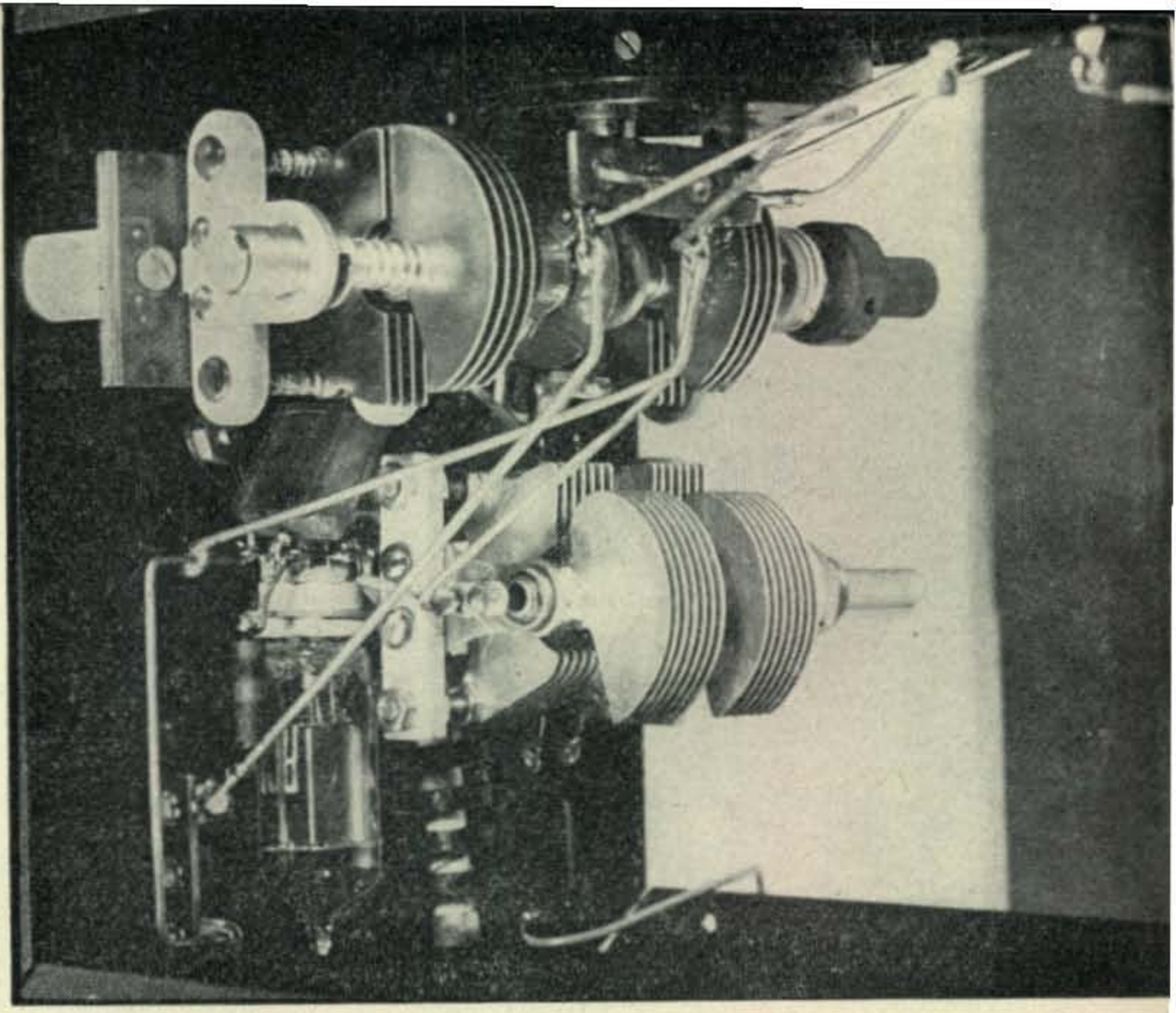
The band-lighted dial is further proof of Collins interest in amateurs. In every equipment designed and built for amateurs by Collins, you'll find engineering that advances the art of amateur radio.

FOR RESULTS IN AMATEUR RADIO, IT'S . . .

COLLINS

COLLINS RADIO COMPANY, CEDAR RAPIDS, IOWA

11 W. 42nd St., New York 18, N. Y. **458 S. Spring St., Los Angeles 13, Calif.**



Side view of grid dip oscillator with both covers removed, showing band-spread and tuning condensers. Note inverted vertical mounting of 3A5 tube.

by
CLAYTON F. BANE, W6WB*

. . . About Grid-Dip Oscillators

THE IDEA of using specially constructed oscillators for a wide variety of test purposes has long been understood and put to use by most engineering laboratories. Although some mention of the "grid-dip" oscillator has appeared in amateur literature, the lack of general usage is sufficient evidence that the subject is open to review and clarification. It is the purpose of this article to provide constructional ideas and design information on a typical oscillator suitable for amateur use. Further, to attempt to bring out some of the reasons why a good grid-dip oscillator is a necessity in the modern amateur station. In subsequent mention of this type of oscillator, we will refer to it merely as "GDO."

The function of a GDO is certainly not complicated. For illustrative purposes we can compare it to the well-known absorption frequency meter. When the L/C circuit of such a meter is resonated to the same frequency as the oscillator or amplifier being checked, an indication of the frequency of the latter may be had by observing the kick in plate current as the absorption device is tuned past the operating frequency. This technique is well-known and requires no elaboration. It is significant that the absorption meter is entirely useless unless the element under test provides the necessary r-f energy. Thus an absorption meter would be of no earthly use to a man who has a new transmitter, the amplifier of which refuses to hit resonance. He would have no way of knowing whether the frequency of the tank circuit was too high or too low. A GDO would tell him this in thirty seconds without even turning on the transmitter!

A GDO is merely a specially designed, calibrated oscillator utilizing a sensitive meter (in the grid circuit) which deflects when the L/C circuits in grid and/or plate are tuned to the same frequency as the circuit to be checked. Providing their own driving source, the use of such instruments for antenna and transmission line measurements alone will bring direct and useful return to their builders. Additionally, the frequency of any L/C circuit within the range of the instrument can be determined quickly and with good accuracy.

Since the usefulness of this type of device is greatly enhanced by portability, the power source problem can be eliminated at the outset by the use of dry "A" and "B" batteries. A standard type in general use should be selected so that replacement will not be difficult. The current drain on our particular instrument is low, (150 ma for filament, 5 ma for bleeder, and approximately 5 ma for plate) so that with normal usage, the batteries should last their shelf life.

It is a bit unfortunate that with all the hundreds of existing tube types, design considerations dictated the use of a miniature triode of the 1½-volt filament series. This exact tube does not appear to be available, therefore we compromised

155 St. Elmo, San Francisco, Calif.

by using one of the triode sections of the 3A5. This twin triode normally operates at three volts but the filament is center-tapped, thus permitting half-voltage operation when only one of the triodes is used.

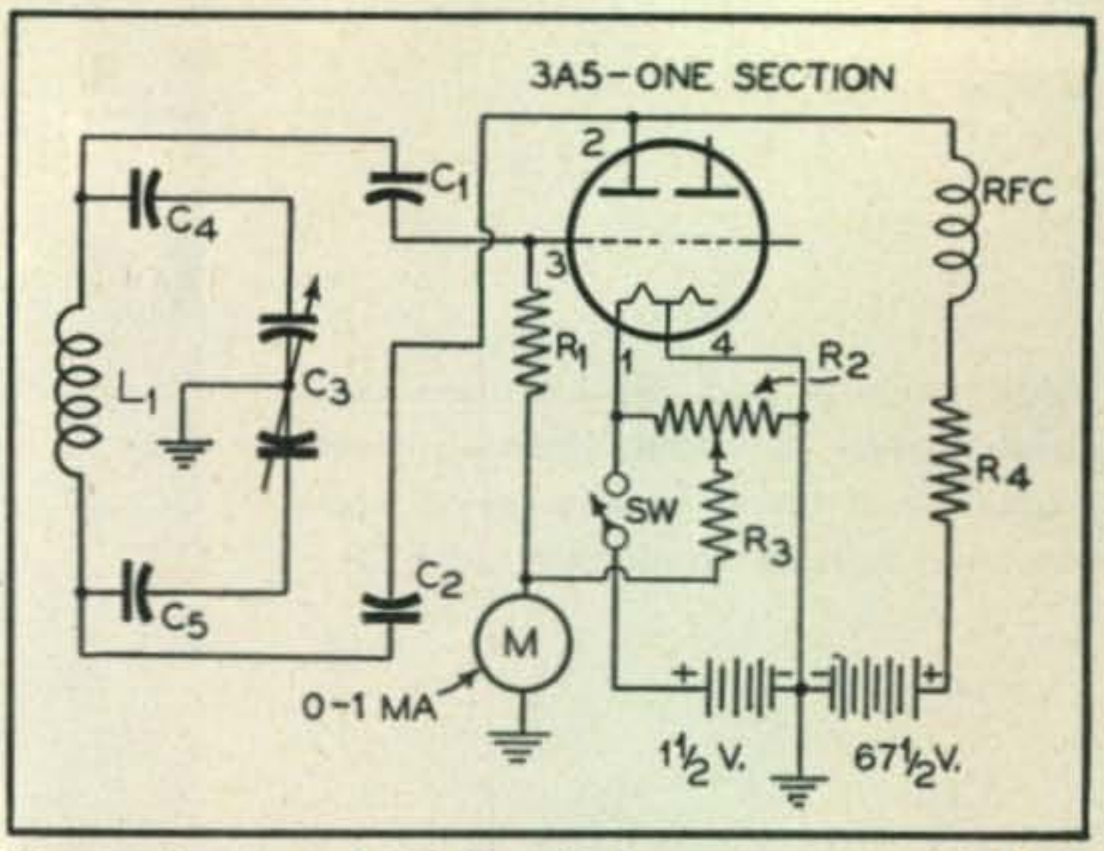
Circuit Considerations

In the GDO it is essential that the oscillator circuit be of a type that will provide reasonably even output over a wide range of frequencies. Many of the more popular circuits are not suited to filament type tubes since they require either a cathode tap or some means of establishing the filaments above r-f ground potential. In view of the relatively wide frequency range to be covered, the use of filament chokes was not viewed with favor—resonance effects would be inevitable. The Colpitts circuit was decided upon because feedback is achieved by a split-stator capacitor, permitting the feedback ratio to remain constant throughout the tuning range. This circuit is of further advantage in that it makes two-terminal coils possible by eliminating the necessity for coil tapping. Reference to the circuit diagram will show that the circuit is shunt-fed in both grid and plate circuits. It would have been possible to eliminate the plate blocking capacitor *C2* and to have fed the plate voltage to the center tap of the coil *L1* through the r-f choke. This idea was abandoned in favor of the circuit shown although it should be mentioned that the r-f choke connected directly to the plate gives rise to a small capacity unbalance requiring some supplementary balancing capacity on the grid side.

The matter of frequency coverage is of course dependent upon the requirements of the individual user. For normal amateur work the coverage should certainly include 40, 20 and 10 meter bands and very possibly 80 meters. This means then that the instrument should have a minimum frequency range from 6500 to 30,000 kc *continuously* and to be properly effective, should have provision for spreading out the three amateur bands over a substantial portion of the tuning dial. It will be seen that such a wide tuning range (over 4 to 1) would not be very practical to attempt with a single coil-condenser combination. As a consequence, the decision was made to use plug-in coils and to keep the individual coil range down to approximately 2 to 1. (i. e., 7000-14,000, 14,000-28,000 etc.)

The Colpitts circuit requiring a split-stator tuning condenser, careful search was made for such a unit having a plate shape that would avoid band-end crowding on the dial. The National Type selected, while not true straight line frequency, is a reasonable substitute and has proven very satisfactory. This capacitor has a maximum rating of 100 $\mu\mu$f per section with a minimum of 5.5 $\mu\mu$f. Unfortunately, this is the largest capacity listed in this particular type—a maximum of 150 $\mu\mu$f per section would have permitted a better margin of coverage.

The matter of tuning ratios and the effect of minimum capacitances upon them should be carefully considered. In circuit design it is usually best to think in terms of frequency *ratios* rather than in the actual frequencies themselves. This is simply done by dividing the highest frequency to be covered by the lowest frequency thus:



Circuit diagram of GDO. Only one section of 3A5 is utilized. Note C4 and C5 are variable condensers.

Parts List

C1, C2—.002 μf, 400 working volts, postage stamp mica.
C3—split stator, 100 $\mu\mu$f. per section. National Co. type STHD-100.
C4, C5—50 $\mu\mu$f, double bearing model variable. Hammarlund.
R1—5000 ohms, ½ watt, carbon. IRC.
R2—500-ohm potentiometer.
R3—1000 ohms, ½ watt, carbon. IRC.
R4—two resistors paralleled. 10,000 ohms, ½ watt and 4700 ohms, ½ watt.
Meter—0-1 milliampere.
Tube socket—miniature type. E. F. Johnson. #277A.
Tube—RCA type 3A5.
RFC—2.5 mh. National Co. type R-100.
Housing case—9" long, 6" high, 5" wide.
Tuning dial—2¾" diameter, black scale with white lettering. Crowe.
Coil forms—4-prong, polystyrene, 1¼" diameter, 2¼" long. Amphenol.
SW—S.P.S.T. toggle switch.

Coil Winding Data

All coils wound on Amphenol, 4-prong polystyrene forms, 1¼" diameter.
All windings start 5/8" from bottom of form.
Plate circuit connection goes to side of winding nearest bottom of form.
All coils wound with No. 18 BS, plain enamelled wire.
All coils close wound.
10-meter coil—5½ turns. (Coverage, 30 mc to 15 mc, approx.).
20-meter coil—13½ turns. (Coverage 15 to 7.5 mc, approx.)
40-meter coil—31½ turns. (Coverage 7.5 mc to 3.8 mc, approx.).

$$\frac{\text{Highest frequency}}{\text{Lowest frequency}} = \text{Frequency ratio}$$

However, the information at hand has to do with capacity ratio, therefore the frequency ratio can be put into useful form by simply squaring it:

$$\text{Frequency ratio}^2 = \text{Capacity ratio}$$

It follows from this that when we know the capacity ratio we can find the frequency ratio by taking the square root:

$$\sqrt{\text{Capacity ratio}} = \text{Frequency ratio}$$

Example:

Capacitor maximum is 100 $\mu\mu$f. Capacitor minimum is 10 $\mu\mu$f.

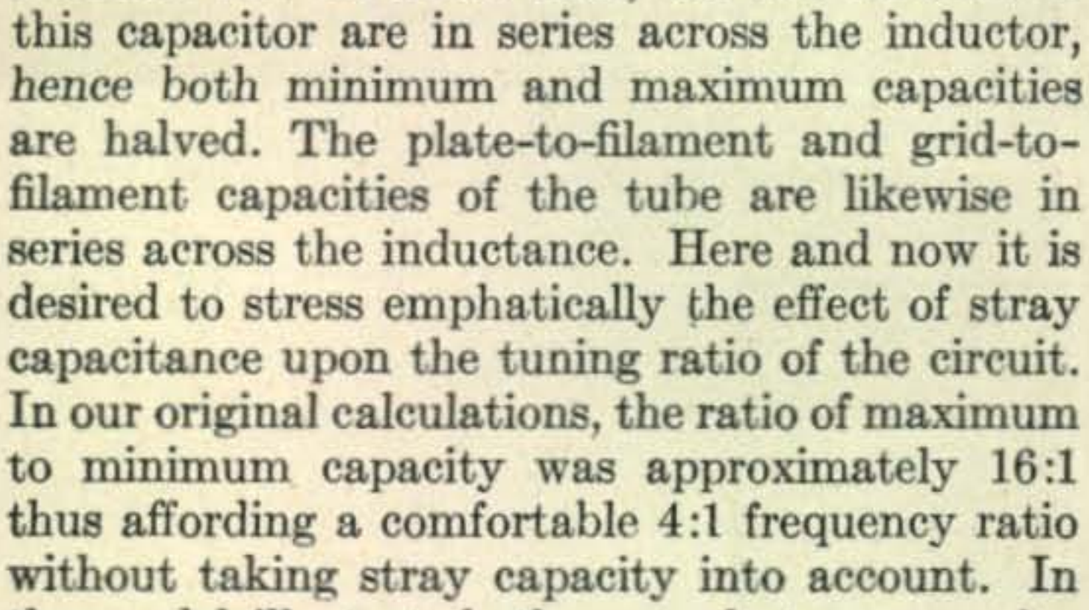
Therefore:

$$\frac{100}{10} = 10 = \text{Capacity ratio}$$

$$\sqrt{10} = \text{Frequency ratio}$$

If in this example the lowest frequency to be covered were 7000 kc, the highest possible frequency, (using the capacitor above) would be, $7000 \times \sqrt{10} = 22{,}135$ kc.

In our particular GDO, the frequency ratio was dictated by the capacitor to be used which, while greater capacity would have been desirable, was still excellent for the purpose because of the low minimum capacity. Observe in the circuit diagram that this capacitor *C3* has a split-stator with rotor grounded, connected directly across the inductor *L1*. In effect then, the two sections of this capacitor are in series across the inductor, hence both minimum and maximum capacities are halved. The plate-to-filament and grid-to-filament capacities of the tube are likewise in series across the inductance. Here and now it is desired to stress emphatically the effect of stray capacitance upon the tuning ratio of the circuit. In our original calculations, the ratio of maximum to minimum capacity was approximately 16:1 thus affording a comfortable 4:1 frequency ratio without taking stray capacity into account. In the model illustrated, the actual stray capacity added by the tube, wiring, proximity of coil and capacitors to case and other factors was high enough to reduce the original 16:1 capacity ratio to 4:1! In other words, instead of having a nice overlap on adjacent bands we barely squeezed under the wire with a frequency ratio of 2:1. A little algebraic juggling, (which we will omit) will show that about 12.5 $\mu\mu$f must of necessity have been added by the strays to reduce the capacity ratio to its present value. In this and similar circuits requiring wide frequency coverage, *watch the stray capacities!*



Mechanical details of the band-spread panel shaft extension.

After due consideration of the various methods of achieving electrical band-spread, the series capacitor method was selected. As regards the theory of this method, suffice it to say that an additional capacitor (variable) is introduced in series with the main tuning capacitor thereby offering a convenient means of reducing the tuning ratio. Parenthetically, the same general result can be achieved by a shunting capacitor. The main difficulty here is that the shunt value for proper spread would be from 200 to 300 $\mu\mu$f, thus making the inductance for the highest frequency band very small indeed.

The main tuning capacitor being a split-stator type, it becomes necessary to use two separate band-spreading capacitors (*C4* and *C5*), ganged together with an insulated coupling. Each of these capacitors has one of its rotor plates bent in at the tip so that the capacitors will short out when the plates are fully meshed. Note from the photographs that these two capacitors are completely insulated from each other and from chassis, being mounted on a strip of bakelite which is in turn supported by two one-inch long-ceramic standoffs.

The plug-in coils are wound on Amphenol four-prong polystyrene forms with the end of the winding that connects to the plate-blocking capacitor *C2* nearest the housing case. It is of importance that the winding data given be closely followed and the spacing of the start of the winding from the bottom of the form should not be ignored. All coils are wound with a common wire size as a matter of convenience.

Many laboratory model GDOs use a microammeter as the indicating instrument. However, the 0-1 milliammeter being more common in amateur circles, the design of this instrument was planned around the latter. The meter plays an important part, as will be shown.

When the inductance of the GDO is coupled to some circuit and resonance established, the result is that some of the oscillator energy is coupled into the load. This coupling loss results in reduced feedback voltage to the grid with consequent drop in rectified grid current through resistor *R1*. It is this current that is read on the milliammeter. It should be noted that in the above instance, the plate current would have increased with coupling exactly as it does when any oscillator is coupled to a load. However, the

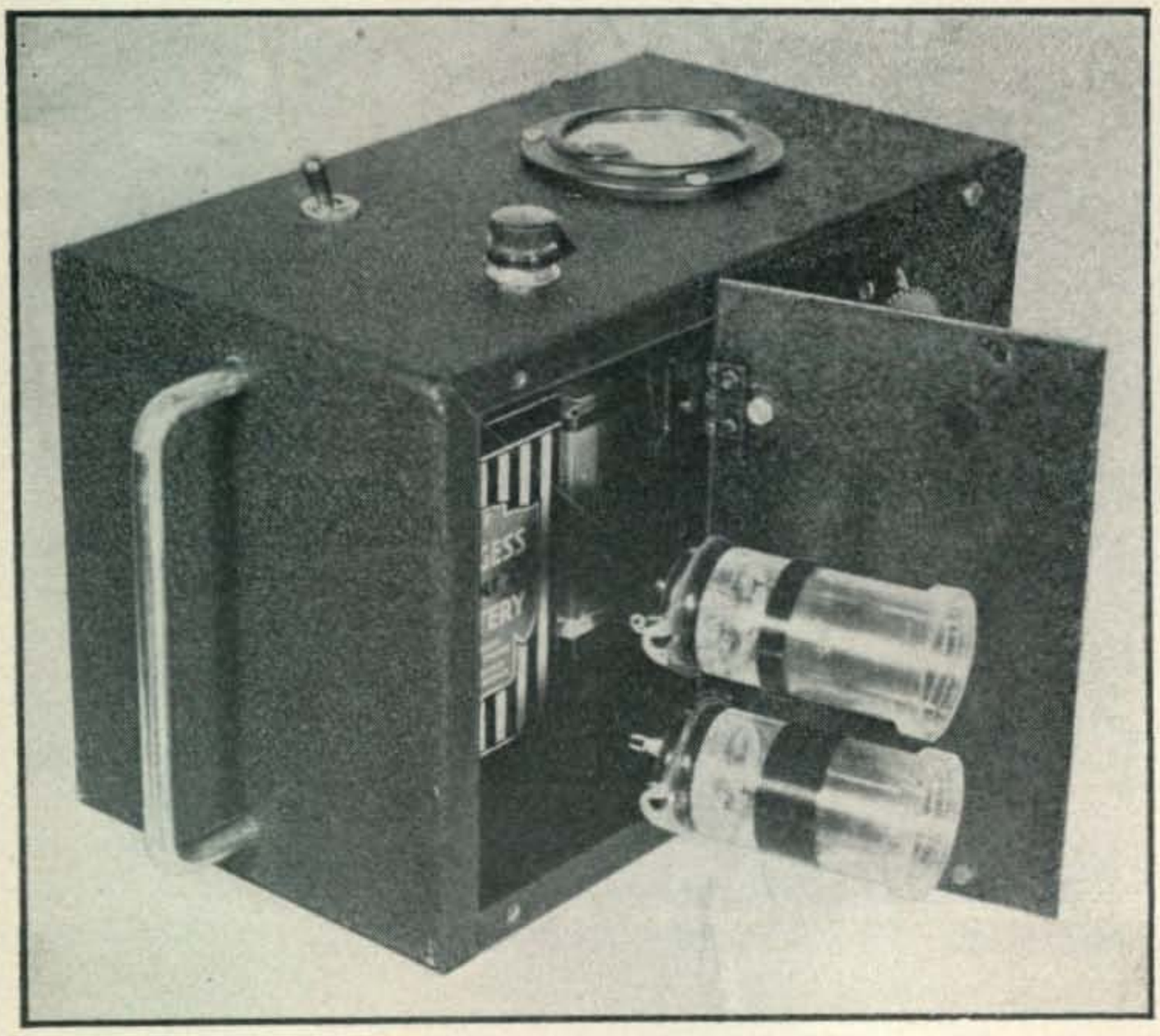
change in grid current under these conditions is a much more sensitive indication of the degree of coupling. A slight flick of grid current can be seen with coupling so loose that the plate current seemingly does not move as the instrument is tuned through resonance with the load.

It is too much to expect that an oscillator covering such a wide frequency range will have absolutely constant output throughout its entire tuning range. This unit is no exception. Radio-frequency choke resonances and capacity unbalances on grid or plate to ground tend to cause variations in output over the range.

Capacity unbalance will show up at the high frequency end of the dial when the main tuning capacitor is at minimum capacity. Such unbalance normally amounts to but a few micro-microfarads. When the main tuning capacitor is at maximum, the unbalance capacity becomes a negligible part of the total and has slight effect upon the feedback ratio. However, at minimum setting the unbalancing stray capacity may closely approach the tuning capacity, thus substantially altering the feedback ratio. Such ratio unbalances are evidenced by a drop off in rectified grid current. A simple procedure for checking unbalance is to touch in turn both grid and plate of the tube with the metal portion of an insulated handle screwdriver. The additional capacity so added will cause the grid current to rise when the side requiring additional capacity is contacted. A permanent correction may take the form of a small metal tab fastened to whichever of the band-spread capacitors is on the correct side of the circuit. This tab should be set so as to be parallel to the side of the housing case and the spacing adjusted until a reasonable rise in grid current is obtained. In the unit illustrated, this capacity is obtained by a ¾" washer fastened to the shaft bearing of the band-spread capacitor nearest the rear of the housing case (grid side.).

In addition to drop-off in current due to capacity unbalance, the amount of grid current on the high-frequency range will be at considerable variance with that obtained on the lowest frequency range. The plate and bias voltages are adjusted to favor the highest band covered, therefore the meter would be off scale on the lowest band if suitable corrective measures were not applied.

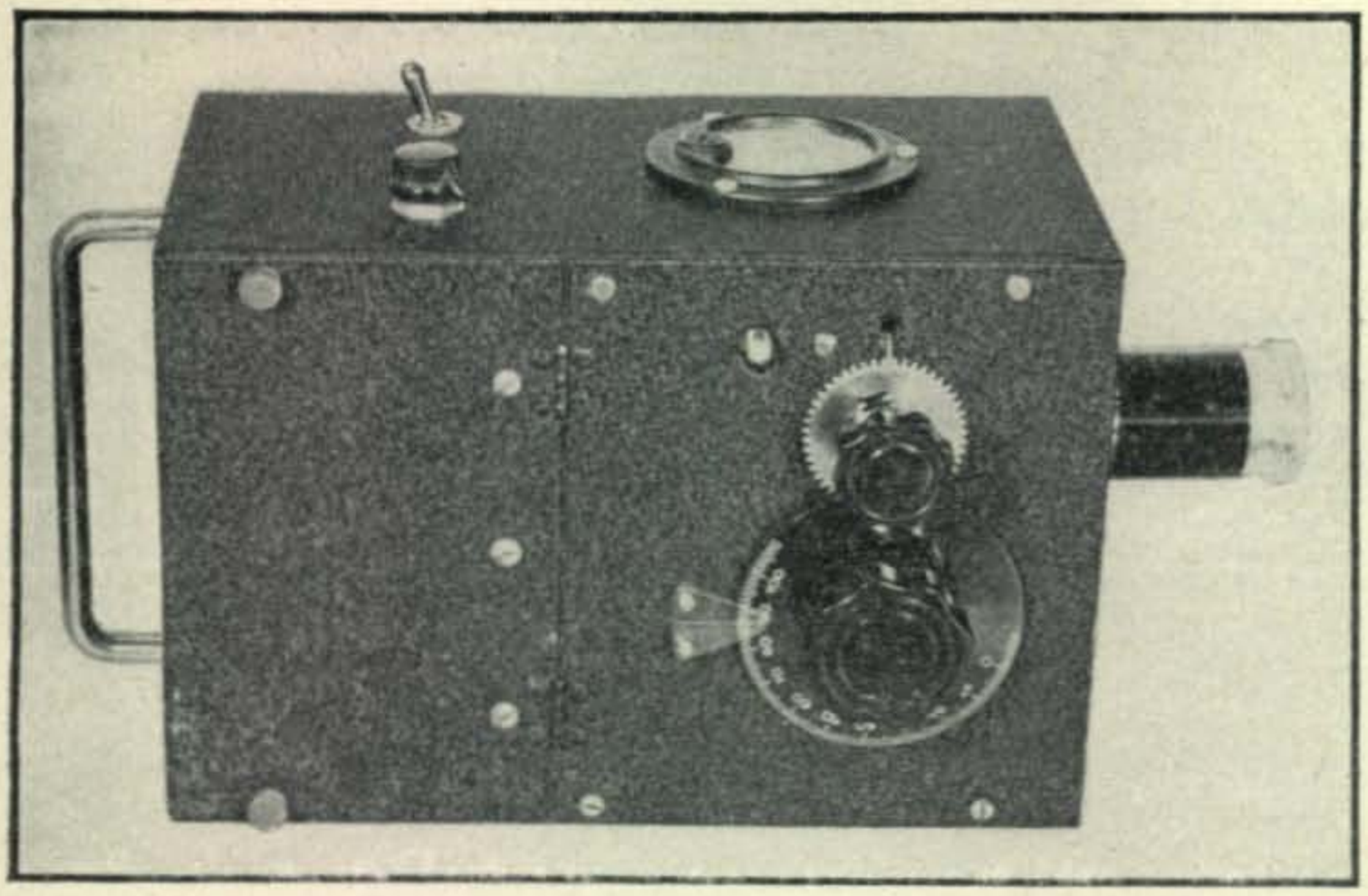
The meter cannot merely be shunted since this would reduce its sensitivity and the amount of pointer movement for a given degree of coupling to the test load. The problem was solved by introducing a variable "bucking" voltage from the potentiometer *R2*, which is in turn connected directly across the "A" battery. The meter pointer can be set to any position on the scale without having the slightest effect upon meter sensitivity. Make certain that *R2*, is connected on the *filament side* of the ON-OFF switch so that the bucking voltage will be removed when the oscillator is turned off. If this is not done the meter will go off scale on the zero side! The same effect may be observed (depending upon the setting of *R2*) if the instrument is accidentally turned on with the search coil not plugged in. This is the reason why the storage compartment in the cabinet holds only two coils; the third remains in operating position at all times.



❖ ❖

Side view of grid dip oscillator with cover of coil compartment open. Construction details of door and cut-out are clearly visible in this photograph.

❖ ❖



The completed grid dip oscillator. Note the band-spread reset gear at right.

Calibration

Perhaps the easiest method of calibrating is to beat the oscillator against an all-wave communications receiver. Normally such receivers have calibration sufficiently accurate for most purposes. The main function of the general coverage range of the GDO is to find *where* a particular antenna or circuit is tuning. The exact frequency is relatively unimportant, hence high accuracy in calibration is not essential. When working with antennas or circuits within the amateur bands where accuracy is important, the band in use can be spread out on the tuning dial by utilizing the series band-spread capacitors. The method of beating the oscillator against a receiver and recording the dial readings is well known and will not be repeated. Suffice it to say that calibration curves should be drawn up for all bands and kept *with* the instrument. When working outside where you cannot check against your receiver, these calibration curves will come in very handy.

Band-Spread Details

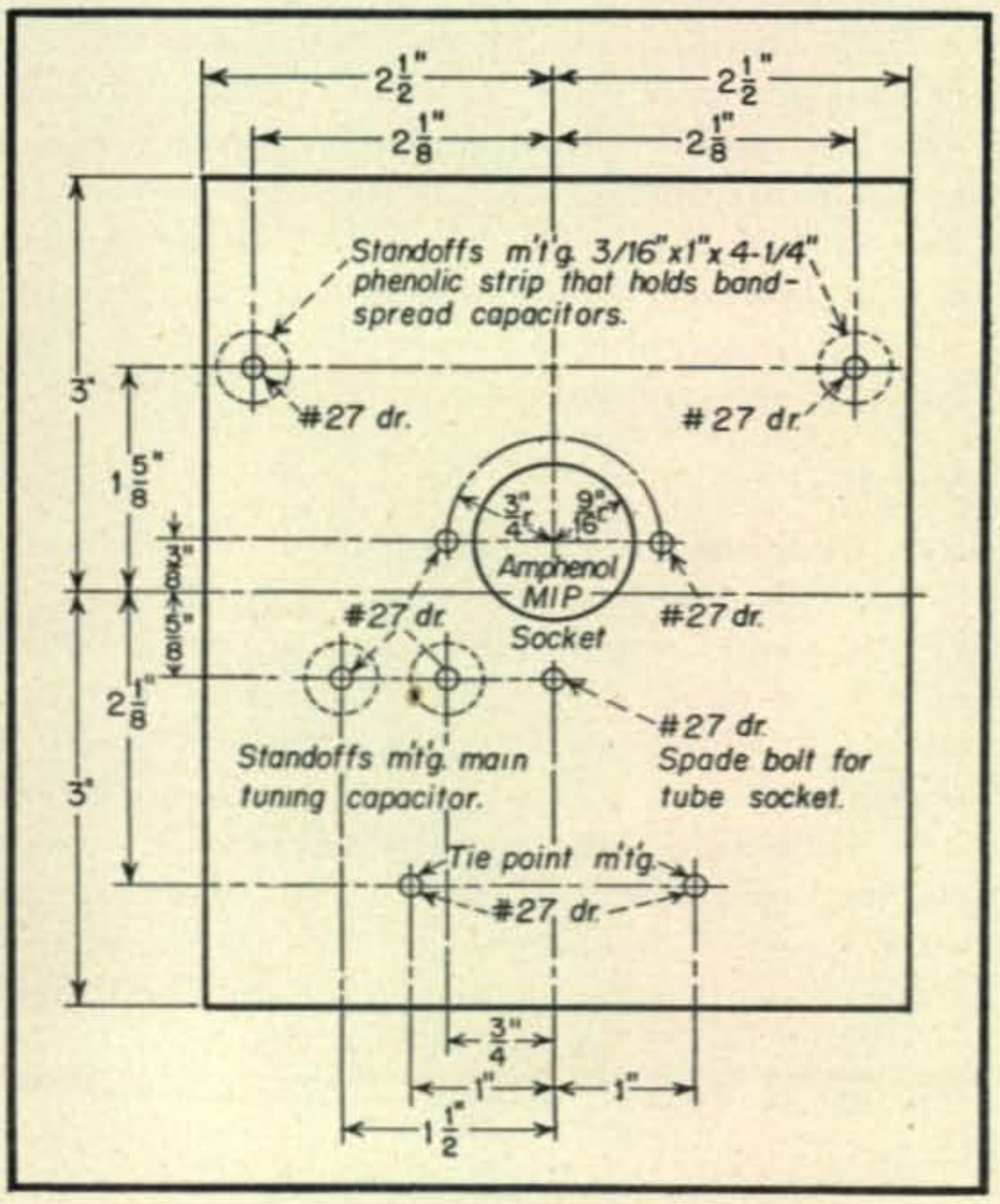
It will be noted from the photographs that the band-spread control, (directly above the main tuning dial) has a small gear affixed to its insulated shaft. In addition, a lever arm is arranged so that an end projecting through the panel will mesh into the teeth of this gear. This arm has a tension spring to insure that it will remain seated between the teeth of the gear until the lever knob, (on the end of the arm) is depressed. In this manner it becomes possible to set the band-spread capacitor to a high degree of accuracy and permits absolute return to any point of calibration which may be marked on the gear for the particular band in use. This same principle will be recognized as that utilized on some types of dividing heads used on lathes and milling machines. The gear is readily obtainable being part of a spring-loaded worm drive in wide use at one time in reduction drives for auto radios. The hub has a $\frac{3}{8}''$ opening which nicely passes the phenolic shaft of the same diameter fastened to the band-spread capacitor. The inner end of this rod is drilled for $\frac{1}{4}''$ and is permanently fastened to the capacitor shaft.

Band-Spread Setting Procedure

The following procedure is used to set the band-spread:

1. The small coil is used for the ten-meter band, the medium coil for twenty meters and the large coil for forty meters.
2. For any given coil, set the main tuning capacitor to *maximum* capacity.

[*Continued on page 76*]



Mechanical layout of housing case end. All major components mount directly on this end of the cabinet. The socket is for plug-in inductances.

Electronic Bias

FOR CLASS B MODULATORS

J. H. OWENS, W2FTW*

THE HIGH RANKING POPULARITY of zero-bias tubes is directly traceable to their ability to perform in class B modulator service without the use of negative grid bias. This quality eliminates the need for C batteries or bias packs and their associated complications. Were it not for two interfering factors, the condition would be Utopian indeed. Unfortunately, most of the popular high-mu triodes require a few volts of negative grid bias when operated at maximum rated plate voltage, and of course, that's the way we hams use them. That brings us right back where we started, needing a few volts of grid bias.

Perhaps the best solution to the problem has been in the use of C-batteries. They provide excellent voltage regulation and life at nominal cost. However, they have a habit of leaking occasionally, and messing up our transmitting equipment with corrosion-producing slime. Then they develop high internal resistance which causes distortion. Above all this, they prevent the station from being the way we like it . . . all a-c operated.

High cost is probably the main disadvantage of bias power supplies for class B modulator service, but poor voltage regulation is also a major factor contributing to their lack of popularity. Fair voltage regulation can be had at the expense of high bleeder current, which in turn aggravates the filtering problems, especially severe in high current, low -voltage circuits.

Self-Bias

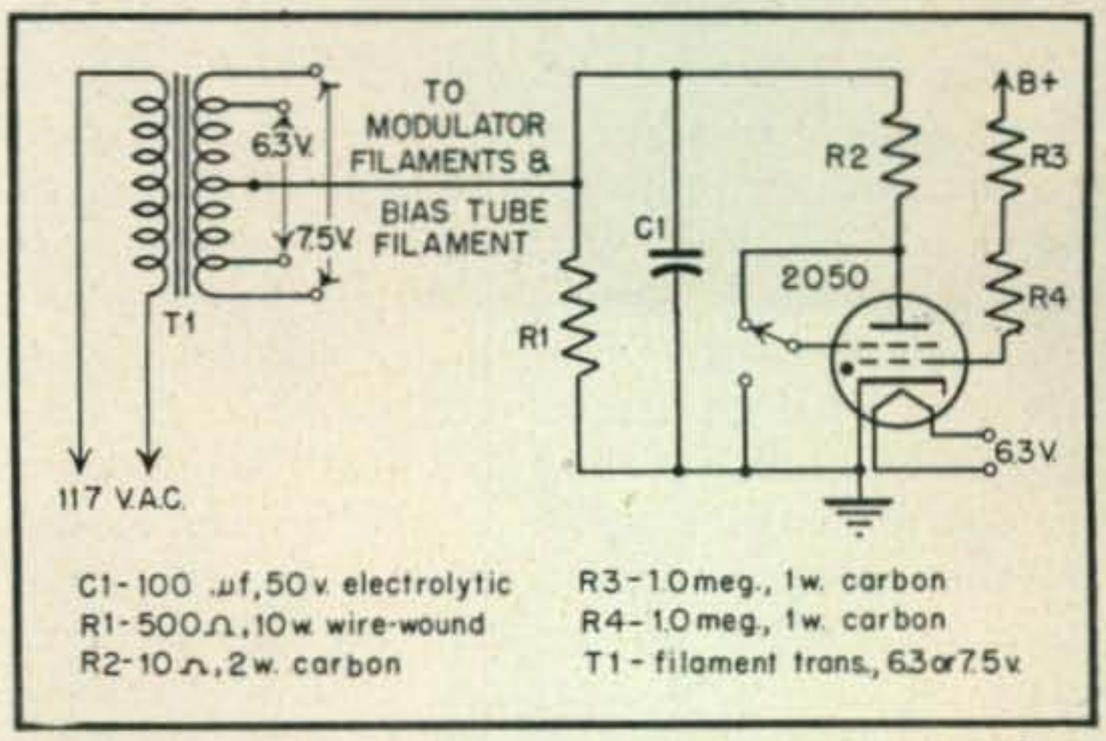
It would be ideal if the d-c plate current could be used to develop the required bias voltage. If only it would remain fairly constant with signal, a resistor could be used in the cathode-return lead the same way we get self-bias in class A audio amplifiers. However, this is not the condition. In class B amplifiers, the average d-c plate current varies from a low value of about 20 ma in the no-signal condition to perhaps more than 200 ma in the full-signal dynamic condition. Practically speaking, this means that in order for self-bias to be used, the bias resistor would need to have an inverse volt-ampere characteristic of 10 to 1. In other words, the resistance would have to drop to one-tenth of its initial value to maintain a constant voltage drop with a ten-times increase in plate current.

Now it so happens that resistors having such unusual characteristics are readily available in the form of gas rectifier tubes. The 83, 866A, and 816 will maintain a uniform voltage drop over a wide range of plate current. The type 2050 thyratron is an even better example, and its miniature near-equivalent, the 2D21, is ideal for lower power applications. These thyratrons have the advantage of unipotential indirectly heated cathodes as a preference over the filament types. They also have the benefit of control characteristics allowed by the two extra elements, the control grid and the shield grid.

The Circuit

The 2050 was chosen for illustration because of its relative complexity. Any of the gas or vapor diodes can be substituted, and such substitution will simplify the circuit and eliminate some of the components.

Fundamentally, the internal plate-to-cathode resistance of the thyratron is used as the self-biasing resistance in the cathode-return circuit of the



Circuit for electronically biasing class B modulator tubes. Switching the shield grid of the 2050 gives a small change in the average bias voltage. R3 and R4 are in series to provide an additional voltage breakdown safety factor.

*6931 Harvey Ave., Merchantville, N. J.

modulator tubes. It provides a fairly constant voltage drop of something between six and twelve volts, but its resistance varies widely with current.

The average voltage drop can be shifted a couple of volts by the shield grid. If this grid is connected to the cathode in the normal manner, the drop shou d be something between ten and twelve volts, but if it is connected to the plate, the drop should be something between eight and ten volts. The exact voltage will depend upon the static plate current and the degree of ionization as caused by other conditions.

Over its rated range of plate current, the 2050 has as inverse volt-ampere characteristic that is just a little steeper than it need be to maintain an absolutely constant voltage drop. Consequently, the voltage across the tube falls a little as the plate current rises. This factor necessitates the use of a stabilizing resistance of a few ohms in series with the tube's plate, which incidentally has a beneficial effect on the operation. Because of the presence of this series resistance in the circuit, a large capacitor can be connected across the biasing network without any instability being caused by the tube acting like a relaxation oscillator. The capacitor smooths out any reactions caused by surges or other fluctuations that might take the tube outside of its linear range.

The 2050 control grid serves a useful purpose in the performance of the circuit. Fed through a high resistance from the plate supply, it fires the tube instantly upon application of the plate voltage to the modulators. If it were not for this grid control action, the voltage on the 2050 plate would have to rise as high as fifty volts sometimes to cause ionization and conduction.

As a further safety factor, a protective resistor is connected across the entire network. In case of failure of the thyratron, this resistor provides a path to ground for the modulator plate current. It also provides more than enough bias to keep the plate dissipation within ratings, and it serves to protect the high-capacitance low-voltage electrolytic condenser in the circuit.

It is worth mentioning that gas and vapor tubes can be ionized by a-c as well as by d-c voltages. If the 2050 is forced to conduct high frequency currents, its d-c handling capacity is reduced by an equal amount. Therefore, the tube and its associated wiring should be kept away from strong r-f fields. If the application is a low-power one, a small amount of r.f. can be purposely used to reduce the voltage drop across the tube from about eight volts to a value near six volts, with the shield grid connected to the anode. An exposed wire, connected to the anode or control grid can be used to pick up the r-f voltage.

Application Notes

The arrangement illustrated is especially useful with the following modulator tubes when operated at or above the plate voltages indicated in the adjacent column:

Type	*Plate voltage*
RCA-809	500 volts
RCA-811	1250 volts
TZ-20	750 volts
TZ-40	1000 volts

As stated previously, the 2050 tube drop can be varied over a range of about six to twelve volts, but the secondary importance of an exact amount of bias should be fully appreciated. For instance, a pair of modulator tubes in a particular set of circumstances might have a negative bias value of nine volts recommended. The reason for the nine volts could be that two 4½-volt C-batteries equal nine volts when connected in series. Six or twelve volts of bias might work equally well, and one of these alternatives might even be better.

The primary reason for the use of grid bias on class B zero-bias modulator tubes is to keep them within their plate dissipation ratings. If the actual value used is a little higher than that recommended by the tube manufacturer, the plate-to-plate load impedance may be reduced a little; or if the bias is lower than recommended, the plate-to-plate impedance should be increased. But this is getting down to some mighty fine points, especially when consideration is given to the fact that when an amplifier is used to drive a loudspeaker, the reflected plate-to-plate load impedance may vary as much as ten to one over the normal audio frequency range! Class B modulators, working into a pure resistance (class C final) load, are at a decided advantage, even though the modulation transformer may not have a tap of exactly the right impedance.

The Filament Question

If the modulator tubes have 6.3 volt filaments, the 2050 heater can be connected in parallel with them directly across the transformer winding. The center-tap of the winding would then go through the stabilizing series resistor to the 2050 plate. However, if the modulator tubes have 7.5 volt filaments, a two-ohm wire-wound resistor should be used in series with the 2050 heater. Six ohms will be required if the filament supply is ten volts. All other connections will be the same.

Higher Power Problems

If your rig uses 805s or 838s for modulators, the average d-c plate current will ride up to about 400 milliamperes under full grid signal, and

[*Continued on page 74*]

Make Your Receiver

A FREQUENCY STANDARD

J. N. WHITAKER, W2BFB*, and JACK COSTELLO, W2EMK**

Federal Communications Commission Rules and Regulations. Part 12

Rules Governing Amateur Radio Service. Effective April 1, 1946, Revised to May 9, 1946

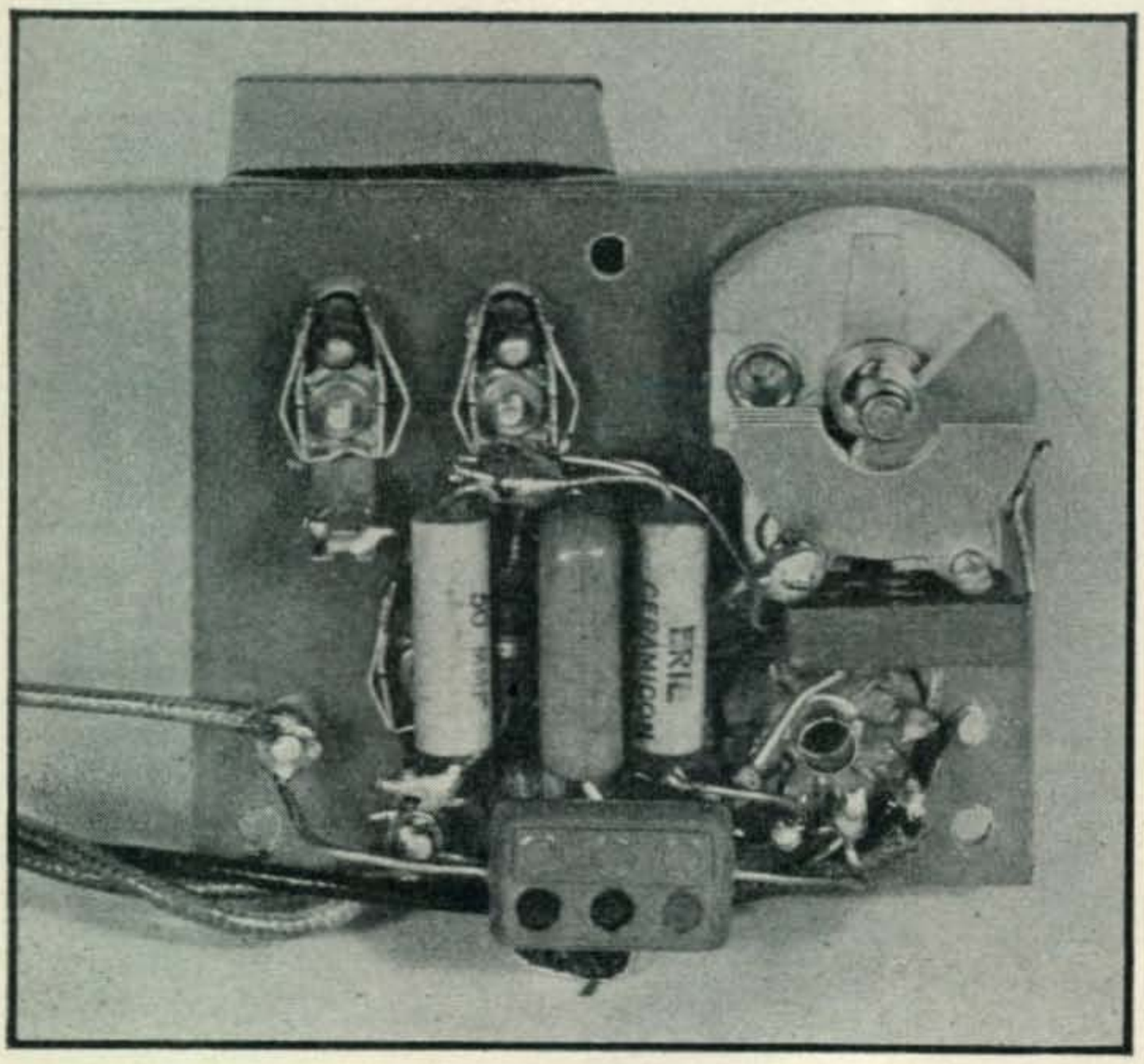
12.135—Frequency Measurement and Regular Check.

The licensee of an amateur station shall provide for measurement of the emitted carrier frequency or frequencies and shall establish procedure for making such measurement regularly. The measurement of the emitted carrier frequency or frequencies shall be made by means independent of the means used to control the radio frequency or frequencies generated by the transmitting apparatus and shall be of sufficient accuracy to assure operation within the amateur frequency band used.

The rule and regulations governing the regular and accurate frequency checking of amateur stations are very clear. They leave no possible doubt as to what is required. Yet the average amateur station operator seldom checks his frequency, and in fact does not own equipment which is adequate for such a check. It is simple to purchase a crystal with the frequency stamped on the h lder, put it in the rig and assume that the frequency is as marked, and not worry about it until the "pink ticket" arrives, or until some fellow ham with a good frequency meter gives the offender a frantic call and tells him he is out of the band.

A frequency standard that meets all the requirements of the FCC is liable to be a rather expensive item. True, a few good frequency standards have been made available in the war surplus markets, but even here the reliable ones are quite expensive.

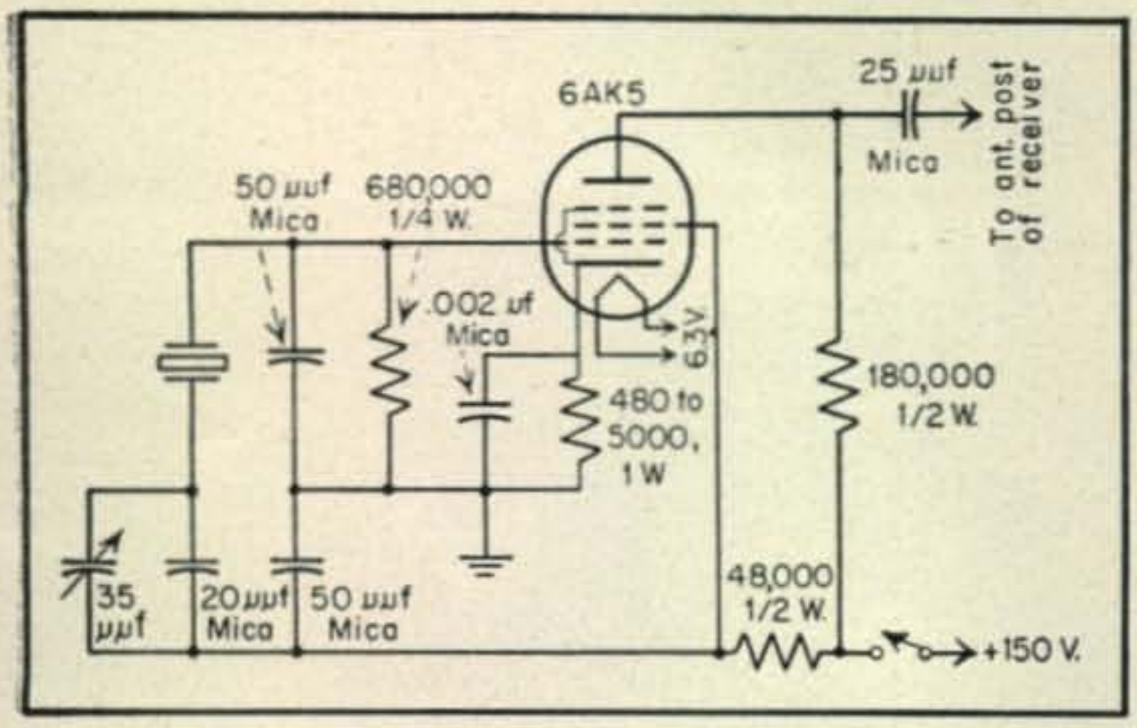
*93 Shepard, W. Englewood, N. J.
**660 Locust, Mt. Vernon, N. Y.



❖ ❖

With a minimum of parts necessary for this frequency standard the wiring is simple. The Hammarlund APC 35 variable condenser occupies the right hand corner with other components strapped directly to the crystal and tube sockets.

❖ ❖



Circuit diagram of 100 kc receiver frequency standard.

One item that any station must have is a good receiver. Most amateur stations have commercially built receivers and the dials are usually calibrated directly in frequency. Also most receivers have a main tuning dial and an auxiliary band-spread dial. The usefulness of the calibration depends to a great extent upon the accuracy with which the operator is able to adjust these dials. The Bureau of Standards' transmitter WWV is a check point that is unquestionable, but unfortunately the most useful frequencies transmitted are too far removed from the amateur bands to be used directly, and some form of a low frequency oscillator having harmonics that fall near or within the amateur bands must be used. Such an oscillator may be adjusted so that one of its harmonics will zero beat with WWV. The other harmonics will then become accurate markers for the initial adjustment of the receiver.

The use of an auxiliary oscillator is also usually a somewhat involved procedure and takes time and care to adjust. It is something that one must remember to turn on and warm up before using. The obvious solution is a 100-kc crystal oscillator, but there again one usually encounters some tricky construction and adjustments. What is needed is something that can be used instantly and at any time when the station is in operation. We have the solution to this problem in a very simple device which may be built into the receiver. It is capable of operation as soon as the receiver is operating properly.

Simple 100-KC Crystal Oscillator

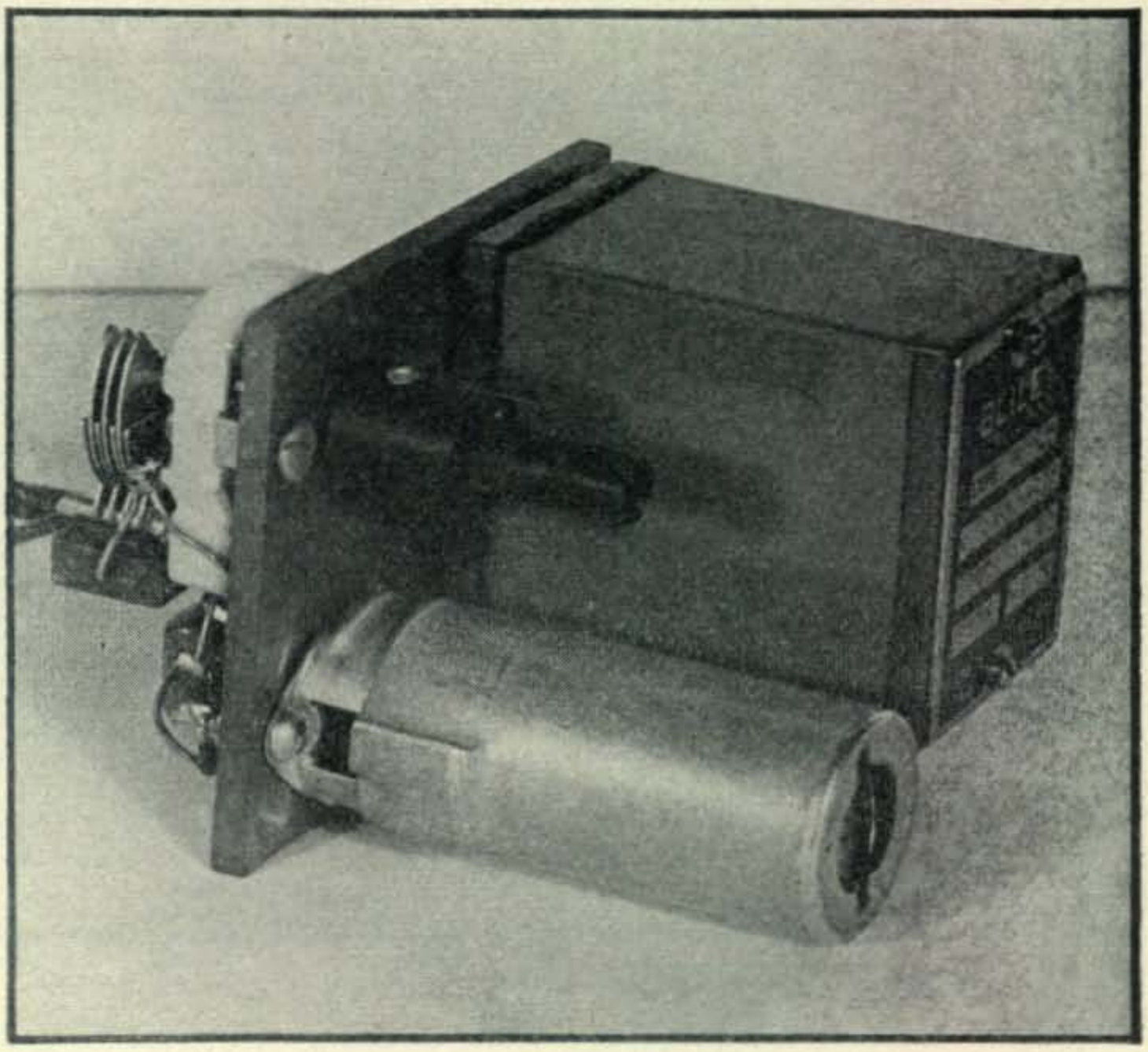
This device consists of an unusually simple oscillator circuit using a miniature 6AK5 tube and a 100-kc crystal. A 6AU6 or a 6AK6 tube will operate just as well as the 6AK5. The crystal requires more space than all of the other parts together, and almost any receiver has a little space somewhere on the chassis where the oscillator can be mounted. There are no really critical values in any part of this circuit. Good operation will be obtained with resistor and capacitor values plus or minus twenty per cent of the values shown, although the values indicated are just about optimum. The only values that might be at all critical are the tuning capacities in series with the crystal. The 50-$\mu\mu$f capacitors between grid and ground and screen and ground should be of the ceramic dielectric type for best results.

As may be seen from the diagram, the oscillator circuit is very similar to the old time Colpitts oscillator, with the usual inductance replaced by the crystal and its tuning capacitance. The out-

❖ ❖

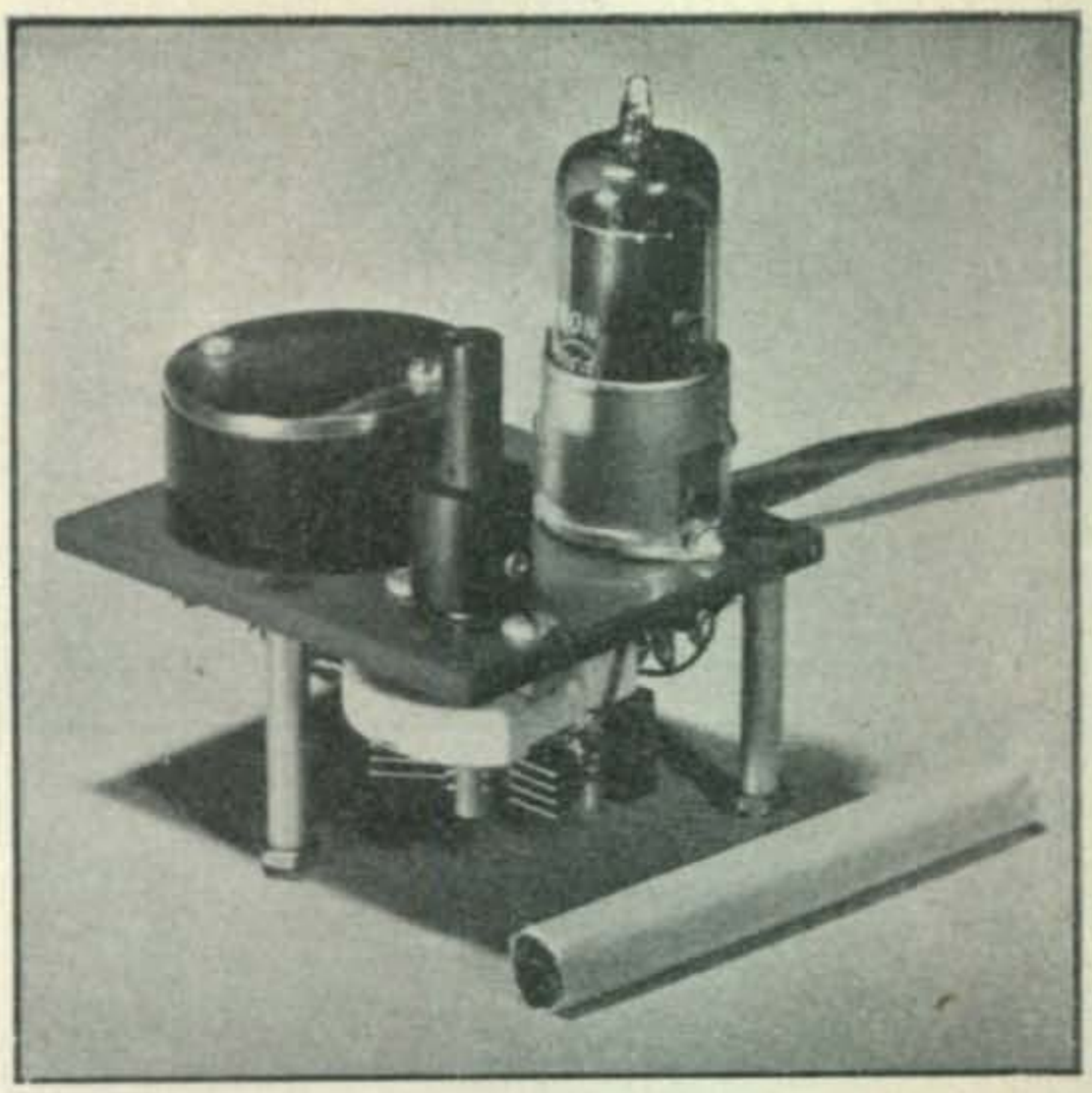
Physical size of the receiver frequency standard is largely determined by the size of the 100 kc crystal use. The variable condenser allows for minor variation of the crystal frequency to dead-beat it against WWV.

❖ ❖



put is obtained by means of electron coupling to the plate of the tube, and the frequency is not affected by the load. A 25-$\mu\mu$f capacitor connected between the plate and the antenna binding post of the receiver provides ample output to produce an R8 signal in the receiver at 28 mc, without the use of any auxiliary frequency multiplying devices. If the signal is too strong in the receiver, the level of the harmonics of the oscillator may be reduced by replacing the 180,000-ohm plate resistor with a resistor of a lower value, or by reducing the coupling to the antenna of the receiver. In some installations it may be found that satisfactory pickup is obtained from radiations from the oscillator circuit without the connection to the antenna terminal.

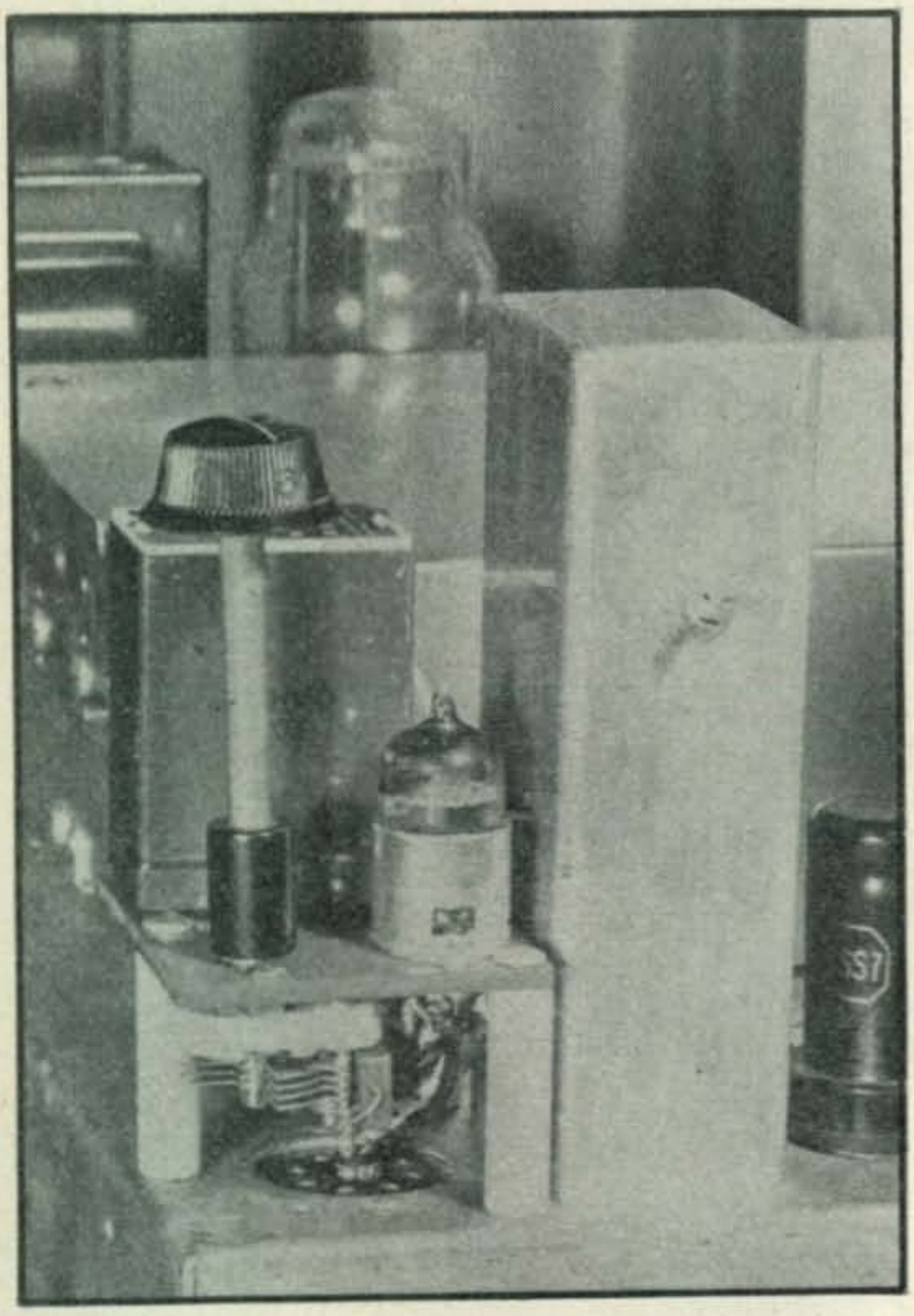
This oscillator circuit may be used with a crystal of almost any frequency, since it is an aperiodic circuit. The frequency governing device is the crystal and its series condenser. Any crystal which is a sub-multiple of 5000 kc may be used, although a 100-kc crystal is the most desirable.



Another model of the frequency standard showing its compact size as compared with a cigarette. Operation with or without tube shield is equally satisfactory.

Operation

The filament of the 6AK5 is left on continuously when the receiver is on. The on-off switch opens the plate and screen supply to the oscillator tube. The filament and plate power required is negligible. The filament requires 175 ma at 6.3 volts, and the plate and screen currents combined are approximately 1 ma at 150 volts, so there is little danger of the additional load impairing the operation or the life of the receiver.



The frequency standard installed on the chassis of a communications receiver.

When the installation has been completed, allow the receiver to warm up in the usual manner. Tune the receiver to WWV and turn on the crystal oscillator. Adjust the crystal tuning capacitor until the harmonic of the crystal is zero beat with WWV. If a 100-kc crystal is used, a signal will be heard in the receiver every 100 kc throughout the entire tuning range.

The tuning capacitor in series with the crystal will not change the crystal frequency very greatly. A total variation of approximately 10 cycles may be obtained when using a 100-kc crystal. A proportionate change may be obtained with crystals of higher frequency. Although the obtainable adjustment of frequency is slight, it is sufficient to enable the operator to accurately adjust the crystal to the exact frequency. Once this adjustment has been made, it will rarely, if ever, be necessary to make any readjustments.

If the crystal frequency is too high, omit *C1* and *C2* (in series with the crystal) and connect *C1* across (in parallel) with *C4* for frequency adjustment.

With good 100-kc and 1000-kc crystals available at a very nominal price, it is possible to convert any stable receiver into a very accurate and convenient frequency standard at low cost. With this receiver-type frequency standard no one should have any difficulty in complying with Section 12.135 of Part 12 of the FCC rules and regulations.

Westward Ho!

A. DAVID MIDDELTON, W1CA*

Traveling around in the wilds of Idaho, or anywhere in the West, for that matter, is plenty of fun, with or without a ham outfit aboard. What with driving vast distances, making camp, fishing, hiking, sleeping, eating (ah yes . . . eating) . . . breaking camp, etc., one seldom gets a chance to set up the gear, even if it is along. But once the rig is on the air, there are so many guys you want to work that everything else goes by the board. As a "for-instance" consider what happened when Charlet and I pulled over the Galena Summit into the Stanley Basin country in central Idaho. We had been promised some wondrous lakes thereabouts but being a bit blasé by then, didn't expect too much. We sure got the general idea when we saw that blue sparkling water of Pettit Lake. Moving on to Redfish Lake, north of Pettit, we admitted that our informant had been really on the beam. Redfish Lake was the answer to this camper's prayer. So much for the scenery.

On Goes The Rig

But what about ham radio? Well, something told us that *this* was the spot to put the gear on the air. So with a few well-placed throws, we had the Windom swinging about 45 feet up in the air, in the clear, and the rig set up. What followed was something in the way of knocking 'em dead on 40 meters. Those QSOs were really solid, Jackson! The score for Redfish Lake was the best yet, with 25 calls and 17 QSOs.

With swimming such as I never dreamed about, and 40 meters really hopping, the days went all too swiftly. We had some swell QSOs with W6OCZ at Pinecrest, on Strawberry Lake in the Sierra Mts., worked W7COB in Portland, and W7EWR in Helena just any old time. Then there was the Milwaukee station, W9USA, that kept pounding in, and we kept trying—but never did raise them. The 40-meter signals, in and out of Redfish Lake, were the best yet. Those Sawtooth Mountains must have a lot of what it takes to make good propagation. Or maybe it was that free-swinging Windom.

We're Off Again

The lure of the greener grass across the fence took us away from that radio-camping paradise and onto the road north through Stanley. What happened to us then shouldn't happen even to a 160-meter fone man!

We had almost "topped-out" the pass leading down into the Clear Creek road on the way to Lowman, when out blew a tire. With the road just barely wide enough for one car and so steep that the Olds was in "slow low" at that, we sure were in a tough spot. The spare got on somehow while traffic was blocked in both directions. To say that the road was rough is a rank understatement of fact. Why, there were rocks as big as a pole-pig!

Well, the spare held, but another tire, a new one, let go about four miles further on, in an even tougher spot. We made a forced landing right there on that shelf road, on a sharp turn, while we booted the least damaged tire. It took about an hour's work, some ingenious planning, plus the help (?) of two other guys, before we could horse that car to a kind of turnout where the traffic could pull by.

Then, using sheer bravado, plenty of good luck, and a powerful lot of overtime labor on the part of our hard-working Guardian Angel, we inched the Olds about ten miles up over that hump and down into the canyon to the very first spot where we could find room to pull the car off the road! Brother, that Clear Creek Trail is one narrow rut. I would not distinguish it with the name *road*, although W6GWD swears he used to drive a gasoline truck over it. I think that Roy really walked and carried the truck.

When we pulled off that boulder-strewn roadway onto the campsite where it looked safe we examined the booted tire. There was an egg-sized bubble of boot and innertube sticking out from a 3-inch cut in the tire. Looking back on the ten miles just traversed, and realizing that a blowout would likely have meant ditching the car over the side of that rugged mountain . . . well, such things are nice to look back on . . . if you can do it!

Now, it would make a fine yarn if I stayed on the mountain, sitting pretty in a cozy camp, on my rubber cushion, while I radioed for a tire, plus a mechanic to put it on. Not even Hugo has successfully demonstrated the transmission of matter by radio and since even the AAA could not come out that far, radio let me down.

Leaving Charlet at the camp, I flagged the first vehicle bound downhill. The prospectors

*23 River Glen, Farmington, Conn.
ex-W1OJH, W2OEN

aboard that pickup kindly allowed me to perch on top of their duffle, (me and my empty rim), and even found me a room after chauffering me right into Boise. Those ore sacks got pretty hard after a 90 mile ride, but I *was* moving!

The Ham Fraternity Comes to The Rescue

Right after dinner, I went in search of some morale boosting. Not recalling any of the Boise gang. I asked the receptionist at KIDO if she knew of any local hams. Was I surprised when, just like that, this pretty miss did things with an intercom, and conjured up Roy Pack, W7JKS, right from inside the recording studio. After introductions, Roy admitted that he was a new licensee, not so active, and that I probably wouldn't recognize his call. Frankly I didn't, but I did recognize the good old ham spirit, with the Welcome Sign displayed as plain as could be.

I was hustled out to a "real ham shack"—the Fine establishment. Until I was introduced to Betty Fine, W7GUQ the name didn't click. Then I knew where I was. A lot of pleasant QSOs had been held with Betty when W1OJH was at Jackson Lake and in other QTHs. Later I met the OM—W7GQA, Frank. Finally came their oldest daughter, Louise, and what do you think—W7JFZ! Louise proceeded to sit down and work the rig, after railroading Frank and me away.

And there you have a real ham family. The

(Top, left). W6NJO (left) enjoys a cool one while chewing the fat with W6HLM. (Top, right). Left to right: W6NNS, W6LSX, and W6QVQ. (Center, left). A well-known San Franciscan, W6RBQ, director of Pacific Division ARRL. (Center). No wonder the QRM around McNear's Beach was so tough. That's what the grounds looked like during the hamfest. (Center, right). W6VKB looks like he's in a tizzy. He really wasn't, as his HY114 job worked fine. (Bottom, left). The ole Texas Cow Poke hisself, W6TCP (left), with W6NDN, of Hayward on the right. (Bottom, right). Left to right: W6OIN (with hat), W6TCP, W6OJU, Baldinger, (no call).

OM, the XYL, and the kid sister all licensed and active on the air, too. The Fines had other assorted youngsters, some of whom were already learning the code. Boy, the QRM around Boise is going to be tough!

While at the Fine home, W7IQJ dropped in and talked for a time. Then Frank took me out to KIDO and later to visit W7AHS, a 20-meter fone man who was really knocking 'em cold.

How I obtained a new tire and finally got back to that Horse Creek camp is another story, and non-radio—but what happened afterward is definitely part of this yarn.

Betty, W7GUQ, kindly consented to work a daily sked with me until we got up enough nerve to come down off that high perch, and work the sked she did. On moving day Betty said she would QRX every hour, on the hour, until we were safely down into civilization, as personified by the main highway. I was not to come on the air unless I needed assistance. We didn't—but the going seemed much safer knowing that W7GUQ was QRX to listen to any tale of woe we might have.

That night we camped under the Zepp in the Fine backyard (they live out in the country) and pounded some more brass at the W7GQA-GUQ-JFZ rig.

Operations in Canada

On-the-air operation suffered after we left Boise, when we headed north through the Canadian Rockies, however, we did get in a bit of really good hamming in Canada.

Charlet and I boarded a motor launch on a lake near Banff for a short sight-seeing cruise. Of course, the W2OEN/1 call cards were in plain view both fore and aft on our Olds which we parked by the dock. As we got aboard who should raise us but none other than VE6AW or rather the old VE4AW, of Calgary, with whom I had had many a QSO in the pre-war days. We chewed a lot of cross-the-border fat and agreed that many mutual ham problems exist in Canada and the States. The usual ham parts shortage, QRM, and the ever present "how do you raise 'em" problem.

Some weeks later, in Calgary, we dropped into Jim Smalley's ham store, VE6GD. We soon had quite a hamfest going with Jim, VE6PY, VE6LX and his son (soon to be licensed) and VE8AJ, from the Yukon Territory. AJ was buying parts to put on a super-duper rig at Whitehorse.

Back To The States

On our way back into the states we stopped off at Vancouver to see my old side-kick, W7HRR and his wife, Sue. We put on the 2-meter rig at Arch's shack but heard nothing. However, at my old W7GLH QTH outside Vancouver, I did hear several 2-meter signals over Labor Day week-end but could not identify the calls due to the usual practice of rapid signing off or no signing at all. The beam showed that signals were originating south of Vancouver, probably in the Portland area.

Enroute to Crater Lake we halted at the Mammouth Sugar Pine Tree for a look. While back in the tall timber, we heard somebody blowing code on a slide whistle. When we got back to our car we noticed that a nearby car had W6HRF in big letters on the rear window. Mrs. HRF was in the car and presently the OM and their Young Squirt came out of the timber—sure enough the kid was tootling what did sound like random letters on a whistle. His CQs were really solid! We had a good chat, then headed north; W6HRF and his party headed back home to Mt. Shasta.

While on the subject of casual roadside QSOs, we missed one in Napa, California when W6CZN passed by, saw my QSL card in the car window and left a "hello" note beneath my windshield wiper blade. The shock of seeing that white paper in such a spot, just where the local John Law usually puts his "invitation to appear" set me back a month's growth, but anyway we were awfully sorry to miss W6CZN.

That brings up a point. In over 11,000 miles of travel this summer, so far we have seen only two instances of calls displayed on automobiles out on the road, And we keep an eye out for them too. One car, in Colorado, had a W9—on it, but the letters were blurred and obviously pre-war. The other was that of W6FAV, seen somewhere along the highway. Surely there must have been more than the three of us riding the highway this summer. Also—we have yet to see a call sign displayed outside a house on the road, although we have seen several neat rotaries, etc., along the way. How come, gang?

We stopped off at Concord, California to see Roy Dewey, W6GWD and his wife Renee. Roy and I were classmates at a radar school conducted by Submarine Signal in Boston in 1944. Also visiting the Deweys was Bill Manley, W6RQH. Bill, a former pilot with plenty of "Hump" experience, had just brought his fishing boat in from a busy summer of commercial fishing. Among Bill's gear was quite a lot of heavy-duty fishing line that had been replaced with steel line and a power winch. W6RQH gave me a generous hunk of this cord line, which is just the ticket for putting up portable antennas in the field. It's light, strong and Bill says its available where ever commercial fishing tackle is sold.

Roy took both Charlet and me up in the Concord Air Club's plane. Altho Reg (W6ITH) didn't know it, we dropped down to about 1500 feet for a look-see at that maze of antennas and stuff on his ranch in the Berkeley hills.

[*Continued on page 68*]

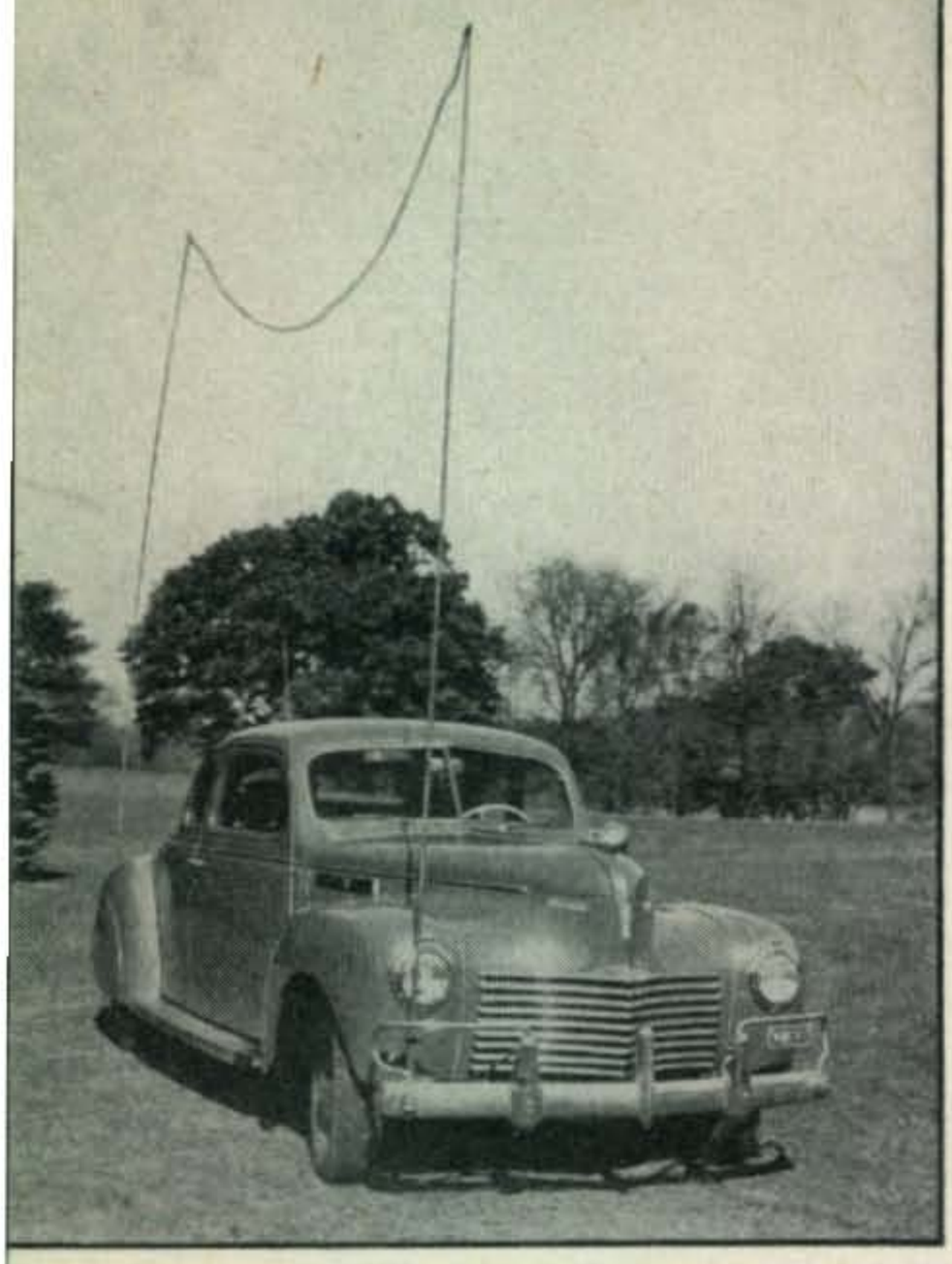


Fig. 3. With the antennas fully extended they are a little too high for mobile operation, but at a portable location the 52 foot total length of the antenna appears to work out quite well on 75-meter phone.

The SCR-284A Car Installation

CHARLES W. BOEGEL, Jr., WØCVU*

Some additional notes on the highly successful 75-meter portable of WØCVU.

THE EXCELLENT RESULTS obtained with the portable SCR-284 described in the October, 1946 issue of *CQ* has prompted the author to find an easier means of working short hauls on 75 meters, than erecting a folded dipole antenna. An idea of using two *tank type* antennas, one on the front of the car and the other on the rear, with a jumper wire across the fully extended 12-foot tops, has proven very satisfactory. The front antenna, as shown in *Fig. 1*, must be insulated from the bumper. The antennas will collapse to 14 inches and are welded to the steel plate as shown in *Fig. 2*. Measuring the lead from the SCR-284 to the front antenna of 16 feet, two antennas of 12 feet and the 12-foot jumper make approximately 52 feet total antenna length. This is brought to quarter-wave resonance with the antenna tuning network switch on number 2.

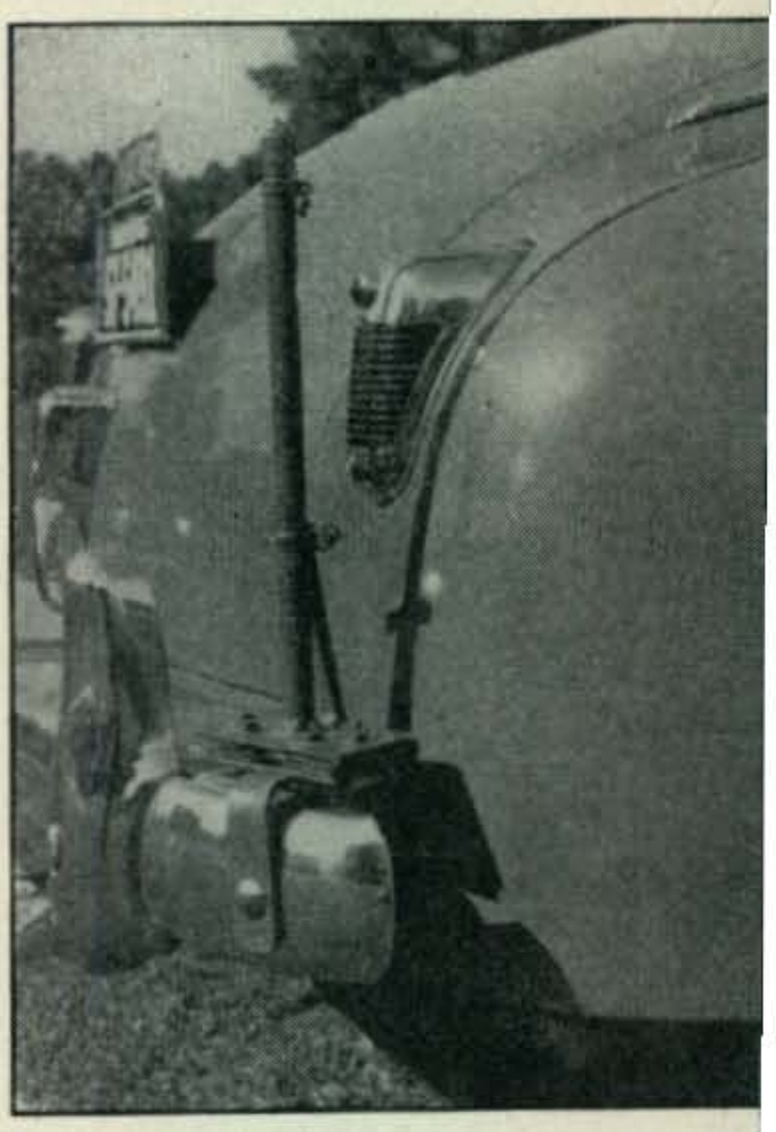


Fig. 2. Closeup view of the insulated antenna base for the tank type antenna.

The preparation of the front brace and angle for the antenna requires a little care in construction. A one-half inch piece of bakelite separates the two metal plates and all screw holes are countersunk so that the heads are at least 1/16 inch below the edge of the bakelite. The holes are filled with Duco cement and then topped with PX Glazing putty in a very thin coat. The antennas should be welded to the top plate on the sides of

*℅Collins Radio Co., Cedar Rapids, Iowa

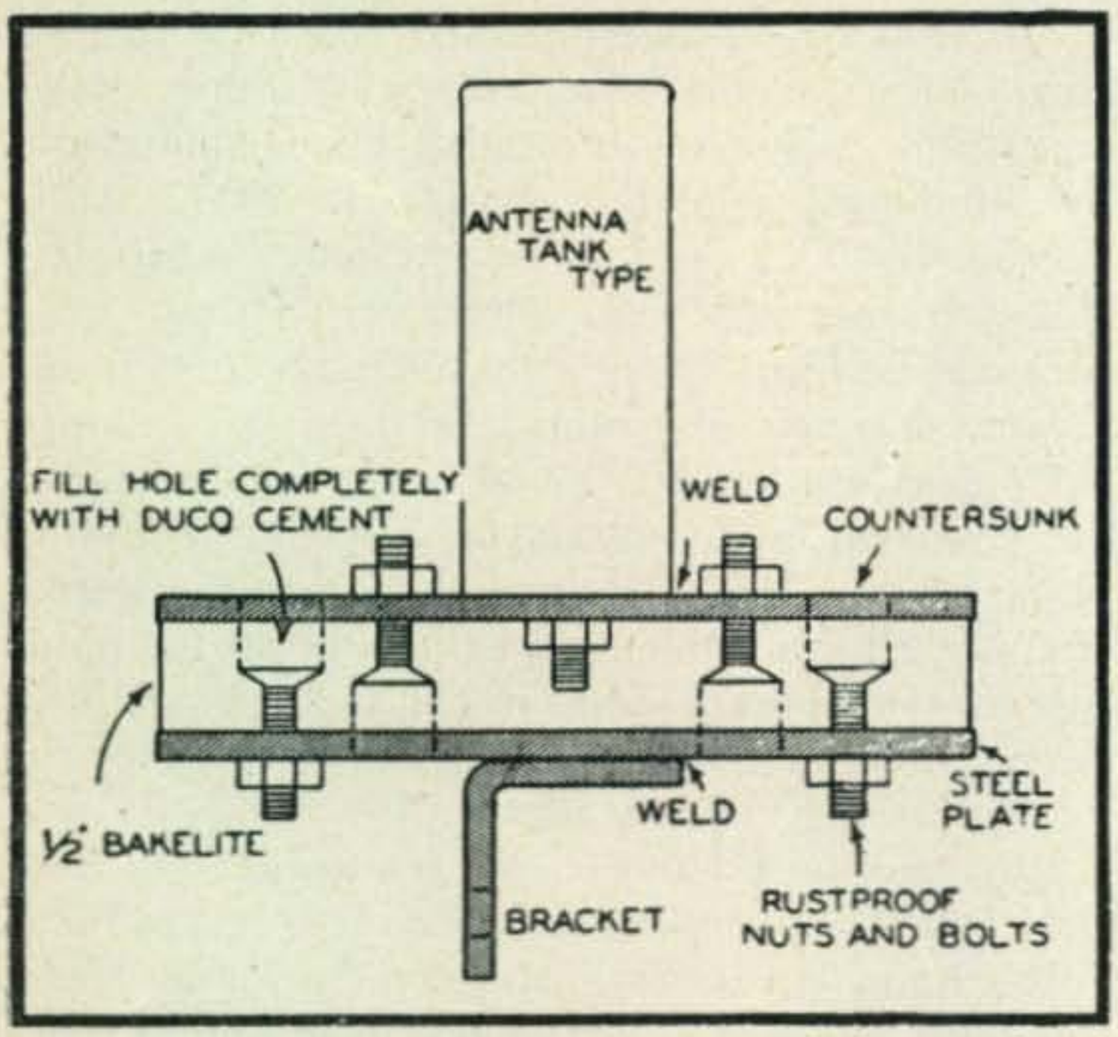


Fig. 1. Exaggerated assembly view of the insulated angle base for mounting the tank type antenna on the bumper of any automobile.

[*Continued on page 76*]

IN AMATEUR circles, there is probably no more controversial subject than that of antenna systems. By an antenna system, we include all equipment used to transmit the radio-frequency power generated in the final tank circuit. This equipment includes a means for coupling the final tank circuit to the radiator, and a radiator capable of transmitting the power itself. That the antenna system be as efficient as possible is, of course, the goal.

In the one-band amateur antenna system, when we speak of maximum efficiency, we not only include the transmission of power from the tank circuit at a single frequency, but also over a band of frequencies with a minimum of effort on the part of the amateur operator. We include in the phrase "minimum of effort" the time and energy necessary to construct, erect, and initially adjust the antenna system, as well as to maintain proper operation over the operating frequency band.

THE TROMBONE T

HENRY M. BACH, Jr. W2GWE*

A thorough analysis of the engineering behind the Trombone T is covered in Part 1. The second half of the article will give the practical application of this data. The antenna in field tests has given W2GWE an outstanding DX signal, attested by over 140 countries worked on 14 mc since the reopening of the band

The initial cost of the antenna system is likewise a prime consideration, for we have yet to meet the amateur who has used the same antenna for the past ten or fifteen years.

The Trombone T

With the above considerations in mind, we have developed an antenna system which we have called the "Trombone T." If an exceptionally efficient one-band antenna system is desired, we feel that one will have difficulty in exceeding that of the "Trombone T." We devised this antenna system with the following specific requirements in mind:

a) The system shall be wide band. The transmitter final tank circuit shall look into a resistive impedance from the highest to the lowest frequency in a single band. The physical dimensions shall be non-critical, no "in the field" adjustment shall be required, duplicating calculated dimensions shall suffice and small errors in construction shall not affect the operation. This means that the band width shall substantially exceed the band width of the amateur band.
b) The operation shall be independent of weather conditions. Rain or shine, high humidity or dry, the loading shall not change and the final d-c plate current meter reading shall not vary.
c) The feed system shall not radiate; it shall not be a hazard to humans or animals and shall be capable of being run almost anywhere. The length of the feed line shall not affect the loading; i. e., the feed line shall be "flat."
d) The radiation pattern shall not be markedly directional, for we want to work all directions.
e) The antenna system shall be protected from lightning at all times (even during transmission).
f) The same antenna system shall be equally effective for receiving and transmitting—we want only *one* antenna, and if you can't hear them, you can't work them. The system, when used for receiving, shall not only be effective with respect to signal pickup, but also with respect to noise-reduction qualities. The feed line shall be incapable of pickup.
g) Last, but most important, the finished job shall not be objectionable to the wife (or landlord, if you are unfortunate enough to have one). We have found the wife is fussier than the neighbors, so if it meets with her approval, the neighbors won't squawk—(Except for BCI).

The antenna system may be broken up into three parts, the radiator, or antenna itself, the feed system, and the coupling between the tank circuit and the feed system. We shall consider them in the order named.

The first question that arises when considering the radiator is shall it be vertical or horizontal. Each has advantages and disadvantages. We know that the vertical antenna is non-directional in the horizontal plane, and the horizontal antenna is broadly directional in the horizontal plane. *Figure 1* shows how the input resistance at the center of a half-wave radiator (actually the length of the radiator is decreased approximately 5% in order to cause the reactive term of the impedance to vanish) varies with height above ground, for the horizontal and vertical radiator. The solid lines are for the case of a theoretically

*36 Woodmere Blvd. S., Woodmere, N. Y.

perfect ground, the dotted line is for a horizontal antenna above typical east coast ground.* A theoretically perfect conducting ground is found only in the case of an antenna over salt water and is closely approximated in the case of salt marshy ground. These are rarely possible in amateur installations. If the radiator were in free space and the cross-sectional area of the wire used were vanishingly thin, the resistance would be 73 ohms. We all know that when we have a second antenna in proximity to our transmitting antenna, the second antenna picks up some of the energy from the transmitting antenna and re-radiates it.

Self-Impedance

A radiator has a self-impedance which in the case of a half-wave (shortened 5%), whose cross section is negligibly small with respect to the antenna length, in free space, we have said is 73 ohms. The second wire couples to the radiator; there is a mutual impedance between the radiator and the second wire. This mutual impedance may be positive or negative, and it will either increase or decrease the impedance of the radiator. The magnitude of the mutual impedance will be a function of the spacing between the radiator and the second wire.

Figure 2 is a plot of the resistive term of the mutual impedance between a pair of non-staggered half-wavelength wires in free space as a function of the spacing between the wires. *Figure 3* represents the resistive term of the mutual impedance between a pair of colinear half-wave radiators in free space as a function of the spacing between adjacent ends. Suppose we desire to know the resistive impedance at the drive point, *D*, of the array in free space shown in *Fig. 4*. The array is seen to be a half-wave radiator stacked above a half-wave radiator, with the radiators excited in phase, producing approximately 4 db gain in the vertical plane over a single half-wave horizontal antenna in free space. The self-impedance we have said is 73 ohms. The resistive term of the mutual impedance is given by *Fig. 2* as -14 ohms. Thus the center impedance of each radiator at the feed point is 59 ohms. The half-wave feed line provides a 1:1 impedance transfer; hence the resistive term of the impedance at the feed point is $\frac{59}{2}$ ohms = 29.5 ohms.

Coming back to the half-wave radiator, the presence of the earth alters the impedance of the radiator, and may be explained by postulating a second radiator the same distance under the ground as the radiator is above the ground. In the case of the vertical radiator, the image antenna is colinear with the vertical radiator, and its top end is spaced from the bottom end of the vertical radiator by twice the distance from the bottom of the radiator to the "ground." The "ground" may be actually of the order of one-tenth wavelength below the level of the earth, as in the case of Long Island soil.* In the case of the horizontal radiator, the radiator and its image may be visualized as a stacked, two-

*The points denote actual measurements made at wavelengths from 8 to 27 meters.

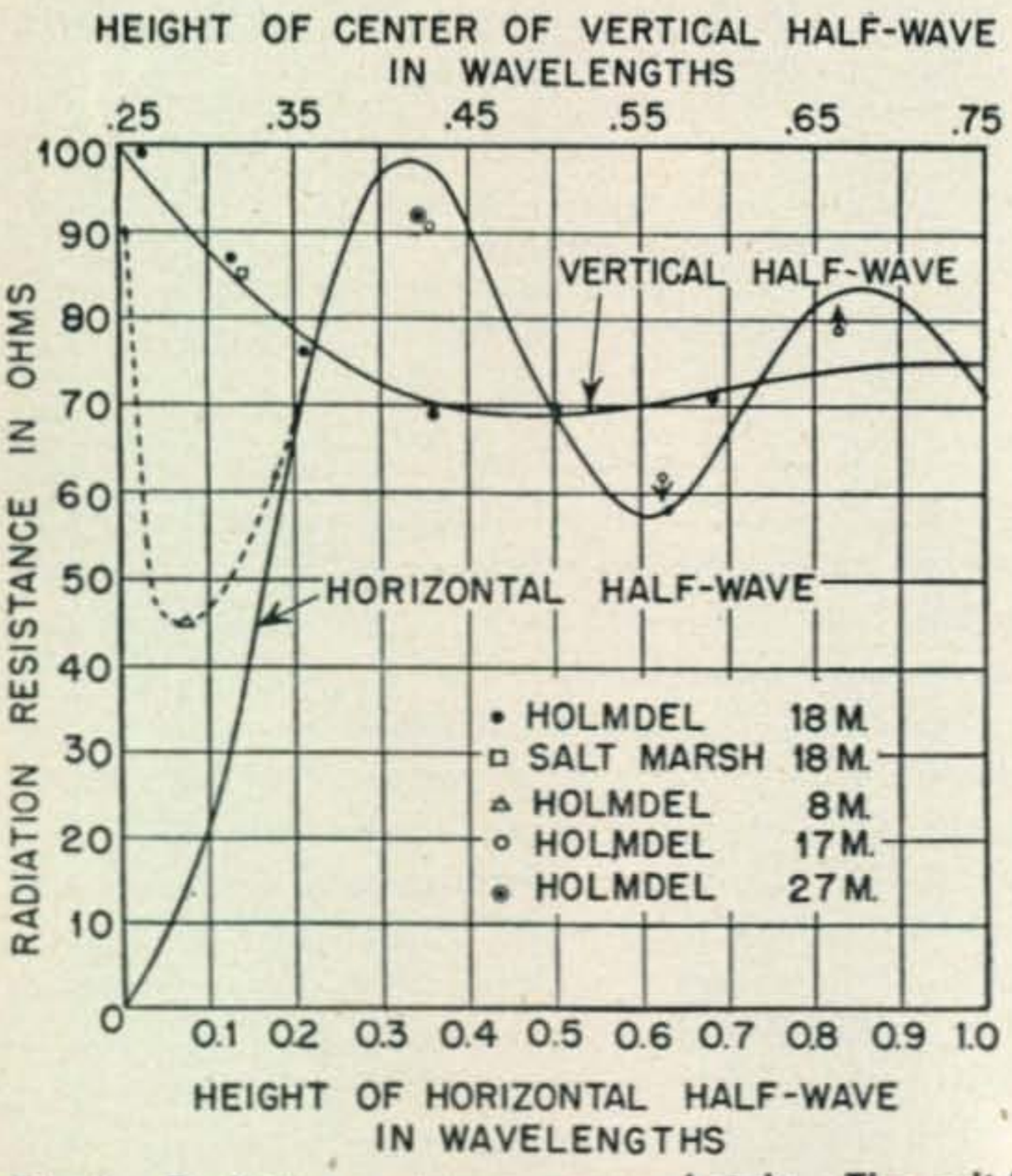


Fig. 1. Radiation resistance versus height. The solid curves are calculated for perfectly conducting ground. The points denote measurements made at wavelengths from 8 to 27 meters.

[From *Proceedings of the I.R.E.* Jan. 1934]

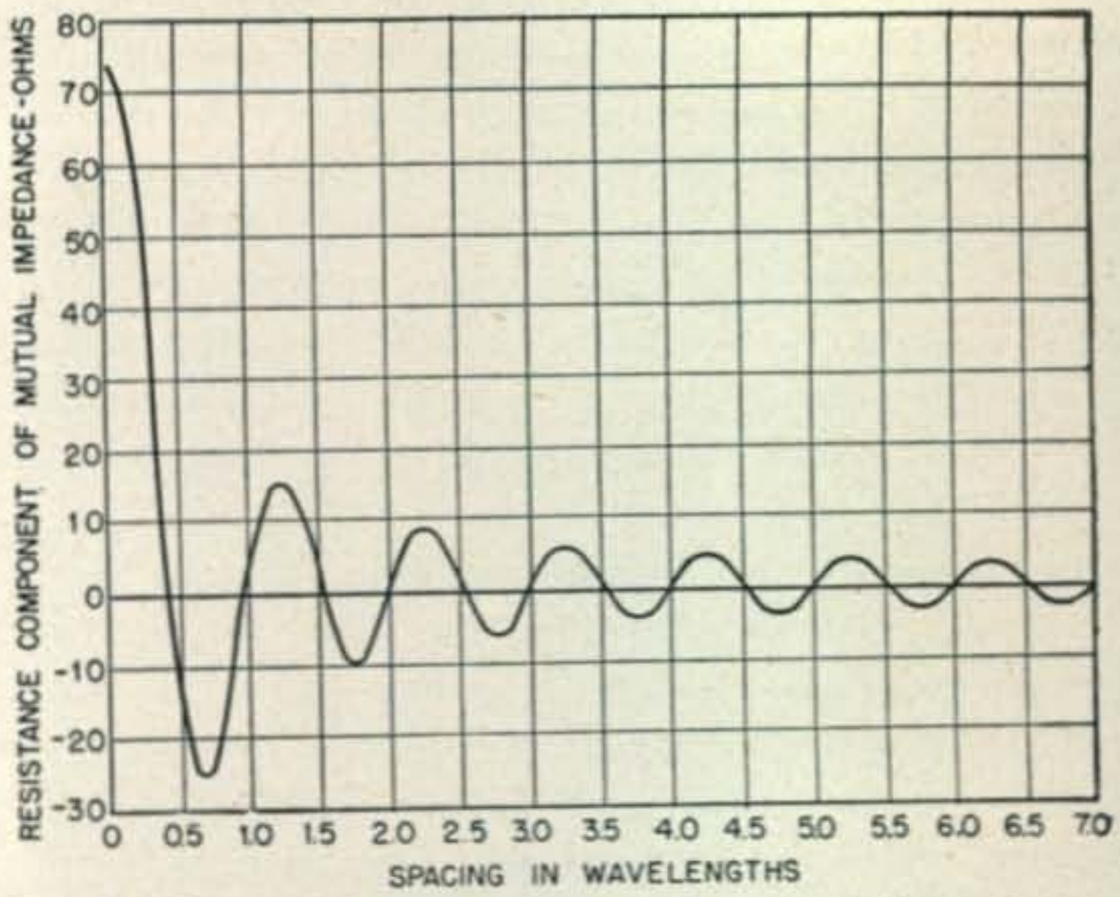


Fig. 2. Resistance component of mutual impedance between two parallel nonstaggered half-wavelength antennas.

[Reproduced by permission from *Radio Engineers' Handbook*, by F. E. Terman, copyrighted 1943 by McGraw-Hill Book Co., Inc.]

RCA Review, October, 1939, page 131, Fig. 21.

element horizontal array with the distance between the stacked elements equal to twice the distance from the radiator to the "ground." The mutual impedance between colinear radiators is less than the mutual impedance between parallel radiators for the same center-to-center distance, so we see why the input resistance of the horizontal radiator in the presence of the earth varies by a greater amount than the input resistance of the vertical radiator. At substantially great heights above the earth the magnitude of the mutual impedance is small and the resistance at the feed point varies much less.

From *Figs. 2* and *3* we can calculate the impedance of a half-wave radiator a given height above ground. Postulating a half-wave horizontal radiator with a center self-impedance of 73 ohms (in free space) 3/10ths wavelength above a perfect ground, we proceed as follows: The image will be spaced 6/10ths wavelength from the radiator. Hence, from *Fig. 2*, the re-

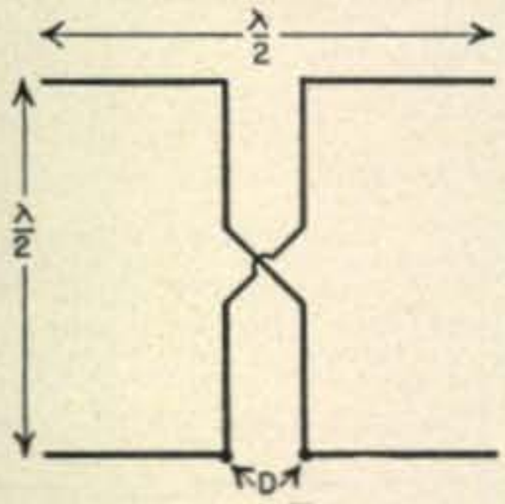


Fig. 4. Half-wave radiator stacked above a half-wave radiator, with the radiators excited in phase, producing approximately 4 db gain in the vertical plane over a single half-wave horizontal antenna in free space.

sistive term of the mutual impedance then will be −25.5 ohms. However, in the case of the horizontal antenna, the current in the image flows in the opposite direction at any instant from that in the radiator. Thus the resistive term of the impedance will be 73 ohms−(−25.5 ohms) = 98.5 ohms. For vertical radiators, *add* the mutual impedance obtained from *Fig. 3* when the radiator is an odd number of half-wavelengths long and *subtract* when the radiator is an even number of half-wavelengths long. We will find later in this paper that the self-impedance of radiators is a function of the ratio of length to diameter of the radiator. Combining the data presented above with the subsequent data on the self-impedance will provide a rather accurate figure on the impedance at the feed point of a half-wave radiator. You will see that the familiar 73-ohm value is quite a bit off!

For 14-mc operation, the maximum usable vertical angles for DX communication are below 20° and probably lie between 10° and 20°. For 28-mc operation, the most effective angles are probably below 12°. For 7-mc communication, angles up to 30° are utilized, however, the low angles (below 20°) are the ones with which the DX is worked.

Figs. 5 A,B,C,D and E and *6* show the vertical plane directional characteristics of horizontal and vertical half-wave radiators for the case of perfectly conducting and typical grounds.

Provided we can get the half-wave horizontal at least a half wave above the ground, note that the horizontal is better than the vertical for typical ground conditions. In fact, we would prefer the one wave high, half-wave horizontal to the half-wave vertical even for perfectly conducting ground.

Concerning vertical directivity, the optimum height for the vertical half-wave antenna is seen to be with the center one quarter wave above ground— with the one end just at ground level, and for the case of the horizontal, enhanced results will be obtained at heights of approximately one wavelength.

The above considerations are for the case of the vertical directivity broadside to the half-wave horizontal antenna, and it should be realized that the low angle radiation off the ends will be substantially down.

The shape of the horizontal pattern of the half-wave horizontal (i.e., the pattern seen by an observer looking down at the antenna) is not affected by height above ground. The intensity of the horizontal pattern at a specific vertical angle is, however, determined by height above ground.

Horizontal Antenna Preferred

We conclude that even if one has a location with few surrounding objects (trees, houses, etc.), with an extremely good conducting soil, and is unable to get the horizontal antenna up to a

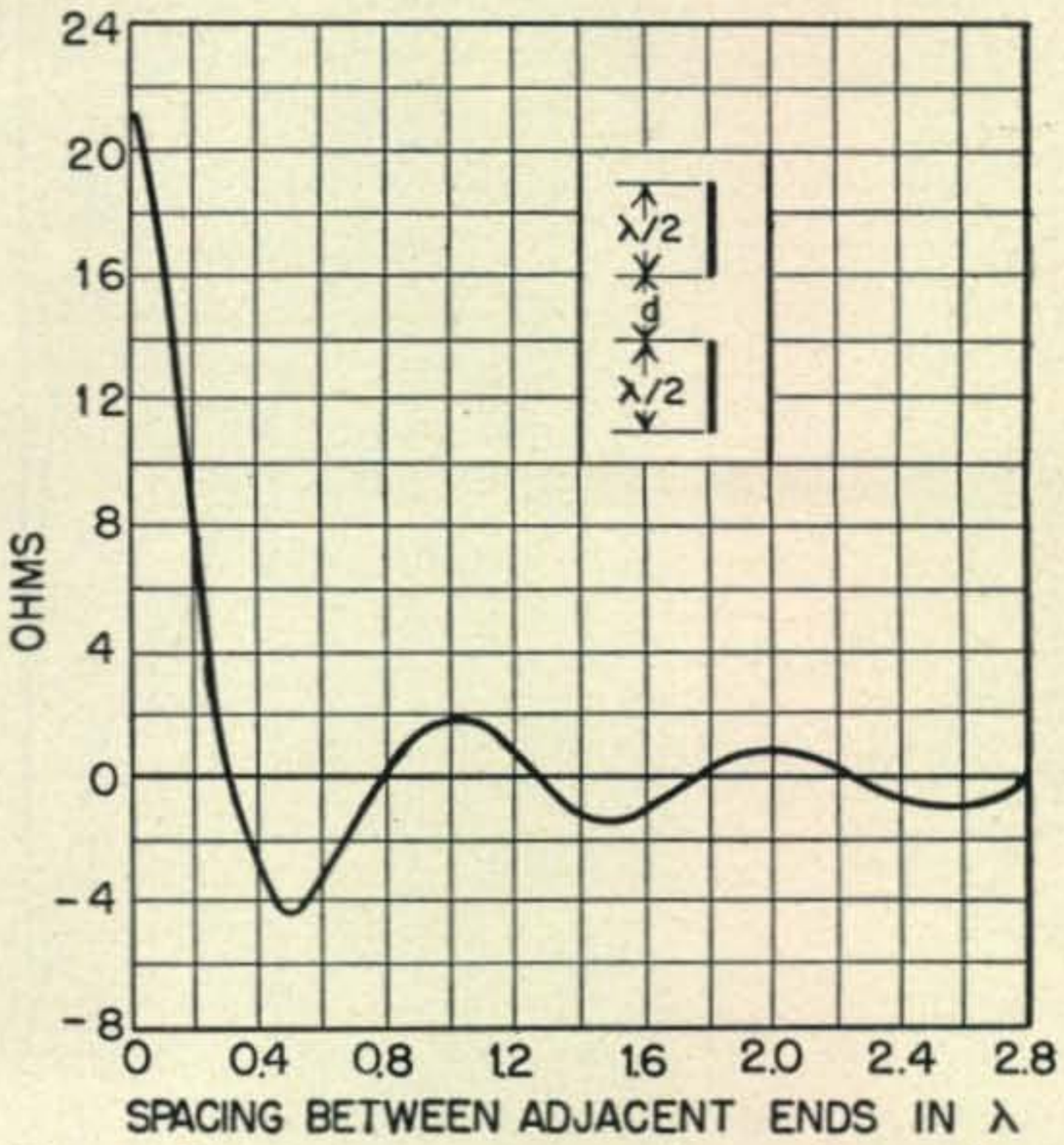


Fig. 3. Resistance component of mutual impedance between two colinear half-wave antennas.

[Reproduced by permission from *Radio Engineers' Handbook*, by F. E. Terman, copyrighted 1943 by McGraw-Hill Book Co., Inc.]

height of the order of one wavelength, nevertheless the horizontal antenna is to be preferred.

Now that we have decided to use a half-wave horizontal radiator placed as high as possible, we shall next consider the radiator itself.

The radiator shall be center-fed, since only in a symmetrical antenna system will the entire system be balanced with respect to ground, and the radiation pattern be symmetrical.

Table 1 shows how the input impedance at the center of the "shortened" half-wave 14.1-mc antenna varies with the ratio of length to thickness, how the end impedance varies and how the percentage that the length of the antenna must be decreased in order to present a resistive impedance increases as the thickness of the antenna is increased.

If we were going to erect a half-wave antenna for 14 mc using No. 12 wire and the antenna were going to be 40 feet high, we would calculate the center impedance in the following manner:

From the table we see that the resistive term of the self-impedance will be 67.85 ohm (neglecting ohmic resistance of the No. 12 copper wire, since it is only of the order of .05 ohms). One wavelength at 14 mc is roughly 70 feet. The actual ground will be approximately one-tenth wavelength below the ground for the case of Long Island soil so the spacing between the radiator

14.1 MC Half-Wave* Dipoles in Free Space

Diameter of radiator in inches	Resistive value of center impedance* in ohms	Resistive value of end impedance* in ohms	% shortened from Half-wave
.064 (#14)	68	4050	2.83
.081 (#12)	67.85	3850	2.87
.102 (#10)	67.75	3700	2.95
.129 (#8)	67.52	3600	3.05
.250	66.95	2850	3.35
.375	66.47	2450	3.55
.500	66.1	2220	3.75
.750	65.5	1875	4.00
1.00	65.15	1725	4.2
1.125	64.9	1625	4.3
1.250	64.75	1560	4.4
1.375	64.6	1500	4.45
1.5	64.4	1440	4.55
1.75	64.1	1340	4.6
2.00	63.85	1260	4.85
2.50	63.35	1140	5.1
3.00	62.9	1045	5.35

*Length of antenna shortened from half-wave value $\left[L_{ft} = \frac{492}{\text{freq. (mc)}}\right]$ to cause reactive term impedance to vanish.

and its image will be $\frac{47}{70}$ x 2—1.34 wavelengths which, from *Figure 2*, means the resistive term of the mutual impedance will be +11 ohms. The

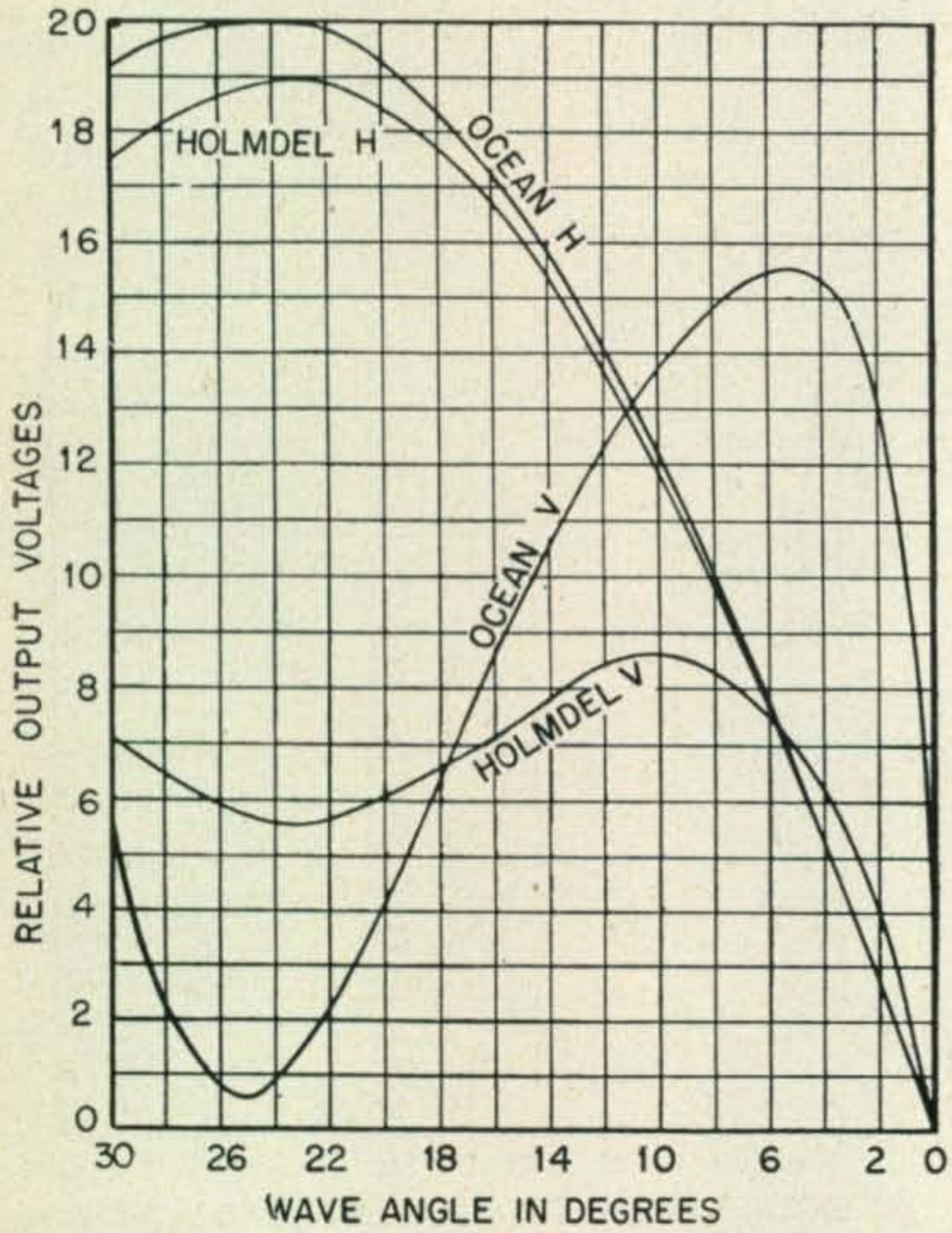


Fig. 5A. Vertical plane directional characteristics of horizontal and vertical doublets elevated 0.6λ for two types of ground (H, horizontal; V, vertical):
A—Holmdel site (farmland) $\Sigma = 2 \times 10^{-13} E = 25$.
B—Ocean site (salt marsh) $\Sigma = 3.3 \times 10^{-11} E = 80$.
[From *Proceedings of the I.R.E.*, April, 1932]

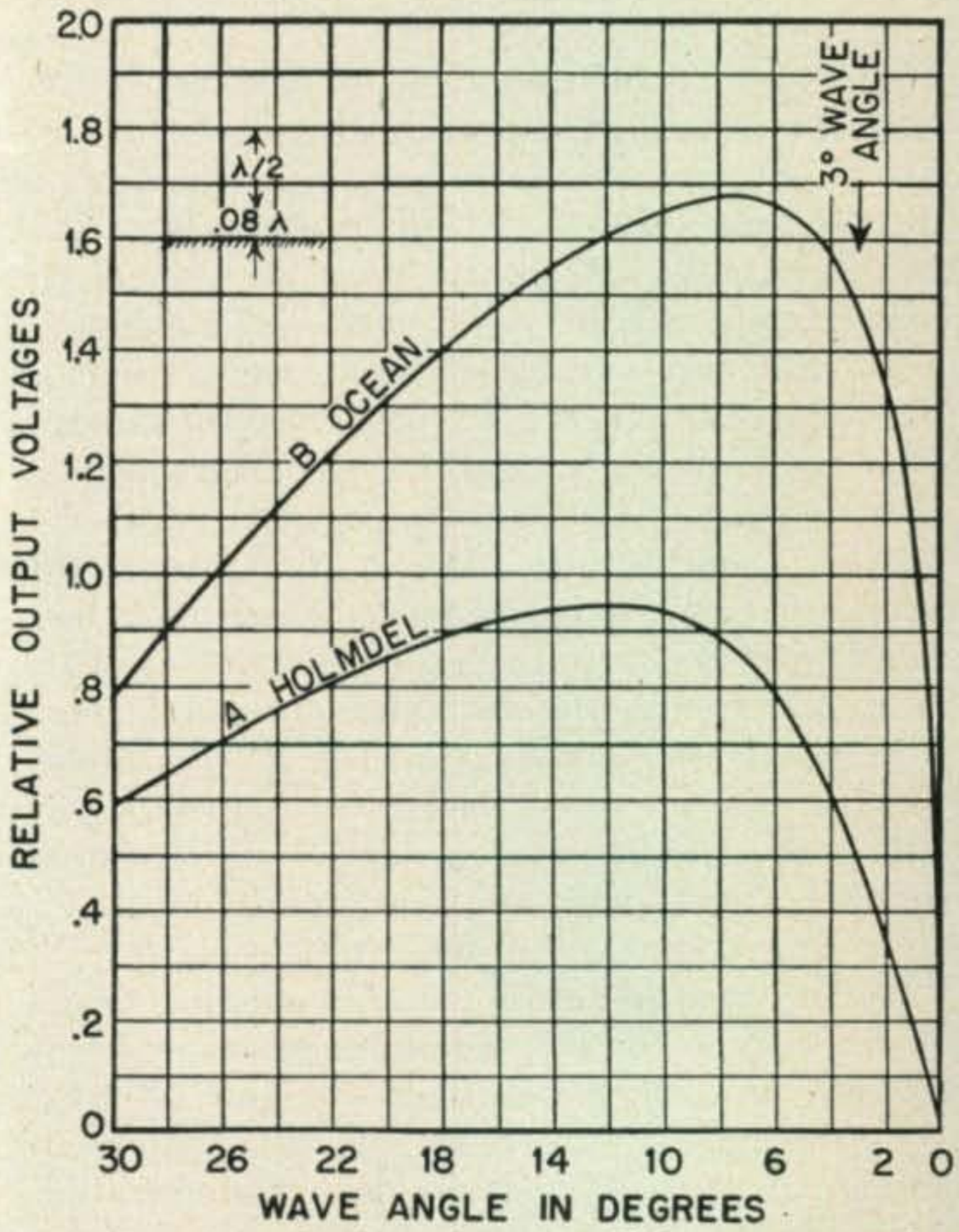


Fig. 5B. Vertical plane directional characteristics of a half-wave vertical antenna for two types of ground:
A—Holmdel farmland ($\Sigma = 2 \times 10^{-13} E = 25$).
B—Salt marsh ($\Sigma = 3.3 \times 10^{-11} E = 80$).
[From *Proceedings of the I.R.E.*, April, 1932]

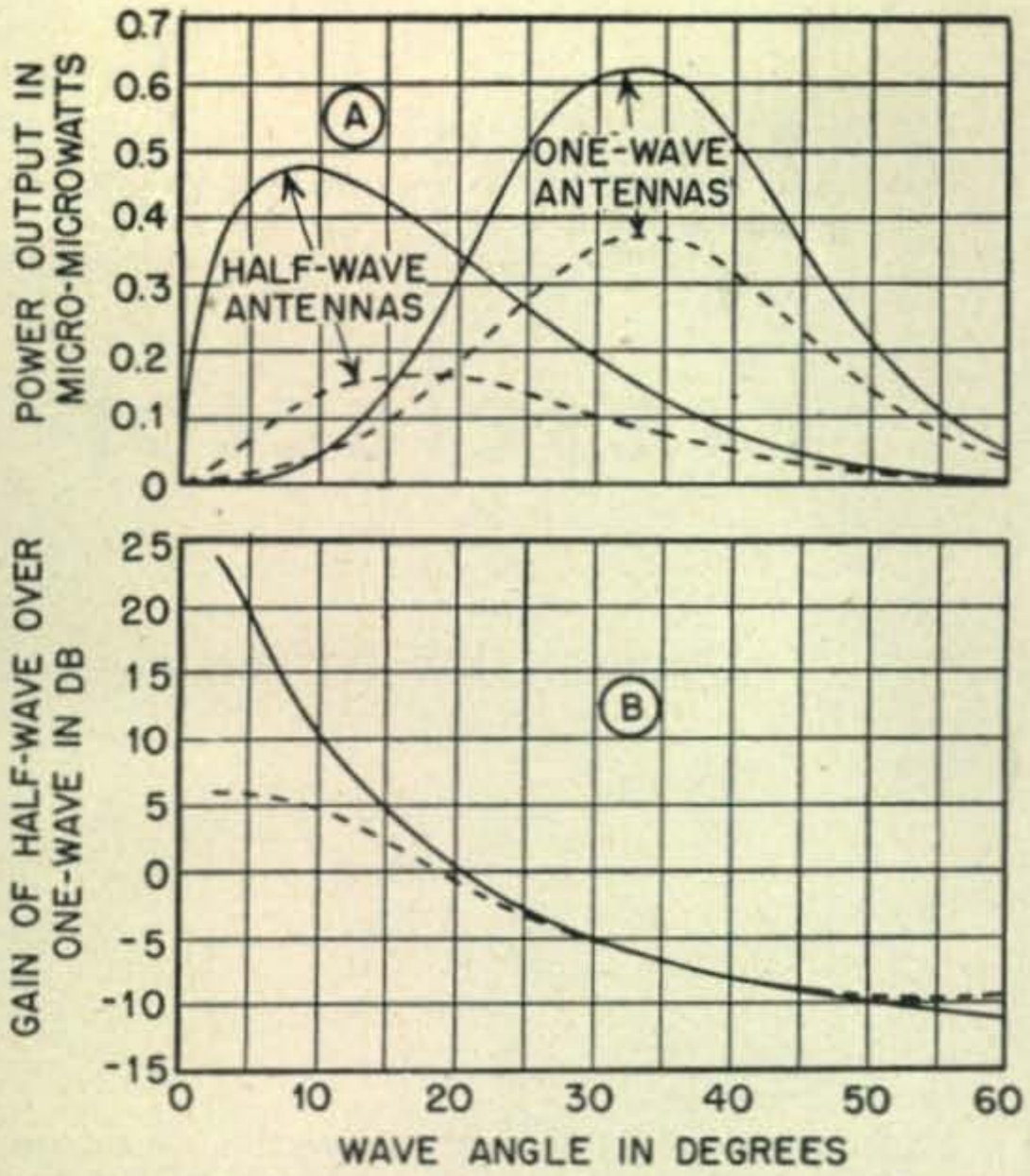


Fig. 5C. A shows vertical directional patterns of half-wave and one-wave vertical antennas. The solid curves are for ocean water (dielectric constant = 80, conductivity = 4×10^{-11} e.m.u.). The broken curves are for Holmdel ground (dielectric constant = 25, conductivity = 1.3×10^{-13} e.m.u.). The wavelength is assumed to be 25 meters and the incident field intensity one microvolt per meter. In B the ratio of power expressed as a gain is plotted for the two types of ground. The angle Δ is measured from the horizontal. The lower ends of the antennas are assumed to be in close proximity to the ground.

[From *Proceedings of the I.R.E.*, Jan., 1934]

impedance at the feed point then will be 67.85-11 = 56.85 ohms. We will obtain an almost perfect match with 52-ohm cable—RG 8/U, and we will have a mismatch with 73-ohm cable—1.3:1 standing wave ratio.

The "Q" or sharpness of a radiator is a function of the ratio of length to thickness—the thicker the radiator, the blunter the resonance becomes (and the lower the input impedance at the center). A worthwhile improvement at the higher frequencies can be obtained by using 1″ elements over the more generally used No. 12 or No. 14 wire.

However, the half-wave antenna is not sufficiently broad at 14 mc with a 1″ diameter conductor to present a purely resistive impedance to the feed system over the entire band.

The Folded Dipole

The folded dipole type of radiator, however, has a much lower "Q" and the resonance is sufficiently blunted to present a resistive impedance over the entire 14–mc band. The principle of the folded dipole is quite simple, and a short discussion of it will dispel some of the mysteries that seem to surround it.

Consider first an antenna of length $\frac{2k+1}{2}$ wavelength where k is zero or any positive integer. This antenna will have a current maximum at the center and for the special case of $k=0$, the input resistance R_{in} will equal 73 ohms when the antenna is a multiple of a quarter-wavelength high, is shortened slightly to eliminate the reactive term, and the cross-section is vanishingly thin with respect to the length. The power radiated, P_r, by the antenna will equal the square of the current, I, times this resistance R_{in}:

$$P_r = I^2 R_{in}$$

(Neglecting the heating loss in the antenna wire itself, which is negligible.) Now if we parallel two half-wave antennas, split and feed one at the center and space them sufficiently close together so as not to alter their coupling to the universe from that of the single antenna, we will make an important change in the input resistance. The current in the parallel elements is in phase, and the radiated power is unchanged from that of the single dipole. Each parallel element carries but half the current of the single dipole—the current in each of the parallel elements is $I/2$. The input resistance at the feed point may be obtained by equating the equal powers:

$$P_r = I^2 R_{in} = \left[\frac{I}{2}\right]^2 R'_{in} = \frac{I^2}{4} R'_{in}$$

[*Continued on page 70*]

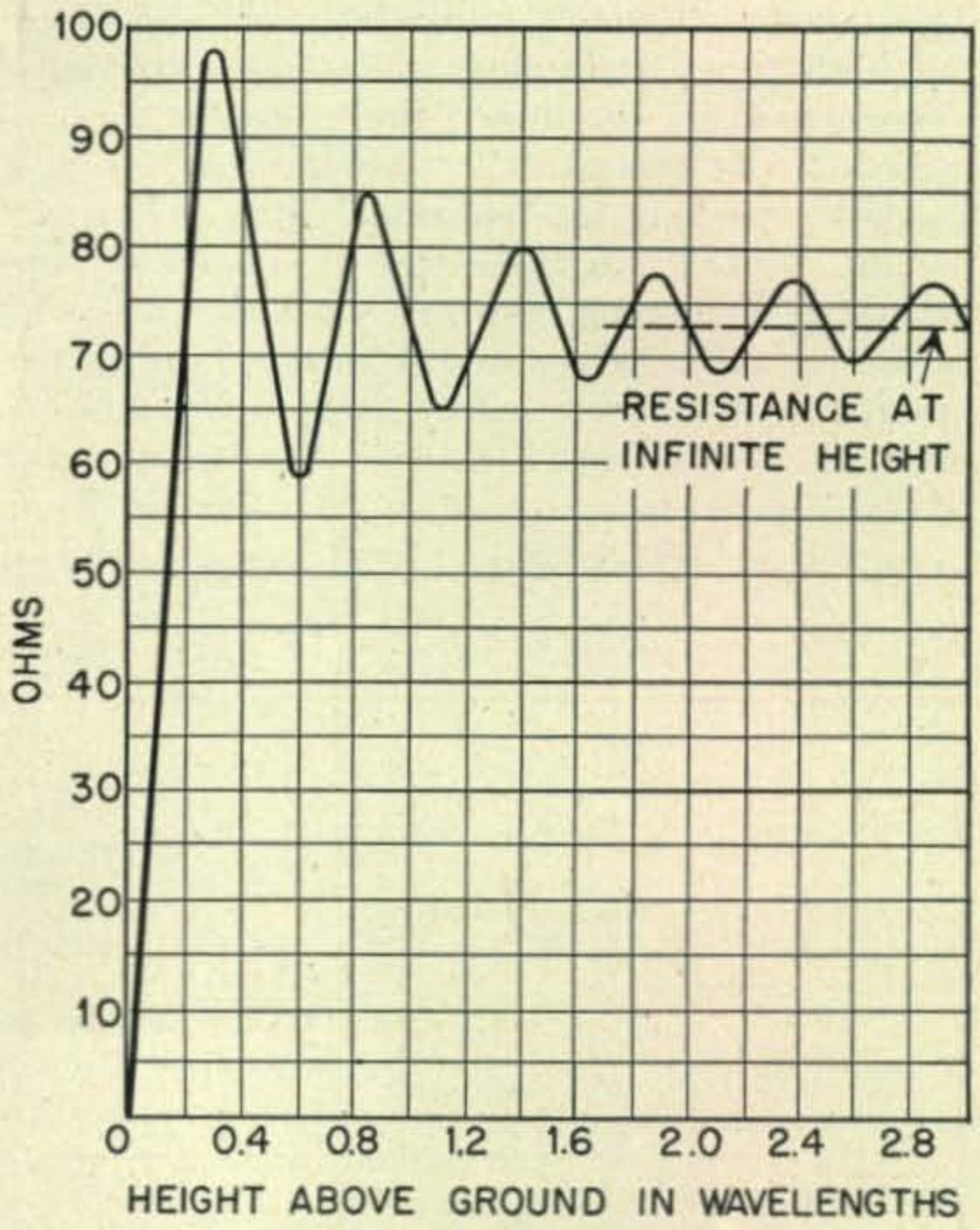
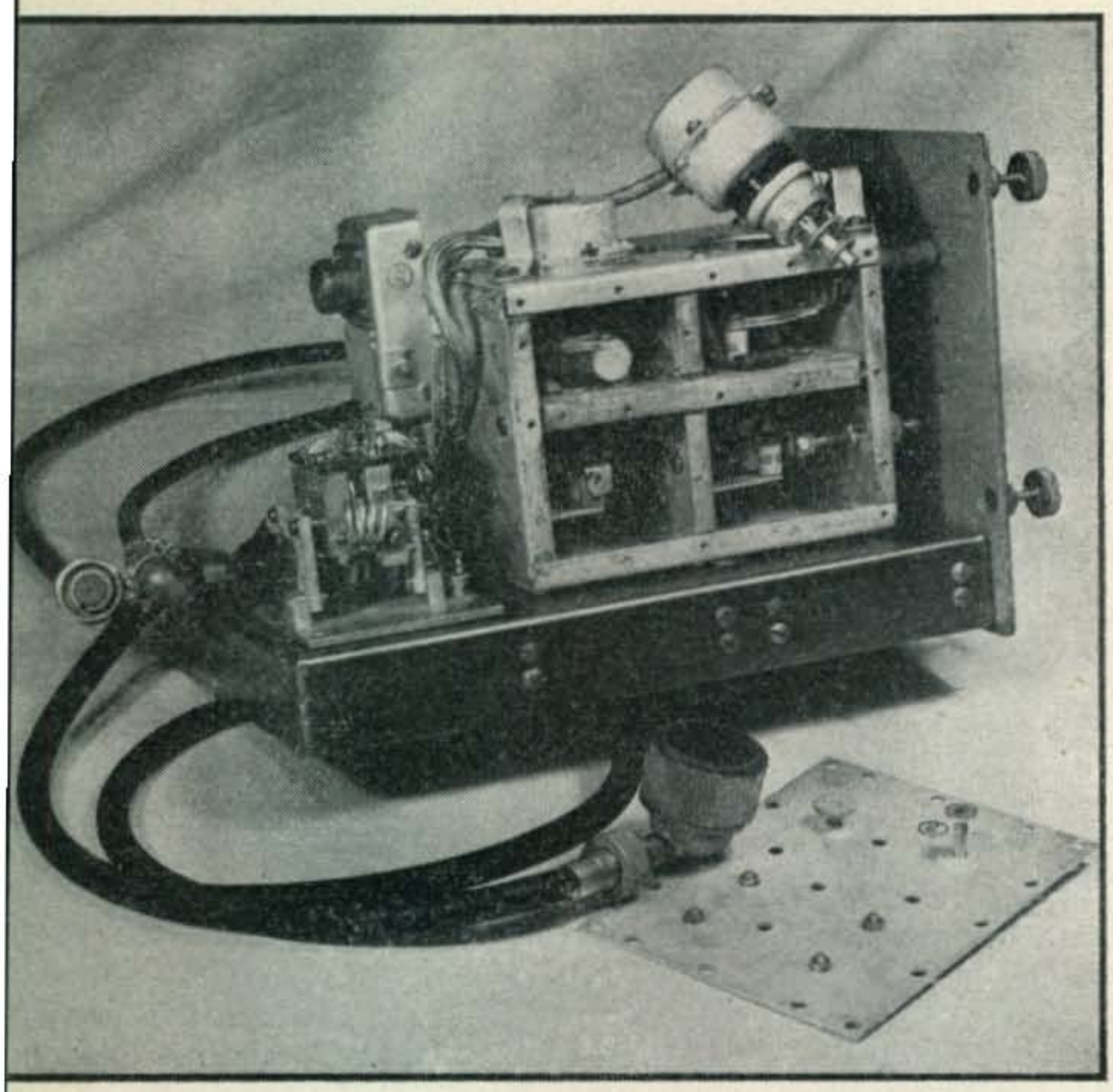


Fig. 5D. Half-wave dipole radiation resistance versus height (perfect ground assumed).

[From *Proceedings of the I.R.E.*, June, 1932]

Lighthouse Preselector

MAURICE GUTMAN, W2VL*



Side view of lighthouse preselector. The Cardwell v-h-f oscillator is mounted for laboratory experiments. Padders on cathodes of lighthouse tubes can be observed in top deck of shield can.

An excellent surplus unit which has recently become available is the "Lighthouse Preselector," manufactured by the General Electric Co. to boost the efficiency of the SCR-602 light-weight, early-warning radar sets. This preamplifier, designated as the BC 1284, is built around two G. E. 446A lighthouse triodes in a grounded-grid circuit. The cathodes and plates of both tubes are tuned and coupled coaxially. When used by the armed forces, power was obtained from the parent radar unit and from a source requiring an additional filter. This accounts for the four Pyranol 4-μf, 600-v filter condensers. Dropping resistors lower the 325 volts from the radar power supply to 140 volts for the plates of the lighthouse tubes. Approximately 20 ma is drawn by the BC 1284. The triodes take 6.3 v and .75 amperes each for their heaters. From the above voltage and current requirements it can be seen that the power supply required is a modest one.

In superhet receivers, the noise produced by the first tube will determine the sensitivity limit. This is why low-noise triodes were chosen over multi-element tubes for this amplifier and also why a grounded-grid amplifier circuit is used to provide stable high gain. The designers claim that the total noise picked up when using this booster will be scarcely more than that picked up by the antenna itself. The over-all gain is from 16 to 20 db. It is important, however, to note that the main consideration is not the over-all gain, but rather the improvment in signal-to-noise ratio. An improvement of from 6 to 10 db in signal-to-noise ratio can be expected when operating with a 144-mc superhet.

When a receiver can stand gain of this magnitude at its front end the improvement will be very worthwhile. The modifications necessary to make this unit operate in the 144-148 mc amateur band

*17 Devon St., Lynbrook, L.I., N.Y.

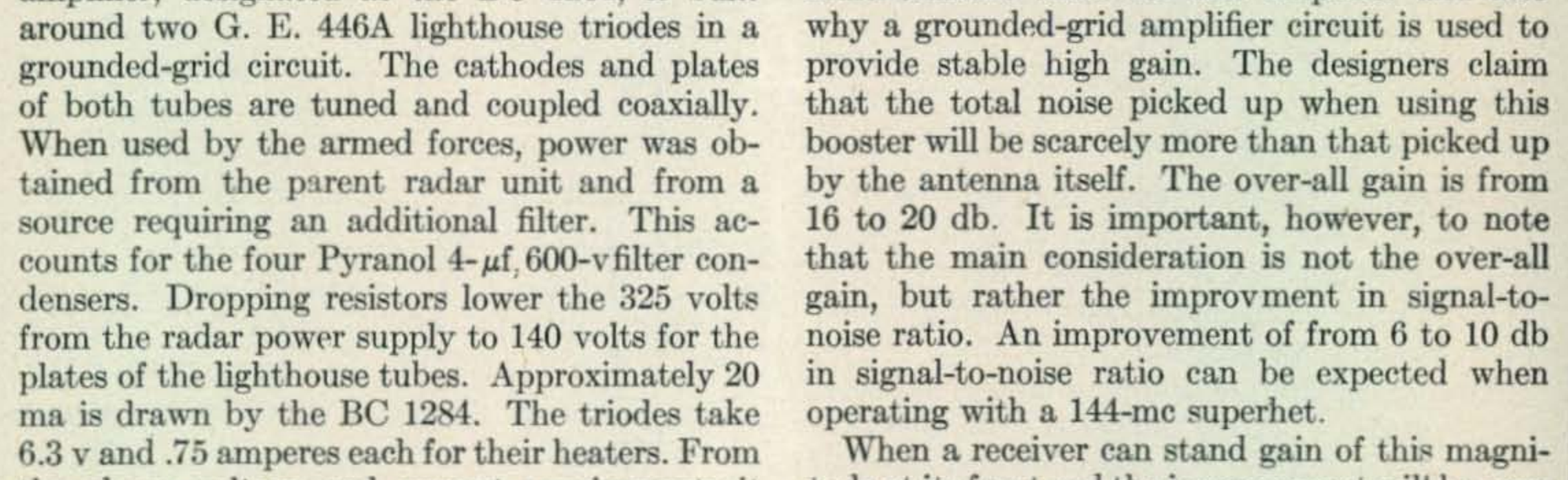
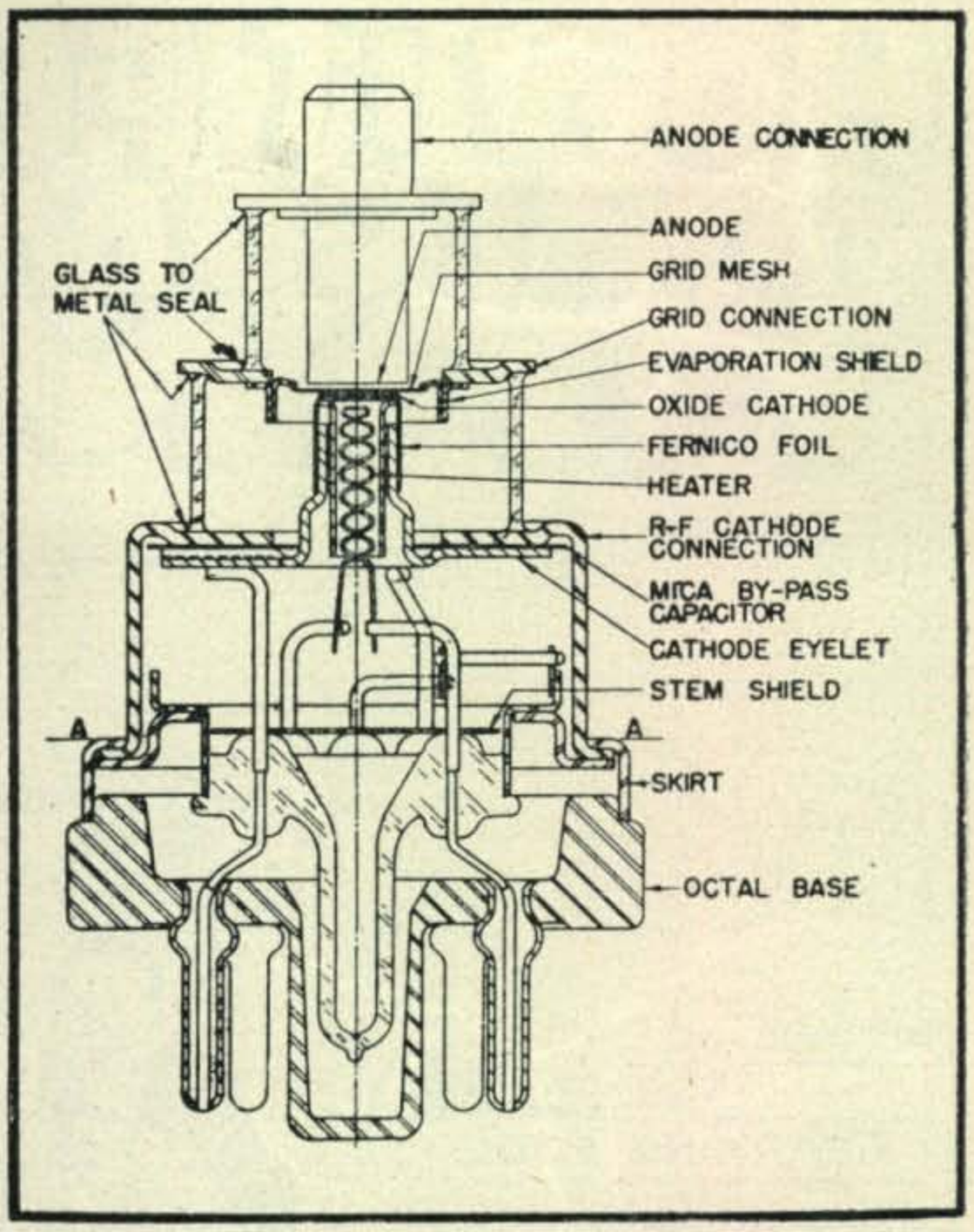


Fig. 1. Circuit diagram of lighthouse preselector. Dotted lines show where 20 $\mu\mu$f fixed ceramic condensers must be added. Coil tap is moved as outlined in text.

are simple and require but ten minutes work to accomplish. The left side of the shield can with its 15 screws must be removed so that a 20-$\mu\mu$f fixed ceramic condenser, may be fastened from the cathode ring on the tube (the top ring) to ground. This must be done on both tubes. The next step is to remove the lead from the variable condenser stator to the silver-plated coils and place the condenser across the full winding. From an inspection of the circuit diagram, *Fig. 1*, it can be seen that the condenser originally had been across only a small part of the plate coil. These minor changes will suffice to bring the frequency up to 144 mc. From there on it is only necessary to tune all circuits to resonance.

If the experimenter desires to use the preselector on 6 or 10 meters he will need to remove the Pyranol condensers from the right side of the shield box. The top of the can is also removed. A word of caution, put all screws back on the can, otherwise the unit is likely to break into oscillation.

With the sides and top removed, coils for the lower frequency bands can be wound and placed within the can. The cathode bracket which now provides the necessary inductance for the cathode circuit would be replaced with a coil. Tests were made with a good two-meter superhet and a microvolter, and the results indicate that the unit provides the gain claimed for it. During the course of the tests it was possible to improve the signal-to-noise ratio by over two-to-one. However, the gain in the receiver should be lowered and the preselector allowed to furnish the necessary gain. It is the intention of the author to experiment with the BC 1284 as a converter for 144 mc by placing an oscillator-mixer on the rear of the chassis with the regular communication receiver furnishing the r-f amplification and audio. The photo shows the unit with a Cardwell oscillator in place. The excellent stability of the Cardwell unit in conjunction with the BC 1284 make possible a fine superhet converter.



Details of typical lighthouse tube, showing construction and component parts. (G.E. 2C40)

New WWV Schedule

The technical radio services broadcast continuously by the National Bureau of Standards, Central Radio Propagation Laboratory, Washington, D. C., have been extended to include four additional radio carrier frequencies (20, 25, 30 and 35 megacycles). The accuracy of standard frequencies as broadcast has been increased fivefold; it is now better than a part in 50,000,000.

A total of eight radio frequencies (2.5, 5, 10, 15, 20, 25, 30 and 35 mc) are now given. Seven or more transmitters are on the air at all times, day and night. This insures reliable coverage of the United States and extensive coverage of other parts of the world. Vertical non-directional antennas are used.

The services are: (1) standard radio frequencies, (2) time announcements, (3) standard time intervals, (4) standard audio frequencies, (5) standard musical pitch, 440 cycles per second, corresponding to A above middle C, (6) radio propagation disturbance warning notices. All of the frequencies are useful for field intensity recording by persons interested in studies of radio propagation. The four highest frequencies are broadcast particularly for this purpose. The radio frequencies and other data are:

Radio frequency megacycles per second	Time broadcast EST	Power output kilowatts	Audio frequency cycles per second
2.5	7:00 P.M. to 9:00 A.M.	1.	440
5	7:00 P.M. to 7:00 A.M.	10.	440
5	7:00 A.M. to 7:00 P.M.	10.	440 and 4000
10	continuously	10.	440 and 4000
15	continuously	10.	440 and 4000
20	continuously	0.1	440 and 4000
25	continuously	0.1	440 and 4000
30	continuously	0.1	440
35	continuously	0.1	440

The station call letters (WWV) and other announcements in voice are given each hour and half hour.

Information on how to receive and utilize the services is given in the Bureau's Letter Circular, "Methods of using standard frequencies broadcast by radio," obtainable on request. The Bureau welcomes reports on reception, method of use, or special applications of the service, particularly with reference to the higher frequencies.

HOW IT FEELS TO BECOME A HAM!

BY W2EA* EX-8EA

READING AND STUDYING ALL THE RADIO BOOKS PUBLISHED

LEARNING CODE

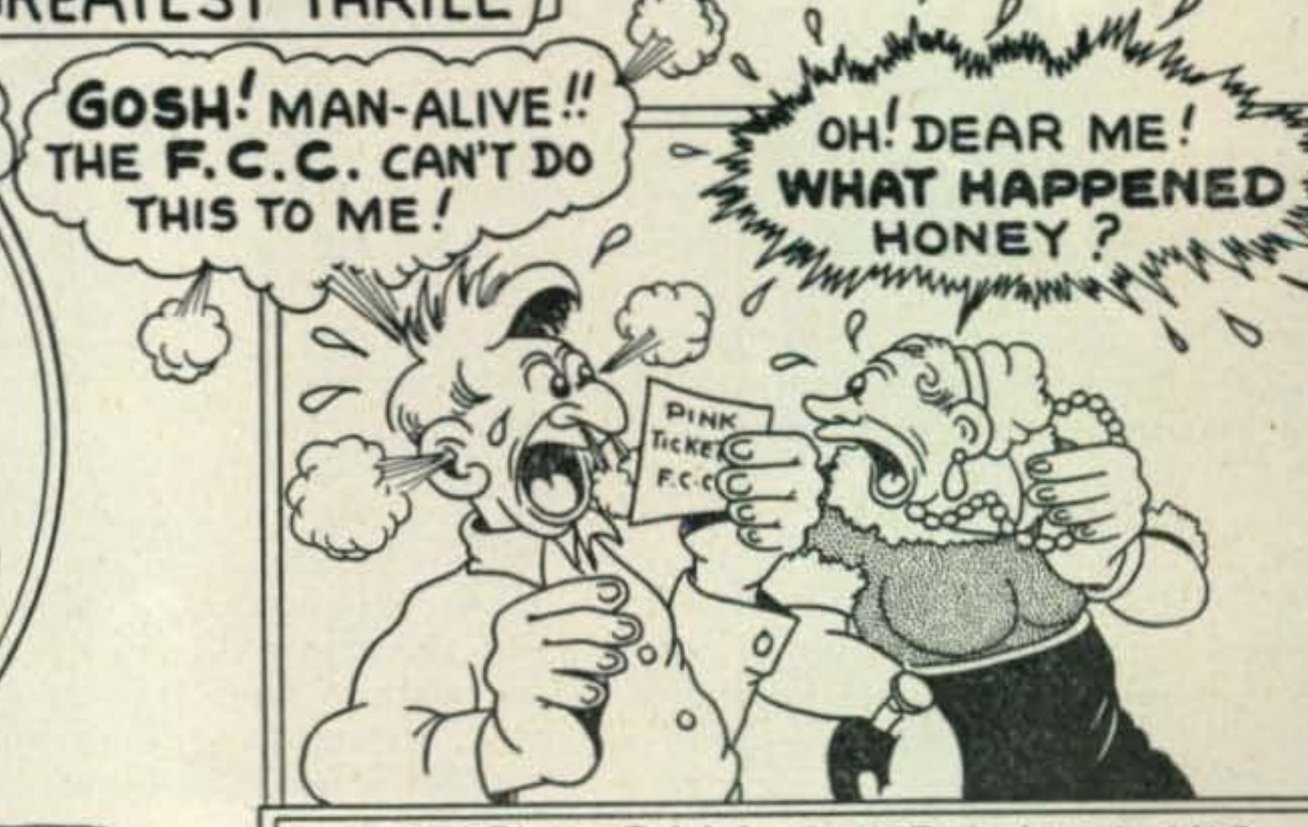
BUYING RADIO PARTS

TAKING YOUR WRITTEN TEST & DIAGRAMS (OVER 3 HOURS)

PUTTING UP THE SKY WIRE

HIS GREATEST THRILL

SHOWING OFF YOUR DX QSL CARDS TO A FRIEND WHO KNOWS NOTHING ABOUT HAM RADIO



UNCLE SAM SENDS HIM HIS FIRST PINK TICKET FOR BEING OUT OF THE BAND 987 K.C.
(THE FINAL MUST HAVE "TAKEN OFF"!)

Staff Cartoonist, Harrison Radio Corp., 11 W. Broadway, N. Y. 7

Monthly DX Predictions - - MARCH

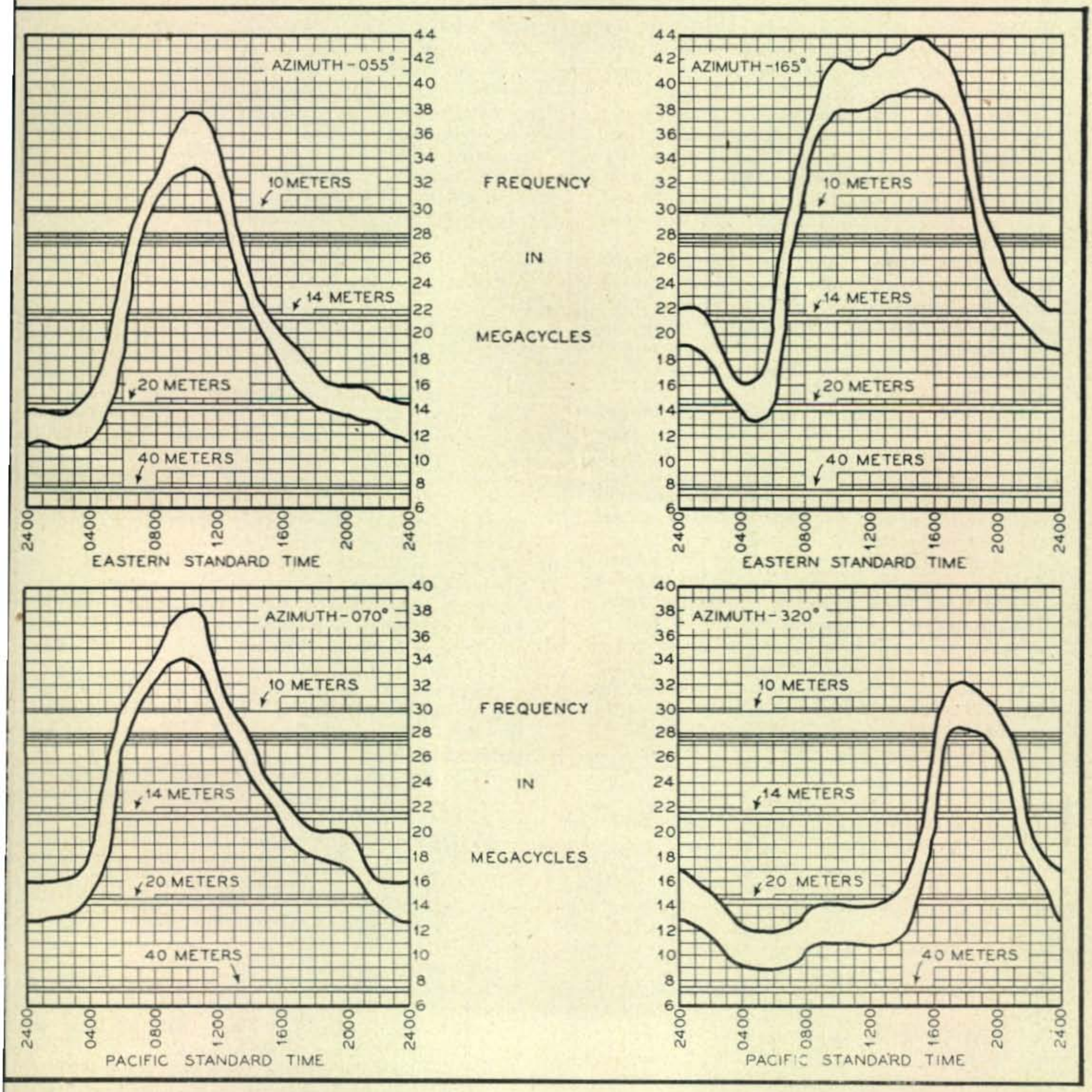
OLIVER PERRY FERRELL*

PEAK MUF AND peak DX conditions for the first part of the year generally occur during the first few weeks of March. This year there are good indications that the MUF trend will equal and possibly surpass the peak of last November. DX openings, however, will probably be rather spotty as this is also considered the season of severe ionosphere storms and disturbances. After the middle of March there will be a noticeable shifting of the skip. The DX in the northern reaches of this hemisphere will start fading out much sooner or will not be heard at all. On 10 meters particularly, the South Africans and the Australasians will be heard and worked with much better signals. The South Americans will also be very strong, holding up in signal strength over long periods of time.

The graph in *Fig. 1* illustrates the predicted MUF (maximum usable frequency) and the OWF (optimum working frequency) for those stations in the eastern portion of the United States working into the Mediterranean and near eastern areas. The Eastern Standard Time values are indicated by the

*Assistant Editor

[Continued on page 73]



March 1947 average propagation conditions. Fig. 1. (top, left). Eastern United States to Mediterranean areas. Fig. 2. (top, right). Eastern half of the United States to South America. Fig. 3. (bottom, left). Western half of the United States to Central and South Africa. Fig. 4. (bottom, right). Western half of the United States to Malay States, Burma, Southern China and Eastern India.

CQ DX

By HERB BECKER, W6QD

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

ZONE AND COUNTRY HONOR ROLL

To enter the Honor Roll it will be necessary to submit a list of Zones and countries worked. We are not asking you to send in your confirmations but suggest you do not count any Zone or country until you are sure the station is genuine. We reserve the right to exclude any stations on your lists which are known to be pirates. We will, however, require confirmations from those who are eligible for the W.A.Z. certificate.

Your Zone and country lists, both "postwar" and "all-time", must be compiled in accordance with the new postwar Official Country List. It is recognized that some of the old-timers will lose a country or two, e.g., Danzig, Saar, etc., but this should be offset by numerous additions now in the new country list.

Sequence in the Honor Roll will be determined by the number of postwar Zones worked. After the zone total will be the number of postwar countries worked. We will then show, on the same line, the "all-time" totals of zones and countries. No one can enter the Honor Roll with "pre-war" totals only.

The "C.W. and Phone" portion of the Honor Roll will contain the totals of those who operate both, while the "phone" column will contain totals of "Phone-to-Phone" only contacts.

Once your totals are entered and additional zones and countries are worked, simply submit the information on the new ones.

In order to facilitate our handling of the compilation of the Honor Roll we would like the lists from all to be somewhat standard in form. The information we require: (1) Call of Station worked, (2) country or (Zone), (3) date, (4) time.

In addition to this it will help to number the countries and zones so that totals may be easily recorded.

THE NEW Official Country List published in the February issue should be taking hold about this time. By that, I mean, it should give you fellows something definite to bite your teeth into and pin down your countries, once and for all; the same thing goes for zones. Just as soon as we get enough lists of your zones and countries, we are going to start printing them. In order to enter the Honor Roll of zones and countries it is only necessary to follow the steps outlined in the box at the head of the column.

In order to help us out at this end, whenever possible, we would like to have the lists typewritten. (No, we're not choosy . . . . just lazy!) Since you will have a nice alphabetical list of countries to use, it might be well to send in your lists in that order. As for the zones, I have noticed, over a period of years, most of the fellows number the zones down the page from one to forty, and then, opposite each zone, put the call letters of the station worked, followed by the date and time. This will give us a good master list, and as new zones are worked, we will simply put them in on your original list. On your alphabetical list of countries, we would like to have you show the country first, followed by call letters of the station, date and time.

I would like to call your attention to the totals of zones which we have written up in previous issues of *CQ*, as well as further on in this column. These totals have all been copied from contributions from you fellows, but with the advent of the official country list, it might be necessary for many of you to revise your count. The complete lists of zones and countries, which we now have on hand, will be checked against the Country List. The correct totals then will be shown in the Honor Roll, as soon as complied. To you fellows who have been sending in only the total zones and countries worked, please take a few moments, and make a complete list. This will be necessary in order to qualify for the Honor Roll.

Many of you will be right in the middle of the first post war DX contest when you read this stuff, and your poor ol' DX Ed wishes he only hand more time, during the past few months, to get set up to do some plain and fancy key punching with you, or, maybe, it would be again' you. But—after winding up this column I've gotta make a rather fast trip east getting back the week *after* the first week-end of the contest. 'Taint fair! As it looks today, the three element rotary will just about be completed when the contest ends.

It looks as though we have lost a good W9 in the person of W9VKF. He has joined the gang at ARRL and will soon become a W1. Pete's all time record of zones and countries stood at 35 and 106. The maximum power input at W9VKF was 100 watts. Good luck, Pete.

W2IYO is up to 39 zones and 90 countries post-war, with all time total of 39 and 144. WØSQO and WØMKF both work for Collins Radio in Cedar Rapids and have a little private phone race of their own. At present, they are tied with 30 zones and 57 countries post-war. Both are using 3 element beams on 20 and run 300 to 400 watts input.

W2IOP apparently has time enough between issues to work a little DX of his own, as well as snoop around for some gossip for me. Larry is a man after my own heart. He says, "Gosh, why don't the guys get up on 40? There's literally hundreds of DX stations on the band . . . never heard anything like it." Well, there it is fellows. And many of you will remember the old DX column plugging "Life begins on 40." A lot of fun can be had on the band, and I am sure, with all those stations Larry is hearing, if we get enough Ws chasing them, there will be a little more DX worked on this band. W2IOP isn't through yet . . . he is still bubbling over. He was so enthused with 40 c.w., he decided to take a crack at 10 c.w., and proceeded to work Europeans like Ws. But he says, "It's an entirely different brand of stuff." Larry also says

Be sure you're right

with the

HAMMARLUND FS·135·C

FREQUENCY STANDARD

Connect up the FS-135-C in your receiver and you have a first-class frequency meter all set to go. You will have the satisfaction of knowing you are obeying F.C.C. rules and you'll get accurate signals every 100 KC's to mark the band edges or make any other checks you want.

You will find the FS-135-C is a cinch to connect and it's so small it fits in any receiver. The ingenious circuit and a special crystal permit variation of the crystal frequency for zero beating with WWV. Once this adjustment is made you practically have a WWV junior built right in your receiver.

See the FS·135·C at your dealer's

HAMMARLUND

THE SIGN OF QUALITY — ESTABLISHED 1910

THE HAMMARLUND MFG. CO., INC., 460 W. 34TH ST., NEW YORK 1, N.Y.

MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT

See these offered by the REMARKABLE SAVINGS RADIO SHACK

***Famous for fair dealing with radio amateurs for more than twenty years.**

BC-348 RECEIVER

Acclaimed the best military receiver for amateur use, this easy-handling set covers six band-switched ranges from 200 kc to 18 mc (less BC band), with constant sensitivity on all bands. Has Xtal filter, AVC, MVC, BFO, automatic noise compensator, temperature-compensated oscillator; output at 300 or 400 ohms; vernier tuning on all bands. Furnished with built-in dynamotor, full set of tubes, and details of conversion to 110v. a-c.

Complete a-c conversion kit for BC-348.....$6.50

Gon-Set 10-11 Meter Converter

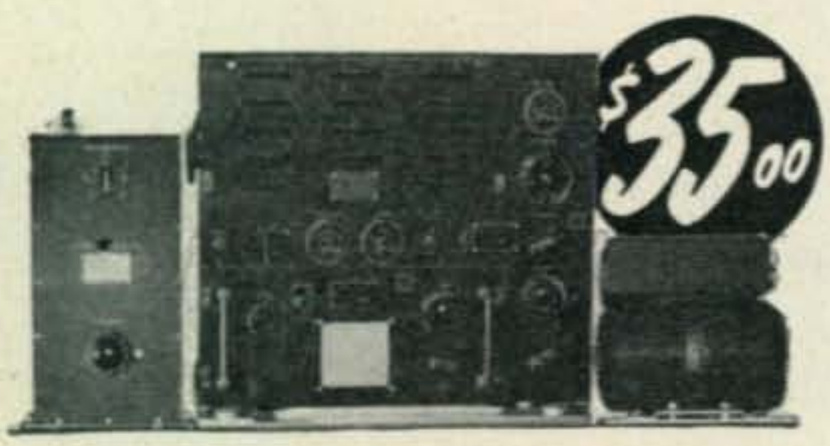
Ideal for use with BC-348. Supplied with full set of tubes.

$39.95

SCR-522 VHF XMTR-RCVR for all-purpose work at 100-156 MC

So good it was standard equipment on all AAF and RAF planes, this set is now yours at but a small fraction of its original cost. Ten-tube crystal-controlled superhet has 3-microvolt sensitivity at 10 mw output. Seven-tube temperature-stabilized xmtr delivers 15 watts. Remote control box gives push-button tuning on four crystal-controlled send-receive channels. Dynamotor (28-volt d-c) powers entire rig. Furnished with all tubes, plugs, and detailed dope on conversion to 110-volt a-c operation. Condition — like new. Weight —about 100 lbs.

AAF XMTR BC-375-E



For a real bargain, you can't beat these used, but in A-1 shape, BC-375's. Furnished complete with five tubes, seven tuning units covering 200 kc to 12 mc (less BC band); antenna tuning unit BC-306-A with variometer and tap switch, dynamotor PE-73-C with relay, fuses, and filter. For detailed description of this 200-pound bargain, see our Feb. QST adv.

PE-103 DYNAMOTOR New Lot, only $9.00

Brand new, in original Signal Corps packing; delivers 160 mils at 500 volts; operates from 6 or 12 volts d-c; complete shock-mounted assembly includes breakers, switches, relays, filters, and cables.

STANDARD RECEIVERS

HALLICRAFTERS

S-38 complete	$39.50
S-40 complete	89.50
SX-42	250.00

NATIONAL

HRO-5TA-1 complete	306.71
NC-240D with speaker	241.44
NC-46 with speaker	107.40
1-10A with tubes, less speaker and power supply	67.50

HAMMARLUND

HQ-129X complete	173.25
SP-400X complete	342.00

RME

RME-45 complete	198.70
RME-84 complete	98.70

PANADAPTER

Complete	99.75

and the entire line of COLLINS EQUIPMENT

Check RADIO SHACK first for RELIABLE SURPLUS Values

***The one and only original RADIO SHACK is located in Boston and has no branches or affiliates elsewhere.**

BUYS in TUBES

872A		$2.25	304-TH	Eimac	$9.95
807	West'hse	1.05	809		1.79
811		1.95	810		2.59
813		6.75	814		4.50
211	GE	4.95	826		2.25
829B		3.94	832A		4.05
829B	socket	.69	931A		1.88
			2AP1		2.25

FREQUENCY STANDARD BC-221

This stable, heterodyne frequency meter checks up to 5th harmonic on most receivers and up to the 125th on the better ones. Fundamental ranges are 125-250 and 2000-4000 kc; stability is better than .005%; instrument works on 110 v.a.c., on vibrapack, or on batteries. You can use it for a signal generator or make it into a VFO that's a humdinger. It's complete with tubes, original crystal and calibration charts. Hardly to be told from new, this is one of the finest instruments we've yet been able to bring you from surplus stocks — it's a value you can't afford to miss. Order today!!

SCR-274-N COMMAND SET

This remarkable assortment of gear — with parts alone worth far more than our entire selling price — gives you

- 3 RCVRS — 190-550 kc; 3-6 and 6-9.1 mc
- 2 XMTRS — 3-4 mc; 4-5.3 mc
- 4 DYNAMOTORS — 28-v. d-c input
- 1 MODULATOR — carbon mike input
- 2 TUNING CONTROL BOXES
- 1 ANTENNA COUPLING BOX with r-f ammeter, antenna relay, and 5000-volt, 50 mmfd. WE vacuum condenser
- 29 TUBES — a complete set for each unit

Our extremely low price is possible because the equipment is slightly used — but it's in first class shape ready to give you years of service. DON'T MISS THIS BARGAIN IN USABLE GEAR!

XMTG CAPACITORS

Nationally known, high-voltage, oil xmtg capacitors, all in rectangular cases, with stand-off insulators.

Mfd.	Volts d-c	Net Ea.	Mfd.	Volts d-c	Net Ea.
4	600	$0.71	2	1500	$1.20
6	600	.79	4	1500	1.59
8	600	1.19	6	1500	1.79
10	600	1.29	2	2000	2.95
2	1000	.71	8	2000	3.75
4	1000	1.19	2	2500	3.25
8	1000	1.49	2	3000	3.45
10	1000	1.79	4	3000	4.25
			2	4000	4.95

SEE OUR ADVERTISEMENT IN FEBRUARY QST FOR DETAILED DATA ON ALL THESE AMAZING VALUES

Speed delivery and save C.O.D. charges — send full amount with order; 50% deposit required on all C.O.D. orders.

The RADIO SHACK
167-B WASHINGTON ST.,
BOSTON, MASS., U.S.A.

that W2GWE is knocking them off regularly, and has about 150 post-war. W1FH has around 150, and W1CH 151, while W2IOP, himself, has 95. Right here and now, how about you guys sending in your lists? All we hear is "grape vine" stuff. In winding up the donation from ye Editor, he says FF8FP is closing down shortly, as Pan American is folding up the base in Dakar. So, boys, it's now or never. The same might hold true for FF8WN.

W8HYC sends in a nicely typed list of zones and countries, all done on 14 and 28-mc c.w. His post-war totals are 38 and 112, which is nice going. W6LER, likewise, sends a well typed list of 36 and 80 post-war, and 37 and 104 all time. W6LER gives with a few QTHs:

XZ2KM, 379 Dalhousie Street, Rangoon.

VO6K, USCG Loran Radio Stn. Battle Harbor, Labrador, Navy No. 228 FPO, N. Y.

VQ3HJP, P. O. Dar es Salaam.

VU2KP, Asm Leach, No. 4 IEG Training Centre, Kirkee, India.

ZK1AA, Rarotonga, Cook Islands

ST2AM, RAF Station, Khartoun, Anglo-Egyptian Sudan

UI8AA, Box 88, Moscow

Gordon is doing some nice work, and all of it has been done on 14 mc c.w. He uses a 4 element rotary, a pair of 250THs in the final, the receiver being an AR-88. Oh, yes, another thing he brings up is that there are a couple of stations on Libya . . . one English, and one American. The first signs T1NS, while the latter signs TR1P. This dope was gathered through W6VKV/I6.

W1NKW would just as soon see the DX stations listed by band instead of frequency, since it appears that a majority of them use v.f.o., and are seldom on the same frequency two days in a row. He is all for us listing as many QTHs as possible, providing, of course, they are not in the current Call Book. The same feeling is expressed by W3LFR, who is ex-W8AYG. During the past two months, Doc has worked 27 countries on 5 continents using 20 meter phone. How about the zones?

W9AIO has been working a little 20 phone employing the use of one of these new little narrow band FM exciters. Now don't go and raise the eyebrows, because Royal is making special tests with permission from the FCC. He also pounds brass once in a while. New ones for him are: XZ2KM and VQ3HJP. I believe he is running a kw into a pair of 4-250As.

W5MY keeps telling me he isn't much of a DX man, and his receiver isn't working very well, and then proceeds to tell me about working UA1KBA, KA1ZU, CR9AN, VQ8AD, VU2FM, VS1BX, and HZ1AB. Doc takes issue with a crack I made in the December column about the name of UA1KBA being "Soya." He said he has a card to prove that that isn't right . . . it is "Nina," and adds, "If I too may be a bit corny, it is like "nine o'clock," which was the time I worked her." Now, I will expect to hear of someone else getting a card from her with still a different name. This probably could turn into quite a long winded session. Probably of more importance to all of you is the QTH of HZ1AB. It is John Anderson, APO 788, % P.M. New York City. No, W5MY isn't a DX man . . . he's just working a few of these "locals" for the deuce of it.

W2SKV kicks through with a little info about FA8US. It seems that he is in Algeria, and is temporarily bootlegging but expects to get a call very shortly. In the mean time W2SKV will forward QSLs. He also lists a couple of QTH's:

OX3GE, APO 55, % P. M. New York City.

VE8MI, R. D. Lang, Negus Mines, Ltd., Yellow Knife, NWT, Canada.

W9VND/2 wants to know if we require lists of zones and countries, or should he just write in saying he worked 36Z and 89C. I believe the answer is up at the front of the column, and at this point, I might add, if any of you fellows previously sent in only totals, it will be necessary to send complete lists to enter the Honor Roll. Before leaving the W9s, Ozzie had 33 zones and 76 countries post war. W9KA wants to know if anybody can help him get a card from YT6MEN whom he worked some years ago. W9RBI is up to 66 countries on phone and 82 total.

G6QX has just completed a 3 element rotary a la W8LO, as described in the June issue. This array will be used on 10 and 5. Bob has worked 22 countries on the 3.5 mc band, and a total of 40 for post-war. As he says, if he once gets over his constructional urge, he will get back to operating and boost his totals.

KP4KD worked OX5JJ in Zone 40 on 20 c.w., this being a new all time country for him. A new post-war country was snagged with he worked YR5V. Ev gives with a few QTHs.

VQ2HC, Box 27, Kitwe, Northern Rhodesia

VS1BX, P.O. Tel. Thorne, PO's Mess, RN Air Station, Sembawang, Singapore

ZD4AB, Box 100, Koforidua, Gold Coast

EK1AA, British P.O. Box 57, Tangier Zone, Morocco.

FF8WN, W. T. Moore, % PAA, APO 194 % P. M. New York City

W1GKK worked EK1ND who told him he was starting the A.R.S.T. "Amateur Radio Society Tangier." His QTH is Milton Ramsey, Hotel Tangeria, Tangier, Africa. Other QTH's from W1GKK, who, incidentally, is up to 67 post-war countries on 20 phone, are:

ZB1AD, Signals Officer, R.A.F., Luga, Malta

J5AAA, 24 Division Sig. Co., APO 24, % PM San Francisco, Calif.

W6ONP/KW6, Pan American Airways, Wake Island

J3HRP, APO 301, % PM San Francisco, Calif.

J2AAO, APO 925, % PM San Francisco, Calif.

It is good to hear from Ren Collins, He is now W3KDP, ex-W8EUY. I met Ren early in the war at RNL, and he is still there. He bought a house back there but doesn't have enough room for rhombics, so he is going to use a couple of rotaries on 10 and 20. His post-war countries now total 55. WØAZT of Denver is up to 22 zones and 38 countries post-war. Cliff also lists a couple of QTHs:

OX3BC, Thule, Greenland—QSL to John Ciagannek, 3621 S. 14th Street, Arlington, Virginia

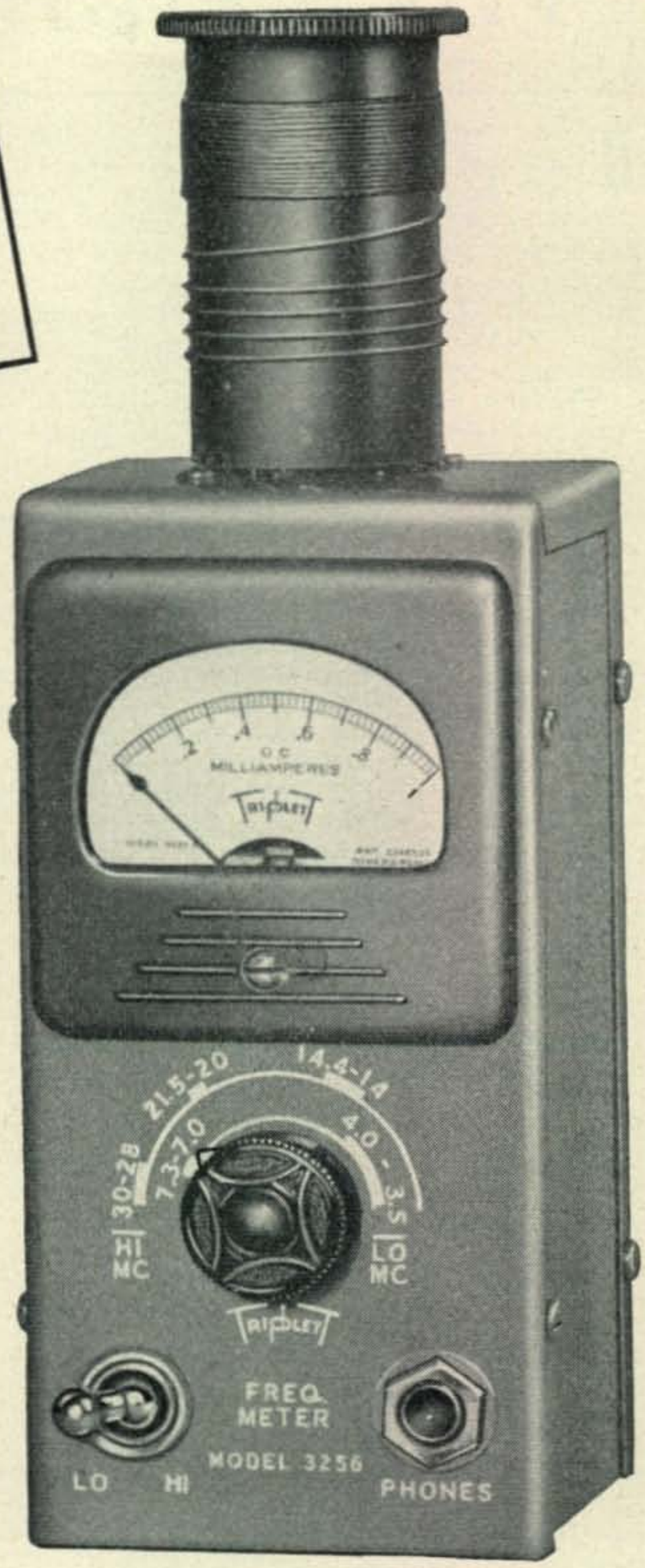
OX1Z, APO 858, % P.M. New York City

W7QAP is little by little increasing his power, having started with a 6L6 or less, and is just about ready to fire up his 4-250A on 7 mc. About a week ago, Bud had some tough luck when a high wind blew over his pole. Now he is right in the midst of cooking up some poles that will really take it. He is out on the desert, just outside of Tucson, and quite comfortable except when he has a little trouble with the cactus needles. Any day now, I expect to see a picture of Bud galloping out on his pony to the far end of his rhombic or V beam.

W3GHD is up to 34 and 73. Bob says the secret of working this stuff is mostly a lot of lost sleep and he is not far from being right.

[*QSY to page 56*]

HIGH SENSITIVITY
Model 3256
ABSORPTION FREQUENCY METER



Know What Band You're In... Avoid "Pink Ticket" Trouble

Brand New!—A band switching, tuned absorption type frequency meter covering five amateur bands. Incorporates the new germanian crystal and a DC Milliammeter indicator for greater sensitivity. Direct calibration on panel—no coils to change. Switching permits instantaneous band change. Audio jack, another new feature, provides for monitoring of phone signals. Calibration is in megacycles in the following bands: 3.5-4; 7-7.3; 14-14.4; 21.5-20; 28-30. By removing plug-in coil other frequencies may be covered.

Use This New Unit for Checking:

1. Fundamental frequency of oscillating circuits.
2. Presence, order and amplitude of harmonics.
3. For parasitic oscillations.
4. The neutralization of R. F. ampliers.
5. Standing wave ratio on transmission lines.
6. The presence of undesirable R. F.
7. For small quantities of R.F.
8. Monitoring of phone signals.

Model 3256 is fully shielded, highly sensitive, compact—invaluable for use in restricted spaces.

MODEL 666H
Volt-Ohm-Milliammeter

The handiest tester of all. A.C. and D.C. Volts at 1000 Ohms per Volt 0-10-50-250-1000-5000 (compensated copper-oxide rectifier provides for A.C. measurements); D.C. Milliamperes 0-10-100-500; Resistance 0-300 Ohms; 10 Ohms reading at center scale; 0-250,000 Ohms.

Triplett

ELECTRICAL INSTRUMENT CO. BLUFFTON, OHIO

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

by Vince Dawson, Jr., WØZJB*

DURING THE PAST 3 months MUF predictions have indicated that if 50-mc stations were on at the right place at the right time, a contact in the 2500-5000 mile region would be made. There have been many rumors that the boys in the Pacific were getting ready to invade the band, and probably the first word that many heard of their being on was that J9AAK and KH6DD had made contact, confirming the rumors we had heard so much about.

The first word of the contacts and new records, came to our attention during the usual Sunday morning chat with W1HDQ on 28 mc. Ed had heard a ZS mention that a J9 and KH6 had contacted on 50 mc. With all the rumors that have been circulating, this one was disregarded until we heard KH6AR mention that KH6DD had just called him on the land wire and asked him to get on 50 mc, as he had worked a J9 on Saturday night (U. S. time). We started out to find the facts and were almost at loss when our west coast "Agent", Walt Manning W7ERA, came to our assistance, saying he could raise J9ABX for the story. Our thanks, Walt—and here is the story from J9ABX, who called J9AAK on the land line for the news.

Major "Tex" Brewer, J9AAK worked KH6DD and W7ACS/KH6 with S-9 signals. Tex had 3 complete QSOs with KH6DD during the opening, which lasted from 10:47 a.m. to 12:34 p.m., Jan. 26th, Okinawa time. J9AAK even took time out to eat lunch, between QSOs. J9ABX heard both sides of each contact, but did not have an antenna for his 50-mc transmitter.

The station at J9AAK is a Navy type TDQ transmitter, with an 829-B in the final, running 67 watts input at the start of the DX, but souped up to 87 watts before the fade out. The antenna is a 4-element horizontal beam, which was erected just a few days before the contact, with the able assistance of J9ABX. The receivers at both J9AAK and J9ABX are SX–27s.

While we do not know the complete set-up at the KH6 end, we do know that KH6DD was running 500 watts into an 8JK twin three rotary.

J9AAK is president of the Okinawa Amateur Radio Club and has been very instrumental in getting the J9s on 50 mc, which include: J9AAI on 50.64 mc, J9AAK on 50.1 mc, J9AAR on 51.9 mc and J9ABX on 51 mc. All of the set-ups are identical to that mentioned for J9AAK, with, no doubt, some super beams now going up at each station.

Skeds with the U. S. are held daily at 1930 PST, the J9s transmitting the first 10 minutes and listening for the next 10 minutes. On Saturdays they are on at 1500 PST, listening the first 5 minutes and transmitting the next 5 minutes.

During the period these DX contacts were being made, the States were experiencing a complete black-out of W signals. In the middle-west all that was audible were a few Cubans, Mexicans and a few of the W4s in Miami and Key West. The east coast had the same conditions and WWV was in there pitching out Ws, indicating that an ionosphere storm was taking place across the North Atlantic path.

When the reports from the ionosphere sounding stations are available we shall know more about the whole story. In the meantime don't despair, brother Ws, that MUF is still breathing down our necks and it won't be long. Plenty of operating time should bring someone results.

B St., Gashland, Mo.

The International 50-mc Picture

Walt, W7ERA, also mentions that there is activity on six meters in VS1 land but doesn't have any more details about them. He adds that J9AAK is W5KDA of Wink, Texas (the Texans score again), J9ANA is W6CLY of Long Beach, Calif, J9ABX is W6EFH, also of Long Beach, and J9AAR is W9RGY of Peoria, Ill.

G5BY reports a sporadic E opening on the European continent Dec. 2nd at 1900 GMT, when he copied the commercial harmonic of IRL in Italy on 59 mc for over an hour, the only signal heard, unfortunately!

A letter from Russ White, ZL1AO, in Auckland gives us this good news on his 50-mc operation. He has 40 watts to an 815 on either 50.88 or 51.6 mc, feeding a horizontal 3-element beam with .2 wave spacing. The transmitter is automatically keyed with a 1000-cycle tone from 2300-2400 and 0100-0200 GMT daily. Russ listens from 0000-0100 daily for any signals with his beam at 45 degrees, centered on San Francisco. His converter uses a 6AG5 r.f., 6AG5 mixer and 9002 osc, into the communication receiver at 7.4 mc.

Others active down there are ZL2WS, ZL2IY and ZL2PD, the latter using a J antenna at present, but has a beam going up for the W skeds. Russ also adds that ZK1AA on Cook Island is active on the band and is within E-layer skip from Auckland.

50 Mc Openings

The first opening to come in the new year of 1947, was on January 4th when the middle-west gang worked the boys from Alabama to Texas. Connected with this opening were the lowest temperature readings ever recorded here in the western states. WØYUQ found himself in the center of the storm with the mercury going to 31 degrees below zero! In fact, Cliff swore he could see the reflections between the radiator and reflector of his ¼-wave spaced beam. Even the Texans on 28-mc short-skip were heard to say it was down to 2 degrees

V.H.F.—U.H.F. RECORDS

Call	Distance Miles	Date
50 MC		
J9AAK-KH6DD, W7ACS/KH6	4700	1/25/47
144 MC		
W3HWN-W1MNF	410	11/19/46
420 MC		
W6FZA/6-W6UID/6	170	9/28/46

No other record reports received for other bands.

AVAILABLE IMMEDIATELY

MASTER OSCILLATOR
MI-19427-B

This unit was built for RCA. Add a final—becomes a complete transmitter with signal shifter. 2-20 mc—also FM—only a few cycles drift from cold start. Complete with regulated power supply and heavy duty deluxe rack. Flyer giving complete description, technical summary and specifications available upon request. Complete (except for tubes).

Send for yours at **$225.00**

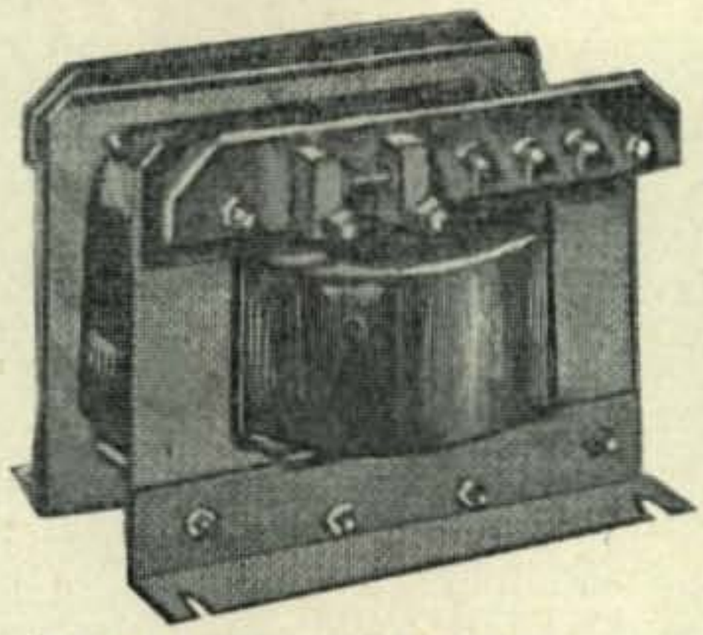
2 METER TRANS. & RECEIVER

(with very slight modification) Complete with AC, 110V, 60CY power Supply, Receiver; 2 indiv. tuned R.F stages, 5 I.F. stages. Transmitter; 2-HY75 or 2C26A modulated by 829B. Brand New. Complete with tubes..... **$54.95**

SPECIAL VALUES IN USED BC 312 COMPONENTS

While they last a special assortment of used component parts for BC 312—Assortment includes R F Osc. 1st R.F., 2nd R.F., 1st Det. First come first served so order yours

today at 49¢ ea or 5 for **$1.50**



RCA 1 KW MODULATION TRANSFORMER

For class B operation. The primary, rated at 500 audio watts, matches any class B tube.

Impedance Ratio	Turns Ratio
Primary to secondary	
No. 1	1:1 1:1
Primary to secondary	
No. 2	25:1 5:1
Primary to secondary	
No. 2	tap 625:1 25:1

Built to highest standards & fully guaranteed **$14.95**

SENSATIONAL TUBE CLEARANCE

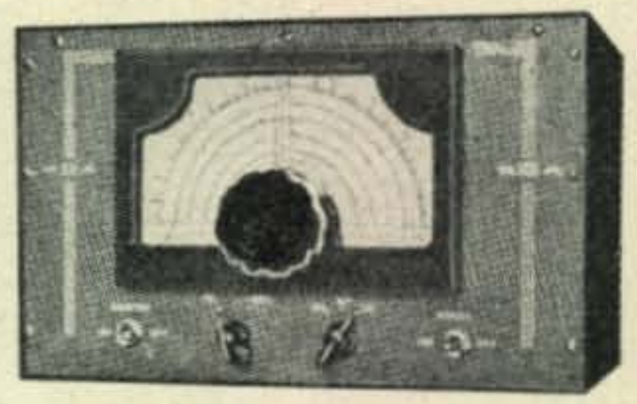
100TH	$4.95	250 TH.	$7.95
813	$5.95	810	$2.49
811	$1.95	815	$2.25
211	$1.25	866A	$ .75

Write for complete special bargain Tube List.

SCR-522 100-156 MC RECEIVER & TRANSMITTER

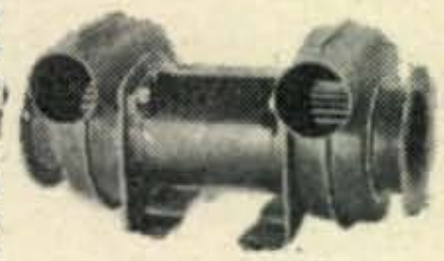
Transmitter output 8-9 watts, voice amplitude modulated on any one of 4 xytal controlled frequencies. Receiver is readily switched to either one of the 4 present xtal controlled channels. Tubes used: 2-832; 3-12A6; 1-6G6; 2-6SS7; 1-12J5GT; 1-12C8; 1-9002; 3-9003; 1-12AH7GT; 3-12SG7.
Special..... **$39.95**

VX-101 JR.



A Variable Freq. Exciter Unit—12-16 Watts Output on 80, 40, 20 Meters. Band switching in 4 calibrated bands—3.5 to 3.7; 3.75 to 4; 7 to 7.5; 14 to 15 MC. Doubling permits complete coverage of 28 MC. Tube Complement: Oscillator—6SJ7; Doubler—6SK7; Amplifier—807, Rectifier—5Y3; Voltage Regulators VR 150 and 105.
Your Price..... **$54.50**

DUAL BLOWER



Blows 200 CFM; 110 Volts AC; Ideal for cooling large tubes or exhaust for lab. or Photo Darkroom application. These units are guaranteed.

A Good Buy..... **$15.95**

BC—348 RECEIVER

Built for continuous duty, 6 band receiver. 6 band switching—200-500 kc; 1.5-3.5-6-9.5-13.5-18 mc.

Has automatic noise compensator—constant sensitivity on all bands—output at 300 or 4000 ohms—xtal filter AVC-MVC-BFO; Smooth vernier tuning; 90 turns of tuning for ea. band. Tubes include 1st RF-6K7; 2nd RF-6K7; RF Osc-6C5; 1st Det-6J7; 1st IF-6K7; 2nd IF & CW Osc-6F7; 3rd IF & 2nd Det-6B8; Aud Out.-41. Complete with built-in dynamotor for 28 volt DC. (Conversion kit available for 110V. operation 60 cy.—Price on request).
Order Today at..... **$49.50**

MAIL COUPON TODAY for LATEST FLYER

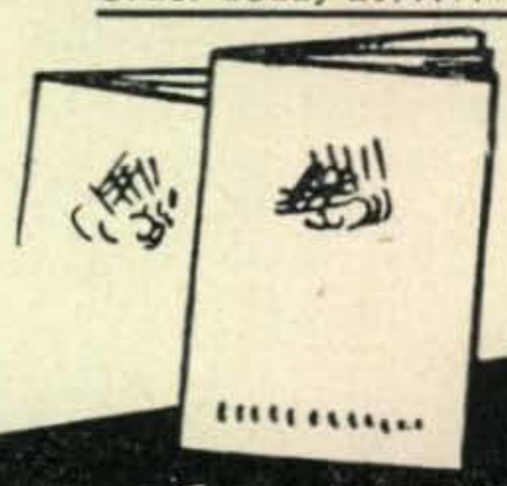
Niagara Radio Supply Corp.
160 Greenwich St.
New York 6, N. Y.

Please send me copy of your latest Bulletin 3Q and other special bargain lists.

Name.....

Address..... Zone..... State.....

City.....



NIAGARA RADIO SUPPLY

160 Greenwich St., New York 6, N. Y.

BOwling Green 9-7993

above zero, and that Davy Crockett was coming back to protect the Alamo from this northern invasion. Well, when things occur to make it rough on the other humans, it seems it's just what the 50 mc boys want, as here is the score, with nice contacts for all the gang that was on.

W5WX in Amarillo, Texas found the band open from 1900 to 2030 CST and hooked the following: WØHAQ, W9CZD, W9UNS, WØIFB (3 QSOs) and WØZJB. This was his chance to try the Gonset converter the XYL gave Bert for Xmas. He also mentions he got a kick out of hearing W9ZHB call CQ DX, to VK land. What's this CQ stuff emitting from Zearing?

WØDZM and WØSV near Minneapolis both got W5HHT for their Louisiana contact, and heard W4EQR of Pensacola, but made no contact with him.

Our new addition to the band W5HHT in New Orleans had nice QSOs with W9PK, WØDZM, W9ZHB, W8BFB, WØSV, W9ZHL, W9ILI, WØIFB and W9QUV. Adding new states to all their lists gives Irv a kick, he says, and he will be looking for more openings. Watsa matter, Irv, are you mad at us Beavers, we are always on when the boys 200 mi farther north work you? Yep, that's why it was named Sporadic-E skip, and 'tis that, in this case.

Charlie Bolser in San Antonio says the temperature was 28 degrees but he still heard on his new VHF-152, WØQYD, W9ZHB, WØHAQ, W9ZHR, WØIFB, W9IKI, WØZJB, W9ZHL, W9QUV, W9PK and W9AK between 1840 to 2120 CST. Just goes to show you, when we thought the band was dead an SWL was hearing all the above stations. Guess we are gonna have to talk to Davy about this Texas inactivity.

The opening on the 4th also brought forth a new station on the band in Pensacola, Fla, namely W4EQR. Harvey really had a time for his first DX in working W9PK, WØIFB, W9ZHL, W9IKI, W9ZHB and WØHAQ, hearing WØZJB as the band passed. He first heard WELD-FM around 1700 so decided to emit a CQ, which brought W9PK back to him for the first contact. His rig is a T-125 with 350 watts and a folded dipole made of 300 ohm ribbon. The receiver is a National 1-10A, which was a little broad for so many stations coming in. Harvey will be a welcome addition to the band, especially for the 6s and 7s who may get into Florida a little easier, as he is about 300 mi closer to them than W4GJO.

In Fort Worth, W5LIU says he heard the short skip on 28 mc so he told W5FRD and W5JDL to get on the band, in between their shivering. This resulted in the first skip contacts since the W1LLL episode, as W5FRD worked W9PK, W9ZHB, W9QUV, W9ZHL, W9JMS, W9UNS, W9AKF, and W9ALU was called in hopes of presenting him with a WACA for the new year, but to no avail.

W5LOW, ex-W9BDL in Corpus Christi got W9ZHL, WØIFB, WØYUQ, W9ZHB and WØIFB, hearing WØZJB ,(that's all, brother, if we get any more heard reports), all this taking place from 1933 to 2116 CST.

W5MDO also of Corpus and a new addition to the gang there had his first taste of 50 mc DX in getting WØZJB (that's better), W9ZHB and WØIFB.

During the Ionosphere storm on Jan. 24th which preceded the J9-KH6 contacts, the boys in the northwest states were blessed with some of that intriguing Aurora skip, WØDZM in Minn. worked WØIFB and W9QUV in Ia. and Ill. WØHXY got IFB and heard QUV. W9DWU QSOd WØIFB as well as WØQIN getting Barney. WØHXY who is called "Magnetic MacTavish" has a magnetic Aurora indicator, which tells him when Aurora is on. Coming home from a free dinner on the 24th, he saw the horizontal intensity way above normal and the compass off about one degree. With an indicator like that could he miss?

50-MC DX HONOR ROLL

Calls	States	Districts	Other
W9ZHB	28	10	VE3
W1LLL	27	10	
WØZJB	27	10	VE3-4
W1HDQ	25	9	G5-6*
W1PFJ	25	9	
WØYUQ	22	10	VE3
W9PK	21	9	
WØDZM	20	10	VE3
WØSV	19	9	
W3RUE	16	9	
W2IDZ	17	7	
W8SLU	14	10	
WØJCQ	13	10	
W6NAW	13	8	VE7
W1JLK	12	5	
W9ALU	7	6	
W7ERA	5	3	
W7HEA	4	3	
W7JPA	3	2	
W7BOC	2	2	
W7CTY	1	1	

Cross-band.

The 50 Mc Gang

Since the W1HDQ-G5BY-G6DH affair, lots of the 50-mc lads are paying more attention to the frequencies in between 30 and 50 mc. From all over we are getting reports of commercial harmonics, facsimile, television channels and, most of all, aircraft beacons or h-f range stations. These latter stations have a 1000-cycle tone, with it broken every minute and a call or code sign given in c.w.

W6QG says the Australian Aircraft Beacons on 33.4 mc (SY), and 33.9 mc (AD) have dropped off considerably from the loud sigs they put in during October and November. Ray also reports on Jan. 4th, 5th and 6th when WWV was giving W sigs, he found cross-country skip sigs in the 40-50 mc range highest of the month, on these days. Going to 41.4 mc on the 4th, 43.9 mc on the 5th and 46.4 mc on the 6th. Although he did lots of calling on 50 mc, all he heard was a strong carrier on 51 mc with occasional tone modulation, this was on the 6th around 1015 PST. The range 48 to 56 mc was filled with an uncommonly large amount of diathermy signals of various intensities, while on other days it is rare to hear anything in these ranges. Evidently the band was open, but to where is anyone's guess. Ray concludes that the MUF is at its highest when WWV is sending their W signals, indicating an ionosphere storm is on or expected.

Here is more on the W1HDQ-G contact on Nov. 24th. As you will recall WWV was sending Ws and W9ALU was hearing 50-mc signals, from W2BYM and W8CYW in Detroit, which would indicate some E_s present. We asked for comments from our Propagation Editor, Perry Ferrell, who says that the St. Johns, Newfoundland, ionosphere sounding station, which was in their path, only

[*Continued on page 62*]

ANOTHER ERA FIRST

Narrow Band F.M. Exciter with E. C. O.

just what *you* have been waiting for . . .

1. Eliminates B. C. L. interference
2. Cuts through Q.R.M.
3. Expensive modulator components eliminated
4. Any spot in the band - in a jiffy
5. High impedance microphone imput
6. Absolutely equalized side bands
7. Completely calibrated and ready to go
8. 8.2 Watts output, 7 to 8 Mc., link coupled

ERA

ELECTRONIC RESEARCH ASSOCIATION
88 NINTH STREET, SAN FRANCISCO 3, CALIFORNIA

$39.95

Temperature corrected, voltage regulated, variable E.C.O. provides minimum drift and accurate factory calibration . . . Completely self powered . . . High impedance input for either crystal or dynamic microphone . . .

The YL's Frequency

by Amelia Black, W1NVP - W2OLB*

PARDON MY SOUTHERN accent, but it comes even more naturally now after a visit to our native W4-land (W2OLB was once W4HZP).

Among the old Atlanta, Georgia, acquaintances we renewed, was W4EFS, Gus Barron. He introduced us to his cousin Jenny James, W4EZJ, the first licensed YL in Atlanta, we understand.

Jenny, a confirmed fone ham, does most of her operating on ten, where she has managed to hold weekly skeds with ZE1JR, using only 23 watts. Present power is 63 watts in a rig consisting of an 807 and a pair of 6L6s; antenna is a dipole, receiver—homemade.

Raised in the same house with cousin Gus, Jenny caught the radio bug and has been licensed since 1937. Radio has been a full time job with her ever since. Jenny, who holds a second class telegraph license, is a radio operator at Eastern Airlines, Candler Field, in Atlanta. Previously she was radio theory and code instructor at the NYA Chapman Springs School in College Park, Georgia.

Jenny James, W4EZJ

Notice to OMs: W4EZJ (see pix) is not only pretty and vivacious but a *real unmarried* YL!

Besides Jenny and our YL of this month, there's apparently only one other YL in Atlanta, W4FIS, Billie Allen, who told us that the ten-meter band is her favorite also. Billie's the wife of W4DXM.

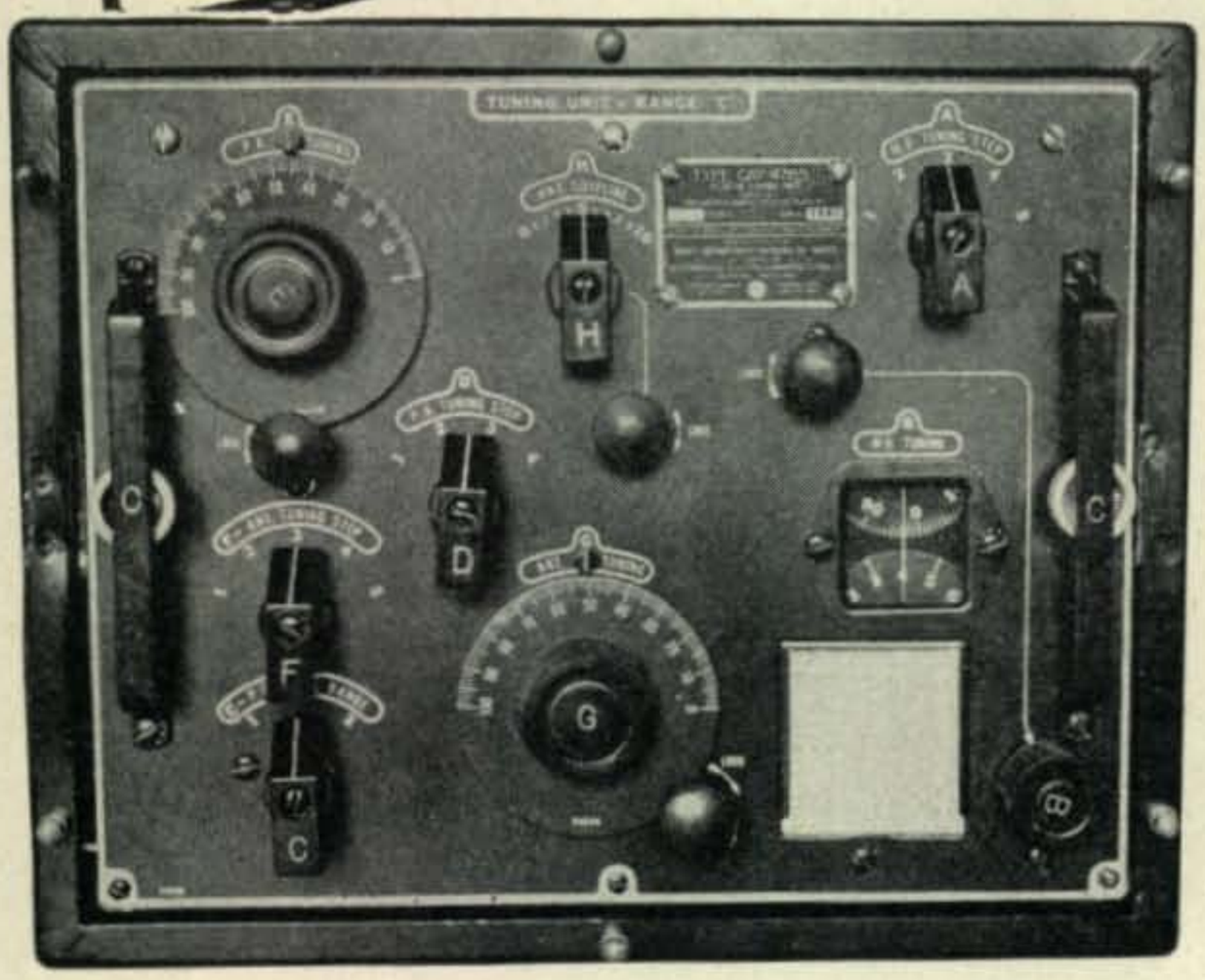
The unusual photographs below show May Smith, W1BDN, of Manchester, New Hampshire, at her rig in 1920 and again ten years later. We believe that Miss Smith, who will soon celebrate her eightieth birthday, is the oldest active YL and were told by W1MZ, who kindly supplied the pictures, that Miss Smith still operates both phone and c.w. She is on 10, 20, and 75-meter phone, and on 3610 kc c.w. Her present rig runs 225 watts input, and she uses a National 1-10 receiver and a revamped RC 111. As far back as 1880 she was part-time operator on a telegraph line in northern New York, having learned the code in her teens, and has been licensed since 1920. Her first call was W1DBE, changed to W1BAE in 1923, and later to her present call of W1BDN. Her brother is W1HPM.

W7JFB, Miriam Brown, of Everett, Washington, writes: "I have been very occupied recently . . . and every spare moment spent at the rig. Still enjoy 75-meter phone most, with some evenings on 80 c.w., other evenings in local QSOs on ten meters. Continuing Thursday skeds with Lizette, W7HDS, which are mostly 100% and very enjoyable. We moved up the hour to better combat 20-meter QRM, and now make the contact at 11 a.m. PST on 14,260 kc. One evening a week I also tune up the rig on 20 meters for skeds with points in Alaska, KL7DB in Valdez or KL7EU in Anchorage. Now have a six-meter converter and a little stand-by ten-meter transmitter, which doubles to six; when the OM has time to erect an antenna will do a bit of experimenting on that band. That above covers ham activities here, except that we do belong to the local amateur club, organized several months ago. Thus

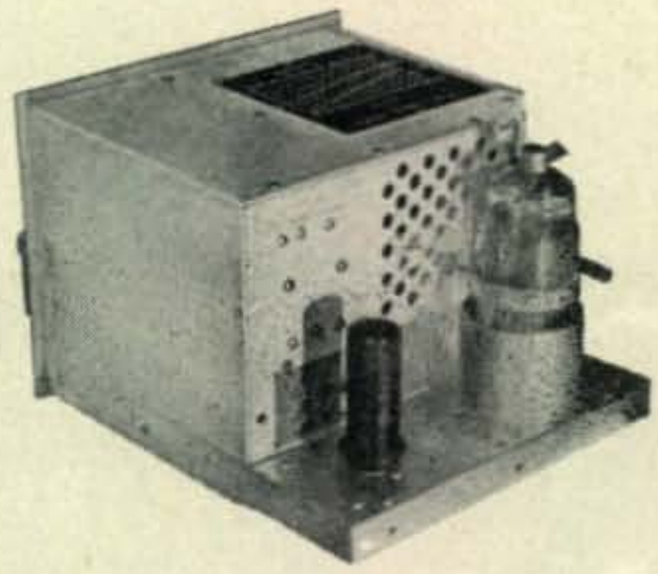
[*Continued on page 62*]

(Left) May Smith, W1BDN at her rig in 1920. (Below) Photographed again ten years later.

Build Your New Transmitter Around This Tuning Unit!



This Westinghouse tuner is one of the best values we have seen. It is a complete precision tuning unit for M.O.P.A. operation either as a transmitter up to 250 watts or a driver for bigger rigs. Calibrated controls tune the oscillator, amplifier and antenna circuits. Diagram and instructions for easily mounting M.O. and P.A. tubes as shown in photo, supplied with each unit. With a very small additional investment in tubes and power supply, you will be operating a top quality, dependable transmitter. These items may be found in our new Amateur Catalog H200A at a fraction of their normal cost.



The Westinghouse Tuning Unit is available in 6 ranges:

Range A—350 to 800 KC	D—3000 to 4525 KC
B—800 to 1500 KC	E—4525 to 6500 KC
C—1500 to 3000 KC	F—6200 to 9050 KC

(May be modified for higher frequencies by removing coil turns).

When ordering, specify range. Shipped complete with attractive dust proof, steel carrying case for only..... $12.50 F.O.B Chicago

10 Meter Whip Antenna

Beautiful quality, 2 section 8′ antenna for ¼ wave on 10 meters. Mobile or fixed. 4″ ceramic insulator and rubber moulded spring mounting. 72 ohm coax termination. Complete with connectors — only..... **$5.25** each.

Look for the Wells Display at Your Jobbers

Twinax 2 Conductor Coax Cable
95 ohm nominal impedance. Suitable for any power up to 1 KW..... **18c** Per Ft.

WELLS SALES, INC.

4717 W. Madison St., Dept. C-3

Chicago 44, Illinois

Wells Sales, Inc., Dept. C-3, 4717 West Madison Street, Chicago 44, Ill.

Please ship via express collect.....Westinghouse tuning units with range.....at $12.50 each and.....¼ Wave Antennas at $5.25 each for which I enclose my check (or M. O.) for $.....

Please send free Amateur Radio Catalog H200A. I am also interested in the following equipment.....

Name.....

Address.....

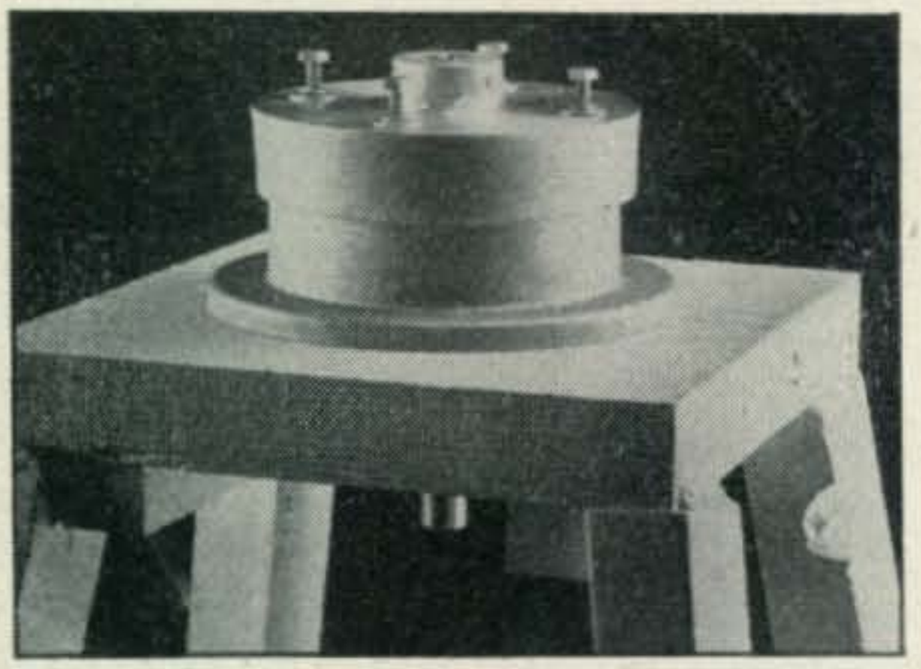
City.....Zone.....State.....

parts & products

Beam Rotator

The Amateur Division of the Wilcox Electric Co., Inc., Kansas City, Missouri announces the production of a beam rotator as an addition to its line of equipment.

The rotator is adaptable to any beam, and is easily converted to either motor or manual drive. For



manual operation a pulley with ¾" fitting is used on the rotator shaft, or for motor drive a ¾" reducer to the diameter of any needed to fit the need makes the unit very universal. If V belt reduction is desired, the pulley for manual operation may be of the V type. Other features include: Rugged construction of cast aluminum; weather resistant, requires no lubrication; has 9/32" diameter stainless steel ball bearings in races, for ease of rotation; withstand high winds with load weight of 200 lbs.; universal mount to beam or tower; has ¾" diameter steel shaft, 6" in length below base; low cost.

Orders are now being taken from dealers, through which the unit is available to the amateur.

Superior Electric Co.

A new twelve-page bulletin has been released by The Superior Electric Company of Bristol, Connecticut, manufacturers of voltage control equipment.

The bulletin clearly illustrates and describes Seco's complete line of *Powerstat* variable transformers, Seco Automatic Voltage Regulators, *Voltbox* a-c power supplies and special custom-built equipment such as Seco remote positioners and Powerstat theatre dimmers.

Detailed description including many charts, graphs, and dimensional drawings makes this bulletin complete for engineers or amateurs seeking the answer to voltages control problems.

The Superior Electric Company will be pleased to forward copies upon request.

IF XTAL FILTER

I-F Crystal filter for BC-312. BC 342. Resonant at 470 kc. Crystal included..... **$6.95**

TUBE SPECIALS

3BP1	$3.95	837	$ 1.35
3FP7	2.98	872A	2.98
5BP1	4.95	705A	6.75
5BP4	7.95	241B	40.00
5CP1	4.95	861	85.00
5CP7	6.00	Sockets for 5BP1, 5BP4, 5CP1, 3BP1 and similar types 95c	
5FP7	3.50		
5JP2	8.95		

Audio Transformers, Modulators

Mod. for 211's cl. A. 50W. . . **$1.35**
Mod. 807 to pr 807's (screen) **1.00**
INPUT: Single Button mike to grid 20:1..... **1.00**
OUTPUT: 600 ohms to 6 ohms..... **1.00**

CHOKES

2 hy @ 160 ma (Made by GR) 2 for **$1.00**
12 hy-12hy @ 150 ma..... **3.35**
12 hy @ 200 ma. Made by Thordarson..... **1.95**
59 hy @ 100 ma 850 ohms DCR made by Jefferson. **2.00**
2.6 hy @ 800 ma stud and terminals at bottom, made by G. E..... **5.95**

SPECIAL ITEMS

Visors for 5 inch 'scopes....$ .75
Tube shields for 2AP1..... .98
Broadcast band push-button tuning units inductive or capacitive types.....**$1.49**
*Hand generator, type GN-45B. Output: 6v-3a/500v-.14a rated speed 60 cps.....**$5.95**
Oscilloscope chassis, completely punched, for use with a 2 inch tube. Octal sockets included 15" x 11" x 9".....**$1.50**
Sonde UHF transmitter, complete, less battery.....**$2.75**
Johnson transmitting condenser type 500D35. 35-500 mmf. .08" spacing 3500v (List $11.75) .**$4.75**
Power transformer115 v/60c:3200 vNCT @ 150 ma.....**$7.25**
Helmhotz phase shifting coil (360° phase shift).....**$2.25**
Earphone cushions to fit any lightweight set. Per pair.....**.49**
BC-221 Fre ɥ. Meter.....**$84.00**

Under-water Sound Detector

Ideal for detecting underwater sounds, a 60 ft. length of cable. It is completely enclosed in a solid rubber sheath. Coupled to an audio amplifier, this can be found to have many valuable applications. Ask for SD-1.....**$6.95**

DIRECTION FINDERS!

FAMOUS NAVY UNIT

The DP-12 is a Navy direction finder, made by RCA, with a frequency range of 100-1500 kc. The input voltage is house current (115v/60c). The tube line-up is 3-6C6;4-6D6; 2-76; 1-6AF6; 1-1523. This unit is equipped with loop output junction box, flexible transmission line, input transformer, deck bearings, cable drums, operating pedestal, hand wheel, azimuth scale, loop antenna assembly, and loop pedestal. This unit is a buy for any Sea going small boat at.... **$100.00**

NEW POWER SUPPLY for LM-18 freq. meter. Output: 290v. @ 20 ma; 13 v @ 600 ma. Input: 105-125 v. @ 60 cps; 260 ma; 27.6 W. type 84 rectifier tube; shock mounted Complete with input and output plugs, tube included... **$14.75**

DALMOTRON INTERCOM

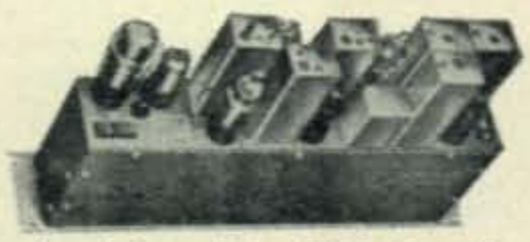
Each Dalmotron is a master station which transmits and receives, permitting conversation with any or all other units in the system, or any number of units desired. Requiring less space than a telephone, it is very simple to install. These brand new units, each for..... **$29.95**

OIL FILLED CONDENSERS

G.E., C-D, W.E., and other well-known brands

1 mf 300 vdc...	$ .25	3 mf 600 vdc pyr	$ .65
2 mf 300 vdc...	.30	4 mf 600 vdc pyr	.70
4 mf 300 vdc...	.35	6 mf 600 vdc pyr	.95
4 mf 400 vdc...	.55	8-8 mf 600 vdc...	1.49
5-5 mf 400 vdc...	1.15	15 mf 220 ac/600 dc	1.75
2 mf 550 vdc...	.30	1 mf 1000 vdc...	.85
.25 mf 600 vdc...	.25	2 mf 1000 vdc...	.98
.85 mf 600 vdc...	.30	1 mf 1500 vdc...	1.05
1 mf 600 vdc...	.35	.4 mf 1500 vdc...	.30
2 mf 600 vdc...	.40	2 mf 660 ac/1000	.95

CW-3 RELAY RACK RCVR

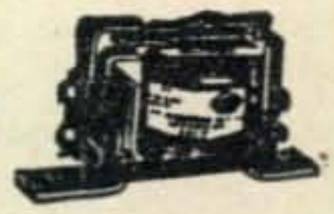


This superhet receiver will operate on any fixed frequency from 1900kc to 16,500 kc. Uses 7 tubes. Operating frequency is determined by xtal. With 2 coil groups, 3-6 mc; 8.1-16.5 mc. Priced, new, at. **$21.50**

All merchandise guaranteed. Mail orders promptly filled. All prices F.O.B. New York City. Send Money Order or Check. Shipping charges only sent C.O.D.

COMMUNICATIONS EQUIPMENT CO.
131-Q Liberty St., New York City 7, N.Y.
WH 4-7658

RELAYS



SPDT Leach 1353 115v/60 cps coin silver contact 10 a rating. This relay is actually DPDT with a bridge between the two poles. EASILY CONVERTED TO DPDT.....**$1.25**

SPST 5a, ac; 115v cont. 115v/60 cps **$1.49**

SPDT contacts; 5a coil rated 115v/60c..... **$1.39**

DPST Telephone type; 2p. 1 cl; 1 open; cont. rating, .5a @ 50v, coil rating 3.5 ma (@ 12 K ohms) 1000 vac..... **$1.05**

DPDT Leach relay, steatite insulated, with 10A silvered contact. Operates on 110 AC.. **$1.95**

SPDT Struthers-Dunn sensitive keying relay, 5 ma-dc Coil. 110v/60 cycles—2 amp contacts..... **$1.49**

SPST Latching relay made by Kurman. Close coil 115v/60c; DCR 1500 ohms. Open coil 115vdc 10 ma.; DCR 5000 ohms.....**$2.95**

OHMITE WIRE WOUND RHEOSTATS

Model H 250 ohms 25 watt.	$ .98
Model H 125 ohms 25 watt..	.98
Model J 1800 ohms 50 watt..	1.25
Model K 3000 ohms 100 watt	1.98
Model L 250 ohms 150 watt.	2.25
Model N 22 ohms 300 watt.	3.00
Model P 1200 ohms 225 watt	2.75

MICROWAVE PARTS

MAGNETRONS!!
type 2J32 (JAN)
Complete information included. The 2J32 is designed for 10 cm. operation. Brand New, packed in individual protective cartons. The 2J32 is listed at $200. OUR PRICE..... **$25.50**

3J31, 1 cm MAGNETRON 40 Kw peak pulse power. Our low price of..... **$20.00**

A FEW 2J38 MAGNETRONS, complete with MAGNETS, (3245-3263 mcs) just ARRIVED! A steal at..... **$37.50**

KLYSTRON oscillator tubes. 2K25/723-ab. designed for 3 cm. operation. New, Packed individually. With complete technical data. Listed at $38.00 OUR PRICE..... **$7.75**

Sockets for 723a/b-2K25...$ .50

30 Mc IF AMP with 2-6AC7's—uses 723a/b..... **$10.00**

Waveguide Sections in Stock.
Send for List.

Army-Navy Type Headphones

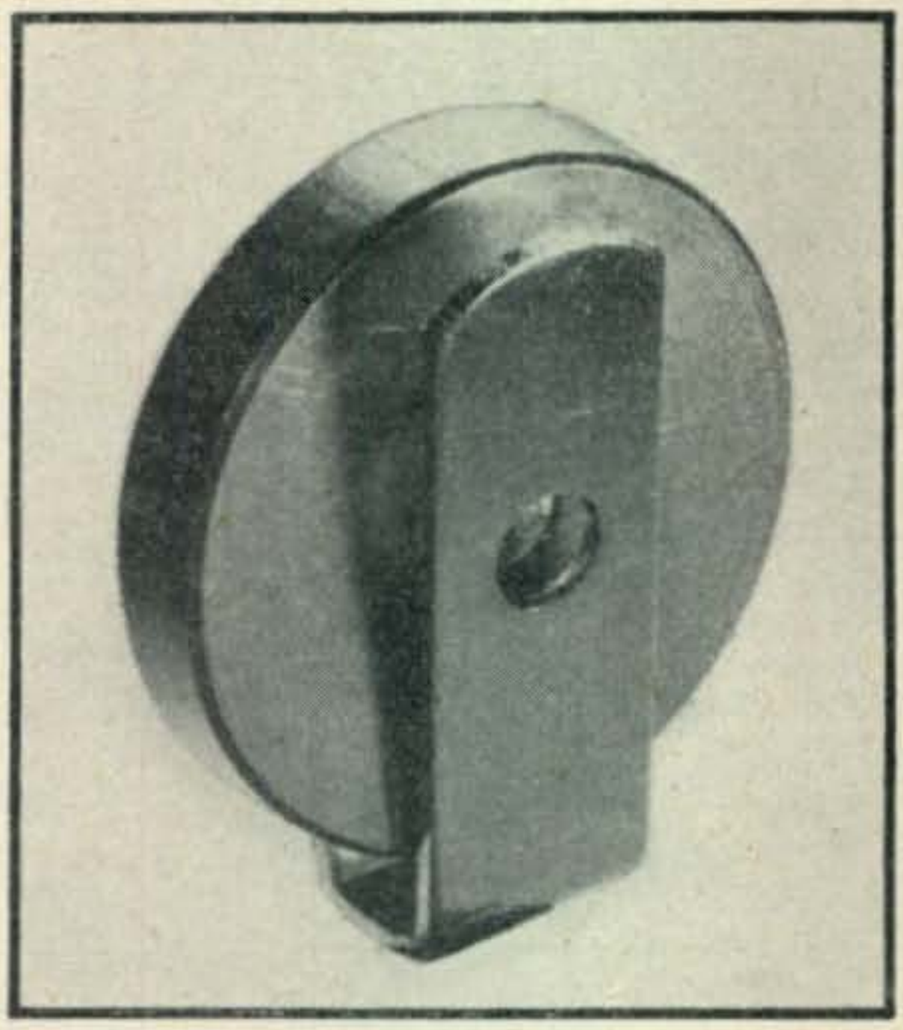
Type HS-23

Leather-covered headband, Detachable rubber cushions, lightweight headset with 2000 ohms DCR, 8,000 impedance, with 6 ft. cord and PL-55 New in cartons **$2.50**
Used in good condition.....**$1.50**

Adjusting Weight for Semi-Automatic Keys

The Speed-X Manufacturing Co., San Francisco, Calif., announces a new addition to their line of hand and semi-automatic telegraph keys and electronic products.

This new item is an adjusting weight for attach-



ment to the vibrator rod on semi-automatic keys for purposes of speed adjustment. Utilizing an entirely different principle to achieve its locking action, this weight eliminates the necessity for locking thumbscrews. Slight fingertip pressure on the release tab is all that is required to permit the weight to be shifted to a new position on the vibrator rod. Once set, the weight remains securely locked and will not loosen under the vibration of high speed keying.

These units may be used singly or in combination to provide any desired dot speed. Designed expressly for the Speed-X semi-automatic keys, the weight has a standard size opening that will permit it to be used with most other keys that have a vibrator rod of the same diameter.

Germanium Crystal Diode

A new germanium crystal diode, with a safe forward current of .05 amps and a safe back voltage of 60 volts has been announced by the Specialty Division of the General Electric Company's Electronics Department.

Feature of the new diode, which will serve as a rectifier, modulator, detector or voltage regulator, is the point-to-plane contact between a microsharp platinum wire and the face of a specially-processed germanium crystal.

Weighing several grams with a body length of 23/64" and 7/32" diameter, the high back-voltage germanium crystal diode furnishes an interelectrode capacitance of approximately 0.2 $\mu\mu$f and has a life performance of at least 3000 hours.

The new diode's low forward resistance and high back-to-forward resistance ratio is especially desirable for this unit's rectifier application.

Amateur Name Guide

A new and novel little prefix indexer, "What's His Handle Guide" will shortly be available from the Radio Transmitter Division of Greene Plastics, Inc., Wakefield, R. I. Covering all radio districts for the United States and all continents, you can jot down your ham friend's name for instantaneous future reference. The reverse side of the Guide lists all world-wide prefixes.

HARRISON HAS IT! HARRISON HAS IT!

ALL STANDARD LINES . . .

We are Factory Authorized Distributors for the top quality manufacturers and we now have in stock lots more new, latest improved production Ham gear! Visit our stores today, for everything you need. We promise you fresh, clean material—quicker—at the lowest current prices—and, above all, our sincere desire to be of friendly, helpful service.

As one of the world's largest distributors of Communications Equipment, we are delivering plenty—right now! ALL MAKES—practically all models. If you want yours in the quickest possible time send your order to HARRISON!

Send in your parts orders, too — If it's new, if it's good, if it's made by a leading manufacturer — Harrison Has It!

RECEIVERS

COLLINS:
- 75A-1 ..... $375.00

HALLICRAFTERS:
- SX-42 new FM-AM .54-110 mc less speaker ... $275.00
- S-36A, FM-AM-CW 27.8-143 mc 307.50
- S-37, FM-AM 130-210 mc 591.75
- S-40 ..... 89.50
- S-38 ..... 47.50

HAMMARLUND:
- HQ-129X, with speaker in cabinet $173.25

HAMMARLUND:
- SPC-400X New "Super-Pro" 55 to 30 mc, with pack, and speaker in cabinet $347.25

NATIONAL:
- NC-240-D, with speaker $241.44
- NC-46, with speaker 97.50
- HRO-5TA1, with pack and speaker 306.71
- 1-10A, with tubes 67.50
- RME 45, with speaker 198.70
- RME 84, with speaker 98.70

TRANSMITTERS

COLLINS:
- 32V-1 ..... $475.00
- 30K-1, complete with 310A-1 exciter 1,250.00

MECK:
- 60T 150.00

TEMCO:
- 75GA $495.99
- 500GA 1,800.00

ABBOTT TR-4B, New 2 meter transmitter-receiver, with tubes 59.80

SONAR:
- XE10 narrow band FM exciter 39.45

[Other models and makes will be carried in stock as they become available.]

Complete stock—quicker deliveries—lowest prices—top trade-in allowances—easy 6% Budget Plan, if desired—and my personal attention to your wishes, all insure your complete and lasting satisfaction with every transaction. I guarantee you'll like doing business with me!

Send me your order, today. A small deposit (you name it) will bring you your new equipment. Balance C.O.D., or tell me what Budget Plan terms you want. Twenty-two years of experience serving Amateurs in all parts of the world is at *your* command. Vy 73 de

Bil Harrison, W2AVA

HARRISON SELECT SURPLUS

Read our ads—past and future—for real values in selected surplus material Reasonably priced—honestly described—guaranteed perfect! You don't "take a chance" when you buy Harrison *Select Surplus!*

HAM

A number of years ago whenever the technicalities of radio became a series of stereotyped expressions, the avid readers of one of our contemporary radio journals could ponder the adventures of one Hashafisti Scratchi. This well embroiled Ham appeared beset upon by every imaginable trial and tribulation. After many inquiries and many hours of watching those out of the band *signals the Editor has again located this bane of the FCC and asked him to explain his long absence.*

Feenix, Ariz., U. S. A.

Dear Hon. Ed. Sir:

Are supposing you wondering what happen to Hashafisti Scratchi since he last rite you in 1940. This beings a long story Scratchi thot he better rite you to explane his absince. It all started one day when I are sitting peecefully in shack, running e.c.o. up and down band with full power on, just to let local amchoors know Scratchi there in case any dx come on. I are just about to go to refrigiderator for a refill when I notice the maleman. I go to door and get the male, being careful to avoid any envelopes with "F.C.C." on outsides, as Scratchi are finding it easier in past few weeks to work dx with different calls. One long envelope espezially interest me, so I open it and find it say "Dear Hon. Sir, Greeting from the President."

Scratchi are sitting rite down to rite thank-you letter to Hon. Pres. when suddinly realizing are not Scratchi's birthday. Carefully rereeding letter I find Hon. Pres. worried about health, and asking Scratchi to have a free fiscal examanation that afternoon. Not having feeling any to well since I draw that reel nifty arc on my Calif. kw tank coil last weak Scratchi decided to avale himself of free examanation.

Well, Hon. Ed., Scratchi are getting surprize of life when he see all the other people taking free examanation, but then he get reely suspicious when no pretty nurses cum around to feel pulse. Scratchi not reel sure what happened after that, only know that he pass examanation with flying colors. First thing I know I have sined papers, and with bunch of others I am on my way to place called boot camp. Phooey, Hon. Ed., no need in boring you with horrible detales that follow. Scratchi are snatched so quick for U. S. Army that he not even have time to get back to shack and turn off his Calif. kw which are left running to heet shack. My brother Itchi rite me later that due to slite matter of sum unpaid bills the power company turn off power same day, so my five kilowhatt toobs not hurt much.

Scratchi are having lots of fun in army after they are finding out what a grate tecknickle whizzard I are. Some of my inventions are doing grate things for Unkle Sam, but accounting secrissy orders still in effect not being able at this time to disclose how Scratchi won war practikally singil-handed. Natch-

erly when being able to disclose my sooper scheme for detecting presents of enemie I will rush same to your Hon. rag by air-male speshul delivery. Scratchi are just abouts inventing this system called radar but that is all I can disclose now.

At presents time I are living with my brother Itchi in Feenix, Ariz. Itchi own a big ranch here, and Scratchi figure this make a good hide-out. Even tho I have Hon. Discharge from army there are a few GIs who have foolish notion that Scratchi run out on them without saying 73, all on acct. of sum monies I owe them. This ranch is a sooper place to put up antennas. Only trouble having recently is big jack-rabbits which insist on chewing on the antenna poles. This are naturally bringing forth a bad case of drooping Lazy-*H's* and grounded Rhombics. Last time this happened I in middle of fb qso with sum reel dx, OK2U2. Are you having new call-book? Itchy are handing me horsey-laugh on acct. call-book I have does not list same.

Itchi just rush in and say he has located sum nice high cacticusses so guess I will go out and string up sum more antennas.

Respectively yours,
Hashafisti Scratchi, Now Esq.

Delaware Valley Radio Association Dinner

The Delaware Valley Radio Association of Trenton, N. J., will sponsor its third annual Old Timer's Nite and banquet on Saturday evening, March 22nd, 1947. The dinner will be held in the Terrace Room of the Stacy-Trent Hotel, West State Street at Willow in downtown Trenton.

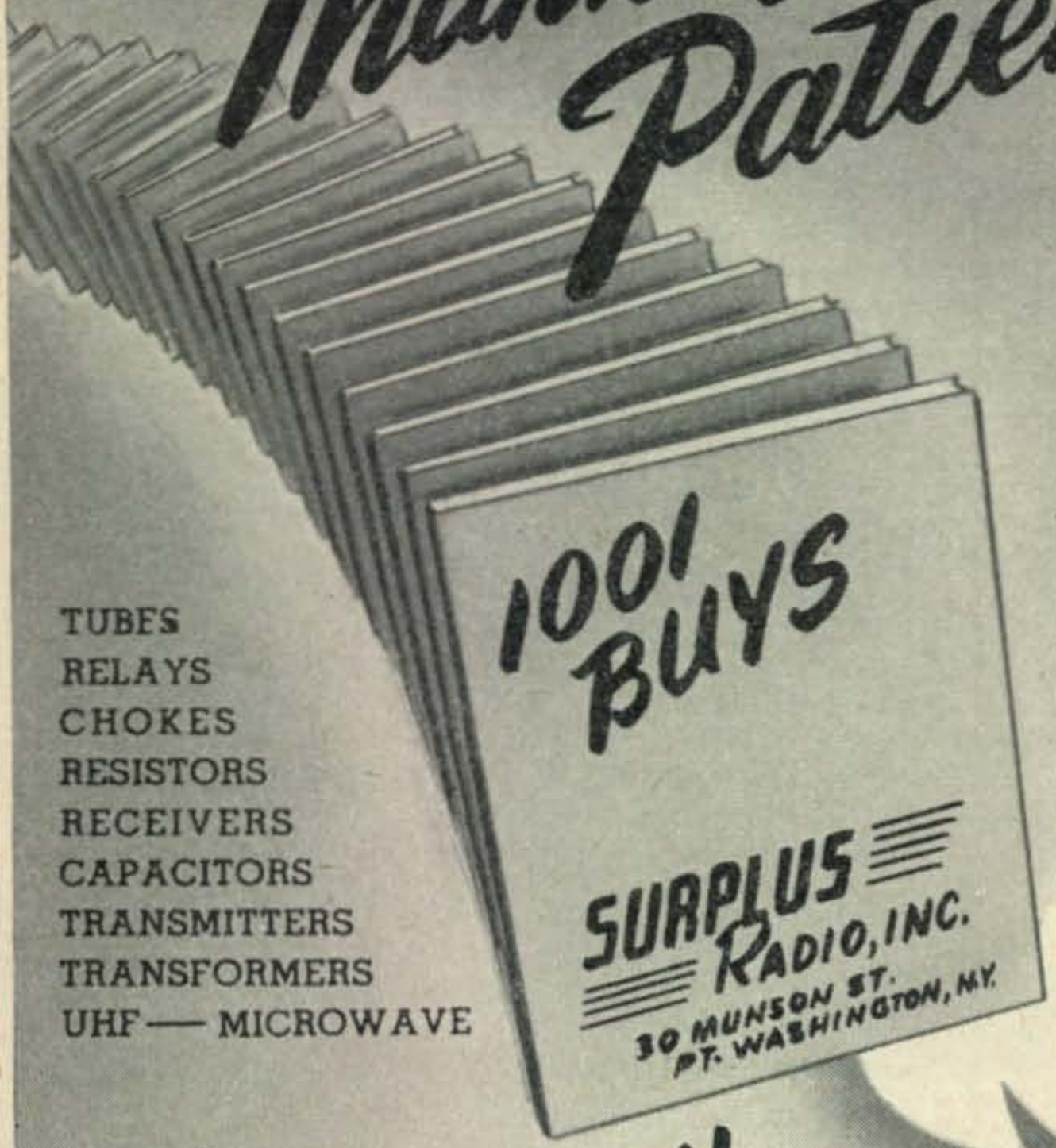
Guest speakers will include old timers in the wireless field and radiomen prominent in all branches of radio. W2ZI's famous collection of old time wireless gear will be on display. Valuable door prizes will be awarded to holders of the lucky numbers. Also to be awarded is a prize for the OM whose radio experience dates back to the earliest days of wireless.

Neither Rain nor Snow . . . . .

This is a true Story! Vern Taylor, WØCUL was notified by the local Express agent that his new Temco transmitter had arrived. Despite the severe snow which buried roads and made them all but impassable, Taylor drove to town, picked up the rig and started back. Caught in a snowbank he walked two miles to his farm, got the tractor and dragged his car the remainder of the distance.

Unable to lift the rig alone, WØCUL got in touch with WØFEE in Goodland, Kansas on 10-meter phone. Because of skip the message was routed via a W7. WØFEE promptly got into his Piper Cub and flew over, landing on a runway cleared in WØCUL's pasture with his tractor. The new rig was on the air within a few hours thanks to the real ham spirit.

Thanks for your Patience!

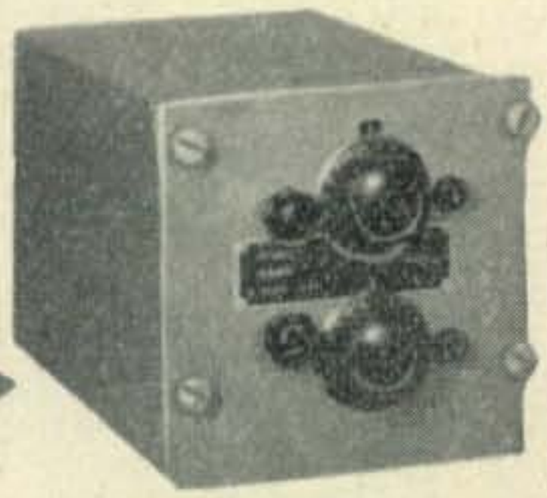


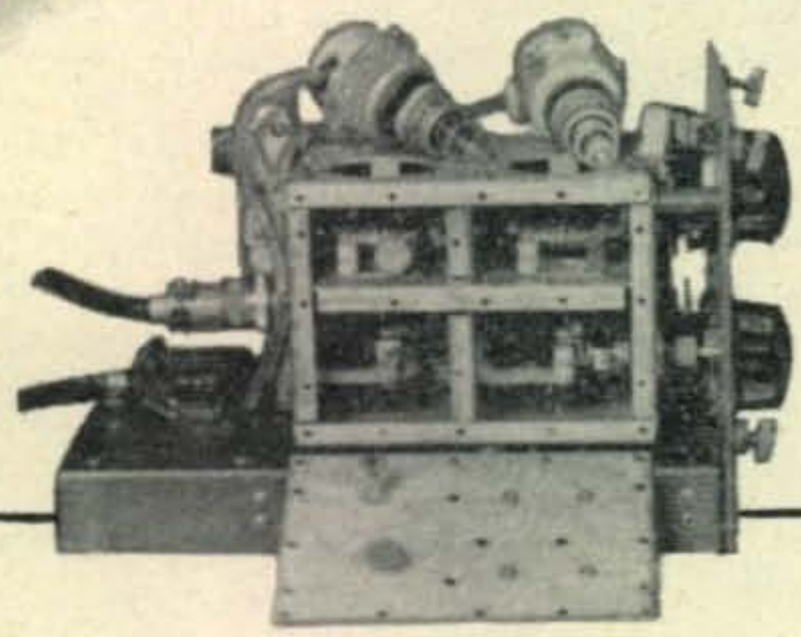
● We know you nave been waiting patiently for your copy of the SURPLUS catalog.
Now here it is, available to YOU!
Packed with the latest electronic components and equipment at prices a FRACTION OF THE ORIGINAL COST.
All equipment strictly BRAND NEW and UNCONDITIONALLY GUARANTEED.

Are you on our mailing list?
Send a postcard for your FREE Copy!

TUBES
RELAYS
CHOKES
RESISTORS
RECEIVERS
CAPACITORS
TRANSMITTERS
TRANSFORMERS
UHF — MICROWAVE

HERE'S AN EXAMPLE





UHF PRESELECTOR
For the UHF GANG!

The Highest Gain Preselector Made!

STOP DREAMING HERE IT IS!

The most efficiently designed unit of its type which has ever been made available to the amateur.
Complete with 3-GL446A tubes, spare parts, cables and sturdy wood carrying case
Original cost $275.
Your cost
All units Brand New. **39.50**

FREQUENCY RANGE: 175 Mc. to 220 Mc. Easily adapted to cover the following bands. 224 Mc; 144 Mc; 54 Mc; 28 Mc.

FEATURES

- Extremely high gain.
- Two grounded-grid lighthouse stages.
- Tuned cathode and plate circuits.
- R.F. circuits individually shielded with silver-plated brass.
- Disk type vernier trimmers.
- National velvet vernier dials.

SURPLUS RADIO, INC.

30 MUNSON ST., Dept. A-1
PORT WASHINGTON, N. Y.

NORTH SHORE (N. Y.) HAMFEST

The third annual hamfest of the greater New York area since the war will be held on April 10th at Lost Battalion Hall in Queens, New York City under the sponsorship of the North Shore Radio Club of Long Island.

John DiBlasi, W2FX, President of the North Shore Radio Club has promised a hamfest that will surpass even the previous two. Amateurs from New York, New Jersey, and New England who smashed attendance records at the early affairs can vouch for the quality of these hamfests.

Accommodations are available for over 1,500 hams. Top-notch speakers and personalties, demonstration of latest equipment, entertainment, a valuable souvenir program, and door prizes that include two nationally known communications receivers are but the highspots planned.

The time is 8:00 p.m., Thursday April 10th at Lost Battalion Hall, 93-29 Queens Boulevard, Elmhurst, L.I., N.Y. There is ample parking space or take the E 8th Avenue or F 6th Avenue train to Woodhaven Boulevard, Queens. Tickets are $1.50 and are available at radio amateur stores or at the door. In addition North Shore Radio Club members, including W2FX, W2FIT, W2PYY, W2KYX, W2BCB, and W2BT can supply tickets.

Sunrise Long Island Radio Club

The Sunrise Radio Club, which has its own shack at 222-34 141st Road, Laurelton, Long Island, meets every Friday at 8:30 p.m. Visiting hams and local amateurs are welcome.

Officers of the club for the year 1947 are: Walter A. Brauer, W2LFY, President; Charles T. Kolz, Jr., W2BKZ, Vice-President; Martin Grob, W2MFK, Treasurer, and John Breen, Secretary.

Metropolitan (Brooklyn) Amateur Radio Society

Organized to meet the demand for an amateur club in ham-congested Brooklyn, the Metropolitan-Amateur Radio Society was recently formed. Meetings will be held every fourth Friday of the month at Livingston Manor, 301 Schermerhorn St., Brooklyn, New York.

Plans call for a club house with workshop facilities, code classes and transmitters and receivers on all bands. Because so many Brooklyn amateurs are living in relatively restricted quarters it is felt that the club will offer them a place to construct equipment and enjoy operating. Officers of the club are: Leon Cohen, W2LVI, President; Walt Zukerman, W2LBF, Vice-President; Jack DeMay, W2NQQ, Secretary, and Dan Morris, W2GBA, Treasurer.

Key Clicks

Converting the ART/13, November 1946, CQ, contains an error in *Fig. 2*. Connections 2 and 7 are reversed.

CQ DX

[*from page 40*]

Hey, you guys, just another word on what you must do to get listed for the first time in the zone and country Honor Roll. You must send in a list of zones and countries showing the call, date and time

of the station worked. Some of you are sending in cards and letters stating briefly, "I have worked 32 zones and 20 countries post-war. You can put this in the list." Naturally, this would be the simplest way for me to handle this thing, but in order to arrive at some standard which will be of mutual advantage, we require a complete list which will cover your original entry. For additions in zones and countries, it will only be necessary to drop me a line *once a month*, giving the full details on the new ones worked. We will then add these to your original list which we will keep on file.

W1GKK said he heard UA1AB on phone calling CQ in the American phone band. George gave him a blast and had a nice QSO. The frequency was about 14240. After about two minutes, everybody was on his frequency, and the next thing he heard was UA1AB on 14375 telling someone, "The frequency I just left sure is hot."

Here's a line from W2RDK. You ask who the deuce is he? Well, he is ex-W8JSU . . . and . . . . furthermore . . . he is the guy whose greatest QRM came from his dad's pigeons flying into his antennas. Charlie's pre-war totals were 39Z and 125C, but, of course, now he has to start all over, since he is in another district. It looks as though he is doing alright with his post-war endeavors, because he has 34 and 73. W1MCW says he has 32 zones and 83 countries, and is running 250 watts into a pair of 812s . . . the antenna being a four element rotary. All this is on 10 meter phone, but we'll need a list before including this with those on the Honor Roll. W9ERU has 36 and 100, his latest being EP1AL, ZC6FP, LA4LA in Spitzbergen.

W8AT has a pretty good system for working new ones. The other day, W8BKP was visiting him, and while there, he took the mike and put out a CQ DX. Back came CR4VV on approximately 28200. W8AT has a new lease on life and is on the air again after a 15 year lay-off. He works 10 phone exclusively and has 23 and 51. Received a card from Pat (one-by-one) Jessup, W2GVZ. As Pat says, he's climbing up "one by one", and every few days, a card arrives giving his latest. This is O.K., but it would be much easier on this end if the contributions were sent in once a month. Anyway, 2GVZ is *way up* to 13 zones and 25 countries.

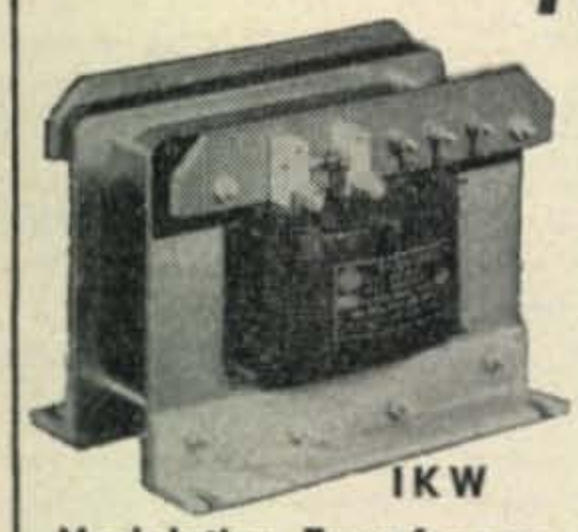
W3IYE send in a nice post-war list of 37 zones and 107 countries. Roy said he could have done better, but has been slowed down because it has been possible to be home only week-ends during the past three months. His rig uses a pair of 813s running between 250 and 700 watts, depending on his mood.

W5JJA has worked 30 zones and 74 countries and never touched this DX business before the war. I would say he is doing O.K. W6JFJ worked G6ZO on 40 meters January 19. Bruce runs about 125 watts, his antenna being a V beam headed for Europeans.

Speaking of G6ZO, W6LHN worked him on, of all things . . . 80 meters. As far as I know, that's the first 80 meter post-war W6—Europe QSO. W6KRI has knocked off about 10 countries on 40 meters, which, of course, is nothing for the boys on the East Coast, but we think it's pretty good out here. W6SA worked a good one recently in EP3D, approximately 14190. W6WB is active in the San Francisco area, and it's good to hear Bud pounding brass again. He said he was quite sure he had worked a few zones, but wasn't quite sure which ones. Guess I'll have to take my zone map with me, the next time I head for San Francisco, and bring Bud up to date.

In a copy of "Shortwave Magazine", published in London, we see a few items in their DX column, which is written by G6QB. I know he won't mind if

SAVE! ON THESE AND THOUSANDS OF OTHER BARGAINS IN STOCK FOR *IMMEDIATE DELIVERY*



1KW

Modulation Transformer

SPECIALLY PRICED AT **$14.95**

We have a real value in a modulation transformer. This item, made by RCA TO BROADCAST SPECIFICATIONS, is conservatively rated at 550 Watt audio to modulate that new KW rig. Really rugged construction with protective flashover gaps which are adjustable. Terminals and gaps are mounted on a "Mycalex" terminal board. The laminations that make up this transformer are of high audio quality and are extremely thin, making it impossible for the core to "chatter or talk." Audio Watts—550 Sec. #1—450 Mils Sec. #2—80 Mils Turns Ratio—Pri: Sec. #1-1:1 Pri: Sec. #2-5:1 Pri: Sec. #2 Tap-25:1 Impedance Ratio—Pri: #1-1:1 Sec. Pri: Sec #2-25:1 Pri: Sec #2 Tap-625:1 DC Resistance—Pri., 135 ohms Sec: #1 112 ohms; Sec. #2 99 ohms Transformers insulation tested: Pri. 8000V.; Sec. #1-11-000V; Sec. #2-2000V. to the rest of the coils and core. Primary center-tapped for Class "B" modulators. Secondary #2 will carry 80 Mils to modulate screens of beam power or screen grid tubes. Primary will match any Class "B" tubes up to 10,000 ohms plate to plate, such as 810's, 75T's, 8005's, ZB120's, 203's, HY51Z's, 211's, 813's, 828's, 805's 203Z's. Size 8½" wide, 7½" deep, 7¼" high. Heavy channel iron mounting brackets. Weight approx. 40 lbs.—Cat. No. MT-100

Something You Can't Be Without

PIN STRAIGHTENER

For miniature tubes—Gov't cost $4.80 our price—Cat. No. P10 **49c**

MICA CAPACITATOR

Mica capacitator .002 MFD 3000 WVDC Cat. No. RT-101 **49c**

IF TRANSFORMER

IF transformer, mounted in aluminum shield can, 1500 KC, with air trimmer, impedance coupled type—Cat. No. T-19 **95c**

30MC IF TRANSFORMER

30 MC IF transformer in square aluminum can, silver slugged tuned—Cat. No. T-20. **29c**

Butterfly Condensers

Ideal for high frequency work.

Type A—frequency range 75 to 300 megacycles to be used with 955 tubes. Cat. No. BC-1

Type B—frequency range 300 to 1000 megacycles to be used with 368AS doorknob tube. Cat. No. BC-2

Sockets part of assembly on both. **95c each**

Order by Catalog Numbers!

CONDENSERS

CATALOG NO.	CAP. MFD.	WORKING VOLTS	YOUR COST
C110	1	5000 OIL	$3.95
C111	3	4000 OIL	$4.95
C112	1	1000 OIL	44c
C113	4	500 OIL	49c
C114	8	600 OIL	95c
C115	2	600 OIL	49c

VARIABLE CONDENSERS

100 MMFD variable APC type—Cat. No. T-21. **59c**

30 MMFD variable APC type—Cat. No. T-22. **25c**

12 MMFD variable ¼" shaft—Cat. No. T-23. **30c**

CHOKES

Thordarson 8 HY 150 M choke—Cat. No. FC-201. **95c**

Thordarson 8 HY 175 M choke—Cat. No. FC-202. **$1.49**

Thordarson 12 HY 25 M choke—Cat. No. FC-203. **39c**

Thordarson 8 HY 350 M choke—Cat. No. FC-204. **$4.95**

Thordarson T48003

Thordarson 2H-7H 550 MA swing choke size 4½ x 5½ x 5½ square black crackle case. Cat. No. FC-205 **$5.95**

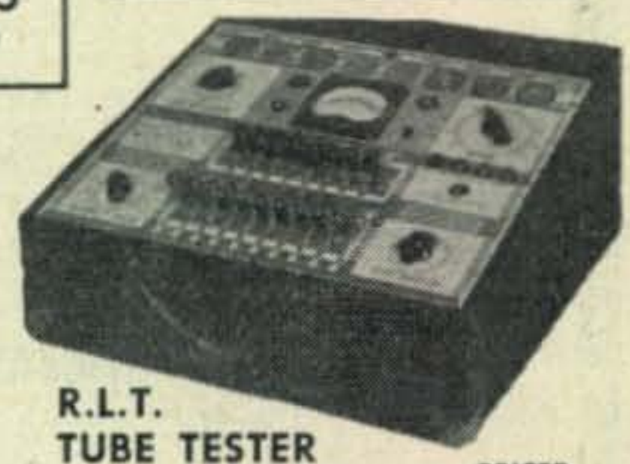
Filament Transformers

Thordarson 6.3 V—4 amps., 6.3 V—4.5 amp., 9.7 V—.5 amp., pri. 110 V AC 25 or 60 cy—Cat. No. FT-11 **$1.95**

Thordarson pri. 110 V 60 cy.—sec. 6.3 V 6 A, CT—Cat. No. FT-12 **$1.49**

Thordarson 110 V 60 cy. pri., sec. #1—2.5V 10 A CT, 3000 V ins., sec. #2 10 V 3.25 A, Two 5 V 3 A; 6.3 V 1 A—Cat. No. FT-13 **$4.95**

All Orders F.O.B. Detroit

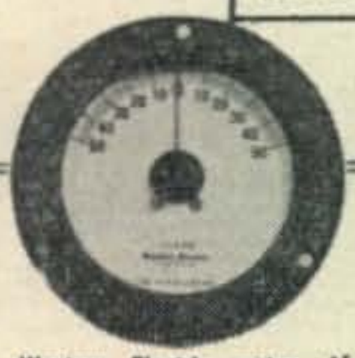


R.L.T. TUBE TESTER

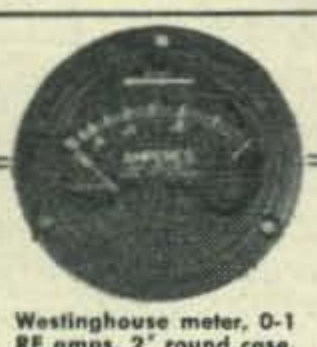
Tests all tubes up to 117 V. • Tests shorts and leakages. • Tests individual sections. • Works on 90-125 V 60 cycle AC. • Comes in portable cabinet complete with all operating instructions with 8d. Cat. No. TT-100

PRICED AT ONLY **$49.95**

Westinghouse meter, 0-1 MA movement, 2" round case, scale calibrated 0-140 and 0-500. Includes mounting hardware. Cat. No. M-101. **$2.95**



Western Electric meter, 4" round, zero center, 0-½ MA each side. Cat. No. M-102. **$3.95**



Westinghouse meter, 0-1 RF amps, 2" round case, internal thermocouple, in original box. Includes mounting hardware. Cat. No. M-103. **$2.95**

SHALLCROSS ACRA-OHM WIRE WOUND RESISTORS

2,000 ohm	60,000 ohm
3,300 ohm	65,000 ohm
9,000 ohm	70,000 ohm
15,000 ohm	75,000 ohm
18,000 ohm	100,000 ohm
25,000 ohm	160,000 ohm
30,000 ohm	600,000 ohm
50,000 ohm	

±1W **39c each** 3 for $1.00

1 MEG. . 89c

TUNING UNIT

Tuning unit BC 375. Approx. 65 MMFD cond., coils, RF chokes, dials, asstd. mica condensers 2500 WVDC, over $50.00 in parts. Cat. No. TU-101. **$3.75**

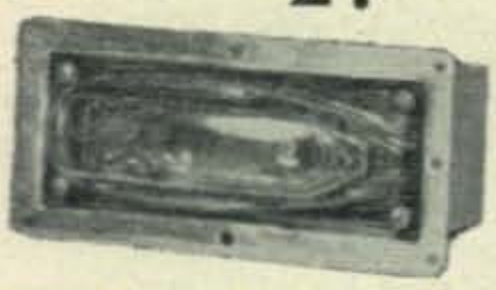


PHOTO FLASH TUBE

Photo Flash Tube. High speed photo flash tube, 12,000,000 lumens light output. Stops all action. Ignition coil included on back of bulb. 10,000 flashes. Diagrams furnished on request. Your cost Cat. No. PF-101. **$8.95**

SELSYN MOTORS

The ideal way of indicating the position of rotary beams, wind indicator, etc. (400 cycle). Line cord and instructions for 110 VAC operation furnished.—Cat. No. SM-100. **2 for $3.95**

DYNAMOTOR

Power supply—inputs 6 or 12 V, output 500 VDC at 160 MA, mounted on box with circuit breakers, relays, interference filter and two 10 ft. cables. U. S. Govt. surplus. Cat. No. DM-101. **$9.95**

Receiver and Transmitter

SCR-522 USED in good cond.

100-156 MC receiver and transmitter complete with 18 tubes. Cat. No. RT-10 **$29.95**

Transmitter and Receiver

Has been widely used on the 144 MC band. Shipping wt. 100 lbs. U. S. Govt. surplus. Your price, less tubes and power transformer. Cat. No. RT-102. **$14.95**

Hot Spot Specials

- Asst. resistors ½ watt fully insulated in popular ohmages per 100—Cat. No. R-5. $1.49
- Asst. mica condensers per 100—Cat. No. C-12. $1.95
- Wafer sockets 4-5-6-7 & 8 prong per 100 Cat. No. WF-4. $2.95
- 12" Utah P. M. Speaker Alnico #5 with 6F6 output transformer—Cat. No. 5T. $6.95
- Asst. knobs push on wood & plastic per 100—Cat. No. KP-100. $1.95
- 6J4—$1.50, 6J6—95c.
- Johnson sockets #210—25W—Cat. No. JS-210. 49¢
- 75,000 ohm 200 W bleeder—Cat. No. B-75. 49¢
- 955-9004 tubes—Cat. No. T-99. 65¢
- Sockets for acorn tubes—Cat. No. AT-10. 19¢
- 8-8 MFD 350 WVDC, 20 MFD 150 WVDC, round can—Cat. No. RC-88. 69¢

Write for **FREE** *Bulletin*

HERSHEL RADIO CO.

5249 GRAND RIVER DETROIT 8, MICHIGAN

20% DEPOSIT REQUIRED ON ALL C. O. D. ORDERS

we lift them. One of them has to do with VU2AJ disclosing that every Saturday at 1100 g.m.t., the boys out there have a QSO party in which AC3SS and AC4YN frequently join. This is on 20. (That's the kind of a party I would like to get in on).

W3EVW is a little uncertain as to the number of zones and countries he has. He says providing so and so, and so and so counts, he has 36 post-war zones and 90 countries. This might be as good a place as any to, once again, say to you fellows that we have been quoting the totals of your zones and countries directly from your cards and letters. By the time you read this, the zone map and Official Country List will have been published, and I have a hunch it will make a few changes in some of the totals.

W8BF has worked 35 and 90 for his post-war phone total. He also worked UA1AB, who, at that time, was on about 14320, and VQ4ERR on 14340. 8BF gives the QTH of TR1P as AACS, APO 498, % P.M. New York.

W3JTC, ex-W9UHQ, has gone and converted himself over to DX. The first contact he made on 20 was VS9AN, and since that time, he has worked 59 countries. His rig is a pair of 814s with 150 watts input. His antenna is a single wire, two waves long, running right into the shack. Most of his DX has been worked with the use of only one crystal at 14150 kc. He is getting a big kick out of 40, and like many others on the Atlantic Coast, says the Europeans and Africans really roll through. Some of his better stuff on 40 include KP6AB, KH6FG, ZK1AE, W6NQG/KM6, ZS5FE, SM7FN, LA7YA, OK1FF, and many G, F, ON4, ZL and VK stations.

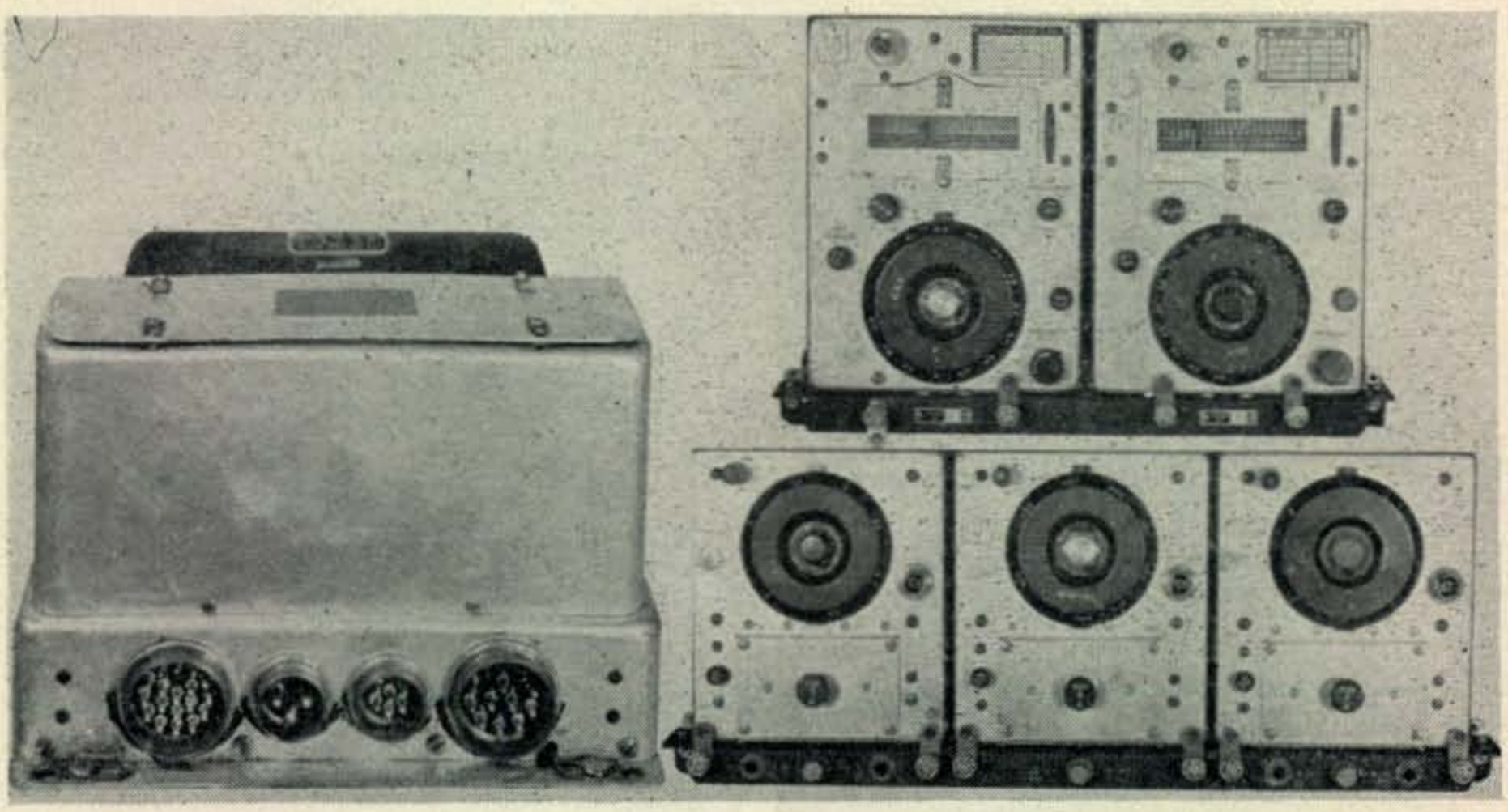
Well, it looks as though yours truly is finally on the air with something more than 33 feet of wire hanging up. We finally have the 10-20 Mims 3 element beam on top of my 60 footer. I can thank Leo Shephard, W6LS, Eric Firth, W6EAY, and a couple of husky linemen. A couple of Sundays were required to execute the entire juggling act, and since W6LS has used one of these beams for years, he is a past master at installing and tuning up. You may recall that I mentioned obtaining this Mims shortly before the war started, and it's been in cold storage for over five years. Since this particular QTH doesn't lend itself to long wire antennas, such as V's and rhombics, this beam is going to come in mighty handy. Of course, hundreds of you fellows have put up rotary beams, and many of you will know it's not a job you can accomplish just by getting a couple of parts together, running out the shack door, and hanging them on a pole. This is the first one I've ever attempted, but . . . no . . . that's wrong . . . frankly, I had little to do with this thing. We had planned to finish putting up the rotary, but it was necessary for the XYL and myself to make a trip out of town. So, these big hearted guys went ahead with the job, and upon getting home Sunday evening, there was a nice new three element beam all tuned up raring to go. LS still thinks it was a put up job , . . running out on him. The pay-off was, upon looking in the log, the first station worked in testing the antenna was . . . W9FID. Of course, it was gratifying to know that I can still get into the 9th district. And, to bore you further, the first DX QSO was with my old friend Peter "Ginger Rogers" Pennell, G2PL. By a strange coincidence, Pete had put up a new rotary, and this was his first DX contact.

That's about the works for this time, but once again, let me ask that you fellows send in your complete lists of zones and countries, and we'll get the Honor Roll started as soon as possible. 73.

FAMOUS A.A.F. COMMAND SET

SCR-274-N VALUE $600.00 $34.95

NOW AVAILABLE Only



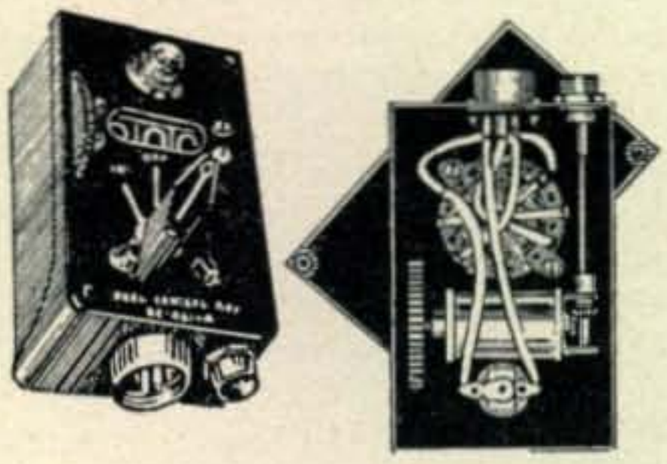
This complete combination package consists of 3 receivers—the BC-453-A (190 to 550 kc) the BC-454-A (3.0 to 6.0 mc) and the BC-455-A (6.0 to 9.0 mc). These receivers operate from a 24-28 volt source and each contains a separate dynamotor for plate power. These receivers are very sensitive, incorporating an RF stage, BFO for c.w. reception and make excellent receivers up to approximately 10 mc.

The two transmitters, BC-457-A (4-5.3 mc) and BC-458-A (5.3 to 7 mc), consist of a master oscillator tube (1626 or 12J5) exciting a pair of beam tetrodes in the power amplifier stage (1625's or 12 volt 807's). The tubes in the amplifier are connected in parallel. Included in each transmitter is a Piezo-electric crystal and an electronic resonance indicator for calibration. The transmitters are complete with dynamotors.

The modulator (with dynamotor) contains all necessary circuits and components for plate and screen modulation of the transmitters.

All mounting racks, remote control boxes, jack boxes, and shafting are included in this superlative offer.

These components are practically new and have had "ferry" time only.



REEL CONTROL BOX

BC-461-A

Contains 3-Wheel Veeder Counter. Complete with Flexible Shaft.

Counts number of feet of trailing wire antenna. Jeweled dial light, applicable for many uses.

Value $20; Your Cost . . . 95¢

TERMS: 20% DEPOSIT WITH ORDER—BALANCE EXPRESS COLLECT

LIBERTY SALES CO., INC.

115 WEST BROADWAY
NEW YORK 13, N. Y.
BArclay 7-6063

YL'S FREQUENCY

[*from page 46*]

far I seem to be the only female operator in these parts, I mean—in our county. The name of the club is the Cascade Radio Club . . ."

Miriam mentions further a sked among four W7-YLs. Besides herself, Liz, W7HDS, Mary Ann, W7FWR, and Inez, W7JKX, are meeting on 3760 kc with hopes of organizing a YL net in their area. Local YLs take heed.

Congratulations to Lillian Ruocco, W2PMA, who's just been elected YLRL Second District Chairman. Lil's the hard-working secretary of the New York City YLRL club.

Her predecessor as DC-Lenore Conn, ex-W2NAZ —is quite grateful to the FCC for giving her the call W6NAZ. Lenore, now in Los Angeles, is back on the high end of 40 and on 75 with an 80-meter zepp.

Another W2-YL who's moved to California is W2RBU, Ellen White, now of San Diego.

W2PBI, Jerry, reports a new four-element close-spaced rotary beam for ten meters. All elements are mounted on a boom and the entire beam is made of duraluminum, weighing about 18 pounds. Short skips on ten should be a cinch for Jerry, who, we learned was national 80-meter hurdle champion in 1936. From 80 to 10 . . . a good leap in itself.

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

[*from page 44*]

recorded an MUF of 43.5 mc at 2500 miles. Also, the cross-country work of W4GJO-W6QG indicates it was not by *F-2* layer transmission, as the density would have shown up in the reports of the Baton Rouge ionosphere sounding station. In the part of the sunspot cycle we are in at present, *G* layer patches are very frequently observed. They are usually not any higher in density than the *F-2* region, but because of their greater height, 400 to 500 km, they get the 6-meter signals back to earth. All this is interesting, and shows we have lots to learn about the ionosphere. We amateurs can continue to play an important part by sending in reports of any skip DX. After we use them they are forwarded to Perry, who compiles reports that eventually get to all parties interested. It is important to see that amateur work is fully recognized. How's about it, gang, let's get those reports in before the 25th of each month.

Poncho, W6WNN ex-W9LLM, says the activity on 50 mc in the San Diego area is small with only 3 active stations. W6JUM has 300 watts to a pair of 35 TGs and a 4-element horizontal beam. W6BOS runs 70 watts to a 829 and a 4-element horizontal beam.

Clair Gould, W4JSU, ex-W9AQQ in Indianapolis is in a dither as to his receiver for six. Seems he is crossed up whether to get an ARR-5 or buy a BC348-Q and build a converter. At any rate Clair will be in there, come the merry month of May and gunning for the old 56-mc gang.

Bruce Parsons, W2COT says the gang in the N.Y. area are now holding a round table on six, each Monday night, and invite new additions to join them.

W4GJO says that W5LIV in New Mexico, who heard him several times last summer, has left, and another chance to work a hard-to-getter is lost. Grid also says that the London TV station has been coming in lately, reaching S-9 peaks, but nothing in the way of DX from across.

"TAB"

That's A Buy

CRYSTALS NEW GUART'D IN FT243 HOLDERS ACTIVE OSCILLATORS, GOOD DOUBLERS AND TRIPLERS, "BT" cut 2cys per deg C per Mc. Four for.....$3.00

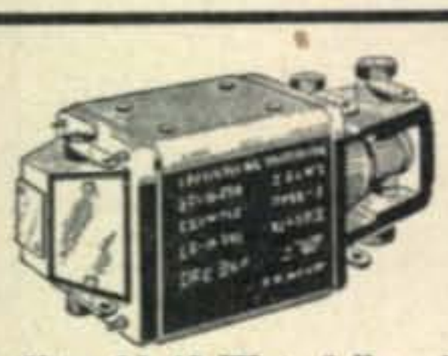
6250 to 6750 (6MTR)
6797 to 6863 (11MTR)
7000 to 7425 (40, 20, 10MTR)
8335 to 9000 (6MTR)

OTHER FREQUENCIES AVAILABLE
Crystal Std 200fkc +10cys.....**$5.95**
Dual socket CINCH Mica B', 2 for.. **.25**

TBY Vibrapack & storage battery new Willard 4V/40AH V'pack output 156V/30ma, 3V/375ma, 1.5V/200ma 7.5V/20ma, Navy manual, NEW Gtd Complete.....**$9.95**
TBY Vibrator & CK1005 Rect tube, spares..... **2.50**
THERMADOR transf cased SC Cont duty Pri 200, 210, 220, 230, 240V 440V/50-60cys; Sec 3800VCT 6KW/2.7 Amps (G'Cost $365) New gtd.....**$45.00**
Transf line to line 500, 333, 250, 200, 125, 50 ohms ±1DB Cased Thermador mfgr. Gtd new.....**$1.95**
175ohm cased choke 10Hy/125ma/175ohm, 2 for **2.68**
Cased CHT Choke HV insltd 50Hy/125ma..... **2.50**
WE Dynamic mike 20' cable D-17334D-A..... **9.95**
Kenyon Dynamic mike to G transformer..... **1.95**
GE Door-Lock interlock safety switch 2 for.... **1.38**
Micro-Mu Switch Leaf SPDT 15A/125V Two for **1.08**
EDISON TIME DELAY RELAY 115V/10amp **1.49**
PRECISION 1 Meg W. W. RESISTORS, 3 for.. **2.50**

GR VARIAC 200CU/860WATT.....**$14.95**
GR VARIAC 200B/170WATT..... **9.95**
TRANSTAT 88 to 132V/18.2Amps-110V **29.50**
POWER SUPPLY RELAY RACK TELETYPE SYSTEM Variable inpt 115/230V-50/60cy output 0.4 Amp 115VDC Ripp e 0.5%RMS-Outputs up to 1.5Amp DC WE-KS-5825-"TAB" SPECIAL.....**$25.00**

WE 509 Headset & 8ft cord & plug new ($12)....**$4.95**
POWER RHEOSTATS 25Watt-400, 500, 2500, 25000ohm Ohmite Clarostat, H&H, 4 for... **3.00**
Rheostats 50watt-8, 60, 100, 225 OHM 4 for.. **3.96**
WE Xtals boxed sealed 1N21, 22, 23, 25, 3 for.... **.99**
GE METER 2½" B'C one amp RF..... **3.95**
GE Meter 2½" B'C five amp RF..... **3.50**
GE Meter 2½" B'C One milliamp..... **2.95**
GE 2000V/1000ohmsV 2½" B'C & mult..... **8.95**
GE DN1 Min 1½" MTR one ma/100ohms..... **2.95**
WSTGHSE Dual AN IND 200microamp..... **4.50**
GE 2.5 & 25 ma zero ctr Galvo 3½" B'C..... **3.95**
SIMPSON ONE MA 3½" B'C Type 25..... **3.95**
WESTON 476 SQ 3" B'C 15VAC ($10)..... **4.25**
WESTON GE-10 plus 6DB 500/600ohm L..... **3.95**
GE Pyranol 15mfd/330VAC/1000WVDC, 2 for.. **5.50**
304TL, Gtd, 2 for..... **7.81**
6J4, Gtd, 2 for..... **2.98**
VT127A/100TH, 2 for..... **5.98**
Vacuum Relay Switch 15,000V/10A..... **3.95**
UTC 3200VCT/200ma Trans, Chokes, Condensers, 866A's & filament transf 200ma DC/115VAC ...**28.95**
Collapsible Telescopic Ant., AN30, 12" to 9 ft....**1.49**



NEW NAVY DYNAMOTORS EICOR DC GT'D overseas packed. AN insp Hi-eff. CONT. duty, input 12V/4A or 24V/2A, output 500V/50 ma: Input 12V/8A or 24V/4A output 275V 110 ma & 12V/3A. Either UNIT **$1.95** or both units (2) & filter **$3.49**, Wgt. 9 lbs., 7¾" L x 2⅞" H x 4¼" W. Adaptable to 6V operation. Alnico Field.

$2 Min. order FOB N.Y.C. Add Postage all orders and 25% deposit. WHitehall 3-3557. Send for catalog 300. Specialists in International Export. School, College & Industrial trade. Money back "TAB" Guarantee.

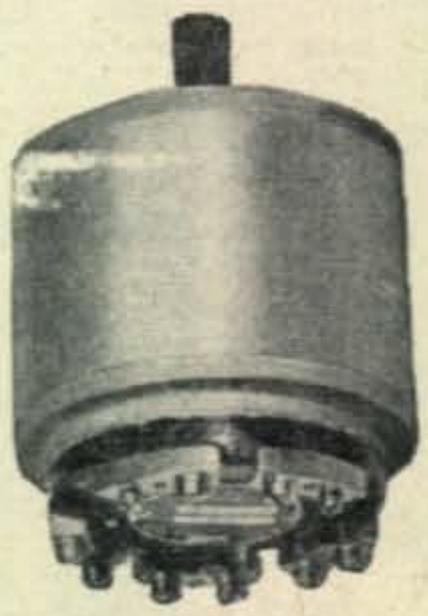
RCA 808 JAN-CRC New Gt'd Fil 7.5V/4 Amp Plate 1500V/200 Watts Rated 140 watts output each "UHF" (List $7.75) "TABS" PRICE $2.70. Two for..**$5.00**
1625 (S'807) Boxed new, 2 for..... **1.30**
446A/2C40 Lighthouse Tube..... **2.85**
807 JAN GTD New, Two for..... **2.00**
304 TL GTD New, Two for..... **7.81**
955 JAN GTD. 2 for **1.45**
956, 957, 958A, 959 & socket, each. **.90**
872A New & sockets, Two for **5.75**
866A New & sockets, Two for... . **2.00**
3B24 HV Rectifier 20,000V/60ma... **4.95**
2V3G JAN HV RECTIFIER 16,500V (3.40) Two for **1.50**

6AL5 Boxed new Gt'd 3 for.....**$2.25**
6H6, 3A4, 6C4 JAN GTD new c68 @ Two for... **1.25**
2050, 2X2, RK60/1641, 6SL7, 1E7G New..... **1.25**
6SA7, 6B8G, 6SN7, 6J6, 6V6, 9006 New @..... **.84**
6AG7, 6SQ7, VR105, VR150 (LP $3.20), 2 for .. **1.60**
5Y3GT Rectifier new Gtd @ 59c Two for.....**1.00**
NE16/991 Neon ¼W Glow lamp (LP45) 4 for... **1.00**
35L6, 50L6, 35Z5, 12SQ7, 12SH7 Two for..... **1.80**
MAZDA No. 323 3V/190ma (LP $1.85) 4 for... **1.00**
MAZDA No. 49 Min Bay 2V/60ma, Ten for.... **1.00**
NE15&51-1/25watt Neon Glo-Lamp, Ten for .. **.80**
MAZDA 44 Min Bay 6.3V/250ma, Ten for ..... **.75**
NEON U-4GT SIGLITE dual tel plug, 3 for.... **1.00**
WE 717A Door Knob tube Two for..... **3.85**
WE 703A UHF Door Knob tube new ($40)..... **5.95**
Littlefuses 250ma/3AG (LP.25) 48 for..... **1.00**
Condenser kit silvermica & mica 50 for..... **2.00**
Resistor kit BT½&1watt 50 to 2 megohms ass't.. **2.50**
Control kit ABJ, 50 to 2 megohms, ten for..... **2.50**

829B/3E29 Boxed Gtd new.....**$2.90**
3BP1 Boxed JAN new Gtd & socket..... **2.99**
5BP1 or 5CP1 new Gtd..... **3.95**
2C26 Boxed new 10 watts UHF 2 for.... **1.50**
954 Boxed new Gtd @ 50c Five for..... **2.00**
6AK5 Boxed new Gtd @ $1 Ten for.....**8.90**
6AG5 Boxed new JAN @ 81c Ten for... **7.49**

Oscilloscope 3" Kit 3BP1 includes transformer 115V/60cy Pri, 375VCT/110ma, 1320V 5V/3A, 2.5V/3.25A, 6.3V/2.75A, New 3BP1 C'Ray tube, 5Y3GT Rect tube 2V3G Rect tube, Condsrs, choke, LOW & HV supply, Complete.....**$16.95**
Transformer cased "LANGEVIN" Pri 105 to 250V-50/60cy; Sec 2240VCT/500ma 12V/4.5A 19.2V/2.5A, 2.5V/10A HV insltd $11.50; Two for..... **19.95**
Transf Hmt'clly cased pri 50/800cy-80/115V Sec 1000VCT/110ma, 6.3V/5A, 5V/3A, Three 6.3V/.65A, 6.3V/1.25A & 2 H'cased chokes 10Hy/110ma & 2 oil condsrs 3mfd 330VAC 1000WVDCPyr. & RK60 **9.95**
1N34 Sylvania Germanium crystals..... **1.39**
5BP4 & Socket, Gtd. **6.49**
805 or 845 & Socket, 2 for **8.95**
CW3 Recvr Relay Rack mtd 3½" x 19", Fixed tuned Xtal Control. New Superhet uses 6K7RF, 6K8 Convtr, 6K7IF, 6C8G Det & BF0, 6SN7BF0, 6C8 Audio, 80 Rect, Complete 115V/60cy pwr supply, case, tubes, manual, use as convtr or VFO..... **13.80**
Antenna Sections SC, M550, 39¼" long, 12 for **11.00**

NEW SELSYNS TYPE XXI, AC SYNCHRONOUS REPEATER 115V 60cy—Made for Gunfire control; Guaranteed Ordnance Insp; Hi-accuracy; Continuous duty. Packed for overseas shipment, complete with Insp Calibration report. Per pair...**$7.95**



"TAB," Dept. Q3A, Six Church Street, New York 6, N.Y., U.S.A.
CORNER OF CHURCH & LIBERTY STS., ROOM 200

Bill Copeland, WØYKX of 56-mc 12-element H array fame is now on 6 and has been running skeds with the Beavers. To date sigs have been very weak, which is discouraging, as on 56 mc he used to easily work WØZJB at 200 miles during the winter months. This suggests that perhaps six-meter signals do not get the benefit of bending as they did on 5 meters. Bill has 250 watts to a pair of T-40s, feeding a 4-element closed-spaced beam 40′ high. The converter uses a 6AK5 r.f., 6AS6 mixer and 6C4 osc. The mixer tube is a new type of miniature tube, similar to the 6AK5, except the suppressor is brought out separately and the h.f.o. is injected there for mixing. Bill says its plenty hot and the signal-noise ratio is better than when using a 6AK5 as a mixer.

Louie Cox, W7ACD of Shelley, Idaho is building up a 4-element beam and has an ARR-5 receiver, which he says looks like the best bet for those desiring a general coverage of the bands from 27 mc to 146 mc. Louie will have 400 watts to a pair of VT-127As for the summer's DX.

Harold Balyoz, W6YBP, was the first one we have talked to who had converted his ARR-5. Harold by-passes the 1st r-f stage and couples the antenna into what is normally the 1st r-f plate coupling coil. In series with the antenna he uses coils to hit the three bands and tunes them with a 50-$\mu\mu$f condenser.

Herb Spoonts, W5LIU, reports on the Ft. Worth gang, indicating some new converts will be on the band.

W5FRD has 200 watts to 6 half-waves in phase, 2 over 2 broadside, east and west. The receiver is a converter ahead of an HQ-129X, using 6AK5, 6BE6, 6C4. W5JDL has an 807 at 70 watts into a 3-element beam and a SX-42 receiver. W5CVW has 100 watts to a 829-B, S36 receiver and a doublet antenna. W5LIU has 60 watts to a 807, and at present an SX-16 receiver although a converter is being built. Antennas are various lower frequency long wires, but a beam is coming up.

Herb says that W5EYU, W5CHU, W5GVZ, W5CVA and several others have promised to get on before May, to get in on the fun, without "ole demon QRM" messing them up. They would like to add stations to their net in the vicinity of 100 to 200 miles, and if possible up through Oklahoma (W5HLD), to the Eager Beavers and thence to W8SLU. Any of you interested drop us a note and we will line something up to try and get a message from the Texas gang to as far east as possible. Perhaps sometime in May when the bending is more prevalent, how's about it, is it a deal?

The Corpus Christi gang now includes W5LOW, W5AOK, W5MDO and W5GEL, the latter two being new but eager to get some of those fb contacts they have heard others doing.

WØHXY says his log for Nov. 24th, when the band was open to England, shows a short contact with WØSV after he had called CQ DX, and a notation that WØDZM was calling G5BY on six and rebroadcasting his (G5BY) ten-meter signals to the six-meter gang. Phil was an interested listener while doing some carpenter work at the same time. Since Jan. 19th, the gang around Minneapolis has been calling WØQIQ in Marshall, but n.d. so far. Skeds are kept with WØYSJ in Fargo, N. D. which have not materialized as yet. WØYSJ is reported running 400 watts and has a Gonset converter; another of those hard to get states now showing some activity.

W9AB has been running skeds with W9PK (185 mi) and they have been clicking twice a week. He has received lots of cooperation from 9QCY, 8JLQ, 9MBL and 8CVQ but so far they aren't

working out like the skeds with 9PK. Harry received from Santa a new 3-element beam which he now has mounted 24 feet. Of course, on Jan. 12th, when the band was open for DX, the power lines in his city went down and made him miss the opening!

Howard Zeh, W8JLQ, says his skeds with W9AB haven't panned out yet, as they seem to have inverted-temperature inversion! Howard lists these stations now active in the Toledo vicinity, W8SUI-50.4 mc, W8NMU-51 mc, W8YKF-51.15 mc, W8RQI-51.4 mc, W8ZQE-52.35 mc and heard that W8QUE, Denver Union was back on the band. Howard would like to see the vertical gang around Dayton and Cincy get horizontal-wise.

Here's a letter from Bud Justinak, W7GBI, who now is back in Montana, at Stanford. He has a Flying service there and will be on six with his old 5-meter, 250-watt rig and has realigned the DM-36 for 50 mc. In the new hangar he is building he has reserved a place for the rig and will have the antenna on the top. His frequency is 51,728 kc. Bud, incidentally, heard the contact of W8CIR/1-W6NAW while in Long Beach and said he pulled plenty of hair when he couldn't raise the transplanted Boston boy.

W9ALU in Metamora, Ill., heard W4EQR make his debut on six Jan. 12th, with a nice strong sig, and later on he heard W5FRD and W5WX. He also sends this info about Mr. Zearing of Graybill, Ill., namely W9ZHB. As May is the best month for 50 mc Es, Ed will take his vacation of 28 days and if the band is good will extend it to 32 days. Yep, we could say something here, but as the Chaplain said the last day we were in the Army, "Leave us not be bitter." However, Ed, we are willing to stack *that* 50-cents against another, June will be a better month for 50 mc DX than May. Is it a bet?

W7HEA, says W7AWX has a mobile rig going now, and as he is a traveling salesman he carries a big six-meter needle to give all his ham customers an injection each time he calls on them. Watcha use in the needle, AWX, a combination of MUF and E_s? The boys there in the Yakima Valley net are still looking for something to happen and will be in on it, if same occurs.

A card from W8TOB in Lorain, Ohio, says he is now ready for six-meter work with 200 watts to a pair of 35Ts and a 3-element beam on 50,186 kc. So far Chuck hasn't heard any 50-mc signals from the Akron or Cleveland area.

The 144-Mc Gang

Sam Harris, W8UKS of Lakewood Ohio, near Akron, sends us the best report yet on 144 mc. Sam has one criticism to make and that is the material contained herein is not what he keeps looking for each month. In other words he doesn't feel that too much copy should be given to a night when all the gang was enjoying DX and they all knew it was open, but he would rather see info on what the gang does when the band isn't open. Such as his normal working range, how many nights a week can he work a station some distance away, does c.w. extend the range and what changes he made when he extended the range from 50 to 100 miles? W8UKS goes on to ask what results in miles did he experience when power was raised or lowered and how does he organize his DX work so that he can keep his maximum range moving further away? He ends up by saying inversion is a nice thing to set DX records with, but is a poor comparison on a cold winter night when inversion isn't in. Yes, Sam, you are right! It would be an answer to the Editor's prayer if reports would give those facts.

So gang if in the future you can follow the outline of Sam's report we could present a much better picture in the column, on any of the bands. As a suggestion read Sam's report below and next time you send us one, try to follow his outline.

The rig at W8UKS is 600 watts to a pair of VT-127As, xtal controlled. Antennas are a three-section (45 degree) reflector behind a double extended Zepp with directors, a two-section, square corner reflector behind a pair of half-waves in phase (for a higher angle of radiation), and a four-bay turnstile for general coverage. The two section is 55 ft. high and the three section is up 75 feet. The turnstile is around 90'. Really quite an elaborate set-up.

The receiver is a converted SCR 624, with a two-stage grounded grid preselector, feeding into a 10-mc i.f. for MO and 456 i.f. for stabilized rigs.

Sam's best DX with this set up is to W2RPO, in Buffalo, N. Y. 190 miles away. W2RPO was worked two nights in a row when conditions were favorable. The best consistent DX is W3QKI, (ex-W8QKI) of Erie, Pa. This latter distance is 100 mi along the lake shore and only one contact was missed in the last 3 weeks. W3QKI runs 40 watts into four half-waves stacked in front of a screen reflector. On weekends a schedule is maintained with W8LIO of Andover, Ohio, 75 miles over land, who uses 6 watts into a square corner 70' high.

Regarding power, he has this to say. The 600 watts has its place when sigs are weak, however if the station at the other end has a good receiver, 50 watts seems all that is worthwhile. This estimate is based on the present reliable range of 100 miles.

To boost his signal still more, the antenna height was raised until no further increase in signal strength was noted. As 60 feet was reached it put him in the clear of surrounding objects and seemed to be the peak, over flat land. But to get into Akron he found that up to 75' raised the signal several S points, as there is a 1320' ridge in between.

All the work done in that area is on horizontal polarization. An increase of 6 db was noted in ignition noise when verticals were tried. Five nights out of the week he would lose W3QKI in that amount of QRM.

This is the kind of report that Sam would like to read about, especially those from the east and west coast, so how about it? We might not be able to print several this lengthy in one issue, but we will feature one from each section of the country over a period of time.

Hod, W9ALU in Metamora, Ill. now has a SCR-522 xmtr and has worked W9ZHB, W9RGH and W9BHT, with 60 mi as his best DX. He also says W9ZHB has 4 states on 144 mc; Wis., Ind., Ia., and Ill. with Mich. coming up in the near future.

W4EQR, our new addition to 50 mc, has worked W4MS on 144 mc, using PP 76s and 5 watts into a 3-element beam. While the distance, is only about 7 miles with S-9 sigs it is a good start to increase activity.

W2VL says there are 45 members in the V-H-F club in the N. Y. area. There are plenty of stabilized xmtrs and superhets being used to relieve the congestion. Recently W2FI gave a talk on a 144-mc rig he built, using PP 6J6s on 72 mc, and a 6AQ5 to 144 and an 832 final, very compact and neat. One is being utilized for the Club's station. W2JIH is also a club member, so they get all the latest on v-h-f antennas.

144-mc activity around Sacramento is about the same, according to W6CLV. Around Xmas time the gang got together for a dinner and over a hundred attended and had an fb time. That was the

night 144 mc was open to the east, didn't you guys know?

Walt Voelker, W3LFC gives us the dope on the Philly gang. The band is undergoing a cleaning in a big way for stabilized rigs, and these have shown up with nice and shiny signals. W3BYJ, e.c.o. and 829, W3FXG, e.c.o. and 829, W3EWZ 146.8 mc 832 and ARC-3, W3DNZ 145.5 mc to ARC-3, W3HDB 147.5 mc 829, W3LZE 145.3 mc 829, W3MFY 144.3 mc 829, W3IZU e.c.o. 829, W3GQS 144.2 mc 832, and across the river on the Jersey side are W2PAU e.c.o. 829, W2RSO e.c.o. 832 and ARC-3, W2REB 144.3 mc, W3KI/2 e.c.o. 832, W2EH 144.27 mc 832, W2EUY 144.015 mc 829 and W2RFP 147.350 mc. Most of these rigs are ARC-3s and for receivers the BC1068A, BC1161A and BC624. Incidentally, Walt, W3LFC is ex-W2OCP and is on 147.720 mc.

W3LTN has 25 watts with a SCR-522 on 156 mc and 8-element beam either vertical or horizontal. He has a 522 and BC 406 for rcvrs. W3WBM runs 50 watts to a 815 and a vertical antenna, receiver is home built super. W3GV, ex-W8GU is Dawson Bliley and will be on with 250 watts soon.

W2RJH in Westfield, N. Y. is a steady contact at 35 mi. He runs 10 watts to a Hytron osc and a super regen receiver. W8LYI at N. Kingsville, Ohio is 35 mi away from Erie, and has hills to overcome, which cuts his sig down compared to W2RGH.

During strong inversions anyone works DX, says Herb. Last fall everyone who was on worked into Buffalo, Niagara Falls, and other points at that end of Lake Erie. The Erie gang would like to see some skeds with the east coast for middle west gang or the coming summer, as some night a strong inversion will make the record fall. This sounds fine and we will contact Herb for times and skeds. Those interested in the east and around Chicago, where activity is plenty high, drop us a line.

Art Monsees, W6HJP, of Mill Valley has his 144-mc station on top of Mt. Tamalpais, which is the highest point in the Bay district. The rig is a pair of 24Gs, with 811s as modulators. A superhet rcvr is used. W6HJP is on every night from 1900-2200 PST looking for the gang. He promises a list of the DX worked, for next month.

235-Mc Activity Looms

We are glad to see this band commence to liven up.

W6CLV reports interest around Sacramento, with W6KME using a 1-10 rcvr and no xmtr as yet, W6PIV and W6BVK use transceivers. W6KME heard W6PIV about 5 mi away while mobile. Their transcvrs have parallel lines with about 5 watts. Home stations are planned with more power.

W2OHE, in the land of trees, Brooklyn, says that W2KU, W2QUF, W2DZA and W2OHE now have rigs on 235 mc and W2DWL, W2AUF, W2NXT have rcvrs and are busy getting rigs on. Pres also gives out the info that March 13th is the Brooklyn hamfest date.

1250-Mc Activity

Bernie Bates, W1BBM, our explorer of the u.h.f., now has great prospects with these stations getting on 1250 mc; W1GRC Chatham, Mass; W1VL Chatham, Mass; W1MNF East Orleans, Mass; W1ARC W. Harwich, Mass; W1DJK Dennisport, Mass.; W1BCN Hyannis, Mass. and some DX, W2BAV in Rye, N. Y. Sounds good fellows—let us know what comes of it. They are going all out for the band as Bernie has ordered eight 2C40 tubes for them.

WESTWARD HO!

[from page 25]

After some unsuccessful listening at W6GWD on two meters, Roy and I hitched up the Olds and went in search of a good site to engage in some of that San Francisco Bay area v-h-f activity. Roy one of the old 5-meter gang from back in the early '30s, knew just the spot—high up on Grizzly Peak Boulevard above Berkeley. At least, that is where Roy said we were. The fog was so thick that I couldn't see the three-element beam on top of its 12-foot pole, but the signals surely were not fog bound. We blasted through to various stations in the Bay area and in about 40 minutes QSOed eight, all of whom gave W1OJH/6 a roaring welcome. Included in the QSO were W6TCP at Hayward, W6BPV in San Carlos and W6JED at Burlingame. Other QSOs were up to 20 miles distance.

Those W6s take a W1 call right in their stride and nobody thinks it's setting a new record. Nevertheless,one guy insisted that we must be parked right outside his shack, although we were over 25 miles away, airline.

One day, we went into SF and saw the sights. Called up W6RBQ. He and Mrs. Ladley picked us up right in the heart of Chinatown and took us on a night-time sight-seeing trip of the San Francisco area. Then we saw the RBQ rig that puts such swell signals into the east.

Rag Chewing on the V.H.F.

Another high spot of the Bay area visit was an all-too-brief personal ragchew with another Sub Sig alumnus, Jim Brannin, W6OVK, one of the grandest v-h-f guys in the country. We caught Jim at his office just before he took off in his railroad car with some v-h-f gear to be tested—his job is electronics engineer for the Southern Pacific. Jim made us promise that we would look up two of his special pals, W6NNS and W6TCP in Hayward. He insisted that those two boys were red-hot v-h-f operators and well worth a visit. Jim, you spoke it right! Little else but v.h.f was discussed when we drove to Hayward one afternoon, but brother, how that subject got a going over.

One of the points was what I would like to call the "California plan." Later, I learned that Ed. Tilton, W1HDQ, had already aired this idea in print but further emphasis is surely in order. The plan is simply this—we immediately subdivide the two-meter band so that there will be a region set aside for exclusive use of stabilized transmitters—yet this would leave plenty of room for the "wobble boys." Realizing full well that any attempt to stablize the *entire band* would result in a rapid exodus of too many of the gang, and yet knowing that the road towards efficient utiliza-

tion of the band lies in using *modern techniques*, many of the California fellows would like to have the low frequency megacycle of the band (144-145) for stabilized rigs exclusively. This would permit use of supers and crystal-controlled gear or other high-stability jobs without the junk now all over the band.

Many of the gang know the score on how to get the most out of the v-h-f bands, and they are *not* the boys who are working five or ten miles. They are the hundred milers and up. Also, they can use power, if it is necessary. W6NNS can put on a kilowatt of two-meter energy, crystal-controlled, at that. Pumping that into a good 16-element beam will bring results when received on a comparable receiver.

Surely *three megacycles* is enough for the Sloppy Joes and their wobbling transceivers and superregeneratives. How about a megacycle (144-145) for stable gear? The California gang is really behind it! It is a fast-growing idea and deserves all the attention it can get.

The W6s I talked to hope that the rest of the gang will fall into line and promote this plan. They also hope the Sloppy Joes will show enough sportsmanship to stay above 145 mc. Better yet—that they will put in stabilized control and get in on the real fun. Why, some of those boys are considering (and may have done it by now) working straight c.w. on the two-meter band, so that they can work some real DX!

W6NNS is using a tripler-oscillator (8 mc to 24), a 6J6 doubler, an 832 tripler to 144 mc, followed by an 829 amplifier on 144.01 mc. When he needs high power he puts on a pair of Eimac 4-125s. His receiver has several i-f stages, some r-f stages and about a dozen or so tubes. There's an 832 crystal-controlled for 235 mc although two meters is W6NNS's pet spot.

W6TCP has an 832 crystal-controlled on two meters and a superhet with a flock of stuff on it. These boys use big antennas with plenty of gain. And they work 'em, too!

Marin Radio Amateur Hamfest

On Sept. 15th Charlet and I attended our first west coast hamfest at McNear's beach near San Rafael to participate in the Marin Radio Amateurs seventh annual hamfest and picnic. Just about everybody on the west coast was there, it seemed to us. We met W6s we had QSOed many times in the past, and also some new ones. W6WVK had just been licensed *four days* before the hamfest! We saw walkie-talkies, handy-talkies "movable talkies," ten-meter mobile jobs like W6RBQ's complete with its own gas-driven 115-volt generator, in the car's trunk compartment. We watched a guy who must have weighed at least 300 pounds win the "Squat-a-key" award for bumping out his call with the seat

of his pants. Then we watched W6BIP's toddler get a round of applause after he personally investigated that big key and tried it out. Now—there is an up and coming c-w man!

We talked to W6OJU who, on Aug. 25th, worked W6PZQon 2 for a near record of 270 miles!

Then we watched that old Texas Cow Poke, W6TCP, a v-h-f-minded character if you ever met one, win a BC-375 transmitter on a raffle. TCP wasn't quite sure what he had won—just wait until he opens that crate! Well, maybe he can salvage some of the parts, anyway!

The list of those present would look like a west coast's Who's Who in Hamdom and we were really pleased to have the opportunity to meet so many of the W6 gang. Now we know what they look like. Honest, gang, they don't speak with that characteristic W6 note at all.

There was one feller there with a fine 22, complete with 'scope. We never did figure out what he was aiming to do with that firearm at a peaceful hamfest. Maybe he had some gripe we didn't know about!

When the prize was awarded for the ham who came the farthest distance, I was busily engaged in bending somebody's ear and did not hear the announcement. When W6OIN of San Diego was called to the platform and offered the prize, Ray stated that W2OEN/1 from Connecticut was in the audience. Evidently the master of ceremonies thought that Connecticut was just another of those inland California counties and he pressed the prize on W6OIN, who, by the way is another Sub Sig alumnus and a very good friend of the writer.

Anyhow—after holding a raffle ticket ending in the number 13 which didn't pay off, and after coming clear across the entire USA to attend their hamfest, I get left out on an 815 by an MC who doesn't know his geography. Nevertheless a really good time was had by all, including Mr. and Mrs. W1CA from Connecticut. That's a *state*. Son!

TROMBONE T

[from page 31]

where R'_{in} is the input resistance of the folded dipole.

The squares of the currents cancel and we see that R'_{in} is four times R_{in}. For the case of $R_{in}=73$ ohms, $R'_{in}=292$ ohms. For the case of $R_{in}=52$ ohms, $R'_{in}=208$ ohms.

Thus we see that the input impedance of the folded dipole when fed at the center approximates 300 ohms for an antenna height of a quarter-wave or multiples thereof and a thickness that is vanishingly thin with respect to the antenna length. For other heights it is equal to four times

the resistance of a half-wave antenna at the same height.

Incidentally, the use of N wires, each of equal diameter, opening one at the center for feeding, will increase the resistance at the feed point over that of a single wire by the factor n^2. (This is derived in *Appendix A*.) This of course holds true only when the spacing between the wires is very, very close with respect to a half wave in order that the coupling to the universe not be altered from that of the single dipole.

Following the same analyses, using two (or more) wires of different diameter, the currents in the two wires will be dissimilar (but will be of the same phase), and by opening the smaller of the two at the center, resistance values greater than four times may be obtained, the values being a function of the ratio of the currents. By opening the larger of the two conductors the resistance will be less than four times, lying between one and four times the value of the single half-wave dipole, as a function of the ratio of the currents in the two conductors.

We have stressed that the currents in the two branches of the folded dipole are in phase. Thus even if the folded dipole is constructed from the

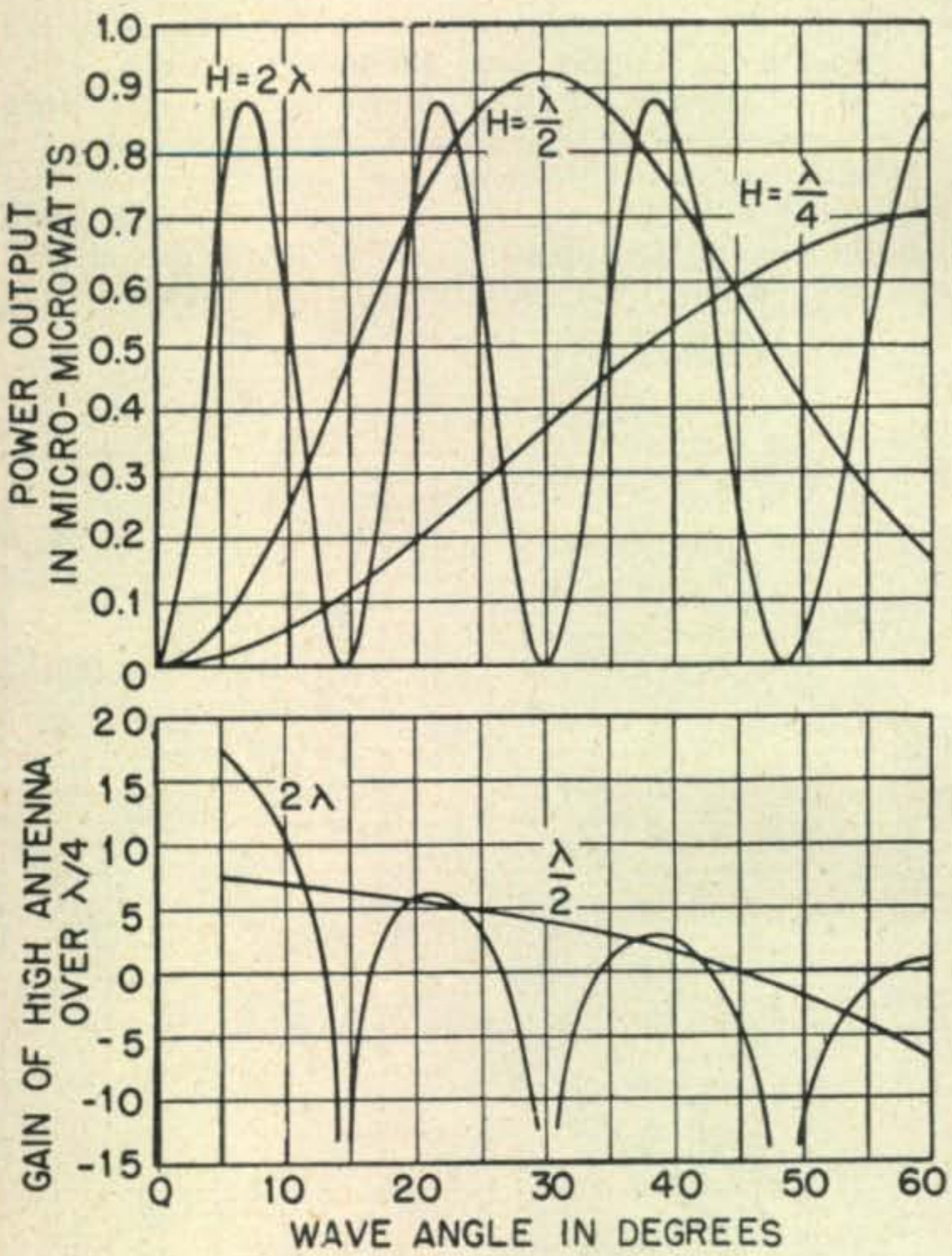


Fig. 5E. Vertical directional patterns of horizontal antennas calculated for perfectly conducting ground. The wavelength is assumed to be 25 meters and the incident field intensity one microvolt per meter.

[From *Proceedings of the I.R.E.*, Jan. 1934]

popular twin conductor parallel cable, the *length of the cable is not reduced by the velocity of propagation of the cable.* The electrical length of a cable

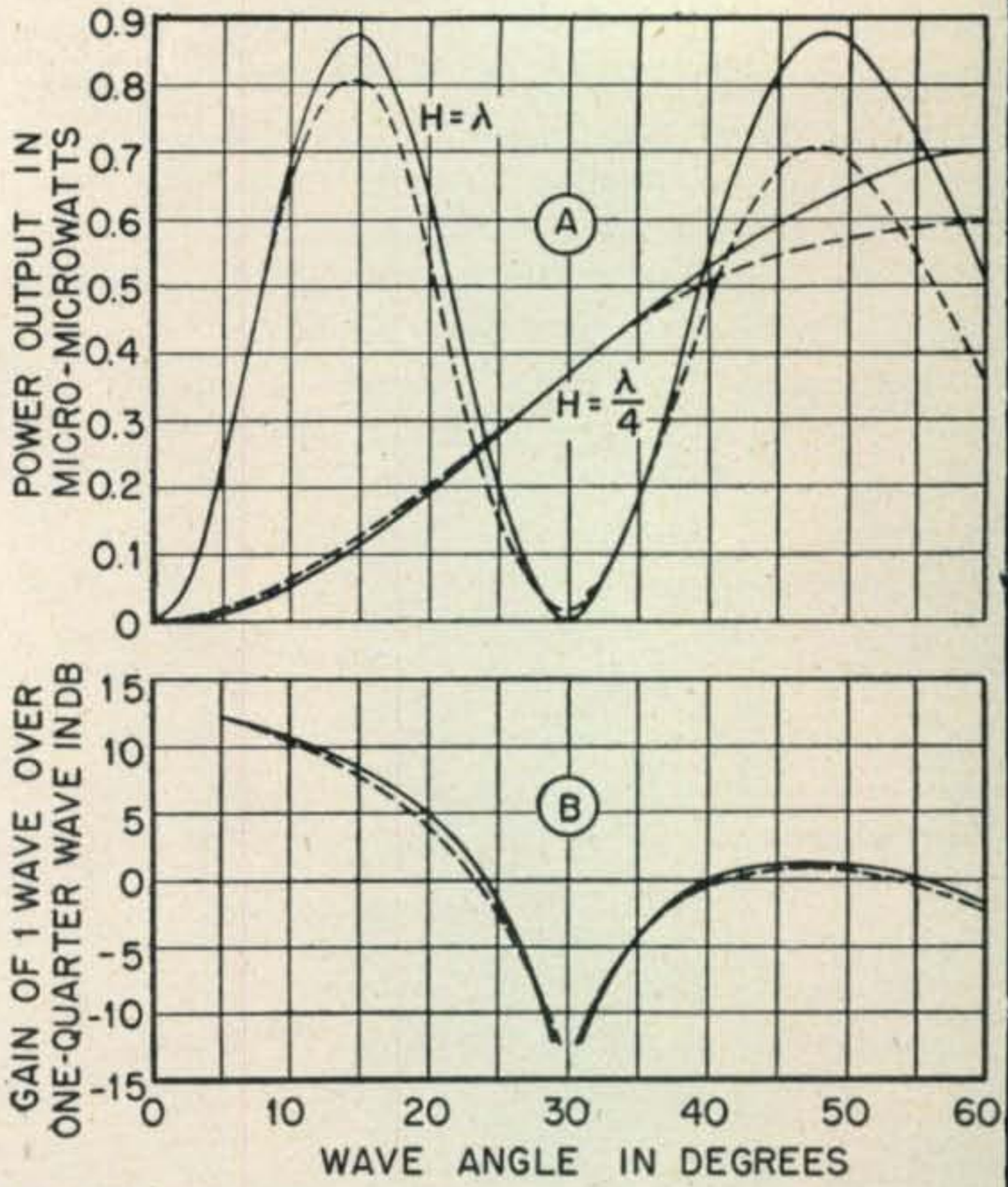


Fig. 5E. A shows vertical directional patterns in the median plane of horizontal antennas. *H* denotes the height above ground. The solid curves are calculated for perfectly conducting ground, the broken curves for Homldel ground (dielectric constant = 25, conductivity = 1.3×10^{-13} e.m.u., wavelength 25 meters, and the incident field intensity one microvolt per meter). *B* shows the corresponding gain curves.

[From *Proceedings of the I.R.E.* Jan. 1934]

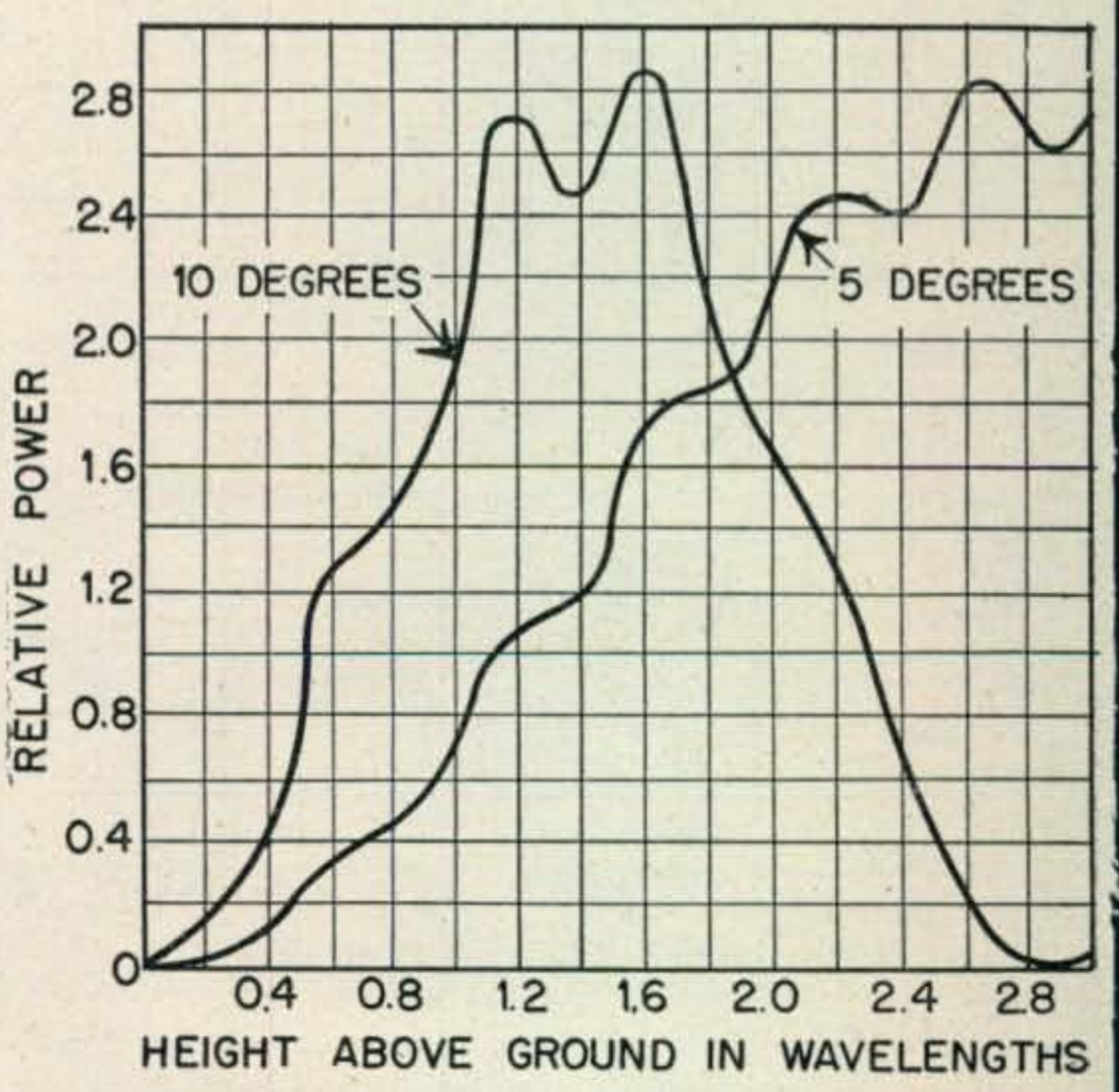


Fig. 6. Half-wave horizontal dipole relative radiation at elevation angles of five and ten degrees vs. height above ground. (Perfect ground assumed).

[From *Proceedings of the I.R.E.* June 1932]

containing a dielectric is shortened by the V. P. of the dielectric only when the lines of force are *through* the dielectric. In the case of a twin parallel conductor or coax containing *out-of-phase currents*, the electrical length is reduced by the V. P. of the cable. When the conductors are carrying in-phase currents the lines of force are not through the dielectric, and the velocity of propagation is as with air dielectric. The electrical length of a half wave is 95% of the physical length. This has been experimentally verified at a frequency of 100 mc by Marvin Kronenberg, W2IJU. He verified that half-wave antennas of No. 14 wire and twin parallel conductor (known as Twin 300) shortened to provide a resistive impedance, were of the same length.

[To be continued next month]

DX PREDICTIONS

[from page 35]

twenty-four hour clock scale on the abscissa and the frequency in megacycles on the ordinate scale. The upper or outer trend outline is the MUF while the inner trend line is the OWF. Entering the graph at the left hand border we find that the MUF trend crosses the 20-meter band at about 0350 hours EST. This means that conditions of ionization in the upper atmosphere are such that they will support 14-mc communication. However the optimum working frequency (OWF) when 20 meters will definitely be open on this particular path does not occur until shortly after 0500 hours EST. Neglecting sub-solar signal absorption around midday, 20 meters will then be open, equal to the span of the OWF, or closing down after 1800 hours EST. Although this path may not actually close after 1800 hours and since daily variations in the length of the opening do occur, it is necessary to include the margin of safety afforded by the frequency separation of the MUF and OWF scales. Therefore, the graph indicates that 10 meters over this path may open with scattered signals as early as 0645 hours EST and will close at about 1300 hours EST. On 10 meters the peak conditions are relative to the noticeable peak in the MUF outline, or in other words, conditions should be excellent between 1000 and 1100 hours EST.

The path from the eastern section of the United States to the general London-Paris area, which is not illustrated this month, is expected to reach a peak MUF of approximately 39.0 to 40.0 mc, although by the first week in April this will have dropped to about 32.0 mc. During the first few weeks of March, 10 meters will open on this path at about 0645 hours EST and should not close down till after 1500 hours EST.

The South Americans make the most notable improvement during March and April. This is illustrated in *Fig. 2*. A peak MUF of about 44.0 mc is expected around 1500 hours EST, or if you are in the middle west around 1530 hours CST and 1400 hours PST, if you are on the west coast. Good 10-meter conditions are expected from 0730 to 1830 hours EST. It will be noted that during this particular season of the year, the 20-meter band may stay open nearly twenty-four hours with only the likelihood of a slight dropout around 0445 hours

EST. As the month progresses, the South Americans will show more signal strength and during the middle of April the MUF may exceed 45.0 to 46.0 mc.

Very good conditions on the 10-meter band are predicted for the west coast stations to work into Central and South Africa. The graph in *Fig. 3* shows that 10 meters should be fairly active and will open between 0500 hours and 0630 hours PST. Peak conditions are clearly indicated around 1000 hours PST. The band will close with a slow dropping out of the signals after 1245 hours PST. Those stations on the east coast will also find the South Africans very strong with the 10-meter band opening about 0700 hours EST and reaching peak conditions after 0930 hours EST.

Fig. 4 depicts the general expectations for west coast stations working into Southern China, Siam, Burma, Malay States and Eastern India. A few scattered 20-meter signals may be heard until 0200 hours PST. This band will then close, but will re-open around 1430 hours PST with peak conditions due to sub-solar absorption being fairly near the OWF outline, or specifically around 1600 hours PST and 2200 PST. The low end of the 10-meter band may be expected to open sporadically between 1700 and 1830 hours PST, although scattered signals will quite likely be heard from 1600 hours to 2000 hours PST.

DX conditions from Australasia are expected to be excellent during the entire month, with an accent on improvements after the first week of April. Ten meters should open from the west coast to New Zealand around 1000 hours PST. Peak east coast conditions about 1830 hours EST on 10 meters.

The trans-continental MUF in the United States is expected to be about 40.0 mc with sporadic *F2* openings up to 44.0 mc.

The data for the prediction graphs are drawn from the *Basic Radio Propagation Predictions . . . Three Months in Advance* as issued by the Central Radio Propagation Laboratory of the National Bureau of Standards. These booklets are available on a subscription basis from the Superintendent of Documents, Washington 25, D. C.

ELECTRONIC BIAS

[*from page 19*]

that is too much for the 2050 to handle and still give long life. The 866A or the 83 will take this heavier plate current, and there is very little to choose between these two types for the higher powered applications. The availability of a center-tapped filament transformer can well be the deciding factor, the 866A requiring 2.5 volts, and the 83 taking five volts.

When mercury vapor diodes are used, the control grid resistor and connection will be eliminated, and ionization will be caused by the voltage on the plate only. Of course, the tube drop cannot be varied by a shield grid, therefore it will stay close to its nominal value of ten volts.

As we see it, the only disadvantage is the lack of a wider variety of tubes for higher voltage applications such as is required in class AB_2 modulator service, and for use with lower mu tubes in class B modulator service.

SCR-284A

[*from page 26*]

the antenna itself and bolted to the steel plate at the bottom. To make the antenna fairly easy to pull out we have been using powdered graphite.

With the new antenna, distances of 200-300 miles have been worked consistently with 10 watts output. The best DX from a portable QTH with this antenna was about 600 miles. Again it is necessary to mention that notice of 75-meter portable operation must be filed with the engineer in charge of your respective district. This must give where such operations are to take place and dates of both beginning and termination of such operation. Approximate locations are also necessary. A 30-day schedule may be filed with the engineer for convenience.

GRID DIP OSCILLATORS

[*from page 17*]

3. Set receiver to the low frequency edge of the desired band.

4. Open the band-spread capacitor until the signal from the oscillator is heard in the receiver. This final setting of the spread control corresponds to maximum obtainable spread which amounts to approximately fifty degrees on the tuning dial. More complete spread is not possible if the same coils that are to be used for general coverage are likewise used for band-spread. If desirable, special coils can be made up which will achieve complete spread. The same set-up procedure should be followed; it then becomes a matter of adding more turns to the coil until the band-spread capacitors can be opened enough to give the required spread.

Mechanical

The various photographs should be of assistance in visualizing the general mechanical construction of this particular unit. However a few brief details may be helpful. The unit is built in a standard metal cabinet, 9″ long, 6″ high and 5″ wide, having removable side cover plates. The design is such that the unit can be held by its handle with the left hand thus leaving the right hand free to manipulate the tuning control. In making measurements one is constantly looking at the milliammeter, therefore it follows that the obvious place for the instrument is on the top of the box where it is clearly visible. The on-off switch and the meter-setting potentiometer are mounted on this same top face of the housing case.

A desire for short lead arrangement prompted the mounting of variable capacitors, tube, coil socket and associated circuit components on the inner front wall of the case. Both sets of variables are mounted on one-inch ceramic standoffs from

this front face. The tube lies in a vertical position and its tube socket is mounted to the wall by means of a spade bolt. Resistors and r.f.c. are securely held in position by tie points. Wiring should be such that it will not vibrate and to this end, No. 14 copper bus wire was used wherever possible.

The hinging of the side cover plate can be neatly done by taking the plate to a metal shop and having the cut made on a square shear. In this way no stock is lost, and when the small hinges are fastened on, the two plates should butt nicely. It will be necessary to file notches for the hinge bearings.

Suitable receptacles for the two extra coils can be easily obtained by using four-prong Amphenol sockets. The type of socket used has a ring of heavy gage metal which will be stout enough to support the socket when a right angle bend is made near one of the tips. The bent tip is fastened to the hinged panel with a 6/32 machine screw. It will be advisable to pull out all but one of the contact springs in each socket; the four contacts grip much too firmly for this non-electrical application.

Using the Instrument

While measurements can be made on many types of antennas, transmission lines and resonant circuits, the basic procedure of operation remains the same for all. In practically every instance one will have a rough idea as to the frequency range in which resonance will occur in the element to be measured. Thus the proper search coil can be selected.

1. Turn on the instrument and set the grid current reading to near full scale using the balancing potentiometer for this purpose.
2. Place the inductor of the GDO close to the circuit to be measured and carefully rotate the tuning dial until the grid current shows a definite downward dip. With close coupling, this dip should be obvious since the grid current may drop two to three major divisions on the meter. This procedure establishes the initial resonance position but it will be found that it is much too coarse to be of use.
3. The GDO should be slowly moved away from the load, meanwhile tuning back and forth across the dip point. The amount of grid dip should decrease and the tuning on the dial will become more sharply defined.
4. If one will remember that when the instrument was calibrated against a receiver there was practically no coupling involved, it can be readily realized that loose coupling must likewise be used in the measuring procedure. Tight coupling gives a fine dip on the grid meter but also "pulls" the oscillator and thereby gives rise to a change in frequency from the original calibration. In any case, the final result should be achieved by accurately setting the tuning dial until the grid meter reads at the trough or lowest point in the dip even though this may mean a very slight meter indication.

[*Please turn to page 79*]

Classified Ads

Advertising in this section must pertain to amateur radio activities. Rates: 25c per word per insertion for commercial advertisments; 5c per word for non-commercial advertisements by bona fide amateurs. Remittance in full must accompany copy. No agency or term or cash discounts allowed. No display or special typographical ad setups allowed. "CQ" does not guarantee any product or service advertised in the Classified Section. Closing date for ads is the 1st of the month preceding publication date.

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

BC-348 RECEIVER. Converted 110 VAC. Slightly used but guaranteed A-1 condition. $48. W4IUT, Rt. 3, Box 172, Fairfax, Va.

BEAM·ANTENNA. All aluminum. High efficiency with minimum weight and torque. 2 to 20 meters. Write for information. W2KMQ, 956 Paulding Street, Peekskill, N. Y.

BEST OFFER takes any or all of the following items: 1 Triplett Model 1503 tube tester; 1 Triplett Model 1295 modulation monitor; 1 de luxe model MacKey speed key serial No. 348; 1 HRO National receiver with complete set of coils and coil rack, power supply, loudspeaker, rack mounting; 1 wireless set No. 19—Mk II—2.0 to 8.0 Mcs.; 1 radio transmitter set AN/ART-13A, 200-1500 Kc, 2000-18,100 Kc; 1 Tobe bridge analyzer; 1 Piezo-Electric calibrator (100 Kc and 1000 Kc) RCA Type TMV-133-A; 1 Hickok OS-10 RF oscillator; 1 Lafayette record player. Please address replies to: Mrs. Charlotte Bouck, Middleburgh, N. Y.

CRYSTALS: Precision low drift units. Type 100A in 80, 40 and 20 meter bands. Two units plug in one octal socket. Plus or minus 5KC. One dollar each. Exact frequency $1.95. Rex Bassett, Incorporated, Fort Lauderdale, Florida.

CRYSTAL PROCESSING KIT:—including 4 "BT" blanks; state preference in 5.4 to 8.4 megacycle range; 2 holders, abrasive, instructions, treatise—$1.00 plus postage. Breon Laboratories, Williamsport, Pa.

FCC EXAM samples. We send you exam and correct your answers. Commercial, any class—$2.50, ham—$1.00, per exam. J. R. Johnson, Mount Arlington, N. J.

FOR SALE: Radio and Electrical books, fifty, mostly new; Ghirardi, Cooke, Hausmann, Hellmann, Marcus-Horton, Hoag, and others. Over 10 years copies of QST, Radio, Radio Craft, Radio News. List free. E. S. Hillery, W2GNK/9, Elmwood, Ill.

FOR SALE: Sherman Tank Transceiver, complete with 110 volt power supply kit, $75.00. Robert Barr, 106½ Lyon Avenue, Butler, Pa.

HAMS—An 8 x 10 exact reproduction of your Ham ticket beautifully mounted on long-lasting Duron Board and sealed in transparent plastic to last forever. Framing unnecessary, ready to hang. Satisfaction guaranteed—act now. $3.00 postpaid. Send name, address, call letters, issuance date to W2GPG, P. O. Box 22, West Orange, N.J.

HAROLD GORDON CUSACK: QTH? Roger Curran, 803 Forest, Fulton, New York.

MAKING FEW FB ROTATORS and mount for rotary beam, reversible, one RPM, weatherproof, $30.00. William Bates, W8FGG, Reynoldsburg, Ohio.

QSL's . . . Samples for Stamp . . . Henry L. Carter, Jr. . . . W2RSW, 747 S. Plymouth, Rochester 8, N. Y.

ONE SX28A Hallicrafters, A-1 condition, $190.00. S. Palasek, 62 Main St., Port Washington, N. Y.

PANADAPTER, new, used once, taken from dealer as trade-in value—$90.00. Three element UHF Resonator Beam. Used one week. Spare set of Tubes for Temco 75GA, used 100 hours, including TB35. Prefer local purchaser to avoid shipping expense. W2NCY, 60 Merritt Avenue, Dumont, N. J.

PLATE TRANSFORMER—1470v CT 1.2A—$8.00. 851-1040v. CT. .363A tapped primary—$5.00. Swinging Choke 1.75 to 12.5H, 1.0A—$7.50. Smoothing Choke 7.0H, .215A—$2.50. Filament Transformer—2.5v, 11A., Ins. 3500v.—$2.50. ARC-5 crystal controlled two meter transmitters, 100-156 MC., complete—$30.00. Discount 20% over $10.00 on transformers. SKL Laboratory, Box 188, Lexington 73, Mass.

SAMPLES: Listeners —dime; Operators —quarter, coin. KERNZ, (Quality QSLs), Fulton, New York.

SELENIUM RECTIFIERS, half wave 5 ampere $4.25, 2¼A $2.25, 1½A $1.85. Full wave 1A $2.50. ½A $1.85. McMurdo Silver amateur and test equipment stocked. Catalog free. Bursma Radio, R5, Grand Rapids 4, Mich.

SELL COMPLETE STATION: Hallicrafters HT-1, 40-80-160 band switching, 814 final, and HRO-W 500 Kc to 30 Mc coils, power supply and speaker—$350.00 F.O.B. Bruce H. Hart, Pine River, Minn.

SELL: HRO 5TA1, practically brand new. Used less than 6 hrs. Including 4 sets coils, PS. speaker $269. With 9 sets coils $325. Weston 772 tester $46. W2OTR, 7919 20th Avenue, Brooklyn, N. Y.

SWAP: New Wilcox Gay 6A10 dual speed recorder and amplifier for HT9 or comparable xmtr. M. York, W1OCU, Houlton, Maine.

TELEVISION RECEIVER easily constructed from our plans. Vision Research Labs announces new line of television booklets written especially for the ham experimenter. Booklets now available ($2.00 each): "Design and Construction of a 7" Television Receiver" and "Visual Alignment Sweep Generator." Booklets contain theory, practical details, illustrations, schematic diagrams, etc. Vision Research Laboratories, P. O. Box 52, Kew Gardens 15, New York.

TRADE first CQs, packaged headsets, microphones, W2QOM, New Rochelle, N. Y.

TRANSFORMER GE 450-0-450, 250MA 5V., 6.3V $4.75. Dry electrolytics 16-16 450V 49c, 25MF 25V 19c, 12MF 150V 16c. Other bargains. HamRad, Box 33, Bedford, Mass.

QSLs - SWLs! Highest quality. Reasonable prices, postpaid. Stamp for samples. W1HJI Press, P.O. Box 1023, Manchester, N. H.

3" CATHODE RAY radar scope, ID-93-APG-13A, 115v 400cps complete with 11 tubes incl. 3BP1, brand new, $25.00. Request surplus bargain list. Rubin Radio, Shrewsbury, N. J.

WANTED: New or used portable recorder with play back. State condition and price. Riley Parsons, W2SBR, Raquette Lake, New York.

QSL's? Samples 25c. Sakkers, W8DED, Holland, Mich.

EMPLOYMENT OPPORTUNITIES

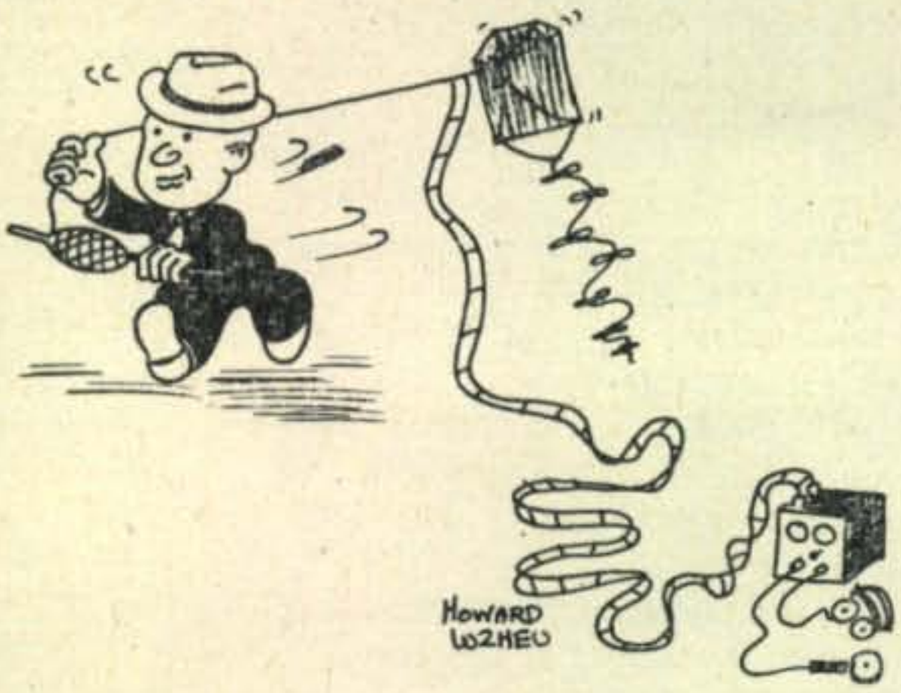
WANTED: Radio Transmitter Assembly Expert. Ham preferred. Must have complete knowledge wiring, assembly, tubes, circuits, and all component parts. At least five years actual experience required. This position cannot be bluffed. Write, giving full detail and references to: Greene Plastics, Inc., Radio Transmitter Division, Wakefield, R. I.

5. For really accurate work (such as adjusting a high-Q beam to frequency), it will generally be advisable to establish a setting as described, then pick up the oscillator signal on your receiver, thus obtaining the frequency directly from the receiver dial.

6. In beating against a superheterodyne receiver there is an excellent possibility that two signals will be picked up from the oscillator as it is tuned through its range. It will be found that these two signals will differ in frequency by twice the i-f frequency of the receiver. In other words, one of them is image. Since most modern receivers have the oscillator set on the *high* side of the r-f mixer, always select the signal from the GDO that occurs with its tuning condenser toward maximum capacity. The correct signal will of course be considerably stronger than the image.

7. If it is impossible to get the oscillator search coil close enough to the load to obtain sufficient meter indication, link coupling may be used to advantage. A single turn link on both ends is normally sufficient. The link may then be adjusted so that the meter indication is reduced to the proper value for accurate measuring.

Summarizing, it should be stated that it is beyond the scope of this article to cover in detail the many applications of the grid-dip oscillator. It might be significant to note that the particular instrument shown was constructed by the writer for the express purpose of being able to work out some new antenna ideas. Our efforts were rewarded the first time the meter was set up for preliminary test. One semi-vertical antenna that we had been trying to load to 40 meters (with no success) turned out to be 300 kc too low! Our pet two-element beam was pegged 100 kc from where we thought it was! The 300-ohm feed line was found to resonate at about 30 mc! Right then and there the grid-dip oscillator became a permanent fixture at W6WB.

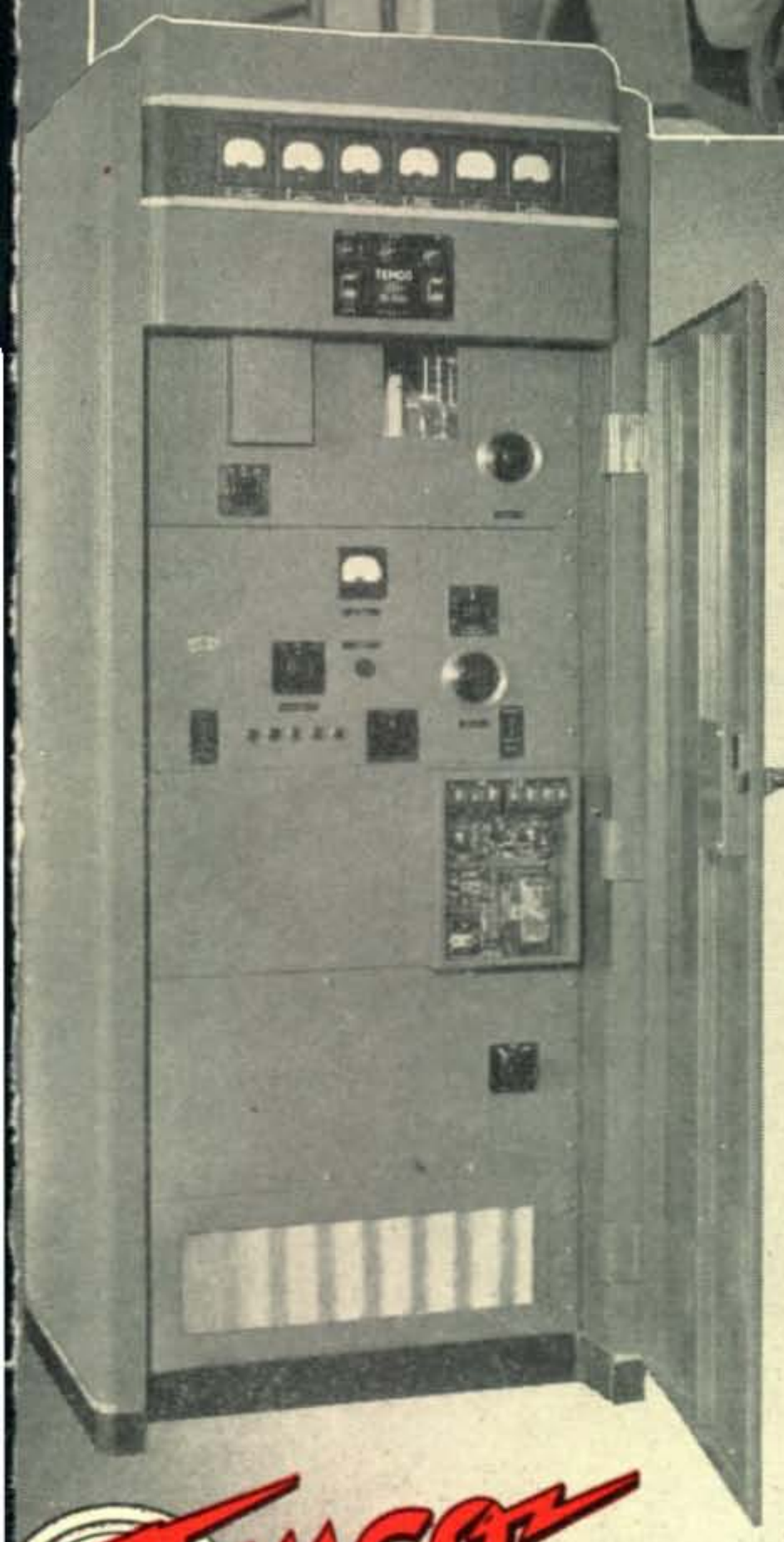


POSITIONS WANTED

YOUNG MAN, thoroughly experienced typing, stenography, billing, some bookkeeping and counter-sales; 10 years experience in radio experimenting; desires position of responsibility with radio firm, vicinity New York City. J. A. Hazelwood, 105-30, 133 Street, Richmond Hill, N. Y.

CQ Ad Index

Everybody and his brother



prefers a TEMCO

Meet the three Schweitzer brothers, from left to right... Bill—W2KG... Pete—W2MDQ...and Lou—W1MBJ. Heard over the air on ten, twenty and seventy five meters, their custom-built TEMCO Kilowatts are quickly recognized by their outstanding signals.

Say these three well known and frequently heard radio amateurs, "Our pre-war experience with TEMCO TRANSMITTERS was so extremely gratifying that when the time arrived to equip our new stations... naturally we selected TEMCO. Short skip—long skip—northern lights or what have you, our TEMCOS always get through. And for easy handling they're unsurpassed...everything's at your fiingertips and everything's in one cabinet."

Discriminating amateurs, like the Schweitzers prefer TEMCO TRANSMITTERS because of their excellent DX capabilities, operational flexibility and highly efficient circuit designs. If you too want a transmitter that leaves nothing to be desired in both performance and appearance...make yours a TEMCO. Available in a range of power *output* ratings from 75 watts up. Write for full details and prices stating your requirements.

Work a QSO with a TEMCO KILOWATT at the IRE Show. Booth 65 B March 3rd to 6th inclusive.

TEMCO
RADIO COMMUNICATION EQUIPMENT

TRANSMITTER EQUIPMENT MFG. CO., INC.

345 HUDSON STREET • NEW YORK 14, N. Y.

Now— THE LOW-COST VHF BEAM POWER TUBE YOU'VE BEEN WAITING FOR

ACTUAL SIZE

$3.50

AMATEUR NET

Here's why you'll want to use the new RCA-2E26 for 6 and 2 meters...

RCA gave you a *very-high-power* version of the 6L6—the justly popular 807. Now RCA brings you the 2E26—a *very-high-frequency* version of the 6L6. It's destined to become the hottest VHF final in the field for these reasons:

1. Economy: Because of its small size, high power sensitivity, and high efficiency, the RCA-2E26 makes an excellent final amplifier for a compact, inexpensive VHF transmitter operated from a simple low-voltage power supply.

2. High Power: A single RCA-2E26 operated at its ICAS ratings will take an input of 33 watts at 500 plate volts in class C telegraphy at frequencies as high as 150 Mc., and 40 watts at 600 volts at 54 Mc. It will take an input of 22.5 watts at 415 plate volts in class C telephony at frequencies as high as 150 Mc., and 27 watts at 500 volts at 54 Mc.

3. Low Drive: At 144 Mc., about 2 watts of RF must be delivered to the grid circuit. A 6V6-GT is a satisfactory driver tube.

4. Features: The 2E26 has short internal leads, a rugged button stem fitted to an octal base having a low-loss micanol insert and metal sleeve, excellent internal shielding, and double-ended construction for isolation of grid and plate circuits.

5. Application: The 2E26 is an excellent medium-power final amplifier for 6 and 2 meters. As a doubler, it will supply more than adequate power to drive an 829-B or 815. It will deliver 15 watts of 2-meter RF as a TPTG oscillator.

RATINGS AND CHARACTERISTICS

Heater Volts		6.3
Heater Amps.		0.8
Direct Interelectrode Capacitances, mmf		
Grid to Plate (maximum)		0.20
Input		13.0
Output		7.0
CLASS C TELEGRAPHY		
Max. Ratings (ICAS)	Frequencies up to 125 Mc.	At 160 Mc.
DC Plate Volts	600	450
Plate Input, Watts	40	30
Grid No. 2 Input, Watts	3.5	2.7
Plate Dissipation, Watts	13.5	13.5
TYPICAL OPERATION		
DC Plate Volts	600	350
DC Grid No. 2 Volts	185	200
DC Grid No. 1 Volts	–45	–90
Peak RF Grid No. 1 Volts	57	105
DC Plate Current, ma.	66	85
DC Grid No. 2 Current, ma.	10	7
DC Grid No. 1 Current, ma. (Approx.)	3	3
Power Output, Watts (Approx.)	27	16.5

For further information, see your local RCA Tube Distributor or write RCA, Commercial Engineering, Section M39C, Harrison, N. J.

Have you seen HAM TIPS?
Get a copy from your local RCA Tube Distributor

THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

TUBE DEPARTMENT

RADIO CORPORATION of AMERICA

HARRISON, N. J.