

January 1960

50¢

# CQ



*15th Anniversary*

**The Radio Amateur's Journal**



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*It pays to insist on*

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3023.5 Kc., .005%..... **\$3.45 Net**

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FCC assigned frequencies in megacycles: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255; calibrated to .005%. (Be sure to specify manufacturer of equipment)..... **\$2.95 Net**

Type Z-6A,  
Frequency  
Standard

To determine band edge. To keep the VFO and receiver properly calibrated.

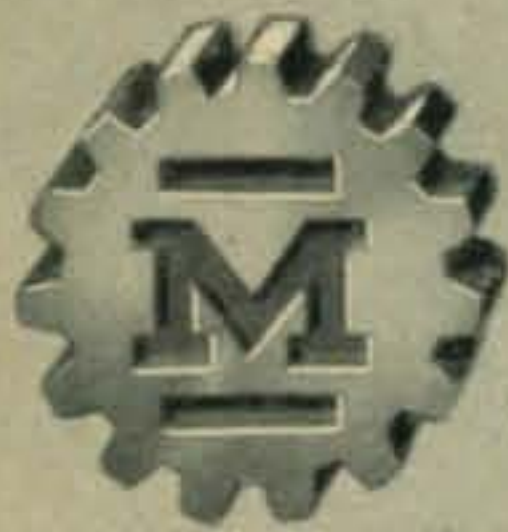
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For further information, check number 3 on page 126.

*Designed for*



*Application*



**The No. 90651  
GRID DIP METER**

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

**JAMES MILLEN  
MFG. CO., INC.**

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CQ, the Radio Amateurs' Journal is published for active hams by active hams. Not affiliated with any clubs or other political groups, CQ endeavors to be a true and honest reporter for those interested in the hobby. Suggestions for improvement are welcomed.

Authors would do well to send for the CQ Style sheet which will explain our confused system of abbreviations and symbols. The article "Author Author" (October 1952 CQ) tells all about how to write articles for CQ, how much we pay, etc. Reprints of this article are available from CQ if you have been improvident in keeping up your radio library.

**CQ CERTIFICATES:**

The WPX Award is granted for two-way contact with certain number of amateurs in different prefixes of the world. Full details are contained in the WPX Record Book which is available for 15c from CQ. Application forms are free.

The WAZ Award is granted for contacting all of the amateur zones of the world. Current standings of amateurs working for this award will be found in the DX column. A DX Zone map of the world is available free from CQ. Send stamped envelope.

Special SB Certificates are available from the Sideband Department for operators providing proof of contact (QSL cards) with stations in 50, 75 and 100 countries using two-way sideband. Send cards directly to the SB Editor.

**TECHNICAL INFORMATION:**

Please check the 11-year cumulative index which was published in the January 1956 CQ for information about articles in past issues of CQ. The December 1956 to 1958 CQ yearly indexes will bring you up to date. Most back issues are available at \$1 from us. Check our "Back Issue" ad for details on those not available. Reprints of the Cumulative Index are available free. For further information see the Ham Clinic column.

**DISCLAIMER:**

The authors and editors do the best they can to make everything as correct as possible in the articles. If for any reason any of them should happen to goof we hasten to point out that everything is experimental and we guarantee nothing.

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# BUILD YOUR OWN



# HAM GEAR



HEATHKIT HAM EQUIPMENT  
IS DESIGNED BY HAMS  
WHO KNOW YOUR  
PROBLEMS AND  
NEEDS.

PROVEN, "ON THE AIR"  
PERFORMANCE



### "SENECA" VHF HAM TRANSMITTER KIT

Beautifully styled and a top performer of highest quality throughout. The "Seneca" is a completely self-contained 6 and 2 meter transmitter featuring a built-in VFO for both 6 and 2 meters, and 4 switch-selected crystal positions, 2 power supplies, 5 radio frequency stages, and 2 dual-triode audio stages. Panel controls allow VFO or crystal control, phone or CW operation on both amateur bands. An auxiliary socket provides for receiver muting, remote operation of antenna relay and remote control of the transmitter such as with the Heathkit VX-1 Voice Control. Features up to 120 watts input on phone and 140 watts on CW in the 6 meter band. Ratings slightly reduced in the 2 meter band. Ideal for ham operators wishing to extend transmission into the VHF region. Shpg. Wt. 56 lbs.



HEATHKIT VHF-1 **\$159<sup>95</sup>**



HEATHKIT DX-20 **\$35<sup>95</sup>**

### DX-20 CW TRANSMITTER KIT

Designed exclusively for CW work, the DX-20 provides the novice as well as the advanced-class CW operator with a low cost transmitter featuring high operating efficiency. Single-knob bandswitching covers 80, 40, 20, 15 and 10 meters using crystals or an external VFO. Pi network output circuit matches antenna impedances between 50 and 1,000 ohms. Employs a single 6DQ6A tube in the final amplifier stage for plate power input of 50 watts. A 6CL6 serves as the crystal oscillator. The husky power supply uses a heavy duty 5U4GB rectifier and top-quality "potted" transformer for long service life. Easy-to-read panel meter indicates final grid or plate current selected by the panel switch. Complete RF shielding to minimize TVI interference. Easy-to-build with complete instructions provided. Shpg. Wt. 19 lbs.

**HEATH COMPANY** Benton Harbor, Michigan



a subsidiary of Daystrom, Inc.

# Mobile Gear...for the Ham on the Go!

## "CHEYENNE" MOBILE HAM TRANSMITTER KIT

All the fun and excitement . . . plus the convenience of mobile operation are yours in the all-new Heathkit "Cheyenne" transmitter. The neat, compact, and efficient circuitry provides you with high power capability in mobile operation, with low battery drain using carrier controlled modulation. All necessary power is supplied by the model MP-1 described below. Covers 80, 40, 20, 15 and 10 meters with up to 90 watts input on phone. Features built-in VFO, modulator, 4 RF stages, with a 6146 final amplifier and pi network (coaxial) output coupling. High quality components are used for long service life and reliable operation, along with rugged chassis construction to withstand mobile vibrations and shock. Thoughtful circuit layout provides for ease of assembly with complete instructions and detailed pictorial diagrams to insure success. A spotting switch is also provided. A specially designed ceramic microphone is included to insure effective modulation with plenty of "punch". Plan now to enjoy the fun of mobile operation by building this superb transmitter. Shpg. Wt. 19 lbs.



HEATHKIT MT-1  
\$99<sup>95</sup>



## "COMANCHE" MOBILE HAM RECEIVER KIT

Everything you could ask for in modern design mobile gear is provided in the "Comanche" . . . handsome styling, rugged construction, top quality components . . . and, best of all, a price you can afford. The "Comanche" is an 8-tube superheterodyne ham band receiver operating AM, CW and SSB on the 80, 40, 20, 15 and 10 meter amateur bands. A 3 mc crystal lattice-type IF filter permits the receiver to use single conversion without image interference, and at the same time creates a steep sided 3 kc flat top IF bandpass characteristic comparable to mechanical type filters. The neat, compact and easy-to-assemble circuitry features outstanding sensitivity, stability and selectivity on all bands. Circuit includes an RF stage, converter, 2 IF stages, 2 detectors, noise limiter, 2 audio stages and a voltage regulator. Sensitivity is better than 1 microvolt on all bands and signal-to-noise ratio is better than 10 db down at 1 microvolt input. One of the finest investments you can make in mobile gear. Shpg. Wt. 19 lbs.



HEATHKIT MR-1  
\$119<sup>95</sup>

## MOBILE SPEAKER KIT

A matching companion speaker for the "Comanche" mobile receiver. Housed in a rugged steel case with brackets provided for easy installation on fire wall or under dashboard, etc. Uses 5 PM speaker with 8 ohm voice coil. Measures 5" H. x 5" W. x 2 1/2" D. Shpg. Wt. 4 lbs.



HEATHKIT AK-7  
\$5<sup>95</sup>



HEATHKIT AK-6  
\$4<sup>95</sup>

HEATHKIT MP-1  
\$44<sup>95</sup>



## MOBILE POWER SUPPLY KIT

This heavy duty transistor power supply furnishes all the power required to operate both the MT-1 Transmitter and MR-1 Receiver. It features two 2N442 transistors in a 400 cycle switching circuit, supplying a full 120 watts of DC power. Under intermittent operation it will deliver up to 150 watts. Kit contains everything required for complete installation, including 12' of heavy battery cable, tap-in studs for battery posts, power plug and 15' of connecting cable. Chassis size is 9 1/16" L. x 4 3/4" W. x 2" H. Operates from 12-14 volt battery source. Circuit convenience provided by self-contained relay which allows push-to-talk mobile operation. Shpg. Wt. 8 lbs.

## MOBILE BASE MOUNT KIT

The AK-6 Base Mount is designed to hold both transmitter and receiver conveniently at driver's side. Universal mounting bracket has adjustable legs to fit most automobiles. Shpg. Wt. 5 lbs.

## POWER METER KIT

This handy unit picks up energy from your mobile antenna and indicates when your transmitter is tuned for maximum output. A variable sensitivity control is provided. Features a strong magnet on a swivel-mount for holding it on a car dashboard or other suitable spot. Has its own antenna or may be connected to existing antenna. Sensitive 200 ua meter. Shpg. Wt. 2 lbs.

HEATHKIT  
PM-2  
\$12<sup>95</sup>





# COMPANION UNITS



HEATHKIT TX-1 **\$234<sup>95</sup>**

## "APACHE" HAM TRANSMITTER KIT

The many features and modern styling of the "Apache" will provide you with just about everything you could ask for in transmitting facilities. Emphasizing high quality the "Apache" operates with a 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, built-in switch selected circuitry provides for single-sideband transmission using the SB-10 External adapter. The newly designed, compact and stable VFO provides low drift frequency control necessary for SSB transmission. A slide rule type illuminated rotating VFO dial with full gear drive vernier tuning provides ample bandspread and precise frequency settings. The bandswitch allows quick selection of the amateur bands on 80, 40, 20, 15 and 10 meters. This unit also has adjustable low-level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL34 tubes in push-pull class AB operation. Time sequence keying is provided for "chirpless" break-in CW operation. The final amplifier is completely shielded for TVI protection and neutralized for greater stability. A cooling fan is also provided. The formed one-piece cabinet with convenient access hatch provides accessibility to tubes and crystal sockets. Die-cast aluminum knobs and control panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. A "spotting" push button enables the operator to "zero beat" an incoming frequency without putting the transmitter on the air. Equip your ham shack now for top transmitting enjoyment with this outstanding unit. Shpg. Wt. 110 lbs. Shipped motor freight unless otherwise specified.

## HEATHKIT SB-10 SINGLE SIDEBAND ADAPTER KIT

**\$89<sup>95</sup>**



Designed as a compatible plug-in adapter unit for the TX-1 "Apache" transmitter, this unit lets you operate on SSB at a minimum of cost, yet does not affect the normal AM and CW functions of the transmitter. By making a few simple circuit modifications, the DX-100 and DX-100-B transmitters can be used, utilizing all existing RF circuitry. Extremely easy to operate and tune, the adapter employs the phasing method for generating a single-sideband signal, thus allowing operation entirely on fundamental frequencies. The critical audio phase shift network is supplied completely preassembled and wired in a sealed plug-in unit. Produces either a USB, LSB or DSB signal, with or without carrier insertion. Covers 80, 40, 20, 15 and 10 meter bands. An easy-to-read panel meter indicates power output to aid in tuning. A built-in electronic voice control with anti-trip circuit is also provided. 10 watts PEP output. Unwanted sideband suppression is in excess of 30 db and carrier suppression is in excess of 40 db. An EL84/6BQ5 tube is used for linear RF output. Shpg. Wt. 12 lbs.

MODIFICATION KIT: Modifies DX-100 and DX-100-B for use with the SB-10 Adapter. Model MK-1. Shpg. Wt. 1 lb. \$8.95.



HEATHKIT AR-3

**\$29<sup>95</sup>**

(less cabinet)

## ALL-BAND RECEIVER KIT

A fine receiver for the beginning ham or short wave listener, designed for high circuit efficiency and easy construction. Covers 550 kc to 30 mc in four bands clearly marked on a slide-rule dial. Transformer operated power supply. Features include: bandswitch, bandspread tuning, phone-standby-CW switch, phone jack, antenna trimmer, noise eliminator, RF gain control and AF control. Shpg. Wt. 12 lbs.

CABINET: Opt. extra. No. 91-15A. Shpg. Wt. 5 lbs. \$4.95.



HEATHKIT QF-1

**\$9<sup>95</sup>**

## "Q" MULTIPLIER KIT

Useful on crowded phone and CW bands, this kit adds selectivity and signal rejection to your receiver. Use it with any AM receiver having an IF frequency between 450 and 460 kc that is not AC-DC type. Provides an effective "Q" of approximately 4,000 for extremely sharp "peak" or "null". The QF-1 is powered from the receiver with which it is used. Shpg. Wt. 3 lbs.



# OF DISTINCTIVE QUALITY

## ACCESSORY SPEAKER KIT

Handsomely designed and color styled to match the "Mohawk" receiver this heavy duty 8" speaker with 4.7 ounce magnet provides excellent tone quality. Housed in attractive 3/8" plywood cabinet with perforated metal grille. Speaker impedance is 8 ohms. Shpg. Wt. 7 lbs.



HEATHKIT AK-5  
\$9<sup>95</sup>



HEATHKIT RX-1 \$274<sup>95</sup>

## "MOHAWK" HAM RECEIVER KIT

Styled to match the "Apache" transmitter the "Mohawk" ham band receiver provides all the functions required for clear, rock-steady reception. Designed especially for ham band operation this 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc and covers all the amateur frequencies from 160 through 10 meters on 7 bands with an extra band calibrated to cover 6 and 2 meters using a converter. Specially designed for single sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled wired and aligned front end coil bandswitch assembly assures ease of construction and top performance of the finished unit. Other features include 5 selectivity positions from 5 kc to 500 CPS, bridge T-notch filter for excellent heterodyne rejection, and a built-in 100 kc crystal calibrator. The set provides a 10 db signal-to-noise ratio at less than 1 microvolt input. Each ham band is separately calibrated on a rotating slide rule dial to provide clear frequency settings with more than ample bandspread. Front panel features S-meter, separate RF, IF and AF gain controls, T-notch tuning, T-notch depth, ANL, AVC, BFO, Bandswitch tuning, antenna trimmer, calibrate set, calibrate on, CW-SSB-AM, receive-standby, upper-lower sideband, selectivity, phone jack and illuminated gear driven vernier slide rule tuning dial. Attractively styled with die-cast aluminum control knobs and escutcheons. No external alignment equipment is required for precise calibration of the "Mohawk". All adjustments are easily accomplished using the unique method described in the manual. An outstanding buy in a communications receiver. Shpg. Wt. 66 lbs. Shipped motor freight unless otherwise specified.



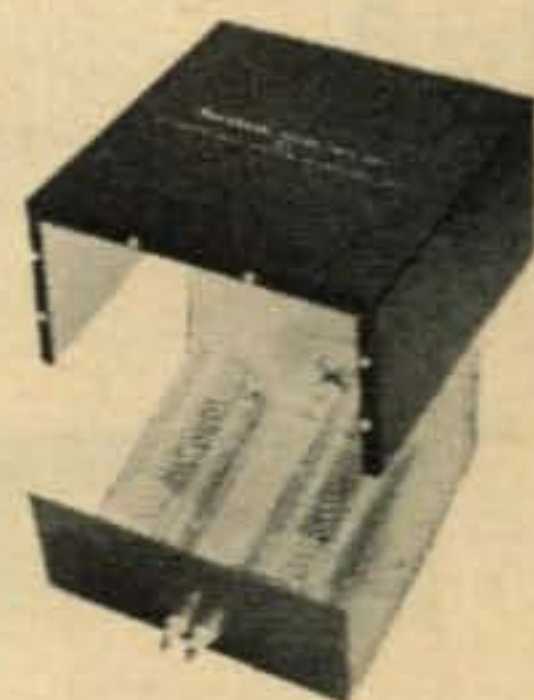
HEATHKIT AM-2  
\$15<sup>95</sup>

## REFLECTED POWER METER KIT

The AM-2 measures forward and reflected power or standing wave ratio. Handles a peak power of well over 1 kilowatt of energy and covers 160 through 6 meters. Input and output impedance provided for 50 or 75 ohm lines. No external power required for operation. Use it also to match impedances between exciters or RF sources and grounded grid amplifiers. Shpg. Wt. 3 lbs.

## BALUN COIL KIT

Match unbalanced coaxial lines, found on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance with this handy transmitter accessory. Capable of handling power input up to 200 watts, the B-1 may be used with transmitters and receivers covering 80 through 10 meters. No adjustment required. Shpg. Wt. 4 lbs.



HEATHKIT B-1  
\$8<sup>95</sup>



HEATHKIT VX-1  
\$23<sup>95</sup>

## ELECTRONIC VOICE CONTROL KIT

Eliminate hand switching with this convenient kit. Switch from receiver to transmitter by merely talking into your microphone. Sensitivity controls allow adjustment to all conditions. Power supply is built in and terminal strip on the rear of the chassis accommodates receiver and speaker connections and also a 117 volt antenna relay. Shpg. Wt. 5 lbs.



HEATHKIT VF-1  
\$19<sup>50</sup>

## VFO KIT

Far below the cost of crystals to obtain the same frequency coverage this variable frequency oscillator covers 160, 80, 40, 20, 15 and 10 meters with three basic oscillator frequencies. Providing better than 10 volt average RF output on fundamentals, the VF-1 is capable of driving the most modern transmitters. Requires only 250 volts DC at 15 to 20 ma, and 6.3 VAC at 0.45 a. Illuminated dial reads direct. Shpg. Wt. 7 lbs.

# Save 1/2 or more...with Heathkits



HEATHKIT DX-100-B \$189<sup>50</sup>

## DX-100-B PHONE AND CW TRANSMITTER KIT

A long standing favorite in the Heathkit line, the DX-100-B combines modern styling and circuit ingenuity to bring you an exceptionally fine transmitter at an economical price. Panel controls allow VFO or crystal control, phone or CW operation on all amateur bands up to 30 mc. The rugged one-piece formed cabinet features a convenient top-access hatch for changing crystals and making other adjustments. The chassis is punched to accept sideband adapter modifications. Featured are a built-in VFO, modulator, and power supply, complete shielding to minimize TVI, and a pi network output coupling to match impedances from 50 to 72 ohms. RF output is in excess of 100 watts on phone and 120 watts on CW. Band coverage is from 160 through 10 meters. For operating convenience single-knob bandswitching and illuminated VFO dial on meter face are provided. A pair of 6146 tubes in parallel are employed in the output stage modulated by a pair of 1625's. Shpg. Wt. 107 lbs. Shipped motor freight unless otherwise specified.



HEATHKIT DX-40 \$64<sup>95</sup>

## DX-40 PHONE AND CW TRANSMITTER KIT

An outstanding buy in its power class the DX-40 provides both phone and CW operation on 80, 40, 20, 15 and 10 meters. A single 6146 tube is used in the final amplifier stage to provide full 75 watt plate power input on CW or controlled carrier modulation peaks up to 60 watts for phone operation. Modulator and power supplies are built in and single-knob bandswitching is combined with the pi network output circuit for complete operating convenience. Features a D'Arsonval movement panel meter. A line filter and liberal shielding provides for high stability and minimum TVI. Provision is made for three crystals easily accessible through a "trap door" in the back of the cabinet. A 4-position switch selects any of the three crystals or jack for external VFO. Power for the VFO is available on the rear apron of the chassis. Easy-to-follow step-by-step instructions let assembly proceed smoothly from start to finish even for an individual who has never built electronic equipment before. Shpg. Wt. 25 lbs.

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ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

QUANTITY	KIT NAME	MODEL NO.	PRICE

For further information, check number 5 on page 126.

# Letters.....to the Editor

## First ET?

Dear Sir:

In the November issue of CQ, p. 64, there is an article "A New One" on Single Sideband. The caption under the photo on the same page says "Ethiopia's first single Sideband station".



## ET 3 RL



ROGER LECLAIRE  
UNIVERSITY COLLEGE  
P. O. BOX 888  
ADDIS ABABA, ETHIOPIA

May I call to your attention that the first Single Sideband station in Ethiopia was ET3RL, using an Hallicrafter SR-500 and a Telrex 3-el. Beam. The first two-way contact on Single Sideband from Ethiopia was with VE7EL of Vancouver. It took place on January 13, 1957 (GMT). The first U.S. contact with Ethiopia was W8QNF.

There were not very many stations operating SSB at the time. Enclosed, you will find a QSL card of ET3RL and a photo of the station.

Roger Leclaire  
VE3CNU, ex-ET3RL

P.S. The same station is still existing in Addis-Ababa and have the call sign of ET3UCA. However, it has not been very active recently.

## Citizens Radio

Gentleman:

In your article about the Citizens Radio Service, written by Barry Briskman in the August issue of CQ, he stated that one could secure part 19 of the Citizens Radio Service Rules for fifteen cents by writing to the Superintendent of Documents in Washington. This I did. Today I received a letter from the FCC, which states, "Federal Communications Commission Rules and Regulations Part 19, Citizens Radio Service is no longer available in separate form but will be contained in Volume VI of the FCC Rules and Regulations." Volume VI costs one dollar and twenty-five cents and is available from the Superintendent of Documents.

Those who sent in fifteen cents in cash will receive five-cent coupons (3) that will be received in lieu of five cents in exchange for public documents or may be redeemed for cash if requested.

I thought this information might be of some interest to you.

Pikeville, Kentucky  
Gary Yarus

## Cops?

Dear Editor:

I have just read with considerable interest, and I might add some chagrin, the article "RADAR SPEED TRAPS DEFEATED" by Glynn N. Murphy, K2UAW, in your October 1950 issue.

My interest is twofold: one, as an amateur and avid mobile operator, and two, as a police officer who is vitally interested in the legal rights of the individual, the dignity of the law, the officer and the courts.

My motivation in replying to Mr. Murphy's article, I believe is the same as that interest in justice and fair play which sparked his authorship.

Mr. Murphy's feelings in this matter can readily be understood, particularly so, in the light of his allegation to the deliberate perjured statement of the officer. If this allegation is true, then the cause of justice has not been completely served in that the court was not informed of the greater offense, the alleged perjury.

A point in rebuttal to Mr. Murphy's doubt of a woman judge to understand non-linear detection, re leakage, etc. Personal experience in giving expert testimony before courts presided over by women judges, I have found to be no different than their masculine counterparts in grasping technical explanations from expert witnesses on many and varied subjects including complex anatomy, neurology, chemistry, physics and mathematics to name a few, as well as technicalities concerning radio and radar. Here is where the "expert witness" either earns his title or falls flat on his face.

There is no room for argument, I believe, on the technical aspects of the case. Knowledge of the shortcomings of such equipment including its calibration as well as the possibility of introduced error from many sources, could lead to a persuasive defense argument. There is little doubt had the prosecuting attorney at least the same technical advantage as his "worthy lay opponent," the possibility of the AF-67 causing a sustained reading on the radar equipment could have been effectively challenged.

Exception is taken to Mr. Murphy's statement with regard to the "sarcastic tone only a cop can put over." The word "cop" is in bad taste, to quote from one esteemed source, namely John Edgar Hoover.

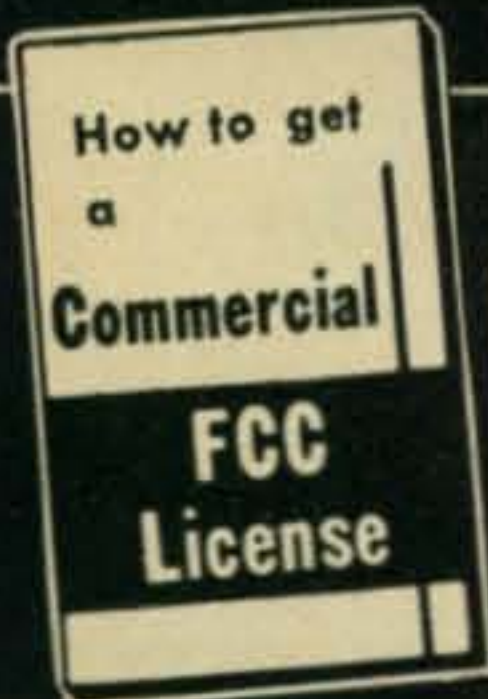
The implication to every reader of CQ that all "cops" are sarcastic and distort the facts, is too strong to go unchallenged. There must be many amateur radio operators who serve the law as officers, attorneys and possibly even a judge or two, as well as many others who will agree with me.

We can probably all agree that there are persons who bring discredit to their profession as well as to themselves in all walks of life, people who will distort the facts to their own ends. This type of individual does not exclude policemen, nor even the amateur radio operator, however of this I am sure, when we have an interesting and informative article such as Mr. Murphy gave us, read by the many people who subscribe to CQ magazine, the story verisimilitude and interest could have been held without bias, or possibly libelous statement, at a point where there could be no official rebuttal.

It is my belief that we all must have a very healthy interest in the right of the individual and the presumption of innocence until guilt is proven beyond that reasonable doubt required under our system of justice. Certainly Mr. Murphy must hold a "dim view" of that justice, or of a particular

[Continued on page 18]

# How To Pass FCC COMMERCIAL RADIO OPERATOR License Exams



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Tells where to apply and take FCC examinations, location of examining office, scope of knowledge required, approved way to prepare for FCC examinations, positive method of checking your knowledge before taking the examination.

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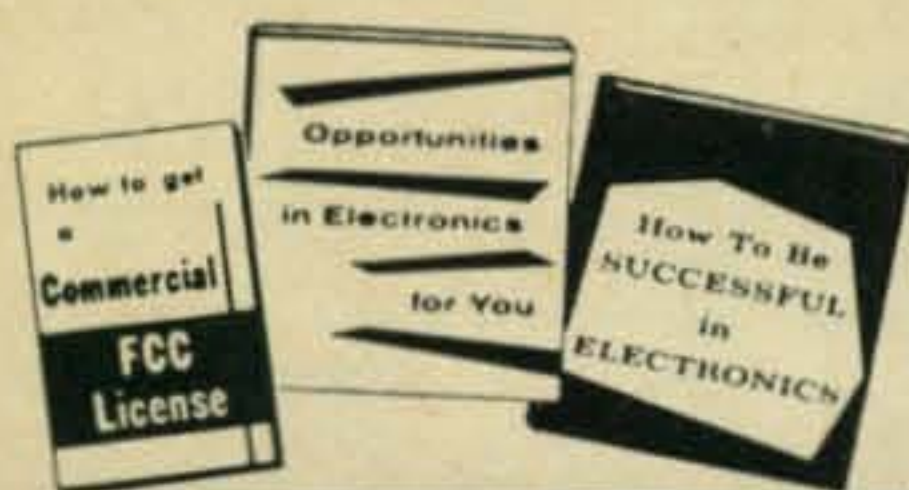
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City ..... Zone ..... State .....

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CQ-58



Feenix, Ariz.

Deer Hon. Ed:

Eggscousing please if this letter being diffrent from other Scratchi letters on acct. maybe this letter not making to much sense. You seeing, Scratchi are just getting grate big shock.

No need to rushing out and bying nickel get-well card to sending me, Hon. Ed., on acct. I are not in bed or even sick. Shock I having not being shock you getting from standing in shower ushing defective electric vibrater. No indeedy. Shock I getting coming from eggsparyance I just going thru. What happening to Hon. Good Old Days of Amchoor Raydio? They all gone, Hon. Ed., they all gone.

Like taking what happening to me. One nite frend of mine calling me on land-line and saying he wanting to ask favor of me. Seems like this feller very intrusted in teeching things to teenagers. He wanting to know if I like to teeching class in code and theery to some teenage boys.

I thinking it over and telling him hokay. After all, Scratchi wanting to help peeple become amchoors, even though it making the QRM something feerce.

So, that nite Scratchi diving feet-first into junk box, and by time I coming up for air I are finding I having plenty stuff to running 1/c code class and theery class. Coming across surplus code instrukter unit likesame Hon. Uncle Sam using to teeching code in war. This are kind what having place to plugging in eleven-teen diffrent sets of headfones.

After digging reel deep coming up with ten sets headfones. Some have slitley cracked or missing bakelite ear cups, but are mending these with frickshun tape and all of them are testing out reel slicky. Also finding nice strate key. This are kind waying maybes for or five pounds, and having knob on it about size of small doorknob.

Also coming up with assortment of meters, resistors, condensers, switches, batteries and wire. This is so can setting up eggspairaments for fellers to watching and learning Hon. Ohms Law and other stuff.

By following weekend being all set. Going  
[Continued on page 100]

# QSL contest

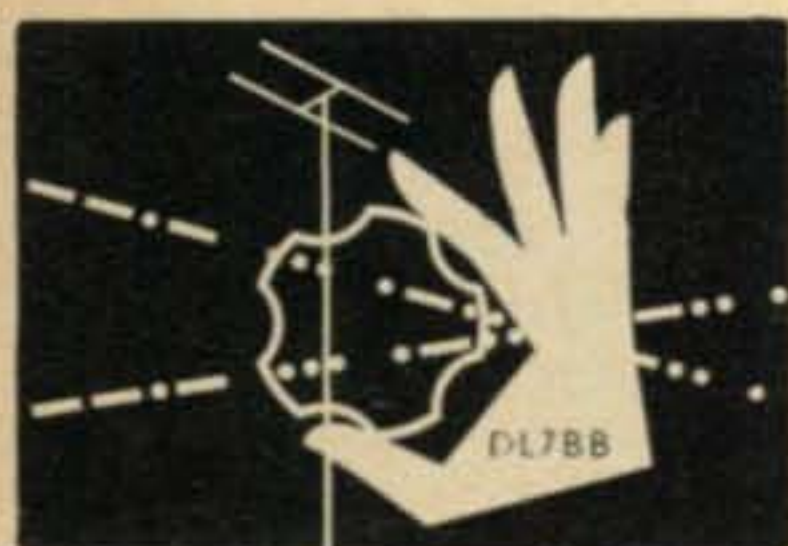
Winner



Featured in this month's Hall of Fame we find winner HK4FB from Medellin, Colombia, South America. Alberto's card is a striking 4 color affair done on thick, high-gloss stock. Congrats, Alberto. Hope you enjoy the free year of CQ.

## Big Losers

This is the only place where losers are winners, so DL7BB, SM6CU and our own W6PXH will have to be satisfied with mere reproduction of their cards (plus a free copy of a well known amateur publication). Better luck next time, OM's.



## New... Improved!



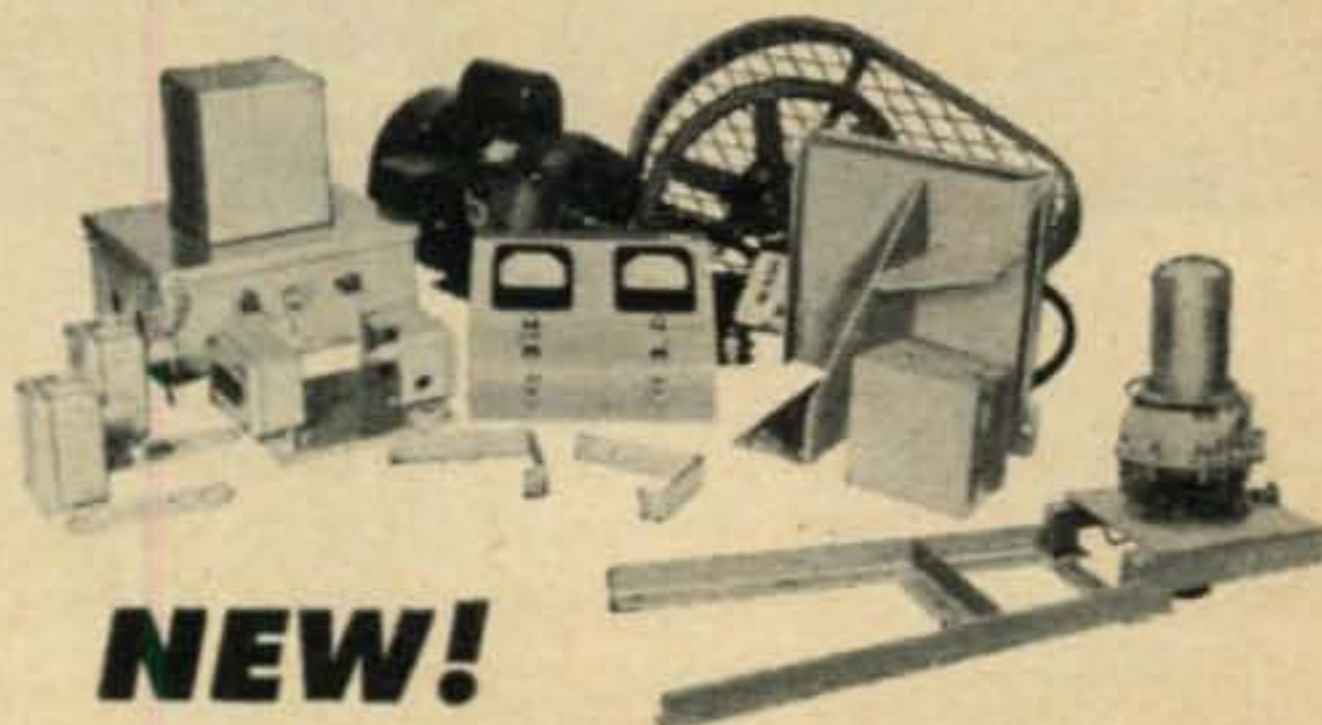
# Tri-Ex

## ROTATING TOWER

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Look At These All New Features!

- New roller guides for smooth, silent, frictionless raising and lowering.
- New rotating ring with large, sealed, precision ball bearings. You can rotate the entire tower with the tip of your finger!
- Increased strength and greater weight for utmost safety.
- New triple-coated finish for maximum weather protection.
- Plus many more new, exciting features!



## NEW!

### TOWER RAISING and LOWERING and ROTATING UNIT

Enjoy the convenience and ease of remote control. Here's everything you need to completely motorize your tower!

Write today for catalog describing and illustrating the most complete line of towers for amateurs and industry ...from low-cost economy models to the most deluxe.

**TRI-EX TOWER CORP.**  
127 East Inyo Street, Tulare, Calif.

For further information, check number 52 on page 126.

now...  
transmit-  
receive  
with this  
handful  
of power!



The size of a paperback book (and almost as light-weight), Cornell-Dubilier's new **Transipower 12TP3** transistorized converter is the quiet, highly efficient alternate power supply for portable or mobile receivers and transmitter/receivers.

This power-packed package weighs **ONLY THREE QUARTERS OF A POUND**. Its heavier-duty companion, Model 12TP12, only one pound more. Both are "circuit-protected" throughout against transients and overloads, fuse-protected against circuit failures: both housed in corrosion-resistant, heavy-gauge aluminum for ruggedness, lightness and maximum heat transfer. Here are the ratings—**12TP3**: 12 VDC to 300 VDC at 300 MA (30 watts); **12TP12**: 12 VDC to 500 VDC at 240 MA (120 watts).

For full details, see your C-D distributor or write today for Bulletin EB-3016 to Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey. Also ask about C-D's famous "HAM-M" Rotor.

**CDE** **CORNELL DUBILIER**

Affiliated with Federal Pacific Electric Company

For further information, check number 7 on page 126.

## CLUB BULLETINS

Marvin D. Lipton,

311 Rosemary Road, Toronto 10, Ontario, Canada.

### A Bit of Everything

By the time that you read this the confusion concerning our *CQ Club Bulletin* should be cleared up. In transferring printing and mailing operations of *CQ News* from Toronto to New York, we missed publishing the September issue and part of the October copy. If you still have not enrolled your club with this department you may do so by notifying us at the above address.

I was rather sorry to learn that Butch, K9-IXD, has given up the editorship of *Ama-Chewer*, the Indianapolis Radio Club's journal. Butch edited three papers and she could hardly be blamed for making her task a little easier.

Art, W6IQJ, sends in word of a ham radio show heard every Friday in the Los Angeles, California, area. The long wave station, at the 860 kc spot, airs a program at 6 pm, outlining the amateur radio activities of W6's in the Southwestern U.S. region. Free ads are accepted from hams and are read on the air. These "ham commercials" are limited to ten seconds in length. Parties interested in influencing home-town broadcast stations in such a venture can obtain additional info from Art at P.O. Box 59029, Los Angeles.

The boys at CFQC radio & TV in Saskatoon, Saskatchewan, Canada, have founded a ham club which includes such personalities as Mel, VE5QC; Dave, 5AG; Bob, 5BQ; and Earl, 5OB. The group offers the "QC Award" to any amateurs contacting 4 club members.

Don MacDonald, K4FQQ, the publicity chairman of the Panama City Amateur Radio Assn., in Florida, dropped me a note about a couple of pending club projects, but like others, his mail arrived too late for publication.

[Continued on page 100]

The licensed firemen and policemen of Cleveland, Ohio, got together to form an unusual ham club. Above we see the results. From L to R: Back Row: W8AF, K8PRP, K8MLS, KN8OFT, W8PMA, W8NGY, W8BYO, K8NMY. Front Row: W8SRO, W8AOZ, K8KNJ, W8LY, Pres., K8HVX, Sec'ty-Treas., W8LJI, W8UWN, W8COG.



FROM

# hallicrafters

AN ENTIRELY NEW CLASS  
OF **SSB** EQUIPMENT



The engineering team that developed the incomparable SX-101 and HT-32 now offers a precision rig that puts Single Sideband within reach of all.

**SX-111 Receiver \$249.50.** Here's a CW/AM/SSB receiver with the essential performance characteristics of the renowned SX-101 . . . at a price that can put it in your shack tomorrow. CW/AM/SSB reception; complete coverage: 80, 40, 20, 15 and 10 meters in 5 separate bands, 6th band tunable to 10 Mc. for WWV. Upper/lower sideband selection; sensitivity: 1 microvolt on all bands; 5 steps of selectivity: 500 to 5000 cycles. Dual conversion, crystal controlled 2nd converter, famous Tee-Notch filter, built-in crystal calibrator.

**HT-37 Transmitter \$450.00.** A precision-engineered CW/AM/SSB transmitter with the same power, rugged construction and smooth, distinctive speech quality of its big brother, the famous HT-32. VFO employs double reduction disc drive, fixed T.C. Sideband suppression 40 db. at 1000 CPS. Power rating: 70-100 watts P.E.P. output CW or SSB. 17-25 watts carrier on AM phone. Two 6146's in the final. 3rd and 5th order distortion products down 30 db. Instant CW CAL signal from any transmission mode.

For further information, check number 8 on page 126.

the new ideas in communications are born at . . .

Export Sales: International Division  
Raytheon Mfg. Co., Waltham, Mass.  
Canada: Gould Sales Co., Montreal, P.Q.



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Ideal for veteran or novice. 90W CW, 65W ext. plate mod. 80 thru 10 meters.

\* 90-WATT CW TRANSMITTER #720  
KIT \$79.95  
WIRED \$119.95

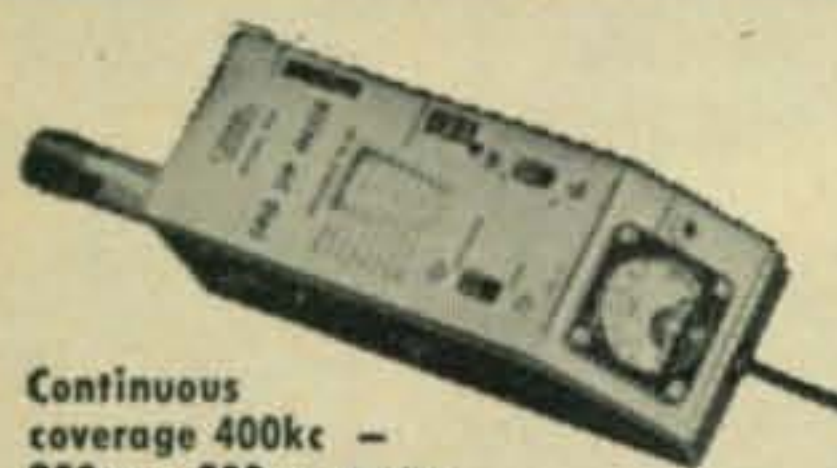
"Top Quality"—ELECTRONIC KITS GUIDE



Delivers 50W undistorted audio. Modulates xmitters having r.f. inputs up to 100W. Unique over-modulation indicator.

HIGH-LEVEL UNIVERSAL MODULATOR-DRIVER #730  
KIT \$49.95  
WIRED \$79.95

Cover E-5 \$4.50



Continuous coverage 400kc - 250mc; 500va meter.

GRID DIP METER #710  
KIT \$29.95  
WIRED \$49.95

Includes complete set of coils for full band coverage.

COLOR & Monochrome DC to 5MC Lab & TV 5" Oscilloscope #460

KIT \$79.95 WIRED \$129.50

5" Push-Pull Oscilloscope #425  
KIT \$44.95 WIRED \$79.95

PEAK-to-PEAK VTVM #232  
KIT \$29.95 WIRED \$49.95

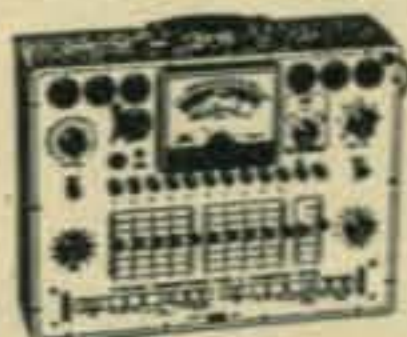
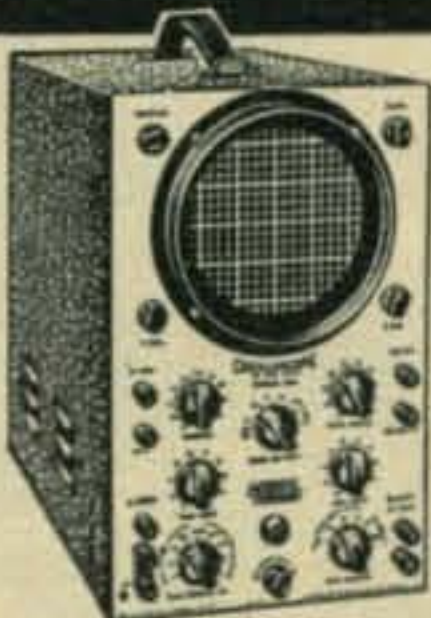
Vacuum Tube Voltmeter #221  
KIT \$25.95 WIRED \$39.95

RF Signal Generator #324 (150kc-435mc)  
KIT \$26.95 WIRED \$39.95

TV-FM Sweep Generator & Marker #368  
KIT \$69.95 WIRED \$119.95

Dynamic Conductance Tube & Transistor Tester #666  
KIT \$69.95 WIRED \$109.95

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CQ-12

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For further information, check number 9 on page 126.

14 • CQ • January, 1960

# MARS BULLETINS

## Air Force MARS Western Technical Net

Sundays 2-4 PM local time,  
3295 kc, 7832.5 kc, 143.46 mc

Jan. 3—"Technical Net Session."

Jan. 10—"Basic Radioteletype Discussions," by Colonel Fred Heward, K6EER, AFA6EER, NCS Rad-tel No. 1.

Jan. 17—"Radioteletype Printer Maintenance and Trouble Shooting," by Mr. E. J. Loustaunau, TTY Foreman, Pacific Telephone Co., San Bernardino, Calif.

Jan. 24—"Electrochemical Power Cells and Accessory Equipment," by Mr. W. W. Grundel, Manager, Excide Industrial Division, Electric Storage Battery Co. San Francisco, Calif.

Jan. 31—"Net Session and Conversion Information with a Technical Discussion."

## Air Force MARS Eastern Technical Net

Sundays 2-4 PM EST  
3295 kc, 7540 kc, 15,715 kc

Jan. 3—Recess date.

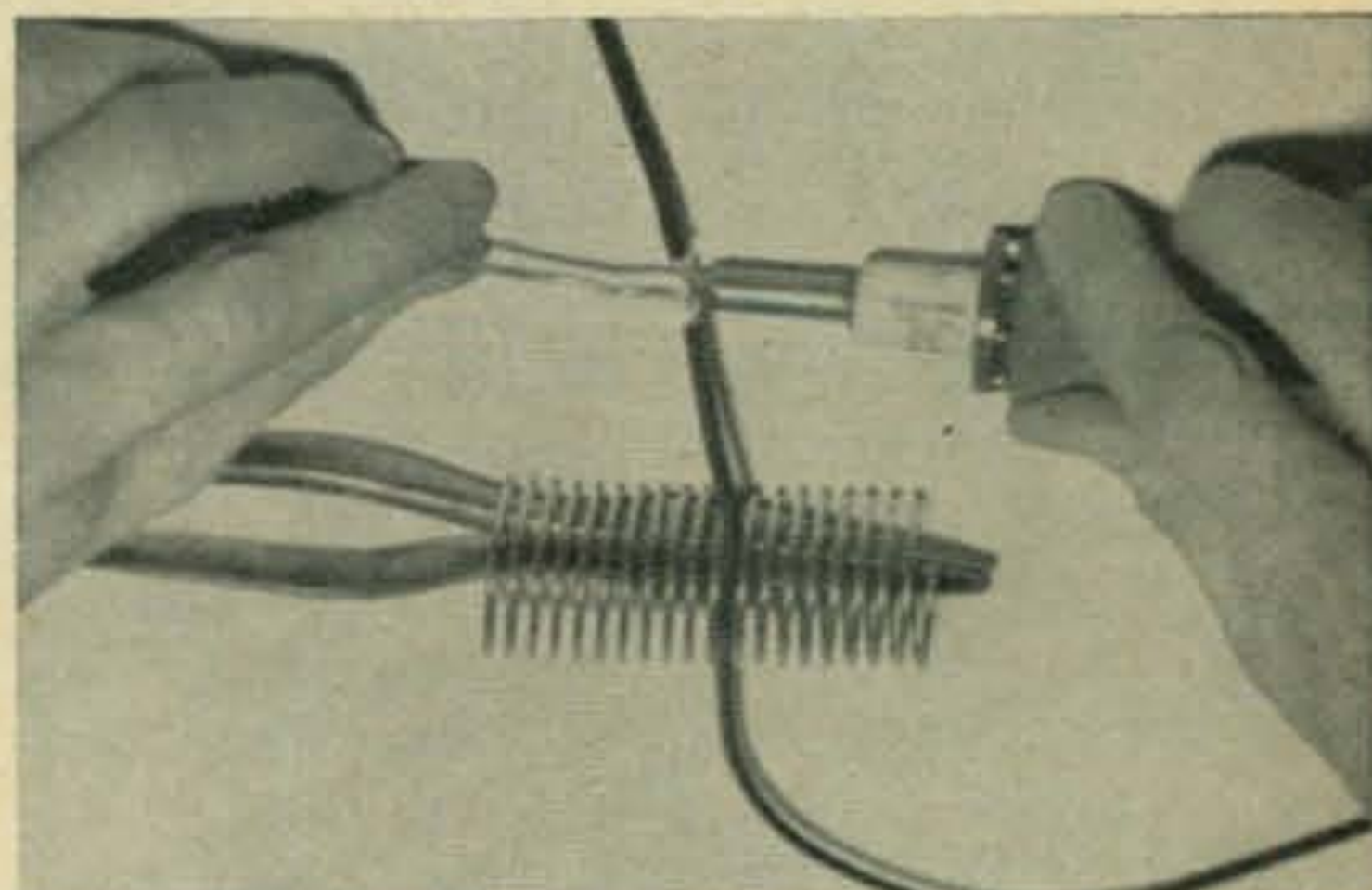
Jan. 10—"Review of Technical Topics."

Jan. 17—"Basics Of Single Sideband," Henry G. Adams and S. Edwin Piller, Eldico Electronics Div. of R. E. L.

Jan. 24—"Fundamentals Of Transistors," Robert Gunderson, Braille Technical Press.

Jan. 31—"Optics And The Visible Spectrum," Edward C. Scott, Rome Air Development Center.

Feb. 7—"Infra-Red," Robert D. Byrne, Rome Air Development Center.



### Work Holder

Use a large coil spring that has a wide opening between the turns as a handy "vise" to hold wires or parts while you solder them. If the weight of the spring is not sufficient to hold the work still, slip a pair of pliers or other heavy tools inside to anchor it down.





# MSB-1

## 1960's Biggest Value

# MSB-1 MOBILE SIDEBAND COMMUNICATOR TRANSCEIVER

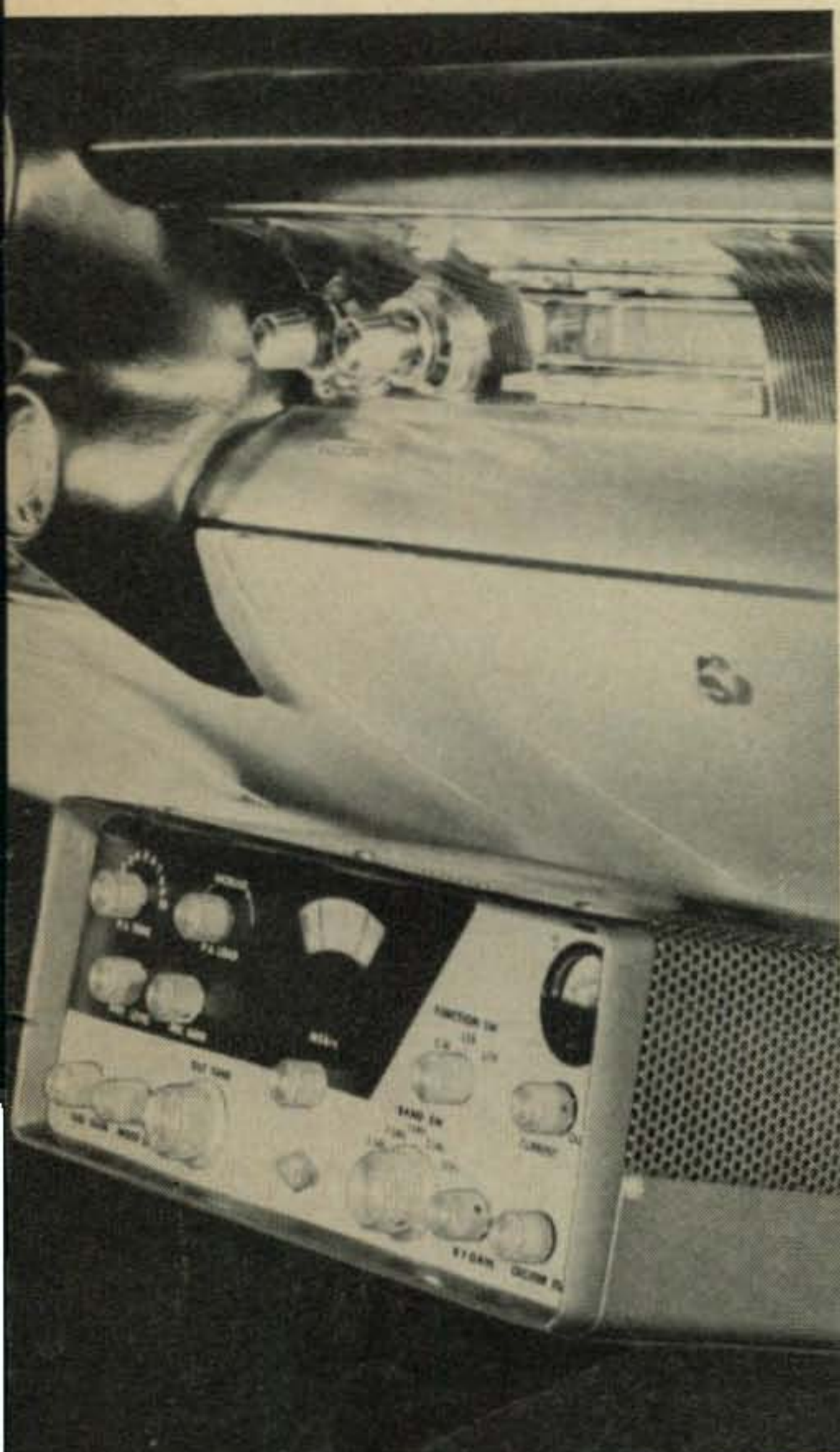
MSB-1...far advanced in design...  
priced for fullest value!

Compact...mounts readily under dash  
complements any modern car. Its attractive  
gunmetal housing with black and satin  
aluminum panel shows equally to advantage  
on any well-appointed operating desk.

Highly stable...non-critical with single  
knob VFO tuning both transmitter and  
receiver...with quartz crystal filter to  
eliminate unwanted sideband.

### Every desirable modern feature...

125 watts P.E.P. input...upper and lower side-  
band and CW...all band operation, 10 through  
80 meters...high stability VFO...VOX...push-  
to-talk and phone-patch provisions. Receiver  
sensitivity better than 1 microvolt...9 mc  
band-pass crystal filter for excellent  
transmitting and receiving selectivity...100 kc  
crystal calibrator unit available as an acces-  
sory...12V DC power supply is transistorized...  
AC supply also available. MSB-1 is only  
5"H, 12"W and 12"D, weighs but fifteen  
pounds less power supply.



Tentatively priced at 795.00 w/12V DC power supply.

For further information, check number 10 on page 126.



## GONSET

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*The Turner '254'*

# THE MICROPHONE DESIGNED FOR THE HAM



Versatile, easy to operate—the new Turner 254 gives hams a dependable desk type crystal mike that's engineered for all amateur communications. It operates by a touch-bar on-off switch and lever-lock on-off switch. Output level—48 db. Response level 60 — 8,000 cps. Smart grey hammertone finish. One-piece die cast construction gives years of rugged service. And it's priced for every ham budget — only \$14.10 net. See your Turner dealer right away, and get on the air with the new Turner 254.

**THE TURNER MICROPHONE COMPANY**

17th Street N.E., Cedar Rapids, Iowa

For further information, check number 11, on page 126.

## Announcements

Baltimore, Md.

There will be a banquet, on January 20th, at the Alcazar Hotel in Baltimore, Md. It is a meeting of all the ham clubs in the vicinity of Baltimore and is sponsored by the Chesapeake Amateur Radio Club in conjunction with all of the local clubs. The guest of honor and speaker will be Wayne Green, W2NSD. For further information and reservations contact John Jones, W3OTG Glen Arm Rd., Baltimore 34.

CQ 15 Year Index

CQ's complete 15 year index is now available. It will be sent, free, upon receipt of a self addressed and stamped envelope.

Lawton, Oklahoma

"The Lawton-Fort Sill Amateur Radio Club will hold its annual Founder's Day "Ham-Fest" on Sunday, 14 February 1960, at the spacious, well-heated National Guard Armory at Lawton, Oklahoma. Registration will begin at 9 A. M. Pre-registrations will be accepted until 10 February 1960 which will apply to pre-registrations prize and other prizes. Prizes will be given between 1100 and 1500 hours. Free coffee served all day. A barbecued beef dinner will be served by a local catering service promptly at 1230 hours. Bring gear for sale or trade. Large signs will be posted on all major highways and a fixed station will operate on 3860 KC to guide mobiles in to the location. Pre-registration charge is \$3.00, which includes the dinner and chances on all prizes. No extra charge for registration at the door. For further information write Lawton-Fort Sill Amateur Radio Club, P. O. Box 892, Lawton, Oklahoma.

Joint Northern and Southern California DX Conference

When: January 23 (approx. noon) until January 24 (approx. 1:00 PM).

Where: Hotel Californian, Van Ness and Kern, Fresno, California.

Registration: \$8.00, which includes prizes, dinner Saturday evening (approx. 6 PM) and breakfast Sunday (approx. 8:30 AM).

Pre-Registration closes Jan. 1, 1960 (must be postmarked no later than Jan. 1 for pre-registration prizes) with checks, money orders, etc. made payable to the Treasurer of So. California DX Club, P. O. Box 13, Alhambra, California.

Reservations will be handled by Hotel Californian, Van Ness and Kern, Fresno, California. Tariff as follows:

Single bedroom—\$5.50 to \$6.50

Double bedroom—\$8.00 to \$10.00

Twin bedroom—\$10.00 to \$12.00

World known DX personalities will be present along with a tremendous program. Join the "Sport of Kings" (DX racers) at Fresno on Jan. 23 and 24, 1960 for a time to be remembered.

"Talking Books"

In celebration of its tenth anniversary, The Braille Technical Press announces that the only radio and electronics magazine for the blind radio amateur, Hi-Fi enthusiast, sound recording technician, radio and TV serviceman, etc., will now be published monthly on "Talking Book" records.

The record edition will provide two hours of information on all phases of radio and electronics. They are recorded at 16-23 rpm on a 10-inch unbreakable vinylite record. The subscription price is \$10.00 per year for twelve monthly issues. These "Talking Book" record subscriptions are for the purchase, not rental, of the records.

Portsmouth, New Hampshire

At the recent annual elections of The Port City Amateur Radio Club the following officers were elected for the coming year:

President: Roland Brulotte (K1CBX), Portsmouth, N. H.

Vice President: Edward McCann (K1CJO), Eliot, Maine.

Secretary: Richard Wilder (W1GGA), Portsmouth, N. H.

Treasurer: Clarence Hackney (W1DZZ), Portsmouth, N. H.

Board of Directors: (the above mentioned officers, plus:) Robert Calkins (W1IMB), New Castle, N. H., Norman Cain, Portsmouth, N. H., Leodor Boisvert (W1HIE), Newmarket, N. H.

GLOBE ELECTRONICS  
TOMORROW'S PRODUCTS TODAY

A DIVISION OF TEXTRON ELECTRONICS, INC.



90w BANDSWITCHING

## Globe Chief Deluxe

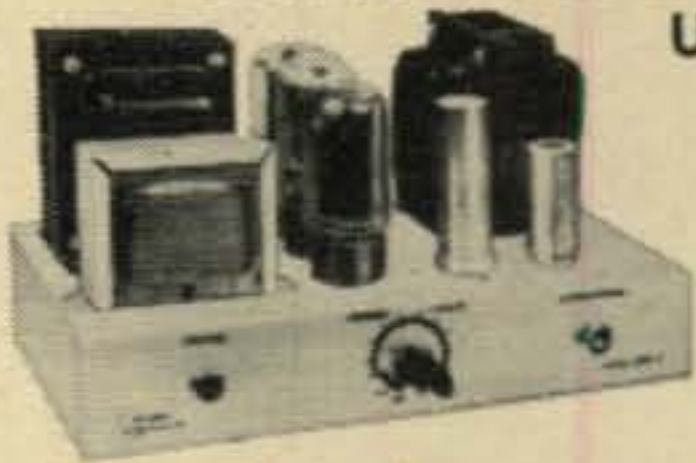
Wired  
\$79.95

Kit  
\$59.95

A powerful, compact, handsome transmitter with power supply built in, either wired or in kit form. Numerous modern features include choice of cathode or grid block keying, easy plug-in receptacles for later addition of modulators and VFO's, NEW WIDE RANGE Pi-network, and others. Multi-colored kit construction diagrams.

BY SIMPLE PLUG-IN; NO CONVERSION

Convert the Chief to AM Phone with the  
**UNIVERSAL MODULATOR UM-1**



Class A or AB-2 modulator, matches output impedances 500-20,000 ohms. Supplies up to 40w audio with proper tubes. May also be used for driver for high power modulator. Steel cover, add \$3.00.

Kit:  
(less tubes)  
\$34.95

Wired:  
(with tubes)\*  
\$49.95

\*Standard tube compliment, one 6U8, one 5U4GB, two 6L6's.



OR THE SCREEN MODULATOR SM-90

Permits radio-telephone operation at minimum cost. Self-contained. Printed circuit board, all parts and complete instructions.

Kit:  
\$11.95

**GLOBE MATCHER JR. AT-3**

Antenna tuner for power input 100w CW, 75w Fone or less. Aids matching transmitter to high impedance antennas. Unbalanced input-output. Wired: \$15.95. Kit: \$11.95.

see your local distributor or write for detailed information on these and the complete line of Globe Electronics products including Globes New CB-100 2-way Radio.

**GLOBE ELECTRONICS**

A DIVISION OF  
TEXTRON ELECTRONICS, INC.

22-30 SOUTH 34TH ST. COUNCIL BLUFFS, IA.

For further information, check number 12 on page 126.

# ALL IN A NAME

by Al Edwards, W2BOH  
Bellerose, New York

It seems that hams' names are used everywhere!

## Cities

Tunis	K6ENI	Dallas	W3RZV
Valencia	W6ODM	Dayton	W8VO
Wellington	K6KGY	Dover	K6PCB
Albany	W4VKC	Flint	W7TVU
Austin	W8UCS	Hollywood	W2AER
Birmingham	K6PHW	Huntington	W6TCQ
Boise	W2HOJ	Lansing	K2EJN
Boston	W2ZFI	Montgomery	K6LTS
Burbank	W1JHP	Richmond	W2MRR
Cleveland	W9EJS	Salem	KN6LJO

Can you imagine naming all these birds after ham handles?

Buzzard	W3RRV	Peacock	W5EQJ
Crane	K5ADH	Pidgeon	W9YNX
Crow	W6AP	Quail	W3EBM
Dove	W9CIY	Raven	VE6XO
Duck	W4KPD	Robin	W6INP
Eagle	W0JZR	Sparrow	W8AEY
Finch	K2CO	Starling	K4HXO
Hawk	W0YIA	Stork	W3TUS
Heron	KN0BPL	Swallow	K2JXJ
Jay	G2HJ	Swan	W6AEE
Lark	W8NVZ	Swift	K2KCS
Nightingale	W6ETH	Thrush	W2RTN
Parrot	VE2OU	Woodcock	G600
Partridge	W0HKY	Wren	W2ZNX

W7ZK is Mr. Bird

## Bird parts:

Wing	W1AOF
Feather	W3SHU
Down	W9MGB

## Almost forgot:

Dickie	W2VIW
Cage	K2DMM
W9HQC is Mr. Fish	

## Fishing equipment named after hams:

Rod	W2KVY
Reel	KN4IAL
Hook	W1CGV
Line	G2ASL
Creel	W4TMH
Scales	W1BOB

## Baseball expressions named after us hams:

League	W0VSX
Club	K6EAE
Field	W3FRU
Diamond	W3SDA
Player	W4OQT
Pitcher	G3JNI

## Chester, Pa.

The Mobile Sixers Radio Club held its elections on October 13th with the following results:

President—Reed McGee, W3JBA  
Vice President—John Lybrand, K3GXV  
Secretary—William Clark, W3UKG  
Treasury—Al Platenberg, K3VEZ

The mobile sixers meet on the second and fourth Tuesdays of each month at the Red Cross Hdq's at 10th and Edgemont in Chester, Pa. Everyone is cordially welcome. Meeting time 8 P.M.

Thank you and 73  
Hanabel E. Unruh, W3TXO  
Editor "Six Only"  
Mobile Sixers Radio Club

## DL4 QSL

The DL4 QSL Bureau address has now changed. At present, it is:

DL4 QSL Bureau  
c/o DL4HAB  
50th Communications Squadron  
APO 109, New York, N. Y.

All DL4 amateurs are encouraged to send along suggestions, complaints, or comments. I believe this would affect W/VE amateurs in that many of them evidently send their QSLs direct to the DL4 bureau. They are sending them to the old address, which takes a few more days transit time.

A. J. FLETCHER, DL4OV  
SSgt, NCOIC MARS Radio Station

## LETTERS [from page 9]

court, when he failed to mention what, if true, might be described as a dangerous police situation. I am sure the Chief of Police of the municipality as well as the court involved, would have been most interested.

Mr. Murphy receives my plaudits for not accepting the courtesy of a waiver when he felt he was not guilty as charged, and I hope he has a heightened respect for the courts (even if the judge was a woman) by virtue of that court's decision in his favor.

The prosecutor (now some percentage points less than 100%—hi) is required to present each case on the facts as introduced by the evidence. He too is relying upon factual evidence, and it is not to be doubted, that had the prosecutor any inkling that such official evidence was not factual, he would, I believe, in the interest of justice, propounded pertinent questions directed at the prosecuting witness, the answers to which might have shed light upon the improper police procedure and bias of testimony referred to in the article.

Respectfully yours,  
J. Donald Shirer, W8QBF  
Chief, Department of Police  
Division of Safety  
Olmstead Falls 38, Ohio

## No Patience

Editor, CQ:

With reference to the letter that appeared in CQ for October 1959. Mr. Garlough, what you apparently lack is patience. Almost every station DOES QSL. With some it takes a bit longer than others, but the cards do come. Most DX stations QSL through the QSL Bureau. Cards are generally cleared once-a-month. It is expected that one should wait about 4 months for QSL, especially if you did not include return postage.

Perhaps the best way to get a fast QSL card from a DX station is to send him a stamp from his country. This saves him the trouble of exchanging IRC's. In many cases, IRC's are not accepted at a local post office, even though they should be. These stamps can be purchased from W2SAW. Use IRC's only when you can't get the stamp. Of course, if you do not know his address send it via the QSL Bureau, but try to get his address from him in the QSO. You can also find "pirates" easier if you know the address of the station you worked.

I hope these tips work for you as well as they have worked for me. I was able to get QSL cards from over 100

[Continued on page 100]

# NEW!



**GENERAL - COVERAGE  
AT ITS SSB BEST!**

## NEW HAMMARLUND HQ-180

- ★ 18-tube, triple-conversion, superheterodyne with automatic noise limiter.
- ★ 540 KCS to 30.0 MCS with bandspread on 80, 40, 20, 15 and 10 meter amateur bands.
- ★ Razor-sharp slot filter with up to 60db attenuation. Separate linear detector. Selectable Sideband. Controlled BFO. Selectable AVC. Built-in 100 KCS calibrator.

They said it couldn't be done — professional-quality performance SSB in a general-coverage receiver at a price less than ordinary SSB general-coverage receivers. Hammarlund did it! The all-new Hammarlund HQ-180 goes far beyond any previous concept in value and performance. See it and try it right now at your Hammarlund dealer . . .

**\$429<sup>00</sup>**

\*Telechron clock timer optional, \$10 extra.

WRITE FOR COMPLETE SPECIFICATIONS . . .



Established 1910

# HAMMARLUND

MANUFACTURING COMPANY, INC.

460 West 34th Street, New York 1, N. Y.

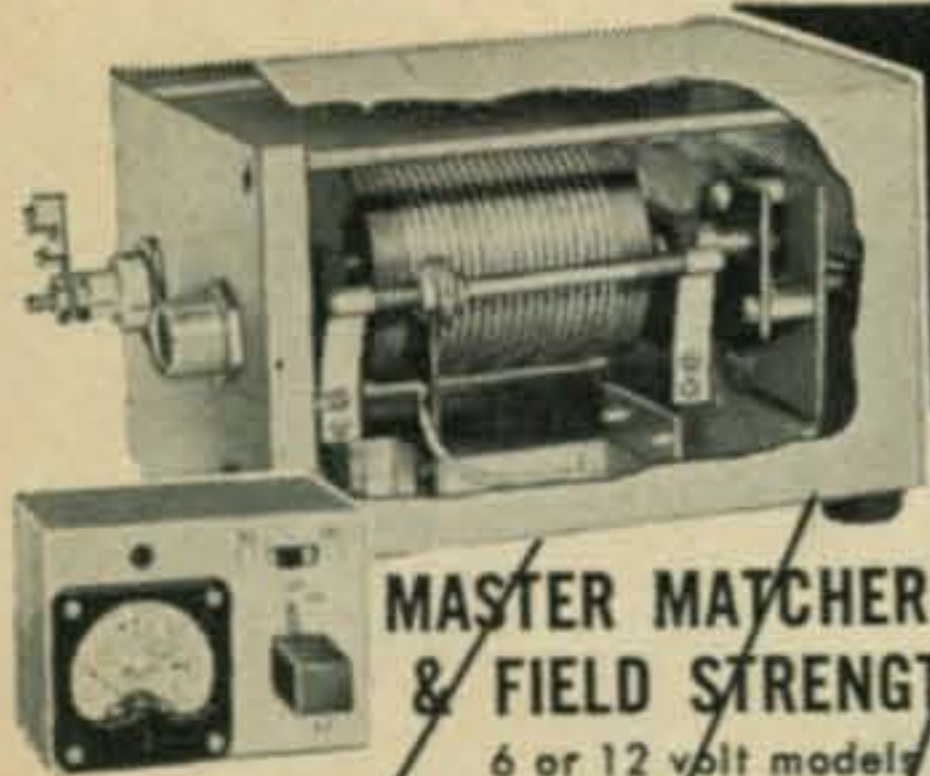
In Canada: White Radio, Ltd., 41 West Ave., N. Hamilton, Ont.

Export: Rocke International, 13 E. 40th St., N. Y. 16, N. Y.

For further information, check number 14 on page 126.

January, 1960 • CQ • 19

**Leaders in the  
Design and Manufacturing of  
Communication Antennas & Equipment**



**MASTER MATCHER  
& FIELD STRENGTH METER**  
6 or 12 volt models **\$24.95**

Automatically  
tunes entire  
band by re-  
mote control.

**MULTI-BAND ANTENNA COILS**  
New Plug-in type coils, designed to operate with  
std. 3' base and 5' whip.

**NEW!  
SLIM-JIM  
ALL-BAND  
BASE LOADING  
ANTENNA COIL**

96" WHIP



**ULTRA-HI-"Q" COILS**  
FOR 80, 40, 20,  
& 15 METERS  
Your  
Choice  
**\$5.25**

The coil with the highest "Q" ever obtained.  
Tested and found to have a "Q" of well over  
515. Use with 36" base sect. 60" whip. 3" Dia.



**NO. 900**  
10-15-20-40-75

**NO. 999**  
10-15-20 MET

**NO. SSB-156**  
40 & 75 M.

FOR 10, 11,  
15, 20, 40, 80  
METERS

SIZE  
3/8" X  
9"

NO.  
B-1080

Positive action,  
just slide whip  
in or out to  
loading point  
and lock nut  
into position.

**\$17.95**

**3 ELEMENT 11M. BEAM  
NO. SR-500**  
Provides a power gain of  
approx. 2 1/2 (8DB)  
in forward direction.  
10 to 1 interfe-  
rence reduction from sides  
and rear. VSNR 1. 1 to 1 at band  
center when fed with 52 OHM coax. . . **\$36.00**

**THE CITIZEN  
SR.**

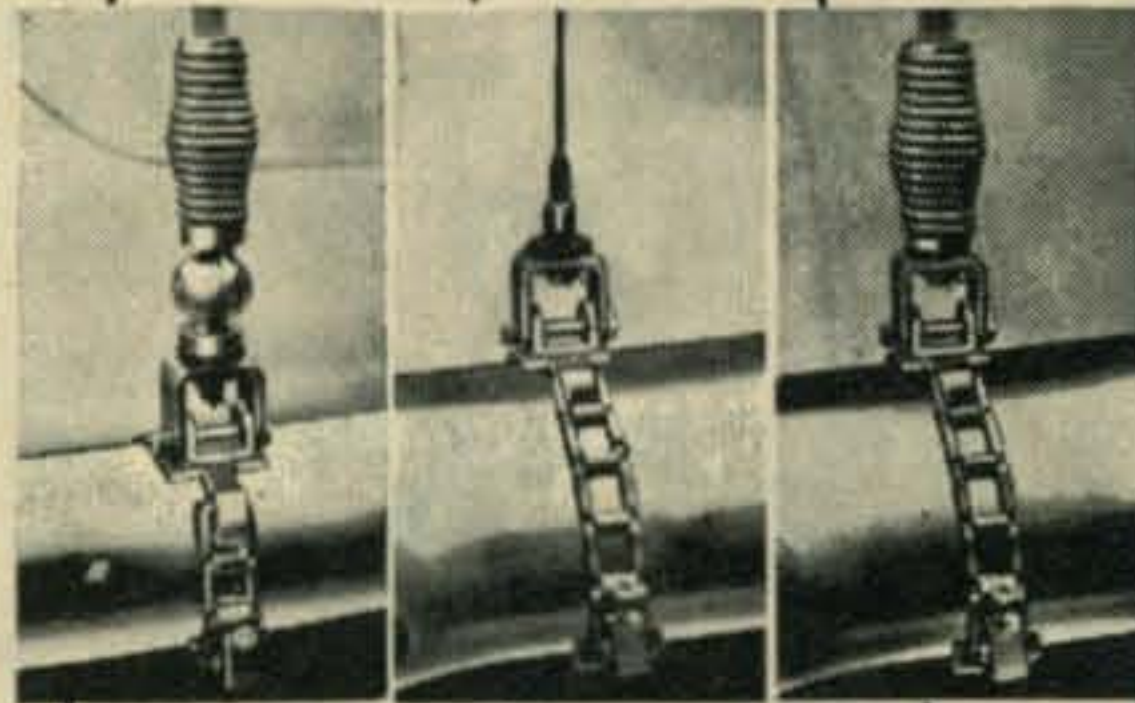
• Rigidly tested & engineered—found to have  
"Q" of 525 • Handles 500 Watts input  
• Operates into a 52-ohm cable • Positive  
contact—noise free, troublefree operation  
• Weathersealed • Factory pre-tuned—no ad-  
justments needed. **YOUR CHOICE** **\$14.95**  
EACH

**MASTER-MAGIC  
WAND**

New easy-to-install, sin-  
gle band, top-loaded  
plastic covered fiber  
glass antenna provides  
maximum performance  
at the most useful ra-  
diation frequencies.

10 Met.- 5 Ft. L. **\$8.95**  
11 Met.- 5 Ft. L. **8.95**  
11 Met.-35 In. L. **8.95**  
11 Met.-45 In. L. **8.95**  
15 Met.- 5 Ft. L. **8.95**  
20 Met.- 5 Ft. L. **8.95**  
40 Met.- 6 Ft. L. **9.95**  
80 Met.- 6 Ft. L. **9.95**

**BUMPER MOUNTS**



**No.444 \$17.80 No.445 \$7.95 No.446 \$13.45**  
Adjustable to any bumper. No holes to drill.

**FIBRE-GLAS  
WHIPS**

*The Feather-  
Weight Antenna  
with Spring-Steel  
Strength!*

Completely  
weather proof,  
breakproof an-  
tenna with  
special flexibili-  
ty that prevents  
accidental short-  
ing-out against  
overhead ob-  
structions which  
can cause loss of  
signal, serious  
damage to equip-  
ment.

**FG-60 60" \$4.95**  
**FG-72 72" \$4.95**  
**FG-84 84" \$5.15**  
**FG-96 96" \$5.25**  
**FG-103 103" \$6.95**

**11M. CITIZEN  
BAND ANTENNA**

40" base loaded  
S.S. whip antenna.  
Fitted with a 1/4"  
dia. brass slug for  
use with a stand-  
ard-broadcast 8-  
ball type cowl  
mount, also roof-  
top or trunk lid  
type mount. Low  
standing-wave ra-  
tio on most of  
band when fed  
with a 52 ohm  
coax.

**8B-27 \$12.95**

**MARINE  
LAYDOWN  
MOUNT**

Can be mount-  
ed in any posi-  
tion. Adjust-  
able swivel for  
all positions.  
Chrome-plated  
brass, water-  
proof phenolic  
insulator.

**\$19.95**

**SWIVEL-BODY  
MOUNT**

Smaller version of  
Master Mobile Mounts,  
less spring. Swivels,  
mounts in all positions.  
3/8"-24 thread for  
Magic Wand, and all  
Master Antennas.

**No. J-11 \$2.95**

**CITIZEN BAND  
ANTENNA**

**26.960-27.225  
MC**

VSWR under 1.5:1  
at resonance. Com-  
plete with 50' RG  
58/U Cable. Swivel  
type antenna  
base for flat or  
peaked roof  
installation.

**GP 27-11  
\$34.50**

**SUPER HI-GAIN  
CITIZEN BAND**

Stacked coaxial  
antenna provides  
5-6 DB gain.  
42" high from  
ground plane.  
Furn. with 12"  
ext. for bumper  
mount.

**460-465 MC  
No. CL-465  
\$21.95**

**MARINE  
ANTENNA**

Center-loaded, pro-  
vides max. power on  
all marine freq. from  
2 - 3 meg. Weather-  
proof, waterproof.  
10 1/2' overall length,  
4' S.S. plastic-coated  
whip, 18" impreg-  
nated coil. Colorful.

**\$29.95**

All products are for Universal Use-Mobile, Home,  
Marine, C.A.P., Civil Defense, Emergency, etc.

**WRITE FOR FREE  
CATALOG OF COMPLETE  
LINE**



**Master Mobile Mounts, Inc.**

1306 BOND STREET · LOS ANGELES 15, CALIF.

**AT LEADING  
RADIO JOBBERS  
EVERYWHERE**

For further information, check number 15 on page 126.

Merry Christmas  
from your XYL

POWER...

PACKAGED FOR TODAY'S AMATEUR



LPA-1 GROUNDED GRID LINEAR AMPLIFIER  
NET PRICE \$375.00 COMPLETE WITH TUBES

LPS-1 POWER SUPPLY  
NET PRICE \$205.00 COMPLETE WITH TUBES

Power—a full kilowatt with this smartly designed, excellently styled version of the famous B&W linear amplifier family! New compactness . . . takes up no more space on your table than a receiver. New features . . . for greater performance and flexibility than ever before.

Separately housed LPA-1 R. F. section employs two Type 813 beam power tetrode tubes, connected as high-Mu triodes in a grounded-grid circuit. Blower, filament and bias supply are included in this section.

High voltage power supply unit LPS-1 may be remotely located. Switching control panel is removable for convenient installation at the operator's location. Circuit consists of a full wave single phase bridge rectifier, using four Type



LPA-MU MATCHING UNIT \$36.00  
LPA-MU-2 \$36.50

816 mercury vapor rectifier tubes. R. F. filtering protects tubes and prevents mercury vapor hash radiation.

The LPA-1 can be driven by most exciters in the 100 watt class, such as the B&W 5100/5100B series, Vikings 1 and 2, Valiant, Collins 32V, KWM-1, 32S-1 series, Heath DX100 and others.

A compact impedance matching unit, the B&W LPA-MU, is separately available. It provides for operation with fixed output exciters such as the Hallicrafters HT 32 Series and similar types. A similar unit, the LPA-MU-2, is also available for use with the B&W L-1000-A and L-1001-A.

Your local distributor should have these advanced units *now* . . . see them soon.

Send for this illustrated brochure in full color giving specifications and detailed descriptions of the new B&W LPA-1, LPS-1 and LPA-MU.



*Barker & Williamson, Inc.*

For further information, check number 16 on page 126. **Bristol, Penna.**

OTHER B&W AMATEUR EQUIPMENT: Transmitters AM-CW-SSB • Single Sideband Generators • Single Sideband Receiving Adapters • Dip Meters • Match Masters • Frequency Multipliers • Low-Pass Filters • T-R Switches • R.F. Filament Chokes • Transmitting R.F. Plate Chokes • Audio Phase Shift Networks • Band Switching Pi-Networks • Cyclometer-type Counters • Antenna Co-axial Connectors • Baluns • Variable Capacitors • Fixed and Rotary Type Coils

**THE ONE MICROPHONE THAT IS A  
SYMBOL OF AMATEUR RADIO  
THE WORLD OVER**



For more than two decades the Astatic D-104 has been top choice of ham operators everywhere

**AND NOW**

**ASTATIC BRINGS YOU 2 NEW MIKES DESTINED TO BECOME  
EQUALLY FAMOUS IN SINGLE SIDE BAND TRANSMISSION  
THE MODEL 10-C CERAMIC AND 10-D DYNAMIC**

You'll prefer the 10-D or 10-C for their more intelligible signal, higher talk power, tailored response, less splatter, greater attenuation of unwanted side band.

MODEL 10-D RECOMMENDED FOR USE WITH HT-32.

Model	Net Price	Model	Net Price
10-C	\$17.82	10-D	\$23.82
G10-C*	\$29.94	G10-D*	\$35.94

\*Complete with G-stand

For complete information write for Astatic Microphone Catalog.

THE **Astatic** CORPORATION • CONNEAUT, OHIO  
In Canada: Canadian Astatic Limited, Toronto, Ontario  
Export Sales: Roburn Agencies Inc., 431 Greenwich St., N.Y. 13, N.Y.  
U. S. A.

FROM WHAT  
YOU HEAR



**SUPERIOR ENGINEERING IS TYPICAL OF  
THE COMPLETE ASTATIC MICROPHONE LINE**

For further information, check number 17 on page 26.



# **new** 5 BAND VERTICAL **new** 2 BAND VERTICAL

## **AVAILABLE NOW!!**

MODEL V-5 Work 10, 15, 20, 40 and 80 with one antenna . . . one RG/8U feed-line!

Designed and built to meet United States Air Force electrical and structural specifications. The V-5 is 100% rust proof and performs brilliantly on each of the 5 bands. It is capable of handling power of 1 KW to the antenna! Weatherproof trap assemblies are used throughout . . . no external loading coil needed.

Maximum length of antenna is 43 feet, 8 inches. Supplied complete with polyethylene guy rope, heavy duty base with internal coax fitting and all necessary hardware. For best results radials (not supplied) should consist of 12 wires, each approximately 64' in length.

Amateur Net \$118.50

**TRAP**  
HEAVY DUTY BASE MOUNT supplied with  
Models V-5 and V-4-8.

**MASTER**

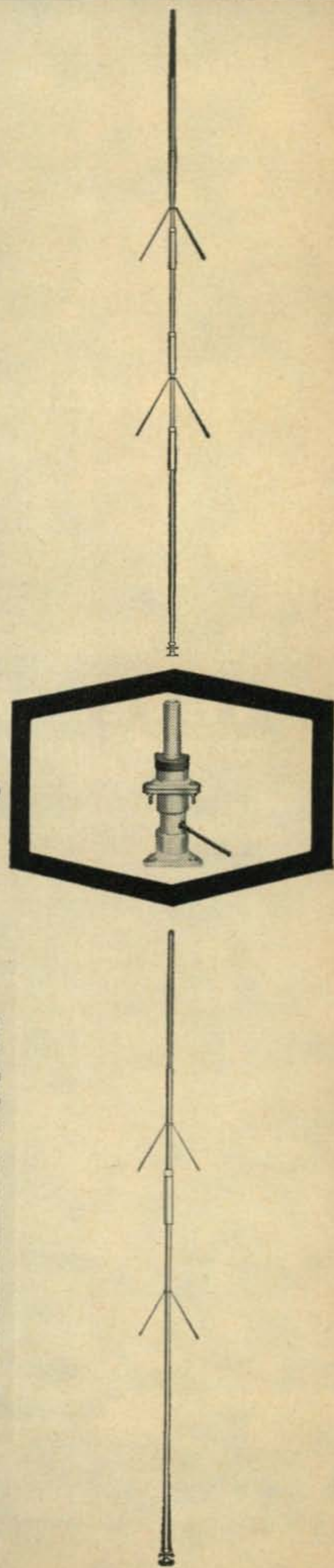
MODEL V-4-8 For 40 and 80 meter bands. Equivalent to a separate  $\frac{1}{4}$  wavelength vertical on each band. Heavy duty 100% rust proof construction. Husky over-size trap assembly handles 1 KW (AM) in the antenna. Maximum overall length of the antenna is 52 feet, 3 inches. The antenna requires 12 radials each 64 feet in length for best performance. Antenna comes complete with base mount, described above, polyethylene guy rope, hardware and detailed instructions.

Amateur Net \$85.00

**Mosley Electronics Inc.**

8622 St. Charles Rock Road  
St. Louis 14, Mo.

For further information, check number 18 on page 126.



The Sun Never Sets on  
**International Products**

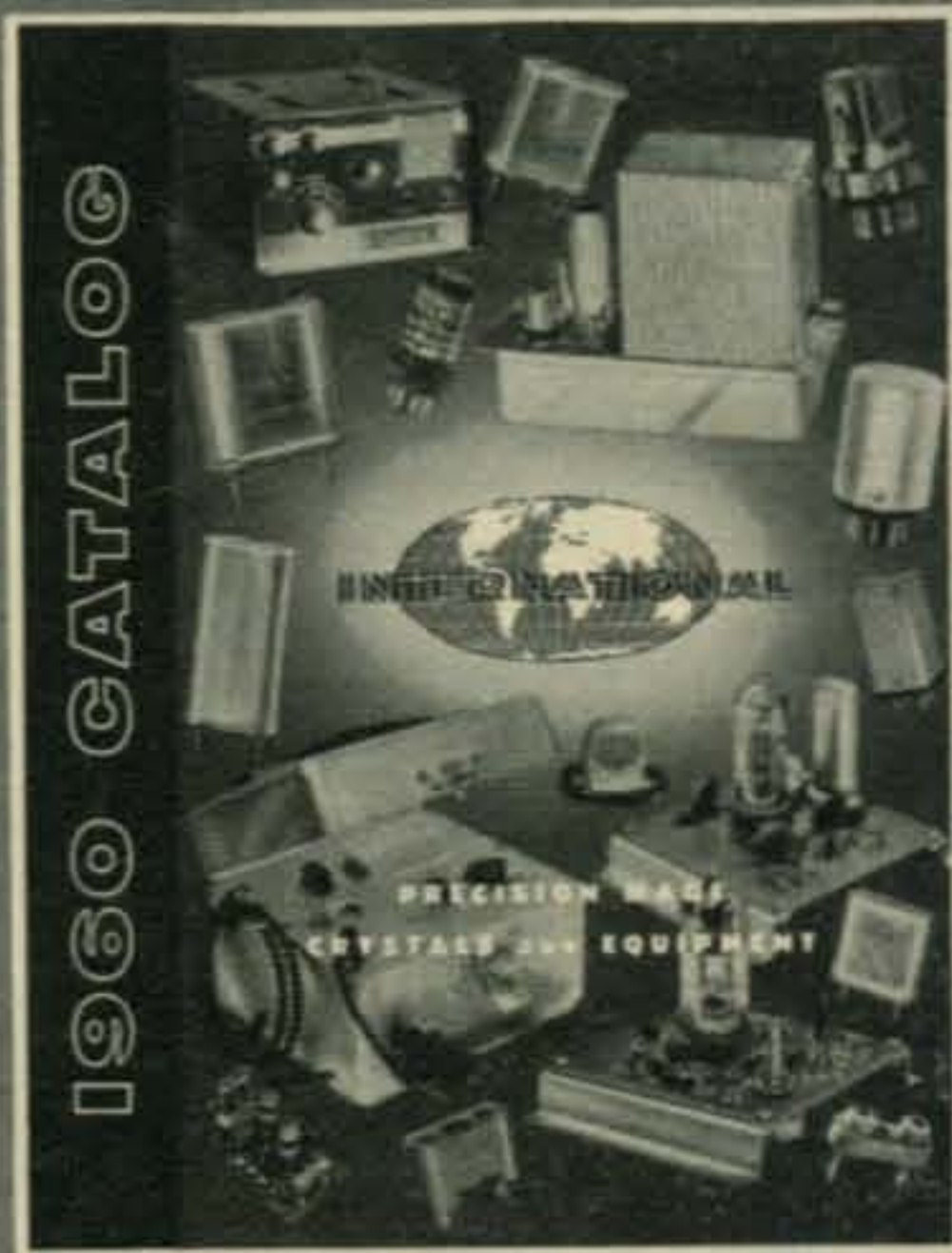


**INTERNATIONAL**  
CRYSTAL MANUFACTURING CO., INC.

18 NORTH LEE, OKLAHOMA CITY, OKLA., U.S.A.

Around the World  
and Pole To Pole you will  
find International  
precision made crystals  
and equipment where  
dependability counts.

1960 CATALOG FREE / SEND FOR YOUR COPY TODAY.



CUSTOM MADE COMMERCIAL CRYSTALS  
SPECIALIZED AND MINIATURE CRYSTALS  
AMATEUR CRYSTALS  
PRINTED CIRCUIT OSCILLATORS  
CRYSTAL CONTROLLED ALIGNMENT  
OSCILLATORS  
6 AND 2 METER CONVERTERS  
6 AND 2 METER TRANSMITTERS  
MODULATORS  
POWER SUPPLIES  
CRYSTAL OVENS  
MICROPHONES  
ANTENNAS  
CITIZEN BAND TRANSCEIVERS  
SUB-ASSEMBLIES FOR RECEIVERS-  
CONVERTERS-TRANSMITTERS  
CUSTOM OSCILLATORS AND  
TRANSMITTERS

# THE BROADBAND TWINS



**THE REVOLUTIONARY NEW 100V  
EXCITER-TRANSMITTER**

NO TUNING (except VFO), uses famous CE BROADBAND system. PRECISION LINEAR VFO-1KC Calibration. Single Knob Bandswitch 80 thru 10. SSB-DSB-AM-PM-CW and FSK. RF Output adjustable 10 to 100 Watts PEP. Meter reads Watts Input, Amps Output and Carrier Suppression. 2" RF Scope. Speech Level and Load Mismatch Indicators. Audio Filter - Inverse Feedback - 50 db Carrier and Sideband Suppression.

AT YOUR DEALERS NOW.....PRICE \$695.00



**FAMOUS MODEL 600L  
BROADBAND LINEAR**

NO TUNING CONTROLS - CE BROADBAND Couplers in HIGH EFFECIENCY CLASS AB<sup>2</sup> using single 813. Easily driven to 600 Watts PEP Input 160 thru 10 by a 20A or 100V. Built-In HEAVY DUTY POWER SUPPLY - 45 MFD PAPER Capacitor. Meter reads WATTS INPUT, GRID DRIVE, RF AMPS, and SWR. Completely shielded - TVI suppressed - parasitic free. REMEMBER there is LESS than ONE S UNIT difference between the 600L and a 2 KW PEP job. ....PRICE \$495.00

**MODEL 20A**



**THESE MULTIPHASE EXCITERS  
PIONEERED AMATEUR SSB**

**MODEL 10B** - 10 watts PEP. Plug-in coils 160 thru 10 meters. Perfect voice control on SSB-DSB-AM and PM - CW breakin; Carrier and calibrate level controls. 40 DB suppression.

Wired.....\$179.50 Kit.....\$139.50

**MODEL 20A** - 20 watts PEP. Bandswitched 160 thru 10 meters. SSB-DSB-AM-PM and CW. Magic eye monitors carrier null and peak modulation. Ideal for driving AB<sup>1</sup>, AB<sup>2</sup>, and most Class B linears.

Wired.....\$279.50 Kit.....\$219.50

**MODEL 10B**



**MODEL GC-1.** Gated Compression Amplifier. Connects between receiver and speaker. Automatically brings all received signals to same level-no blasting. Compensates for receiver AVC deficiencies. Compresses a 40 db increase in level to less than 3 db. Magic Eye continuously monitors compression value. Keep peace with your family and neighbors - buy a GC-1.

KIT....\$49.50 Wired....\$59.50

**MODEL MM-2.** 3" RF analyzer scope for use on SSB-DSB-AM-PM and CW. MONITORS RECEIVED AND TRANSMITTED SIGNALS thru new electronic switching circuits. NO TUNING - BROADBAND response 1MC to 55MC at power levels of 5 watts to 5 KW. SIMPLE CONNECTIONS. Built-in 1KC oscillator for exciter alignment. Plug-in IF adapters available for 450-500 KC, 80 KC and 50 KC.

IF adapter RM-455 or RM-80 or RM-50 .....\$9.95  
MM-2 (less adapter) wired.\$129.50  
Kit .....\$99.50



WRITE FOR INFORMATION ON THE COMPLETE MULTIPHASE LINE.

**MULTIPHASE  
EQUIPMENT**

*Central Electronics, Inc.*

1247 W. Belmont Ave.

Chicago 13, Illinois

A SUBSIDIARY OF ZENITH RADIO CORP.

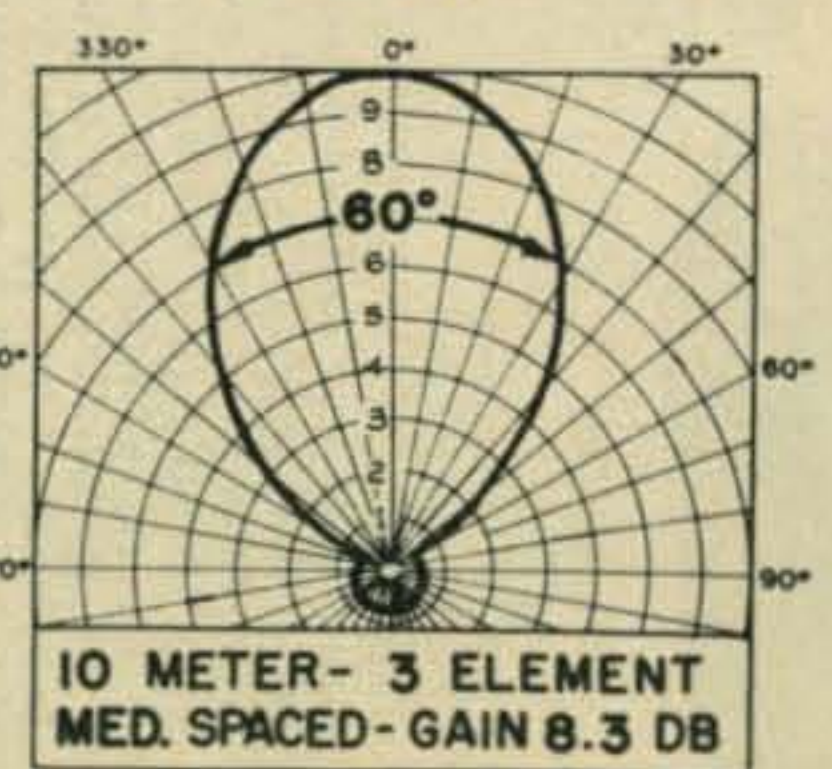
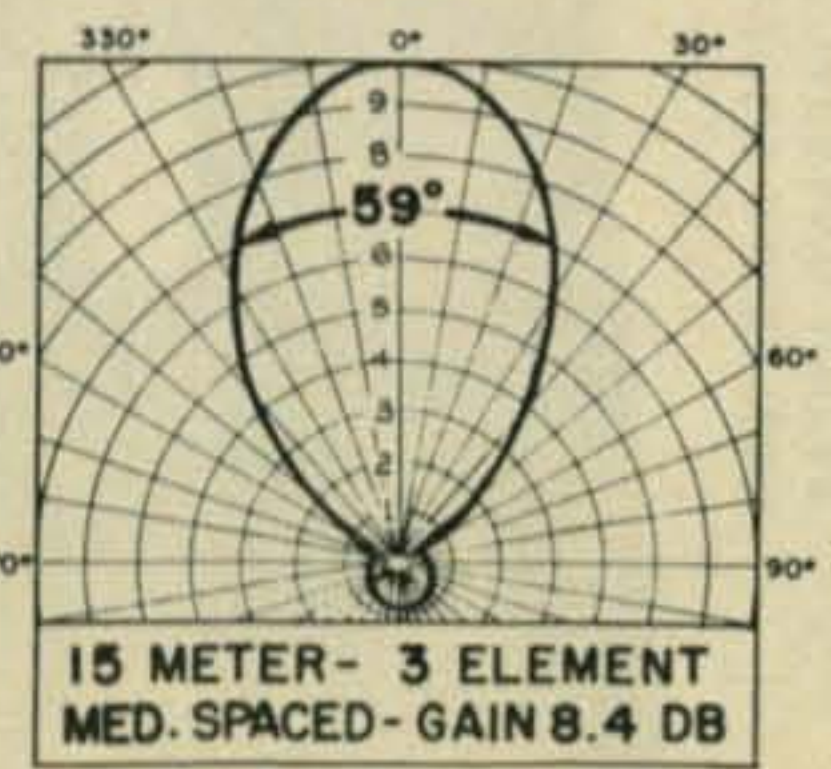
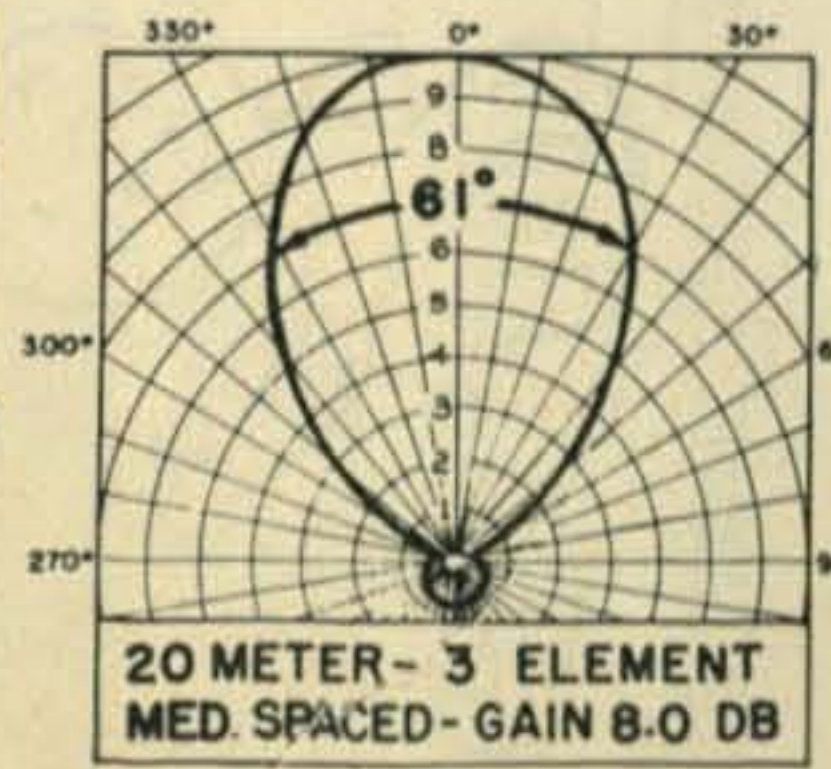
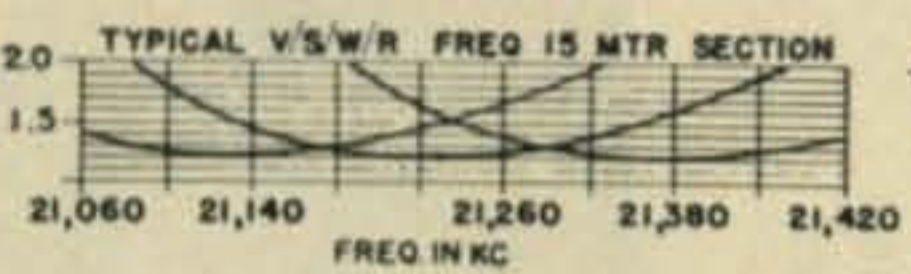
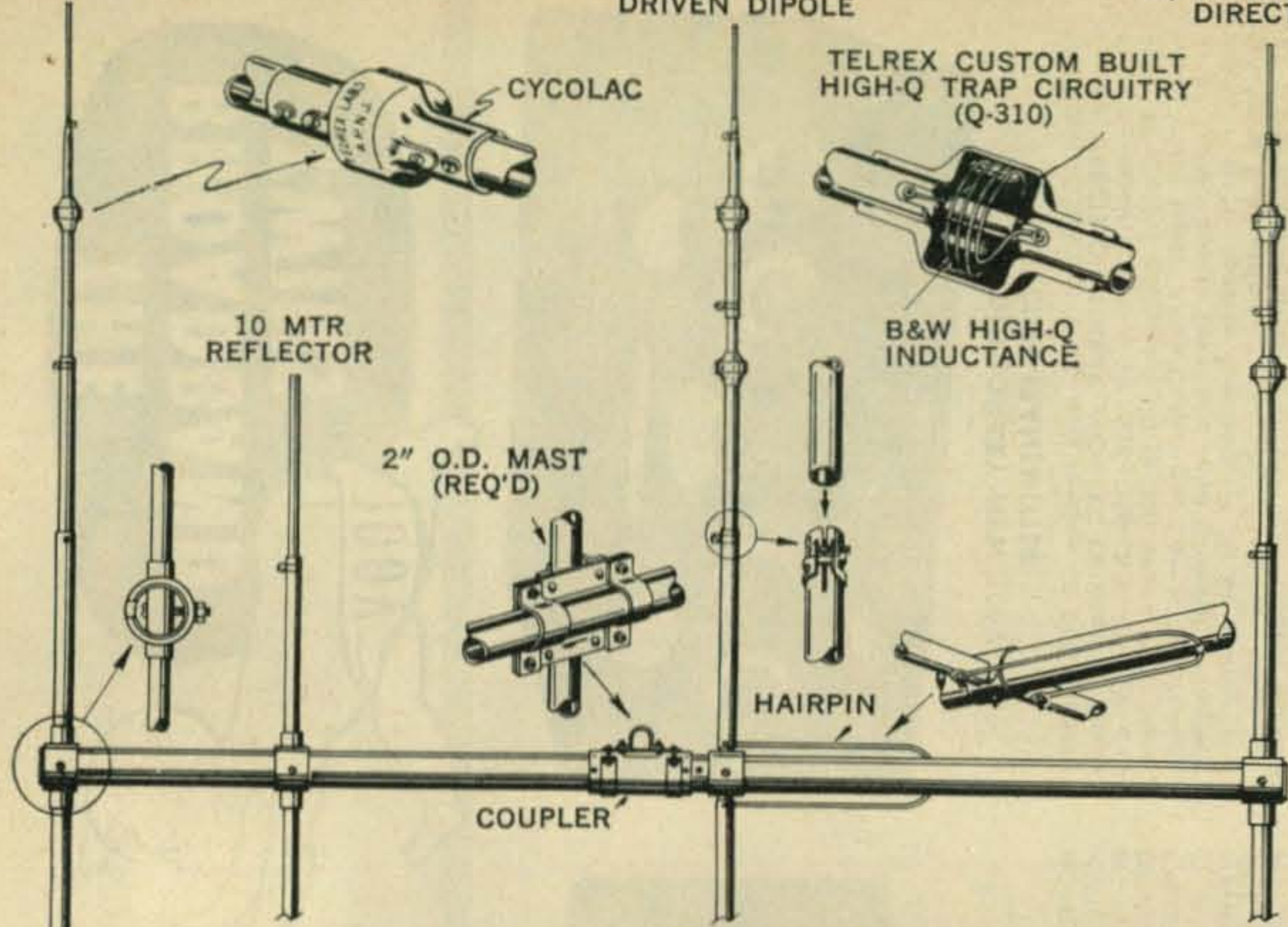
**MULTIPHASE  
THE OVERWHELMING  
CHOICE OF HAMS  
EVERYWHERE**

For further information, check number 21 on page 126.

15 & 20 MTR REFLECTOR

"TRI-BAND"<sup>®</sup>  
10, 15 & 20 MTR  
DRIVEN DIPOLE

"TRI-BAND"<sup>®</sup>  
10, 15 & 20 MTR  
DIRECTOR



For the Perfectionist! Broad Band "Baluns" are available:  
Model BBB 3/0 (2KW) \$24.50

# TELREX CHALLENGER "TRI-BAND"<sup>®</sup> Single-Transmission-Line Array

## Model TBS-416 \$159<sup>50</sup>

F.O.B. Asbury Park, N. J.

Telrex Model TBS-416—tuned, matched and calibrated for easy assembly (to your favorite band sectors) and Telrex specified performance at your site — without tuning or adjustments of any kind, required, or recommended! Model TBS-416 consists of 4 medium spaced elements (two of which are "Tri-Band"<sup>®</sup> elements) on a 16 ft. boom, providing optimum 3 element 10, 15 and 20 MTR performance. Model TBS-416 is engineered to provide maximum performance and satisfaction per dollar, per element!

### SPECIFICATIONS

V/S/W/R at resonant point (using 50 ohm coax).....1.2/1  
Bandwidth within 2/1 V/S/W/R...1.5%  
F/B ratio on 10, 15 and 20 meters.26DB  
Max. power rating.....1.2 KW 100%AM  
Boom length and diameter  
16 ft. x 2" O.D.  
Longest element length  
Approx. 30 ft.  
Turning radius approx...17 ft.

Support mast required 2" O.D. Seamless .125 wall min.  
Wind surface area.....5-29 sq. ft.  
Wind load at 100 m.p.h.....164 lbs.  
Recommended rotator—  
Telrex Model.....175 RIS  
Design wind load rating with 1/2" radial ice load.....85 m.p.h.  
Antenna net wt. 44 lbs.—  
Shipping wt. approx.....58 lbs.  
Shipping container size approx.....11" x 6" x 10"

- The following Single-Transmission-Line "Tri-Bands" available:
- CHALLENGER TBS-308 ..... \$ 99.75  
3 Elements (8' x 2" O.D. Boom) gain 5 db.  
Recommended Rotator—Telrex 175 .....
  - MONARCH TBS-626 ..... 259.75  
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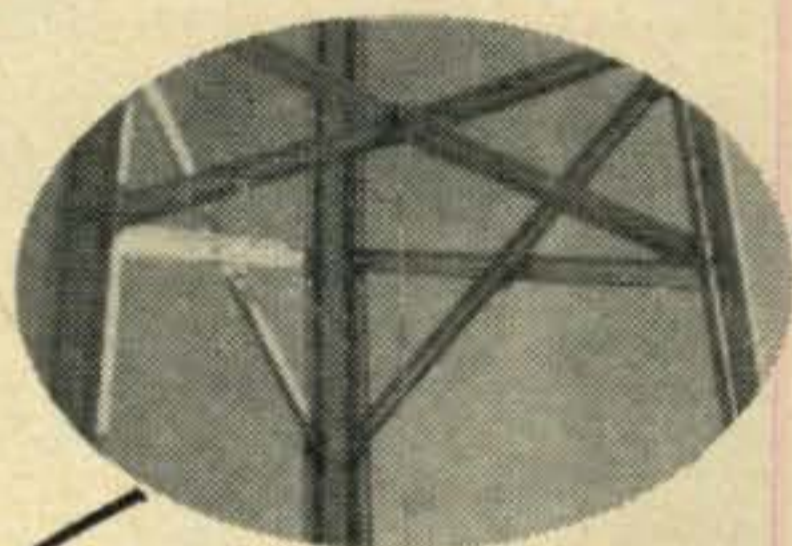
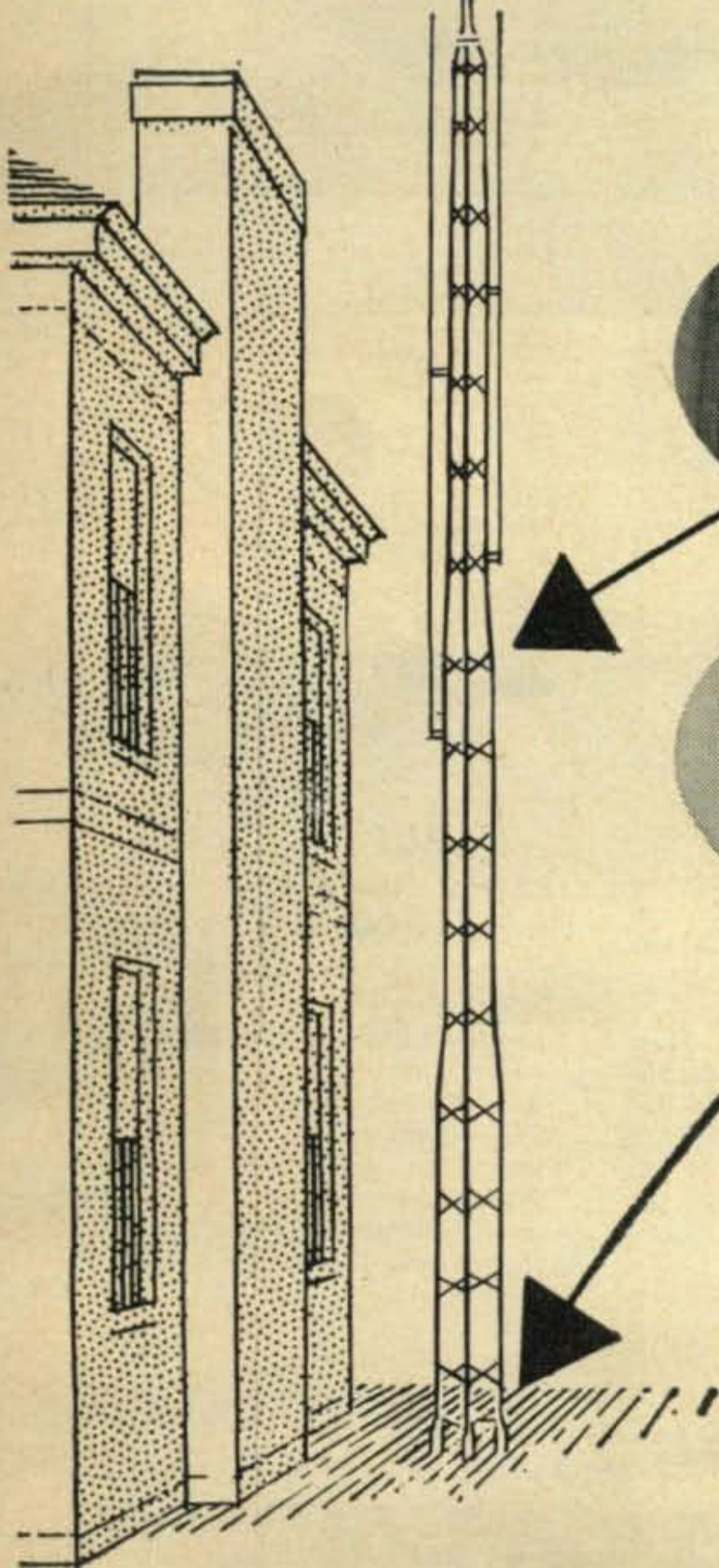
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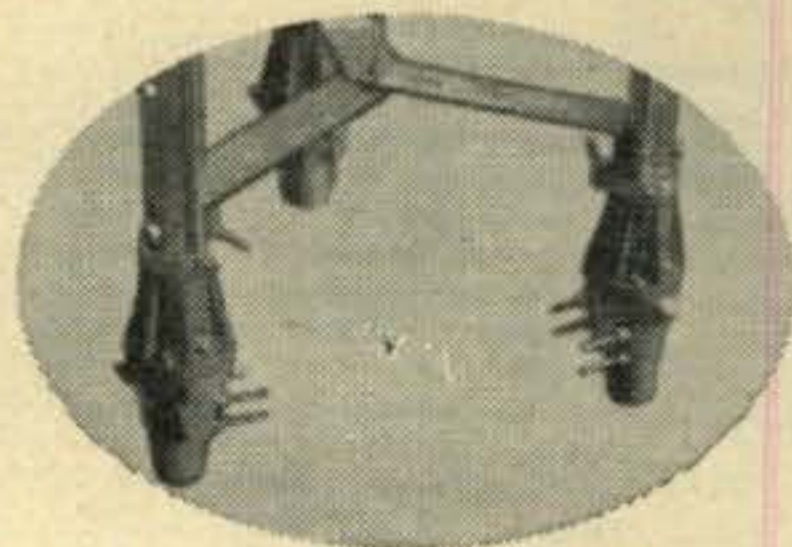
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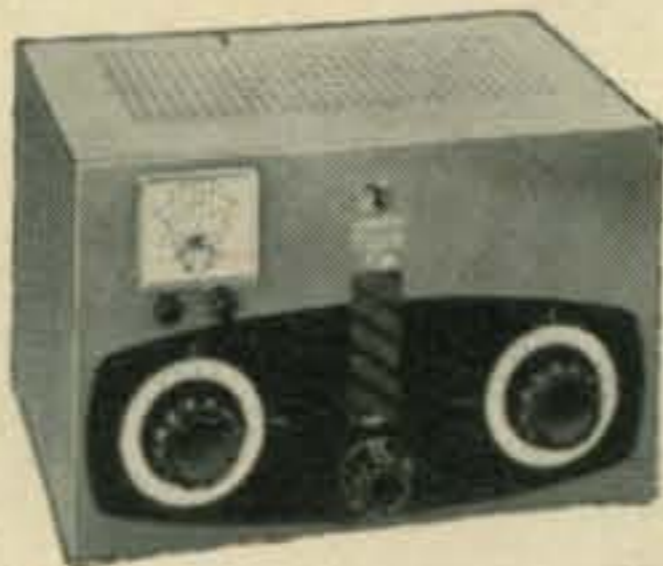
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240-104-2..Wired .....	\$439.50



**"FIVE HUNDRED"** — 600 watts CW input; 500 watts phone and SSB (P.E.P. with aux. SSB exciter). Bandswitching 80 through 10. With tubes.

Cat. No.	Amateur Net
240-500-1..Kit .....	\$749.50
240-500-2..Wired .....	\$949.50



**"THUNDERBOLT" AMPLIFIER**—2000 watts P.E.P.\* input SSB; 1000 watts CW; 800 watts AM linear. Continuous coverage 3.5 to 30 mcs. With tubes.

Cat. No.	Amateur Net
240-353-1..Kit .....	\$524.50
240-353-2..Wired .....	\$589.50



**"6N2"**—Instant bandswitching coverage of both 6 and 2 meters. Power input rated at 150 watts CW, and 100 watts AM phone. With tubes.

Cat. No.	Amateur Net
240-201-1..Kit .....	\$129.50
240-201-2..Wired .....	\$169.50



**"6N2" THUNDERBOLT AMPLIFIER**—Input rated 1200 watts P.E.P.\* SSB and DSB, Class AB<sub>1</sub>; 1000 watts CW, Class C; 700 watts AM linear, Class AB<sub>1</sub>. Continuous coverage 6 and 2. With tubes.

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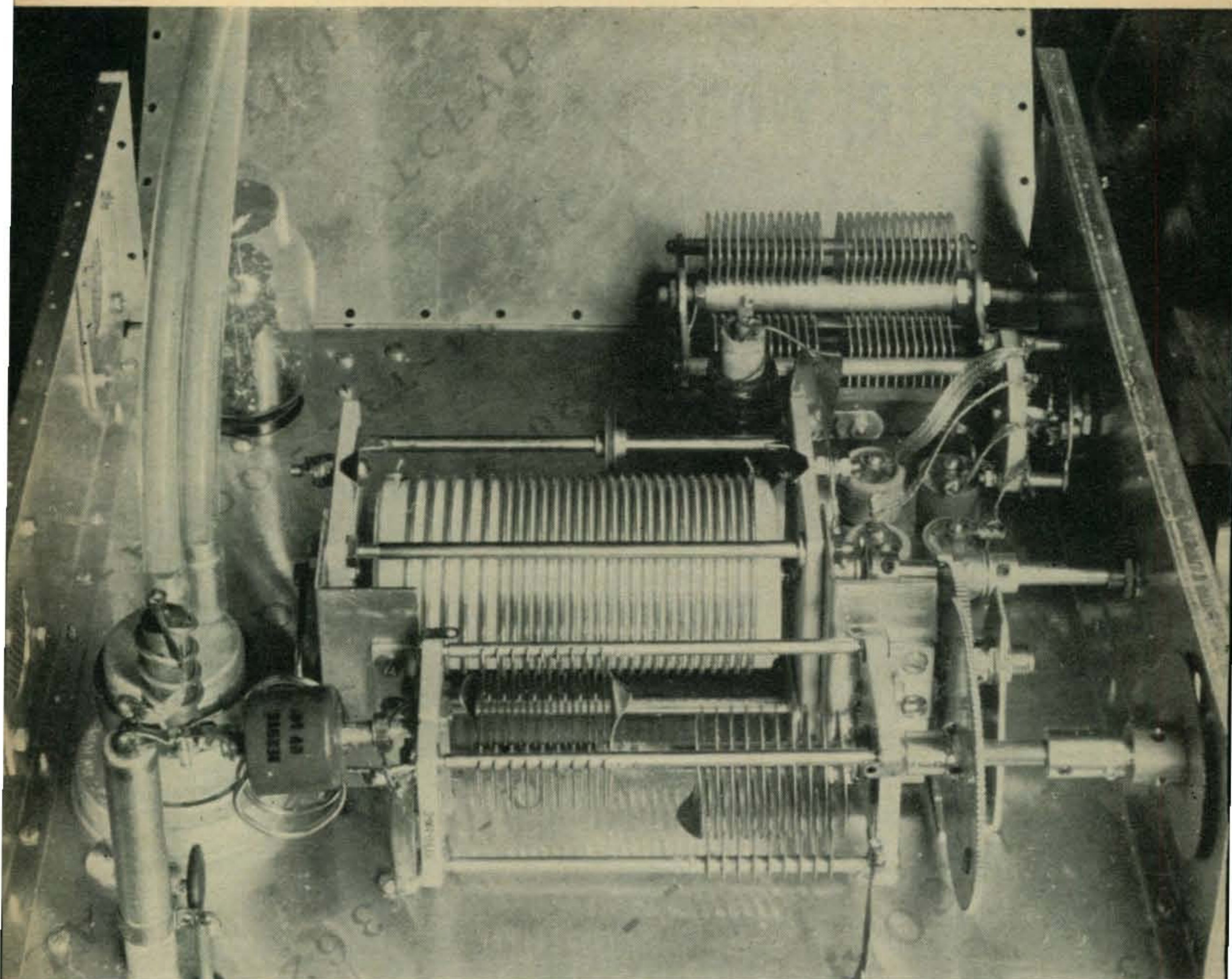


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251-101-1..Matching desk top, back and 3 drawer pedestal, FOB Corry, Pa. ....	\$132.00

\*The FCC permits a maximum of one kilowatt average power input for the amateur service. In SSB operation under normal conditions, this results in peak envelope power inputs of 2000 watts or more, depending upon individual voice characteristics.

For further information, check number 23 on page 126.



## A 500 Watt Mobile Linear

..... WATER COOLED!

**Murray Gellman, K2CBO**

Brooklyn 30, N. Y.  
1268 East 12th Street

After several years of operating AM phone from the car, I decided that it was time to give SSB a try. I'd been on SSB from the home station and found it to be terrific while I couldn't get much fun out of fighting the QRM in the AM portion of the band while driving.

As a first attempt, I installed a small 100 watt (PEP) sideband exciter and transistor power supply. This worked out fine, being quite an improvement over the 250 watt AM rig that it replaced. But that left me with a Leece-Neveille alternator in the car that was loafing.

That would never do! The idea of a linear began to take shape.

It takes a lot of air to cool a 300 watt plate dissipation tube; considerably more than you can run through your car trunk without resorting to major anatomical modifications of the car body. The decision was made to use a water-cooled bottle. Eimac had just the ticket; the 4W300B tetrode. The task of water cooling turned out to be relatively simple once I made the decision to use it. A standard electric auto gas pump of one gallon per three minute capacity does the job nicely. For fixed



operation of the linear, a standard tropical fish tank pump would serve adequately.

### Cooling System

Although the circuitry of the linear is undistinguished, we are interested here in the mechanical problems as well as the providing of safeguards to protect the final amplifier tube in the event of any malfunction along the line.

Considerable thought was given to providing a suitable cooling system for the linear. After experimenting with various designs, I finally came upon a simple, effective and fool-proof system. The system used requires a two gallon oil can, a funnel and a Microswitch. This oil can becomes our reservoir. With the exception of a one half inch lip around its edges, the top of the can should be removed. This is easily done with a knife. The lip on the top is necessary as it will be used to enable it to be soldered on the reservoir later in the construction. Prepare the funnel from either soft copper or tin with a large hole at the top and a small one at the bottom. The funnel should have a top diameter of about two inches, the bottom hole approximately one sixteenth of an inch in diameter and the overall length of it should be two and one half inches. The Microswitch used was a BZ-2RW2. This type has a lever arm with a small wheel on the end. Remove this wheel, and bend a one quarter inch lip at the end of the lever. This should now be soldered to the side of the funnel about  $\frac{3}{4}$  of an inch from the top. It isn't necessary to use this exact switch. Any normally open type with a lever arm will do the job.

The basic theory of operation behind this system is simple. The funnel is suspended inside the oil can. It should not touch the water in the can. (Approx. 1 gallon of water should be put in the two gallon can.) When the water enters the funnel, the funnel fills as it cannot escape from the small hole as quickly as it enters. When the funnel is about three quarters full, there will be sufficient weight to cause

the funnel to sag towards the bottom of the reservoir can. This sagging depresses the arm on the switch, causing the switch to trip. In the event that the pump fails, and no water enters the funnel, it will take about 15 seconds for the funnel to lose sufficient water for the switch to open. As you can see, the system is just about 100% foolproof.

After the funnel-switch has been constructed and is working properly, mount it on a small bracket made of copper and solder it to the inside of the oil can. It should be mounted approximately in the middle of the can. (NOTE: Paint the inside of the can with flat black paint before doing the preceding; this to increase heat dissipation). Drill two holes in the side of the can near the top. Mount a National TPB plastic feed-thru in one, and a ground lug in the other. Solder wires from the contact of the switch to these. Apply some rubber cement around the holes after the feed-thru and ground lug have been mounted.

Provision must now be made to take the water in and out of the reservoir. Drill a  $\frac{1}{4}$ " hole near the bottom of the can and solder a 2" length of  $\frac{1}{4}$ " copper tubing in the hole. This outlet will be well below the water level and is used to take water out of the can. Make up a square tin or copper plate a little larger than the opening to be made on the top of the can. Lay the plate into position and note where the center of the funnel is located with respect to the cover. Now solder another length of  $\frac{1}{4}$ " copper tubing in the cover of the can in such a way that water will pour into the funnel. After the system is working properly, solder the can to the  $\frac{1}{2}$ " lip left on the cover. Make certain that it is water tight. The cooling system is now complete.

The water is transported from the can to the tube and pump by using  $\frac{1}{4}$ " I.D. plastic or rubber hoses. (See photos).

It is important that the tubing used be of sufficient length to present adequate resistance from the anode of the 4W300B to the grounded reservoir. The water used in the reservoir should, of course, be soft to present adequate

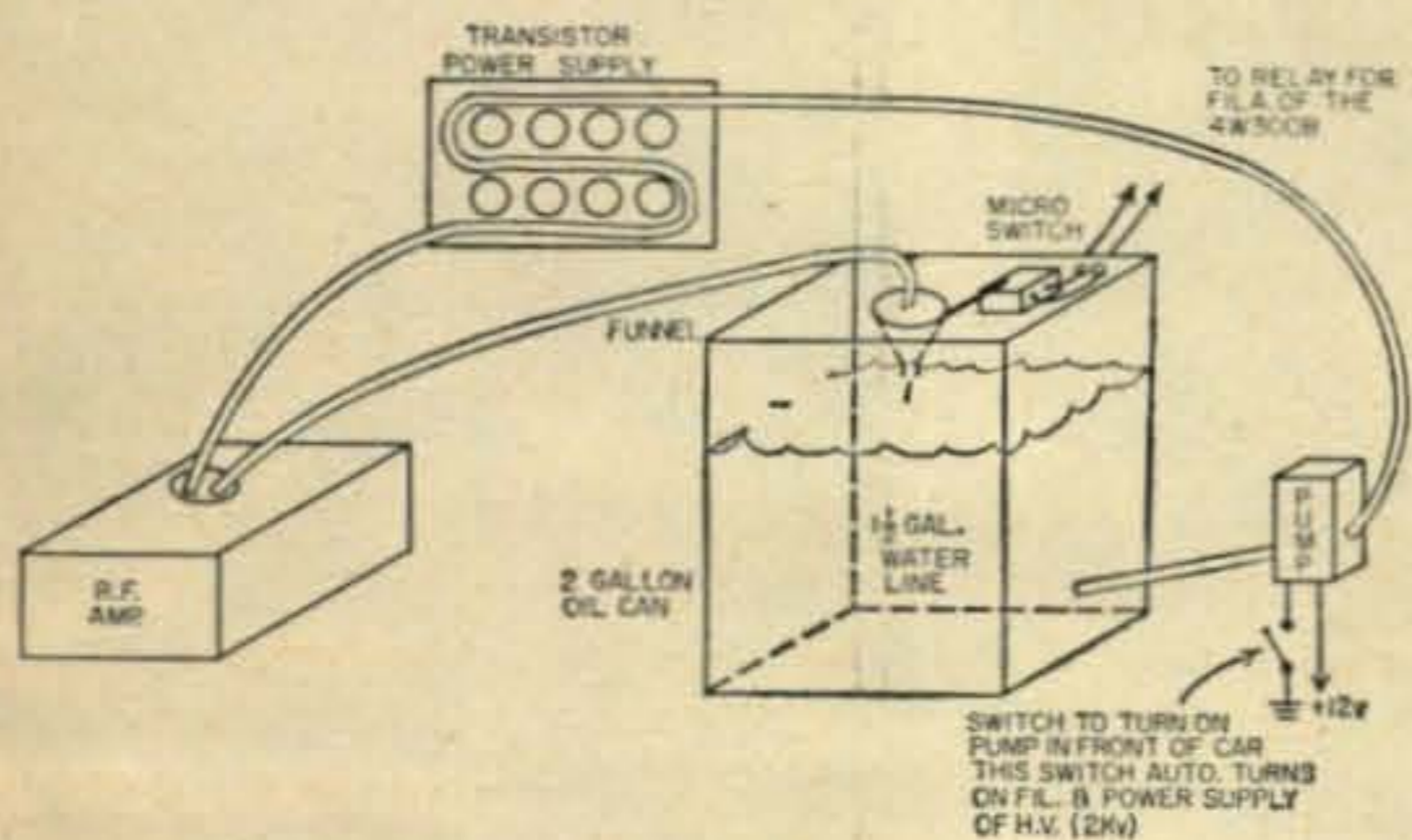


Fig. 1—Water cooling set up. The circulating water cools both the Eimac 4W300B and the transistorized power supply. Should the water cease to circulate, the funnel weight would decrease, opening the switch.

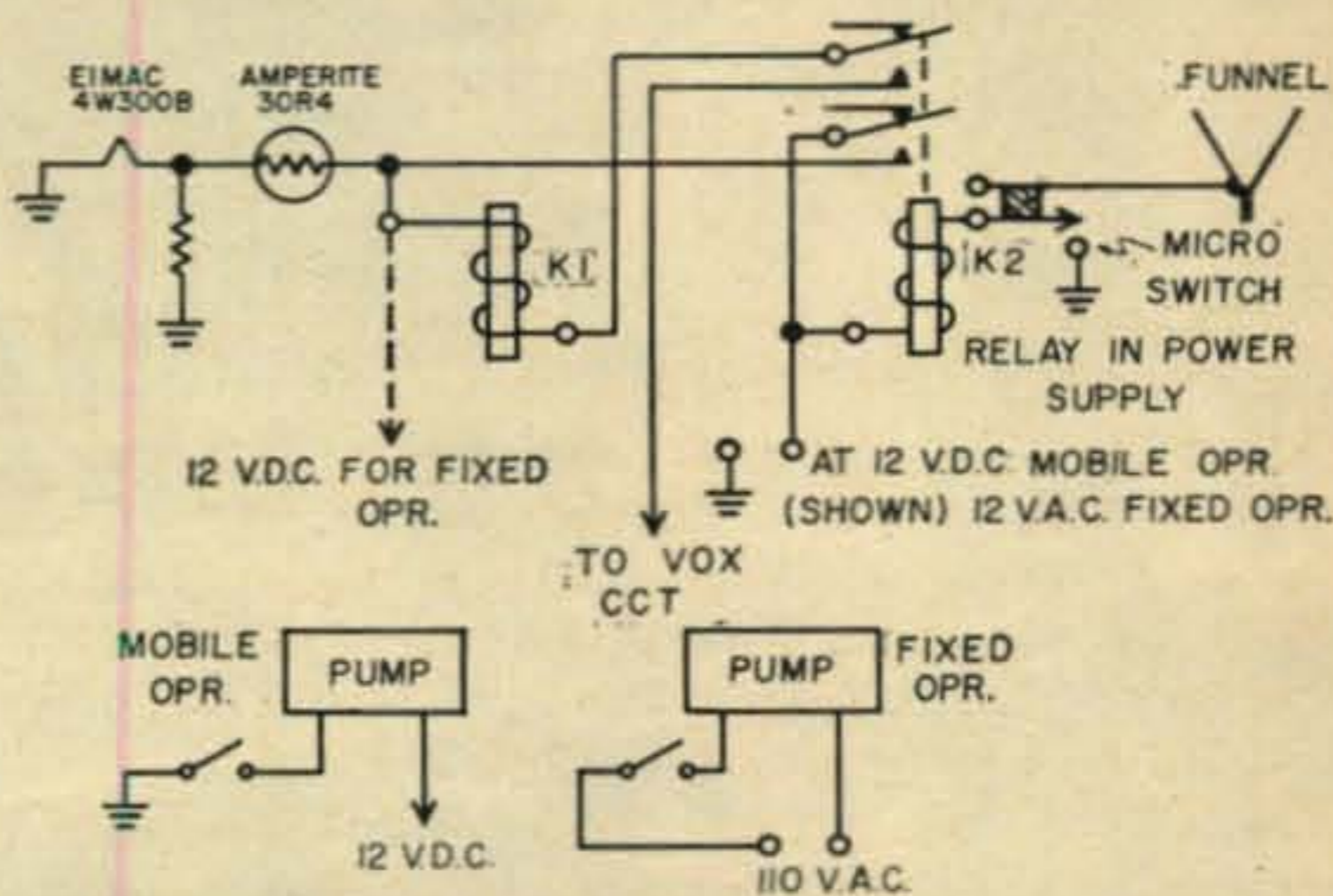
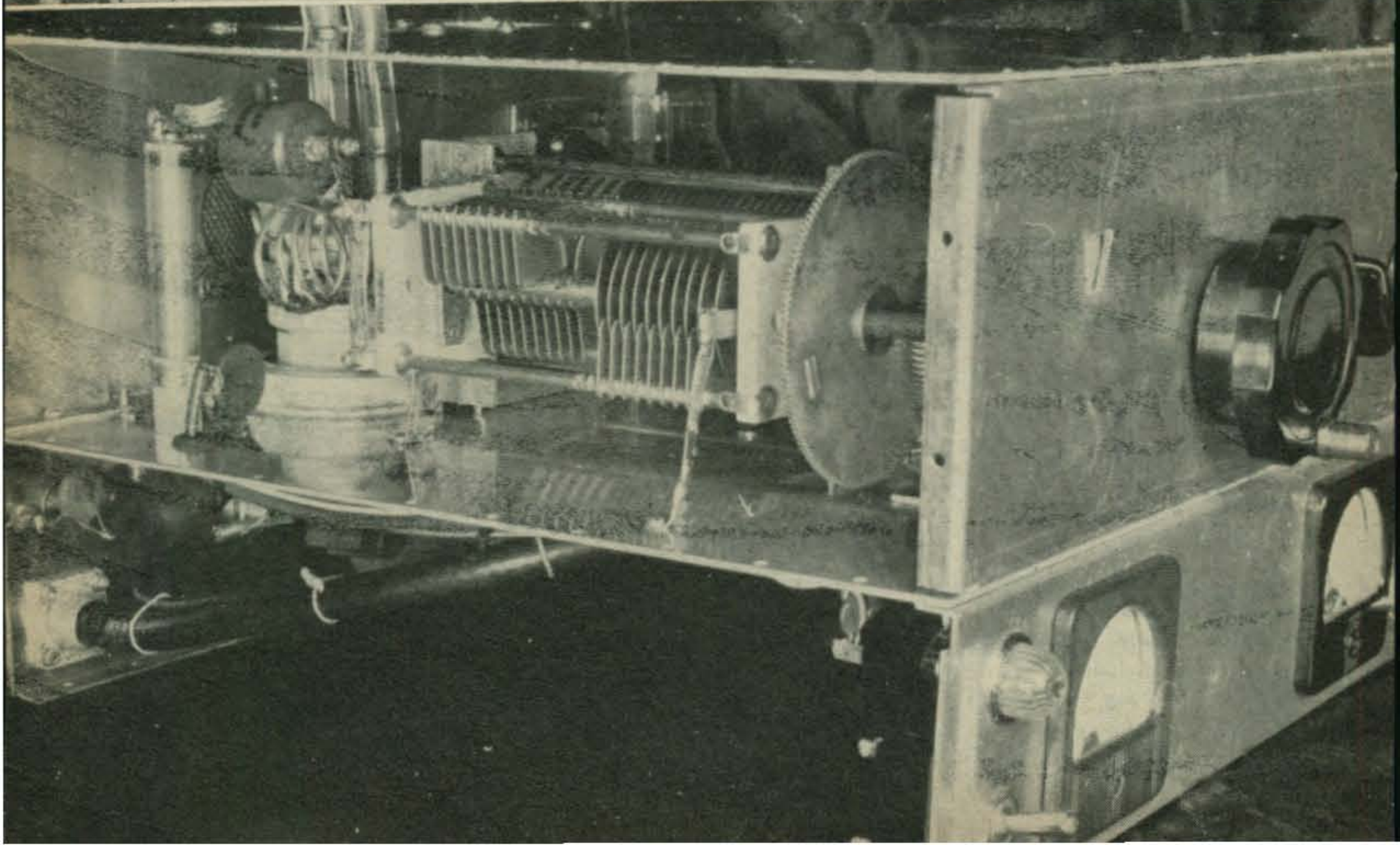
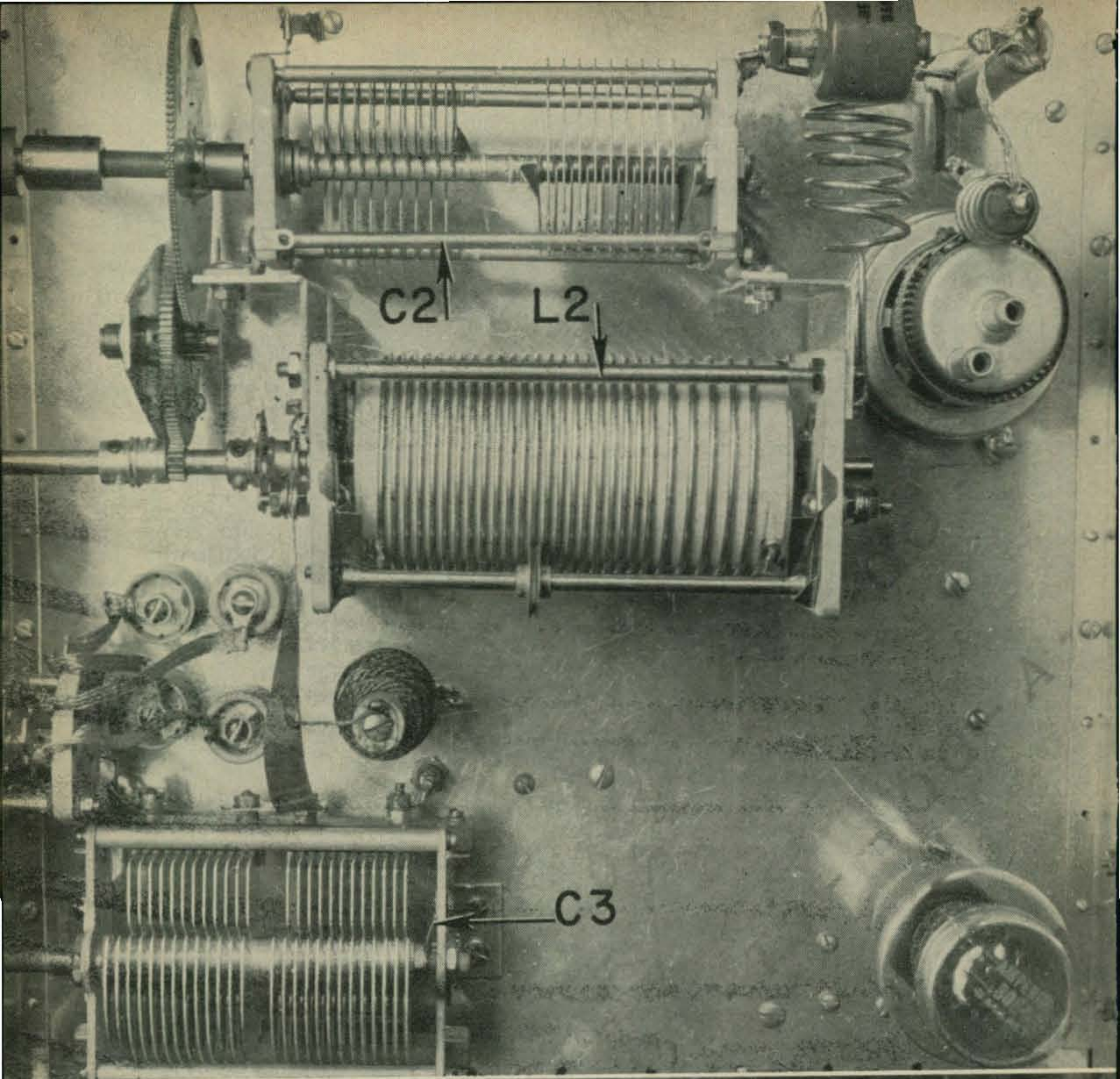


Fig. 2—Circuit safeguarding the final against water circulation failure. Elimination of the weight of the water in the funnel deenergizes K2.



resistivity. New York City water supplies are OK, but distilled water may be required in some locales. The water supply is activated by a dashboard switch which actually controls the

pump. The power for the final amplifier is controlled by the Microswitch in the reservoir.

For cold weather use, it will be necessary to use a suitable anti-freeze solution in the

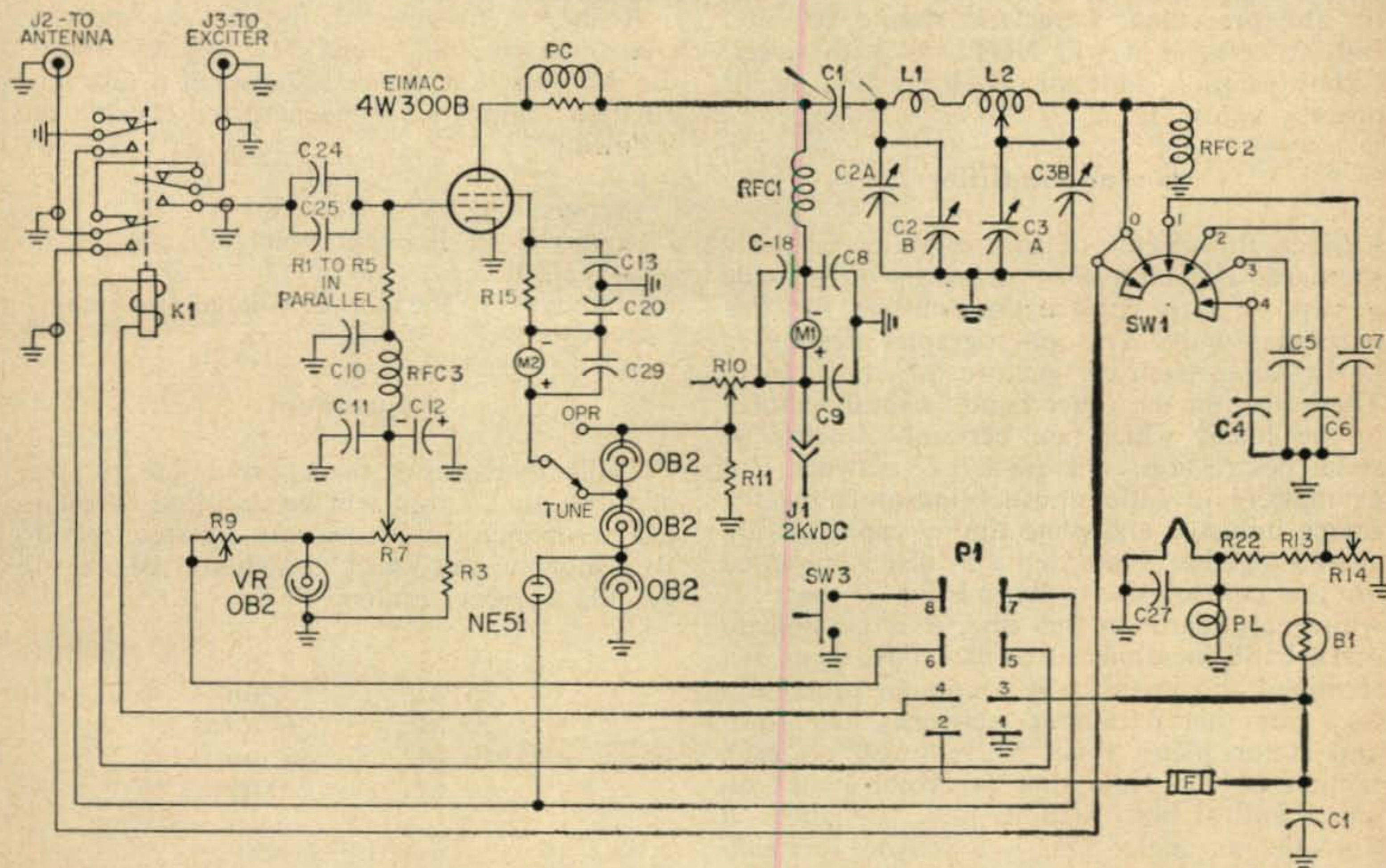
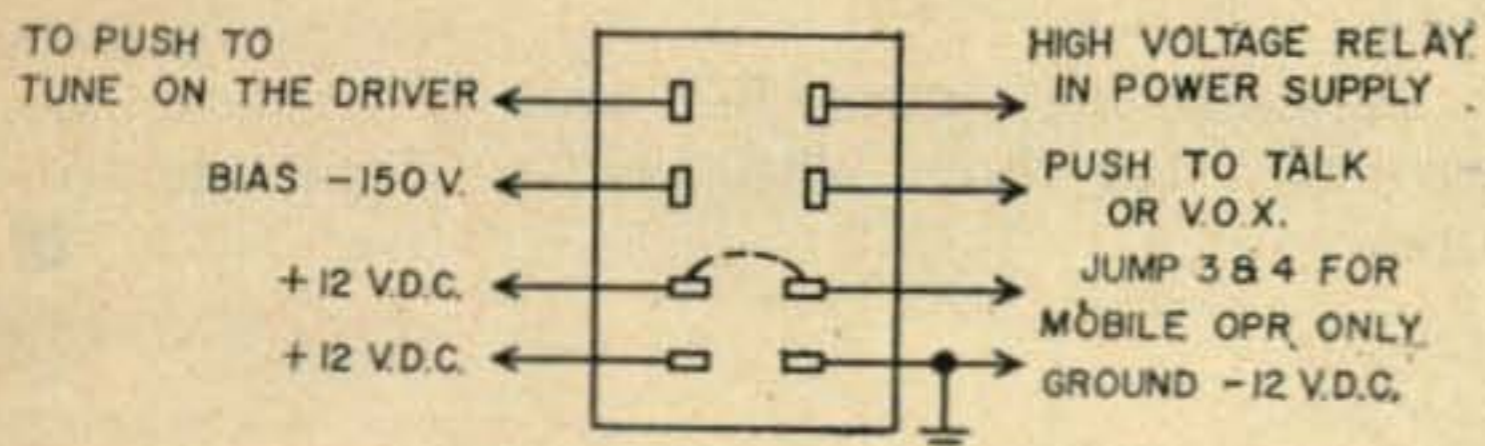


Fig. 3—Schematic of the 500 watt linear for mobile operation. Power plug connections are shown to the left.



**Parts List**

- C1 Centralab TV 207 .005 20 KV
- C2 HFBD 100C hammarlund 100-100 uuf
- C3 Cardwell MR 260 BD or equiv. 560-560 uuf
- C4, C5 Centralab 850S 100N 100 uuf
- C6, C7 Centralab 858S 500 500 uuf
- C8, C18, C19 Centralab DD60 202 .002 6KV
- C9 Centralab DD60 152 0015 6KV
- C10 Mica, 600v .01Mfd
- C11, C13, C14, C15, C16, C17, C20; .005 uf 600v Mica
- C12 30 Mfd 150v Electrolytic
- RFC1 2½" close wound #28 silk covered wire on a 3½" ceramic standoff.
- RFC2 Bud CH 568
- RFC3 Nat. R100 2.5 mh
- L1 6 turns of #12 bare wire air wound 1 x 1½
- L2 Johnson 229 202
- M1 0-300 milliamps 2½ inch meter
- M2 Minus 10 to plus 40 milliamps—2½" meter
- R1, R2, R3, R4, R5 Sprague 10NIT 250 ohms 10 watts noninductive
- R6 Sprague 5NIT 50 ohms 5 watts noninductive
- R7 5K 4 watt wire wound pot
- R8 4 K 5 watt wire wound res.
- R9 2K 10 watt adj. wire wound res.
- R10 100K 100 watt adj. wire wound res.
- R11 50K 10 watt wire wound res.
- R12 3 ohm 10 watt wire wound res.
- R13 4 ohm 10 watt wire wound res.
- R14 5 ohm 10 watt adj. wire wound res.
- R15 470 ohm 2 watt comp. res.
- SW1 Centralab P1SD 2500 series

- SW2 SPDT
- SW3 SPST Momentary switch
- J1 Millen 37001
- J2 Cinch Jones S 308 CCT
- P1 Cinch Jones P 308 AB
- B1 Amperite Ballast 30R4

**Miscellaneous**

- 1 Boston Gear Y4896
- 1 Boston Gear Y48144
- 1 12 inch length of drawn pinion wire Y44816
- 2 National TPB Feed through
- 1 Eimac SK 640 Air Socket
- 1 6 x ¼ inch Brass Rod
- 2 Panel Bearing Assembly
- 1 Insulated Flexible coupling
- 1 4 Amp fuse MTH and holder
- 1 Tie point strip 4 term
- 1 NE 51
- 1 PL #44 or #47
- 1 Neon Pilot light assembly
- 1 Bayonet Pilot light assembly
- 1 Octal socket mounting plate and retaining ring
- 2 Coax chassis receptical
- 1 Coax hood for RG 8U
- 4 Rubber feet ⅝ dia
- 1 Rubber Grommets ¼ inch hole
- 3 SeeZak P 12 x 12
- 4 SeeZak P 4 x 12
- 4 SeeZak P 3 x 12
- 1 Auto-Pulse pump model #500

reservoir. DO NOT USE A PERMANENT ANTI-FREEZE! A solution may be made by mixing one quart of DuPont Zerone and three quarts of water. A gallon of DuPont Perceclene (a dry cleaning fluid) may be substituted for the preceding. Perceclene should be used full strength, as it will NOT mix with water. Either solution functions well as low as 10 degrees below zero.

### Linear Amplifier

Since the circuit of the amplifier is fairly standard, I don't feel it necessary to provide a step by step construction outline for this particular unit. The photographs present a fairly comprehensive picture of the design. There are, on the other hand, several features in the linear which are certainly worthy of some description. The plate LC network, for example, is a little unusual inasmuch as the rotary inductor and plate tuning capacitor are geared together. Note that a 2" disc is mounted on the control shaft. By pasting a piece of white cardboard on this disc, it is possible to mark band locations after they have been determined and in this way facilitate future tuning. For this particular network, two rotor and stator plates must be removed on each section of C2. Note that the rotor plates on either end of both sections have been bent at a 45 degree angle. This is necessary to facilitate tracking of the network.

Figure 4 shows the mechanical assembly required for mounting the specified gears, as well as the arrangement of these gears, while fig. 5 gives the mechanical data for mounting C2 and making the screen ventilating plates for the unit.

### Safety

The safeguards to protect the final involve relays K1 and K2. Relay K1, when energized,

feeds the output of the exciter to the grid circuit of the 4W300B and connects the antenna to the final output. When deenergized it feeds the exciter directly to the antenna. It also cuts off the high voltage.

Relay K2, mounted in the power supply, is controlled by the funnel Microswitch. When the Microswitch opens because of water circulation failure, K2 is deenergized causing the following:

- 1—removal of 12 v from K1
- 2—removal of filament voltage from the 4W300B
- 3—removal of the anode voltage from the 4W300B

### Adjustments

Table One shows the approximate number of turns on L2 that will be required to establish resonance on the various amateur bands. By following this chart you should be able to get the correct results.

10 M	2 turns
15 M	3 turns
20 M	6 turns
40 M	13 turns
80 M	23 turns

TABLE ONE

A complete parts list and schematic are provided for those who wish to duplicate this unit.

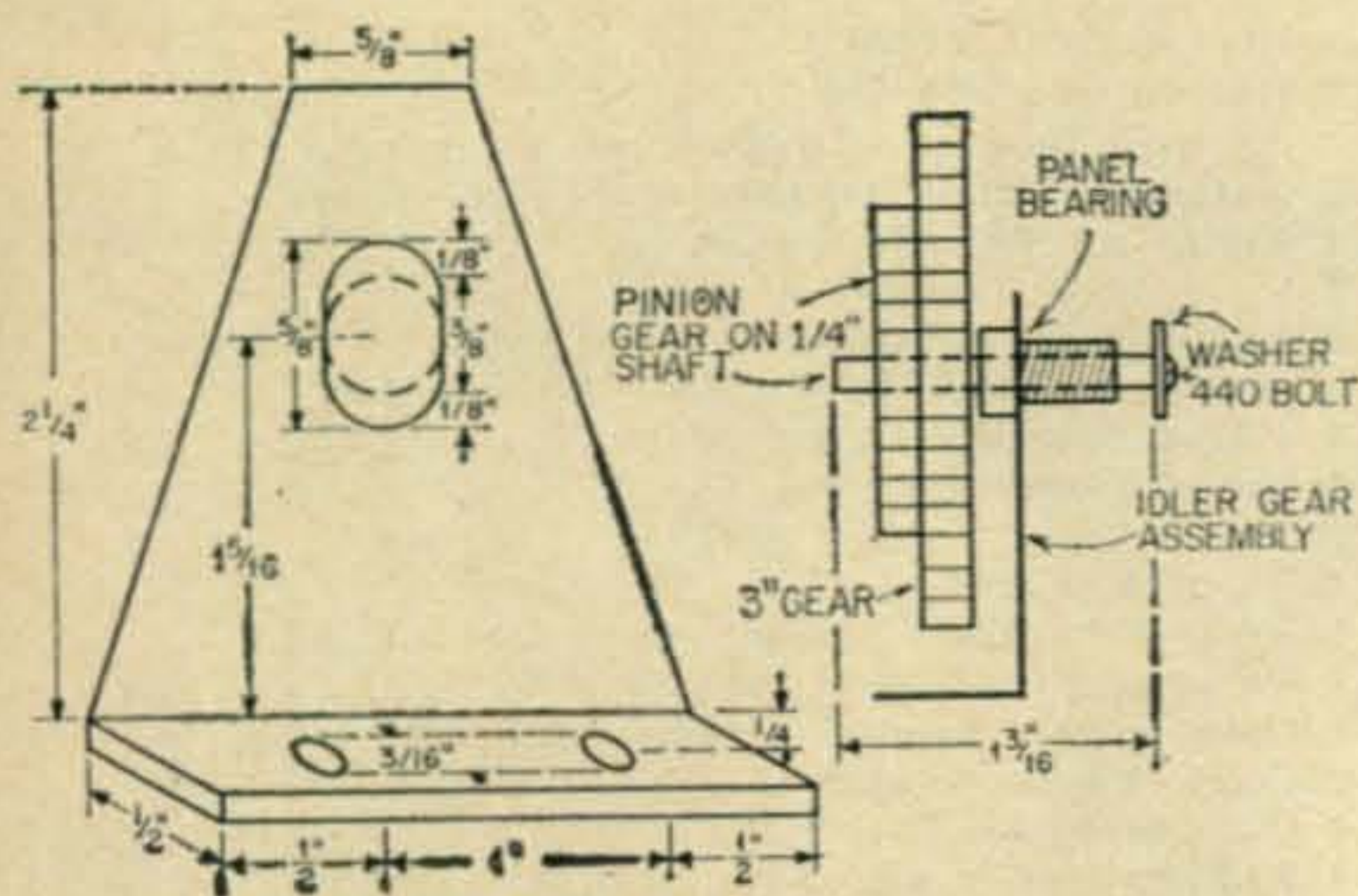


Fig. 4—Idler gear assembly and mounting bracket. The gears used are Y4896 and Y48144 made by the Boston Gear Co.

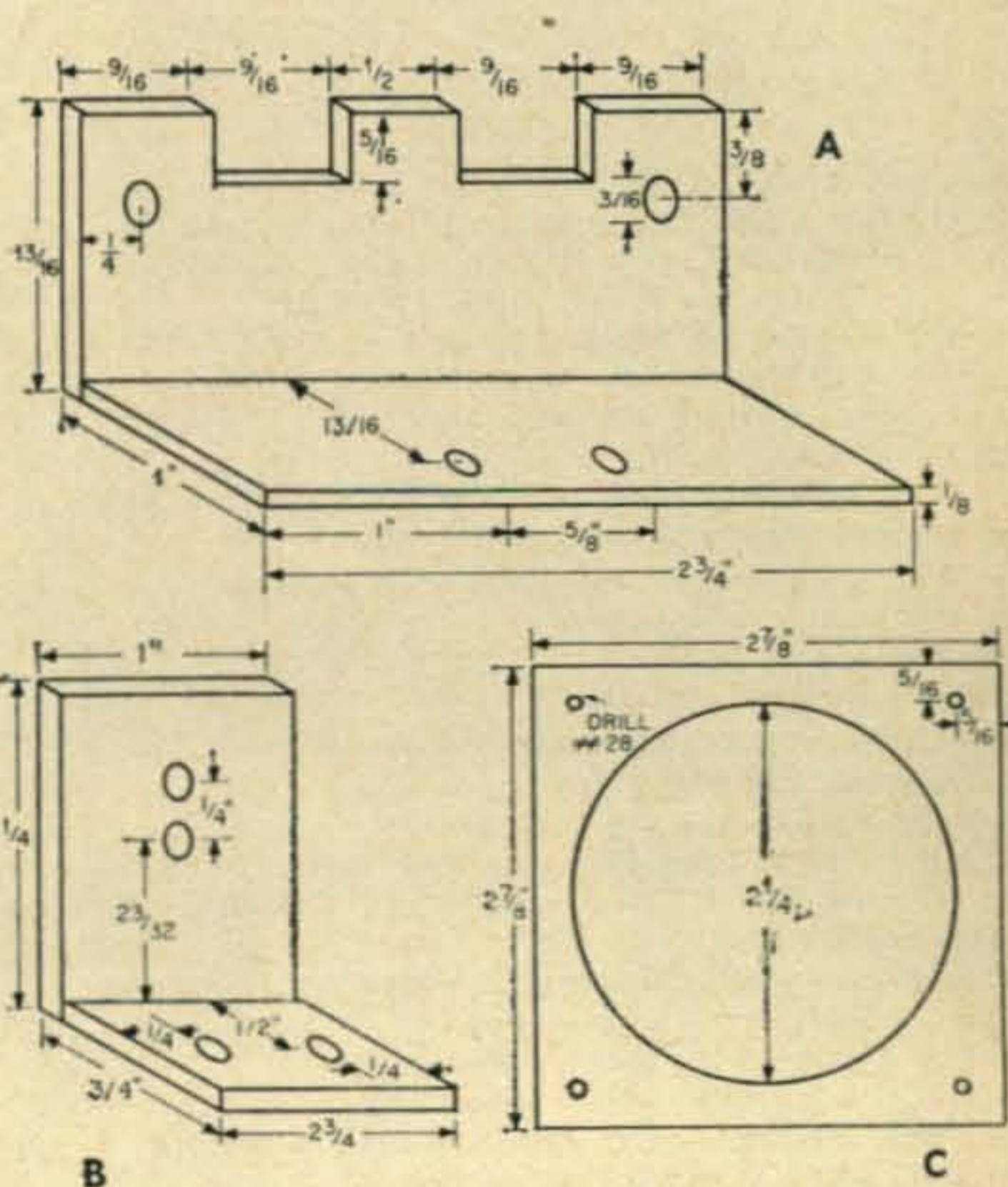


Fig. 5—A—Mounting bracket for C2  
B—Mounting bracket for C3  
C—Plate for vent screens.

# Power Supply Delay Circuit

Willard W. Wehe, W6VZB

16080 Cambrain Dr.  
San Leandro, Calif.

Several articles appearing in the amateur journals lately have pointed up the need of better dynamic regulation of plate supplies feeding variable loads. Most circuits accomplish the lowering of internal impedance and resonance by using larger valued filter capacitors. This is an effective approach, however little is said about the effect on the rectifiers of the greatly increased charging current. By simply increasing storage capacity and not changing filter inductance values the peak current of nearly any of the popular mercury vapor tubes used in higher power transmitters can be exceeded. Those who have tried this may notice how much brighter the tubes flare up when plate voltage is applied. Just how much peak current is flowing in a circuit is tedious to calculate and difficult to measure, but peak current ratings are given for a purpose and exceeding them will shorten tube life. This was not too important while tubes appeared inexpensively on the surplus market, but for those who have just purchased a new set of 866A's or 872A's this simple circuit addition will be of interest.

By limiting the application of full voltage to the filter section for just a few milliseconds the filter capacitors will charge up sufficiently to present a much higher impedance load for the rectifiers. This can be accomplished either at the output of the rectifiers or at the ac line input. The difficulty in working with high voltages makes the latter method simpler. It also limits the charging current to the transformer core. It is this current that makes the house lights dip even when energizing an unloaded power supply.

Two relays are used in this circuit, one to short out a resistor connected in series with the plate transformer primary. The other relay with a high resistance coil is supplied rectified and delayed voltage taken from the plate supply primary. Its contacts key the coil of the first relay. Actually one relay could be used if it had both a high resistance coil and heavy duty contacts. This allows the main plate transformer to be supplied through the resistor for several milliseconds before the resistor is shorted out. In this time the filter capacitors charge up to where no increase in brilliance of

the mercury vapor tubes is noted when full voltage is applied. The actual amount of delay is not critical, by adjusting the timing until a double click is heard when the plate switch is closed insures enough time for full protection. The resistor value is not critical. Any resistance between 3 and 10 ohms is good for a high power rig. A general rule is to make it twice the dc resistance of the plate transformer primary. Since it carries current for only a short period when the supply is turned on a 100 watt size is large enough for a kw transmitter.

Circuitwise nothing could be simpler, no critical parts or parts placements. It can be built into an existing power supply or as a separate sub chassis. In the latter case the connecting leads should be heavy enough to avoid primary voltage drop.

This circuit was worked out and put into operation as a last resort after several sets of mercury vapor tubes showed extremely short life. The supply used is a standard California size, 3000 VDC 1 amp. Output section consists of 16 2mf capacitors parallel connected and fed through a single 8/40 henry choke. Without the delay circuit the tubes used, RX21A's flare up violently when plate voltage is applied. With the delay the tubes show nothing more than a moderate blue glow when turned on until a load is drawn.

Admittedly this involved a large power supply but the principle applies to all rigs and for the few inexpensive parts required it represents good insurance for a pair of trusty tubes. ■

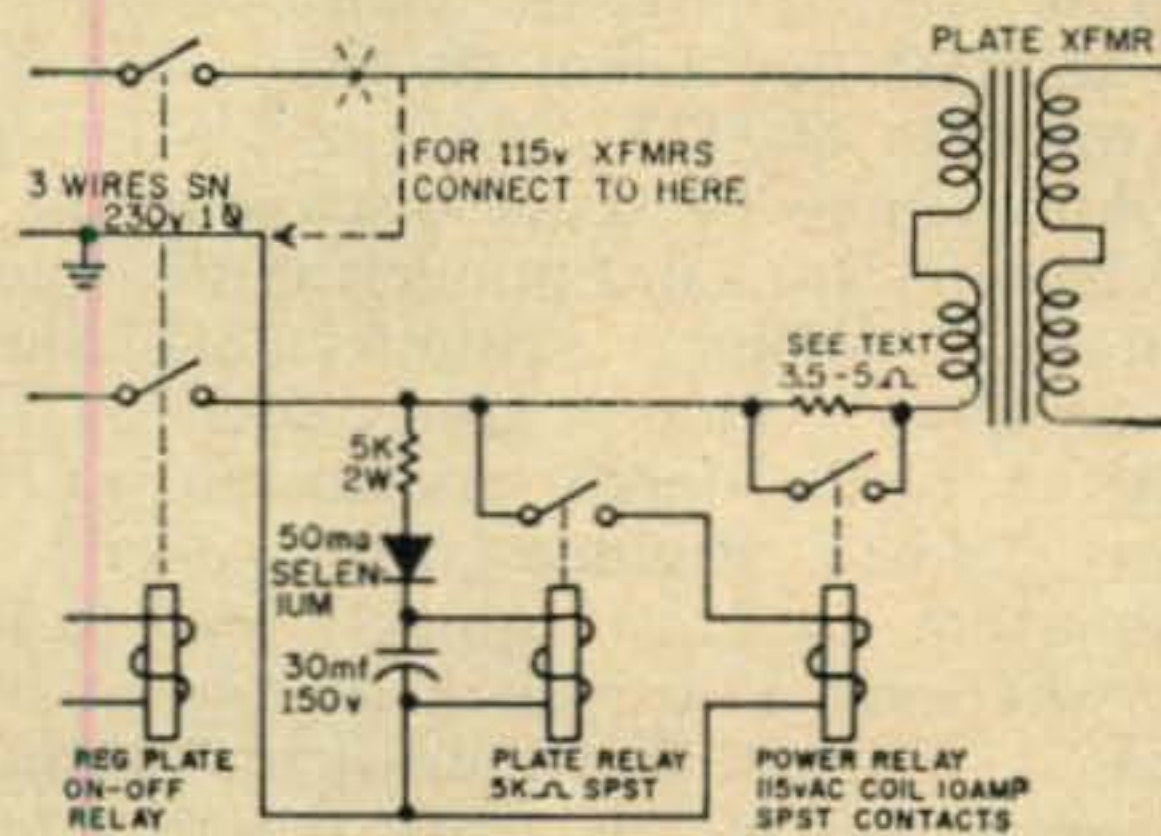


Fig. 1—Simple circuit to prevent the capacitor charge surge from affecting the rectifiers.

# Countries Galore in 1961!

William I. Orr, W6SAI, 3A2AF,  
ex-FP8AC, 7B4QF

I see by the latest magazines that the "top DX'ers" in the Honor Roll have worked some 290-odd countries!

\* \* \*

This silly situation was brought forcibly to my attention at a small cocktail party I attended a few weeks ago. During the chit-chat with an unknown guest the conversation gradually turned towards ham radio, DX, and geography. Although my conversation partner was not an amateur, he was conversant with the hobby, and I found the occasion to remark,

"Yes, I've been lucky enough to talk to more than two hundred and eighty countries with my radio set."

The result of this remark was as if a jackass had brayed in the middle of the room. The babble of conversation stopped and all eyes turned towards me. I quickly turned a brilliant scarlet in color and muttered, "Well, er, maybe some of them weren't really countries . . . islands, you know . . . heh". But the damage had been done.

The hostess saved the day by grabbing me by the arm and leading me to the corner of the room saying, loudly, "My dear boy, everybody knows there are *so* many, many countries! Do have another Martini."

\* \* \*

It is *so* true. There are many, many countries—at least according to the radio ham's flamboyant list of "DX countries". Many profitable hours may be spent discussing the "official" country list, and pondering the interesting question: "When is a country not a country, and vice-versa?" Hot potatoes such as "Why are the Aaland Islands considered to be a "country" when Ruanda-Urindi, Sicily, and Tasmania are not?" can quickly lead to harsh words whenever DX men gather.

It can be noticed that the list of "countries" slowly grows day by day. Each month a "country" or two seems to be added to this list. Perhaps the thought behind this is that the DX-man spends many a happy hour chasing the

latest additions to the list, happy in his hobby as a bug catcher chasing a butterfly with his net fluttering in the breeze. Not so. Each additional country added to the "legal list" brings an anguished groan from the jaded DX-man, forced to go through hours of torture, QRM, and vicious pile-ups merely to hold his place on the sacred totem pole of DX-achievement.

I remember the day when the British West Indies were split asunder and a tremendous blotch of countries were added to the DX-list. The "off-the-record" remarks of a well known DX man concerning this change should be recorded for posterity. He said: "....(censored) .....! That means I'll have to work all those .....(censored).....islands all over again!"

This is true! The *real* DX'er shudders at the thought of the continual dog-fight on the air, as each new country is slowly added to the "list", producing a long-time corrosive effect to the soul, such as generated by the Chinese Water Torture, wherein the victim is slowly driven crazy by the continual drop-drop-drop of water on the forehead.

## The Solution to a Difficult Problem

Away with this endless form of DX-torture! If new countries are needed to spur the jaded DX-man onwards to greater paper victories, let them be produced by the gross. THINK BIG! The number of countries are only limited by the imagination. A grand total of a thousand or so is not impossible. To get the ball rolling in the right direction, the following "countries" are proposed for the grand list.

### Rockall Island

Surely the blood-shot eyeballs of the DX-man must have popped when he read in *Time* magazine a year or so ago that England has formally annexed *Rockall Island*, a tiny speck of rock jutting up in the Atlantic Ocean between Scotland and Iceland! A "GR" prefix for

this spot will set a million telegraph keys a-clicking. G.P.O. attention!

### The Salvage Islands

Owned by Portugal, these exotic (and barren) islands off the African coast are well known by undersea divers for their variety of aquatic life. A CT4 prefix and DX-pedition will surely place them before the crew of expectant DX-ers. Portuguese hams, get busy!

### Campione D'Italia

Nestled in the Ticino area of Switzerland not far from Lugano is the tiny enclave of *Campione*, a speck of Italy in the midst of Swiss territory. Its *raison d'être* is presumably the gambling casino, illegal in Switzerland, but legal in Italy. An added bonus for the DX man is that an Italian radio amateur is living in this enclave! (If you want to know his call, just look through the "I" section of the Callbook. He's listed!)

### Another Enclave, Biltgen

The town of *Biltgen* in northern Switzerland (near Schaffhausen) is territory of the German Federal Republic. Entirely divorced from German territory, this town is recommended to DJ-DL amateurs for a future DX-pedition. Go to it, lads!

### Baarle Hertog

The DX world missed a good bet when the town of *Baarle Hertog* (a Belgian Enclave in Holland) was recently awarded to Holland by the World court (or was it the other way around?). The situation is hazy, but should be investigated at once by the ON4-PAØ gang before a never-to-be-forgotten chance slips into limbo.

### Livira

Now here's a goodie for our Spanish amigos! The enclave of *Livira* is nestled high in the mountains, only a stone's throw from Andorra. A few miles inside the French border, *Livira* is a legal part of Spain, and surely qualifies for "country" status under the DX-men's liberal interpretations.

### Order of the Knights of Malta

This ancient and noble Order occupies a single building deep in the heart of Rome and is legally recognized as a "country" by scores of other countries, who presumably should know about such things. Eager Italian DX men should investigate this shining opportunity at once, before the lease runs out. (It isn't hard to find; it is near the American Express office in Rome!)

### The British Sandwich Islands

The following story was told me by a ZL amateur. I do not vouch for the truth of the matter, but it bears investigation. On one of the Hawaiian islands (the island of Hawaii, I believe) there is a small park which contains the grave of Captain Cook, and a memorial to that brave and intrepid man. This park has been ceded by the U.S.A. to the government of *New Zealand* (!) and is legal territory of that country! This was astonishing news to me, and I immediately bought the ham from "down under" another drink. I pass his story along to the KH6 amateurs to investigate at the earliest opportunity!

### Countless Countries!!!

The above are some of the more obvious "countries" recommended for instant approval. Many other less obvious ones are at hand. The area of *Hagian Oros* is worthy of attention (see your Atlas)—*Mona Island* near Puerto Rico—*Block Island* off the northern tip of Long Island—*Catalina Island* off the coast of Southern California—and how about the *Thousand Islands* in the St. Lawrence River? The possibilities are endless! With a flimsy excuse, almost any portion of the globe can be converted into a "country" for the benefit of the avid DX-er! Certainly the DX'ers in New York City should investigate the *United Nations* buildings (this should be easy—the U.N. already has a prefix: 4U).

It is recommended that these new "countries" be added *en masse* to the DX list, rather than being strung out over a period of years, as is the current technique. A minimum of thirty or forty countries each month for the next six months or a year would do much to add life to the stagnant world of DX, already lulled into a restless torpor by the paucity of new DX countries.

It is further recommended that a subscription fund be set-up and administered by well-known DX men to aid and assist future DX-peditions to these new "countries". A small sum (fifty dollars or so) can be extracted from each eager-beaver DX man awaiting the proposed expedition. To insure that only the "paid-up" stations are worked, the contributors should have the right to affix the letters "P-U" to the end of their call, attesting to their special status in the world of DX.

In this manner, every rare spot in the wide, wide world can be legally counted on the "list" and placed at the tender mercies of the DX-gang. (Editor's note: with the possible exception of Wrangel Island). (Author's note: Remind me to tell you the story of the Wrangel Island DX-pedition that took place just after WW2. Some DX-er's have Wrangel Island *confirmed*, and don't even know they have the card! Yes, indeed!) ■

# Updating the HQ14OX

Louis Beregowitz, K2LGY  
1841 East 19th Street  
Brooklyn, N.Y.

There comes a time in the life of every ham when the desire for new equipment becomes overwhelming. He (or she) can give you all kinds of reasons for the change and none against it. Mine came with the biting of the Single Sideband bug. Sure the old receiver could be used but it wasn't exactly 100% efficient and also it lacked many other features which I felt were very desirable. Looking over the market featuring receivers which I felt filled the bill I realized that my bank balance wasn't equal to the task. This presented a problem which I am sure has confronted many a Ham in the past. After many a night of skull knocking I finally came up with an answer. Revamp the receiver myself.

Next came the problem of what I wanted in the way of improvements. This problem resolved itself much easier than the first since the requirements for a Single Sideband receiver are well known.

- 1—Good selectivity
- 2—A good method of calibration
- 3—A selectable system of *avc* for either AM, CW or SSB.

Since the HQ14OX is basically a fine receiver insofar as sensitivity and selectivity is concerned the only problem here was to improve skirt selectivity and band width. This was solved by the incorporation of a Collins 3 kc mechanical filter. The difference in reception was immediately apparent.

A method of calibrating the receiver was also no great problem although the HQ14OX is a 2-dial receiver. With the installation of a 100 kc crystal oscillator I was able to set the dials to within cycles of the desired frequency.

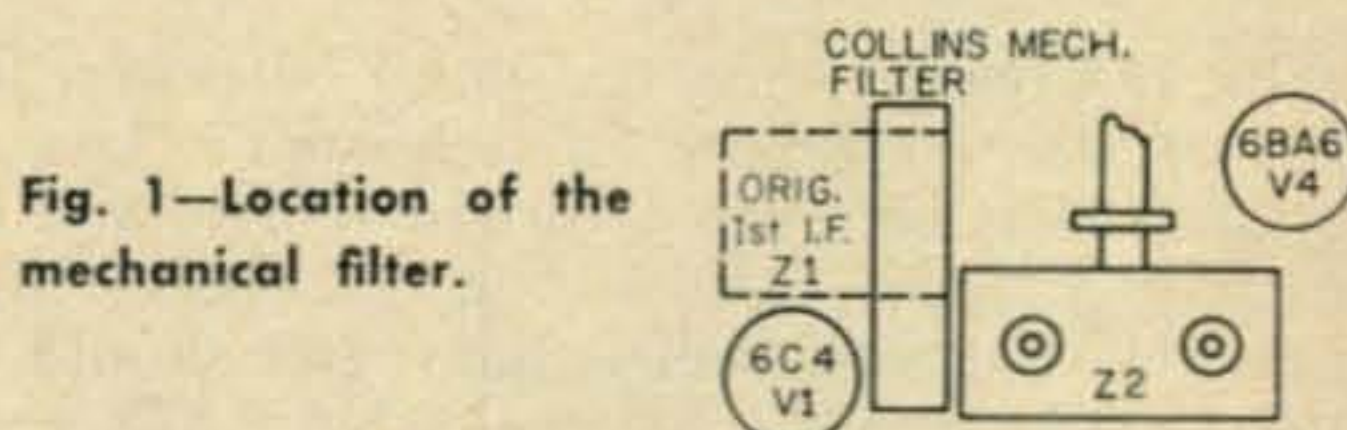
The third problem was a much harder nut to crack. After trying various types of *avc* circuits, none of which proved satisfactory, I finally ended up with two *avc* circuits in the receiver. One, the original circuit which I retained for AM reception, and the other a 'Hang *avc*' circuit for CW and SSB.

In order to quiet the fears of the more timid souls who feel that cutting into a receiver ruins the resale value of it, the only cutting of the panel was the installation of an on-off switch for the crystal calibrator. Inside the set the

only apparent changes are the addition of two sockets, one for the 100 kc crystal and one for the 100 kc oscillator tube. Other changes which are not so apparent are the replacement of the 1st *if* transformer with the Collins mechanical filter, replacement of the 3 pole 3 position AM-CW switch with a 4 pole 3 position switch and the addition of a small out-board chassis housing the SSB *avc* components. This is mounted on the tuning condenser cover.

## Construction

The first step in the conversion of the receiver is the installation of the mechanical filter. Remove the 1st *if* transformer and drill holes according to the mounting template of the filter you intend using. (See fig. 1). The



Collins filter will mount easily in space available. Either side can be used as primary so no unusual care need be observed. Across the primary and secondary of the filter, install the necessary resonating capacitors (in the case of the filter I used they were 135 mmf each) and replace the wires taken off the original transformer as though the filter were an *if* transformer. Since there is an insertion loss with the installation of any filter (in this case about 10 db) it must be made up in order to retain the sensitivity the receiver had originally. In the case of the HQ14OX this is easily accomplished by replacing the limiting resistor (R40 in fig. 2) of the sensitivity control with a 250

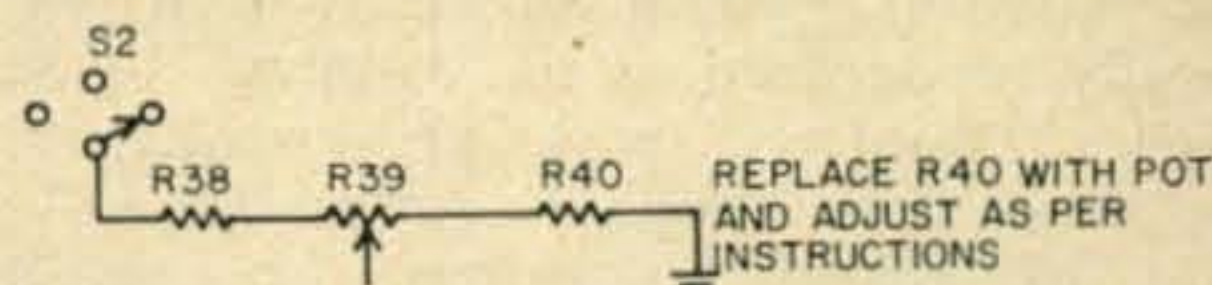


Fig. 2—Partial schematic of the sensitivity control circuit. Replace R40 with a 250 ohm pot and adjust it as directed in the text.



ohm potentiometer and adjusting it until the original S readings are obtained. Do not adjust any of the *if* transformers unless they were off to begin with.

### Crystal Calibrator

Next in line is the incorporation of the crystal calibrator. First drill holes, using templates, for the 7 pin min socket, crystal holder and variable condenser. Use layout sketch of fig.

Fig. 3—Layout for the crystal calibrator.

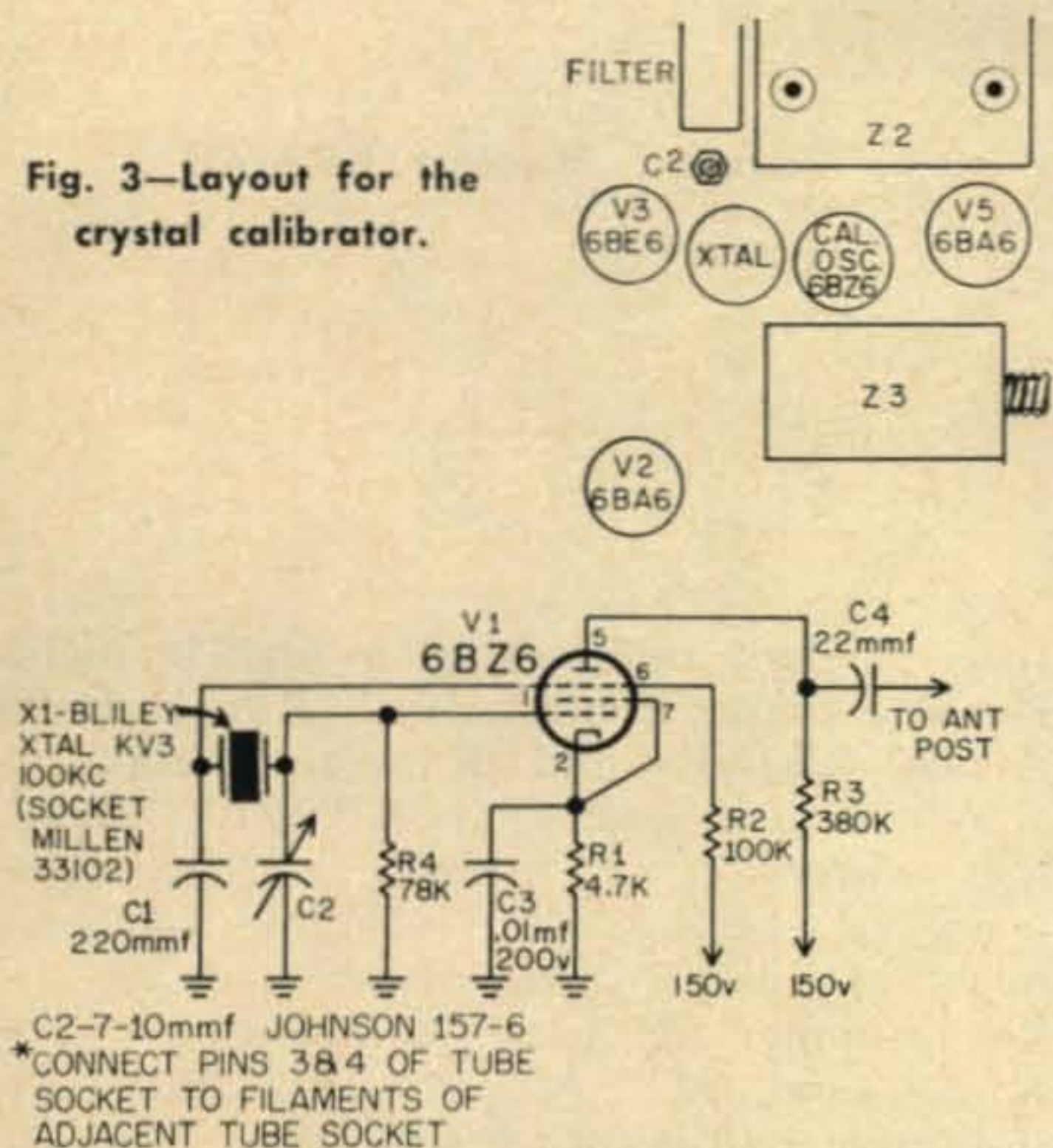


Fig. 4—Crystal calibrator circuit.

3 as a guide. Mount parts and wire according to the diagram of fig. 4.

When completed turn on receiver and tune in to WWV on either 5 *mc* or 10 *mc*. Turn on calibrator allowing it to heat up for 10 or 15 minutes. Adjust variable capacitor of calibrator until you zero beat its signal with WWV. Allow to run for another 15 minutes and adjust again if necessary. You will now have a reference point every 100 *kc* which will allow you to set band edges on all ham bands.

### Hang AVC

Coming into the home stretch we start on the final part of the revision, the hang *avc* circuit. There is nothing critical about it since there is no *rf* involved. Mount the tubes and transformer according to the mechanical layout of fig. 5 and wire according to the diagram of fig. 6.

The final part of the wiring involves the changing of the methods switch and it will be necessary to loosen up the cans of the *bfo* oscillator in order to install the switch. One word of caution. Be careful with the *bfo* variable condenser so as not to bend the plates when moving the *bfo* can out of the way. The original and revised circuits are shown in figs. 7 and 8.

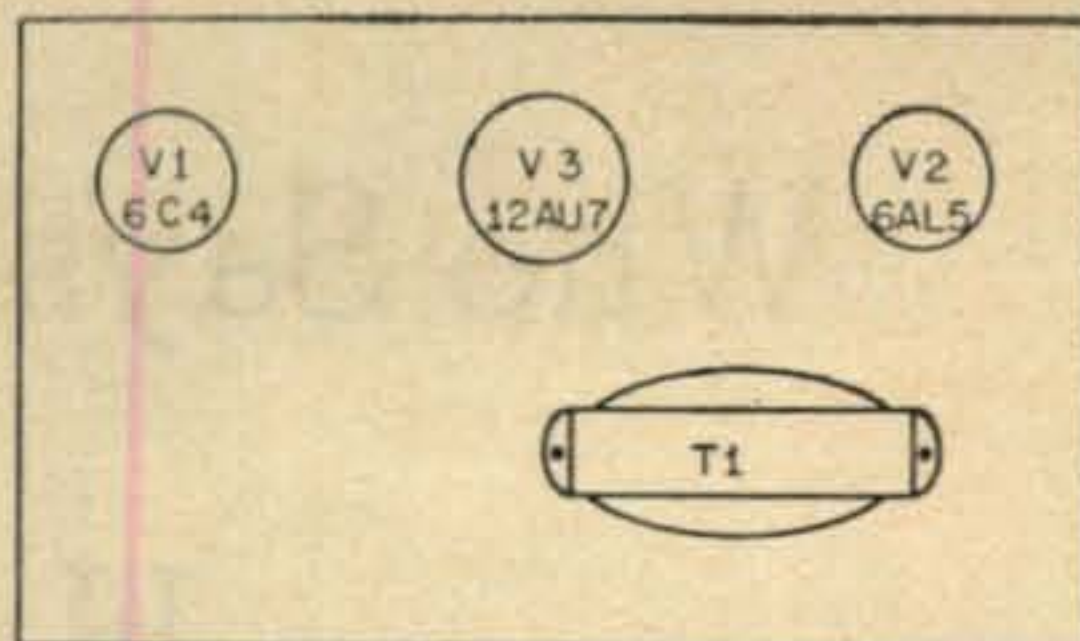


Fig. 5—Parts location on the "Hang avc" chassis.

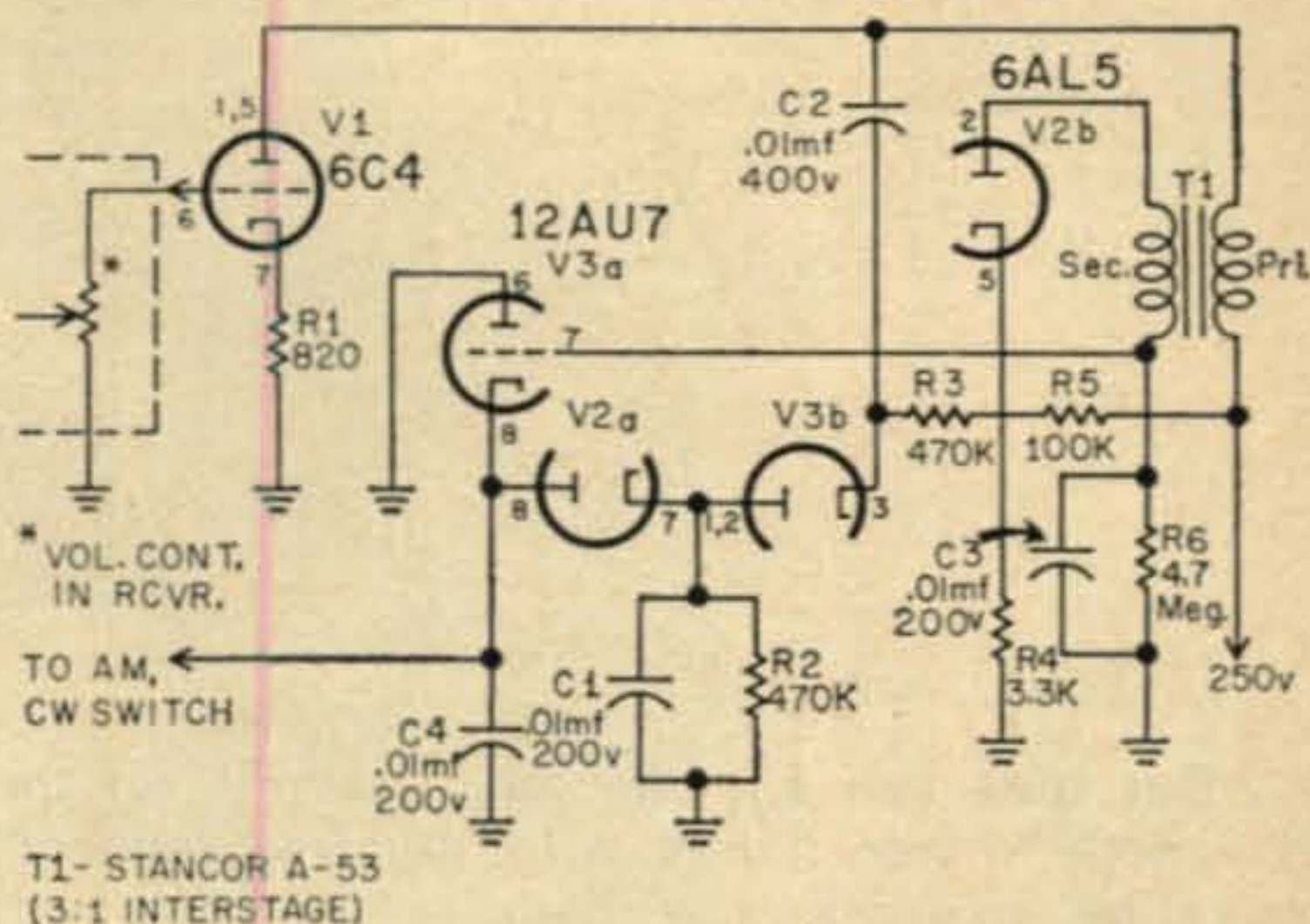


Fig. 6—"Hang avc" circuit. (George Luick, WBFL, Improved AVC for Sideband and CW. QST, Oct. 1957.)

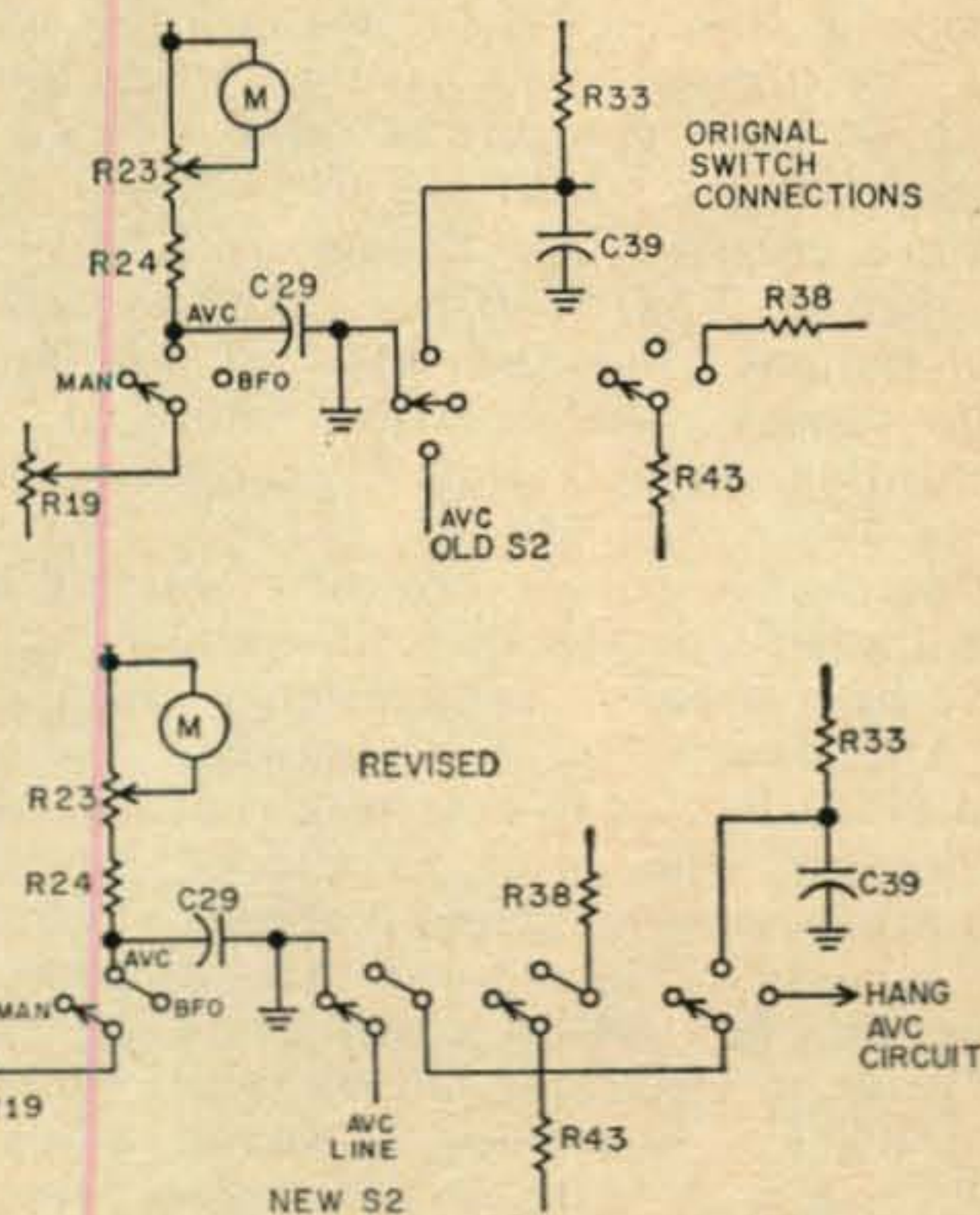


Fig. 7—Original and revised circuits of the method switch.

Now comes the reward of all this work. After turning on the receiver set it on your favorite ham band and set the band edge using the calibrator. You will be on the head. Tune across the band using the method switch in the AM position and you will hear the stations come in with a lack of QRM which you never imagined possible. The band width will

[Continued on page 125]

# Who Says A Novice Can't Have Fun?

**Carole F. Hoover, K9AMD**

401 East Wood Street  
Hillsboro, Illinois

**"But how can I** make any contacts on the crowded Novice bands with my low power?" grumbles many a new ham.

It's true that a Novice can operate only on certain frequencies with not more than 75 watts output from his transmitter, but Scott Millick, a 16-year-old amateur who lives in Litchfield, Illinois, has proved in a few months that any beginner can have as much fun and make as many contacts as those with General Class privileges.

Since receiving his license as KN9PPX in October of 1958, Scott has talked to well over 500 stations, and the walls of his upstairs radio "shack" are crowded with QSL cards confirming contacts with 31 countries and 50 states.

Responsible for Scott's new interest is his grandfather who has been an enthusiastic short wave listener for more than ten years.

"After hearing all those stations," Scott said, "I decided I'd like to talk instead of just listen."

Pointing with pride to a code proficiency certificate for sending and receiving at 25 words per minute, he mentioned that his goal is 35 wpm. and he's getting closer every day.

"I use an electronic keyer," Scott continued, "but it's lots better for a Novice to develop skill first with a hand key before getting a "bug." That's what I did."

Low power doesn't seem to cramp his style a bit. With only 50 watts input, practically all contacts are successful. Scott's favorite band is 15 meters where he chases DX stations with a three element beam.

"You've got to be a good code operator on this band," Scott admitted, but with a minimum of effort, a novice can work any country in the world."

Following a contact with a British station one day, Scott was invited to join the RSGB, Radio Society of Great Britain, and he now

receives their bulletins as a regular member. He also prizes contacts with Russia, Finland, Africa, Australia, and all the continents.

When not operating as KN9PPX, Scott enjoys woodworking, fishing, and growing unusual varieties of corn including some specimens of Indian corn which won an award last summer in local competition. During school time, Scott gets up early and works a station or two before breakfast.

His parents and especially his SWL grandfather are tickled pink since he became a ham. And what about Scott? Well, he passed his General Class license exam recently and is anxiously awaiting the arrival of his new ticket.

"I'm looking forward to being a General," Scott Millick told me, "but I don't think I'll have any more fun than I have had as a Novice."

One look at the pages of his log crammed with DX and the card-covered walls of his shack is all any Novice needs for encouragement. ■



Scott Millick, Kn9PPX, and his SWL grandfather, Bill Cassens, pinpoint a new contact made on the novice band.

# A Simple DSB Exciter

## TEN WATTS FOR TEN METERS

E. H. Marriner, W6BLZ

528 Colima Street  
La Jolla, California

Many radio amateurs who are now deprived of ten meter SSB operation because of circuit complexity will find this Double Side Band exciter an excellent substitute. The SSB station operators on 28 mc using SSB receivers tune DSB in the same manner as SSB signals and will not notice the difference unless they happen to switch over to the other side band.

The use of DSB is also an inexpensive solution to SSB operation on ten meters which will now be at its maximum cycle for the next few years.

This DSB transmitter should also offer the most fun for portable operation on vacation trips. Because of its simple rugged construction it is not subject to misadjustment during transit.

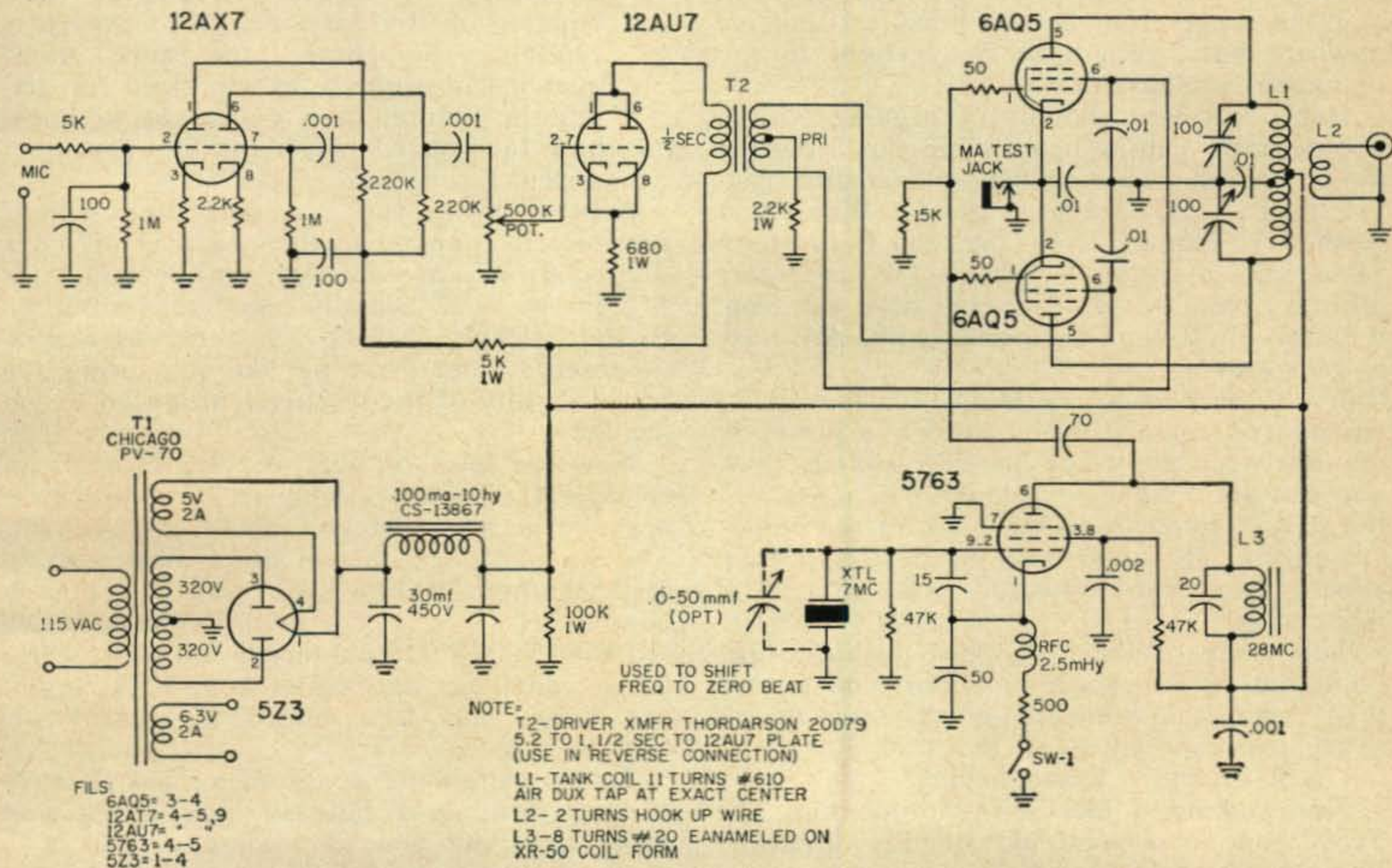
The transmitter is constructed with a minimum of circuits to keep it simple. The audio components are chosen to eliminate low fre-

quency signals which sometimes cause distortion. Voice control and a stable vfo could be added by the constructor at a later time.

### Oscillator Stability

On ten meters it is very necessary to have an extremely stable oscillator which is not frequency modulated. This is not easily achieved when doubling oscillator frequencies from a 7 mc vfo where any slight drift is amplified each time the frequency is multiplied. Therefore, crystal control contributes to stability. Most SSB operation exists between 28650 kc and 28700 kc. Thus, with a few 7 mc crystals ground higher from 7150 kc by applying a few swipes of grinding compound on a glass plate and a little lapping, should spread the frequen-

[Continued on page 125]



# A Photoelectric Densitometer

John W. Campbell, Jr., W2ZGU

The major use of electronics today is actually not in communications, but in the non-communications fields of artificial senses, and artificial nervous systems—computers and servo systems, reacting to electronic sensing devices detecting angles, light or heat radiation, nuclear radiation, pressure, or whatever it may be. Generally, electronics is used for information detection and manipulation. In that broad category, radio is only one sub-class.

Most hams, it seems to me, have photography as their second hobby—which is, of course, another technique of information detecting and handling!

Some while back I started trying to make my electronics do a little good in my photography department; the two information detecting, analyzing, and manipulating fields can be a real, Grade A syndicate when they pull together!

What's the fastest combination of film and developer that gives the best tone-range in a finished print? Aesthetic arguments on that one can range from hell to breakfast and get nowhere but I've got as much right to my opinion as you have to yours!"

Hah!. But you should try arguing with a photoelectric densitometer some time! It's the most arbitrary, opinionated, self-satisfied gadget. And . . . by the way, did you know that "arbitrary" comes from the old Latin term "arbitrari," meaning "a witness." What's more arbitrary than a fact? It doesn't have a reason; it simply is. It can't be argued with. Arbitrary as hell, aint it . . .?

If you develop a film in D-11, which is intended for making black-and-white-and-nothing-inbetween copies of line-cuts and the like, you can get a good, solid-looking negative . . . but it isn't going to do the XYL or the Junior Op justice. It would tend to have snowman effects; two coal-lumps for eyes in a dead white face.

Too many of the high-speed push-it-to-the-limit film-developer combinations tend toward this Abominable Snowman effect. True, there's a negative exposed at an index of 8000 . . . but is it a picture worth having?

Now, taking a nice wide-latitude film like Tri-X pan, in a good old standby developer like DK-50 or D-76 will give you nice tones,

and a wide range . . . but it's also somewhat grainy, and the speed isn't as high as it might be.

At this point, whether the film-developer combinations are fast, or not, the arguments tend to be. And here's where a densitometer comes in and starts being arbitrary—a witness. It testifies to facts.

What we want to know is:

1. Does the negative have a complete gray scale with uniform steps . . . or does it have some sort of non-linear response that hits the highs and lows, and flats out in the mid range?

(Hmmm . . . doesn't it sound like we're discussing a hi-fi amplifier! Essentially we are; we want a hi-fi information-recording system!)

2. Does the negative have a reasonable contrast range—say about a 40 to 1 range that will match a #2 or #3 paper properly?

3. What's the darkest shadow the combination of film-developer can record perceptibly. (Sometimes, for some shots, quality can properly be sacrificed for getting-the-picture; then you want to know how far you *can* push the film-developer system.)

Another thing you can determine with a densitometer applied to the negatives: is your shutter-diaphragm-stop combination honest? Is 1/25th @ F 22 actually equal to 1/50th @ F 16, 1/100th @ F11 . . . etc., as they're supposed to be? Nothing like measuring the actual density of the negatives produced to get the facts.

Now the level of light coming through an enlarger lens, after pushing its way through a negative, is not what you would call brilliant. The standard light-meters don't even start to read at those levels—even with the biggest booster cells.

I tried with a 929 photocell, and a two-stage 6AU6 amplifier; the results were 90% amplifier noise, and 10% maybe-it's-signal-but-I-can't-be-sure.

To be useful, the densitometer has to have a small opening; a hole an inch across isn't going to allow you to analyse details of a negative. And that, of course, means the photo-

cell's going to be working in a low light-level, with a tiny "f-stop."

Also, be it remembered that a photocell isn't like a film or paper; film or paper can be left under the light till the image builds up nice and strong. A photocell *always* works on a "billionth of a second exposure" basis—the output is electron current, and the effective exposure time is the time it takes one photon to kick one electron loose from the photocathode. This is not, be it understood, a slow, or long-time process. There are a few faster processes in the Universe . . . but not very many.

For practical work, we need a gain of approximately 100,000,000 times, and a signal-to-noise ratio of at least 1000 to 1.

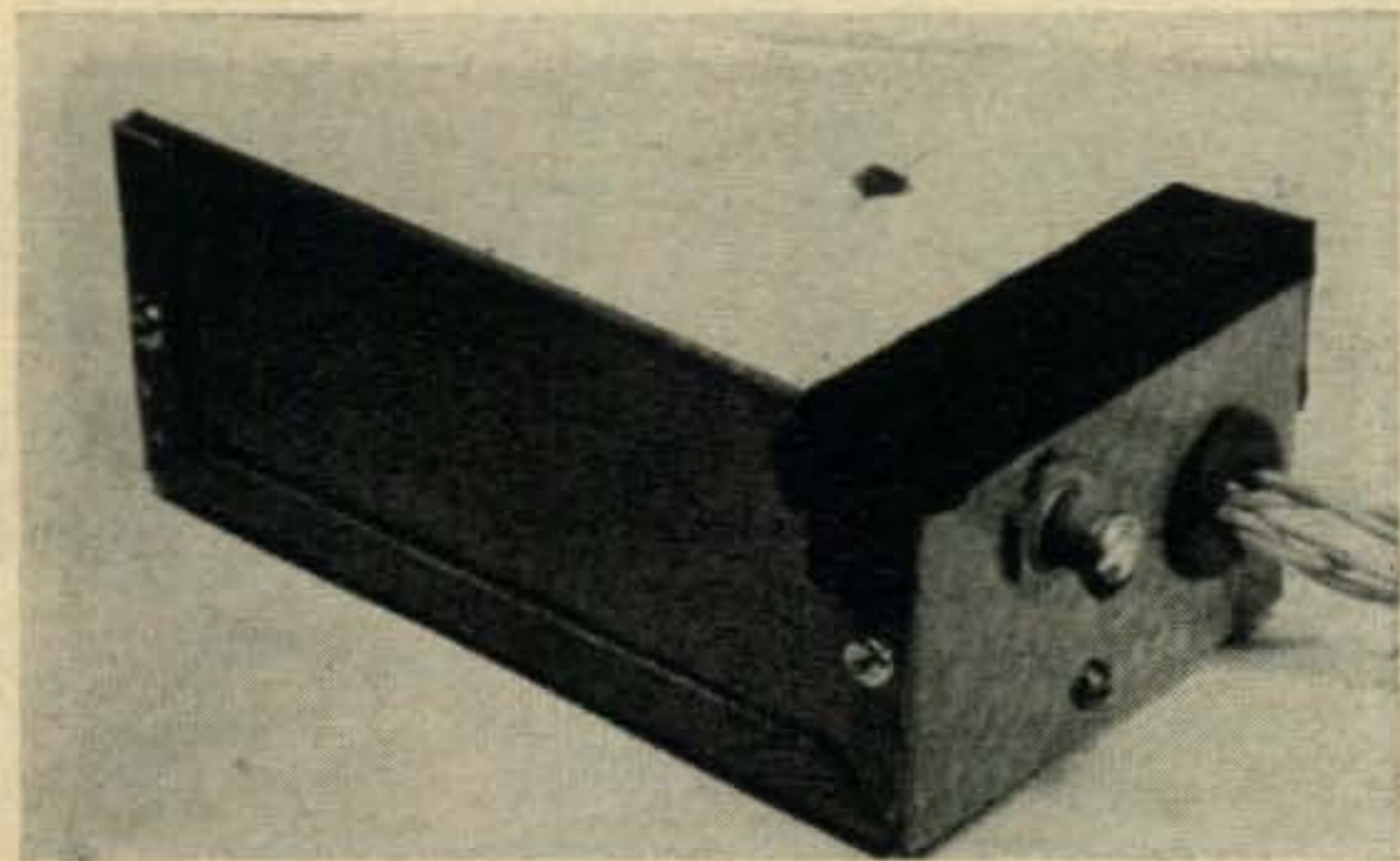
Standard amplifier circuits don't seem to work well under those conditions; a gain of 100,000,000 in a vacuum-tube amplifier is theoretically possible, but I'd hate the job of combing out the oscillation.

### Electron Multipliers

The electron-multiplier amplifier is a wonderful thing, and a totally different sort of thing. The principle of the electron-multiplier is simple: if you shoot a rifle bullet into a pebbly beach, you can expect to have two to ten pebbles go flying into the air for every rifle bullet hitting the beach. Of course, if the bullet just sort of dribbles in, no . . . but if it arrives with a reasonable *zing*, pebbles fly.

To an electron, a metal plate looks like a pebbly beach. If the electron arrives with vigor, vim, and violence, other electron-pebbles are going to go flying . . . not into the air, but into the free vacuum inside the tube, where electrostatic fields can grab them and hustle them along to other pebbly-beach plates.

If we set up a series of plates, sensitized to electron-bombardment so that spare electrons are readily knocked loose, we can get an amplifier of very unusual characteristics. For one thing, it's an amplifier operating at *zero* impedance. The voltage of the plates can be



Densitometer light head ready for use. The external polystyrene "fish eye" lens is visible on top.

nailed down to absolutely pure *dc*—we won't let it budge a fraction of a microvolt—and we still get five times as much current out as we had going in.

That makes it nice in a 100,000,000-fold-gain amplifier; we can nail down every stage so that there isn't any voltage *to* feed back!

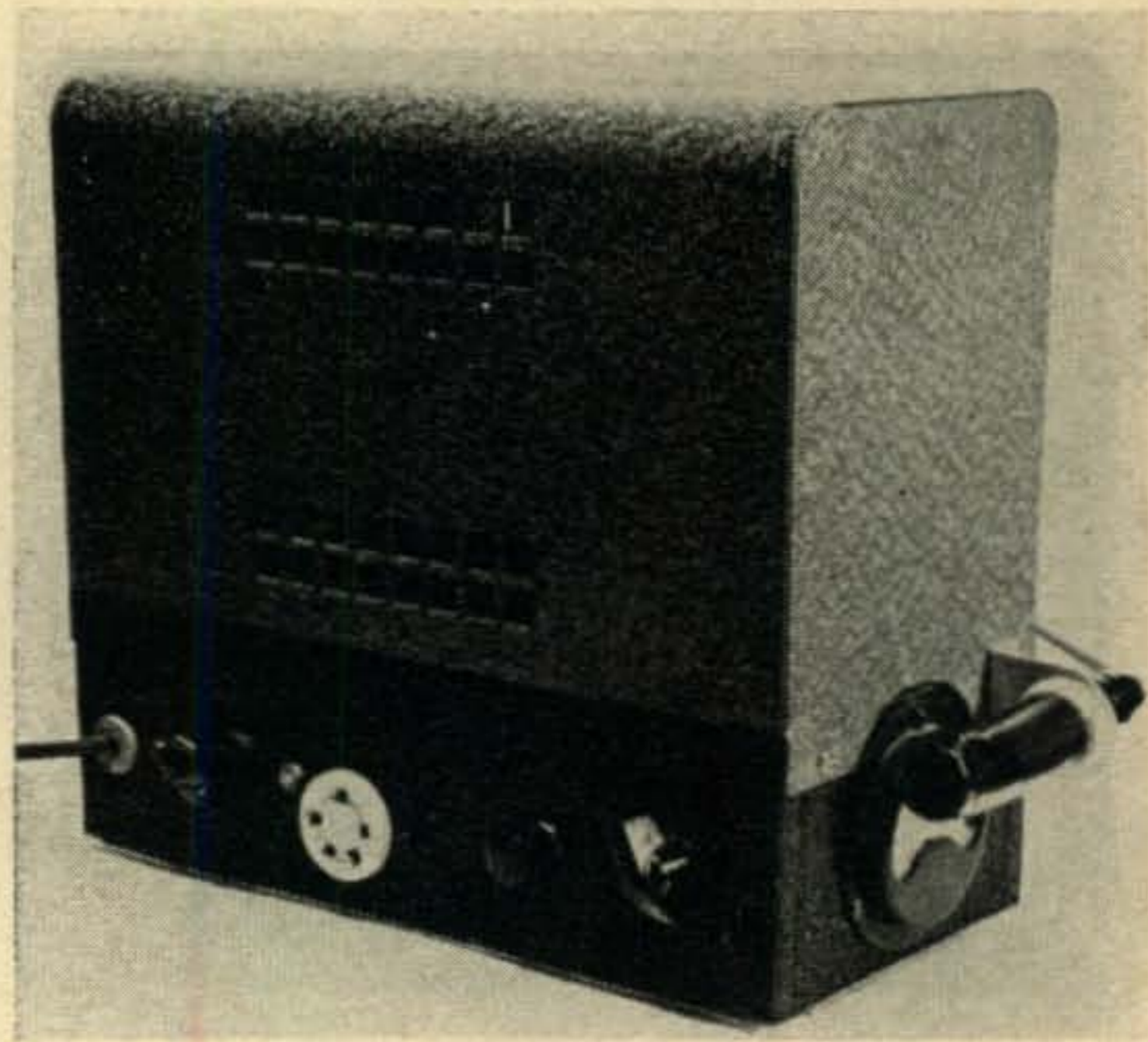
The 931-A, and a variety of essentially similar nine-stage photomultipliers are, today, delightfully cheap. (You can also buy the super-doooper ones used in scintillometer work, for from \$50 to \$500 a copy.) They've gotten much cheaper since the automobile companies started using them in these headlight beam control gadgets. They're nice rugged contraptions, with a gain of 1,000,000 built into one bottle about the size of a 6SN7 or 6V6GT.

They've got an 11-pin base—one pin for the photo-cathode, one for each of the 9 electron-multiplier *dynodes*, and one for the final electron-collecting anode. (See fig. 1.) For the maximum gain, apply 100 volts between each pair of electrodes, which means that the lightsensitive cathode runs 1000 volts negative to ground, and the anode at ground, when the tube is dark.

### Multiplier Operation

Inside the tube there is a series of dynode plates, each sensitive to the impact of electrons, and each shaped and located in such a way that when equal voltages are applied between each successive pair, the electrostatic fields resulting serve *two* highly useful functions.

1. To accelerate the electrons from one plate to the next. Thus the photocathode being 100 volts negative to dynode #1, the electrostatic field makes the electrons emitted from the photocathode when light strikes it, race over to the dynode #1 and



Densitometer power and metering cabinet. The device over the meter is a shielded pilot light.

strike it in turn with a 100-volt energy.

2. The *shape* of the electrostatic fields is such that the electrons are made to go in a complex curving path—the electrostatic fields are also acting as electron-lenses, as in a cathode ray tube focussing system.

These nine-stage photomultiplier tubes are among the most ingenious, mechanically simple gadgets that have come along yet. Getting a gain of a million in something the size of a flashlight D-cell is, after all, a neat trick.

(If you're really loaded, and insist on going whole-hog, Du Mont is manufacturing an 11-stage photomultiplier. I suspect it could detect a black flea hidden in the black hair of that proverbial black cat in the coal bin at midnight.)

Because the electrostatic fields are used for focussing, as well as electron-accelerating, it's important that the voltages between stages be equal; it is not critical that they be 100 volts, or 50 volts, or any other particular value—but it is important that the voltages between cathode, dynode #1, dynode #2, dynode #3 . . . etc to dynode #9 be equal. The voltage between dynode #9 and final anode, however, is not involved in electron-focussing, and can vary freely.

However, the gain-per-stage is a function of how hard the electrons strike when they arrive at a dynode. The harder they hit, the more extra electrons get blasted loose from the pebbly-beach surface of the next dynode. With 30 volts per stage, there will be no gain at all; the rifle bullets are just dribbling into the beach, knock loose no pebbles, and just lie there useless. At about 50 volts per stage, gain starts to show up. The tube manufacturers recommend 100 volts per stage maximum. You can run it up to 125 volts per stage, but there's no need to—a 931-A has plenty of gain with its rated voltages.

### Supply Regulation

There is, however, one slight tricky effect here. What we have, in effect, is a certain gain per stage; call it  $n$ . (It runs about 5 at

100 volts per stage.) Now there are nine stages; the over-all gain then is  $n \times n \times n \times n \dots$  for nine stages, or  $n$  to the ninth power. If the voltage being supplied the tube changes a wee bit . . . the gain changes by a ninth-power law! If the voltage drops to one-half, the gain doesn't drop to one-half—it drops to less than 1/500th!

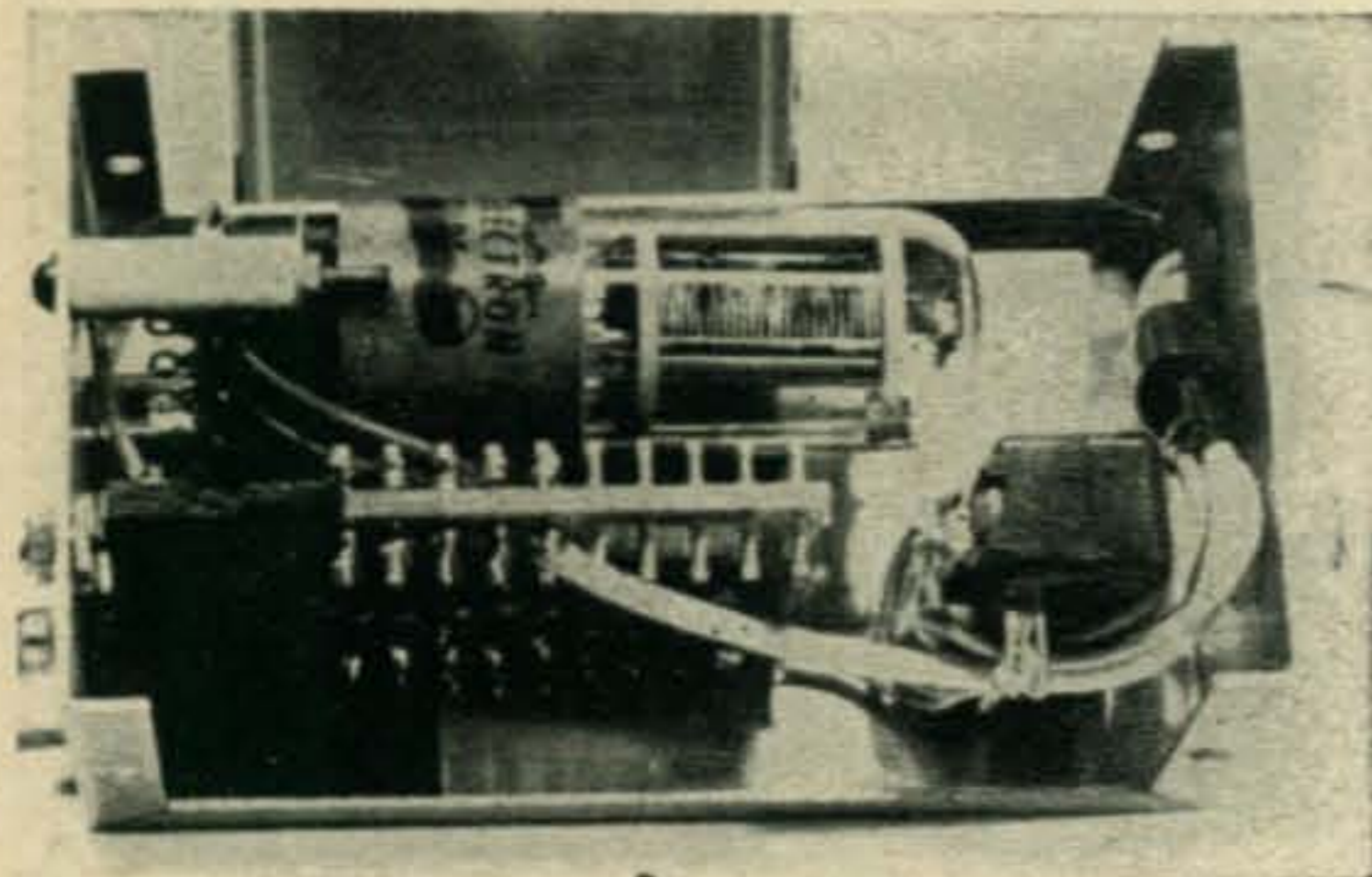
The electron-multiplier output is, therefore, decidedly sensitive to voltage-supply fluctuations; for densitometer work we need a pretty well-regulated voltage supply, and at -1000 volts.

This might be complicated if it weren't for some of the other factors involved—particularly the exceedingly tiny current demand of the electron-multiplier. In densitometer service, the usual output current at the anode, after million-times amplification, is a stupendous 0.0001 milliampere. A tenth of a microampere is not a serious load on a power-supply; the actual electron-current from the photocathode itself is about 0.1 micromicro-ampere. (And that's still a meaninglessly large number of electrons per second!)

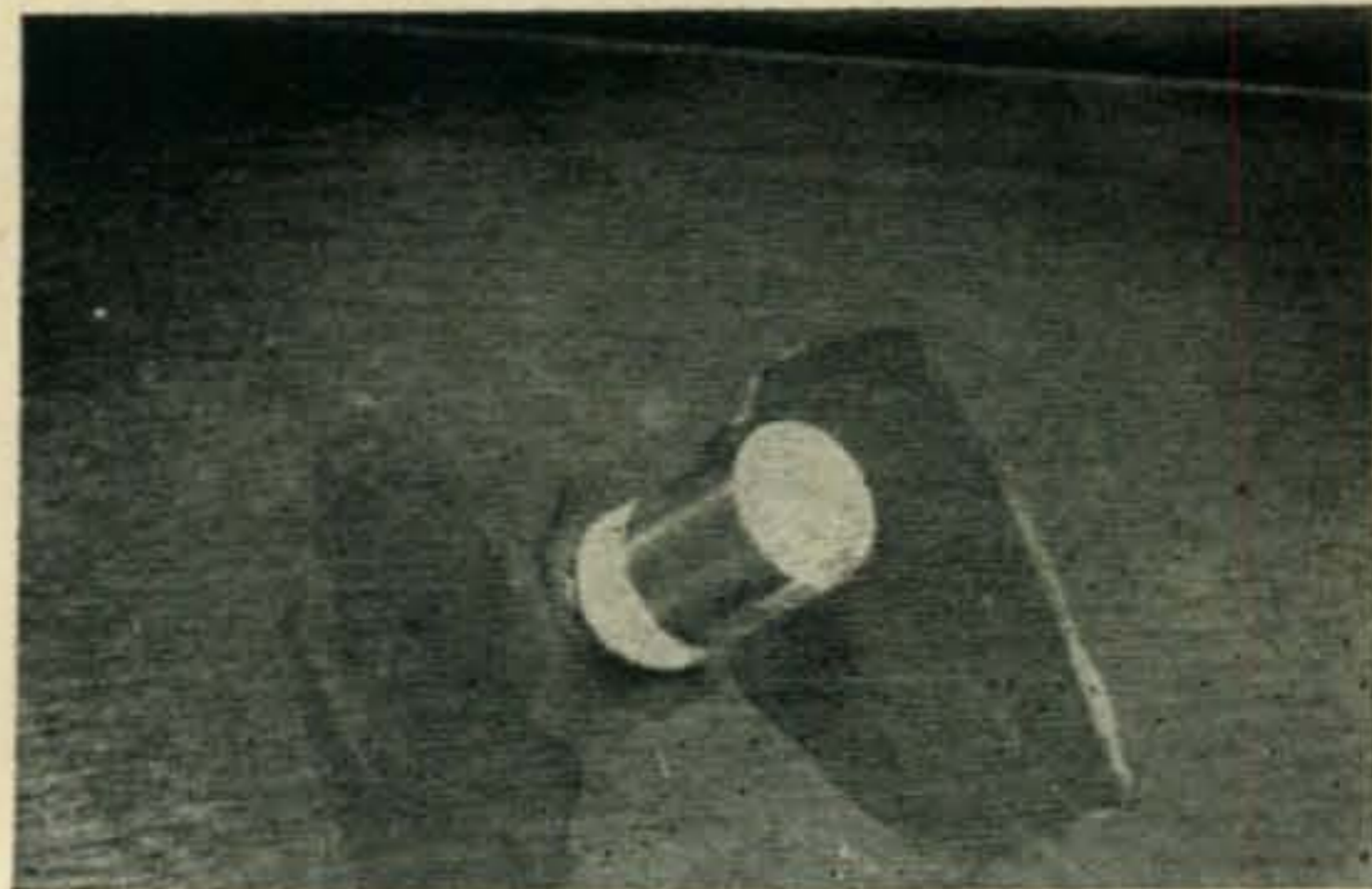
There's a neat, simple solution to the problem. Take a standard cathode-ray-tube type power supply, yielding the usual 1500 volts negative, run it into a 100,000 ohm, 2-watt resistor, and then into a string of 18 of the tiny Ne-2 neon glow-lamps. The result is 1000 volts quite adequately regulated. The Ne-2 bulbs, within their low power rating, work just as well as voltage-regulators as do the regular VR-75s. Any one, particular Ne-2 may stabilize anywhere from about 55 to 65 volts—but any given tube, once it fires, settles down and stays right there. The string of 18 will give you a dependably regulated -1000 volts.

### Indicator Circuit

Now it would be perfectly possible to run the output current from the 931-A anode directly into a sensitive microammeter. There's one slight hitch on that; the 931-A is sensitive . . . but it's also rugged, and can easily cover



Internal view of Densitometer light-head. The 100 k resistors are mounted on the terminal strip.



The polystyrene rod "light waveguide" mounted in the Densitometer light-head cover. (Rod is 1/4" dia.)

a rather stupendous range of light-levels. RCA doesn't advise taking more than one milliamperere out of the 931-A anode . . . but you can readily collect 10 mills if the tube is illuminated directly by ordinary room light! This sort of output would have a tendency to tie the sensitive microammeter needle into a pretzel. And most of us have, at one time or another, turned on the white light at the wrong time. . . .

Also, it's unnecessary to use an expensive sensitive meter, when a simple cathode-follower tube will allow us to use a cheap and rugged meter . . . and give us a neat, self-protective circuit for the meter. If the cathode follower is so hitched that the output of the 931-A drives the grid *negative*, then the maximum possible voltage swing of the cathode-follower's cathode will be limited sharply; it can't possibly be driven negative-to-ground. Even if the 931-A puts out a 100 volt signal, the meter will never be smacked with more than the 5-volt-or-so cathode-potential of the cathode follower.

The circuit shown is rigged so that the 6BK7 cathode-to-cathode voltage is zero when the 931-A is dark; under maximum illumination the 6BK7 cathode-to-cathode voltage can be only about 5 volts.

The meter-resistors  $R_m$  and  $R_p$  protect the movement;  $R_m$ , which is always in circuit, should be selected to make the meter you use give a full-scale reading at about 1/3rd the saturation level of the cathode follower—say, a value such that the meter reads full-scale on 1.5 volts.  $R_p$ , the switched-out protective resistor, should, when in series with  $R_m$ , make the meter read full-scale only with about a 7 or 10 volt signal.

The push-button mounted in the light-head unit has to be pushed to get a reading—and when you're finger's off, the meter is protected by a series  $R_m$  plus  $R_p$ , and the room light won't damage the equipment.

The bias-cell in the grid circuit of the other half of the 6BK7 is, you'll notice, under zero

load conditions; the smallest mercury cell will do, and will last for several years. Ordinary dry-cells are good for at least two years in this service.

This range-switch system may seem inefficient at first glance; half the signal is thrown away. True . . . but the 931-A has some dark current, and that shifts the zero around in an annoying way. This unit has sensitivity enough that you can throw away some signal. And this system was, believe me, worked out strictly by rule of thumb. (And at times I felt I was all thumbs.) Experiment and see what you come up with! This works . . . but I'm giving no guarantees that it's unbeatable!

### Anode Regulation

The two Ne-2 tubes in the 931-A voltage-divider string are there for the purpose of fixing the voltage of the dynode #9 at a precise, stable point negative to ground. The unit uses the high-voltage power supply for the anode supply, as well as the dynode-voltage supply. The anode voltage is the only one that varies . . . but if it weren't for the two Ne-2's in the string, the whole system would shift up and down as the anode current changed. This way the voltage on dynode #9, and all other dynodes, is constant.

Incidentally, when a dynode is doing its job, more electrons leave it to go to the next, than arrive at it from the preceding dynode. That is, if 100 electrons reach dynode #8 from dynode #7, 500 will leave #8 and go to #9. This means #8 suffers a net loss of 400 electrons. Therefore the dynode tends to go *positive*, whereas we are accustomed to thinking in terms of plates and screens that tend to go *negative* with increasing current. A disconnected dynode doesn't act as a disconnected grid does, therefore; an unconnected grid goes negative until it blocks the tube completely. An unconnected dynode will tend to go positive until it floats at a voltage just below that of the next higher-voltage dynode. It won't block the tube . . . but it raises hell with the electron-focussing and gain.

One other item; NO SMOKING! Being a fairly heavy smoker myself, that's a nuisance [Continued on page 123]

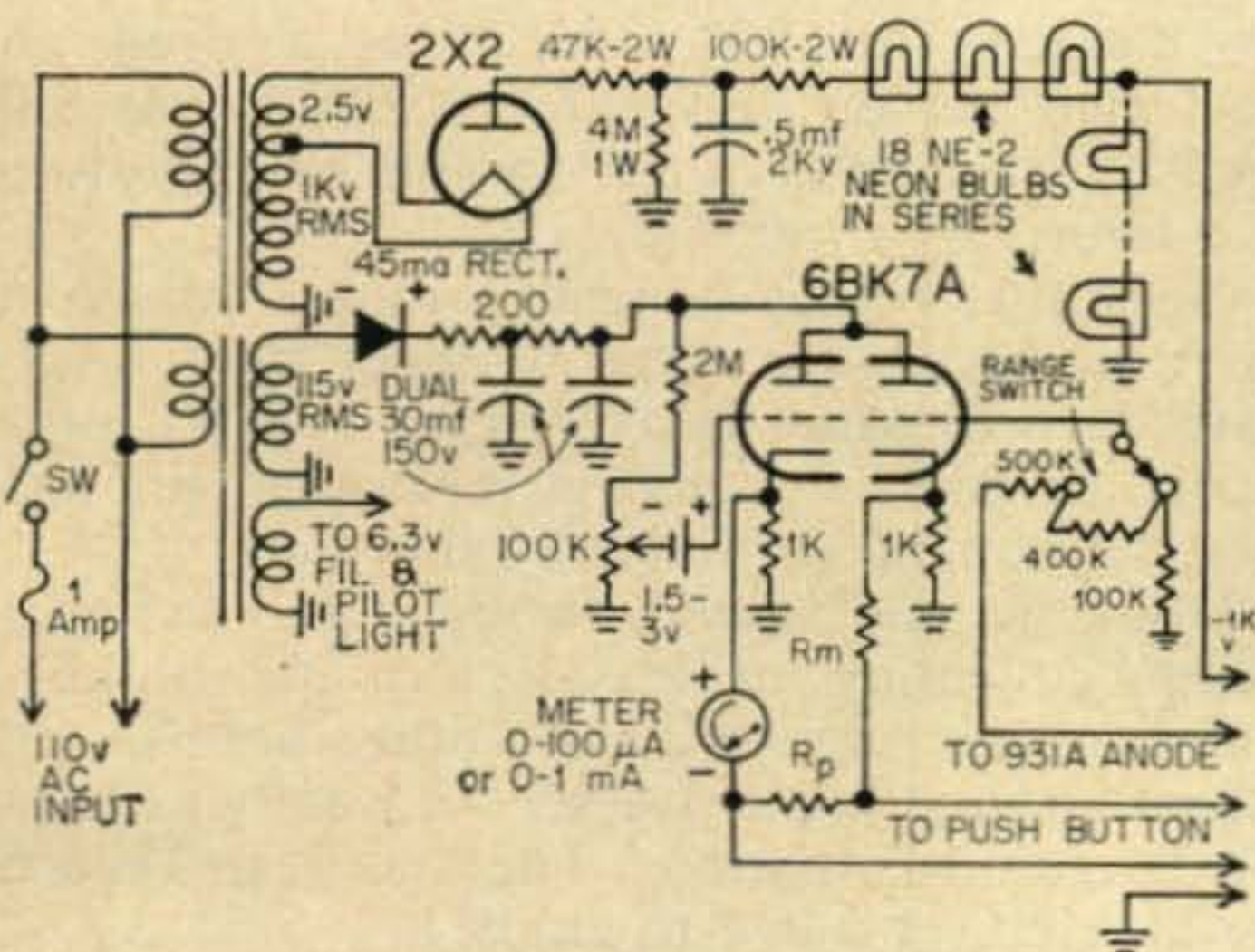


Fig. 1—Circuit of the Densitometer power supply and metering circuit.

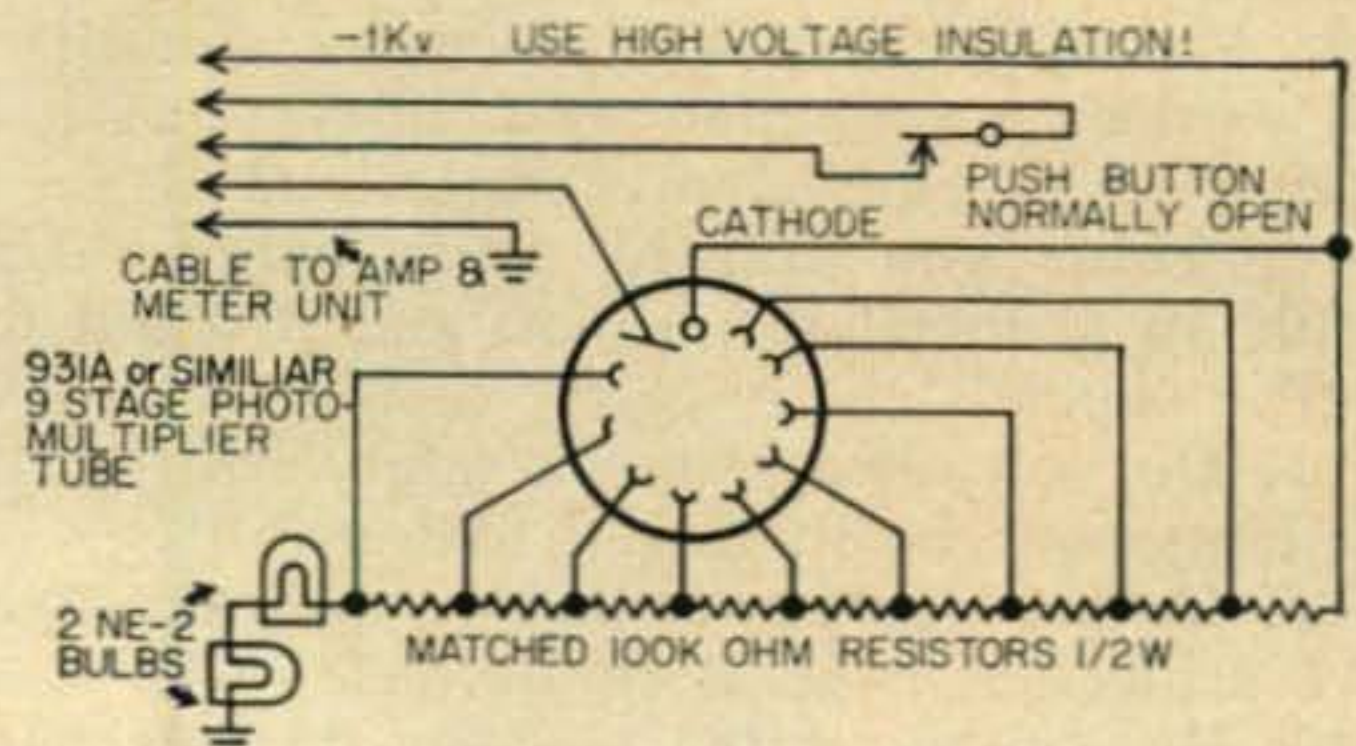


Fig. 2—Circuit of the light-head, connected to the power supply chassis by a 5 conductor cable.

## Safety Quiz

Let's Live a Little—Longer

**Jim Kyle, K5JKX**

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Okla. City 19, Okla.

A slightly dumb amateur, Sam  
Just couldn't stay out of a jam.  
A live rig he'd test  
But the bleeders went west  
And presto—barbecued ham!

Of course, you're not like old Sam. You have better sense than to feel around the inside of a transmitter with the power on, since you don't want to be the featured dish at a barbeque.

But is your shack and workshop as safe as you think? The writer, nursing a chronic case of burned hands from relatively minor radio incidents, found a number of common danger points in his shack. How many of them live in your shack, too?

This quiz may help you find them. Count 5 for each yes.

1. Does your shack have a main power switch which kills all ac power from one point?

2. Do all members of your family know the location and function of this switch?

3. Do you have a soldering-iron holder which encloses the hot end of the iron?

4. Is your antenna strong enough to withstand winds at least twice as strong as the strongest ever recorded at your location?

5. Are all power supplies delivering voltage higher than 300 VDC equipped with enclosed cabinets and interlock switches?

6. Do you disconnect the battery cable of an auto before doing any work other than minor tuning on a mobile rig?

7. Are all antenna feeders equipped with a grounding switch which meets national safety code requirements?

8. When some part of your rig fails to operate properly, and the trouble appears impossible to locate, do you work at it in short bursts with frequent rest periods?

9. Are all items of equipment in your shack and workshop grounded by a direct lead to a water pipe or equivalent connection?

10. Have you trained your wife and/or family in artificial respiration and first aid for electric shock?

11. Do you always don a safety belt before climbing your beam tower, and use it?

12. Does every power supply in your shack have a bleeder in good condition?

13. Regardless of the bleeder, do you short out all filter condensers before touching high-voltage lines?

14. Do you believe 50 volts can be dangerous to a healthy adult?

15. Do you believe six volts can be dangerous to a healthy adult?

16. Do you always clamp metal work in a vise before drilling or sawing it?

17. Would you shut down the rig if your 40th-zone contact was just answering you but a thunderstorm struck at your location?

18. Are all points on your equipment carrying more than three volts enclosed or otherwise protected against accidental contact?

19. Is it impossible for your rig to be turned on accidentally?

20. Do you make frequent checks of your shack and workshop for possible danger points?

Have 'em all answered? If your grade is over 75, you have an excellent life expectancy so far as radio dangers are concerned. Between 50 and 75, you should survive a while longer if you're lucky. From 25 to 50, you'd better get busy and make some improvements. And below 25, it's no use, call the undertaker!

If you thought some of the questions were put in to trip you up, you're wrong.

Questions 6 and 15 were brought painfully home to the author a short time back while installing a mobile rig. An auto battery has high current availability. It won't electrocute you—but after having a wrist-watch or a ring arc-welded while still on your hand, you'll almost wish it had.

There are cases on record, in fact, of radio-men having fingers literally burned off by rings which shorted auto battery lines during installations.

Question 9, also, doesn't deal with an obvious danger. But it's a fact that a tired and frustrated person gets careless. And you only need to be careless once in the neighborhood of a 600-volt power supply . . .

Question 4 may appear over-stated. Wind gusts, however, are much stronger than steady-state record wind measurements. The author sports a 3-inch scar across the top of his head as a permanent reminder of this fact.

Don't get too scared, though, and switch to stamp collecting or model airplane building. Ham radio is as safe as any other hobby—and safer than many—if you keep a weather eye out for dangerous situations. The idea is to keep on the lookout, and live to enjoy it.

(P.S.—Don't be too discouraged if you score low the first time around. So did the author!) ■



# Stabilizing The Heath AR-3 Mod I

Bob Moren, W4INL

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Graham, N. C.

As practically every ham knows, The Heath Co. sells a great many kits for various applications. The writer has had occasion to examine and construct several of them and in every case has been impressed with the high quality to dollar ratio.

Recently, I was asked by a new ham (age 13) whether it would be possible to modify the Heath AR-3 receiver to improve its stability. The lack of stability is no reflection on the receiver—after all, for less than thirty dollars its not supposed to be a 75A4. Since my young friend probably enjoys the same status held by myself at his age, namely high enthusiasm and low finances, the job was begun.

## Mechanical Changes

Examination of the receiver and its schematic indicated that it would be necessary to make both mechanical and electrical modifications to achieve the desired stability. Since an out-board preselector was available, only the problem of stability was considered. The mechanical operations consisted mainly of removing the loudspeaker and placing it in a box of its own; installing end plates on the chassis to provide a bit more rigidity; cementing small lucite plates to oscillator coil "do" to prevent movement relative to the chassis, and re-mounting the main tuning capacitor directly to the chassis rather than on the rubber grommets as called for in the original design.

## Electrical Changes

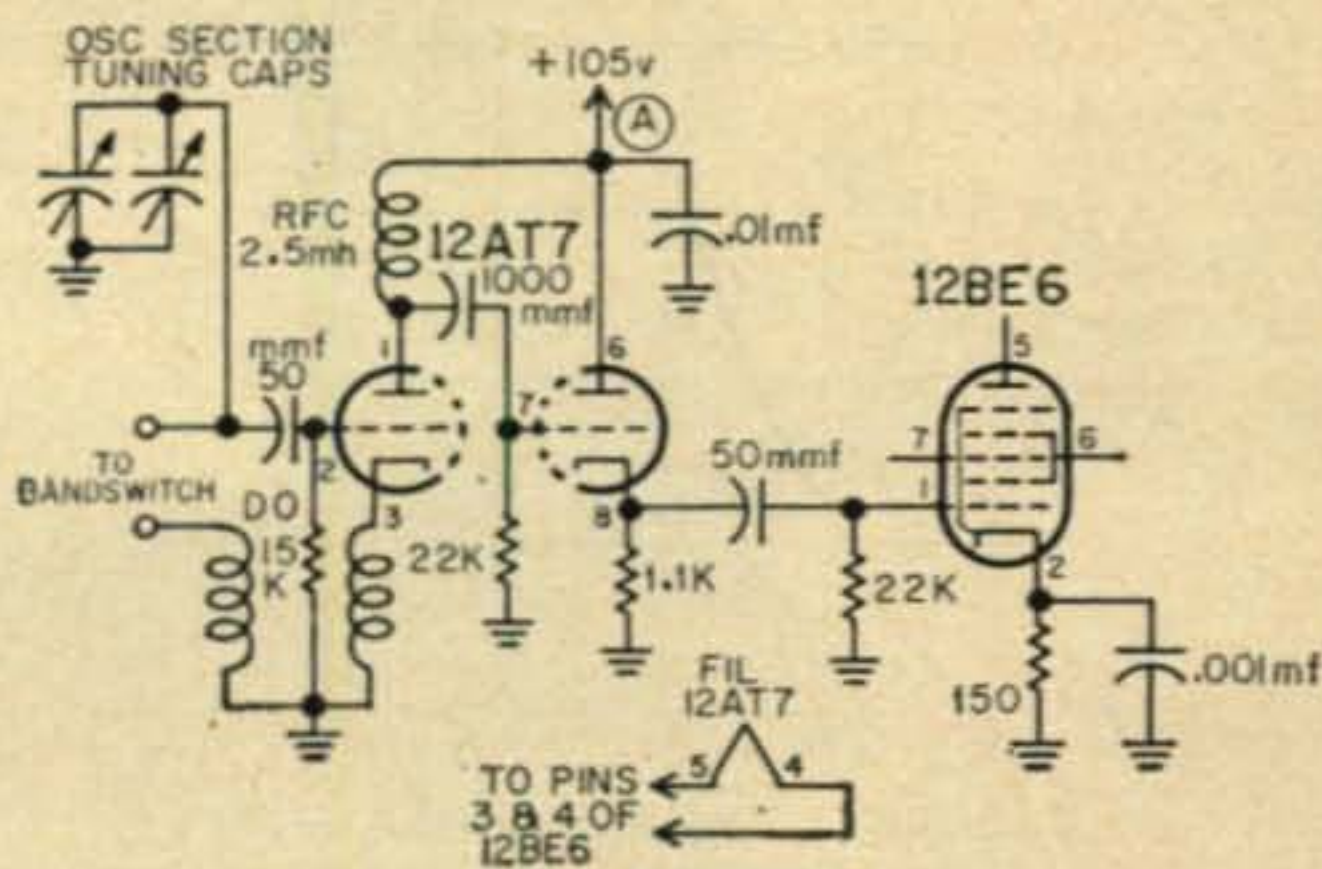
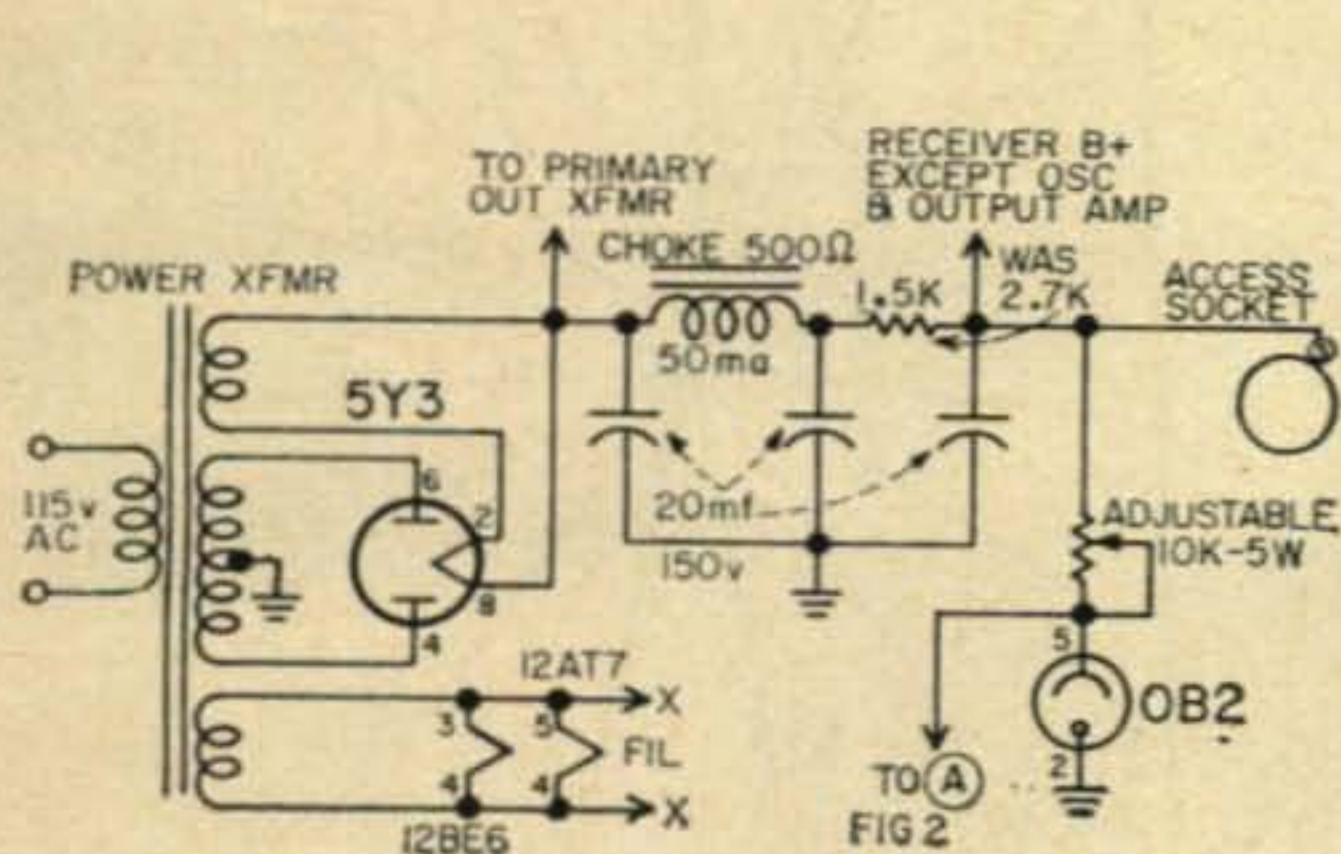
In order to accomplish the electrical changes it was also necessary to mount a 9 pin ceramic miniature socket on the chassis just behind the 12BE6, and a 7 pin miniature socket behind the "phone-standby-cw" switch to the right of the coil box. In the spot vacated by

the speaker, a 50 ma filter choke was mounted. Having completed these operations, the receiver was ready for the wiring modifications. Before referring to the schematic a brief word of description would be in order. The nine pin ceramic socket is used for a 12AT7 twin triode, one half of which is used as the high frequency oscillator. The other half is used as a cathode follower and serves to couple the oscillator output into the number one grid of the 12BE6.

The seven pin miniature socket is used for an OB2 regulator which serves to stabilize the dc voltage to the oscillator. The filter choke provides the means to add an lc section to the power supply filter.

Figures 1 and 2 represent the schematic changes and a comparison with the original schematic of the receiver as supplied by the Heath Co. will indicate that only a modest number of new components are required to complete the modification. After the wiring changes are made it would be well to recheck against the schematic. Naturally, it will be necessary to realign the receiver and the procedure described in the Heath Manual for this receiver should be followed. After the modifications shown, it was a simple matter to tune and hold an SSB station on the 15 meter band, something which was very difficult to do prior to making the changes.

Two additional comments are in order. The 10 K, 5 watt resistor should have its adjustable tap set for a current of 9 or 10 ma through the OB2. A further improvement in the stability of the receiver could be made by installing a separate *bfo* in place of the reflex oscillator. However, since the receiver was to be used primarily for the lower frequencies, namely 80 and 40 meters the alterations as described were completely satisfactory. ■



# Vertical and Horizontal

## 160-80-40-15 vertical plus 80-40 Horizontal

*Why to build-it*  
*How to build-it*

**Gerald Lindsay**

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Every ham at some time or other has asked himself the question: Horizontal or Vertical? At the shorter wavelengths this question is easily answered as space is not a major factor. Quite often it is merely the simple problem of trying both horizontal and vertical and then deciding which is best for the particular location. Then, in some cases, there is little choice. For mobile work a vertical is necessary as the efficiency of a horizontal antenna very close to ground approaches zero. Again, if beams are used, the tendency is to use horizontal antennas as it is usually easier to avoid coupling to adjacent objects in this way.

With the trend to suburban living, more and more hams have a backyard and space for a small antenna farm. Let us see what can be done in designing a horizontal and vertical antenna for the different bands from 160 meters down. The various factors will be discussed in the following paragraphs.

Is a ground necessary? We all know of hams working DX with no external ground or at best with a water pipe ground. The question is—could they do better with a good buried radial wire ground system. The answer as we shall see, is "yes."

### Horizontal Antennas

If a horizontal antenna is used, the most

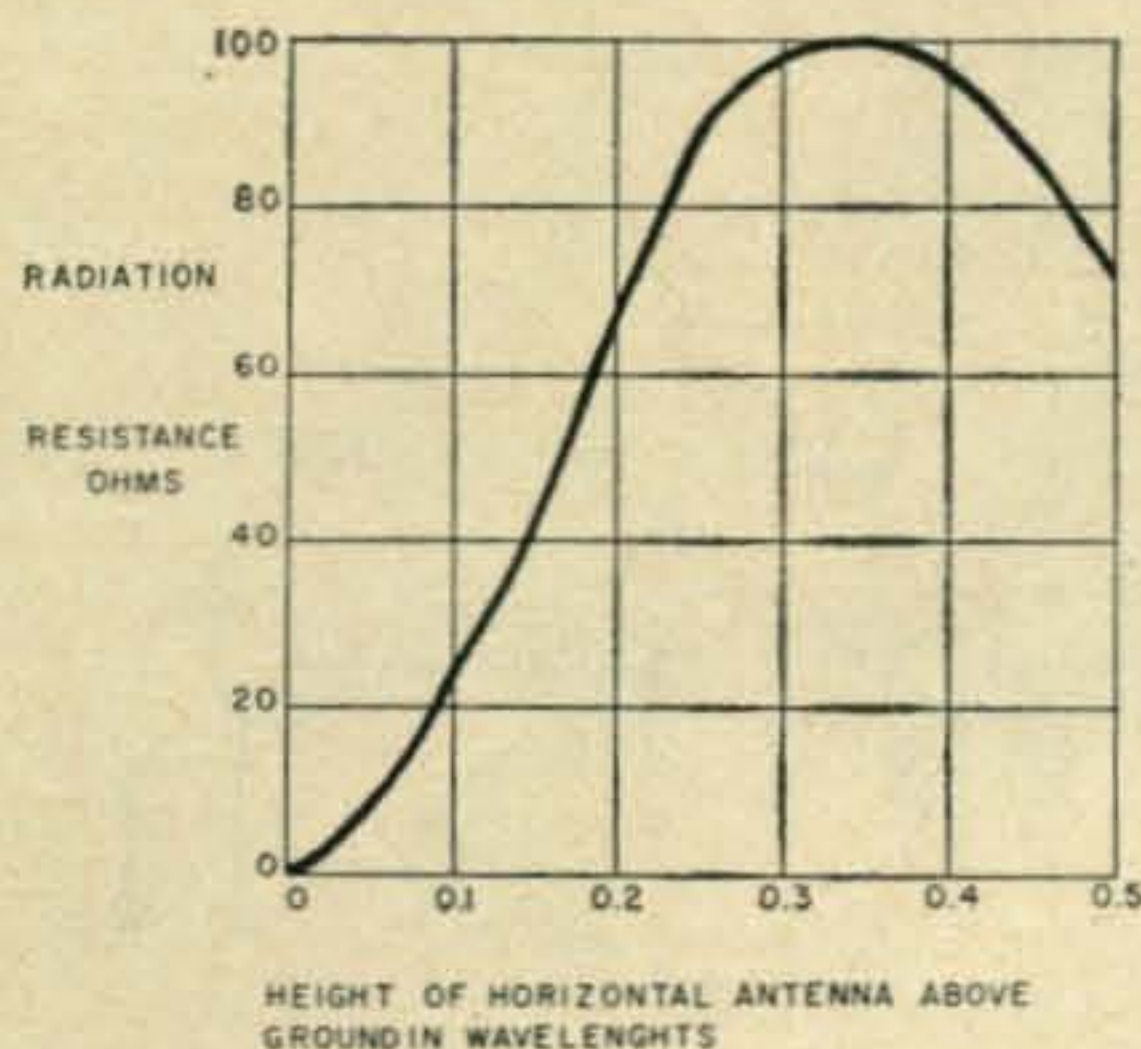


Fig. 1—Graph of the relationship between horizontal antenna height and the driving impedance.

serious problem is height above ground, and second is the ground system. When the horizontal antenna is on the ground, the radiation resistance is zero as the antenna current and its image current are equal and  $180^\circ$  out of phase and hence they cancel each other. A good ground system will not help here. Therefore the prime requisite is to operate the antenna some distance above ground. See fig. 1 which shows the driving point impedance of a horizontal half wave dipole. We see that by the time we reach an eighth wave above ground the driving point impedance is already about 30 ohms. This value is high enough to give a reasonably good efficiency. However, as the height is increased the low angle radiation tends to increase but the number of lobes in the vertical pattern of the horizontal antenna also increases. For the time being let us assume that a height above one eighth wave is satisfactory. At the impedance represented by this height, a good ground although important, is not vital.

At 160 meters which is mainly a local band, the wave does not go through enough atmospheric discontinuities to change polarization from horizontal to vertical or to circular. Hence a wave transmitted in the horizontal polarization will likely remain so until received. As most low frequency antennas are vertically polarized there is no point in having a horizontally

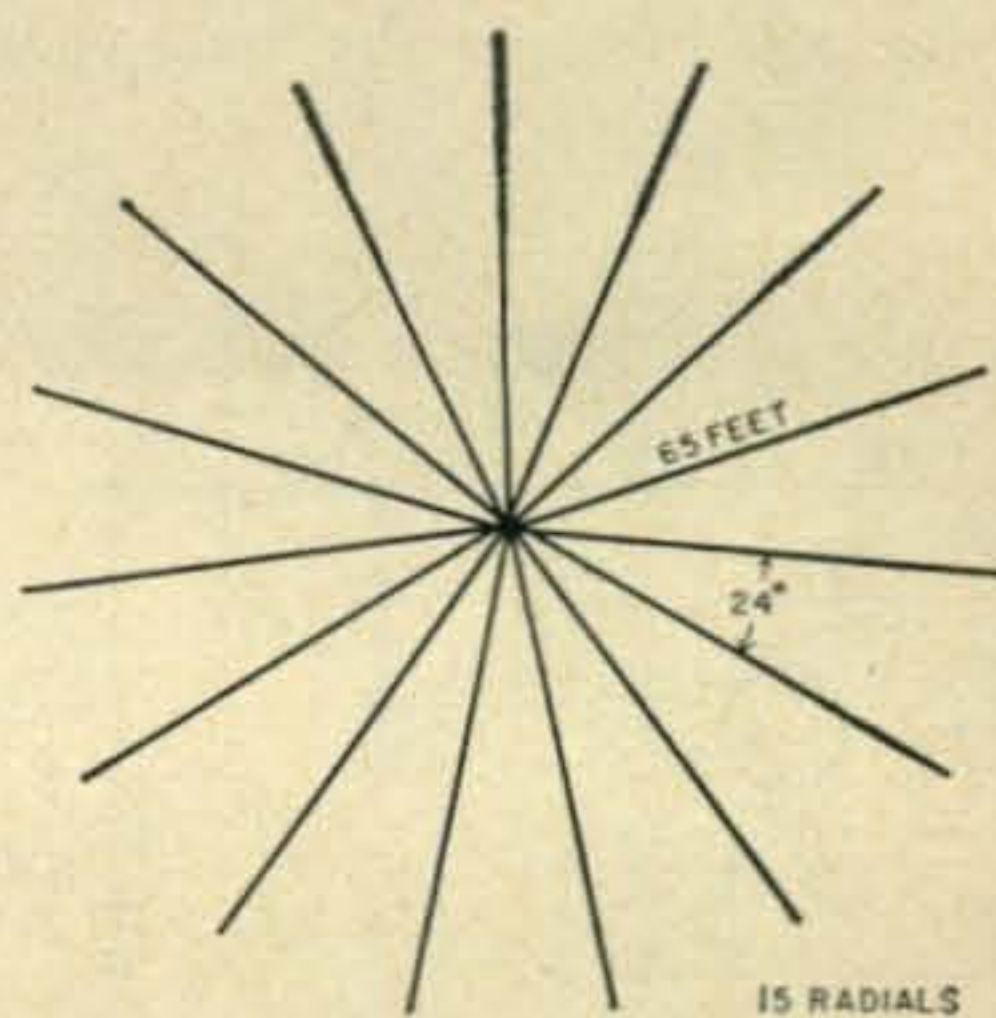


Fig. 2—A radial ground system to be buried 4 to 6 inches below the ground.

polarized transmitting antenna on 160 meters. There is also the problem of locating a 160-meter horizontal antenna far enough above ground to be efficient. On 40 and 80, however, where communication is over medium and long distances and the plane of polarization may change even over short periods of time or for different distances, it is sometimes helpful to be able to switch from horizontal to vertical polarization.

For 20, 15 and 10 meters, rotary beams are available, hence let us say our horizontal antenna will be used for 40 and 80 meters only, and will be one eighth wave or more above ground at 80 meters. The antenna itself should be at least one quarter wavelength and preferably one half wavelength long at 80 meters.

### Vertical Antennas

If a vertical antenna is used, the efficiency of a short antenna is more directly tied in with the ground loss resistance. If it were not for ground losses, coupling losses, and losses in the antenna wire itself, an antenna one inch high would radiate almost as efficiently as an antenna 125 feet high at 160 meters. In fact until the antenna height is increased above one quarter wavelength, the only reason for increasing the antenna height above a few inches is to increase the ratio of the antenna resistance to the loss resistance, and hence to increase the proportion of the available power from the transmitter which is radiated. Hence we see that the shorter the vertical antenna the lower the ground resistance must be, and to lower this ground resistance a radial wire ground system should be used.

### Ground System

The old idea of burying a car or house radiator below ground in a chemical solution does not produce a good radio frequency ground. It

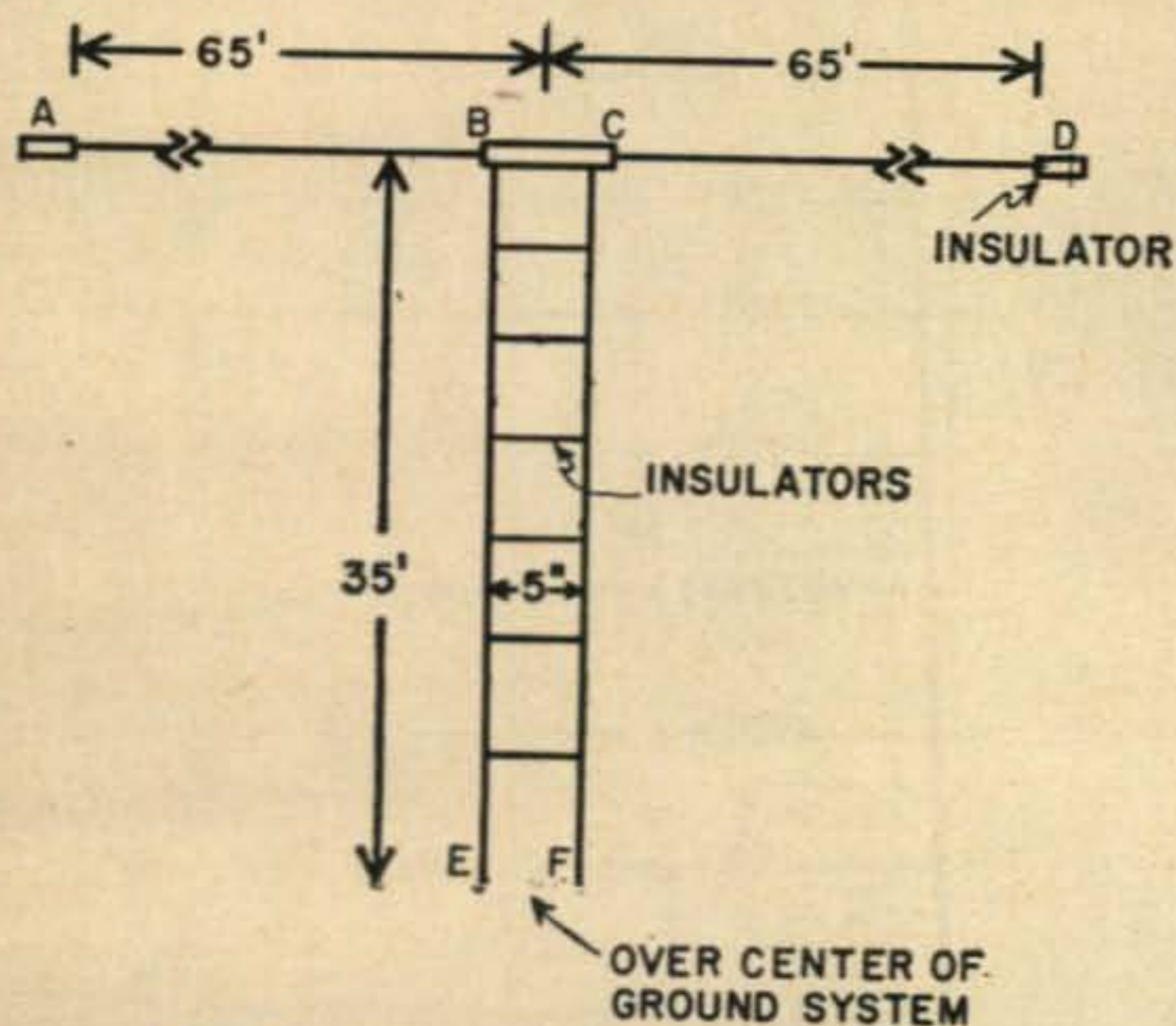


Fig. 3—Simple antenna that may be used as a top loaded vertical or a conventional horizontal as explained in the text.

may be better than nothing but that is about all. The buried ground should consist of radials having a length of one eighth wavelength minimum. In commercial AM broadcasting installations it is customary to employ 120 or more equally spaced radials each  $\frac{3}{8}$  wavelength or more long for maximum efficiency. For ham use from 10 to 20 equally spaced radials about  $\frac{1}{8}$  wavelength long at the lowest frequency to be used would be a good compromise. (See fig. 2.) The radials should be buried from 4 to 6 inches below the surface of the ground. Any greater depth to get below a flower bed or garden will reduce the efficiency considerably. The current must flow from the ground wires to the ground itself at about the same depth at which the current will flow in the ground after it leaves the wires. This depth is known as the skin thickness and is probably more familiar to most hams in choosing the optimum size of wire in winding coils.

### Top Loading of Vertical Antennas

The top section of a short antenna does not add much to the radiated signal but does represent an appreciable amount of capacity. Therefore we can cut off a section of the top of a given antenna and then connect a piece of metal to the top of the antenna to give a capacity to ground and end up with a shorter antenna which radiates the signal almost as well as the original antenna. On the other hand we can add a capacity at the top of a given

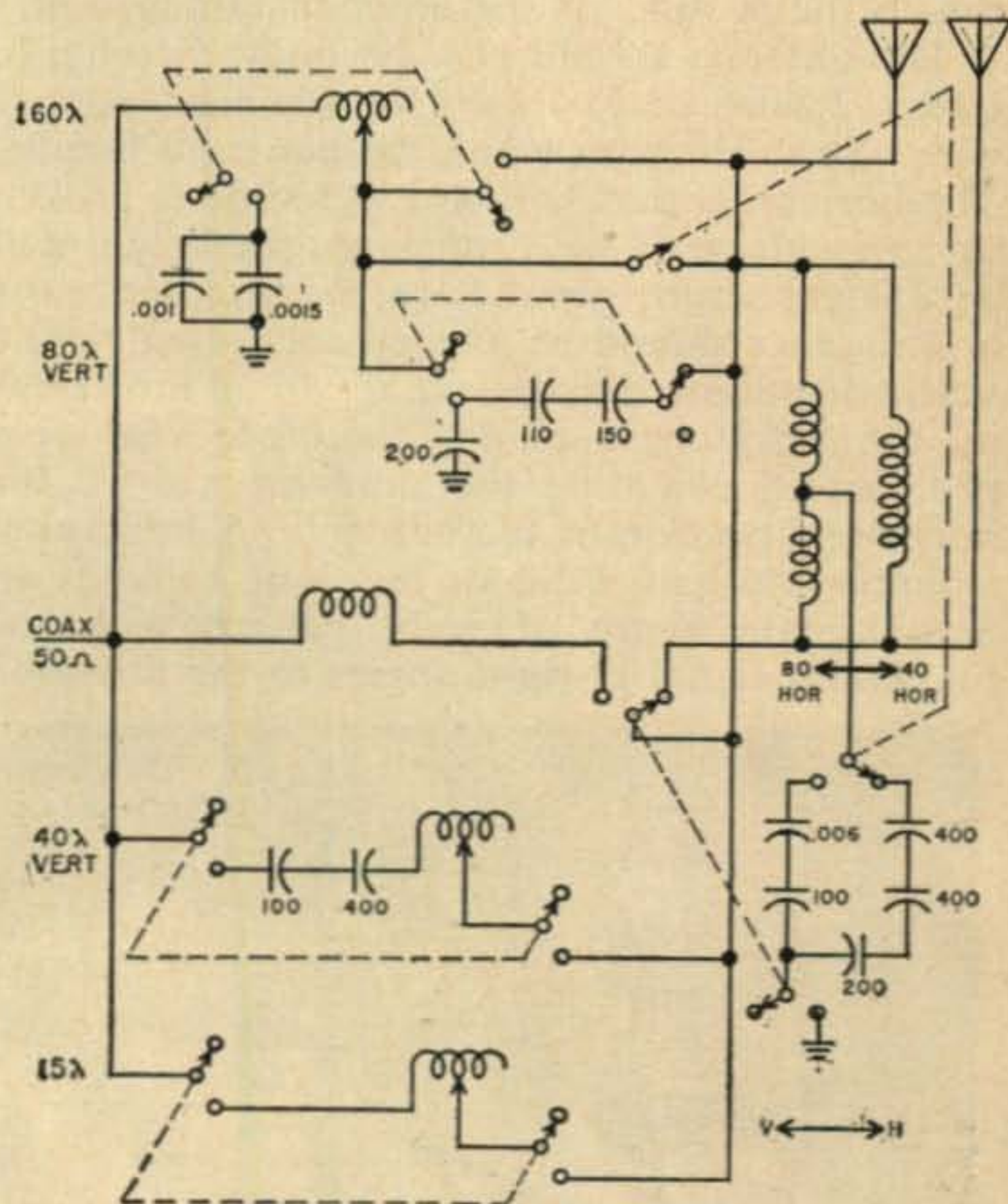


Fig. 4—An antenna tuning unit that may be placed at the base of the transmission line and connected to the transmitter through a coaxial cable. Each band is tuned separately and switching is accomplished by relays.

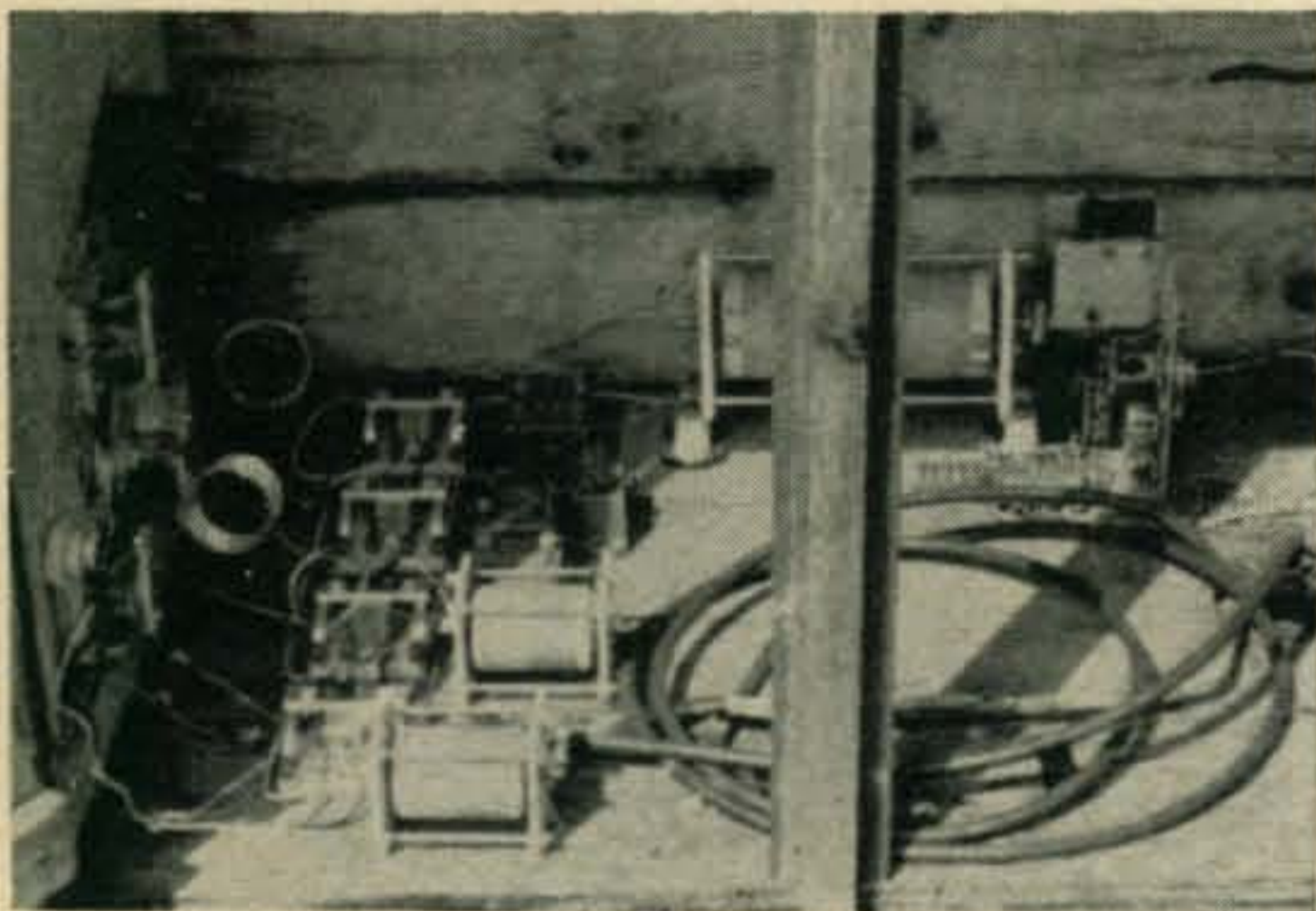
antenna and thus obtain an antenna which is as efficient as a much higher antenna.

### Final Design of Complete System

Based on this discussion let us see what an antenna system, which would fulfill all these requirements, looks like. First of all a relatively flat site with its center about 60 feet from adjacent houses, trees or other projections above ground should be chosen, if possible. At the center of this site the vertical antenna lead will be erected, hence this will be the center of the ground system. If we assume that 15 radials will be used then the spacing between adjacent radials will be  $360/15$  or 24 degrees. The wire size to be used should be 16 or larger, not for electrical reasons only, but for strength to resist ground movement, frost, etc. The length should be  $1/8$  wave at the longest wavelength or about 65 feet for 160 meters.

A garden tractor with attachments could be used for laying this ground system. Just lay out fifteen troughs spaced 24 degrees 65 feet long and 4 to 6 inches deep starting at the antenna. Lay one of the ground wires in each trough and cover it with earth. Be sure to leave enough wire at the center so that all wires may be soldered together. It is sometimes advisable to bury a copper sheet about 2 or 3 feet square, 4 to 6 inches deep at the center of the ground system, and to solder all ground wires to this. Then a copper strap about one inch or more wide is soldered to this plane and from there run to the ground of the antenna tuning unit.

The antenna should now be built. See fig. 3. Use #12 wire or #14 solid or stranded copper wire. Stranded wire would be easier to handle. The horizontal part will be 130 feet long broken by an insulator at the center and the height will be 35 feet about ground, so the support posts or chimneys should be located accordingly. The vertical antenna radiates equally in all directions in the horizontal plane, therefore the only problem in orienting the antenna will be the horizontal portion of the antenna. A horizontal antenna one half wave or less long radiates an approximate figure of eight pattern with the maximum signal at right angles to the direction



Housing containing the tuning unit and remote controls.

of the antenna wire. Generally in this country, the optimum direction of the wire would be on a line somewhere between North-South and Northwest-Southeast.

But how can we make a horizontal and vertical antenna all in one? Here is the answer. See figure 3. Each horizontal leg AB, CD is 65 feet long. They are joined at the center by means of an insulator between B and C. From B and C a parallel wire transmission line spaced 4 or 5 inches is run vertically towards ground and ends at the antenna tuning unit at E, F. Now it is easy to see how it works. We connect E, F together and feed the antenna from E, F to ground. The two vertical wires being joined together at the feed point act as one, and hence this is our vertical antenna. The horizontal wires act as top loading to effectively increase the apparent height of the vertical antenna. If we disconnect E and F now and feed E and F as a balanced feeder, then the vertical part will act as a transmission line and hence will not radiate, and the top sections AB and CD will act as a horizontal antenna.

Now comes the problem of feeding the antenna. One relay must be mounted directly below the antenna down lead to switch from horizontal to vertical. Preferably all the tuning equipment should also be mounted directly below the vertical antenna. However, if this is inconvenient or impossible then a coaxial line may be run from the antenna to the transmitter shack and an antenna tuner such as the "Z-Match" used at the transmitter end of the line. This method, although convenient, does sacrifice considerable efficiency. The best method is to have individual antenna tuning for each band, remote controlled by switches at the transmitter. Such a system is shown in fig. 4. The values of

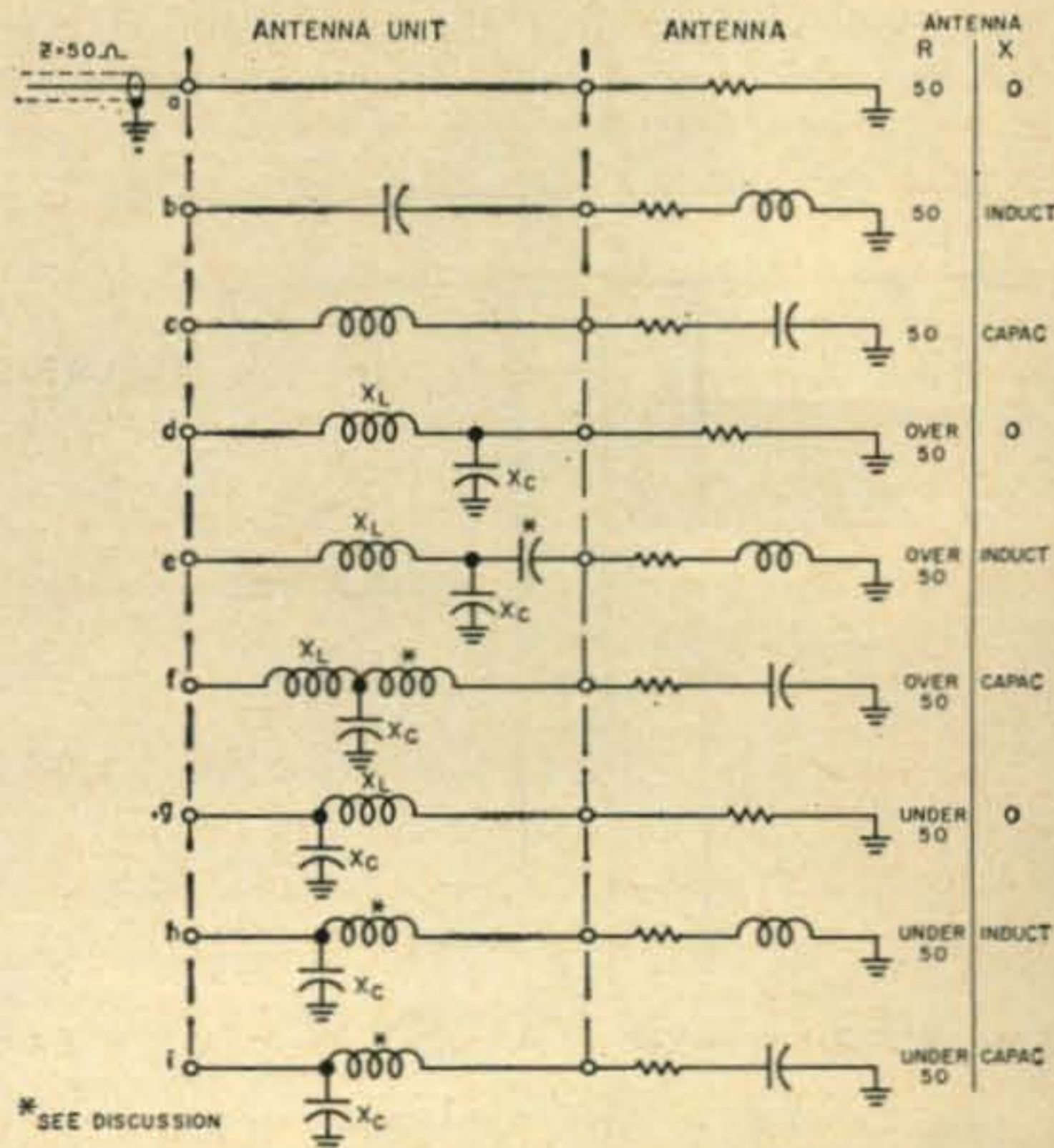


Fig. 5—Possible configurations in the tuning circuit for various antenna conditions.

# Portable

KN9HII, Olive Nease with Gonset Communicator and L & J Products Two Meter Halo antenna in her Isseta.



OM Arlo Nease, K9HIH uses the Communicator and L & J Halo in his 1960 Porsche Super Convertible.



This Gonset goes everywhere. Several states have been worked from this Cessna. K9BYK, Jay, is in the plane, Arlo, K9HIH is holding the Gonset.

capacitors and inductors will change with individual installations. Generally speaking, tuning units should consist of an "L" network, as the "L" network has the least loss of any network; plus some means of transforming from a balanced to an unbalanced transmission line. The circuits used are as shown in fig. 5.

Referring to fig. 5, the following information holds: This figure is based on a 50 ohm transmission line but will hold for other values, except that component values will change.

- The antenna matches the transmission line, hence no tuning unit is needed.
- The antenna is 50 ohms and inductive. This inductance must be tuned out for maximum power transfer, hence the tuner will only have a capacitance reactance equal in numerical value to the inductive reactance of the antenna.
- Similarly if the antenna is capacitive, the tuner will only have an inductive reactance equal in value to the capacitive reactance of the antenna.
- Here the antenna resistance is not 50 ohms so an "L" network must be used. In matching, the shunt capacitor of an "L" network must always go on the side of the inductor connected to the high resistance. If  $R =$  high resistance,  $Z =$  low resistance

$$X_L = \sqrt{Z(R-Z)}$$

$$X_C = R \sqrt{\frac{Z}{R-Z}}$$

- This is the same as (d) except a capacitor is used to tune out the antenna inductive reactance.
- This is the same as (d) except an inductor is used to tune out the antenna capacitive reactance.
- Here the high and low resistances are interchanged hence the L network is reversed. In this case  $R$  is now the low resistance so that now

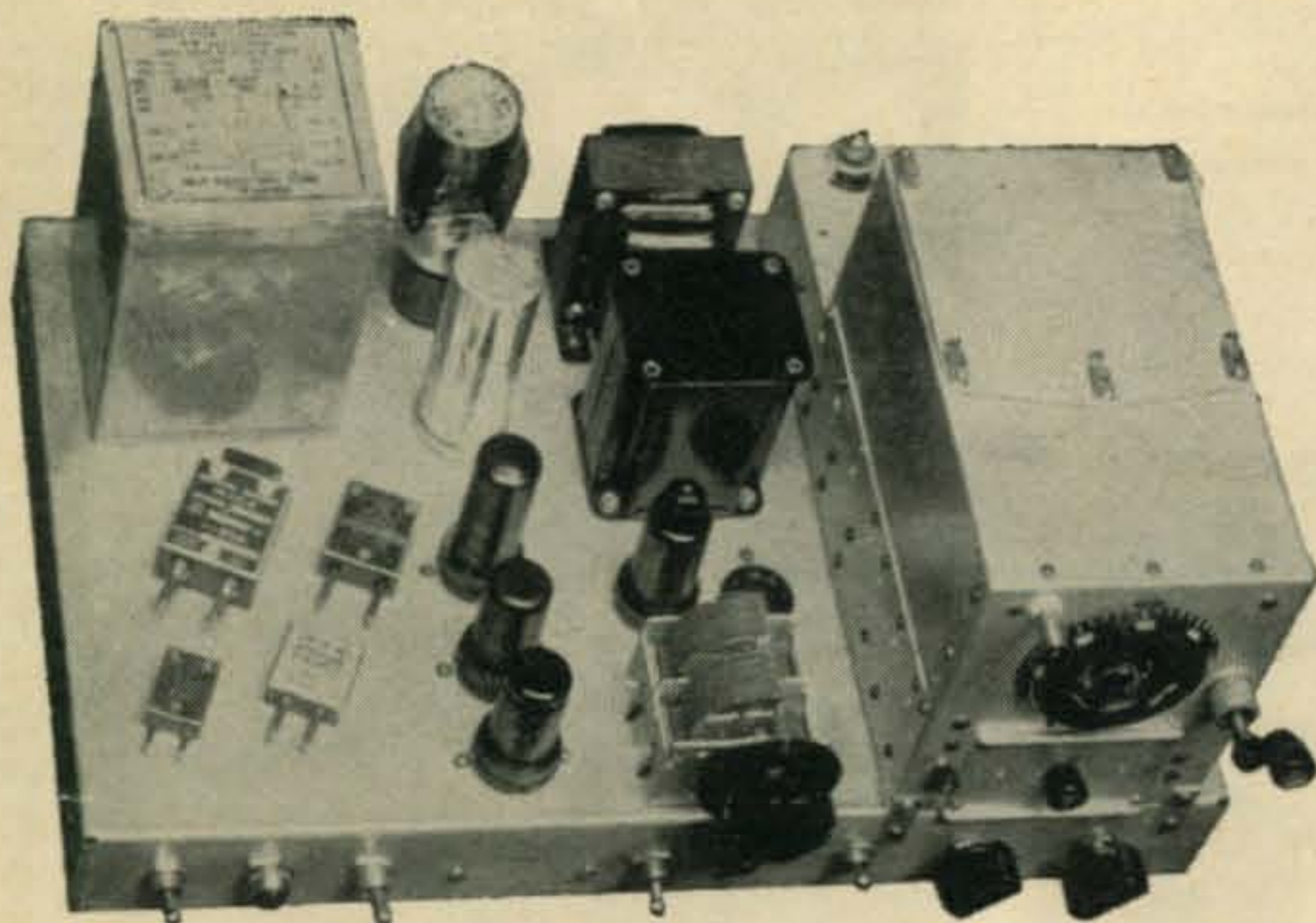
$$X_C = Z \sqrt{\frac{R}{Z-R}}$$

$$X_L = \sqrt{R(Z-R)}$$

- This is the same as (g) except that the reactance used must be the difference between (1) the inductive reactance obtained from (g) and (2) the capacitive reactance used to tune out the inductive reactance of the antenna. If the value of (2) is greater numerically than the value of (1) then the series reactance will be a capacitor instead of an inductor.
- This is the same as (g) except that the reac-

[Continued on page 122]

# 3 Band Command Receiver



**Louis L. Brent, WOUC**

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Saint Louis 15, Missouri

The receiver described is an excellent one for the Novice, the experimenter or the old timer. With receivers costing 300 to 600 dollars and up, it is a welcome relief to put together 30 or 40 dollars worth of parts and afterward say "This receiver does a fine job."

The basic ingredients here is the well known BC-453 (190-550 *kc*) Command receiver. Today's top price is about \$16.95. If you're using all new parts, buy a new one. If you're working from the junk box, get a used one (\$9 to \$12).

## Conversion

Modifying the receiver is simple, and takes about an hour. A schematic diagram of the BC-453 (any of the series will do) will make things easy (Command Sets—Cowan Publishing Co., \$1.50 or your local radio store).

First, remove the top and bottom covers from the receiver. Carefully remove the 20 *mmf* ceramic coupling capacitor from between the antenna post and the tuning capacitor. Reposition this capacitor, connecting one end to the bottom of the same tuning capacitor (stator). Drill a small hole through the receiver chassis near the gang tuning capacitor, to pass a 12" length of insulated wire. The free end of the coupling capacitor is connected to one end of this 12" lead. This will bring the antenna lead out through the bottom of the set.

Temporarily remove the antenna, mixer and *rf* coil assembly. Locate the gain control line on the front connector. Solder a 12" length of insulated wire to the rear of this pin (#1).

Locate the CW shut-off line on the front connector. Solder a 12" length of insulated wire to the rear of this pin (#5). Now label these lines (CW) and (GAIN) using a small piece of adhesive tape, so they can be identified later. Replace the coil assembly.

Now cut three 18" lengths of shielded wire. Remove R18 (510K) and R19 (100K). Solder the ends of one length of shielded wire to the pins formerly holding the 510K resistor (the outside braid should connect to chassis). Label this line (VC) for volume control. Take the second length of shielded wire and connect one end of a .006 *mfd* ceramic capacitor to the center conductor. Locate the grid terminal on the 12A6 socket. Clip the lead to the .006 *mfd* mica capacitor which is bolted to the chassis. Remove this capacitor from the set. Now connect the free end of the .006 *mfd* ceramic capacitor to the grid terminal. Label this line (VC ARM). (Replacing this capacitor will reduce microphonics in the finished receiver.)

Now locate the plate lead on the output transformer (#2). Take the third length of shielded wire and connect to this point on the transformer. Label this conductor (AMP GRID). The small filament choke (L15) should be removed from the set and the two wires to it, soldered together.

Secure about 18" of 3-conductor rubber insulated cable. Solder to the base of the power connector, J2. (This is a 3-pin connector, located under the filament choke, which is now removed.) A total of seven wires (counting

the 3-wire cable as one wire) should now hang from under the receiver. The last bit of work is to parallel all filaments for 12-volt operation. The receiver modification is now complete.

A convenient size chassis for this receiver set-up is 11 x 17 x 2 inches. Place components on the chassis as shown in photograph. The power supply should occupy the left rear section of the chassis.

If your power transformer does not have a 12 volt winding, a separate 6 volt filament transformer secondary should be connected in series with the 6 volt winding on the power transformer to give a total of 12 volts.

The chassis is laid out with components arranged as shown. From the rear, rectifier tube, filter capacitors, *af* power output tube, pentagrid converter and *rf* amplifier tubes. The next row of components are filter choke, output transformer, two sockets for crystals and the converter *rf* and mixer tuning capacitors. The front-of-chassis controls are, left to right *ac* power, power indicator light, B minus switch (standby), speaker/phone jack, *cw* switch, *rf* gain control, *af* volume control. The switch to the left of the speaker jack is not used. Its intended use was bandswitching but was found unnecessary.

The command receiver should be positioned on the right side of the chassis. Three 5/8-inch holes should be cut in the chassis; one approximately 3 inches from the rear of the receiver, one midway of the chassis and one 3 inches from the front of the receiver. Center the holes with respect to the receiver position. The three holes will allow passage of the cables and wires from the receiver. Place the receiver in position and bolt it to the chassis (leave the bottom cover off). Connect one side of the *cw* switch to chassis and connect the wire marked *cw* to the other terminal on the switch. Connect the wire marked GAIN to the arm of the *rf* gain control. Connect one side of the volume and gain controls to chassis. Connect shielded wire marked VC directly across the volume control. (Connect shield to chassis side.) Connect shielded wire marked VC ARM to the arm of the volume control. Connect shielded wire marked AMP GRID to the amplifier grid coupling capacitor. Connect power cable to power supply B-plus, B-minus (chassis) and 12.6 volt output.

Figure 1 shows diagram of the added output stage, using another 12A6 (surplus at about 29 cents).

Two sockets, one octal and one 5-pin, will accommodate almost any type crystal holder you can find. DC-8L octal, CR-1A, FT-171B, FT-243 (1/2" small, 1/2" large, 3/4" large pins). These sockets are located directly behind the converter tuning capacitors. The octal socket should be wired pin #3 "hot", 1,5 and 7 to chassis. The 5-prong socket wired pin #2 "hot" (connect to pin #3 on octal socket), 3 and 4 to chassis. Any of the above crystals will fit

into one or the other socket.

The converter schematic (fig. 2) is conventional except for the crystal oscillator portion of the pentagrid converter. It was adopted from my mobile transmitter (CQ May 1954). The arrangement gives useful output to the 4th harmonic of the crystal frequency. The converter coil forms are 1/2" by 2" polystyrene rods.

The one remaining wire out of the receiver (antenna lead) is connected to the converter output. A coax connector on the rear of the chassis is the antenna connector.

## Results

All wiring done, let's see what we have: The BC-453 receiver has a frequency range of 190-555 *kc*; this gives a tuning range of 360 *kc* for a ham band. 80 meters is 300 *kc* wide; 75 is 200 *kc* wide; 40 meters is 300 *kc* wide and 20 is 350 *kc* wide. If we use 4 crystals and reset the converter tuning capacitor, we can cover these four bands, reading the frequency directly from the dial. Suppose we start with a 3500 *kc* crystal. We just add the crystal frequency to our dial reading and that's the frequency we're tuned to. For 80 and 75 meter reception the converter capacitor is set at about maximum capacity (9 o'clock). Tune the command receiver from 300-500 and you're tuning 3800-4000 *kc*. Now set the converter capacitor at about half mesh (12 o'clock). The

[Continued on page 122]

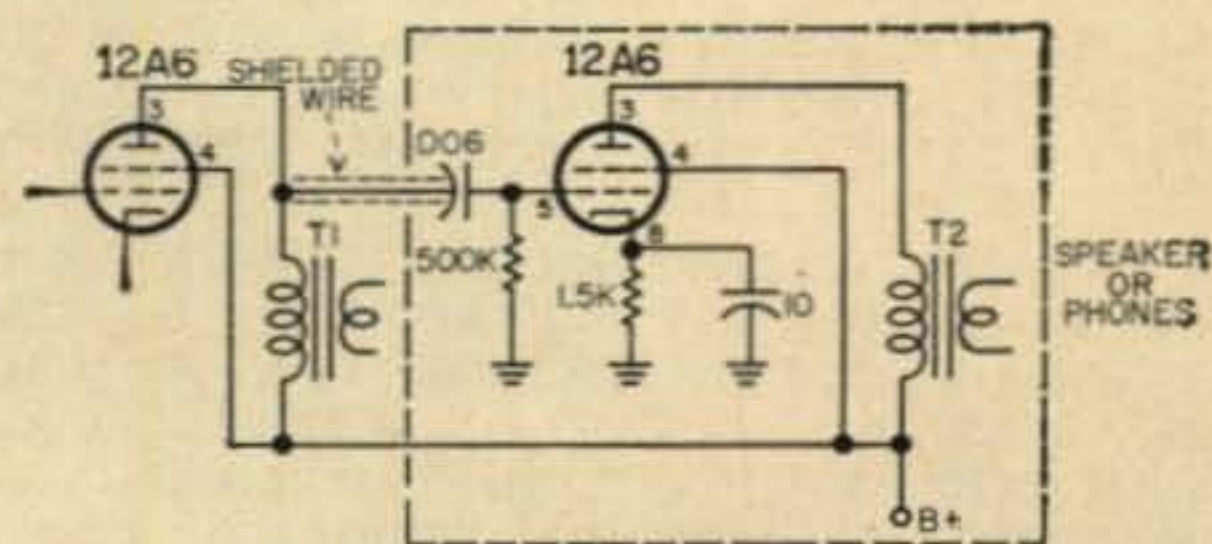


Fig. 1—Circuit of the additional audio amp.

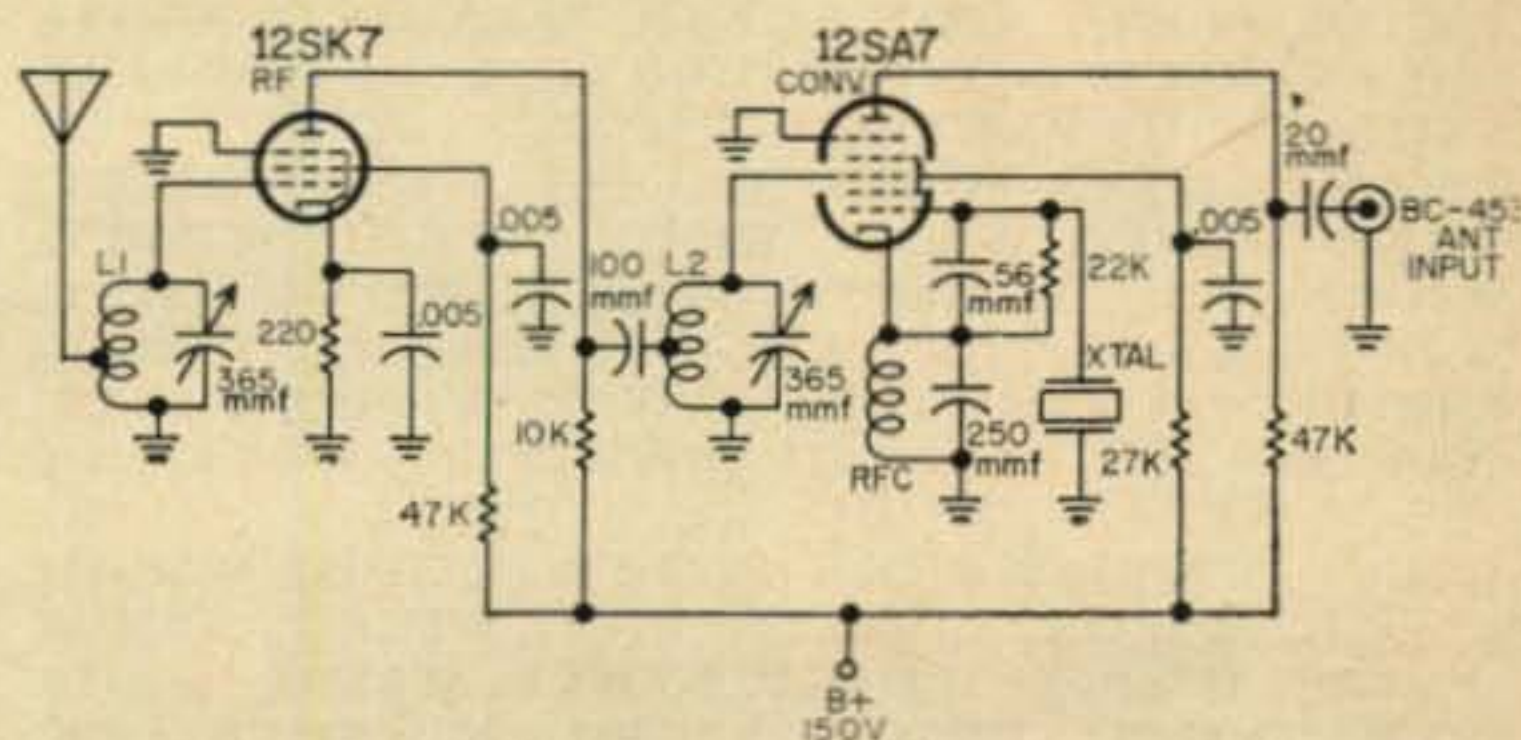


Fig. 2—Converter circuit to feed Command set.

### Coil Data

Forms: 1/2" x 2" Polystyrene rod  
 L1-32 turns #22 enameled. Tap 6 turns from ground.  
 L2-32 turns #22 enameled. Tap 16 turns from ground.  
 Space turns the diameter of the wire.  
 Fixed condensers should be ceramic or mica.

# Results Of Armed Forces Day - 1959

Certificates of Merit have been mailed to four hundred and fifty-five contestants in recognition of making perfect copy of the Secretary of Defense's International Morse Code (CW) message to radio amateurs on Armed Forces Day 1959. The message was transmitted at twenty-five words per minute by military stations on 16 May 1959. Certificate winners of the CW message are as follows:

N1AAU, N1ASP, W1AXG, W1BKG, W1BMW, K1CUE, I1CWZ, W1DSW/A1DSW, W1DV, W1DWO, W1ELL, W1GZQ, W1FV, K1GVW, W1HGE, K1HVJ/K1NR, W1HXI, W1JBB, KN1JHH, KN1JFF, Q1JMS, W1JOS, K1KBB, K1KSO, W1MCG, W1MEG, W1MIX, W1QJM, W1QPR, W1SAD, W1SRM, W1TA, W1TEC, ZL1WB, W1WGN, W1YFP, W1ZPA, W1ZYO, W1ZR.

W2AFZ, W2ATM, WA2BHA, K2BKG, W2BXW/A2BXW, W2CLQ, W2COG, N2CTD, K2CXO, W2ECZ/MM, K2EQP, W2FSN, K2GFO, A2GQN, W2GVU, W2HAQ, W2HQL, W2HX, W2JBZ, W2JOA, W2LRW, W2LYH, K2MBD, W2NMJ, W2NNK, W2OCO, W2PPB, W2PVK, K2PWM, K2SEN, W2SHC, W2TOX/A2TOX, W2TUK, K2QBW, K2UYG, W2VEH, K2CKC, W2VPH/4, K2YHZ, K2YTD, W2ZMK, W2ZK, W2DSS.

N3AAJ, W3ABZ, W3ADE, K3AGF, W3BFF, A3BHK, W3BKE, W3CB, W3DJW, N3EAD, W3ECP, W3ELL, A3EOV/W3EOV, W3FZO, KN3GOH, W3GQC, W3HCE, K3HNY, KN3HWI/3, VE3IA, W3JBP, W3KMD, A3LQV, W3MBL/A3MBL, W3MCG, W3MFW, N3NCE, N3NDV, N3NNL, W3PYW, W3QCB, W3UEQ/1, A3USA, W3VDV/S., W3VGF, W3VKQ, W3VXI/1, W3WGH, W3YRB, W3ZLP.

W4ABY, W3AEV, W4AGV, W4ATE, K4BAI, W4BBZ, W4BJR, W4CQI, K4CRL, K4DNZ/AA4DNZ, W4DTI, W4EFV, K4EHN, W4FDS, W4FXR, K4GAT, W4GMZ, K4HLS, W4HME, W4HQZ, W4HZZ, K4IRK/6, W4ISS, K4IVZ, A4IYT, W4KJ, K4JLK, W4KLT/A4KLT, W4KR, W4KVO, W4LYV, K4MEU, K4MMB, W4NWK, W4OGK, W4OLD, K4OSH, W4OXX, W4POI, K4PSE, W4RHZ, K4SGT/4, W4SOT, W4SDR, W4SRK, K4TDR, W4VHX, W4VYZ, K4WAG, K4YPD, W4ZKU, W4ZPR.

W5BCF, KZ5BS/WØGKK, W5DIW, K5DMR, W5EGD, K5EGU, W5EGX/N8NAA, W5GCJ, W5GOG, KZ5GH, W5GRT, W5GKV, W5HKP, K5HVP, W5JET, W5JIS, W5JPC/A5JPC, KZ5LP, N5LTH, N5LTJ, K5LTK, K5MMO, W5NDV, K5NRA, N5LTI/K4NRY, W5PCL, W5PNO, K5RHF, K5SKG, W5SPZ, W5SQB, W5SYE, W5YOK, W5ZU.

N6AAB, N6AAJ, W6AAL, N6AAR, N6ABQ, N6ABT, A6AEE/W6AEE, KH6AO, W6AWP, W6AXV, KH6BGW, W6BHG, KH6BLT, W6BYY, W6CBF, K6CHR, W6FIW, W6FNG, KH6FX/AB6FX, W6FYN, W6FZC, CQS, W6DTY, K6DV, K6DYX, N6EBA, W6ELT,

K6ESQ, K6EXY, N6FAC, N6FAI, W6FHI, W6FLE, W6FLW, W6FNG, KH6FX/AB6FX, W6FYN, W6FZC, K6GB, W6GEB, K6GK, W6GKZ, W6GQY/A6GQY, AF6GSX, K6GZ, K6HB, W6HXQ, W6IAH, KH6IJ, W6ID, W6IBO, W6IZH, K6KVF, K6MCA, W6MWR, W6NNV, W6OJW, W6OWP, K6PMG/3, W6PYN, W6QIE, W6QIL, W6QQ, W6RLP/5, W6SCQ, W6THQ, K6TPL, W6TYQ, A6UJY/W6UJY, KH6UK/AB6UK, K6WDV, W6WX, W6WTL, W6WZB, W6YCF/A6YCF, W6YHM, K6YKG, K6ZIK, W6ZPX.

W7ADQ/9, W7BHH, W7BJR, K7BPR, W7BVH, W7CO, W7CZY, W7EBS, W7EYF, W7FCO, W7FIX, W7FOS, W7FYW, W7GCL, AF7FN, W7KQV, W7KQX, W7LCS, W7LFA, W7LJW, W7LPM, W7MAE, W7SNA, AF7YKG, W7ZMD.

W8ARO, W8BKM, K8BTY, W8CAT, W8DPX, W8DAE, W8DHL, W8DSX, W8FFK, K8HOS, W8HNY, W8HS, W8HZA, W8IJV, K8IKE, W8JGI, W8JKX, K8JLO, K8KLC, K8LNQ, K8MBN, K8NRA, W8PHM, W8PEI, W8QHW, W8SQI, W8RIR, W8SQU, W8SRU, W8TZO, W8YCP, W8YPT, W8ZHB, W8ZJY, W8ZL, W8PBO, W8WOA, W8DEZ/AF8DEZ.

N9ABM, N9ACY, N9ADA, K9ALP, K9BKB/3, K9BSH, W9CCO, W9CHD, W9ERB/A9ERB, W9EWC, W9GVZ, W9HAE, W9HTO, W9JAM, K9KMT, W9LGH, N9ADI/K9NBI, W9MAK, A9NXX, W9NZZ, W9ONI, W9PNE, W9TZN, W9UML/A9UML, W9VHD, W9WNB/K9CFP, W9YGP, W9ZEN, W9RAR, W9YZO, W9ZGW/A9ZGW.

WØAOK, WØARO, KØBØLJH, KØPIK, WØPIV, IX, WØBP, WØDJE/9, WØRCV, WØRCV/AFØR, WØDRB, WØDYF, WØCV, KØSJB, WØWIN, ECE, WØEWH, KØIDV, AFØWYK/WØWYK, AØN, WØJHY/5, WØLKK, KSF, WØOKH.

Alexander, C. P.	Frisby, C. E.	Nelson, R. H.
Ranks, C. L.	Graham, B. H.	Norman, M. L.
Bastian, D. J.	Herbert, J. R.	Parrotte, K.
Becknell, J. L.	Hilf, R. G.	Paul, S. E.
Beetham, W. J.	Holbrook, P. L.	Pollero, V.
Blenkinstaff, R. T.	Hutton, W. L.	Quinn, J. E.
Bottoms, W. J.	Hyatt, R. L.	Reynolds, D.
Brock, C. E.	Johnson, G. M.	Richards, C. D.
Bronkala, H. J.	Kelley, C. E.	Ricketts, G. D.
Brummet, R. K.	Klein, C. M.	Rider, C. R.
Case, W. G.	Klein, W. C.	Simpson, W. G.
Curtis, O. F.	Koenig, P. W.	Smith, J.
Davidson, R.	Kruger, E. J.	Taylor, J. A.
Dayton, V. B.	Lawhon, H. O.	Throop, F. M.
Devitto, L. J.	Lawrence, J. E.	Ungari, J. A.
Dobbins, S. M.	Lewis, W. M.	Wilson, W.
Easterwood, B.	Martin, J. E.	Wixon, R. R.
Eastwood, E. H.	Miller, F.	Zaug, C.
Ekdahl, W. E.	Murrill, C. C.	

## Military to Amateur Contacts

Operating on military frequencies AIR, NSS, and WAR, amateurs worked in the 80-40-20



# Amateur Radio Station K6NCG at Treasure Island

Judith Howell, JO/SA



Chief Warrant Officer, C. M. Unfried USN is adjusting the dials on the new 1 Kilowatt side band transmitter and receiver set at the Amateur Radio Club, Naval Schools Command, Treasure Island while l. to r. Commander Sydney J. Fass W6NZ, Mr. Nat C. Smith W9UJ and Captain H. J. Campbell look on.

**K6NCG** is the call of the Treasure Island Naval Schools Command Amateur Radio Station. This station is operated nights and weekends by students and staff of the Electronics Schools. During the day it is under the supervision of a Custodian.

In the last few months improvements in K6NCG have included: installation of a 37 foot crank up tower mounted upon the roof of the station, raising the height of the new Mosley tri band antenna to a 67 foot altitude; and the purchasing of a complete 1 Kilowatt side band transmitter and receiver.

Amateur stations have recently been installed on such ships of the fleet as the USS Ranger and the USS Glacier. This makes it possible for the men engaged in isolated and extended operations to keep in contact with the outside world via amateur stations throughout the U.S. With its new equipment K6NCG will be in a position to add its services.

Trustee for K6NCG is Chief Warrant Officer, C. M. Unfried (K6IGJ) an officer in the Electronics School, Naval Schools Command. Custodian of the club is Chief G. G. Carlson (W6KVD) also in Electronics School, Naval Schools Command. Both of these men are licensed amateur radio operators and do this work as a collateral duty assignment. ■

and 15 meter bands, using CW, AM, SSB, and RATT. The three military stations made a total of two thousand six hundred and ninety-four contacts.

## Radioteletypewriter Receiving Competition

The radioteletypewriter receiving competition featured a message from the Secretary of Defense transmitted at sixty words per minute. A total of one hundred and ninety-four contestants received a certificate of merit for perfect copy. RATT winners of certificates of merit are as follows:

W1OUG, W2BVE, K2EID/AA2EID, W2GQN/A2GQN, W2HDQ/A2HDQ, K2HHH, K2HJC, W2ICX, W2JAV, W2KDW, W2LRW, W2PAU, W2PEE, W2RUI, W2TAM, W2TKO, W2TOX/A2TOX, W2UAE.

K3APS, VE3BAD, W3CRO, W3DJZ, W3HCE, K3HHY, W3JNE, W3MHD, W3NQA, K3NRB, W3PRQ, W3TUZ, W3YRB, W3ZYK.

W4AIY, W4EHU, A3FJ, K4GFL, W4HNF, W4HNT, K4IVZ, W4KJN/AF4KJN, K4KKZ, K4NAS, K4NDE, K4NRY, W4NWK, W4PHL/A4PHL, K4PSE, W4WMM/A4WMM.

W5BOT, K5BSS, W5DHz, AC5DS/KZ5DS, N5EFA, W5FPD/A5FPD, W5GJH, W5GMM/AF5GMM, N5LTI, N5LTN, K5MBB, W5RDT, K5RHF, K5RXC, W5SQB/AF5SQB, W5SYE, K5THK, W5TVG, K5WAB.

W6AEE/A6AEE, W6ASJ/A6ASJ, W6AXV, K6BHF, W6BIK, K6BPI, W6BYS, W6CAP, W6CBX, K6CHR, W6CQI/6, KH6CQS, K6CXS, W6CZ, K6GZ, WA6DME, W6DOU, AG6FCW, W6FHI, F6FLW/A6FLW, W6FZC, K6GB/AA6GB, W6GDO/AF6GDO, W6GGC, K6GOK, AF6GSX, K6HHD, W6HTS, W6HIV, W6JCK, W6IZJ, K6JIV, K6JPR, W6JOX/AF6JOX, W6/AF6JWF, K6JWQ/AFA6JWQ, W6LFD, W6LDG, W6NRM, W6PGP, W6QIE, K6QMK, W6QYS, VE6UJX, K6USN, K6WDV, K6ZEG, W6SCQ, W6CBF, K6HB, K6ZBL.

K7ABB, K7AFI, KL7AIZ, K7BXS, W7CBE, A7CO/W7CO, W7FOS, W7JMH, W7KQK, W7KV, W7LPM, W7MC, W7MEV, W7PVF, W7TUI, W7VI, W7VMN, W7VPH, W7WBB, W7TMF.

WSDWL, W8FEU, W8IJV, K8KBO, K8KLC, W8KPT, W8LGL/AF8LGL, K8MRU, W8PEI, W8WUD.

K9BRL, K9BSL, W9CWH, W9DNP, K9EHP, W9EWC, K9EYY, W9GGH, W9GRW, AF9GVN, W9LKK, W9LOT, K9NBI/N9ADI, W9ONM/AF9ONM, W9OPI, KN9QEE, A9QIX, W9QKE, W9WKM.

W0BP, W0FQW, W0HAH, AF0JHS, W0LQV/AF0LQV, W0OKH, W0QOZ.

Amateur Operators of the Comm. Platoon, 1st Battle, Grp. 20th Inf.

Anderson, W. R.	Golinski, R. L.	Manis, C. L.
Brock, C. E.	Goodman, D. J.	Miller, F.
Brummet, R. K.	Graham, B. H.	Quinn, J. E.

[Continued on page 100]

# A Simple Grid Current Indicator

Vernon Trexler, W5IUR

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Have you ever wondered, when you were driving that class AB1 linear if you were driving it into the grid current region? You couldn't tell for sure, and you hoped you weren't because the book mentioned you would have poor loading on the driver and distortion products. Of course you could add a meter, but it is large, expensive and does not make a good grid current indicator for a class AB1 linear.

Here is a gadget that will indicate when you drive your final too hard and exceed the grid bias causing grid current to flow. It is a simple circuit using a gaseous filled tetrode connected as a triode and is shown in fig. 1. The high voltage secondary of the power transformer is used both to supply the necessary ionizing voltage and to give isolation from the *ac* power line.

The plate resistor is chosen by the amount of *ac* voltage applied to the tube and the resistor will be a 100 K for each 100 volts of *ac*, rms voltage applied. The grid voltage applied

to the circuit is set by the 1 meg. pot so that the indicator is not lit as the transmitter is normally used. There will be slight changes of *ac* plate voltage caused by the varying demands of the transmitter and the grid voltage must be set so that this will not cause an indication. When the grid bias is exceeded, the voltage on the grid of the indicator will rise, the tube will fire and the indicator will come on. When grid current does not flow, the indicator light will go out because of the *ac* plate voltage and will give you an automatic indicator.

With *dc* on the plate once the tube has fired, you would have to open the plate voltage manually to extinguish the indicator, because once the thyratron has fired with *dc* on the plate, the grid loses control of the tube. With *ac* on the plate, voltage goes to zero 120 times a second, and when this happens the normal grid voltage will cause the tube to stay extinguished.

The indicator tube can be a 2D21, 2050, etc. The indicator light can be a NE 2 or NE 51. The reason for the thyratron is that it can handle large currents and is a "go no-go" tube, either conducting fully or not at all.

Of course you could put an *ac* relay in the plate circuit of the thyratron and have its contacts turn off the transmitter when you exceed the grid bias. This requires a different size plate resistor depending on the relay and *ac* voltage, but this seems to be too much of a good thing.

Of course this gadget is good only when the bias voltage can move up when the grid current starts to flow, but this should normally be satisfactory for a class AB1 linear as there is no reason for electronic bias voltage regulation since the bias voltage is not to be exceeded.

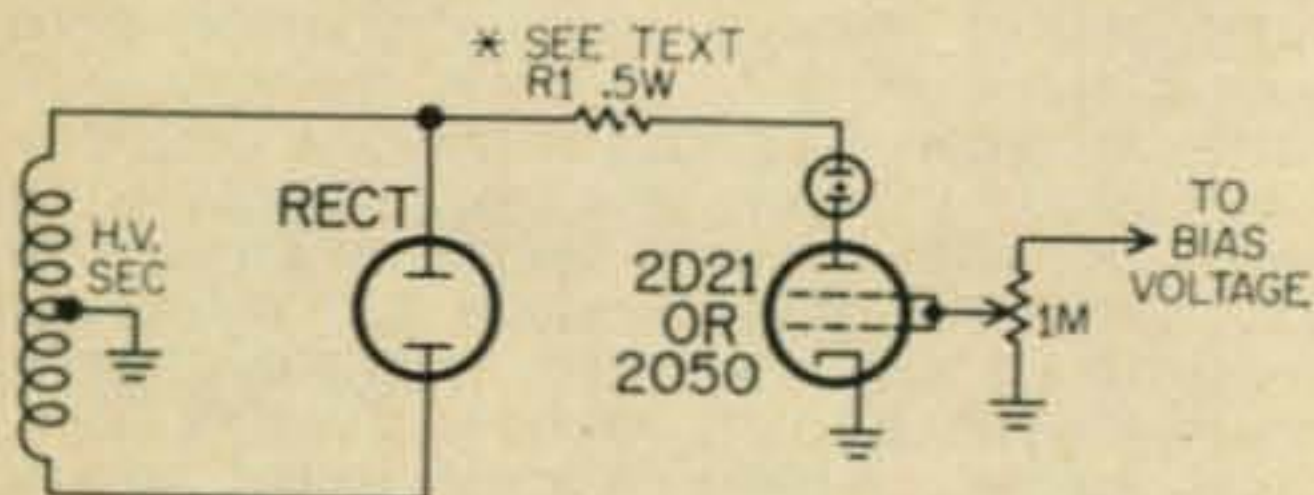


Fig. 1—The circuit of the grid current indicator. The method of determining the correct value for R1 is explained in the text. No more than 500 volts should be developed across R1. Divide the required resistance value into as many individual resistors as necessary to insure no more than 500 volts across each.

## Cryptogram From W9ICF

Alas, poor Mack! He has been working phone so long that when he works CW he rarely ever transmits the proper Morse character for the letter he has in mind. You phone men can also help us decipher Mack's words of wit and wisdom (since no Knowledge of Morse code is required for correct solution).

In this message we happen to know that the letters "A" and "L" are correct and that the

word "Life" is probably present somewhere in the text.

GUGSO CAM NLAQP BIG JVVL VMOG  
FM IFP LFJG DKB BV CASSQ FP  
NLAQFMT BIG JVVL ALL VMG'P LFJG  
LVMT. BIAB YIFOI BIG JVVL WVGPF  
BIG GMW, BIG YFPG CAM WVGPF  
BIG DGTFMMFMT. PV PKDPOSFDG BV  
OH MVY!

# Hidden Transmitter Hunt, Texas Style

**John Estes, W5QPI**

2926 Field St.  
San Angelo, Texas

**Johnny Joiner, W5KPJ**

2621 30th St.  
Lubbock, Texas

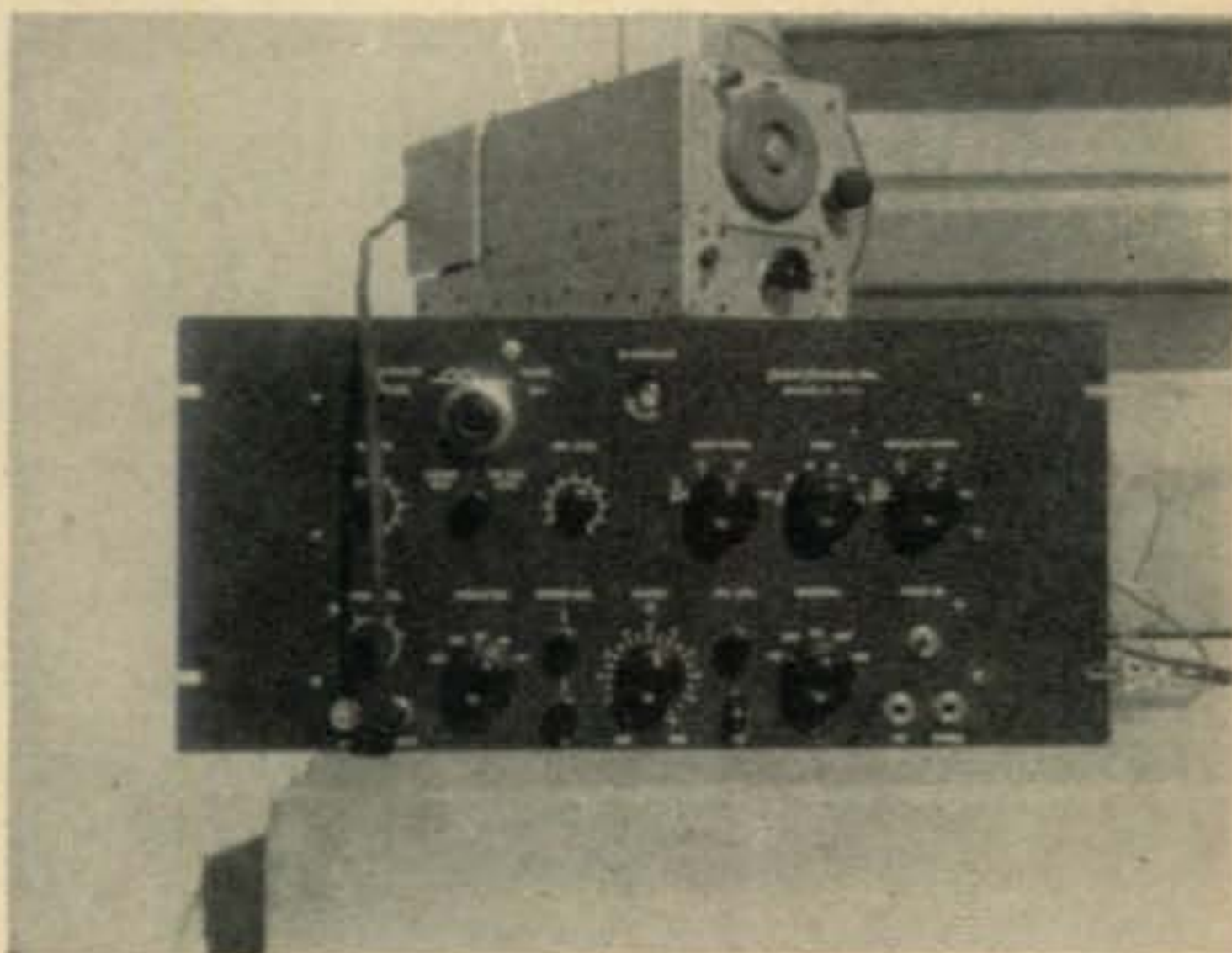
This is a story about a hidden transmitter hunt, Texas Style. When I use the word TEXAS you probably immediately think I will spread it on a little thick. Most of our past transmitter hunts were routine affairs. The hidden transmitter was out in the woods with the flies, bugs and the heat. A wide straw hat and a thermos jug of something cold were mighty welcome items. When the temperature hits about 100 and the sand blows in your face, one begins to wonder why it is necessary to be hidden like a criminal. Why be out in the heat and dust and be a juicy meal for



Just another backyard wood junk pile? Buried somewhere beneath this pile of boards is the 20A and the Command 3-6 MC receiver.



I hope you fellows hurry and find us, the heat sure is bad and the flies and bugs are about to eat us up. Also it is mighty hot and we are thirsty.



A view of the 20A and the 3-6 Command receiver.



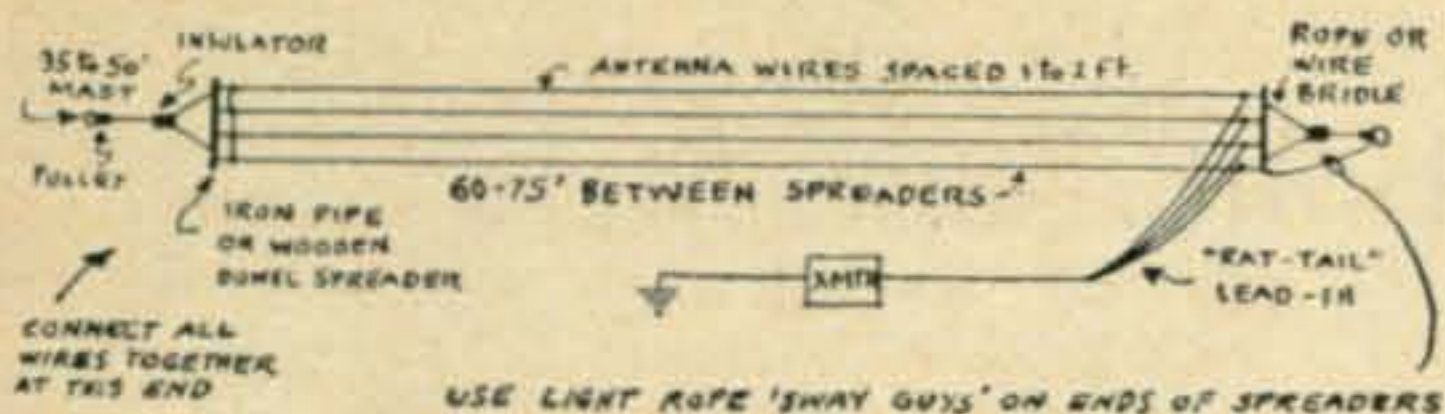
A picture of W5KPJ on the right with several of the hunters.

the mosquitoes? Why couldn't I sit in the cool comfort of my own house? Why not have an air cooler to keep the temperature about 68 degrees and the XYL to bring me a refill on a tall cool glass as needed? Why not? It probably had not been done before but after all this is TEXAS so why not do it the easy way.

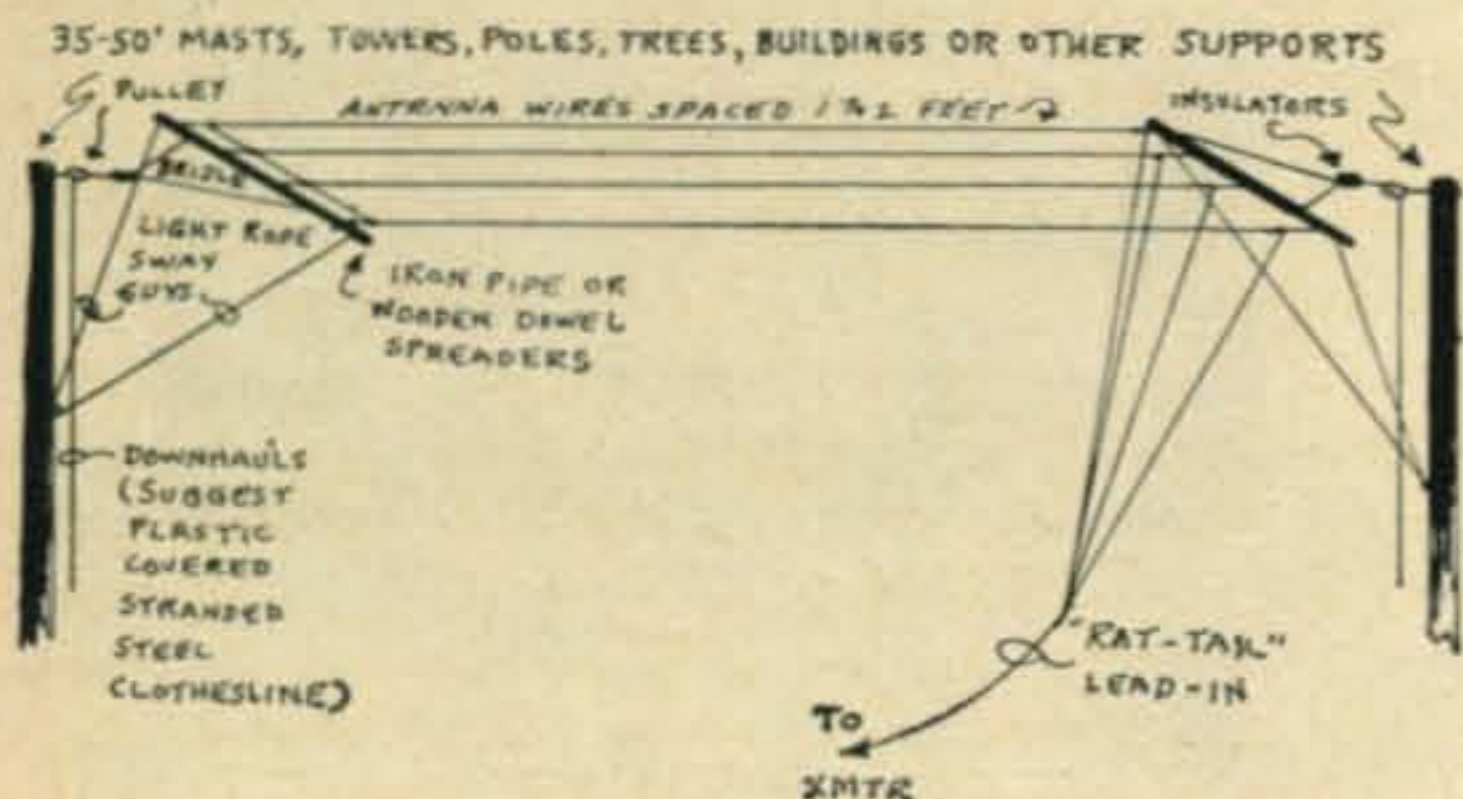
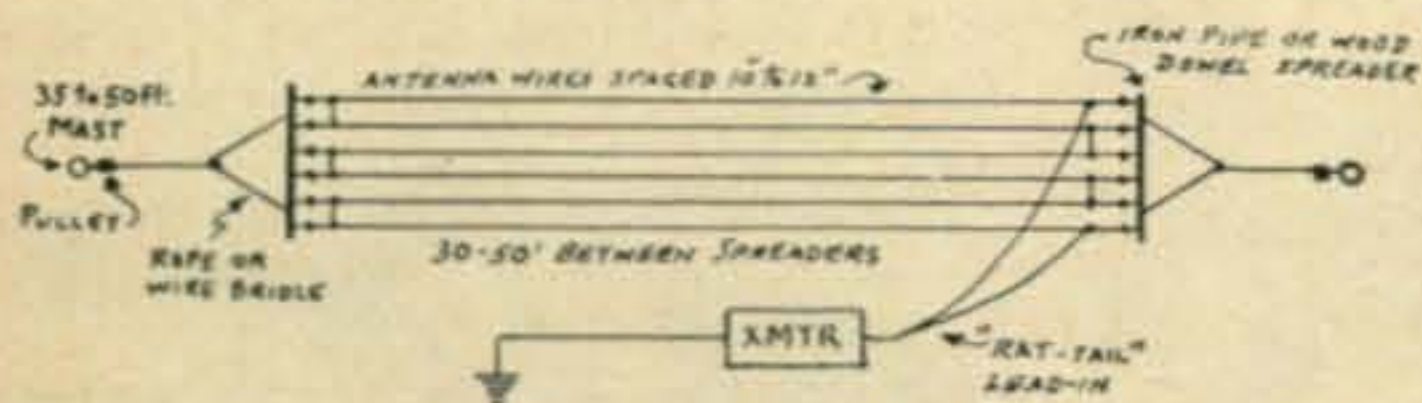
*The "easy" way is illegal. Don't copy the system. Ed.*

The survey of available equipment revealed the standard all-band receiver and a 75 meter transmitter at the home QTH. We also had a Central Electronics 20A transmitter that put out fair signal on 10 meters voice controlled. A further check in the surplus gear box revealed a 3-6 mc receiver. Why not

[Continued on page 60]



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 Mercer Island, Washington



## More on 'Restricted Space' Antennas

It seems that once again we are back on the subject of antennas for use in the 75/80 meter band, where space restrictions prohibit a half-wave long wire. Regardless of how many articles, suggestions and letters appear in various ham publications, the old question . . . "How can I erect a half-wave antenna for 75/80 meters on a 100 foot lot?" continually recurs.

Face it—you CAN'T! Not in a straight line; maybe diagonally if your lot is wide enough and you don't have to use guyed masts or poles. You'll find a number of solutions in the various handbooks, manuals and current periodicals. You can cut a half-wave wire and bend it around on a horizontal plane to fit the space. You can keep it a half-wave long and 'droop' the ends, or you can use a vertical in one of its various forms, with or without a loading arrangement. In spite of these many answers, the cry STILL goes up—"What to do?"

Far be it from me to set myself up as an antenna "expert". I've probably built and used more different types of antennas for the lower frequencies in my fifty years of ham and commercial experience than the majority of my readers. Nevertheless, I have always felt, and still do, that antennas for the 75/80 and 160 meter bands are merely incidental adjuncts to the transmitter. Sure, I'll get a howl from the

antenna theorists, but my shoulders are broad. Say what you please about 'standing waves', 'current loops', 'voltage nodes', 'impedance match' etc. Is THAT what you're after or is it COMMUNICATION you want?

You know as well as I do that the 75/80 meter frequencies are NOT a part of a "DX" band. If you want to work there, you presumably accept the fact that communication range versus power input is considerably less than at the higher frequencies. So, if you want to work "DX", you choose an appropriate "DX" band, erect an elaborate multi-element rotary beam or equivalent and 'the world is your oyster'. BUT, if you want RELIABLE communication over a REASONABLE distance (traffic nets, for instance) in the 75/80 meter range, why worry about theoretically 'precise' antennas, transmission lines, trick coupling devices, etc?

Certainly I'll grant that there is a considerable difference in RADIATING efficiency through use of such "gadgetry" but I still fail to recognize the NEED for 'ultra-efficient radiation' to cover the usual area for which the bands under discussion are most reliable. No doubt but what a single wire, cut to half-wave for the frequency being used and fed by coax or twin-lead line, tuned or untuned, is highly efficient. The so-called "Windom" antenna, or "off-center Hertz" is another excellent and

highly efficient radiator if you have the space for a half-wave wire. If you have, USE one of them.

The major concern of those of you to whom this article is 'beamed' is with achieving reasonably efficient communication on 75/80 within restricted space. Actually, anything metallic that will load at all, will radiate. How well, of course, depends on a number of factors but radiate it will.

I have had mighty good success on 80 CW with a rusty barbed wire fence of random length—perhaps 150 feet—and 15 watts input. Up to 1200 miles shows up authentically in my log! I've worked better than 600 miles using a seven foot whip standing in the corner of a motel room and fed with a random length (about 15 feet) of RG/58-U coax line! NO 'trick' antenna loaders—just the tapped series loading coil in a little BC-474 transceiver running at ten watts input! As an experiment, I increased the loading to 15 watts by merely hanging an aluminum stew-pan on the top of the whip for a "top-hat" loader! Test signals with the same stations showed not one iota of difference in signal strength, with or without the "top-hat"!

So, if you're so concerned about working 75 or 80 because you have no room for a half-wave long wire—forget it. Maybe there's a galvanized iron chimney on the roof of your apartment building; probably guyed with 3 or 4 rusty wires; try it! It will probably make a pretty good "umbrella antenna" which was the U. S. Army Signal Corps standard in early days and did right well! Don't worry about rusty joints—chances are the rf will burn right through them, but better to bond them for the tiny spark created can DO things to neighborhood TV's! If the thing will load at all, it will RADIATE!

Or perhaps it's just a 3 or 4 wire clothesline in your backyard; hook on to it—you might be surprised! Connect all the lines in parallel if they aren't a continuous loop but warn your XYL not to hang wet wash on the line when you're working "DX" (!)?

Another good bet is the metal rain gutters around the roof—just be sure that the downspouts are not in direct contact with ground—most are not.

However, if you are a really serious-minded student of theory and the above suggestions simply 'horrify' you, because you cannot find, nor can you evolve, any equation which will substantiate that "Maxwellton's Braes are Bonny" or whatever they prove, try this; dip into the past and pull out the good old "multi-wire" antenna of early days!

Ever hear of one? No? All right, I'll let you in on a little early "wireless" lore. Back in those 'hoary' days, antennas weren't 'such a much' from the technical standpoint. They presented a bit more physical construction than our present single wires, but not nearly ap-

proaching that of a modern beam. An antenna was simply a 'necessary evil' then, if you wanted to get out farther than across town. With NO antenna at all, most of the old sparks were good for several miles if the other guy had a good hunk of carborundum in his crystal detector stand! Stick a bunch of wire up in the air and hook it to the "helix" (or "oscillation transformer" if you were the envy of neighborhood hams) and, oh, boy! did you work out!

Remember, all of the work done then was on 200 meters and under. No one even DREAMED of going LOWER; most of the transgressions were the other way and it was every ham's dream to get the "special experimental license" authorizing him to use 375 meters! Can you imagine a HALF-WAVE long wire at THAT wavelength on a city lot? Change that to frequency and figure it out for yourself!

Were we, who had never heard of 'half-waves', 'standing waves' etc., stumped? Not by a long shot! We simply followed current commercial and military practice on their ships and shore stations and used MULTI-wire antennas of whatever random lengths would fit the space we had available! Transmission lines—what were they? We used "lead-in wires" taken off the antenna proper at whatever point was most convenient to reach our shack! Most popular was to take the lead-in from either one end of the antenna array, or from the approximate center thus forming what were commonly dubbed as either an "inverted L" antenna or a "T" type.

Did we work out? The LEGAL power then, as now, was one Kilowatt maximum input. So with anything from a Model T Ford spark-coil to a one KW transformer, we blindly moved clips around on our helixes or oscillation transformers until the pointer on the old hot-wire ammeter in the antenna or ground lead shimmied its way to the highest reading. If we didn't get a lot of amps, we made a tentative guess whether the antenna was too long or too short. If too long, we simply stuck a Leyden jar fixed condenser in the antenna lead-in and re-adjusted the clips on the coil; if too short, we inserted a copper tubing multi-turn loading coil instead, tuned for the highest reading and—there we were!

Remember, we worked across the Atlantic and from coast-o-coast with such crude rigs, using 200 meters and with an almost complete lack of knowledge of the finesse of proper adjustment!

Theoretically, those old antennas can be easily explained. What determines the resonant frequency (or wave-length) of a wire in free space? Not only its length, but its capacity (to ground). Lacking space in early days for a single wire several hundred feet long, just as you do today for 125/135 feet, the practice then was to increase the NUMBER of wires, shortening them to fit the space available. The

number of wires varied from two to eight usually, separated one or two feet. Connections likewise varied, according to individual whims. The accompanying drawings in fig. 1 show several methods.

### Multi-Wire

With such multi-wire arrangements, a larger metallic surface suspended above the earth and forming one 'plate' of the condenser, increased the capacity to earth (the other plate) by reason of increased area. At the same time, the parallel proximity of the antenna wires to each other established a capacity effect between adjacent wires. So—we increased 'capacity' in our radiating system thereby lowering its resonant frequency. The other element establishing frequency being 'inductance', we could if need be (in the case of extremely short antennas) increase inductance by connecting every other pair of wires together at opposite ends, thereby forming a single length of wire in a "grid" formation.

For example; in 1921, as 8DAG at Cincinnati, I was restricted to an antenna length of thirty feet with which to work on 200 meters! So what? Eight 30 foot wires, equally spaced on six foot spreaders and the wires used in the "continuous grid" formation gave me 240 feet of wire in a 30 foot stretch PLUS the capacitance between wires and a large area 'condenser plate' above ground!

I didn't even need a loading coil—the secondary of the oscillation transformer had sufficient turns to permit tuning to resonance (I guess! Anyway the hot-wire ammeter read 10 or 12 amperes with my quarter kilowatt spark!) AND I consistently worked all over the East Coast and on a number of occasions worked the Seefred Bros., 6EA of Los Angeles!

Let's say then, that you fellows with a 'space' problem have an exciting field of experiment open to you. Right now I have no space problem and use a half-wave, off-center fed Hertz. I don't have the time to experiment with short, multi-wire antennas but probably many of you do; why don't YOU try it? You may even come up with an "Edison Award" if you can 'dig up the bones of the past' and make it work in the present!

Here's my suggestion then; get yourself enough antenna wire to constitute a half-wave antenna. Cut it to two, four, six or eight equal lengths which will fit your available space. Attach both ends to 'spreaders' of pipe or wooden curtain rod. If the wire lengths are very short (30-45 feet) I'd suggest an insulator in each end of each wire so that you can use the "grid" arrangement shown in an accompanying sketch. If only 2 to 4 wires of 50-75 feet each are required for your span, you need not insulate them from the spreader but put an insulator in each 'bridle' to which you attach the downhaul. Take your lead-in wire from either end or the middle; if you use plain antenna wire

for this, remember that it will radiate also, all the way to the shack—so will your ground wire! If you use coax or twin-lead, radiation from it will be pretty well attenuated.

Forget all the 'monkey-business' about 'impedance match', 'antenna couplers', 'standing waves' etc., use your initiative and meet your problems as they arise. WORK at it—you've got just as much chance of coming up with some new ideas in radiating systems as had experimenters in other lines. Marconi, Edison, deForest and other radio 'greats' needed only a hint! Catch on?

Just remember that what you are striving for is the best possible communication you can achieve with the equipment you have in spite of what YOU consider an antenna space handicap—I don't. ANYTHING metallic that will load at all will radiate—remember? The antenna can't keep it—it's GOT to go SOMEPLACE.

### A Few Tips

Let me add a couple of tips. First check your neighbor's TV! I haven't the least idea of what the 'marconi' type antennas described will do to it, theoretically nothing—but CHECK!

Second—DON'T write a long letter to the Editor or to me and ask for more information and/or suggestions. You've got ALL of the basic 'meat' here—you 'chaw' on it—let's see if ham initiative is equal to what it was in the "tin-can days" of amateur wireless! Good luck and 73! ■

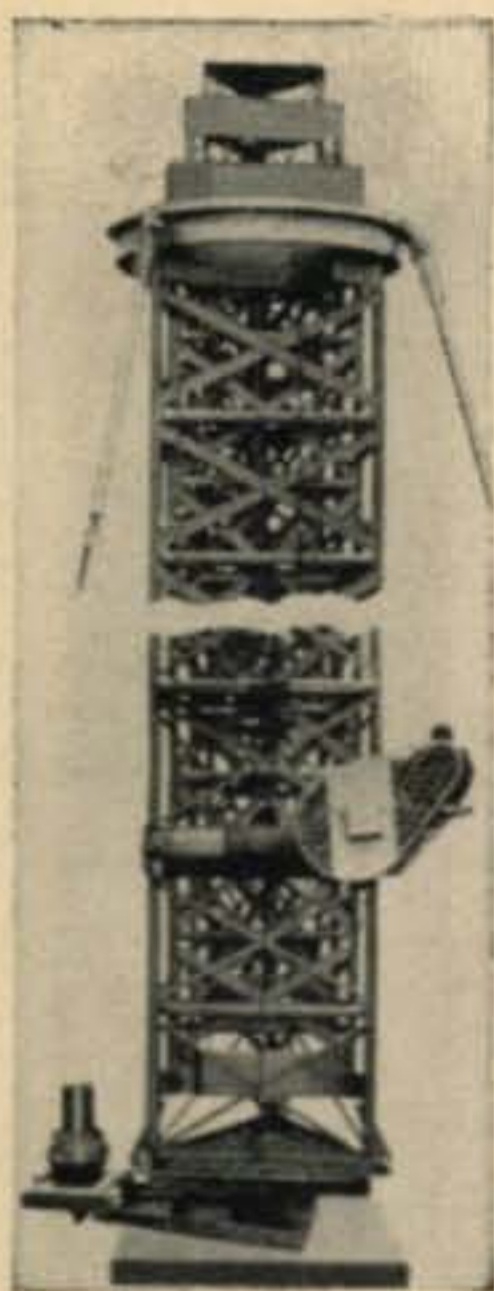
*AUTHORS NOTE:* For more detailed information on 'multi-wire' flat-top antennas, consult your local library; inquire particularly for "RADIO TELEGRAPHY & TELEPHONY" by Alfred Powell Morgan (1915) and for "OPERATOR'S WIRELESS TELEGRAPH and TELEPHONE HANDBOOK" by Victor H. Laughter (1909). Early issues of QST, RADIO, MODERN ELECTRICS and early HANDBOOKS will also assist materially.

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### HIDDEN XMTR [from page 57]

transmit on 75 meters from the house and have the command 3-6 mc receiver feed audio into the 20A? The 20A would take the audio and turn itself on and then put out a signal on 10 meters. I could listen to myself and the mobile hunters on the 10 meter receiver back at the house. It was no sooner thought up than done. The necessary wiring of the 20A and the command receiver did not take long. We buried the 20A and the command receiver under a wood pile about 5 blocks from the house with the 75 meter transmitter. The ac line to the 20A and receiver was buried under ground and ran off about 100 feet to a nearby source of 110 volts ac. The receiving and transmitting antennas were also under the board and boxes. The pictures tell the story. ■

# New Amateur Equipment



## Tri-Ex Rotating Towers

Called the HZRN series, these towers are self-supporting and feature new roller-guides for smooth raising and lowering. The complete tower and antenna rotate on 12 large, precision ball bearings at the 20-ft. level, and on a heavy-duty flange-type, self-aligning ball bearing at the base. Either a prop-pitch or any other gearhead-type motor can accomplish the rotating. The Tri-Ex people have designed this series to meet both RETMA and UBC building specifications, which should make it easier for the amateur comes time to get the building permit. For more detailed dope gash A on page 126.

## Transistorized Supplies by B&W

Barker & Williamson descend upon the transistorized converter market with a new line of units in 25, 6 and 120 watt models. All models operate with an input of 12-14 vdc. The 25 watt model delivers 115 or 26 volts at 400 cycles. Small and lightweight, these converters range in price from \$32.50 to \$57.50. For more and more, just puncture B on page 126.



## Knight Pocket VOM Kit

Allied Radio announces the release of a low cost, pocket type *vom* kit. Hardly larger than a pack of cigarettes, this little unit reads 13 ranges at 1000 ohms-per-volt sensitivity. The ranges available include: DC Volts, 0-5-15-50-150 and 500; AC Volts, 0-15-150 and 500; DC Milliamperes, 0-1-10-100; Ohms, 0-30,000 (1.2K mid-scale). The Knight Kit VOM is supplied with a battery and test leads and features a front panel zero-adjust. For gobs of additional data, merely lacerate E on page 126.

## Beam and Quad Matching Devices by Cesco

Continental Electronics & Sound Company have two interesting additions to their already famous beam antenna hardware line. Cesco's Tri-Ax reactance match for three-band beams is both reasonably priced and well engineered. It is, of course, ideally suited for any three-band "trap" type antenna. Their model Q-125 Quad Stub Tuner really makes life simple. Why balance atop the tower on your tippy-toes and move a shorting bar around, when this little device makes tuning as easy as turning a screwdriver. Much data is yours for the asking. Interested? Stab C on page 126 and we'll see if we can cajole the scoop from president A. C. Self, W8FYR.



## RF Signal Generator

By who? Health, of course. Who else has such a large, economical line of test equipment for brother ham? This dilly (Model RF-1) does the job with an accuracy of 2%. The RF-1 comes preassembled as far as the coil and bandswitch assembly is concerned. It has also been aligned at the factory. Note the easily-read 3" dial. Come on now, you know you need a sig gen to align that old receiver. Mash D on page 126 and the sales pitch is yours FREE.

# The 'Andy Ohmmaker

A Wide Range Resistance Box  
on a Narrow Budget

Jim Kyle, K5JKX/6

11953 Cameo Place  
San Fernando, Calif.

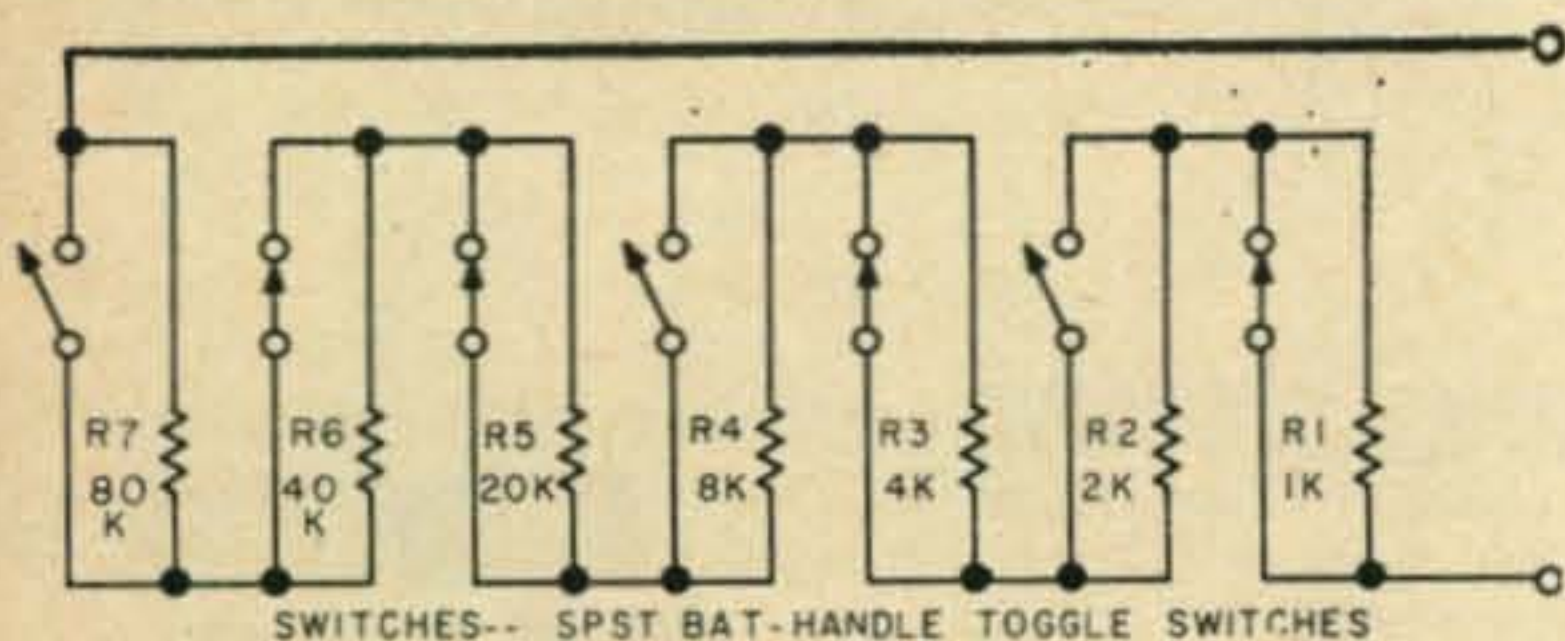
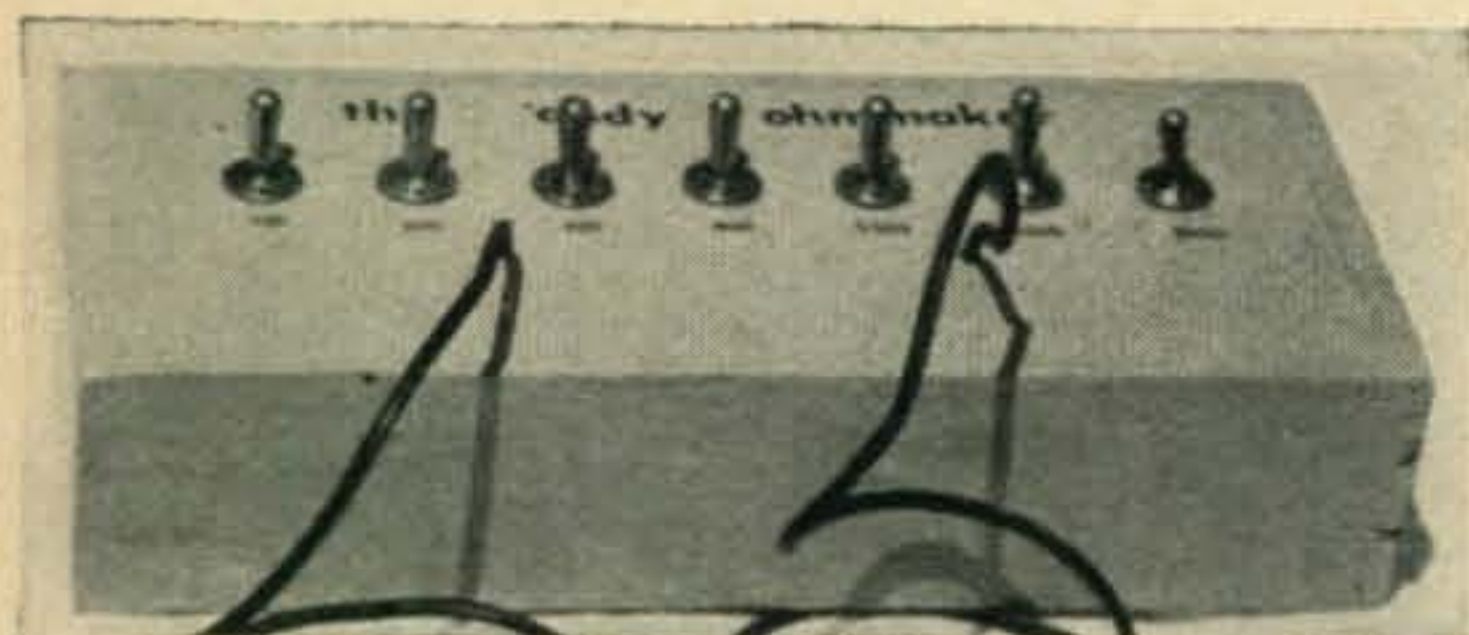


Fig. 1—Circuit of the ohmmaker.

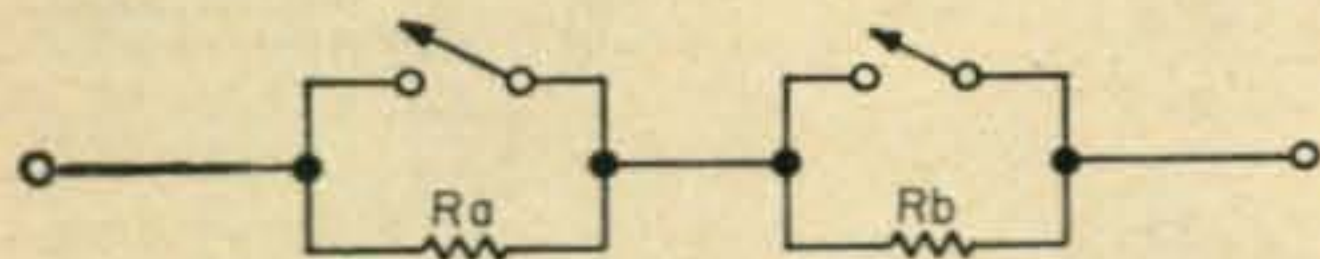


Fig. 2—In a circuit such as this, possible resistance between terminals is either  $R_a$ ,  $R_b$ , or  $R_a$  plus  $R_b$ . When values of  $R_a$  and  $R_b$  are properly proportioned— $R_b$  always being equal to twice  $R_a$ —and the number of resistor-switch units in the circuit equals  $N$ , a total of  $2^{(N-1)}$  different resistance values can be obtained. With seven such units, nearly any value between 1,000 and 155,000 ohms is available.

If you build your own equipment, and like the author, do not own a small fortune's worth of test gear and decade boxes, you probably shudder in horror when you get to the line in the article which reads, "Value of  $R_1$  must be adjusted after construction for best performance."

If so, friend, cheer up. The 'andy Ohmmaker is just the thing for you. With its seven switches and as many resistors, it can produce any value of resistance within 15 percent tolerance between 1,000 and 155,000 ohms.

Its principle can be used to create other sizes of ohmmakers as well. If you should need them, six more switches and resistors will extend the range downward to one ohm, giving you the opportunity to go mad trying to decide whether 124,973 ohms gives better results than 125,001 ohms.

I picked the 1,000-150,000 ohm range because the gadget was originally wired up to help pick plate load and screen resistors in transmitters and audio circuits. For all-around amateur use, the range from 100 to 15,500 ohms might prove better. If you want it, simply divide all resistance values which follow by 10.

## Binary Notations

Computer experts may have already figured out how the ohmmaker works. Those of us who don't have a working knowledge of electric brain circuitry (which includes the author) may get an introduction to it.

The circuit is based on binary notation: These two-dollar words mean a system of counting figures with only two digits.

In other words, if you base a number system on just two digits instead of 10, you have a binary system. It gets confusing in a hurry, however, since the familiar number five comes out as "101".

The basic idea revolves around the fact that while one plus one equals two, one plus two equals three. And with one and two to start with, you have a choice of one, two, or three.

For example, one by itself is one. Two alone is two. And one and two are three.

Now take one, two and four to start. By



binary notation, these are 001, 010, and 100. By simple addition, you come out with anything from one to seven.

Add eight—or in binary, 1000—to the basic list, and you can produce any number up to 15.

Obviously, you can carry this to extremes. One version of the ohmmaker in its drawing-board stages used 20 switches to produce 511 separate combinations.

It was discarded, however, after four hours' worth of calculations resulted in values for only a third of the possible products. Besides, anybody who wants a substitution box covering the range 100 to 51,200 ohms in 100-ohm steps can do it with less parts another way—but we'll come to that later.

The basic ohmmaker, then, has four switches and four resistors in the ratios one to two to four to eight.

Rather than carry out a higher range in one system, it was decided to build two systems which would work together. If this is clear as mud, read on. It gets thicker before we're through.

Going back to the basic system—one, two, four and eight—which can be combined to produce any sum from one to 15, read the numbers as thousands of ohms of resistance.

The result gives you any resistance from 1,000 ohms to 15,000 ohms in thousand-ohm steps—useful in itself.

But three more switches can more than triple its usefulness.

Included in the range of the first "stage" is the value 10,000 ohms—the sum of 8,000 and 2,000.

Take this 10,000-ohm combination as the first resistor of a stage in a second unit, follow it by 20,000 ohms, 40,000, etc.

Result—you can take your pick of resistance with 15 percent tolerance limits between 1,000 and 155,000 ohms.

### Construction

Mechanically, the ohmmaker is a simple affair. A strip of wood, metal, or what have you is used to mount all seven switches in a line—or however you want to mount them.

The resistors are wired across switch terminals so that each switch, in the "on" position, shorts out its associated resistor. All switch-resistor units are then connected in series. A terminal connection at each end of the string completes the ohmmaker.

All switches in the "on" position results in a dead short, or virtually zero ohms. Opening the 1,000-ohm switch inserts the 1,000-ohm resistor in the line. Closing that switch and opening the 2,000-ohm one gives you 2,000 ohms between terminals, while opening both puts the resistors in series and produces 3,000 ohms.

If all switches are marked with their resistance values, all you need to do to take your pick of ohms is to add or subtract.

### Operation

Here are a pair of examples which should make the whole confused thing a little clearer. To start with, let's say your calculations show a screen resistor of 148,000 ohms is right for that new rig.

Take your desired figure, 148,000. Subtract the largest resistance you have available on the board—80,000. Throw that switch. You still need 68,000 ohms.

Subtract the largest value you have left—40,000—and throw its switch. Still, you need 28,000.

Now subtract again—20,000—and have 8,000 to go after throwing the third switch. You still have a switch marked 8,000, so throw it, and there's your desired 148,000 ohms. If your ohmmeter will measure that accurately, check it and see.

But after a series of tests, you wind up with more or less resistance in the line when the rig is at the point of best operation. You don't want to leave the ohmmaker permanently connected to the gear, for you're going to need it again next time you start building.

Just note down the values on all switches thrown to "in" and add them together. Say you have 40,000; 80,000; 8,000; 2,000 and 4,000 ohms thrown to "in." Your total value is 134,000 ohms.

At this point you have two choices, since that's a non-standard value. You can either make it up with several standard resistors—say a 100,000-ohm, a 30,000-ohm and a 4,000-ohm unit—all in series, or you can pick the closest standard values above and below the ideal, flick them out on the ohmmaker, and find out just how much difference it makes.

### Range Extension

To extend the ohmmaker's range downward as mentioned earlier, simply use the same stage-combining stunt used here to go up. In place of the 1,000-ohm resistor in the units as described, use the 800-plus-200 ohm combination of an ohmmaker designed for the 100-1,500-ohm range, and so downward into the tenths of ohms if you like.

Accuracy of the unit, of course, is limited to the accuracy of its individual resistors. So is power capability. The unit here uses 5-watt resistors below 4,000 ohms and 10-watt resistors on the higher values.

And there are a few holes in the coverage at higher values, but accuracy is within 15 percent. For instance, no values between 15,000 ohms and 20,000 ohms can be set up—but if calculations show need for a 17,500-ohm unit, either 15K or 20K will be within 15 percent of the target quantity.

Keeping these things in mind, however, the 'andy ohmmaker is one of the 'andiest gadgets in this 'am's shack. Try one and see!



The LPA-1 Grounded Grid Amplifier and the LPS-1, its associated power supply.

CQ Reviews

## The B & W LPA-1 Grounded Grid Linear Amplifier

Frank Anzalone, W1WY

It's not that I was unhappy with the performance of my B&W 5100-B; I had increased my country total some 30 points in the past year. But with the competition becoming keener and the DX more elusive, the need for more power became apparent.

Since CW operation was still the primary requisite, with SSB next in importance, any of the many advertised finals would probably fill the bill. However I already had upward of 135 good clean watts of *rf* and I could not see wasting a good part of that output in a dummy load.

A grounded grid linear seemed like the answer since this type of amplifier requires plenty of drive. And it's good to know that little of this will be wasted since most of it would find its way to the output circuit and the antenna.

A letter to Tom Consalvi, W3EOZ, at B&W brought fast action. Within a week I was unpacking their new LPA-1 Grounded Grid Linear Amplifier and its associated power supply, the LPS-1.

It can be seen from the illustrations that considerable restyling has been done outwardly and the new model is now a 2-unit job. Electrically and mechanically, however, little change has been made, since the preceding models left little to be desired in the way of performance.

The *rf* section measures 9 $\frac{3}{4}$ " by 18 $\frac{1}{4}$ " and is 16" deep, while the power supply is 8" by 17" and 14" deep, seemingly small for a high voltage supply for a KW amplifier.

Like its predecessors, the LPA-1 uses a pair of 813's connected as high-MU triodes, but is now rated at a full KW input on CW as well

as SSB, and 375 watts as a linear on AM phone.

Quite naturally the pi-network tank coil is a B&W 850A inductor, a familiar item in many high powered rigs. The special tank condenser is a two stator job, one of low capacity for the 14, 21 and 28 *mc* bands and the other a higher-C section for 7 and 3.5 *mc*. The latter section is automatically switched into the circuit by a lever ganged to the band changing switch on the 850A inductor.

The antenna loading condenser, a 1500 mmf variable, is located under the tank condenser.

The filament transformer, bias supply, tube sockets and associated components are mounted on a separate sub-chassis. On the underside of the chassis is the B&W FC-15 bifilar filament choke, a very important item in a grounded grid amplifier, and also a popular item in many composite jobs. A third winding on the FC-15 provides a small amount of feedback, which, in conjunction with a small metal post mounted between the 813s, takes care of the neutralization.

The bias supply utilizes a selenium rectifier and a resistance-capacitance filter. The bias knob on the front panel controls the output voltage of this supply.

A cooling fan goes on automatically when the filaments are turned on.

No tuned input circuit is required since the input impedance of a grounded grid circuit is quite low and offers a good match to a driver having a low impedance output. A short length of coaxial cable, 5 or 6 ft., will do the trick.

So much for the *rf* section; now to the LPS-1 power supply. Under full load this unit draws 1.4 KW, which is not too excessive for a 115 vac primary supply. Don't be disappointed by the size of the *HV* transformer when you remove the protective cover on the unit. It will more than handle a full gallon on both CW and SSB and considerably more than the 375 watts on a continuous duty basis as required for AM linear operation. Modern design and high grade insulation have cut down the physical size considerably. This, plus the fact that the rectifier utilizes four 816's in a full wave bridge circuit, makes for a highly efficient power supply.

The filter is a single section choke input with a row of eight 80 mf 450 volt electrolytics in series. A 20,000 ohm resistor across each condenser divides the potential equally as well as serving as a bleeder.

This is modern design, son. The days of the "pole pig" and large oil capacitors are over.

A tune position on the control switch inserts an electric heater element in series with the primary of the plate transformer, reducing the output voltage and eliminating the danger of damaging the tubes or other components during the tuning process.

The power supply unit can be placed adjacent to the *rf* unit or remotely controlled. A separate panel is supplied for this purpose.

According to manufacturer's specifications, *rf* driving power requirements for CW or SSB

operation vary from 40 watts on 80 meters to 80 watts on 10 meters. Therefore the LPA-1 can be driven to its full input by most of the standard or composite exciters in the 100 watt output class. I repeat, 100 watts output. However fixed output exciters and those that fall just short of this figure can still be used with the addition of a model LPA-MU matching unit. This is a small, compact bandswitching unit designed to provide a correct impedance match between the exciter and the input to the LPA-1. Under these conditions a driver with an output of about 60 watts will fulfill the driving power requirements. The LPA-MU matching unit will fit in back of the 850A inductor and can be directly coupled to the bandchanging switch, thereby eliminating the addition of an input switching control.

Another model, the LPA-MU2 is designed for operation with earlier models of B&W grounded grid amplifiers.

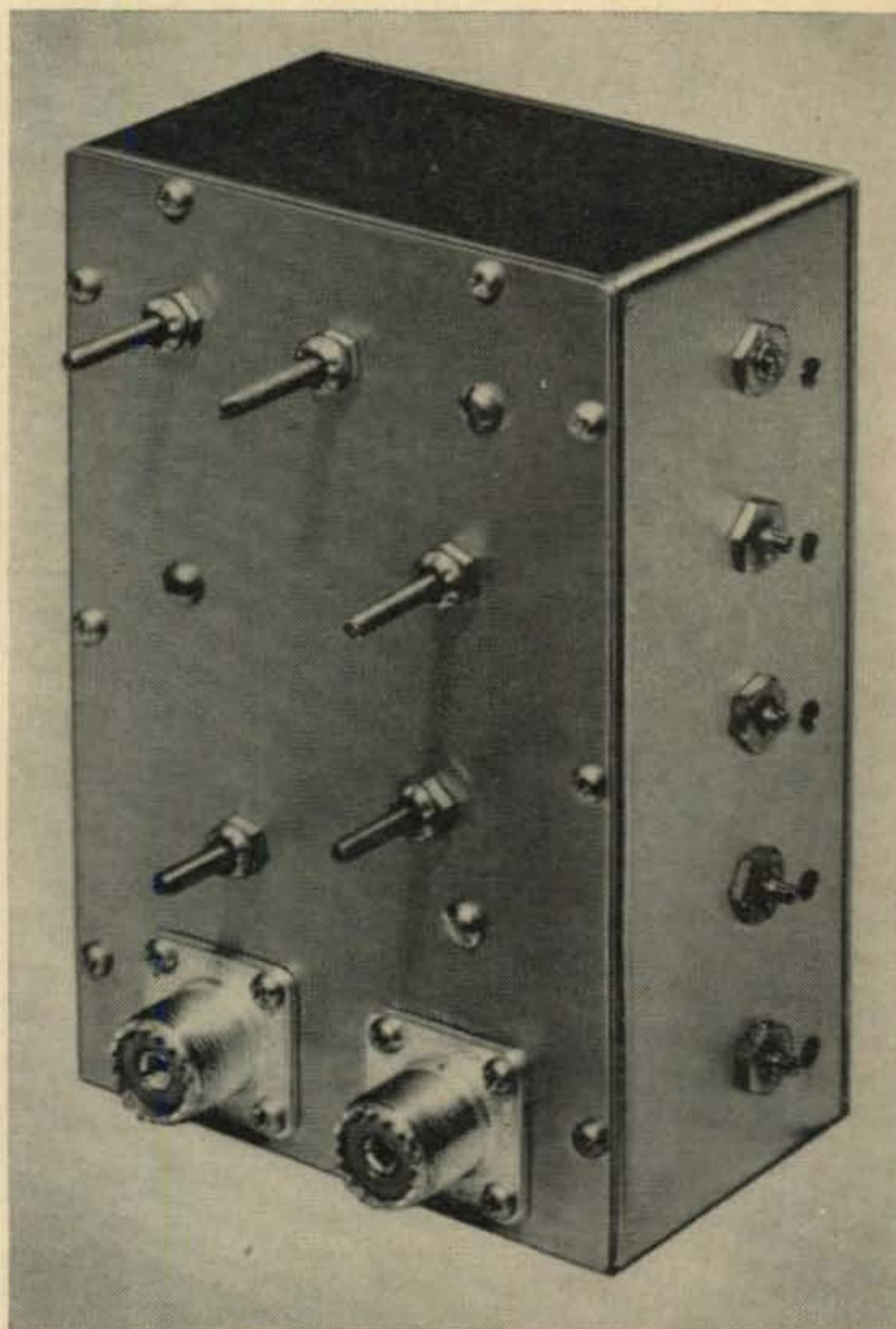
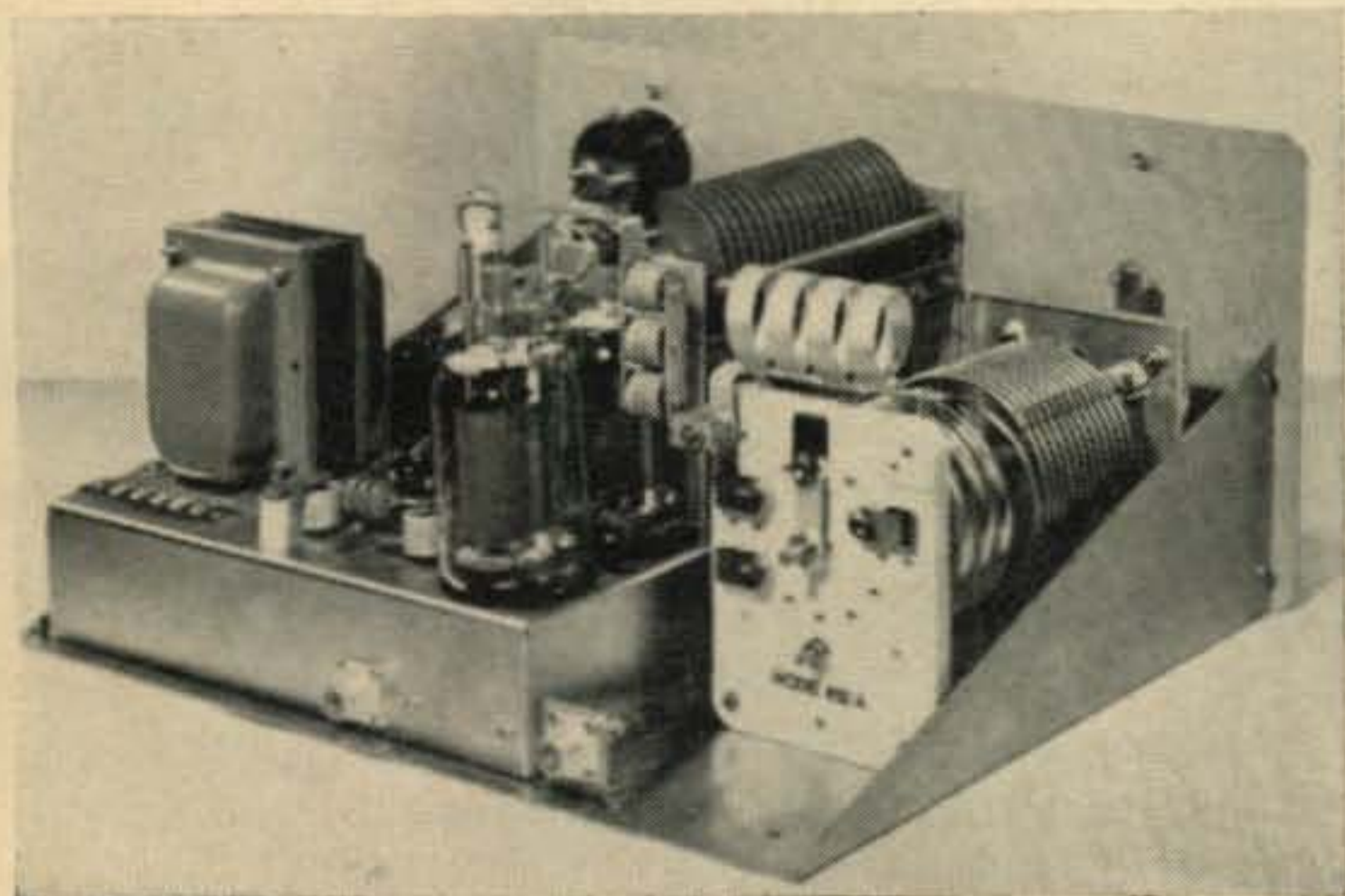
As mentioned before, the LPA-1 is rated at 375 watts input as an AM linear, but the best you can expect out of it is about 125 watts, if you're lucky, plus the 25 watts required to drive it (33 per cent efficient, remember?) So in my case it was hardly worthwhile since I could realize better than 100 watts output running the 5100-B "barefoot."

There are several things we like about the LPA-1. The low intermodulation distortion, a feature of grounded grid amplifiers. The use of

[Continued on page 100]

The LPA-MU Matching Unit. For use with fixed output and marginal output exciters.

Rear view of the LPA-1. In evidence are the 850A tank inductance and the special tank tuning condenser. Also the sub-chassis with the 813s and the filament transformer. Partially visible between the two is the cooling fan. Note the space behind the 850A for mounting the LPA-MU matching unit.



**Urban Le Jeune, Jr., W2DEC**

416 North 15th St., Kenilworth, N. J.

***DX DX DX DX DX DX DX DX***

The following certificates were issued between October 15th and November 15th, 1959:

**CW/Phone WAZ**

1192	W4HA	John McCaa
1193	W3AOH	A. F. Susen, M. D.
1194	W2UF	Jesse G. Sadler
1195	W3RBF	Olen D. Sickeler
1196	W9LSV	Harry J. Ockerlander
1197	K2HXL	Frank West
1198	W4IFN	Warren Snyder
1199	W9IRH	John Gohndrone
1200	ZL1PV	N. G. Gulde
1201	W7CAB	Walter Ryckman
1202	W3MJF	Ray Davidowski
1203	W3RZL	Clayton R. Brown
1204	W5DA	J. L. Young, Jr.
1205	W8QFA	William T. Parker
1206	K5BGZT	Mrs. N. D. Tilley
1207	W3KVQ	Ed. M. Blaszczyk
1208	VE3IR	R. S. Rennie
1209	W0BTD	Norman Harrison
1210	W2YTH	Thomas W. Winternitz
1211	HB9HZ	John Grange
1212	G3GYH	Edward Roy Boothroyd
1213	ZS6AJQ	A. G. Carmichael
1214	K4KOY	Frank Booth
1215	OZ8SS	Mogens Ambjorn
1216	W7CNM	Vernon D. Phillips
1217	G3JAF	A. H. Trigell
1218	W9LIL	Thomas D. Taylor
1219	K2JGG	Tom Hughes
1220	UF6FB	Serge Kiknadze
1221	W6UYW	Peter C. Kreager

**All-Phone WAZ**

46 OE2YL Inge V. Ehrmann

**CW WPX**

76	W2GT	A. Edward Hopper
77	W8TTN	Philip F. Krichbaum
78	W5AZB	C. M. Sandidge
79	W2HO	Willibald Vollkommer
80	W0SNL	Don Palmer
81	PY4AO	Arquelao S. Gomes
82	SM5AHJ	Nils Aastrom

**SSB WPX**

16	K2HEA	Irv Strauber
17	MP4BBW	Ian Cable
18	W3MAC	Lewis J. Papp

**Phone WPX**

10 DL3TJ Gunter Halbauer

I have had many requests to publish a complete listing of all WAZ holders. After much research and digging into dusty files, here it is . . . . . Please excuse any mistakes as some of the records were REALLY ancient . . . . . The listing is in the order in which the certificates were issued.

W2BXA	W3LOE	G4CP	W8JIN	W6ITH	W3RUT	4X4RE	G8KP	W9OTS	W4AAU
W6VFR	W6SN	VE6GD	W8NBK	W8KML	W8DHC	W6TXL	W5NUT	OK3EA	W3NCF
W6PFD	W6AYZ	VE7VO	W6AUT	KL7UM	W6UQQ	W9QIY	OKZ3HM	GM5RH	ZS1OU
W6SAI	W6DZZ	VE7GI	W6AUD	W0HX	W8BF	VE1EP	W2GT	W1KXU	G8KU
W6ITA	W6UCX	W6EYR	W6DFY	KH6PM	W6ALQ	W6FOZ	W3LMO	W9MQK	UB5KAB
W6MJB	W6LN	W0SQO	W0NVC	I1AY	W6OYD	W4MR	ZC4IP	W2ZVS	W4VPD
W6SA	JA2KG	PY1DH	ZS6FN	W8DAW	W5RS	W6YMH	CN8JX	W9QNO	W1BIL
ZS2X	W6UZX	PY1AHL	W9DUY	W6AM	KL7MF	W2NUT	W3NKM	W6ETJ	VE3KE
W6LEE	OK1LM	W6VE	W8HUD	W6CG	W3EPV	W5CEW	W6RZS	W3ALB	W6NJU
W8HGW	W6MX	W1FH	ZL1GX	CX2CO	G6YQ	W6EFR	W2HSZ	W5DML	W1ZW
VE7ZM	W6CZY	W6IFW	OK1RW	HB9X	W9UXO	W4KFC	VOLDX	W3IMV	W9KXK
W6ADP	PK6HA	G5VU	KP6AA	W7RT	W3CGS	W6LTX	JA6AO	W2OBX	W2QJM
W7FZA	W6PQT	W2PEO	KP4DA	ZL1HY	W6QNA	W6CYV	PY1HQ	OY6ML	K6AYA
W6TI	W6CEM	KG6AL	PY1BG	W1DQH	W5BZT	W5GNG	G8KS	W8EWS	W0AJU
W6LER	W6IBD	W7ENW	ZS2EC	W3AXT	W5FXN	W0SYK	W7SGN	JA7AD	JA3BP
W6WKU	W3BES	W6OBD	W3IXW	G8JD	W8GLK	OH5OP	W2DGW	OH2LA	HB9ET
W6YZU	W6MUC	W6BUD	G5GK	W8PQQ	W5ABY	OH1ST	W7ADS	W1MV	DL7CS
W6FHE	W6AVM	W6LS	W6NGA	ZL2GX	W0QDF	G8FW	W8IRN	W0QYE	W9HCR
G2PL	W6MVQ	VK6SA	W6SR	W8CDT	W0BFB	G6XL	W4EO	KP4KD	DL3BJ
W6AMA	W6RBQ	G3ATU	DL1AU	W4AIS	W3ECR	SM3BIZ	W2HZY	W7QON	G3GFG
W7BD	W6GRL	ZC1CL	ZS6A	VK3NC	W8DFQ	JA2BL	W9BPW	CO2SW	SP7HX
W6NRQ	W6TS	W4AIT	W0FFY	W0ANF	W9IU	JA8AA	W9GDI	IT1TAI	W3JZY
W6RDR	I1IR	W6ID	VK2VP	CN8MM	W3VKD	W5OLG	W4CXA	W6FZL	W9YOR
W6TT	LU6DJX	KH6QH	W3CPV	W6TPJ	W6KBC	W3SWV	W6SQP	SM7YO	PA0FX
W6PB	ZL2GX	G6QB	W6BUO	W8KML	W7PHO	W6CHV	W2QHH	LU7AS	ZL1AH
W6DUC	W6GDJ	W6ONZ	ZL2CU	LU6AJ	W6ZUI	W1ICP	W3KPI	DL7EN	ZL2HP
W6ENV	W6LRU	G3YF	KH6MG	4X4DK	W3DRD	5A5TH	W4DQH	ON4TX	ZL4BO
W7AMX	W6RLN	VK6KW	W6FHW	W3WV	W9EU	OK2AG	W1ZZK	K6EC	W2BYP
W7DXZ	W2AQW	W0ELA	PY2CK	W8UAX	W6KYG	W6CGP	W2BBS	W6ZZ	W3AYS
W6PCS	VK2QL	ZS6DW	KG6GD	W5ADZ	W6UJ	W7DJY	VE1PQ	W9KA	VK3CX
W7DC	VE3BZ	KH6PY	W5FNA	VE8AW	OK1MB	W7BGH	W1FFO	W5IAH	LU5AQ
W6MLY	W0UOX	I1KW	DL1IB	W2HMJ	DL9PX	PA0VB	W8TLL	K2CD	G8QZ
W6BAM	VK2ACX	KH6VP	VK2AM	W5JUF	HB9NL	ON4FQ	W9FDX	DL3BK	G3FPI
W6FSJ	W6DLY	ZS2CR	W6HJJ	K5ABW	SM5AHK	OZ7BG	W5NW	W5MMD	W2HQL
W6OMC	CE3AG	W6JK	W7BTH	JA1AG	W1TYQ	SM5CO	W8CQ	G3FXB	DL9TJ
W6NNV	W6PH	W0PWQ	VS6AE	KL7PJ	W0BCI	DL1KB	W0KOK	W0VBQ	K6EDE
W6AAN	G8IP	W0DU	CR9AH	W0AIW	W6ZVQ	W8OYP	G4TM	W2OGE	W1LHZ
W0YXO	OK1WX	G8IG	W3BHV	W9YFV	W7FB	W5LP	W5LGS	DL1GU	W9PQA
W0NTA	CX1FY	G2VD	VE7KC	W7AC	W6NIF	G3FKM	W6CAE	HB9MU	W0SNL
W4BPD	G5YV	VK4EL	W6NZ	W2LPE	W8BSH	W4TM	ON4QX	OZ7SN	W2GNQ
W9NRB	W6BVM	G6RH	ON4QF	W3KDP	W9ABA	OH3NY	K6ENL	G6XA	W6CTO
VK2DI	W8BHW	KH6LG	G2MI	W4LYV	W9RBI	W9ROU	W2PZI	ZL1RM	OH5NJ
W6SC	W0OUH	KH6CT	ZS2AJ	W4GXB	W5PZL	W6KEK	PA0LY	W5MY	OH3RA
ON4TA	W6BAX	W5GEL	SM5LL	W9LMN	W8DMD	OK1JX	W9EHW	LA4DD	HB9UL
W9KOK	W6GAL	W2JVU	SM5KP	W5UX	W7KTN	W4EPA	W9GIL	GM6MD	PA0RLF
ON4JW	W6LDD	W2AGW	W8PQQ	K2DCA	DJ1BZ	W6NHA	W5URU	W3DBX	OK1AEH
W6AM	W6EFM	W8BRA	LU8EN	K2GFQ	YU1AG	W3DEC	F9MS	W9ESD	W9QLH
G3DO	W6TEU	VK5JS	OH5NK	W8JBI	W1BFT	KL7BHE	VE7MD	ON4DM	K6CWS
W2IOP	W6WWQ	W9VND	DL1DC	W8MPW	ZU2MD	KL7PIV	DJ2BW	OK3DG	ZL3GU
W6BPD	W6EPZ	VK2WS	W6LW	W2ZGB	W6YMD	W8TMA	OH1QE	SM3AKM	K2QXG
JG5BJ	PY1AJ	KH6CD	VQ4ERR	W4ML	W7MGT	DL7AB	VE2WW	LA2B	ZL2AI
W7GUI	W8SDR	W7LYL	G2LB	W5CKY	W6MJJ	G8GP	GM3EST	W9YSX	W1NLM
W6PKO	KH6BA	W7KWC	W5KUC	W6GMF	W6KSM	W3WGH	W0PGI	VE7JB	PY1HX
W6AOA	W6SYG	W6BZE	W6DVB	W0NLY	VK3YL	W5AWT	K9AGB	W8DEN	K4LPW
W7BE	W6KEV	OE1CD	W6LGD	W6DBP	VE6NX	VE3QD	KH6AYG	W2SUC	W5TIZ
W6KUT	W6TZD	VK2HZ	G4MJ	K6ENX	DL1GV	W0QGI	K9DNR	W5QN	W9TQL
W6DI	W6UHA	W6EHV	W6CTL	W3ZAO	W2CNT	W4AIX	DL3AO	DJ2LK	W4GRP
W4CYU	KH6MI	CE3DZ	SM7QY	W2SAW	W7HKT	W2LAX	DL3RK	DJ2LM	W1QJR
W6MEK	W6MHB	W6DUB	F8BS	W9VIN	W8CLR	W2TWC	G3BHW	W7GHB	GI3AXI
W6PZ	VK3CN	G2IO	G3AAE	W5TPC	W3PGB	W6EYC	W1BGA	OH2TM	ZL1AJU
W7GBW	W6CIS	W6IDZ	W7HXG	W5FFW	W8VLK	W7AJS	W4JAT	W2LV	G3HCL
KH6IJ	W6PUY	I1XK	G8IG	W4LZF	SM5BCE	W8KPL	W8HMI	W1ZD	W4VYP
VE7HC	W6HX	G3TK	W7GUV	W1BIH	K9BVR	W0VBK	F8EJ	W2IRV	I1SM
W2CZO	W5KC	W4CYY	W8KIA	VE6VK	W2GVZ	W2AYJ	W7WVE	OK3MM	VK6DX
W6QD	W7KWA	VK3EK	W1GKK	W6ZEN	W1JYH	W3FYS	W9BZB	K2BU	5A5TE
W5AFX	OK1CX	VK5KO	W9FKC	JA1AA	G3HLY	JA5AI	W3KZQ	W0YTL	W3MJF
G3AZ	VK3JE	OK2SO	W8SYC	DL1BO	W7QGF	OH5PE	W6SUQ	VK4DO	DL7AD
W6EGB	W6WB	DL7AA	W9YNB	W9FJB	W2KUW	K6EVR	SM5KX	W2DSU	W1EOB
W6RM	VK4HR	DL1FF	W9FID	JA1DM	W0QVZ	W2MUM	W6RLP	F3FA	W8ONA
W6KRI	OK1HI	W6NTR	W9HUZ	SM5KV	OE1BH	W7HIA	W9JUV	CX1BZ	W3GEN
W1AB	W6OEG	ZL1BY	HB9J	W8UPN	VK4FJ	W1QNC	W3AS	DL6YK	G3GSZ
ZL1HY	W6EAK	W7OY	W8WZ	W2PTI	W7GXA	W8YIN	ZL2AFZ	W7AQB	W4BYU
OK1FF	W6CYI	W6ATO	W8TTS	FA8RJ	OH2YV	W6TKX	F8XT	SM3AKW	W1HZ
W3EVW	W6JZP	PY1GJ	PY2CK	SM7MS	OH2XK	DL7AH	W8AE	W9WSQ	W6NXP
W6RW	W6SRF	W7IYA	DL1IT	W6YY	W3JTK	W1FZ	W2FSN	SM5CCE	W5NOT
VE4RO	W6RLQ	W6BUY	W7VY	W5HDS	VE3JZ	F3AT	W2REF	W2SSC	W6BYH
W6SRU	ZS6CT	W3GAU	W6GFE	W6GPB	VE6MN	W2WS	W2IWC	G3IOR	K2PIC
W9VW	W9NDA	W3IYE	KV4AA	OK1KTI	W4LVV	OE1FF	W9ABB	G3AJP	W6YK
G3AAM	G3BI	W3JTC	G3DOG	W4QCW	VE3DIF	W6KG	W1PFA	W2BRV	K4PDV
W3GHD	G2FSR	VK6RU	W4AH	HB9EU	W8CED	K6LZI	W0GUV	W4BJ	W6UOV
W6BIL	W6PDB	W3JNN	GM3DHD	LA3DB	W2JT	OH2HK	F3YR	OE3RE	K5ADQ
LA7Y	OK1SV	W3KT	W6CUQ	W5EGK	W6OME	W3LMA	DL3FM	W5OGS	W0RBA
G6ZO	W7ASG	VK5MF	W2UFT	W2TQR	W4OM	W2AZS	OE3WB	JA6AD	W4FFV

W2HTI	OE5JK	W1WY	JA1GC	W3RPG	W3LUD	KØDQI	K4QIJ
SP8CK	PAØPN	LA1K	W5WZQ	OH9RD	G2AJB	K4IIC	W9KMN
W2OTC	F9RS	EI9Y	K6TXA	W9MUJ	EI3R	W2FXA	W8UMR
HB9KB	DL7CW	OH1TM	JA1BF	W6UNP	F3DM	W3KA	VE6AO
G3BKF	KL7PI	SM5WI	K9ECO	W6AFI	ON4LB	W2PTD	W8SZS
W5QVZ	WØFUH	W7IWH	G8UG	W1GYE	G3GGS	K9CJK	
JA1AB	W2HO	K2KCE	W7CSW	VE2AIO	W2VND	W8MCC	
HB9GJ	W9RKP	W6PLK	W8JSU				
W9FVU	W2FBS	UA4IF	VE7ZK				
W8TJM	W3LMM	SM5AQB	W1WDD				
DL1IA	W2RSR	W5KLB	WØBSK				
G3KHE	W2FXN	9S4AX	KA2NY				
JA2JW	K2UPD	W6KYT	W6FLT				
UA9DN	CN8DJ	W3IPO	F9ER				
W9SFR	OD5LX	SM5WZ	OH2HW				
W5CE	WØFNN	W4PLL	VE3CFG				
4X4CJ	K2OEA	W4OPM	W9WCE				
G2YS	WØMLY	W4CYR	VE3EU				
G3EYN	W2KED	SM5AQV	W3SOH				
OK1XQ	K4BVQ	W2TVR	W4IMI				
OK3AL	W2BOK	W3MFW	CE3HL				
HB9KC	W8QFR	W4DHZ	K5KBH				
OK1LM	W6WTH	W7EJD	HB9MQ				
DL1ZN	W2AEB	W5DRU	ZS6IF				
PY4AO	OH5RH	W3JKO	K9AVQ				
WØVKB	W1AZY	W6WO	W5PQA				
DL1DX	K6RWO	K5LIA	KH6DQ				
DL1QT	VE7SB	W4JV	G3VA				
OK1CG	W7AUS	W3OP	W3UXX				
KH6KC	ZL3DX	UA3BN	PAØVO				
CN8GU	SM5ARR	SM3EP	W9INN				
W3EPR	KØDMY	W4SXE	W1OJR				
W1LZE	VE5TK	W7YGN	W8CWY				
W2UVE	G3ESY	SM3AGD	W7FLD				
W2CWK	DJ3JZ	W7PB	W7DAA				
F8VQ	W6WJM	WØAGO	W1IJB				
W10OA	SM7TQ	W9UX	OK1KKJ				
WØLVA	KH6BLX	DL6MK	W1AJG				
SM3ATY	KH6BTX	KØHOB	SP6RT				
OE1RZ	SM2BCS	SM5AJU	I1ER				
HB9MO	KH6AUJ	W9WHY	W2BAC				
K2CPR	W3WU	K6OXU	K2OLS				
W2EQS	DL1MF	WØUQY	VK7LZ				
W1BLO	LA7Z	W6VSS	VE6JR				
EI4Q	LA8LF	W3ARK	W6QDE				
OK3EE	SM5CXF	W6GSL	W8JRB				
W1OOS	JA9AA	W4KWC	W1ODW				
W3BCY	HA5BI	K6KJR	W4YGG				
K4HFS	G3CQE	DL3LB	OK1PD				
W5HJA	XZ2TH	W9WYB	OK2UD				
SM7ID	W9WFS	HB9TT	W4COC				
K9EAB	W8KZT	K6CQM	G2GM				
HB9IM	G3KKP	DL6EN	W7CKY/KL7				
W2GDX	UA1CB	DJ2AE	UC2AA				
W7ETK	ZL1RD	DJ1JW	UA9CR				
OH1PI	G3DXC	W5LGG	UA9CL				
W2VYX	VE2YU	W4AZK	UC2CB				
W3KFQ	JA3DY	W9EXY	VQ2GW				
K6JQJ	VE3BWY	DJ3KR	K6GMA				
W2DS	W2SHZ	W3EOB	G3CSL				
K2GMO	JA2AT	UR2BU	W9VZP				
F9IL	WØZYB	K6AQP	DL6DE				
F3CB	WØCDP	W3CA	W7NRB				
K2FC	OH2MB	K4LNM	K6CYO				
OH3TH	VE2NV	W4NBV	W6BIF				
G3HFJ	W3DWY	W9IWX	W7AHX				
W6GMC	K2LWR	VE7KJ	W6BYB				
DU7SV	OH7OU	W6RAN	W6BZ				
VE8PB	W2AYU	IT1ZGY	VE3CIO				
ON4MN	W6NWI	EI9U	W6ZMX				
G3JHZ	W1DHO	W6ONK	W6JHV				
W2TXB	W4UXI	WØAZT	I1FO				
VK7CH	W9QGR	W5PM	W6MUF				
W3BQA	DL1LZ	W5BRR	W7ZOH				
DL3LL	VE3RE	W8CWY	KP4YT				
W8DLZ	K4GSU	K5LZO	SM5BPJ				
W6CZQ	W6KIQ	W9DYG	K2VUI				
OH6OA	K4AW	W6SIA	W3AEL				
G3IMV	GW3BNQ	K4RID	WØEWH				
PAØLOU	W6OSU	OK1MP	DL3DD				
PY3QX	F8TM	4X4KK	G8JO				
OH3RS	W1EQ	DL6OS	G6BS				
W1OTX	I1ALU	JA1CC	G3FUR				

### ALL-PHONE WAZ

VQ4ERR	4X4DK	HB9J	ON4DM
G8IG	OK1MB	W6YY	W2JT
PY2CK	CX2CO	GW3AHN	DL7BA
W6ITH	W6GVM	W2BXA	G3FXB
W6AM	W9NDA	W2DEC	W6YK
ZL1HY	F8DC	W9WHM	W2HTI
W8PQQ	9K2AZ	ZL1KG	W7PHO
ZL2GX	W5KBU	G8GP	ZL4BO
CN8MM	I1SM	W9YSQ	G3BYM
W8KML	G3HLS	W9YSX	DL7AA
LU6AJ	W9RBI	SM5CO	W7MGT
			I1AOF

### "Ether Waves"

The following is an editorial by Frank, K4-OCN, which appeared in a recent copy of the "Ether Waves," the publication of the Ohio Valley Amateur Radio Association. Because it is so timely and important, we will start this month's information with it.

"Let's get busy at the job of convincing our congressmen and senators that they should take immediate steps to legalize reciprocal licensing agreements with other countries.

We are spending billions for implements of war and untold amounts more for peace. We have a variety of foreign aid programs, student exchanges, groups of industrialists who visit other countries and last but not least, tourists. Much has been said about the exchange of students. It is undoubtedly a good program and helps people to know people of other nations.

All of these programs are good ones, but each of them costs the Government money. There is one program that could do as much or more than any other one program and would cost the Government nothing. AMATEUR RADIO. Amateur Radio creates, perhaps, more international friendship than almost any other single hobby, program or projects. Yet our Government has seen fit to "Hamstring" the amateurs of the United States by preventing them from carrying their hobby to foreign lands, where they could and would meet and make friends with peoples of all nations. In other words our Government will not permit reciprocal licensing agreements with other countries and subsequently very few foreign countries will allow American amateurs to visit their country and practice their hobby within their boundaries.

The reason for this ban is unknown to all or most licensed amateurs of the United States. As for a foreigner transmitting secret information, it would be almost impossible for him to do so, since the amateur bands are so very

heavily populated that there is no time of the day or night, that you could transmit on those bands without being overheard by hundreds of listeners. If a spy wanted to get information back to his country he would most certainly avoid broadcasting it for all the world to hear.

If our Government would permit reciprocal licensing with other countries, then amateurs from all corners of this country would visit other countries and other amateurs and pursue their hobbies collectively in friendship. There would be a meeting of peoples, a making of friends, and the cause of peace would be greatly advanced at no cost to the Government.

ARRL recently stated in one of their editorials that the whole subject had been explored and that for the present, there was nothing that could be done about it. Well, I have great respect for the ARRL and believe that every amateur should be a member, but now and then I do disagree with some of their views and this is one time that I must take exception to their conclusions. I strongly believe that there is much that we can do to bring about reciprocal licensing.

Our Congressmen and Senators are in office only because you and I go to the poll and elect them to their jobs. They know all too well that the hand that helps them up the stairs to the Halls of Congress is also connected to a foot that can kick them back down if they don't follow the wishes of the people who elected them. For this reason, Congressmen and Senators pay great attention to letters from people back home and if enough letters are received about a certain bit of legislation, it has much to do with their thinking and their voting, and you may be sure that if many letters poured into Congress, it would go a long way toward getting something done. This is a fight that could be greatly helped by many outside of the amateur field. Almost all people are interested in peace and if we can do a selling job to our friends and neighbors, we can enlist the aid of millions more people, all of whom have the right and ability to write their particular representative. Most amateurs have families and these too can assert their belief in the cause of reciprocal licensing. If all works well we just might muster several million letters into the Halls of Congress.

With many of our club publications being sent all over the world and our national publications reaching into almost every country, we might well enlist the aid of foreign groups to write their feelings to our representatives, stating that it is their considered opinion that reciprocal licensing would help greatly in international relations and friendships.

I believe that if OVARA will begin now to take some action in the matter and call for help from Amateur Radio Clubs all around the world, it is quite possible that this idea could snowball into a landslide of letters for Senators and Congressmen and if it should, you may be

sure that shortly thereafter, we would get some favorable legislation.

I believe that OVARA could prepare a list of points to be made in letters to their Congressman (not letters). Any writer could then use this list of points as a basis for his letter and put his thoughts in his own words. If we print a thousand copies of these points along with a detailed letter requesting help from other clubs and groups and then mail it to a thousand clubs both here and abroad and ask that they too get busy and supply their members with a copy of our points or a set of their own design, then no doubt, we would be on the way. It is believed that most clubs in foreign countries would welcome the chance to get in the battle and if they do, you can be pretty sure that in time we will win.

Of course, there would be some cost to publishing and mailing this material, but for a club so strongly devoted to DXpeditions, DX and contests, how else could we better invest a few dollars of the club's money. We can do it and we will do it, if the majority of OVARA membership are ready to roll up their sleeves and get in the fight. So, how about it fellas? It's your baby now."

I'm sure that everyone can see the good this program can do, not only for ham radio, but for world peace as well. We, as DX'ers, would benefit directly since our main interest is in contacting foreign operators, and we all know of DXpeditions which have been nipped in the bud because of lack of reciprocal licensing. So, let's get behind the OVARA 100% with our support. A QSL card to the OVARA, c/o K4-OCN, P.O. Box No. 7, Burlington, Ky. is all that is necessary to let them know that you are going to support the program and it will be greatly appreciated. It will be the first step in getting this job done.

## Letters

**HL Korea**—The following letter was received this month.

"It is our great pleasure to inform you the present activity of amateur radio here in Korea, the Land of Morning Calm.

We have tried for the last several years to get the licenses of amateur radio stations and, finally, we got the license of HL9TA on the HQ of KARL and it is now on the air on 40-10m band, mostly on 20m phone, with 50w rig.

HL9TA is, of course, a club station with 6 operators, CHO, RHEE, YIM, YOS, JOHN and the only YL ham in Korea, Miss Im. But the number of operators will be increased because this HL9TA is the only ham station licensed for Korean people.

There are also other 4 ham stations in Korea licensed as club stations to the Americans in Korea and the QTH's of these 5 stations are:

[Continued on page 94]



# ham clinic

CHARLES J. SCHAUERS, F7FE/W6QLV

CQ Magazine, 300 West 43rd St., New York 36, N. Y.

## Grateful Anniversary

This month marks the beginning of HAM CLINIC'S third year. Since its inception, thousands of letters and cards from hams the world over have been received and answered.

Some of the questions were difficult, some easy and others impossible. If you were one who did not receive a reply, you no doubt were one of many who forgot to include full name and address with your communication.

Many hours were spent (not only by me but by a few selfless volunteers) searching technical files, books, magazines, parts catalogs and making written inquiries regarding your information.

One letter from HAM CLINIC to one young ham ran over 5 typewritten pages, but the majority of replies were made by postcard. In any event, every effort was made to help you, the practicing ham, and our mutual hobby of amateur radio at large.

Living overseas temporarily has enabled us to see the ham radio picture from many diversified viewpoints.

I sincerely hope that HAM CLINIC has helped you—if it did not, you can bet that we are sorry and did try.

You might have noticed that some of the column is written in the first person while other parts are written in the first person plural—this is so because I (the *actual* writer) do not feel I should take all the credit for what is published—I have had a lot of help—expert and otherwise.

Mistakes made? Sure, we are only human and just another ordinary ham who loves the hobby.

In 1960 let us hope that we shall do better and extend our help. Above all, I would like to say, that you the readers of CQ and QST and WRA and CRA are the nicest group of readers a writer could ask for. Why? Because you are hams—that's all that matters to ME!

## Measurements on Beam Antennas

Hams who have purchased *some* beam antennas designed for 10-15 and 20 meter operation are disappointed when their own checks and tests disclose that the *vswr* and the *fbr* are *lower* than claimed by the manufacturer.

Sometimes when this happens they berate the product unmercifully without attempting to discover why *their* own calculations may be a "mite" off.

Complaints received by HAM CLINIC relative to *some* antennas may have been justified. However, after some exchange of correspondence, there is some indication that the test and check methods used by some hams are not always "according to Kraus."

It is true that antenna measurements of most manufacturers are often done under *ideal* conditions using the very best test equipment obtainable. If every ham could duplicate the manufacturer's tests he would have little trouble coming up with the same *swr* and *fbr* figures; but herein is where the trouble begins.

You cannot take a homemade impedance bridge (for example) and expect it to perform like those GR makes; nor is it always possible to choose one's test site.

Where some hams "fall down" in coming up with accurate test data is in the area of *instrument calibration!* Putting together bridges and field strength meters is not so difficult—but accurate calibration is—without a little laboratory help.

Another thing—the *rf* that "activates" the *swr* bridge must be harmonic free if accurate readings are to result. Trouble obtaining a real low (1-1.5 for example) *swr* is not always due to improper matching, it can be the result of "cross frequency" products.

Trying to adjust a beam and plotting *fbr* patterns when the beam is only a few feet off the ground is a practice that causes antenna engineers (of ham beams anyway) many sleepless nights. Of course, rough adjustments can be done in this fashion but you are only kidding yourself if you think *accurate* adjustments are possible when the antenna is mounted on a couple of barrels!

Height in the case of beams (especially) makes THE difference. Adjust a beam for a 60 foot tower then swing it down to 20 feet and see what happens! Your radiation pattern and *fbr* will change—make no mistake about it.

An actual radiation pattern from *any* antenna is a "concoction" of ground reflection and the free-space wave pattern. Another thing, if your ground (under the antenna) has good electrical and reflecting characteristics,



the antenna will work better. Don't believe it? Well then try an installation on real rocky, dry ground first—make your measurements—then try another installation of the same antenna on good moisture—full earth. Of course there will be a difference! Perfect ground conductivity is quite impossible to find, so the effective ground plane is always figured as being some little distance into the earth itself.

A few points to remember when checking out beam antennas:—make sure your coaxial cable is of the proper impedance and that it is properly connected to the antenna electrically. If you buy surplus coaxial cable, make sure you are getting 52 or 72 ohms as called for by the beam manufacturer. Check your bridges against at least 2 and preferably 3 others for calibration. Make sure that you're *not* measuring harmonics (especially the "subs"). Remember that man-made objects as well as nature's trees, bushes and so on can throw off your field strength measurements. Be sure to use an antenna on your field strength meter that has the same polarization as the antenna being checked. Pick a cold dry day to do your measuring and *do* re-check your adjustments on a rainy day—there more than likely *will be* some difference. Do follow the manufacturer's recommendations on installation and if you find that your beam is not "acting" as it should, Do write to him, and explain how you installed it; checked it out; what you are feeding it with (line and type of transmitter); what your readings are and ask for his advice. You'll find that he will usually come through and patiently tell you all he can.

I know it is disconcerting to feel that your antenna is not operating just like you want it to—even if you *are* in a poor location. But remember this before you get angry and shoot off a letter you may be sorry for later—every manufacturer can certainly prove to you that his figures are correct on *swr* and *fbr*—as well as gain.

What you are interested in is not the ideal test setup and how the antenna worked at the factory—you are interested in making it work properly at *your* location with *your* equipment. It can be done—IF you'll take the time out to find out *which* antenna will work best at *your* location. As pointed out before, there IS an antenna for *nearly* any location—one type may work beautifully one place and poorly in another—to find out takes a little trying—but we all must (in one way or another) live with compromise—don't expect a dipole to do the job of a rhombic nor the all-band unit to do the job of a well designed single-band beam—not yet anyway.

## 72 and 75

"The two messages you suggest 'Peace and Friendship' (72) and 'May God Bless You and Yours' (75) would certainly help to convey

our country's deep spiritual heritage and our people's desire for a just and lasting peace. . . ."

These words from our Vice President, Richard M. Nixon are deeply appreciated as well as the many cards and letters received from radio amateurs throughout the world.

It was quite a thrill for me, I assure you, to hear these signals transmitted by other than American voices!

Let us hope that we hear them *more* and *more* throughout the New Year—if we do, you can bet that the American ham's heart will be in them!

## Questions

### Scope

"Please give me the proper method for connecting up a scope to my af generator to give me an elliptical pattern."

See fig. 1. If you wish you can modulate either the vertical or the horizontal.

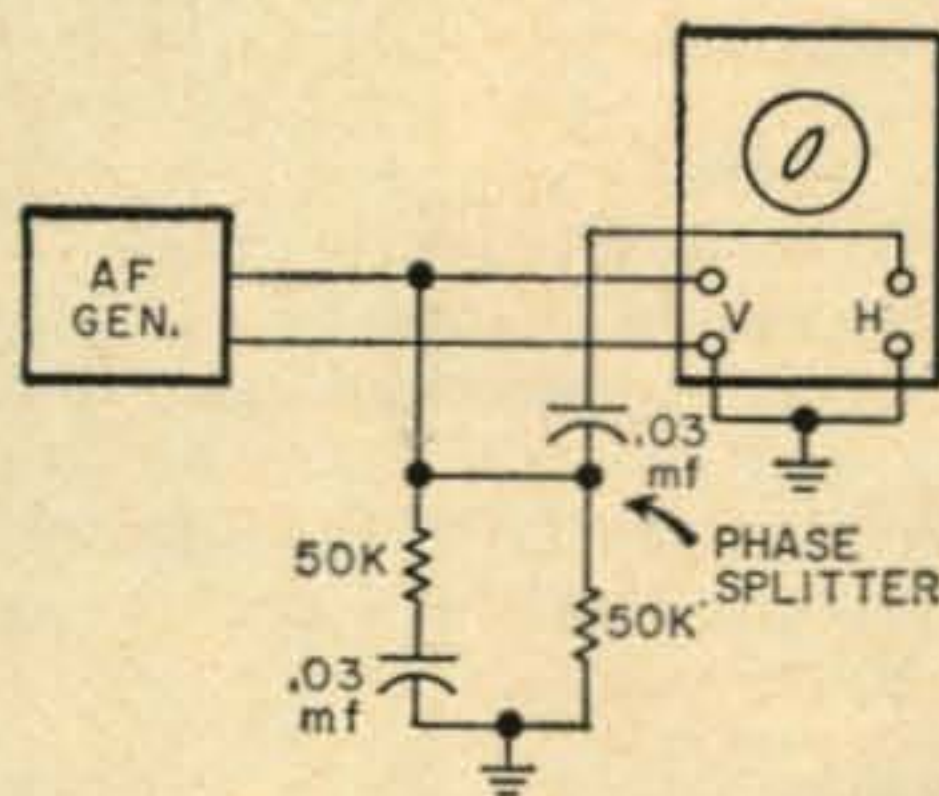


Fig. 1—Set up for elliptical scope pattern presentation.

### RF Mod %

"How about a diagram (make it simple) for modulating an *rf* generator signal and showing modulation percentage on a scope?"

See fig. 2.

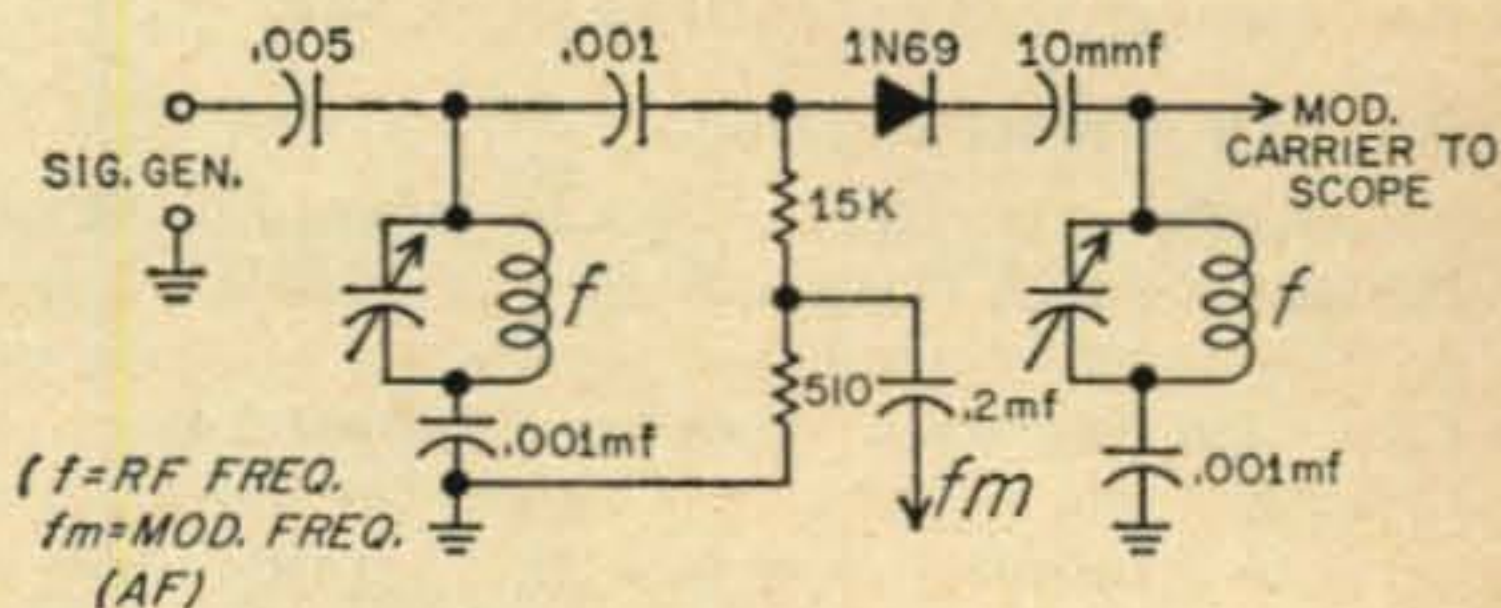


Fig. 2—Signal generator modulator.

### Better VOX

"I've tried different mikes but yet I cannot seem to get the SB10 vox to 'kick in' quickly enough. Anything to help sensitivity?"

Yes. First try a 68K resistor instead of the 100K in the 6AL5 plate circuit. Then, bypass the cathode of V1B with a one mfd condenser. This worked for me with a D104. I tried the system recommended by W2ALR described in

July 1959 QST using diodes (page 61). I recommend this too.

### Mike Transformer

"Suggest a transformer for a carbon mike feeding a *Raytheon* 2N363 transistor."

Try an Argonne AR 152.

### 75A1 Improvement

"I heard over the air that CQ at one time contained some information on improving the 75A1. What issue?"

Try Sept. 1951 and Oct. 1949.

### Product Detector

"How about a product detector circuit for my SX88?"

I could suggest a number but none would surpass the one described by Smith (W6GMC) in *Western Radio Amateur* magazine (Aug. 1959) "Smitty's detector is the "neatest" for the SX88 that I've seen yet. The November 1956 issue of CQ also contains a good one for this particular set.

### CR Tube Change

"Can I use a 5XP1A in place of a 5GP1 crt without major changes?"

No. Socket connections are different for one thing and the 5GP1 has no third anode. Too, deflection sensitivity is different. My new scope book for hams will contain such information. Hope you get one!

### Choke Broke

"I'm on my third choke in my power supply. The other two sputtered and shorted to ground. 1500 volts at 350 mils are involved. What cooks?"

Your circuit—and choke. Sure you're not "pulling the tail" (too much current) out of that choke? Take the choke out of the high voltage plus side and put it in the negative side—this will stop the arcing to ground. Also for that *first* condenser, I'd suggest a little less capacity—try 2 instead of 4 mfd.

### Buy An Umbrella, Joe!

"Here's one to tax your ingenuity 'doc'. Bought a small transistor *bc* radio which I use with a transistorized ham converter (*Regency*). Last field-day took it along. Operated it on a folding table outdoors. About an hour and forty-five minutes later the thing quit. Took it into a tent, checked connections, batteries, etc. (all okeh), took it back outside; operated for about two hours and she quit again. Took it back into the tent rechecked everything again, took it out—played again—about an hour and thirty minutes later quit again. Now you tell me."

Easy. Heat from sun I'll bet. Doubt this? Take back off the BC set and expose to the sun while playing—bet she quits! Next field-day—take an umbrella! (Please don't tell me it was raining!)

### 262 KC IF

"Is it possible to design and build a Q multiplier for a receiver having an *if* of 262 kc?"

Yes. 2-3000 microhenry slug tuned coils are available for this. But do remember that the "bandwidth" of a Q multiplier is a small percentage of the *if* frequency used. How much you reject or accept depends upon the percentage difference. You can figure from .1 to .3 depending upon Q of tuned circuit. Band pass (desired) must be figured for AM and CW bandwidth—too sharp for AM and you lose intelligibility. Even though you may be able to tune the Q multiplier through a band-pass—the *approach curve* is the THING.

### Voltage Too High

"I built up a nice transistor power supply for my mobile rig, patterning it after one available in kit form. Seemed to work okeh the first day. The next day, *blooop*, out went the transistors. The supply is mounted where there is little heat and I'm sure that I did not pull too much current out of it. Before I install some new transistors I'd like for you to tell me what the *possible* cause is."

Sure—too much voltage from your *generator*. Sometimes 2 or 3 extra volts will make a difference! Check your gen output with the engine revving up. Suggest a dropping resistor—better to have less than no output at all. You still had heat "brother"—no getting away from it—heat sinks work but not too well when there's too much voltage.

### More Audio

"I have a receiver using a 6AQ5 feeding the speaker. I'd like more audio. What is the best way to get it?"

If you have enough voltage and current for two 6AQ5s why not add another one and make the output pushpull? Paralleling them won't accomplish anything, you'd need an output transformer having about 1/2 of its former primary impedance—and you'd still need the extra current. The only way to do the job properly is to change the power transformer and revamp the whole output circuit. Or you can do as a friend of mine did, use a couple of power transistors instead of the 6AQ5 and you'll gain a couple of watts or so; but this takes some doing.

### Voltage Tripler

"How about a circuit of a voltage tripler (using selenium rectifiers—no tubes—no transformers) operating on 220-240 volts *ac* to power a portable cw rig at an overseas location where only 220 volts are available?"

See fig. 3. Be sure you check for ground before plugging in. Mark your plug. For tube filaments you can use dropping resistors or even non-electrolytic condensers in series with the line. Portability however, indicates the use of resistors.

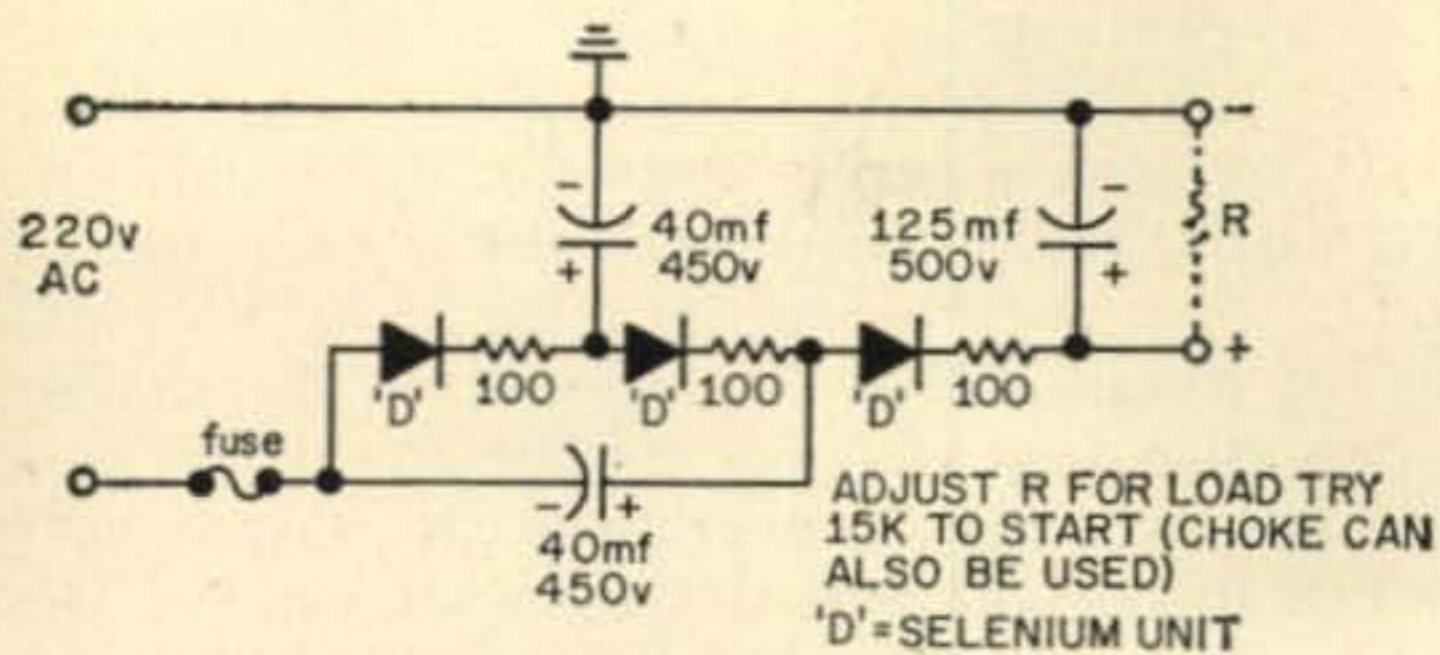


Fig. 3—Voltage tripler circuit.

### Neutralization

"I got one of the first TX-1 transmitters. You mentioned neutralizing the 6146s. I thought tetrodes didn't need neutralizing because of the small plate to grid capacitance. My set seems to work ok. How about this?"

Better stability results with neutralization—especially with tubes as power sensitive as the 6146s. Feeding a little voltage from the driver stage to the plates of the 6146s (through wire capacity coupling) does the trick very well. Your TX-1 okeh on 10 meters? If not, neutralize.

### VSWR

"Tell me, will an unterminated antenna have fewer standing waves than a terminated one?"

No.

### Intercom "I"

"My folks bought a wireless intercom that works fine when I'm not on 75 meter phone. What gives and what can I do?"

Two things to start with—first: make a trap tuned to 75 meters and insert it in series with the power line at the transmitter; second: try a ground on each intercom station IF it is transformer powered. Third: (and nearly last) make sure that your power line input is filtered (in your transmitter) with chokes and ceramic by-pass condensers. Some intercoms operate on 75 kc; you might try a rejection type filter at the transmitter. Also, try some resistance (starting at about 200,000 ohms) in series with each tube input in the intercom. If the above doesn't work, consult current ham handbooks and follow the info on doing away with *bci* for small radio sets.

### Hash

"Built up a power supply, using transistors, for my KE-93 receiver. The 2000 cycle note from the supply feeds through—I've tried more condensers but cannot seem to eliminate the buzz. What's suggested?"

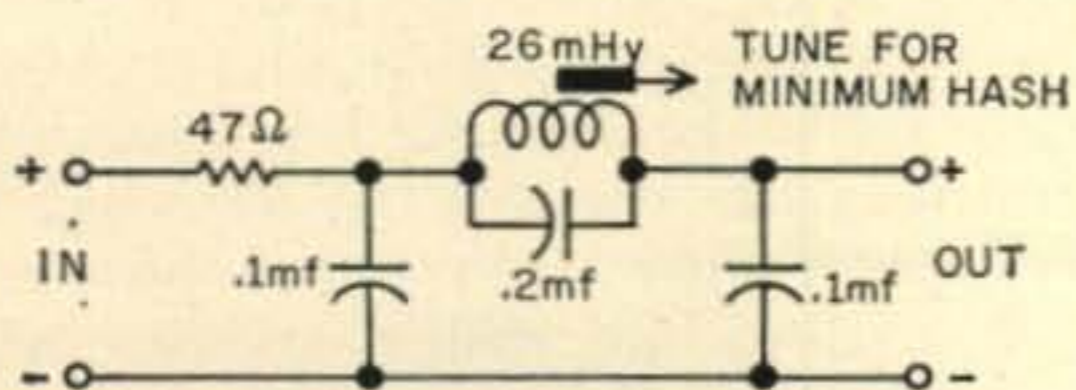


Fig. 4—Circuit of a tuned hash filter.

See fig. 4 for an "m" derived filter. Some experimentation will be necessary to obtain correct values. The values shown, worked for me with my KE-93 and a transistor supply using *Delco* transistors and a toroid—oscillator frequency close to 2 kc.

### Lightning Arrestor for Coax

"Do I need a special lightning arrestor on my coax transmission line?"

The National Board of Fire Underwriters say *no*; but the negative answer is not to be taken that the coax is not to be grounded *outside* as well as *in* the shack. I still use—and do suggest a special coax arrestor.

### Dow Coaxial Relay

"What do you recommend as the best coax relay for ham use?"

Unquestionably the *Dow* relay No. DK60-G2C. I've tried a large number, but personally have found this one to be THE best. Built for 1000 watts of *rf*, this relay can take it! I have purposely abused this relay to find out what it could do—and it came thru unscathed and still operating smoothly, quietly and without perceptible *rf* loss. In its price range I doubt that any other relay can touch it. I especially like it for *vox* operation on SSB—it is truly a little giant—easy to mount and long lasting. I DO prefer it to a TR switch using a tube. Show me a better relay for the same money and I'll buy one! This, I am convinced is the relay for the novice as well the the advanced ham—"you pays yer money and you gets 'sumptin really worth having'."

### For Friendship

Notice to International hams—send your name to HAM CLINIC if you want to receive copies of American radio and electronic magazines—especially CQ—free.

Notice to American hams—send your name to us to let us know you want to receive the QTH and name of a worthy receiver of your discarded technical magazines (of course, you pay the postage; a few cents won't break you!)

Avis au hams Internationals: envoyer votre nom et adresse a HAM CLINIC si vous voulez recevoir les magazine radio et eletronique Americains sans frais—specialement CQ.

Special thanks from HAM CLINIC and those interested in cementing international relations to: the Harrisburg Radio Club (Pa.) for its year's subscription to CQ for the Nicola Tesla Amateur Radio Club of Belgrade, Yugoslavia. In turn (I've been told) they will receive a copy of the Yugoslavian ham mag. (75 to you "Doc".)

72 — 72 — 72 — 72 — 72 — 72 — 72

### To Each His Throne

We have received a lot of entries for the "name the scope book" contest. It is surpris-

ing how many hams sent in the *same* names. Next month we'll let you know whether or not you were lucky or not and send *you* (the lucky one) \$25.00 of good American money. How about another try for those of you who sent in "Scope Dope?" (I don't want any *addicts* reading it—hi!)

### CQ Dog X-Ray?

My pet peeve: the guy who calls "CQ Dog X-ray" on phone! (Me too! Ed.) Pet like: the guy who is unashamed to use 72 and 75!

### Open Door

It is always nice to welcome a ham for a visit—especially overseas. When Wayne, our Editor popped in on me during October I WAS surprised but delighted. If any of you are fortunate enough to get to France, you too look me up—I'll be glad to see you.

### Questions (again)

#### Russian Articles

"How come we never see any articles by Russian hams in our English language ham mags?"

Admitted, they are few and far between, but if you want to read a nice article (in English) by a Russian ham (UA3BJ—Leo Shishkin) obtain a copy of the *Canadian Amateur* from Editor John Brown (VE7JB) at 10328 Trans-Canada Highway, North Surrey, New Westminster, B.C. Canada . . . that is, the May 1959 copy. Leo, *CA's* Moscow correspondent, wrote a nice article called, "For Amateur Experimenting." It describes a chirp-free, click-free breakin system. Worth reading.

#### Transistorized Converters

"I've heard that there *are* some transistorized converters on the market for use with BC sets (either mobile or home) for around \$15.00. Where?"

Try *Lafayette Radio*. As low as \$15.50—BC to 6 meters.

#### SHF DX Record

"Who holds the DX record on 10,000 megacycles and when?"

On July 18, 1959 using 10 *kmc* gear, HB1FU and HB1JP communicated over a distance of 139 miles.

### Tech Twist

Know what Self Laminating Plastic is? Well, I didn't either until the other day when W3-TDF send me a few sheets. This stuff is fantastic! It can be used for repairing broken glass meter fronts; making dials (with a piece of hair between two pieces); covering cable and wire ident tags; membership card protec-

tion as well as for valuable circuit diagrams preservation. I used it to make up a cathode ray tube grid—merely drew on my black lines accurately (in inches) and put it over the flat end. I also used it for making a WWV scale for my modified KE93 receiver and for making a new direction dial for my beam rotator control box. Its uses are endless. It is only .005 inches thick and will not discolor due to sunlight. Its shelf life is unlimited. Write Ray Bilger, Box 31F, Langhorne, Penna. for prices, etc. Another use for the plastic: laminating your often-shown special QSL cards! Incidentally, no machine or heat needed with this stuff.

### Observation

With the advent of the high voltage filament tubes, many manufacturers are putting out intercoms, record players, etc. which use no power transformer. This results in *no* line isolation and possible *af-rf* interference from nearby hams. A real quick cure for conducted line interference is a small 110-110 volt line isolation transformer for a couple of dollars. By-passing, resistance filtering, etc., sometimes have little effect. A brute force filter (which may work in some cases) is more expensive than the small and simple isolation transformer.

Observed: too much "corner cutting" in putting these transformerless sets together. (They also have a proclivity for picking up motor noises etc., which are often blamed on a neighboring ham too).

Ham advice: don't touch 'em—isolate 'em.

### Tuning the SB 10

HAM CLINIC has received more letters regarding the SB 10 than any other piece of gear—during the last few months. Most of the questions relate to modifications of the unit and adapting it for use with some transmitter (other than the TX-1). However, there are still many hams who have a little trouble understanding tuning procedure for best performance.

Here then is the way I suggest you go about getting the unit on the air.

First: tune up your *transmitter* on CW or phone in the usual way. Make sure you have proper load (antenna); that you have proper grid drive (and some reserve) and then, that your SB 10 is connected up properly.

Switch or connect your final for linear operation. (Your screen voltage to your final tubes *must be* regulated). Now then, switch your transmitter exciter output to your SB 10—do not touch your original transmitter tuning settings YET. Tune the balanced modulator and output controls on the SB 10 for maximum reading—WITH your carrier null pots *turned* so a meter reading will result. If your reading

[Continued on page 110]



by **DONALD L. STONER, W6TNS**

P.O. Box 137, Ontario, Calif.

# semiconductors

Some time ago I obtained a copy of the Russian experimenter magazine "Radio." My inquisitiveness led me to take a course in the Russian language so that I could understand what these people were doing in the field of electronics.

What does this have to do with Semiconductors? In studying these articles, my first impression was one of amazement at their progress in the semiconductor field. Every issue, without exception, contains three or four construction and theory articles.

Since the magazine is intended for internal consumption, it contains a minimum of propaganda. By making educated guesses I would say that they are about four years behind us in devices and applications. The variety of circuits and construction articles indicates that transistors are readily available to readers. Many pocket radios are described but some use vacuum tubes in the converter-oscillator section which would lead one to believe that *rf* transistors are more expensive or not readily available.

The majority of circuits show audio and test equipment applications and one is repro-

duced here for your interest. Figure 1 is a transistorized volt-ohm-milliammeter that could be easily reproduced by experimenters. It features a sensitivity of 100,000 ohms per volt by using two transistors in a bridge configuration.

Before delving into a circuit explanation, a few words of explanation about the symbols are in order. The Russians use a comma rather than a decimal, thus 1,5K is actually 1500 ohms (1.5K). The regular resistor symbols are wire-wound, while the blocks are composition type. The lines in the blocks denote the wattage. In fig. 1, symbols R1 and R2 are 1/4 watt, R3 and R4 are 1/2 watt, while R5 and R6 and 1 watt size. Capacitors inside a dotted circle are electrolytic. The switch with five positions selects the function (this switch has six sections) and the switch with the 11 positions (three sections) determines the range. By knowing these points you should be able to understand the circuit and even duplicate the instrument.

The two transistors (PP1 and PP2) are type P14, and are similar to our CK-722. An equal amount of collector voltage is applied

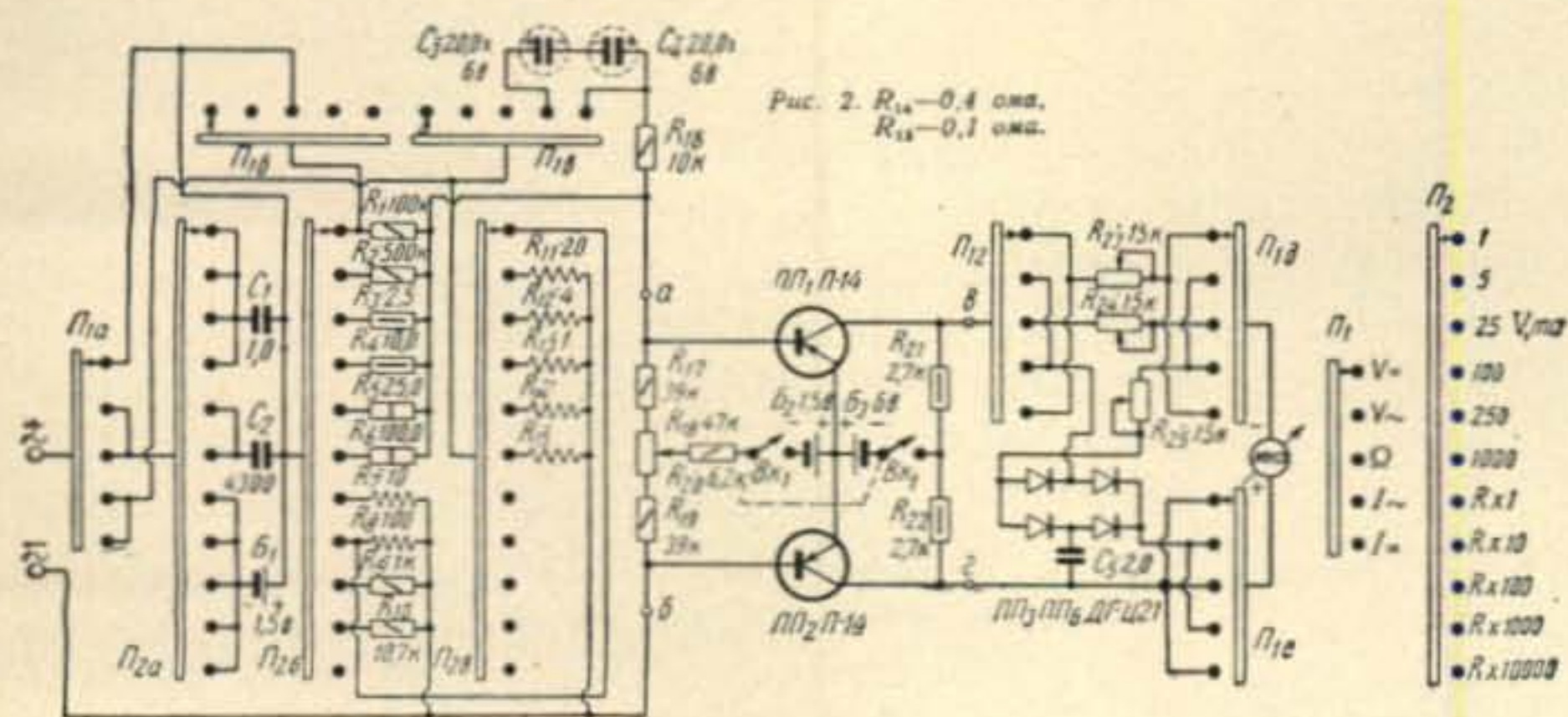


Fig. 1—The Russian transistorized volt-ohm-milliammeter described in the text. Unmarked resistors, R14 and R15 are 0.4 and 0.1 ohms respectively. Battery 1 is 1.5 volts, B2 is 1.5 volts, and B3 is 6 volts. Resistors R3, R4, R5, and R6 are in megohms. As an example, R6 is 100.0 megs.

to each transistor through R21 and R22 (2.7K). Equal base bias is applied through R17, R18, and R19. The potentiometer acts as a meter zero since a meter connected between collectors will read zero when the circuit is balanced and no voltage is applied between points "a" and "b".

The function switch is shown in the *dc* volts position and the range switch is set for one volt full scale. If a voltage is applied to the terminals, the bridge will be upset. Follow it with me. A positive current flows through switch 1A, up to the swinger of 2b, through R1 (100 K) and on to the base of transistor 1, tending to cut it off and raise the collector voltage. At the same time the negative voltage is applied to transistor 2, which causes it to conduct more, thereby decreasing the collector voltage. The collector voltage of transistor 1 is connected to the negative meter terminal through switch 1d, R23 (full scale calibrate) and switch 1f. The positive meter terminal returns to transistor 2 through switch 1e. The meter is calibrated on this range by applying one volt and setting R23 for a full scale reading.

On *ac* volts the input signal path is similar, except that the *ac* travels through switch 1a, 2a, and capacitor C1. The *ac* voltage is amplified by the two transistors. The signal on the collector 1 is now connected to the anode/cathode junction of the upper diodes, through switch 1d. The signal from collector 2 is coupled to the opposite end of the bridge rectifier through capacitor C5, 2.0 mfd. The meter reads the rectified voltage through switch 1e, calibration "pot" R25, and switch 1f.

On ohms, switch 1a goes down three positions and switch 2 goes down six positions. This connects the external resistance to be measured to battery 1 through 1a and 2a. The plus end of this battery goes through section 1b to R1, and on to the base of transistor 1. The other end of the resistor goes to the base of transistor 2, along with a positive voltage from battery 1 through R7 (10 ohms) and switch section 2b. The meter circuit is the same as for *dc* volts except that calibration potentiometer R24 is used.

On *ac* current (redundant) the signal travels through switch 1a and on to 1c. The return path back to the other meter terminal is through R11, R12, R13, R14, or R15, depending on the range selected. The signal is coupled to the transistor bridge through switch 1c, and capacitors C3 and C4 which are used for current calibration. In the collector circuit the bridge rectifier is used once again. On *dc* current (again) capacitors C3 and C4 are switched out of the circuit and current flows through R16 (*dc* calibration). The meter once again reads the collector voltage difference.

If you plan on constructing this meter, I would suggest that you redraw the circuit showing five and 11 position rotary switches.



Have you worked solar powered station K6LMW yet? Amateurs in at least 14 states are the proud possessors of this card for 10 meter phone contacts.

The text specifies a 200 uamp meter, but with our higher beta transistors it is likely that a 0-1 *ma* meter would prove satisfactory.

If you are interested in reading more about Russian semiconductor projects, would you please send a postal card to the address at the beginning of the column? If there is sufficient interest in Russian amateur electronics, a column might be devoted to translations such as this one. What do you think?

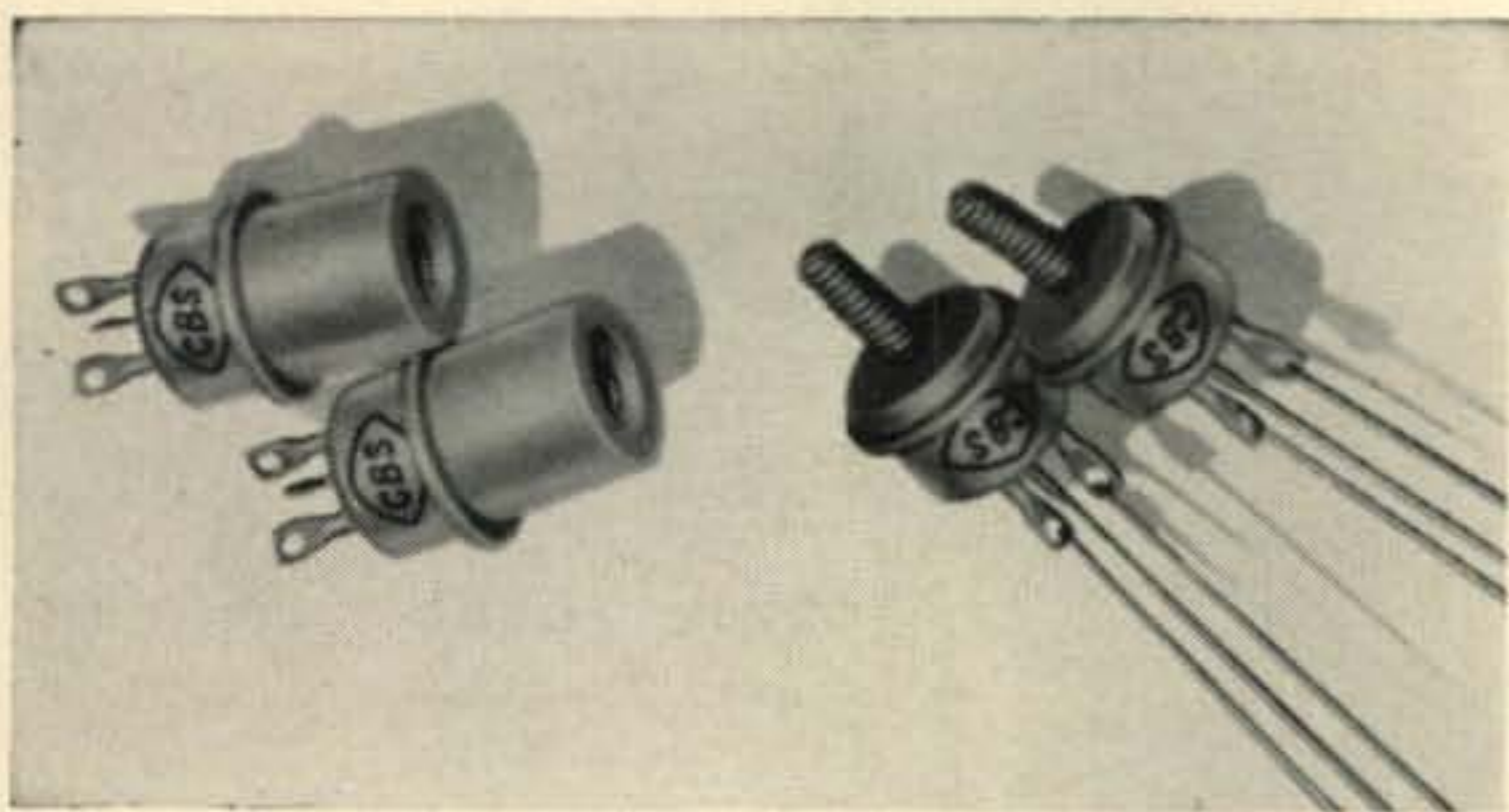
### QRP Corner

A short note from Major Gilbert, K6LMW (QRP DX'er extraordinary!), 2912 N. Buena Vista St., Burbank, Calif. lists 14 states worked using 75 milliwatts on 10 meter phone. Stations worked are W9UCZ in Ill., W6MV -Calif., WØTBL in Missouri, KØCUO -Minn., K5DLY in Ark., K5HCM -Tex., W5JW in La., WØLFL in Kan., W4OGG -Tenn., W8RNU in Wis., W5JCS in Okla., KL7ARC in Alaska., K4CLG -Ala., and W5TXK in ole Miss. Major has converted to silicon transistor but didn't mention a power increase. He also states that 1, 2, and 3 volt zener diodes are available from Transitron, Inc. His passionate pink postal of his pigmy power plant is reproduced for your edification.

### Semiconductor News

Amperex Electronic Corp., 230 Hicksville, L.I., N.Y. has a clever gas-filled subminiature indicator tube designed to be used in conjunction with transistors in computer circuitry. This tube is fired when the grid voltage (tied to a transistor collector) drops below a certain point. There should be many applications for a transistor controlled indicator tube in amateur circuitry.

Bendix is now in production with their 2N1120 "powerhouse." This device is rated at 10 amps, with  $E_{ce}$  of 70 volts. It will readily dissipate 45 watts at 25°C. The new Bendix



In addition to their entertainment line, CBS Electronics has introduced eight pairs of complementary (matched NPN and PNP) power transistors.

2N1176 series is intended for use in driver applications. They are rated to 60 volts and will dissipate 300 *mw*. For data sheets write Bendix Red Bank, Long Branch, New Jersey.

CBS Electronics, 900 Chelmsford St., Lowell, Mass., has expanded the line of matched complementary NPN - PNP power transistors to include industrial packages. There are 16 different types carrying numbers 2N 1320 through 2N1334. Bulletin E-60 describes them. The latest issue of *CBS Tech-Tips* (available from your distributor, or direct) describes methods and techniques for servicing transistor equipment.

Clevite Transistor Products, Waltham 54, Mass., is stocking a new series of nine JAN type subminiature silicon and germanium diodes for use in computers. Bulletins B-217A-2, B213-1 and -2 describe these devices.

Delco Radio has reduced the price of many of their transistors, as much as 34% in production quantities.

General Transistor, 91-27 138th Pl., Jamaica 35, N.Y., has a brochure describing their new line of PNP silicon transistors. Ask for S-100.

Of interest to experimenter is news from International Rectifier Corp, El Segundo, Calif., about their low cost 1/2 and 1 watt zener diodes. These inexpensive regulator diodes, shown in the photograph, are available in 10% voltage steps from 5.6 to 27 volts. International's new space vehicle solar cells incorporate an extremely thin, optically-coated coverglass to provide optimum reflection properties and high thermal emissivity. They reduce cell temperature, protect it from micrometeorite bombardment, reflect the unwanted part of the solar spectrum, and improve the transmission of desired radiation.

Magneto Inc., 6 Richter Ct., East Northport, L.I., N.Y., have introduced a line of mag-amps packaged to mil-specs. If you use these devices, drop them a line.

Motorola, Inc., 5005 E. McDowell Rd., Phoenix, Ariz., has dropped the prices on their zener diode line and added a new item, a 3/4 watt flangeless package. Their line now extends from 6.8 volts to 200 volts and wattages from 3/4 to 50 watts. Talk about powerhouse tran-

sistors, the Motorola 2N1167 is rated at 25 amperes to 100 volts.

Quite startling is Pacific Semiconductors new micro-micro diode. The unit is described as a fly-speck on a wire and weighs 14-09 milligrams compared to 160 milligrams for a standard glass diode. It is estimated that over 20 million could be packaged in a cubic foot! These diodes are made by the new molecular bonding technique.

Seco Mfg. Co., 5015 Penn Ave., So., Minneapolis, Minn., has a new low-cost dynamic transistor tester that looks like a bargain. It features a GO-NO GO test and is priced at \$19.95.

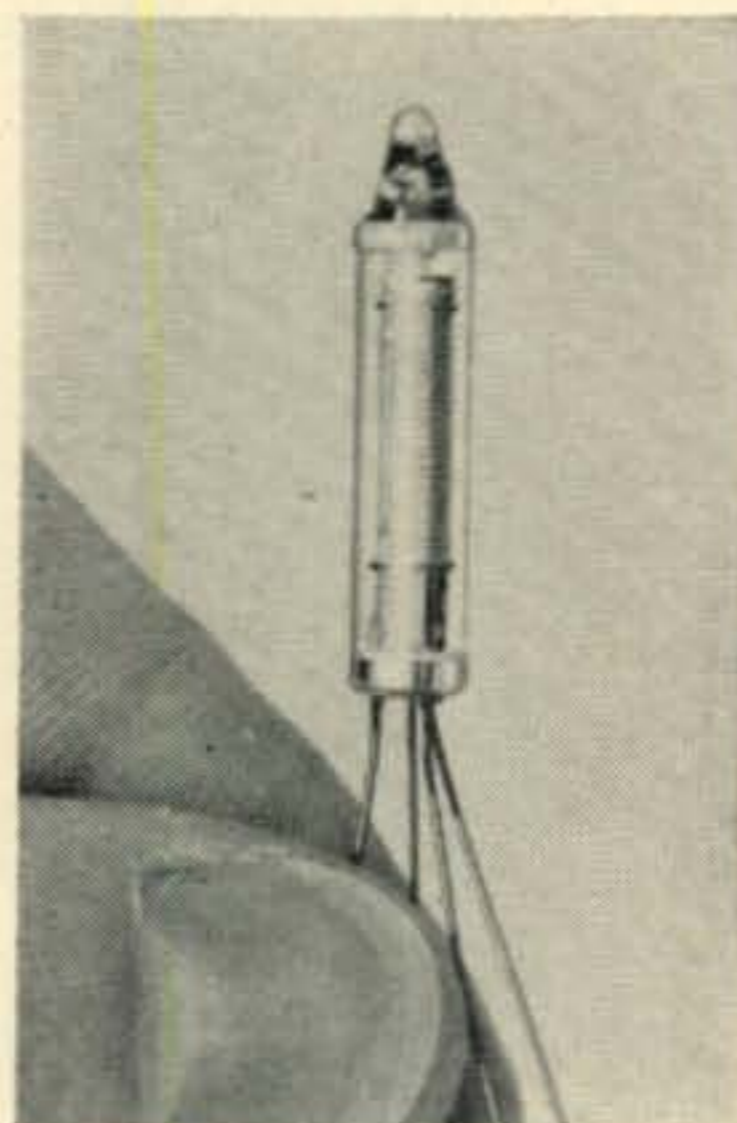
Silicon Transistor Corporation, Carle Place, L.I., N.Y., has a new brochure on computer diodes. Bulletin 1895 describes them.

Sylvania Electric Products, 1100 Main St., Buffalo 9, N.Y., has a new booklet titled "Medium and High Speed Switching Transistors" that will be of interest to experimenters.

For complete coverage of Texas Instruments new products, get on the mailing list of either Radio Products Sales, Inc., 1501 Hill St., Los Angeles, Calif., or California Electronics Supply 11801-11 W. Piel Blvd., West Los Angeles 64, Calif. The latest issue of TI's "Application Notes" describes transistor choppers.

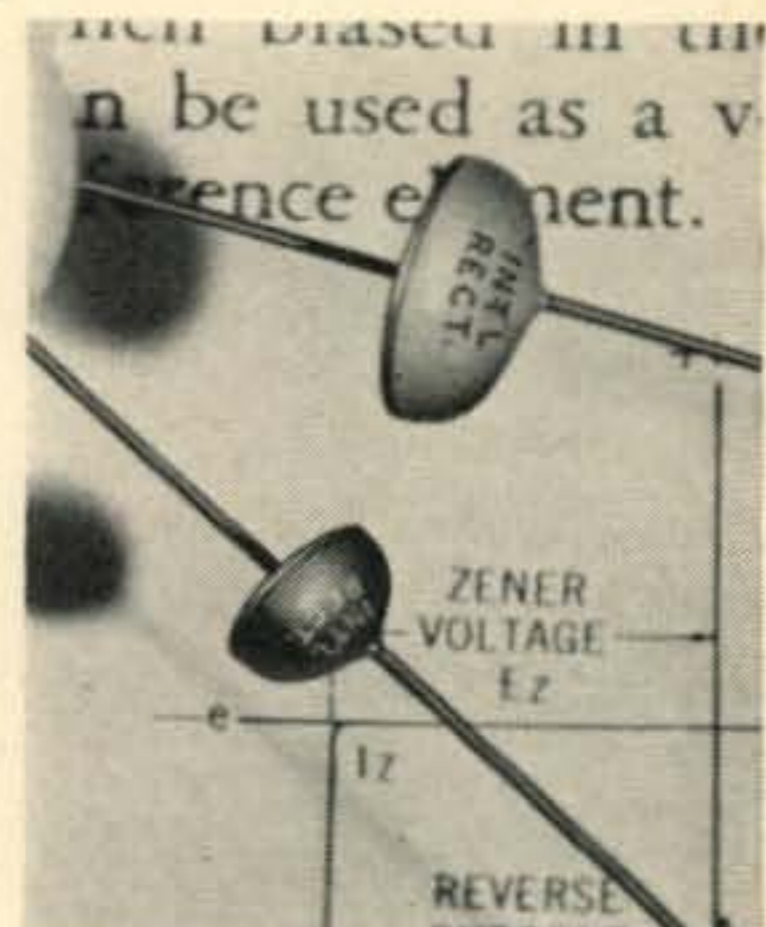
A late flash . . . RCA has just announced a new regulator diode to be used as a bias regulator in class B audio circuits, type 1N-2326. More about this next month.

73, de Don, W6TNS



The Amperex 6977 subminiature indicator triode is used in conjunction with a transistor trigger for high sensitivity applications.

International's new low-cost zener diode shown here in the 500 *mw*. and 1 watt packages. The devices are available from 5.6 to 27 volts in 10% increments.



# PROPAGATION

**George Jacobs, W3ASK**

607 Beacon Road, Silver Springs, Md.

## Last Minute Forecast

A moderate radio storm is forecast for January 24-28. A period of exceptionally good propagation conditions is expected to occur January 5-7, with the remainder of the month seasonally normal.

The following is an over-all picture of band conditions forecast for January, 1960. For specific times of band openings to areas throughout the world, refer to the *CQ Propagation Charts* on the opposite page.

**6 Meters:** MUF's are at their highest values of the season to many areas of the world. Many six meter openings are forecast to occur during the daylight hours.

**10 Meters:** Excellent world-wide openings are forecast almost daily from shortly after dawn through the early evening hours.

**15 Meters:** Fifteen meters is expected to open shortly after dawn and remain open through the early evening hours. On most days conditions are expected to be excellent for world-wide communications, with signals exceptionally strong during peak periods. Peak conditions on this band usually occur about an hour or two after they occur on ten meters.

**20 Meters:** Seasonally lower ionospheric absorption and decreased noise levels are expected to result in considerably *stronger* signals on this band. The band is forecast to open shortly after sunrise, remain open to some areas of the world through the afternoon hours, and peak during the early evening hours. On better than average days, twenty meters is very likely to remain open around-the-clock to some areas of the world.

**40 Meters:** Fairly good DX openings are forecast to many areas of the world from shortly before sundown, through the hours of darkness, and until shortly after sunrise. Static levels are expected to be relatively low, and signal levels rather high. Short-skip openings should occur at all times, with the skip as short as a few miles during the noon period, extending outwards to greater distances as evening approaches.

**80 Meters:** Seasonally optimum propagation conditions are expected to continue through January. This should result in some DX open-

ings during the hours of darkness. During the daylight hours, normal ionospheric absorption limits openings to distances generally no greater than 250 miles. This range increases during the late afternoon hours, and as darkness approaches.

**160 Meters:** The best times for 160 meter openings are the same as those shown for eighty meters. However, because of higher noise levels and greater absorption on 160 meters, this band is expected to open *less frequently* than 80 meters.

## 160 Meter Tests

From W1BB it is learned that this year's 160 meter test transmissions are scheduled to take place between 0500 and 0730 GMT on the following Sundays:

January 3rd and 17th  
February 7th and 21st

During these test periods, *extra special* efforts will be made to contact European, Asian, African and other 160 meter stations throughout the world. W1BB urges very active participation in the tests in order to promote Amateur use of this band, and to obtain valuable propagation data.

Further information concerning the test periods, as well as 160 meter news in general, can be obtained directly from W1BB, Stewart S. Perry, 36 Pleasant Street, Winthrop, Mass. Sunspot Cycle catchline 10 demi

The Zurich Observatory reports a monthly relative sunspot number of 107 for October, 1959. This was the lowest monthly number recorded since January, 1956, further evidence that solar activity is now declining.

The latest available *smoothed sunspot number*, upon which the solar cycle is based, is 167 centered on April, 1959.

This month's *Propagation Charts* are based upon a *predicted* smoothed sunspot number of 135 centered on January, 1960.

73, George, W3ASK/HB9



ALL TIMES IN E. S. T.

EASTERN USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Western Europe	9A-11A (2)* 6A-8A (3) 8A-2P (4) 2P-4P (2)	6A-8A (3) 8A-12N (2) 12N-4P (4) 4P-6P (2)	9A-12N (1) 12N-2P (2) 2P-5P (4) 5P-11P (3) 11P-9A (2)	4P-6P (2) 6P-2A (3) 2A-4A (2) 6P-2A (2)**
Central Europe	8A-11A (1)* 6A-8A (2) 8A-12N (4) 12N-2P (2)	6A-11A (2) 11A-1P (4) 1P-3P (2)	2A-8A (2) 8A-12N (1) 12N-3P (2) 3P-9P (3) 9P-2A (1)	4P-6P (2) 6P-10P (3) 10P-3A (2) 8P-2A (1)**
Eastern Mediterranean	8A-11A (1)* 7A-10A (2) 10A-12N (3) 12N-2P (2)	6A-11A (2) 11A-1P (3) 1P-3P (2)	12M-7A (2) 7A-11A (1) 11A-4P (2) 4P-12M (3)	5P-12M (2) 8P-10P (1)**
North and Central Africa	9A-1P (1)* 6A-8A (2) 8A-1P (3) 1P-3P (4) 3P-6P (2)	6A-1P (2) 1P-4P (4) 4P-6P (3) 6P-8P (2)	1A-9A (2) 9A-1P (1) 1P-3P (2) 3P-7P (4) 7P-1A (3)	5P-7P (1) 7P-3A (2) 9P-1A (1)**
South America	8A-12N (2)* 12N-3P (1)* 3P-8P (2)* 6A-10A (3) 10A-5P (4) 5P-8P (3)	6A-10A (3) 10A-2P (2) 2P-6P (4) 6P-9P (3) 9P-2A (2)	12M-8A (3) 8A-3P (1) 3P-5P (2) 5P-12M (4)	6P-4A (3) 4A-6A (2) 9P-3A (2)**
South East Asia	8A-11A (2) 11A-5P (1) 5P-7P (2)	7A-9A (2) 9A-12N (1) 5P-9P (2)	7A-9A (3) 9A-12N (2) 12N-5P (1) 5P-9P (2)	7P-10P (1) 5A-7A (1)
Australasia	9A-11A (3) 11A-5P (2) 5P-8P (3) 8P-10P (2)	9A-11A (2) 11A-4P (1) 4P-7P (2) 7P-10P (3) 10P-12M (2)	12M-7A (2) 7A-9A (3) 9A-11A (2) 11A-12M (1)	5A-8A (2) 5A-7A (1)**
Guam & Pacific	4P-6P (1)* 2P-4P (2) 4P-6P (3) 6P-8P (2)	8A-10A (2) 10A-3P (1) 3P-5P (2) 5P-7P (3) 7P-9P (2)	7A-9A (3) 9A-12N (2) 12N-11P (1) 11P-7A (2)	10P-1A (1) 5A-7A (1)
Japan & Far East	5P-8P (2)	4P-6P (2) 6P-8P (3) 8P-10P (2)	4P-6P (1) 6P-12M (2) 12M-6A (3) 6A-8A (2) 8A-10A (1)	3A-7A (1)

ALL TIMES IN C. S. T.

CENTRAL USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Western & Central Europe	8A-10A (1)* 6A-8A (2) 8A-12N (4) 12N-3P (2)	6A-8A (2) 8A-11A (3) 11A-1P (4) 1P-3P (2) 3P-5P (1)	1A-5A (1) 5A-7A (2) 7A-12N (1) 12N-2P (3) 2P-4P (4) 4P-6P (3) 6P-1A (2)	5P-2A (2) 7P-12M (1)**
Southern Europe & North Africa	9A-11A (1)* 6A-8A (2) 8A-10A (3) 10A-2P (4) 2P-4P (2)	6A-8A (3) 8A-11A (2) 11A-3P (4) 3P-5P (2) 5P-7P (1)	7A-12N (1) 12N-2P (3) 2P-6P (4) 6P-12M (3) 12M-7A (2)	5P-2A (2) 7P-12M (1)**
Central & South Africa	9A-1P (1)* 6A-10A (2) 10A-3P (4) 3P-5P (2) 5P-7P (1)	5A-11A (1) 11A-1P (2) 1P-5P (4) 5P-7P (2)	12N-3P (2) 3P-8P (4) 8P-3A (3) 3A-12N (1)	6P-12M (1) 9P-12M (1)**
South America	8A-12N (2)* 12N-4P (1)* 4P-7P (2)* 6A-1P (3) 1P-4P (4) 4P-7P (3) 7P-9P (2)	5A-9A (3) 9A-2P (2) 2P-6P (4) 6P-9P (3) 9P-1A (2)	1A-8A (3) 8A-2P (2) 2P-4P (3) 4P-9P (5) 9P-1A (4)	6P-4A (3) 4A-7A (2) 8P-3A (2)**
Japan & Far East	2P-4P (2) 4P-6P (3) 6P-8P (2)	2P-4P (2) 4P-9P (3) 9P-11P (2)	1P-7P (2) 7P-11P (3) 11P-5A (2) 5A-7A (3) 7A-9A (2)	12M-7A (1)

CENTRAL USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
South East Asia	9A-1P (2) 1P-4P (1) 4P-7P (2)	7A-9A (2) 9A-3P (1) 3P-8P (2)	7A-9A (3) 9A-12N (2) 12N-5P (1) 5P-11P (2)	NIL
Australasia	8A-11A (3) 11A-2P (2) 2P-7P (3) 7P-9P (2)	8A-11A (3) 11A-3P (2) 3P-9P (3) 9P-12M (2) 12M-2A (1)	4P-8P (1) 8P-12M (2) 12M-4A (4) 4A-9A (3) 9A-11A (2) 11A-4P (1)	3A-8A (2) 5A-7A (1)**
Antarctica	7A-9A (1) 6P-10P (1)	7A-9A (2) 9A-4P (1) 4P-7P (2) 7P-12M (3) 12M-2A (2)	4P-7P (1) 7P-9P (2) 9P-3A (4) 3A-9A (2) 9A-12N (1)	12M-4A (1)

ALL TIMES IN P. S. T.

WESTERN USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Europe & North Africa	6A-8A (2) 8A-10A (3) 10A-1P (2)	1A-6A (1) 6A-9A (2) 9A-12N (3) 12N-2P (2)	1A-5A (2) 5A-10A (1) 10A-4P (3) 4P-7P (2) 7P-1A (1)	6P-2A (2) 8P-1A (1)**
Central & South Africa	6A-11A (2) 11A-2P (4) 2P-4P (3) 4P-6P (2)	6A-11A (2) 11A-4P (4) 4P-6P (3) 6P-10P (1)	10A-1P (1) 1P-3P (2) 3P-6P (3) 6P-9P (2) 9P-11P (3) 11P-1A (1)	5P-8P (1)
South America	8A-12N (2)* 12N-8P (1)* 6A-1P (3) 1P-4P (4) 4P-6P (3) 6P-8P (2)	5A-8A (3) 8A-1P (2) 1P-6P (4) 6P-9P (3) 9P-2A (1)	8A-1P (1) 1P-4P (2) 4P-10P (5) 10P-2A (4) 2A-8A (2)	6P-8P (2) 8P-4A (3) 4A-6A (2) 9P-1A (2)**
Guam & Pacific Islands	1P-4P (1)* 12N-2P (3) 2P-4P (2) 4P-7P (4) 7P-9P (2)	8A-11A (1) 11A-1P (3) 1P-6P (2) 6P-9P (3) 9P-1A (1)	7P-9P (2) 9P-2A (3) 2A-6A (2) 6A-9A (3) 9A-11A (1)	2A-7A (3) 4A-6A (2)**
Australasia	4P-7P (1)* 8A-4P (3) 4P-8P (4) 8P-10P (2)	7A-12N (3) 12N-6P (1) 6P-8P (2) 8P-11P (4) 11P-2A (2)	6A-10A (3) 10A-8P (1) 8P-12M (4) 12M-6A (2)	12M-7A (3) 1A-7A (2)**
Japan, Okinawa & Far East	3P-5P (1)* 1P-3P (3) 3P-6P (4) 6P-8P (3) 8P-9P (1)	12N-4P (3) 4P-7P (4) 7P-9P (3) 9P-12M (1)	5P-8P (2) 8P-10P (4) 10P-4A (3) 4A-12N (2) 12N-5P (1)	12M-8A (3) 1A-6A (2)**
Philippines & East Indies	3P-5P (1)* 9A-11A (2) 11A-2P (1) 2P-5P (3) 5P-8P (1)	9A-12N (3) 12N-3P (2) 3P-6P (1) 6P-9P (2) 9P-12M (1)	10P-12M (2) 12M-4A (3) 4A-10A (2) 10A-12N (1)	3A-7A (1)
Malaya & South Asia	3P-5P (1)* 9A-11A (1) 3P-8P (3)	9A-12N (2) 12N-3P (1) 3P-5P (3) 5P-8P (2) 8P-10P (1)	12M-4A (1) 4A-7A (2) 7A-10A (3) 10A-1P (2)	4A-7A (1)

SYMBOLS INDICATING NUMBER OF DAYS CIRCUIT IS FORECAST TO OPEN DURING JANUARY, 1960

(1) 1-4 days (2) 5-11 days (3) 12-18 days (4) 10-26 days

(5) more than 26 days.

\*\* Indicates best times for 80-meter openings.  
\* Indicates best times for 6-meter openings.

Time Symbols: A means A. M. N means Noon  
P means P. M. M means Midnight

The CQ Propagation Charts are based upon a CW power of 150 watts at radiation angles less than thirty degrees, from a dipole antenna. They are centered on the Eastern, Central and Western areas of the U. S. A. This month's forecast is valid through February 15, 1960. Forecasts are based upon basic radio propagation data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

by **DONALD L. STONER, W6TNS**  
 P.O. Box 137, Ontario, Calif.



# Novice

Novices often hear about a mysterious radio station called WWV. Possibly you have heard this station on your communications receiver and wondered what the strange tones and ticks were.

**What is WWV?** The standard time and frequency transmissions of the National Bureau of Standards radio stations, WWV and WWVH, provide an invaluable service to laboratories and individual experimenters throughout the world. Extremely precise audio and radio frequency standards, as well as accurate time intervals and radio frequency propagation warnings, are placed at the disposal of anyone having a receiver covering the short wave bands.

The standard frequency stations WWV and WWVH are operated by the Central Radio Propagation Laboratory of the National Bureau of Standards. WWV is located at Beltsville, Md. (near Washington) and WWVH is on the island of Maui, in KH6 land. Both stations broadcast continuously on the carrier frequencies and with sufficient power to be heard around the globe.

The standards are accurate to one part in 100 million! The frequency of the stations is held to one part in one billion and is derived from standard quartz crystal clocks which are evaluated over long periods with reference to Standard Time from the U.S. Naval Observatory.

Six technical radio services are given continuously by the six stations of WWV. They are: standard radio frequencies, standard audio

frequencies, standard time intervals, standard musical pitch, time signals, and radio propagation forecasts. The radio carrier frequencies are 2.5, 5.0, 10.0, 15.0, 20.0, and 25.0 *mc*.

At WWV and WWVH, the time interval for the tones 440 and 600 cycles are three minutes. The intervals are free from modulation and are useful in the assessment of high-precision frequency standards. At WWV the tones are interrupted precisely 40 milliseconds each second except at the beginning and the end of each three-minute tone interval. The time pulse commences precisely 10 milliseconds after the 40 millisecond interruption begins. These "time ticks" consist of eight cycles of 1 *kc* audio. An additional pulse, 0.1 seconds later, is transmitted to identify the beginning of each minute. As before, no pulse is transmitted at the beginning of the last second of each minute.

WWV can easily be found on the frequencies mentioned earlier but they are off the air for approximately four minutes each hour. The "silent period" commences at 45 minutes, plus or minus 15 seconds, after each hour.

**Propagation Disturbance Notices.** How good will the ham bands be for DX next week? Will 15 meters be open to Europe? WWV knows all and tells all to those who know how to interpret the information.

In addition to the standard time and frequency transmissions, WWV also broadcasts radio propagation disturbance warning notices for the amateurs and others. These announcements are made in code during the 19th and

Numeral	Forecast Propagation Condition
1	Impossible
2	Very Poor
3	Poor
4	Fair to Poor
5	Fair
6	Fair to Good
7	Good
8	Very Good
9	Excellent

Fig. 1—WWV Symbol Code.

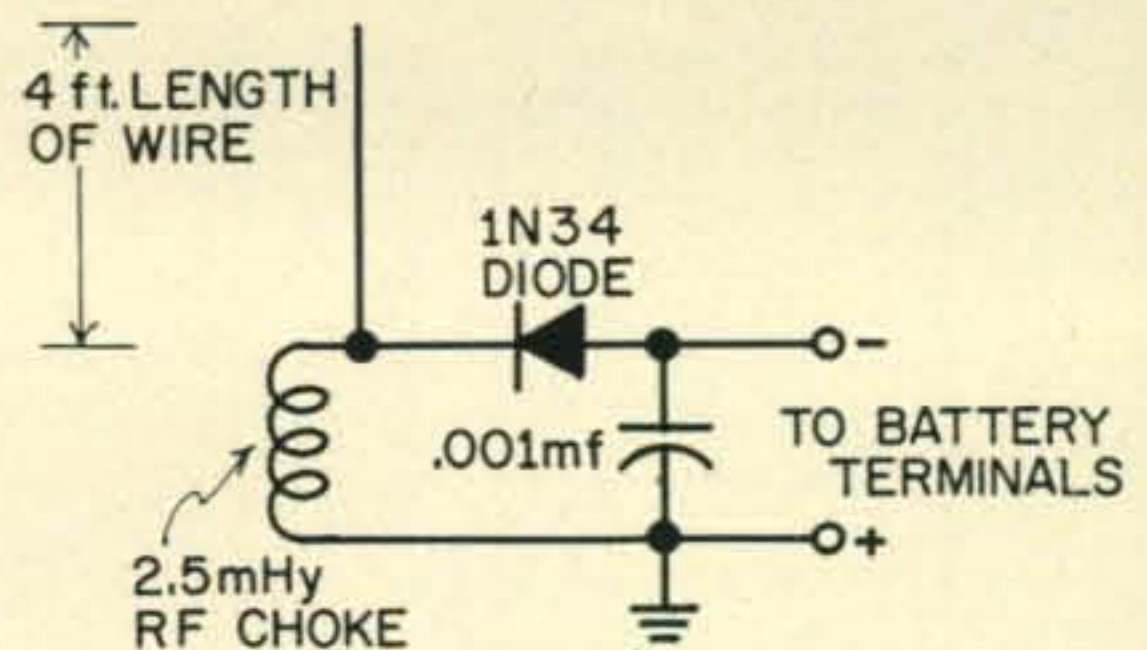


Fig. 2—A circuit suitable for converting the Heath Code Practice oscillator to a keying monitor. The battery is removed and plus and minus in the schematic is connected to the terminals.

49th minutes of each hour. The transmission includes a symbol to indicate the present ionospheric conditions affecting communication paths over the North Atlantic and a numeral to indicate the condition forecast for the next 12 hours. Thus the letters "N", "U", or "W" sent five times in code mean that the present radio reception conditions are "normal", "unsettled", or "disturbed", respectively, while a numeral which follows each letter indicates that the forecast for the next 12 hours is for conditions as shown in fig. 1.

According to this system, the characters W7 transmitted from WWV would be interpreted to mean that the present ionospheric conditions affecting radio propagation were "disturbed", but expected to improve to "good" within the next 12 hours. Mighty good information, particularly if you plan on staying up all night for a contest!

There is much more to the "WWV Story." I hope you find it as interesting as I do. Next month I'll tell you how you can use the other bits of information transmitted by WWV. Many thanks to the "Aerovox Research Worker," for supplying this valuable information.

### Who's DX?

Our DX reports come from opposite ends of the globe this month. Tima Popovic, YU-1-RS357 reports hearing the following stations in Yugoslavia recently. Oct. 11, 1918- 2035 GMT: KN1KVC, LDO, LKI, LWH, MBQ, WV2CKT, DRK, FFL, FHQ/2, FMZ, GEG, HAN, HOZ, IPB, KN3IAR, IRU, JHE, KN-4FJW, FNF, FVW, GNM, JJH, JNB, JSV, JSY, LXP, MPT, ONB, KN5USE, KN8PJD, PWA, PWF, REC, KN9QHN, SEF, SRJ, TDA, TKN, TVO, UBO, UEM. October 18, 1710- 2100 GMT: KN1JHH, KCE, KDH,



Dave J. Church, WV2HZR, 7 West Main St., Canton, New York, has banged up a WAS total of 26/16 on 40 meters. Dave suggests that hams investigate the use of aluminum for antenna wires, he says it's FB! Incidentally, Dave offers to sked anyone needing New York.

How's this for a slick set-up? The owner is Carl Schultz, Jr., WV2IMG, 32 Skyview Dr., Cohoes, N. Y., who operates only two meters with his "Gooney-Bird" (Communicator) and eight element beam. Look for him between 8:00 and 10:00 PM EST each day.



There's a DX smile if I ever saw one! It belongs to Jim Dionne, KN1MEM, 35 High Rock St., Westwood, Mass., who is 11 and has been on the air for one month. So far Jim has worked 10 states with 8 confirmed and a KP4 as a DX bonus.



Jim Rankin, K5BQS/5, Box 161, Co-Lin Jr. College, Wesson, Mississippi, chases certificates between studies and would like to work the 82 counties of Miss. Don't miss the Certificate Seekers Directory, Jim. Oh, yes, look for him on 7165.



Bill Lovell, KN7JBQ, 532 Jerome Ave., Astoria, Oregon, has a neat and efficient station, and QSL's to prove it. So far the WAS is 22/18 and a VE station for DX, on 21.126 mc. Jim offers to help prospective Novices and would like a sked to join the Rag Chewers Club.

KMU, KTH, LDT, LPA, LRR, LWZ, LXC, MBK, MKF, WV2DXH, EFM, FDR, FHU, FJE, FJW, FMS, FPV, FRU, GWL, GXU, HFT, HGE, HGL, IAG, IDM, IRG, OGU, KN3IFY, IWK, JHG, JLM, WP4ARX, AST, KN4CWN, FTI, IZF, JIU, JWQ, LNP, NAO, KN5VYX, WGU, KN80IP, OPZ, OYU, QEF, KN9ROD, KNØUBV. Oct. 19, 1720- 1940 GMT: KN1JCO, KPS, KSH, LGC, LGM, LXB, WV2DHU, FUB, KN3IPQ, KN4ESR, FME, FSJ, GMI, OAL, KN5UKZ/1, WV-6FOL (congratulation!), KN8PMG, RHK, KN9QMX, SWR, TMD, KNØWGX. Oct. 21, 1723 and 1800 GMT: WV2FPB, FYE, KN-4UD, KUH, KN9SBD, KNØUAM. Oct. 22, 1800 and 1910 GMT: KNIKNM, LIH, MGK, KN3JIX, WP4AAQK, KN4ERR, ERU, ERV, JUK, JZU, KN5UTJ, KN9SMA/4. Oct. 23, 1815- 1900 GMT: WV2DGO, DFV, FBY, KN3HGJ, KN4JPV, KN5VIN, KN8QQN, KNØVWT. Many thanks for another FB report, Tima.

Ivor Staffords' (VK3XB) average seems to be picking up. His latest report shows that he is working about half the stations he hears. During the period Aug. 23, and Oct. 31, Ivor heard the following stations in Australia. Italicized calls were worked. KN1LTZ, LQE, LNM, KDO, WV2, DHF, *DPH*, *FPB*, HGL, HJI, HTB, *KN3GZS*, *HBP*, *HLB*, IWV, *JAW*, *JLF*, *JLG*, *JMK*, *JMP*, *JXB*, KN4AEY, *EKQ*, *FJW*, FNH, FRJ, FSJ, *FWJ*, JPD, KDD, LIA, LSA, LTQ, NAN, PET, KN5SAZ, SHF, SUZ, UGD, *UGN*, UKH, UOM, UQC, UQY, *VNV*, VQU, VRC, WUX, WH6DAO, DDZ, DFW, DKN, WV6CRV, DQF, FAR, FCG, FEH, *FOL*, FTX, FVH, FXI, GPD, *HEI*, HSF, KN7GDO, HJD, HOX, HSG, IFI, INE/7, IUT, JCF, *JIW*, *KN8MNF*, *MWL*, MWN, *NNU*, *OCN*, OIH, OTO, *PAE*, PBJ, *PUR*, QBN, QDU, QGU, QHT, QIA, *QKC*, SYR, *KN9MWL*, *PXW*, *PYO*, *QAN*, *QBV*, *QPI*, QZU/KH6, RPF, *SCM*, SJA, SKB, *SNO*, SPD, SQH, TCO, KNØRWA, THZ, *TKN*, *TKO*, *TPW*, *TZU*, UGZ, UHE, UIC, UVF, UWT, VCN, *VGD*, *VMZ*, VNB, VQI, *VXR*, VZR, WEX. Ivor is looking for Novice 7 mc. WAS and needs Maine, N.H., R.I., Ga., N.C., S.C., Idaho, Mont., Utah, N. Dak., Alaska. I believe you can make skeds through W2CC, K8IKH, and W5UUC, or by writing Ivor Stafford, 16 Byron St., Box Hill SH., E 11, Victoria, Australia (include 4 IRC's).

Jimmy Briles, K4DSX/TA, TUSLOG, Det 28, APO 324, New York, reports hearing the following Novices on 40 meters between Oct. 19 and 20th, in Istanbul, Turkey: KN1LGU, WV2ERE, FVP, GWM, HBX, HTO, KN-3IIB, JCS, JGZ, JJR, JLO, JUA, KN4FME, HBY, JYK, KQK, KTM, LFC, KN8NCE. Thanks again for a fine report Jimmy.

### Net News

The Tri-State Novice Net is on 3.738 mc, at 4:15 EST after Oct. 13 on Tues. and Thurs.

The NCS is WV2FGP and can be contacted at 415 Hazel Ave., Linden, N.J.

The Continental Teenage Novice Net (CTNN) meets Tues., and Thurs., each week on 40 meters (7180 kc) at 1730 EST with K8CDE as net control and KN8OKS as alternate. Drop a line to Lance, K8CDE, 3957 Limerick Ave., Cincinnati 36, Ohio for more data.

### Help Wanted

W4 —Morris Meyer, 440 E. Chestnut St., Louisville 2, Ky.

Charles Allen, 1750 N.W. South River Dr., Miami, Florida

VE3—Welfred Antheunes, 479 Queen, Wallaceburg, Ontario, Canada. Phone number MA 7-4765

### Letters

Stan Edgerton, KN8RAL, 1409 Hamelink Dr., Kalamazoo, Mich., is a new Citizens Band "convert." He got on a month ago with a DX-40 and S-40A and thinks ham radio is "IT," and claims he has missed many years of fun.

Jim Wood, KN8?, 535 Chestnut Ridge Rd., Hubbard, Ohio, is an almost Novice and expects to be on around Xmas time with a DX-20 and AR-3. Jim would like pen pals.

Ross Chappell, KN4KWE, Tompkinsville, Ky., has been on three months and worked 20 states on 80 and 40 with his DX-40 and G-33 (Gonset) to a dipole and Gotham V-80 vertical. No, Ross, Heath CO. won't work as a CW monitor without modification. See the circuit of fig. 2 for an idea that should work.

Eddie, KN3IYK, Tilghman, Md., lives in a trailer and claims the smallest ham shack. He "bombs" the ionosphere with an S-38E, Knight 50 watter and a mobile whip antenna. Eddie moves every two weeks, so don't look for skeds.

Dale Clark, WV6IRK, No QTH, zipped off a letter as soon as he got the ticket, but doesn't have a transmitter yet. He did some operating from the famous W6KG's ham shack and should be on with his own rig by the time you read this.

Lloyd Simon, WV2GHD, 32 Amherst Ct., Rockville Centre, L.I., N.Y., inhales with an RME 4300, exhales with a Viking Ranger into a dipole or 15 meter beam. WAS is at 35, and Lloyd would like skeds with K7, K4, and DX that includes GM, DL8, EI4, SP1, (Poland), OK1, UB5, HA5, PAØ, F8, EA, OZ, K1, plus the Dakotas. He has some strapping LA3SG/P, HB9 and others.

Joe, KN3IJS, 1232 Newton St., N.E., Washington 17, D.C., whacks away with a 80 meter dipole, DX-40, and SX-99 and operates every nite. Joe's WAS is at 29/20.

Dave Marks, K8MRC, Box 124, Columbus Grove, Ohio, still operates 40 cw with a di-

[Continued on page 112]

# VHF

**50mc. 144mc. 220mc. 420mc. and above**

**Sam Harris, W1FZJ**

P. O. Box 334 Medfield, Mass.

Well here it is January already and we're still working like mad to try and get our antennas finished before the cold weather sets in. As there is an inch of snow on the ground outside, I'm afraid we're not going to make it. It won't be because the fellows aren't trying but rather because we just go too ambitious a project for the time available. However, that is one of the nicest things about ham radio. I don't know as I've ever talked to a ham who didn't have a list of projects a mile long waiting to be finished, started or discarded as the case may be. One of the purposes of amateur radio magazines is to serve as an information center for builders and experimenters. Ideas which prove successful and useful generally end up having an article written about them. Unfortunately many good projects are never brought to the completion stage. As a result the valuable information so laboriously obtained by the experimenter is lost to the fraternity. In order to avoid this and to help other people in their projects, it would seem like a good idea of everyone who is actively engaged in trying out new ideas would make up a list of his projects and send them in for evaluation and possible publication. Don't send in ideas which you want kept confidential because the purpose of this idea is to let other people know what you're doing.

One of the projects in progress at the Rhododendron Swamp VHF Society is an automatic tuned *vhf* receiver. After three weeks of trying this and that and the other thing, we finally arrived at a system which proves quite workable. The receiver tunes a 1 *mc* section of the band in approximately one minute. When a signal is encountered, a squelch circuit removes the motor travel bias and allows a discriminator circuit to tune the receiver to zero beat with the signal. When the station stands by, travel bias is reapplied to the motor and the receiver continues to tune the band. It's so simple to construct and it works so well that we just can't imagine why we haven't had one for the last ten years. Obviously a project of this kind requires little on the inventive side, as automatic tuning receivers have been with us for many years. The only prob-

lems involved were simple mechanical and mounting type of problems. A project of this type is more or less in the same category as a panadaptor. It's a device which if you don't have one, you never miss it and can't really see any good reason why you need it; but if you do have one you just can't understand how you got along without it.

Speaking of panadaptors, we have received several letters on the APA38 panadaptor which we mentioned several months ago. Most of the inquiries were from people who had converted the *if* frequencies involved to other than the original. I don't see any reason why this shouldn't be done, but I have no first hand information of what type of results might be expected. It sounds like a lot of work to me. If you are using the "38" as it was originally intended, to scan the frequencies in the vicinity of 30 *mc*, it is possible that you will encounter a sensitivity problem. The APA38 was designed to work at the output of a relatively high-gain *if* system, and if you are attempting to use it at the output of a converter, it is quite possible that the signal levels will not be sufficient to give a good indication of weak signals. For high level output type converters such as the Tapetone, the gain of the APA38 is sufficient. If your converter output however, is low, the simplest practical solution is to build a one or two stage 30 *mc* preamplifier to go in front of the panadaptor. There just isn't room in the panadaptor case for these additional stages and an outboard unit would be required. Power transformers to fit in the case are apparently as scarce as hens teeth and no purveyor of radio merchandise has come forward with any reasonable substitute. Several people have inquired as to the purpose of inserting the 6 *mc* crystals in the *if* system. If you have your panadaptor working, the reason for the crystals will become immediately obvious when you tune in your first signal. The second *if* amplifier bandwidth is so wide that any one large signal will cover the entire panadaptor screen. The purpose of the crystal is to narrow down the *if* passband so that signals will occupy a much smaller space on the screen. Obviously if the *if* amplifier has a 1 *mc* passband, then a strong



Bill Miller, KØOKP, with the equipment that keeps him happy, and which just might be moved into the back room of the drug store.

signal will occupy a 1 *mc* segment on the picture. If you have a 1 *kc* passband, the same signal will occupy only a 1 *kc* segment of the spectrum. If you have your sweep width adjusted to cover a 1 *mc* spectrum of the band and there are ten stations active in this band, then in order to be able to see each of the ten stations separately they will obviously have to occupy something less than 100 *kc* apiece. However, if two stations are operating 10 *kc* apart and the passband is 100 *kc*, then they will show on the screen as a single station. If you narrow the passband down with crystals to about 1 *kc*, it is then possible to distinguish between two stations who are only 3 or 4 *kc* apart. It must be remembered that a panadaptor is nothing more nor less than an automatic tuning receiver with a cathode ray to show you the stations instead of a loud speaker to let you hear them. IF selectivity is obviously necessary to separate the different stations.

### Moon Bounce

Last month we mentioned a rumor which claimed a 2 meter moon bounce contact between the west coast of the U. S. and New Zealand. To date there still is no confirmation of this contact; however, there is at least some concrete information regarding the attempt which is being made. The New Zealand end of the effort is being handled by the "Auckland Radio Club." Apparently the effort has been going on for almost two years. The boys in Auckland are equipped with rotatable and tilt-able beams and apparently have obtained permission to run sufficient power to make the attempt worthwhile. The American end of this attempt is being handled by an undisclosed group of amateurs located somewhere in California. They apparently are ashamed of their efforts and as a result are making a determined effort not to let anyone know what they are doing. Apparently the American boys are not interested in credit for trying. At the time of writing this, I have the information on the New Zealand end of the effort, but I have not had a chance to find out how much information they would like published.

The pictures which appeared a couple of months ago in "CQ" showing my two meter moon bounce antenna brought in a flood of requests for schedule information. Unfortunately while the antenna is there and is ready to use, and has successfully received signals bounced from the moon, we are not keeping schedules with anybody at this time. Our first few months experiments using a 128 element beam indicated that there was no possibility of making contact with anyone who had anything smaller. In fact, the 23.5 *db* gain obtained from the 128 element beam and a kilowatt transmitter power turns out to be quite marginal from the return signal point of view. A good deal of trouble is also encountered in the Faraday shift which brings the reflected signal back in some other polarization. Some method of adjusting the polarization of your receiving antenna is obviously necessary to obtain any reasonable results. Never-the-less, if someone is really interested in trying some schedules and feel that their equipment is capable of the necessary results, we would be glad to cooperate.

### Station Of The Month

A bit of information has come our way concerning an active *vhf*er in Denver, Colorado. (It came our way because we sent and asked for same). Bill Miller, KØOKP, leads quite a busy life for himself.

Bill received his ticket on February 17th, 1958, and even though his operating time is limited, Bill manages to keep up with Net meetings and the local radio club.

A graduate from Xavier University of Louisiana and post-graduate at Ohio State University, Bill holds the rank of Captain with the USAF Reserve. He owns and operates the "Miller's Drugstore" in East Denver; is married and has two lovely children, a boy 7 and a little girl 1½ years old.

Although Bill works from 0900 to 2100 at the drugstore, he still finds time when he gets home to call "CQ," and greatly enjoys nightly ragchews and building ham equipment. He is a member of the Denver area 6 meter net, The Mile High Hi-Banders, Mars VHF Net and the Denver Radio Club. Also received a citation from the USAF for Observations during IGY.

By this time Bill should have his 6 and 2 vertical Hygain hoisted above the drug store and be "in business" on the side whenever he can grab a minute. Good luck, Bill, and continued good operating to you.

### New Certificate

The Northwest 6 meter amateurs are offering to amateurs, in all other areas, the opportunity to become members of the "Exclusive No'West Club" and earn a certificate.

The rules provide that seven different contacts be made with Western Washington sta-

tions within the area pictured on the certificate; no more than two from Seattle. All contacts must be in the 50-54 mc band, on or after October 1, 1959.

### Club News

On Saturday, October 10th, a group of 35 vhf enthusiasts met to organize the "Greater Atlanta VHF Society." The membership encompasses an area of approximately 25 miles of the City of Atlanta.

With the assistance of the Police Chief, the group was furnished suitable meeting facilities at the police station and arrangements were made to meet each month. In addition the Society organized a 6 Meter Net to meet each Friday night at 2030 on 50.2.



Just seven contacts (the right contacts) and you can be the proud possessor of the beautiful certificate issued by the "No'West Club."

The Organization will have no social aspects but will adhere strictly to technical information and discussion of problems common to vhf participants. At the first meeting, Dick James, K4GJE/4 demonstrated to the group a portable cubical quad for six meters which he has been using for quite some time with great success. Two of the members, Leon, K4YFU and Sam, K4YGK, tried out their luck with the quad on Brasstown (the highest point in Georgia, 4800 feet elevation) and during four hours made contact with five states and worked over 50 stations.

Officers: Larry Manning, W4BGE—  
Chairman

Larry Barker, W4GIS—Associate Chairman  
Al Shaftel, K4TDU—Secretary, Treasurer  
Gene Harris, K4FNZ—Net Control

The "Michiana VHF Radio Club" of South Bend, Indiana, has a large membership with most of the activity on six meters. However, they tell us that interest in two meters is increasing and activity on that band should soon begin to increase.

The Michiana VHF Phone Net meets each Tuesday at 2000 CST and covers North Central Indiana and Southwestern Michigan. Stations taking turns at Net Control are W9EPT,

K8AYF, K9GCL, K8BJC, and K9MSP.

### Mail

**Tulsa, Oklahoma.** Words of wisdom received from John Morris (KN5WNQ): "Thought I'd let you know that two meter activity is picking up here in Oklahoma. Although I for one thought no one would ever get interested enough to suffer through the burned fingers and skinned knuckles to the finish when they could sit back and through the smoke haze see the faint glow of the final tube and know that it was squirting juice into that slick two meter beam." *YOU TOO?*

I have a 10 watt (power into the antenna) mobile, and also a 10 watt fixed station. If I get the notion to finish the power supply this week-end, (*you'd better*) I will have the 120 watt fixed station transmitter on the air, with the usual 829-B final. The frequency is 146-90 mc. Others are interested but somewhat reluctant. One not reluctant is W5CFE who is also mobile on 146.90. He is in the process of coming up with a 60 watt fixed station and maybe a 60 watt mobile too. Much interest and some doers in this area." *Keep proddin' 'em, John. That's all they need.*

**Canoga Park, California.** From warmer than New England, California, and Denny Williams (K6UMM) we hear that: "Have been on six meters for ten months now and so far have forty-five states confirmed. *Hope you get the rest of 'em faster than most of us.* The band opened to KH6 land on Sunday, November 1st for State number forty-five for me. Worked W3BJG, K9KVV, K9CIB and K6HGP, all portable KH6, during the period from 1115 to 1300 PST, with signals 5/9 plus."

"My dad, Con, K6UMG, worked Alfred, LU3EX, on the 26th of September at 2000 PST with good reports both ways."

"It looks like we might get a few more openings to the west (Japan) this year, but W6JRR, K6SQH, and myself K6UMM, will be on  
[Continued on page 113]



Brings back memories of "Dayton Hamvention." C. C. Plaque being presented to "Jackie," (Elaine) W8WRH, by Frank, W8JHS, at the 50 mc picnic at Wadsworth, Ohio, this past summer.

# SURPLUS

by **KENNETH B. GRAYSON, W2HDM**

Care of CQ 300 West 43rd Street, N. Y. C. 36, N. Y.

For a change, this month we will shy away from conversions and deal with the general question of surplus. We received a lot of mail from beginners who want to know what to buy. There are many more letters received which ask for data on conversions which have been covered here or elsewhere. There are just as many questions as to how to solve some other ticklish problem. The general impression is that not enough of the right type of surplus is being converted.

First of all, it seems that an understanding of what the equipment can do is definitely needed. For example, "what communications receiver should I buy," is a common question. Usually we recommend the BC-312, 342 or 348 or the BC-779 (Super-Pro) receivers. Of these, the 342 and the 779 have *ac* power supplies while the others will require an *ac* power supply to be built. The RBM (2 to 20 *mc*) receiver is also another good buy. If you are a novice or an experienced ham the recommendation we can make is to think about the *TOTAL* use you can make of the receiver. An ARC-5 with a set of crystal controlled converters and a power supply can easily give more ham versatility for less money than an expensive commercial receiver with no bandspread. As a matter of fact, the ARC-5 command sets still offer the most for the dollar. A book has been prepared covering them and their conversions. It's called the "Command Sets" (\$1.50 from the Radio Book Shop—1379 East 15th Street, Brooklyn 30, New York).

The RU series receivers are *trf* sets of low price (about five dollars). They use plug-in coil drawers and are worth every cent of the money. The RU transmitters are stable and cheap. Though not as powerful as the ARC-5, they offer many good parts to cannibalize from. The ARB is an aircraft multiband receiver good for general coverage work. The TCS is certainly worth the money since it is a fine transmitter and receiver combo. Covering 2 to 12 *mc*, it can easily be extended to ten meters. Naturally, it was designed by Collins.

Another Collins design is the MBF covering 60 to 80 *mc*. It's an *ac-dc* transmitter-receiver and can easily be modified to six meters. The only trouble is that you can hardly get them

anymore. This little gem is a natural for civilian defense. In the Navy, it was used on small ships much the same as the TBS was used on larger vessels. The TBS (currently selling for about \$15.00 for the transmitter and \$20.00 for the receiver) is a single channel crystal controlled unit. The receiver is easily modified to six or ten meters, and has an integral 110v 60 cycle power supply. A separate power supply is needed for the transmitter, unless you latch on to the big bulky motor generator set.

The Navy had a series of communications receivers that were really stable. The RAA, RAB and RAC and RBA, RBB and RBC were quite common aboard ships. They are large, not generally rack mounted, and have no calibrated bandspread as we know it, but certainly does have selectivity. The RAK-RAL series were *trf* sets with regenerative detectors. The RAK covers 15 *kc* to 600 *kc* and the RAL covers 0.3 to 23 *mc*. Both use the same type of 110vac power supply.

The Navy made use of a whole series of National receivers. The RBL was a modification for low frequencies of the NC-100. The Navy added an *rf* stage to the NC-100 and called it the RAO. The HRO became the RAS in the fleet. Many other sets were similarly acquired. Even the Germans copied the HRO for their use.

In the Army, the Super-Pro became the BC-779 and 796 (plus a whole string of other numbers) depending upon the frequency range. A very popular transmitter made by Halli-crafter became the BC-610 and modifications are constantly reappearing bringing it up to date. These were basically modified amateur equipments.

For the aircraft of WW II other problems existed. The equipment used was of good quality but operated with 400 cycle power line frequencies or 28 volts *dc*. The big problems are usually solved after we change the power supplies, relays, motors and controls. In general, communications aboard aircraft was accomplished by the ARC-5 set, the RU, the ART-13 (good old Collins again) and the BC-375 transmitters for the low frequencies and the ARC-5 (*vhf*) and SCR-522 for *vhf*. Very little if any *uhf* communications took



place, probably because of the state of the art and the use of *uhf* for radar.

Many aircraft radar sets have been released, although just about any equipment that even acted like a pulse generator was called a radar set. The radars were the AN/APS-4, AN/APS-13, the ASB and the shipboard SA, SC, SS, SK, SL, SO and SX. Land radar equipments were hidden in SCR numbers, like the 586, etc. Loran equipment was given names such as AN/APN 4, 5 and 9 and the DAS. These are still around and can be converted to scopes, with some effort.

The many IFF sets, used to identify friendly targets, were given MK (Mark) numbers (since they involved gun-fire control) and later were given the BN, BP, BL and APX numbers. The BC-645 is one of the Army units, known as a transponder. It emitted a signal when interrogated by a radar. Operating in the 450 *mc* range with an MOPA, it can be used at 420 *mc* with a little effort.

Many APR sets were made for aircraft use. These were wide band receivers used for searching the spectrum for enemy signals. Once found, an ATP was used as a jammer. Chances are the APR operator listened in and observed a panoramic scope at the same time. Such equipments were the RDC and APA-10, and 38.

Also in the aircraft were the navigational receivers, such as BC-733 for localizer (left right of runway) ARN-5 for glide slope (angle to the runway) and the APN-1 altimeter which operated near 420 *mc*. Over a marker beacon, the BC-1028 lit a lamp to tell the pilot he is at a particular point on the runway approach.

With the Marines went the TBY which covered 28 to 80 *mc*, battery operated. This was a back carried set and sent voice on CW. They now go for under thirty dollars complete. The TBX is a larger set operating below 8 *mc* and comes in a trunk with generator antennae, etc. (Saw about fifty at Communications Equipment 343 Canal St., N. Y. C., N. Y. for under 60 dollars, new). The TBW which is a counterpart of the airborne GO-9 was also sent ashore for Marine use. Packed in a separate floatable container, they are pretty much travel as they come.

Take all of this, add about two thousand more sets, such as the BC-611 handy talkie, LM and BC-221 frequency meters, TDZ-RDZ VHF sets, the GRC's, TRC's, TAJ, TBK, and so forth and we say if you can't find it surplus—you just aint trying.

The problem of what to buy is greatly dependent upon the pocketbook and availability. It's always advisable to deal with a reputable supplier. If you use the mail or express for transportation check prices closely. The local dealer with a higher price may be cheaper in the long run, considering freight charges.

Locating surplus conversions is not too difficult. CQ has run quite a few and the eleven

year index is still available on request with many listings. The 'Surplus Radio Conversion Manual' comes in two volumes and covers many sets. It sells for two fifty each at the Radio Bookshop. QST has run many conversions, mostly in the late 1940's. Some of the other radio magazines have run conversions from time to time as has the MARS Bulletin.

Manuals are hard to come by for many sets. The Government Printing Office has some, but chances are you'll have to shop from dealer to dealer for them. Drop us a card and we'll be glad to run a request in this column. If you're just interested in a schematic, take a look at the "Surplus Schematic Handbook" (\$2.50) which has almost a hundred different circuits of the more popular surplus equipment.

### Mail

This month's mail shows some interesting requests. From out in Hawaii, the Lahainaluna High School Amateur Radio Club is looking for conversion information for the US Coast Guard transmitter T-106. Send it to Itsuo Yano, Lahainaluna High School, Lahaina Maui, Hawaii.

Ben White, 911 Turner St., Zanesville, Ohio is looking for info on the BC-22 transceiver. W6AAZ needs the manual on the TS-34/AP BC-779 and Hickock RFO-5 scope, and will send a BC-610 manual to some one who needs it. Bill Rowley, Box 334, Rte. 4, Huntington, W. Va., needs a conversion of the RDZ. Louis Schmit, C.P.P.S., St. Charles Seminary, Carthegena, Ohio needs some info on how to convert the ART-13 to ten and fifteen meters. WA6AOV wants the ID-6A/APN-4 manual while W5CMG/6 needs the handbook on the MD-3/APT-4.

W9WYM wants to convert his BC-689A to 420 *mc*, and any information that is available on the BC-888. William Gunn, A2/c, 310 FMS, Box 277, Schilling AFB Kansas needs the RBS manual. K9ELB has an English piece of equipment known as the PR-1143 Reference 10D-52 and would like any data available on it. W1BO wants a manual on the BC-221. William McMahon, 1048 Kensington Ave., Buffalo 15, N.Y., wants additional data on the I-177. H. P. Lutz, 1215 Nelson Avenue, Bronx 52, N. Y. wants information on the T-50M transmitter. W1ZSR wants to get schematics of the RCK receiver. W8FEM is searching to the BC-788C book, and W8NFD wants the BC-699 (SCR-543) manual.

William O'Brien, 1534 South Avenue, Syracuse 7, N. Y. wants the RBM manual. O. J. Guiberteau, 6418 Flamingo, Houston 17, Texas wants to convert his AKB-5 and the BC-604. W8MIB needs the APQ-2 manual.

As a closing note, we would greatly appreciate it if anyone using the I-177 tube tester would send a card with tube settings to that we may pass them on to others.

73, Ken, W2HDM

sideband  
sideband  
sideband

# SIDEBAND

By: Bob Adams, W3SW

Silver Springs, Md.

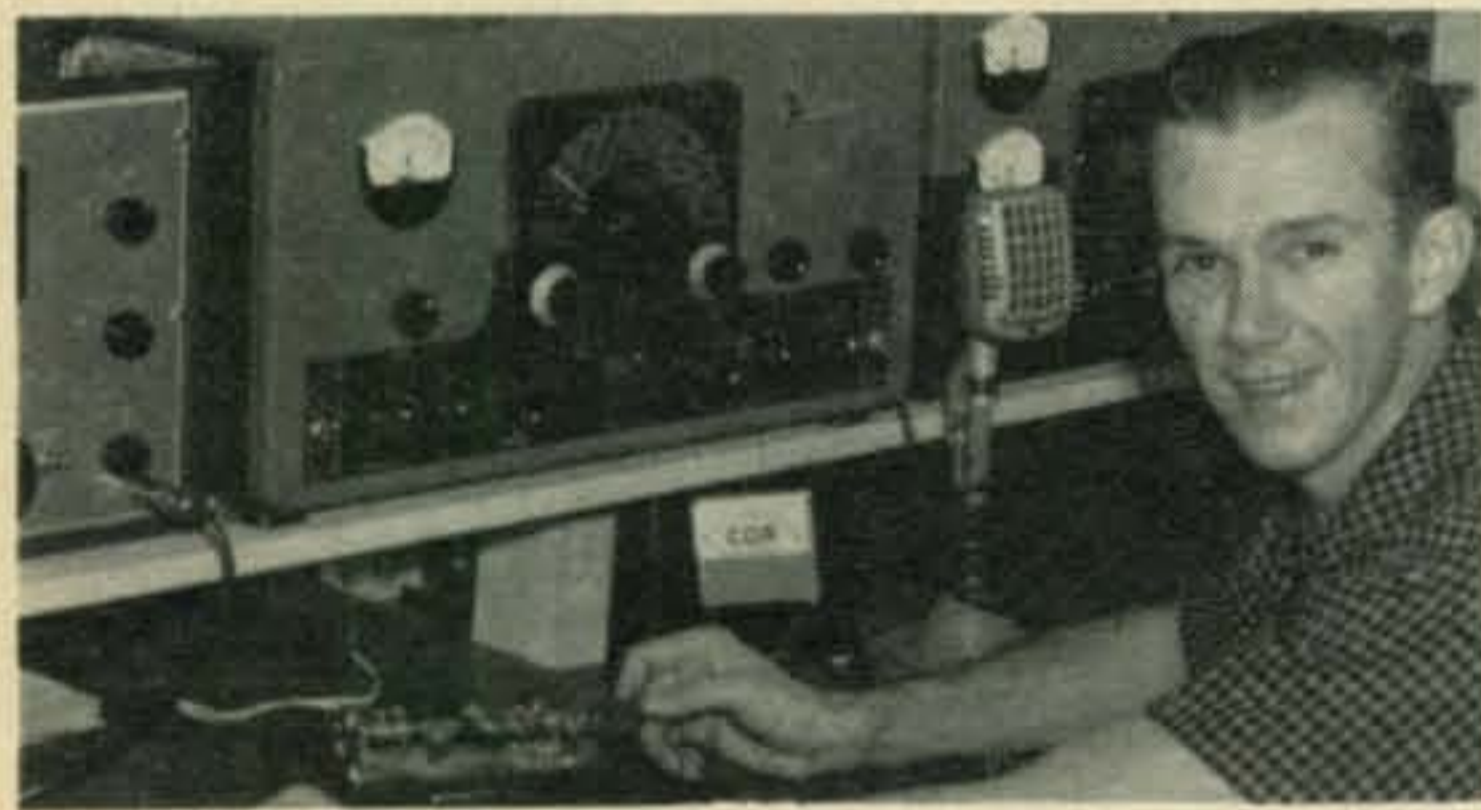
P. O. Box 625

## Worked 100 Country Club

Two-Way SSB  
(In order of award)

W6UOU	W6IAL	PY4TK	W6TOT	YV5FK
W2JXH	K2JFV	K9EAB	W9HB	TI2EV
F7AF	W1ADM	W7IAA	W5DA	W8DMD
K6GMA	TI2RC	VQ4ERR	W7GIE	K2FW
W3SW	W2CFT	W8MPW	W1LHZ	W1WDD
W4IYC	KØABH	W3MAC	W2MA	K6LGF
TI2HP	ZL3IA	W1GR	W6BAY	W3VSU
W8QNF	W6BAF	W8JXM	W5RHW	W1OOS
W6ITH	W2TP	W1EQ	K4HXF	W9QNO
VE3MR	W6RKP	W5FDZ	K2EWB	ON4DM
W8GCM	PY2JU	W8JXY	K2HUK	W2MAF
W8EAP	W6UPP	W2OTZ	VE3ES	YV5ABD
W8YBZ	W6PXH	W5BGP	MP4BBW	4X4DK
WØQVZ	WØCVU	W6WNE	W1DCE	VK3AHO
WØFUH	W4INL	W6TNS	W2ATJ	DL1VR
W8PQQ	W8YIN	W4HIM	KZ5WZ	K8EWK
ZL3PJ	TG9AD	HB9TL	HB9IE	KØCTL
K2MGE	W3NKM	K2HEA	W6ZEN	
W2OQO	W6QFE	W7VEU	W5KFT	
W2VZV	W8MG	W4CDY	KØKWY/4	

Seven more Sidebanders qualified and are extended a warm welcome to one of Radio Amateur's most popular clubs. W9QNO, ON-4DM, W2MAF, VK3AHO, DL1VR, K8EWK and KØCTL are the newest additions. The



K6VKX, "Jay".



DL4XN, "Wally" courtesy DL4AS.



VQ2RB, "Ralph" courtesy K6VKX.

total membership is now ninety-seven, and we should pass the 100 mark this month.

With the exception of a few stations in very remote places in the world, most of you will receive this month's issue before the *Fourth Annual CQ World-Wide SB Contest* is scheduled. The date is from 1800 hours GMT on January 30, 1960 until 1800 GMT on January 31, 1960.

The rules and point scoring system were discussed in last month's CQ, but are repeated for the benefit of those who missed them.

The Contest will be open to all licensed amateur sideband radio operators throughout the World.

All authorized amateur bands may be util-

ized, but no multiplier will be allowed for multi-band operation.

Stations may be worked as many times as desired but only *one* contact may be counted.

Stations in the same country as you are located in may be worked and these contacts will be credited.

The usual message of five digit information will be exchanged, with the first and second being the Q and S signal reports, and the other three the number of the QSO. For example: 59001 indicating the first contact you have made in the Contest.

Your final score will be the sum of the number of QSO's made, multiplied by the number of different country prefixes.

The winners of the first and second Contest, Eva and Alex of CN8MM are now permanent residents of Brazil and will not participate. Last year's winner, Peter of HB9IE, was recently married, but reports he will try to improve his fantastic score which won the

W3SW Gold Cup. This cup properly engraved has been shipped to Peter. We had hoped to have it presented by Wayne, W2NSD our Editor during his last trip to Switzerland. Another cup has been ordered, and will be presented to this year's winner. Certificates will be mailed to the first twenty-five highest scorers.

Doc, W8EAP sent in one hundred and seventy-nine QSL's (some which have me still drooling) and qualified for his "Worked 175" endorsement. There must be some wonderful QTH's in that particular section of the country because W8GCN, W8EAP, W8YBZ and W8PQQ are all battling to become the first to work two hundred.

Ian, MP4BBW writes to advise that he has ordered a new 50-foot foldover tower and expects to have a linear amplifier in operation for the Contest. He also hopes to move shortly from his present noisy location to a quieter one in another section of the camp. Judging by his present list of confirmations I would say that he is doing very well right now, hi!



DL4AS, "Mark".

K4CFG/4 reports that OE7SU is interested in sideband operation. I have sent him some requested conversion information. Frank, OE-1FF also wants to go to sideband, but is prevented by the high duty charged on imported radio equipment. Does anyone have a 10A or similar sideband generator that he would want to donate? An Austrian SB station would sure be welcome.

Jay, K6VKX writes to give us the real, "behind the scenes dope" on VQ2RB's changeover to sideband. Jay and Ralph had been keeping regular schedules, first on CW then on AM. When K6VKX went on SSB recently, VQ2RB quickly recognized the superiority of it over AM and has ordered a rig from the USA. He should soon be on the air causing big pile-ups, as he will be the only SSB signal from VQ2. Jay will handle the QSL's for VQ2RB. Send a self addressed envelope with the necessary return postage to: K6VKX, 7940 Canary Way, San Diego 11, Calif. Thanks Jay, for the photos of Ralph and yourself. Incidentally V-2RB needs only Vermont QSL to receive his WAS.

Bob, W4INL, sent us a nifty photo of his rig and now we know why he is up among the top DX'ers. Last count was 175 worked,



W4INL—deluxe".



DL4EC, "Larry" courtesy DL4AS.

with a few QSL's missing. The HRO receiver shown was completely rebuilt and at the moment it utilizes triple conversion pass-band tuning with plenty of twin triodes. Bob can be heard any morning when the band is open, with his usual big signal. W4INL said that the reason for Georges', UA1DZ improved signal is due to a new "Vee" beam.

Thanks to Mark, DL4AS we are able to show several of the DL gang. He was host to John, SVØWB in October. John will be leaving the Isle of Rhodes around the first of January, 1960 and will return Stateside. SVØWB will always be remembered for his splendid operating and terrific signal. Too bad he cannot bring the QTH home with him.

The time is rapidly approaching to make your reservations for the annual SSB Dinner which is to take place this year on March 22, 1960 during the Institute of Radio Engineers Convention in New York City. The SSB Dinner is being sponsored by the SSB Amateur Radio Association and tickets are secured through them. A gala affair is being arranged and you should send for your ticket early to ensure your attendance. As usual there will be many wonderful prizes to be won and top notch speakers will address the group. This has come to be the top event in SSB.

With the Holidays upon us, it is my fervent hope that you all will enjoy the best of health throughout the NEW YEAR, and that all of you newcomers to SSB will find it as enjoyable and effective as we have.

73, and Happy New Year, Bob, W3SW

# CONTEST CALENDAR

by Frank Anzalone, WIWY

14 Sherwood Road, Stamford, Conn.

January 9 - 10—DARC WAEDC CW  
January 16 - 17—BERU CW  
January 23 - 24—DARC WAEDC CW  
January 23 - 24—N. M. QSO Party  
January 30 - 31—CQ WW SSB

## DARC WAEDC

Starts: 11:00 GMT Saturday, January 9th.

Ends: 23:00 GMT Sunday, January 10th.

Starts: 11:00 GMT Saturday, January 23rd.

Ends: 23:00 GMT Sunday, January 24th.

The 5th annual WAE contest sponsored by the DARC is a two weekend affair this year. However it remains a CW contest only. And the object of course is for non-Europeans to contact as many European stations as possible during the contest period.

Competition is on the basis of all band operation, 3.5 thru 28 mc.

It is recommended that you study the rules regards the QTC feature. This and all the other contest information appeared in last month's Calendar.

Send your logs to: The DARC DX Bureau, Fuchsienweg 51, Berlin-Rudow, Germany.

## BERU

Starts: 00:01 GMT Saturday, January 16th.

Ends: 23:59 GMT Sunday, January 17th.

As we all know this contest is open only to amateur stations within the British Commonwealth. It was reported in the R.S.G.B. Bulletin that a W station was heard calling "CQ BERU" and strangely enough a station did answer him. His reply was simply, "Remember 1776." Hi. Incidentally last year's winner in the high power section was a local cousin, VE7KX. And in the low power division, ZS6R was top man.

## New Mexico QSO Party

Starts: 8:00 AM MST Saturday, January 23rd.  
Ends: 8:00 PM MST Sunday, January 24th.

The Sandia Base Radio Club of Albuquerque announces the first New Mexico QSO party.

Its unfortunate that a better date was not chosen for this initial affair. Falling on the same week-end as the WAE contest will make it a bit rough.

However for those seeking New Mexico for WAS credit and the Sandia Base Fellowship Award, following are the details:

## Scoring:

1. New Mexico stations: 1 point per contact, multiply total by number of states, U. S. possessions, Canadian provinces and foreign countries worked.

2. Outside stations: 3 points for each New Mexico station worked, multiplied by total number of New Mexico counties worked.

3. Credit will be given for contacts with the same station on other bands.

4. New Mexico stations will send number of QSO, signal report and county. Others send QSO number, signal report and state, possession, province or country.

5. There is no time limit within the contest period, no power restriction and contacts can be made on CW or Phone.

## Awards:

1. Certificates to the 1st, 2nd and 3rd highest scoring stations in each U.S. call area.

2. Certificate to the highest scoring station in each country, Canadian province and U.S. possession.

3. Certificate to the top station in the U.S., outside of New Mexico.

4. First, 2nd, 3rd and 4th place certificates for New Mexican stations.

5. A Sandia Base Fellowship Award will be given to any station contacting 25 different stations in Albuquerque. Contest logs will be accepted in lieu of QSL cards.

Send your logs postmarked not later than February 15th to the, Sandia Base Radio Club, Att: John C. Kanode, K5UYF, 1900 Madeira Drive N.E., Albuquerque, New Mexico.

## CQ WW SSB

Starts: 18:00 GMT Saturday, January 30th.

Ends: 18:00 GMT Sunday, January 31st.

Bob Adams, W3SW filled you in on the details in his column last month and again this month.

If the SSB activities in our WW Phone contest is any indication, the "sidebanders" should really go to town in this one.

Give us a little more details when you announce the results this year, please Bob.

## Ed. Notes

Those interested in the "Worked Ontario Counties" awards, (W.O.C. 30 or 50) should send their application and cards, including suf-  
[Continued on page 113]

# Citizens Radio

Lee Aurick, W2QEX

## Citizen Jamboree

In late September, an informal gathering of C/Bs convened at Wycoff in northern New Jersey.

Despite the somewhat impromptu arrangements, more than 200 C/Bs and their progeny, with a sprinkling of hams included, came together face-to-face for an enjoyable day of gab. A few brave souls ventured forth from as far as Brooklyn and Long Island.

The host, Harry 2W2410, saw to the arrangements and offered directions over the air to mobiles bound for the Jamboree.

Several alert distributors were on hand to exhibit their most recent equipment, as were a few electronic service companies to make contacts and offer advice. Everyone seemed to have a wonderful time and agreed they'd be back for the next jamboree.

Though some of the people in attendance appeared to be making use of citizen radio as it was intended by the FCC they seemed in the minority. The great majority of these nice people were having the time of their lives just talking to each other in person, and over the air.

## Citations And License Revocations

Now we all know that casual contacts and conversations are beyond the scope of the C/B regulations, just as preaching is beyond the pale of your conductor. Realizing that these few comments will have small effect on the overall situation, it is pertinent, however, to point out that licenses are being revoked for operation inconsistent with the regulations. Citations also have been issued by the FCC for contacts made beyond the normal ground-wave range, and as more violations occur, the Commission is certain to feel the need for more stringent regulation. All C/Bs can help to curb this need by observing the regulations as they now stand. They may need some explanation in certain instances and this is one place we'll be glad to help. A final word of warning before going on to other matters: We believe that many amateurs will find C/B activities and equipment of interest, but the two services are not related beyond this. Casual contacts belong in the ham bands and *not* on the citizen's band.

## Off-Frequency Operation

Last month we promised to talk about the

effect of some of the C/B regulations and how best to abide by them and keep out of trouble.

There are several places in the regulations that really need attention, but some of the most flagrant violations appear to be in the area of unlicensed adjustments. This brings us to the simple procedure of installing crystals for operation on channels other than those provided in the equipment when it was purchased.

The regulations require a crystal accuracy of .005 *per cent*, not just .005. This means, of course, that to find the tolerance to which your crystal must operate, you must multiply the crystal frequency on which you wish to operate by .00005! This permits a variation of plus or minus 1.3 *kc* throughout the C/B.

In itself, it would seem permissible to buy a crystal with this tolerance for the desired frequency, plug it in, and let it go at that. And this is where the rub comes in.

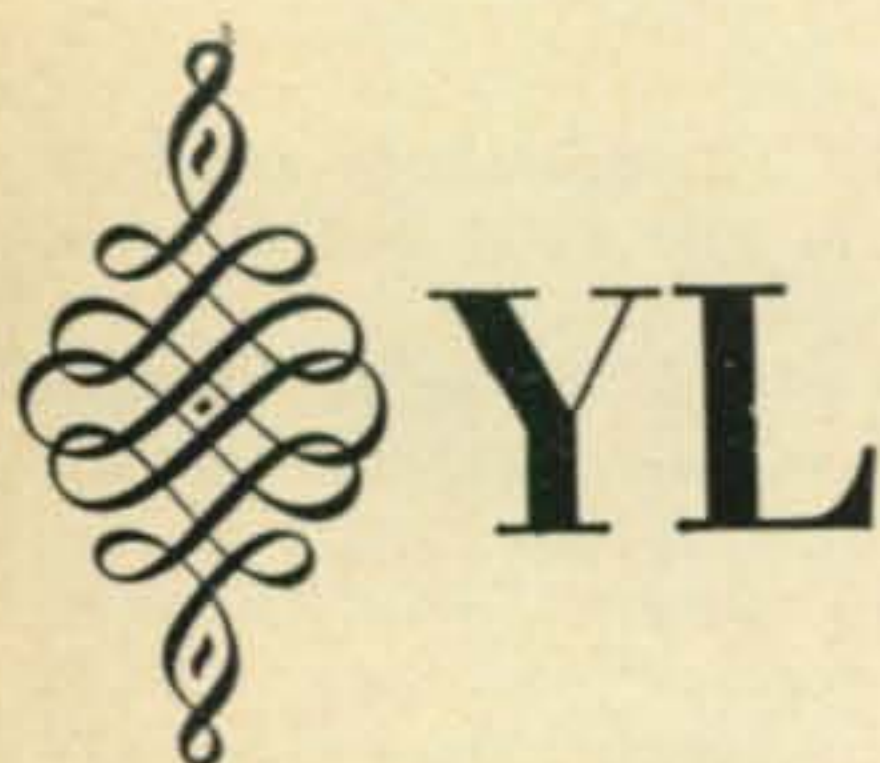
Crystals are peculiar beasts, and not the strangest of their peculiarities is their tendency to operate on slightly different frequencies when placed in different equipments. The primary reason for this is the variety of oscillator circuits found in present equipment. There are almost as many circuit variations as there are manufacturers.

As a consequence, it is possible and probable, that a crystal which meets the tolerance requirements in your friend's rig does not do so in yours. In other words, you may purchase a crystal marked 26.965 *kc* from XYZ Co. There is little doubt, XYZ being a reputable outfit, that the crystal meets the required tolerance when tested in their production oscillator. But will it oscillate at the indicated frequency in your rig? It won't—unless you operate it under the identical conditions such as circuit and temperature, that XYZ did.

How can you be sure? Well, short of writing for a technical explanation and description of the XYZ test set-up, you can't. The amateur operating in the ham bands never runs into this problem unless he's looking for a crystal near a band edge.

Because C/Bs are not required to possess technical knowledge, or the equipment to make the necessary tests for frequency compliance, the regulations specify that these adjustments must be made by a licensed operator holding at least a 2nd Class Commercial Radiotelephone License. There are adjustments that can be

[Continued on page 120]



by **Louisa B. Sando, W5RZJ**  
212 Sombrio Drive, Santa Fe, N.M.

### New YLRL Officers

To the new officers of the Young Ladies' Radio League for 1960, our heartiest congratulations! This will be the biggest year yet in YLRL's history—its 21st in existence—with membership approaching the 1000 mark, and with the 3rd International Convention promising to be outstanding. The officers to guide YLRL during this eventful year will be: President, W6DXI, Gladys Eastman; Vice President, W5EGD, Lillian Beebe; Secretary, K6EXQ, Connie Hauck; Treasurer, K6OQD, Jean Kincheloe; editor of *YL Harmonics*, K6ENK, Wanda Gluck.

These YLs will be serving YLRL as District Chairmen: K1ADY, Mary Hadley; K2DKL, Bonnie Grant; W3UUG, Miriam Blackburn; W4UF, Dorothy Saunders; K5BJU, Harriet Woehst; K6HAD, Jan O'Brien; W7CPV, Betty Hartzig; 8th, to be announced; K9IXD, Butch Singer; WØSZH, Norma Gray; KL7BLL, Marge Marge Reich; HK6 and VE, to be announced.

A write-up and photo of W6DXI, Gladys, was presented in this column in CQ for Nov., 1958. "New" since then has been her active participation during 1959 as YLRL's vice president—attending many conventions and with K6KCI sparking the first California YL convention at Santa Barbara, together with handling YLRL's contests and introducing the new YL "Howdy Week."

At this writing new vice president Lillian, W5EGD, is in the process of packing for a move from Houston, Tex. to Baltimore, Md. where her OM, W5DIW, has been transferred with the FCC. Lillian sent out her first CQ on

May 17, 1954, as a Novice. In Oct. '54 she got her General and completed working WAS (she lacked only 2 States) and has since earned WAC, WAS/YL, WAC/YL, DXCC, WBE, YL-OM 10CC, 25 CPC, BPL medallion, YLCC, and a number of club certificates. The rigs at W5EGD are a Valiant running 275 watts, a home-brew SSB rig and a 30-watt mobile. Antennas are a G4ZU beam, all-band vertical and 40m doublet. Lillian operates all bands except 6 and 2 and has worked over 150 countries. Prior to the transfer Lillian was president of GAYLARK. Other hobbies in-



Lillian Beebe, W5EGD/  
3, YLRL vice president  
for 1960.



Jean Kincheloe, K6OQD,  
treasurer for YLRL dur-  
ing 1960.

clude photography and ceramics and Lillian has been a Den mother. Daughter Nancy Ellen is 17 and son Richard is 10.

K6EXQ, Connie, who obligingly agreed to serve another year in her post as secretary, also was presented in this column in CQ for Nov. '58. Her task is a large one, keeping all the membership records straight as YLRL ever increases in numbers.

New treasurer, Jean, K6OQD, is known to many of you as YL editor of *Western Radio Amateur*. She got her first license in 1955 and operates 2, 6 and 10 through 80 meters. Jean has two Public Service Awards, BPL medallion, Grand Master Traffic Handler's certificate awarded by PAN News; WAC, YLCC with two stickers, and a number of club certificates. She holds appointments as OPS and OO, Class I, is in AF MARS as AFA6OQD, and is District Radio Officer of district 8 of the Los Angeles Co. Sheriff's Dept., Disaster Comm. Service. OM Bill, K6OQC (they got their licenses the same day), is Communications Officer in the same RACES outfit as Jean is RO. Jean's other hobbies are philately, building model airplanes, and they are now adding radio control models. They have no harmonics, but two dogs for pets and four tanks full of tropical fish.

Editor Wanda, K6ENK, also has been presented earlier on these pages. This will be the third year Wanda has carried on the tremendous job of editor of *YL Harmonics*. How she does it we'll never know, for in addition to three older jr. ops, little Lois Ann joined the Gluck family this last year.

### 3rd International YLRL Convention

More news from WRONE girls planning the 3rd International YLRL Convention scheduled for June 17-19, 1960, at the Hotel Commander, Harvard Square, Cambridge, Mass. WRONE is asking for help in their one convention fund-raising project—the souvenir bedspread. This spread is being made of squares that are replicas of the many certificates offered by YL clubs throughout this country and some from DX lands. They will be put together with the YLRL girl-on-the-globe as the center and a header at the top will read "3rd YLRL International, 1960, Boston, Mass." Each YL can help by buying and/or selling tickets available through the YL clubs, or from Chata Swenson, W1RLQ, Box 193, Morningdale, Mass. Tickets are 25c each and in addition to the bedspread are good for a second drawing, this to be for a handmade hairpin lace afghan (so you can sell tickets to other friends as well as YLs). WRONE would love to have you there, but you *don't* have to be present to win.

### With the Clubs

A sincere welcome to the newest of the YL

clubs—ALAMO YLs. On Sept. 27 nine licensed YLs met in the home of K5PDI, Mary, the first meeting of its kind for the YLs of San Antonio. They chose the name Alamo Ladies Amateur Microphone Organization, or ALAMO YLs. In addition to bi-monthly meetings, the members hold a net on each Friday at 0900 CST on 7235 kc. Also, a 2 m net has been set up so Tech and Novice licensees may participate. Those attending the organizational meeting: W5's, IOZ, KQG, TSE, WXT; K5's OPS, OPT, PDI, YCE and KN5TSZ.

HAWK observed the club's 2nd anniversary in October with 50 members, 100% YLRL. Green star stickers for the HAWK certificates are available for those who contact an additional 10 members of the club. Custodian is W9RTH, Ada. HAWK vice President, K9IXD, Butch, received Indiana's Outstanding Amateur Award at the Indiana Radio Club Council's annual hamfest.

The Portland Roses have these officers for '59-60: Pres., W7HPT, Beverly; V. P. & treas., W7QKU, Donna; secy, K7BII, Mary; publicity-activity mgr., W7NOK, Pat. W7RVM, Helen, is still custodian of the certificate, which may be obtained by submitting proof of 8 contacts plus return postage to W7RVM.

K6TYJ, Betty, is now acting president of the Sacramento CHIRPS, Colleen, K6PWH, having found it necessary to resign.

Officers for the Georgia Peaches for 1960 include: Pres., K4LVE, Gladys; V.P., K4GCT, Helen; treas., K4KKR, Peggy; secy, K4ZZS, Marguerite. Ga. Peach Meg, K4HSC/4 recently had an FB write-up in the *Atlanta Journal*.

New custodian for the Lads 'n' Lassies certificate offered by the Los Angeles YLRC is Irma, K6KCI, 762 Juanita Ave., Santa Barbara, Calif.

Floridora YLs now number 82. The club has a new net especially for YLs that go to business or school. It meets at 2000 EST on 3950 kc with K4BAL NCS assisted by K4OYB.

New call and QTH for WAC/YL Custodian, Barbie Houston: K5YIB, Rte. 2, Box 178, Garland, Tex.

### Christmas Again. . . .

And if you don't have your copy of "CQ YL," speak up and let the OM know that's one item on your Christmas list. You gals can order it for your OMs, too, you know! The one and only book devoted to the YLs, it contains 18 chapters covering the YLs' participation in every phase of Ham radio; 167 pages, 500 photos. As the gals say, *your shack just isn't complete without a copy of "CQ YL"*! Order from this column editor, W5RZJ, QTH at head of column; \$3 per copy, postpaid and autographed.

33, Louisa, W5RZJ

HL9TA:—KARL, Central Box 162, Seoul, Korea;

HL9KJ:—The Advisory Group, Ministry of Communications, Seoul, Korea;

HL9KR:—Box 35, HQ, 314th, Air Div. SPO 970, San Francisco, Calif., USA;

HL9KS:—KMAG, APO 102, c/o P. M. San Francisco, Calif., USA;

HL9KT:—304 Sig. Bn., APO 301, c/o P. M. San Francisco, Calif., USA.

The QSL Bureau of Korea is: KARL, Central Box 162, Seoul, Korea and it will handle only the QSL's for these 5 ham stations and other SL's will be sent back to sender because there is no other ham stations except these 5 stations in this country.

HL2 stations licensed to several schools as the experimental radio stations are forbidden to QSO with foreign hams and we advise you not to QSO with these HL2 stations because they are not ham stations.

Now, unfortunately, there is no individual ham stations yet here in Korea, but we believe we shall have them in the next spring at least.

We wish to see you on the air and Best 73es 88!

We, HL9TA, send QSL 100%, of course, hi.  
 Cho Dong-In  
 Op of HL9TA  
 Secretary of "KARL"

**HC8 Galapagos Islands** — The following is from Dan, W8MXS.

*Tigress Expedition* is the name we have coined for this trip. OA4GM, Bill Koehler, has instituted this expedition to qualify his two-masted schooner for long distance racing and since his ship is named The Tigress, so goes the name. The operation will take place from the Galapagos Islands sometime about mid-January and we will be on the air about 10 days. The operators will be OA4GM, OA4AGI (OA4IGY) OA4CX, OA5G and W8MXS. We will operate SSB on 10, 15, and 20 meters with a KWM-1 (with D adaptor), 40 and 80 with another sideband rig, and all bands CW with a third rig. Antennas are a 2 element tribander, an all band vertical, and several dipoles.

We plan to leave Lima, Peru on Jan. 7 and, depending on sailing conditions, we should be in the Islands in 8-10 days thereafter. QSL to W8MS—with S.A.S.E. for stateside QSO's, IRC's for all other to get QSL direct, the rest via Bureaus."

**DL4 Germany**—The new QTH for the DL4 QSL Bureau is: HQ SQUADRON, 7425th SUPPORT GROUP, APO 109, New York, N. Y.

**CR10 Portuguese Timor**—In a recent letter to VK3KB, VK5BV says: "I didn't think my CR10 attempts had been so closely followed . . . owing to political complications I was unable to transmit . . . I am going to make

another attempt to go there next January or February." All radio communications from Timor were shut down for a period but VK-5BV thinks he will be able to get operating permission on his next try. (Tnx VK3KB).

**160 meters—First Crossing!** !! by W3RGQ and G3PU after a series of schedules occurred on Friday night October 16th at about 0600 GMT. Shelly is making a real effort on 160 this year, having written over 50 DX stations for special schedules on 160, and planning to be on the air himself looking for DX *two* nights per week—Fridays 0430-0530 and Saturdays 0530-0630 GMT on 1802-1822 kc listing 1827-1837 kc. He has to date worked 31 Countries—Nice work Shelly. . . .

**Conditions this year** seem to be shaping up pretty well—with Transatlantic DX and West Coast DX already worked, and a few quiet nice D nights—we are hoping!

**Russian SWL Card** has been received by W1BB from UA1-642 Leningrad reporting W1BB's signals 349 last January which shows that U. S. signals can and do reach USSR on 160 and with increasing numbers of Russian HAMS operating "Top-Band" a QSO is a distinct possibility—who will be the first? ? ? W3-RGQ we understand has *scheduled* with one or more Russian Hams for tries. (Tnx W1BB).

### ANNUAL TRANSATLANTIC and WORLDWIDE "TOP-BAND" 160 Meter DX TESTS

These special "Tests" will be held this season on the following SUNDAY mornings from 0500 to 0730 GMT, in accordance with the listing given below:

January 3rd and 17th  
 February 7th and 21st

During these periods, extra special efforts will be made to contact European, Asian, African and other 160 meter DX Amateurs throughout the world, for general DXing, and also to make observations as a contribution to the study of *propagation* conditions on these frequencies.

An active group of English and DX Amateurs, in cooperation with USA Amateurs are behind this effort in carrying on these *tests* which have been a yearly activity since 1932. All 160 meter stations throughout the world are invited and also urged to participate in as many of these tests as possible.

Most W/VE's will operate in the 1800-1825 kc segment east of the Mississippi River, while those to the west will use 1975-2000 kc. Clustering near 2000 kc usually, DX will be found mostly between 1795 and 1875 kc, the best place being 1800-1835 kc. Some DX's will be found near 2000 kc.



W/VE stations will call CQ DX TEST the first 5 minutes of each hour, and each alternate 5 minute period, listing the second 5 minute period, and each alternate 5 minute period of the hour, for DX. The DX stations, of course, will do just the opposite. Thus each station alternately calls for 5 minutes, and then listens for 5 minutes throughout the test—unless working or hearing DX. Particular care should be taken by all participants to carefully “set” their clocks with WWV, etc., to be sure of keeping in step with these 5 minutes periods, and not causing QRM by transmitting during the listening periods. These calling and listening periods of course apply only when no DX is being heard or worked. When DX is coming through, the idea is to QSO regardless of the periods—BUT, here again, adherence to the 5 minute periods even for a QSO would help to minimize RM. Send all reports to W1BB.

**VU5 Andaman Islands**—As you are reading this item, the VU2ANI/5 DXpedition should be on. VU2AK, VU2NR, and VU2RM were scheduled to start operation around the middle of December for a period of 4 weeks. The location will be Port Blair in the Andaman group. A KWM-1 and beam was shipped to the boys so they should have a good signal. W8PQQ will be the QSL manager for this trip. (Tnx W4IFN).

**ZD2 Nigeria**—John, ZD2JM, should be back in Nigeria after a vacation in Scotland. John will remain in ZD2 until the end of 1960. K9EAB is his QSL manager and requests a S.A.S.E. with all card requests.

**VK9 Cocos Keeling Island**—Deane, VK6DL, who is probably more familiar to you as VR-3B, is going to Cocos Keeling for at least a year. He should be there some time in the beginning of 1960. (Tnx W2BOK).

**New Countries**—As you already know, two new countries have been added to the ARRL countries list—they are Cargados Carajos VQ-8B and the Willis Islands. Currently active from the VQ8 group is VQ8BBB. VQAP operates from there every August as VQ8APB. VK4IA is currently active from Willis Island.

JA1CB is going to an island that is midway between Japan and Wake, either in January or April. This should be a new one because



At one time making WAZ represented quite a feat, the arrival of JT1AA in zone 23 made the task quite a bit easier but here is a fellow who's WAS is as hard earned as anyone's ever was. Fourteen year old Scotty, KØDQI, made WAZ with the rig you see here except that a vfo had been added to the equipment. The antenna? A folded dipole 20 feet in the air. The log also shows 200 countries entered. Look out for this fellow.



This is the rig that furnished many of the gang with W1QMS/VE1 Prince Edward Island QSO's. Mac W1QMS promises to go to another spot this year.



One of the better known OK DX hounds OK1MP. It looks like Milos has just found a new one.

The gang at HZ1AB. Standing, l. to r. K1DWC; James Davis; W4ERQ; K5MMI; Maurice Carpenter, K5IUO; K9PBV. Kneeling l. to r. KØILI; W6NZL and K6LYM. Bud K5IUO advises the boys heat up a three curtain Rhombic with a BC610 which is driven by a 325-1. They look for stateside contacts at 2300 GMT daily. 14325 kc is the preferred frequency. Forty meters will be given a go very shortly.



of the distance. VE7ZM will be the QSL manager . . . Bob, W6ZRK, who is QSL manager for EL2AB, EL2AD, and EL8C, has a new QTH, Box 73, Mojave, Calif. . . . VS4FC is on daily looking for W/K QSO's. Look for him around 1500 to 1600 GMT. (Tnx W6-DXC) . . . IK7HZ should be in YK land just about this time . . . W6AM's first fling at SSB netted HB9QP/CR8 and MP4QAO. Not bad for a beginner . . . Cav, ex KC6JC, is now K3JUN at Woodstock College, Woodstock, Md. . . . CN8GV may be reached at W3ZVT . . . The official 4X4 QSL Bureau is at P.O. Box 4099, Tel Aviv, Israel . . . VK-2FR (Lord Howe) is active on 14328 DSB around 0630 GMT with ZL2GX as MC (Tnx W8YIN) . . . UAØKYA is in Kizil City, Tana Tuva which counts the same as UAØ but is Zone 23. He is active on 14 mcs. cw around 1300 GMT. (Tnx WØBTD) . . . JT1AB requests all his QSL direct to him at Box 369, Ulan, Bator, Mongolia. (Tnx WØBTD) . . . SP1JV is on 21 mcs. CW looking for Wyoming and Nevada to complete his WAS . . . VO1-CV, Adam, who is one of the ex operators at HA5KBK, would like information on other ex HA hams . . . LA9RG/P Spitzbergen said last mail left there in November and first next year will be in May . . . W6CEI suffered severe injuries when he fell off his roof while installing a TV antenna. A few short notes from his many DX buddies would certainly be most welcome . . . VKØCC is ex VK4CC and wants all QSL's via VK4FJ . . . I1ADW/HV gave many of the gang a new country. Bill is the first amateur station to operate from within the confines of Vatican City . . . (Tnx W6KG for the above items) . . . DL4RB, who is K6IPC, would like schedules in the Southern California area. Dick's QTH is HQ. Btry. 72nd Arty. Gr. APO 800, New York, N. Y. . . . Anyone who did not receive a deserved CN-8GI QSL are asked by Walt to send for another. Walt's QTH is Box 11, Navy 214, FPO, New York, N. Y. . . . The balsa raft "Nahakin" (mayan for House of the Sun), set out in November on its historic expedition to Peru. Archaeologists Francisco Mick and Wolfgang Cordan head the group setting out on the Nahakin from the Pacific coast port of Iztapa to follow the ancient Maya sea route to South America in an effort to prove that the Maya traded with South America early in the Christian era, and heavily influenced the Chimu civilization of Peru. The Nahakin is a replica of an ancient balsa log raft recently discovered in a tomb on the coast of Peru. Findings of this scientific expedition will be submitted to the International Archaeological Congress is to be held in Vienna this year. The trip is expected to take three months. The raft will use the call TGØOA. They will operate for about a week to ten days from Cocos Island, T19.

## Russian Certificates

The following certificates offered by the Central Radio Club may interest many certificate seekers.

1. The certificate "W100 U" is issued in honor of the Centenary of A. S. Popov—the Great Russian Scientist—the Inventor of Radio.

a. The certificate "W100 U" is issued to any amateur who submits proof of contacts with 100 different amateur radio stations of the USSR. Five of these contacts must be with the Sverdlovsk Region, A. S. Popov's birth place.

b. All contacts, phone or cw, between January 1 and December 31, 1959 are taken into consideration.

c. Contacts must be made on either 3.5; 7; 14; 21; or 28 mc.

d. Minimum signal reports must be RST 337 and RSM 335. "M" is modulation.

e. Send either the 100 QSL cards or a list including the call, date, time, frequency and signal report.

2. The certificate "R-6-K" is issued for contacts with amateur radio stations of 6 continents.

a. It is necessary to have contacted the following areas:

a Europe

f Oceania

b Africa

g. European USSR which includes UA 1, 2, 3, 4, UB 5, UD 6, UO 5, UG 6, UF 6, UP 2, UR 2, UQ 2.

c Asia

e S. America

h Asiatic USSR which includes UA 9, UA Ø, UI 8, UN 8, UL 7.

d N. America

b. Phone or cw certificates are established as follows:

1st degree—for contacts on 40 m only.

2nd degree—for contacts on 20 m only.

3rd degree—for contacts on 10 and 15 m.

4th degree—for contacts on any bands.

c. All contacts must be made after June 1, 1956.

d. Minimum signal reports are RST 337 and RSM 335.

e. The 8 QSL cards or other verifications must be sent to the Central Radio Club.

3. The certificate "R-150-C" is issued to any amateur submitting proof of contacts with 150 countries including at least 15 Union republics of the USSR.

a. The certificate is issued for phone and cw contacts separately on any amateur bands.

b. Only contacts after June 1, 1956 are taken into consideration.

c. The minimum signal reports are RST 337 and RSM 335.

[Continued on page 110]

# the great Hy-gain VHF Yagi's

FOR 2M, 1 1/4M AND 3/4M

Model No. 210  
2 Meter, 10 Element  
13.4 db Gain

\$14.95

All Hy-gain VHF antennas are Optimum Spaced for Maximum Forward Gain. Parasitic elements are constructed from solid 3/16" 6061T6 alloy aluminum rod for Hi-Q, resulting in tremendous efficiency. Booms are large diameter 1 1/4" OD aluminum tubing. Hardware is hot dipped, galvanized and iridite treated for maximum weather ability. Guaranteed for 1 Full Year. Two-Meter models use adjustable hairpin match; 1 1/4M and 3/4M models use ratio dipole.

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9 db Gain

\$8.95

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1 1/4 Meter, 11 Element  
14.2 db Gain

\$13.95

Model No. 313  
3/4 Meter, 13 Element  
16.1 db Gain

\$12.95

## NEW ADJUSTABLE HAIRPIN MATCH

Sensational new hairpin match, fully adjustable for any line impedance 52 or 72 ohm coax . . . 200, 300 or 450 ohm parallel line.

## NEW ELEMENT/BOOM BRACKET

Molded high impact styron Element-to-Boom bracket for perfect alignment. Boom constructed of 1 1/4" OD. Aluminum tubing; Element, of 3/16" solid Aluminum rod.

### ADD 3 db GAIN

Dual Stacking Kit for any two VHF Yagi's \$4.95

### ADD 6db GAIN

Quad-Stacking Kit for any four VHF Yagi's \$15.95

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Stacking Frames for use with any of the Quad-Stacking Kits above \$59.95

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"WE HAVE 'EM  
IN STOCK  
HERE AT  
'the house  
the hams built'"

Says Leo I. Meyerson  
W0GFQ, President



"ALONG WITH THE ENTIRE  
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AND HUNDREDS OF  
OTHER HAM ITEMS  
FROM THE NATION'S  
LEADING MANUFACTURERS"

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FOR OUR FREE  
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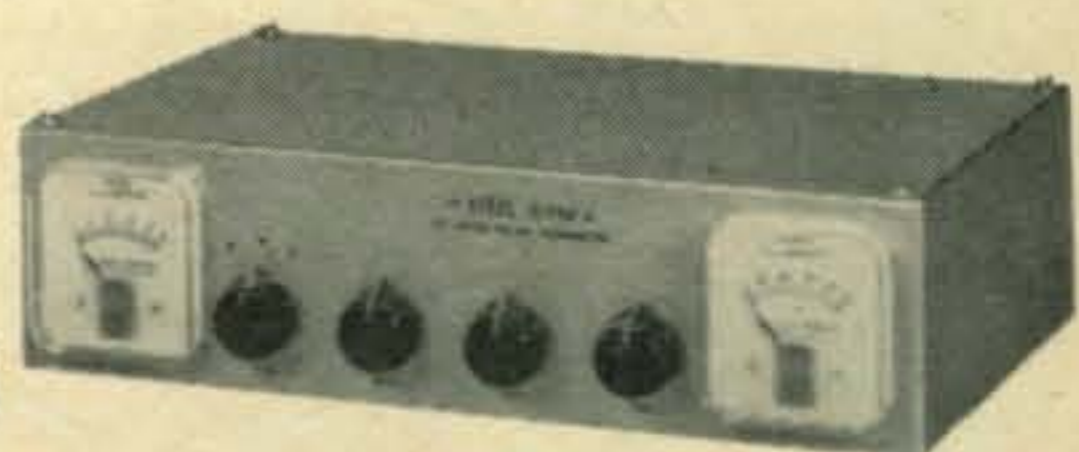
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For further information, check number 24 on page 126.

## 60 WATTS ON 6 METERS

### THE NEIL BETA 6 SIX METER PHONE TRANSMITTER

- Two Tuning Meters Eliminate Bothersome Meter Switching
- Exceptionally Clean Modulation
- Ideal for Mobile or Fixed Station - only 3 inches high  
B+ requires 600v @ 100ma; 350v @ 200ma (approx.)



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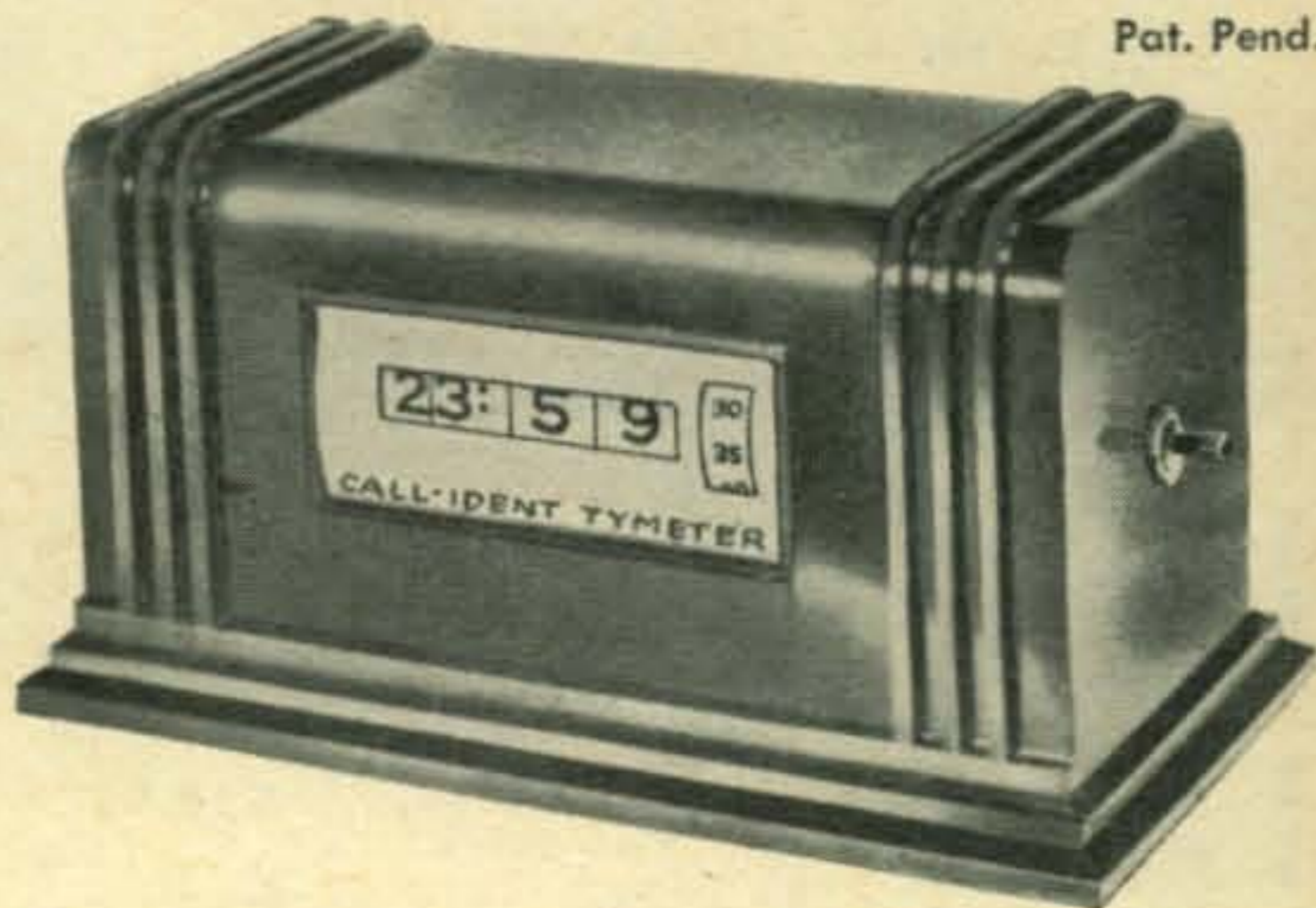
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## LETTERS [from page 18]

countries that were worked over a period of one year in about one year.

73

William R. Schneider, Jr. K2UYG

### QSL

Dear Wayne:

I read with interest the "Letters to the Editor" column in Oct. CQ. It is with regret that can only confirm W8EFG-79 on the fact that it is difficult to get QSL cards from Mexico, South and Central America. Perhaps we live in the land of mañana (tomorrow). It has been the policy of Mexican Radio League President XE1H, to constantly remind us to send QSL cards when requested. When ever possible this I do, since I am an American living in this beautiful country and have the privilege of operating a "Ham" radio station.

We are pleased to note also that 3rd party communication has been approved between our two countries, this will help unite the "hands across the Border."

Ken Moss, XE2DS

## CLUB BULL. [from page 12]

I am happy to help you promote your club activities if you will inform me at least 2½ months prior to the event. And pictures are seldom returned.

### New Members

This was another big month for new members. Here is the latest list of newly registered clubs: Catalina R. C. (paper, Zerobeat), East River A. R. C., Saskatoon A. R. C., Windsor A. R. C. (paper, Windsor A. R. C. Bulletin), Panama City A. R. C., Ashley High School R. C., Jefferson Barracks A. R. C. (paper, Barracks Bugle), Lynchburg A. R. C. Inc., Western R. C., and Dobyns-Bennett High School A. R. C.

73, Marv, VE3DQX

## SCRATCHI [from page 10]

to meeting place cupple hours erly and getting everything set-up. Code machine plugged in. Earphones all plugged in and put in front of diffrent chairs, reel profeshunal-like. Key also plugged in, and hole outfit sounding like million bux.

On rest of table I wiring up cupple big 5 inch meters into batteries and varybul resistors and switches. Hon. Ed., it looking like real labrotory. Even laying out wire so it having square corners and being reel neet looking.

Rite on dot of when class supposed to starting door opening and seven fellers coming in. Six of them wearing black leather jackets. They not saying anything but walking over to Hon. Table and looking at all the stuff on it. I not understanding to much of what they saying, but it going like this.

One feller looked at me and said "Squaresville." Another guy: "The End." Third feller

speaking up: "Man, dig this crazy museum." Another feller: "Yeah, dig this eerie resistor." After this they all circled the table once more.

Finely first feller says: "Man, I'll bet General Pershing sure hated to give this stuff up." Second guy picks up earphones and says: "Real crazy stereo." Third feller: "Not a single tunnel diode." Next guy: "Not even a transistor." Another feller: "Crazy, man, crazy."

Then they all start walking out the door. Just before last one goes, he turns and says: "Daddy-O, get hip. Right now were going out and see if we can excite a couple of chicks." With that he slammed the door.

That nite, at home, after I had tossed all the stuff in the junk-box, Scratchi was feeling reel low. In fackly, if it not being for the tellyfone call I getting, I probly resineing from amchoor raydio ranks.

What tellyfone call? Oh, it from that one feller that not wearing leather jacket. He calling to telling me not to minding what the other fellers are saying, and he wanting to know if I still intrusted in teeching him to being amchoor raydio operator. Natchyourally I saying it hunky-dunky with me.

On thinking it over, Hon. Ed., one out of seven not bad percentage at all. That almost ten percent, you not thinking?

Respectively yours,  
Hashafisti Scratchi

## ARMED FORCES [from page 55]

Correa, Horacio	Hall, R. F.	Sutton, B. G.
Crow, N. D.	Hanson, W. B.	Ritzen, Jacob
Frisby, C. E.	Heward, F. R.	Rood, Otis
Gilbert, T. R.	McKinnon, W. A.	Wixon, R. R.

The military departments are pleased with the continued increase in participation in these tests and appreciate the interest shown by the amateurs participating. Congratulations to all winners of the Secretary of Defense certificates and it is hoped that next year's participants will exceed the present record. ■

## B&W LPA-I [from page 65]

813s, low cost replacement. A minimum of controls, ease of operation. And its size, table-top operation.

On the other side of the ledger, only my own personal opinion mind you, I would have liked a power supply that could also utilize 220 vac primary. And cabinet styling and construction to match the 5100-B and 51SB-B I already have in use.

Under actual operating conditions the results have been most gratifying for the short time I have been using it. In a couple of real pile-ups,

[Continued on page 110]

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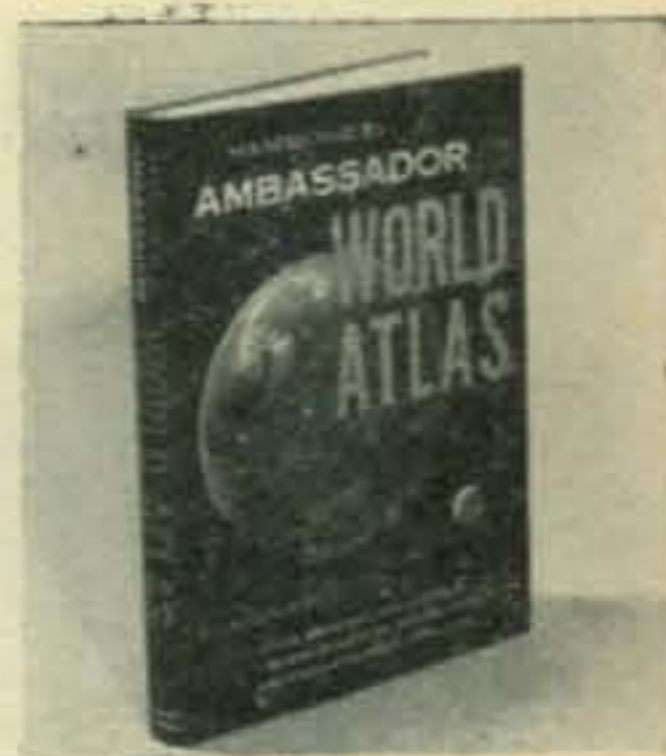


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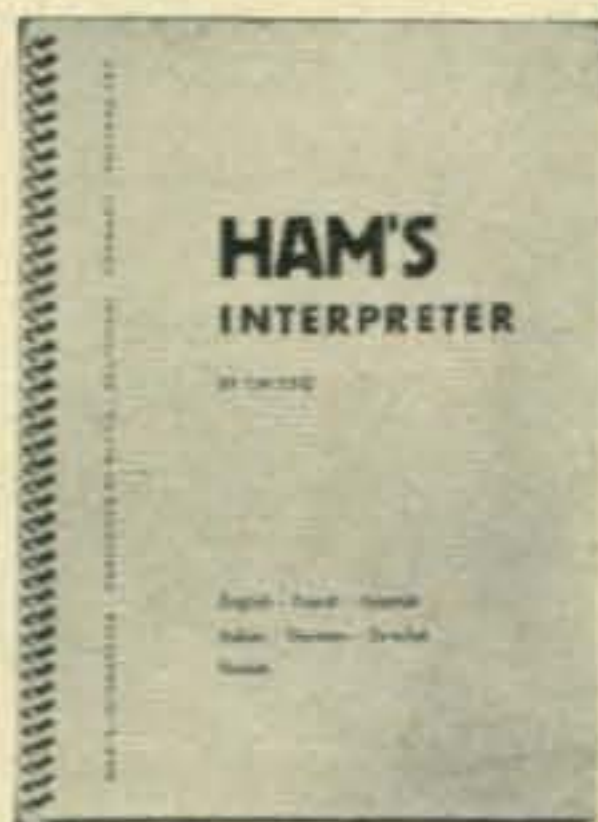
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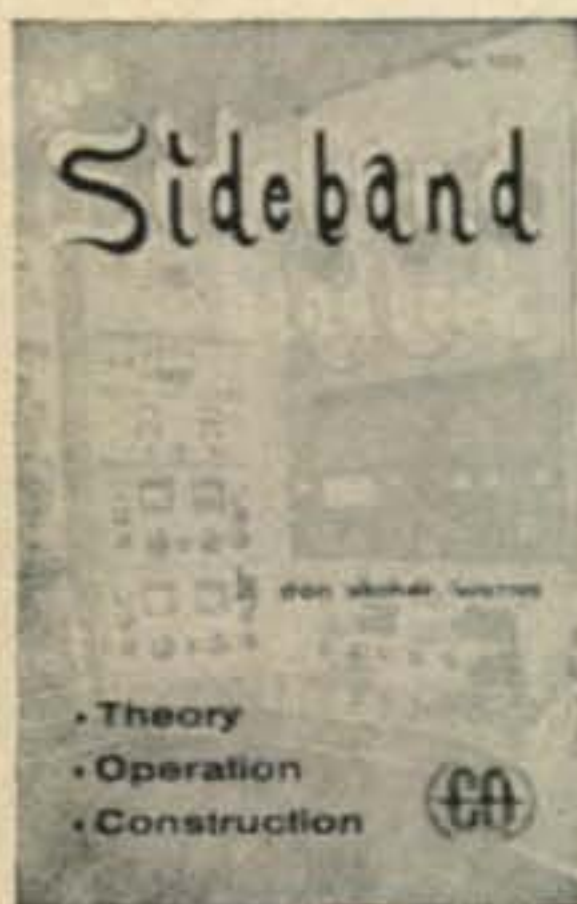
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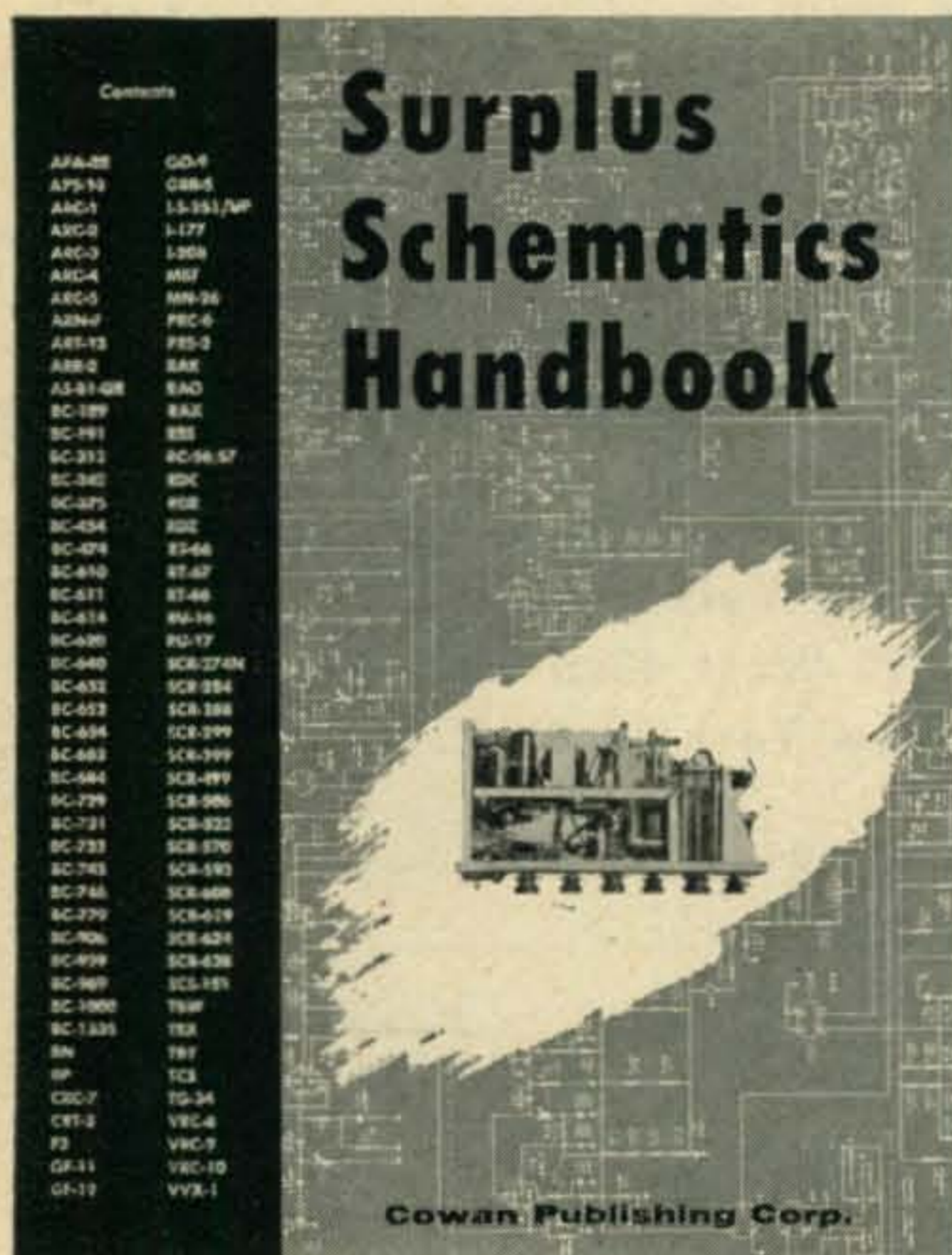
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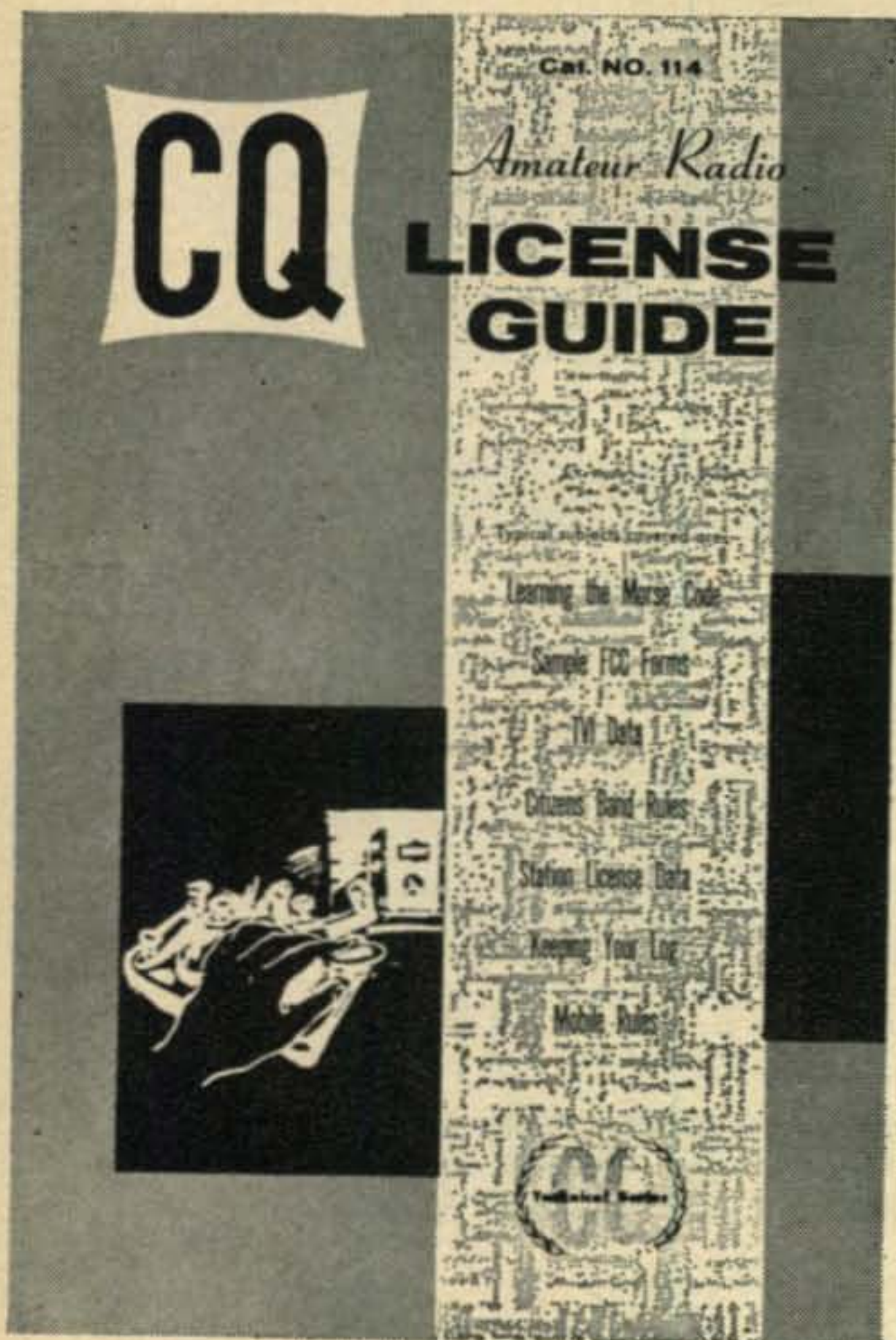
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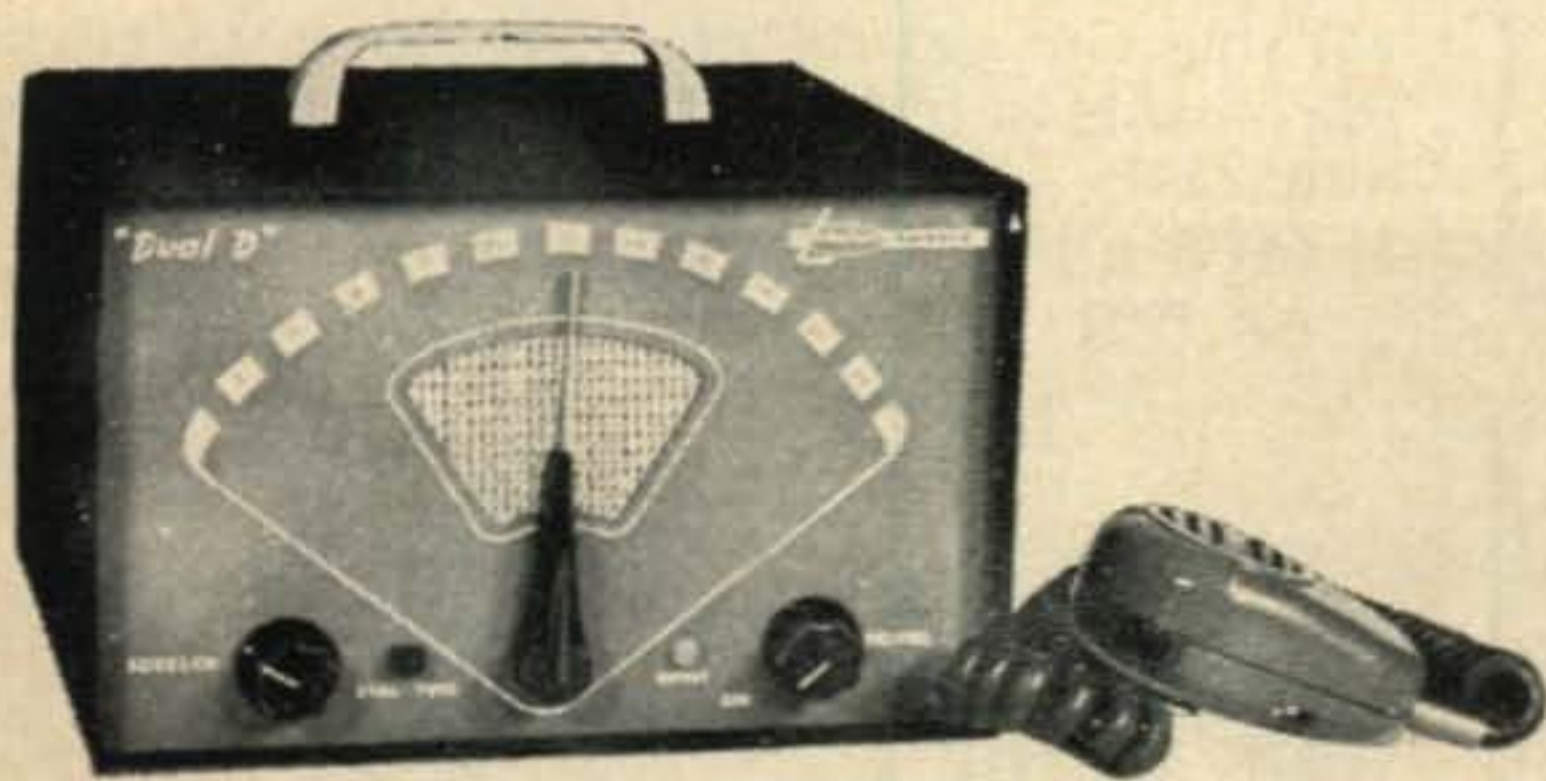
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## LPA-1 [from page 100]

AP4M and VS90C on 20, and ZS7M on 10, no difficulty was experienced raising them. And in the recent VK/ZL contest, when the band opened up on 10 meters, it was quite a thrill to work over a dozen of them in less than an hour. This in spite of the QRM from the West Coast.

Tuning up the LPA-1 for SSB operation was a cinch. A few short calls on the high end of 20 immediately proved the gain in signal strength over the 5100-B/51SB-B combo. That I was putting out a potent signal, there was no doubt, but what was more satisfying were the flattering reports on the quality of the transmission.

In fact, I am so completely satisfied that I am providing a permanent spot for the LPA-1 and the LPS-1 at W1WY. ■

## DX [from page 96]

All applications and QSL cards should be sent to the Central Radio Club, P.O. Box 88, Moscow, U. S. S. R.

Thanks to K9IAP for the above information.

Well, that's about it for this month. I would like to sincerely thank the West Gulf DX Club for putting me on their mailing list for their very excellent bulletin.

I would like to wish everyone a Very Happy and Prosperous New Year and may the end of 1960 find you all with over 300 countries worked. The best of luck es DX.

## Last Minute News

W4KWC is now FO8AC's QSL manager.—DL9PF of PX1PF fame is going to TA land and will try and get on the air.—Sorry to hear of the passing of old time DX'er F8PQ.—W8UMR now QSL manager for ZS3RO and ZS3SM.—K3ACJ is now DL4SS.

All QSL cards for CN8JF go to W8UWT. Please do not send the cards direct.

73 Urb, W2DEC

Central Electronics 20A Exciter with QT-1, \$199.00—Collins KWM-1, \$595.00—Collins KWS-1, \$1,295.00—Collins 32S-1, \$515.00—Collins 75A4 with 3.1 filter, \$550.00—Collins 75A4 with .8-3.1-6 Kc filters, \$595.00—Collins 75S-1, \$425.00—Collins 312B-2 Console, \$99.00—Eldico SSB-100A, SSB Exciter, \$325.00—Globe Champion model 300A, \$375.00—Gonset GSB-100 Exciter, \$435.00—Gonset 500W Linear Amplifier, \$149.00—Hallicrafters HT-30, SSB Exciter, \$289.00—Hallicrafters HT-32, SSB Exciter, \$495.00—Hallicrafters HT-33 Kilowatt Linear, \$435.00—Hallicrafters SR-34AC 6 and 2 Transceiver, \$295.00—Hallicrafters SX-62, \$165.00—Hallicrafters SX-62A, like new, \$275.00—Hallicrafters SX-88, \$325.00—Johnson Kilowatt, 4-400A tubes and desk, \$995.00—Johnson Kilowatt, 4-250 tubes, \$845.00—Johnson Thunderbolt, factory wired, \$524.50—Johnson Navigator, \$119.00—National HRO 50T, \$175.00—National NC-183D, \$225.00—National NC-300, \$275.00.

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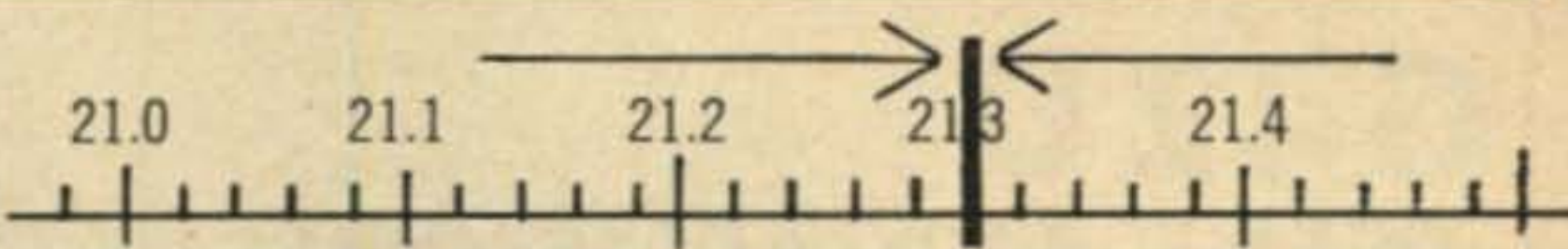
Used Equipment. Collins KWS-1 \$975, KWM-1 \$500 up, 32V2 \$250, 32V3 \$375, 75A-4 \$475-\$525, Hallicrafters SX-101 Mark IIIA \$290, SX-100 \$215, S-53A \$55, Johnson Thunderbolt \$350-\$450, KW Matchbox \$65, Courier \$175, Ranger \$175, Challenger \$100, CE 20A \$175, 600L \$275, B & W 5100S & 51SB \$450, Hammarlund HQ-110C \$170, HQ-100C \$130, HQ-120 \$100, HQ-160 \$269, Heath DX-35 \$45, DX-40 \$50, DX-100 \$175, Cheyenne MT-1 \$89, Gonset \$295, Morrow MBR-5 \$125, MB-560 \$125. Wanted: Amateurs who can service and install Citizens Band Equipment. Special Discounts available. Write for complete listing of used equipment and specials.

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## HAM CLINIC [from page 74]

is under 50 turn your exciter's drive control (sometimes a capacitor but usually a pot) until you bring up the reading to about 70 or 75. Then try your null controls—they should null the meter. If not, retune the balanced modulator control and make sure your output control is tuned properly. Improper settings of these two controls and it will be hard to null the carrier. If the nulls occur, then turn up your mike gain (to about 10 o'clock) and whistle about 3 inches away from the mike





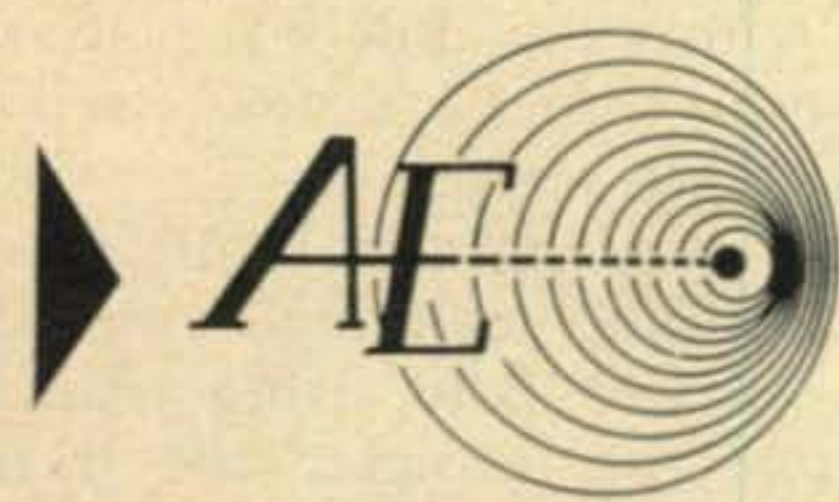
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There are all sorts of interesting (subscribe to CQ) things going on these days that you should know about (subscribe to CQ), like the attempts being made to change the (subscribe to CQ) Communications Act of 1934 to permit (subscribe to CQ) foreign amateurs to be licensed while in the U.S. (Subscribe to CQ) And there is the coming International Amateur Radio Convention (subscribe to CQ) to be held in New York City next August (fill out the blank below) which should turn out to be the biggest ham convention (fill out blank) ever held anywhere. You might be interested (fill it out) in getting all the inside info on it too. Tell you what, just fill out the blank below (fill it out right now) and you'll get all the news as it happens.

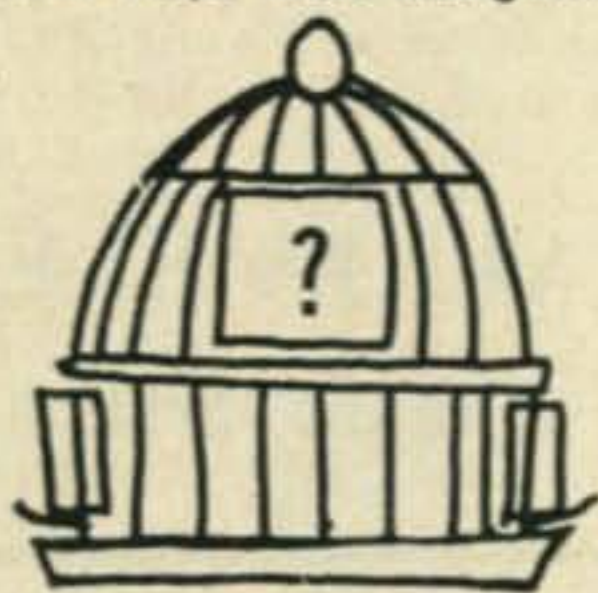
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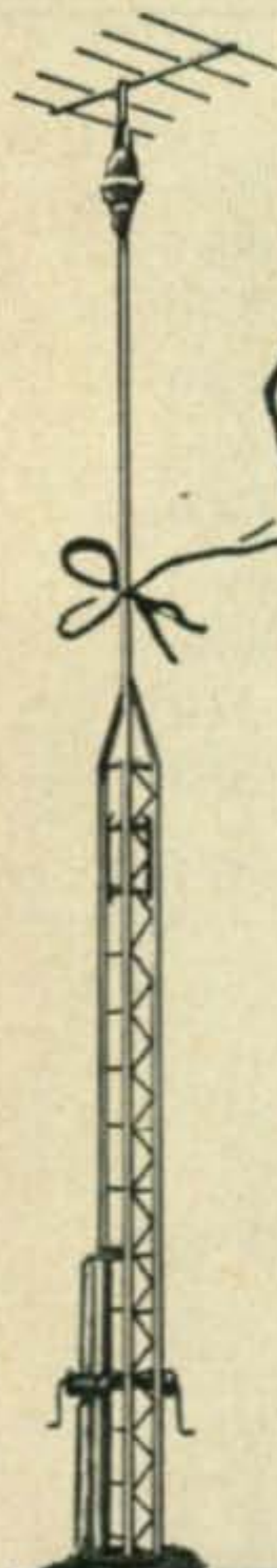
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112 • CQ • January, 1960

... with your final on—on the TX-1 the final meter will rise from about 55 mils to about 250 (depending upon antenna load)—as you whistle back down on the drive (exciter) control so that your final meter will read about 200-210 mils. You are now in business. With 2 final tubes such as the 6146s, about 200 mils are okeh . . . you can exceed this (up to 50 mils) on Vox. If you have to *retune* your exciter *appreciably* (on any transmitter) to get maximum reading on the SB 10; something is wrong . . . and it could be unwanted oscillation. That's it!

### Thirty

I am not a prophet, but I feel that I should, like many others make a few predictions for the New Year of 1960.

Before the year is out I am sure we will see some startling technical advancement in the *uhf* highpower field using transistors and something *like* the tunnel diode. I believe we will also see some gigantic strides made in the minification of ham transceiver gear. We'll go into 1961 with a few DX records, unthinkable in 1952.

We will hear more and more about long hop (relayed) TV and we will hear the voice of one of our astronauts (coming from outer space).

CQ will have more construction articles and be read by more people and the convention in New York will be a huge success.

We'll have peace too. (We all hope).

And HAM CLINIC will continue to do its best by you—fellow hams . . . so 73 and 75! To the world———72!

Chuck, W6QLV/F7FE

### NOVICE [from page 82]

pole, AR3, and DX-20 and claims a WAS of 48 and WAC of three. He still needs Vermont and S. Carolina. Dave would like skeds and pen pals.

David LeJeune, KN5WNV, Lake Charles, La., attends McNeese College but does a little hamming with a DX-40 and a surplus RAL-7 which he recommends highly to Novices. Look for David on weekends and he will tell you all about it.

Phil Wilson, WV6GKJ, 4422 Hartle Ave., Bell, Calif., has a WAS of 15/9 with his Eldico 2R-752V and S-38C. Phil will help prospective Novices (phone LU 9-4571) and would like pen pals.

George L. Wilkinson, 8811 Tangelo Ave., Fontana, Calif., is starting a QSL World-Wide bureau. The membership fee is \$1.00 per year. Drop him a line for more information.

Atlee Kohl ("Kohl"), KN8QCJ, 2250 Glendaloch Rd., Ann Arbor, Mich., says to heck with DX and rag chews with his Globe Scout

65A and S-107 and QF-1. Kohl would like to join a net in his area, however.

Jim McQuagge, KN4LIX, 800 Harmon Ave., Panama City, Fla., sent a picture of his SX-43 and Adventurer but it was too dark, sorry Jim. He has been on two months and picked up a 20 state WAS, with 19 confirmed.

Frederick R. Washburn, WV6FJJ, 13041 E. Stanford St., Santa Ana, Calif. has a problem that has put him off the air. Possibly one of the local hams can help and letters, I am sure, would be appreciated.

Frank Mohler, WV2FDZ, 187 Broad St., Eatontown, N.J. runs a homebrew 815 rig and a BC-699, along with an SX-28. Frank plans to get on 15 meters soon.

That folds our dipole once again this month. Be sure to keep the letters and pictures coming this way. And if you are contemplating going after the Novice license, be sure to send your name and address for the "Help Wanted" column.

73, De Don- W6TNS.

**VHF** [from page 85]

every morning listening for the east coast boys." (*Why won't anyone look for us girls?—Signed—W1HOY.*) The rig here is a G-50, 30 watts out, and an eight element wide-spaced Yagi, 50 feet up."

"I should be in school (18 years old) but got my knee injured in a football game so must keep off of it for three months." *Seems funny to me, Denny, this particular three months! Good luck, anyway.*

73, Sam, W1FZJ

**CONTEST CAL** [from page 90]

ficient return postage, to: W.O.C. Contest Coordinator, Metro Amateur Radio Club, 82 Froman Ave., Toronto 7, Ontario, Canada.

Regards our own World Wide DX Contest. The consensus of opinion seem to be that conditions were fair to poor during the Phone section, depending on the location and bands used. The lower bands, even 20, were not too productive. However 10 and 15 were really hopping at the writer's location. At this writing no scores have been received that top last year's records. However we have still to hear from some of the more active stations.

It was impossible to include claimed scores in an earlier issue and at this late date it would be rather anti-climatic.

We've got our fingers crossed for the CW week-end coming up about the time this goes to press.

Should have a lot of contest activity for you next month.

73, Frank, W1WY

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- Cardwell 150 Mmfd. Fixed Padding-Capacitor—Jobber-boxed. \$1.00
- Micamold 40 Mfd. @300 VDC Capacitor—40c each (10 for \$3.00)
- Jennings "U" Variable Vacuum Cap. 50 to 250 Mmf @ 15 KV. new. \$69.00
- Sprague Plug-In Capacitor. 2,000 Mfd. 15 VDC. 20c ea. (\$15.00 per hundred).
- Sockets: Acorn 15c; 25 W B'ynt 75c; 50 W B'ynt. \$1.50
- Tube Type HF100—unused orig. JAN boxed. Type HF100. \$8.50
- Beacon Xmtr. Late design. Uses two 6201 into push-pull Amperex 6360 final. Will work on 1 1/4 meters w/slight changes. Can be modified to operate on 2 meters by changing final coil, and antenna. Complete w/3 tubes, antenna & orig. case. (Orig. cost over \$300.00 each). Brand new. \$19.95
- Battery for above (Dry-Charge). Requires water to operate. w/connecting cable & plug. \$4.95
- Hammarlund, Super-Pro SP600 Receiver. Excellent condition, lab tested. \$450.00
- APR-5A UHF Receiver—1000 to 6100 MCS. Operates from 115 VAC 60 CPS. Lab tested O.K. \$45.00
- Century Antenna Line Tester—for Ham & TV use. Brand new. Jobber boxed. \$7.95
- Raytheon Power Supply—Input: 6 VDC—Output: 117 VAC @ 60 CPS (50 watts conserv.) New. \$16.95
- RCA Type WP-33A Regulated Power Supply. Input: 105 to 129 VAC, 50/60 CPS. Output: 260 to 295 VDC @ 600 Ma. Regulation less than .2 volts variation from min. to max. load. \$75.00
- New Silicon Rectifier. Input: 130 Volts at 500 Ma. Price 75c each (10 for \$7.00)
- Audio Devices Silicon Rectifier. Input: 130 VAC @ 250 Ma. Price 55c each (10 for \$5.00)
- Aircraft-Lab Type Selenium Rectifier. Full-wave bridge type. Input: 450 VAC (RMS) Output: 350 VDC @ 340 Ma. Encapsulated. Hermetically sealed. Oil Filled. \$7.95

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MOBILE Hams Citizens—Stop generator whine ignition noise regulator clicks \$5.25 postpaid. Specify frequency. Ignition Kit, 19 Salem St., Cos Cob, Conn.

SCR-522 VHF 40 watt, four channel, crystal controlled transmitter-receiver. Completely redesigned with 115V/60 cycle power supply. All you need is a mike and antenna to join the crowd on 2 meters. Ideal for hams, novice phone, and cap. Hundreds sold. Price \$125 with one set of crystals, your choice. Bill Slep Company, Box 178A Ellenton, Florida.

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PRESERVE YOUR HAM TICKET, Social Security Card, small photo, passes and anything else of value that is wallet-size. We will laminate it in clear plastic, guaranteed for life. Lamination will prevent it from getting torn, soiled or frayed. Send your ticket or anything of value with \$1 in stamps or cash for each item that you want preserved. 24-hour service. Send to Dept. HW, CQ Magazine, 300 West 43rd St., New York 36, N. Y.

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SAVE on Electronic, Radio and Communications Components and equipment for Hams and Commercial use. See thousands of parts in stock—many more coming in daily, all at unusual savings. If you live in or near Philadelphia, visit our new warehouse at 31st & Grays Ferry, or send for free catalog. Selectronics, 1206 South Napa Street, Philadelphia 46, Pa., or Phone HOward 8-4645.

TELETYPE PERFORATOR PAPER OILED TAPE—yellow 11/16" wide, 8" O. D. Roll, 1" E. D. Sold only in sealed boxes containing 40 rolls each. Shipping weight 46 pounds. \$10.00 per box. RTTY Clubs write for quantity discounts. Selectronics, 1206 S. Napa Street, Philadelphia 46, Pa.

TOROIDS: Uncased 88 mhy like new. Dollar each. Five \$4.00 PP. DePaul, 101 Starview, San Francisco.

ATTENTION MOBILEERS !! Leece Neville 6 volt 100 amp. system alternator, regulator, and rectifier, \$45.00. Also Leece Neville 50 amp. system, \$50.00. 12 volt 100 amp. system, \$85.00. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., 115 Willow Street, Brooklyn 1, N. Y. K2PAT, ULster 2-3472 or JACKSON 2-2158.

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NEW SERVICE for amateurs. List your equipment for sale including price. Let us know your needs. No charge to buyer or seller. W2EEJ, Herbert Greenberg, 821 Rutgers Road, Franklin Square, N. Y.

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75 WATT 6 meter 829B transmitter. Forced air cooled, crystal oven. Push to talk. Complete with antenna change over relay. Power supply and crystal in compact metal cabinet 16" x 11½" x 10". Converted surplus—Excellent Condition First M. D. \$70 or will trade shipped f.o.b. Seneca Falls, George Bastedo, RD. #1, Seneca Falls, New York.

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RICH IS BACK in W9-land and Lu sez, "I'll never move that pile of junk again" so here goes. A raft of good stuff including mint 32V3 at \$350 just a sample. Stamp for big list. All my QST, CQ and Proceedings since back in the '20s. W9JS, 1916 E. Evergreen, Wheaton, Ill.

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- Dummy Load Type TS-78U Standard Coax Input. Excellent for VHF, lo-pwr use with three pilot bulbs. Compact. Excellent value. \$1 each (3 for \$2.50)
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- Ling Closed-Circuit TV Camera. Brand new. Write for details. Approx. \$700.00
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ATR type 1212QR (12 V. input 7 prong vibrators) \$2.49  
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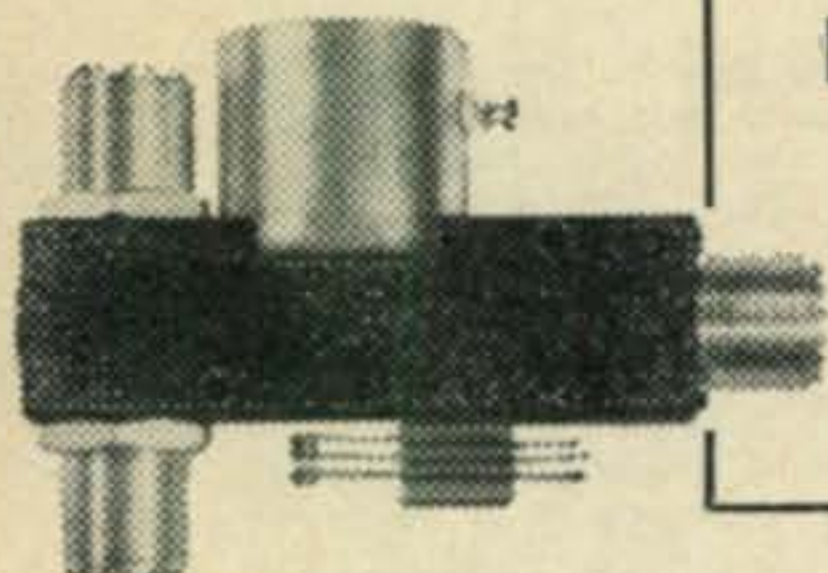
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For further information, check number 40 on page 126.

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**EPOXY RESIN  
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## COAXIAL RELAYS

For quieter operation and resistance against moisture, all coils are encapsulated in an epoxy resin. Add to this: low VSWR—less than 1.15 at 500 mc.—low losses—high contact pressures—patented receiver protecting connector (optional)—bifurcated DPDT external contacts (optional)—and many other mechanical and electrical features, all of which are found in the NEW Dow DK60 series. \$10.90 to \$14.20.

### OTHER FINE DOW-KEY PRODUCTS:

DK60-T2-Transfer two or more antennas—1KW capacity—price (with standard U.H.F. connectors) \$10.90 to \$12.65.

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Catalog sheets available from any of our 700 dealers and distributors in U.S. and Canada or from the main office.

**DOW-KEY CO. INC.**

THIEF RIVER FALLS, MINNESOTA

For further information, check number 41, on page 126.

## CRYSTAL DEPOT

### SPECIAL FREQUENCIES

ALL MARINE FREQ. SUPPLIED IN FT243—FT171—MC7 Holders. Also POLICE, C.A.P., C.D., MARS. tol. .005% — \$2.00

.01% Tolerance .....	\$1.50
.005% Tolerance .....	2.00
100KC Marker in HC6/U.....	4.00
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CITIZEN BAND CLASS D-3rd OVERTONE CRYSTALS  
26.965 MC to 27.225 MC IN HC6/U HOLDERS \$2.50 EA.

### JET NOVICE CRYSTALS 99¢ (.01% Tolerance)

80 Meters 3701KC to 3749KC
40 Meters 7152KC to 7198KC
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### STOCK CRYSTALS 50¢

FT243 Holders 4035KC to 8650KC in steps of 25 KCs
DC34 Holders 1690KC to 4440KC
FT241 Lattice crystals 370KC to 540KC (except matched pairs + or - 15 cycles..... \$2.00 pr.)
FT171 Holders 1738KC to 8616KC
CRI/AR Holders 6000KC to 8590 KC

SEND FOR FREE CATALOG

24 HOUR SERVICE

TERMS:  
Include 5¢ per crystal for postage & handling. No C.O.D.'s

**JET CRYSTAL COMPANY**

2416 AMSLER ST. near CRENSHAW BLVD,  
TORRANCE, CALIFORNIA

PHONES: DAVenport 6-2300 & 6-2301

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## FOR SALE (Cont'd)

VHF Amateur's Journal! Columns on 50 mc and above by KH6UK, KL7AUV, K6EDX, K4PEV, and many more distinguished VHF'ers. Published every two weeks! Send \$1.00 for ten issues . . . VHF, 67 Russell Avenue, Rahway, N. J.

HALLICRAFTER SX 99 Receiver with Knight crystal calibrator \$95.00, Globe Scout 65A \$50.00. M. F. Greene, Box 586, Douglas, Ga.

FOR SALE: Power supply components for 1 kw rig—also other ham gear. V. Barker, Woodside Drive, Freeport, Illinois.

4 BAND RECEIVER \$50. 5 CHANNEL 27 MEG TRANSCEIVER \$105. BOX 211, OLIVE, CALIF.

COLLINS S LINE Revr., Xmtr. ser. no. 590 complete \$1,025. WØOSX, 1396 West Idaho, St. Paul, Minnesota.

FOR SALE: Collins 32V1. Mint condition! Used only 10 hours since factory reconditioning 6 months ago. \$290. John Minette, Saint Edward's Seminary, Kenmore, Washington.

TELETYPE converter, Northern Type 107 Mod. 2 dual channel with all new tubes and complete manual \$125. Earl Smith, York Village, Maine.

SSB EQUIPMENT, 1-HT32 used only 3 hours and in beautiful condition \$475.00. Drake 1-A receiver, 1 month old \$235.00. B&W grid dip osc., new in box \$25.00. Reason? Going Yachting. W6KKT, Jesse Touhey, 2820 Gough St., San Francisco, Calif.

BC348P, A.C., S-METTER, MANUAL. CONVERTED TO BAND SPREAD 9.3-13.5 MEGACYCLE BAND ON 20 METERS. GOOD CONDITION. \$60.00. CARL BLACK, PROVINCETOWN, MASS.

SALE: Two meter communicator, three top shape with Halo, Mast, Mount, Xtals, and PTT Mike. Also viking one, VFO, many unusual extras. Both terrific buys. Come see. Call ACADEMY 2-7309 or write Al Feder, K2CUI, Apt. 3A, 336 Central Park West, New York 25, N. Y.

FOR SALE: Two 304TL tubes. Used Little—Excellent Condition. Best Cash Offer or will trade. Clarence Comer, W8NCN, Ona, W. Va.

FOR SALE: New General Electronics Model TN-75 (in original carton), Novice Transmitter—comes completely wired and tested . . . Nothing to do but plug into 115VAC circuit, plug in key and connect proper OHM twinlead dipole antenna. Sold nationally for \$58.50—make offer! Box #2662, 300 W. 43rd St., N. Y. 36, N. Y.

RECONDITIONED EQUIPMENT: WORLD RADIO LABORATORIES—TERMS—TRIALS!! New Guarantee! Aerotron Transceiver 6-12-110V \$159.; Ameco AC-1 (novice-cw) \$14.95; Black Widow 2M-6-12-110V \$159.00, CE "B" Slicer \$59.00; CE MM-1 Scope \$79.00; Collins 75A4's from \$549.00; Collins 310B Exciter \$149.00; Collins 32V3 \$485.00; Creative Transcon 6, 12V \$69.50; Globe CB-100 \$99.50; Globe Champ 300A \$389.00; Gonset G-11 \$89.00; Gonset 6M Linear II \$109.00; Hallicrafters S40-B \$79.00; Heath DX-20 \$34.50; Heath MT-1 W/mic \$129.00; Hunter CM-20A Cyclemaster \$129.00; Johnson Rangers \$219.00; Johnson Viking II \$219.00; Johnson Valiant \$349.00; Morrow/MB-560 \$139; Soanr SRT-120 \$89.00; Subraco MT-15X \$37.50.

FOR SALE: Complete instructions for converting the Collins ART 13 transmitter for Ham usage on the bands from 80 through 10 meters with as much as 250 watts C.W. or A.M. or 500 watts sideband using an external generator. Included are instructions for the power supply, antenna, and operation instructions. Handbook is illustrated with picture showing location of all components, and sells for \$1.50. Schematic is 22 x 36 inches and sells for \$1.50. Send M.O. or Cashiers check for \$2.50 and get both. Satisfaction guaranteed. Sam Appleton, K5-MKI, Box 717, Tulia, Texas.

GOING VHF, must sell DX-40, \$45.00; and a Hallicrafters S 40-B with Heath Q-mult, \$70.00. L3JFA, 1034 Bryn Mawr Ave., Penn Valley, Penn.

SELL TO LOCAL: T.C.S., BC-1147-A, T-23 and others, WA2CQS, IN 3-7269.

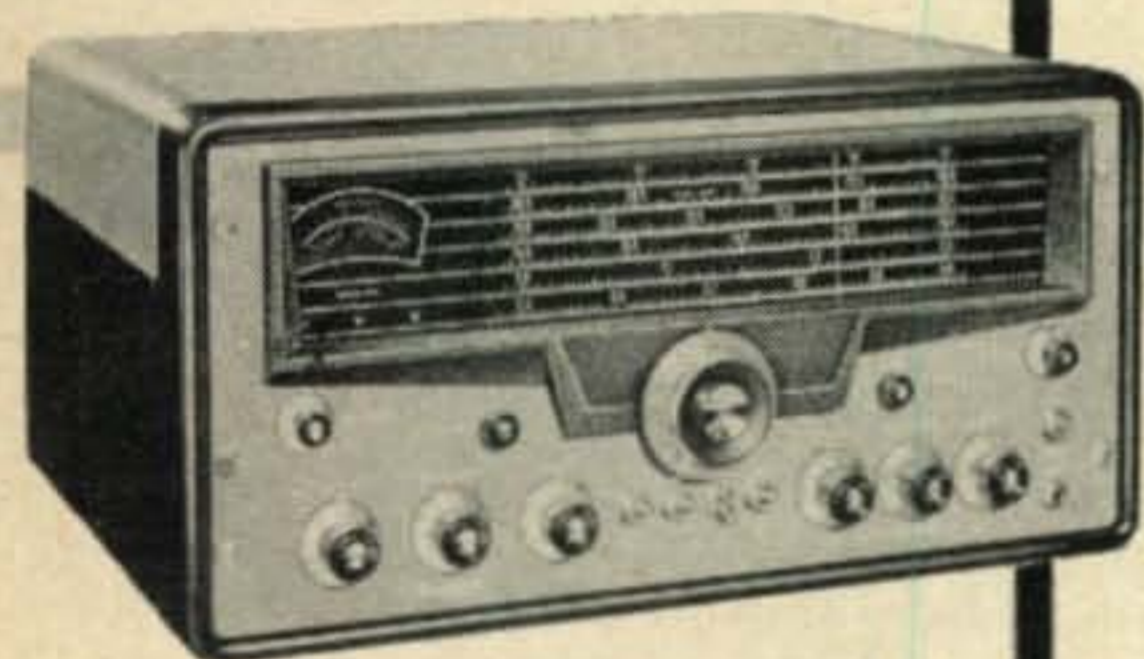
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ON HALLICRAFTERS**



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**\$129<sup>95</sup>**



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HT-37 TRANSMITTER**

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**\$695<sup>00</sup>**

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Please quote an extra 20% allowance on my model \_\_\_\_\_

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- HT-37 Transmitter @ \$450.00 (NO. 45DX349)
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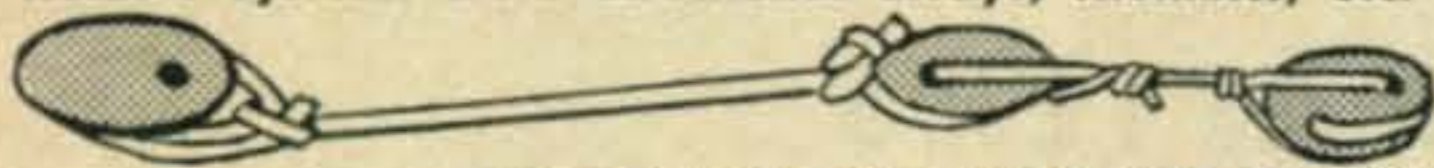
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Name \_\_\_\_\_  
Address \_\_\_\_\_  
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For further information, check number 43 on page 126.

## NON-METALLIC GUY LINE — PERFECT FLEXIBLE INSULATOR — REVOLUTIONIZES HAM RADIO & TV ANTENNA SYSTEMS

Non-inductive, non-conducting, non-absorbing Glas-Line isolates systems from directional arrays, rhombics, etc.



The new main insulator of W3UCT. The Glas-Line is between the two egg insulators running to the lower left. The copper link between the center egg insulator and the upper right egg insulator is for the dead-end feeder of a Zepp antenna.



View of an open thimble and eye bolt for coupling the Glas-Line guy wire to a tree. GLAS-LINE cannot rot, will not shrink, stretch or sag... has high breaking strength of over 500 pounds with proper use.

100' SPOOL Plus 50¢ for postage & handling **\$2.98**  
600' REELS Plus \$1.00 for postage & handling **\$17.34**

Announcing New 'SUPER' GLAS-LINE with 1,000 lb. TENSILE STRENGTH with proper use.

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Send check or M.O. No C.O.D.'s please.

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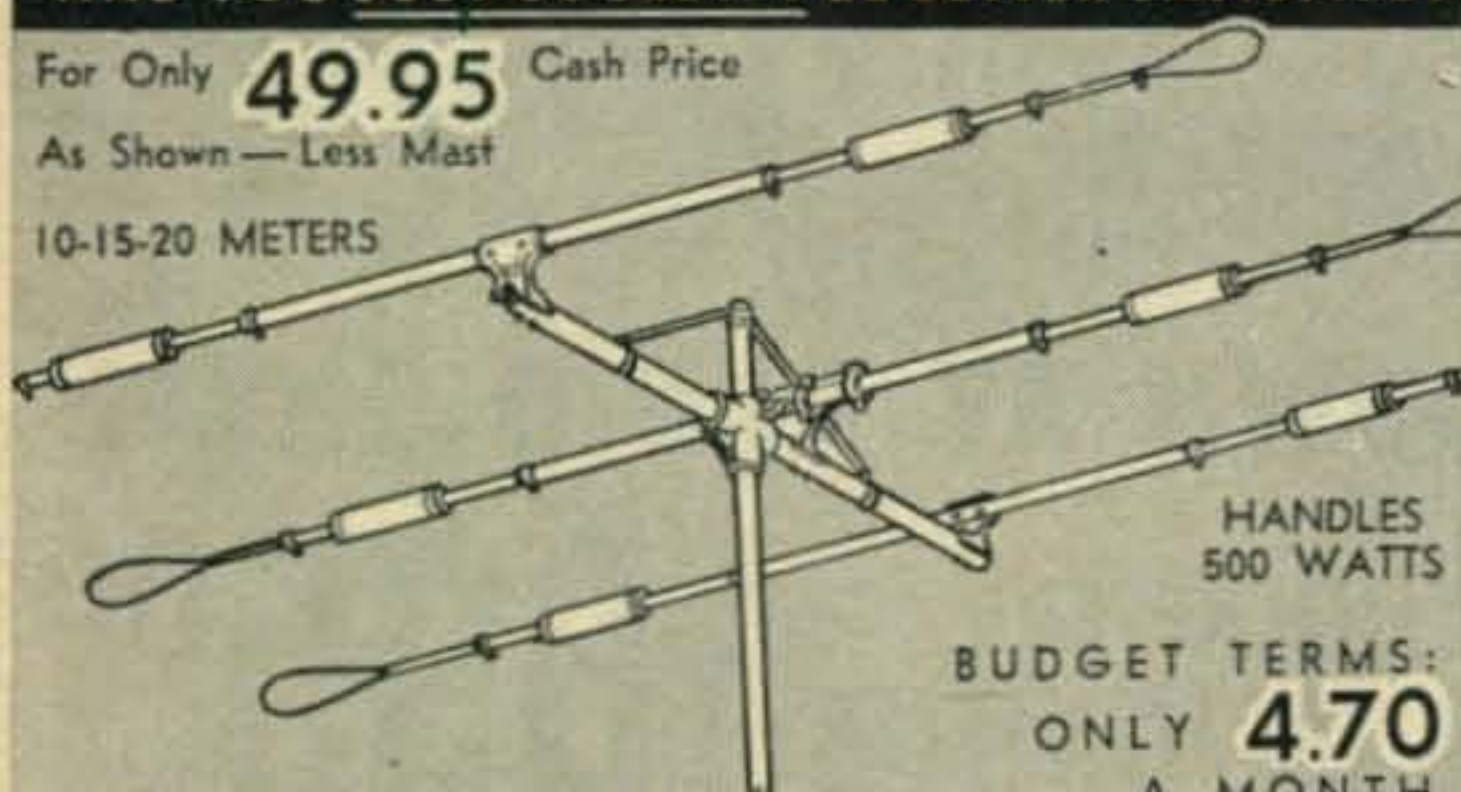
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TURN WITH TV ROTOR  
SINGLE 52 OHM COAX. FEED — WEATHER-SEALED TRAPS;  
PRE-TUNED HEAVY-DUTY MODEL TB-600 AVAILABLE AT \$59.75

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If fully satisfied, pay \$4.70 within 10 days and \$4.70 per month for 11 months.  
ORDER DIRECT FROM HORNET... AND SAVE

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Please rush the TB-500 TRIBANDER for a 10-Day Free Trial. If fully satisfied, I agree to pay as checked below. If not satisfied, I agree to return the beam prepaid within 10 days without further obligation.

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SURPLUS UNUSED Collins Noise limiter assembly, fits any Dual Diode-High MU Triode. Complete unit with 12H6 tube and schematics. Postpaid \$2.00. Engineered Electronics, 17 Hensler St., Newark, N. J.

BARGAINS: Reconditioned and guaranteed. Shipped on approval. Easy terms available financed by us. Hallicrafters S-38, \$29.00; SX-99, \$119.00; SX-96, \$159.00; SX-100 \$199.00; S-40B; S-85; SX-71; SX-88; SX-101; HT-32; GPR-90 \$349.00; Hammarlund HQ-100, \$129.00; HQ-110, \$189.00; HQ-129X; HQ-140X; HQ-150; HQ-160; HQ-170; National SW-54, \$29.00; NC-98, \$89.00; NC-300, \$269.00; HRO-60, \$365.00; Johnson Pacemaker, \$295.00; Ranger, \$179.00; Viking II, \$179.00; Valiant; Thunderbolt; Viking 500; Heath DX-35; DX-40; DX-100; Central 20A, \$159.00; Collins 75A-1; 75A-2; 75A-3; 75A-4; 32V-1; 32V-2; KWM-1; KWS-1; Globe; Gonset; much other equipment. Write for list.

Henry Radio, Butler, Missouri

TELETYPEWRITER EQUIPMENT: Model #14, 15, 19, 26 & 28 Teletype machines. Telewriter Receiving Converter and others. For general information & equipment list write: Tom WIAFN, Alltronics-Howard Co. Box 19, Boston 1, Mass, Richmond 2-0048.

## WANTED

WANTED: Military and Commercial laboratory test and measuring equipment. Electroncraft, Box 399, Mount Kisco, N. Y.

WANTED: High Voltage Power Supplies, 115 or 220 VAC anything above 3000 volts DC at 500 ma ccs. KW power amplifiers, 4-1000A's, PL-172A. State price and give phone number. Will pick up within 75 miles of N. Y. Box BB, CQ, 300 West 43rd St., New York, N. Y.

WANTED: All types of communications receivers, transmitters, test equipment, teletype equipment, factory-built amateur gear. Cash or trade for NEW HT-32. Valiant, Thunderbolt, SX-101, NC-303, Fisher HI-FI, etc. Write Tom WIAFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. (Richmond 2-0048) Store: 60 Spring St., Newport, R. I. (Viking 7-3435, Fred, W1JFF).

WANTED TRADES NEW AND USED: KWS-1 \$1250.00, 32S-1 \$590.00, 75S1 \$495.00, 32V2 \$350.00, HQ100 \$149.50, HQ110 \$209.00, HQ129 \$129.00, HQ145 \$269.00, HQ160 \$379.00, HQ170 \$359.00, Johnson Mobile \$75.00, Thunderbolt \$589.50, Valiant \$439.50, Johnson Citizen Messenger \$139.75, Courier \$289.50, Hallicrafters 101 Mark III \$395.00, HT33 new \$495.00, SX99 \$119.00, SX100 \$295.00, HT32A \$695.00, S107 \$94.95, NC125 \$139.00, NC183D \$319.50, NC173 \$139.50, NC57 \$69.00, SW54 35.00, CB100 Citizen \$125.95, Globe King 500A \$425 90 Chief \$49.50, 90A \$54.95, 680 \$94.95, 680A \$97.95, DSB100 \$129.95, VFO755 \$42.95, NC300 \$299.95, NC2400 \$169.50, CE20A \$195.00, 10B \$139.50, CE Slicer \$37.50, WQ Multiplier \$59.95, Heath DX35 \$54.95, AT-1 \$23.50, DX20 \$34.50. Easy terms, Ken-El's Radio Supply, 428 Central Avenue, Fort Dodge, Iowa, or 128 31st Street NE, Cedar Rapids, Iowa.

WANTED: TELETYPE TG-7 and Model 15 and parts, printers and reperforators, etc.; COMM'NS REC'V'RS AND XMTRS, e.g. BC-610-E, -I, BC-399A, Collins 51J, 17L3, -4; R-388 and R-390/URR; 18S-2, -3; ARN-14 and -30; APR-9, -10, ARC-21, 27, etc.; APS-31, -33; and TEST EQP'T, with TS- or 1- prefix. We pay freight. AMBER INDUSTRIAL CORP., 75 Varick St., N. Y. 13, N. Y.

KP-81 receiver—prefer inoperative. Barker, Woodside Drive, Freeport, Illinois.

WANTED: Tubes—Special purpose and receiving. Top prices for Klystrons, Power Tubes, Thyratrons, T.V. and Receiving Tubes. Tubes must be unused. Also Communication Equipment—Aircraft and Ground, Omnireceivers, Loran, VHF, Marker Beacon, Transceivers, Lab grade Test Equipment, Signal Generators, Oscillographs, Recorder, or what have you. Bob Sanett, W5REX, V & H RADIO & ELECTRONICS, 2053 Venice Blvd., Los Angeles 6, Calif.

WANTED TO BUY: One Gonset Converter #3012-12 or 6, or trade Pentron Tape Recorder. J. C. Alley, P.O. Box 122, Troutman, N. C.

For further information, check number 45, on page 126.



12 V. MOBILE all-band equipment wanted. Box 221, Lyons, N. Y.

WANTED: Government surplus buyers send your lists of clean equipment and parts you have for sale. Bill Slep Company, Drawer 178, Ellenton, Florida.

### QSL

GLOSSY 3-color QSL cards 100—\$4.50. Free sampler. Rutgers Vari-Typing Service, 7 Fairfield Road, New Brunswick, N. J.

QSL's? Samples 25¢ (refundable). W6CMN, 6707 Beck Ave., North Hollywood, Calif.

QSL-SWL: \$1.00 per 100. Samples dime. Riesland, W6HTN, Del Mar, Calif.

QSL's—2 and 3 colors. Kromekote, Attractive, Distinctive, Different, 48-Hour service. Sample 10¢, K2VOB Press, 62 Midland Boulevard, Maplewood, New Jersey.

QSL SAMPLES. Dime, refundable. Roy Gale, Waterford, Conn.

QSL's—"Brownie" W3CJI, 3110 Lehigh, Allentown, Pa. Samples, 10¢, with catalogue, 25¢.

QSL-SWL. Samples free. Bolles. W5OWC, 7701 Tisdale, Austin, Texas.

QSL's: Samples, dime. Print Shop, Corwith, Iowa.

QSL's-SWL's: That are different, colored, embossed card stock, and "Kromekote." Samples 10¢. K8AIA, Box 953, Hamilton, Ohio.

CREATIVE QSL CARDS. Personal attention given. Free samples and catalogue. Bob Wilkins, Jr., Box 1064-2, Atascadero, California.

QSL's-SWL's. Sample free. W4BKT Press, McKenzie, Tennessee.

QSL: 100 4-color \$3.50. Others less. Glossy cards. Nice selection. Samples 10¢. Dick, W8VXK, 1018 Arthur, Mt. Pleasant, Michigan.

QSLs??? LARGEST variety samples 25¢ (refundable). CALLBOOKS (winter) \$5.00. Religious QSL samples 10¢. Sackers, W8DED, Holland, Michigan.

QSL's, SWL's, XYL-OM's. (Sample assortment approximately 9¼¢.) Covering designing, planning, printing, arranging, mailing, eye-catching, comic sedate, fantabulous, DX-attracting, prototypal, snazzy, unparagoned cards, (Wow!) Rogers KØAAB, 737 Lincoln Avenue, St. Paul 5, Minnesota.

QAL'S, SWL'S, REASONABLE. PAYE, W4ZKK. 824 AVANDALE. COCOA, FLORIDA.

QSLs. Samples Free. Phillips, W7HRG, 1708 Bridge Street, The Dallas, Oregon.

QSLs-SWLs; 100 two color glossy \$3.00; QSO fil ecards \$1.00 per 100; Samples 10¢. Rusprint, Box 7507, Kansas City 16, Missouri.

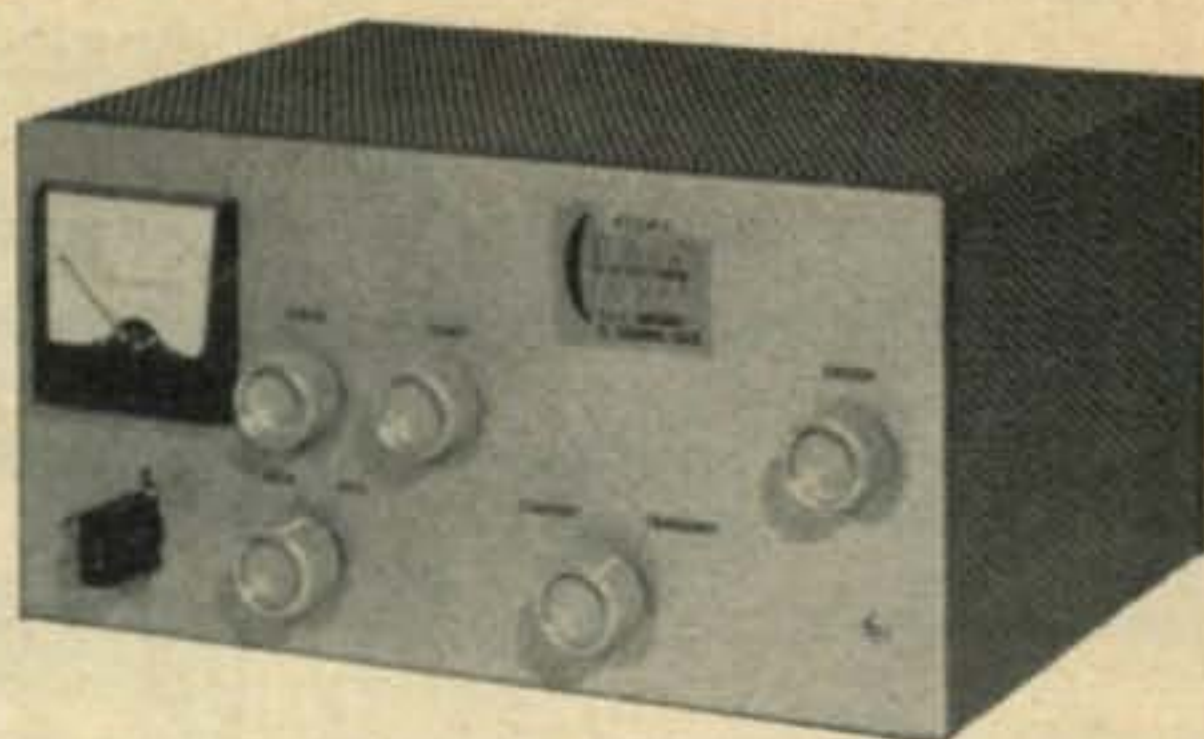
QSL's-SWL's, samples 10¢. Malgo Press, 1937 Glendale Avenue, Toledo 14, Ohio.

### SWAP OR SELL

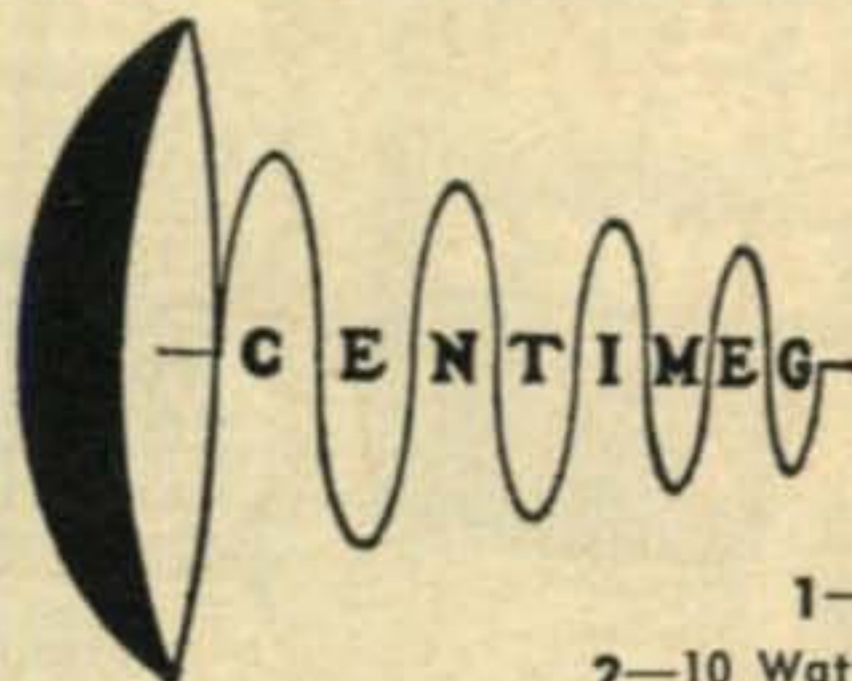
Sell or Swap—Sola Constant Voltage transformer 500 watts, 115 Volts, excellent \$35.00; 2 meter Tranceiver Scr-522 unmodified—exc., \$30.00; Transformers (2) Primary, 110 220, Secondary, 600 VCT, 165 ma, C.C.S. 6.3V-6 Amp 5V-3 Amp, Hermetically sealed, Brand new @ \$4.50 ea., f.o.b. Bill Monteverdi, Box 491, Geneva, New York.

### MISC

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432 MC. Xtal controlled transmitter



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For further information, check number 46 on page 126.

**BC-659 — \$16<sup>95</sup> RE-NEW** | **PE-120 — \$7<sup>95</sup> RE-NEW**

BC-659 FM RECEIVER-TRANSMITTER—27 to 39.1 MC FM. 5 Watt. Crystal Control on Two Pre-set Channels; with Tubes and Speaker—Re-New: **\$16<sup>95</sup>**  
PE-120 POWER SUPPLY for BC-659 or BC-620; with Vibrator for 12 Volt operation—Re-New: **\$7<sup>95</sup>**  
BA-41 BIAS BATTERY—for BC-659 or BC-620...New \$4.95  
AN-29 Telescoping ANTENNA for BC-659...New 2.95  
FT-250 SHOCK MOUNTING for BC-659/PE-120 Used 4.95  
SCHEMATICS for BC-659/PE-120 w/voltage & Resistance 2.00

**BC-603 — \$14<sup>95</sup> RE-NEW** | **BC-683 — \$24<sup>95</sup> RE-NEW**

BC-603 FM RECEIVER—20 to 27.9 MC.... Re-New \$14.95  
BC-683 FM RECEIVER—27 to 39.1MC; Used \$19.95 R-N 24.95  
BC-604 FM TRANS.—20 to 27.9 MC: Used \$4.95; R-N 7.95  
BC-684 FM TRANSMITTER—27 to 39.1 MC....Used 7.95  
FT-237 MOUNTING for Receiver-Trans. ....Re-New 7.95  
FT-346 MOUNTING for Receiver only .....Re-New 4.95  
DM-34 Dynamotor, 12 V. f/BC-603-683; Used \$2.95; R-N 4.95  
DM-35 Dynamotor, 12 V. f/BC-604-684; Used \$6.95; R-N 9.95  
FT-384 TEST ADAPTER for BC-603-683-923—Used for testing various Voltages & Alignment of Receivers. Plugs into rear of set; has metering switch & provision for attaching output meter & VTVM. Complete with 6-Ft. Battery Leads & Clips.  
Prices: USED: \$2.95 — RE-NEW: \$4.95

#### GROUND PLANE ANTENNA

CITIZEN — COMMERCIAL — Made from sturdy surplus Insulated Base and Screw-in type Elements. For use in the 25 to 50 MC Bands. Specially cut to your operating frequency. (Specify Frequency when ordering.) With Adapter for 1" pipe mounting. **\$14<sup>95</sup>**

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For further information, check number 47 on page 126.



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For further information, check number 48, on page 126.

**AN/ART-13 100-WATT TRANSMITTER**

(Government original Cost \$1,000.00)

Designed to provide radio communication by voice, (MCW) or CW telegraphy. Class "B" audio modulator system capable of modulating the carrier at least 90% on voice or MCW. Incorporates automatic tuning mechanism which may be used to select any one of 11 frequencies, range 2000 KC to 18,000 KC. Frequencies 200 KC to 1500 KC range is provided by addition of oscillator 0-16/ART-13-A. Shipping weight 90 pounds.

With Tubes and Meters—Condition Fair	\$29.50
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0-16 Low Frequency Oscillator—Cond. Fair	\$ 5.95

AN/ART-13-T47 with Tubes and Meters.	\$39 <sup>50</sup>
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T47 with Tubes and Meters. Condition	\$49 <sup>50</sup>
Excellent .....	

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**MISC. (Cont'd.)**

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**HAMS:** Learn Calculus or algebra. Powerful modern mathematics. Easy practical lessons, first four \$1. Mathco, 4256-5 Minmor, Cincinnati 17, Ohio.

**FUN in the SUN** at the Greatest of all Florida Hamfest, the TROPICAL HAMBoree, January 30 & 31. Write Box 104, Miami 1, Florida for details and hotel reservations.

**NATIONWIDE CONSULTANTS, INC.** has many interesting assignments for qualified personnel in the following categories: *ENGINEERS, EE's & ME's* Fire Control Systems Servos, Circuit Design, Pulse, Digital-Analog Computers, Test and Evaluations, Ballistics, Telephone Cross Bar, Military Communications, *Technical Writers*—Heavy electronics background handbook, instruction manuals, and specifications. *Parts Listers*—Experienced repairing IPB's, provisioning conference leader background. *Technical Illustrators*—Exploded views, perspective layouts, ink rendering, wiring diagrams and charts. Assignments available in North, South, East and West. Top Rates Fringes. Send resumes to James B. Moss, Director of Personnel, NATIONWIDE CONSULTANTS, INC., 20521 Kinsman Road, Cleveland 22, Ohio. Skyline 2-2888.

**FOURTH STUPENDOUS YEAR**—Broward Amateur Radio Club's Get-Together and Auction. Doors open 9 A. M. Lunch at noon, auctioning 1 P. M. Armory, S. W. 24th St. and 4th Ave., Ft. Lauderdale, Fla., Saturday, Feb. 13.

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**CITIZENS BAND [from page 91]**

made, but they require precision equipment and a sound technical background.

Most manufacturers specify a source for extra crystals if they do not offer them for sale. This is your best chance of obtaining crystals which you may be reasonably certain will meet the tolerance requirement in your rig.

There's little comfort too in asking a friend to listen for you to see if your signal is "right on" the channel. Most C/B receivers have little selectivity and "look" at a pretty large slice of the spectrum. You could be as much as 4 or 5 kc off frequency and your friend would most likely never know the difference. It should be pointed out here too that C/B receiver channel markings are not to be relied upon. Most manufacturers make no attempt to calibrate channel markings and the dials that are calibrated must be looked upon solely as "decorative". In short, it just is not feasible to tell another station more than that you can hear him.

**Operating Procedure**

It only takes a few minutes of listening on the C/B to discover that there must be some

pattern to all the conversation. But the newcomer is often confronted by a seeming jumble of incomprehensible gibberish.

Some amateurs, and doubtless some SWLs, apparently have brought the use of Q signals to the C/B. The truth of the matter is that they don't belong here anymore than they belong on the amateur phone bands. Instead of attempting to use these operating abbreviations, which were designed for cw use only, why not just say what you mean. C/B operators are not radio operators, in the amateur or commercial sense, and are therefore not expected to know involved operating "shorthand".

Why can't we make it a rule to *keep it simple*? This applies to reports of readability and signal strength too. How about confining reports to such as "Loud and Clear", "Strong but with interference", "Weak but readable", and any other combination that will clearly advise the fellow on the other end how his signals are being received? This is important information, and it shouldn't be clouded in a mass of misunderstood Q signals and R and S reports. Let's give it a try, yes?

### New Coaxial Antenna

Now added to the rooftop forest of C/B antennas at 2W2870 is a fine coaxial specimen. Manufactured by Herb Kreckman of Cresco, Penna., the CO-30 antenna for C/B use is one of a very complete line of vertical antennas. As a matter of fact, Herb makes nothing but vertical antennas, and does he know how to make them.

This antenna is not the least expensive we've ever seen, but if it's your aim to put one up to stay for years of maintenance-free operation, here is the one that can do it.

The whip part of the antenna is solid aluminum. This is fitted to a glazed ceramic insulator to which a brass tubing skirt is fastened by 8, 8-32 screws. The coax cable, (RG-8/U or RG-58/U) must be equipped with a PL-259 connector. This mates with a connector at the base of the whip. The cable passes through a 3/4-inch pipe mast and the mast passes through the brass tubing skirt to thread into standard pipe threads on a bushing within the ceramic insulator. Materials needed: 3/4" pipe mast and coax cable with connector. Construction may best be described in a word: solid.

Signal reports have been most encouraging, and there's no doubt that this antenna will lay down a potent vertically polarized omni-directional signal. It should be of particular interest to C/Bs who use their stations for business purposes, since the antenna shows equal transmitting and receiving characteristics in all directions.

Next month we're going to discuss another antenna for C/Bs and possibly have some more to say about regulations.

73, Lee Aurick, W2QEX/2W2870

**HOLD AUDIO  
DISTORTION  
DOWN  
BRING  
TALK POWER  
UP**



with a  
**P & H COMPRESSOR-AMPLIFIER**

It's a fact — 100% modulation on most ham rigs is a "sometime thing". Uncontrolled, instantaneous audio peaks can ruin an otherwise clean signal. THERE'S A SIMPLE SOLUTION — Install a P&H compressor-amplifier in the mike line of any AM, SSB, DSB or PM transmitter — Adjust audio gain for full 100% modulation and forget it! TALK POWER IS UP — FLATTOPPING IS GONE. The net result is the CLEANEST, MOST POTENT AUDIO your rig is capable of. Single knob control. Works on AVC principle — like broadcast compressors. TWO MODELS: The AFC-1 (3x3x5") requires an external power source and has a built-in 90-3500 cycle band pass audio filter . . . sells for only supply, a switch controlled (Broad-Medium-Sharp) audio filter and costs you only \$54.95. Also available the AFC-2CW, a sharp filter model for CW \$32.95. The AFC-2 (5x5x7") has a built-in power reception or mike input on filter exciters. If you are interested in what either of these "Little Grey Boxes" can do for your phone signal . . . Or what smooth, instantaneous, non-blasting phone and CW reception you can get from that older model receiver with a P&H compressor in the speaker line . . . See your dealer, or drop a card to DEPT. R-11.

**P & H ELECTRONICS INC.**  
424 Columbia Lafayette, Ind.

For further information, check number 49 on page 126.

### ALL BAND TRAP ANTENNA!



Reduces interference and Noise on All Makes Short Wave Receivers. Makes World Wide Reception Stronger. Clearer on All Bands!

For ALL Amateur Transmitters. Guaranteed for 300 Watts Power for Pi-Net or Link Direct Feed. Light, Neat, Weatherproof

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SEND ONLY \$3.00 (cash, ck., mo) and pay postman balance COD plus postage on arrival or send full price for postpaid delivery.

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 Mounting Clips for above Globars, Ni. PL. Bronze @ 10¢  
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 Ohmite Rheostat 10 ohm 25W (12½W with cover). .... 85¢  
 RTTY Polar relay WE-255A. .... \$4.95  
 Polar relay, Western Union 41C, adjustable, used good. \$1.95  
 Relay Duncos, 6 VDC coil, cont. 1A, 1B, 1C sealed. 35¢ ea. 3/\$1  
 Relay Duncos 8HXX 115/60 coil, spst rtd 30a. .... \$1.95  
 Power Xfmr. Herm. sld. Pri: 115v 50-2400cy. Secd: 680v @ 140ma; 700v @ 70ma; 6.3v @ 11amp & 6.3v @ 3amp. \$3.25  
 Choke, AF Herm. sld. 12hy 150 ma 210 ohm .... \$1.95  
 Step Down Xfmr 115/60 to 38 v @ 1.73 a. herm sealed \$1.25  
 SPRAGUE HY-pass—cap. 0.1 mf 400 v #80PI. 35¢, 3/\$1.00  
 Oil Capacitor 8mf 600vdcw w/mtg bkts. .... 85¢ ea. 2/\$1.60  
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 1mf 400vdcw. .... 30¢ ea. 4/\$1.00  
 Micro Switch, interlock ass'y, #1AC1. .... 95¢  
 Micro Switch, #BZ-R31, Norm. open or closed. 35¢ ea. 3/\$1  
 Ohmite Power switch, 6 taps, rtd 15amp @ 150vac. .... \$1.50  
 GE interlock switch, push button, momentary cont. 25¢, 5/\$1  
 Rotary canopy type switch, A-H&H, DPST 3A 125V. 25¢, 5/\$1  
 Meter, Panel, scale 0-2.5KV, 0-1ma mvmt, 3"rd. .... \$3.95  
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 Mike Receptacle Amph 80MC2F @ .... 28¢

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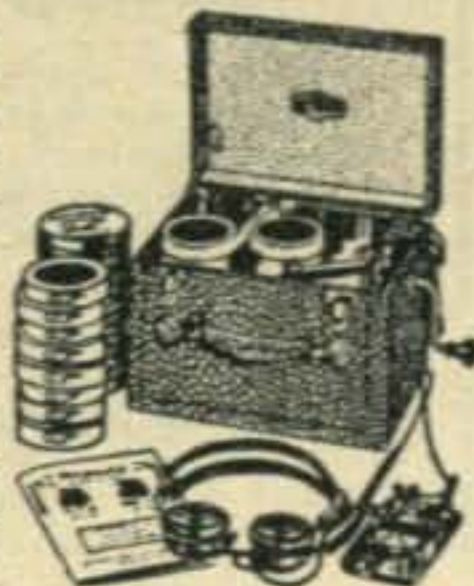
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**INSTRUCTOGRAPH COMPANY**

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 357 West Manchester Ave., Los Angeles 3, Calif.

### COMMAND RECEIVER [from page 53]

converter output is now 7000 kc (second harmonic of 3500 kc) and tuning from 200-300 is tuning 7200-7300 kc. Now set the converter capacitor to minimum (3 o'clock). Converter output is now 14000 kc (4th harmonic of 3500 kc) and tuning 200-300 is tuning 14200-14300 kc. When a signal is heard, it is advisable to slowly tune the converter capacitor to the position of maximum signal. Note this setting for each amateur band or band segment.

### Adjustment

Now that the novelty is over, make a couple of adjustments. While tuned to a signal, adjust the antenna trimmer of the BC-453 for maximum signal. Now check the receiver for frequency accuracy. The crystal frequency plus the dial reading is the incoming signal frequency. If adjustment is necessary, adjust the oscillator trimmer of the BC-453; also try to peak the *rf* and mixer trimmers. The top covers may now be replaced on the receiver.

A good choice of crystals would be 3410 kc to tune 3500-3960 and 7010-7370; 3500 kc to tune 3690-4050, 7190-7550 and 14190-14550; 6810 kc to tune 7000-7360 and 13810-14255; 13800 kc to tune 13990-14255 kc. Crystals higher in frequency than the desired band may be used by *subtracting* the dial reading from the crystal frequency. Example: 7520 kc crystal. Set receiver dial at 520 and read 7000 kc. For MARS members, 4450 kc is 330 on the dial using a 4780 kc crystal. With the same crystal, WWV is 220 on the dial for 5 mc; 440 for 10 mc, for dial calibration and correct time. Set receiver dial to these settings and tune the converter.

For any desired frequency between 3.5 mc and 14.5 mc, simply add or subtract the dial reading to or from the appropriate crystal and tune the converter. Remember that conventional surplus crystals deliver 1st, 2nd, and 4th harmonic output.

Since completing this receiver (number 4, and finally my own) I have not had occasion to use my big communications receiver, except for 10 and 15 meter contacts. For you hams who want sensitivity, selectivity, stability and low cost all in one package, here is your project. ■

### V & H ANTENNAS [from page 51]

tance used must be the sum of (1) the inductive reactance obtained from (g) and (2), the inductive reactance required to balance out the capacitive reactance of the antenna.

Any type of balun may be used to go from balanced to unbalanced line in the case of the horizontal antenna. From then on the input of the balun is treated as the input to an unbalanced antenna. ■

## DENSITOMETER

[from page 45]

... but a densitometer measures light, and will happily measure the drifting swirls of cigarette smoke as they pass under the enlarger lens. If you can't seem to account for the random swinging of the needle . . . put out that butt, and try again!

## Range Switch

The range-switch gives only a 5-to-1 increase in sensitivity; it may seem an inadequate spread. But we're working with light, and it's a darned sight simpler to change the light-source than to switch highly sensitive electronic circuits. Your enlarger already has built into it a mechanism specifically designed to change the light output in steps of 2X—most enlarger lenses today have click-stops for the various F-stops. I'm using the EL Nikkor F 2.8 lens, on my 35mm enlarger. That goes from F 22 to F 2.8 in 2X click-stopped steps—a range-scale giving me 64 times change of light output; the range-scale on the meter adds another 5 times, for a total of 320-to-1. And if I want more, I'll use a neutral-density filter over the photocell.

## Meter Illumination

The 931-A has the usual blue-sensitive photocathode; the thing works nicely as an enlarging light-meter, because it fairly well matches, in sensitivity, the sensitivity of normal enlarging paper. Safelights do affect the photocell, but it's pretty insensitive in the yellow-orange region of the spectrum. For densitometer work, however, you need to work in darkness—hence the shielded pilot-light over the meter. (It's a standard pilot light, with a short piece of 3/4 inch polyethylene black plastic tubing shoved over it. A slit in the side of the poly tubing illuminates the dial.)

## 931-A Light Head

The "optical system" of the 931-A light-head is something that leaves room for lots of playing around. You can't mount the tube right up against your input hole, because of the tube-socket dimensions. And a hole gives a rather marked directional effect on the sensitivity, which can be confusing. What I have is a jack-leg solution, but it works within the useful limits of what I need.

Clear polystyrene rod, the kind with polished outside surface, *not* the milky-surface type, will "conduct" light, somewhat as a wave-guide

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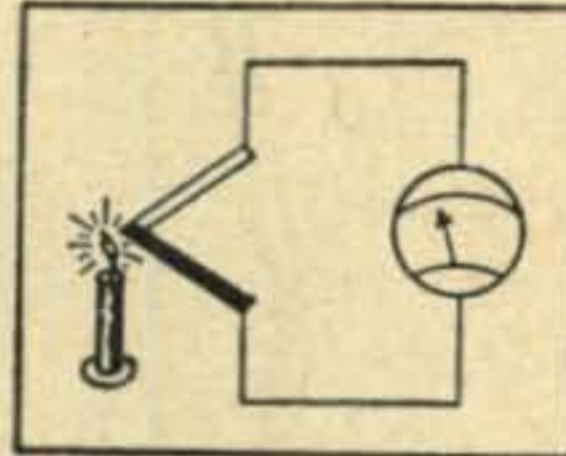
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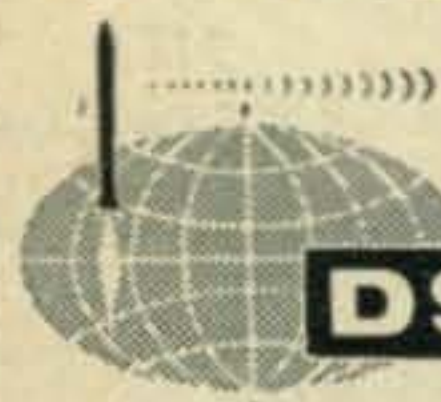
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conducts microwave energy. A 5/32nds hole is drilled in the metal box. I cut a piece of ¼-inch polystyrene rod, and smoothed one end on very fine sandpaper; the result is a frosted glass end effect. The other end I turned down (with a file, while the rod was spun by the ¼-inch drill) till it made a push fit in the hole. Daubed with a little Duco cement, it stuck in place solidly. This serves to conduct the light entering the hole to a point as close as the tube-envelope of the 931-A will permit. The outside end of the rod was filed smooth with the metal box. Another piece of poly rod was turned to a hemispherical end. (Roughly, that is!) It was very-fine-sandpapered till it, too, had a frosted-glass surface. Then the tiny hemispherical lens was cut off, smoothed flat, and with a single drop of polystyrene dope, welded to the flush end of the internal rod.

Result: in effect, the rod ends in a "wide-angle lens" of exceptionally lousy resolving power, but quite efficient light-gathering power. Since the photocell can't "see pictures" anyway, the resolving power means nothing; the light-gathering power does count. The system is much less sensitive to directional effects due to the wide-angle-lens effect.

### Connecting Cable

The cable from the power-and-meter cabinet to the 931-A light-head merits some consideration. There's 1000 volts in that cable, and it has to be handled a lot. It is urgently recommended that measures be taken to keep it in the cable, and not in your hands. There are special kinds of hook-up wire intended for TV picture-tube leads, with insulation rated at 30,000 volts. This makes the cable somewhat clumsier, but nowhere near as clumsy as you'll be in a state of *rigor mortis*. This is one place *not* to follow the usual ham practice of, "I know the manufacturer says it's good for 1000, but I bet I can get away with 2000. . . ."

A final defense and safety measure: the 100,000 ohm resistor in series with the string of Ne-2's would, on shorting to ground, allow only about 15 milliamperes to pass. That small a current will not ordinarily kill, or even render unconscious, anyone in reasonable health—but it is guaranteed positively to alert you, beyond any doubt, to the fact that the insulation is defective.

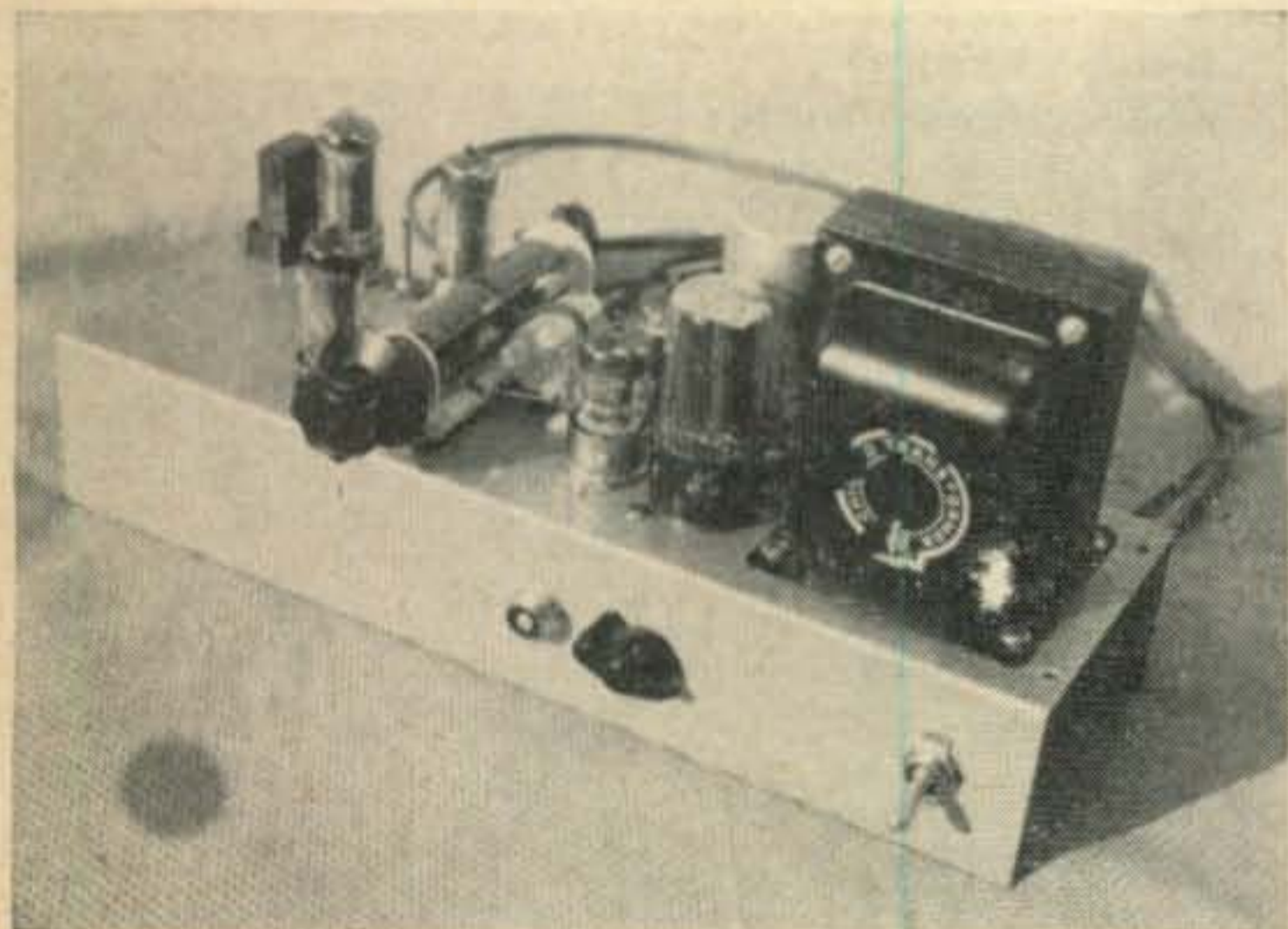
Be it remembered that you're apt to have solutions of various kinds around in a dark-room, and quite apt to have moisture on your hands. The use of the very best, solid-plastic, rather than wettable-cloth, insulation is warranted. The perfect integrity of insulation can be checked readily—and I did!—by putting it in a stainless steel tray with standard acetic acid stop-bath solution, hitching one end to an ohmmeter, and the other end of the ohmmeter to the stainless steel tray. If you can read the number of millions of ohms resistance between liquid and conductor—throw it away and try

another kind of wire. It should be over 100,000,000 ohms.

After you've got the thing set up and functioning, one of the most useful projects will be to set up a true gray-scaler for testing film-developer combinations. If you set up a light-box, with a gray scale having steps of 50, 75, 88, 94, 97, and 99 percent absorption, you can take pictures of that on each roll of film you want to test. If, in the developed negative, you don't find 7 even steps of density . . . the film-developer combination isn't what it should be. And that won't be simply a matter of opinion—it'll be *arbitrari!* ■

### DSB EXCITER [from page 41]

cies across this portion of the band where the operator may get close enough to the other SSB station frequency to make contact. A variable 0-50 mmf condenser inserted across the crystal will allow the operator to lower the frequency 1 to 2 kc and zero beat the SSB stations if necessary.



Crystal control also has another advantage because the frequency will remain constant when the oscillator cathode is opened and closed during transmission and reception. A good *vfo* would have to be a complicated heterodyne type to accomplish the same thing so that the signal would not interfere with reception. The output of the exciter is enough power to drive a class AB-1 amplifier to 1 kw, with the gain turned down low. ■

### HQ 140X [from page 39]

be 1½ kc each side of carrier and the edge of the band width will be about 65 db down below the carrier. Now turn the method switch to CW position. Tune in a CW signal and sit back and relax. Full *avc* action, S meter reading and no thumping. Next tune in a SSB signal adjust your *bfo* to bring in the signal properly and you will notice that all the stations come in with a minimum of volume control handling. You can't ask for more than that. ■

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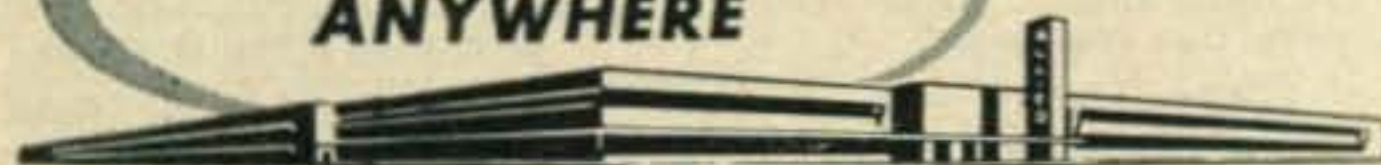
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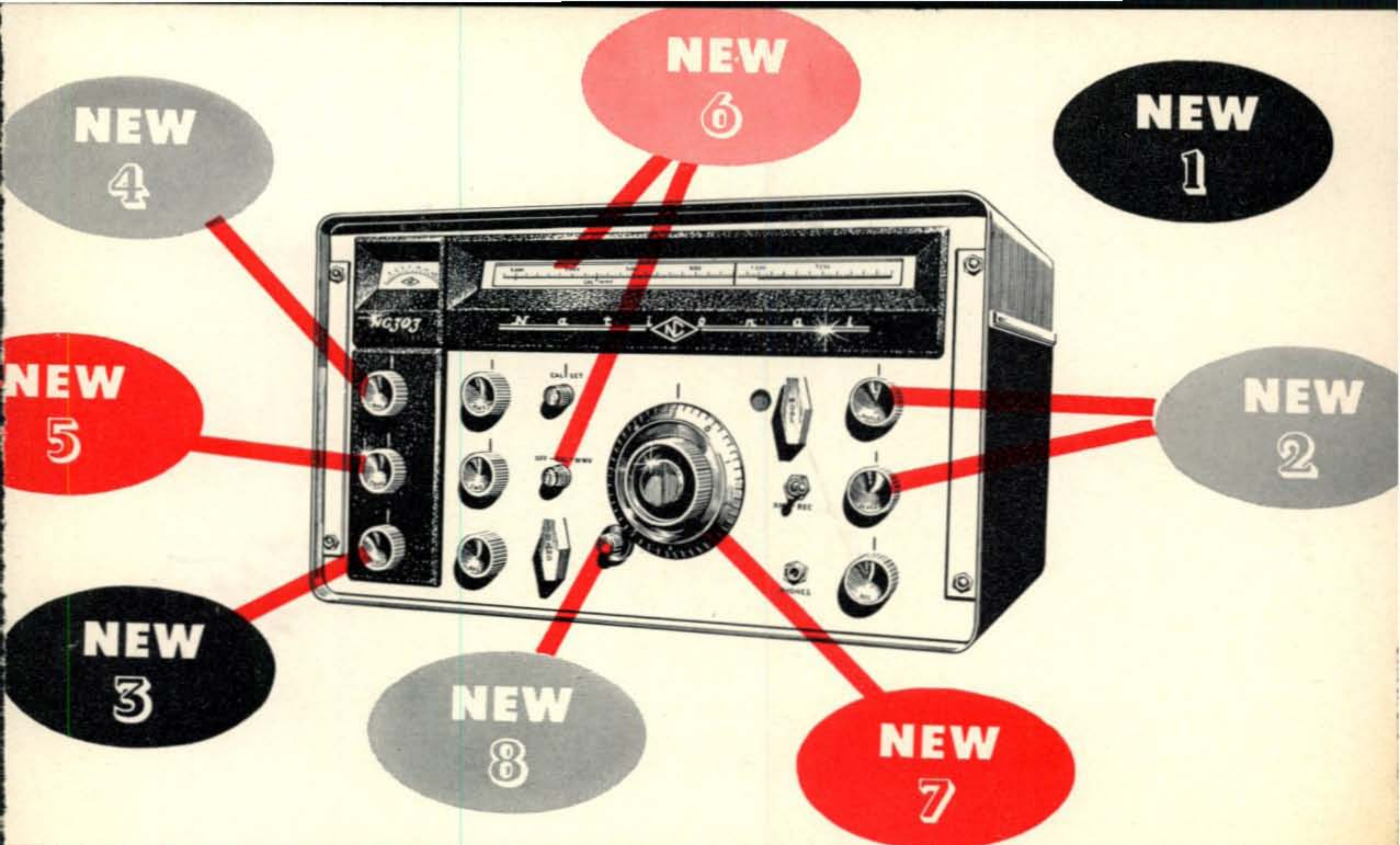
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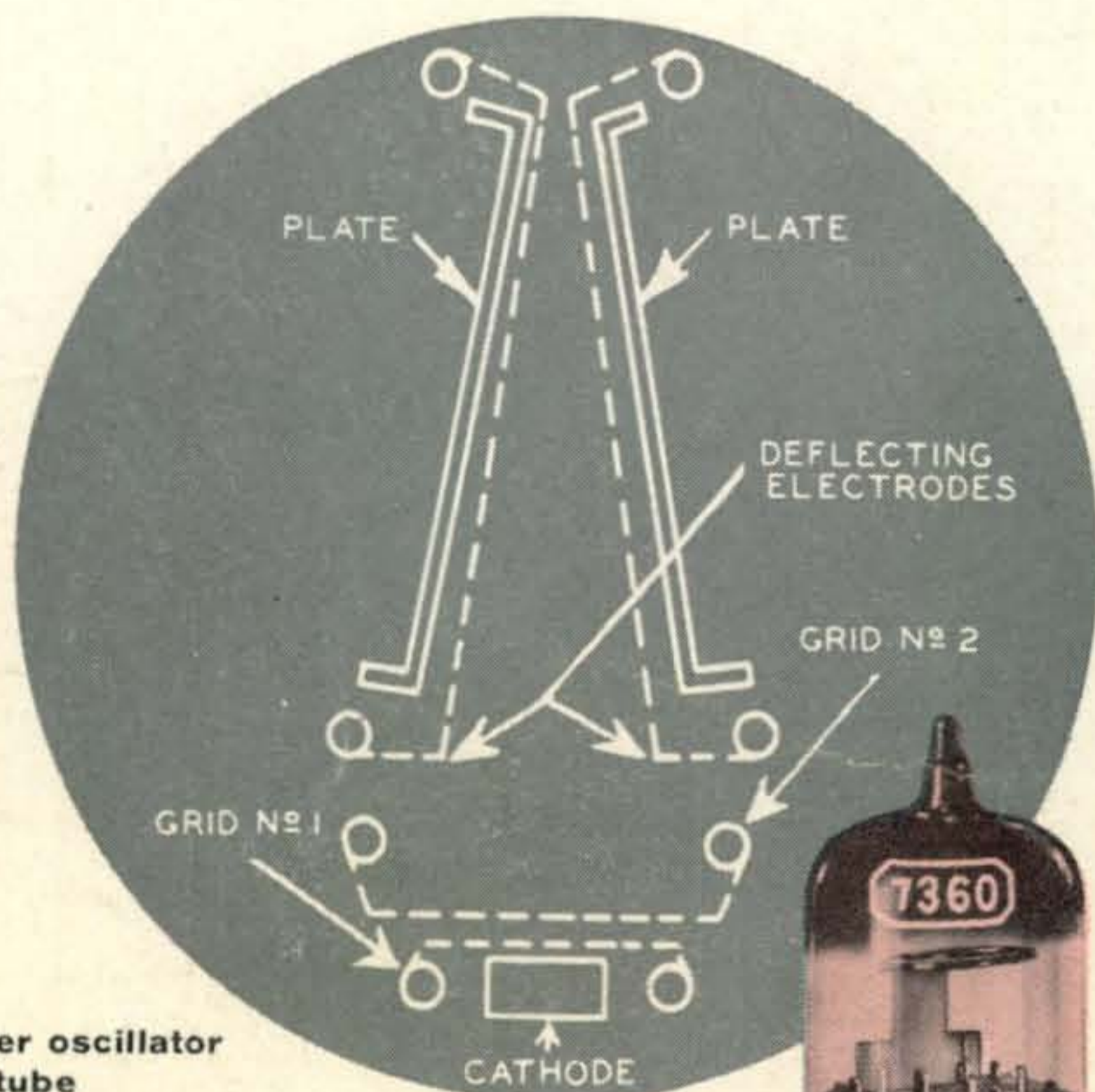
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Shown actual size

Specifically developed for SSB and DSB suppressed-carrier rigs, RCA-7360 is the small-but-mighty tube that can "double-up" on a number of exciter functions at frequencies up to 100 Mc. It simplifies circuitry—makes it practicable to use inexpensive components.

Here's how it operates! The cross-section shows the main elements of the RCA-7360. The single flat cathode, control grid, and screen grid form an electron gun which generates, controls, and accelerates a beam of electrons. The total plate current to the two plates (at a given plate voltage) is determined by the voltages applied to the control grid and the screen grid. This total plate current varies with the bias or signal voltage on the control grid as in any conventional tube. The division of the total plate current between the two plates is determined by the difference in voltage between the two deflecting electrodes.

RCA-7360's are now available at your RCA Industrial Tube Distributor. For a technical bulletin on RCA-7360, see your RCA Industrial Tube Distributor. Or write RCA, Commercial Engineering, Section K-37-M, Harrison, N. J.



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For the name of your nearest RCA Industrial Tube Distributor, call Western Union by phone number and ask for Operator 25.