ANC

NOVEMBER
1954
35c

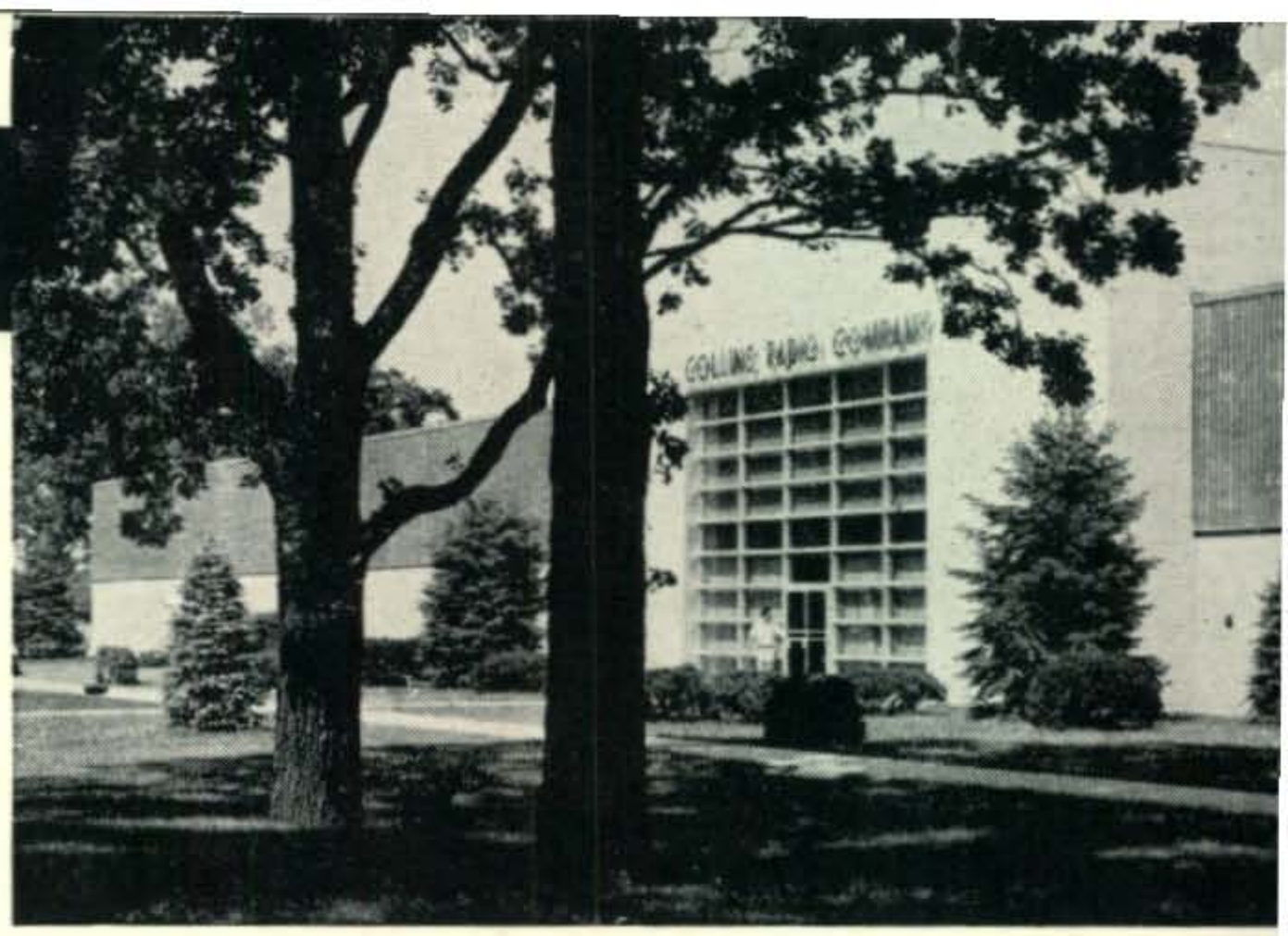
CQ

RADIO AMATEURS' JOURNAL

In This Issue =

Table Top Transmitter for Two... Complete
"Brief Case" Station... "Junkeyboard"...
Telescoping Towers for Working DX...

ENGINEERING NOTES

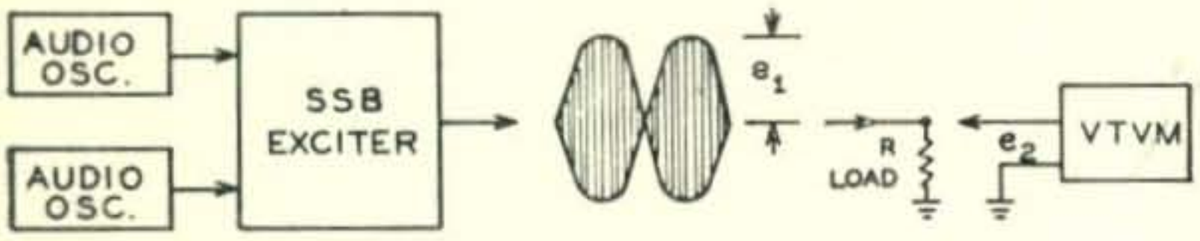


SSB— TRANSMITTER POWER and DISTORTION

While single sideband transmitter power output and distortion have both been discussed previously, the importance of the relationship between the two has not in general been recognized. The reduced bandwidth required by SSB is one of its chief advantages. But distortion in SSB like overmodulation in AM destroys this advantage. The problems involved in SSB distortion should be recognized so that this important advantage is realized in practice.

First, a definition of the transmitter power we are talking about: We have "peak power", "average power", "peak envelope power" and "talk power"—all useable terms if properly defined. The power that an amateur is interested in is the power input to his final amplifier, commonly measured (acceptable to the FCC) by multiplying the plate voltage by the maximum plate current observed on voice peaks, with a plate current meter having a maximum time constant of 0.25 seconds. This power would be called the "peak power input." This method does not give the absolute peak power input since the plate-current meter will not respond fast enough to indicate the current on modulation peaks.

The amateur may also be interested in the power output of the exciter driving his power amplifier. SSB power output is generally referred to as "peak envelope power (P. E. P.)". "Peak envelope power"



has been defined as the RMS power during the maximum RF cycle which occurs in the transmitter. When making the two tone tests, this occurs during the coincidence of the peaks of the two test tones. The diagram shows the transmitter output waveform when making a two-tone test. An oscilloscope will show the peak voltage (e_1) across the transmitter load. A VTVM will read the output voltage. However, most VTVM's are calibrated in RMS volts so that the value (e_2) is 0.707 of the amplitude shown on the scope. Then P.E.P. = $(0.707e_1)^2/R$ if the voltage is measured on a scope, or P.E.P. = $(e_2)^2/R$ if the voltage is measured with a VTVM calibrated in RMS volts.

All amplifier stages have some non-linearity. The degree depends upon such things as DC operating voltages, RF grid-input voltage and plate-voltage swing. With non-linearity, intermodulation distortion is produced. The distortion of an SSB transmitter is considered to be the difference in db between the level of the desired modulating tones and their third order products. For instance, if we were to modulate with two tones of 2000 and 3000 cps respectively, the two third order products would be at 1000 and 4000 cps (obtained from $2f_1$-f_2 and $2f_2$-f_1). A selective receiver such as the 75A-3, with an 800 cps mechanical filter, can be tuned across the spectrum and the level of each of the above signals can be read on the "S" meter. If assuming a transmitted bandwidth of 3100 cps we can see that the 3rd order product of 4000 cps in the above example could interfere with a nearby signal. The difference between the measured levels of the two desired tones, 2000 and 3000 cps, and the undesired 3rd order modulation products, 1000 and 4000 cps, should be at least 25 db in order to minimize the interference The distortion products can fall on either side of the desired channel and within it. Distortion products such as the 5th, 7th, etc., will also be present but are generally lower than the 3rd order. If the 3rd order products are high, the 5th, 7th, etc., will also be high and the interference created will cover much more of the band.

From the above examples, it can be seen that a linear amplifier can be given considerably different ratings. For instance, an amplifier may be capable of producing 3 watts P.E.P. output with the 3rd order distortion down 30 db. By changing the bias and driving it harder, it may be possible to produce 10 watts output but the 3rd order distortion may be down as little as 6 to 10 db. Obviously, with the second rating the amplifier is producing considerably more distortion and interference.

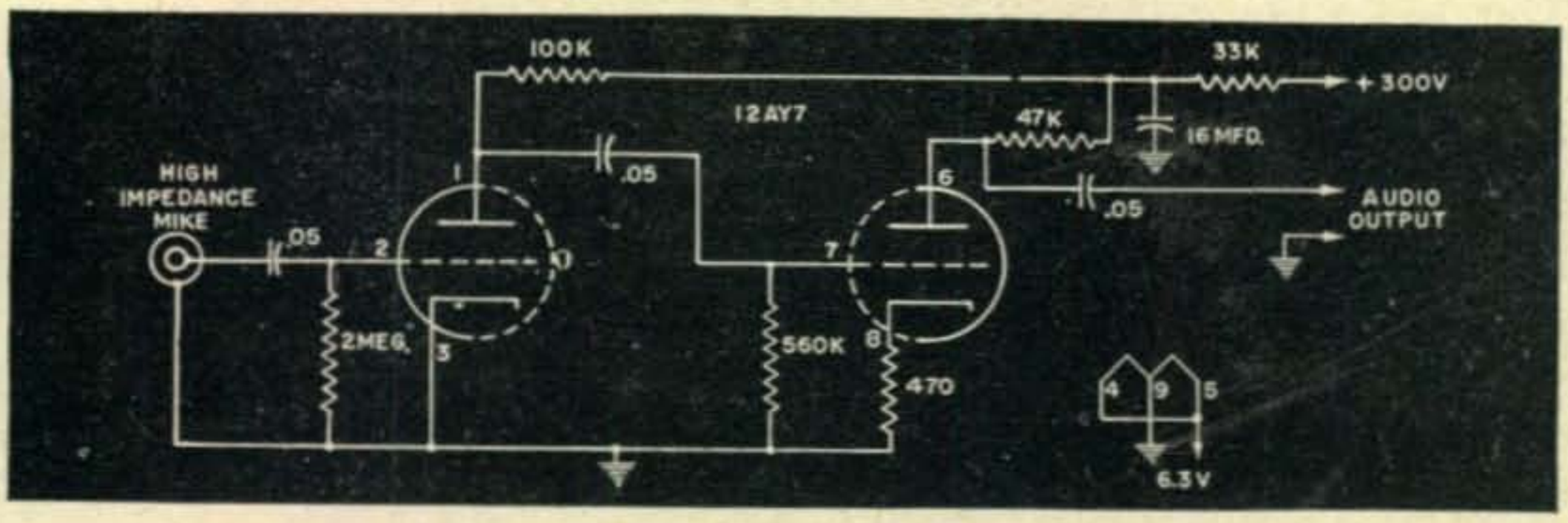
It is essential then that linear amplifiers be operated conservatively if we are to obtain the maximum improvement possible from an SSB communications circuit.

G-E TUBE QUALITY SHOWS IN SUPERIOR DESIGN DETAILS

THEY'RE special, the 4 slots that G.E. puts in the mica spacers of 12AY7 twin triodes. The slots act as barriers to plate-to-grid leakage, which can cause that baneful "egg-frying" noise in audio amplification.

You get a quiet tube in the 12AY7 because G-E designers made sure that every part is engineered for low microphonics. As with all General Electric tubes, 12AY7 high quality isn't merely determined by tests—instead, it starts at the drawing-board, is a product of many G-E design features that join to assure optimum performance.

See the 12AY7 at your G-E tube distributor's! Buy G-E tubes for every ham requirement! You can be sure your needs will be met by efficient types *designed-in-detail* for their jobs!
Tube Department, General Electric Company, Schenectady 5, New York.



● Low noise level of G.E.'s 12AY7 enables this 2-stage amplifier to boost speech input with a minimum of hum and hiss. Build the device on a turret-type socket . . . it will take up only 1 square inch chassis space!

CQ . . . CQ . . . Have you nominated your Edison Award candidate?

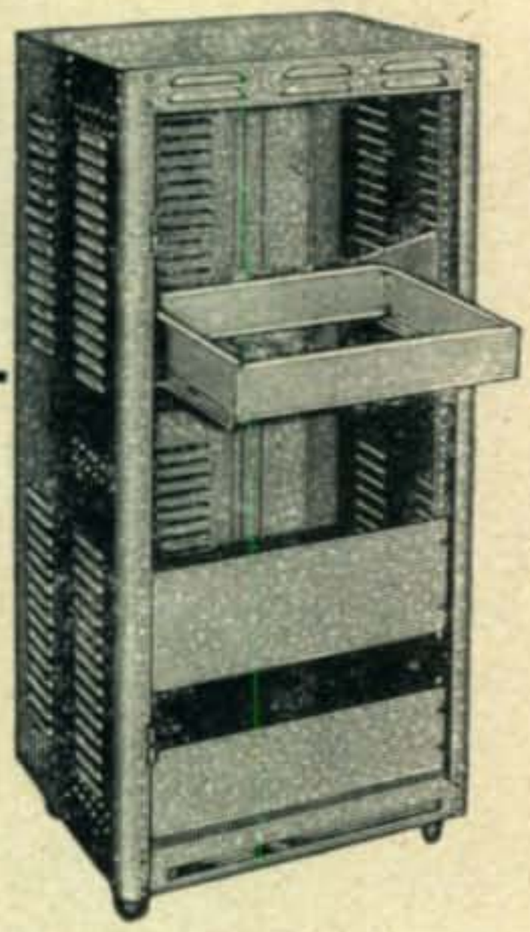
Letters must be postmarked not later than January 3, 1955. If you haven't selected your candidate, please do so soon—then prepare and mail in your nominating letter. Instructions were given on this page in September. Trophy, gift, and national acclaim will go to the amateur who has rendered outstanding public service in 1954!

GENERAL ELECTRIC

166-186

Now add extra convenience to your rig with

BUD Golden Glow SLIDING DRAWER ASSEMBLY



In addition, there are many other handy uses for this practical drawer.

The new BUD S.D. 1717 Sliding Drawer Assembly is easily and quickly assembled and installed in any standard rack. Can't fall out, can't tilt . . . perfectly safe mounting for any object placed on it. Slides easily in and out on ball bearing suspension in the same manner as the drawers in the most expensive steel filing cabinets.

Here Are Some of the Many Uses of the BUD Sliding Drawer Assemble

1. Mounting for record player
2. Base for portable typewriter
3. Mounting for apparatus or instruments
4. Base for writing table
5. Handy drawer space

LOOK AT THESE CONSTRUCTION FEATURES

Chassis formed from one piece 14 gauge aluminum.

Electrowelded. Chassis size 16¾" x 14" x 3" with ½" flange top and bottom.

Support brackets formed from one piece ⅛" aluminum.

Brackets accurately punched to conform with standard panel mounting holes.

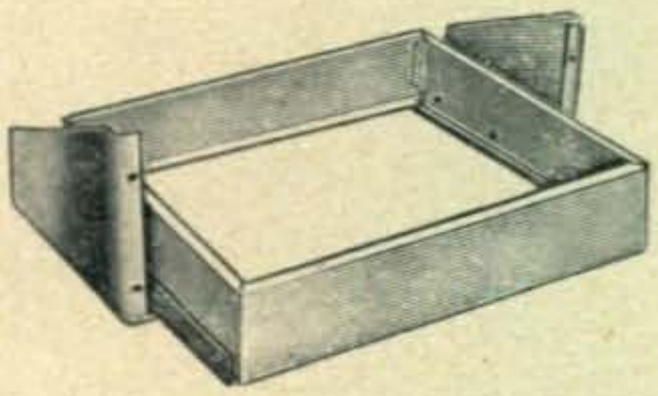
Slide rail fastens securely to chassis, slides easily in and out on ball bearings in channel.

Stop screw on slide rail prevents drawer from falling out of channel.

Support brackets and channel finished in etched aluminum.

Chassis and slide rail finished in gold-tone. will support up to 50 pounds.

Also available, aluminum plate which may be fastened to top of chassis as shelf, desk top or support; or attached to bottom of chassis to form drawer. Size 16¾" x 14". Made of 14 gauge aluminum. Gold finish. Punched with four mounting holes. Catalog No. T.P.—1718.



Catalog No. S.D.—1717	Sliding Drawer Assembly Amateur Net	$10.65
Catalog No. T.P.—1718	Drawer Plate Amateur Net	$2.19

See these products at your nearest Bud distributor

BUD — THE MARK OF PERFECTION

BUD RADIO, INC.

2118 East 55th St. Dept. L Cleveland 3, Ohio

CQ

November, 1954
Vol. 10, No. 11

Our Cover Photo

The "Brief Case" station used by W6MUR. See page 34.

Feature Articles

13 TABLE-TOPPER FOR TWO
Edwin T. Kephart, W2SPV

21 THE JUNKEYBOARD," Part II
John Williams, W2BFD

34 THE BRIEF CASE TRANSMITTER-RECEIVER
Rodney W. Johnson, W6MUR

46 WHAT YOU SHOULD KNOW ABOUT TELESCOPING TOWERS
William I. Orr, W6SAI

Departments

26 DX AND OVERSEAS NEWS
30 YL's FREQUENCY
32 PROPAGATION CONDITIONS
40 NOVICE SHACK

Miscellaneous

4 SCRATCHI
10 BOOK REVIEWS
68 CLASSIFIED ADS
72 ADVERTISING INDEX

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

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

Feenix, Ariz.

Deer Hon. Ed:

If you are by chancey peeking out Hon. Window from high up in your skysweeper office, and seeing sumbuddies floating by on nice soft clowd, that will be me. Yes indeedy, boy oh boys, are things hunky-dunky lately. Wowie!! Normally old Scratchi are not easily affected, but the dreem of every amchoor just coming trew to me. It are all coming abouts in most unyoushewall way.

Hon. Brother Itchi are having good friend from way backs who inheriting local amchoor radio supply house cupple years ago. Now this selfsame feller are talking to Itchi resently, and saying how he wishing he could taking off and getting months vaycayshun. Running radio store by himself he not having anybuddies to take over. Also, can't affording to paying much even for vaycayshun time. Anyhows, cutting long story down to cupple chit-chats, Brother Itchi saying I'd be happy to helping, and I saying shure thing, so last month, there I are, in charge of local radio store.

Just standing there, my first day, and looking arounds at all the geer, are making Hon. Mouth watering. Toobs after toobs after toobs, big ones, small ones, rare ones. Varyable condensers, any size, any shape, and spacing. Meters, round or square, volt mil or ohm . . . toob sockets, 4, 5, 6, 7, octal, loctal, miniature . . . wire, antennas, transformers, chokes. Boy, would I like to having this for personal stockroom! I building DX farm what reely rasceing cane.

Are running my fingers thru the banana plug bin with reel joy when first customer are coming in. He needing one 100 ohm quarter-what resistor. Big deal . . . must be running load tests on his new heering-ade.

Are dusting things off, shoving crooked things strate and strate things crooked, reeding Radio Handbook, and are still awake after lunch when getting second customer. He wanting to get started in amchoor radio and could I helping out? After long confab one hour later he walking out with thirty-five cents beginners handbook.

That afternoon things getting even duller. Just before closing time another feller coming in. He wanting to know if I are having anything to giving away free, gratis for big awkshun at local Ham club. I giving him small package of soddering lugs and then locking up for nite. Total net profit for day, one and three-thousands cents. Hon. Ed., at that rate are just covering my salary!!

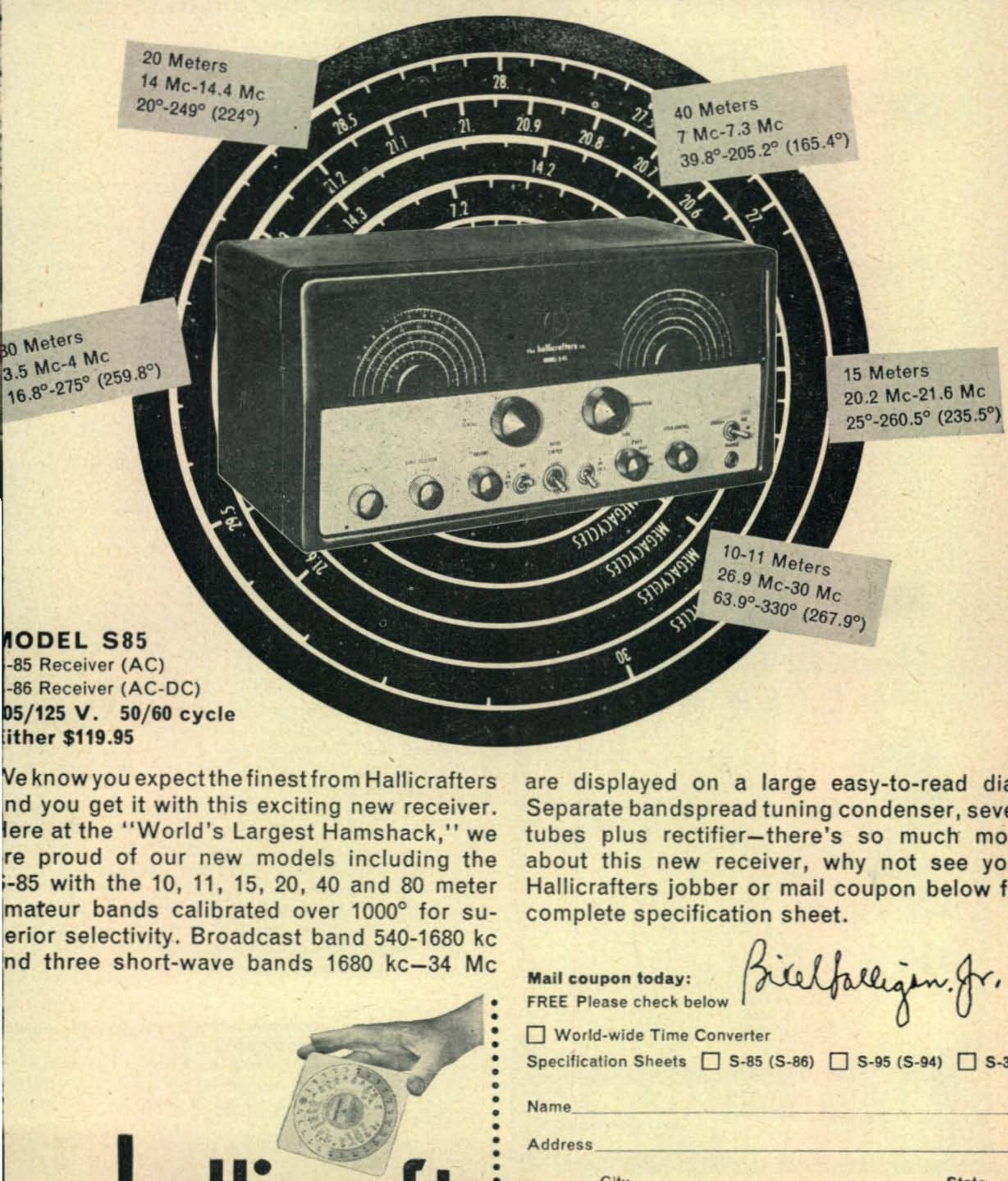
Next day business are going to dogs and dropping off to new low. Not getting one oustomer. In fackly,

[*Continued on page 6*]

Leading a brand new line . . .

first with over 1000°

OF CALIBRATED BANDSPREAD!



MODEL S85
S-85 Receiver (AC)
S-86 Receiver (AC-DC)
105/125 V. 50/60 cycle
Either $119.95

We know you expect the finest from Hallicrafters and you get it with this exciting new receiver. Here at the "World's Largest Hamshack," we're proud of our new models including the S-85 with the 10, 11, 15, 20, 40 and 80 meter amateur bands calibrated over 1000° for superior selectivity. Broadcast band 540-1680 kc and three short-wave bands 1680 kc—34 Mc are displayed on a large easy-to-read dial. Separate bandspread tuning condenser, seven tubes plus rectifier—there's so much more about this new receiver, why not see your Hallicrafters jobber or mail coupon below for complete specification sheet.

hallicrafters

Chicago 24, Illinois

Mail coupon today:
FREE Please check below

Bill Fallgren, Jr.

☐ World-wide Time Converter

Specification Sheets ☐ S-85 (S-86) ☐ S-95 (S-94) ☐ S-38D

Name_____

Address_____

City_____ State_____

☐ Ham (call letters_____) ☐ Listener

Occupation_____

[from page 4]

postman not even sticking Hon. Nose in with male. Not that Scratchi are being idle. No indeedy. I going on explorayshun hunt. Ending up in basement. Hon. Ed., If you thinking there are compleet stock upstairs, you should seeing geer in basement. My sacred ant. Honest to nokidding, I never seeing more compleet stock of stuff.

Only one part of basement are having me wunder. Having there many big cartons and boxes of surplus geer, which evidentally not worth anything, on acct. Hon. Owner have written SCRAP all over them, like he planning to tossing them away, no doubtless. I opening one box, and coming up with dawggonest toob you ever seeing. About ten inches long, with fancy base and complicated insides. Hon. Ed., it are like nothing.

That afternoon old geenyus Scratchi are having talk with himself, and deciding this store are having everything except customers. So, going to noosepaper office and putting in big ad. Hon. Ed., that ad are a reel gen. Putting Seek-You in big 60 points tipe then giving the pitch. Telling all amchoors that store are holding big contest. One hundred bux cold cash to feller what identifying toob I having on display (that reely old nothing toob). Also saying that if anywun coming in and asking for sumthing we not having, getting free chance on brand-new communicayshun reseever.

Next day, after ad in paper, I are not eggsactly having to fite my way into the store, but are having steddy streem of customers. Most of them needing such things as 6⅞ ohm 92 what resistors, so I plenty busy handing out free chances on reseever. Also managing to sell a few items now and then. Are having big interest in unknown mistry toob, but no buddies seeming to figure out what it is.

Following day are like the last, and days following that are ditto-wise. In fackly, next cupple weeks are same. Getting lots of people in store, giving away eleventeen hundred chances on new reseever, selling sum stuff, and nobuddies can figuring out what toob are. This toob, howsumever, getting sum 1/c publicity. Are listening in on local 2-meters net and heering Hams talking about it. Everybuddy are mistified.

As the days are getting closer and closer to owner of store coming back, Scratchi are getting worrieder and worrieder. Here are abouts to giving away reel slicky communicayshun reseever, free for gratis, and Scratchi have not boosted store sales enuf to paying for same.

On the day Hon. Owner returning, I going into store with hevvy harts. Owner are there, with big smile and deep tan. One hour later, after I telling him how I doing, smile are gone and he looking pailer by the minute. Looking back on it, I still shuddering to thinking what happening if not get interrupted by feller walking in store, looking at mistery toob, and saying he not only can telling us it is, but he willing to pay twenty-five bux each if we having any more. ARE WE HAVING ANY MORE??. Hon. Ed., it are like being in electric chair with exeycueshuner reddy to pulling big switch, and a fuse are blowing. What a relief!!

Hon. Owner's Face getting back tan all of a sudden, and his smile are so big it practikally meeting in back of his hed. He taking stranger by arm and

[Continued on page 8]

New Heathkit VFO KIT

MODEL VF-1

$19.50

Ship. Wt. 7 lbs.

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

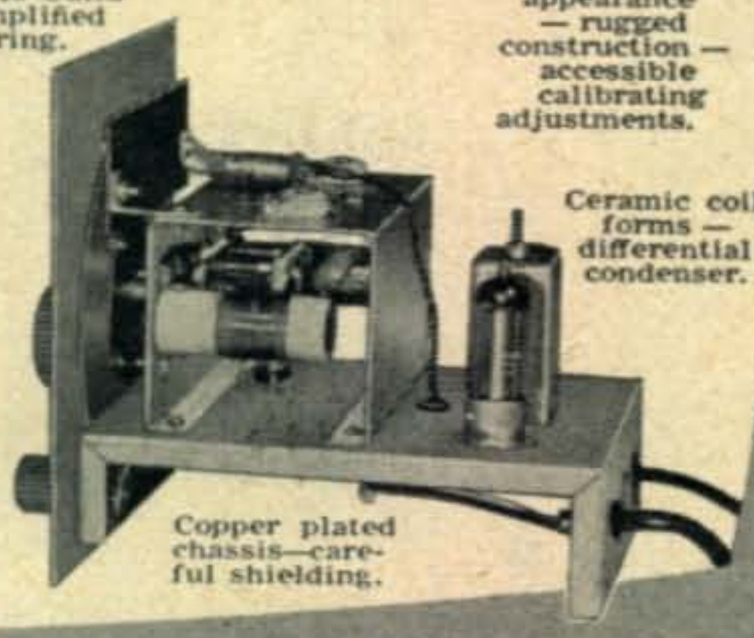
Here is the new Heathkit VFO you have been waiting for. The perfect companion to the Heathkit Model AT-1 Transmitter It has sufficient output to drive any multi-stage transmitter of modern design. A terrific combination of outstanding features at a low kit price. Good mechanical and electrical design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

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

Open layout,— easy to build — simplified wiring.

Smooth acting illuminated dial drive.

Clean appearance — rugged construction — accessible calibrating adjustments.



Ceramic coil forms — differential condenser.

Copper plated chassis—careful shielding.

Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1

$29.50

Ship. Wt. 16 lbs.

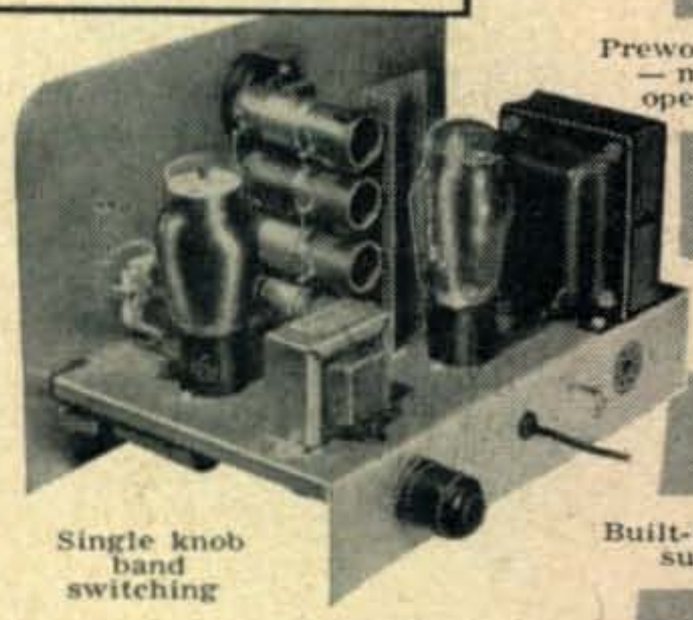
SPECIFICATIONS:

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

Crystal or VFO excitation.

Prewound coils — metered operation.

Rugged, clean construction



52 ohm coaxial output.

Single knob band switching

Built-in power supply

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

NEW Heathkit COMMUNICATIONS RECEIVER KIT

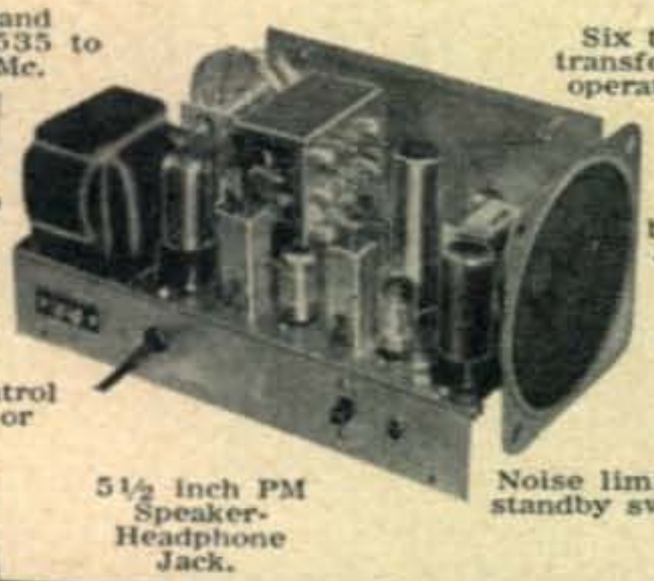
Four band operation 535 to to 35 Mc.

Six tube transformer operation.

Stable BFO oscillator circuit.

Electrical bandspread and scale.

RF gain control with AVC or MVC.



5½ inch PM Speaker-Headphone Jack.

Noise limiter—standby switch.

SPECIFICATIONS:

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

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

MODEL AR-2

$25.50

Ship. Wt. 12 lbs.

CABINET:

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

HEATH COMPANY
BENTON HARBOR 6, MICHIGAN

[from page 6]

walking down into basement with him to showing him stock of mistery toobs.

You knowing, Hon. Ed., that stranger are bying almost five-hundred mistery toobs—gracious to goodness, that are a small forshun. And to thinking that Hon. Owner are reddy to scrapping same!

He are so happy he telling me that anything I want in store are mine, up to five-hundred bux worth!! Wowiee! A free charge account. When I finish my new rig I can Working All Zones blindfolded with one arm.

How's that, Hon. Ed., you are not understanding about mistery toob? Easy. You seeing, it not a toob at all. It are speshul high-whattage projecshun lamp for using in stage liteing, and on acct. not made any more, but having many projectors still in use, lamp are worth its wate in radioactive bubble-gum.

Respectively yours,
Hashafisti Scratchi

Ham In The Industry

Rush S. Drake, W4ESK, well-known DX contest participant (and winner) has returned to the State of Washington. Rush has recently been appointed a Field Engineer for EIMAC tubes in a territory that will include Washington, Oregon and parts of Idaho and Montana.

Rush has been licensed since 1933 (as W7ESK) and is a graduate of the University of Washington in E.E. He served in the U.S. Navy during both the Korean conflict and World War II, with the rank of Commander in the U.S.N.R.

Leon A. Wortman, W2LJU, popular Ham journal and radio trade writer has been appointed sales manager of the J. C. Warren Corp., Freeport, L.I., The Warren Company is a manufacturer of specialized tape recorders which under the direction of W2LJU will greatly enlarge its field. Leon was most recently the national advertising and sales promotion manager for the RCA tape recorders and high-fi components.

In the commercial field Leon has also been associated with A-V Tape Libraries, Fairchild Recording Equipment and Audio-Video Recording Co.

MATCHMASTER

Models 650 and 651

A Dummy Load, R-F Watt Meter, SWR Bridge, All in One

Here's the instrument you asked for. And once you've tried it, you'll wonder how you ever got along without it. It provides, in one completely self-contained cabinet, 6" x 8" x 8",—

A Dummy Load—for all kinds of tests on your transmitter without putting a signal on the air. Maximum SWR 1 to 1.2 over a frequency range of 300kc to 30mc.

A Direct-Reading R-F Watt Meter—for precise adjustments of all r-f stages up to 125 watts, and even higher powers by sampling. Excellent repeat accuracy over full 125 watt scale.

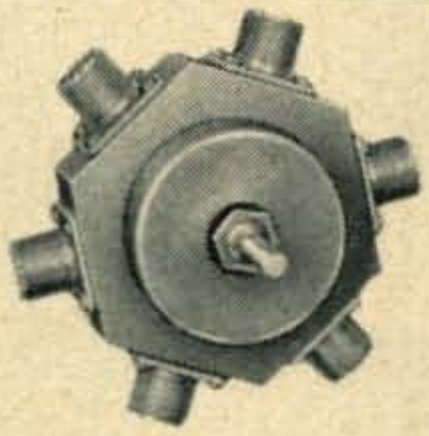
Integral SWR Bridge—for matching antennas and other loads to your transmitter, giving you precise adjustment of beam antennas, antenna tuning networks, and mobile whip antennas.

Controls — including a 3-position function switch, and a meter adjusting knob—are conveniently grouped on the attractive, silk-screen-gray front panel, which also contains a 3-inch calibrated meter, and Type SO239 input and output connections. The ventilated steel cabinet is finished in attractive blue Hammertone. Two types are available;
Model 650: 52-ohm line–Model 651: 73-ohm line
For details, write for descriptive Bulletin 650.

AUDIO PHASE SHIFT NETWORK

Type 2Q4—Model 350

This octal based, audio phase shift network provides a constant 90° phase shift, ± 1.5°, over the audio range of 300 to 3000 cycles, yet requires no more space than a 6J5 tube. Designed especially for single sideband receiving and transmitting applications.

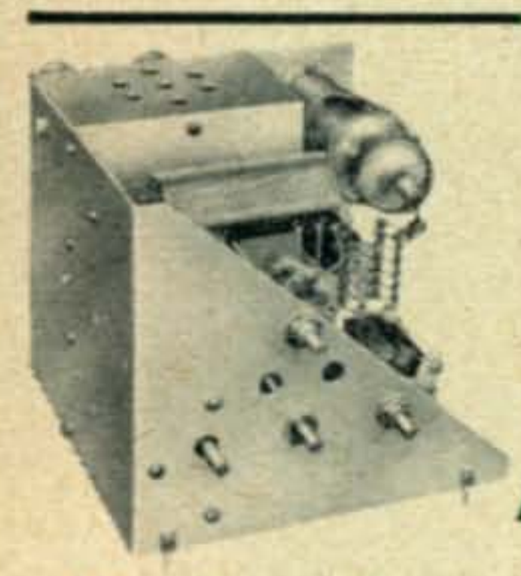


MULTI-POSITION COAXIAL SWITCH

Model 550

Takes The Mess Out of Switching Circuits

At last you can have an inexpensive, multi-position coaxial type switch—for selecting antennas . . . transmitters . . . exciters . . . receivers . . . and other r-f generating devices using 52-75 ohm coaxial line—without fumbling or breaking your back trying to screw and unscrew connections. This B&W Model 550 is equipped with six SO239 type connections for selecting any one of five 52 or 75 ohm lines. It will handle 1kw of modulated power with a maximum crosstalk of —45db at 30mc. Housed in a heavy, 4" diameter aluminum case, the Model 550 is made for single hole mounting.



MULTI-BAND FREQUENCY MULTIPLIER

Model 504C

Gives You Any Band At The Flip of a Switch

Here is a newly conceived and designed exciter unit that makes transmission on any band available at the flip of a switch. Compact in its 8" x 7" x 9½" size, the Model 504C covers the 80 through 10 meter bands with a nominal power output of 25 watts from the 807 amplifier stage through a flexible pi-network output circuit. Its broad band type amplifiers require no tuning, and the unit comes equipped with four 6AQ5's that make up its multiplier string. An external VFO or crystal oscillator (80 meter fundamental) is required, as well as a suitable power supply. Sturdily constructed of heavy gauge frosted aluminum, the Model 504C also makes an ideal basic mobile foundation unit for multi-band operation.

ON THE

PRECISION TOROIDAL TYPE SSB BANDPASS FILTER

Model 360 and 361

Here is a precision bandpass filter valuable for use in heterodyne type sideband generation. Containing eight toroidal type coils in an LC type filter, it is designed to pass the frequencies 16.9 to 20kc. Extreme skirt attenuation. Two types are available: a receiving type (Model 360) for 20,000 ohm input and output; and a universal transmitting or receiving type (Model 361), for 20,000 ohms input and an output of 20,000 ohms unbalanced, plus two 500 ohm balanced outputs. Both types are precision adjusted and housed in hermetically sealed, tinned steel cases measuring 2⅝" x 2¼" x 3¾", exclusive of mounting studs and terminals. Write for Bulletin 360.

BARKER & WILLIAMSON,

AIR WITH B&W

SINGLE SIDEBAND GENERATOR — Model 51SB

For Use With B&W Model 5100 Transmitter

Now, for the first time, you can get really sparkling performance on either SSB, AM phone, or CW. This B&W Single Sideband Generator teamed up with the famous Model 5100 Transmitter gives you outstanding SSB operation on all frequencies provided in the 5100. Tuning and operation are a breeze. No test equipment is required. Single sideband signal is generated by a simple and efficient method perfected after two years of extensive research and testing by B&W engineers. No stone has been left unturned to give you such extras as voice operated and push-to-talk controls, a speaker deactivating circuit, TVI suppression, and unitized construction for quick and easy removal of any major section. Completely self-contained, the 51SB requires no more external accessories than a microphone.

Combine this Single Sideband Generator with the features of your Model 5100—150 watts input on SSB and CW, 135 watts on AM phone; VFO or crystal operation; pi-network final—and you've got a combination that will flutter the heart of the most critical operator. The 51SB cabinet is made to bolt right onto the 5100 cabinet, extending the 22-inch length to 32 inches. Distinctive panel styling and appointments are the same for both. Easy to install, the 51SB comes factory wired and tested, complete with tubes and all necessary components to convert your Model 5100 Transmitter to SSB. This combination provides a superlative driver for *any* hi-powered linear amplifier. Write for Bulletin.

Inc. 237 Fairfield Avenue
Upper Darby, Pa.

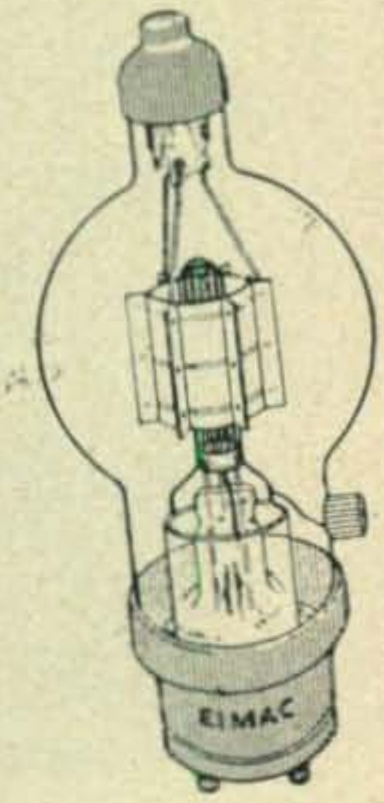
These are just a few of the hundreds of products especially designed and built by B&W to meet the needs of the radio amateur. Others are described in Catalog 2PC available upon request. Write for your copy.

AD #1: NOVEMBER 1934

EIMAC 150-T The Tube You Asked For Is Here At Last!

IN EVERY IMPORTANT FEATURE—

UNSURPASSED



HERE is a tube, new and **original** in design. It fulfills the most severe requirements of amateur practice. High output is obtained with low grid driving power and low plate voltages. Exceptionally high vacuum increases **usable** filament emission and prolongs tube life. Tantalum grid and plate construction permits maintenance of high vacuum even when overloaded. Extremely low inter-electrode capacities make for high efficiency at high frequencies. Isolated grid and plate leads, in conjunction with elimination of internal insulators, insure freedom from arc-over or breakdown. Low voltage double-V filament reduces hum, increases filament ruggedness and life and increases mutual conductance. The large NONEX envelope, free from discoloration, allows maximum heat radiation without bulky physical dimensions. Improved 50-watt base insures rigidity and freedom from short-circuiting. "Ghost" grid structure minimizes electronic shadowing effects on the plate.

Characteristics:

EIMAC-150-T Triode

Fil. Voltage 5 V.; Fil. Current 10 A.; Rated Plate. Dissipation 150 W.; Amp. Factor 13; Max. Plate Current 200 MA.

Plate Voltage	1000	2000	3000
Plate Resistance	2750	1900	1250
Mutual Conductance	5800	7300	1200
Normal Power Output (75% eff.)	150W.	300W.	450W.

PRICE $24.50. Sold Only by Reputable Dealers.

More POWER per dollar! Fewer dollars per hour of useful life! The result of six years' experience exclusively building transmitting tubes for ship, mobile, portable and amateur use. Unconditionally guaranteed to be gas-free, and against mechanical defects for two years.

"COMPARE AND REFLECT"

EITEL-McCULLOUGH, INC.

San Bruno, California, U. S. A.

The story behind this first EIMAC ad of twenty years ago

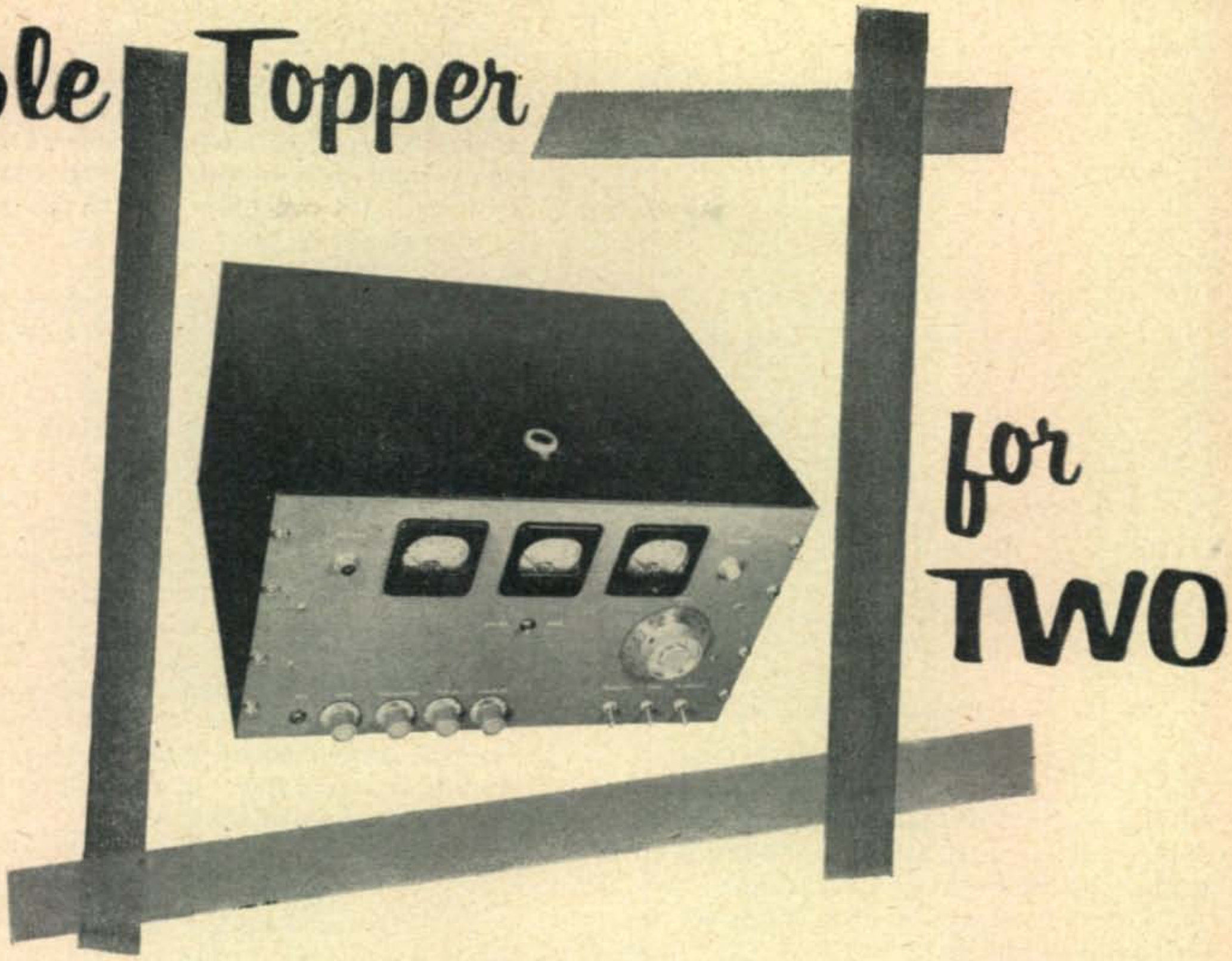
In November, 1934, the above advertisement introduced Eimac tubes to the amateur radio world. In those days, keeping a rig on-the-air wasn't easy. In fact, because it was just plain frustrating, this first Eimac ad came about. Bill Eitel, W6UF, and Jack McCullough, W6CHE, like thousands of other enthusiastic hams, were dissatisfied with the short life, lack of dependability and performance of electron-power vacuum tubes of the day. Rather than live with the problem, they decided to do something about it. In short they made a power triode without troublesome internal insulators, used metals with low gas absorbing capacities as electrodes and perfected thorough pumping techniques. The tube, designed specifically for the amateur radio operator, was called the 150T. What has happened since then has made Eimac the largest manufacturer of transmitting tubes in the world. Eimac triodes, tetrodes, pentodes and klystrons have been continuously specified for all types of commercial and military service. But the amateur radio operator has not been forgotten. Month after month since the first Eimac ad, you have been kept informed about Eimac tube developments and applications. Today, with 69 amateur radio operators in the organization, including W6UF and W6CHE, president and vice president-treasurer, respectively, Eimac illustrates the importance of the amateur to electronic progress.

Eimac

EITEL-McCULLOUGH, INC. SAN BRUNO CALIFORNIA

The World's Largest Manufacturers of Transmitting Tubes

Table Topper for TWO



Edwin T. Kephart, W2SPV

W2SPV was licensed in January 1936 with the call W3GAI. Ed has done considerable writing and photography work for CQ and allied publications. At the present time W2SPV is mainly interested in 10 and 2 meters, but has started to lean towards 75-meter SSB. Active on RTTY and mobile on all bands. Ed is past-President of the South Jersey Radio Association and is now their Recording Secretary. Works for the U.S. Government in the Aviation Medical Acceleration Laboratory, NADC, Johnsville, Pa. as an electronic scientist. Married, one son. Mailing address: 4309 Willis Ave.- Merchantville, N.J.

Many Hams now operating in the two-meter band with surplus v-h-f equipment or simple rigs have been known to become discontent with their low power—but after considering the cost of power supplies and high-level modulation equipment have elected to remain in the low power class. For high level modulation of a 100-watt carrier the modulator must produce at least 50 watts of audio and often its cost, plus the cost of a suitable modulator power supply, is equal to or more than that of the r-f section of the transmitter. The problem then is how to get into the high-power r.f. class and still remain in the low power money class.

Screen modulation [1,2,3] offers one possibility of obtaining high r-f power and side-stepping the cost of a high level modulator. Despite the poor reputation which screen-modulation systems have gained—due to careless design and operation of some transmitters—screen-grid modulation *can* produce high-quality results. No separate modulator power supply is required and the full power requirements for a modulation system of this type can usually be obtained from the r-f exciter supply.

Circuit Description

The design of the rig shown in the block diagram, *Fig. 1*, is based on the aforementioned principles. The r-f exciter section uses only three tubes in a simple, rugged and time-tested arrangement. It is basically the same as the low-power "Novice" transmitter r-f section.[4] A modified Pierce crystal oscillator 6AG7 *(V1)* uses an 8-Mc. crystal operating on its fundamental mode. The oscillator plate circuit is tuned to 24 Mc. and drives a 6AG7 *(V2)*, tripling to 72 Mc., which in turn drives a 2E26 *(V3)* as a doubler to 144 Mc. Energy from this stage is link coupled to the tuned grid circuit of the final amplifier stage, a 5894 *(V4)*. The antenna

---

1. "A System of Gating Modulation," C. O. Bishop, CQ, Oct., 1952, page 19.
2. "Some Experiments with Screen Grid Modulation," Frank C. Jones, CQ, Jan., 1952, page 13.
3. "Further Experiments with Screen Modulation," Frank C. Jones, CQ, Dec., 1952, page 17.
4. "Getting on Novice Phone," E. M. Brown and E. T. Kephart, CQ, (part I), December, 1952, p. 28; (part II) January, 1953, p. 23.

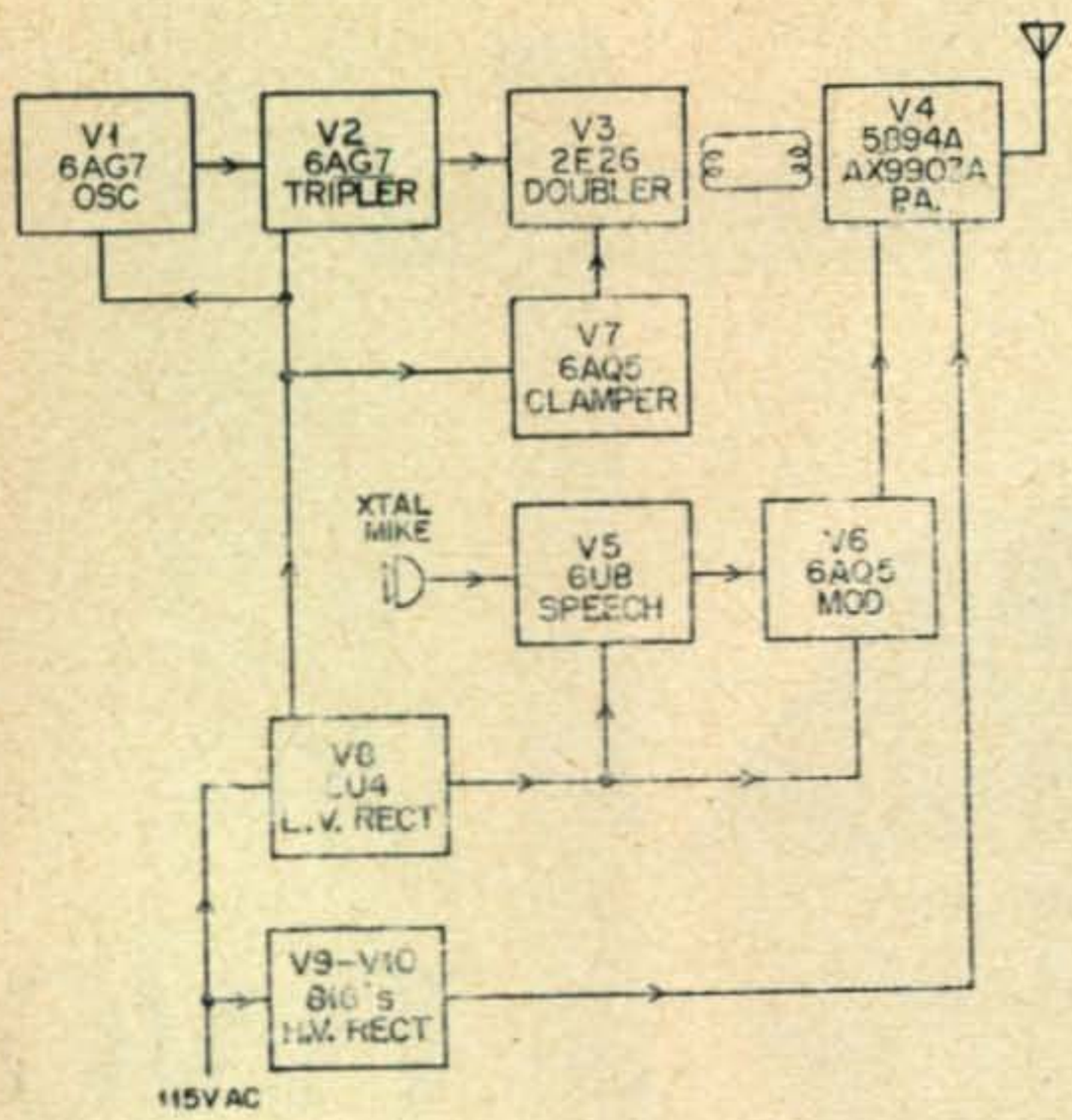


Fig. 1. Block diagram of the transmitter.

feed line is link-coupled to the final tank coil. A 6AQ5 *(V7)* is used as a clamp tube to protect the 2E26 in the event of excitation failure. The 6U8 *(V5)* is used as a speech amplifier and an a-f driver. This dual purpose tube provides adequate gain for use with a high-quality crystal or high impedance dynamic mike. A 6AQ5 *(V6)* serves as the "gating" modulator[1] for the screen of the 5894. No clamp tube was deemed necessary for the protection of the final stage.

The nature of the *gating system* of modulation is such that d.c. and audio-frequency voltages are applied to the screen grid of the stage being modulated through the 6AQ5 modulator. The operating screen-grind voltage of the 5894 is controlled by a resting carrier control. When this control is set for proper modulation characteristics, the screen voltage is low enough that the 5894 is more-or-less protected. It it true that if excitation is lost during a QSO, the screen voltage will still be applied and will vary with modulation. However, if one occasionally checks his r-f output or the grid drive to the final during a QSO it is doubtful whether a damaging failure would occur. Protection can be afforded during tune-up by controlling the screen voltage to the final by retarding the resting carrier control and holding the plate current to a safe level during the tune-up period.

Two of the newer tubes on the market have been incorporated in this rig. The 6U8 is a triode-pentode design for use as a local oscillator-mixer and other combined functions in FM and TV receivers. Its characteristics are sufficiently similar to the popular 6AU6-6C4 speech/driver combination to lead to its use as the speech amplifier and a-f driver. The compact construction and short internal leads make it easier to eliminate effects of r.f. in the speech system.

The r-f output stage uses an AX9903A/5894. One advantage of this tube is that it does not normally require neutralization at 144 Mc., if the proper precautions against stray plate-to-grid feedback are observed. Small neutralizing condensers have been incorporated in the tube during manufacture. The 829 or 3E29 series can also be used in this rig, however it will be necessary to neutralize the stage, by using criss-cross neutralizing wires, in the familiar fashion.[5,6]

One of the difficulties commonly encountered with tubes at v.h.f. involves cathode lead-inductance effects. The lead within the tube, and the external connections to ground are often long enough to make the tube unstable in its operation. This tendency can be minimized by "de-*Q*-ing" this cathode lead inductance. Instead of using a length of wire for the cathode-to-ground connection we made this connection through four 10-ohm, ½-watt carbon resistors connected in parallel. (Do not use wire wound resistors here, as these have inductance and may act as r-f chokes!)

Power Supply

Two power supplies are required. One, a low-voltage supply using a 5U4 rectifier and a brute-force filter, provides 350 volts at 120 ma. This supplies power for the exciter, speech stages, and final amplifier screen. The high-power plate supply provides 600 d-c volts at 220 ma. and uses a single-section choke-input filter and a pair of 816 rectifiers. Separate filament transformers are provided for the 816 filaments and the 5894 filament. Both plate supplies have bleeder resistors across their output for safety.

Transmitter Layout

The general arrangement and construction may be seen in the top and under chassis views of the transmitter. The whole rig, including all power supplies, is built on a 17"x13"x2" chassis. A 10½" aluminum rack panel is fitted to the front edge of the chassis by means of 11-inch side brackets. The unit may be mounted in a desk-type rack cabinet. This arrangement provides a complete and compact transmitter that may be made portable by the addition of a pair of handles.

The power supplies occupy the rear portion of the chassis and the r-f section the front. The final amplifier plate tank condenser is mounted above the chassis on ceramic stand-off pillars of sufficient height to bring the stator terminals in line with the plate terminals of the 5894. The p-a tank coil, *L7*, is mounted on the same ter-

5. "A VHF Amplifier Using the 829," **QST**, March, 1946, p. 55.
6. "144 Mc. Double Beam Tetrode Power Amplifier," **ARRL Handbook**, 23rd through 27th editions.

minals as the plate connectors. The output link, *L8,* is supported on a *National FWH* terminal strip supported from the p-a condenser frame.

The rigs *"tune/operate"* switch, *Sw2* disconnects the p-a power and the screen supply to the final stage when in the tune-up position. The *"transmit"* switch, *Sw3,* provides for front-panel switching of the transmitter during tune-up or local control. Terminals are provided on the rear edge of the chassis for a push-to-talk switch, or for remote control. Your author chooses to use a foot switch which he found to be a boon to operating during a contest or net drill. A receptacle is also provided for a remote antenna change-over relay. Three meters are incorporated in the rig to read plate and grid currents. A 0-100 ma. meter, *M1,* reads plate current to the 2E26 *(V3).* A 0-5 ma. meter, *M2,* is used to read grid current to the 2E26 and the final. A SPDT toggle switch connects the meter across *R7* (100 ohms) for reading the grid current of the 2E26 doubler; or across *R11,* which serves as a meter shunt, so the meter reads full scale when 10 ma. grid current flows in the final grid return circuit. A 0-200 ma. meter, *M3,* reads plate current to the 5894 *(V4)* at all times. Experience has shown that it is not necessary to meter the plate and grid currents of the low-power r-f stages.

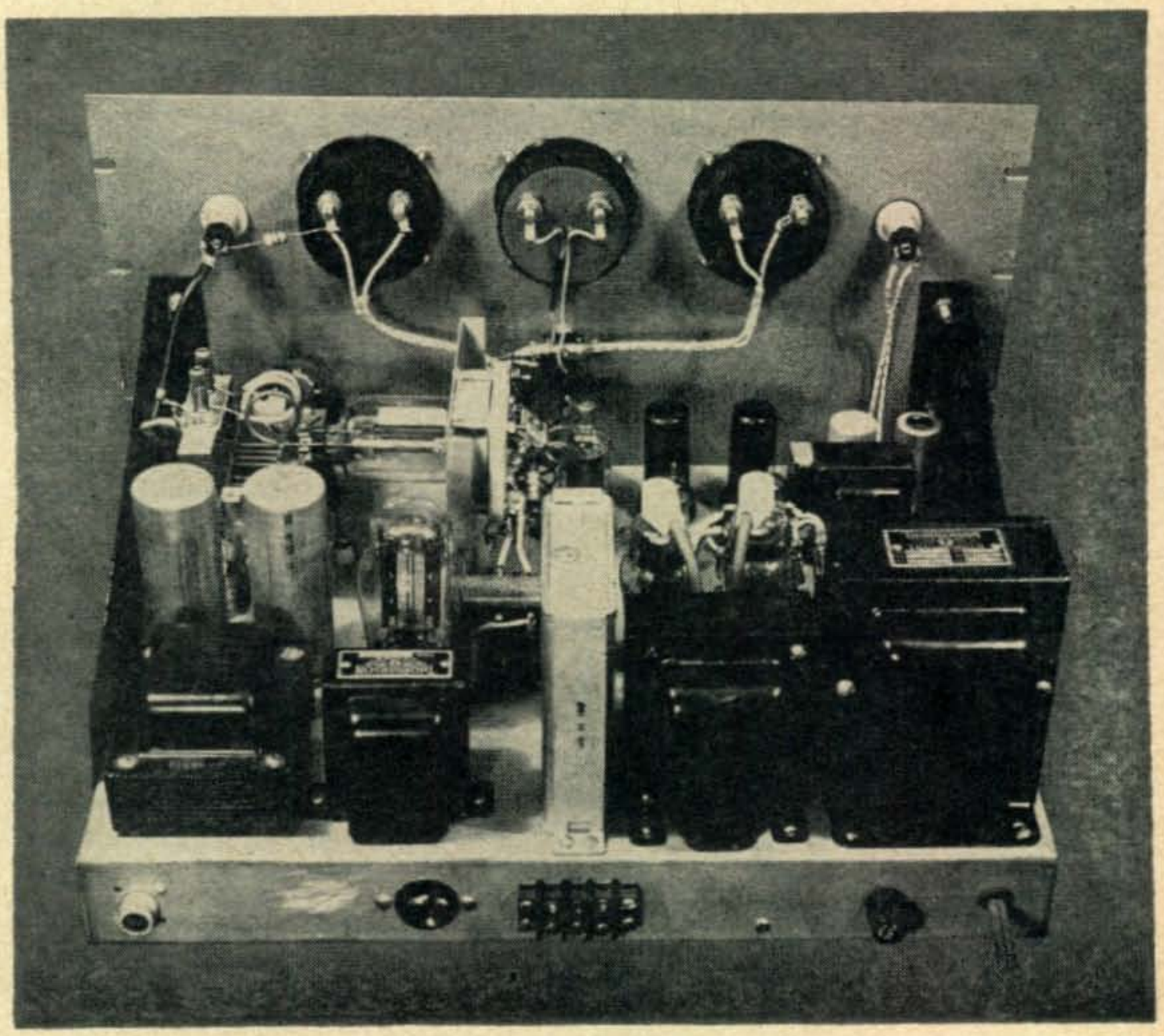
The resting carrier control is not mounted on the front panel as this control is usually set and left in that position. The front panel controls may be identified from the front panel view and only the necessary controls for operation are brought out to the front panel. Output terminals are located along the back edge of the chassis.

Construction

The construction of the transmitter is straightforward and simple. The usual precautions for intercoupling and the prevention of feedback should be observed. All leads must be as short and direct as possible. Only power, control and filament leads may be cabled. The photographs clearly show the general wiring details. It is suggested that the parts be laid out and arranged before any drilling is done. The arrangement of *V1, V2* and *V3* may be taken from the chassis drilling plan of the "Novice" transmitter,[4] as the same geometric arrangement was used for the exciter section.

The 5894 socket is mounted on a vertical tube shelf which may be formed from a piece of scrap metal in accord with *Fig. 3* or fabricated by soldering stiffners to a *Bud #CB523* chassis deck. This arrangement allows for short lead lengths in the grid and plate circuits and provides shielding between the grid and plate circuits. The p-a grid coil, *L6,* is mounted directly across the grid terminals of socket *V4* and *C4* is soldered across the coil leads. Link, *L4-L5,* is self supported and is made from a length of insulated hook-up wire. It is fitted between the turns of *L3* and *L6* and held in place with a drop of *Duco Cement,* or coil dope.

Connection is made between the plate leads of the 5894 *(V4)* and *C5* with short lengths of flexible copper lead or thin strap fitted with spring wire clips, *Birnbach cat #32A.* Choke,



General arrangement view of the transmitter as viewed from the rear. The high voltage power supply is in the right foreground and the lower voltage supply is in the left foreground. The meters, from left to right, are M3, M2 and M1.

Coil Data

L1—7 turns, 5/8" diameter, 16 turns per inch (**B&W Miniductor** #3007).
L2—7 turns, 1/2" diameter, 16 turns per inch (**B&W Miniductor** #3003).
L3—5 turns, 5/8" diameter, #12 AWG spaced 2" see text).
L4-L5—2 turn link, 5/8" diameter, insulated hook-up wire (see text).
L6—2 turns 5/8" diameter #12 AWG spaced 1" (see text).
L7—2 turns, 3/4" diameter #12 AWG spaced 1 1/2" (see text).
L8—2 turns, 3/4" diameter #16 AWG insulated with spaghetti close wound, (see text).
RFC1—7 turns, #20 AWG close wound on #28 drill (see text).

RFC3, is an *Ohmite Z50,* supported between the center tap of *L7* and an insulated feed-thru bushing mounted beneath *V4*. As mentioned previously, the p-a tank condenser *C5* is mounted on ceramic pillars and is mounted upside down on the pillars with an angle clip at each corner. This arrangement brought the stator terminals in line with the plate pins of *V4,* however, the shaft of the condenser, if brought through the front panel at this point, will not provide a symmetrical layout of the panel. The shaft was fitted with a 1-to-1 gear train which allowed for a more symmetrical panel layout. This could also have been accomplished with a pair of dial pulleys and cord.

A length of co-ax, RG59/U, feeds the r-f output from the link to the output receptacle on the rear lip of the chassis. R.f. is also fed to the r-f output indicator on the front panel thru a short length of RG59/U. The coupling to the r-f indicator system is adjusted by *C17*.

Coils

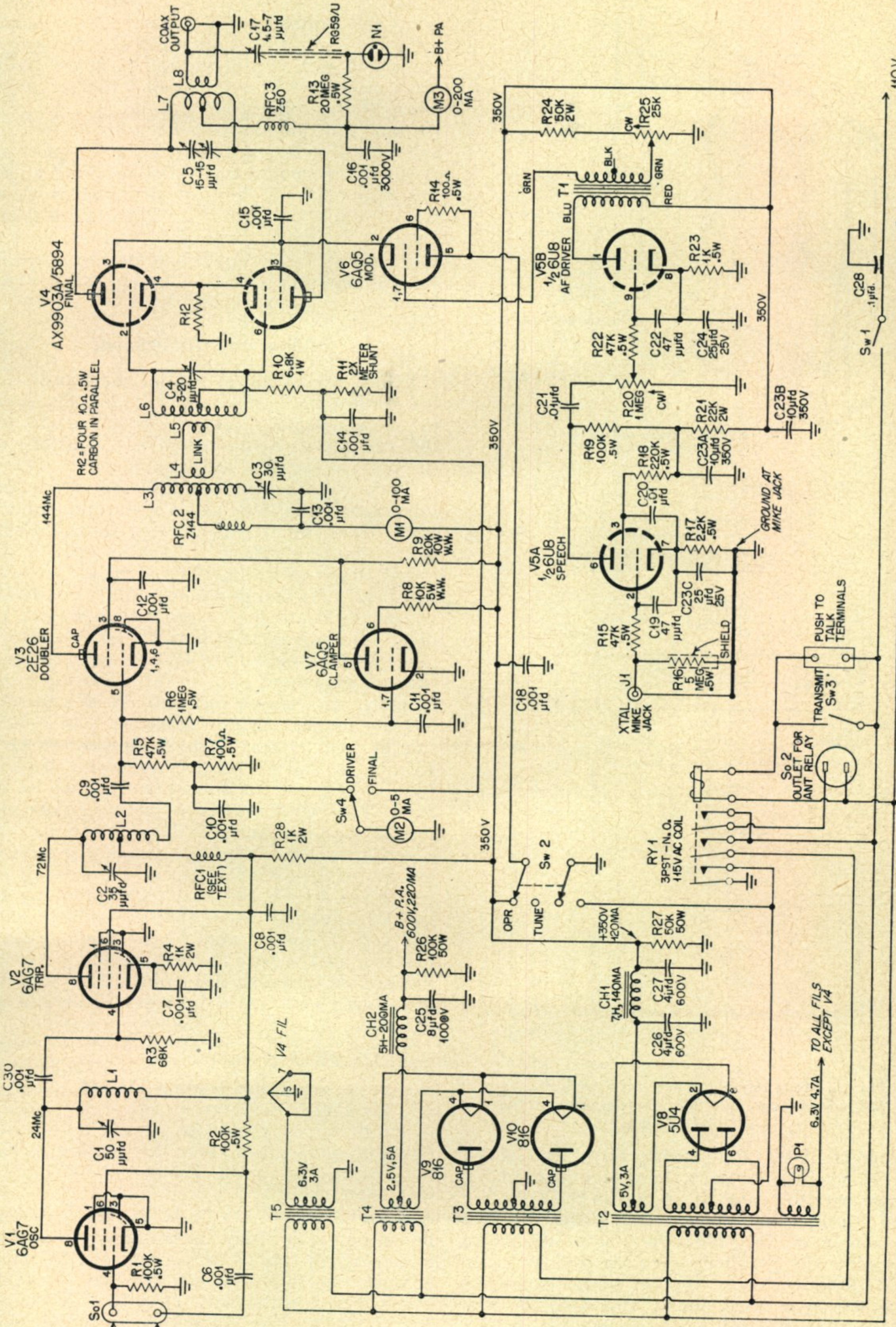
All coils for the rig are either home-made or fabricated from *B&W miniductors*. *L1* consists of 7 turns of *B&W miniductor #3007,* and is constructed as follows: Cut off 7 1/2 turns from the coil with a sharp knife or fine saw. Loosen 1/4 turn from each end and straighten out. The coil is self supporting and mounts between stator terminal of *C1* and insulated terminal strip at junction of *R2* and *R28*. *L2* consists of 7 turns of *B&W miniductor #3003* and is fabricated in the same manner as *L1*. *RFC1* must be home made, and is wound as follows: Wrap 7 turns of #20 AWG copper wire around the shank of a #28 drill, leaving one-inch at each end. Remove coil from drill. Bend one lead at right angles to coil and cut off to 3/16". Solder this end to the center turn of *L2*. Trim the other end short, tin and solder assembly in the circuit between *C2* and ceramic pillar at terminus of *C9*. The short tinned end of *RFC1* connects to *terminal 6 of socket V2*.

Coil *L3,* consists of 5 turns of #12 AWG tinned or enameled solid wire (antenna wire), 5/8" in diam. Wind the 5 turns around a wood dowel 5/8" in diam., leaving ends of coil 2" long. Bend leads at right angles to coil and stretch out coil to make it 2" long. Fit coil *L3* between plate cap of the 2E26, through a grommeted hole in the chassis, to the stator of *C3*. CAUTION —Do not apply force to plate during this "fitting"—the 2E26 glass envelope is quite fragile! *RFC2* is mounted between center turn of *L3* and an insulated tie point mounted under one of the socket mounting bolts. *L6* consists of 2 turns of #12 AWG wire wound on a 5/8" mandrel and spaced to occupy 1". Leave the leads about 1 1/2" long, to start. Bring leads out from coil to about 1/2" then turn at right angles to coil. The coil is self-supported from the grid terminals of socket *V4*. After mounting the coil trim ends. *C4,* as previously mentioned, is mounted directly across leads to coil. *R10* mounts between center turn of *L6* and an insulated tie point mounted conveniently on the vertical tube bracket supporting the 5894.

Link, *L4-L5,* is made from a length of insulated hook-up wire. Take a two-foot length of wire and form a 2-turn coil with an inside

C1—50 μμfd., air variable, **Hammarlund** HF-50.
C2—35 μμfd., air variable, **Hammarlund** HF-35.
C3—30 μμfd., air variable, double spaced, **Hammarlund** HF30X.
C4—3-30 μμfd., trimmer, **BUD** 833.
C5—15/15 μμfd., dual variable, **Cardwell** NP-15-ND.
C16—0.001 μfd., 3000-volt disc ceramic, **Erie** 3KV-102.
C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C18, C30—0.001 μfd., disc ceramic, **Erie** 811.
C17—1.5-7 μμfd., trimmer, **Erie** Ts2a-1.5.
C19, C22—47 μμfd., tubular ceramic.
C20, C21—0.01 μfd., disc ceramic.
C23a/C23b/C23c—10 μfd./350v./10 μfd./350v./25 μfd./25v., electrolytic.
C24—25 μfd., 25v., electrolytic., CD Blue Beaver.
C25—8.0 μfd., 1000v., **CD** type TJU 10080.
C26, C27—4.0 μfd., 600v., **CD** type TLA 6040.
C28, C29—0.1 μfd., 250 v.a.c., **Sprague** Hi-Pass #28P9.
Ch1—Filter choke, 7 henries, 140 ma., **Stancor** C1421.
Ch2—Filter choke, 5 henries, 200 ma., **Stancor** C1646.
M1—Milliammeter, 0-100 ma., **Simpson** model 27.
M2—Milliammeter, 0-5 ma., **Simpson** model 27.
M3—Milliammeter, 0-200 ma., **Simpson** model 27.
N1—Pilot light socket with neon lamp NE51.
R1, R2, R19—100,000 ohms, 1/2w.
R3—68,000 ohms, 1/2w.
R4, R28—1000 ohms, 2w.
R5, R15, R22—47,000 ohms, 1/2w.
R6—1.0 megohm, 1/2w.
R7, R14—100 ohms, 1/2w.
R8—10,000 ohms, 5w., wire wound.
R9—20,000 ohms, 10w., wire wound.
R10—6800 ohms, 1w.
R11—2X meter shunt to suit meter resistance.
R12—Four 10-ohm, 1/2w., resistors in parallel.
R13—20.0 megohms, 1/2w.
R16—5.0 megohm, 1/2w.
R17—2200 ohms, 1/2w.
R18—220,000 ohms, 1/2w.
R20—1.0-megohm potentiometer, **IRC** type Q.
R21—22,000 ohms, 2w.
R23—1000 ohms, 1/2w.
R24—50,000 ohms, 2w.
R25—25,000-ohm potentiometer, **IRC** type Q.
R26—100,000-ohm, 50-watt, wire wound, **IRC** type PWW.
R27—50,000-ohm, 50-watt, wire wound, **IRC** type PWW.
RFC1—See coil table.
RFC2—Ohmite Z-144.
RFC3—Ohmite Z-50.
Ry1—Relay, 3-pole, 115 v.a.c. coil, **Advance** 979B.
Sw1, Sw3—Switch, SPST.
Sw2—Switch, DPDT.
Sw4—Switch, SPDT.
T1—Audio interstage, 1:3 ratio, **Stancor** A63C.
T2—Power transformer, 360-0-360v., 120 ma., **Stancor** PM8410.
T3—Power transformer, 600-0-600v., 225 ma., **Stancor** PC8303.
T4—Filament transformer, 2.5v., 5 amp., **Stancor** P-6133.
T5—Filament transformer, 6.3v., 3 amp., **Stancor** P-5014.

Fig. 2. Wiring schematic and complete parts list of the "Table-Topper" 144-Mc. transmitter.


V4 AX9903A/5894 FINAL
V6 6AQ5 MOD.
V5B ½6U8 AF DRIVER
V5A ½6U8 SPEECH
V3 2E26 DOUBLER
V7 6AQ5 CLAMPER
V2 6AG7 TRIP.
V1 6AG7 OSC
V8 5U4
V9 816
V10 816
COAX OUTPUT
L8
L7
L6
L5 LINK
L4
L3
L2
L1
C17 4.5-7 µµfd
RG59/U
N1
B+ PA
M3 0-200 MA
RFC3 Z50
R13 20MEG .5W
C16 .001 µfd 3000V
C5 15-15 µµfd
C15 .001 µfd
R14 100Ω .5W
R12 = FOUR 10Ω .5W CARBON IN PARALLEL
R10 6.8K 1W
R11 2X METER SHUNT
C4 3-20 µµfd
C14 .001 µfd
C3 30 µµfd
C13 .001 µfd
RFC2 2144
M1 0-100 MA
144Mc
72Mc
24Mc
R9 20K 10W W.W.
R8 10K 5W W.W.
C12 .001 µfd
C11 .001 µfd
C18 .001 µfd
R6 1MEG .5W
R5 47K .5W
R7 100Ω .5W
C9 .001 µfd
C10 .001 µfd
R28 1K 2W
RFC1 (SEE TEXT)
C2 35 µµfd
C8 .001 µfd
R4 1K 2W
C7 .001 µfd
R3 68K
C30 .001 µfd
C1 50 µµfd
R2 100K .5W
R1 100K .5W
C6 .001 µfd
So1
8Mc XTAL
Sw4
DRIVER
FINAL
M2 0-5 MA
350V
R24 50K 2W
R25 25K
CW
BLK
GRN
RED
BLU
T1
R23 1K .5W
R22 47K .5W
C22 47 µµfd
C24 25µfd 25V
C21 .01µfd
R20 1 MEG
CW
R21 22K 2W
C23B 10µfd 350V
R19 100K .5W
R18 220K .5W
C23A 10µfd 350V
C20 .01 µfd
R17 2.2K .5W
GROUND AT MIKE JACK
C23C 25 µfd 25V
R15 47K .5W
C19 47 µµfd
SHIELD
R16 5 MEG .5W
J1
XTAL MIKE JACK
OPR
TUNE
Sw 2
+350V 120MA
R27 50K 50W
B+ P.A. 600V, 220MA
R26 100K 50W
CH2 5H-200MA
C25 8µfd 1000V
CH1 7H, 140MA
C27 4µfd 600V
C26 4µfd 600V
TO ALL FILS EXCEPT V4
V4 FIL
110 V
FUSE
C28 .1µfd.
C29 .1µfd.
Sw 1
PUSH TO TALK TERMINALS
TRANSMIT Sw 3
So 2 OUTLET FOR ANT RELAY
RY 1 3PST-N.O. 115V AC COIL
GROUND AT MIKE JACK
6.3V 4.7A
P1
T5 6.3V 3A
T4 2.5V, 5A
T3
T2 5V, 3A
CAP
1,4,6
1,7
R12 = FOUR 10Ω .5W CARBON IN PARALLEL

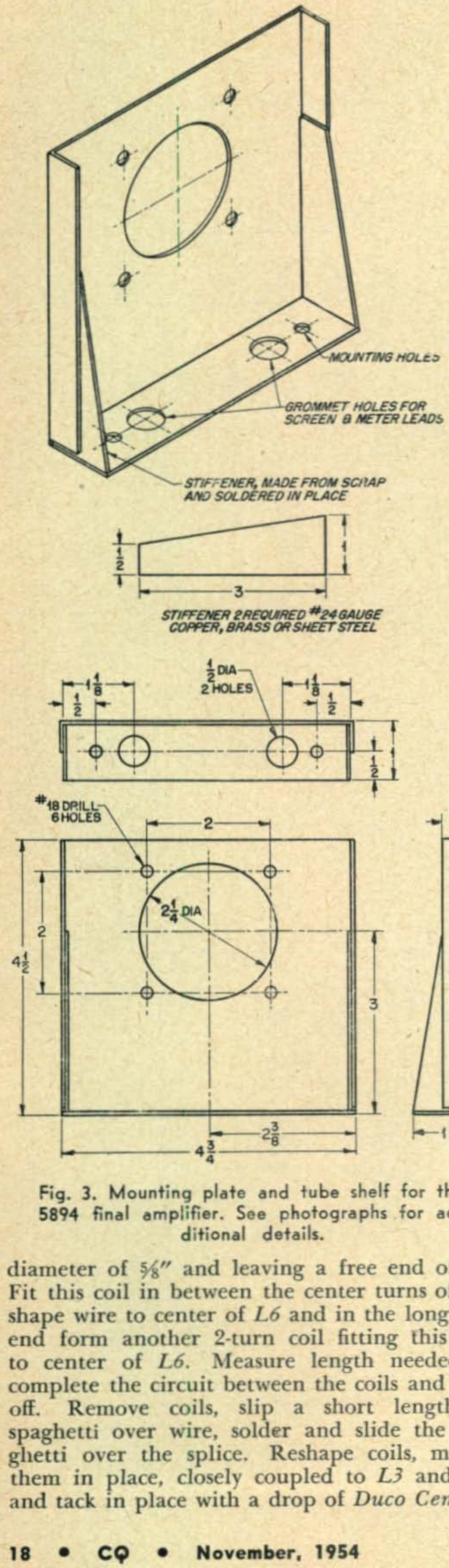


Fig. 3. Mounting plate and tube shelf for the 5894 final amplifier. See photographs for additional details.

diameter of 5/8" and leaving a free end of 3". Fit this coil in between the center turns of *L3*, shape wire to center of *L6* and in the long free end form another 2-turn coil fitting this coil to center of *L6*. Measure length needed to complete the circuit between the coils and snip off. Remove coils, slip a short length of spaghetti over wire, solder and slide the spaghetti over the splice. Reshape coils, mount them in place, closely coupled to *L3* and *L6*, and tack in place with a drop of *Duco Cement*.

The p-a tank coil *L7* is also wound from *#12* wire and consists of 2 turns, 3/4" in diam. stretched out to a space of 1 1/2". An eye is formed in each end of the coil to fit the stator bolts on *C5*. *RFC3* is soldered to the center point of the coil before installing on the condenser. The antenna coil, *L8*, must be well insulated, by sliding spaghetti over the piece of #16 wire from which the coil is wound. This self-supported coil consists of 2 turns close-wound on a 3/4" mandrel. This coil is fitted between the center turns of *L7* and mounted in the *"output"* binding posts as may be noted in the photograph. This coil may be adjusted by bending the coil on its own leads.

Tuning and Adjustment

Before attempting to try out the transmitter for the first time, it is suggested that all wiring be checked against the schematic, and to see that no free wire ends are shorting-out any of the tube socket pins or components.

Turn on the Power switch and allow the tube filaments to come up to operating temperature. Turn the resting carrier control *(R25)* fully *counter-clockwise*. Plug in the 8-Mc. crystal (8.000 to 8.222). Throw *"tune/operate"* switch to TUNE and grid meter switch to DRIVER. A current reading of about 5 ma. should be noted on meter *M1*. Rotate *C1* and near mid-range there should be a kick in grid current; tune for maximum. Rotate *C2*. Near the minimum capacity setting there should be a further increase in grid current, along with an indication of plate current to the 2E26 (read on *M1*). Re-tune *C1* and *C2* for maximum grid drive to *V3*. This should be in the vicinity of 1.5 to 2 ma. Tune *C3* to resonance bringing plate current to minimum on *M1*. If one cannot get at least 1.5 ma. grid drive, try squeezing or stretching the turns of *RFC1* slightly. Try moving the center tap a little each way. Try swapping *V1* and *V2* and check to see that the cathode leads and grounds of *V1* and *V2* are not too long. It might also be wise to check the frequency of the exciter stages at this point. This may be done either with a grid-dip meter or an absorption wave meter.

Throw the grid meter switch *S4* to the FINAL position and tune *C4* with an insulated screwdriver for maximum reading on *M2*. Re-peak *C3*. It might be necessary to adjust the position of the links with respect to *L3* and *L6* to bring the reading to maximum. Maximum grid current should be in the vicinity of 10 ma. (or full scale).

Before attempting to tune the final, it must be loaded with either an antenna or dummy load. Tightly couple *L8* to the final plate tank. Return the *"tune/operate"* to the OPERATE position and throw the TRANSMIT switch on. Rotate *C5* and tune for maximum purple glow in the neon output indicator *N1*. Keep increasing the coupling of *L8* to *L7* until no further

increase in brilliance in the output indicator can be noted. Adjust *C17* until the lamp has just sufficient glow to indicate output. In this way the lamp will reach its maximum brilliance on modulation peaks.

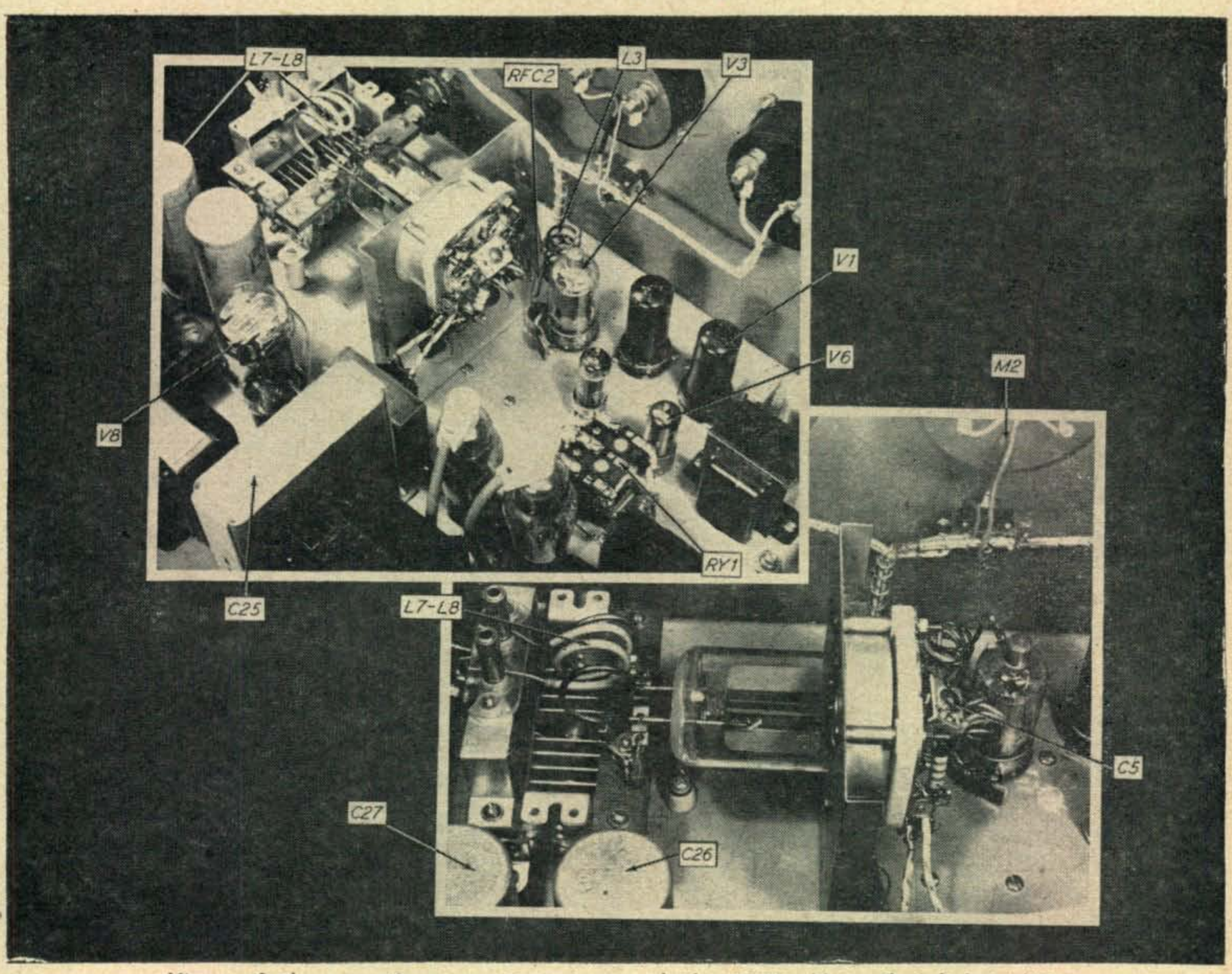
The resting carrier control *(R25)* may now be advanced to increase the resting carrier to about 90 ma., an increase in the brilliance of the output indicator should also be noted. The p-a plate current should kick up to about 120 ma. on loud voice peaks with full modulation. The audio gain control *(R20)* should be advanced to a point where there is an increasing swing in final plate current of about 10 to 15 ma. with normal speech. A better check may be made by listening to the signal on a monitor or a grid dipper, or by using an oscilloscope to adjust for best modulation waveform.

Conclusion

As one might observe in comparing the photographs and the parts lists, some of the components used in our model are not identical with those called for. The final plate transformer *T3* and the audio interstage transformer *T1* are pre-war units. Your author had them on hand and, as long as they matched the modern counterparts, made use of them. The parts list specifies parts found currently on the radio parts distributors shelves. Quite a bit of freedom in the choice of the transformers may be exercised, however, one must remain within the general specifications.

About TVI. This rig has been in operation for the past year without any complaints from TV viewers in the neighborhood. A *Sylvania* 12" continuous tuning TV receiver is used in the shack as a monitor. No outside antenna is used as the built-in antenna gives sufficient pick-up to monitor the three local channels. An *Olympic* 19" receiver, with an outdoor antenna, is used by the XYL. No TVI is experienced in either receiver. A bottom cover, not shown in the photographs is installed on the chassis before the unit is installed in the cabinet.

This rig is capable of generating about 25-watts of useful carrier power *output*. The modulation is 100% on both positive and negative peaks with surprisingly high quality and negligible splatter. Although this may seem like a modest claim on power output, it represents a big gain over the output of most commercially-available two-meter jobs, and the popular surplus rigs.



Views of the mounting arrangement around the 5894. Note that link L4/L5 has been removed in one photo to show detail of the final grid coil L6. All grid and cathode components are grouped around the socket base.

Amperex® Tubes DELIVER MORE POWER...LONGER LIFE... MORE FOR YOUR MONEY

Amperex JAN-type 5894

Special Features that make this tube the OUTSTANDING SELECTION IN ITS CLASS

- Lower battery drain.
- High power gain.
- No external neutralization necessary.
- Zirconium coated molybdenum anodes for high overload capacity and lifetime gettering action.

The 5894 is a UHF and VHF twin tetrode for wide-band operation, RF amplifier, modulator, frequency multiplier service and wide-band oscilloscopes. Considerably reduced capacities provide higher resonant frequencies. Single cathode and screen grid construction results in low RF degeneration, therefore low drive required. Self-neutralized over entire band. Only 4" x $1\frac{3}{16}$". This tube has proved to be outstanding with 5 years of actual mobile operation.

NEW ICAS RATING

PLATE VOLTAGE.....750 vol
ANODE DISSIPATION.....45 wat
HALF FILAMENT BATTERY DRA
ON "STANDBY"

ACTUAL MEASURED POWER OUTPUT

PUSH-PULL OPERATION

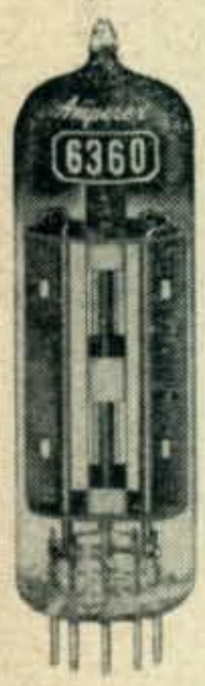
144 Mc.....85 wat
220 Mc.....85 wat
420 Mc.....60 wat

Amperex type 6155—Tetrode

Replaces old type 4-125A. Features heavy, zirconium coated graphite anode for high overload capacity. Powdered glass stem for strength eliminates external "heat-trap" base.

Amperex type 6156—Tetrode

Replaces old type 4-250A. Same features as 6155. Proven outstanding in high frequency communication and amateur service.



Amperex type 6360—Twin Tetrode

High Power At Low Cost! A small, low-cost, efficient twin tetrode, (only 3" x $\frac{7}{8}$"). Highly efficient for operation at up to 200 Mc. Excellent frequency multiplier for 2 meter and 220 Mc bands.

Amperex type 866AX—Rectifier

Rigidly controlled mercury pressure insures a more rugged, more stable, more efficient tube with longer operating life.

Available From Your Local Radio Parts Distributor

AMPEREX ELECTRONIC CORP.
230 Duffy Avenue, Hicksville, Long Island, N. Y.
In Canada: Rogers Majestic Electronics Ltd.
11-19 Brentcliffe Road, Leaside (Toronto 17)

AMPER

In the September issue this article plunged fearlessly into the home construction of a keyboard for teletype and CW transmission. The author described how it could be done using the junked remains of an old typewriter. The second part, printed herein, describes the coding matrix and pulse storage system.

the "Junkeyboard"

John E. Williams, W2BFD*

38-06 61st Street, Woodside 77, N.Y.

Part II of a Two Part Story

As the teleprinter code calls for various combinations of "marking" and "spacing" of the five character selecting pulses, the first approach to a sending keyboard might close from one to five contacts, in addition to the universal contact. With this arrangement the failure of any one contact would cause a misprint, whereas with a single contact arrangement nothing would be printed. An early form of a "printing telegraph" eased this problem by permitting each of the 32 keys, through a single contact, to operate a relay with multiple contacts. The contact problem was still there but the relays were less apt to have trouble and were much easier to clean. The present-day teletype keyboards use notched metal code-bars to translate the code. This system could be used by amateurs with machining ability but it does represent a more difficult solution to the problem than the matrix system.

The rectifier matrix is an old idea and has been used in many computing machines. Neon bulbs may be employed for the same purpose. Considering that there are 80 selecting elements needed for the RTTY keyboard it is obvious that costs would run high if 1N34's or neon bulbs were used, not to mention the problems of mounting and the space involved.

The one rectifier that is usually available around any Ham shack is the small selenium rectifier used in AC/DC broadcast and TV sets. From each disc of such a rectifier many rectifying units can be made. It is quite possible to make up to 30 rectifier cells on a single 1" diameter selenium plate. Of course they will have a common anode and individual cathodes. One surprising discovery was that each segment could handle quite a bit more power than its proportional size would indicate. In one test a disc, removed from a 100-ma. selenium rectifier, was divided into 16 segments. For the same temperature rise permitted the entire disc at 100 ma., the single element could handle 40 ma.! A single segment of this disc was loaded to 60 ma. and left running continuously for two months with no resultant measurable deterioration to the disc. Selenium rectifiers are noted for the fact that they will handle almost any current if the temperature rise can be kept within limits. The power handling capacity of the small segments then would appear to be a result of the entire area of the plate being available for radiation of the generated heat.

Since this process of segmenting the selenium plates brings the cost per rectifier down to less than one cent per element it is a natural for the keyboard matrix. In normal typing, using a matrix rectifier of this type, there is never more than one segment of a disc used at one

* The biography of the author appeared with the first part of this story.

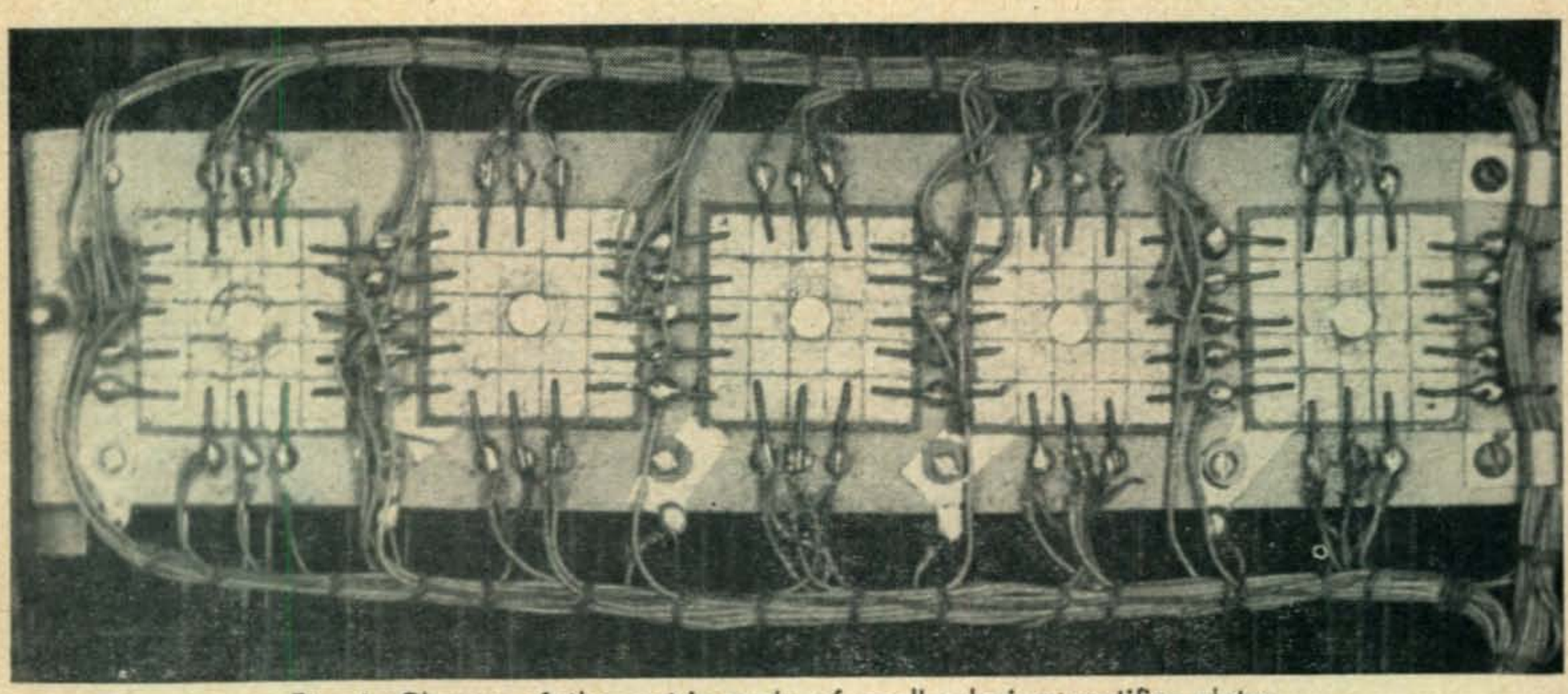


Fig. 1. Closeup of the matrix made of small selenium rectifier plates.

time. Current flows through the selected segments for not more than about twenty milliseconds during each 163 millisecond character. Theoretically, the 40-ma. segments should be able to handle about 400 ma. pulsed. Once built, the matrix should be permanent and trouble free.

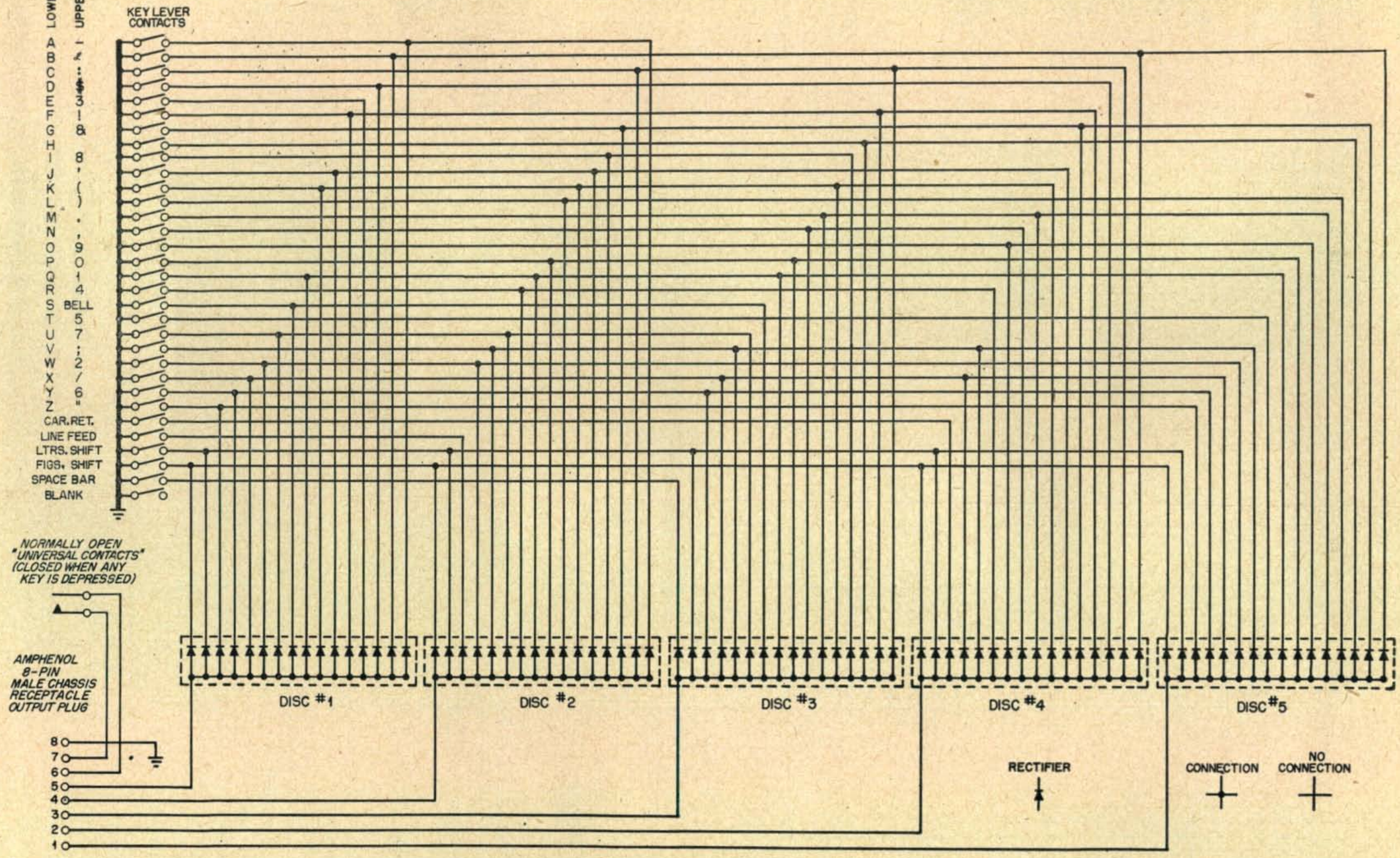
Fabricating the Matrix

The encoding matrix for the keyboard was constructed from a single six plate 250-ma. "Seletron" TV selenium rectifier. Although paint may be removed from the rectifier by dropping the plates in lacquer thinner, it is better to try to locate one not completely coated with paint. The hollow rivet which holds the assembly together can be removed by filing one end until the discs can be carefully slipped apart. Take special care of the silvery rectifier surface during these operations. The surface of each plate should be marked with four horizontal and four vertical pencil lines dividing the area into 25 squares approximately ¼-inch on each side. Lay the plate on a flat surface and, using a machinist's scribe, or awl, and a steel rule laid along the lines, scribe heavy enough to go through the selenium coating into the backing metal (steel or aluminum) but not heavy enough to raise burrs in the backing metal. The scribe should be drawn from edge to edge in a single motion, starting and finishing outside the rectifying film. When all of the lines have been scribed you will have a plate containing 24 rectifier squares (the center hole makes one square unusable), each of which must be electrically insulated from its neighbors. An ohmmeter using a 1-ma. meter and a 3-volt battery will probably show from 50,000 ohms to 200,000 ohms in the non-conducting direction between each cell and the backing plate. In the conducting direction it may be from a few hundred ohms to around 2000 ohms. At the 12-volt potential level supplied to the matrix in use the forward resistance is very much under 100 ohms.

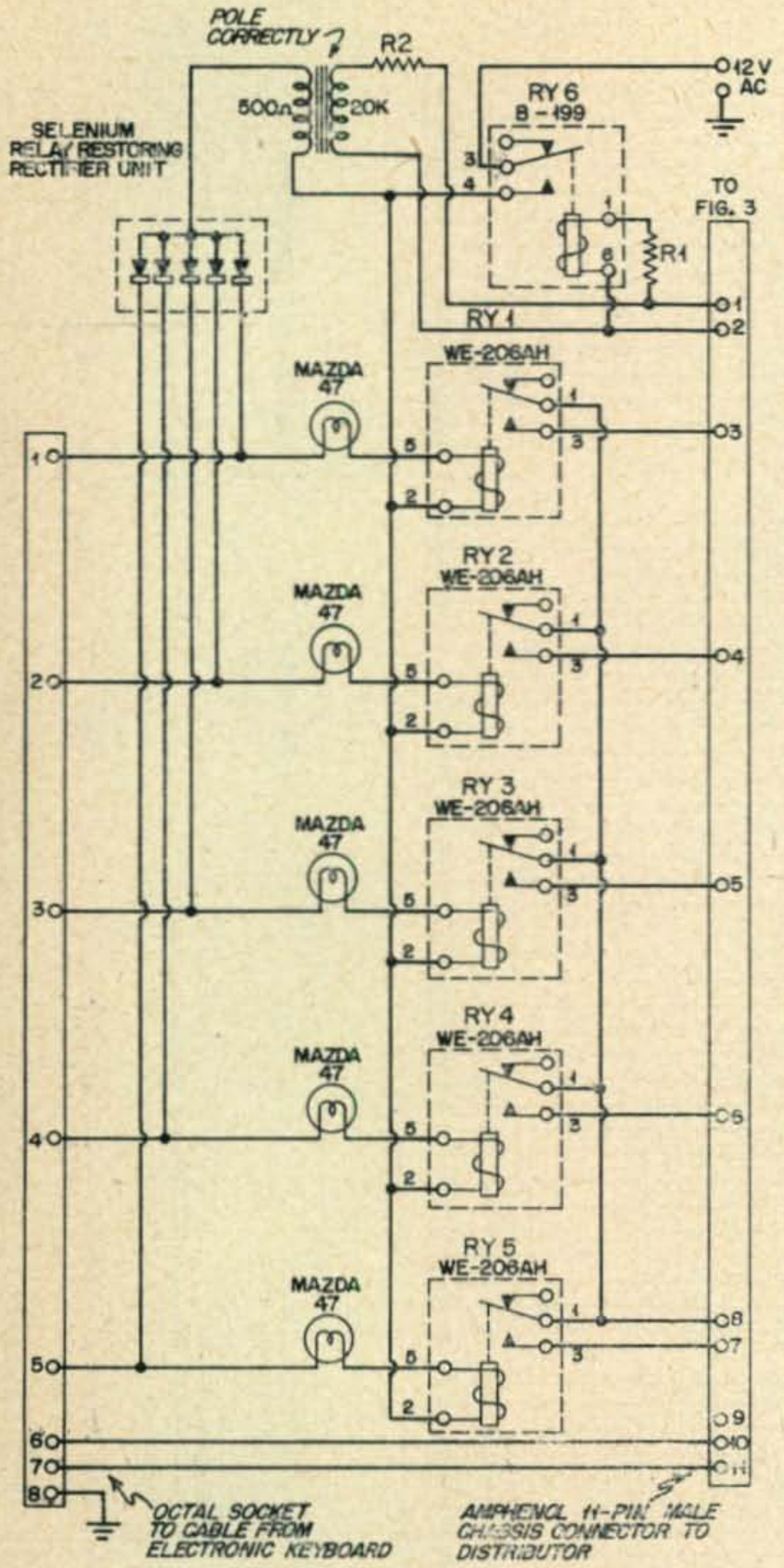
If two squares indicate that they are shorted together (probably by burrs) they may frequently be corrected by scribing again very carefully in the same groove. If you still have some trouble with shorts you can use the W2BFD "infallable" method of sending a brief pulse of 12 volts a.c. through the two rectifiers with NO LIMITING RESISTANCE in series. There will be a short crackle and a blue flash as the short disappears. This trick seems to work regardless of whether the short is from element-to-element or from element-to-backing-plate. A word of caution: *Do not* start the current flow by striking a wire against the segment as this will burn the coating. Establish the contact first and then momentarily switch on the current.

Five of the plates thus prepared are then laid on a piece of thin insulation face up with their centers about 1 7/8" apart. The insulation strip was cut to 10½"x2½"x⅛" so that it would just fit the width of the typewriter base underneath the center of the keylevers. Alongside each of the 16 outer rectifier elements (of the 24 available) of each plate a hole is drilled to fit a small screw (*4-40* x ⅜" long round-head cadmium-plated) which will support the contact finger to conduct the current to the external circuit. The contact is formed from a ½-inch long piece of spring-brass wire of .043" diameter (not critical) which is soldered into the slot in the screw-head. The wire should be bent at about 45° downward so that when the screw is installed in the insulation strip it will force the wire to make a good contact with the segment of the plate. The connecting wire for each contact should be soldered to the screw-head before mounting on the insulation so that the contact won't loosen. Sharp points should be removed from the brass wire contacts by the use of emery cloth.

A close look at *Fig. 1* will show you that the five contacts between each of the sets of plates carries double-end contact fingers made from 1"



The inter-connections of the matrix look pretty complex but they are really quite straightforward and simple to connect when doing the job.



This impulse storage circuit holds the teletype code so that you merely touch each key to send a letter.

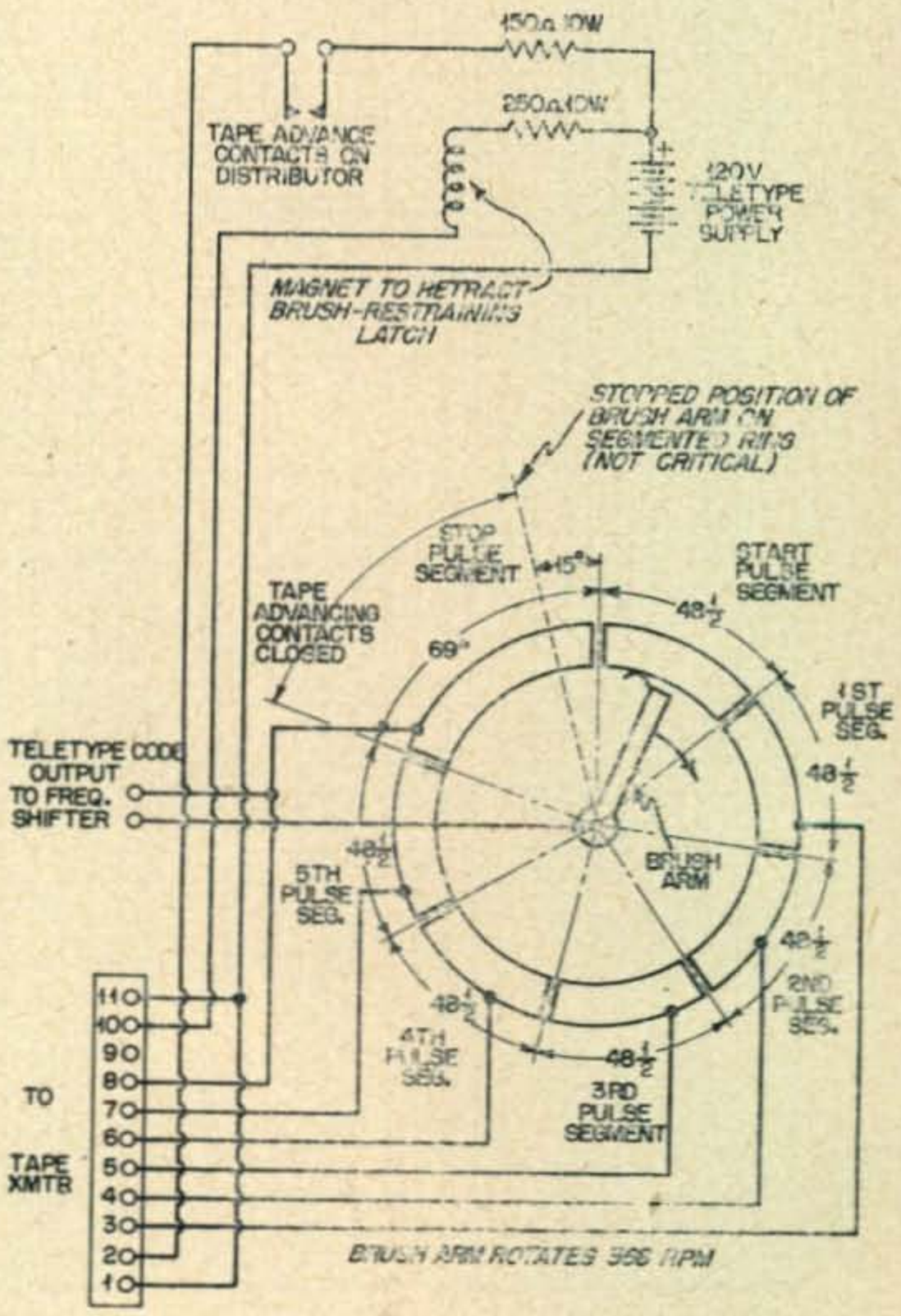
long pieces of brass wire. This is a space-saving feature used in order to get the whole matrix beneath the keyboard. These common contacts must then be assigned to certain letters calling for the proper pulses. Connection is made to the backing of the plates by means of a strip of tinfoil projecting under one corner of each plate (the back of the plate should be sanded clean) and brought out to an additional screw with a washer to afford a large area of contact. Since the 16 contact fingers hold the plates firmly against the insulation it is not necessary to use any center bolts to hold them. The matrix should be mounted high enough so that it clears the operating table with enough room for a masonite cover over it to protect it from injury. A sketch of the connections to the matrix and screw contacts can be made and pasted to this cover. Indication should be made on it of the connections assigned to each character.

The simplest way to wire the matrix is to run separate wires from each of the segment contacts (65 wires in all to the keylever contact screws. This keeps congestion at the segment contacts at a minimum.

An 8-pin *Amphenol* male chassis connector should be mounted on the left rear lip of the keyboard casting. The connections to the backing plates of the matrices should go to *pins 1, 2, 3, 4* and *5*, respectively. *Pin 8* should be grounded and also connected to a grounding pigtail on the keylever pivots which are all soldered to a grounding wire to assure good contact. *Pins 6* and *7* connect to the universal contacts which may be mounted in any suitable fashion on the left sidewall of the keyboard. Both sides of the universal-contacts should be insulated from ground. Of course one more matrix plate could have been used in place of the universal-contact arrangement but this seemed a bit more complex.

Storage of Impulses

A few thousandths of a second after depressing a key, a coded output is available from the matrix. This output consists of "current" or "no current" according to the combination re-



Wiring diagram of a typical tape distributor such as those used with the "Junkeyboard." These units are fairly inexpensive and are in good supply.

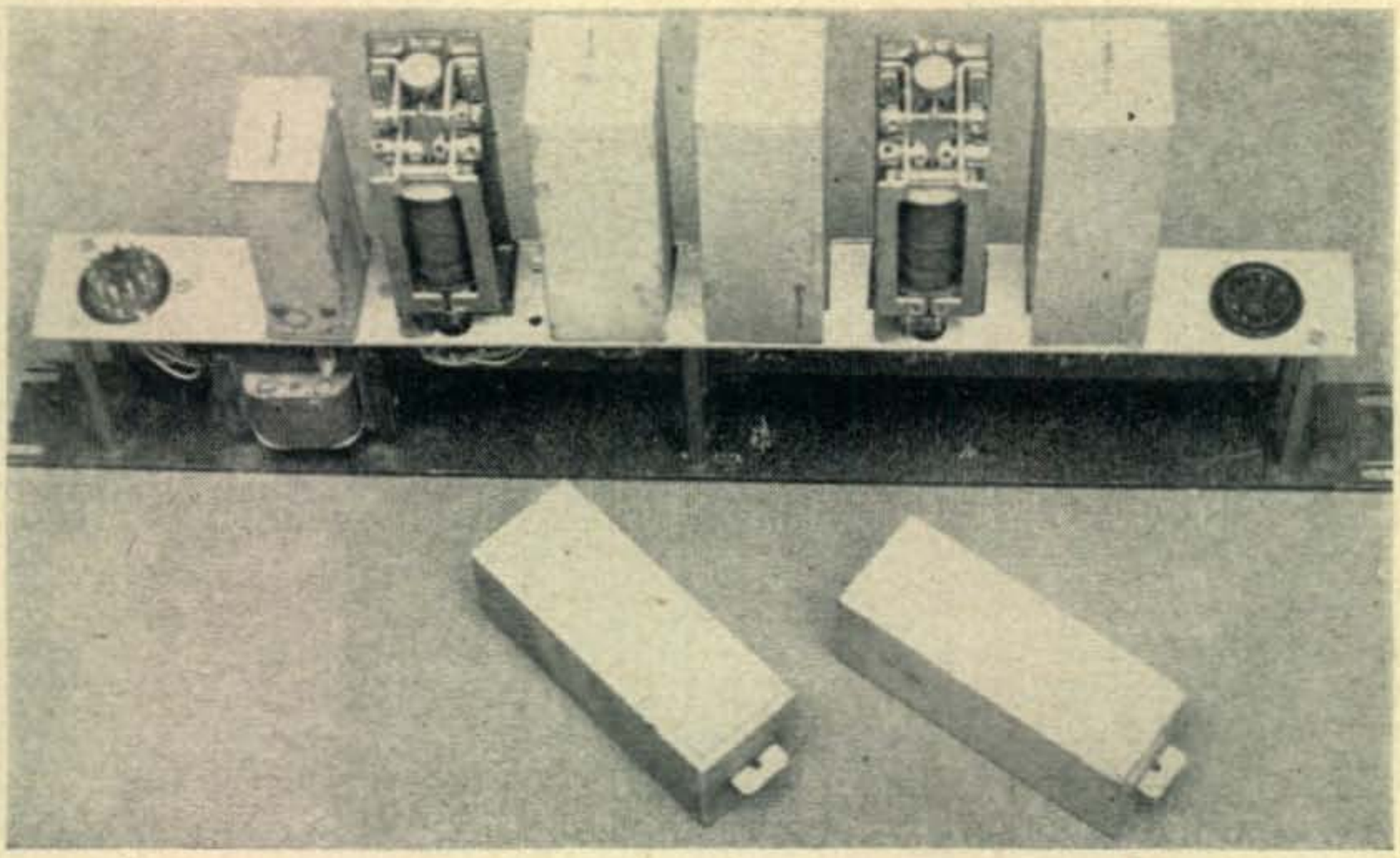


Fig. 2. Pulse holding relay rack with five inexpensive polar relays and one telephone type relay.

quired for that particular letter. The five-unit code permits a maximum of 64 teletype selections, 32 in lower case and 32 in upper case (two to the fifth power is 32). Transmission by wire or by radio requires that these five pulses, to which "start" and "stop" pulses have been added, follow one another and not occur all at one time. This means that some sort of storage method must be used. This can be done with condensers, relays or vacuum tubes, but the use of five relays seems to be the simplest and cheapest method. Plain telephone type relays may be used with additional locking windings or locking contacts. A simpler system is to use five of the inexpensive polarized relays now available to the amateurs for $1.50.* These relays can be adjusted so that a pulse of current through the winding will position the armature against the *marking* or *spacing* contact (depending upon the direction of the current flow) and it will lay against this contact even though the current ceases until a pulse of current in the opposite direction moves it to the other contact. Polar relays are also known for their speed of action, making the choice even easier. This same relay assembly is actually needed for certain types of teletypewriter tape transmitters and need only be switched to the electronic keyboard when manual transmission is desired. The same relays will thus serve two functions.

As the matrices are, by nature, rectifying devices, there is no need for a DC supply. A common 12.6-volt filament transformer *(Merit P-2959)* furnishes the exciting current for the entire keyboard.

Keyboard Lockout

With no provision for "lockout," errors will occur in the transmitted signal if a second key is depressed while the code from the previous letter is still being sent. As the matrix output current only moves the relays to their *marking* contacts, to be restored after the code has been transmitted to their spacing contacts, pressing a key, let us say, for "A" which requires *relays 1* and *2* to move to "mark," followed by "N" which calls for *relays 3* and *4*, the letter actually transmitted would be "K" which calls for marking on *relays 1, 2, 3* and *4* (provided the second key was pressed soon enough). Lockout is very easily accomplished by removing the matrix voltage as soon as the relays have been positioned by the first key and not restored until the full character has been transmitted. This is accomplished by means of the telephone-type (B-199) relay (*Ry-6*) which is arranged to operate as soon as the distributor begins its cycle. The contacts of this relay interrupt the 12-volt transformer supply. The polar relays will operate in less than one-thousandth of a second and have about twenty times that interval to position themselves.

Storage Relay Restoration

The storage relays are moved to a marking condition by the keyboard and some method of returning the relays to a spacing condition at the end of the cycle must be built in. Restoration is obtained by passing a d-c pulse from the distributor (at the end of its cycle) through an audio transformer primary. The transformer differentiates the d-c square-wave passing through the primary and provides two pulses of opposite polarity from the secondary. One pulse, coinciding with the leading edge of the square-wave, is passed through another divided plate rectifier containing five segments and thence to the polar relay coils. The polarity of the transformer must be correct or else it will be the trailing edge of the square-wave which

[*Continued on page 56*]

* Available from the V.H.F. Teletype Society c/o of the author.

DX and Overseas News

gathered and reported by
R. C. "DICK" SPENCELEY, KV4AA
Box 403, St. Thomas, Virgin Islands

CORSICA, F8FW/FC: Pierre, HB9LA, and Etienne, HE9RDX (DX Editor "OLD MAN"), put this relatively rare spot on the air between July 31 and August 11. A very creditable job was done in the face of frequent breakdowns, low voltage and voltage failures. A total of 2411 contacts were made in 70 countries on all bands from 3.5 21 Mc. F8FW/FC went on the air at 0044 GMT, 7 Mc., July 31. First QSO's were with SM7ANB, VE1EK, SM7CAB, SM5WM and G8DR. At this point the first of a series of breakdowns occurred and after two hours of trouble-shooting operation was resumed with W2TWC, W2FXN, K2EQD, W3SWV and W3AXT being next in line. 103 contacts were made on 3.5, 522 on 7, 1654 on 14 and 132 on 21 Mc. First W's on each band were as follows: 3.5—K2BZT, 7—W2TWC, 14—W3JNN. "Firsts" in each W district were: W1ZL, W2TWC, W3SWV, W4CDC, W5GND, W6VUP, W7BMK, W8PQQ, W9TKV and WØGKL. The transmitter at F8FW/FC, thoroughly shaken up by the rough ride during the 100 mile trip from Ajaccio to Bonifacio, ran 200 watts to an 813 modulated by PP 807's. The receiver was a 22-tube, double-conversion, super-het. The antenna was a 360-foot longwire 100 feet high. The valuable assistance and kind hospitality of Raoul, F9QV/FC, and his XYL did much to make this expedition a success. F9QV/FC is now on the air with a new rig running a pair of 807's but his radio maintenance work obliges him to travel around the island much of the time thus limiting his operating time. The plans of F8FW/FC to spend the last four days in Monaco as 3A2LA were cancelled in view of transportation difficulties. The 3A2 trip may take place next year. (*The island of Corsica, being a "Department" of France, has no separate prefix altho the suffix /FC is generally used by stations there. Efforts are presently being made to make "FC" official for this spot.)*

TOKELAU, ZM7AL: (Via W6QHS) Ernie, ZM6AL, advised that he had visited this spot for a week to ten day stay, September 14 to 24, and planned to be active on 7020 and 7081 kc. with a 10-watt transmitter which is presently in operation on that island. We hope that this operation has gladdened the hearts of many who missed out during the somewhat erratic operations of VR2BZ/ZM7.

ALBANIA, ZA1KAD: This station was heard on Sept. 15, 2000/2230 GMT, 14080 kc., giving his name as "Nako" and QTH as Tirana (Box 69). QSO's of thirty minutes duration each, were noted with W3ECR, W1CLX and W3OCU. (In the past many phony calls have emanated from this QTH. For this reason we mention ZA1KAD with considerable "crossing-of-fingers." However . . . could be!!)

Last Minute Items

Operation from **SVØWK/9**, CRETE, September 5 to 8, manned by Fred, SVØWK/K6AUU (phone) and Ted, SVØWL/W6ZID (CW) resulted in 471 contacts in 58 countries. QSL's should now be out. Further details of this expedition will appear in the December issue. . . . On October 4, **HI8WA, 14096**, CW, was on the air for a few hours giving many a much needed HI contact. The operator was Bill, W4QV, and QSL's should go via W4QV. A few contacts were noted as follows: W3RNQ, W4BQY, W3LMM, W3YNO, W5BPH, W9HEP and WØQGI. . . . W4LZF reports a contact with **ZD3BFC**, 7038, 0720 GMT, October 2. This seems to confirm Bill's promise to get on CW when his "bug" arrived from G-land. Also, contrary to a report in the October **CQ**, we understand that ZD3BFC will be active for two years! **HKØAI**, San Andres, continues activity on 7008 around 0100 GMT. . . . **FG7XA** was speared by W4QCW on 7010, 0315 GMT. . . . W1BLF heard that activity was scheduled by **ZM7AR**, 14060, during the weekend of October 9. . . . Openings reminiscent of "ye good old days" have been occurring with W3FMC reporting **FR7ZA** QSO on 7010 at 0250 GMT and DU7SV and HS1D pouring through on 14 Mc. around 1300 GMT. (We have heard of no lifting of the ban on HS1D as yet). . . . **AC3PT** has been reported on 14061 at 1230 GMT while those needing French Guiana might tune for **FY7YE**, 14061, and **FY7YC**, 14018, who seem to be on most mornings around 1100 GMT.

VQ6LQ is reported to be a new one on the air by VQ2AB who contacted him on October 1, 14070, 1540 GMT. It appears that he will be around for some time and is ex-ZD1LQ. Cards should go via P.O. Box 11, Hargeisa, Br. Somaliland. . . . **W4UIV** may be heard from West Pakistan (or Turkey) in the very near future. . . . Notes via OK1MB state that the University station **LH2P**, Spitzbergen, and **LB9UE**, Bear Island, will both be active in the near future. . . . **ZC5VR** will be heard from Sarawak with a 3-element beam and Panther, 120-watt, rig. He will be heard, same as VS4HK (ex-ST2HK), around 1600 GMT. . . . QSL's for **ZC5SF**, 14020, should go via Box 232, Sandakan, Br. North Borneo. . . . **ZC7BB**, Jordan, should be back in G-land as this is read. . . . **ZD6BX** and **ZD2DCP** may be heard on 3503 from 0300 to 0600 GMT on Saturdays. . . . F9RS reports that **FF8AN** has flown to Douala, French Cameroons, for a tour of duty with Civil Aviation there and should soon be heard as FE8AC or FE8AN. . . . ZL1MP may soon be heard as **VP7NI** on Eleuthera Island in the Bahamas. . . . There are possibilities of a trip to NAVASSA by KG4AP around Xmas. . . . EL2X vacations in Europe from mid-October to mid-November.

DX Notes

W8MPW has received a QSL from **LZ1DX/ZA.** This expedition to Albania (some thought it was of the ST2UU variety) took place August 30 to September 3, 1951 and all contacts were on 14038 kc. The gear consisted of a 5-watt transmitter and 2-tube receiver. Dimiter seeks QSL's from KP4QZ, KP4LK, TI2TG and CE3AG for LZ1DX contacts. They should go via G2MI. . . . **FW8AB,** Wallis Island, has been appearing off and on. August 20 contacts were noted with W6SR, W6TI and W6TT on 14075 (5 kc. drift) at 0500 GMT. We hear that Wallis will be reconsidered as a separate country. Hitherto it has been counted as a regular FK8. FW8AB skeds FK8AO and FK8AC on Saturday at 0400 GMT, 14074 (sometimes 14040). . . . From VK3CX we hear that **VR3A** has had 6000 QSL's printed but they will not reach him until December. . . . W8AJW suggests Simonstown, Union of South Africa, as a separate one, much in the KG4 style, as it is Crown property. John also suggests investigation of Walvis Bay, Southwest Africa which was occupied by England prior to 1918. . . . EL2X advises that a batch of **ZD3BFC** QSL's have already gone forward. G2MI says that ZD3BFC will be in Gambia for two years. (Watch 14110 1600/1800 GMT A3. No CW noted as yet). ON4AU reports **ZD9AB** on 14100, 0800 GMT, 350 watts. . . . From W1VXA we hear that **DL3SS** is the Iranian ambassador to Germany and it is possible that he may be heard from his home station, **EP3SS,** during November. EP3SS runs 50 watts to an 807 on 14040 kc. (Contacts with Iranian Hams are presently banned by FCC.)

W3BHV reports hearing **AC4NC** on 14055 and 14010, 1100 GMT, weekends. . . . VK4YP says that Doug, **ZK1BG,** will show from ZM7 some time soon. . . . G6ZO nabbed **VS4HK,** Sarawak, at 1457 GMT, August 28, 14100. Jim called him 10 kc. off frequency. . . . F8PQ reports **FB8BK** (Tromelin Island), T6, 1445 GMT, 14052. . . . Rog, W4PNK, reports contact with **TT2FD** (Sounds like an antenna!), Tannu Tuva, on 14050, at 1415 GMT. TT2FD said that AC4NC, Chak, has arrived there safely??. QSL's go via VU2JP. . . . G3AAM worked **MP4QAJ** who was airborne, returning to OD5AF. . . . Mirko, YU1AD, reports **MP4QAI,** Qatar, on phone. He says QSL via MP4QP. MP4QAI speaks French but can also QSO in English. . . . Jim, **YN1AA,** advises that the ban on YN Hams, since April 4, has now been lifted. YN1AA came back on the air September 11. . . . Via F9RS we hear that Jules, **VP9BM** (ex-TA3AA, SV6AA, SV7AA), has applied for a license to operate from the French half of the West Indian island of St. Martin. If this is expedited it is possible that Jules may be there for the DX contest. If not, the trip may go forward in May or June of next year. W6SAI and W2BBK, who both hold FP8 licenses, are also eyeing this spot and we suggest all hands "get-together" on this project. In this area the French island of St. Barthelmy and the French half of St. Martin comes under the administration of Guadeloupe, FG7, and will probably not be considered separate. However, FG7 is sufficiently "rare" to warrant putting any one of these spots on the air. The Dutch group of islands consisting of Saba, St. Eustatius and the Dutch half of St. Martin might seem a more logical choice for "separate country" status as they are

Neat and very potent is the set up of the well known I1BNU/TRIESTE. (Photo courtesy VE3IG)

The radio expedition to San Andres Island, last May, when the prefix HKØ was put on the air for the first time, created quite a furor in the DX ranks. Some 75 HK Hams went along on the transport "Almirante Padilla." Top left photo shows the group engaged in /MM operation; top right, the "shack" position on the "Padilla." Lower left: HKØDP (rear) and HKØEH in operating position on San Andres; lower right—HKØ's, as labeled. Photos courtesy HK4DP/HKØDP.

Right, needing no introduction to the DX fraternity are Eva and Alex of CN8MM French Morocco. Upper photo shows the very effective stacked beams.

Takeo Kuwahara, JA1CR, Tokyo, Japan runs 120 watts to a pair of 807's. Receivers are a Super-Pro and BC-312-N/HF 10-20. A GP antenna is used on 3.5 and modified dipoles for 7, 14, 21 and 28 Mcs. Takeo is now up to 108 countries and 34 zones. He seeks zones 9, 10, 16, 18, 19 and 35.

located over 500 miles from the administrating government in Curacao.

Word now comes from **PY2CK** who says PYØ in November. . . . perhaps! . . . Augmenting the somewhat stilted activity from VP4, Trinidad, will be **VP4TP**. He will be on 7 and 14-Mc. CW only and was formerly active from G3CBF, MP4KAI, ZC6BF and 4X4BF. . . . Via **Short Wave Magazine** we hear that **VQ8AL** and **VQ8AR** plan a 10 to 15-day trip to Rodriguez Island in January. This QTH is some 330 miles East of Mauritius and "we quote" should count as a new one. . . . Jottings from the **West Gulf Bulletin** as follow: **HB1MX/HE** was very active around 14030 passing out contest type QSL's freely. Clean but QRS. He left August 15. . . . **EL2X** needs Idaho to complete WAS. . . . W5YLL heard **VR2BZ/VR5** on September 5 working W6's, 14153, A3. . . . W5EFC nabbed **AC3PT**, 14044. . . . **VK1AC** (Macquarie) QSL's will be out early next year. . . . CN8MM says **ZA1KAC** is legit and QSL's. . . . **YJ1AA** is active but questionable. . . . **VP8AZ** works on 14050 and will QSY to 14150 for A3 contacts. . . . VK4NC opines that **VK4IC** should count as a new one and will soon have a VK9 call. . . . **VQ4NZK** will definitely go to VQ9 late this year. . . . W8BKP can furnish QTH of **YA1AA** (phone 14198) only to those who have worked him. . . . (Via G3FXB) VQ8CB skeds **FR7ZA** 14040/7058, 1315 GMT, Sundays.

DX-ploits

Ken, **WØYXO**, comes up to date with 9 additions, dating from FL8MY days, and now occupies the No. 2 position on WAZ with 252. . . . Andy, **W6ENV**, ups to 251 with VR2BZ/ZM7. . . . Marv, **W6VFR**, also hits 251 with the addition of FO8AJ. His phone total reaches 181 with FO8AJ and 4S7YL. . . . Don, **W6AM**, now rests on 248 thanks to VR2BZ/ZM7 and SVØWK/9 (Crete) . . . . Jim, **G6ZO**, keeps pace with Don by adding VS4HK for 248 while Frank, **W6MEK**, adds ten, such as OD5LX, FB8XX and VS4RO to reach 247. . . . Al, **W8PQQ**, goes to 246 with SVØWK/9 and MP4QAH while discarding PX1AR. . . . **W6SYG** also reaches 246 with VR2BZ/ZM7 and HKØAI while Jim, **W8JIN**, comes up to date with 8 for 246. . . . Howy, **W2AGW**, smarting under the ST2UU loss, recoups with HKØCV and SVØWK/9 for 244. . . . VR2BZ/ZM7 pushed **W6MX** to 243 while Ed, **W6DZZ**,

[*Continued on page 65*]

In a farewell dinner given to Tom Gabbert, TI2TG, the following members of the Radio Club of Costa Rica, and visitors, may be seen (Standing L to R) TI2JA, TI2RJ, TI2MS, HK2GO, TI2RL, TI2BX, LU4DZI, TI2AJ, TI5WLC (Jr. op), TI2OFR, TI2AAL, TI2RU, TI2LJ, TI2RKL, TI2PZ (Sitting L to R) TI2WFP, TI2SJ, TI2TF, TI2TG, TI2DLM, TI2JRC and TI2WLC. TI2TG was given a plaque which read "To Tom Gabbert with the recognition and affection of his friends and amateur radio colleagues for his extraordinary cooperation" (Sig) Radio Club of Costa Rica, August 1954. TI2TG arrived at Wilmington, Calif. on August 22 and was met by W6MBA, W6MUR and W6YY. We hope to hear him soon as a W6.

A Complete Amateur Station

IN *only* ONE CUBIC FOOT *with*

Harvey-WELLS BANDMASTERS

6 AMATEUR BANDS

BAND-SWITCHING

Factory built & tested
(NOT A KIT)

T-90

90 WATT TRANSMITTER
The midget with a MIGHTY PUNCH

$179.50*

Complete with tubes less power supply (NOT A KIT)

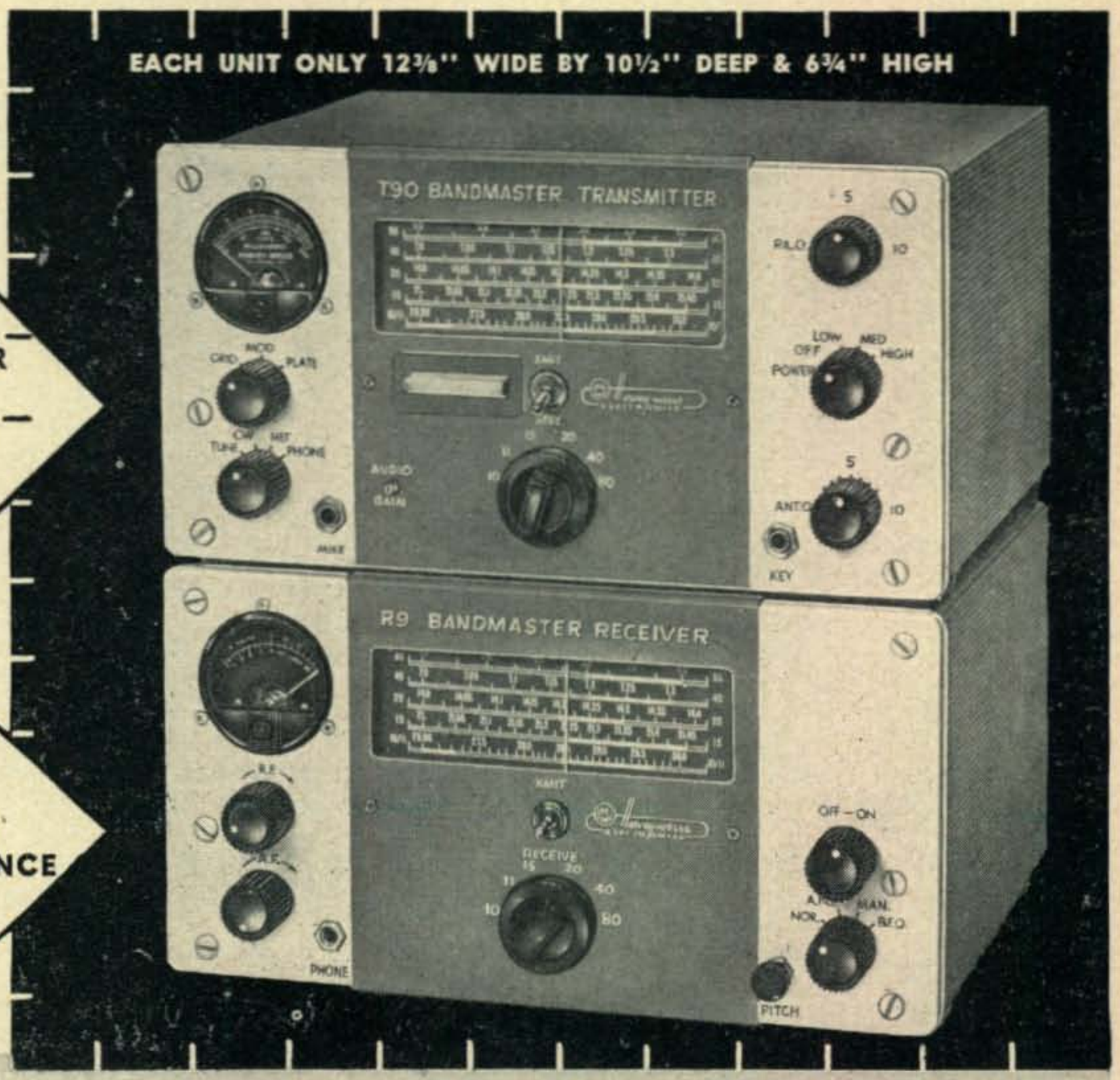
R-9

9 TUBE RECEIVER
DOUBLE CONVERSION
PACKED WITH PERFORMANCE

$149.50*

For 115 V. AC operation

EACH UNIT ONLY 12⅜" WIDE BY 10½" DEEP & 6¾" HIGH



TRANSMITTER FEATURES

1. TVI Suppressed
2. Complete band-switching; no plug-in coils
3. Complete Break-in Key or keying of multiplier stages only
4. VFO Tuning without carrier on
5. Cathode biased Exciter tubes and clamp tube control of Final Amplifier Screen Voltage
6. Initial tuning at reduced power
7. Three position excitation control
8. Antenna loading flexibility
9. Selector switch allows metering of PA Grid, PA Cathode and Modulator currents
10. Remote Break-in and Receiver muting provided by relay control
11. VFO voltage regulated and temperature compensated
12. Illuminated dial and meter
13. Crystal door on front panel
14. Filament Operation 6 or 12 volts AC/DC
15. Low average Modulator current
16. Built-in provision for either Carbon, Crystal or Dynamic microphone and push-to-talk

RECEIVER FEATURES

1. Double conversion on all bands
2. Three tuned circuits on each band, in R.F. section
3. All coils slug tuned, giving high "Q" circuits
4. Separate oscillator coils for each band (no spurious response)
5. Bandwidth: Four kilocycles wide at the 6 db point
6. Complete with tubes and built-in AC power supply. 6 or 12 volt DC power supply available.
7. Crystal filtering optional.
8. Approximately 6" of dial spread on all bands. Accurately calibrated
9. Rigid Steel construction. (Vibration-Proof)
10. 6¾" hgt. enables easy under dash mounting for mobile installation

Send for technical Bulletins **HW 456** *and* **HW 457**

*Prices subject to change without notice.

Harvey-**WELLS ELECTRONICS, INC.,** SOUTHBRIDGE, MASS.

the YL's Frequency

Monitored by

Louisa B. Sando, WOSCF

Towaoc, Colorado

YLRL's 15th Anniversary

Just fifteen years ago the *Young Ladies' Radio League* came into existence. Small in scope, but ambitious in aims, it was destined to become a major force in amateur radio. It all came about this way:

The May, 1939 issue of *QST* contained an ad for the late W1CBD's book "Two Hundred Meters and Down." One statement was, "Goodness knows—and *you* won't tell—how many of you YL key-twitchers there are . . . "

W7FWB, Ethel Smith (now *W3MSU*), wrote to the ARRL: "Nobody seems to know, but I think we *would* tell. I should like to have you publish this letter or some kind of a request to have the YLs make themselves known . . . So how about it YLs? Perhaps we should band ourselves together in a YLRL or something to that effect and make these women-ignoring authors sit up and take notice." Ethel's letter was published in *QST* a couple of months later. Not only did it result in starting our organization, but named it as well.

Twelve girls answered that letter. Enid Carter, *W9NBX* (now Enid Aldwell, *W6UXF*), became the spark-plug of the group. From the girls she compiled a list of names and addresses of other YLs and drew up a tentative constitution. The proposed YLRL *Constitution and By-Laws*, dated Sept., 1939 lists these YLs as charter members: *W1GQT, W5HYF, W6RGX, W7FWB* (now *W3MSU*) *W7GXI, W8SBB, W8TAY* (now *W4JCR*), *W9CHD* (now *W6NAZ*), *W9NBX* (now *W6UXF*), *W9NLW, W9UA* (now *WØUA*), *W9WWP* (now *W6WSV*), and *VE2HI*. A succeeding copy of the *Constitution* bears the statement, "Adopted October, 1939."

Enid selected these officers to start the YLs on their way: *W7FWB*, Ethel, became the first president; *W9WWP*, Carol Keating was appointed vice president and activities manager; *W9NBX*, Enid, took on the duties of secretary-treasurer, and soon *W8TAY*, Anita Bien, became publicity chairman. Enid also set dues—25c a year!

Enid then began publishing a monthly bulletin. The first issue, Vol. 1 No. 1, was dated Nov., 1939 and entitled "YL News." A single mimeographed sheet, it contained a plea for members and requested suggestions so that the bulletin might be named.

Response was quick and enthusiastic. Vol. 1, No. 2 (Dec. '39) bore the name *YL Harmonics*, which Enid chose from among twenty suggestions she received, ranging from "Hamettes" and "QTT" (Quick To Tell) to "Spurious Radiations" (suggested by an OM!). Up to three pages, it announced a December "Get Acquainted" QSO Party on 40 and 80 CW, inaugurated "Chatter" (district reports), listed district chairmen, and contained this list of paid-up members: *W7FWB, 9NBX, 9CHD, 9NLW, 9DBD, 1FOF, 9WWP, 2KUG, 9ILH, 6EK, 8TAY, 3TAY, 3FXZ, 6RGX, 1KEP, 1GQT, 2KBG, 2IXY, 9OWQ, 7EIU,, 8SJF, 9UA, 2FKA, 8TPZ, VE2HI.*

In the February, 1940 issue of *YL Harmonics* (Vol. 1 Nr. 4) Enid warns "Beware the OM who passes

The first local chapter of YLRL was founded in Cleveland by W8TAY in June, 1940. At its second meeting W8PWY took this photo of the YLs. L. to r. on couch: W8PZA, Mildred; W8CKH, Gertrude; W8ODI, Ruth, and W8TAY, Nita. On floor: W8SBB, Mary, and W8UCY, Carol. W8TLZ, Ruth, was also a member at this time. Photo courtesy W4JCR (ex-W8TAY).

Left—W6UXF, Enid Aldwell, was W9NBX, Enid Carter, at Bowbells, N.D., when she spark-plugged YLRL and took on duties of secretary and editor. She is wearing an authentic Bavarian costume, an example of her latest hobby.

himself off as a YL. W1IOR has been taken off our membership list since it was discovered that the only feminine thing about him was his desire to be a member of the YLRL!" *W9EXM* reported organizing the *Keno YL Club* in Kenosha, Wis., for all women interested in becoming radio operators.

The April, 1940 issue of *YL Harmonics* was up to six pages, listed YLRL nets on 160 and 20 phone, and 80 and 40 CW. First members in England and Alaska were welcomed. By this time the Ham world was taking official recognition of the youngster in its midst, not yet a year old. The May, 1940 issue of *QST* carried the article "The YL's Unite!" compiled by W8TAY, Nita (now W4JCR). At this time Nita also conducted "YL Chatter" in *Radio News.*

Vol. 1 Nr. 7 set forth the policy of *YL Harmonics* and YLRL to use the term "YL" for all licensed amateur operators of the feminine sex, and the June issue announced YLRL's affiliation with ARRL. Also in June, 1940 the YLs of Cleveland, Ohio, united to form the first official local YLRL chapter.

1st Anniversary

November, 1940 brought **YL Harmonics** to its first anniversary, and that issue boasted 15 pages and cover. It announced the winner of the slogan contest as **W8TAY**, Nita, who submitted the slogan "QRV—I am ready." The 1st Anniversary Party contest highlights were given. **W1FTJ**, Dot, won the contest and received the **Corcoran Cup** donated by **W8TPZ**. YLRL nets were now in operation on 160, 80, 40, 20 and 10.

YLRL was really on its way! To further the YLs

enthusiasm a YLRL song was written with words by **W8UDA**, Dot. And it was about this time that our "33" signature was originated by **W8KYR**, Clara (now **W2RUF**). Its original meaning, as published in **YL Harmonics**, was "Love Sealed With Friendship between one YL and another YL." YLRL stationary and pins were also now available.

YLRL activities progressed rapidly in 1941. **W3NBX**, Enid, became president; **W8TPZ**, Marie, vice president; **W9DBD**, Leta, secretary and editor, and **W8TAY**, Nita, continued as P/C. Membership grew to 250 and many YLs were engaged in Civil Defense work. The October, 1941 issue of **QST** carried W8TAY's article "YLRL QRV!" Later Nita received a letter from Eleanor Roosevelt who was assistant director in the Office of Civilian Defense, applauding YLRL members on their enthusiasm for their work as described in the article and stating it: "will prove of inestimable value should the need for active defense arise."

Then came Pearl Harbor and "curtains" to Ham radio for the duration! The YLs took their rightful places as radio operators, instructors, in industry, and in the women's auxiliaries of the armed forces.

W8TAY, Nita, became YLRL president and editor in 1942, and it was at her insistence that **YL Harmonics** was kept going to hold the girls together. Serving with her were **W8UDA**, Dot, vice president; **W1FTJ**, Dot, secretary-treasurer; **W7HDS**, Lizette, P/C.

The third anniversary issue in 1942 contained 13 pages and cover. One whole page contained a list of job opportunities for YLs in the CAA, Navy, Signal Corps, at MIT, in the WAAC and WAVES. Membership was now listed as over 300.

At war's end YLRL was still a closely knit organization, able and ready to continue with **YL Harmonics**, to reactivate nets and contests. In 1949 **W6NAZ**, Lenore, and **W6YRL**, Sandy, compiled data on all the members and in May of that year the first YLRL Callbook was published, proceeds of which helped to swell the club's treasury.

10th Anniversary

1949 also was YLRL's 10th anniversary. The Oct.-Nov. issue of **YL Harmonics**, with **W3OQF**, Barbie, as editor, contained an FB account of YLRL's beginnings and history to date. 31 pages in size, it listed member-

[*Continued on page 60*]

W4JCR, Anita Bien, was W8TAY in Cleveland when she accepted the post of YLRL's first publicity chairman.

Left—W3MSU, Ethel Smith, was W7FWB in Washington State when she started YLRL on its way and became the first president.

W6WSV, Carol Witte, was W9WWP, Carol Keating, in Chicago when she was appointed YLRL's first vice president and activities manager. She is pictured here while taking WAVE training in N.Y.C.

ALL TIMES IN E S T

EASTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Western Europe & Central Europe	0800-1330 (3)	0600-1400 (3-4) 1400-1600 (2)	1500-1700 (2-3) 1700-2000 (3-4) 2000-0400 (2)	1700-0230 (3)
Southern Europe & North Africa	0730-1400 (3-4)	0600-1430 (3-4) 1430-1630 (2-3)	1530-1700 (2-3) 1700-2000 (3-4) 2000-0230 (3)	1800-0200 (3)
Near & Middle East	0730-1130 (2)	0700-1300 (2-3)	1730-2230 (2)	1830-2200 (1)
Central & South Africa	1000-1400 (1)* 0730-1400 (2) 1400-1600 (2-3)	0600-1300 (1) 1300-1500 (1-2) 1500-1730 (2-3)	1730-0100 (2-3)	1900-2300 (1-2)
South America	1000-1500 (2-3)* 0800-1500 (3) 1500-1700 (4)	0630-1530 (2-3) 1530-1730 (4) 1730-1900 (2) 0000-0200 (2)	1800-0500 (3-4) 0500-0730 (2-3)	1930-0400 (2)
South East Asia	Nil	0700-0900 (1) 1500-1800 (0-1)	0300-0700 (0-1)	Nil
Australasia	0730-1200 (1) 1600-1830 (1)	0630-0900 (2) 1200-1800 (0-1) 1800-2000 (1)	0100-0800 (2-3)	0300-0700 (2)
Guam & Pacific	1530-1800 (1)	0630-1000 (2) 1530-1830 (1) 1830-1930 (1-2)	0000-0700 (2-3)	0100-0530 (1-2)
Japan & Far East	Nil	0630-0900 (1-2) 1500-1700 (1)	0200-0700 (1)	0200-0600 (0-1)

ALL TIMES IN C S T

CENTRAL USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe	0800-1100 (1-2)	0700-1300 (3) 1300-1430 (1-2)	1630-1930 (3) 1930-0330 (1-2)	1800-0130 (2-3)
Southern Europe & North Africa	0700-1300 (3)	0600-1330 (3-4) 1330-1500 (2)	1630-2000 (3-4) 2000-0100 (2)	1800-0100 (2-3)
Central & South Africa	1000-1330 (1)* 0700-1330 (2) 1330-1500 (2-3)	0530-1230 (1) 1230-1430 (1-2) 1430-1700 (2-3)	1700-0000 (3)	1830-2200 (2)
Central America & Northern South America	1100-1400 (2)* 0730-1400 (3-4) 1400-1600 (4-5)	0600-0900 (3-4) 0900-1500 (2-3) 1500-1800 (4) 0100-0230 (1-2)	1800-0600 (4)	1900-0430 (3-4)
South America	0900-1500 (2)* 0700-1430 (2-3) 1430-1600 (3-4)	0600-1500 (2-3) 1500-1800 (3-4) 1800-2000 (1-2) 2300-0200 (1-2)	1800-0530 (3-4)	1900-0500 (2-3)
Japan & Far East	1500-1730 (1)	0700-0900 (1) 1500-1700 (1) 1700-1830 (2)	0100-0800 (1-2)	0200-0600 (1)
South East Asia	1500-1830 (0-1)	0700-0900 (0-1) 1500-1830 (1)	0200-0600 (0-1)	Nil

ALL TIMES IN C S T

CENTRAL USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Hawaii	1300-1600 (2-3)	1000-1130 (2-3) 1130-1800 (1-2) 1800-2000 (2-3)	2100-0300 (3-4) 0300-0800 (2)	2200-0630 (3)
Australasia	1700-1900 (0-1)* 0900-1100 (1) 1400-1900 (2)	0700-1130 (2) 1130-1730 (0-1) 1730-1930 (1)	0200-0800 (3)	0600-0700 (2)

ALL TIMES IN P S T

WESTERN USA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Europe & North Africa	0730-1000 (0-1)	0700-1300 (1)	1600-0000 (1-2)	1800-2300 (1)
Central & South Africa	1100-1400 (1)* 0800-1300 (1-2) 1300-1500 (2)	0600-0900 (1-2) 0900-1500 (0-1) 1500-1700 (1-2)	1700-2130 (2-3) 2130-0000 (1)	1800-2130 (1-2)
South America	0900-1430 (2)* 0700-1300 (3) 1300-1530 (4)	0600-1400 (2-3) 1400-1700 (4) 1700-2000 (1-2) 2300-0230 (1-2)	1700-0330 (3-4)	1800-0230 (2-3)
Guam & Mariana Islands	1330-1630 (1-2)* 1200-1630 (2-3) 1630-1800 (3)	0700-0900 (1) 1200-1700 (1) 1700-2000 (2-3)	0000-0800 (3)	0100-0700 (2)
Australasia	1400-1800 (1-2)* 1100-1900 (2-3)	0900-1200 (2-3) 1200-1700 (1) 1700-2000 (2-3)	2300-0700 (3)	0000-0600 (2-3)
Japan & Far East	1400-1800 (0-1)* 1300-1630 (2-3) 1630-1830 (3-4)	1200-1600 (2-3) 1600-2030 (3-4)	2200-0730 (3-4)	2300-0600 (2-3)
Philippine Islands & East Indies	1400-1800 (2-3)	0900-1100 (1-2) 1300-1430 (1-2) 1730-2000 (1-2)	0200-0700 (2)	0300-0500 (1)
Malaya & South East Asia	1500-1800 (1-2)	0800-1100 (1-2) 1500-1930 (1-2)	0300-0700 (1-2)	0400-0600 (0-1)
Hong Kong, Macao & Formosa	1500-1730 (2-3)	0700-0900 (1) 1400-1700 (1-2) 1700-2000 (2-3)	0100-0630 (2-3)	0200-0600 (1-2)

Symbols For Expected Percentage of Days of Month Path Open:

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

*Indicates time of possible ten-meter openings.

The CQ Propagation Charts are based upon a CW radiated power of 150 watts and are centered on Washington, D. C., St. Louis and Sacramento. These forecasts are, for the most part, based upon basic ionospheric data published by the CRPL of the National Bureau of Standards, and are valid until December 15th.

Ionospheric Propagation Conditions

Predicted by

George Jacobs, W2PAJ

Propagation Conditions—November

6 Meters: Only an occasional short skip opening expected during November, possibly co-incident with auroral activity.

10 Meters: DX propagation conditions poor to fair with some openings expected on certain north-south paths during the daytime hours.

15 Meters: Seasonal propagation conditions are improving on this band, with fair to good world-wide DX expected during the daytime hours.

20 Meters: Band is closing earlier in the day because of the shorter hours of daylight in the winter months. Daytime DX conditions fair to good from shortly after sunrise to shortly after sunset.

40 Meters: Fair to good DX expected to many areas of the world from a few hours before sunset to a few hours after sunset, with some paths open until shortly after sunrise.

80 Meters: Night-time DX propagation conditions on this band during November are expected to be fair and improving with considerably less atmospheric noise (static) from a few hours after sunset to a few hours before sunrise. When MUF failure causes 40 meters to drop out on a particular circuit, check 80 meters for openings on the same circuit.

160 Meters: Seasonal DX propagation conditions are improving as ionospheric absorption and atmospheric noise levels generally decrease in the northern hemisphere during the winter months. This band should open a few hours after sunset and remain open until shortly before sunrise, with DX possible on exceptionally quiet nights.

Sunspot Cycle

This month's Charts are based upon a predicted smoothed sunspot number of 10, centered on November, 1954. The observed **monthly** Zurich sunspot number for August, 1954 was 8.1, resulting in a provisional Zurich **smoothed** sunspot number of 5.4 centered on February 15, 1954.

80 Meter Fade Outs

A special note to those who conduct local **night-time** nets on the 75/80-meter band. Towards the end of November, and lasting until the late spring, you will experience considerable difficulty keeping satisfactory contact with stations located within a radius of approximately 100 miles. The reason for this is that on a good many nights during the winter months, the MUF for these short paths will drop below 3.8 Mc. after approximately 2030 local standard time, and below 3.5 Mc. about an hour later. During these periods, networks of stations within a hundred or so miles of each other should use the 160-meter band for QSO's.

The June Eclipse

One of nature's rather rare and most spectacular phenomena—a total eclipse of the sun—occurred on June 30, 1954. In a previous column (May, 1954) we mentioned that a total eclipse of the sun has special significance to radio researchers. Only during such an event, is the ionizing radiation of the sun (which forms the various layers of the ionosphere) cut off in the middle of the day. This affords the opportunity to observe the effects upon shortwave radio circuits as rapid changes in ionization takes place.

Radio observations made during previous total eclipses of the sun have resulted in the formulation of much of our present theory concerning ultra-violet radiation from the sun and its effects upon the ionosphere and high frequency radio propagation. During the eclipse of June 30, field teams of scientists were set up throughout the world, along the path of totality, for the purpose of conducting scientific observations associated with the eclipse. As soon as the reports of these observations are published, they will be reviewed in this column. Meanwhile, the following two reports, received from amateur radio observers, are indicative of the effects of the eclipse upon shortwave radio.

Bob Scheoning, WØTKX, observed the eclipse totality at Bloomington, Minn., and reported the following:

"At 1039 GMT, the static level on 3.5 Mc. was quite high. W9BQM, very loud, had just signed with ZL2GO who was just above the static, but with a good signal. I had a brief QSO with ZL2GO. At 1100 GMT I went out to the garden to watch the eclipse. I remained in the garden until the end of totality, and then returned to 3.5 Mc. At 1108 GMT W9BQM was working ZL1MQ.

Last Minute Forecast

Moderate ionospheric disturbances are forecast for the periods October 31-November 2 and November 13-15. The period November 23-29 is forecast as unstable or disturbed. Good shortwave propagation conditions are forecast for November 3-5 and 9-12.

ZL1MQ was about the same signal strength as ZL2GO was earlier, but W9BQM was now much weaker, almost as weak as the ZL. At 1130 GMT the static level dropped considerably. ZL1MQ, ZL1MB, and W9BQM were all heard with W9BQM's signal back to good strength. The ZL's were down slightly but well above the noise.

"From this it appears that the F-layer signals (the ZL's) were not markedly affected by the eclipse during the times that I was listening. The E-layer, which was probably propagating W9BQM, seemed to lose its effectiveness around totality and regain its effectiveness after the eclipse had ended.

"I wouldn't have missed the view of the total eclipse for anything; at totality the pheasants stopped crowing, and the birds stopped twittering—one could 'hear' the eclipse. The total eclipse was infinitely more impressive than partial eclipse's that I have seen."

From London, England, where the eclipse was a little more than 75% total, the following observations are reported:

"Before the eclipse, shortwave reception appeared to be quite normal. At about 1100 GMT, some rapid and fairly deep fading was noticed on the Canadian shortwave broadcast transmissions from Sackville, N.B. This was followed by a gradual increase in the signal strength of the 15-Mc. band transmitter, with considerable fluctuations in the strength of this and also of the 11-Mc. band transmission. The increase in strength of the 15-Mc. signal was preceded for a short period about 1105 GMT by a sharp decrease and more pronounced fading for about five minutes. Observations on medium waves showed a partial simulation of night-time reception conditions, the field strength of Norwegian and North German transmissions increasing between 1030 and 1300 GMT, thereafter decreasing again. An increase in signal strength of 20 db. was observed on the Norwegian transmission."

It would appear from these observations that during the period of the eclipse, radio waves of such frequencies as are transmitted better by night than by day showed a

[*Continued on page 60*]

the BRIEFCASE

TRANSMITTER -RECEIVER

Rodney W. Johnson, W6MUR

W6MUR has been an active Ham since 1935 always maintaining a big interest in DX (CW version). In that quarter Bill runs a conservative, TVI-proof kilowatt to push-pull 450TH's. The shack wall is graced by DXCC, WAS, A-1 Operator and numerous contest certificates, as well as various commercial licenses. W6MUR is Senior Project Engineer with the Ralph M. Parsons, Co. and is a graduate of the University of California. Bill has done quite a bit of writing, in and out of the strictly Ham field. He has contributed to Electronics, Proceedings of the I.R.E., QST, and of course, CQ. Mailing Address: 1202 Avoca Ave., Pasadena 2, Calif.

A true Ham finds it a little hard to leave Ham radio behind him when he takes even a short trip. With a complete station in a brief case, as described in this article, he does not have to. The station consists of a complete 7- and 14-Mc., c-w transmitter, with special keying features, a superheterodyne receiver, and a power supply, plus accessories, all of which fit in a standard, 15-inch brief case.

The photographs show the appearance and general construction of the station, and the schematic diagram, *Fig. 1*, shows the complete circuit.

The transmitter consists of a 6AG7, crystal oscillator-doubler driving a 2E26 amplifier on the 7- and 14-Mc. bands. Both stages use "Johnson" multi-band, plate tank circuits,* making it unnecessary to change coils to change bands.

Included in the transmitter are two features which are rather unusual in portable equipment. They are a vacuum-tube keyer and a built-in, electronic "bug," with the option of using a conventional key available at the snap of a switch. In fact, as the time the photographs illustrating this article were taken, a DPST paddle to operate the electronic "bug" had not yet been constructed; therefore a conventional "bug" is shown.

Oscillator keying is used. Fixed bias on the 2E26 prevents its plate current from soaring when the key is open. Break-in operation is achieved by connecting the coil of a low-current,

* "Multi-Band Tank Circuits," R. W. Johnson, W6MUR, QST, July, 1954, page 25.

d-c relay in series with the 2E26 screen voltage lead. When the key is closed, the screen current actuates the relay, disconnecting the antenna from the receiver and grounding the receiver input terminals.

Pre-cut half-wave doublet antennas fed with receiving type, 75-ohm ribbon are used with the station. They are link-coupled to the amplifier tank coil, and a variable condenser in series with one side of the line controls antenna loading. Although it is theoretically wrong to ground one side of the antenna feed line as shown, no ill effects from doing so have been observed.

The Receiver

The four-tube superheterodyne receiver employs a 6AU6, r-f amplifier; a 6J6 mixer and crystal-controlled, high-frequency oscillator; another 6AU6 as a tunable, regenerative, second detector; and a 12AX7, with its two sections in cascade, as the audio amplifier.

Using a crystal frequency midway between the two bands and a tunable intermediate frequency of around 3.5 Mc., the 7- and 14-Mc. bands are covered with a single crystal. On the 7-Mc. band, the receiver responds to frequencies which are equal to the difference between the oscillator and the intermediate frequency. On the 14-Mc. band, it responds to the sum of these frequencies. The resonant frequencies of the fixed-tuned circuits in the r-f and mixer stages determine which mode of operation prevails.

The only pecularity introduced by such operation is that on 7 Mc., the received frequency decreases as the intermediate frequency increases, while on 14 Mc., the response follows the more-conventional pattern. With separate calibration scales on the dial for each band, this introduces no complications.

An actual crystal frequency of 10.55 Mc. was chosen, because most of my activity is in the 7 to 7.1 and 14 to 14.1 Mc. segments of these bands. With this frequency, both segments are covered by tuning the second detector between 3450 and 3550 kc., which range is centered on the dial.**

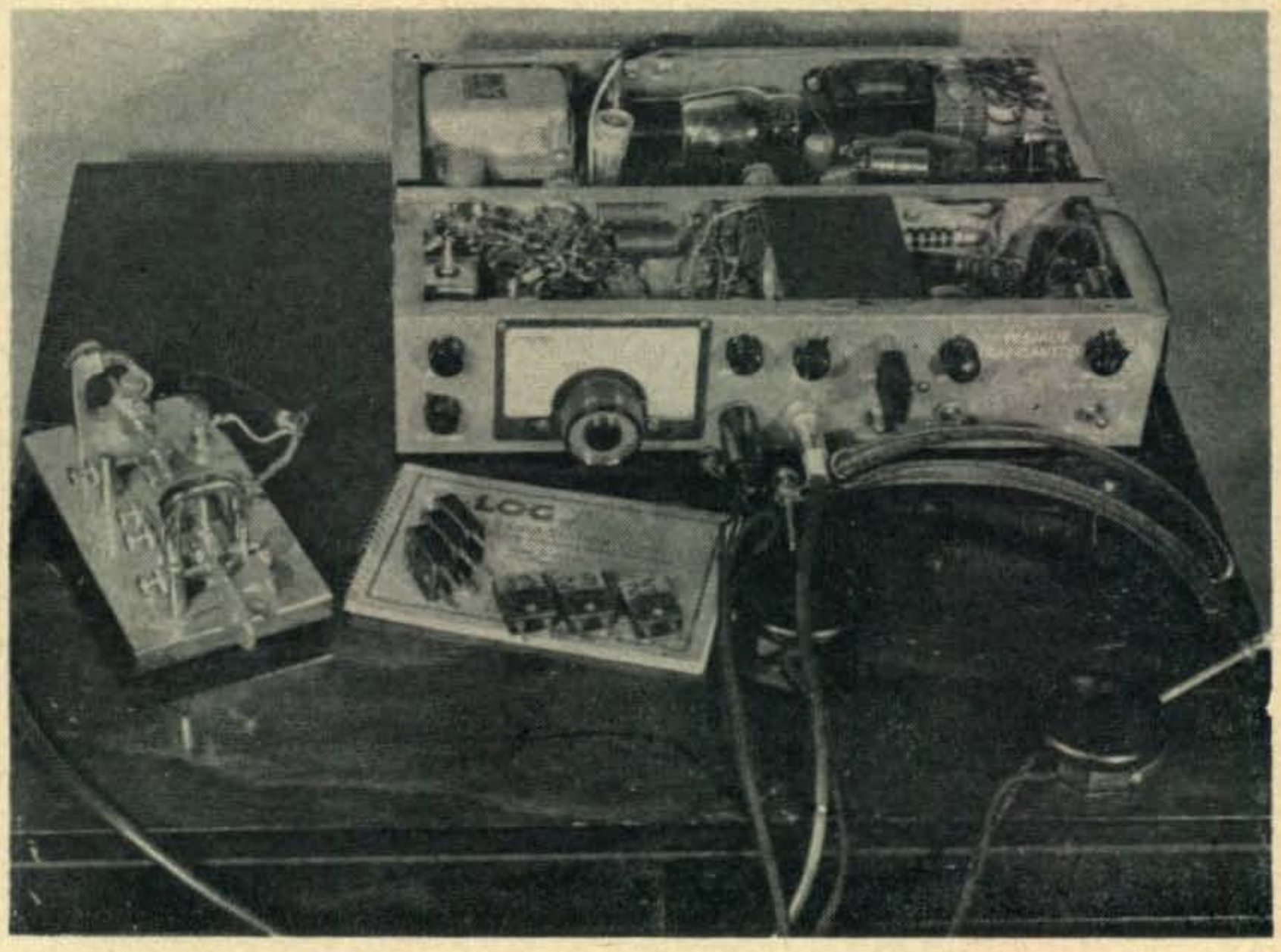
All power to operate the *Brief Case Station* is obtained from the built-in power supply. It delivers 375 volts to the transmitter, 150 volts, regulated, to the receiver, and the several values of negative voltage required to bias the 2E26 and for the proper operation of the keying circuits. A 5V4G rectifier is used in the B+ portion of the supply, and a pair of series-connected selenium rectifiers furnish the negative voltages. The 5V4G was chosen because of its low internal voltage drop and because it can be operated in any mechanical position.

Two special notes are in order about the electronic keyer.

1. It is not of the "self-completing" variety, as a matter of personal preference. With that type, when you hit the dash contact by mistake, a complete extra dash in made. This really "murders" the code. With this type, only a slight "tick" or part of a dash is heard. Also, it is more tolerant of individual keying idiosyncracies.

2. There is some interaction between the dot and the dash multivibrators introduced by the common coupling system between them and the keyer tube. It causes no trouble at speeds of less than 40 w.p.m; therefore, the complications of using separate neon-tube couplers and isolating resistors for the dot and the dash pulses was not considered necessary. With twenty watts and a poor antenna, signals will seldom be strong enough for 40 w.p.m. transmissions.

** A 10.6-Mc. crystal would center the lower 200 kc. of each band on the dial—**Editor.**



The "Brief Case" station ready to go. How far will it go? W6MUR/6 has worked Australia and New Zealand with it on both 40 and 20 meters. A conventional bug is shown as a suitable "paddle" key for the electronic keyer had not been constructed when the photos were taken.

Construction

The entire station is constructed in a 10"x 14"x3" chassis turned upside down. One of the 3x14-inch sides becomes the front "panel." The miniature *National* type MCN dial that controls *C18* will just fit, if a bit is trimmed off of its inner rotating plate and care is taken in positioning and drilling the mounting holes. Use the smallest available knobs for the remaining controls.

Exact dimensions and spacings are not given, because they will vary with the components used. Close inspection of the different pictures, especially *Fig. 2,* will give the constructor sufficient information to duplicate the unit without undue difficulty. Probably the most important precaution to observe is to use the smallest components available. This applies especially to the bypass and filter condensers, because there are quite a few of them.

All tubes, except the rectifier and the voltage regulator, are mounted on the sheet-metal partition, which bisects the chassis. Lips are bent on each end and the bottom of it to fasten the partition in place with sheet-metal screws. These screws are removed to permit partial removal of the partition when changing tubes.

In *Fig. 2,* the black rectangle to the left of *Ry1* is an L-shaped shield that isolates the transmitter oscillator from the amplifier. Its top was covered with a piece of black paper while the pictures were taken to eliminate excessive light reflection. Under the shield are concealed the important oscillator components, *L5* and *C40.*

Also concealed from view are *C1* and *C2,* which are mounted on the left lip of the chassis, near the *L1/L2* coil shield.

Speaking of *L5,* it is wound in an unusual manner. It contains 38 turns of #20, d.c.c. wire, close wound and centertapped on a ¾-inch form. The two halves of the coil are wound in opposite directions. This construction is necessary to permit covering the two bands with a 50-μμfd. per-section, dual-stator condenser.

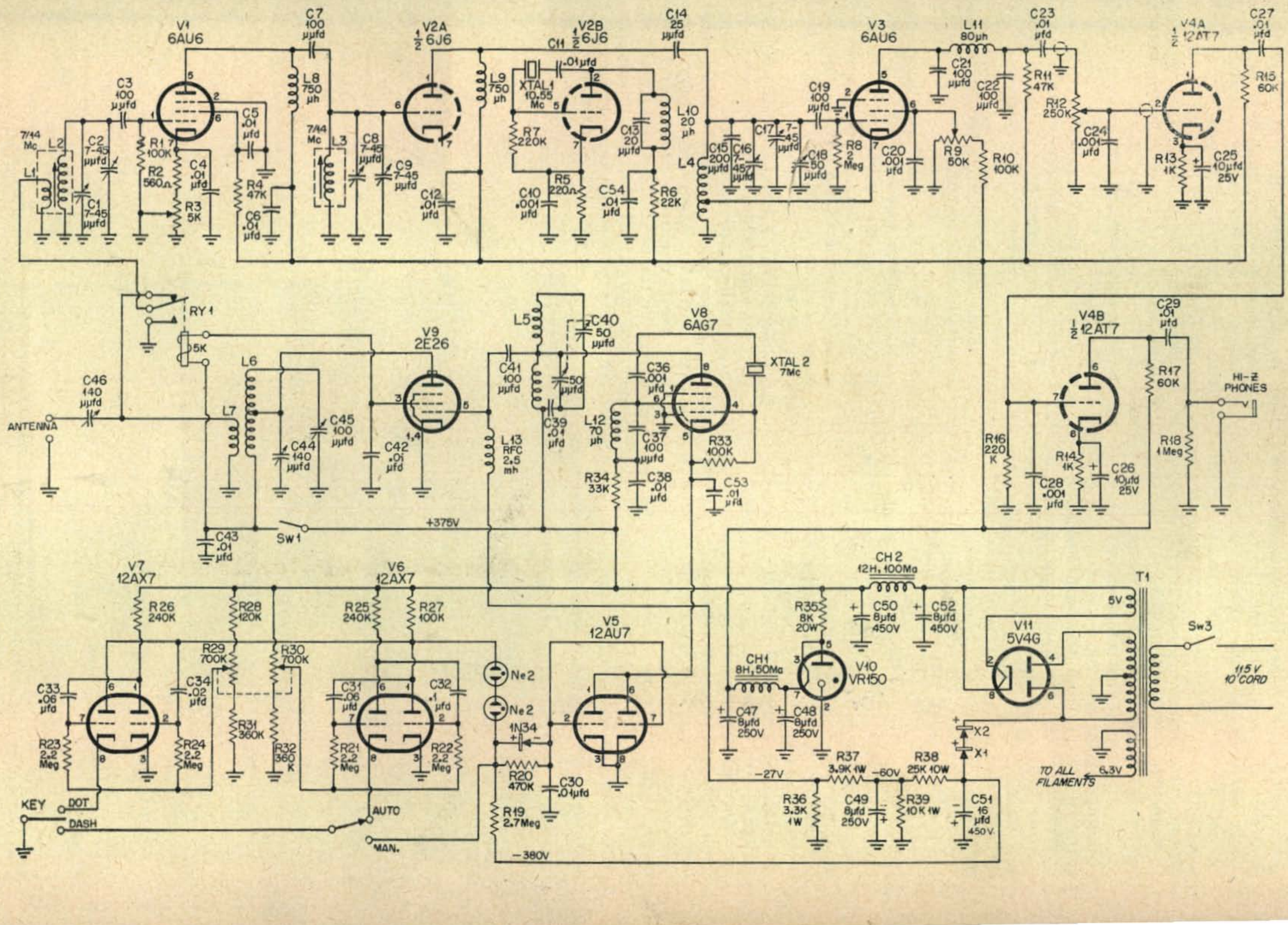
All the remaining coils are conventional. Their specifications are given in the parts list accompanying the schematic diagram. The slug-tuned receiver coils, *L1/L2,* and *L3* are mounted in one-inch square, aluminum cans to minimize the possibility of oscillation in the 6AU6 r-f amplifier.

In wiring the second detector socket, keep its components away from conductors carrying alternating currents, such as the filament and the 117-volt power leads. The tube is shielded for the same reason; i.e., to prevent hum pickup.

When wiring the power supply, remember to connect the selenium rectifiers in reverse of the conventional manner; so that a negative output voltage is obtained. Also connect the

Fig. 1. Equivalent parts of other manufacturers may be substituted, if no larger in physical size.

C1, 2, 8, 9, 16, 17—7-45 μμfd., dual ceramic trimmers (**Erie** N650).
C13, 19—100 μμfd., ceramic (**Erie**).
C4, 5, 6, 11, 12, 23, 27, 29, 30, 35, 36, 38, 42, 53, 54—0.01-μfd., midget mica or ceramic, 400-600 volts (**Aerovox** or **Erie**).
C7, 21, 22, 24—100 μμfd., midget mica. 400-volts.
C10, 20, 28, 36—0.001 μfd., disc ceramics.
C13—30 μμfd., NPO ceramic (**Erie**).
C14—25 μμfd., midget mica.
C15—200 μμfd., zero-temperature-coefficient ceramic.
C31, 33—0.06 μfd., 400v. May require experimental adjustment. See text.
C32—0.1 μfd., 400v. May require experimental adjustment. See text.
C34—0.02 μfd., 400v. May frequire experimental adjustment. See text.
C37, 41—100 μμfd., ceramic (**Erie** N750L).
C39, 43—0.01 μfd., mica 600v.
C40—dual 60 μμfd., midget variable (**Hammarlund** HFD).
C44, 46—140 μfd., midget variable. APC type with shaft.
C45—100 μμfd., midget variable (Hammarlund MAPC).
C47, 48, 49—8 μfd., 250v. electrolytic (**Sprague** Atom).
C50, 52—8 μfd., 450v. electrolytic (**Sprague** Atom).
C51—16 μfd., 450v. electrolytic (**Sprague** Atom).
Ch1—8 henry, 50ma., filer choke. (**Stancor** C1279).
Ch2—10.5 henry 110ma., filter choke (**Stancor** C1001).
L1—5t., #20, d.c.c. at bottom of **L2**.
L2—21t., #24, enam., close wound on ½" slug-tuned form (CTC LS4).
L3—Same as **L2**.
L4—28t., #24, enam., close wound on ¾" form. Tapped 16 turns from bottom (ground end.
L5—38t., #20, d.c.c., close wound on ¾" form, centertapped. Reverse direction of winding at the centertap; so that the two halves are wound in opposite directions.
L6—32t., #18, enam., close wound on 1" form, centertapped.
L7—3t., #18, glass-insulated wire over bottom of L6.
L8, L9—750 μh., r-f choke **National** R-33).
L10—20 μh., r-f choke (**National** R-33).
L11—80 μh., r-f choke (**National** R-33).
L12—70 μh., r-f choke (**National** R-33).
L13—2.5 μh., r-f choke (**National** R-100).
NE-2—Minature neon bulbs, 2 required.
R1, 10, 13—100,000 ohms, ½w.
R2—560 ohms, ½w.
R3—5000 ohm potentiometer.
R4, 11—47,000 ohms, ½w.
R5—220 ohms, ½w.
R6—22,000 ohms, 1w.
R7, 16—220,00 ohms, ½w.
R8—2 meg, ½w.
R9—50,000-ohm potentiometer.
R12—250,000-ohm potentiometer.
R13, 14—1000 ohms, ½w.
R15, 17—60,000 ohms ½w.
R18—1.0 meg., ½w.
R19—2.7 meg., ½w.
R20—470,000 ohms, ½w.
R21, 22, 23, 24—2.2 meg., ½w.
R25, 26—240,000 ohms, ½w.
R27—100,000 ohms, 1w.
R28—120,000 ohms, ½w.
R29, 30—ganged 700,000-ohm potentiometers (speed control).
R31, 32—360,000 ohms, meg., ½w.
R34—33,9000 ohms, 2w.
R35—8000 ohms, wire-wound, 20w.
R36—3300 ohms, 1w.
R37—3900 ohms, 1w.
R38—25,000 ohms, wire wound, 10w.
R39—10,000 ohms, 1w.
Ry1—S-p,d-t relay, 5000-ohms (13-ma.,) coil (**Potter-Brumfield** 5).
Sw1, 3—S-p,d-t, toggle switches.
Sw2—S-p,d-t, toggle switch.
T1—650 to 700v., c.t, @ 100 ma., 6.3v., @ 3.5 A., 5v @ 2 A. One dimension must not exceed 2⅞", to fit chassis (**Thermador C64, Peerless R-340-F**).
V1, 3—6AU6 (2).
V2—6J6.
V4—12AT7.
V5—12AU7.
V6, 7—12AX7 (2).
V8—6AG7.
V9—2E26.
V10—OD3 (or minature equivalent OA3).
V11—5V4G.
Xtal-1—10.55 Mc., fundamental-cut crystal. See text.
Xtal-2—7 Mc., crystals.
X1, 2—100 ma., selenium rectifiers (**Federal .. .. 1101A**).
National MCN dial.


V1 6AU6
V2A ½ 6J6
V2B ½ 6J6
V3 6AU6
V4A ½ 12AT7
V4B ½ 12AT7
V5 12AU7
V6 12AX7
V7 12AX7
V8 6AG7
V9 2E26
V10 VR150
V11 5V4G
T1
RY1
Sw1
Sw3
XTAL 1 10.55 Mc
XTAL 2 7Mc
CH1 8H, 50Ma
CH2 12H, 100Ma
ANTENNA
KEY
DOT
DASH
AUTO
MAN.
HI-Z PHONES
TO ALL FILAMENTS
115 V 10' CORD
+375V
-380V
-27V
-60V
6.3V
5V
1N34
Ne2
Ne2

positive terminals of the electrolytic filter condensers in this part of the circuit to the chassis.

The OD-3/VR-150 socket is wired so that its internal jumper completes the circuit to the auxilliary receiver B+ filter. This protects the 250-volt filter condensers, used here because of their small size, if the unit is turned on with the voltage regulator out of its socket.

Tuning and Adjustment

Tuning of the transmitter oscillator is conventional. It delivers 7-Mc. output when *C40* is resonated near maximum capacity, and it delivers 14-Mc. output when *C40* is resonated near capacity. A ¼-watt neon bulb touched to the 6AG7 plate lead may be used to indicate resonance. Tune for maximum glow.

Tuning the 2E26 plate circuit the first time can be tricky, unless you know what to expect. It tunes to the 7-Mc. band with *C45* set near *minimum* capacity and to the 14-Mc. band with it set near *maximum* capacity. Once *C45* is set, the circuit is resonated with *C44* in the usual manner.

As already stated, the transmitter is designed primarily to feed pre-cut ½-wave doublets. But it can and has been used with other antennas. Antenna coupling is varied with *C46*, which is mounted in a small can and connected in series with one antenna conductor. For the first tune-up, it will be convenient to connect a 100-ma. meter in series with the 2E26 plate-supply lead. Antenna coupling can be adjusted for a 2E26 plate current of about 60 ma. After observing how much a neon bulb placed near the 2E26 plate lead dims at this loading, compared to its unloaded brightness, the neon bulb may be used as the loading indicator.

Placing the regenerative second detector on the proper frequency is the first step in aligning the receiver. Probably the easiest way to do so is with the aid of a calibrated communications receiver. Tune it to 3500 kc. Connect a short wire to its antenna terminal and bring the end of the wire near *L4*.

Set *C18* to half capacity and advance *R9* until the detector goes into oscillation. Then adjust *C16* and *C17* until you hear the signal generated by the detector in the communications receiver.

The communications receiver may be used in the same manner to check the 10.55-Mc. crystal for oscillation.

Lacking a calibrated signal generator, the transmitter oscillator may be used as a signal source for adjusting the receiver r-f and mixer circuits. Set *C40* for 7-Mc. output, remove the B+ voltage from the 2E26 with *Sw1*, turn *Sw2* to "Manual," plug in an appropriate crystal, and close the key.

Screw the slugs in *L2* and *L3* half way. Set *C1*, *C2*, *C8*, and *C9* near maximum capacity and tune in the transmitter oscillator signal with *C18*. Then peak *C1* and *C8* for maximum signal strength in the phones, regulating volume with *R3*. Next, repeat the process for 14 Mc. by tuning the transmitter oscillator for 14-Mc. output and setting the receiver trimmer condensers (*C1, etc.*) to minimum capacity, before

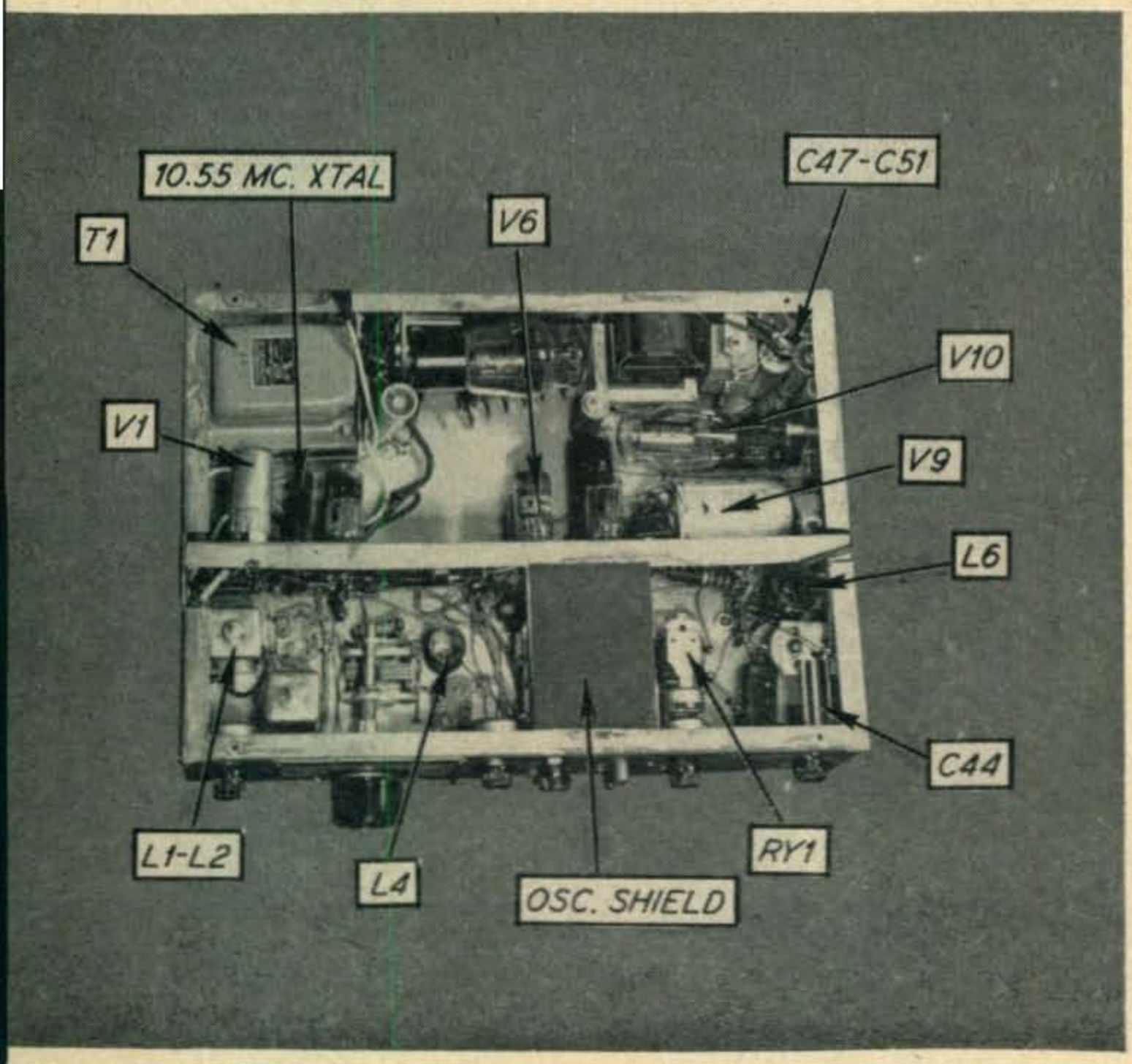


Fig. 2. This photograph shows the construction of the W6MUR portable station. Exact dimensions have not been included with this article since they will depend largely upon the individual requirements.

HERE'S WHY...

It's Easy to Buy—from

WORLD'S LARGEST DISTRIBUTOR OF AMATEUR RADIO EQUIPMENT · THE WORLD

Leo. E. Meyerson
WØGFQ

- WRL Provides for only 10% down payment; up to 18 mos. to pay. You deal only with us!
- WRL Features special "10 Day Free Trial" Plan.
- WRL Offers over 600 bargains in reconditioned equipment. *Save up to 50%.*
- WRL Reconditioned sets have 100% trade-in value within 90 days of purchase. (New gear, only).
- WRL More *Money-Value* for your trade-ins. Ask the man that deals with WRL.

LOOK AT LEO'S OFFER ON THESE National NC RECEIVERS

FELLOWS, WE OFFER:

The highest trade-in values in the industry! Let us know what you have and what you want!

NEW NC-98

ONLY $8.19 PER MO.

$15.00 CASH DOWN

$149.95 CASH

Here's top-notch value! Now, for the first time, a crystal filter, an S-meter, choice of electrical bandspread on amateur or SWL bands, an RF stage and 2 IF stages . . . only a few of its many fine features.

NC-88

Only $9.54 PER MONTH

$12.00 Cash Down

$119.95 CASH

Newest receiver with built-in speaker. Advanced AC superhet circuit. Tuned RF stage, two IF stages, two hi-fi audio stages with phono input. Separate hi-frequency oscillator & many, many other features. Write for complete data sheet today.

HRO-60

Dual conversion on all frequencies above 7 mc. Edge lighted, direct frequency reading scale. three IF stages at 456 kc employing 12 permeability tuned circuits on all bands; one IF stage at 2010 kc on all freq. above 7 mc. Built-in power supply. Separate BFO switch and frequency control. Only $533.50, less speaker.

ONLY $29.08 Per Mo.
$53.35 CASH DOWN

NC-183D

Designed for maximum sensitivity and selectivity. Dual conversion added to IF system with 1720 kc. first conversion frequency. Condenser specially guarded against vibration and shock. Special push-pull, high fidelity audio system incorporated. Includes all time-tested features of the NC line. Less speaker, only $399.50.

ONLY $21.78 Per Mo.
$39.95 CASH DOWN

SPEAKER FOR HRO-60 OR NC-183D $16.00 ADDITIONAL

EVERY PIECE OF OUR RECONDITIONED EQUIPMENT CARRIES A 90 DAY, FACTORY-NEW GUARANTEE! IF YOU ARE NOT 100% SATISFIED WITH ANY PURCHASE FROM WRL, RETURN IT WITHIN 10 DAYS, PREPAID, FOR FULL CREDIT.

GLOBE SCOUT

65 WATT — BANDSWITCHING

Operates 10-160 M. Metering provided. Pi Network antenna tuner. Self-contained power supply. 100% modulation of Final. Thoroughly TVI-screened. Provisions for dynamotor attachment. 8" x 16" x 8" cabinet.

Only $99.95 completely wired.

PAY JUST $7.95 PER MO.

NEW GLOBE KING

500 WATT—BANDSWITCHING

500 watts on fone and CW. Completely bandswitching 10-160M. Provisions for VFO and SSB input. Thoroughly screened and by-passed for TVI! Protective bias, dual power supply, push-to-talk, Pi Network, just a few of the many fine features.

Only $675.00 — Pay just $36.78 per mo.

EVERYTHING IN ELECTRONICS! !
THE NEW 1955
FREE
WRL CATALOG
OVER 15,000 TOP-VALUE ITEMS

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

Please send me your New Free Catalog and full information on the items checked below! **Quote your top Trade-In offer for my:** _____ C-11

(Name and Make of Equipment)

for your _____
(New Equipment Desired)

☐ NC-98 ☐ NC-88 ☐ HRO-60 ☐ NC-183D
☐ Globe Scout ☐ Globe King ☐ Reconditioned Equipment List ☐ E-Z Pay Plan

NAME _____
ADDRESS _____
CITY & STATE _____

WORLD'S MOST PERSONALIZED RADIO SUPPLY HOUSE

3415 W. BROADWAY, CO. BLUFFS, IA., Phone 2-0277

the Novice Shack

Conducted by

Herbert "Herb" S. Brier, W9EGQ

385 Johnson Street, Gary 3, Indiana

Vacuum tubes make radio as we know it today possible; therefore every amateur should know something of their development and how they work.

The First Vacuum Tube

The incandescent electric was the forerunner of the first vacuum tube. The English scientist, Fleming, introduced a metal plate inside the evacuated bulb close to the filament. He then connected a meter and a battery in series between the filament and the plate (also called the anode) as shown in *Fig. 1.*

With this circuit, Fleming discovered a number of interesting things. With the battery polarity as shown, an electric current flowed through the circuit, which included the vacuum inside the bulb, normally an excellent insulator. He could control the amount of current by varying either the plate battery voltage or the filament temperature (voltage). Furthermore, reversing the plate battery connections cut off the current flow, no matter how high the voltage or how hot the filament. Finally, substituting an alternating current source for the battery produced a pulsating direct current flow through the tube during the half cycles when the plate was positive with respect to the filament.

Fleming's experiments proved that the heated filament was emitting electrons, which are minute charges of negative electricity. Normally, these electrons hovered in an invisible cloud around the filament to form what is known as a *space charge.* The positive voltage on the plate overcomes this charge and attracts the electrons to it (*unlike charges attract; like ones repel*), thereby causing a current to flow from the cathode to the plate.

No current flowed in the opposite direction when the plate battery polarity was reversed, because the cold plate did not emit electrons to be drawn to the cathode.

Such a two-element tube is now called a *diode,* from the Greek *di,* meaning *two,* and *-ode* for *way* or *path.* Before discussing its uses and later tube developments, we will investigate the source of the *free* electrons in a tube. Its general name is the *cathode.**

The Cathode

Although all matter contains tremendous quantities of electrons, knocking them free of most substances is like chipping granite with a toy hammer. The only really practical method of obtaining free electrons in the quantities required in a vacuum tube is the original method: "boiling' 'them out by heating a metallic filament (passing an electric current through it). This process is known as *thermionic emission.* When the heating and emitting functions are combined in one element, we have the *filament-cathode.*

All early tubes used pure tungsten filament-cathodes, because it was the only material then known

---

* The difference between a **filament** and a **cathode** is a matter of definition. The word **filament** defines a shape—long and thin or thread-like, while the word **cathode** defines a function. Therefore, not all filaments are cathodes, nor do cathodes have to be in the shape of a filament.

Left, the husband and wife station of Bill, W3WRC (right) and Louise, W3WRE, Moreau, Johnstown, Pa. Standing beside Bill is his brother Ken, W9KRJ, of Gary, Ind., whom Louise and Bill call "Ham radio teacher extraordinary." To Ken's left is Bill's brother-in-law, "Buzz," W3WET, Glenolden, Pa. These calls are familiar to regular readers of the Novice Shack through Louise's reports on her sometimes-frustrating experiences as a Novice. As of early September, she, Bill, and "Buzz" shed the "N's" from their calls.

Clarence Kado, K6CJQ, Gardene, Calif., worked 44 states and seven countries with ten watts on seven Mc. in four months. Then, raising his power to seventy watts, he added another five countries. His antenna is a "drooping ground plane" vertical, fifty feet high.

we're trading high at ALLIED

why wait for that new receiver?

get the best deal
select your new receiver and get the top trade-in on your old equipment

easiest terms
only 10% down, or your trade-in as down payment

write us today
and you'll see what we mean by "Trading High"

TAKE YOUR PICK FROM RECEIVERS LIKE THESE:

Collins 75A-3. Peak performance from 160 to 11/10 meters. Dual conversion plus 9 tuned circuits and 3 kc mechanical filter.
98 SX 028. Net . . . **$530.00**
97 SX 776. 10" speaker. Net **$20.00**

Hallicrafters S-85. NEW! 540 kc—34 mc in 4 ranges. Bandspread, RF amp., dual IF's, BFO with pitch control, ANL, tone control built-in speaker, etc.
98 SX 711. Net . . . **$119.95**

Hallicrafters SX-88. Dual conversion; 535 kc to 33.3 mc in 6 ranges. 2 RF stages, 50 kc second IF, crystal-controlled 2nd conv. osc.
98 SX 715. Net . . . **$595.00**
98 SX 716. 10" speaker. Net **$19.95**

Hammarlund HQ-140-X. 540—31 mc in 6 ranges. Crystal filter, ANL, 6 sel. positions, elect. bandspread, etc.
98 SX 766. Net **$264.50**
97 SX 757. 8" speaker. Net **$14.50**

National NC-98. 550 kc—40 mc coverage. Crystal filter, S-meter, separate HF osc.
98 SX 732. Net **$149.95**
NC-98SW. As above, but with bandspread for 17, 19, 25, 31, 41 meter SW BC bands.
98 SX 720. Net **$149.95**
98 SX 722. Matching 6" speaker. Net **$11.00**

National NC-183D. Dual conversion; 540-31 mc and 47-55 mc in 5 ranges. 3 IF stages, 16 tuned circuits, 4.4–55 mc.
97 SX 666. Net **$399.50**
97 SX 663. 10" speaker. Net **$16.00**

National HRO-60. Dual conversion; 1.7-30 mc; bandspread on 80, 40, 20, 11-10 meters. 2 RF stages; ANL; S-meter, 6-step crystal filter, etc.
97 SX 722. Net **$533.50**
97 SX 721. 10" speaker. Net **$16.00**

ALLIED is headquarters
for all amateur receivers and station gear. For the best trades in hamdom, write us. Describe your equipment, tell us what you want to buy, and we'll reply promptly with the best deal you'll get anywhere.

Trade HIGH at ALLIED write us today

FREE:
Your 308-Page 1955 ALLIED Catalog. Get it—use it for the best deals in Ham Radio.

ALLIED RADIO
100 N. Western Ave.
Chicago 80, Illinois

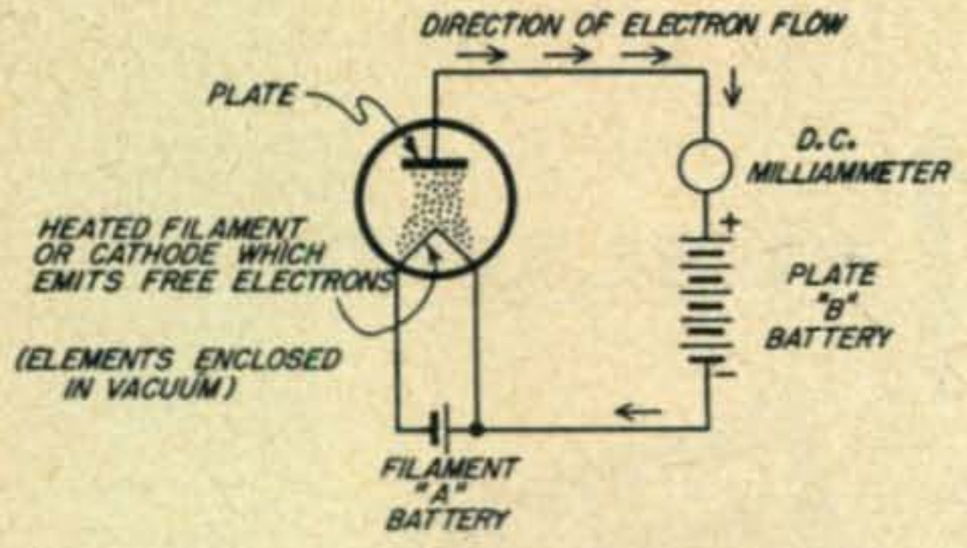


Fig. 1. Circuit to demonstrate properties of the diode, the first vacuum tube. Details in text.

that could be heated enough to release electrons in quantity and still have a reasonably long life. Later, it was discovered that adding a small amount of thorium to the tungsten greatly reduced the temperature required to emit electrons. Next, it was discovered that certain rare-earth oxides exhibited still higher thermonic efficiencies.

In use these oxides are painted on the filament, usually a nickel alloy in this application. Also, because the temperature required is so reduced, it is practical to apply the oxide to an insulated metal sleeve and to pass the heating current through the filament inside of it. This arrangement produces an *indirectly-heated cathode*, and the filament is then usually called the *heater*.

The indirectly-heated cathode came into general use when power to heat the filaments was obtained

Using a home-built 6AG7-807 transmitter running seventy watts, a folded dipole and an NC-98 receiver, David Walker, WN5FPA, Van Buren, Ark., has worked 29 states in a month and a half.

from the commercial, a-c power mains, rather than from batteries, because it helps prevent the alternating heater current hum modulating the tube's output. Too, it is frequently an operating advantage to have the heater and the cathode electrically independent of each other.

A disadvantage of the more-efficient cathode materials is that they are adversely affected by continuous high-voltage fields; consequently, most tubes designed to operate with above about 3500 volts on their plates still use pure tungsten filaments; medium-voltage transmitting tubes use thoriated-tungsten filaments; and all receiving tubes and many transmitting tubes operated at plate potentials of 750 volts or less use oxide-coated cathodes, either directly or indirectly heated.

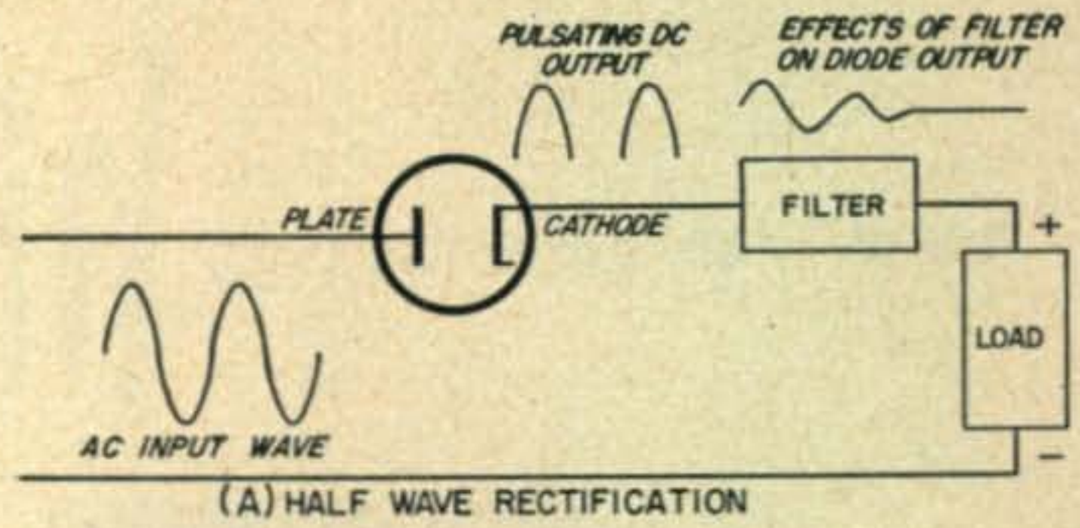


Fig. 2. Fundamental power-supply circuits using diodes as rectifiers. In (B), two diodes are combined in one envelope to form a full-wave rectifier. In high-voltage power supplies, separate ½-wave rectifiers are often employed. Part (A) is also used in the text to illustrate the machanics of radio signal detection.

A few comparisons will give an approximate idea of the thermionic efficiencies of the various cathode materials. The *UV201*, a very early tube, required five volts at one ampere to heat its tungsten filament. Its successor, the *201A*, the same tube, except that it used a thoriated filament, required five volts at one-quarter ampere. Modern battery-operated tubes require only 1.25 volts at 0.04 to 0.1 amperes to heat their oxide-coated filaments!

Operation Of Diodes

Getting back to the diode, its principal uses are as power-supply **rectifiers** and signal **detectors**. **Figure 2** shows two power-supply circuits employing diode recti-

Alan Harper, KN2HLY, Plattsburgh, N.Y., started his amateur career with an old General Electric "All Wave" receiver and an AT-1 transmitter; he worked 14 states in five weeks with this combination. He then got an AR-2 receiver and now has 22 states and Canada.

NOW HENRY DARES TO GIVE YOU THIS GUARANTEE

100% SATISFACTION
or Your Money Back at end of 10 day Trial

Bob Henry,
WØARA
Butler, Mo.

Ted Henry,
W6UOU
Los Angeles

hallicrafters

NEW SX 96

For top performance with extra pull power and ability to tune in stations.

$25.00 Down
18 monthly payments of $13.60
—$249.95 Cash Price.

SX88—$60.00 down
18 monthly payments of $32.40—$595.00 Cash Price

SELECTIVITY—For the first time, selectivity from 10 KC to 250 cycles in six steps.

	Cash Down	18 Monthly Payments	Cash Price
S53A	$10.00	$ 5.45	$ 99.95
S85	12.00	6.54	119.95
SX99	15.00	8.00	149.95
SX62A	35.00	19.07	349.95
HT20	45.00	24.50	449.50

Only Henry gives you

- **Top Trades**
- **Only 10% Down**
- **Easy Terms**
- **Fast Delivery**
- **Personal Service**
- **Low Prices**
- **Complete Stocks**
- **We *want* you to be satisfied. Ask any Ham about Henry. And Henry has the new equipment *first*.**

Write, wire, phone or visit either store today.

We will have all the New Hallicrafter models in stock as soon as they come out.

Henry Radio Stores

Butler 1, Missouri
Phone 395

BRadshaw 2-2917
11240 West Olympic Blvd. Los Angeles 64

fiers. **Figure 2A is a half-wave** circuit. The positive halves of the alternating-current wave pass through the diode to appear as direct-current pulses at the cathode. These pulses are then smoothed out by the filter to appear as a pure direct current at the load. Connecting the diode as shown produces a positive output voltage. Reversing it will produce a negative output voltage by passing the negative halves of the alternating-current wave.

Figure 2B utilizes a dual diode—two plates working against a single cathode—and a transformer with a center-tapped secondary to rectify both sides of the alternating-current wave. The d-c output of full-wave rectification is easier to filter than that of half-wave rectification, because each a-c cycle produced two d-c pulses. The half-wave circuit finds its greatest application in so-called a.c/d.c. receivers, where the alternating house current is fed directly to the diode plate.

Diode Detectors

Figure 2A may also be used to illustrate the operation of a diode detector. Instead of low-frequency house current, assume that the input wave is a radio signal, with a frequency measured in millions of cycles per second. Also assume that the load is a pair of headphones. The diode will rectify this signal exactly as before, producing d-c pulses through the phones. These pulses are so close together that only a minimum of filtering is required to smooth them into pure direct current.

Now assume that the radio signal is amplitude modulated; i.e., its strength is varying in accordance with

"Chic" Barnett, K2BVF, and his brothers, W2DVI and K2BVG, form the Ham population of Newport, N. J. Running forty watts, Chic has worked 41 states and six countries on 80 and 40 meters.

the intelligence it carries. Naturally, the current through the phones will vary in the same manner, and anyone wearing them will hear a reproduction of the original modulation.

Note that the detector does not actually convert the radio-frequency signal into an audio-frequency signal. Rather, it converts it to direct current, and this direct current increases and decreases in exact step with the modulation. Thus, it is the modulation that produces the audible signals we hear in the phones.

News For And About Novices

As a result of petition presented by James Price, W5FXN, and Tom Walker the **Federal Communications Commission** in Docket No. 11157, proposes to open the 50-54 Mc. and 144-148 Mc. amateur bands to the holders of Technician Class licenses. Interested parties may file written data in favor of or in opposition to this proposal with the Commission before November 15, 1954. An original and four copies of all data must be furnished.

This docket will undoubtedly be discussed more thoroughly in other portions of this issue of CQ; therefore, I simply mention it here for the benefit of Novice and Technician licensees who are primarily interested in the UHF/VHF amateur bands. I personally am heartily in favor of the idea.

Carol Dugan, **W7TQP**, 1036 S. Walnut, Casper, Wyo.,

"Mac," OH1RX, calls himself a Finnish "Novice," but within two years of operating, his fifty watts have worked about 100 countries.

writes; "Although I had had my Conditional license since March, I still read the **Novice Shack** and work Novices. I have a VFO and run 80 watts on 7 Mc. only. So far, I have worked 45 states and would certainly like to make a "sked" with anyone in Vermont, Delaware, and South Carolina. Also with anyone who would like to work a YL (14) in Wyoming. I'd like some pen pals, too."

"Doc," **WØFDM** (Ivan T. Schultz., M.D., Humboldt, Iowa), forwards a helpful tip: "I thought I might offer a suggestion to those learning Ohm's Law and the power formula. I learned it from my college physics professor and used it while teaching high-school physics.

"To remember Ohm's Law, think of the word **ERIE**: **E = R x I = E**, where **E** is the electromotive force in volts; **R** is the resistance in ohms; and **I** is the current in amperes.

"For the power formula, think of what most of us like for desert, **PIE**: **P = I x E**, where **P** is the power in watts, and **E** and **I** are as above.

"Knowing these two formulae, it is also easy to calculate power when voltage and resistance or current and resistance are known. When **E** and **R** are known: Rearranging the first formula gives us **I = E/R**; therefore **P = E/R x E**, or **P = E** square **R**.
When **I** and **R** are known: **E = I x R**; therefore, **P = I x I x R**, or **P = I** square **R**."

Stanley Wilson, Jr., **WN9IFZ**, Rt. 1, Washington, Ind., says; "I am on 7 Mc. with an 807 running about 70 watts, a ½-wave doublet antenna, and an S-38 receiver.

[*Continued on page 67*]

J. David Gattermeir, WØQBX, California, Missouri. The cards on the wall indicate that Dave worked his share as a Novice. He is presently organizing a teen-age net on 75-meter phone.

NOW! 3 ARROW SALES OFFICES!

FASTER SERVICE! LOWER SHIPPING COSTS! BIGGER SELECTION OF ELECTRONIC EQUIPMENT

To **speed up service** and **reduce shipping costs,** Arrow Sales of N. Hollywood announces the joint openings of a central branch sales office located at:

2441 SOUTH MICHIGAN AVE., CHICAGO 16, ILL.

and a branch sales-showroom at

2005 EMPIRE AVE., BURBANK, CALIFORNIA

This expansion makes available one of the largest stock of aircraft, radar, test, commercial, Ham and military equipment ever assembled by one company!

For quickest service and lowest transportation costs, **direct all mail to either the North Hollywood or Chicago mailing address,** whichever is closer to you.

All buyers in the western area **wishing to inspect or purchase equipment** are invited to visit the Burbank sales-showroom at 2005 Empire Avenue.

Now, more than ever, its pays to do business with Arrow Sales!

INDICATOR SCOPE

ID6A/APN4

Made to operate in conjunction with Radio Receiver R9/APN-4. Unit includes one 5" scope tube, crystal controlled standard oscillator, sweep circuits, marked pulses. Good cond. Weight 40 lbs.
WITH TUBES & CRYSTAL **$19.95**

ARC-4 MOBILE TRANSCEIVER

140-144 MC Complete with control box, tubes. dynamotor with schematic. Excel. cond. 12/24 VDC
Wt. 38 lbs..... **$32.50**

C.A.P. SPECIAL

BC-625 VHF TRANSMITTER

Freq. range 110-156 MC. With modulation section and speech amplifier. Less tubes & crystals, with conversion dope. Used, good condition. (See Nov/53 CQ.)
Wt. 17 lbs..... **$9.95**

TG-10 CODE KEYER

Self-Contained Automatic unit for code practice signals from an inked type recording. Complete with 7 tubes and electric eye: Audio freq. output of 800 CPS. Size: 11x24x18½"—110-220 VAC 60 cy.—78 RPM motor can be used for a turntable—Power unit can be used for a P.A. system—
wt. 85 lbs. Used, clean cond..... **$14.95**

SOUND POWERED HANDSET. Ex. cond.....Ea. **$ 5.50**
2 for **10.00**
T-26 CHEST MIKE. New..... **1.45**

NEW HAM CIRCULAR!

Ask for your FREE copy!
Drastic reductions on selected hot items!

BC-669 RADIO RECEIVER AND TRANSMITTER

Excellent for 75 and 160 Meter

45 watt crystal controlled CW-phone transmitter, companion receiver, both have a frequency range of 1680-4450 KC. The receiver is tunable and crystal controlled. Two meters for tuning transmitter. Superhetrodyne type receiver using iron core tunable coils for high gain and selectivity. Built-in speaker supplied.
CD-515 cable, tubes and 10 crystals with schematic. Like new condition. With carrying case. **$89.50**
WT. 180 LBS.

PE-110 AC power supply 115 V 60 cps input.....**$39.50**
RM-21 Remote control unit..... **6.95**

ARB NAVY RECEIVER

105 to 9050 KC. Four Bands, Calibrated Dial, LF-Ship-BC 6 Volt. Size 8¼" x 7¼" x 15¼". Excellent cond. With —80 & 40 Meter—Complete with Tubes and Dynamotor. For 24 Volt operation; easily converted to 110 V—12 or schematic.
Weight 30 lbs..... **$19.95**

DU-1 DIRECTION FINDER LOOP AMPLIFIER for ARB receiver. With tubes and loop. Excel. cond. With schematic. Wt. 10 lbs..... **$19.95**

UHF TRANSMITTER-RECEIVER APS-13

$3.95

Freq. range 415-420 MC. 5 stages of 30 MC. IF amplifier. Complete with R.F. and I.F. sections. Less dynamotor, tubes, and tube shields, with schematic. Excel. cond. Weight 13 lbs.

234-258 MC RECEIVER

11-tube UHF tunable receiver with schematic. Like new. Wt. 10 lbs..... **$14.95**
Rack.....**$3.50** Control Box.....**$1.50**

All shpts. F.O.B. whse., N. Hollywood or Chicago. Calif. or Illinois residents add sales tax, 25% deposit required. Specify shipping instructions and **ADD SHIPPING COSTS TO EACH ORDER.** All items subject to prior sale and change of price without notice. Direct all mail to N. Hollywood or Chicago mailing address.

ARROW SALES, INCORPORATED

Western Mailing Address
P.O. BOX 3878, N. HOLLYWOOD, CAL.
Office-Warehouse: 7460 Varna Ave., N. Hollywood, Cal.
Phones: STanley 7-6005, POpular 5-1810

Central Mailing Address
2441 S. MICHIGAN AVE., CHICAGO 16, ILL.
Phone: CAlumet 5-9313
(CABLE ADDRESS: ARROWSALES, N. HOLLYWOOD
TELEGRAPH ADDRESS: WUX, N. HOLLYWOOD, CAL.)

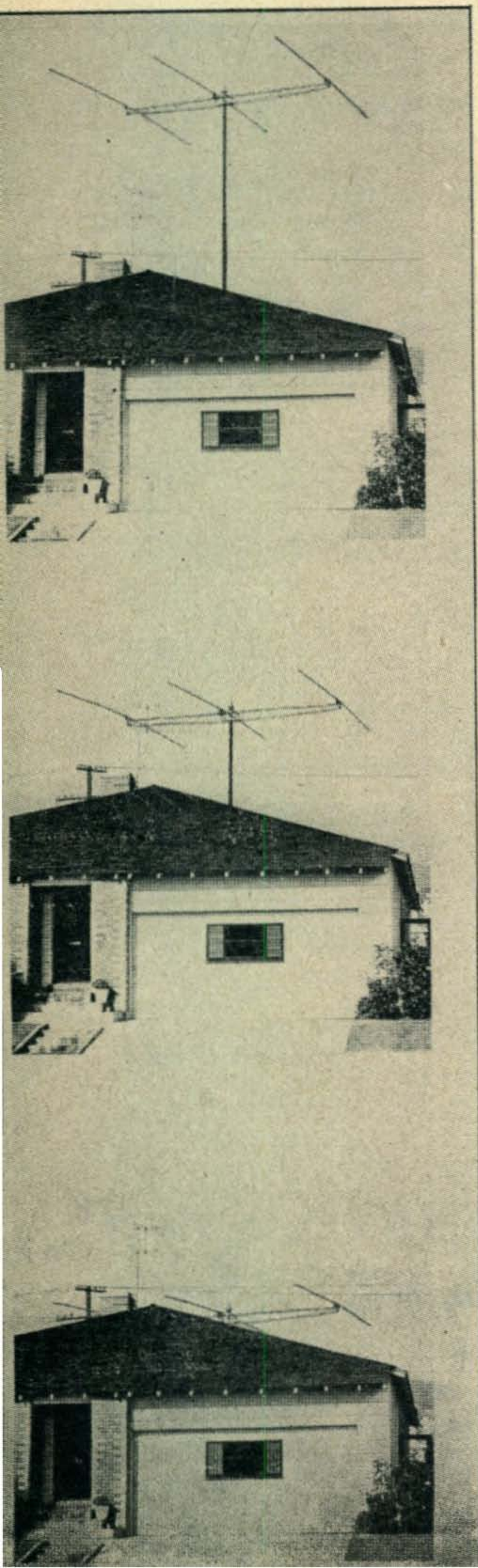
Visit our sales-showroom at 2005 EMPIRE AVE., BURBANK, CAL. Phone: VIctoria 9-2834

CQ Antenna Feature

What You Should Know About Telescoping Towers

WILLIAM I. ORR, W6SAI

Assistant Editor, CQ



GOING—GOING—GONE. The wide spaced three element twenty meter beam of W6FHR gracefully descends from the operating height of fifty feet to a resting height of 22 feet. The motor driven tower can actually drop the beam below the level of the house roof, when the tower is fully retracted. The fifty foot steel tower stressed to withstand the heaviest winds is guy-less and entirely self-supporting. The 25 foot boom is rotated by a surplus "prop pitch" motor, mounted atop the boom. Two selsyn drives are attached to the antenna system. One indicates the heading of the antenna, the other indicates the extended height of the tower. When the 20 meter band is dead, W6FHR shunt excites the tower as a top loaded vertical antenna for 40 and 80 meters!

First — What NOT to DO

Working on a beam antenna closely resembles the task of building a boat in the basement. If one is not careful during the building of the boat, the day may come when it is necessary to tear out the side of the house to get the boat out of the basement. The analogy applies more closely to a beam antenna than one would think, once the beam is built and placed atop the tower. If one is not careful during the building and tuning of the beam antenna, the day may come when it is necessary to take the antenna down to make some minor repair, or tuning adjustment. To the sorrow of many Hams, getting the beam antenna down to the ground from the top of a thirty or fifty foot tower is no easier a task than getting the proverbial boat out of the basement.

This homely little simile was brought forcibly to my attention during an attempt to adjust a stacked 15 over 20-meter dual array. After the monstrosity had been struggled to the top of the tower, measurements indicated that inter-action between the two beams effectively detuned them both so that they were practically useless.

What to do? Hang by my heels fifty feet in the air, retuning the beams, my family (anxiously) and neighbors (hopefully) waiting for me to drop to a sudden end? In addition, every Ham well knows—by the theorem of *IPOIO*[1] that the wind will start blowing in heavy gusts the moment a foot is placed on the top rung of the tower, no matter how mild the climate at ground level may be.

1. Liscum Diven, "IPOIO," **CQ**, April 1952, p. 49.

The only answer was to lower the whole array, make the necessary adjustments on the garage roof, and then to raise it into position atop the tower once more. This looked like a dismal project that would take up at least two good week-ends, that might otherwise be spent working DX, or something equally profitable.

The job was finally done (actually requiring three weekends, during one of which EA9DD was worked by all except W6SAI), and involved a tremendous amount of physical wear and tear. After the completion of this little chore, some serious thought was devoted to the problem of designing a new antenna set-up that would lower the antenna to the vicinity of the ground to permit adjustments to be made with ease, perhaps at the top of a step-ladder.

A Solution

The first thought was to place the antenna and rotator on a little car that would run up a track bolted on the side of the tower.[2] This would necessitate an un-guyed tower, or one with removable guys. It would also involve some rather close tolerances between the track and the car, plus quite a bit of machine work. In addition, it would be impossible to rotate the antenna at any intermediate elevation, since the tower and track would block rotation of the beam. Since quite a bit of time and money would undoubtedly be expended on the proposed tower, it was felt that rotation of the beam at any chosen altitude was a "must." Just off-hand, I could think of any number of interesting experiments that could be run with a beam that could be elevated as well as rotated. As a final down-to-earth clincher, when the beam is dropped to a low altitude, nothing is visible to the neighbors. The antenna would only be run up into the air when in use. I was convinced and "Project Telescope" was started.

2. Anderson and Anderson, "Lower that Beam," CQ, June 1949, p. 28.

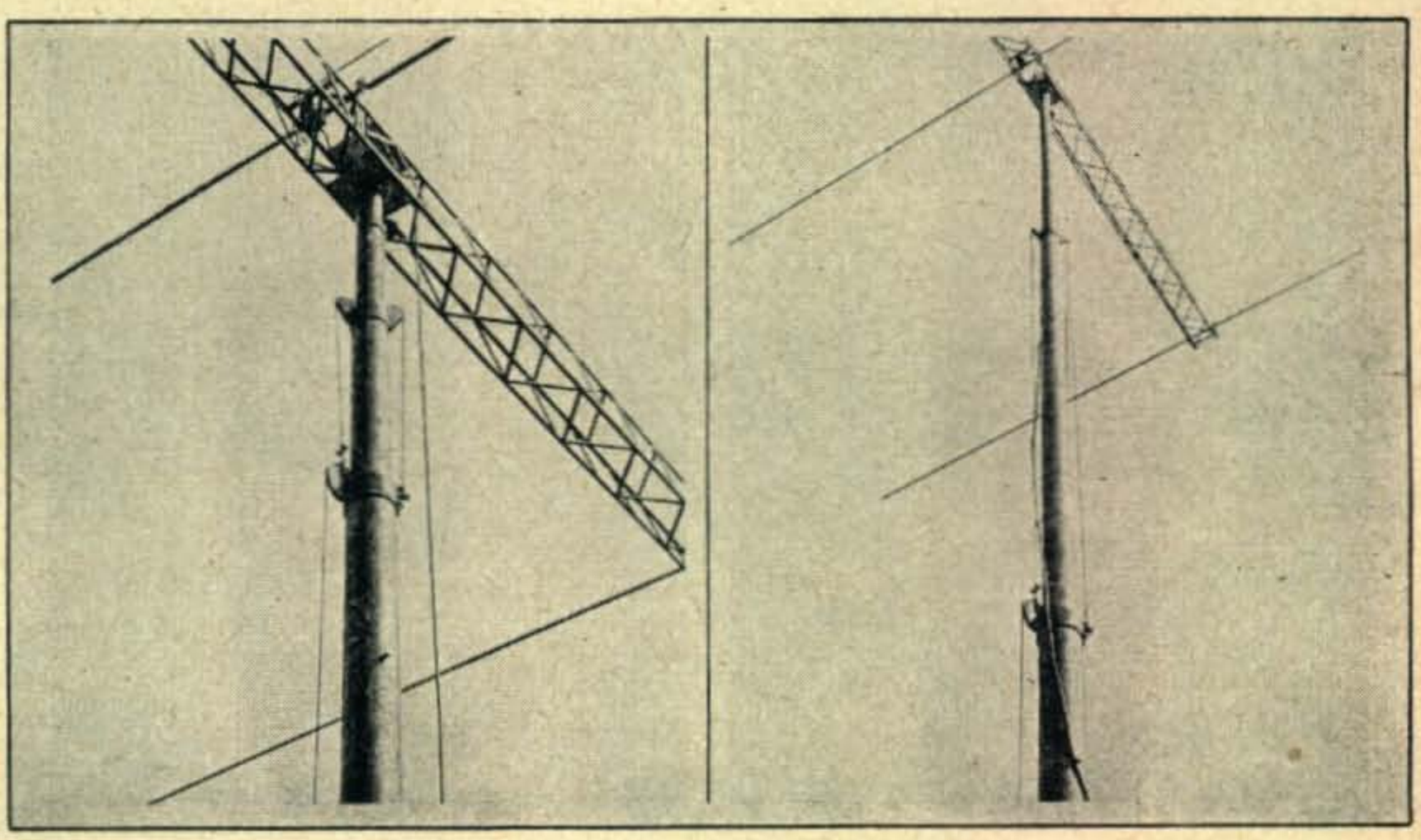
The tower-track idea was eventually dropped and a form of telescoping tower, made in concentric sections, that could be raised and lowered by mechanical or hydraulic means took its place. This system possessed three important advantages:

1. As the beam descended, the tower would "shrink," leaving no residue above the beam to antagonize the neighbors.
2. The beam would always be at the "top" of the tower. This solves the problem of turning the beam at various altitudes.
3. If the proper material is chosen for the tower, the required tolerances would be automatically "built-in" the purchased material, thus saving a lot of expensive hand finishing.

Considerable attention was given to the idea of operating the tower hydraulically by means of water pressure. This idea proved to be impractical, as the tower sections would have to be chromium plated and sealed to prevent leakage. ("Put a sprinkler head at the top of your tower and water your petunias as the beam descends," helpfully suggested W6LGU.)

A great deal of weight was given to the opinions of W6FHR, a structural engineer, who had been toying with just such a tower design for some time. We finally joined forces and decided the tower should have the following general specifications:

1. The tower should be made of relatively inexpensive material, such as steel pipe. The construction and assembly should be considered low precision work. This would keep cost to a minimum.
2. The tower should have a minimum height of 18 feet, and should "expand" to a height of 50 feet.
3. The tower should be self-supporting, and no guys should be needed. It should have a safety factor of 100% in a 70 m.p.h. wind, assuming a wind load of 15 pounds per square foot on a 4-element 20-meter beam.
4. The tower should be designed in excess of all local building codes.



Right hand photo — The tower fully expanded. Left hand — A close-up of the tower in a retracted position. The cable drive system and pulleys may be seen, as well as the mounting plate for the 25 foot antenna boom. The antenna is a wide spaced 20 meter array, fed with a gamma match, and RG-8/U line. Special high-stress pulleys and aircraft-type cable are used as the erecting force. The two pulley bushings are located in the center of the photograph.

5. The tower should have a special fixture at the base, so it could be taken down at a later date, if desired.

6. It should be fool-proof in operation, and designed so as to be jam-proof.

The biggest design battle occurred over the problem of whether or not to use guy wires. If one or two sets of guy wires were added to the tower, it would be possible to construct the tower out of much lighter material. In fact, a braced structure of one-inch tubing could be built, sort of on the order of the Eiffel Tower. Strong arguments were advanced by the "guy the-tower" school of engineers, the strongest of which was the monetary savings involved in this type of construction.

After much discussion the problem was boiled down to the simple decision to restate just what we really were looking for. What was the so-called philosophy of the design? Just what were we trying to achieve?

"The idea is roughly like this," stated W6FHR. "What we want is a structure that will cause the antenna to be raised and lowered at will. It must be 'clean' in appearance, and not look like a rat's nest to the neighbors. It must take up a minimum of ground space, and above all, it must be strong; I hate to lay in bed at night during a windstorm and wonder when the darn antenna is going to crash about my ears! I don't want a cheap TV-type mast that has to be held up by a bunch of 'antennas' tied to it. Sure, a guy-less tower costs more, but the amount of money put into the antenna is a small fraction of the money the average Ham puts into his station as a whole! I want a tower that's going to last for fifty years, not one that might flop over if a guy-wire corrodes on me!"

This passionate appeal convinced even the hardest skeptic—the guyed tower was cast into limbo, and we went ahead with our original design. Finally, with a sigh of relief we shipped the blue-prints off to the sub-contractor for fabrication of the tower.

A few weeks later a large, flat-bed truck pulled up in front of the house. The driver, a cigarette clinging perilously to his lower lip, vaulted over the door of the cab and accosted me. "Hey, Bud, where do you want this here tower put?" Encouraged by the friendly kibitzing of the five man erection crew that was standing by, he backed his truck to the prepared tower base, and gently lowered the tower into position.

Springing into action, the five man team heaved as one, and slowly the tower reached a vertical position. The retaining plates were put in place, and excited hands lifted the three-element twenty-meter array to the prepared mounting atop the tower. The coaxial and motor drive cables were plugged into place, and when all was ready, the green "UP" button on the tower control box was pressed, and tower and antenna rose majestically in the late afternoon air. It was a great moment.

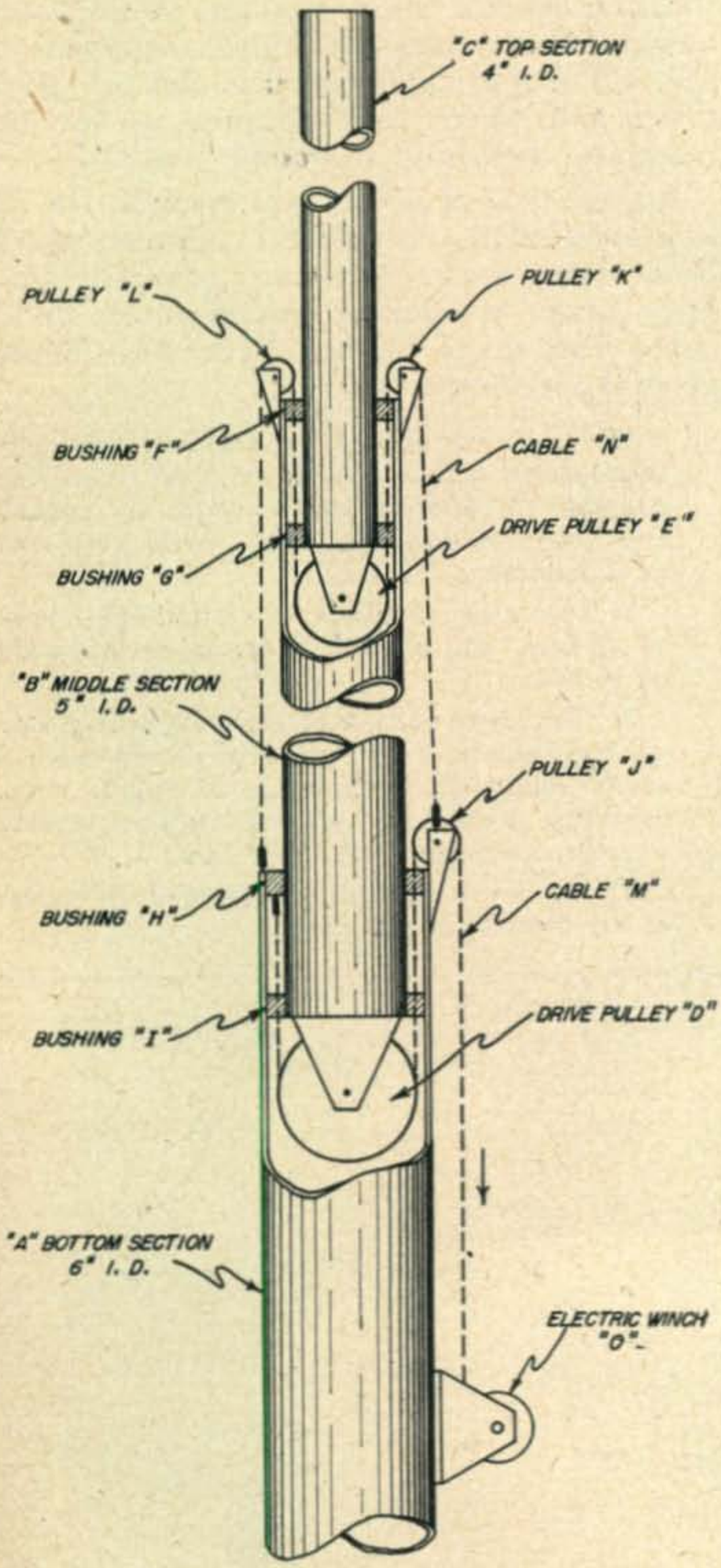


Fig. 1. Mechanics of the tower. See text for all details on operation.

General Design of the Tower

This telescoping tower is made of three sections of seamless steel line pipe, which conforms to *A.P.I. 5L Spec., Grade B.* This pipe is smooth, uniform and resistant to corrosion. It is about 30% stronger than ordinary iron pipe, and its concentricity is much truer. Each section of pipe is 21 feet long. The base section is 6″ I.D., the center section is 5″ I.D., and the top section is 4″ I.D. An overlap of three feet is allowed at the two center joints, and the bottom section of the tower is embedded seven feet in the foundation. This makes the total overall height of the fully ex-

[*Continued on page 50*]

PRICES CUT! FINAL CLEARANCE

ITEMS BELOW MUST GO — NO ORDERS LESS THAN $5.00 ON THIS SALE BECAUSE OF SPECIAL PRICES. SMALL QUANTITIES IN STOCK. ORDER EARLY.

GRIMES RETRACTABLE LANDING LIGHTS

Contains 600 watt 24 V. lamp. Use four in these lighting or small motor and retracting mechanism easily adapted for your disappearing appliances in homes, etc. Used.....ea. **$1.95**

STANCOR 6 V. AUTO RADIO PACK—$19.95

This is the models 752 & 132 packs with reg. price of $43.90. Delivers 6 V. at 12.5 amps continuous and 25 amps instantaneous. Choke condenser filter for direct opr. of auto receivers. Metered voltage output. Used, 132 packs....**$19.95 ea.**
Late Model New, 752 packs.... **29.95 ea.**

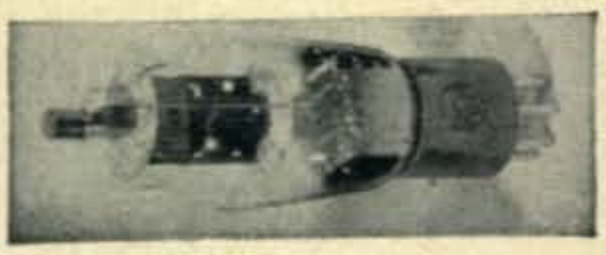
TRANSTAT VOLTAGE REGULATOR

Type TH 115 V. input 50-60 cy. Output 57.5-0-57.5 or may be connected for 0-125 V. output @ 45 amps max. NEW.....**$45.00**

TRANSTAT VOLTAGE REGULATORS

Type RH 90-130 V. input 50-60 cy. Output 115 V. 30 amp. max. NEW.....**$29.50**

1625 TUBE 12 V. 807



These tubes are 807's with a 12 V. filament making them ideal for new 12 V. car mobile transmitters.

New JAN boxed, guaranteed.....ea. **39c**
Lots of 10 or more.....ea. **29c**

HEYER CIRCUIT TESTER — NEW — $19.95

Mfd. for the U.S. Army for check & setting of generators & other electrical apparatus on 6 & 12 volt automotive equip. Brand new.

SIGNAL CORPS TELEGRAPH KEY — $1.00

Type J-47 Signal Corps key with heavy silver contacts and Bakelite base.

AR-1 ARGON 2 W. BULBS — 30c ea.

Reg. screw base. Packed 10 per box @ $2.50 box.

MOBILE ANTENNA MOUNT-75c

Heavy spring base mount used by Signal Corps for vehicle antenna. Threaded bushing takes MS-51 mast sec. Bottom bushing 11/16" dia. with 1/2" hole. Measures 9½" long, 1½" dia. Mast sections MS-49-50-51 to make up 9 ft. ant. 75c per sec.

AN-80 ANTENNA

465 Mc. Antenna which may easily be trimmed for amateur use. Easily mounted for mobile use. Includes rubber gasket for rooftop. Matches 52 ohm cable, coax cable fitting included. NEW.

2 for 79c Each

POTENTIOMETERS 25 for $1.79

Here is a close out of many fine misc. Potentiometers put up in an assortment of 25 to include useful values from 60 ohms to 2 megohms in both wirewound and carbon, with & without switches, singles, duals, & triples, midgets and regular. Possibly no assortment alike so order several. You will save on the need of any one. All brand new controls.

25 for $1.79

APN-1 RADIO ALTIMETER

Here is the complete rec. trans. part of APN-1 containing the mod. condenser in demand, along with its other components of relays, etc. (less tubes except 955's). Size 18" x7"x7¼". Wgt. approx. 8 lbs. Used.....ea. **$9.75**

ALPHA HAND MONITOR — $27.95

Brand new, mfd. by Barker-Williamson for the Atomic Energy Commission with acquisition cost of several hundred dollars. Indication of radiation made on 0-20 micro amp. meter in panel. Only 27 in stock. No technical data available. A bargain if you know what to do with it.

MALLORY CAP. SELECTOR — $1.25

Brand new Mallory Cat. No. MSS-100. Reg. Dealer Net $6.80. Cap. selector to take guess work out of replacement of starting capacitors in range of 26 to 180 Mfd. Simply connect alligator clips and turn knob to give proper operation & substitute.

GUY WIRE—5,000' spool—$1.29 per 1,000'

Extra strong snarl, and rust resistant cable. Originally used for aircraft control cable, has 21 strands alloy brass plated to resist corrosion. 350 lb. breaking test. OD 3/64". Ideal TV Antenna guy wire. Wound on wood & metal spool of 5,000' length.

Per spool **$6.45**

3/32" Stainless Steel Aircraft Control Cable ideal for large Xmtg. Beams (over 1,000 lb. breaking strength). New..**3c/ft.**
¼" Galvanized Stranded Utility Pole Guy Wire 500 ft. reels only.....**5c/ft.**

KIT 24 MISC. CONDENSERS — 79c

Assortment of 24 miscl. tubular & mica condensers in voltages to 600 V. All new full length leads.

NEW JAN BOXED TRANSMITTING TUBES

RCA-826.....$ .99 ea.
WE-316-A.....$2.50 ea.
VT-127-A.....$2.50 ea.

REMIT SHIPPING CHARGE AND INSTRUCTIONS WITH ALL ORDERS, OTHERWISE ORDER WILL BE SHIPPED EXPRESS COLLECT. ALL ITEMS GUARANTEED TO YOUR SATISFACTION OR MONEY REFUNDED IF RETURNED PREPAID WITHIN 10 DAYS OF RECEIPT.

ESSE RADIO CO.

40 WEST SOUTH STREET
INDIANAPOLIS 25, IND.

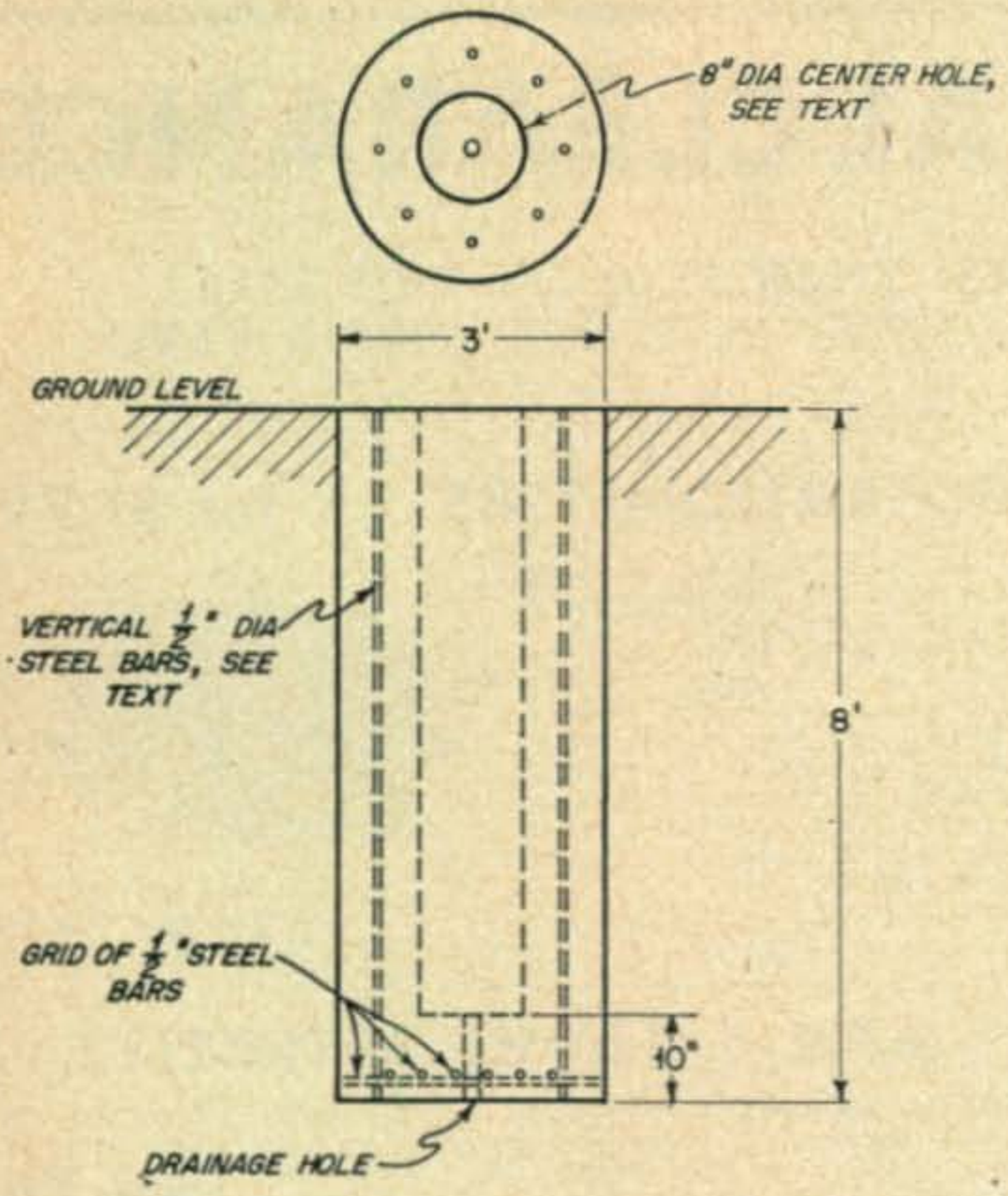


Fig. 2. Suggested base mounting hole.

tended tower 50 feet. When the lattice boom[3] is mounted on the top of the tower, the elements of the antenna are exactly 51½ feet above ground.

A clearance of ¼" exists between the telescoping tubes and in this space is strung the tension cable that raises the tower. The cable is 5/32" diameter, 7 x 19 aircraft control wire. It works at about 30% of its maximum safe load. The top end of the large tube, both ends of the center tube, and the bottom end of the top tube are all shimmed to provide a close slip fit between the tower sections. The circular shim, about ¼" thick, may be turned out on a lathe, and held in final position on the tower with *Allen* set screws.

In order to keep the three sections of the tower aligned for proper cable action, the two moveable sections of the tower are keyed by a ½" x ¼" key, extending the full length of the tubes. A corresponding keyway is cut in the top bushing of each moveable tube section, just large enough to pass this keyway.

The Drive Mechanism

An electric winch *(O)* winds up the main drive cable *(M)*. An upward lift is exerted on the drive pulley *(D)* mounted on the inner section of pipe *(B)*. The far end of the drive cable is clamped to fixed bushing *(H)*. The bushing *(I)* slides with the center pipe section. A separate cable section *(N)* and pulley-bushing assembly *(K, E, L, F, G)* elevates the top section *(C)* when the center section moves. Special jam-proof high strength pulleys are used in this "lift-yourself-by-your-bootstraps" operation.

3. Orr and Abrahams, "A Lattice Boom for 14 Mc. Antennas," CQ, April 1951, p. 21.

Driving Mechanism and Control Circuit

Attached to the tower, about four feet above ground level is a worm drive unit, with a 30:1 reduction. The use of a worm provides a one-way action, that allows force to be transmitted to the cable to raise and lower the tower, but prevents the weight of the tower on the cable from acting through the gear reduction unit to turn the drive shaft. It is possible to erect and lower the tower by means of a crank on the worm drive, but it is a long task, particularly for the usual "out of condition" Ham. It is much better to couple a 1/3 h.p. electric motor to the worm gear, and let it do the hard work. If the motor is used, and limit switches are mounted at the top and bottom limits of tower movement, the tower may be remotely controlled from the operating position.

The Mounting Base for the Tower

The completed tower weighs slightly less than 1,000 pounds. The center of gravity (when the tower is contracted) is only about three feet above ground level. This greatly simplifies the installation problem.

If it is possible to pick up the tower with a crane, a simple mounting base, such as shown in *Fig. 2* may be used. A hole three feet in diameter and eight feet deep is needed. In many localities, this is the standard diameter of a sanitary cesspool, and a sewer contractor can dig such a hole with his automatic machinery in a few minutes. A patchwork of ½" diameter steel foundation bars is laid at the bottom of the hole. Seven steel bars, eight feet long, are then arranged in a circle of about 2 feet in diameter. Two other bars are bent, forming a 2-foot circle, and are wired to the vertical bars, forming a crude cage, *Fig. 3*. This cage is lowered into the hole to provide internal reinforcement for the concrete to be poured later.

[*Continued on page 52*]

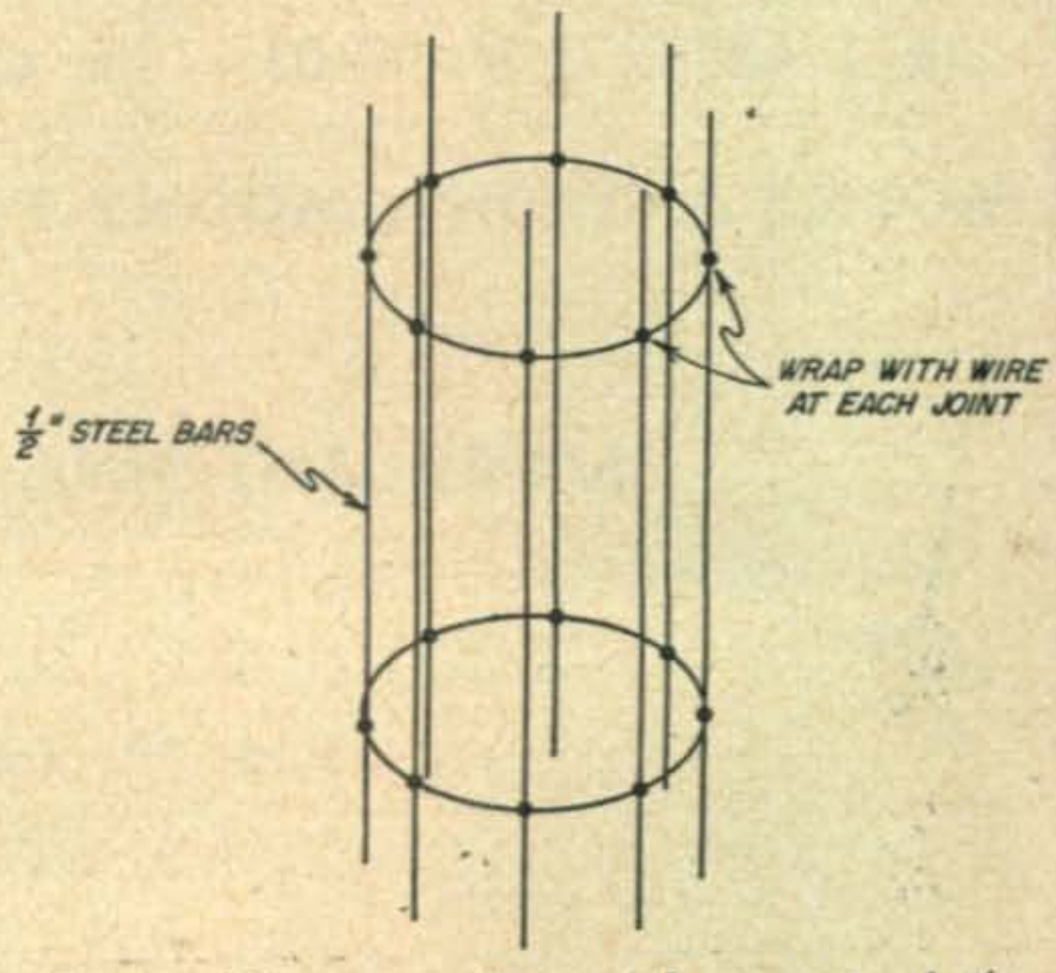


Fig. 3. Wire cage for re-inforcement of the tower mounting base. This is put in place before the concrete is poured (see Fig. 2).

TELESCOPING TOWERS

[*from page 49*]

It is next neeessary to make an inner core, or form, about 8 inches inside diameter which can be dropped inside the cage, to provide the central hole for the tower. The best bet is an 8-foot length of eight inch thin-wall steel tubing. This is lowered into the hole, and aligned in a true vertical position by means of a few sticks of wood, and some wire stays.

When all is ready, the cement should be slowly poured into the area surrounding the central pipe. When the cement nears the top, the retaining bolts with their wooden template (to be described later) should be put in place, and the cement poured around the retaining

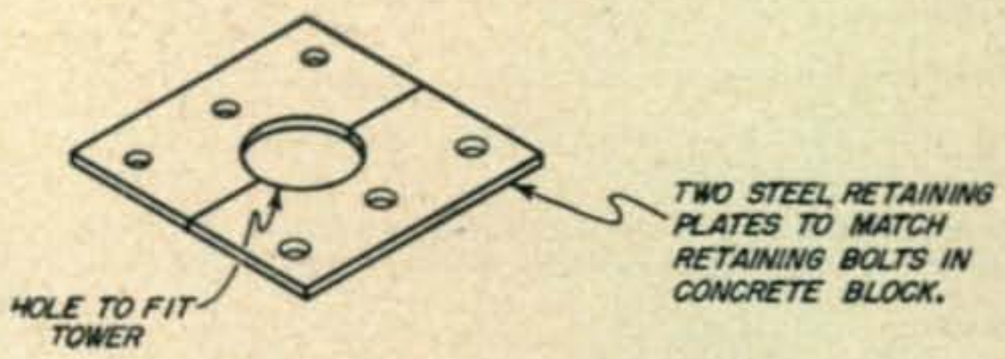


Fig. 4. Tower retaining plates.

bolts. The retaining plate should rest just above the top of the 8-inch pipe, clearing its top lip by perhaps ½ inch or so. The cement should be allowed to harden for six or eight days before the antenna is placed in the mounting base.

Retaining Devices

When the tower is in a vertical position in the base, the area around the tower may be filled with sand, which should be wetted down and packed into place. The retaining plate should be bolted into place, and the tower is ready for operation.

The tower retaining plates are cut of ¼" sheet steel stock. When placed together, they have a hole cut through the center with a torch that will just pass the outside diameter of the tower. Each section of retaining plate has three 1" diameter holes cut in it to anchor the plate to the retaining bolts sunk in the concrete form. After the retaining plate has been made, a wooden template of the sections should be made of ⅜" plywood. The retaining bolts are bolted to this template before they are sunk in the concrete, thus insuring a proper fit between the bolts and the retaining plates.

Tower Maintenance

The tower requires a very minimum of upkeep. Before it is erected, the complete tower should be given a good coat of red lead paint,

then a final color coat that will blend into the surrounding objects. A gray-blue is very effective at de-emphasizing the tower to the neighborhood. The erecting cable, the two top tower sections and the pulleys and gear drive should then be given a liberal coating of grease.

Results

The beam has been deliberately left up in high winds with no signs of vibration or deflection of the tower. Exceedingly interesting results have been obtained on both short-skip and DX contacts when the beam has been elevated and depressed. For extreme DX work (The W6-Europe path) it has been found that the maximum height of 52 feet is best. As the beam is slowly dropped from this height, the Europeans become more hollow-sounding and drop off in signal strength. At 52 feet it is comparatively easy to work European phone signals through the east coast QRM. At a 30-foot elevation this is almost impossible. "Skip" to the east coast is also optimum at the full elevation of 52 feet. At this elevation, the main lobe of the beam is at an angle of about 18°. This is still a little high for optimum results to Europe, as the signals from that part of the world should arrive at angles between 5°-10°. However, an angle this low calls for a tower height of 70 feet or so—out of the question!

As the desired skip length decreases, the optimum height of the antenna also decreases. A height of about 40 feet is optimum for W8 and western W4 stations—a skip of about 1800 miles. A thirty foot height is deadly into the WØ and W5 areas. On short-skip within the W6 call-area, a height of 20 feet or so is optimum.

Local Effects and TVI

One of the most valuable features of the antenna is its uncanny ability to attenuate local signals. In the Los Angeles area on a busy Sunday, operation on 20 meter phone is almost impossible because of cross-talk between local high power phone stations. It is now possible to find a certain height at which particularly loud local signals may be greatly attenuated, possibly by a correct out-phasing of the direct and indirect ground waves. This ability alone makes the tower well worth its initial cost. Local signals that completely paralyze the receiver become merely a strong signal when the height of the tower is changed five feet or so.

Interesting results are also obtained with regard to TVI. The 1 kilowatt transmitter used with this antenna is 100% clean TVI-wise. The only problem is primary blanketing of nearby receivers. As the tower is run up in height, the blanketing effect slowly drops off, and is less severe at 52 feet than at 35 feet. At 35

[*Continued on page 54*]

[from page 53]

feet, even a high-pass filter on the TV set is not enough to completely free the screen of interference. At 52 feet a high-pass filter is not needed on a well-designed TV set. We have since found that maximum interference occurs when the antenna fires directly into the power lines.

There is no doubt that this power line affects the operation of the antenna. Loading of the transmitter and the SWR of the coaxial feed-line both fluctuate violently when the antenna fires into the power line. Checks with stations located in the line of fire of the beam when it is aimed at the power line report a very marked drop in signal strength when the beam lies in the plane of the power wires. The beam is located about 40 feet from the line.

Once a tower of this type is used, where variable height as well as rotation may be had at the push of a button it can easily be seen that elevation is as important as rotation of a beam antenna.

Editor's note: Because of the interest in this remarkable tower, W6FHR has made arrangements for the construction and assembly of this tower for interested parties. Information may be obtained by writing to Lewis H. Abraham, 11339 Gladwin St., Los Angeles 49, Calif.

"BRIEF CASE STATION"

[*from page 38*]

tuning *C18* for the strongest signal and then adjusting *C1* and *C8* to peak the signal.

It may be necessary to change the positions of the coil slugs and repeat the above adjustments once or twice, in order to be able to resonate these circuits on both bands. Final adjustments may be made with over-the-air signals, and the trimmers may be stagger-tuned if it is desired to equalize the receiver gain over a wider range of frequencies.

Different crystals may be plugged into the transmitter oscillator to provide "spot" frequencies for preparing calibration curves for the dial on *C18*. Remember that separate calibrations must be prepared for the two bands.

To complete the preliminary adjustment of the *Brief Case Station*, check the transmitter keying. This should preferably be done with the aid of another receiver. A few of the components in the electronic keyer circuit are fairly critical in value; therefore, they may need experimental adjustment for best results. The important components are *R28*, which equalizes the speed of the dots and the dashes, and multivibrator capacities *C31* to *C34*.

The 1N34, *C30*, and *R20* shape the keying pulses. Although their adjustments interact somewhat, *C30* may be varied in value to change the "break" time constant, and then *R20* adjusted to change the "make" time constant.

Operation

The *Brief Case Station* has been used on several recent trips and has given a good account of itself, even on moderate DX. Australia and New Zealand have been worked on both 7 and 14 Mc. The receiver is quite sensitive and surprisingly selective on CW, in spite of its simplicity. The pre-cut antenna is dropped out of the hotel window or strung up horizontally, indoors if necessary. The collapsible, 12-foot, *surplus* whip shown in the cover photo is often used for support.

With the exception of the screwdriver, all the components are stowed inside the chassis for transportation. They are held in place and the unit is protected from damage by the

[*Continued on page 56*]

[*from page 55*]

chassis plate, which is removed during actual operation, to insure adequate ventilation. The buttoned-up chassis is slipped into the center compartment of the brief case, and the screwdriver, phones, antenna, key, etc., are carried in the outer pockets. With everything in place, the brief case weighs about 25 pounds. Incidently, it is necessary to remove the knob on the main dial and carry it in one of the side pockets in order to close the brief case.

Obviously, with a number of screwdriver adjustments required, changing bands is not an instantaneous process, but by having their settings marked beforehand, the operation takes only a few minutes.

BE SURE THE HOTEL POWER DOES NOT USE DIRECT CURRENT, BEFORE ATTEMPTING TO OPERATE THE TRANSMITTER.

EDITOR'S NOTE: Various manufacturers will supply the 10,550 kc. crystal used in this unit. We recommend any of the following companies:

Bliley Electric Company
Union Station Building
Erie, Pa.

International Crystal Manufacturing Co.
18 Lee Avenue
Oklahoma City, Okla.

Petersen Radio Company, Inc.
2800 West Broadway
Council Bluffs, Iowa (type 2XP)

"JUNKEYBOARD"

[*from page 25*]

restores the relays and this, of course, would obliterate the code which we wish to send.

A resistance is generally needed in series with the primary of the transformer so that the restoring pulse amplitude is not excessive. These restoring pulses should not be any stronger than is needed to infallibly bring all of the relays back. A variable wire-wound resistor could be used to advantage to determine the point where excessive restoration current makes it fail to operate properly upon the depression of a key. The proper operating point is midway between these two extremes. Once set it should require no further attention. The d-c pulse from the distributor which is used to restore the relays, and lockout the keyboard is the

[*Continued on page 58*]

$1.50

Single Sideband Techniques

by Jack N. Brown, W3SHY

Wish we could say that we suddenly thought we'd better put something out on this subject—but, sorry—we just can't. Carefully written, prepared and edited, this book required six months to assemble. Regardless of whether you know quite a lot about SSB, or absolutely nothing—this is the text that covers it all—from start to finish. Half of the book is devoted to pieces of SSB equipment that you can build.

$2.00

Radio Amateurs' MOBILE HANDBOOK

by William I. Orr, W6SAI

The only practical handbook on the market today on the subject of Ham mobile installation, operation and maintenance. Not just talk and theory, but complete text and schematics on converters, receivers, power supplies, antennas and transmitters. Thousands have already been sold and are in the hands of the mobile operators that really "get out." Just about at the point where we can say, "only a few copies left." Get yours today.

CQ Yearly Binders

Stamped or Plain

Wondering what to do with your loose copies of CQ? That's easy. Get a CQ binder at a ridiculously cheap price and have them at your fingertips. Why dig around under the desk, or in some old box to find an important CQ schematic? Put your CQ issues immediately in a steel reinforced red fabricord binder and keep them orderly and handy. When ordering be sure to specify whether you want yours stamped for a particular year, or just plain.

$3.50 each

CQ Magazine CQ-11
67 West 44th Street, New York 36, N.Y.

I enclose $_____ for which please send me:

_____ copies of your "Mobile Handbook" at $2.00/copy.

_____ copies of your "SSB Techniques" at $1.50/copy.

_____ CQ Yearly Binders. Years to be stamped _____, _____, _____, or plain ☐.

All New York City purchasers please add 3% sales tax to above items.

My correct address is: (Please Print)

(name) (call)

(street or avenue)

(city) (zone) (state)

[*from page 56*]

pulse normally obtained from the distributor to advance the tape transmitter to the next set of perforations. This takes place during a portion of the "stop" pulse immediately following the fifth selecting pulse.

Indicating Lamps

In series with the winding of each of the polar relays is a pilot lamp which will indicate the coded output of the matrix at a glance. In normal typing these lamps flicker very rapidly as they are only on for about twenty milliseconds. If they are used for testing the matrix or as an aid in memorizing the code (not particularly needed, but it does come in handy for trouble shooting) the distributor should be shut off, permitting the lamps to stay on as long as a key is held down. It might be a good idea to reduce the 12 volts to 6 (select the center-tap of the transformer) when doing this. These lamps will take away all the mystery surrounding the operation of the matrix and are quite interesting to watch during typing. Further, the lamps act as series resistors which limit the matrix current to a safe value since the relays have low resistance windings.

The relay strip is mounted on a standard rack panel 19" x 1¾" as shown in *Fig. 2*. The relays are mounted on an aluminum sub-panel 17" x 1 11/16" which is supported three inches from the rack panel. At the left is an eleven-prong male Amphenol plug which connects to the distributor. Next is the B-199 telephone-type relay for lockout. Then there are the five polar relays for storage (*numbers 1* and *4* have their covers removed), and finally the octal socket which connects to the keyboard. Under the subpanel is the filament transformer, the restoring rectifier (composed of a single 1" square selenium plate divided into six cells of which one is unused), and the indicating lamps. The lamps might well be mounted on the front panel for a more flashing appearance (ahem!).

Distribution

Teletype tape distributors are the simplest solution to the problem of putting the impulses in time sequential order. These devices are still in good supply and are not expensive. Since most amateur teletypewriter operators ultimately install tape equipment for automatic sending this piece of equipment will eventually be needed anyway and might as well serve a double purpose. An all-electronic distributor will be the subject of a future article. For purely local operation no distributor is required since all that is necessary is to wire the contacts of the keyboard relays directly to the typing unit selector-magnets. Were it not for FCC

[*Continued on page 60*]

regulations to the contrary we could send five different tones simultaneously over the air, detect each one separately and feed the d.c. resultant to the indicated selector-magnet.

More Information

The primary source of teletype information and equipment is the V.H.F. Teletype Society, 38-06 61st Street, Woodside 77, N.Y. If you have further questions about this article, or about getting started on RTTY, contact the Society.

In a future article, I hope to be able to explain a method of generating Morse code with this type matrix. It will permit the standard RTTY setups (tape) to send CW at any speed from one to a hundred words per minute.

PROPAGATION

[*from page 33*]

remarkable increase in intensity as the moon covered the sun. Waves of such frequencies as are generally transmitted better by day than by night showed a corresponding decrease in signal intensity. The eclipse effect was definitely a night effect, indicating a temporary decrease in the electron density of the ionized layers as a result of the decrease in ultra-violet radiation reaching the ionosphere from the sun because of the blocking effect of the moon.

The next total eclipse of the sun will occur on June 20, 1955, with the path of totality extending across the Indian Ocean, southern India, and across southeastern Asia to the North Pacific Ocean. This eclipse will not be visible as a total eclipse in the United States.

Mail

During the past year the amount of letters received from readers of this column has increased considerably. If you have a specific question concerning radio propagation that you would like answered, or a comment concerning this column, send it directly to W2PAJ, c/o **CQ Magazine.** Please enclose a stamp addressed envelope for each letter to be answered by return mail. Please allow at least two weeks time for reply to specific questions. Next month we will discuss some of the questions asked during the past few months by readers of this column.

YL'S FREQUENCY

[*from page 31*]

ship as 339, contained many features and anniversary greetings from people prominent in the radio world.

In January, 1950 a new contest was added, the **YL-OM** Contest. Since then also, YLRL has issued many awards for **WAS/YL** to Hams who have worked a YL in each of the 48 states, **WAC/YL** (for working a YL on each continent), and the newest award, **YLCC**, for working one hundred different YL operators.

In recent years YLRL has become decidedly international and now has members, in addition to the U.S., Alaska, Canal Zone and Hawaii, in Australia, Canada, Chile, Czechoslovakia, Ecuador, Germany, Great Britain, Italy, Mexico, Mozambique, Netherlands, New Zealand, Panama, Peru, Puerto Rico, Southern Rhodesia, and Union of South Africa. Total membership has reached over 500 YLs!

Now YLRL starts on its 16th year—a year which promises to be the biggest yet. With enthusiastic officers and big plans (see "YL's Frequency," **CQ**, July and Sept. 1954) we can look forward to increased membership, continued fine contests, refurbished treasury, big issues of **YL Harmonics**, a new edition of the YLRL Callbook, and **the first national YLRL convention** (to be sponsored by the Los Angeles YLRC, place and date to be announced soon).

First Officers

Before we look too far ahead, let's go back to our very first officers, the ones who started us on such a successful course.

At the time our first president, **W7FWB**, wrote her new famous letter, she was very active on the air from Wenatchee, Wash., having received her license in 1936. Ethel was especially interested in AARS and in '41 was district net control in her state. After Pearl Harbor she was called to the Presidio in San Francisco. Thereafter she served at Ft. Douglas, Utah; Quonset Point Naval Air Station, R.I., and the Seattle Naval Air Station. For the last nine years she has been an Electronics Engineering Aide at the Naval Research Laboratories in Washington, D.C.

Ethel is not now very active on the air, but is very much so in club work. She is president of the new radio club at NRL (W3NKF), secretary-treasurer of the Washington TVI Committee, and treasurer of the Society of Women Engineers. She also is a member of the Washington Radio Club. Her apartment QTH makes operating her present station, W3MSU (a Viking I and HQ-129), almost impossible, but she does get on from W3NKF and mobile with her 10-meter rig.

YLRL's first vice president, **W9WWP**, licensed in 1936, was a sophomore at the Univ. of Illinois when YLRL got under way. After getting her degree at U. of I. (in Home Ec.), Carol went to work as Asst. Engineering Aide in BuShips. In 1942 she became the first woman

[*Continued on page 63*]

YLRL 15th Anniversary Party Rules

Dates: Phone—Start Sat. Dec. 4, at 1200 EST. End Sun. Dec. 5, 2400 EST. CW—Start Sat. Dec. 11, at 1200 EST. End Sun. Dec. 12, at 2400 EST. Operate no more than 20 hours on phone and 20 hours on CW.

Frequencies: All bands. Cross-band operation, phone to phone and CW to CW, is permitted.

Eligibility: Contest open to any licensed YL or XYL operators throughout the world. Not limited to YLRL members. Contacts with OM's do not count.

Procedure: Call "CQ YLRL."

Exchange: QSO number; RS or RST report; name of State, U.S. Possession, VE District or Country.

Scoring:
a—5 points for each contact.
b—Same YL may be worked on other bands for additional credit.
c—add number of points and then multiply by number of different States, U. S. Possessions, VE Districts and Countries worked. Maryland and District of Columbia count as one state.
d—All phone contestants running 150 or less watts input at all times may then multiply the final score by 1.5.
e—All CW contestants running 150 or less watts input at all times may then multiply the final score by 1.25.

Awards: Highest phone score—Cup
Highest CW score—Cup
(These cups are awarded on a yearly basis. Any operator winning the same cup three times gains permanent possession of it.)
2nd and 3rd place awards to be donated.
Certificate for high score for phone and CW in each U.S. District and Country.

Logs: Copies of phone and CW contestants logs must be postmarked not later than Dec. 31, 1954, to be sent directly to Gilda Shoblo, W6KER, Vice President YLRL, 3715 Liberty Blvd., Southgate, California.
When submitting copies of logs, please list phone contacts and CW contacts separately.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF CQ, published monthly at New York, N. Y. for October 1, 1954.

1. The names and addresses of the publisher, editor and business managers are: Publisher, Sanford R. Cowan, 6 Embassy Court, Great Neck, N. Y.; Editor Oliver P. Ferrell, 67 West 44th St., New York 36, N. Y.; Business Manager, Sanford R. Cowan, 6 Embassy Court, Great Neck, N. Y.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) COWAN PUBLISHING CORP., 67 West 44th Street, New York 36, N. Y.; Sanford R. Cowan, 6 Embassy Court, Great Neck, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgagees, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and beliefs as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

(Signed) S. R. COWAN, Publisher

Sworn to and subscribed before me, this 20th day of August, 1954.

HARRY N. REIZES, Notary Public

[from page 61]

staff member at ARRL with a call, serving first as Asst. Comm. Mgr. and then as Acting Comm. Mgr. Then she spent a year in the WAVES hospital corps.

As **W6WSV**, the QTH is South Pasadena, Calif., where Carol shares with OM, W6WSW, an **HQ-140X** and a rig consisting of a 5763 xtal, 6146 final, running 65 watts, on 20 CW. Carol has been active in the **Los Angeles YL** club, was its first president, has served as P/C, and this year is 6th district chairman for YLRL. Chief occupation: cook and nursemaid to Marcia 6, and Michael 2.

First secretary-treasurer of YLRL, **W9NBX**, Enid Carter, put Bowbells, N.D., on the map with her issues as editor of **YL Harmonics.** For some time she has been permanent librarian of YLRL. Enid was licensed in 1936, and for many years was very active on 80, 40 and 20 CW, keeping up with the fastest ops. She also participated in AARS. Enid met her OM, W6ZD, via the Ham bands. Now Enid Aldwell, W6UXF, she is located in Los Angeles. Enid says she is completely out of the Ham game at present. She and her OM have taken up German and Austrian folk dancing and spend all their spare time with practicing, exhibitions and research into authentic dances, music and costumes.

YLRL's first publicity chairman, **W8TAY**, Nita (now W4JCR), held that post for five years. She has had many jobs in YLRL and is now chairman of its constitution committee. Always an enthusiastic booster of YLRL, it has been from Nita's files and early issues of **YL Harmonics** that much of our data on YLRL's beginnings has been gleaned.

YLRL Nets

PHONE

Band	Freq.	Day	Time	NCS
75	3900	Wed.	7:00 a.m. EST	W1VOS
	3900	Wed.	8:00 a.m. EST	W4HLF
	3900	Wed.	9:30 a.m. EST	W8ATB (W8HUX alternate)
	3900	Mon.	3:00 p.m. PST	W7HHH (W7SBS alternate)
	3920	Wed.	9:00 a.m. PST	W6PJF (W6QGK alternate)
20	14,240	Thurs.	2:00 p.m. EST	W6UHA
10	28,900	First Tuesday of each month, 9:00 p.m. EST QRMary Net, roundtable		

CW

80	3610	Wed.	9:00 p.m. EST	W9JTX
40	7034	Tues.	1:30 p.m. EST	W7ROA (W7RLH alternate)

Nita's present work is program director for WISE-TV in Asheville, N.C. Prior to that she was in Radio WISE. For some time she was a recreation director in a V.A. hospital. Wartime service included work in the Intelligence Dept. and she was a training director in Special Services of the Army. Nita says that long ago she was a technical writer and then a lab aid in Brush Development Co. in Cleveland, and before her marriage was a dancer and in the theater. Nita received her Ham license in March, 1939. She and her OM, W4JCS, have a Harvey Wells with Meissner Signal Shifter, and operate all bands.

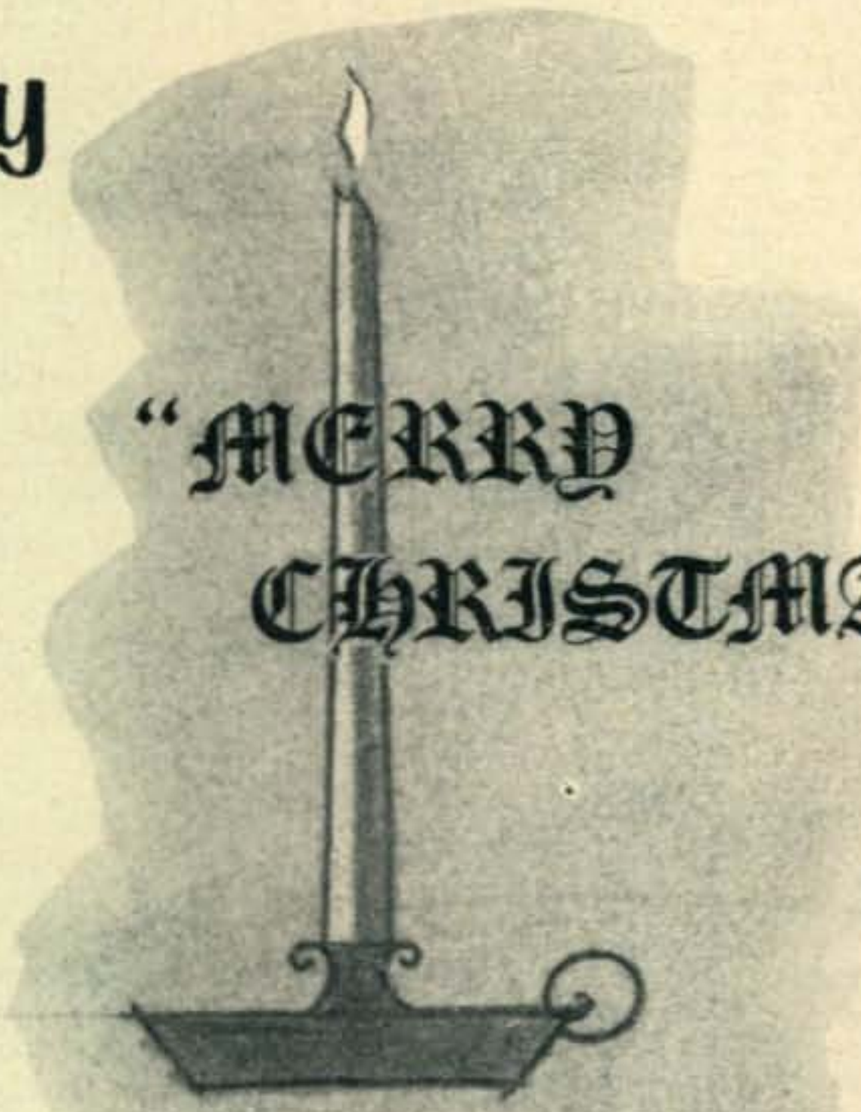
How Many YLs?

So the YLRL has grown and prospered—but the original question to which an answer was sought remains unanswered. The lace-trimmed ad for "Two Hundred Meters and Down" said ". . . **you** won't tell—how many of you YL key-twitchers there are . . ." Just **how many** licensed YL operators are there? The 500 members in YLRL are only a portion of all those licensed in the U.S. and elsewhere. This sibyl estimates between two and three thousand. Any other guesses?

YLRL welcomes new members. Dues are $2 a year and include a subscription to **YL Harmonics.** For more information about YLRL and a membership-application card, drop your column editor a note at Dulce, N. Mex.

To all of the YLs who assisted in providing data for this account of YLRL's history, our grateful thanks. Till next month, 33, *W5RZJ*.

Say



"MERRY CHRISTMAS"

with

CQ

The ideal gift for the "Ham to be," Novice
or Old-Timer, who will appreciate your Christmas
Thoughtfulness. A subscription to CQ will ease
your Christmas shopping burden and provide a monthly remembrance
from a wife or husband, member of the family, or
fond friend. Subscribe now — we will send a suitable
gift card. Use the attached envelope —
no postage required.

DX NEWS

[*from page 42*]

goes to 239 with FB8XX, HKØJH and VR2BZ/ZM7. W6GDJ made it 233 with ZM7 while **W6VE** submitted new list with 227 total. . . . **W6EFM**, helped by HKØCV, went to 219 as **OH5NK** moved to 157 with KAØIJ, JZØKF, TA3AA, SVØWP and EA9DE. . . . **KV4AA** moved to 241 with VR2BZ/ZM7 and SVØWK/9 and Al, **W2WZ**, upped to 234 with VS4HK. . . . **W9LNM** added HK1GP (HKØAI) and I5PP to reach 224. . . . **W9HUZ** is now 214 with VR2BZ/ZM7 while Ray, **W2BJ**, went to 211 with SVØWK/9. . . . **VK4FJ** finally nabbed Antarctica with VK1EG for No. 210. . . . **W6LGD** reached 168 with TA3AA, OD5LX and ZP5AY while Stan, **W9NZZ**, rose to 160 with EA9DD, ZC4IP and F8FW/FC. . . . Bob, **WØTKX**, added JZØKF for No. 187 while **W5KUJ** reached 187 with such as LZ1KPZ, VR3A, FO8AJ and EA9DD. . . . Pat, **W2GVZ**, adds one with

New Addresses

ex-DL4YK —W3UYH/7, SFC. Eber F. Diehl Jr. 9470 Tech. Unit Army Electronic P.G. Fort Huachuca, Ariz.

PJ2AR —Homer Waits, Lago Colony, Box 720, Aruba, NWI.

VP7NG —Glen Van Voorhies, RCA Service Co. Grand Bahama. Patrick AFB, Fla.

ex-W2ZRX/VO2—Bob Wilder, 25 Maple Road, Baldwinsville, N.Y.

WP4AAA —Ernesto Viera, 170 Arizmendi St. Rio Piedras, Puerto Rico.

ZA1KAD —Box 69, Tirana, Albania.

ZM6AT —Box 200, Apia, Western Samoa.

Thanks to W7UYE, G6ZO, Ground Wave Magazine (KP4) and West Gulf Bulletin.

LZ1KSP for No. 179 while W4EPA's attic FD raised LB8YB for 159. . . . Dixie, **W2ZVS**, upped to 169 with SVØWK/9 and VS9AS. The same SVØ helped Bill, **KV4BB** to No. 183. . . . Robbie, **VQ4ERR**, ups his phone total to 223 with MP4QAH, EA9DD and NE1NMC (Nepal). . . . **WØNCG** A3'ed to 161 with YU1GM, F8FW/FC and CR4AD.

W4CTL claims QSO with AC3PT, 7030, 0030 GMT, for his No. 100. . . . **W8JGU** upped to 150 with ZD6BX and VS5RO. . . . **W6UJW** nabbed ZB1AUV. . . . Bob, **W6OXS**, has finally worked his 100 and awaits QSL's. . . . Tom, **W4BXV**, received his GL and started off on the long DX trail by nabbing KC4AB. . . . **K2BYF's** 25-watter accounted for CT2BO, ON4TQ, KP4CC and TI2PZ on 7 Mc. Bill is 12. . . . **W2ZCZ's** attic dipoles nabbed CX2AM, TF3AB, OH1AA and ZB1KQ. Dick also nabbed ZL1CI on 3515. . . . Doug, **W7UYE**, with 25 watts is knocking off stuff like PJ2AR, LU8FBH,

Honor Roll Endorsements

(To September 15, 1954)

WØYXO	40-252	W6GDJ	40-233	WØTKX	38-187
W6ENV	40-251	W6VE	40-227	W5KUJ	38-187
W6VFR	40-251	W6EFM	40-219	W2GVZ	39-179
W6AM	40-248	OH5NK	40-157	W4EPA	37-159
G6ZO	40-248	KV4AA	39-241	W2ZVS	36-169
W6MEK	40-247	W2WZ	39-234	KV4BB	35-183
W8PQQ	40-246	W9LNM	39-224		
W6SYG	40-246	W9HUZ	39-214	PHONE ONLY	
W8JIN	40-246	W2BJ	39-211		
W2AGW	40-244	VK4FJ	39-210	VQ4ERR	40-223
W6MX	40-243	W6LGD	39-168	W6VFR	40-181
W6DZZ	40-239	W9NZZ	39-160	WØNCG	35-161

Last complete HONOR ROLL appeared in the October issue.

ZL1ADU and assorted KH6's on 14 Mc. . . . VE3IG, Hal, nabbed CR6AI for No. 98. Two more to go before the three-element Mini-beam goes up! . . . Tom, **WØIUB**, received CAA certif. No. 984 and is sweating out KZ5-25. . . . **KN6ENL** nabbed KC4AB on the 7 Mc. Novice band. She is W6LGD's XYL! . . . From Takeo, **JA1CR**, here are some top DX scores from JA-land: **JA1AA** 37-133, **JA8AA** 31-110, **JA1CJ** 35-108, **JA1CR** 34-108, **JA1DM** 35-106, **JA1AQ** 27-104, **JA3AF** 33-102, **JA6AO** 32-97, **JA3AA** 32-96 and **JA1AH** 32-90. JA1CR says hardest zone to work is Zone 9. How about that YV's? . . . Lou, **W9ESQ**, adds such as KG6FAA, VK9YY, VK6WT, KC4AB and F8FW/FC on 7 Mc. and VQ4BNU, LU8ZS and ZB1AUV on 14. His latest certificates include WAA No. 126, CAA No. 772, WPR No. 210 and BERTA No. 739. . . . **W7VY**, Gene, and **W5MIS**, Tom, also nabbed VR2BZ/ZM7. For the former it was No. 247.

[*Continued on page 66*]

Here and There

KV4AA logged visits from **KP4UE, W8AJW, KP4WN** and **W5RX.** The last mentioned will soon be heard as a new KV4. . . . Bill, **W8KPL,** is running 15 watts at new QTH in Royal Oak, Mich. . . . W6QOP keys from **DL4FF.** . . . Alan, **VK9YY,** leaves for VK2-land in November. . . . Buck, W4RBQ, played host to **KC4AB and Co.** coming and going. As a result he nabbed the first KC4 QSL and also a rock paper-weight from Navassa. . . . W7WJV keys from **F7CZ.** . . . **TA2EFA** is due to return state-side in November. . . . Prose, W2BMX, is now **W4CXA** near Washington, D.C. . . . From W1DSF we hear that hurricanes Carol and Edna didn't treat the beams and towers of W1FH, W1HOL, W1ADM and W1JDE very nicely. Carol was the main offender and struck around noon on August 31. . . . **W6FSJ's** recent swing through South America resulted in visits with HK3BO, HK3PC, HK3AB, YV5BY, YV5AO, YV5FL, PY1TD, PY1ADA, PY1ARM, PY9DB and CX5AF to name a few. . . . **KG4AK** returned to states in September and planned mobile operation with ELMAC gear. . . . Bill, **W5DGV,** reports that some idiot broke into his shack with grand larceny in mind. Being unable to dislodge the transmitter he wound up by swiping all Bill's QSL cards beginning with the Z prefixes. Some of these are replaceable but he sure would like duplicates of the following: ZB2B, ZD4AM, ZB1AR, ZD2DYM, ZD6DH and ZM6AK.

Carl, **W8BTI,** and XYL visited W4RBQ. . . . **W7NCO** now keys from **W6YUS.** . . . We hear that Pat, **W2AIS,** ex-ZC8PM, is now back at sea. . . . **YU1AD** reports a swell time had by all at the YU Hamfest, Ljubljana, August 19/22, visitors included G2MI, G5NU, DL1CU, DL1DH, DL3VG, DL3SG, DL9PR, HB1AG/HE, DJ1BQ, DJ1BV, SV1SP, OZ1FM, OE5HN, OE6HK, OE6FO, I1BCB/Trieste and YU1GM/W4GMP. Mirko nabbed the 10,000 dinar prize for the best home-made rig but this amount (about 35 bucks) was quickly dissipated during the night's revelry. . . . **W1ZL** had three feet of water in the shack when hurricane Carol came by. When Edna was announced he dismantled the rig—That's right—Edna passed him by! . . . YK1AJ belatedly advises us that a 500-watt station signing **YK1DF** was active from September 2 to 30. It was operated in connection with the Damascus International Fair. Each W station worked will have his call entered in a lottery for various prizes which will be sent to the lucky winners! . . . Dave of **KA9MF** advises that this station belongs to the "Hokkaido Amateur Radio Club" and is on the air almost 24 hours daily. Transmitters are a BC-610 and WRL Globe Champion while a Collins 51J-3 and NC-125 do the inhaling. Antennas consist of a three-element beam on a 90-foot steel tower and a 10-wavelength sloping Vee beam. 90 countries have been worked since operation commenced in November 1953 and only South Carolina is needed for WAS. 21 and 28 Mc. activity is planned soon and KA9MF is looking for many countries in the Caribbean area. QSL's go out 100 per cent. QTH: KA9MF, Field Station 8612 AAU., APO 48, PM. San Francisco. . . . Ned, **W1RAN,** visited W4KFC, W4PNK and others in Va. . . . KP4-land has finally passed on to three letter calls with the assignment of WP4AAA.

Japanese Certificate

In addition to the AJD (All JA districts) and the WAJD (Worked all JA Prefectures) the JARL awards the JCC (Japanese Century City) award to any station submitting proof of QSO with 100 cities in Japan. There are 380 cities in Japan. 10 IRC's must accompany applications. (This should be a tough one!)

160 Meters

It's time to check your "long wires" in anticipation of what is hoped to be the best "top-band" season ever. It is known that VS6CQ will be on and possibly a few JA stations. Via W1BB we learn that the annual 160 meter TRANSATLANTIC TESTS will take place between 0500 and 0800 GMT on the following dates: December 5 and 19, January 2, 16 and 30, February 13. See you there!

THE NOVICE SHACK

[*from page 48*]

In 40-odd days, I have worked 27 states. Best DX is California. As I do not get out very well at night, I write letters and re-read the Novice Shack. I hope to get on 3.7 Mc. soon. I am 16 years old and am a Junior in High School."

John Thompson, **WN8SAQ**, 8500 Concord Hills Circle, Cincinnati 27, Ohio, says, "I am writing to tell you of the wonderful results I have had in QSL'ing. Out of 35 cards sent, 2 have been answered. In a short period of operating time, I have contacted 7 states, all confirmed, using a home-brew, 6L6 transmitter and an S-38C receiver."

Jim Stebbins, **WN8SYV**, 1856 Cornelius, S.E., Grand Rapids, Michigan, writes: "I have been a Novice for 11 days and have worked 17 states, all in the last 8 days. But working them and having them confirmed are two different things, hi. I run 40 watts and use an NC-57-B receiver. My antenna is a folded dipole and my frequency is 7189 kc. WN8RUQ, WN8SKA, and I have organized a little club of Novices only. We are going to hold contests for the best DX, hi."

K. J. Farnsworth, **WN7WLV**, 3708 S. 23rd E, Salt Lake City, Utah, writes: "I never realized how many Hams there were in Salt Lake City until they turned up after my name appeared in the "Help Wanted" department in the Novice Shack. Thanks a lot for printing it. . . . Been on the air 8 days now and have had 31 QSO's in 9 states."

Hy Slo-Bodkin, 177 Rugby Road, Brooklyn 26, N. Y., reports, "I am a short-wave listener (SWL). Since November, 1953, my percentage of replies to reports mailed to amateurs has gone up from 28% to 34% at the present. Has any other SWL done as well? I would like to hear from those who have."

Gerald Lasitter, **WN4GRY**, 81 Third Ave., Prichard, Alabama, gets right to the point. "If anyone ever tells you that lightning never strikes twice in the same place, don't believe him. On August 15, lightning struck my antenna twice within two minutes. Luckily, no damage was done. . . . "I run 50 watts to a Globe Scout and use a doublet antenna. Receiver is an S-77A. In three weeks, I have worked only five states, mainly because I do the housework while my mother is working. My greatest confirmed DX is 600 miles."

Terry Long, **WN9HNJ**, 40 West Harrison Ave., Wabash, Ave., writes: "I have been on the air 18 days and have had 51 contacts in 12 states. I hope this clears up my address for some of the fellows I worked."

Lloyd, **KN2ICK**, wondered if he would have to take the written test over again when he applied for his General-class license, seeing that he had already passed his Technician-class examination before an FCC examiner before the rules were changed. The answer is, if you qualified for a Technician-class license at an FCC office before the rules were changed, you can qualify for a General-class license simply by passing the 13-WPM code test before an official FCC examiner.

David Gattermeir, **WØQBX**, 106 High, California, Missouri, writes: "I am now a General. While a Novice I used 6AQ5-807 rig feeding 3.7-Mc. and 7.2-Mc. doublets, and an S-40 receiver. I managed to work 36 states and Canada, mostly on 3.7 Mc. I might add that I worked just as far and got better reports on 80 than on 40 meters—well almost as far. I can't see what everybody has against 80 meters. . . . I sent out 170 QSL cards as a Novice and received 160 in return. I use a plain, but attractive card and filled it out neatly. And I do not wait for the other fellow to send his card first. . . . I am now using a VIKING I transmitter and an RME-45 receiver. Both used, but work well, with appearance to match."

Miss Patsy Nikodem, 1800 So. 69 St., West Allis 14, Wisc., says: "Here's an SWL-W9 knocking at your Novice Shack door. I don't know whether I am welcome before I get my license, but here I am. My receiver is only an S-38C, but it sure pulls in signals from far-off places. I also have a 'Sky-Rocket' transmitter that W9IQY built for me. It runs 15 watts, and it really gets out. A couple of my friends have had it on the air."

Sam, **WN4GHS**, seems a wee bit bitter. "I think any Novice who uses a 'Bug' key on the air without first

[*Continued on page 71*]

RATES: 25c per word per insertion for commercial business organizations.
5c per word per insertion for individuals on a non-commercial basis.
CLOSING DATE: November 25, for the January issue.
MAIL: Your typewritten copy with full remittance should be sent to CQ Magazine, 67 West 44th St., New York 36, N. Y. Attention: Jeanne C. Gillespie.
NOTE: The products and services advertised in this section are not guaranteed by the publishers of CQ.

For Sale:

ATTENTION BEGINNERS and Novices: S-38C receiver and Instructograph Jr. with 5 tapes. Both practically new. All for $59.95. Barry Sorkin, 1084 New York Ave., Brooklyn 3, New York.

SURPLUS—RG-8/U cable 100 ft. $5.95, 250 ft. $13.25, 500 ft. $25. New connectors: PL-259 and SO-239 5 for $2.00. New oil-filled condensers 600WVDC 2 μfd 69c 4 μfd 90c, 7 μfd 95c, dual 8 μfd $1.95: 1000 WVDC—1 μfd 69c, 2 μfd 90c, 4 μfd $1.59, 8 μfd $3.25. AN/APS-13 420 Mc. transceiver with 17 tubes $22.50. Postage extra. Request new bargain bulletin. Visit new store for thousands of unadvertised bargains. Wanted to purchase—surplus radio equipment. Navy synchros. Lectronic Research, 717 Arch Street, Philadelphia, Pa.

FOR SALE: Late model HQ129-X with speaker, KW final-250TH's with power supply, 28" Bud cabinet, and assorted parts. All for $400. Prefer personal pick-up. W9QCM, 704 South Walnut Street, O'Fallon, Illinois.

SELL: NC125 & speaker $125; SX28A $135, or swap for commercial test gear. K2BJB, 90 West 164th Street, New York City.

RADIOTELETYPE—model 12 page printer. UTC S-9 and S-22 Universal transformer and driver, PE-103 generators, old copies Radio News, CQ, QST, and Amateur Radio Defense. W6DOU, 1558 "B" Street, Hayward, Cal.

FOR SALE: Complete station—Hallicrafters S-40B $70. and Hammarlund 4-20 transmitter with matching Hammarlund 4-11 modulator $60. CW & fone. Both in good condition. W3SCY, Dave Lavash, 505 Faulk Rd., Wilmington, Delaware.

FOR SALE: Radio controlled Sterling B-6M 28" model cabin cruiser. Complete with hard tube receiver, two-tube transmitter, meters, motors. Perfect working condition $35. Rev. Robert W. Mark, Wellsboro, Pa. W3KOJ.

"CLEANING HOUSE": 223AX xmitter with TU17 or 18 unit plus cables $30., PE125 power unit $15, 500 amp. Weston Meter Model 271 less shunt, like new $50., 5 amp Weston Meter Model 273 with shunt, like new $70., Dynamotor 14v. in 600v—300 ma. out, 2 @ $15 each. MC7-ARC5 modulator less tubes $8. BC788AM xmitter-recvr with tubes and xtal $15. PE103 motor less base $10. A5 Automatic Pilot Control Unit $8. 457 xmitter less tubes & xtal $4. 4½ μfd condensers 500 v.a.c., 8 @ $1. each. Plugs: BC375. 522. 274—75c, T12 mike $1.50, 110v. xformer 10 v.c.t.-12A, 1600 insl. $4. TU17 & TU18 units $2. each, 223AX cables 2-PL150 $1.50 each. Hi Voltage cables 2-PL59 $1. each. Write for more information. Joe J. Crowl, 4317 Oleander, Bellaire, Texas.

SELLING Collins 75A-2, 148C-1 NBFM adapter, 8R-1 calibrator, speaker. Excellent condition. First $325. Also Gonset Tri-band $25. WØMWD.

A FEW LEFT, GN-39-F DC generators. See page 69 of September issue for details. Easco Communications Co., 2611 Goshen Ave., Elkhart, Indiana.

HALLICRAFTERS HT 18-VFO transmitter, still in carton, perfect, $75. Hammarlund 420 transmitter $20; BC696-3-4 Mc xmitter $20; SCR 522 type 2-meter transmitter and receiver $75. 10-meter beam and tower $25. LM frequency meter, modulated, with original 110 v.a.c. power supply and calibration book, like new. Best offer. M. D. Welch, 2640 50th S.W., Seattle 6, Wis.

FOR SALE: Filament transformers, 5v. 4 amp. and 10.5v. 1 amp. $1.00 each postpaid. James Fred, 1508 East 4th St., Mishawaka, Indiana.

Viking II with VFO in excellent condition. Not a scratch on it. $275. HRO-5OT1 & speaker 80-40-20-10 coils, top condition $275. W9VSF, 903 South Madison, Hinsdale, Ill.

FOR SALE: Complete Gonset mobile unit consisting of Super-Six, Superceiver squelch, Gonset Commander, VFO Mallory 555H, mike and relays. Will sell complete for $250 or sell by unit. Am interested in trading for receivers or transmitter preferably Collins. Erv Rasmussen, 164 Lowell Redwood City, California.

CLASSIFIED

SAY YOU SAW IT IN CQ

Hobby Necessities:

SCOTCHLITE REFLECTIVE CALL LETTERS. Visible day/night, attachable to any smooth surface by its own tape-type adhesive, weatherproof, 3" high, silver on red, $1.00 set, postpaid. Satisfaction assured—money back guarantee. Adhesive Tape Products Co., 434 Hudson Street, New York 14, N.Y.

JUMBO LAWN STAKE CALL SIGN, reflectorized, aluminum, complete $2.75. Overnight service. W2LPG, 133 Airsdale Ave., Long Branch New Jersey.

BE ADMIRED, BE RECOGNIZED, your call letters on a beautifully finished Rhodium tie bar. $2.00. Val's, 22 Brookshire Road, Hyannis, Massachusetts.

NECKTIES. Your handle, call and antenna towers hand-painted. $3.00. Give color. Henry Schanding W3RRF, Harrington, Delaware.

QSL Cards:

QSLs! HAM XMAS CARDS! Samples all 10c. Tooker Press, Lakehurst, New Jersey.

QSLs. Snappy colors. Reasonably priced. Samples 10c. Ted Besesparis, W3QCC, Frackville, Pennsylvania.

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

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

QSLs from Ketchican to the Ivory Coast "Super-Speed Specials" are the most. Samples 10c Robinson, W9AYH, Dept. B, 12811 Sacramento, Blue Islands, Illinois.

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

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

UNBEATABLE QSLs! Samples 25c (refunded). Sackers, W8DED, Holland, Michigan.

QSLs. Samples-dime, returnable. Printer, Corwith, Iowa.

QSL's. Samples Free. Winston A. Carter, WØLDY, 607 South Oakland, Webb City, Missouri.

Test Equipment:

Test Equipment repaired and calibrated by factory staff. All makes. Hickok, Simpson, Triplett, Heath, etc. Prompt service at low factory prices. Our nineteenth year. Douglas Instrument Laboratory, Norfolk Avenue and Shetland, Boston 19, Mass.

Miscellaneous:

FIRST $5.00 check or money order takes 25 recent issues RSGB Bulletin and Short Wave Magazine. Brand new. Box GF, CQ Magazine.

PRINTED CIRCUITS: Make your own printed circuits. Kit includes materials and instructions. $2.95. Felix Dutko, 2078 Vyse Ave., Bronx, New York.

CRYSTAL KIT brand new holders & all accessories for complete FT-243 crystals; includes free, two semi-finished and sized blanks for each holder. Packed in hinged-lid, metal box. Kit #1, 25 holders $2.49; kit #2, 50 holders $4.49. Easco Communications Co., 2611 Goshen Ave., Elkhart, Indiana.

Wanted:

TOP DOLLAR PAID for ART-13's, dynamotors, parts racks and all other component parts. Write: Harjo Sales Co., 4109 Burbank Blvd., Burbank, Calif.

WANTED ART-13 transmitters. Write James S. Spivey, Inc., 4908 Hampden Lane, Washington 14, D.C.

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

WANTED: Instruction book for crystal calibrated frequency indicating equipment Model LM4a. Ted Dell, W4BEX, 454 Highland Ave., Eau Gallie, Florida.

Wanted: Miessner 150B transmitter unmodified, or ART-13. M. H. Klapp, W2EQV, 17 Kenosha Street, Albany, New York.

WANTED: Mobile and fixed station gear. Must be reasonable. C. Hockett, W7RXB, Ronan, Montana.

WANTED: Gov't surplus or amateur equipment. Cash or trade for new Johnson Viking, Ranger, Barker & Williamson, Hallicrafters, Hammarlund, National, Elmac, Gonset, Telrex, Central Electronics, Harvey Wells, etc. Need ART-13, DY-17, CU-25, ARN-7, ARC-1, RTA-1B, BC610, BC614, BC939, BC348, BC312, BC342, TCS, teletype, tech. manuals, test equipment. BC221, APR-4, ARC-3, power supplies. List of used transmitters, receivers, on request. Alltronics, Box 19, Boston 1, Mass. RIchmond 2-0048.

WANT: Impedance bridge, Q-meter, A.C. VTVM, technical books, tube tester, sweep generator, test equipment. HAVE: BC342-N and S38-B receivers, Marchant calculator, 100-watt CW and 100-watt phone transmitters, telescope mirror, W9NVC, Box 122, Beloit, Wisconsin.

WESTON LABORATORIES of Littleton, Massachusetts, will purchase your BC-221 frequency meter. Conditions of purchase are that the original calibration book be provided, that the instrument not be altered, and that it be mechanically operable. Write: Weston Laboratories, Box 407, Littleton, Mass.

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

WANTED: Cash paid for BC610 transmitters and BC221 frequency meters. In addition we buy technical manuals, also TCS sets, R5A/ARN-7, ART-13, DY-17, others. Amber Company, 393 Greenwich Street, New York 13, N.Y.

WANTED: Collins 30K-1 or KW1 for cash. W2BBV, 49 Frum Ave., Yonkers, N.Y.

WE WANT YOUR USED GEAR. Highest trade-in allowance on National, Hallicrafters, RME, Hammarlund, Gonset, Morrow, Johnson, etc., C&G Radio Supply Co., 2506-2 Jefferson Avenue, BR. 3181, Tacoma 2, Wash.

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

Instruction:

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

For Sale:

BC457-A with complete power supply, 80 watts, $35. WØRNV, Route 3, Brainerd, Minn.

SELL: 21A midget teletype tape printer $45. 12,000-ohm 110 v.d.c. relays DPDT $1.75, Collins 32V-1 $375. 32V-3 $595. Boehme keyer and tape perforator, $145. Dumont #241 scope $275. WANT: SIG-5 supply catalogs, technical manuals, ARN-7, APR-4 tuning units, ART-13 and parts, CU-25. BC610, BC614, BC939. Will trade. Tom Howard, W1AFN, 46 Mt. Vernon St., Boston 8, Mass. Richmond 2-0916.

SELL: Millen 90902 oscilloscope less 2BPI $25, 2 Selsyns 115v 60c 3½" D x 5" L $12, Bliley CC02A $7. Used tubes 3-812A and 4-812 $12, Hammarlund frequency standard FS-135 $6, UTC S-9 transformer $3.50, Triplett 2½" 300 ma. meter $3.50. FOB, W3NQA, 201 Pioneer Street, Warren, Pennsylvania.

DUMONT 208 5" scope $125, BC221 T in Bud cabinet $50, Millen 90800 50-watt transmitter $20, Simpson Model 380 wavemeter modulation indicator $30, new Amprobe Jr. 25 $15, Silver Micro match 908 $25, or will trade for 10" or 12" bench or table saw. Levern Glau, Route One, Sioux City, Iowa.

NEW SX88, best offer. New HT20, best offer. Postwar SX28A, like new, $145. Bob Denniston, Box 709 Newton, Iowa.

FOR SALE: Complete mobile station—Elmac A-54 xmtr; Elmac PMR6-A rcvr; dynamotor; whip antenna; 75-meter loading coil; all for $200. VHF152A, like new, $39. Novice CW rig, complete with 80-meter coil, xtals, tubes, power supply, $18. Cabinet, 22" x 48", black-crackle finish $3. W5RZJ, Dulce, New Mexico.

75A3 NFM and matching speaker $485. SX71 $165. Eldico GDO $20. Ten meter xmtr with 6 v.d.c. dynamotor and relays $30. W8ZBD, 511 N. Warner, Bay City, Michigan.

FREE. BIGGEST list of Ham gear in the country. AM, SSB, RTTY, Mobile, etc. Write for your copy today. Dossett, 855 Burlington, Frankfort, Indiana.

RTTY Polar Relays, WE255A, brand new, boxed $8.50; Keyboard, very clean, converted per CQ Sept.-Oct. 1954, needs inexpensive matrix only $7; exc. condition Harvey-Wells TBS50A $70; reconditioned Teletypewriter $50; G.I. disc recorder & playback like new $15; 12GP7 new $8. Andrew Stavros, W2AKE, 116-32 132 St., South Ozone Park, N.Y.

BC929-A scope, tubes, excellent $20. f2.0 125mm Schnieder Xenen lens, 4x5 Graphic Mount $40. 2 Foto-later dark-room ventilators $20 each. WANT: KW 813 final with coils for all bands, rack mounting. W4VDF, Indian Rocks, Florida.

REAL BARGAINS: New and reconditioned Elmac, Gonset, Morrow, Collins, Johnson, Hammarlund, National, Hallicrafters, RME, Millen, Lysco, others. Reconditioned S-38 $29; S-40A $69; S-76 $129; SX-71 $169; SX-42 $179; SX-62 $179; SW-54 $29; NC-57 $59; HFS $79; NC-125 $129; NC-183 $199; HQ129-X $169; Harvey-Wells TBS50C $69; Meissner EX $49; S-40B, HT-20, Collins 75A-1, 75A-2, 75A-3, 32V-2, 32V-3, Viking I, Viking II, Viking VFO, many others. Shipped on approval. Easy terms. Satisfaction guaranteed. Write for free list. Henry Radio, Butler, Missouri.

FOR SALE: Harvey-Wells TBS50D $75. Matching power supply $25. 522 xmtr and recvr, now in use $40. W2LOB, 108 Sunset Ave., North Arlington, New Jersey.

ODDS 'N ENDS: Dynamotors: in 12v. out 330v., in 12v. out 500v., in 12v. out 275v. and 550v., also some 24v. at various outputs. Transmitters: ARC-5 (5.7-7.0 Mc.) for 40 meters, ARC-4 for 2 meters. New tubes: 50-446A, pair 304TL, 2-5" cathode ray. Transformers: Power, Pri. 115v.—Sec. 800v. c.t. @ 300 mils, 5v. @ 6 amp. 6.3v. @ 5.5 amp.; Power, Pri. 6v. or 115v.—Sec. 6.3v., 150v. and 400v. Power, Pri. 115v.—Sec. 700 v.c.t. @ 350 mils, 2.5v. @ 10 amp., 5v. @ 5 amp. Plate, Pri. 115v.—Sec. 1600 v.c.t. @ 100 mils. Make an offer to buy or trade. Will answer all. Dan Johnston, W2CMI, Viewmont Terrace, Little Falls, N.J.

VHF152A Converter A-1 condition $35. Gonset communicator I, latest model $150. Mercury 5 HP motor 1954 model, brand new, $155. Gonset VFO preamplifier for use with Gonset communicator $55. Converted BC522 transmitter w/ power supply, panel mounted, ready to go on air, $45. E&F coils for HRO50TL @ $14 each. Bill Harper, W9BWM, 4037 Eddy Street, Chicago 41, Ill.

FOR SALE: Morrow 3BR $20; Babcock DX transmitter $45; Eimac VVC 60-20 $35; BC312 receiver $40; Carter dynamotor 6v. -420v. 280 mils $35; ten-meter coils for BC779 $15.00. W5ZLW, 2807 North 24th, Lawton, Okla.

YOUR BID? All Viking—all like new—II, VFO, Match Box, Signal Sentry, HRO50T with XCU, NBFM, speaker, AA, A, B, C, D, coils—RME DB23. W9CVF, Greenwood, Indiana.

SELL: National HRO5TA1 receiver complete coils, tubes, speaker, power supply; VHF152A, new used; DB22A six months old, perfect. W2JIL, Box 62, Brooklyn 12, N.Y.

BARGAINS: With New Guarantee: R9-er $15; Gonset Triband $27.50; VHF-152A $39.50; S-72 $59.50; S-40 $65; NC-57 $65; RME-45 $99; Lysco $89; S-27 $99; SX-43 $129; S-76 $149; SX-71 $169; SX-42 $189; HRO-50 $275; HT-17 $32.50; EX Shifter $49; Globe Trotter $49.50; Harvey-Wells Sr. $69; DeLuxe $89; Viking I $209.50; New SS-75 $189; HT-9 $159; Globe King $295; 32V1 $395; 32V2 $475; 32V3 $595. Free trial. Terms financed by Leo, WØGFQ, write for catalog and best deals to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

FOR SALE: NC-57 with "S" meter. Hallicrafters HT-6 with coils for all bands, ECO units for 20-meters and 75-meters, and instruction book with schematic. Both very good condition. Will sell separately or together. Best offer takes. Dale Rockwell, WØUVZ, Arlington, Neb.

MOBILES! Compact Volt-Ohm-Milliameter Multi-Tester. Ideal for glove compartment or workbench. Ranges: Volts a.c. and d.c. 0/15/150/750; current 0/150 milli-amperes; resistance 0/100,000 ohms. Rugged bakelite case. Test leads included. $11.95 postpaid. Photo and data on request. Immediate shipment. United Instrument Company, P.O. Box 242, San Francisco, California.

FOR SALE: Three Eimac 4-125A tubes, brand new, in original factory cartons. Will sell individually or all three. $25. each shipping prepaid in U.S.A. Harold Reed, W3EJP, 1347 South Capitol St., Washington 3, D.C.

MOBILE: Elmac A54 transmitter, Leece Neville alternator complete with regulator, rectifier and xmfr, Gonset Super Six and Motorola police cruiser receiver, PE103 dynamotor. Best offer over $200. All inquiries answered Frank Schwartz, W4KFK, 204 6th Ave. No., Nashville 3, Tennessee.

SELL: RME 2-11 VHF 11/10-6-2 meter 14-tube double conversion receiver with "Piggy-Back" r-f stage on 144 (June 1953, CQ). First $75 takes. Box RC, c/o CQ Magazine.

BUY SURPLUS radio equipment from U.S. Government List $1.00. Details 10c Ham Box 213, East Hartford, Conn.

GELOSO VFO units used in W6SAI article, October CQ now being imported at $35.00, tested and calibrated, without tubes. GILFER Associates, Box 239, Grand Central Station, New York 17, N.Y.

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

FOR SALE, several sets of ART-13 150-watt modulation and driver transformers, also fully cased power transformers and 10 hy filter choke for speech amp. Power transformer has hv for speech amp, also 90 v.d.c. at 200 mils for bias, two 6.3 v.a.c. windings, two 5 v.a.c. windings for rect. and modulator filaments. Primary tapped for 100-110 v.a.c. Power trans. and choke are UTC. All transformers are brand new and clean. Included is schematic for speech amp and dope sheets on transformers and impedance chart for mod. tubes. Price for complete set is $15.50 postage paid. Send MO or certified check to Jim Daily, W4PLC, Box 13, Mocksville, N.C. WANTED: 3-Western Electric 728-B 12" speakers, will swap new paid Eimac 100THs for one, or two sets of above-mentioned transformer deal for one.

COLLINS 30K-1. Like new condition. Used less than 50 hrs. $950. FOB. New York City. Box HC c/o CQ Magazine.

BC459-A in very good condition, like new, $15. 4-element wide-spaced 10M beam $20. Harold Denny, R4, Washington, Indiana.

Trading Corner:

TRADE 522 transmitter and receiver with power supplies, rack mounted, push-to-talk, mike, spare 832, for Hi-Fi, FM or AM-FM tuner. W2DTE, Robert Cobaugh, 29-29 213th Street, Bayside, New York.

FOR SALE OR TRADE: two-4-250A's, three-4-125A's, several dynamotors 6 v.d.c. 420v. @ 280 Ma. output $15. each or will swap. Write W9IGH, Arnold Hatfield, 202 East Lowell Ave., Mishawaka, Wisconsin.

[from page 67]

mastering it should be made to operate on a frequency by himself. I know some other fellows who agree with me. I am 16 years old and a Junior in high school."

Bill Butler, **KN2IYO**, writes, "My license came today on my birthday (I am 15). I was so nervous when I saw the envelope with Federal Communications Commission on it that I had to bring it in the house and have someone else open it for me." (I also think Bill was still a bit excited when he wrote the letter. It was dated August 4, 1955!).

Burt Gandy, **KN2HCF**, writes; "I have been on 40 meters a lot lately and now have 29 states confirmed. I am using an end-fed 125-foot wire on both 80 and 40 with fair results. Also have a vertical on 40. I worked California the first night I had the vertical up. It also works well into Texas. . . . Have had about seven contacts on 15 meters, including a VE1 and a KN6. The KN6 was worked at 3:00 p.m. on a 22-foot piece of wire strung in the attic. . . . I am 34 years old. I am really enjoying Ham radio, QRM, QSB, and QRN included. I had two years of code in the Navy; so no trouble copying, but would like to improve my sending. Also hope to get started on the General theory very soon."

Help Wanted

Roy H. Engfield (21), 758 Hall St., **Sarnia 10, Ontario, Canada.**

Ralph Parker (16), 1167 Lorette Ave., **Winnipeg 9, Manitoba, Canada.** Telephone: 444370.

Ken Milburn (17), 484 Ingersoll St., **Winnipeg, Manitoba, Canada. Telephone: 723429.**

Charles W. Parsons, **Greenup, Kentucky.**

Mark Marshall (14), Box 109, **Fort Amador, Canal Zone.** Phone 2380. (His old address appeared in August listing).

Robert Reisenweber (16), 135 West 25 St., **Erie, Pa.** Telephone: 28-4316.

Howard Buswell (15), 6155 Barnett Valley Road, **Sebastapol, Calif.** (Aiming for a General Class license).

Stephen Sorton (13), Garden Drive, **New Windsor, N. Y.** Newburgh 49996-M.

Billy Howard (15), P.O. Box 8556, 2880 Cela Road, **Raliegh, Tenn.,** Phone: Memphis 4-9826.

Samuel Birken, 1050 Wheeler Ave., **New York 2, N.Y.** Phone: TI-29084.

Pvt. Donald E. Simonsen (22), Hqs. Co., 2 Bn., 85 Inf. Reg't, 10 Inf Div, **Ft. Riley, Kansas.**

Each month CQ lists those names and addresses of prospective Novices and Hams needing assistance with code or theory. To have your name listed, please address your request to Herb Brier, W9EGQ, 385 Johnson Street, Gary 3, Ind.

Wesley R. John, **KN2HUW**, 523 First St., Palisades Park, N. J., suggests; "New Hams, of which I am one, may find as I did that an atlas containing listings of all towns and cities in the U.S.A. is very helpful. When one fails to copy a QTH completely, a quick check in the atlas under the proper state and you can generally figure out what town you were working.

Miss Bertie Ill. (18), Rebecca Sealy Nurses' Residence, 815 Avenue C. Galveston, Texas, reports: "I have been interested in amateur radio for two years, but I still haven't made the grade. My brother, Don, WN5CSM, caught the bug from me and did make the grade. He runs 40 watts to a long wire, and his receiver is an S-38C. . . . I am a Sophomore at the Medical Branch of degree in nursing. I'd like to exchange letters with anyone who would like a YL 'pen pal' who is a prospective the University of Texas, where I am studying for a B.S. amateur."

Robert "Speed" Hardie, **WN5EUQ**, 2216 Bluff St., Ft. Smith, Ark., wrote me two letters. In the first he said: "I run six watts on 40 meters and have worked 32 states. But is there a shield around the United States? I can't get out of it, but some DX gets in. I have heard KH6, WP4, OH2, OZ2, CO2. . . ." In his next letter, Speed nonchalantly mentions working three WH6's (Hawaii), a WP4 (Puerto Rico) and raising Mexico. In addition, he now has 37 states. But he must have gone "High power," because he mentions his AT-1 transmitter. His 50-foot vertical antenna may help too.

No more space. See you all next month. **73, Herb.**

CQ Ad Index

Allied Radio Corp. 41
American Electronics Co. 60, 66
Amperex Electronic Corp. 20
Arrow Sales, Inc. 45

Babcock Radio Engineering, Inc. 52
Barker & Williamson 10; 11
Bud Radio, Inc. 2

Central Electronics, Inc. 65
Centralab 8, 55
Collins Radio Company ..... Cover 2
Columbia Electronics Sales 59

DX Hound Products 54
DX-O-Graph 66

Eitel-McCullough, Inc. 12
Engineering Associates 66
Esse Radio Company 49

General Electric Company 1
Glass, J. J. Co. 66
Gonset Company 51
Gotham Hobby Corp. 58

Hallicrafters Company 5
Harjo Sales Company 71
Harvey Radio Company, Inc. 58, 60
Harvey-Wells Electronics, Inc. 29
Heath Company 6, 7
Henry Radio Stores 43
Hughes Research & Development Labs 63

Instructograph Co. 66

Lakeshore Industries 59
Lindly & Company, Inc. 65

Millen, James Mfg. Co., Inc. 4

National Company, Inc. ..... 72, Cover 3

Panoramic Radio Products, Inc. 67
Petersen Radio Company, Inc. 9

Radio Apparatus Corporation 62
RCA Tube Dept. ..... Cover 4
Regency 62
Relay Sales, Inc. 60
Rider, John F. Publisher 54

Templeton Electronics Co. 54
Trans-World Radio-TV Corp. 65
Triad Transformer Corp. 53
Turner Company, The 51

United Catalog Publishers 52
U. S. Crystals, Inc. 68

Vaaro Electronic Engineering Co. 72
V & H Radio Supply Co. 61
Valley Engineering Co. 56
Vibroplex Co., Inc. 58

Weston Laboratories, Inc. 66
World Radio Laboratories, Inc. 39

hottest value in ham radio

The New NC-98

$149.95

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

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

tuned to tomorrow **National** NC

the new **HORIZON** *in high fidelity*

Whether you're a hi-fi fan or not, you'll be called on as an expert to voice an opinion. We sincerely feel we have the finest line on the market and we'd like your recommendation. Won't you please write for complete specifications?

ATIONAL COMPANY, INC. 61 SHERMAN ST., MALDEN, MASS .

HIGH POWER
costs less . . .
with RCA tubes

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

1. *They do not require very-high-voltage plate supply transformers.*
2. *They reduce the need for extra high-voltage rating rf bypass and dc filter capacitors.*
3. *They minimize the need for heavy-duty, wide-spaced tuning capacitors.*
4. *They reduce rf and dc insulation problems —all the way through.*

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

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

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

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

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

*For two tubes

RADIO CORPORATION of AMERICA
ELECTRON TUBES
HARRISON, N.J.