ICD

CQ

June 1965
50¢

WORLD WIDE **DX** CONTEST
PHONE RESULTS

In This Issue:

The G4ZU X-Beam

Low Noise 2M. Converter

75A-4 Improvements

$10.00 Phone Patch

S. Americans Dominate Phone Section

The Radio Amateur's Journal

COST
C!OS!T
COST
C!O!S!T!
COST
COST!!!!!!!!!!!!!!!!!!

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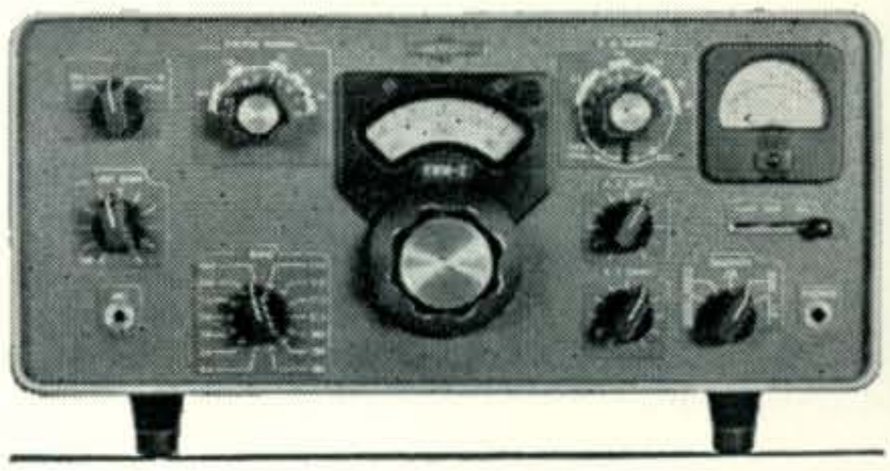

COLLINS

For further information, check number 3, on page 110

MODEL 106B – 6-Element, 10 Meters ▶

MODEL 403B –
3-Element, 40 Meters ▶

MODEL 205B –
5-Element, 20 Meters ▶

MODEL 155B –
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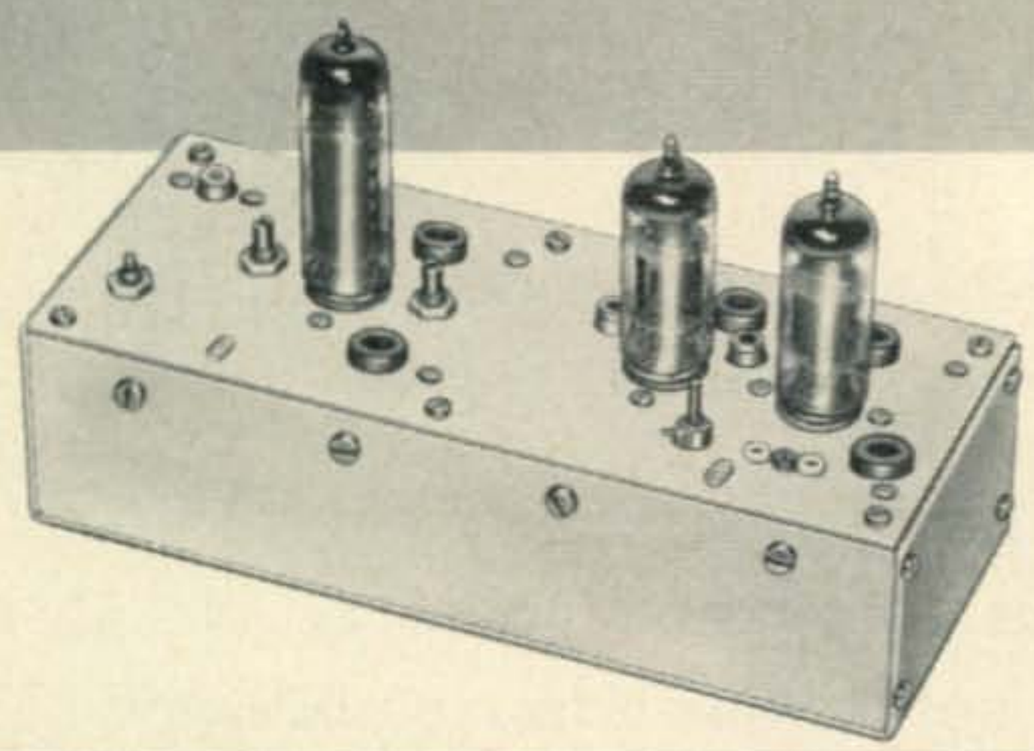
NEW FRON

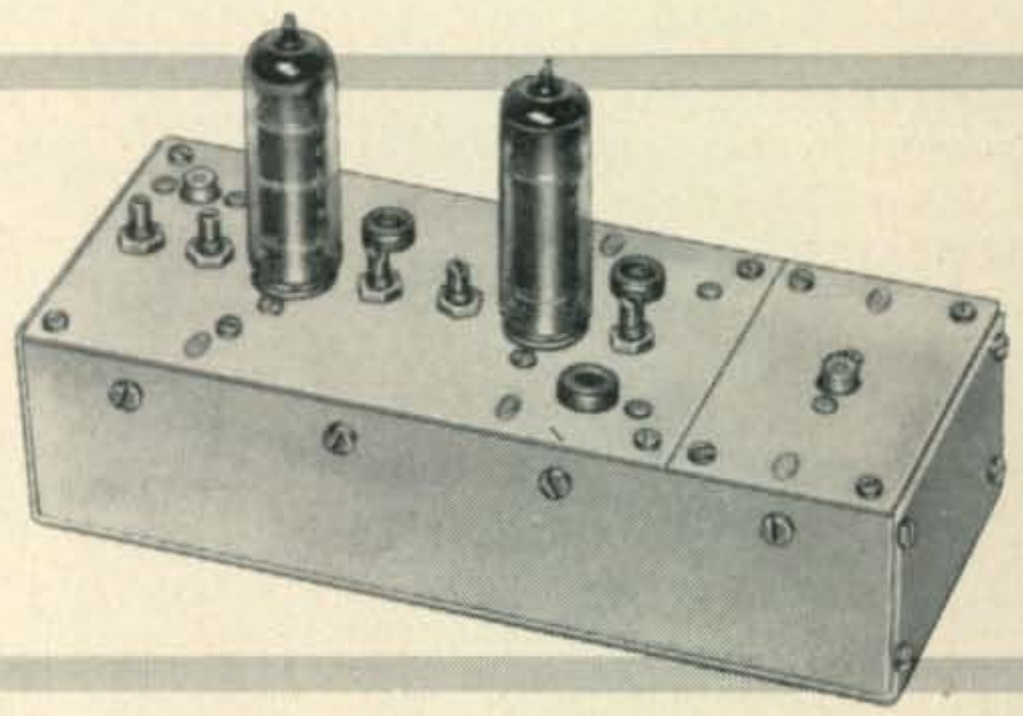
VHF/UHF UNITIZED TRANSMITTERS
50 mc — 420 mc



AOD - 57
DRIVER/TRANSMITTER FOR 50 OR 70 mc

The AOD-57 completely wired with one 6360 tube, two 12BY7 tubes and crystal (specify frequency). Heater power: 6.3 volts @ 1.2 amps. Plate power: 250 vdc @ 50 ma.

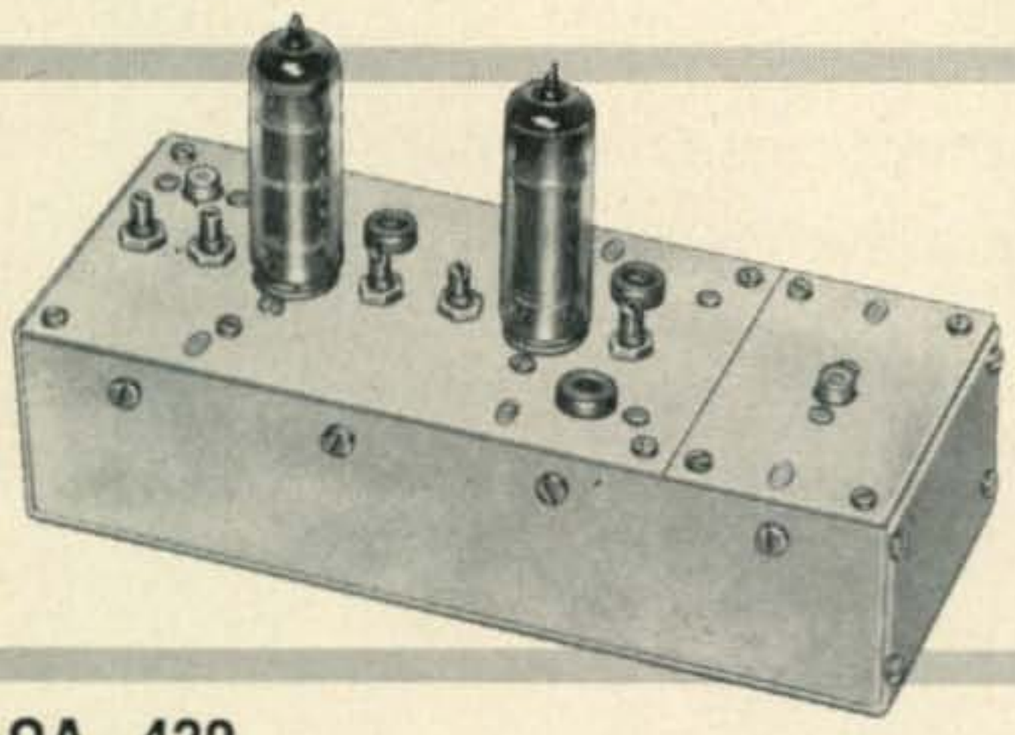
AOD-57 complete **$69.50**



AOA - 144
MULTIPLIER / AMPLIFIER FOR 144 mc

The AOA-144 uses two 6360 tubes providing 6 to 10 watts output. Requires AOD-57 for driver. Heater power: 6.3 volts @ 1.64 amps. Plate power: 250 vdc @ 180 ma.

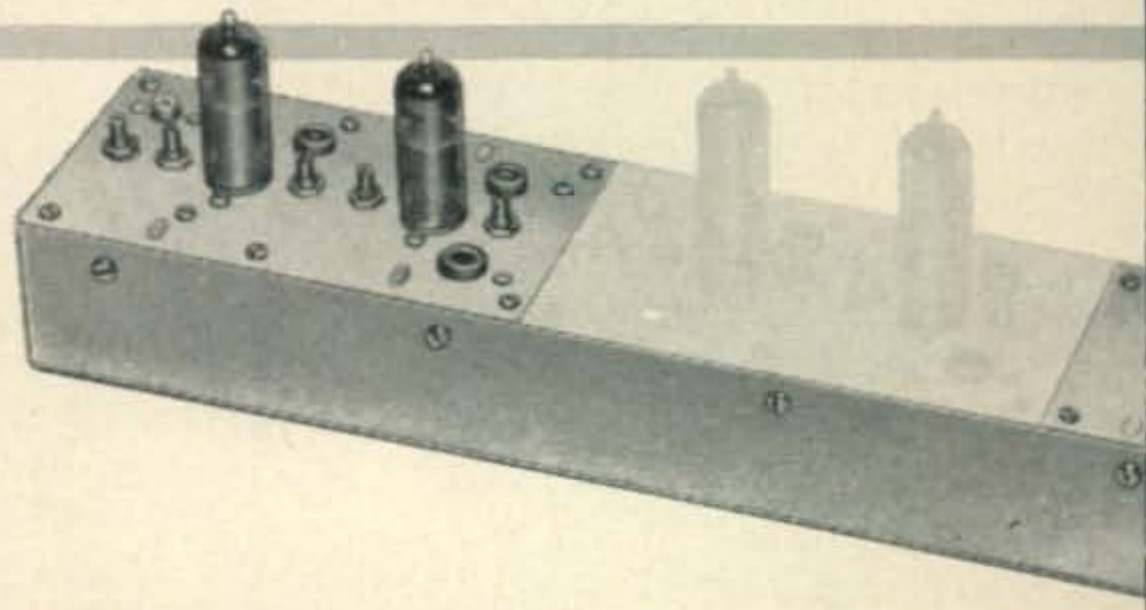
AOA-144 complete **$39.50**



AOA - 220
MULTIPLIER / AMPLIFIER FOR 220 mc

The AOA multiplier / amplifier uses two 6360 tubes providing 6 to 8 watts output on 220 mc. Requires AOD-57 for driver. Heater power: 6.3 volts @ 1.64 amps. Plate: 250 vdc @ 150 ma.

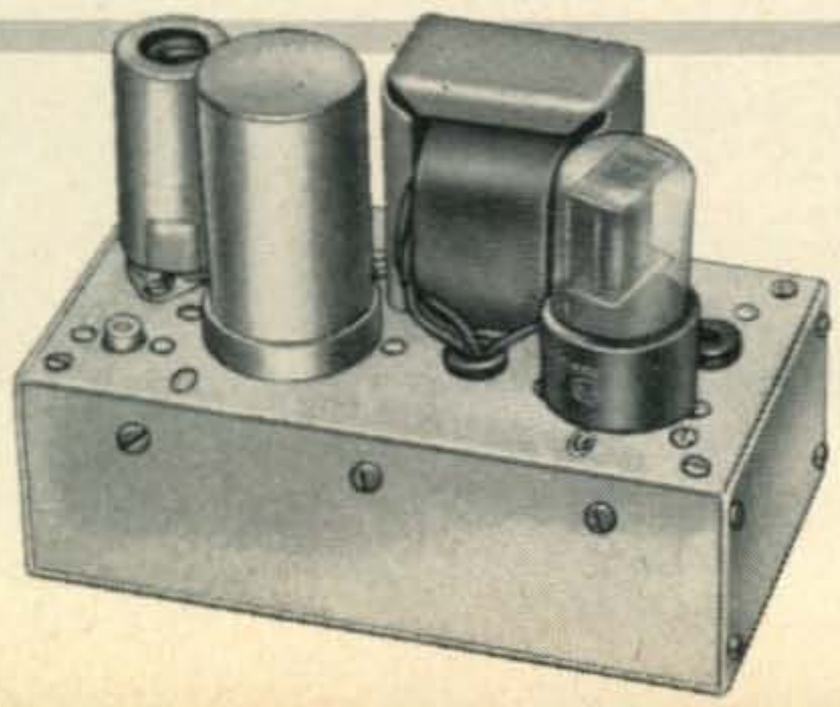
AOA-220 complete **$39.50**



AOA - 420
MULTIPLIER / AMPLIFIER FOR 420 mc

The AOA-420 multiplier / amplifier uses two 6939 tubes providing 4 to 8 watts output on 420 mc. Requires AOA-57 plus AOA-144 for drive. Heater: 6.3 volts @ 1.2 amps. Plate: 220 vdc @ 130 ma.

AOA-420 complete **$69.50**



AMD - 10 MODULATOR:

The AMD-10 modulator is designed as a companion unit to the AOA series of transmitters. Uses 6AN8 speech amplifier and driver, 1635 modulator. Output: 10 watts. Input: crystal microphone (High Impedance). Requires 300 vdc 20 ma, no signal, 70 ma peak: 6.3 vac @ 1.05 amps.

AMD-10 Modulator complete **$24.50**

NTERNATIONAL

International's new unitized VHF/UHF transmitters make it extremely easy to get on the air in the 50-420 mc range with a solid signal. Start with the basic 50 or 70 mc driver. For higher frequencies add a multiplier-amplifier. All units are completely wired. Plug-in cables are used to interconnect the driver and amplifier.

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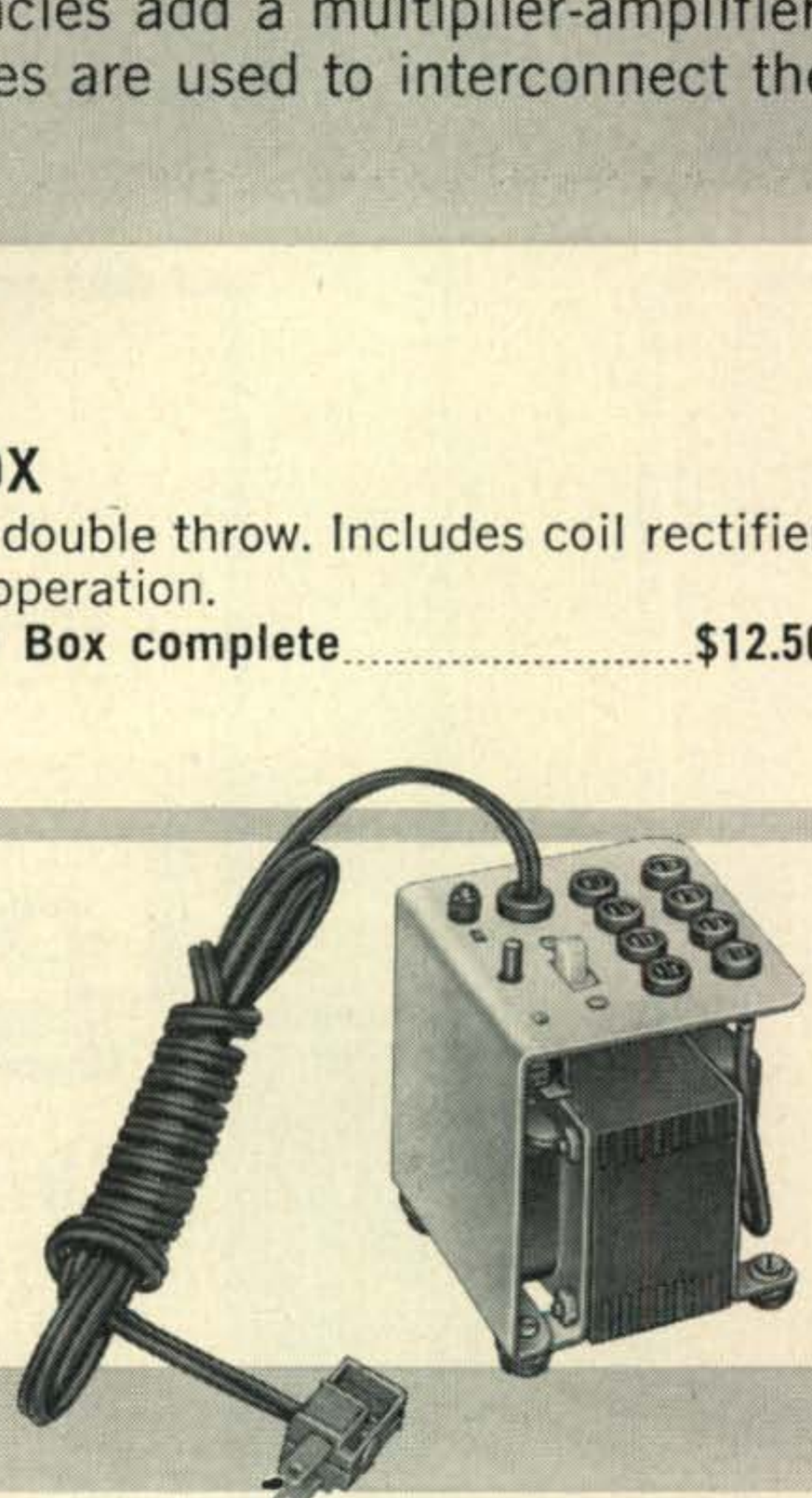
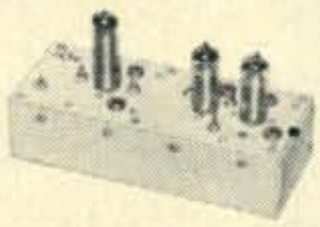
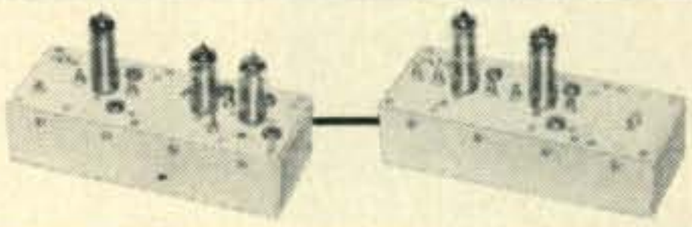
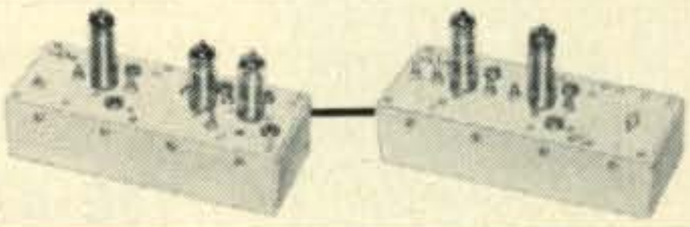
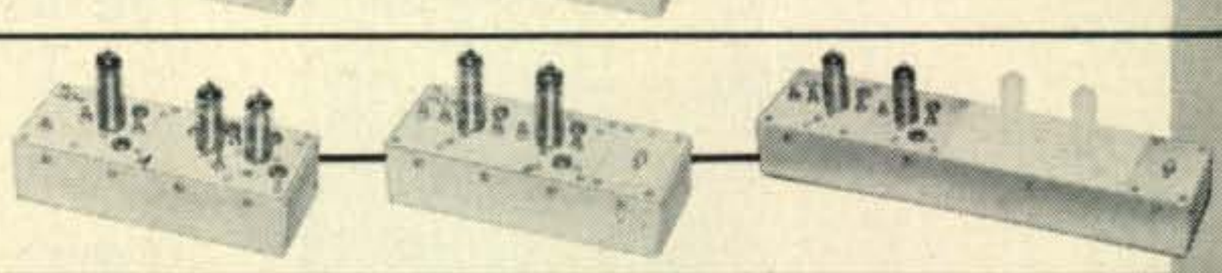
RELAY BOX
Four circuit double throw. Includes coil rectifier for 6.3 vac operation.
ARY-4 Relay Box complete.....$12.50

APD-610
FILAMENT SUPPLY
The APD-610 provides 6.3 vac @ 10 amperes.
APD-610 complete $9.50



COMPLETE TRANSMITTER

6 METERS	**50 mc**	**AOD-57**	
2 METERS	**144 mc**	**AOD-57 PLUS AOA-144**	
	220 mc	**AOD-57 PLUS AOA-220**	
	420 mc	**AOD-57 PLUS AOA-144 PLUS AQA-420**	

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Order Direct from International

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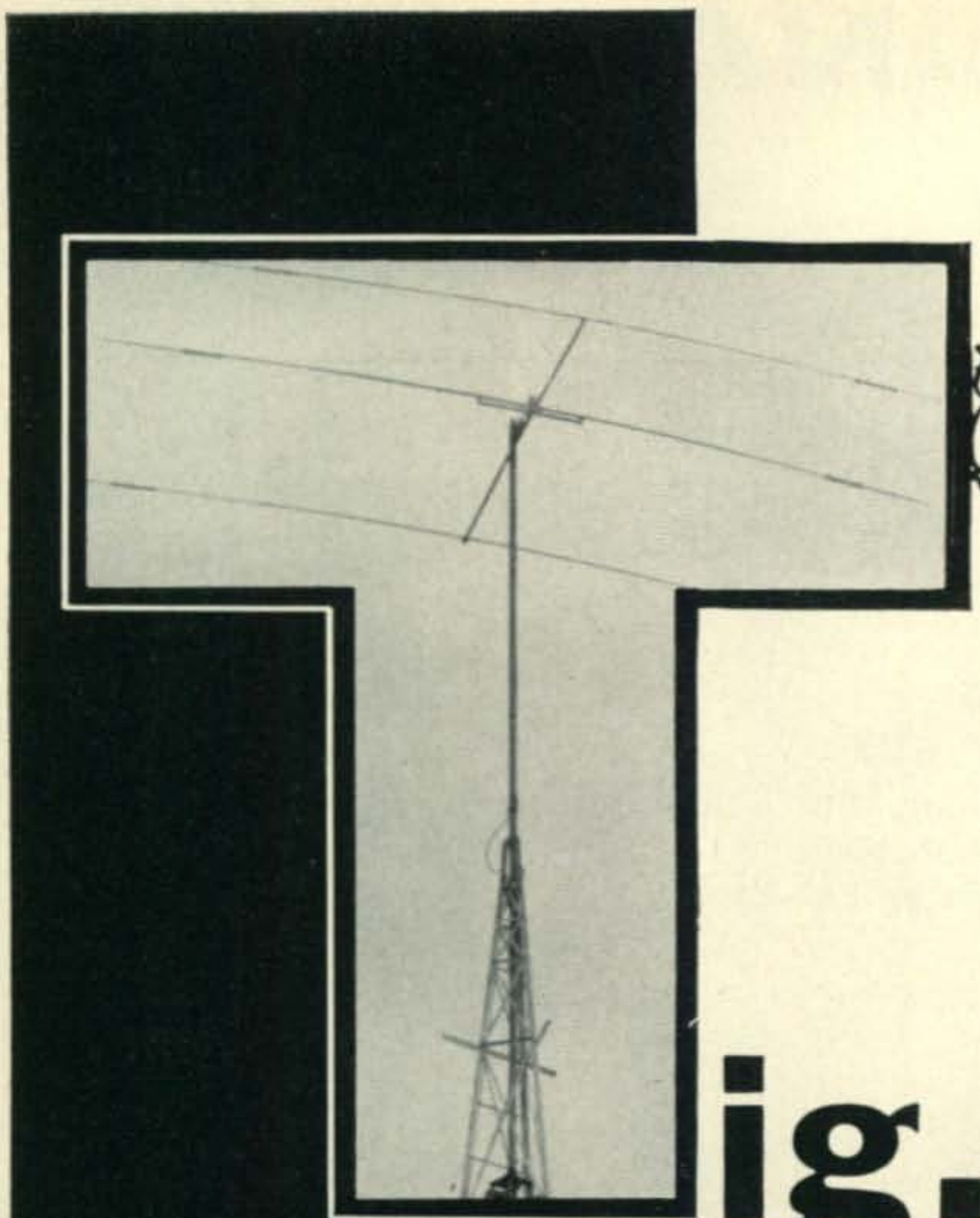

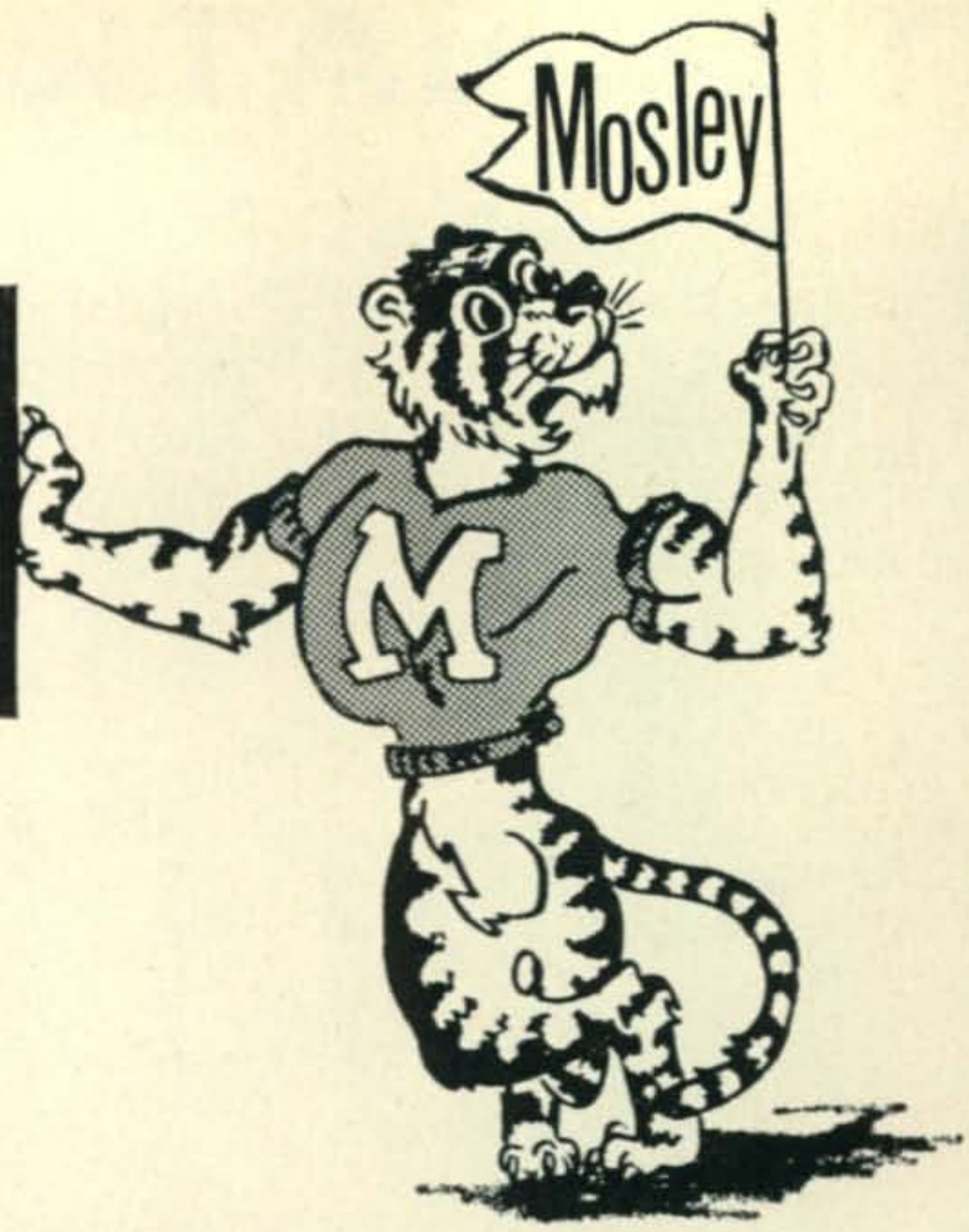

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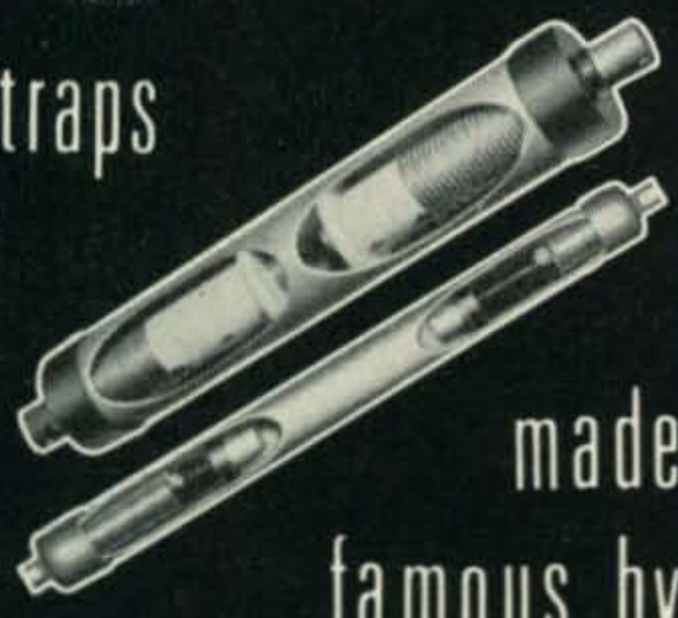
Features the Mosley all-metal enclosed traps



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net price $82.91

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net price $44.79

Electronics Inc.

4610 N. LINDBERGH BLVD. – BRIDGETON, MO. 63044

For further information, check number 6, on page 110

ZERO BIAS

COMMENTS about the recent FCC incentive licensing proposal have been literally pouring into the office for the past month. Although the resultant work is enormous, (just reading and filing them), we really welcome it, for two reasons. First, we have been able to develop a rather good impression of what our readers think, and second, the deluge tells us that amateurs are going about the job of voicing their opinions in an effective and intelligent way.

The most common objection (besides new call letters) is the "downgrading" of the Advanced Class license. It is widely felt that it is unfair to remove long-held privileges from the very fellows that built amateur radio into the great hobby it is now. Frequently, the "Doctor" analogy is drawn, pointing out that a doctor licensed 30 years ago is *still* a doctor and is *still* entitled to practice his profession. The fact that the newly graduated doctor assuredly knows much more about medicines than the new graduate did 30 years ago, does not diminish the standing and value of the old-timer. It is assumed —perhaps wisely, perhaps not—that in order for the old-timer to remain effective, he must keep pace with new developments, and become proficient with new techniques.

Although not entirely valid for amateur radio, the analogy is something to think about. Is the point of the FCC proposal simply to penalize a fellow for being born 30 years too soon? It certainly looks that way. We feel that this change does not fall into the realm of "incentive licensing." For this reason, *CQ* has, in its commentary to FCC on Docket 15928, insisted that consideration be given to renewing Advanced Class licenses as Amateur First Class, instead of General.

Another point of serious objection, among v.h.f.'ers, is the proposal of additional sub-bands on 6 and 2 meters. We feel that these subdivisions will serve no useful purpose. Consider this: Why was the 10 meter band not subject to FCC's incentive axe? We suspect that the activity level of 10 meters caused FCC to bypass 10 to avoid reducing the already small population. Then why do just the opposite on 6 and 2 meters? There's a lot of empty kc up there, and the way to get them occupied is *not* to segregate the v.h.f. operators any more than they are now.

Of course, we can't skip over the distinctive call letter proposal. We understand FCC's need *to police any new* sub-bands, but the proposed "system" (?) is so complex and disheartening to current hams, that some less offensive identifying method must be devised. We suggested one such method last month, but even that was pretty bad. We now suggest that FCC withold any decision on this point until a study has been made of alternate proposals.

These seem to be the most common sore points in Docket 15928. If we've neglected your pet peeve, let us know, but remember—we could fill an entire issue just with the comments of our readers!

OSCAR and the WAS Award

A recent decision by ARRL has us in a bit of a dither. The decision is that QSO's made via repeater satellites are not valid for WAS credits (*QST*, May '65 p. 109).

We're puzzled by the unusual lack of foresight on the part of the Communications Department. The explanation given for the action is that the awards are made to recognize the personal achievement of an operator in attaining a particular goal by means of his regular station equipment and at his regular QTH. The ARRL feels that the use of an external repeater device to complete a QSO transgresses the intent of the awards. We disagree.

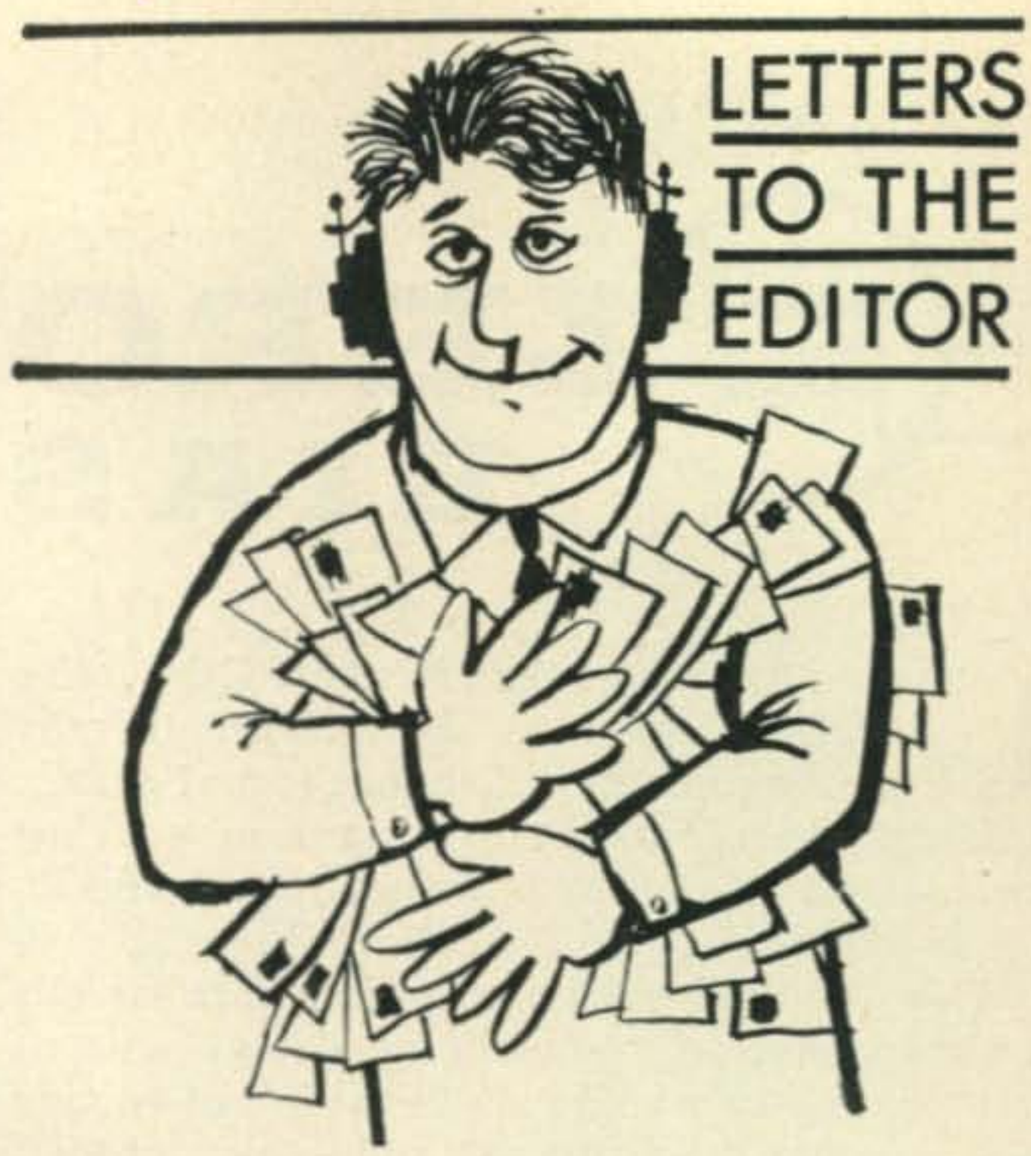
We sincerely feel that ARRL is at least partly oblivious to the significance of satellite communications. Not meaning to be wild visionaries, we predict a time will come (and it's not too far off) when amateur v.h.f. communications via satellites will be a common and routine affair. Even with OSCAR III, every 2 meter operator with a reasonably good station and antenna had an excellent opportunity to conduct QSO's over unprecedented distances. As time goes on, these QSO's will become more common, and repeater satellites will come to be considered a normal (albeit exotic) adjunct to amateur v.h.f. communications.

The time will come when it will be necessary to consider satellite QSO's valid, so why must the pioneers in this exciting new area be penalized? Some fellows may argue that it would be unfair to the two meter men now in the 30-state-or-more category, to suddenly come up against amateurs who stand ready to surpass their efforts via satellites. Well, heck, if that's all that worries them, put an asterisk next to their call to denote satellite communications! If it's good enough for Roger Maris—it's good enough for the really modern and progressive v.h.f.'er!

Perhaps, by the same token, ARRL had better disclaim QSO's made via F2 or E-Layer skip, aurora, scatter, ducting and any other specialized and unusual technique employed by the modern amateur. After all, these, too are "devices" that transgress the status of "regular station equipment," aren't they? But the situation is silly enough without our trying to make it appear sillier. Come on ARRL—step out of the Ford Tri-Motor age and into the Space Age.

73, Dick, K2MGA

LETTERS TO THE EDITOR



Mission Accomplished

Editor, *CQ:*

The Arne Trossman Award plaque arrived today and it is a real beauty!! S'been long time coming, but sure was worthwhile waiting for. Will always have a warm spot in my heart for *CQ* mag.—HI.

The plaque will be placed in a prominent spot in my shack and I just know it will get many an envious glance.

Again, many, many thanks.

Stan Frederickson, W2FLD
322 Harvard Road
Garden City South, N.Y.

Editor, *CQ:*

Was I pleased to read in March's ZERO BIAS that we're going to receive the Arne Trossman plaques. Yes, it has been a long wait.

Was wondering if there was anything that should be done; that is, anything *I* should do.

I must agree with you that K6BX is not doing the right thing. The County Hunters Net on 7223 by open discussion all feel badly about the turn things have taken.

The new USA-CA Custodian, is doing an excellent job. Ed seems to have a much more pleasing personality.

I have been with the USA-CA program since it started and hold No. 2 for 2500 counties, confirmed. Am close to 3000 with 2917.

Tell Ed Hopper the County Hunters are with him and will do everything they can to help him.

Suggestion: Like DXCC, why not a small space somewhere keeping totals of top 25 County Hunters?

Again, thanks, Dick, the Top Honors CHC'ers appreciate what you have done.

Oscar F. Beyer, K8CIR
Route 1, Ottawa County
Grand Haven, Mich.

Homebrew Slot

Editor, *CQ:*

Re: "The Homebrew Slot Antenna," Feb. '65 *CQ*.

I have had numerous inquiries about slot dimensions for different frequencies. The antenna in my article is cut for 145 mc, but will work well at any frequency 2 or 3 mc each side. Actually a 2 mc change (to 147 mc for example) would only make a half inch difference in the length of each of the two dipoles which (with the phasing lines) make up the slot. Best advice is to make it "as is"—it works FB.

Dick Baldwin, K4ZQR
409 Kaelin Drive
Louisville, Kentucky

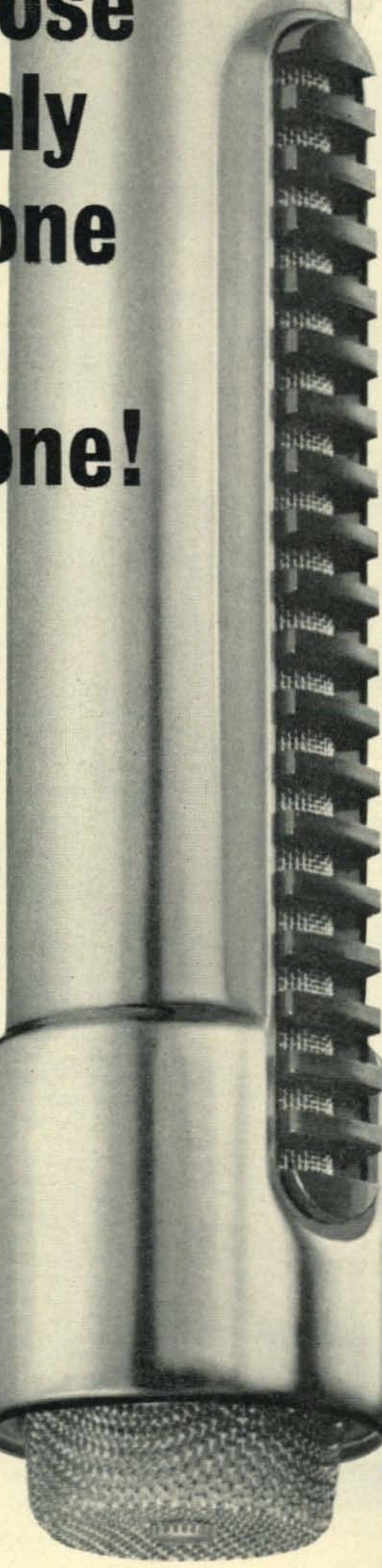
Oh Well, Back To The USA-CA Book

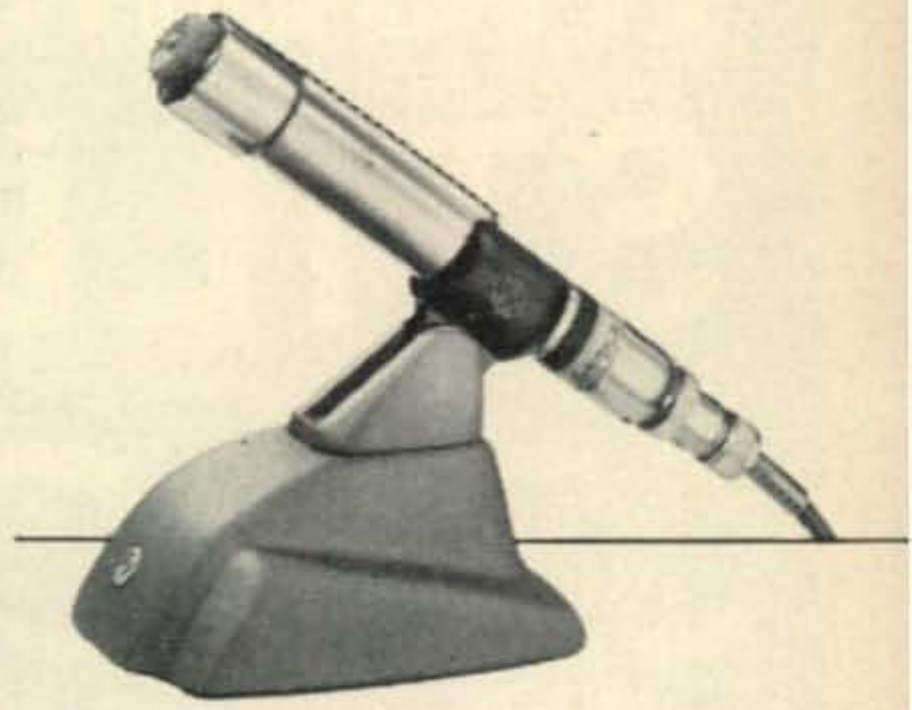
Editor, *CQ:*

We hams of Snohomish County, Washington gratefully acknowledge the publicity afforded us

For further information, check number 8, on page 110

When QRM Gets Tough Choose The Only Microphone With Backbone!





ELECTRO-VOICE
MODEL 676
DYNAMIC CARDIOID

The backbone of the Electro-Voice Model 676 is no mere decoration. It's visible proof of the most exciting idea in directional microphones—Continuously Variable-D (CV-D)™.

Here's how it works. We attach a very special tapered tube to the back of the microphone element. This tube automatically varies in effective length with frequency. It's a long tube for lows—a short tube for highs. All this with no moving parts! The tube is always optimum length to most effectively cancel sound arriving from the back of the microphone, regardless of frequency.

This ingenious solution* is years ahead of the common fixed-path design found in most cardioid microphones. It means you pick up less noise and room reverberation, ensuring a crisp signal and optimum vox performance. It also is less sensitive to wind and shock—ideal for field days! There is almost no "proximity effect"... no boosted bass when you must operate extra close.

Long life and peak-free response are guaranteed by the exclusive E-V Acoustalloy® diaphragm. And the 676 has unusually high output for a microphone so small. Of course you get both 150-ohm and Hi-Z outputs, plus high efficiency dust, pop, and magnetic filters—indeed, all of the hallmarks of Electro-Voice design that have made E-V a leader for years.

But that's not all. The 676 has an exclusive bass control switch built in. Choose flat response (from 40 to 15,000 cps) or tilt off bass 5 or 10 db at 100 cps to eliminate power-robbing lows that reduce efficiency and lower intelligibility. You'll be amazed at the reports of improved audio you'll get when you switch to the E-V676.

Visit your E-V distributor to see this remarkable new microphone today. And when difficult QRM must be faced squarely, stand up and fight back with the microphone with a backbone (and CV-D)—the new Electro-Voice Model 676 dynamic cardioid!

Satin chrome or TV grey,
$60.00 amateur net, Model 420
Desk Stand, $12.00 amateur net.

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Dept. 652G, 618 Cecil Street
Buchanan, Michigan 49107

*Pat. No. 3,115,207

Electro-Voice®
SETTING NEW STANDARDS IN SOUND

For further information, check number 9, on page 110

in your article "Cranium Queries" in April 1965 issue of *CQ*, but we think your writer needs the geography lesson; not your readers.

First of all the "international event of 1962" (Seattle World's Fair) was in our neighboring county just south of us, King County. Secondly, we have a Stampede Pass in the state of Washington (also located in King County) not a "Stampede Tunnel."

Snohomish County is proud that it's the fastest growing county in the state and is the West's largest center of pulp and paper mills. We have the most beautiful scenery in the nation plus unexcelled fishing, hunting, boating and "more abundant life."

Everett, (Snohomish County), Wash.
Robert E. Miller, W7UX
912 Rucker Avenue

P.S. We'll give you an "A" for effort . . . after all, you did get our county name spelled right!

Hard-To-Find Parts

Editor, *CQ:*

I think that *CQ* is about the best medicine that amateur radio has, but as with most medicines there are some undesirable things about it.

My main gripe is the lack of supply sources in the construction articles. I carry at least 2 catalogs from major supply houses in the country and I have yet to come across an article on a project I wanted or could afford to build (not many of these) without running into the same old problem of not being able to obtain parts. Couldn't you put some indication into type of where to obtain these parts that are used in the project?

I know that this may sound a little brash coming from a CB'er but move over fellows I'm on the way up to join you!

Thanks and 73,

John P. McGuire Jr., KLF1653
P.O. Box 12
Camp Douglas, Wisconsin

Here at the *CQ* offices, John, we use only three of the most popular electronics catalogues, as our "standard of availability" for *CQ* articles. Almost every single part used in any article can be found in at least one of the three catalogues. However, hams being the improvisors and experimenters they often employ some very off-beat or specialized parts in their work. In such cases we try to supply sufficient data so that the builder can locate a satisfactory substitute, if necessary. But I'm sure your complaint is somewhat legitimate, so we'll just have to keep even closer tabs on our parts lists.—*K2MGA*

Developing a DX Voice

Editor, *CQ:*

Hooray for Professor Heisseluft's Bel-Canto system. Our club read his interview and immediately launched a self-improvement plan.

The experiences of several members indicate that care should be taken when doing the various exercises Prof. Heisseluft suggested.

One fellow became oxygen drunk while deep breathing and fell off the speakers stand onto the refreshment table. He wasn't hurt, but the sandwiches were very soggy.

A lighter member was outside the club house rotating his arms and breathing in the prescribed manner. He got over zealous and became air borne. We were some time dislodging him from the two-meter colinear.

Consonant producing muscle building should be done with care when in buses or street cars. One should have a humorous book handy to ward off the inevitable stares when one goes, HAH - HAH - HAH.

Several unexpected benefits came from the tongue control exercise. One member became so accomplished that he received several night club and TV bookings. Everyone in the club can now eat olives straight from the bottle. Our supple tongues are great for dips, ice cream cones and lashing comments.

Clothes pins are ever present and the club's tea bill is astronomical. Some of the members

WESTWARD!

and on to the San Francisco Bay Area . . .

Home base for **SBE**—for here in South San Francisco is the big plant where thousands of the high-value **SB-34** transceivers, linear amplifiers and SSB accessories will continue to come off the production line during 1965.

And 50 miles south . . .

San Jose, site of the **1965 ARRL NATIONAL CONVENTION . . . July 2-3-4-5**

A gala event . . . programmed in the true Western style with something of interest to everyone—technical talks—exhibits —group meetings including DX, RTTY, VHF, YLRL, MARS, USNR—a ladies program—dancing—entertainment—steak barbecue—valuable prizes in profusion.

Plan to attend this really big national convention! And be sure to visit the SBE exhibit, Booth #17 where a sparkling new SBE product will have its first showing.

SB-34 **HIGHLIGHTS:**
Built-in supply for 12V DC and 117V AC. Power input: 135W P.E.P. input. (Slightly lower on 15). **Frequency range:** 3775-4025 kc, 7050-7300 kc, 14.1-14.35 mc, 21.2-21.45 mc. **23 transistors, 18 diodes, 1-zener, 1 varactor,** 2-6GB5's PA, 1-12DQ7 driver. **Built-in speaker.** Prewired receptacles on rear accept **VOX** and **Calibrator**—both units optionally available. **Size:** 5"H, 11¼"W, 10"D.

$395 including built-in power supply.

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317 Roebling Rd., So. San Francisco, Calif. 94080

For further information, check number 11, on page 110

refuse to take their tea plain, and the results are similar to those of too much deep breathing.

The members' DX standings are steadily rising, and we expect to set all kinds of new records. Unfortunately since moving our voice power to 1000-3000 cycles the phrase "you're my first YL," occurs all too often.

Allen C. Ward, W5FIP
2103 Winsted Lane
Austin, Texas 78703

We're happy to see that W5FIP and many others have benefitted from Professor Heisseluft's suggestions. We hope to have some more detailed progress reports in time for our next April issue.—*K2MGA*

Mug Shots

Editor, *CQ:*

It has been a few months since I have had the pleasure of reading the "new look" in *CQ*, and one of the most pleasant things, I thought, was the inclusion of the pictures of the various column authors. Equality for all, and that rot! Where in the name of QRM is the picture of the editor of the newest and most informative column, "The Club Forum," Alfred G. Smith, WA2TAQ.

It is perhaps due to the lack of facial beauty found, or the presence of same found in our illustrious author, but none the less, I feel that we all would like to gaze upon the face of Al, in its place of display atop his very fine articles.

I am looking forward to seeing the next issue fully adorned.

Wally Shapiro, WA2OHN
845 Cliffside Avenue
No. Woodmere, New York

OK, OK—Rock Hudson Smith will show his stunning facia starting next month. But remember, it wasn't our idea!—*K2MGA*

Change of Address

Licensees whose addresses are changed by local renaming or renumbering of streets, etc., are not required to file for modification of their licenses or to pay the fee to have their licenses and records changed at the FCC. Simply send in a letter showing both the old and the new address, the call sign, and stating that there is no actual change in the location.

Rome, New York

The Rome Radio Club is sponsoring a Ham Family Day at Beck's Grove in Rome, N.Y. on June 6th. There will be hidden transmitter hunts, mobile judging, auctions, c.w. copying contests and outstanding technical discussions. A new and different program of interest to the ladies is being prepared, and each lady is asked to bring an old hat to the program. Activities begin at 1:00 P.M. and end with a chicken and steak dinner at 5:00 P.M. Reservations by mail are $4.00 for adults and $4.50 at the gate.

Atlantic City, New Jersey

Preparations are in the offing at the R.O.A.R. (Rotarians of Amateur Radio) booth to be set up during Rotary's 56th International Convention at Convention Hall. Atlantic City, May 30th to June 3rd. The FCC has authorized the call K2RI to be used during the Convention so that Rotarians may send personal messages and greetings to fellow Rotarians in other parts of the world.

Haledon, New Jersey

The First Annual Beefsteak Dinner and Dance of the Knight Raiders VHF Club will be held Saturday, June 5, at 7 P.M. at Werners Grove, Belmont Ave., Haledon, N.J. Dinner, dancing and many door prizes. Tickets cost $5.50. Write to Knight Raiders VHF Club, P.O. Box 1054, Passaic N.J. for more information.

For further information, check number 14, on page 110

Belton, Texas

The Belton Amateur Radio Club is having their second annual hamfest on Sunday, June 20th on the shores of Lake Belton in central Texas. There will be exhibits of ham gear, contests and mobile "Talk-In" on 3940 kc. Registration will be $1.50. Contact W5UPO, 1500 N. Beal, Belton, Texas.

Bellingham, Washington

The Mount Baker Amateur Radio Club, K7SKW, of Bellingham will be operating from the 5000 ft. level of Mt. Baker in NW Wash. on June 5th. A special certificate will be available to stations who contact this group. 20 s.s.b. & a.m. and 75 a.m. will be used. QSL address is K7SKW, P.O. Box 457, Bellingham, Wash. For further information, write W7VRO, 2935 Plymouth Dr., Bellingham.

SPPDRET

SPPDRET is the "Society for the Promotion of Putting the Dummy on the Right End of the Transmitter." Anyone who wishes to join in the fight to stamp out QRM may receive a membership badge by signing a pledge that he will do as much as possible of his testing into a dummy load and send it along to Bill Harrison, W2AVA, 225 Greenwich St., N.Y., N.Y.

Springfield, Ohio

The Springfield Amateur Radio Club will hold its second annual Hamfest, under shelter, at the Clark County Fairgrounds on Sunday, July 18, 1965. The highlights of the day's program will consist of a Swap-Shop and a lecture on Ham TV by Charlie Tucker, K8AOH. A program for the wives and children is also being planned. For more details contact Charlie Toothman, WA8FZS, 212 Galewood Dr., New Carlisle, Ohio 45344.

Halmstad, Sweden

On June 11 to 13 the shortwave listeners of the world will be having a convention in Tyleback, Halmstad. During this time the Halmstad radio amateurs will be working on 20 meters on station SM6XA. They will QSL 100% and hope to receive many contacts.

Vinton, Virginia

The Roanoke Valley Amateur Radio Club is holding a Hamfest on May 29th and 30th. This will take place at Vinton War Memorial, Vinton, Virginia. There will be contests and other events in which the amateurs compete for awards.

Maca Park, Ohio

The Northeast Ohio VHF Group will hold the tenth annual hamfest and picnic on Father's Day, Sunday, June 20th at Maca Park, two miles east of Tellmadge, Ohio on State Rt. 18. Lots of prizes and contests. Mobile check-in on 50.5 mc. For further details contact W8JHS, W8CZV or W8IXZ.

Huntington, W. Virginia

The third annual picnic of the Tri-State ARA will be at Camden Park, US 60 West, Huntington, W. Va., 12 noon until 6 P.M., *Sunday*, June 6th. There will be prizes, displays, surplus and swap shop. Single ticket—$1.00; Family—$2.00. For more information contact W8VA, Tri-State Amateur Radio Assoc., 2937 Auburn Rd., Huntington, W. Va.

Waterton, Alberta, Canada

The 31st International Waterton-Glacier Hamfest will be at Waterton Lakes Park, Waterton from July 17th to the 18th. Preregistration—$3.00. The deadline is July 7. Prizes galore for the young and old alike. For further details write to E. S. Hall, VE6PZ, Box 223, Red Deer, Alberta.

Jacksonville, Illinois

The Annual Bowling Green Missouri Hamfest, having been transferred to the Jacksonville area Amateur Radio Club Hamfest, will be held at the Morgan County Fairgrounds on Sunday, July 11.

The Korean Amateur Radio League

The Korean Amateur Radio League and the Eighth United States Army Radio Club will jointly sponsor a Field Day from 0001 GMT July 3 to 2400 GMT July 4.

For the Jeep, the Radio Room or the Office

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MODEL RF-301, MILITARY GRADE SSB TRANSCEIVER

This unit was designed to be used in severe military applications—a jeep, an open boat or a base station. It covers 2 to 15 Mc. A precision frequency synthesizer can be tuned to any 1 KC channel. Continuous VFO coverage also provided. Power output 100 watts p.e.p. and average. Can operate from 115/230 volt AC *and* 12 or 24 volt DC power. Completely self-contained. Transistorized for low power consumption. Compatible with communications equipment used by U.S. defense agencies. Antenna coupler, FSK equipment available. Now in production for quick delivery.

MODEL SB-6FA, COMMERCIAL/GOVERNMENT SSB TRANSCEIVER

The SB-6FA is rated 125 watts power output—p.e.p. *and* average. This is three times the average power of similar equipment. It is ideal for Teletype, Facsimile and CW as well as voice communications. Six crystal controlled channels 1.6 to 16 Mc. High Frequency stability. A commercial equipment of highest quality. One Kilowatt Linear Amplifier, DC models, and a full line of accessories available.

COMPACT SERIES SSB TRANSCEIVER

High quality single-sideband communications in a transceiver that is inexpensive to buy and simple to operate. Can be used by operators with no technical training. Available in 1, 2, 3 or 4 channel versions, 1.6 to 16 Mc. Power output 100 watts. The COMPACT weighs only 34 pounds and is complete in a single cabinet. Also available for Mobile Operation.

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For further information, check number 15, on page 110

A special QSL card will be issued and all amateurs are encouraged to participate. Listening for 20 m phone will be on 14.200 mc and above, and transmission on 14.185 mc and above. Operations will also be on 15, 40 and 80 meters. A.m., s.s.b. and c.w. will be utilized. The station in each US call area contacting the most HL or HM stations will receive a special certificate. The Kimchi award will also be granted for two way contacts with 5 HL stations. Send extract logs to HL9US, HQ EUSA, Signal Officer, APO, San Francisco. 96301.

Warsaw, Missouri

The Ham-Butchers Net will hold their Annual picnic at the City Park, Warsaw, Mo. on Sunday, June 20th at the Shelter House. Those attending are requested to bring their own plates and hardware with covered dish of your own choice. Drinks free. Advance pre-registration tickets are $1.00 Children free. For more information contact KØEQY, 16 Maple Lane, Macon, Mo.

Atlanta, Georgia

The Georgia State Convention of the ARRL and Hamfest activities of the Atlanta Radio Club will be held on Sat. and Sun., June 5th and 6th at the public auditorium on Lenox Square in Atlanta. Convention activities include an ARRL meeting, an equipment servicing clinic and an auction sale. There will also be a MARS meeting, homebrew equipment contest, entertainment, games and Bingo for the XYL's. Arrangements have been made also for all classes of amateur FCC exams to be given Sunday at the convention site. Advance registration—$6.00. Registration after June 1st will be $7.50. For further details contact W. A. Clark, WA4CWU, 2013 Clairmont Terrace, NE Atlanta, Georgia.

Oglesby, Illinois

The Starved Rock Radio Club will hold its annual hamfest June 6th at the La Salle County 4-H home and picnic area southwest of Ottawa, on Rt. 71. Free swap section. Good exhibits of new ham gear. Free coffee and doughnuts. Registration is $1.50 in advance; registration at the gate $2.00. Write to SRRC/W9MKS, George E. Keith, RFD #1, Box 171, Oglesby, Ill. for further information.

Big Flats, New York

The 7th Annual Penn-York Hamfest is at Morrison's Restaurant, Big Flats (Between Elmira and Corning, N.Y.) on June 19th at 12 noon. Grand award—NCX-3 s.s.b. transceiver. Speakers, swapfest, contest, etc. Smorgasbord dinner—all you can eat. Last day for pre-reg. is June 12. Send s.a.s.e. to Earl J. Foster, W3BKF, RD 2, Gillett, Pa.

Denver, Colorado

The Denver Radio Club is sponsoring the Rocky Mt. Division Convention to be held July 17-18, at the Centre Denver Motel. Fine program for all interests, including non-ham YL's. Nationally known personalities are being contacted for speakers. The club radio station will be on the air at the motel and many equipment displays. Registration is $3.00 prior to July, thereafter $4.00. For more information contact Kayla Bloom, 175 So. Jasmine St., Denver, Colo.

Tangier Island, Virginia

The Richmond Amateur Radio Club is sponsoring a trip to Tangier Island. They will use their club call, W4ZA. Operation will be on 80 thru 2 m. sideband and c.w. beginning on June 19th at 8 A.M. EDT. QSL will be 100%.

San Jose, California

The ARRL National Convention will be held in San Jose, Calif., on July 2, 3, 4, and 5. The affair will feature both operational and technical programs, with other regular convention features, topped off with a formal "steak barbecue" at the Santa Clara County Fairgrounds. Convention speakers will include league officials, such notables as Mr. William Grenfell, W4GF, Chief of Standards and Measurements, F.C.C. and Mr. C. D. Tuske, co-founder of the A.R.R.L., who will speak on the early days of amateur radio and the League. For registration and reservation information, write to Associated Radio Clubs of Greater San Jose, P.O. Box 6, San Jose, Calif.

RANGER II

75 WATTS CW
65 WATTS PHONE INPUT!

VALIANT II

275 WATTS CW AND SSB*
200 WATTS PHONE INPUT!

SLICE THRU Q.R.M.

with either of these high performance Viking transmitters

RANGER II—This popular, feature-packed, self-contained transmitter/exciter is available wired and tested or in a complete, easy to assemble kit. As a transmitter, it's a rugged 75 watt CW or 65 watt phone unit—instant bandswitching on 6 through 160 meters—for built-in VFO or crystal control. Temperature compensated VFO is extremely stable—high "Q" pi-network output circuit matches antenna loads from 50 to 500 ohms. Flexible timed sequence keying provides perfect "make" or "break", yet maintains "break-in" advantages of a keyed VFO. As an exciter, without modification, it will drive any of the popular kilowatt level tubes and will provide a high quality speech driver system for high powered modulators. TVI suppressed—with tubes, less crystals.

Cat. No. 240-162-1.....**"Ranger II" Kit**.....**Net $249.50**
Cat. No. 240-162-2.....**"Ranger II" Wired**.....**Net $359.50**

*with auxiliary SSB exciter

VALIANT II—Here's the unit that gives you outstanding flexibility and performance in a compact, desktop rig! Low level audio clipping prevents over-modulation and increases modulation level and intelligibility for increased communications power. Differentially temperature compensated VFO is highly stable—operates in the 1.75 to 2 mc. and 7.0 to 7.45 mc. ranges. Other features: Instant bandswitching 160 through 10 meters . . . complete TVI suppression . . . timed sequence (grid block) keying . . . high gain push-to-talk audio system . . . built-in low pass audio filter . . . self contained power supply . . . control mode switching . . . high efficiency pi-network tank circuit. With tubes, less crystals.

Cat. No. 240-105-1.....**"Valiant II" Kit**.....**Net $375.00**
Cat. No. 240-105-2.....**"Valiant II" Wired**.....**Net $495.00**

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MATCHBOXES
Bandswitching —no plug-in coils!

Complete integrated antenna matching and switching systems for CW and AM transmitters up to 275 Watts or one Kilowatt. No annoying "plug-in" coils; eliminates "load-tapping". Bandswitching 80 thru 10 meters.

Cat. No.	Amateur Net
250-23-3...275 Watts, with directional coupler and indicator	$94.95
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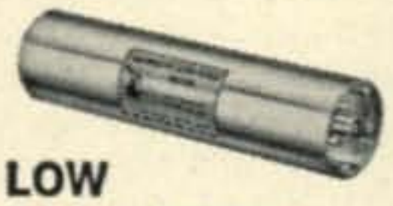

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Wired, pretuned. Handles more than 1000 Watts RF—75 db or more attenuation of harmonic and spurious frequencies above 54 mc.

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DIRECTIONAL COUPLER AND INDICATOR

Provides continuous reading of SWR and relative power in transmission line. May be permanently installed in 52 ohm coaxial line. Easily handles maximum legal power. Wired and tested.

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For further information, check number 17, on page 110

The Amateur Radio Club Forum

BY AL SMITH,* WA2TAQ

WE'RE now going into the sixth month of the CLUB FORUM. As has been said so far, so good. Reader response has certainly proved the need and popularity of a column for Amateur Radio Clubs. As a new addition to amateur radio we have to feel our way around to see just exactly what our amateur radio clubs need and want. Is there anything in particular that you the reader feel that we can do to improve conditions in our amateur radio clubs? Please drop me a line, and if it's within the realm of the CLUB FORUM, I shall be glad to assist in any way I can.

With the warmer outdoor months ahead, it's time for most of us to consider activities for the summer months. Summer usually presents a lull in amateur radio activities as many go away for vacations, to camp, etc. For the many that stick around home, it's a good time for the things that can only take place in the warmer periods.

Right now is the proper time to set the dates for picnics, beach parties, good old fashioned clam bakes *et al.* It's also a great time for the bunny hunts. Hidden transmitter hunts have many side attributes, they promote mobile operation, and stir up many to experiment with loops and small portable receivers to chase that very elusive "rabbit." This type of activity can be beneficial to the fellow that has to chase down the source of interference to his receiver.

Speaking of interference it's amazing the unexpected things that turn up as causes of interference to our receivers as well as the neighbors TV set (and usually blamed on us). We've heard of such things as Bell transformers and fish tank heaters. I'm sure that the reader has run across many unusual things that could be the cause of interference. If you would drop me a post card or QSL letting me know what you have found, I will be glad to include these causes in the CLUB FORUM so that our club interference committees will profit by your experience. Nothing can take the place of experience, and by our amateur radio clubs sharing each others experience we can be of vast assistance to each other.

As mentioned in the April column here are a few more items to consider for Field Day use. At this point you should have had preliminary Field Day Committee meetings with at least a small group of the clubs leading Field Day participants.

A complete layout should have been prepared with all tent, antenna, and generator locations mapped out. With careful planning, the least possible interference, noise, and interaction will result.

---

*504 Beach 43rd St., Far Rockaway, N.Y. 11691.

"I've got myself a $21.95 Kilowatt!!"

Waters CLIPREAMP™

"6 to 10db extra on the exciter add up to a KW gain any way you want to figure it. And using your Clipreamp with the S Line and 30L1 amplifier I've had consistent reports of 6 to 10db stronger signals QSO after QSO — short haul and DX.

On occasion I have alternated the Clipreamp with the 30L1 and the reports came back, 'No change — amplifier is working OK.' Again an approximate 6 to 10db gain.

I am delighted with the unit, of course, and actually feel that I've got myself a $21.95 kilowatt."

Charlie Burgoyne...W1LHZ

MODEL 372

Your distributor has Charlie Burgoyne's "$21.95 kilowatt" now. WATERS doesn't guarantee it to take the place of your linear (after all Clipreamp weighs only 6½ ounces and fits in the palm of your hand) but it does guarantee your complete satisfaction. Buy it . . . try it! If your signals don't punch through QRM better the deal is off — your money refunded! Incidentally, Clipreamp is self-powered and installs in the mike line in a matter of minutes.

Model 372
(less battery)
$21.95

MODELS 3001 & 3002

WATERS UNIVERSAL HYBRID COUPLER & PHONE PATCH

MODEL 3002 (less battery)
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MODEL 3001
(without Compreamp)
$49.50

Perfection in a PHONE PATCH

Here's the only phone patch with its own speech processor! The built-in Compreamp (similar to Clipreamp) in Model 3002 maintains correct out-going patch levels, eliminating all manual switching and providing effortless VOX operation. The Compreamp may be used independently in the microphone line. Provision is also made to switch a tape recorder in for both recording and playback in the Hybrid Coupler and Phone Patch.

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For further information, check number 19, on page 110

Don't neglect a shelter of sorts for the generator set up. A heavy rain will not only drown out your supply of a.c., but will dampen your spirits as well. A frame of scrap lumber, covered with an old piece of canvas will usually do the job. Remember that exhaust mufflers get quite hot on these units, and plenty of space should be given to them and any combustible materials.

Keep your gasoline and oil supplies away from the generators, and always shut down the engines when refueling, for safety. If you run two or more generators, have a drop light running off each in the vicinity of the opposite generator, so that you'll have light in case one unit conks out or while refueling.

Generators seem to be the greatest source of racket at Field Day, that is other than some of the louder eyeball QSOs. One way to help drown out this clatter (the generator noise that is) is to put up a baffle of sorts that will cut down the noise. A blanket or canvas wall close to the generators will do an amazing job of slicing the db's of noise.

Speaking of noise, consideration should be given to an extra tent or two for: Field Day Headquarters, a cook tent, and one for cat napping. This will take the eyeball rag chewing away from the FD operating stations, and allow the boys to make those contacts without the confusion of ham talk in the background.

We could print long lists of things you should have on hand at FD, and we'll mention a few of the more important ones. Everyone should have a flashlight. The usual tools should be available along with soldering irons, etc. Also, as mentioned in April, take along a first-aid kit, and check the phone number and address of the nearest doctor. Safety measures pay off. A gathering point should be designated where towers, masts, antennas, wire, and the like can be brought prior to FD morning. In fact if a truck or trailer is available it could be loaded up the night before with everything that will be needed. Start early, get the towers and masts up, generators set, and shelter in place. You're better off having a few hours of leisure before starting time than to take a chance of not being able to kick off your operation at the appointed hour.

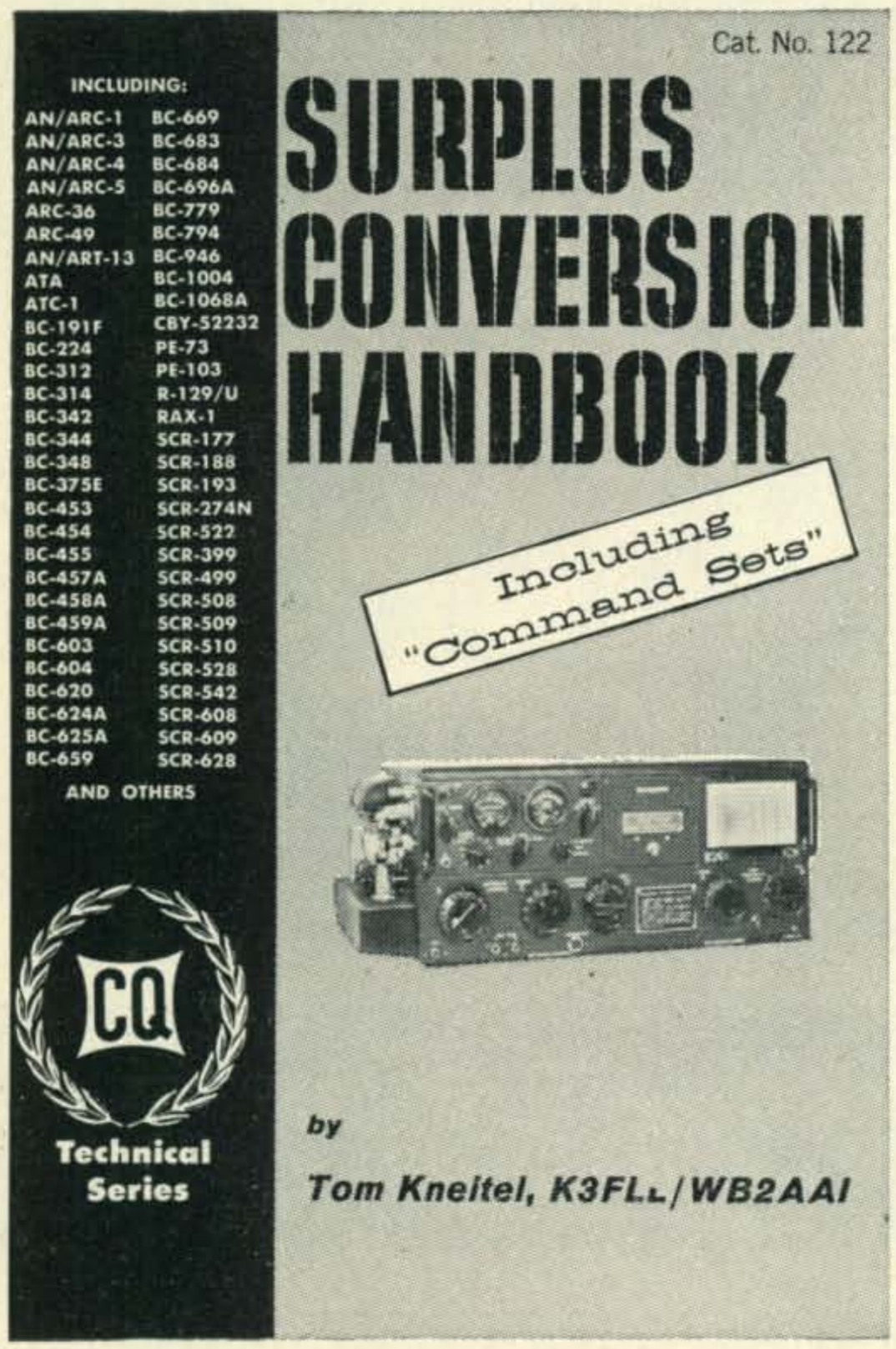
Though we have been preaching public service along with Field Day we certainly don't want to take anything away from the enormous amount of fun in store for you on FD weekend. It's just great to have an avocation like amateur radio where you can enjoy something so well, and yet know you can do so much for the public when a need arises.

As a final measure, gather the clan together just before air time and have a sort of "go get-em men" pre-game rally. Remind all present that FD is more than a contest but a test of their ability and preparedness as well.

Good luck to all, and don't forget to listen for yours truly from K2UHD/2 with the boys from the Rockaway Amateur Radio Club.

73, Al, WA2TAQ

Our Most Popular Handbook



The most popular handbook ever to be presented in the CQ Technical Series was the venerable old "Command Sets." Countless signals on the air today are there because of the information contained in "Command Sets," which went on to become the standard reference guide and definitive work on the topic. It went through 5 sellout printings, and when the last book of the final printing was stripped from our stock room we decided that the next printing would be an even bigger, newer, expanded, revitalized version of "Command Sets."

Our new book is called "Surplus Conversion Handbook," it's 192 pages BIG (that's 58 pages more than its predecessor). We kicked out all of the space-taking ads which cluttered up the old book and replaced them with more conversions—conversions of surplus gear other than just "command sets" alone. So the new book contains all of the best command set conversions of the original edition, plus complete conversion details on a whole slew of the most popular military surplus gear available today, including such winners as: SCR-522, ART-13, BC-603, BC-620, BC-624, BC-659, BC779, ARC-1, ARC-3, ARC-4, and many more. Actually, it covers just about every piece of surplus gear which is worth the time and effort to convert for ham use.

"Surplus Conversion Handbook," Edited by Tom Kneitel, K3FLL/WB2AAI, is a book which every ham will find to be a valuable and interesting addition to the shack. It's available for immediate delivery.

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Gentlemen: Enclosed is $_____ for _____ copy(ies) of the brand new SURPLUS CONVERSION HANDBOOK. Please rush me one of the first copies hot off the press!

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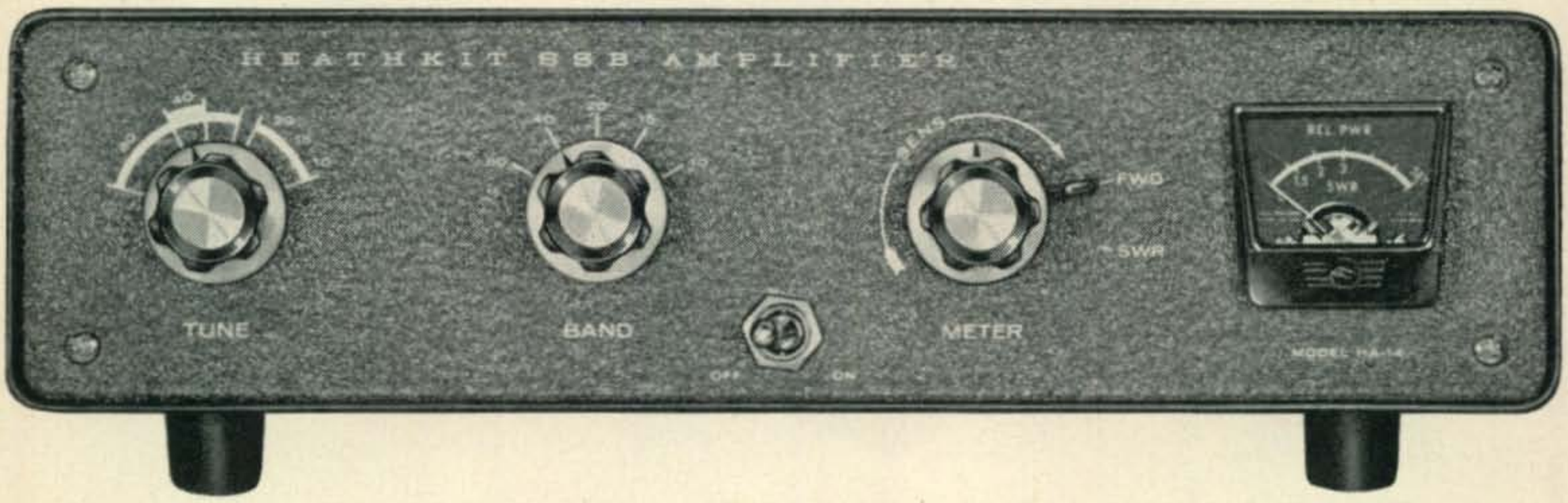
City _____ State _____ Zip _____

PRICE: $3.00

SEND YOUR ORDER NOW!

THE WORLD'S SMALLEST KILOWATT LINEAR



NEW HEATHKIT "KW KOMPACT"
1000 Watts—1 Foot Wide—$99.95
Operates Fixed Or Mobile

Heathkit "KW KOMPACT"...The World's Smallest Amateur Band SSB Kilowatt Linear Amplifier

• Provides 1000 watts P.E.P. input power • Tunes 80 through 10 meters • ALC output to exciter • Built-in antenna changeover relay • Built-in SWR meter aids antenna adjustments on the road & monitors for maximum efficiency • Pretuned broad-band input circuit requires no tuning • Engineered with a pair of rugged tubes ideally suited to mobile operation (572-B's or T160L's) • Full provision for control of "remotely" located AC or DC power supply

Here's A Kilowatt SSB Linear Amplifier That Sets New Standards For Size And Price! It can be installed under the dash of nearly every model of car with your exciter, providing a complete under-the-dash mobile station. This full KW SSB linear measures just 3 3/16" H x 12 3/16" W x 10" D. What's more, the *KW Kompact* goes for only $99.95!

Heath Engineered To Set The Pace For Both Mobile And Fixed Amateur Stations . . . A kilowatt in a car means real sock for mobile and emergency communications—where antenna efficiencies are normally low. In fact, we've included a panel-mounted SWR meter, enabling on-the-spot antenna checks and adjustments . . . a real convenience feature! But the *KW Kompact* is not just a mobile rig . . . Picture it on the top of your operating desk. Nice? Then order yours today. Priced less power supply options below.

Kit HA-14, 9 lbs.....$99.95

HA-14 SPECIFICATIONS—Band coverage: 80, 40, 20, 15, and 10 meters. **Maximum power input:** SSB, 1000 watts P.E.P. **Driving power required:** 100 watts P.E.P. **Duty cycle:** 50% (SSB voice modulation). **Third order distortion:** —30 db or better at 1000 watts P.E.P. **Output impedance:** Fixed at 50 to 75 ohms unbalanced. SWR not to exceed 2:1. **Input impedance:** 52 ohms unbalanced; broad-band pretuned input circuit. **Meter functions:** 0-6 relative power & 1:1 to 3:1 SWR. **Front panel controls:** Tuning, band switch, relative power sensitivity control, meter switch (FWD & SWR), power switch (off, on). **Tube complement:** Two 572-B (or two T160-L) in parallel. **Power requirements:** 2000 VDC at 500 ma SSB peak, —110 VDC at 60 ma, and 12.6 VDC at 4 amperes. **Cabinet size:** 12-3/16" W x 3-3/16" H x 10" D. **Net weight:** 7 lbs.

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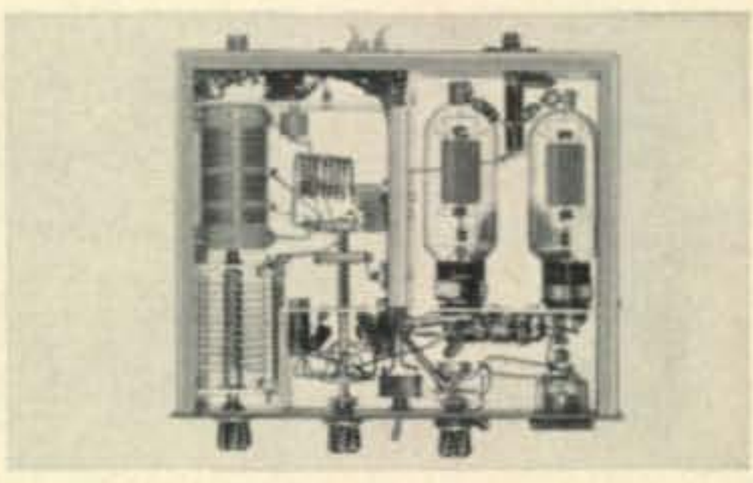

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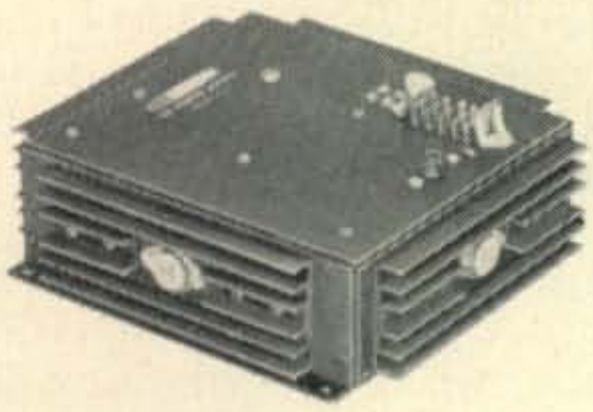

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The G4ZU X Beam for 20

BY JOHN J. SCHULTZ,* W2EEY/DJØBV

This article presents a constructional variation of the well known G4ZU "Birdcage" which was also developed by G4ZU and originally described in the RSGB Bulletin. *This variation is becoming popular in Europe but is still relatively unknown here. It should appeal to many who want a beam but consider even a 2 element Yagi too large. Full size performance is obtained without the use of any loading devices and without any complicated tuning procedures. The model is constructed for 20 meters but the dimensions may be scaled for other bands.*

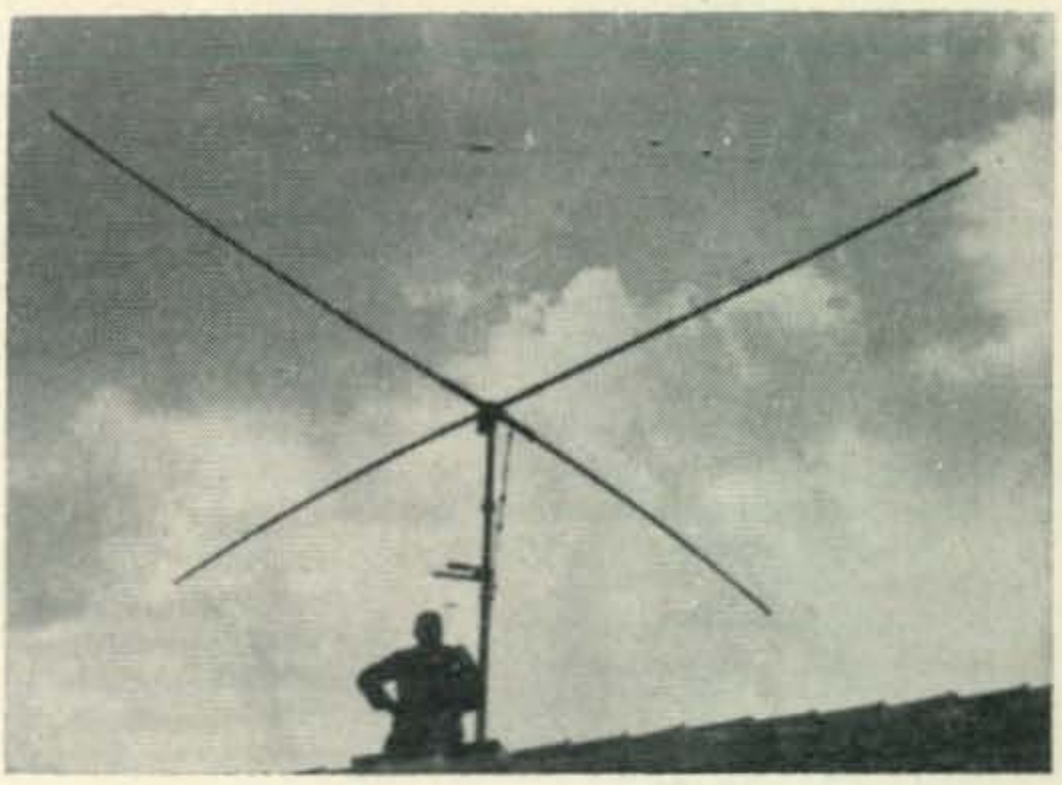
WHEN the time comes to think about erecting a beam antenna, every amateur, either mentally or actually on paper, computes a "figure of merit" for various beam configurations as applied to his particular situation. Usually on the plus side in calculating this "figure of merit" are the main factors of forward gain and front-to-back ratio and these are balanced against the minus factors of cost, constructional difficulties, tuning difficulties, size and appearance. Many amateurs would like to enjoy the advantages of a beam but after evaluating the various types—G4ZU Birdcage, Quad, 2 and 3 element Yagi, *etc.*, and the various types of construction and element shortening variations, conclude that a beam isn't worth the work involved or the stir that it would cause in the neighborhood. Where even a 2 element Yagi rates a minus, the X beam may be just the answer.

Electrical

Figure 1 shows the basic configuration of the X beam. It consists simply of two elements—a driven element and a director. The total lineal length of both elements is slightly longer than the equivalent elements in a 2 element Yagi. There are several ways to look at the configuration. It may be regarded as half of a G4ZU "Birdcage" design with the length of the elements slightly increased in order to achieve proper resonance since the elements are partially folded back on themselves in the same plane. Also, the extra length of the elements can be thought of as performing a transformer action in order to maintain the high current points of the antenna at the maximum element spacing (¼ λ tip to tip) while raising the feed point impedance. The fact that this works out to an almost purely resistive feed point impedance of 50 ohms makes feeding the beam with coax possible without any special impedance matching networks.

Construction

The real beauty of the configuration becomes apparent when one considers the mechanical problems involved in putting the beam together. First of all, the turning radius is only 12 feet—not quite as good as the full-size G4ZU "Birdcage" but much better than that of a normal



The X beam for 20 meters installed on the roof at DJØBV. The rotator is in the attic.

*c/o Engineering Department, Radio Free Europe, Englisher Garten 1, Munich 22, Germany.

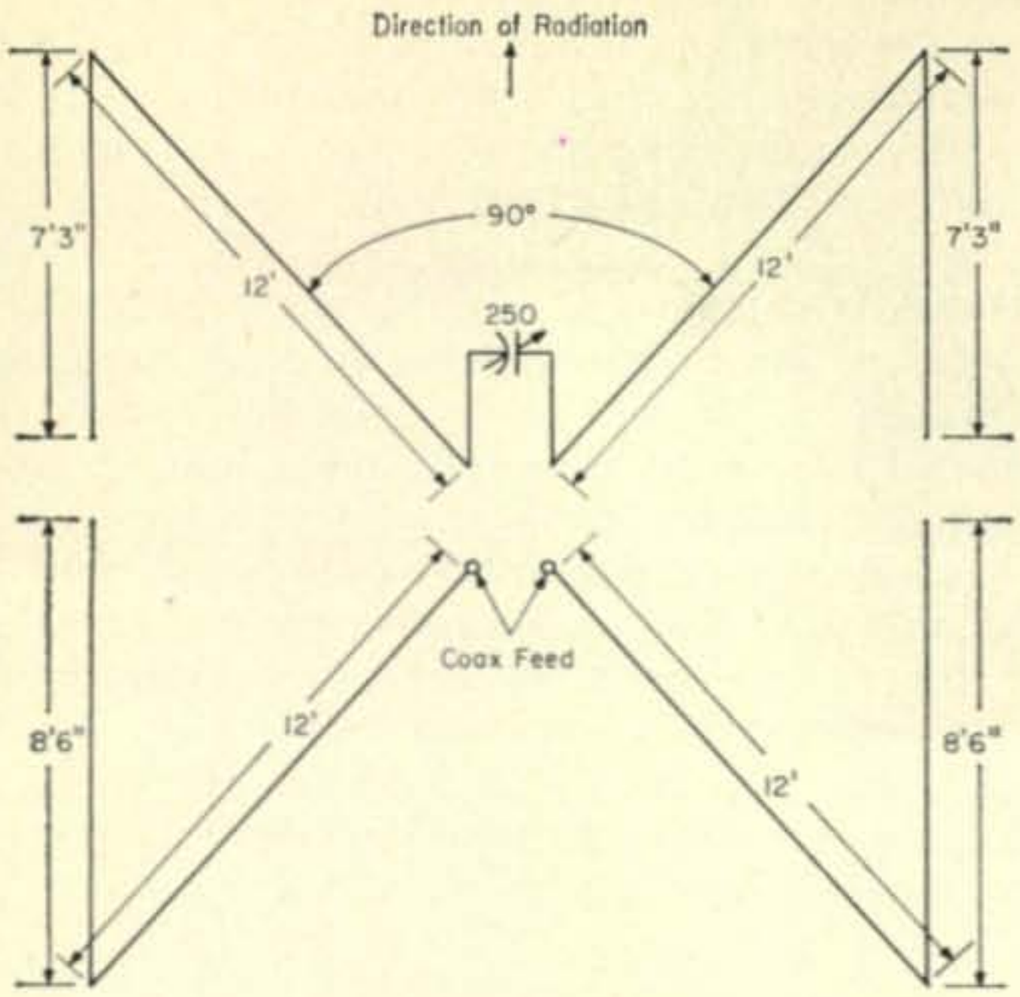


Fig. 1—X beam element dimensions. Direct coax feed (52 ohm) may be used or a Balun as explained in the text. The 250 mmf variable is a close-spaced receiver type.

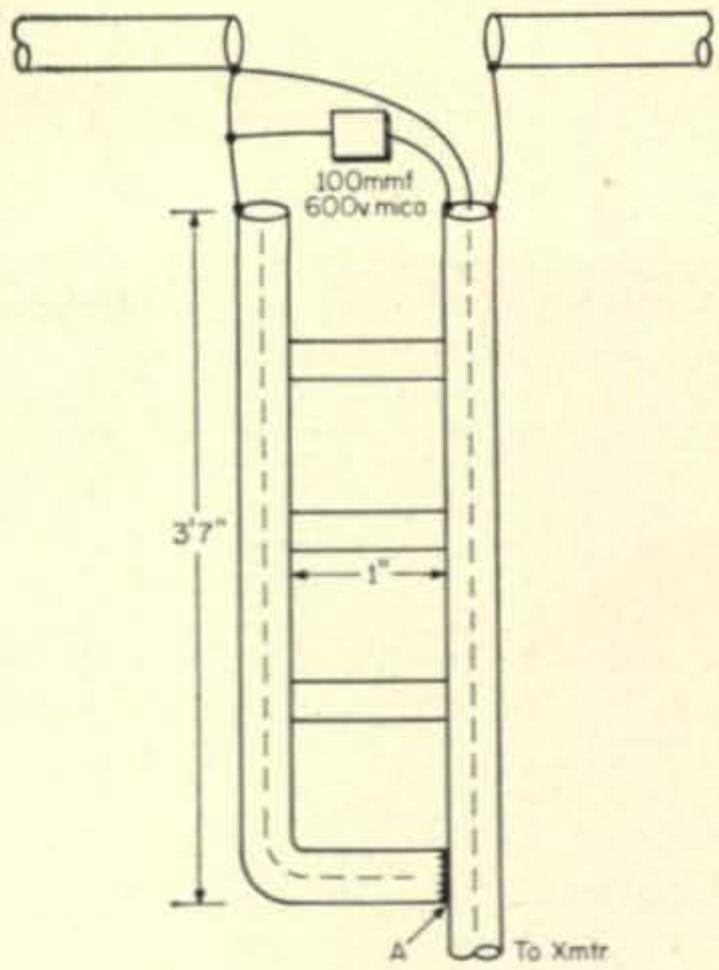


Fig. 3—Dimensions of the shortened Balun for use with the X beam. A normal size Balun should be used if mast length allows. Coax may be RG-58/U or RG-8/U and the capacitor is a 100 mmf 600 volt mica. The two coax lengths are separated by 1" wooden spacers. At point A only the shields are soldered together; the inner conductor of the Balun is not connected at either end.

Yagi. No boom is required and no long mast is required as by the full-size G4ZU beam or a Quad. The weight on the mast is balanced which also contributes to the overall mechanical stability.

There are many methods to attach the four element arms to the mast. Figure 2 shows how I did it. The two angle irons are each 36 inches long and of ⅛" stock. The iron reinforcing plate is 6" square and 3/16" thick. The pipe stub is 1⅞" diameter and was chosen to fit snugly over the 1⅝" diameter main mast. Secure attachment is made to the main mast by means of two stove bolts. The two pieces of angle iron are notched as necessary to allow them to fit over each other and allow the pipe stub to fit. All pieces and the reinforcing plate are welded together as shown. Many other methods of attaching the element arms to the mast are, of course, possible.

The four element arms are insulated from the mounting cross by means of plastic industrial hose passed over their ends. Attachment to the cross is by means of radiator hose clamps as shown in the photograph. The r.f. quality of the insulation at these points is not critical since they are all low-voltage r.f. points.

The driven element is fed with 52 ohm coax through a shortened Balun transformer, the dimensions of which are given in fig. 3. The shortened form of a Balun was used only because a normal length Balun would have been longer than the mast section extending from my house roof. It is not absolutely necessary to use a Balun with the beam anymore than it is necessary with a dipole. Since the antenna is basically a balanced one, the use of the Balun may prevent some minor pattern distortion when the beam is fed with coaxial cable as well as reducing any line radiation which could increase the TVI problem. In any case, if a Balun is used it must

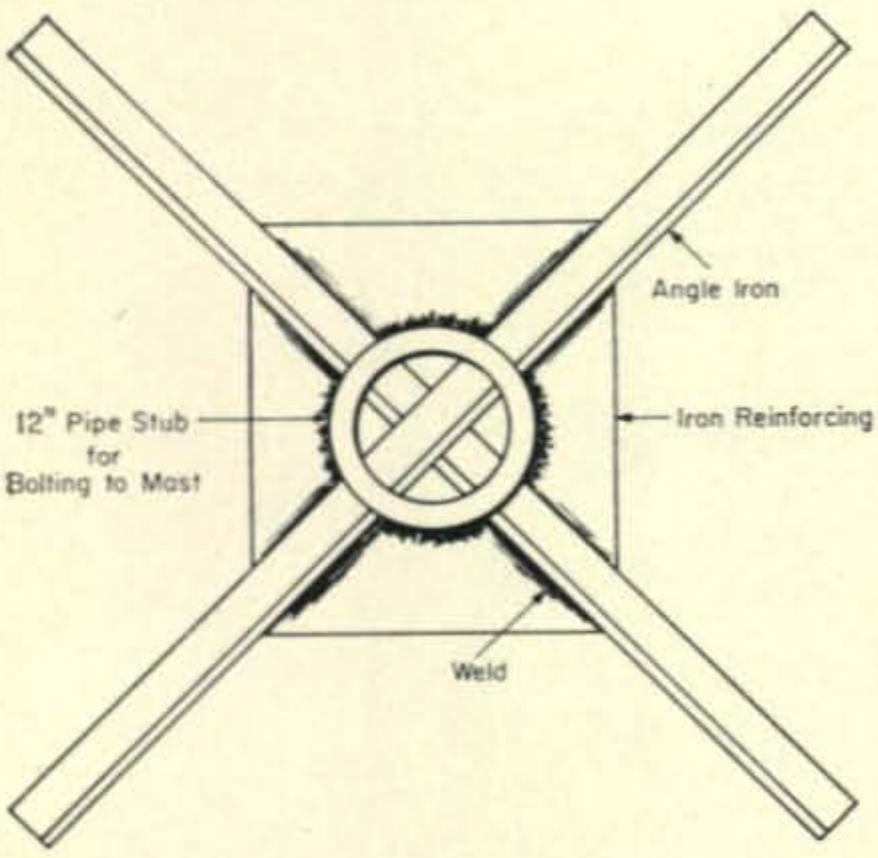
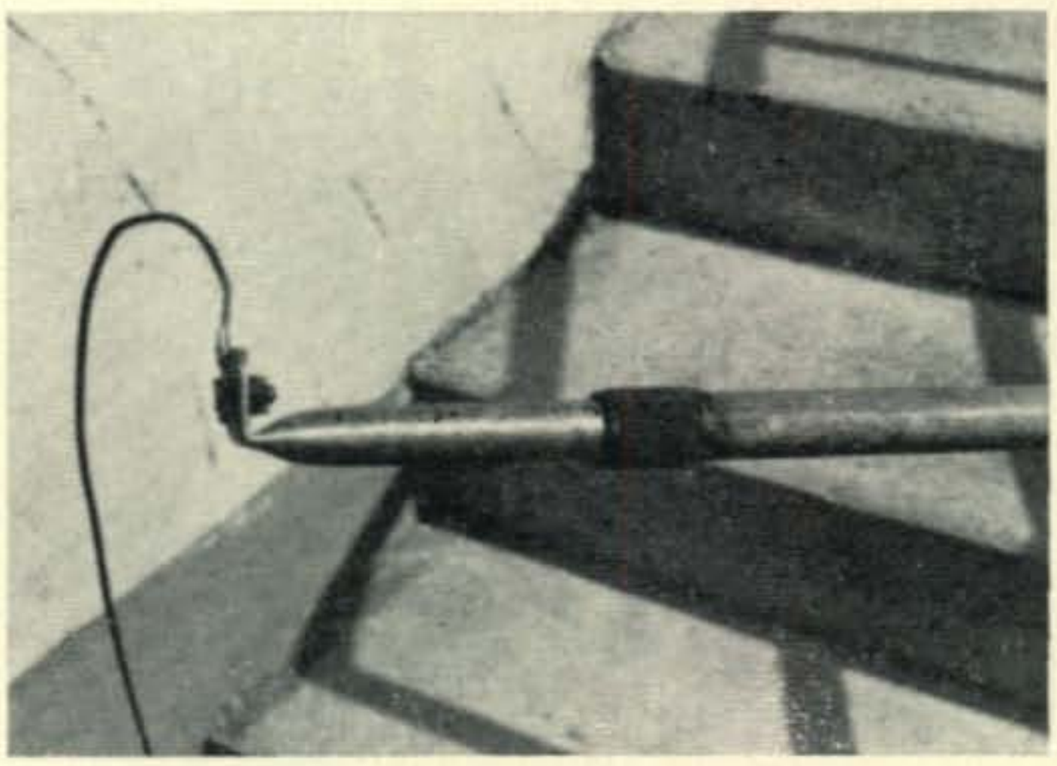


Fig. 2—Diagram of the basic element mounting cross. Material specifications are given in the text. The entire assembly should be painted, after welding, to prevent corrosion.



Detail photograph showing how the wire side elements are connected to the end of the telescoping aluminum arms. Small size cable shoes are used.

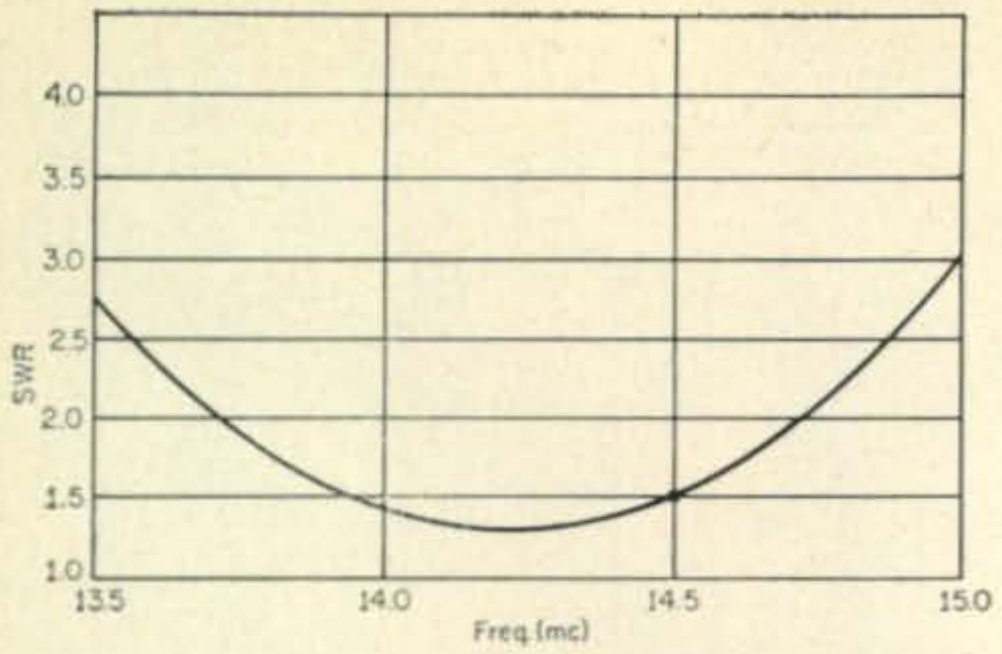


Fig. 4—S.w.r. curve of the 20 meter X beam fed with 52 ohm coax.

be held away from the mast a few inches for its entire length if it is to be effective.

A 250 mmf receiver type variable is mounted in a plastic box which is secured to the mast by another hose clamp. The capacitor is connected in series with the two halves of the director element in order to provide for tuning.

The element arms used for my beam are composed of 4 telescoping pieces of aluminum tubing—1⅛, 1⅞ and ¾ inches. The first three sections are each extended to just slightly shorter than 4 feet each and the last ¾" section, which is just long enough to make a total length of 12 feet, is bent for attachment of the side wires. The side wires are normal stranded antenna wire although copperweld would probably be better since the stranded wire may tend to fray at the point where it is attached to the element arm tips. The construction of the beam with 4 telescoping sections of tubing for each arm is far more elaborate than necessary and just two 6 foot sections of telescoping 1" and ⅞" aluminum tubing, for example, would be perfectly satisfactory.

Tuning

Tuning of the antenna is extremely simple and almost takes longer to describe than it takes to perform. The s.w.r. of the driven element should first be checked. A curve very similar to that shown in fig. 4 should be obtained if the beam is reasonably high, about 30 feet, and in the clear. The beam is quite broad as shown in fig. 4 and no adjustment of the driven element should be necessary. Of course, if any other type of feed besides 52 or 72 ohm coaxial or balanced cable is used, some sort of matching network is necessary. Tuning the director is most easily accomplished by having a friend listen to your signal and with the beam aimed in his direction, peak up the director tuning capacitor for maximum forward gain.

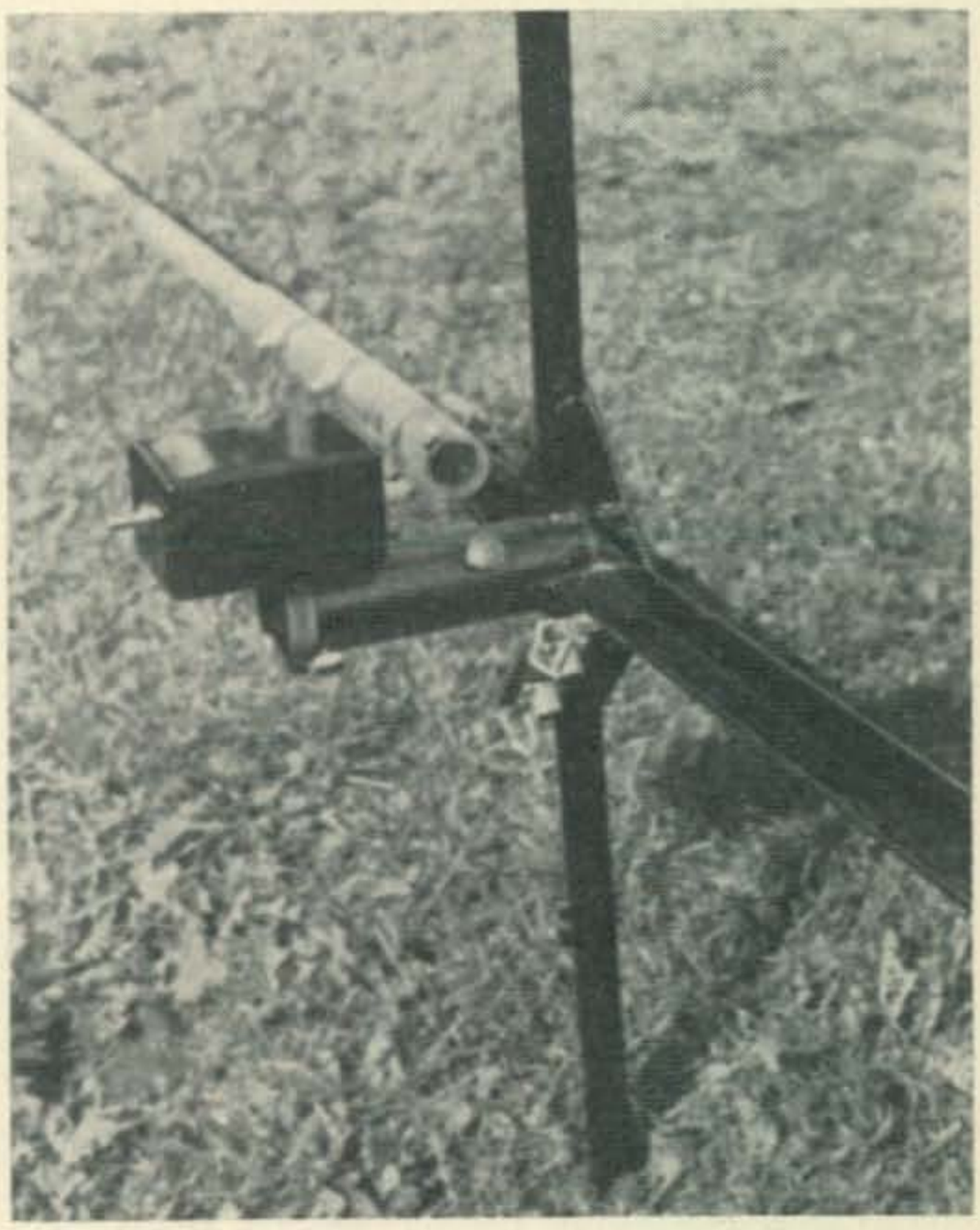
A further, but not absolutely necessary, step would be to then turn the antenna 180 degrees and retune the director tuning capacitor for minimum signal (best front-to-back ratio). The settings of the capacitor for these two conditions should be about the same. If there is some small noticeable difference in the settings, as would be normal for most beam designs, one simply has to decide if maximum forward gain or best front-to-back ratio is most important. A loss of ½ db forward gain may well be worth an improvement of several db in the front-to-back ratio if one is trying to work weak DX with strong QRM coming in from the opposite direction. For most circumstances, however, where the beam is rotated and varying QRM patterns in different directions are encountered, tuning for maximum forward gain is the simplest expedient. I have not tried to plot the actual beam pattern but judging from the relatively broad forward lobe and the relatively narrow but deep rejection slot to the rear observed, I would guess that the pattern must be very similar to the cardiod obtained when two half-waves are spaced ¼ λ and fed 90 degrees out of phase. The forward gain and front-to-back figures users of the beam usually quote also seems to confirm this type of pattern.

Performance

I cannot say, as some antenna articles usually do when describing performance, that even with the beam only several feet off the ground and 10 watts input that I immediately received 599 reports from VQ9 or some other DX. I didn't even try the beam when it was only several feet off the ground. I will say that when the beam was properly installed and tuned, that it performed much better for DX than my previous ground plane and it fully repaid the time it took to build it.

It will equal or outperform, under the same conditions of installation, a full-size, close-spaced 2 element Yagi and, on the band for which it is cut (20 meters), most of the trap-type, multiband beams on the market. The forward DX

[*Continued on page 102*]



The element mounting cross. Large size industrial hose is used to insulate the elements.

THE W4HJZ TWO METER CONVERTER

BY CARL A. EBHARDT,* W4HJZ

A low noise converter for 144 mc is described which employs a type 7788 tube in the front end. The circuit is basically that published in earlier literature. Changes have been made to improve the noise figure, image response, and mechanical layout. Complete detailed construction information is presented. When a converter is constructed as described, a completely stable and birdie free unit will result. Noise Figure runs 2.8 to 3.4 db. This converter was used for Moonbounce QSO on 144 mc between KP4BPZ and W4HJZ, June 14, 1964.

DURING 1962, Amperex announced a new tube called the 7788. Although designed for wideband scope amplifiers the tube has interesting possibilities for the v.h.f. amateur. The pentode noise resistance, R_{eq}, is specified as 100 ohms and typically runs about 80 ohms. The triode connected R_{eq} specified is 60 ohms and typically runs 48 ohms. By comparison the 417A is 105 ohms. The 7788 is listed in Allied Radio catalog for less than 11 dollars.

In August and September, 1962 a circuit and test results for a 7788 converter was published.[1] During 1963 the author constructed the unit. Results were not as good as expected. The best noise figure that could be obtained was an honest 5.5 db. Looking back over the article it was noticed that no noise figure information was given. However, sensitivity information was given. A letter to the author brought the bandwidth used for the tests, 5 kc. Computation of the noise figure was made and it turned out to be 4.5 db. This was considered to be much too high.

After 5 months the details of a new input circuit and revised biasing were worked out. The results were a 2.8 to 3.4 db noise figure. These measurements were made with a 5722 noise generator that has a parts layout exactly as in a previously published article.[2] Currents of 1.8 to 2.0 ma were required for a 3 db noise increase. This gives 2.6 to 3.0 db noise figures before correction. For this type generator corrections of 0.2 to 0.6 db are reasonable. This would give a true noise figure of 2.8 to 3.6 db.

In addition to a good noise figure this converter provides completely birdie and image free performance. This is quite an improvement over many converters the author has built. Feedthrough capacitors and shielding are used extensively but the results are well worth the trouble. The author's unit had absolutely *no* birdies or parasitics from the first moment it had B plus applied! The only changes required were to optimize the input circuit for n.f. A second unit built by K4HJE, from drawings, (and without his ever having seen the author's unit) resulted in another completely stable, birdie and image free converter! Third and fourth units built by other v.h.f. men also showed similar excellent results. So if that is what you want in a converter give this unit a try. It will be well worth the effort.

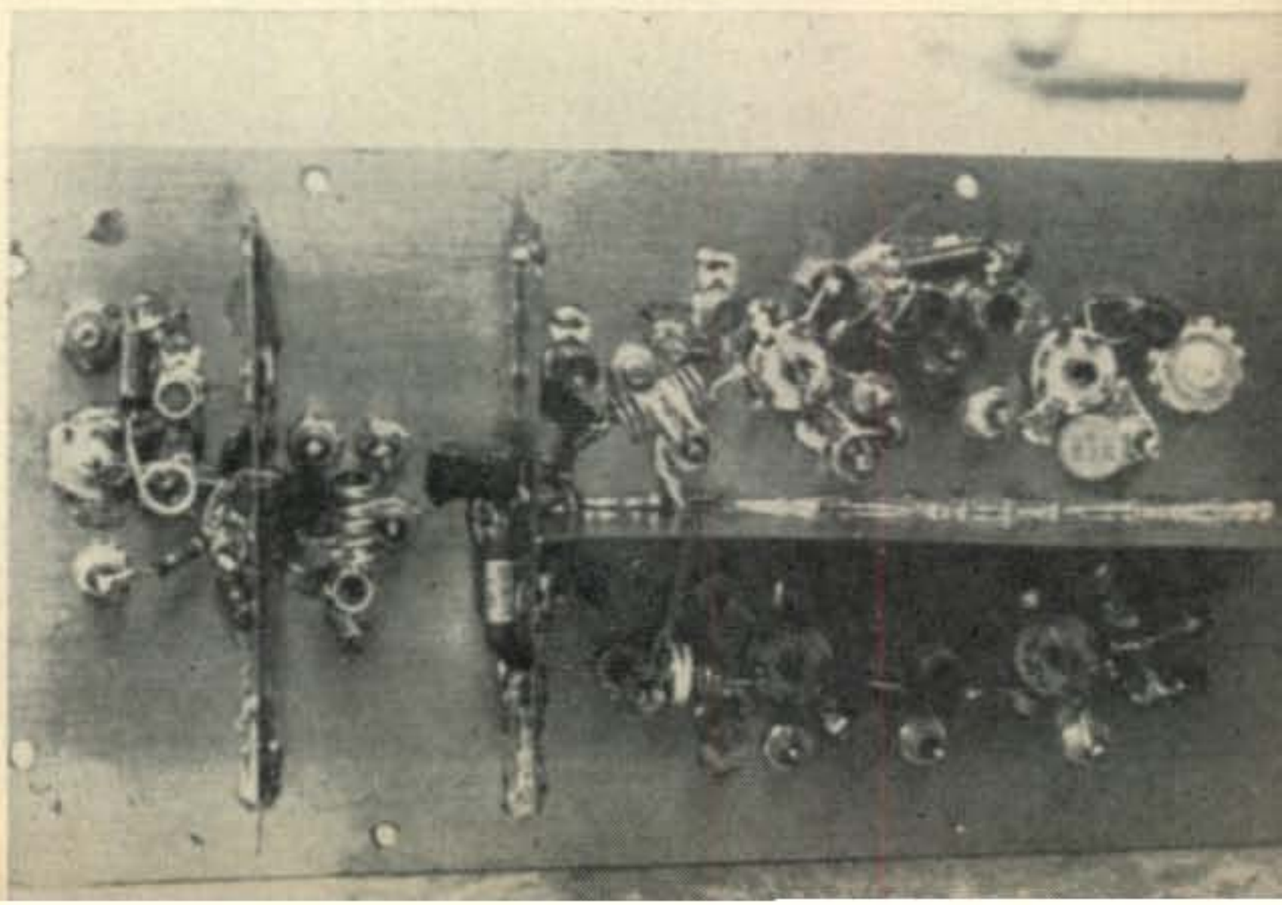
Circuit Description

A 7788 tube is employed as a grounded

*22 Rowan Street, Raleigh, N.C.

[1]Miller, R. "Next To No Noise," *VHF Horizons*, August and September, 1962.

[2]Huie, J. A., "A V.H.F. Noise Generator," *QST*, Feb. 1964, p. 23.



Bottom view of the 144 mc converter. The input is on the left. The oscillator circuit is located in the lower right with the mixer and cathode follower output stage.

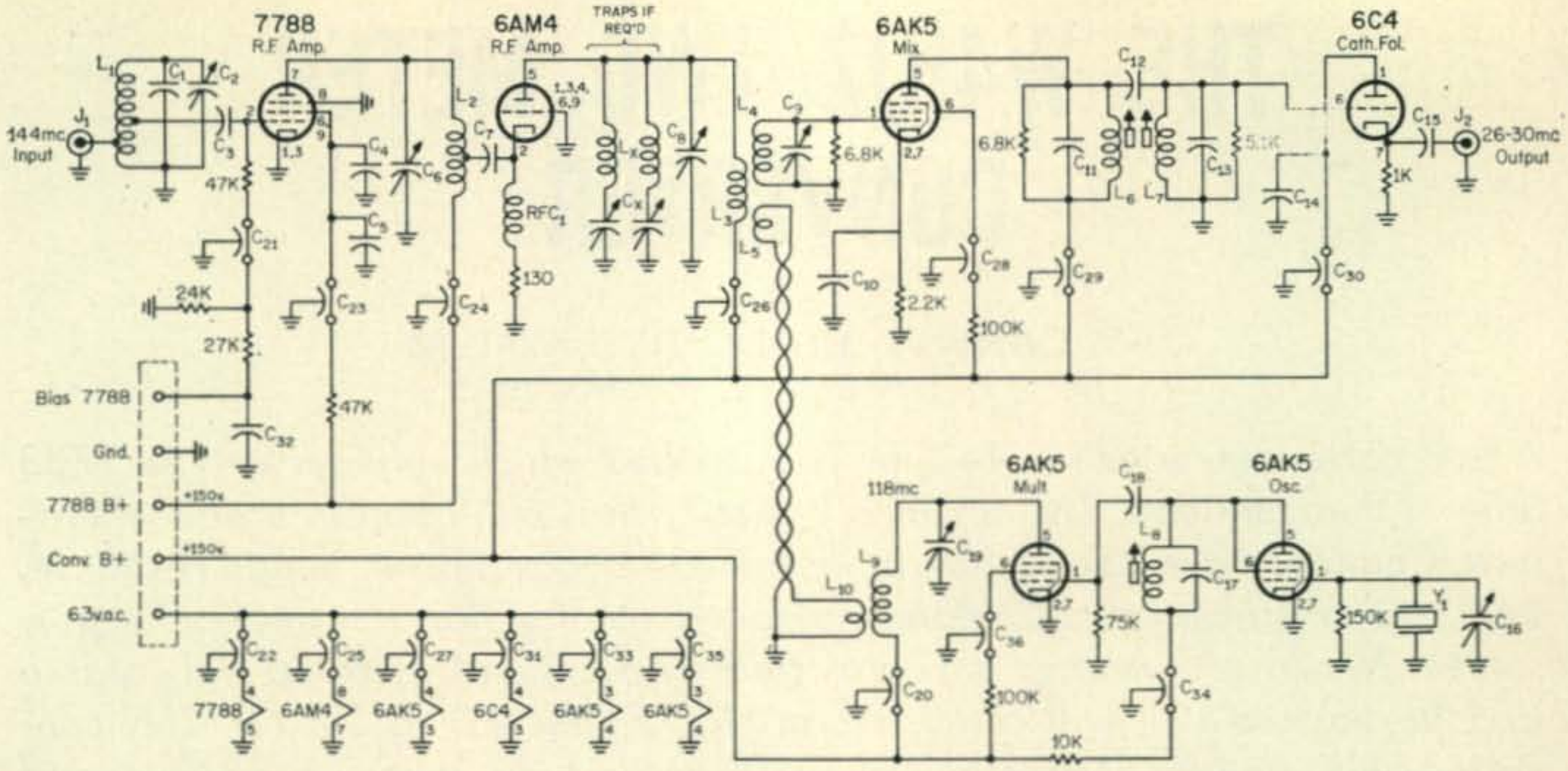
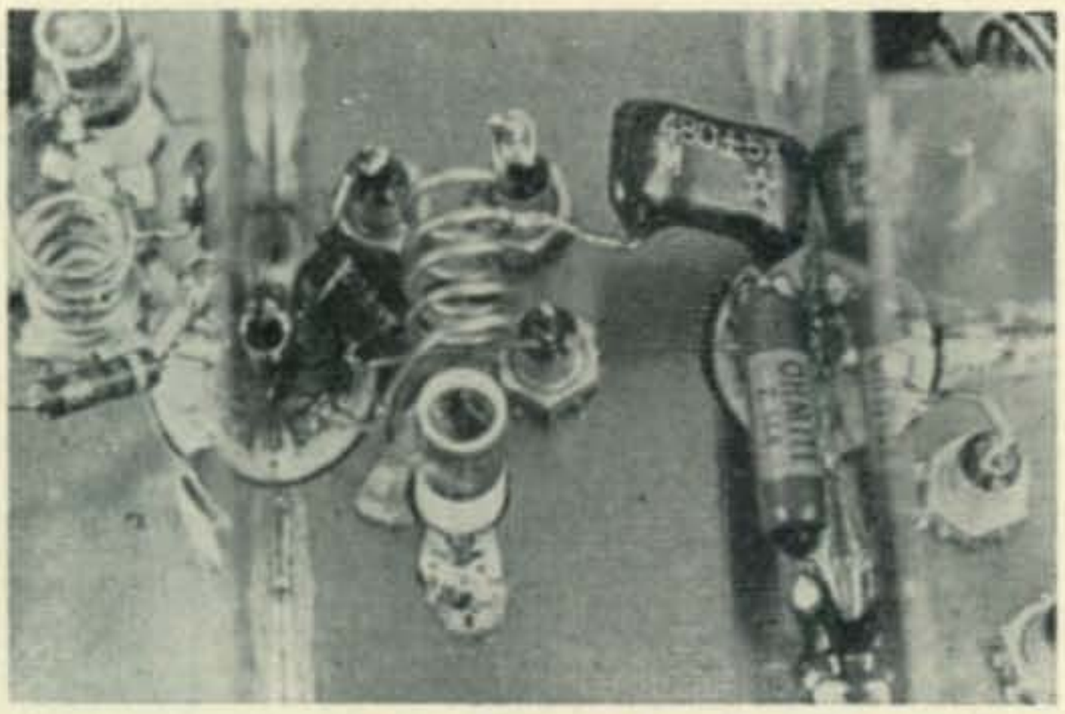


Fig. 1—The circuit for the 144 mc converter is shown above. All parts shown below the chassis line are placed on the top of the board. All resistors are ½ watt 10%.

C_1—2 mmf tubular ceramic.
C_2, C_6, C_8, C_9, C_{16}, C_{19}—1-8 mmf piston trimmer.
C_3—75 mmf mica.
C_4, C_5—Approx. 300 mmf mica.
C_7, C_{18}—Approx. 470 mmf mica.
C_{10}, C_{32}—0.001 mf ceramic.
C_{11}, C_{13}—Approx. 15 mmf ceramic (as needed to resonate).
C_{12}—2 mmf ceramic.
C_{14}—0.005 mf ceramic.
C_{15}—200 mmf mica.
C_{17}—Approx. 5 mmf ceramic (as needed to resonate).
C_{20} to C_{31}, C_{33} to C_{36}—Ceramic feedthrough, 1000 mmf.
L_1—4½ t. #20 tinned, ¼" dia. double spaced. Ant. top 2¾ t. from cold end. Grid top 3⅛ t. from cold end. Adjust tops ±¼ t. for best nf.
L_2—4½ t. #20 tinned, ¼" dia. double spaced. Tap 1 t. from cold end.
L_3—4½ t. #20 tinned, ¼" dia. single spaced.
L_4—3½ t. #20 tinned, ¼" dia. single spaced.
L_5, L_{10}—2 t. #22 hookup wire, plastic insulated.
L_6, L_7—14 t. #26 e. closewound on ¼" dia. slug tuned form.
L_8—10 t. #26 e. closewound on ¼" dia. slug tuned form.
L_9—6 t. #20 tinned, ¼" i.d. single spaced.
L_x-C_x—Series tuned traps. See text.
RFC_1—Ohmite Z-144 r.f. choke.
J_1, J_2—BNG coax connector.
Y_1—39,333 mc overtone crystal.

cathode, first r.f. Amplifier stage as shown in fig. 1. The input circuit is designed to efficiently couple the 50 ohm input signal to the 200 ohm tube input impedance. Bias is applied through a 47K resistor so as to not load the input signal and degrade noise figure. Bias voltage is adjusted to a value giving optimum n.f. (Approximately 20 ma cathode current). For strong signal reception the bias voltage may be increased. This will reduce cathode current and stage gain (while increasing noise figure of course). Gain reduction of about 50 db is possible with bias of about —5 volts.



Close-up view of the r.f. amplifier wiring. On the left side of the shield is L_1 with C_1 behind it. The input jack is just out of sight to the left. On the right side of the shield is L_2 with C_6 just in front of it. To the right is the second shield plate bisecting the 6AM4 r.f. amplifier socket.

The output tuned circuit of the 7788 is tapped at a low impedance point to couple into the cathode of the 2nd r.f. amplifier, a grounded grid 6AM4 stage. The first r.f. stage gain is large enough that the tap is not too critical as far as n.f. is concerned and ±¼ turn doesn't degrade it appreciably.

After two r.f. amplifier stages, the signal is strong enough that mixer noise is easily overcome. Double tuned tightly coupled circuits are used between the 2nd r.f. and the mixer. This gives a total of 4 tuned circuits between the antenna and the mixer. It provides excellent selectivity and rejection of non amateur v.h.f. signals. (See image and spurious response data at the end of the text.)

In the event that additional image rejection is considered to be necessary, series tuned traps may be employed as shown in the schematic (L_x and C_x). These should be resonant at the interfering frequencies. The desired signal level is high enough at this point so that the n.f. will not be degraded.

The incoming signal and the local oscillator are fed to the grid of the 6AK5 mixer. The resultant i.f. frequency is coupled through double tuned, critically coupled circuits into the 6C4

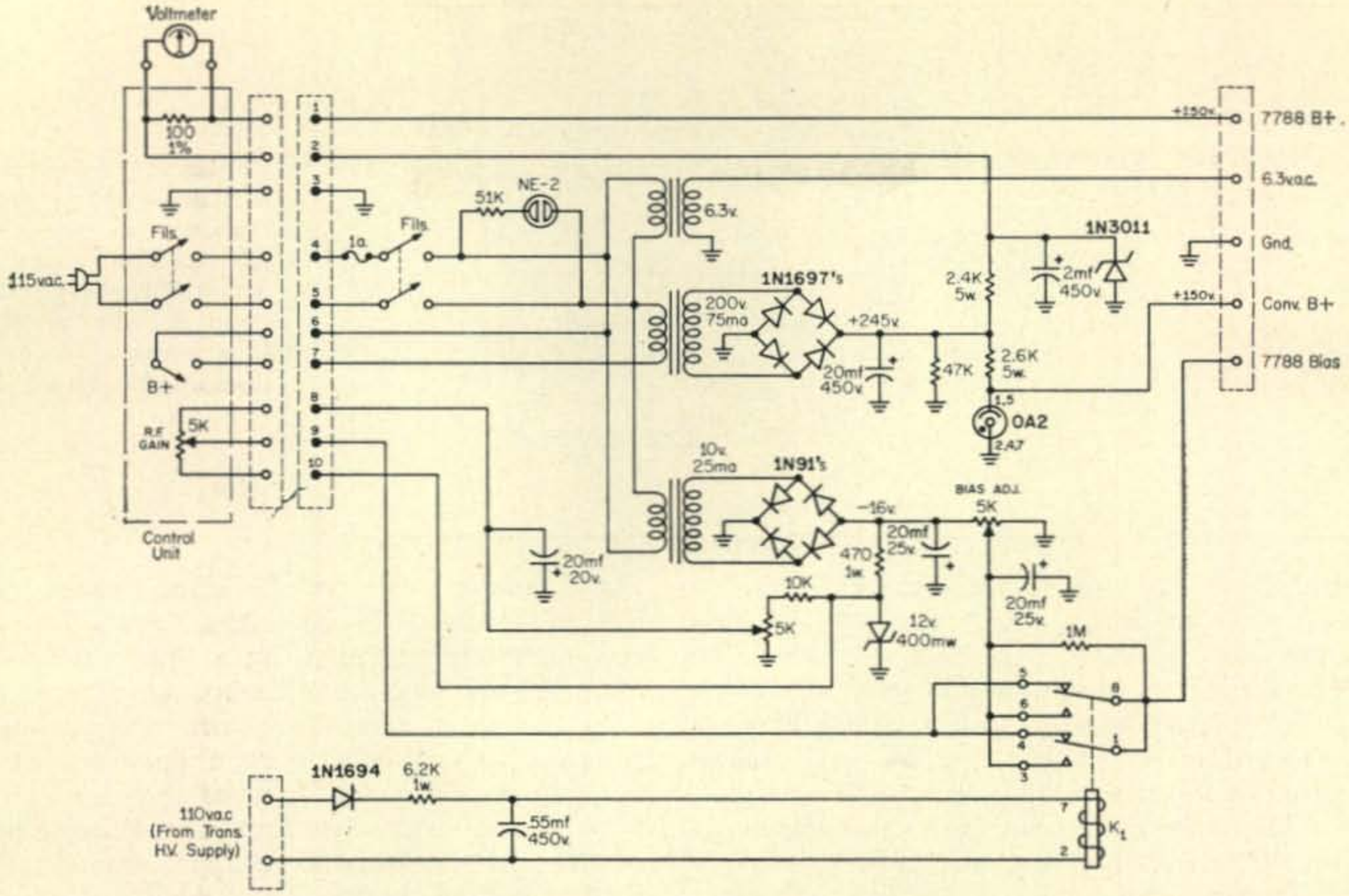


Fig. 2—Schematic of the power supply and control section of the 144 mc converter. The 7788 current drain can be checked by measuring across the 100 ohm resistor. One volt equals ten ma, two volts twenty ma, etc. Relay K_1 is a Struthers-Dunn 214 XDA or equivalent with a 5K (5ma) coil. The 1N1697 diodes are rated at 600 p.i.v. and the 1N3011 is made by Motorola and T.I. All resistors are ½ watt unless otherwise noted and all capacitors are in mf.

cathode follower. These tuned circuits are resistance loaded to reduce their *Q* thereby providing stability and broad response. The cathode follower converts the i.f. output to a low impedance so that coax may be used between the converter and the communications receiver.

The local oscillator consists of a triode connected 6AK5 using a third overtone parallel resonant crystal. The trimmer capacitor across the crystal provides a pulling adjustment on oscillator frequency. This is done so that the converter can be adjusted to have exactly 26 mc output for 144.000 mc input. Then the v.h.f. frequency can be read exactly from the dial of the communications receiver without fudge factors. The oscillator signal is tripled to 118 mc in the 6AK5 multiplier. It is then link coupled to the mixer.

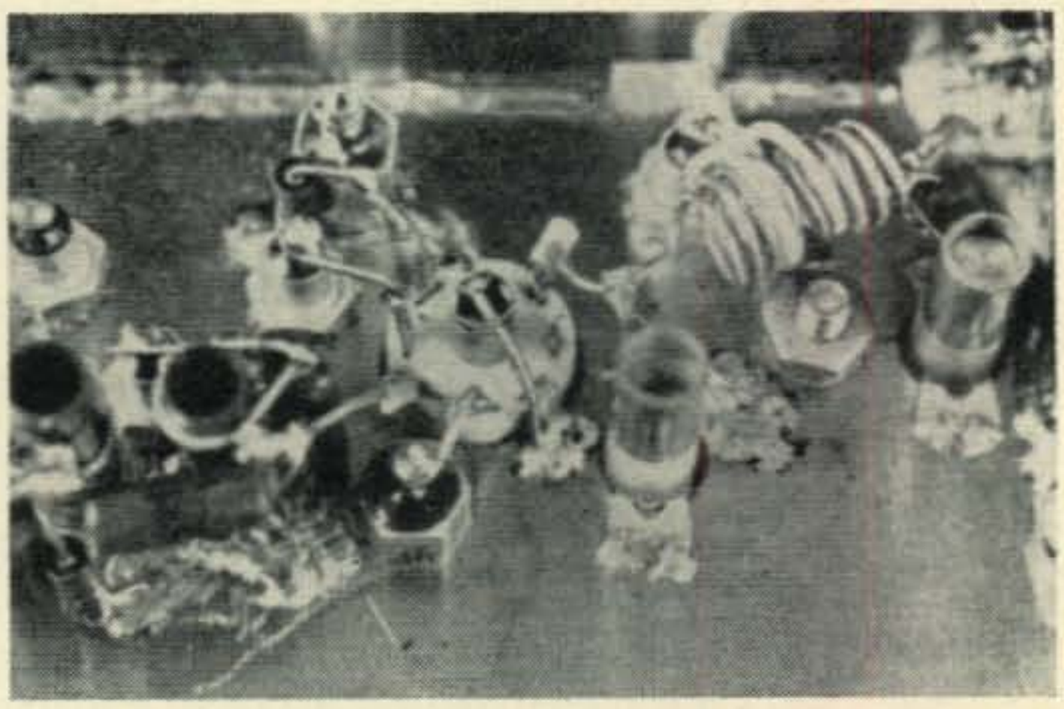
The 7788 like other low noise tubes is sensitive to strong r.f. signals from the associated amateur transmitter. Therefore the power supply is designed with a relay which operates when the transmitter is turned on. This relay applies a large negative voltage to the 7788 grid and prevents grid current flow during transmitting conditions.

Construction Notes

The converter system consists of three units. These are the r.f. section, the power supply, and the control unit. This means that the r.f. section and the power supply may be remotely located. Only a small control unit is located at the operating position. The construction of the power supply and control unit is not critical. Therefore only a schematic is provided for those units and is shown in fig. 2.

Just one note about the power supply is in order, however. Both positive outputs are regulated, one with the 0A2 and the other with a 150 volt, 10 watt 20% zener diode. The zener was used because a v.r. tube can regulate with a load current of up to 30 ma only. Since the 7788 tube may require a current as high as 40 ma, the zener which (can handle a load current as high as 50 ma) was used.

However, all the 7788 tubes used have operated best at 20 ma. If this holds true for *all* 7788 tubes then a v.r. tube (0A2) may be used (at a



View of the mixer portion of the 144 mc converter. On the right is the L_3-L_4 combination with the oscillator input winding. Capacitor C_8 is on the right and C_9 is on the left side of the coil. The L_6-L_7 combination may be seen to the left of the 6AK5 mixer socket.

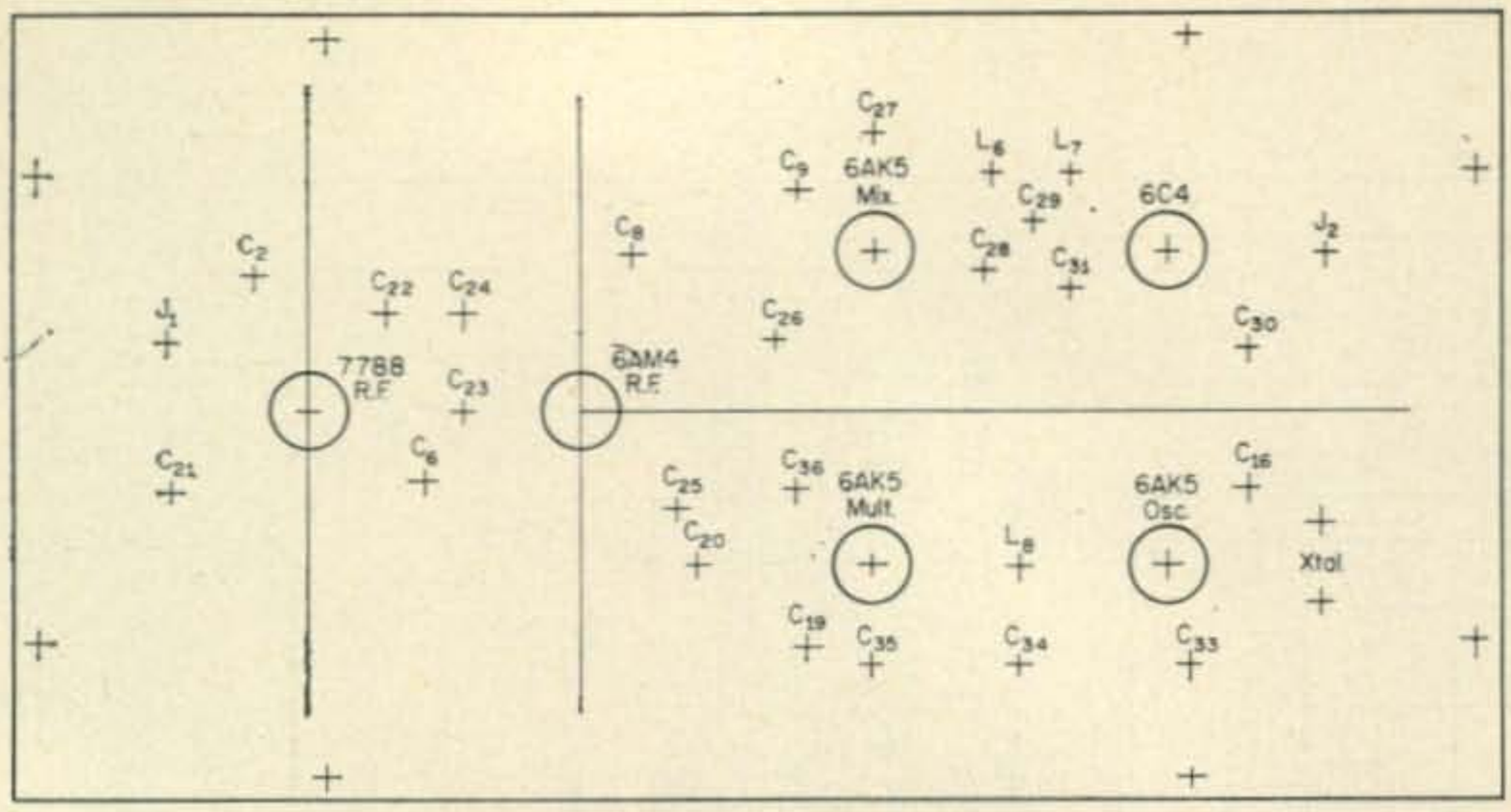


Fig. 3—Layout of the components is shown in the bottom view above. The board is a 1/16" thick double clad copper made G.E., Taylor Fibre, etc. and is sold by Allied Radio and others. The dimensions are 5 x 9½ x 2".

considerable economy) and the series resistor may then also be a 2.6K 5 watt unit as used for the other 0A2.

The converter is built on a flat plate of double clad printed circuit board material. Fig. 3, gives hole locations. A standard 5 × 9½ × 2" chassis is used for the mounting base. Shield partitions are made from thin copper flashing and soldered to the chassis plate. They must be carefully cut to fit snugly around the tube sockets, and clear the lip of the chassis base. Don't forget the small hole for the local oscillator coupling link. Partitions are 1¾ inches high. Socket pins that are close to the shields and go to ground, should be bent over toward the shield and soldered to it. Socket center posts should be grounded the same way.

As the schematic in fig. 1 shows, the power distribution is done on the top of the chassis plate and the critical r.f. wiring is all done on the bottom. This provides excellent shielding and stability, eliminates stray coupling, and makes wiring much easier.

The positioning of the input circuit should be followed closely as it has been carefully optimized for best n.f. Coil L_1 is mounted with its axis perpendicular to the chassis plate. One end is soldered to the plate on a line between the antenna jack and the 7788 socket. The bottom view, fig. 4, is carefully drawn and *should be followed*. The coil lead then goes out to the main body of the coil. It turns and starts clockwise around on the first turn. This starting point of the first turn should be approximately 1/16 inch above the chassis and at the 2 o'clock position as viewed in fig. 4. This means that the points on the coil closest to pin 2 of the 7788 socket will be at ⅛, 1⅛, 2⅛, 3⅛, and 4⅛ turns. Capacitor C_3 taps on at 3⅛ turns. The antenna tap is at 2¾ turns which is close to J_1.

The small screen bypass capacitors C_4 and C_5 should be soldered to the shield plate and tube pins with zero lead length to insure effective bypassing.

The coupling links, L_5 and L_{10} are constructed from a loop of hookup wire. The section between the coils should be twisted and laid flat to the plate. Note that there is only one ground and it is at the L_{10} end.

[*Continued on page 98*]

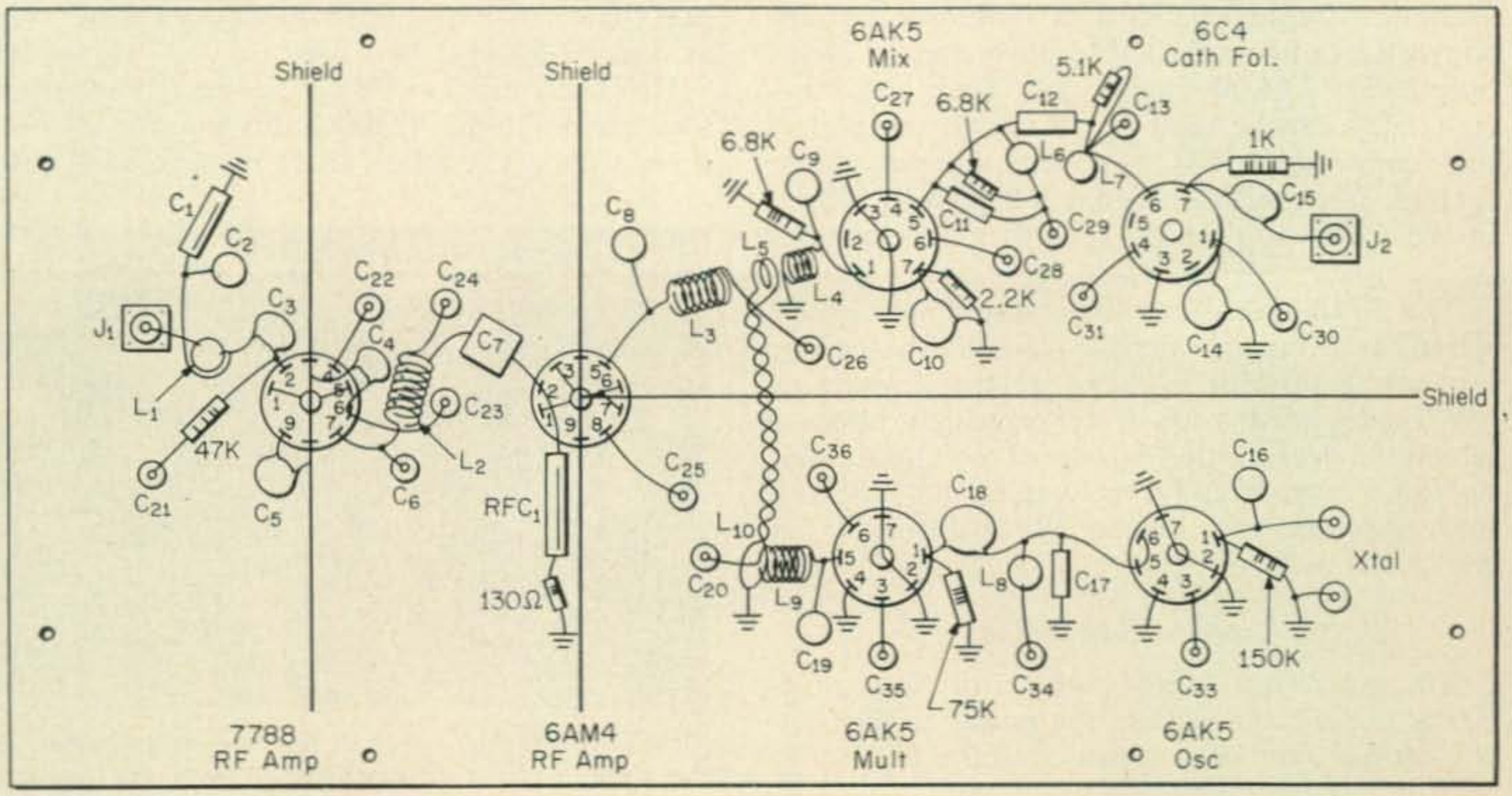


Fig. 4—Bottom drawing of the assembled board showing component placement, socket orientation and shield positions for the critical areas.

Loy Shell, WB6KDK, center, and Mrs. Shell get a guided tour around the aircraft carrier USS Constellation (CVA-64) in San Diego last March to receive the thanks of many of the crewmembers Loy was instrumental in helping during January.

At that time, Constellation was returning unexpectedly from a nine month cruise to the Western Pacific and Loy spent many hours on the air placing phone patches between the crewmembers and their families. Fred Larson, WB6BVQ, handled the rig on board the ship.

Through their effort many problems and would-be problems were averted.

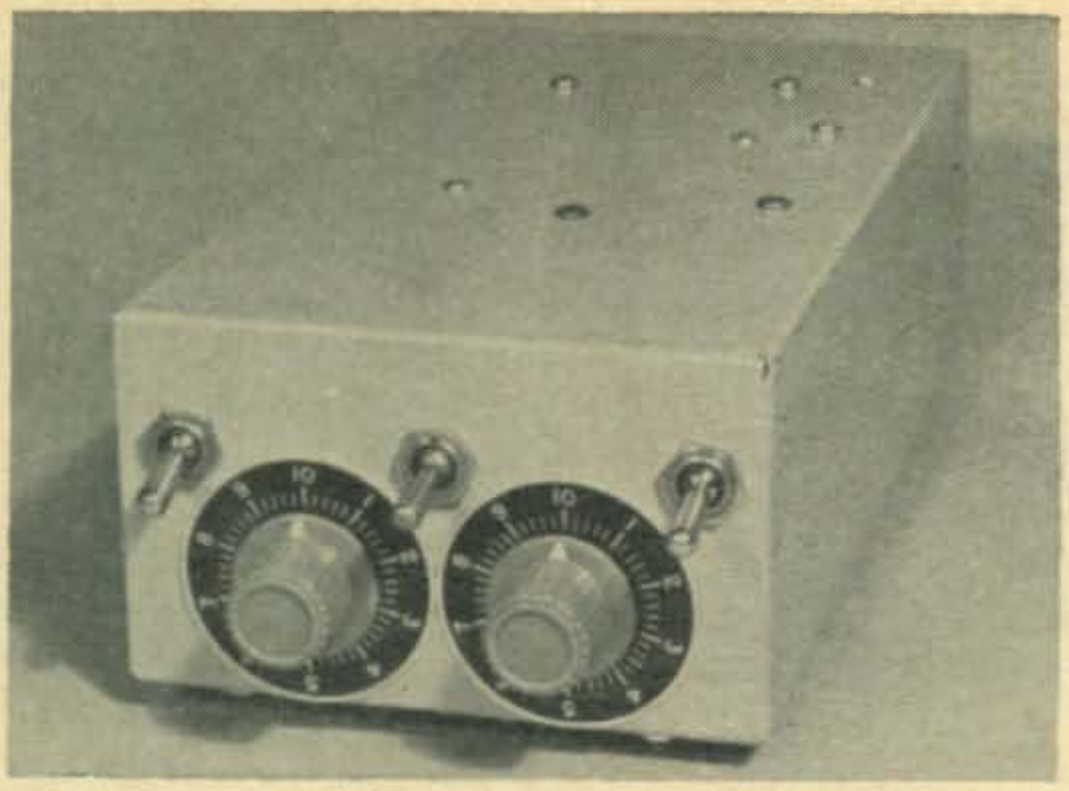
PEOPLE AND PLACES

Howard A. Cookson, W6GW/W2GW and Louis Clement, WA3CKE, met for the first time since 1910 at the recent Harrison Sideband Show in New York City. The last time they met was 55 years ago in San Francisco at Louis' home when both were members of the pioneer radio club "Bay Counties Wireless Association." W6GW's call was then SHC, and WA3CKE was SAG.

CQ's own Walt Burdine, W8ZCV, is shown with Colonel Charles W. Flint, Director of MARS at the Defense Electronics Supply Center, in Dayton, Ohio. Walt just celebrated his 3,653 day of continuous operation on v.h.f. The Colonel is checking the globe to see all the spots Walt has worked with the "Walt Burdine Special" a small low frequency rig (it's in Walts' hand). Walt is connected with the Center as an equipment specialist.

Robert J. Scott, W8DJD, of St. Clairsville, Ohio is the Grand Prize winner in the recent nationwide "New Ideas" Contest, sponsored by The Hallicrafters' Company, it was announced by Travis Marshall, General Sales Manager. He will receive Hallicrafters' amateur radio equipment valued at over $1,000.

Mr. Scott, a radio technician for station WWVA in Wheeling, West Virginia, has been licensed since 1931. His entry was submitted through the Cameradio Co., electronic distributors, in Pittsburgh, Pa. when Mr. Scott visited the city to take an FCC examination for a radio telegraph second class license.



Front view of the $10.00 phone patch. The switches are, from l to r., RECEIVER (S_3), LINE (S_1), and TRANSMITTER (S_2). On the left is RECEIVER GAIN (R_2) and right TRANS. GAIN (R_1).

The $10.00

BY ALBERT KLAPPENBERGER,* K3KWX

WHEN I first got my general I wanted a phone patch but did not have the money to buy a good one. I wanted a patch that (1) was as inexpensive as possible, (2) did not put hum on my carrier or on the phone line, and (3) did not cause feedback when the transmitter gain was increased. I set about building one that would meet these requirements.

After some experimentation I arrived at the design described here. When completed it worked very well and did not cost over ten or twelve dollars. I have been using it for several years now, and every person I have patched with it has complimented me on how clear and clean it sounded. One fellow said he could hardly tell the difference between the telephone mike and my crystal mike as I switched back and forth.

The operation of this patch is quite simple. The circuit is shown in fig. 1. When all three switches are in the normal position (down), the receiver output is directed to the speaker, the station mike is placed on the transmitter, and the phone line is removed from the line filter and primary winding of T_1. Thus, everything operates as usual. When you desire to patch, all three switches are placed in the *up* position. In this position, the station mike is dead, the line is placed on the primary winding of T_1, the transmitter input is connected to the high impedance secondary of T_1, and the receiver output is placed on the 4 ohm winding of T_2.

*6616 Dogwood Road, Baltimore 7, Maryland 21207.

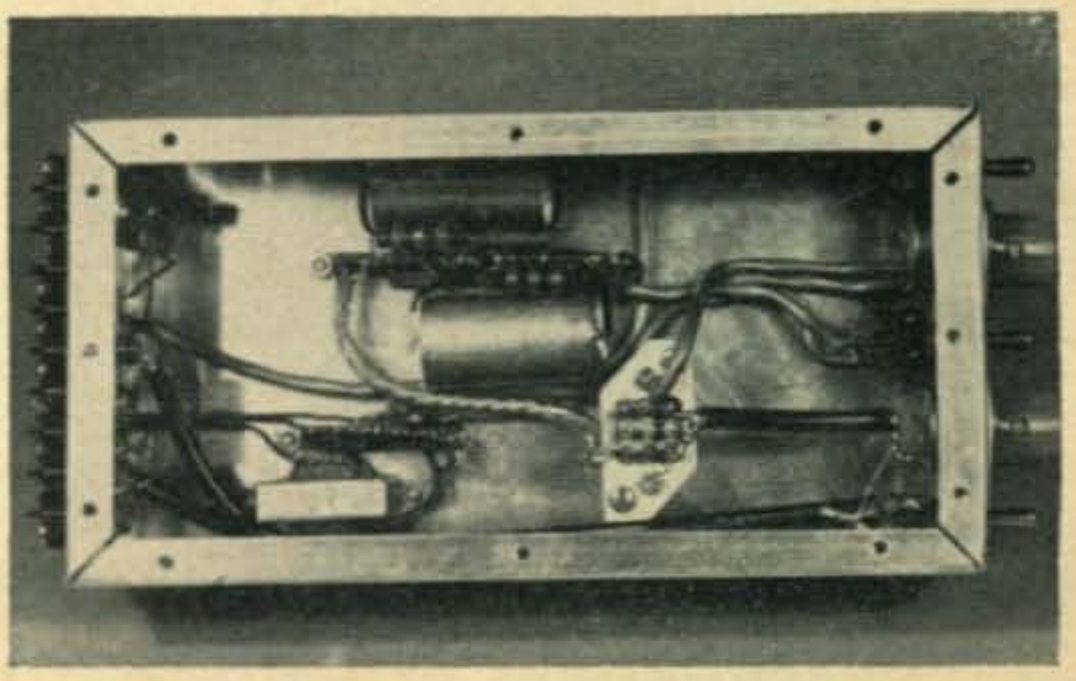
The unit was built in a 5 × 9½ × 3 inch aluminum chassis so the telephone could be placed on top of it. This not only presents a nice appearance, but also serves a purpose, for the weight of the phone prevents the patch from "walking" when the switches are lifted. Three switches were used in preference to one multisection switch for several reasons: this arrangement is more flexible and easier to operate, and one switch seemed to cause hum pick up, cross talk between switch sections, and other undesirable effects.

Construction

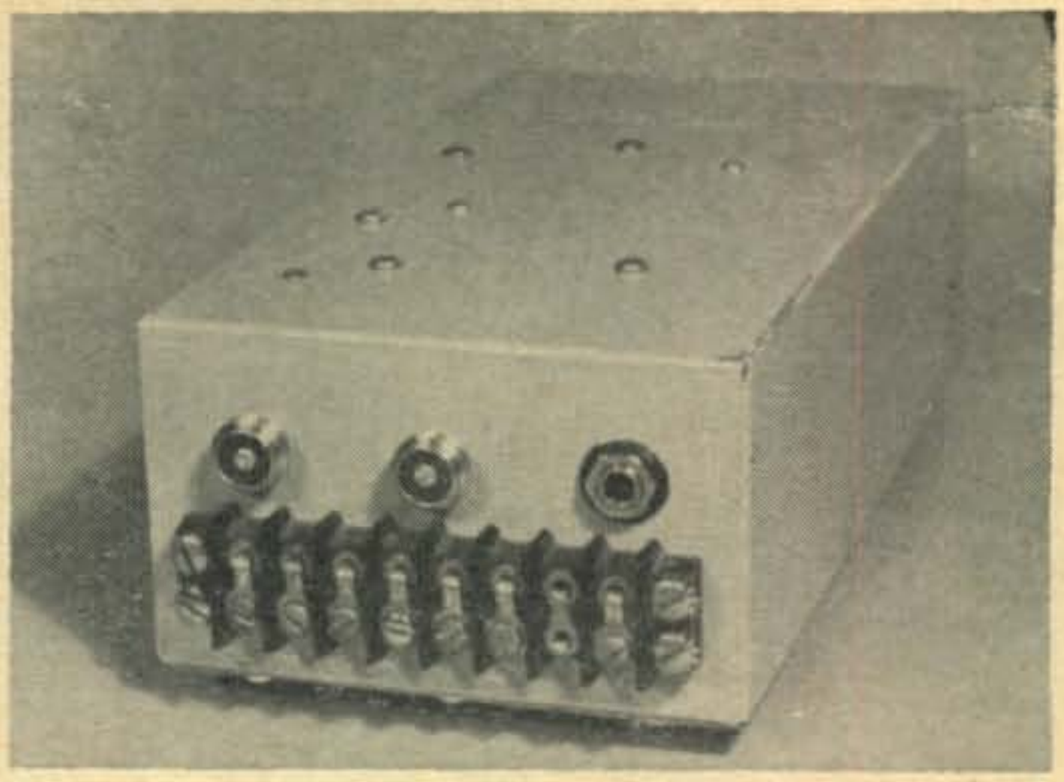
The main transformer (T_1) was mounted on metal spacers but it may be mounted in almost any convenient manner. When mounting, make sure to position the square terminal on the transformer correctly for shortest leads. A solder lug was placed under one of the mounting screws for a convenient ground.

The MONITOR jack (J_1) must be mounted with insulated shoulder washers so as to isolate it from ground. It may be mounted to the right of the mike and transmitter connectors on the rear apron. This jack is used to plug in a db meter, a telephone, *etc.*

The connections made from the receiver, speaker, phone line, and ground, to the patch, can be made to any type of terminal connector or block mounted on the rear apron. (I used an 8-terminal barrier strip taken from the junk box.)



Bottom view of the $10.00 phone patch with the shield plate removed. The line filter is mounted on a ten lug terminal strip in the center of the chassis. Twisted wires or shielded line can be used where shown in fig. 1.



Rear view of the $10.00 phone patch shows connection methods. The two mike connector jacks and insulated monitor jack are above the barrier terminal strip.

Phone Patch

The phone patch described here is about as clean and smooth operating as any, and more flexible than most. But best of all it costs less than $10 to build.

All wiring except the receiver switch (S_3) was done with twin conductor cable. The receiver switch was done with 3 wire cable. Wires twisted together will also suffice for these cables. The transmitter and mike cables from S_2 may be routed between T_1 and the chassis side to their respective connectors. The wire from R_1 to S_2 should be kept as short as possible so as to minimize pick-up.

The bottom plate is sheet metal held in place by twelve #8 sheet metal screws. Four rubber feet are mounted on this plate.

Operation

One requirement of this patch is that the receiver be muted. If it is not, there will be a direct path between receiver output and transmitter input. If it *is* muted, no switching of the patch is necessary when shifting between transmit and receive.

Because three separate switches were used, rather than one 4-pole switch, much operation flexibility was obtained. To turn on the patch. it is only necessary to place all three switches (S_1, S_2, and S_3) in the ON or up position. With the audio gain on your transmitter set in the normal position for your crystal mike, the patch transmitter gain control (R_1) may be adjusted so as to allow the party on the phone to properly modulate your transmitter. When your patch is tuned up in this manner, you may shift your transmitter switch (S_2) to the NORMAL position (down) when identifying your station. This will prevent the high output of the telephone mike from over-modulating your transmitter and also prevent the party on the phone from interrupting. If you desire to let the person on the phone listen to your conversation with someone, without allowing him to modulate the transmitter, the RECEIVER and LINE switches (S_1 and S_3) may be placed in the up or ON position, and the TRANSMITTER switch (S_2) left in the NORMAL position (down). Also, if it is necessary to talk to the party on the phone while receiving, the line switch (S_1) may be turned off. This completely quiets the receiver so you can talk. Also, this may be done in the same manner while transmitting. ■

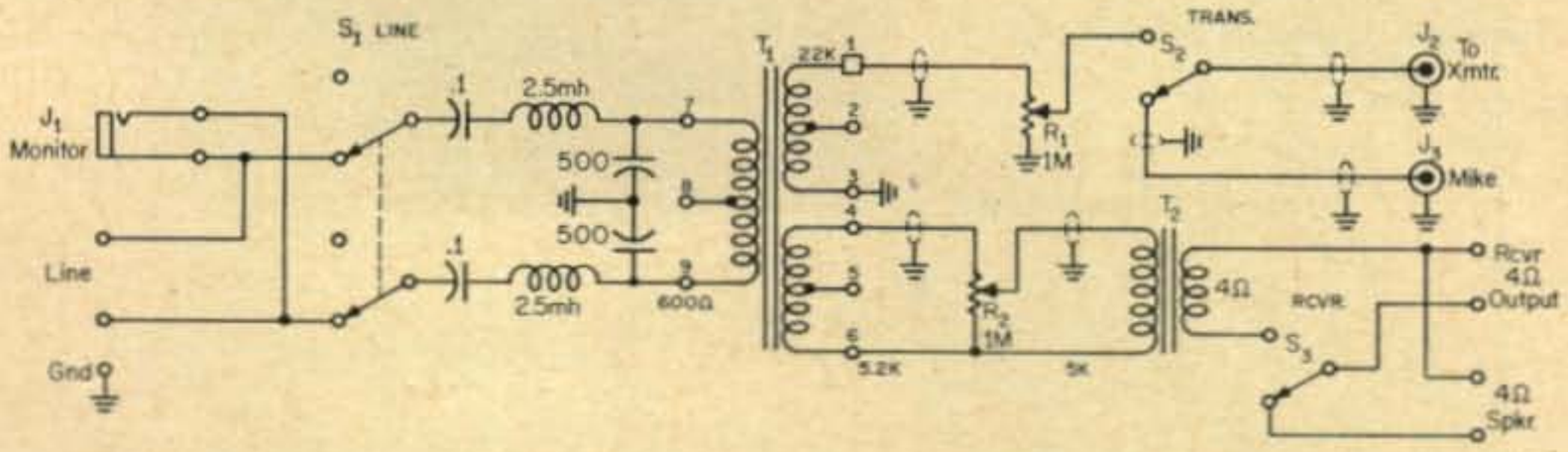


Fig. 1—Circuit of the $10.00 phone patch is extremely simple. Transformer T_1 is a World Radio Lab #XD233 and T_2 is a 5K to 4 ohm output transformer. Connectors J_2 and J_3 may be of the type shown or multiple circuit connectors if a p.t.t. mike is used. The two gain controls have an audio taper and except for the bypass capacitors which are in mmf all other capacitors are in mf.

NOTE: The use of a phone patch is often frowned upon by local telephone companies because of the possibility of damaging sensitive equipment. Therefore it is urged that you use discretion when setting gain controls, and disconnect the patch from the phone line when not in use. In addition, when patching for a foreign amateur, be absolutely certain that a "third party" agreement exists between the U.S. and his government.

Some Notes on the International Quiet Sun Year

BY D. R. HEARSUM,* W8LUZ

WHETHER you are a DXer, rag-chewer, net operator, v.h.f.er or just a Ham's ham, the ionosphere, sun spots, and the aurora are going to creep into your life sooner or later! The IGY has been observed and now the IQSY has been planned because, among other things, communicators the world over need to know more about those effects that the sun has on the propagation of radio waves, or in our parlance "band conditions."

Noteworthy amateur contributions to the scientific observations of the aurora borealis and accompanying radio propagation conditions by German and British amateurs have been reported in Europe as a result of the IGY. I have not seen these activities described in ham publications in the USA, therefore, the following "recap" may be of interest.

European Observations

The European observations reported, and those continuing during the International Quiet Sun Year,[1] are not restricted to the v.h.f. bands but have been made down to 15 meters and may be extended to 3.5 megacycles.

Work by the hams in Germany first came to my attention in a report entitled "German Polar Light Observations 1957-62" which was part of the contributions to the IGY published by the Academy of Sciences in Göttingen, Germany.[2] This report contained many pages of data collected by some 50 German amateurs who made and logged over three thousand observations of v.h.f. polar light (aurora) reflections. The data was collected by Deutcher Amateur Radio Club (DARC) by their organized "group for Amateur Radio observation" having the illustrious title Amateurfunkbeobachtungen (AFB)!

Over a period of 5 years these observations by dilligent German amateurs showed that aurora effects on transmission could be used on at least 160 occasions! Because of cloud cover about one seventh of their 3000 observations could only be made by radio. It was concluded that the seasonal peaks of activity occurred at the equinoxes in April and October during the early and mid evening periods.

Having spent many hours with my 15 and 20 meter beam headed north, (a certain personal interest in zone 23 may explain this!) I can attest to the results that the German hams have reported. The back-scattering of strong U.S. kilowatt carriers on 14 megacycles is easily observed. Sure enough, seasonal maxima of auroral reflection and scattering occurs at the equinoxes in October and April with the maximum in the evening between 1800 and 2100 EST in Ohio. Many aurora contacts have been made on 144 mc, of course, with the Long John antenna headed north.

Ham Accomplishments

Another conclusion which was reached from these DARC studies is perhaps more or at least as significant as the technical results. It was concluded that a group of active and enthusiastic hams under scientific leadership could accom-

*8991 Clyo Road, Dayton, Ohio 45459.

[1]Hearsum, D., IQSY, *CQ*, October 1963, p. 39.
[2]Contribution to IGY published by *Alcademie der Wissenschafter*, Göttingen, Germany.

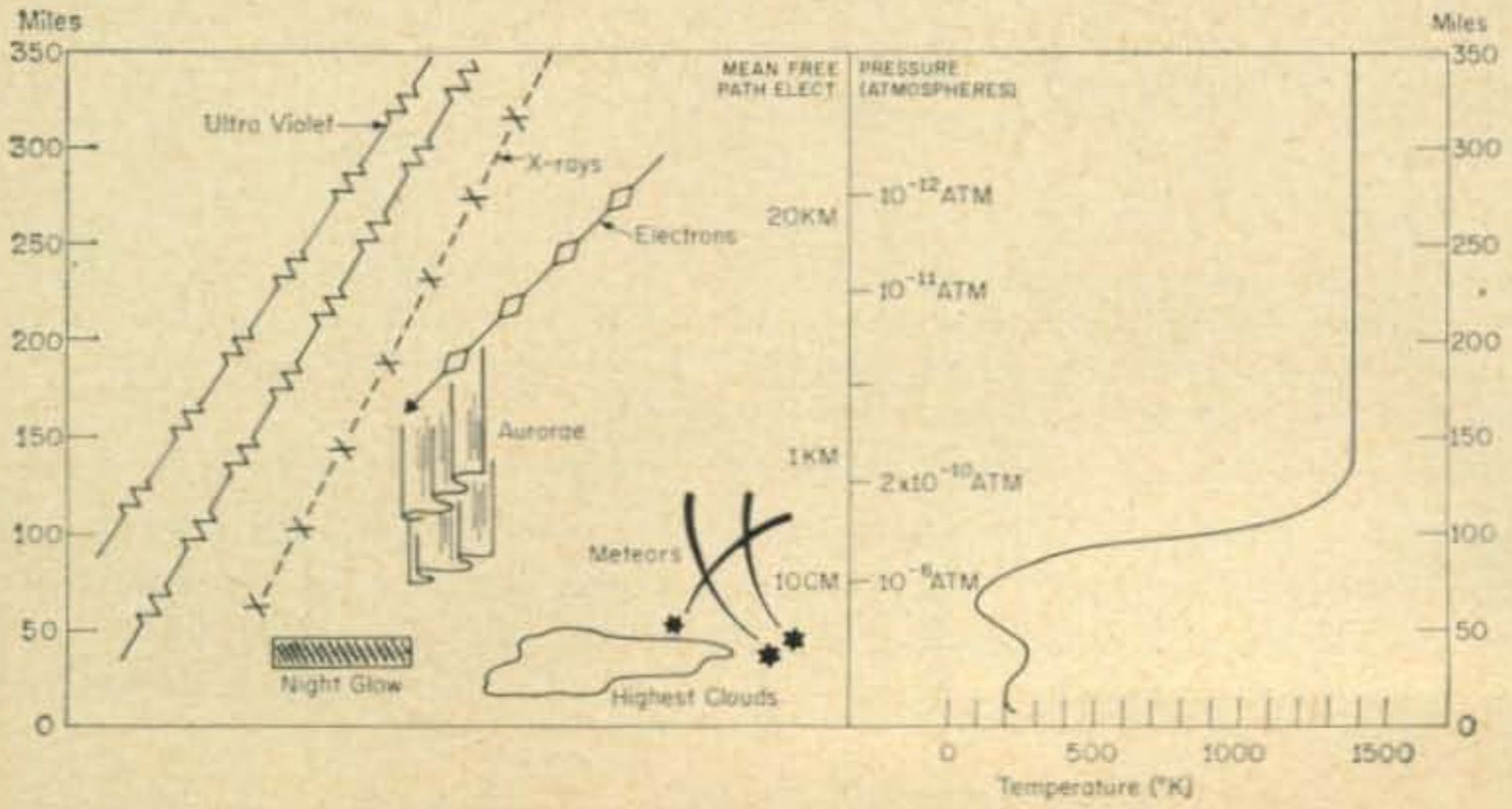


Fig. 1—Influences on the atmosphere up to 350 miles above the surface of the earth.

Frequency (mc)	Call-sign	Location of Transmitter	Watts	Antenna	Direction	Operating Period
28.000	DM3IGY	Collm, Sachsen, Germany				00.00-01.00, 06.00-07.00, 12.00-13.00, 18.00-19.00 GMT
29.000	DL0AR	Hiddesen, Teutoburger Wald, Germany	170	Minibeam	N	Cont.
29.008	5B4WR	Limassol, Cyprus	25	Vertical	Omni.	15.00-19.30 GMT (wk), 07.30-19.30 GMT (Sat., Sun.)
29.005	GB3LER*	Lerwick, Shetland	50	3 ele.	NNW	Cont.
50.046	ZE1AZC	Salisbury, Southern Rhodesia	40	Groundplane	Omni.	Cont.
144.100	GB3CTC	Redruth, Cornwall	50	6-over-6	NW	Cont.
144.150	OE7IB/P	Patscherkofel, Innsbruck, Austria	5	Vertical	Omni.	Cont.
144.500	GB3VHF	Wrotham, Kent	50	5 ele.	N	Cont.
144.929	OH3VHF	Ylojarvi, nr. Tampere, Finland	80	6: 4-over-4	Switched	04.00-23.00 GMT
145.000	SM4UKV	20km west of Orebro, Sweden	90	X-dipole	Omni.	06.00-24.00 GMT
145.150	LA1VHF	Mount Yausta, 125km west of Oslo, Norway	25		Omni.	
145.900	DL0SG	Straubing, Niederbayern, Germany	12		Omni.	
145.987	OZ7IGY	Copenhagen, Denmark		2: Halo		11.00-23.00 GMT
145.995	GB3LER*	Lerwick, Shettland	25	2: 6-over-6	NNE, SSE	Cont.
431.500	GB3GEC	Hammersmich, London	400	4: 8-over-8		Cont.
432.008	DL0SZ	Munich, Germany	35	15 ele.	N	
432.018	OZ7IGY	Denmark				11.00-23.00 GMT
433.000	DL1XV	Predigtsuhl, Oberbayern, Germany	10	11 ele.	NW	

**To be operational shortly.*

Fig. 2—Listing of known beacon stations.

plish the job usually assigned to expensive scientific observation stations and their staff! In fact, because of the wider geographical distribution of the amateur observers, the results are often more valuable. Of course, amateur estimates of distance and direction are generally less precise because they use relatively simple gear, but many reports can be used to pinpoint most occurrences.

Both DARC and the Radio Society of Great Britain (RSGB) plan to continue their work during the IQSY using amateur observers and channeling their reports to a Scientific Studies Committee. The observations are even more significant during the quiet sun period because the incidence of auroral activity should be much less frequent, and other effects may be noticed, which would otherwise be masked by the more spectacular Solar effects.

Auroral displays will be predicted in Europe by announcing Earth magnetic disturbances in Germany over nets established by the DARC/AFB Center in Weisbaden. (See also NBS code groups for Pacific and Atlantic circuits announced in *CQ*, April 1964, page 59).

During IQSY, that is the period Jan. 1, 1964 (originally July 1964) through December 31, 1966, the DARC program will concentrate on auroral back-scatter by using a 170 watt c.w. transmitter at 29 megacycles (DLØAR) located near Lindau, and observations by some 50 "IGY amateurs" of auroral contacts on 21, 28 and 144 megacycles. The program is coordinated by Edgar Brockmann, DJ1SB. International work is reported by Prof. Diemingen with whom Dr. Lange Hesse (DJ2BC) is a co-worker at the Max Planck Institute for Aeronomy. It was this group which coordinated and reported on the excellent amateur work during IGY.

RSGB Project

In Britain, the RSGB will have a similar project. Beacon stations GB3VHF on 144.5 megacycles, G3LER on 145.995 megacycles and GB3CTC on 144.1 megacycles will help aurora observers. Interestingly enough auroral reflections are more frequent and greater on 28 megacycles than on 144 megacycles. Therefore, observations are planned for both bands—a real shot in the arm for the present seldom-used ground wave evening performance of our treasured 10 meter band. This sort of activity might well provide some "protection insurance" for our coveted kilocycles. Hopefully, the RSGB will be permitted to operate a beacon in the 10 meter band at GB3LER, the station located at the Lerwick Observatory in the Shetland Islands, which lies North of the observers in the British Isles.

The RSGB also hopes to obtain "warnings" of unusual solar activities from the world-wide communication company Cable and Wireless Ltd. Area coordinating stations and GB2RS—the RSGB news bulletin station—will relay the information to those participating in the program. The following is quoted from the RSGB Bulletin, "One point to stress is that since auroral propagation will be a rare event every report will be of great value."[3] Large eruptions on the surface of the Sun will occur quite seldom and so will the short wave fade-outs and ionospheric disturbances which follow them. Instead, the Sun's M-regions of radiation will provide cyclic "conditions" at 27 day intervals as the Sun rotates, an effect which might well not be observed during sun-spot maxima. There are

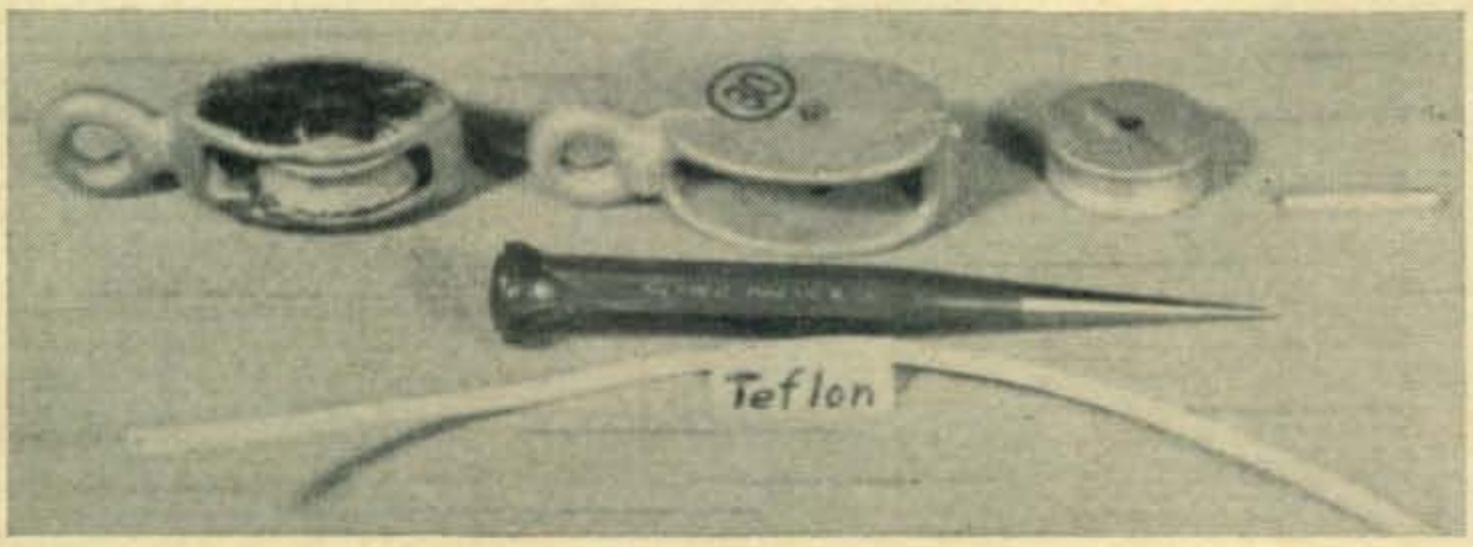
[3]Stone, G., "The IQSY," *RSGB Bulletin*, December 1963.

now 41 observers in Britain reporting to the Scientific Studies Committee.

Only these two societies, DARC and RSGB, volunteered this sort of action at the recent IARU Region-I (Europe & Africa) meeting at Malmo, Sweden. Significantly, neither society has hinted at incentives for licensing. In these days when there is a great deal of talk on Amateur Radio Public Service and Experimental prowess and the need to 'upgrade' our amateur fraternity it comes as somewhat of a shock to find no action in the USA to participate in the IQSY. Apparently we not only need incentives, we need the enthusiasm of our overseas brethren. Let's have the special privileges all right, but for those who are conscientious communicators and the trailblazers in our midst; those who really contribute to the Amateur Service. As you can see, this is one of the many ways to do just that.

Incidently, the European amateur observers had eagerly awaited the launching of OSCAR III into orbit. Perhaps the experiments and tests with OSCAR will reveal some other aspects of propagation during the Quiet Sun Years. As has already been reported in *CQ*, the IARU fully endorses the amateur satellite program. In fact IARU has ably summed up ham objectives as follows; "whatever experimental programs that may challenge their interest and ingenuity without interference to other (radio) services,"[4] should be promoted. ■

[4]Jacobs, G., "Amateur Radio and the 1963 ITU Space Communication Conference," *CQ*, January 1964, p. 43.



Shown at the left is the original pulley (left) and another about to be treated. The original pulley was taken down for inspection. It is in perfect working order and will get a light coating of weather proofing and put back to work.

The Performing Pulley

BY ROSS F. FOX,* W8PZX

I HAD been looking for a weather resistant bronze or nylon stainless steel marine pulley to support the weight at the center of a 75 and 40 meter inverted "V" antenna. It had to carry 196 feet of #14 wire, insulators and tie ropes, the downward pull of the 4 antenna legs at 45 degrees, about 30 feet of RG-8/U coax, a balun, 60 feet of 3/16 inch nylon halyard, center insulators and fittings and gusts of wind to 60 m.p.h. It had to go through many cycles of raising and lowering for experiments with leg lengths, traps and baluns.

On a visit to a local ham supplier, it was mentioned that some Teflon tubing was needed to try in another project. Paul Wolf, W8IVE, was kind enough to contribute a few samples. Upon arriving at the home QTH, a 30 cent zinc coated cast iron pulley was about to be put up, temporarily. Previous experience with iron or pressed steel units was not good. They would carry a heavy load but after a time the roller and pin would rust together and become immobile, even with previous heavy oiling.

The Teflon tubing was laying next to the pulley on the bench and an idea formed. Would it carry the weight? Wasn't it tried in ball joint auto suspensions? A piece of the tubing looked like it would make a snug fit over the pin. The "set" end of the pin was ground off and the pin pulled out. The tubing was cut off to fit the inside of the pulley and pushed on the pin with a tight fit.

The pin and tubing were inserted in one of the holes of a #1 to #60 drill gauge to determine what size drill was needed to run through the center of the roller, being sure to allow a little clearance. A light coat of silicone grease was put on the parts and they were assembled.

After assembly the mistake of grinding off the pin was seen. The short end of pin was hard to punch back solidly and some of the zinc coating was gone. A piece of vinyl tape was stuck over the bare spot and Chrome Guard was sprayed over the pulley. On the next pulley that was converted a punch was used to drive out the pin, making it a very easy matter to reassemble and no plating was taken off.

The pulley has been in use over a year and through many, many duty cycles. Cost, 30 cents plus. ■

*319 Clark Road, Arlington Heights, Cincinnati, Ohio.

RTTY From A to Z

BY DURWARD J. TUCKER,* W5VU

Part XI

The W. E. 215-A and W. E. 255-A polar relays covered in Part IX and X have been the old RTTY standbys for years. Currently there is a growing interest in mercury relays and solid state relays which are covered in this installment.

It was stated at the beginning in Part 9 that a relay approached more the role of a true *relay* or *repeated* of data or information fed to it. The author is certain that after Parts 9 and 10 it must be pretty obvious that any performance short of a faithful repeating of data, either by a polar relay or any other device leaves something to be desired for RTTY.

Mercury Relays

Another type of relay that is finding favor in RTTY circles is the mercury-wetted contact relay, particularly the Western Electric types 275 and 276. It gets its name from the fact that its contacts are continuously coated with mercury. The contacts are sealed in a glass enclosure that is hydrogen filled and the contacts are solenoid operated. The Western Electric mercury relays are encased in a metal tube shell with an octal base and it is desirable that these relays be mounted in a vertical position.

Mercury relays were not manufactured with RTTY in mind. Their uses are many-fold; likewise, their design varies considerably. For instance, the resistance of their coil (or coils) vary all of the way from a few ohms to several thousand ohms. Naturally, the coil current requirement also varies over wide limits. Generally, it is necessary to operate the relays at a current considerably higher than their listed value. In fact, some have found it necessary to increase the operate current to several times the listed value. The RTTY beginner would probably find it a rather confusing and baffling chore to select a mercury relay in the face of so many types and models and varying operating specifications. You also take them "as is" since they are sealed and are not adjustable.

At a 60 w.p.m. keying rate, there is a short period of time during which all of the relay switching contacts are electrically connected. This time should be no more than one millisecond for the W.E. type 275 or 276.

*6906 Kingsbury Drive, Dallas 31, Texas.

The Florida RTTY Bulletin, (put out by W4RWM) has published data on the Mercury-Wetted Contact relays from time to time and has indicated (January, 1965 issue) that if you find a mercury-wetted relay and don't know what it is, send the number to the Florida RTTY Bulletin and they will furnish the specifications.

Solid-State Relays

Solid-state switching was covered extensively in the discussion of f.s.k. Some of our readers have no doubt wondered, as they read the discussions on the mechanical polar relay, why one should not abandon, or why the RTTY'ers haven't already abandoned, the mechanical polar relay altogether in favor of solid-state devices. Precedent or established practices probably account for a great number of RTTY'ers sticking to the tried and time tested mechanical polar relay. There are more proven circuits around using these polar relays and, of course, by no means least is the relatively low cost and general availability of the mechanical polar relay. Then too, solid-state relays as well as mechanical polar

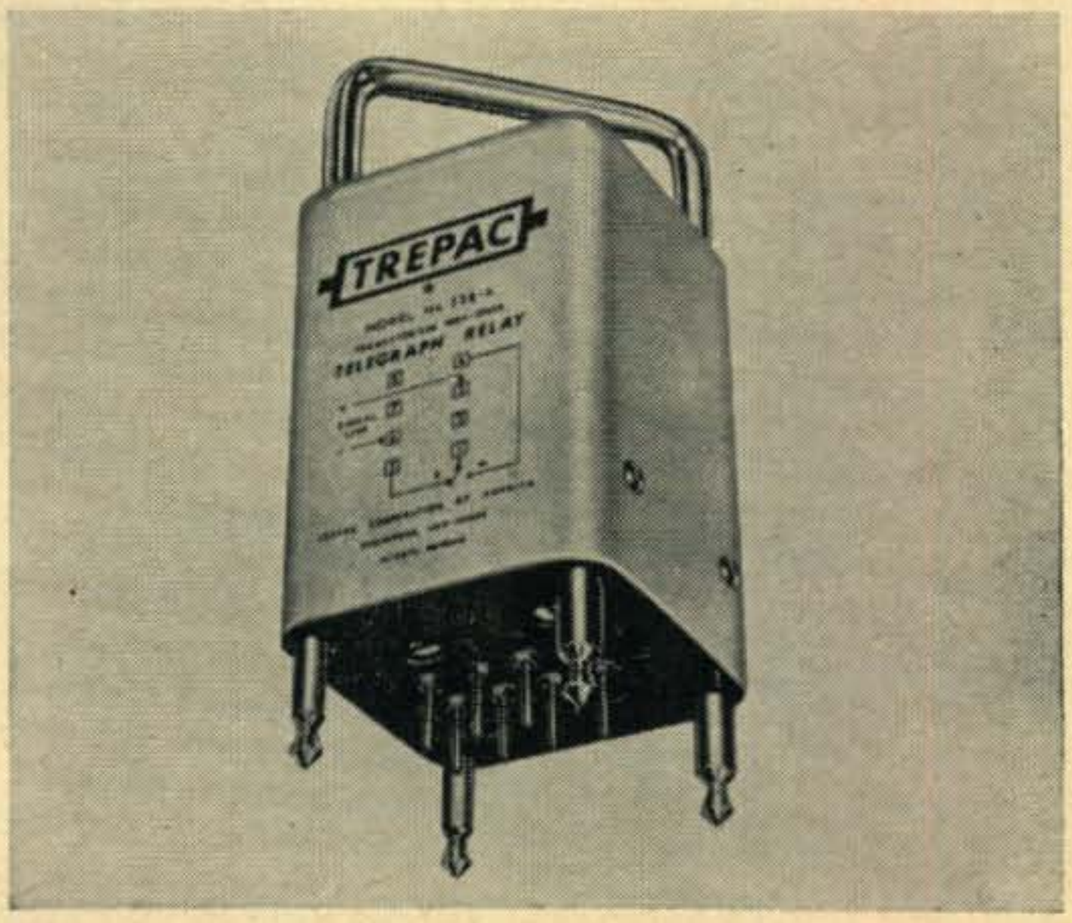


Fig. 68—The Trepac 538-A transistorized high speed telegraph relay. The unit is a direct replacement for the W.E. 255-A.

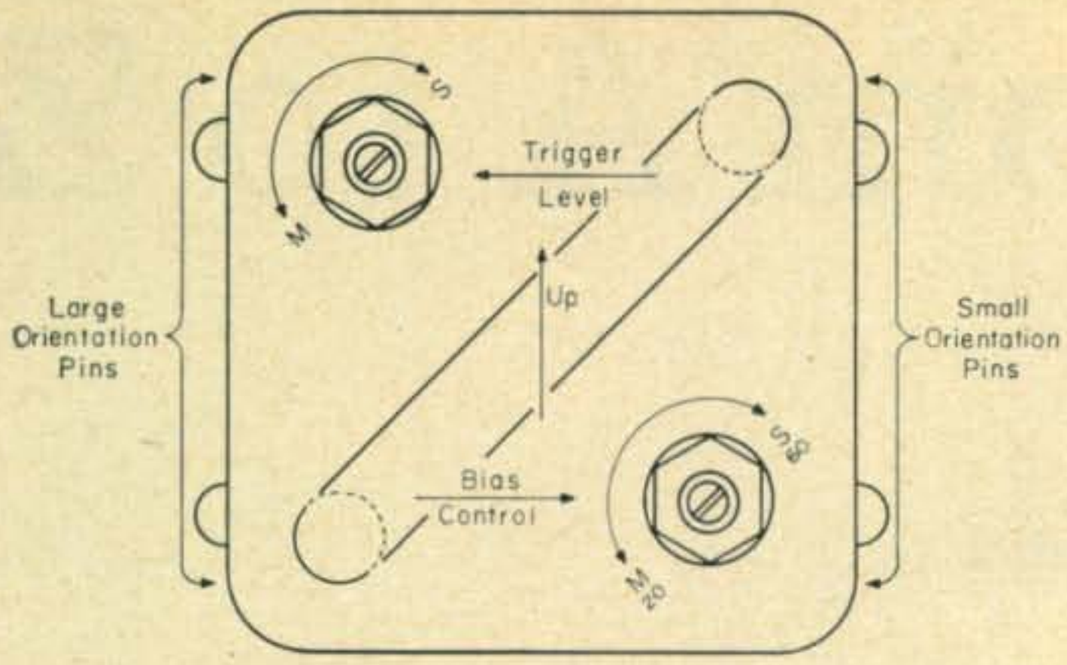


Fig. 69—Top view of the Trepac 538-A telegraph relay showing the location of the BIAS and TRIGGER LEVEL adjustments.

relays, also have definite drawbacks. It will be recalled that teletypewriter selector magnet coils and polar relay coils require a d.c. voltage in the order of 120 volts or more while the voltage for transistors range more in the 3 to 50 volt range. Only now are higher voltage type of transistors being developed. Compatibility with other equipment is certainly a consideration. The use of transistors in amateur RTTY apparatus is increasing but their use or approval is a long way from being universal. Commercial teletype workers, particularly land-line, have probably swung over more to solid-state devices than the radio amateurs have. This may partially account for the reason that older teletype apparatus is being made available for amateur use from time to time.

Model 538-A Relay

A number of solid-state relays are being produced commercially. One company producing a line of solid-state relays is the Trepac Corporation of America.[15] In fact, one of their relays, the Model 538-A transistorized high speed telegraph relay is a replacement for the Western Electric 255-A polar relay and its terminal pin base arrangement is the same. This makes it possible to remove the 255-A relay and plug the 538-A relay directly into the socket. This assumes that the 255-A relay socket was correctly connected, in the first place, in accordance with

[15]30 West Hamilton Avenue, Englewood, New Jersey.

Input Sig. Line ma	E_{meas} across #3 and #6 (*volts*)		Calculated Impedance (*ohms*)	
	With No Ext. Shunt	With 300 Ω Ext. Shunt	With No Ext. Shunt	With 300 Ω Ext. Shunt
8*	2.1	†	263	†
10*	3.2	†	320	†
15*	7.8	†	520	†
20	3.2	†	160	†
25	4.6	2.3	184	92
30	6.0	3.0	200	100
40	8.4	4.8	210	120
50	11.0	5.8	220	116
60	13.4	7.2	223	120
70	16.0	8.4	228	120
80	18.0	9.8	225	122
90	21.0	11.1	233	123
100	23.0	12.4	230	124
120	27.8	14.6	225	122
140	28.0	17.0	200	121

*Internal 300 ohm shunt not used.
†External 300 ohm shunt not used.

Fig. 71—The current and input resistance characteristics of the Trepac 538-A relay are shown above.

standard polar relay pin terminal designations which are as follows:

Signal Line Positive—Pin No. 3
Signal Line Negative—Pin No. 6
Bias Supply Positive—Pin No. 7
Bias Supply Negative—Pin No. 2
Mark Contact—Pin No. 4
Tongue Contact—Pin No. 1
Space Contact—Pin No. 5

A general view of the 538-A relay is shown in fig. 68 and a top view of the relay case is shown in fig. 69. A general schematic of the relay is shown in fig. 70. It will be noted that the 538-A is *not* fully a solid-state relay. It is a modern design approach to the relay problem which uses the best characteristics of both solid-state and mercury-wetted devices. The manufacturer states that there is no operation which can be performed in the switched output of the type W.E. 255-A polar relay which cannot be performed *better* by the Trepac 538-A relay.

The input circuit to the 538-A is purely resistive. There is no interaction between units

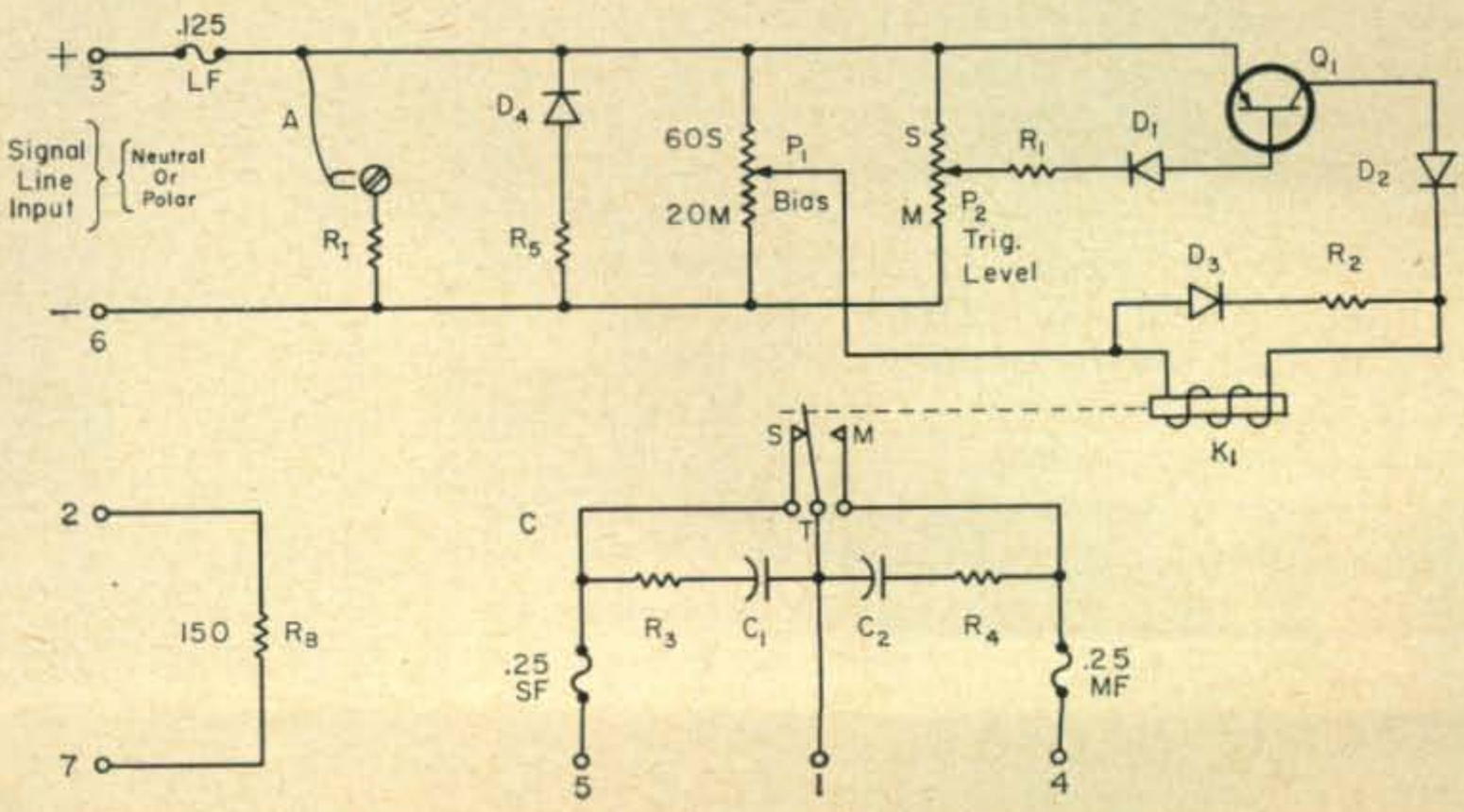


Fig. 70—Circuit of the Trepac 538-A telegraph relay. Fuse marked LF is for the line, SF-*space* and MF-*Mark*. Resistor R_I is the internal shunt and R_B is the bias resistor discussed in the text. Jumper *A* is removed for all neutral and polar signals from 8 to 18 ma. Tongue (contact 1) is in contact with the *space* (5) terminal with no signal or with a negative signal to terminal 3. Applied signal closes 1 and 4. Reloy K_1 is a high speed mercury wetted contact unit.

connected in the same signal loop, and no inductive kick can be reflected into the signal line to interfere with other equipment or change transmission line characteristics. Any number of 538-A relays can be placed in series or parallel so long as the current requirements are met. The 538-A relay will operate satisfactorily from a neutral or polar signal input over a wide range of line currents (approximately 8 to 140 ma or greater if required). Full data on the 538-A is given in the table of fig. 71 supplied by the manufacturer. It represents average measurements made on a number of production units with the BIAS CONTROL set to 0 bias output with a square wave input.

The resistive input impedance of the 538-A may be reduced approximately 50 percent as shown on right side of table, if operation is with signal line currents of 25 ma or more. Since many teleprinter circuits operate on 60 ma loop current the 538-A is shipped with a 300 ohm wire-wound resistor connected from terminal 3 to 6 within the base of the unit. This resistor may be disconnected for lower current operation by removing and insulating the lug attached to one end of this resistor. The input circuit is provided with a 0.175 amp fuse in the positive lead to input terminal 3 within the relay base recess. The input circuit will withstand severe overloading (up to 200 milliamperes) without damage to the unit. Continuous operation at this current will open the fuse installed at the factory.

The output circuit is a transistor-driven high speed mercury-wetted contact capsule which provides complete electrical isolation between the input and output circuits together with high voltage and high current handling capabilities far beyond that obtainable with transistors alone. This relay has no contacts to maintain, clean, adjust, arc or pit. The steel case of the 538-A relay is grounded to all four of the corner orientation plugs, which provides complete electrical as well as magnetic shielding of the relay. For proper switching action the signal circuit positive should be applied to relay socket terminal 3 and the negative return connected to relay socket terminal 6. This is in accordance with standard polar relay pin terminal designations. It will be noted that no electrical bias supply is required for the normal operation of this relay. When this relay is plugged in the socket in place of a W.E. 255-A, the relay socket bias connections are not disturbed but have no effect on the operation of the 538-A. Actually, the 538-A relay has an internal wire-wound resistor of 150 ohms that is connected to pins 2 and 7 merely to provide a normal load on the bias power supply and continuity to any other external circuit connected to these terminals at the relay socket. It will be noted from fig. 70 that these two terminals are not connected to anything else in the relay.

538-A Bias Control

It may be seen from the top view of the relay, shown in fig. 69, that there is a BIAS CONTROL

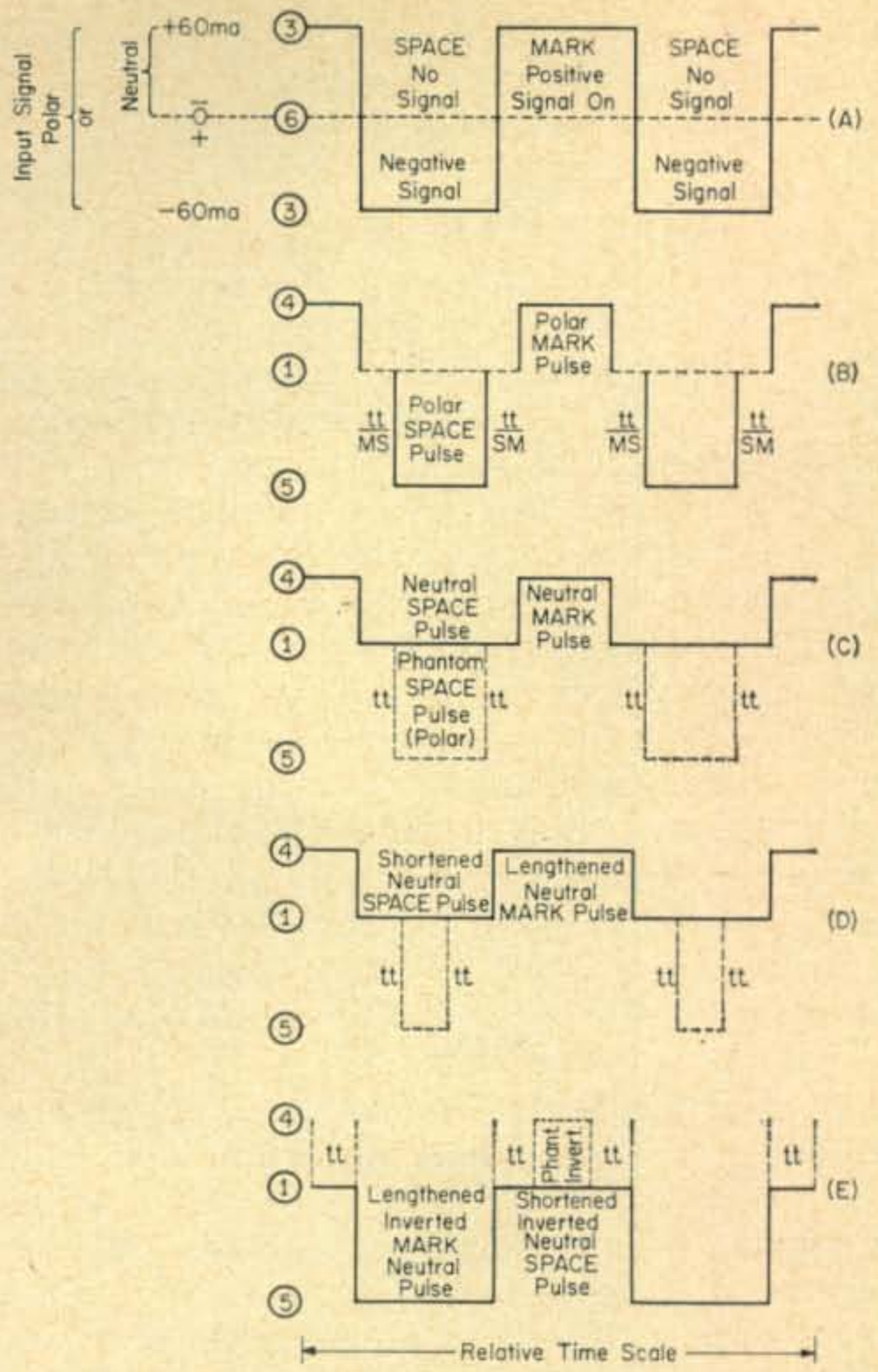


Fig. 72—The effect of transit time (travel of armature, contact 1) between contacts 4 and 5 (*mark* and *space*). (A) shows the input signal; 1-polar, +60 to −60 ma or 2-neutral to +60 ma. (B) This waveform is the output with the nominal factory setting 50M/0/50S for polar output (*mark*-continuity, 4-1, *space*-continuinty, 5-1) Transit time is noted as T_T. (C) presents the apparent neutral output showing the spacing bias effective at nominal factory settings (*mark*-continuity, 4-1, no connection to 5). (D) shows the *mark* pulse lengthened by use of the BIAS control to provide equal length *space* and *mark* pulses from the neutral output. (E) shows how the space pulse may be lengthened with the BIAS control in inverted type operation. T_T is equal to approximately 1 millisecond.

whereby the *mark* and *space* signals may be lengthened or shortened. The manufacturer stated that tests made with the relay showed a gain of 8 points on the low end, plus a gain of 5 points on the high end of the teletypewriter range was accomplished. This was an overall gain of 13 points in the receiving range of the machine.

It was pointed out in the early part of the text, under the "Range Finder" section, that a teletypewriter machine receiver mechanism was so designed that it required only 20%, or 4.4 ms of the 22 ms pulse in which to operate. It was further stated that the machine is equipped with a range finder which could be adjusted so that the machine selecting mechanism is functioning at the midpoint of the 22 ms interval. The range finder is equipped with a scale graduated from 0 to 120. A machine in good working order, will copy when the selector pointer is set anywhere in about the center one-third portion of the scale. The Trepac relay makes it possible to

widen the range, or extend the margin under which the machine will continue to print properly by the aforementioned 13 points.

Distortion

Tests with 40% switching bias and end distortion were also made. In every case, the use of the Trepac Model 538-A transistorized high speed telegraph relay, provided operation superior to that obtainable from the type W.E. 255-A relay, and test results far exceeded the minimum requirements of Bell System Practices.

Switching, as referred to here, means the changing from *mark*-to-*space*, or *space*-to-*mark*. Bias means the elongation of one pulse (*mark* or *space*) with the consequent shortening of the other (the same amount that the other pulse was elongated). Bias distortion was discussed in connection with mechanical relays. "End distortion" is similar to bias distortion. These two types of distortion, as well as other types of RTTY distortion, will be covered in detail just a bit further along in the text.

Detailed mechanical adjustments required to eliminate or reduce bias distortion was thoroughly covered. Here is a relay that requires no contact or mechanical adjustments. In fact, there is nothing mechanical to adjust. On the other hand, it does have an electrical BIAS control that can be adjusted or changed at the will of the operator. This control is shown as P_1 in fig. 70.

It will be recalled that, in the discussion of the operation of the 255-A polar relay, the 2-7 terminal winding is used as a bias winding holding the armature against contact terminal 5 (*space*) and the signal voltage is applied to the 3-6 terminal winding which moves the armature to the 4 (*mark*) contact. Up to this point, we have had considerable discussion about the movement of the polar relay armature (terminal contact 1) to and from the *mark* and *space* terminal contacts 4 and 5. Nothing has been said about the transit time required for the armature to move from the *mark* contact to the *space* contact or back. Some time, however small, is involved in each instance. The Trepac Corporation of America states that this transit time is approximately 1 millisecond for their 538-A relay and is graphically illustrated in the square waves of fig. 72 (b), (c), (d), and (e).

The relay is factory set for a nominal 60 ma neutral signal input, polar output. The bias control is set for equal duration of both the *mark* and the *space* pulses as in keying a polar signal line, with terminal 4 *mark*, terminal 1 tongue, and terminal 5 *space*.

Polar and Neutral

The amateur seldom uses a polar relay so that all contacts (1, 4 and 5) are used at the same time. Such a circuit is called a polar circuit and is used in land-line teletype circuits. If the 538-A relay output is to be neutral, that is, with the *mark* output taken from contact no. 4 *closed* to tongue no. 1, and the *space* output taken from

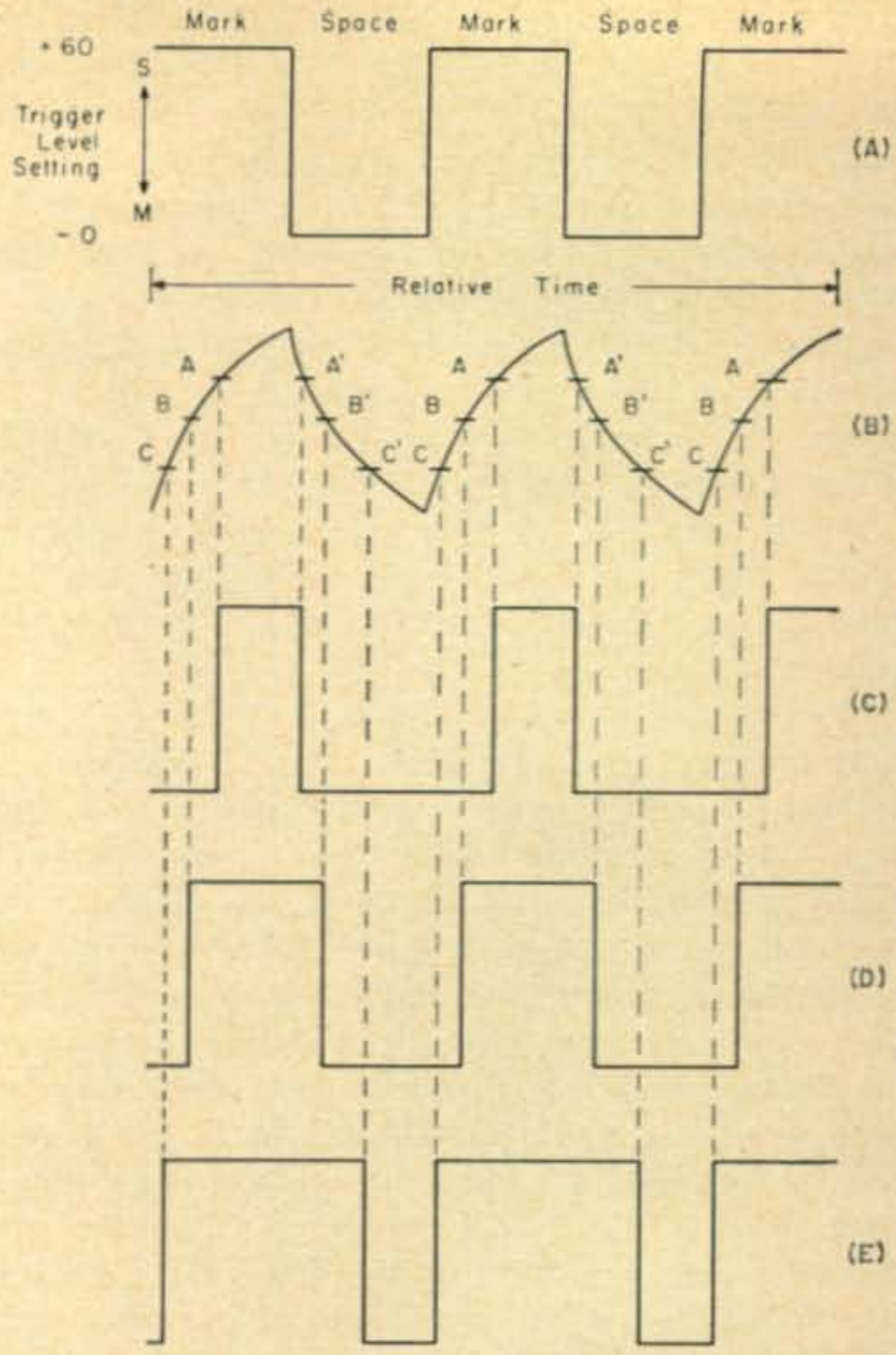


Fig. 73—The effect of varying the trigger level control of a 538-A relay is shown above. (A) Shows a neutral square wave signal that would be fed into a transmission line. (B) Shows that same signal at the end of a long line having suffered heavy characteristic distortion from the line capacitance and resistance. Waveforms *C, D* and *E* represent the square wave outputs from the transistor clipper that are fed to the mercury relay. Waveform (A) Shows the trigger level set too high on the current curve toward the *S* setting. This lengthens the *space* and shortens *mark*. (D) shows TRIGGER LEVEL at the factory setting for equal *mark* and *space*. (E) shows the TRIGGER LEVEL set too low (towards *M*) for lengthened *mark* pulses.

contact no. 4 *open* to tongue no. 1, then the *space* pulse will appear longer than the *mark* pulse. This is due to the transit time of about one millisecond that it takes the tongue to move from the *mark* (4) contact to the *space* (5) contact. To compensate for this transit time and apparent spacing bias when using the 538-A relay to key a neutral output, and restore the equal *mark/space* ratio, turn the bias control slightly in the mark direction (towards *M*).

If the 538-A relay output is to neutral and inverted (with the *mark* pulse from terminal 5 and tongue 1) then the *mark* pulse will appear longer than the *space* or open conditions of the contacts, and to restore the 50% M/50% S ratio, the bias control should be turned slightly in the *mark* direction. (The bias control is also inverted). The Model 538-A relay will compensate for *mark* or *space* weighting in the received signal. To introduce weighting in the relay output, to increase the pulse length appearing across terminal 4, and tongue no. 1, turn the bias control towards *M*. This also reduces the pulse length appearing between terminal 5 and tongue

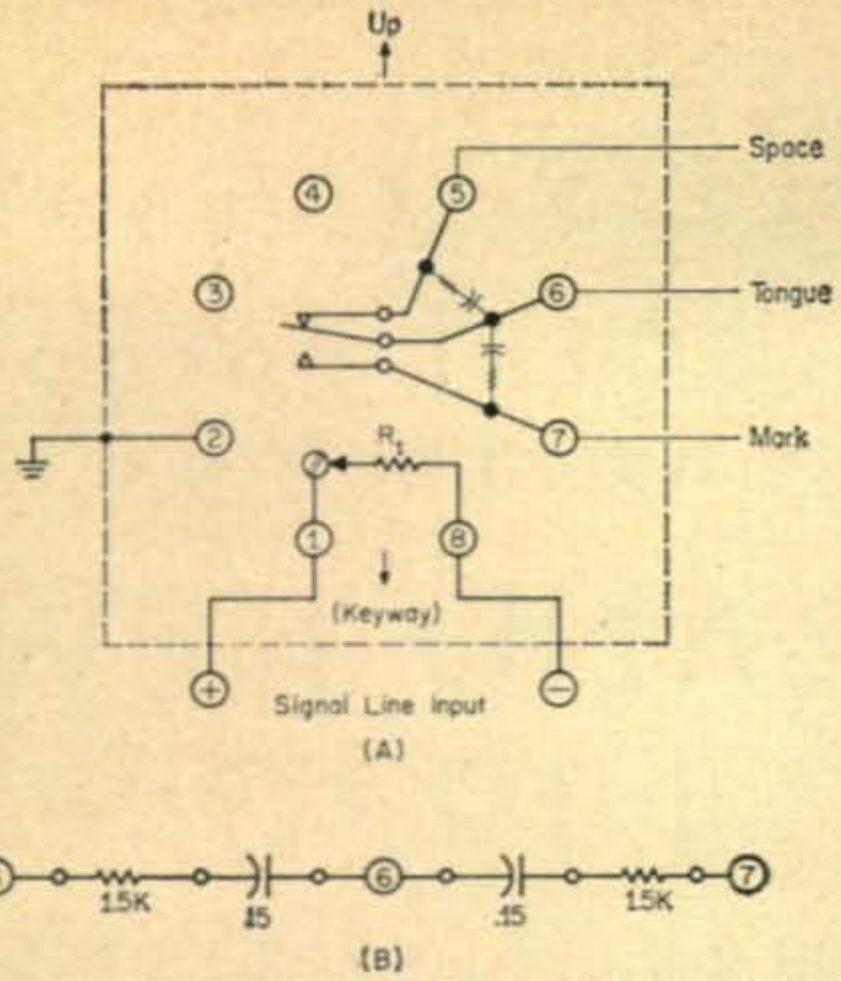


Fig. 74—(A) Bottom view of the octal base plug of the Trepac 538-A/O relay. (B) These components may be added externally across contacts 5, 6 and 7 to compensate for inductive loads greater than 75 ma and 130 volts. Both capacitors are .15.

1. To increase the pulse length appearing across terminal 5, and tongue 1, turn the bias control towards *S*. This also reduces the pulse length appearing between terminal 4 and tongue 1.

The *mark* and *space* settings of the bias control are relative. The bias control is entirely electronic, and establishes the ratio of the *mark* and the *space* pulses appearing in the relay output. When using the 538-A on a 60 ma signal line, the 50%M/50%S setting will be toward the 60 log point on the scale. Turning the bias control potentiometer toward *S* from this point, will lengthen the pulse appearing across terminals 5 and 1. Turning the bias control toward *M* from the nominal factory setting, will lengthen the pulse appearing between terminals 4 and 1. When using the 538-A on a 20 ma signal line, the potentiometer setting of the bias control will be toward the 20 end of the scale. When using the 538-A on any intermediate current signal range, the setting will be between the 20 and 60 ma points on the scale, and if operation at higher signal line currents is desirable, the setting may be nearly fully clockwise beyond the 60 end of the scale.

The same procedure for setting the relay output weighting by the bias control potentiometer will apply regardless of the nominal setting for a particular signal line current.

Trigger Level Control

The relay has a TRIGGER LEVEL control which is an effective wave shaper which controls the *turn-on* and *turn-off* point of the Schmitt Trigger type of input circuit. This can also be readily observed in the circuit shown in fig. 70. This is particularly important in line service where a long line may have heavy *characteristic* distortion due to line capacitance and resistance. However, this control can also be important in RTTY work because the keying wave at the output of the Terminal Unit may not always be the nice square wave that we would like.

The trigger level control is set at the factory for a nominal "crossover point" of approximately 30 ma, assuming the unit will be used on a 60 ma neutral signal line or loop. Normal operation will require no further adjustment of this control. If it should be desirable to set the crossover point higher on the current curve of the signal line, adjust the TRIGGER LEVEL control slightly toward *S*. This reduces the sensitivity of the transistor input, requiring a higher input current to actuate the relay contact output. If it is desirable to set this crossover point lower on the signal line current curve, adjust the TRIGGER LEVEL counterclockwise toward *M*. This increases the sensitivity of the transistor input, requiring a lower input current to actuate the relay contact output.

If the 538-A is to be used at the end of a long neutral transmission line where characteristic distortion caused by large amounts of line capacity and resistance will tend to weight the received signal with a heavy marking bias, the trigger level control should be set higher on the current curve to cut off the "die-away tail" of the capacity discharge on the line. Turning the TRIGGER LEVEL control toward *S* enables *slicing* the signal line current curve to reestablish an equal *mark/space* ratio in the output of the Model 538-A relay.

The normal adjustment of the BIAS control which is set for equal *mark/space* ratio on a square-wave input signal is not disturbed and is not used for correction of this type of bias on the signal line.

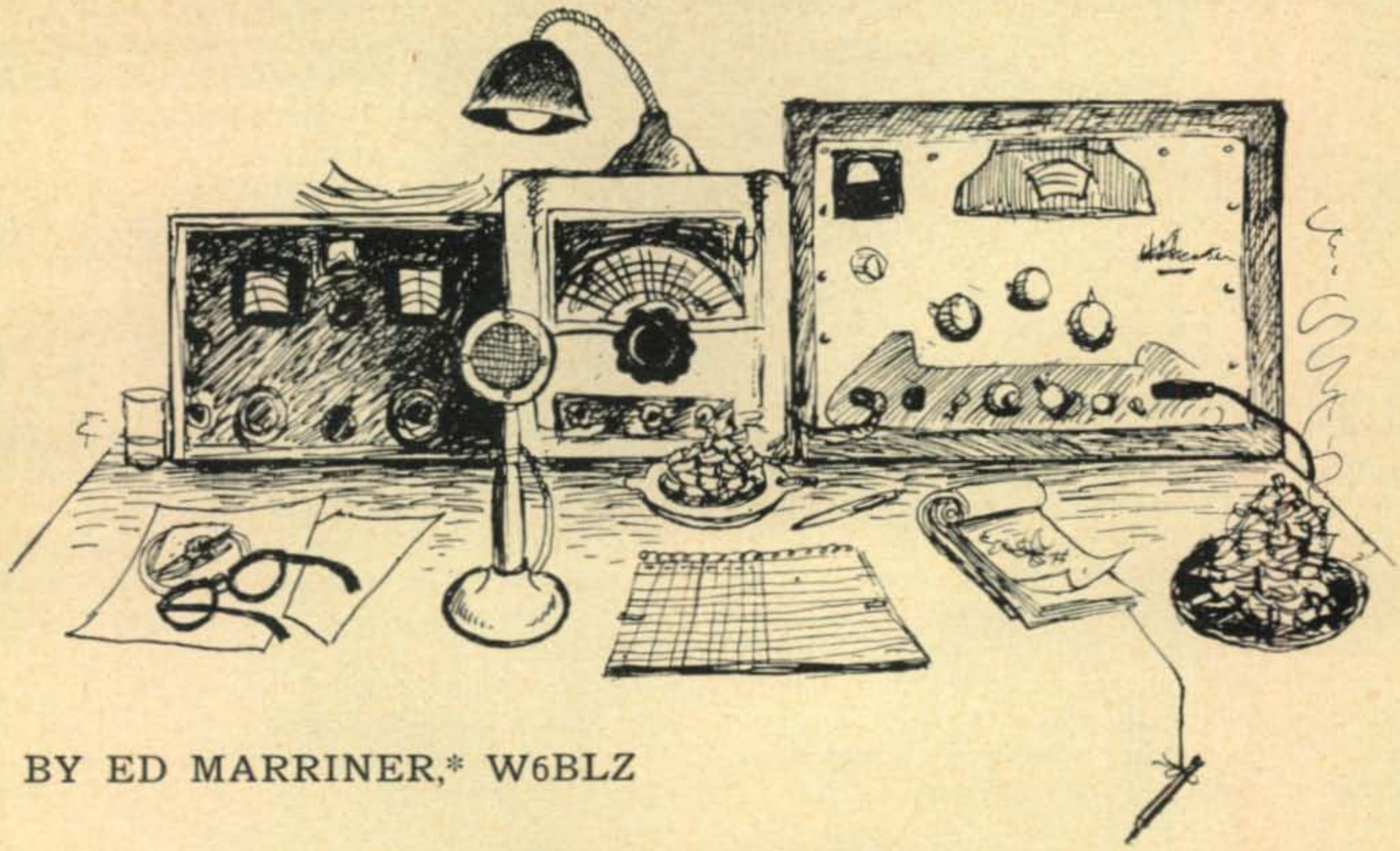
If the trigger level is properly set to provide equal *mark/space* relay output from a line with heavy characteristic distortion, an increase in signal line current level will introduce marking bias, and a decrease in signal line current will introduce spacing bias, but the effect will be somewhat less noticeable than with the conventional type of relay.

The TRIGGER LEVEL control can be used to set the turn-on and turn-off points of the 538-A relay to within a few milliamperes of each other. If the input signal is a reasonably square wave, the trigger level control can be set in each of a number of 538-A relays operating in the same series or parallel loop, to turn on and off at different signal levels without interfering with each other or distorting the output pulses. This provides a convenient and accurate means of obtaining multi-level signaling. A supervisory or monitor signal current of 5, 10, or 20 milliamperes (or other current levels) can be in the signal line at all times, without triggering the units set to respond only to higher current levels. The effect of varying the trigger level control of the 538-A relay is graphically or pictorially shown in fig. 73.

The Trepac Model 538-A is extremely rugged, and will hold its adjustment indefinitely. As the units may be tumbled about, the mercury pool in the contact capsule may flow down and short the contacts. Prior to insertion of the Model

[*Continued on page 95*]

The Story of Communication



BY ED MARRINER,* W6BLZ

When sitting before your rig or operating, have you ever given thought to the rich heritage of the art of communications. The following is part of that art and a look at something we tend to take for granted as "just happened along."

SIGNALLING to me has always been a symbol of adventure and far away places. It never made much difference to me if it was wig-wag with flags or a telegraph key plugged into a transmitter, messages were sent and connections made over deserts and mountains around the world. There have been many incidents in by-gone days which should still be a heritage to the operator interested in communications today. I am sure these stories of adventure have inspired many a young man to become a radio operator or if he couldn't he might travel vicariously by amateur radio.

Looking back over the history books, one finds since the beginning of time, man has solved communication problems for his particular period. Talking without the use of the tongue has been called *telegraphing*. It is derived from two Greek words, which signify, "to write" and "at a distance".

Early man conversed by signs, and travelers in our early west tell us it was not uncommon to see two of different tribes sitting on the ground opposite each other, conversing freely by means of sign language. General Fremont on his way to California mentions in his writings that whenever he travelled through Indian country, he noticed columns of smoke scattered on mountain tops, through which the Indians were signalling to various groups announcing his arrival.

In historic times, during wars, many ingenious methods of communication were used: bells, torches, flags and symbols. Even the *Bible* mentions in the 6th chapter of Jeremiah: "O, ye children of Benjamin, gather to flee out of the midst of Jerusalem and blow the trumpet in Tekoa, and set up a sign of fire in Bethaccerem."

The Egyptians had signals to indicate the rank of important officers, and so did the Greeks. By using emblems on banners and signs in a manner understood by the various companies of soldiers, the standard bearers were able to telegraph orders to "advance" and "retreat". These fellows might have been the first operators because they had to learn their own codes of signals, which might have been complicated.

Beacon fires and torches were used by the Romans and came in all colors of flame for various meanings to the troops. Schedules were arranged and times kept by synchronized water clocks, just like we use NAA's time signals today. In the days of the Greeks, two communications stations might be set up on two mountain tops. When a message was to be sent, the transmitting station operator would hold up a torch so that the receiving operator could set his isochronous water clock which had been calibrated for letters. As the sender held up his torch the receiving operator read off the letter on his end and copied them off every time he saw the torch rise. Because the water column moved slowly it was not difficult to keep in synchronization. If you think this was crude, remember at the Battle of Waterloo the British

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Army used a very similar method 2000 years later with hardly any improvement.

Aeschylus, who lived about 500 B.C., wrote an account of the fall of Troy, describing a telegraph operator stationed by a water clock to relay the news. You can imagine he was grumbling about his lonesome duty post and had to observe operator rules just like the man on duty today. He could not fall asleep on watch, he could not sing nor whistle but must pay attention to signals and be alert at his monotonous post watching for far off intelligence signals. These communication methods remained unchanged for centuries. In 1455 the Scotch Parliament passed a directive that one bale or faggot burnt at a sending station should be a warning that the English were advancing on Edinburgh. Two bales blazing side by side meant that they were coming in great force.

England was invaded many times by the Northmen and signal towers were placed along the coast and you can bet they had top priority. The importance can be shown that the town of Ingleborough, means signal or fire borough. Beaconsfield is another name from ancient usage. and Scout Star Hill in the Shetland Islands.

The flash system of signalling was invented in recent times by Rev. James Bremner of England, during the 1800's. The system worked much like the Boy Scout system where one torch alternating and exhibiting or concealing sent the message. The system was later revised by the British Army and Navy using lanterns in place of torches. This led to the invention of the heliograph or reflecting mirror which played an important part in the Afghan wars in Northern India. Messages could be sent at 8 w.p.m. up to a distance of 100 miles with good accuracy.

During our own Revolutionary war many methods of signalling were used. Some of the methods were moveable flags on one side of a mast with a tub or barrel on top. By moving a flag or a basket on a bracket up and down, various signals could be sent. The number of code signals were limited at about 50. By 1797 the Chappé brothers in England had improved the method by using exposed arms of wood. In 1793 the British Government adopted their system and was using it to relay messages from London to Paris. The same system was installed in Egypt in 1802 and other networks reaching from the German frontier to St. Petersburgh embracing 220 stations and manned by 1320 operators. This European communication network was used until the practical operation of the telegraph in 1837.

Joseph Henry as early as 1829 had observed the magnetic effect which a current had on itself. He did not describe this phenomenon until 1832 and gave American science a chance for world distinction, and paved the way for Sam Morse and his telegraph.

During September, 1837, Morse demonstrated his telegraph sending a message seventeen hundred feet. Stephen Vail saw the demonstration and put up the money to get a system started. Mr. Vail's son Alfred went to work helping Morse and it is said he invented the hand key, and the Morse Code as we know it today. It was not until 1843, that Congress granted enough money to Morse for a construction of a telegraph line. The line was 40 miles long running from Washington D.C. to Baltimore, Md. For the next ten years until Western Union was formed in 1856, it was touch and go trying to keep lines running. Angry farmers cut the lines which were constantly breaking, and the operators all trying to send messages at once slowed the traffic down. Things progressed better after Western Union took over and installed order to the systems.

During the Civil War a corps of telegraph operators in the Army increased to 1200, most of them boys from 12 to 18 years of age. The service was dangerous and by the end of the war only 200 survived. During the war, 15,389 miles of wire were strung and 6,000,000 military messages were transmitted, and I expect filed away someplace today in the Archives in Washington, D.C.

What was going on in the rest of the world? The British pushed telegraph lines in India and we have a report of a historic telegram dated May 11, 1857 which warned the Punjab of the Outbreak of the Sepoy Mutiny. The fateful telegram from Delhi is described by a Mr. Holmes as witness.

"In the telegraph office hard by, a young signaller was standing with his hand upon the signalling apparatus. The mutineers almost upon him, and more and more plainly he heard them yelling as they swept along. Still he went on with his work. Click! click! sounded the instrument. Flashed up the wires to Umballa, to Lahore, to Rawulpindi, and to Peshawur this message warned the authorities of the Punjab—'The Sepoys have come in from Meerut, and are burning everything. Mr. Todd is dead, and, we hear, several Europeans. We must shut up.' The mutineers burst in, the last click died away, and, in the performance of his duty, the signaller was slain." Sir Herbert Edwardes subsequently stated publicly in England later, that this message, was the means of the salvation of the Punjab. Mr. Brendish, the survivor of the two signallers and sender of this message, had retired from the Indian Telegraph Service, and the *Pioneer,* of Allahabad, took the occasion to tell the story of the message from the records of the department. Mr. Todd was in charge of the Delhi telegraph office, having under him two signallers, Brendish and Pilkinton, aged 18. On Sunday, May 10 at 4 P.M., it was found that the line from Meerut was interrupted, and Mr. Todd started to find out the break. At the bridge of boats across the Jumna river he was met by the mutineers the following morning and murdered. The lads, who were left alone in the office outside the Kashmir gate, saw the mutineers pass, and continued steadily telegraphing to Lahore all the news brought in by peons as to the doings of the mutineers in the city. Brendish went out at noon too see what was going on, but was ordered by a wounded British officer to go in and close the

doors. There for two hours the two operators with the widow and child of Mr. Todd remained; and at 2 P.M., Brendish went to the Umballa instrument and telegraphed the historic message, which ended with—"and now I am off." The two took Mrs. Todd and the child to the Flagstaff Tower, where the Europeans had congregated, and from there they saw the blowing up of the powder magazine. That night they fled and made their way to Umballa. Before they left the tower Pilkinton went back to the office to send a message for an officer, and this daring mission he accomplished, for the message is recorded as having been received. The effect of the warning message to the Punjab was that the regiments tainted with mutiny were disarmed before they knew what had taken place at Meerut and Delhi. Mr. Brendish served through the Mutiny, and in 1859 rejoined the telegraph service, ultimately rising to be telegraph master.

It seems over 100 years later operators are still risking their lives in much the same circumstances, as occurred in Congo recently. Operators have given their best and lived in many primitive conditions as this next item reveals: "Bombay, India, Nov. 19, 1897. From the end of August to the end of the year under report, Bombay has suffered most severely from an outbreak of the bubonic plague, and I cannot speak too highly of the way in which the whole signalling staff have stuck to their work. This is an area with plague all around them and at their very doors, and many have lost their lives. Whole telegraph offices have been washed with a solution of phenyl, and chloride of lime placed on the floor at considerable inconvenience to the operators. . . ."

By the year 1870 telegraph lines had been strung in Persia after having been vigorously denounced and opposed by the priests as being a species of magic, and closely allied to other evil principles greatly subversive of religion, although a British line had run through Persia from India to England in 1862.

In Egypt on September 3, 1898, at the defeat of Omdurman, three Royal Engineers were working along entering the city from the south. They noticed a telegraph wire and followed it and presently found themselves at a hut wherein was an old telegraph instrument. It was in charge of an old telegraph clerk who had been held as prisoner by the Khalifa since the fall of Khartoum in 1884. The relay sounder was none other than one of the 12 ordered by General Gordon in 1878. It has been on exhibit since at the Telegraph Battalion stationed at Aldershot, England as a memento.

As we approach the dawn of Wireless Telegraphy, there is one more system that bridges the gap between it and the land line, induction signalling. This new system was made practical in England, and in 1892 was suggested that communication be established between ship and ship or shore by means of coils. A trial was made on a large scale between the North Unst lighthouse, situated on Muckle Flugga, and the mainland a distance of two miles. The induction method worked so well that all of the cables formerly used around England and Ireland to the lightships were replaced with the induction system. This method was used until Marconi arrived in England in Feb. 1896 and demonstrated his superior wireless system which took over rapidly. I think you know the rest of the story. ■

New Amateur Products

Sydmur Transistor Transformers

SYDMUR Electronics recently released a new line of toroidal transformers for use in transistorized d.c. to d.c. power supplies in the mobile. All transformers are epoxy encapsulated and are extremely neat and compact. Several models are available offering d.c. outputs from 100 to 2000 volts, and currents up to 300 ma, all with 12 v.d.c. input. The smaller models are designed for printed circuit board mounting, while the large ones have conventional wire leads. Prices range from $9.95 to $77.50. For further information write to: Sydmur, PO. Box 25, Midwood Station, Brooklyn, N.Y. 11230, or circle 62 on page 110.

General Electric Speed Control

THE G.E. speed control (GE5260-9) is useful for regulating the speed of shop machine tools. The control uses a silicon control rectifier and two diodes. It has an ON-OFF switch, fuse and 6-foot power cord. For further details write to: G.E. Wiring Device Dept., Providence, R.I., or circle 63 on page 110.

An Automatic CQ Sender

BY JOHN J. SCHULTZ, *W2EEY/DJØBV

An inexpensive portable tape recorder is used to send an automatic CQ for phone or c.w.

Most of the newer s.s.b. transmitters (Collins "S" Line, Heath SB-400, *etc.*) use a keyed tone oscillator to operate the transmitter on c.w. The keyed tone acts to generate the keyed carrier and to activate the vox system for c.w. break-in. With these transmitters, it is very simple to use an inexpensive tape recorder, *without* any accessory relays, as an automatic CQ sender.

The recorder used is an imported portable type I purchased in New York for about $11.00. It is battery operated and the speed variation when playing through a complete reel is something astounding. However, for the duration of a good, short CQ call, the speed variation is negligible.

Wiring

The microphone switch is wired as shown in fig. 1 either to feed the microphone or tape recorder output to the transmitter audio input. The recorder I used has a 600 ohm monitor output which worked very nicely into my setup since I had already built into the microphone stand a 600/50K ohm transformer to couple my low impedance microphone to a high impedance transmitter audio input. Using other tape recorders with only low impedance speaker outputs and high impedance microphones, the simplest scheme is to install a small speaker output transformer in reverse to the recorder output to obtain high impedance output.

When operating on phone, the microphone switch selects the microphone or recorder output. I wired the switch for p.t.t. operation but vox could be used by eliminating the p.t.t. connection on the microphone switch. The audio level for the transmitter when using the recorder is controlled by the recorder level control (not the transmitter gain control which is set for the microphone level). If not enough output is obtained from the recorder to allow using its speaker to monitor the CQ, the recorder output to the transmitter can be loaded down with enough resistance to allow a good speaker level while still not feeding too much audio to the transmitter.

On c.w., the operation is equally simple. The CQ call from the recorder is fed to the transmitter microphone input and is used the same as the keyed tone oscillator in the transmitter to operate c.w. Most transmitters using the keyed tone oscillator type of keying system are wired so that the microphone amplifier stages are dead for c.w. operation. It is usually a simple modification to change the wiring, normally the B plus lead to the amplifier stages, so that they are operative in the c.w. mode. The level controls are used basically the same as for phone operation except that the recorder output is adjusted for the same c.w. carrier level as is obtained when keying the transmitter by a manual key.

Recordings

A special word about making the recordings. Inexpensive recorders will produce distortion if the recording level is too high. Low level output is required from the recorder since it feeds directly to the microphone amplifier in the transmitter and therefore the lowest recording level consistent with having enough output to monitor the CQ on the recorder speaker is generally the best one. The station microphone should be used to make the recording so that the CQ sounds as natural as possible. The c.w. call *must* be re-

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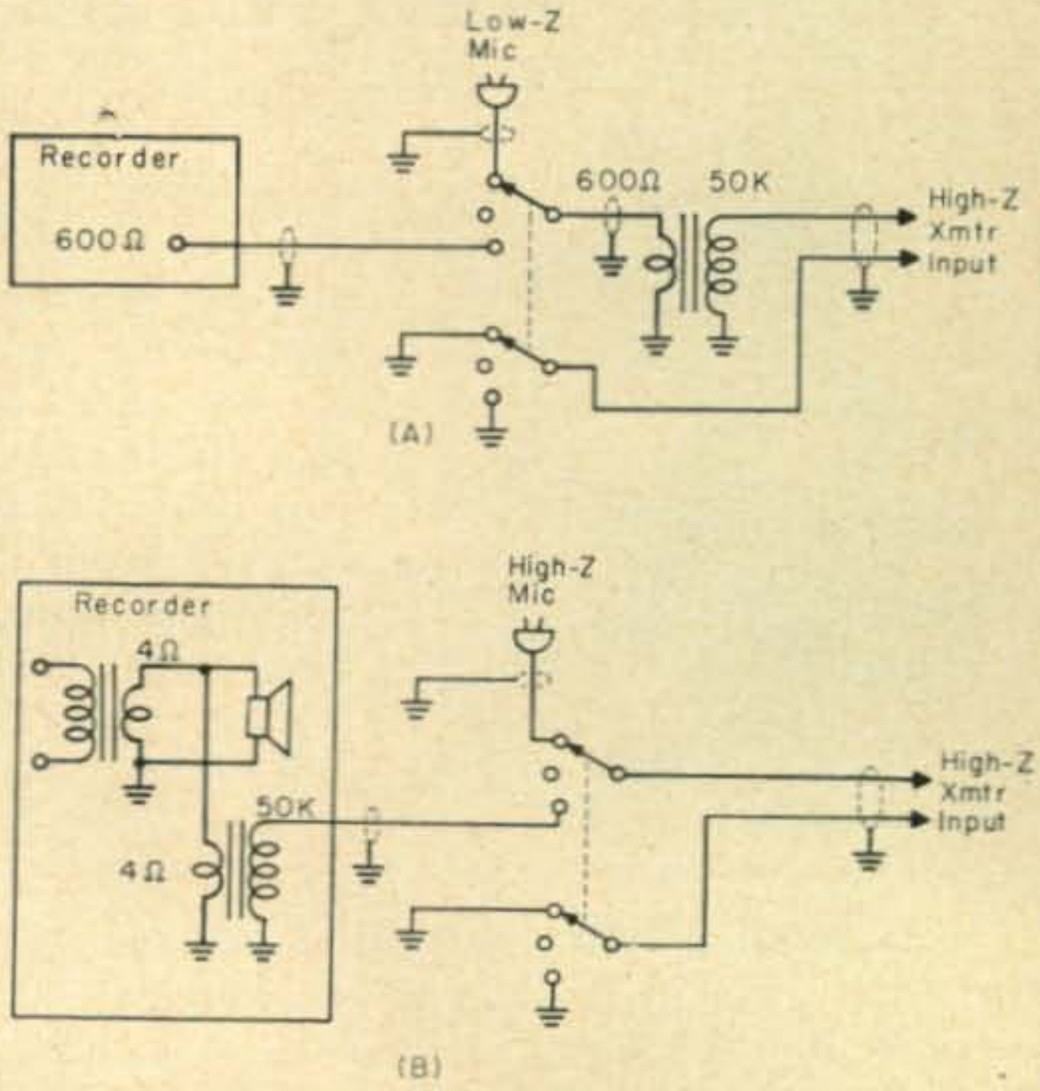


Fig. 1—Circuits for connecting the tape recorder output to (A) low impedance microphone circuit and (B) a high impedance mike circuit. The bottom section of the d.p.d.t. switch is not necessary if only vox operation is used.

*c/o Engineering Department, Radio Free Europe, Englisher Garten I, Munich 22, Germany.

The "Third Method"-Is It Worthwhile

BY FRED JOHNSON,* ZL2AMJ

The so-called "Third Method" of s.s.b. generation is examined in a non-mathematical manner for possible Amateur use. After considering the size and bulk of components and any possible advantages, the question arises, "Is it worthwhile?".

SOME four years ago I decided that a rebuild of my home-constructed equipment was imminent. Full of enthusiasm, I examined the three types of s.s.b. generators—filter, phasing, and "third method"—to determine which method could produce a rig meeting my specifications. I considered the "third method" in detail and fortunately made notes of my conclusions. Since this study took place, I have received numerous comments and inquiries ("What do you know about the third method?") from hams obviously looking around to survey the field before building. The notes presented here are my own conclusions from reading many published articles on this method, and I hope they may prove of interest to others. It is assumed that the reader is fully conversant with the filter and phasing systems of s.s.b. generation for otherwise the explanation would be excessively long.

*15 Byron Street, Upper Hutt, New Zealand.

Block Analysis

The third method is basically a phasing-type system. In fig. 1 consider all blocks to the right of line *A-B*. This is part of a phasing system rig—all parts of it following the wideband a.f. phase-shift network. Audio on leads *X* and *Y* is at ninety degree phase displacement, resulting in two d.s.b. signals (at ninety degree displacement) on leads *G* and *H*. These, when combined, give either upper or lower sideband output from the combining circuit.

To the left of line *A-B*, in leads *X* and *Y*, we have two low-pass filters. These cut-off (ideally) at 1800 c.p.s. (*i.e.* they will only pass frequencies from 0 to 1800 c.p.s.) Preceding these filters are two more balanced modulators (*A* and *B*) which are (or can be) identical to balanced modulators *C* and *D* in all respects, other than the fact that they work at a.f. only.

A.f. from the microphone and a.f. amplifier circuits feed to both balanced modulators *A*

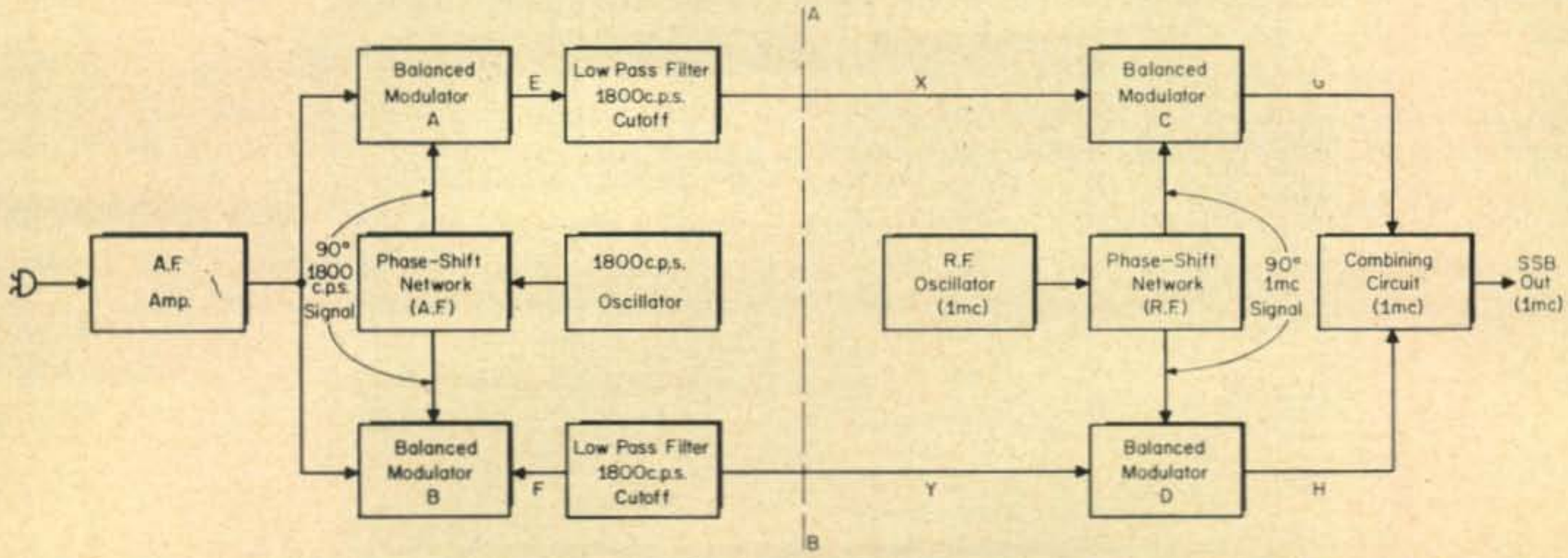


Fig. 1—Block diagram of a "Third Method" s.s.b. exciter. Note the use of balanced modulators in both the a.f. and r.f. sections as well as an oscillator for each section.

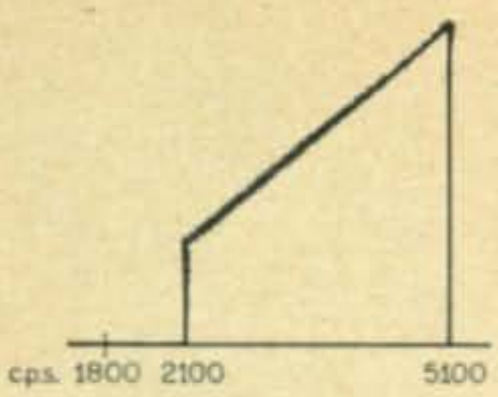


Fig. 2—One component of the signal on leads *E* and *F* in the diagram shown in fig. 1. This represents the upper sideband ranging from 2100 to 5100 c.p.s.

and *B* in the same phase (*i.e.* there are no wideband a.f. phase-shift networks such as we use in a normal phasing rig.) The balanced modulators are however fed with a 1800 c.p.s. tone (or 'carrier') at ninety degrees phase displacement as shown. This phase-shift network has to function at this one frequency only and can be a simple *RC* network.

Operation

On to the explanation of the workings of the method. A few points to watch in the construction of this type of rig will be mentioned as we go along.

Consider first of all the balanced modulator, *A*. It is identical in all respects to balanced modulator *B* except that the 1800 c.p.s. carrier inputs are ninety degree phase displaced. The outputs on leads *E* and *F* will also be identical but phase-displaced by ninety degrees.

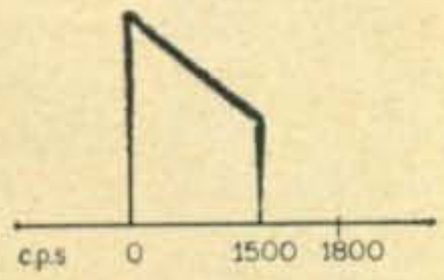


Fig. 3—Another component of the signal present on leads *E* and *F* is part of the l.s.b. ranging from 1500 to 0 c.p.s.

Now consider the a.f. from the microphone to be restricted (by suitable design of the a.f. amplifiers) to a passband of 300 to 3300 c.p.s. This frequency restriction is not really necessary as we will see later but serves to simplify the explanation. Thus an input of 300 to 3300 c.p.s. and a single tone of 1800 c.p.s. are fed to balanced modulator *A*. Output on lead *E* is thus 1800 c.p.s. plus and minus a band of 300 to 3300 c.p.s.—normal modulation of an 1800 c.p.s. carrier by a band of frequencies. Thus *above* the 1800 c.p.s. tone we have an upper sideband as shown in fig. 2, ranging from 2100 to 5100 c.p.s. The wedge shape serves to identify the high and low frequency ends of the passband. Below the 1800 c.p.s. carrier we have 1800 c.p.s. *minus* a band of frequencies 300 to 3300 c.p.s. (*i.e.* 1500 c.p.s. to *minus* 1500 c.p.s.). However as minus frequencies do not exist as such, the frequencies in this lower sideband from 0 to minus 1500 c.p.s. appear as 0 to plus 1500 c.p.s. Thus the lower sideband from balanced modulator *A* consists of two components. The first part is shown

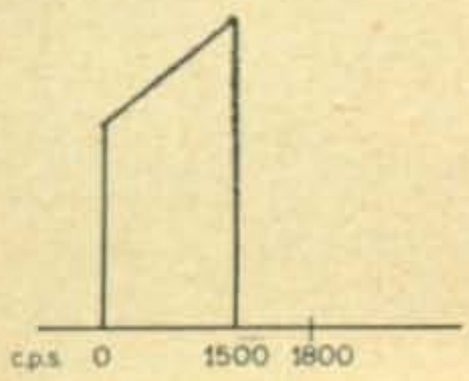


Fig. 4—Still a third signal present on leads *E* and *F* is the remaining portion of the l.s.b., from 0 to 1500 c.p.s.

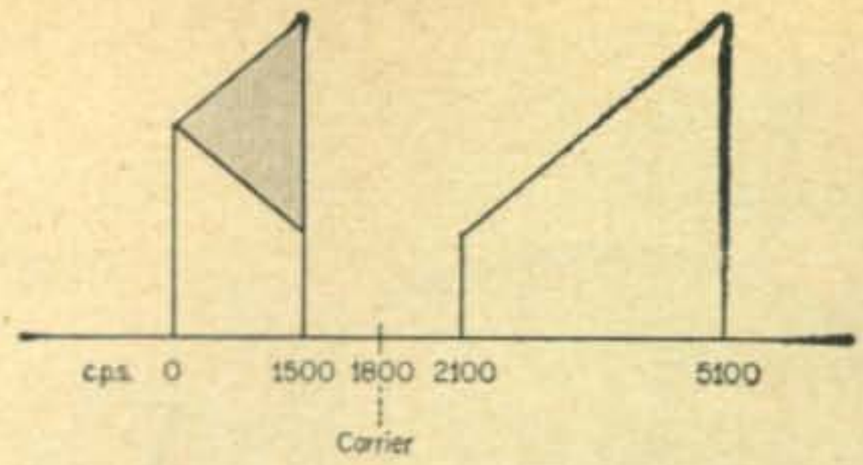


Fig. 5—The total signal on leads *E* and *F* of fig. 1 is the sum of the components shown in figs. 2, 3 and 4.

on fig. 3 and extends from 1500 c.p.s. down to 0 c.p.s. being generated by 300 to 1800 c.p.s. a.f. from microphone. The second part (fig. 4) extends from 0 to 1500 c.p.s. and is generated by 1500 to 3300 c.p.s. a.f. from the microphone. The complete output on each of leads *E* and *F* consists of both components of the lower sideband together with upper sideband as shown in fig. 5. Thus the l.s.b. can be considered as being 'folded back' about 0 c.p.s.

These signals are passed through the l.p.f. and so only the l.s.b. appears on leads *X* and *Y* (fig. 6), the signals on each of these leads being phase-spaced by ninety degrees. Note that the a.f. response is limited to 300 to 3300 c.p.s. by the action of the filters. No special a.f. amplifier design is really necessary to achieve this response,

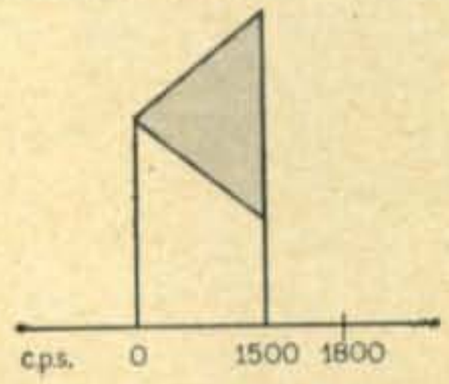


Fig. 6—Signal appearing leads X and Y of fig. 1.

but had to be introduced to simplify the earlier explanation. Note too that the coupling between the modulators *A* and *C*, and *B* and *D*, via the filters, must be direct (d.c.). If an a.c. type coupling (blocking capacitor or transformer) was employed, a notch in the frequency response would appear in the area of the fold (*i.e.* about 0 c.p.s. in the l.s.b.) due to the poor low frequency response of this type of coupling This would show itself as a notch about 1800 c.p.s. in the 300 to 3300 c.p.s. resultant a.f. at the receiving end. This would mean an 1800 c.p.s. whistle into the microphone could not be heard at the receiving end.

For an explanation of the remainder of the circuit we shall now consider each part of the 'fold' in turn, the lower part shown in fig. 3 and the upper part shown in fig. 4.

Leads *X* and *Y* are carrying lower parts at ninety degree phase-displacement. These are fed to the balanced modulators *C* and *D* (as in a typical phasing-type rig) and appear on leads *G* and *H* as double-sideband signals, each side-

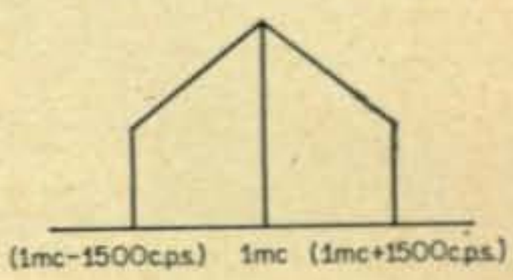


Fig. 7—Component of signal appearing on leads G and *H* of fig. 1.

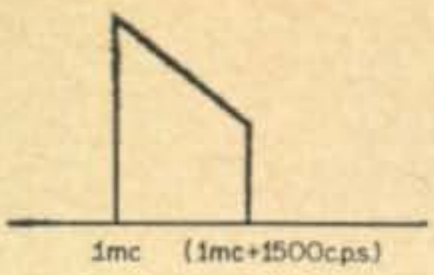


Fig. 8—Component of signal appearing at the output lead of fig. 1.

band extending out from the r.f. carrier (say 1 mc) by 1500 c.p.s. (fig. 7). The signals on leads *G* and *H* join in a combining circuit and as both signals are displaced in phase by ninety degrees, one sideband is cancelled and the other is reinforced (fig. 8). This is normal phasing-rig operation.

So we have single sideband output consisting of 1 mc to 1 mc plus 1500 c.p.s. produced from an a.f. input of 300 to 1800 c.p.s.

Let us now consider what is happening to the upper part of our a.f. lower sideband. Leads *X* and *Y* are carrying ninety degree phase-spaced 'upper' parts and these are fed to balanced modulators *C* and *D*. Thus leads *G* and *H* are carrying upper part double-sideband signals (fig. 9) but these signals are displaced by ninety degrees in phase. These are combined in the same combining circuit as before, and appear as an s.s.b. signal (fig. 10), one sideband being cancelled and the other reinforced. By the nature of the circuit, the upper part appears as a lower sideband signal here (*i.e.* lower than 1 mc) whereas the lower part appeared as an upper sideband signal (*i.e.* higher than 1 mc). These two signals (fig. 8 and fig. 10) appear in the combining circuit to give fig. 11, a 3000 c.p.s. wide true lower sideband produced from a 300 to 3300 c.p.s. a.f. input signal.

It can therefore be said that the output from this system is a type of independent sideband, for about the 1 mc carrier we have an upper sideband containing one lot of information (300 to 1800 c.p.s. a.f.), and below the 1 mc carrier position, a lower sideband containing another lot of information (1800 to 3300 c.p.s. a.f.).

Oddities

Well, that is the system in outline, and a few remarks about its peculiarities will serve to explain it further.

For a true 'upper sideband' signal, we could swap over the outputs from either the r.f. or a.f. phase-shift networks, and get fig. 12—u.s.b. Note that in so switching we switch about 1 mc *not* about the frequencies marked with the asterisk which is where the b.f.o. at the receiver must be placed to read this signal. Thus on-the-air sideband suppression checks (where the transmitting station switches sidebands) causes the receiving station to get a dose of inverted speech, and not the 'suppressed' sideband as happens

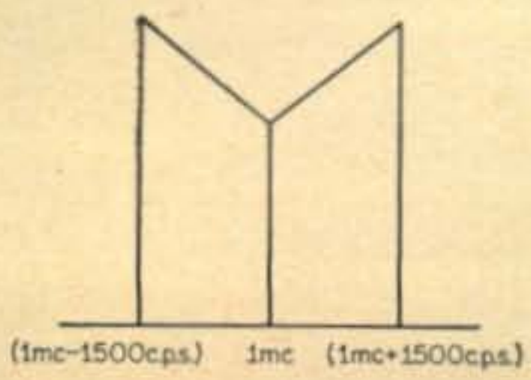
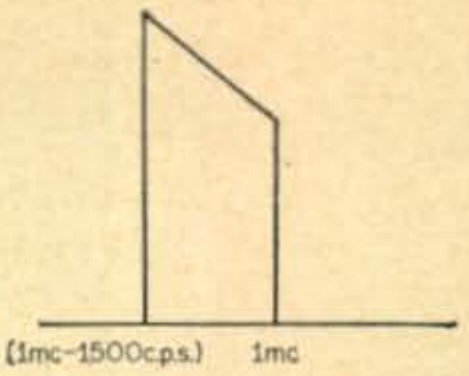


Fig. 9—Component of signal appearing at leads *G* and *H* of fig. 1.

Fig. 10 — Component of signal appearing at the output lead of fig. 1.



when a normal phasing rig switches sidebands (*i.e.* when the sidebands swap about the b.f.o. or carrier).

Also, if either balanced modulators *C* or *D* should become unbalanced and carrier leak-through occur, this will show up as a 1 mc signal which to the receiving station is a 1800 c.p.s. tone. This could be a disadvantage of this method.

If the phasing networks should be incorrectly adjusted the suppressed sideband will show itself as inverted speech within the normal sideband. So for poor phasing adjustments, no out-of-channel energy appears.

Should the low pass filters not suppress the a.f. upper sideband satisfactorily, out-of-channel energy will appear, both above and below the desired sideband, (fig. 13).

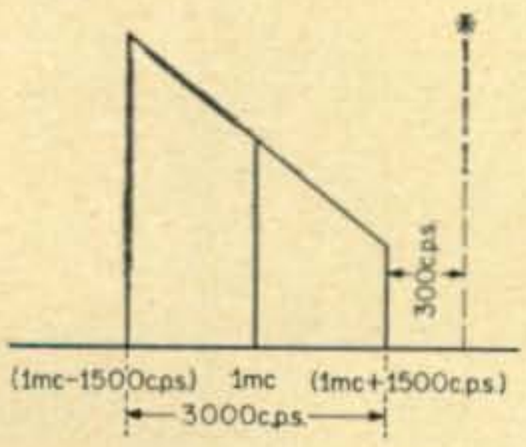


Fig. 11—Lower sideband output. The asterisk marks the point where the b.f.o. must be set to read this signal.

If the balance of balanced modulators *A* and *B* should drift, then a signal at *J* and *K* (fig. 13) will appear. One will zero-beat with the receiver b.f.o., but the other will show itself as a 3600 c.p.s. tone from the receiver speaker.

Another peculiarity is that if carrier from balanced modulators *C* or *D* is wound in for netting purposes, the rig will be 1800 c.p.s. off net (for this carrier should show itself as an 1800 c.p.s. tone). If however, 1800 c.p.s. carrier from the balanced modulators *A* or *B* is wound in, netting could be carried out, (as just explained in terms of unbalance in these balanced modulators). The amount of carrier available will of course depend upon the filter response unless the filters are purposely bypassed for 1800 c.p.s. To net satisfactorily it would seem that talking on to the frequency is the best system.

A disadvantage of sorts is that operation on a.m. as a d.s.b. signal with carrier is not possible, but a.m. is possible as s.s.b. with carrier, as has

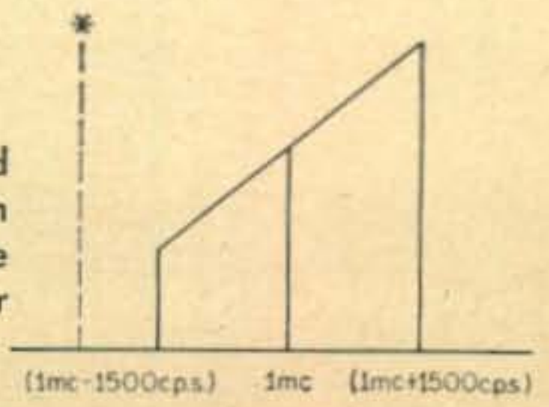


Fig. 12—Upper sideband output. The asterisk again denotes the point where the b.f.o. must be set for reception.

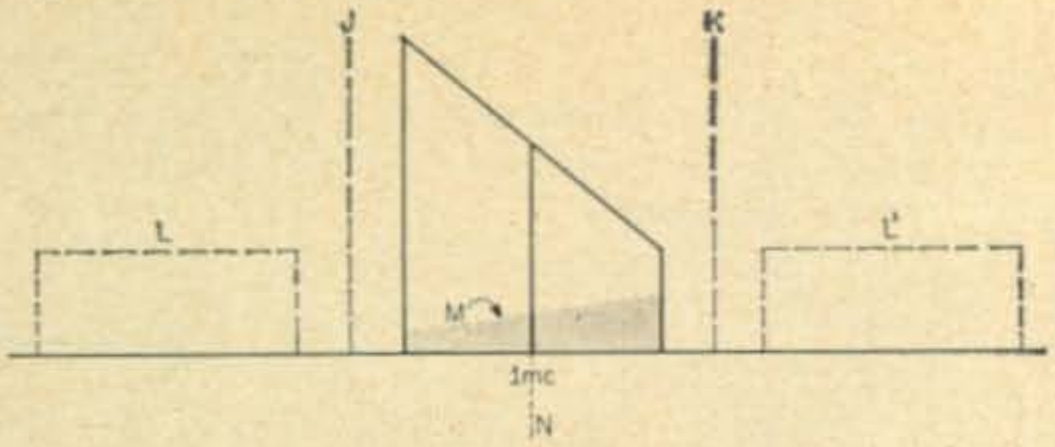


Fig. 13—Shown above is the total output of a "Third Method" s.s.b. exciter. Frequencies *L* and *L'* represent out-of-channel energy due to poor filters. *M* indicates inverted speech (in-channel energy) due to poor phasing. *N* represents carrier introduced by unbalance in modulators *C* and *D* while carriers *J* and *K* are introduced by unbalance in modulators *A* and *B*.

just been shown for netting. If, however, sidebands are now switched, inverted speech appears as a.m. In this case the carrier has to be wound in past the other filter to put it in the correct position relative to the sideband for normal speech.

Summary

The Third Method does not appear to have any worthwhile advantages for amateur use. To replace a wideband phaseshift network with twin balanced modulators, an 1800 c.p.s. oscillator (with its fixed frequency phase-shift network) and two low-pass filters, is a move that can hardly be described as economical. The system is however bi-lateral in that an s.s.b. signal can be fed into the output terminals and result in an a.f. (demodulated) signal appearing out of the input terminals, *i.e.* the system will work in both directions. It can thus be used for both the transmission and reception (or demodulation) of s.s.b. signals. Figure 14 shows a more detailed Third Method exciter that could be used to both generate and demodulate s.s.b. signals in a transceiver.

As you may have guessed, my own assessment of the system is that it is interesting but not worthwhile unless use can be made of its bi-lateral characteristics. This would imply use in a transceiver. The bulk and weight of extra balanced modulators, audio filters, and 1800 c.p.s. oscillator would however make the resultant transceiver larger than one employing the normal 'filter system' with a mechanical filter.

It took a lot of head-scratching to arrive at this conclusion, but I consider it to be a fair one. There the matter lies. Are you going to build one? ■

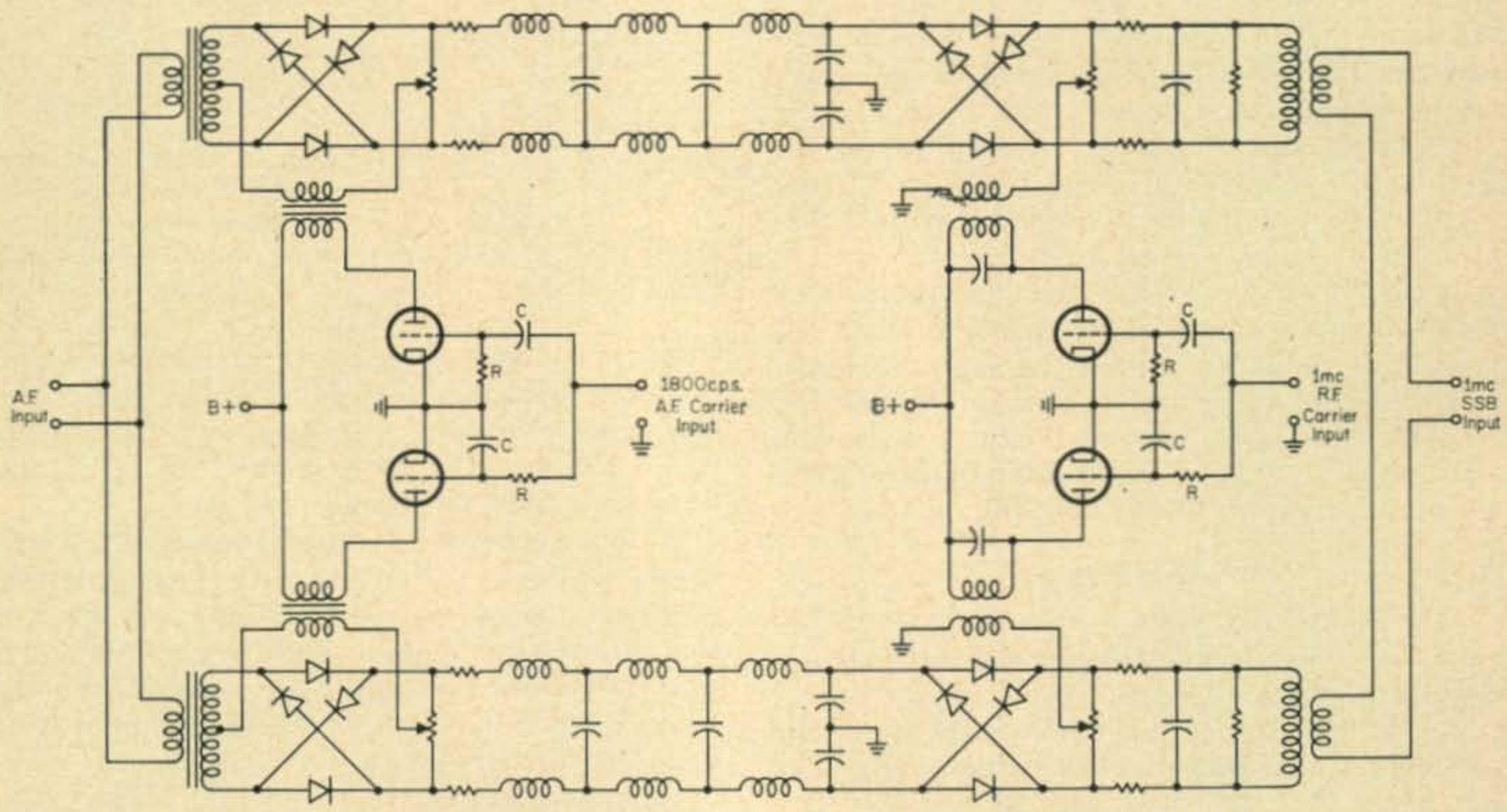


Fig. 14—Diagram of a "Third Method" exciter. Note that it requires two oscillators, four balanced modulators, two phase shift networks and two low pass filters.

Label Your Crystal

HERE's a kink for those hams who bought one of those label makers instead of new shoes for the baby. Use your label maker to prepare labels for your crystals showing the final output frequency. This saves a lot of time looking for "that" rock. Members of the local nets such as the AREC and RACES can label the net crystal with the appropriate abbreviation.

—*WA2VLU*

Improving

THE 75A-4 ON SSB

BY KELTON C. AGRELIUS,* K6SHA

The sterling qualities of the Collins 75A-4 need no review. However, this fine receiver did appear before sideband techniques were perfected. The modifications described below will improve sideband performance and the signal to noise ratio.

THIS article covers a few modifications which when installed in the 75A-4 receiver will improve its operation considerably. The aggravating pumping action on s.s.b. with the R.F. GAIN control full on is completely eliminated. Also, the background noise while tuning for a signal is reduced while the signal to noise ratio is improved. The modifications are relatively simple and require only a few parts for installation.

First Mixer

Figure 1 shows replacement of the first mixer, V_3 with a 12AT7 type tube. This circuit taken from an issue of *CQ*[1], was modified slightly from the original by the addition of a 100 mmf capacitor across the cathode resistor. This was necessary to compensate for loss of gain in the circuit at the lower frequency bands. No major realignment is required. A slight readjustment of L_{11} through L_{17} is necessary to insure that the crystal oscillator tube, V_4, is operating properly, especially on the higher frequencies. A noticeable reduction in noise level of the receiver will be observed because the 12AT7 as a triode mixer has less gain than the 6BA7. Signal to noise ratio checks made against an unmodified 75A-4 receiver as a comparison showed approximately one db improvement in the modified receiver.

Second Mixer

Figure 2 illustrates the replacement of the second mixer, V_5, with a 6U8A tube. Also taken from a previous *CQ* article,[2] this change, in addition to the others to be described, completely eliminates pumping or thump with the R.F. GAIN control full on. This is a great advantage when listening to strong signals and a weak signal tries to break in. Without the modification, when the R.F. GAIN is reduced to eliminate pumping, the weak signal is lost due to the reduced sensitivity.

In performing the modification of both mixers it is not necessary to reorient either tube socket. Rewiring some of the original components and installing additional components is not difficult and lead length is not too critical.

*2109 Saxe Court, Thousand Oaks, California.

[1]Sideband Column, *CQ*, November 1962, page 77.

[2]Sideband Column, *CQ*, July 1960, page 81.

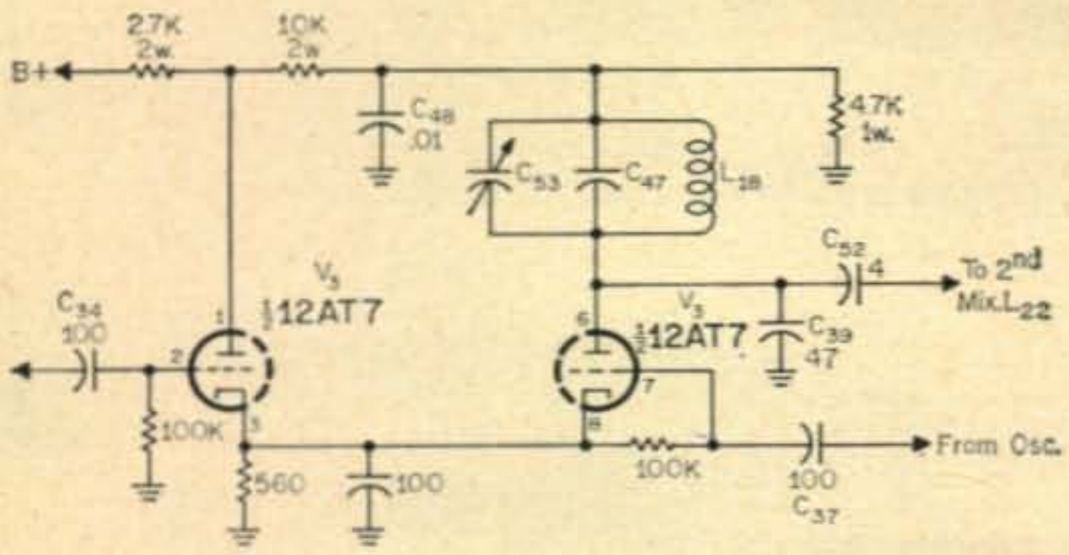


Fig. 1—Modified circuit of the first mixer of the 75A-4 shows a 12AT7 replacing the 6BA7. All components with numbers are original Collins parts. Those unmarked are added components. All new capacitors are in mmf.

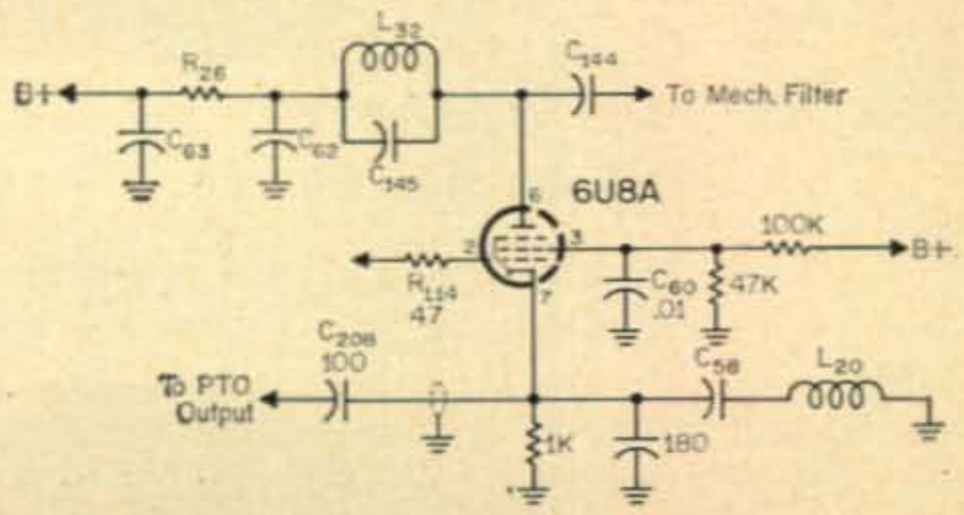


Fig. 2—Modification of the second mixer of the 75A-4 is shown above. A 6U8A replaces the 6BA7, V_5.

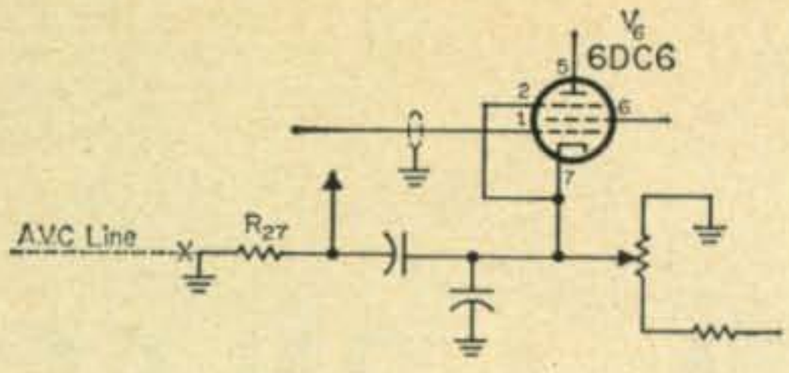


Fig. 3—Modified circuit of the first i.f. amplifier, V_6, of the Collins 75A-4 receiver. The a.v.c. line is broken at point × and R_{27} is grounded as shown. The original 6BA6 is replaced with a 6DC6 as described in the text.

I.F. and A.V.C. Modifications

Further modifications to eliminate the pumping action consists of replacing the first i.f. amplifier, a 6BA6, with a 6DC6 and the removal of a.v.c. from the first and third i.f. stages.

As shown in fig. 3, the first i.f. amplifier tube, V_6, is changed from a 6BA6 to a 6DC6 and the a.v.c. is removed from the grid circuit of the tube. The connection on pin 2 on the tube socket is removed from ground and connected to pin 7. The a.v.c. is removed by disconnecting the a.v.c. line from R_{27} and grounding R_{27}.

The sensitivity of the "S" meter is changed slightly by this modification, and must be readjusted. This can be done easily by use of the Crystal Calibrator as a reference. Before the modification, note the reading of the "S" meter on one of the lower bands with the Calibrator

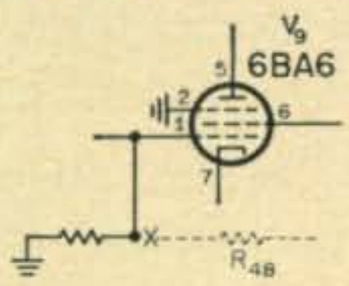


Fig. 4—The circuit of V_9, the third i.f. amplifier is modified only to the extent of removing a.v.c. voltage from the grid by disconnecting R_{48} at the point marked ×.

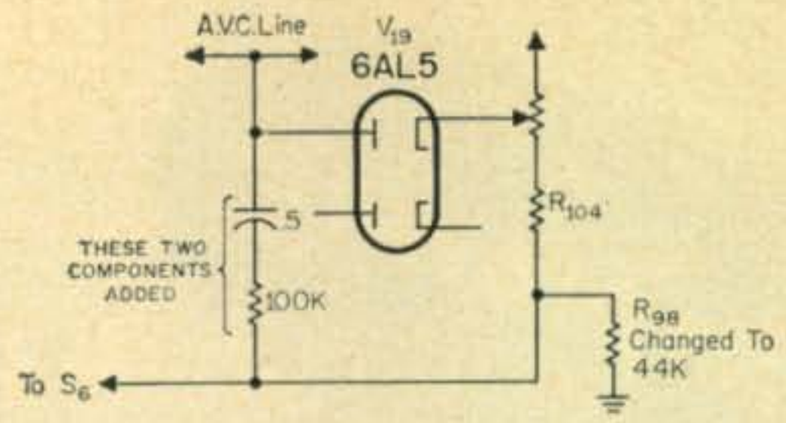


Fig. 5—The a.v.c. time constants are changed by the circuit variations shown above. The series 0.5 mf and 100K are added and R_{98} is changed from 27K to 44K. For even faster recovery, replace the 0.5 mf with a .25 mf.

on and after the modification reset the sensitivity control so the meter reads the same level.

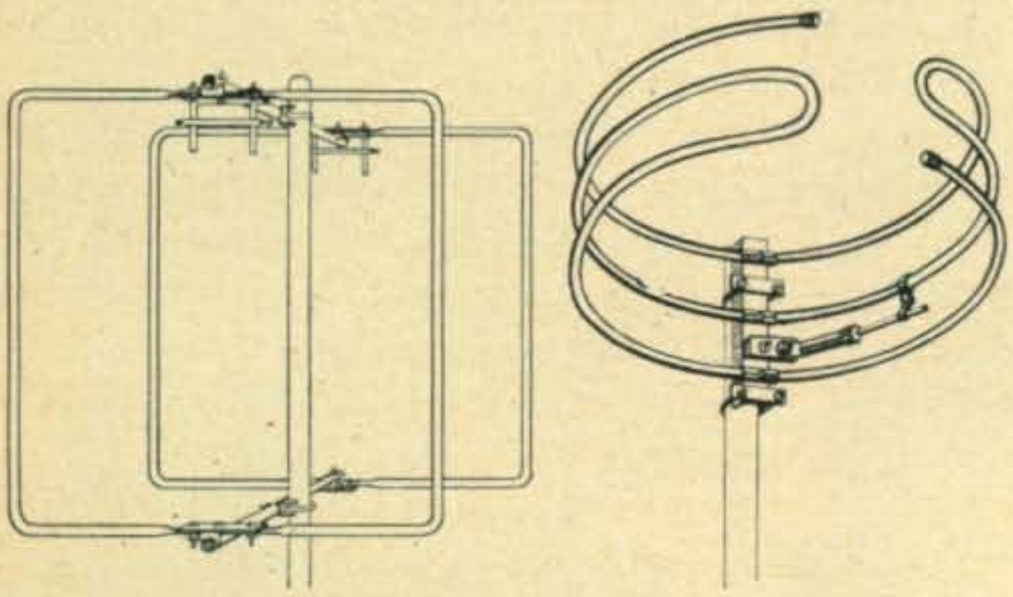
In fig. 4, the a.v.c. is removed from the third i.f. amplifier tube, V_9, by breaking the circuit between R_{48} and R_{70}. Grid return for V_9 is provided by R_{70}.

A.V.C. Time Constants

In fig. 5, a 0.5 mf capacitor and 100K resistor in series are connected from the a.v.c. line to the junction of R_{104} and R_{98}. This provides a slightly longer hang time especially in the SLOW AVC position. If not connected in this manner the recovery time of the circuit would not be fast enough for normal operation in the SLOW AVC position when the receiver is switched to the OPERATE position from STANDBY. Resistor R_{98} is changed to a 44K because a higher negative bias is required in the STANDBY position due to the removal of the a.v.c. from V_6 and V_9. The a.v.c. line previously provided negative bias to these two tubes in the STANDBY position.

The above modifications have been installed and used in the writers 75A-4 receiver for over a year and it is his belief that, with the modifications installed as shown above, the 75A-4 is hard to beat as a top-notch s.s.b. receiver. ■

New Amateur Products



Hi-Par Antenna

Two new antennas were introduced by Hi-Par. The "Tu-Quad (left) is a collapsible quad for 2 meters. It sells for $11.95. The coronet (right) is a halo type antenna. Electrically it is three half wave lengths long with two sections in phase for gain, and the third out of phase for feeding. The net price is $8.95. For further information write to Hi-Par Products, 347 Lunenburg Street, Fitchburg, Mass., or circle 64 on page 110.

Kahn Echoplex System

The patented Echoplex system is an audio processing device which encodes the speech wave by separating it into six frequency segments with six bandpass audio filters. For complete details write to Kahn Research Laboratories, 81 S, Bergen Place, Freeport, L.I., N.Y. or circle 65 on page 110.

New Components by Millen Mfg.

DURING our visit to the recent I.E.E.E. Show in New York we came across a number of new components which should be of interest to the home-constructor of amateur gear and to the manufacturer alike. These units were found at the exhibit of the James Millen Manufacturing Company, Inc., noted for its high-quality products "designed for application."

No-String Slide-Rule Dial

The first item is the Millen No. 10037 No-String Illuminated Slide-Rule Dial. It embodies a new concept in a slide-rule dial assembly that does away with string-drive mechanisms and thereby eliminates slippage and the annoyances of string-driven pointers such as stutter or wobble. At the same time it provides positive pointer travel and resetability. This is accomplished by a flexible and non-stretchable plastic gear-driven rack which rides in a slotted extruded-aluminum channel that keeps the rack in place and properly aligned with the main drive gear (see photo). The rack channel also adds rigidity to the assembly.

The drive gear for the rack is in turn driven by a smooth and positive pinch-type friction-drive wheel. Teflon bearings are employed, so lubrication is never needed. A ¼-inch output shaft, connected to the main drive gear, is supplied with an anti-backlash flexible coupling for simple installation. A shaft rotation of 180 degrees and 6½" of pointer travel is obtained with 5½ turns of the tuning knob. Stops prevent overtravel and they are arranged so that the dial calibration cannot shift when excess pressure is exerted against the stops.

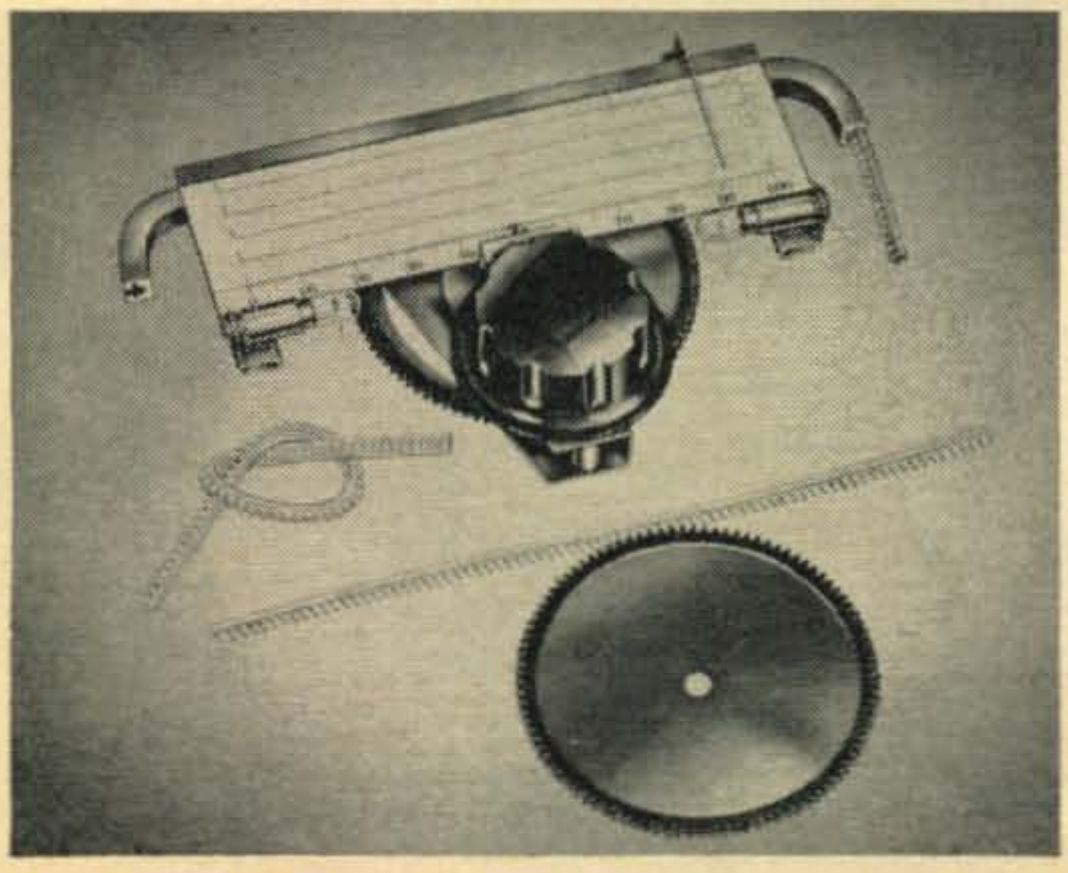
An anti-parallax pointer is employed and the dial face has five blank scales plus a 0-100 calibrated range. The dial is illuminated from the front by two pilot lamps hidden below. Light glare is minimized. A 2¾" diameter tuning knob is supplied.

An extra dividend, not otherwise found on slide-rule dials, is a unique adjustable zero-set control, accessible from the front panel, which makes it most convenient to set the calibration right "on the nose." This is done with a cam that moves the scale slightly to the left or right, a scheme so simple that we wonder why someone has not thought of it before! A neat looking scale bezel, with a clear plastic window, is supplied for mounting on the equipment panel. Its outside dimensions are 7⅝" w. × 2⅝" h. and the behind-panel space required for the dial assembly is 8¾" w. × 5¾" h. × 1-5/16" d. overall.

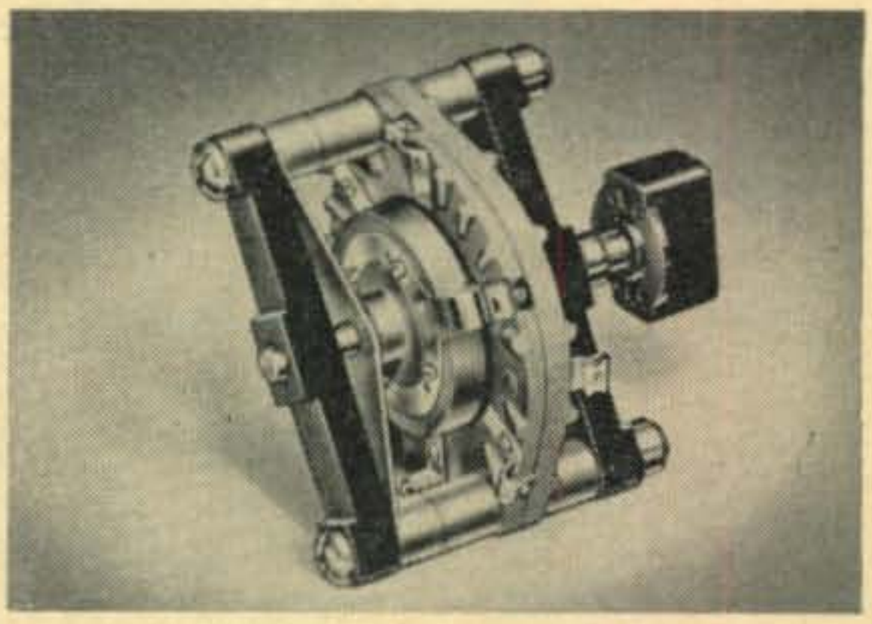
The plastic window may be easily removed for marking the scale calibrations, after which it may be snapped back into place without removing the bezel from the panel.

When you handle this dial, you're impressed with its ruggedness and smooth-operating feeling. It should be well worth considering when you build that new v.f.o., receiver, signal generator, etc.

The price of the Millen No. 10037 dial, as yet unannounced, is expected to be under $12.00.



The Millen No. 10037 No-String Dial.



The Millen No. 51001 High-Power R.F. Switch.

High-Power R.F. Switch

The next component is the Millen No. 51001 High-Power R.F. Switch. Heretofore the most available type of switches, at least for the amateur builder, have been the ordinary ceramic wafer models, unless resort is made to military surplus. This new Millen switch is designed for high-voltage and high-current operation at radio frequencies.

Large size heavy-duty solid silver contacts and silver-plated conducting elements are used throughout. There is a self-cleaning wiping action at the contacts and a heavy spring pressure is used to ensure a low-resistance circuit, while a positive snap-in detent maintains the correct alignment. When the switch is operated, not only are the switch *contacts* opened, but the common connection to the switch arm is also opened at the same time. This provides a dual break which minimizes arcing during a "hot switch." Besides this, the insulated frame is made of a special molded material (glass-reinforced alkyd) that not only has an extremely

[*Continued on page 96*]

Results of the

1964 CQ World Wide DX (Phone) Contest

BY FRANK ANZALONE,* W1WY

THIS was the year of the South American domination. All the world Trophy winners and most of the top scores came out of the fertile DX areas south of us. Venezuela has become contest minded in a big way and the YV boys copped three out of the four available Trophies. The remaining one was salted away by the perennial CX2CO.

Johnny Jaar rounded up five other operators and all the equipment they could get their hand on and activated all bands for a grand total of over 2000 contacts. With all those 3 pointers north of them how could they miss. So YV5AKU is the Top Banana in the Senior division of the multi-operator classification.

In the Junior division the Radio Club Venezolano picked its 5 best phone men and got the most mileage out of the club's new call YV9AA. Some of the fellows were puzzled by the new prefix and thought they had worked a new one, but it was just another YV.

The experience gained in last year's contest was put to good advantage by Raul Eiris and YV5BIG is at the top of the Single Operator, all band list by a wide margin.

Now that Ricardo Sierra, Jr. has completed the cycle by winning all the available Trophies over a period of 4 years, he is again eligible to compete in some of the other divisions and CX2CO is starting all over again by winning the Single Band Trophy on 14 mc.

The expected battle of the "Big Guns" in the United States did not materialize as both W3MSK and W6VSS went single operator for this one and left K2GL to fight it out for world honors. Buzz Reeves and his "Good Luck" gang would have made it too but for the YV block.

W3MSK's strategy paid off and is the winner of the new Potomac Valley Radio Club Trophy which is available only to W/K stations. The man behind the mic. was John Reichart, W3ZKH. Don't be confused when you also see his call in the W3 listing. He had his buddy Bob Cox, K3EST hold down the fort at home.

Bob Stankus, W2VCZ again made his usual fine showing at K2HLB, but lacked the multiplier to match W3MSK's score.

This year 28 mc was really dead. Even "Jaycee" found it tough going and LU1DAB's score is way below his usual peak.

There was lots of activity on 21 mc while the band was open but it required the use of both a.m. and s.s.b. to run up a good score. WA2SFP lead the pack on this band, Jim decided to

*14 Sherwood Road, Stamford, Conn.

TROPHY WINNERS

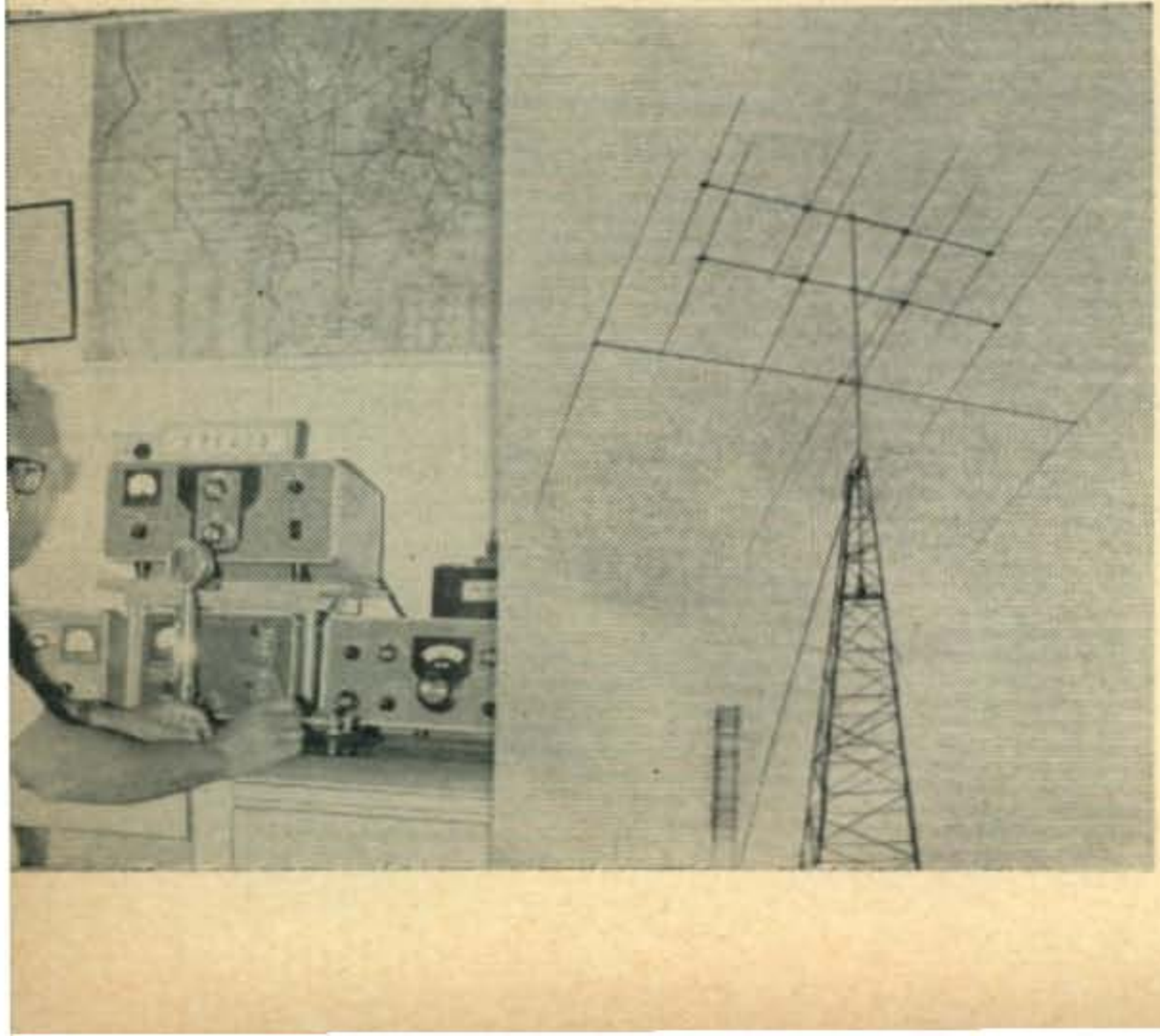
Single Operator, All Band, USA
Potomac Valley Radio Club Trophy
won by W3MSK, Operated by John Reichert, Jr.

Single Operator, Single Band (14 mc)
K2IEG, Barry Briskman Trophy
won by Ricardo Sierra, Jr. CX2CO

Single Operator, All Band
W2SKE, Bill Leonard Trophy
won by Paul Eiris V., YV5BIG

Multi-Operator, Single Transmitter
W6YY, John Knight Trophy
won by YV9AA, Radio Club Venezolano

Multi-Operator, Multi Transmitter
K2GL, "Buzz" Reeves Trophy
won by YV5AKU (Operated by YVAKU, YV5AFH, YV5AHG, YV5AKP, YV5AQS, YV5BED



YV5BIG— Raul might not have a lot of space on the horizontal plane but he makes up for it vertically. The building is 80 ft. high while the top of the "Christmas Tree" tops that by another 51 ft. Starting from the top down, it's the conventional 10, 15 and 20 meter beams, all homebrew. Hanging below is a 40 m. Telerex rotatable inverted V, and there's an 80 m. dipole hidden there somewhere. The S-Line equipment speaks for itself. All this plus an air-conditioned room, and now the W2SKE Trophy to decorate the desk.

relax this year and used his "Big Bertha" on 21 mc only.

However the "bread and butter" band was 14 mc, as it has been for the past few years. Except for CX2CO's runaway score you will note that most of the other high totals are closely bunched together. Once again VP7NS scored the highest number of contacts but Don again failed to get thru to the Far East and Oceania and was short on his multiplier. Note also the fine score made by VE8RG on this band.

The 40 meter "diehards" were even closer matched. How anyone can buck all those propaganda stations and jammers on that band is more than I will ever understand. The annual donnybrook between K2GXI and W3PHL ended up with a slight advantage for Bob, but Fred really made it a close one.

All the 75 meter phone activity was over in the European area, all except W1BU that is. Sam almost forgot to send in his log. Can you imagine not sending in a score of that size? You would be surprised to see some of the other equally impressive scores on other bands that were not sent in by stations that spent more than the admitted few hours in the contest. This year Leslie will be happy to see that he put GI3CDF at the top of the list in spite of the advantage enjoyed by the 4X4's on 3.8 mc.

Some of you will find that your scores have been adjusted, many higher because of improper tabulation, others lower because of laxity in log keeping. Disqualification was avoided in almost all cases, but a high percentage of duplicate contacts and taking credit for questionable contacts will not be tolerated.

With the Trophy winners and top scores appropriately listed in their respective boxes, there is not much object going into details. Subject matter gleaned from the summary sheets should make interesting reading however.

The general consensus seemed to be that conditions were not as favorable as those experienced in 1963 but a lot of these opinions were dictated by the location.

G3FXB found the going tougher on 14 mc this year and Al's score seems to bear out this observation, although he is still top man on 14 mc in Europe.

Out in the Far East both KA2RJ and 9M4LX found it almost impossible to get thru to the States, while the same was true here on the East Coast in the opposite direction.

Some of the boys were not too unhappy however, Bob, K2HFX found 20 in good shape during the daylight hours, while over at WA2RUB, Dick thought that 15 was absolutely amazing, "you fellows must use a crystal ball to pick your dates."

As a matter of fact W3ASK's crystal ball was a bit clouded. George had indicated of possible disturbed conditions for part of the week-end. VE6AAV and K6ERV thought things worked out as predicted, good on Saturday, spotty on Sunday. Good or bad, Arie at XE1AB said he used the propagation charts to good advantage.

Some of the fellows were plagued with other problems. W3ECR had just moved to a new location. "With only dipoles and a transceiver I learned true humility." Amen! Bob, but I am sure you will have something better for the next one. Pity poor VU2RM, Rao is so restricted in space that he has to use indoor dipoles bent to fit the available space, while W3AXW is plagued by apartment restrictions and is limited to a random length of #30 wire concealed on the roof.

YU2DB had a real problem, Matija was knocked out of action by the disastrous floods in this area, which you might recall reading about in the newspapers.

Bob Snyder, a real dedicated contest man, put 9M4LP back on the air the day after he had returned from around the world trip with the XYL and a 3 month old baby. Dog tired before he even started he still made it an interesting competition with 9M4LX. Bob had the thrill of working VK3ATN on all bands, 160 thru 15 (they forgot to try 10) and TIØRC and HC2LDA on 40. He heard W8JIN's c.w. but Jim could not get through on s.s.b.

This was WB2CCO's swan song as a stateside station. Bernie, another dedicated contest man, took down his beam right after the "brawl" and went overseas to Spain. Maybe some EA activity in the next one?

W1QAK was called into work just as he was starting to rack 'em up. Sorry Charlie, no certificate, but you can cry all the way to bank.

OH5OQ also found it necessary to curtail his contest operation, he was out elk hunting. Better meat on the table than certificate on the wall, right Erkki?

And as for thrills; W5EGS was ready to call it quits at 2130, but gave one final CQ and 21 mc and was deluged by JA's. While at W3GRS, Dick's biggest thrill was snagging K7LMU/3W8 during the last 15 minutes. But K2IEG went him one better, Barry flagged down the rare 3W8 for his last contact at 23:59.

Many are the thrills in the hectic operation of a multi-transmitter station. Bet the joint at K2GL must have been really buzzing when VQ8AM was heard weakly coming back to their prearranged sked on 40 a.m. (VQ8AM's log showed just 2 contacts on 40, K2GL and VQ8BS)

And speaking of rare ones, FH8CD showed 10 W/K contacts on 21 mc, while ZS2MI had only 4 of us on 14 mc, guess we missed the boat.

As the call indicates K7PNC/4 is a new arrival on the East Coast. "It took me 2 years to work 38 countries from Seattle," says Stew, "I did it in one week-end in the contest."

It's always a pleasure to receive logs from the YL's. Molly, ZE1JE made the Top Ten again with a very impressive score considering she was only using HT-32. And Tranchi, OH2TJ was again activating all bands.

Missing this year is Susan, VQ2WZ now 9J2WZ but Eric, 9J2EZ the OM made an appearance. We also missed the husband/wife

[*Continued on page 95*]

Top Ten
ALL BAND—SINGLE OPERATOR

YV5BIG	**757,874**		
CX3BH	617,148	ZL1AIX	486,402
W3MSK	598,620	DJ2QZ	479,386
HC2JT	586,713	K2HLB	473,556
DJ6QT	538,916	ZE1JE	427,572
	HB9ZY	412,895	

Top Six
MULTI-OPERATOR SINGLE TRANSMITTER

YV9AA	**1,382,036**	I1RB	649,000
TIØRC	740,526	HC2LDA	524,208
DL1JW	701,274	K21EG	487,326

Top Six
MULTI-OPERATOR MULTI-TRANSMITTER

YV5AKU	**1,463,871**	KZ5AF	672,105
K2GL	1,094,591	K6EVR	411,312
OH5SM	944,790	OH2AA	390,576

Continental Leaders
SINGLE BAND

28mc		G3FXB	251,640
LU1DAB	35,136	4X4FQ	211,050
4X4MJ	1,632	KH6FBJ	127,350
K6CT	560	**7 mc**	
21 mc		DJ2YA	14,965
WA2SFP	100,287	K2GXI	14,706
CR6JL	84,240	JA2BTV	13,050
DJ1ZG	71,463	PY4ND	2,996
KH6FJL	25,912	ZL4BO	2,900
PY5EG	15,120	**3.8 mc**	
14 mc		GI3CDF	35,052
CX2CO	**414,005**	4X4AS	29,392
5A1TW	291,870	W1BU	21,390
VP7NS	286,003	YV5ANS	7,161

U.S. Runners-up

All Band	W6VSS	324,009
28 mc	K6CT	560
21 mc	W4AXE	81,270
14 mc	K2HWL	249,068
7 mc	W3PHL	14,190
3.8 mc	K6BPR	880

Phone Results
SINGLE OPERATOR
North America
United States

W1BFA	**A**	"	**56,787**	**189**	**39**	**73**
W1PST		"	47,940	167	32	70
W1QAK		"	30,528	107	44	67
K1VWL		"	26,765	105	40	61
W1BIH		"	10,143	52	24	45
W1PLJ		"	8,976	66	17	31
W1WY		"	2,766	31	15	21
W1HQV	**21**	"	**24,780**	**156**	**17**	**42**
K1HVV		"	18,530	105	19	47
K1RQE		"	9,720	68	21	33
K1WJL		"	7,245	74	12	23
K1DII		"	2,464	29	13	19
W1BPW	**14**	"	**113,452**	**355**	**31**	**82**
W1ZFV		"	68,256	266	28	68
W1JYH		"	35,750	117	31	79
W1CKA		"	22,572	128	21	45
WA1ANR		"	9,027	63	17	34
W1GBW		"	6,150	52	15	26
W1BU	**3.8**		**21,390**	**129**	**20**	**42**
K2HLB	**A**		**473,556**	**629**	**79**	**189**
K2SUX		"	83,212	238	48	94
W2FZJ		"	75,852	228	41	88
WA2OJD		"	39,010	151	31	63
WA2IZS		"	19,760	86	36	59
W2IUV		"	12,540	71	22	44
W2QDY		"	12,095	81	20	39
W2SNI		"	9,996	75	20	31
WB2FON		"	4,592	42	16	25
K2OEA		"	3,360	30	17	25
W2JB		"	1,247	17	13	16
WA2SFP	**21**		**100,287**	**420**	**27**	**72**
WB2FSW		"	59,248	236	26	66
WB2GSK		"	39,040	170	23	57
W2WZ		"	37,848	175	22	54
WA2CYQ		"	36,900	181	23	52
WA2RUB		"	18,544	110	19	42
WA2JMW		"	16,665	110	19	36
WB2IQB		"	11,472	87	20	38
WB2BGV		"	2,900	49	6	14
K2HWL	**14**		**249,068**	**608**	**36**	**106**
WB2CNA		"	179,596	522	31	87
K2HFX		"	177,606	441	34	104
WB2CCO		"	56,028	219	27	65
W2KIT		"	49,329	201	26	61
K2DGI		"	36,682	149	23	55
WA2TKL		"	10,449	88	12	31
WA2SQY		"	5,535	51	15	26
W2QKJ		"	4,185	33	12	33
WA2BXK		"	738	18	7	11
K2GXI	**7**		**14,706**	**102**	**17**	**40**
W3MSK	**A**		**598,620**	**648**	**96**	**234**
W3ZKH	**A**		**298,240**	**438**	**83**	**173**
W3TLN		"	197,184	383	63	129
K3TPL		"	148,010	294	65	125
W3AZD		"	113,232	254	59	109
W3ZVJ		"	113,088	275	47	105
K3BNS		"	103,016	240	45	113
W3WPG		"	101,387	261	47	96
W3HHK		"	97,488	252	46	96
W3MVB		"	76,288	200	52	97
W3CGS		"	59,212	187	36	77

Number groups after call letters denote the following: Band (A-all); Final Score; Number of QSOs; Zones and Countries. Certificate winners are listed in **bold face.**

XE1HHH—Miss Marilu Romero. Aren't you sorry you didn't make more of an effort to find Zone 6?

W3KT		"	57,630	181	38	75
W3GRS		"	51,375	149	45	80
W3FDH		"	42,500	163	36	64
W3QMZ		"	25,996	142	24	43
W3ECR		"	17,640	105	31	53
W3EQA		"	6,968	48	19	33
K3MCO		"	5,120	46	15	25
W3KDF		"	2,880	35	14	22
W3PN		"	2,482	27	10	24
W3KWH	**21**		**52,734**	**199**	**28**	**66**
K3GKU		"	8,740	73	18	28
W3AXW		"	920	18	9	14
W3JNN	**14**		**129,642**	**369**	**35**	**88**
W3ZSS		"	14,916	115	14	30
K3LEC		"	3,904	45	14	18
W3GHD		"	3,708	38	12	24
W3AYD		"	1,344	23	8	16
W3PHL	**7**		**14,190**	**106**	**17**	**38**
W4BVV	**A**		**269,487**	**408**	**78**	**165**
W4NJF	**A**		**119,130**	**226**	**54**	**111**
K4SHB		"	97,486	232	53	105
W4OPM		"	67,900	189	45	95
K4WCC		"	55,008	184	50	94
WA4CGA		"	24,158	105	34	60
W4EEU		"	21,939	108	23	48
K4LPW		"	21,328	102	32	54
WA4IVL		"	20,510	112	22	48
WA4OAE		"	20,250	104	28	46
W4LRN		"	18,204	91	33	49
K4LTA		"	14,484	86	25	46
W4ZM		"	9,114	67	15	34
K5IQA/4		"	704	17	9	13
W4PTR		"	425	11	8	9
W4AXE	**21**		**81,270**	**276**	**29**	**76**
W4HKJ		"	27,636	121	27	57
WA4SUR		"	17,424	91	24	48
K4ZJF		"	7,810	56	23	32
W4BCV	**14**		**83,436**	**315**	**25**	**77**
W4HZI/4		"	58,272	215	28	68
K4ISV		"	38,012	166	25	61
K4RZK		"	28,056	119	28	56
K4IUO		"	20,864	121	21	42
K7PNC/4		"	13,851	91	19	38
W4LLV		"	10,545	66	18	39
K4YYL		"	7,544	62	17	29
W4KXV		"	3,616	42	11	21
W4OMW		"	1,740	33	8	12
W4JVU		"	1,008	21	8	13
W4RVW		"	969	20	7	12
W4RLS		7	540	14	9	11
W5IPH	**A**		**37,410**	**132**	**43**	**69**
W5EGS		"	33,400	139	36	64
W5JWM	**21**		**19,170**	**101**	**22**	**49**
W5EQT/5		"	13,786	85	23	38
K5HRR		"	2,268	31	10	17

K7UDV/5	**14**	**45,600**	**183**	**29**	**71**
W5KC	"	12,116	94	18	34
K8YCM/5	"	11,856	84	20	37
WA5ALB	**7**	**3,045**	**37**	**13**	**22**
W6VSS	**A**	**324,009**	**469**	**97**	**162**
W6GRX	"	58,455	158	52	83
W6LCX	"	57,600	200	46	74
W6YMV	"	37,968	176	47	65
WB6CWD	"	30,749	130	37	60
K6HOR	"	9,027	60	27	32
WB6HGH	"	7,473	54	22	31
W6BCT	"	3,478	33	17	20
WB6BWZ	"	30	3	3	2
K6CT	**28**	**560**	**13**	**7**	**9**
W6BSY	**21**	**17,030**	**102**	**22**	**43**
K6AEZ	"	10,302	73	21	30
WA6MWG	"	9,177	63	22	35
WA6WPG	"	5,719	52	17	26
WB6FWW	"	4,320	55	13	14
WB6CGA	"	3,610	37	16	22
W1PYM/6	"	1,656	25	10	14
WB6FCR	"	1,160	21	10	12
K6ERV	**14**	**52,032**	**191**	**30**	**66**
WA6ZZK	"	46,276	195	29	63
K6EXO	"	34,101	151	26	55
W6RKP	"	32,004	145	28	56
WA6EYP	"	31,590	146	26	52
K6QDD	"	23,232	132	24	40
WB6FGT	"	19,110	115	24	41
WA6QWN	"	16,476	99	26	38
W6BUD	"	15,420	91	20	40
W6KNE	"	10,504	72	19	33
WA6ESB	"	3,434	43	14	20
WA6SBO	**7**	**8,950**	**69**	**19**	**31**
K6BPR	**3.5**	**880**	**18**	**11**	**11**
W7ESK	**A**	**233,825**	**428**	**71**	**128**
W7YBX	**21**	**6,624**	**59**	**18**	**28**
W7ENA	"	1,368	25	12	12
W7DLR	**14**	**22,120**	**123**	**24**	**46**
W7QPK	"	21,420	117	21	47
W7MKI	"	14,945	89	23	38
W7LVI	"	8,178	66	17	30
W7MX	"	7,216	64	15	26
K7VYU	"	5,109	49	15	24
K8HIR	**A**	**176,528**	**378**	**63**	**124**
W8JIN	"	134,640	256	74	130
WA8EWT	"	25,650	119	35	55
W8WC	"	22,610	104	26	59
W8LXU	"	19,175	99	34	51
K8YRN	"	12,792	80	34	44
W8VND	**21**	**25,949**	**126**	**24**	**53**
K8VDV	"	16,900	97	21	44
WA8CZH	"	10,296	72	18	34
W8UCI	"	2,937	33	13	20
W1BVP/8	"	1,725	28	8	17
W8HUD	**14**	**64,376**	**222**	**31**	**73**
WA8AJI	"	46,060	184	28	66
W8RXY	"	43,774	181	24	62
W8NK	"	20,850	98	25	50
K8OVK	"	12,597	91	17	34
K8DWQ	"	8,159	77	13	28
W8KYY	"	2,667	43	7	14
W8NNH	"	2,387	27	11	20
K9VFF	**A**	**25,132**	**108**	**40**	**63**
K9ZJV	"	16,490	86	34	51
K9MHW	"	13,908	73	28	48
K9DTB	"	2,952	30	19	22
K9ECE	**21**	**29,940**	**135**	**25**	**60**
W9LKI	"	1,848	31	7	17
WA9ISM	**14**	**28,259**	**132**	**24**	**53**
K9KCQ	"	2,703	21	14	19
WA9FXJ	"	1,596	23	12	16
W9OKM	**7**	**2,070**	**33**	**11**	**19**
W9PNE	**3.8**	**110**	**9**	**6**	**5**
WØQUU	**A**	**95,852**	**218**	**52**	**111**
WØLBB	"	32,809	126	44	65
KØJPL	"	4,950	46	21	29
KØGSV	"	1,904	29	14	20
WØLBS	**21**	**21,958**	**77**	**21**	**41**
KØBUU	**14**	**16,043**	**102**	**21**	**40**
WØKZZ	"	4,165	46	14	21
WØSCM	**7**	**902**	**18**	**7**	**15**

Alaska

KL7FAR	**14**	**15,598**	**212**	**12**	**20**
W7SZM/KL7	"	5,456	72	11	20

Bahamas

VP7CX	**A**	**133,422**	**559**	**40**	**71**
VP7CC	"	64,668	291	42	60
VP7NS	**14**	**286,003**	**1148**	**32**	**81**

Canada

VE1ALQ	**14**	**76,500**	**312**	**23**	**62**
VE1TG	"	50,481	301	20	51
VE2WY	**14**	**38,184**	**156**	**24**	**62**
VE2WA	"	30,616	132	29	57
VE2AFC	**21**	**16,020**	**124**	**13**	**32**
VE3BMB	**21**	**3,626**	**39**	**14**	**23**
VE3CBY	**14**	**42,900**	**230**	**23**	**52**
VE3EOE	"	3,838	43	13	25
VE4OX	**14**	**19,932**	**106**	**22**	**44**
VE6AAV	**14**	**31,464**	**168**	**23**	**49**
VE6AGK	"	6,253	109	16	21
VE6YZ	**7**	**759**	**36**	**6**	**5**
VE7BDJ	**21**	**1,540**	**35**	**11**	**9**
VE7PU	**14**	**119,034**	**507**	**29**	**73**
VE7BHW	"	2,541	30	13	21
VE8RG	**14**	**274,778**	**859**	**37**	**96**
VE8ML	"	62,084	312	26	57

Canal Zone

KZ5HH	**14**	**93,600**	**554**	**22**	**56**
KZ5LC	"	46,939	267	24	49

Costa Rica

TI2HP	14	263,175	939	30	91

Cuba

CO8RA	**A**	**90,160**	**367**	**42**	**73**
CO8JC	21	650	45	7	6

Dominican Rep.

HI8WSR	**A**	**384,951**	**1107**	**60**	**101**

Greenland

OX3JV	**14**	**168,735**	**661**	**33**	**72**
OX3MN	"	53,924	320	22	46

Guatemala

TG9SC	**14**	**89,388**	**523**	**23**	**55**
TG9ST	"	40,600	385	19	31

Honduras

HR1RP	**A**	**13,692**	**158**	**22**	**20**

Mexico

XE1ZE	**A**	**169,606**	**581**	**53**	**84**
XE1CE	**14**	**19,710**	**168**	**20**	**34**
XE1HHH	"	8,700	137	18	30

Nevis Island

VP2KJ	**A**	**67,925**	**515**	**27**	**38**

Nicaragua

YN1LH	**14**	**10,848**	**93**	**14**	**34**

Panama

HP1JF	**14**	**11,960**	**221**	**11**	**15**

Puerto Rico

KP4AOO	**A**	**270,633**	**696**	**65**	**112**
KP4RK	"	34,884	217	30	46
KP4BBN	**14**	**35,088**	**233**	**24**	**44**

Africa

Angola

CR6JL	**21**	**84,240**	**341**	**24**	**66**
CR6AU	"	9,700	79	16	34
CR6DB	**14**	**84,018**	**264**	**34**	**80**

Comoro Is.

FH8CD	**A**	**4,608**	**53**	**11**	**21**

Congo Republic

TN8AA	**A**	**19,728**	**125**	**21**	**51**

Liberia

EL3C	14	1,540	26	9	13

Libya

5A3TX	**A**	**33,108**	**182**	**17**	**45**
5A1TW	**14**	**291,870**	**723**	**35**	**106**

Malawi

7Q7PBD	**A**	**103,675**	**270**	**51**	**92**

Marion Island

ZS2MI	**A**	**7,400**	**66**	**18**	**32**

Mauritius

VQ8AM	**A**	**95,580**	**207**	**53**	**124**

Morocco

CN8GB	**A**	**407,784**	**882**	**48**	**108**

Mozambique

CR7IZ	**A**	**2,940**	**36**	**14**	**21**
CR7GF	**14**	**25,050**	**122**	**27**	**48**

Nigeria

5N2CKH	**A**	**187,110**	**427**	**47**	**107**
5N2JWC	**14**	**48,642**	**253**	**22**	**44**

Republic of Congo

9Q5AA	**A**	**22,815**	**149**	**23**	**42**

Reunion Island

FR7ZD	**A**	**31,996**	**173**	**25**	**51**

Rhodesia

ZE1JE	**A**	**427,572**	**707**	**65**	**149**

Sierra Leone

9L1HX	**14**	**60,690**	**258**	**26**	**59**

WA4NGO—Dick (K6CTV) recently moved to the East Coast. Must have used an extra moving van to cart all that gear with him.

I1BAF—High all band scorer for Italy. Now what is Mino doing with that troublesome teleprinter in a phone contest?

The crew that won the John Knight, W6YY Trophy for YV9AA relaxing at the Club headquarters. L. to R.—YV5BBU, 5AEC, 5BOA, 5ANF, and 5BPJ.

K6EVR—Ron Camp at the operating position before the contest crew took over.

HC2LDA—Evidently the gang had a regular field day set up. With all that space they should have planned on multi-transmitter operation.

DJ2SP—Heinz is really QRP. That's all of 30 watts on the desk.

Somalia						
6O6BW	A	129,648	311	46	100
South Africa						
ZS6N	14	121,840	367	36	92
ZS1CZ	"	73,632	271	30	66
ZS4JB	"	29,100	135	25	50
Uganda						
5X5IU	14	120,848	415	31	81
Zambia						
9J2EZ	A	30,720	125	34	62
9J2VB	14	238,428	579	35	113

Asia

India					
VU2RM	A	15,229	83	32	56
VU2CK	14	30,879	175	23	50
VU2AK	"	10,320	75	21	39
VU2KM	"	2,964	44	13	26
Iran					
EP2AU	14	85,446	302	33	68
Israel					
4X4MJ	28	1,632	34	6	10
4X4FQ	14	211,050	580	35	91
4X4AS	3.5	29,392	227	11	33
Japan					
JA1CG	A	87,900	415	31	44
JA1CFN	"	83,850	346	36	50
JA1BUI	"	10,300	83	17	33
JA1HGY	"	1,122	22	15	19
JA1HKP	28	12	2	2	2
JA3CVA	21	21,315	148	20	29
JA7UJ	21	15,925	114	21	28
JA1KFQ	"	13,896	137	16	20
JA3COX	"	10,120	90	18	22
JA1JXU	"	3,741	49	16	13
JA2BGW	"	3,672	51	12	15
JA6UD	"	1,848	22	15	18
JA1NSJ	"	1,792	25	14	14
JA1MYR	"	1,518	26	11	12
JA1IIX	"	476	13	8	9
JA6AZQ	"	102	7	3	3
JA1QBG	"	96	6	4	4
JA2AEV	14	143,509	531	36	57
JA1CWP	"	76,358	367	28	45
JA6NP	"	75,860	310	33	57
JA2ANX	"	5,220	51	15	21
JA1LPO	"	4,224	53	14	19
JA6AV	"	2,100	30	12	18
JA2TY	"	527	18	7	10
JA4AQR	"	480	17	6	9
JA4FM	"	209	11	4	7
JA2BTV	7	13,050	83	23	35
JA1INJ	"	11,858	91	22	27
JA8QC	"	1,729	35	9	10
KA2RJ	14	71,214	326	26	52
KA7DB	"	10,320	89	16	32
Korea					
HL9TR	14	8,244	111	13	23
Lebanon					
OD5LX	14	5,900	42	13	37
Malaysia, West					
9M4LX	A	289,884	578	65	139
9M4LP	"	277,680	533	78	130
9M2LO	21	13,145	96	20	35
9M4JW	14	13,176	96	23	37
9M2GF	"	9,000	83	17	28
Ryukyu Islands					
KR6OJ	A	187,740	512	52	82

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Armenia					
UG6AW	14	4,576	55	9	23
Asiatic					
UA9KTE	A	27,068	150	16	51
UA9RR	21	11,718	104	12	30
UA9EU	14	22,656	124	18	46
UW9AF	3.6	7,028	85	5	23
UAØEK	A	27,420	196	29	31
UAØEH	"	4,598	66	17	21
UAØSH	14	5,207	70	16	25
UAØGF	"	113	15	3	4
Azerbaijan					
UD6BR	A	27,230	138	22	48
UD6BN	14	3,190	40	5	24
UD6BD	"	1,548	32	5	13
UD6FA	"	133	7	3	4
Kazakh					
UL7NW	14	666	18	6	9
Kirghiz					
UM8KAA	14	36,696	169	30	58
UM8KAB	"	1,056	22	9	13
Turkoman					
UH8BO	14	36,176	170	23	53
Uzbek					
UI8CT	A	360	12	4	6
UI8AG	14	23,052	150	22	46
UI8LB	"	8,840	89	11	29

Europe

Aland Island					
OHØNI	A	21,138	246	17	59
Belgium					
ON4SZ	A	184,366	427	55	127
ON5KY	21	27,874	146	22	55
ON4VS	14	8,272	72	18	26
Bulgaria					
LZ1UF	14	589	23	5	14
Czechoslovakia					
OK1ADP	A	151,590	485	46	117
OK3CDR	"	124,950	450	51	119
OK1ADM	"	55,860	232	45	95
OK1VK	"	11,771	120	21	58
OK1AFB	"	3,900	43	14	36
OK2ABU	"	2,010	48	8	22
OK1ZC	21	168	9	4	4
OK3CEH	14	18,692	157	22	50
OK3EA	"	17,358	166	21	45
OK2BEN	"	4,180	72	12	26
OK2BDB	"	1,380	50	5	18
OK1VB	"	1,275	40	6	19
OK1MP	7	4,100	78	9	32
OK2OP	3.5	5,499	134	7	32
OK1AAE	"	2,970	107	5	25
OK3IR	"	2,356	72	6	25
Denmark					
OZ4RT	A	127,512	354	63	135
OZ4WR	"	32,777	168	27	46
OZ3SK	"	29,656	203	26	62
OZ9QW	"	5,967	79	18	33
OZ4DX	"	210	15	4	10
OZ3KE	21	407	15	5	6
OZ7OMR	14	593	19	7	9
England					
G3DYY	A	58,880	226	44	84
G3MWZ	"	6,264	58	19	35
G2AJB	"	4,472	64	14	29
G3MKX	"	4,042	63	13	30
G3CAZ	21	23,256	167	18	33
G3RMF	"	8,976	81	16	28
G3PZO	"	8,624	75	16	33
G3FXB	14	251,640	778	33	87
G3LSF	"	142,010	476	39	71
G3HDA	7	14,328	142	22	50
Finland					
OH2BH	A	53,508	287	35	89
OH3QC	"	10,500	150	21	49
OH1OE	"	10,064	86	22	52
OH3ZN	"	2,952	68	11	30
OH5OQ	"	2,898	65	14	28
OH3YI	21	81	11	3	6
OH5AD	"	45	9	2	3
OH2DX	14	125,358	486	31	71
OH2BZ	"	77,300	425	30	70
OH2TJ	"	68,100	374	30	70
OH4OO	"	34,596	223	29	64
OH5OD	"	3,100	84	9	22
OH3XZ	"	780	37	5	15
OH2TE	"	527	29	5	12
OH3RK	"	160	16	3	7
OH1VA	7	5,014	84	13	33
France					
F9MS	A	39,516	205	28	46
F8WE	"	18,130	135	22	52
F9RM	"	14,308	94	21	52
F8BC	"	588	24	5	16
F3PK	"	13,376	129	15	23
F8PI	21	17,187	138	18	33
F5BV	"	1,054	27	5	12
F2SY	14	17,524	224	12	14
F7FK	14	230,220	936	30	60
F7EI	"	16,048	110	22	37
Germany					
DJ6QT	A	538,916	822	79	187
DJ2QZ	A	479,386	649	82	199
DL3DW	A	225,723	415	73	128
DJ2HH	"	210,700	444	72	143
DL7AA	"	145,350	338	59	112
DL7HU	"	131,147	317	62	137
DJ3WE	"	124,968	330	54	110
DJ5VQ	"	107,640	254	54	130
DL7BQ	"	87,756	287	50	92
DJ8SW	"	55,350	220	41	94
DL8BS	"	42,350	188	37	73
DM2AEC	"	35,600	201	26	63
DJ7VY	"	34,800	203	34	80
DJ5HN	"	21,792	119	36	61

DJ7ZG	"	17,490	87	38	68
DJ4SO	"	12,760	96	23	35
DL1TA	"	11,842	108	21	41
DJ8XZ	"	9,010	99	16	37
DJ2YE	"	8,965	107	16	39
DL1OW	"	8,160	76	23	28
DJ2UU	"	7,888	109	17	51
DJ8IF	"	2,961	60	11	36
DJ2SP	"	1,050	33	8	22
DJ8PY	"	1,010	27	13	17
DM2BDH	"	288	18	6	10
DJ6SY	"	121	7	4	7
DJ1ZG	**21**	**71,463**	**300**	**27**	**56**
DJ1LP	"	39,689	194	23	48
DJ1KOA	"	5,796	51	17	29
DJ3OJ	"	1,794	25	12	14
DL6DF	"	1,323	25	10	11
DJØIK	**14**	**182,090**	**548**	**36**	**95**
DL7BA	**14**	**180,422**	**463**	**37**	**102**
DJ1SX	"	35,644	213	26	50
DJ4PU	"	35,524	193	24	44
DJØGS	"	31,242	174	30	52
DL7EL	"	11,269	92	19	40
DJ6OK	"	7,990	93	16	31
DJ2YA	**7**	**14,965**	**123**	**22**	**51**
DJ3KR	**3.5**	**9,024**	**171**	**11**	**36**
DJ9VW	"	900	33	4	27
DL5DT	**A**	**90,965**	**361**	**32**	**83**
DL4VR	"	23,520	139	32	48
DL5GF	**14**	**146,910**	**642**	**23**	**60**
DL5AO	"	119,000	440	31	69
DL2PO	"	24,780	135	26	58
DL4RM	"	5,746	92	11	15
DL5BR	"	4,282	71	10	19

Greece

SVØWPP	**A**	**47,472**	**354**	**26**	**60**
SVØWBB	"	20,000	155	28	52

Iceland

TF3EA	**14**	**19,020**	**149**	**19**	**41**
TF2WIA	"	16,335	188	14	31

Italy

I1BAF	**A**	**326,716**	**648**	**67**	**139**
I1LCK	"	30,618	248	35	91
I1LCF	"	27,142	130	28	54
I1SF	**21**	**30,485**	**183**	**23**	**68**
I1WSG	"	23,161	155	21	32
I1ZFT	**14**	**83,160**	**341**	**30**	**69**

Netherlands

PAØLV	**A**	**8,040**	**102**	**18**	**49**
PAØHBO	**14**	**218,386**	**628**	**35**	**98**
PAØHSJ	"	13,727	118	18	35

Northern Ireland

GI3SXG	**A**	**61,908**	**348**	**25**	**52**
GI3CDF	**3.8**	**35,052**	**309**	**19**	**50**

Norway

LA3C	**A**	**32,625**	**161**	**29**	**46**
LA6U	"	5,796	58	21	42
LA8NH	**14**	**22,120**	**233**	**18**	**38**
LA3UF	"	20,262	152	22	44
LA8WG	"	1,326	65	9	16
LA5IH	"	345	21	4	11

Poland

SP5XM	**A**	**40,748**	**214**	**40**	**82**
SP6AAT	"	5,246	111	10	33
SP9AJN	21	260	12	5	8
SP5ZA	"	170	7	6	7
SP5AR	**14**	**64,787**	**290**	**31**	**72**
SP5HS	"	8,281	94	15	34
SP9ANH	"	1,960	40	9	19
SP6PZB	"	627	30	6	13

Portugal

CT1NW	**21**	**2,813**	**50**	**10**	**19**
CT1KH	7	1,092	28	3	10

Rhodes

SVØWF	**A**	**11,340**	**118**	**15**	**30**

Roumania

YO4WU	**A**	**7,084**	**108**	**16**	**30**
YO2IS	A	1,472	38	9	23
YO3KBC	**14**	**1,872**	**60**	**5**	**21**
YO3ZM	"	220	19	3	8
YO2CJ	"	190	19	3	7
YO3RF	**7**	**989**	**40**	**7**	**16**

Scotland

GM3BCL	**A**	**60,120**	**262**	**41**	**79**
GM3JDR	**21**	**6,626**	**70**	**15**	**23**
GM3SFH	**14**	**1,056**	**47**	**4**	**18**
GM3NQB	**3.8**	**3,668**	**130**	**5**	**23**

Spain

EA7ID	**A**	**77,216**	**266**	**47**	**105**
EA7JT	"	4,368	70	12	30
EA4GZ	**14**	**173,452**	**744**	**30**	**73**
EA3KT	"	340	20	4	13

Sweden

SM5BDQ	**A**	**205,716**	**607**	**52**	**106**
SM3BIZ	**A**	**204,282**	**539**	**57**	**137**
SM5BPJ	"	20,650	110	24	46
SM4CMG	"	11,100	95	23	37
SM4CHM	"	2,720	53	11	23
SM6AUZ	"	1,922	42	9	22
SM5CZK	"	960	28	10	20
SM5AM	**14**	**209,050**	**696**	**33**	**80**
SM5ANH	**14**	**177,821**	**550**	**37**	**96**
SM5RK	"	57,024	317	28	53
SM2CZT	"	48,848	307	28	58
SM6AMD	"	24,058	216	18	28
SM5BPZ	"	2,904	65	10	23
SM5FT	"	690	50	4	11
SM5GA	"	336	12	6	8
SM6BDM	"	330	12	5	5
SM5BDS	"	130	11	3	7
SM5CAK	**7**	**2,772**	**77**	**8**	**25**
SM7CRW	**3.8**	**2,852**	**89**	**4**	**27**

Switzerland

HB9ZY	**A**	**412,895**	**711**	**68**	**167**
HB9MO	"	161,298	391	55	119
HB9UD	"	14,904	104	33	59

Wales

GW3SFC	**A**	**2,970**	**66**	**9**	**24**
GW3OCD	**14**	**21,945**	**186**	**19**	**38**

Yugoslavia

YU3OV	**A**	**67,950**	**360**	**38**	**112**
YU2DB	"	5,986	98	14	27
YU3LB	**14**	**20,460**	**225**	**20**	**40**
YU1AG	"	54	9	2	4

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Estonia

UR2KAC	**A**	**1,196**	**42**	**8**	**18**
UR2AO	**7**	**1,564**	**80**	**5**	**18**
UR2GZ	**3.8**	**570**	**29**	**4**	**15**

European

UA3VB	**A**	**21,631**	**169**	**27**	**70**
UA6FD	"	1,802	35	11	23
UA1KBW	**14**	**66,033**	**320**	**29**	**58**
UA6XG	"	38,353	263	28	66
UA4KWB	"	31,023	291	18	63
UA1CX	"	8,122	102	9	22
UA1KIL	"	6,854	109	10	36
UW1OL	"	2,310	44	12	23
UA4KCE	"	1,311	47	8	15
UW3TE	"	1,212	46	7	14
UA3FT	"	700	26	6	14
UA3AM	"	16	2	2	2
UA1CK	**7**	**3,600**	**75**	**11**	**29**
UA3UTR	3.8	180	17	4	8

Latvia

UQ2KAT	**A**	**1,380**	**42**	**7**	**23**
UQ2KHE	"	629	35	5	12

Lithuania

UP2ON	**14**	**18,438**	**231**	**13**	**29**
UP2NAE	**3.8**	**1,232**	**55**	**4**	**18**

Moldavia

UO5LP	**A**	**10,030**	**132**	**17**	**42**

Ukraine

UB5UN	**A**	**282,842**	**684**	**69**	**158**
UB5KYB	"	4,230	77	11	34
UB5FG	**21**	**11,918**	**130**	**18**	**41**
UB5CI	**14**	**82,836**	**399**	**33**	**84**
UB5BX	"	13,970	236	13	42
UB5OD	"	7,700	146	12	32
UB5EO	"	4,452	69	10	32
UB5CK	"	3,570	63	10	32
UB5QE	"	2,016	56	7	21
UB5IU	"	648	26	5	13
UB5KED	"	170	17	3	7

White Russia

UC2KGD	7	70	10	2	5

Oceania

Australia

VK2KM	**21**	**16,568**	**150**	**17**	**21**
VK2APK	**14**	**93,086**	**325**	**35**	**74**
VK2WD	"	15,458	94	25	34
VK2AKF	"	12,803	101	18	33
VK3ATN	**A**	**182,055**	**401**	**67**	**92**
VK3TL	**14**	**40,362**	**162**	**32**	**61**
VK3HL	"	17,667	106	24	39
VK3XB	7	1,282	28	9	7
VK3KS	"	360	20	4	2

Guam

KG6APJ	**14**	**123,984**	**388**	**31**	**77**

W4AXE—Doug was 2nd in the USA and 3rd world high on 21 mc.

Hawaii

KH6EPW	**A**	**107,100**	**454**	**31**	**52**
KH6FJL	**21**	**25,912**	**215**	**18**	**22**
KH6FBJ	**14**	**127,350**	**522**	**32**	**58**
KH6BVS	"	61,841	354	22	45

Marshall Is.

KX6CI	**A**	**98,016**	**351**	**46**	**50**

New Zealand

ZL1AIX	**A**	**486,402**	**772**	**76**	**146**
ZL1AGO	"	106,238	305	54	67
ZL3AB	**14**	**36,225**	**200**	**26**	**49**
ZL3RU	"	2,160	35	15	15
ZL4BO	**7**	**2,900**	**60**	**13**	**12**

Philippines

DU1GF	**14**	**3,700**	**48**	**15**	**22**

Tahiti

FO8BL	**14**	**21,504**	**135**	**18**	**30**

Wake Island

KW6EI	**14**	**5,587**	**71**	**10**	**27**

South America

Argentina

LU7DGM	**A**	**144,398**	**391**	**53**	**84**
LU1DAB	**28**	**35,136**	**206**	**21**	**43**
LU8FAO	**14**	**64,600**	**235**	**29**	**71**
LU4GAU	"	32,708	168	25	49
LU4DMG	"	4,995	48	16	29

Brazil

PY2CQ	**A**	**95,910**	**255**	**47**	**91**
PY1NBF	"	84,870	259	45	78
PY7AKW	"	17,712	89	26	46
PY5EG	**21**	**15,120**	**102**	**18**	**38**
PY3OJ	"	6,090	101	11	10
PY1BWF	"	540	13	8	8
PY3AHJ	**14**	**182,245**	**504**	**34**	**93**
PY1CAD	"	154,880	425	35	93

[*Continued on page 94*]

CR6JL—Julio was 2nd world high on 21 mc.

CQ Reviews:

The Clegg 22'er

BY WILFRED M. SCHERER,*
W2AEF

The Clegg 22'er. It is well "groomed" with a simple functional layout.

THE long awaited Clegg 22'er has made its appearance on the amateur equipment market and judging from what we have seen of it, this package was worth waiting for.

The Clegg 22'er is a 2 meter transceiver with full band coverage, designed for a.m. communications in fixed, portable and mobile service as may be desired for general amateur work or C.D. operations. It also may be operated on MARS and CAP frequencies that are adjacent to the 2 meter amateur band.

Well engineered, ruggedly built and neatly packaged in the typical Clegg fashion, the 22'er contains a tunable triple-conversion receiver with loudspeaker, a crystal-controlled 20 watt input plate-modulated a.m. transmitter and a built-in power supply which may be operated from 117 v.a.c. or from 12 v.d.c. (positive or negative ground). The only extras you need for getting on the air are a mike, antenna and transmitting crystal.

Other features include: high receiver sensitivity with Nuvistor front end, excellent frequency stability, noise limiter with on-off switch, adjustable-threshold squelch, a.g.c., slide-rule dial, panel meter automatically switched to read receiver S-units or transmitter relative-power output, transmitter-crystal spotting position for correlating receiver tuning, uses 8 or 12 mc crystals, push-to-talk operation through mike cable or with separate external control, mike gain control, modulation to 100% with peak limiting and high average envelope power, TVI filter, phono jack to relay auxiliary contacts for externally-controlled gear, provision for plugging in external speaker, silicon rectifiers in power supply with power transistors used for switching when d.c. source is used, separate fuses and power cords for a.c. and d.c. operation.

Circuitry

Referring to the block diagram, fig. 1, the receiver section functions as follows: V_1, a 6CW4 Nuvistor, is a grounded grid r.f. amplifier which is coupled to the first mixer, V_{2A}, through a 144-148 mc bandpass coupler. A variable h.f. injection signal of 100-103 mc is applied to the mixer grid circuit by inductively coupling from V_{2B} which is a tripler that multiplies a frequency of approximately 33.3-34.3 mc which is obtained from a temperature-compensated series-tuned v.f.o., V_{3A}, and a buffer V_{3B}.

The difference between the tripler frequency and that of the incoming 2 meter signal appears at the output of the mixer in the range between 44 and 45 mc (144 — 100 = 44 mc; 148 — 103 = 45 mc). This signal is then fed through a 44-45 mc bandpass coupler to the 2nd mixer, V_4, where it is combined with the v.f.o. frequency (fed from the output of the v.f.o. buffer) to produce an i.f. of 10.7 mc (44 — 33.3 = 10.7 mc; 45 — 34.3 = 10.7 mc).

The 2nd mixer is coupled to a 10.7 mc i.f. amplifier, V_5, through link-coupled tuned circuits to provide a narrow bandpass. The output of V_5 feeds the 3rd mixer, V_6, where it is combined with a crystal-controlled frequency of 10.245 mc to provide a selective i.f. of 455 kc. The advantage of the whole scheme is that frequency stability can be more readily obtained, additional crystals are eliminated, narrower bandpass circuits can be used in the i.f., circuit tracking is not needed as in the conventional variable i.f. system, spurious responses are minimized, superior image rejection can be had and good selectivity obtained.

The following detector utilizes a diode, V_{8A}, the a.f. output of which goes throgh a series-type noise limiter, V_{8B}, a squelch diode, CR_1, and on to the a.f. amplifier V_{9A}. A simple and effective squelch is used that has a diode switch for cutting the a.f. feed in or out, as determined by a difference in biasing polarity obtained between the B+ and the screen voltage of an a.g.c.-controlled i.f. stage.

A.f. power output is obtained from a 6AQ5, V_{10}, which is transformer-coupled to the built-in loudspeaker. Another 6AQ5, V_{11}, is wired in parallel with V_{10}, but it is disabled during receiving periods by a cutoff bias obtained through the transfer-relay coil from the negative supply source for the relay. The 6AQ5, V_{11} is used only during transmissions as described later.

Transmitter Section

The transmitter section begins with a crystal oscillator, V_{12A}, that functions with either 8 or 12 mc crystals and doubles or triples in the output through a 24 mc double-tuned bandpass cir-

*Technical Director, *CQ*.

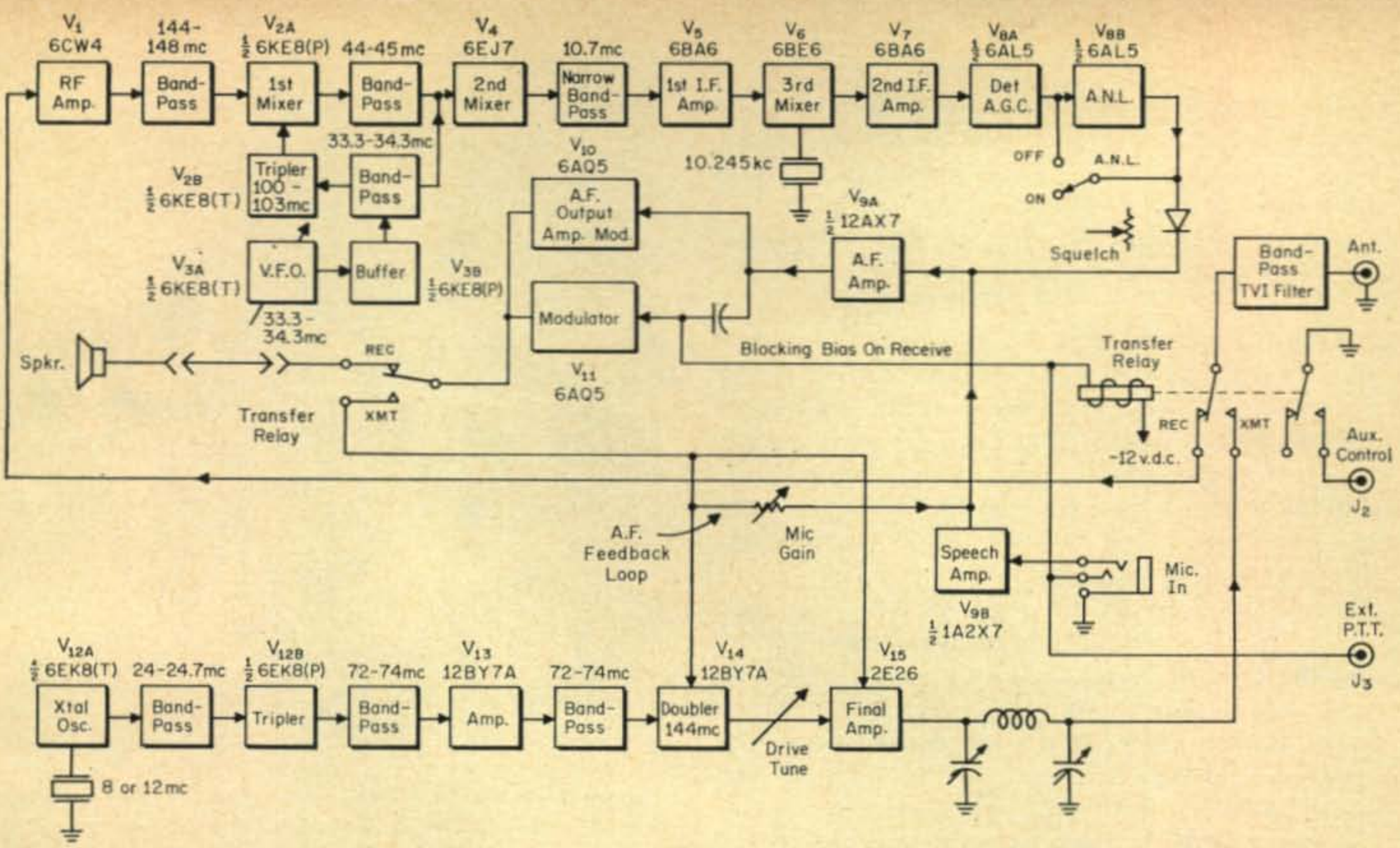


Fig. 1—Block diagram for the Clegg 22'er. Screen voltage is applied to V_{11} only during transmit.

cuit. This circuit is also used to couple the oscillator and the succeeding stage, V_{12B}, which in turn triples to 72 mc. The next stage is a straight-through 72 mc amplifier using a 12BY7, V_{13}. Proper circuit adjustment and moderate loading of the plate circuit eliminates the need for neutralization. The use of an amplifier here provides plenty of r.f. output to adequately push another 12BY7, V_{14}, which doubles to 144 mc and drives a neutralized 2E26, V_{15}, operating as a Class C final amplifier.

An impedance-matching network is installed between the doubler and the final to insure the maximum possible grid drive. This circuit may be tuned by a panel control which is the only drive adjustment to be peaked. The tuning of the interstage coupling circuits is fixed to provide complete bandpass over the required range. The overall setup also provides complete stability and a minimization of spurious responses. The output circuit of the final consists of a Pi-network with both plate tuning and loading controlled from the panel. It is adjustable over a moderate range of low load impedances.

In the transmit position, cutoff bias is removed from V_{11}, so it now functions in parallel with V_{10} to furnish plenty of a.f. power to fully modulate the plate and screen of the final. A.f. coupling to the final is obtained through the primary of the speaker transformer which is tapped at the proper impedance point for obtaining modulation using the Heising system. A.f. power also is applied to the driver to modulate this stage to a degree too, a practice found only in commercial high-power transmitters to provide optimum drive at the crest of the modulated wave and reduce distortion.

High mike gain is obtained from a speech amplifier, V_{9B}, which feeds the a.f. driver stage for the modulator. Inverse feedback is used from the modulator output back to the grid of the driver and the overall a.f. gain is varied by changing the degree of feedback. This is a screwdriver type adjustment.

In order to prevent the receiver from overloading when the crystal-spotting position is used, plate voltage is applied only to the crystal oscillator and the tripler. Normally all the low-power stages are fed off the common B-plus line from the relay transmit position, but during spotting the receiver B-plus is used instead with a diode switch that prevents application of voltage to the stages not wanted. See fig. 2.

A special feature is a bandpass filter, installed directly in the common antenna line from the relay arm, that minimizes the possibility of TVI during transmissions and which eliminates birdies or spurious responses from f.m. and TV stations when the receiver is used.

Power Supply

The built-in power transformer for the 22'er has two primary windings, one for 117 v.a.c. operation, the other for 12 v.d.c. use in conjunction with power transistors in a d.c. to a.c. converter. The high voltage is rectified with silicon diodes operating in a full-wave bridge circuit. R/C filtering is used.

When a.c. power is used, d.c. voltage for operating the relay coil is obtained by rectifying the a.c. heater potential with silicon diodes in a voltage-doubler circuit. For 12 v.d.c. service, a different cable with power plug is used which has the necessary connections and jumpers to automatically engage the transistors and to apply the heater and relay voltages directly from the 12 v.d.c. source. The a.c. and d.c. inputs are individually fused and the separate cables and plugs for d.c. and a.c. power are supplied with the unit.

Construction

The 22'er is well built using a rigid chassis and a ⅛-inch thick panel. An interesting detail

is that the planetary-drive mechanism for the receiver v.f.o. is mounted directly on the tuning-capacitor frame rather than on the panel. This does away with a shaft coupling, insuring perfect alignment and eliminating a source of backlash.

Operation and Performance

The transmitter power (carrier) is rated at 20 watts input, 8-9 watts output. With a power source of 120 v.a.c. or 13 v.d.c., the measured carrier output was a little over 8 watts, obtainable over the whole band. One hundred per cent modulation occurred on the positive peaks, resulting in a p.e.p. output of 32 watts. Peak limiting occurs just at the 100 per cent point. The negative peaks limit at a little less than 100% and thus prevent breaking up the carrier and the type of serious splatter which otherwise could occur therefrom. Also, since the negative peaks limit sooner than the positive ones, the average modulation is well on the positive side, which, together with higher *average* power that is realized with clipping, provides a healthy heap of talk power.

As long as the mike gain is not raised to where an excessive amount of clipping takes place (as may be shown by large variations in the output-meter reading), on-the-air reports did not indicate any undue splatter due to clipping. Reports also indicated excellent a.f. punch and quality, especially useful under adverse conditions.

Receiver

The receiver section is rated for a sensitivity of 0.35 μv for 6 db S/N ratio. Although our measurements indicated a figure nearer 0.55 μv, this should be more than adequate for the majority of situations; in fact, on-the-air comparisons checking the 22'er against converters measuring 0.25 μv sensitivity (measured with the same equipment and technique) the difference in readability of the same weak signals was surprisingly small.

The selectivity at the 6 db points was found to be 10 kc as per specifications and no spurious

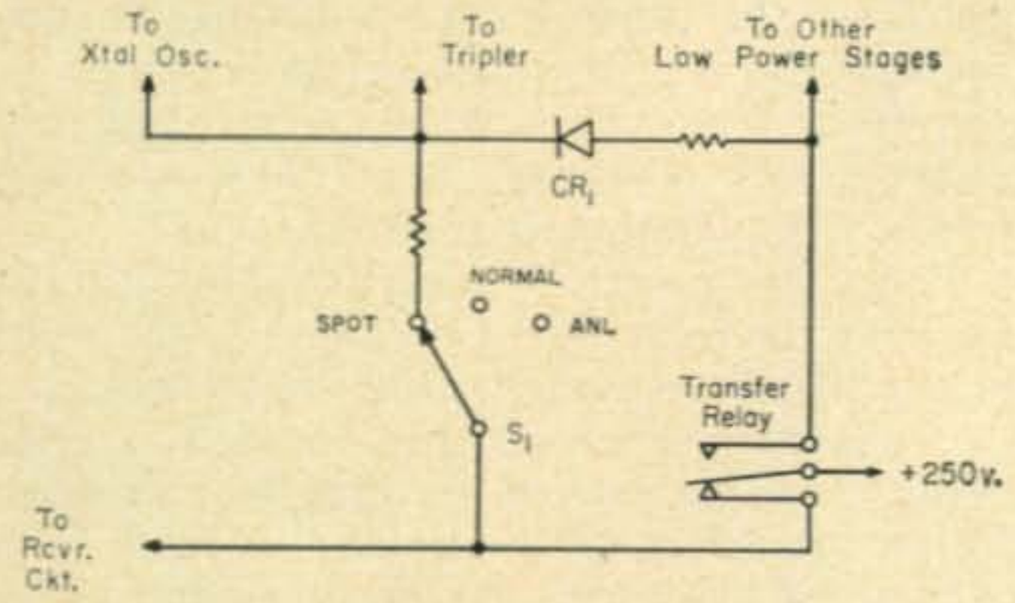
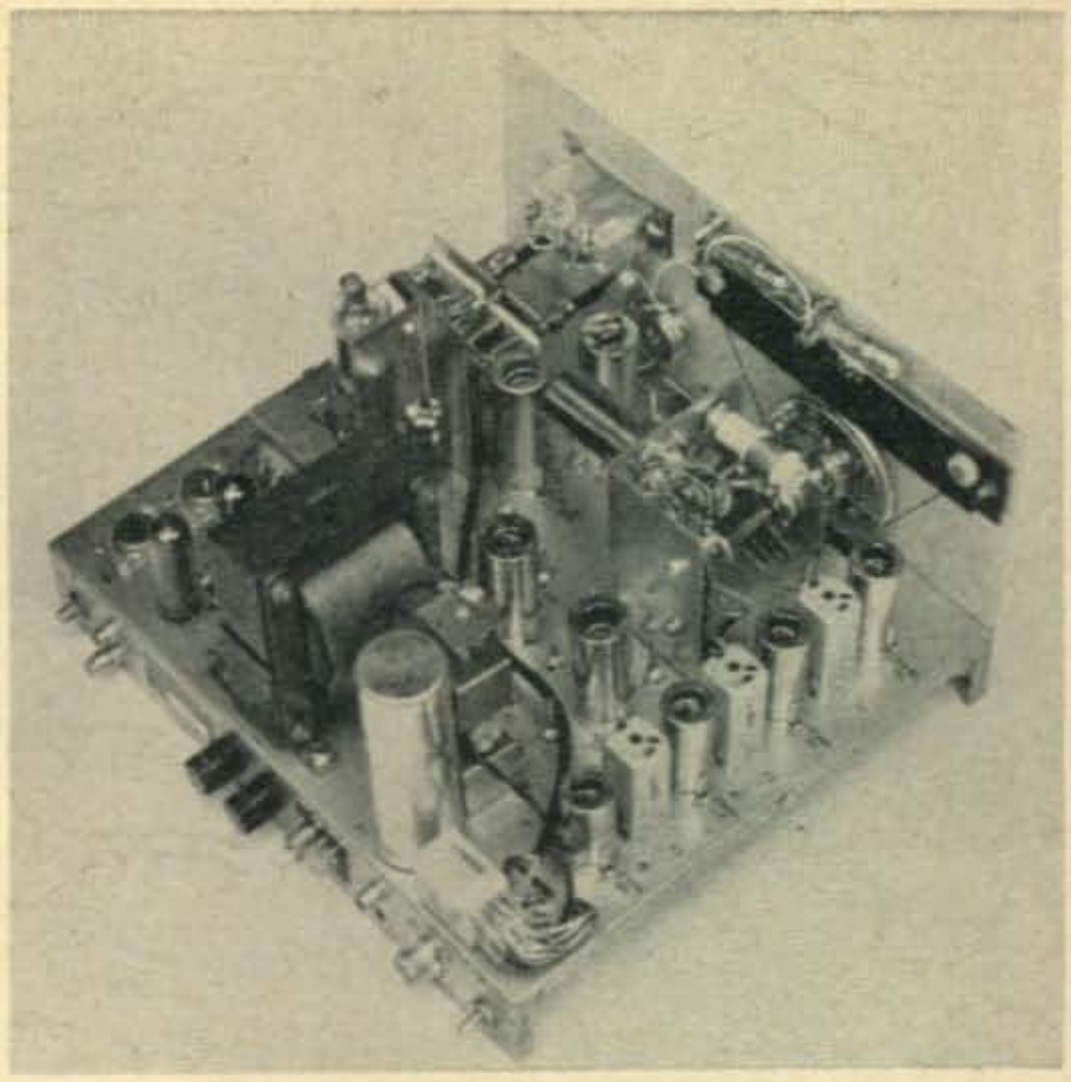


Fig. 2—Method of isolating transmitter B-plus line when crystal-spotting position is used. The positive plate voltage, that is applied to the receiver circuits, also is fed to the oscillator and tripler. At the same time it is fed to the cathode of the diode, CR_1, making the diode non-conductive and thus cutting off the feed to the other low-power stages. When the relay transfers to the transmit position, the B-plus feeds *all* the stages, since the diode anode is now at a positive potential and the diode therefore conducts.



Top view of the 22'er. The receiver v.f.o. may be seen near the dial drive at the right. The gadget standing on the right alongside the vertical electrolytic capacitor is the TVI filter. The final is at the upper right, the modulator and d.c. switching transistors are at the upper left corner.

responses were noted. The noise limiter, which has an On-Off switch, was exceptionally effective and did not cause excessive distortion. The squelch tripped with signal levels below 0.5 μv.

The a.f. quality is exceptionally good for the small size speaker used.

A criticism offered by several observers was that there is no b.f.o. that can be used to locate weak carriers. In this respect, you'll find that with the squelch control set just below the threshold (receiver silenced), weak carriers will readily pop out of the quietness.

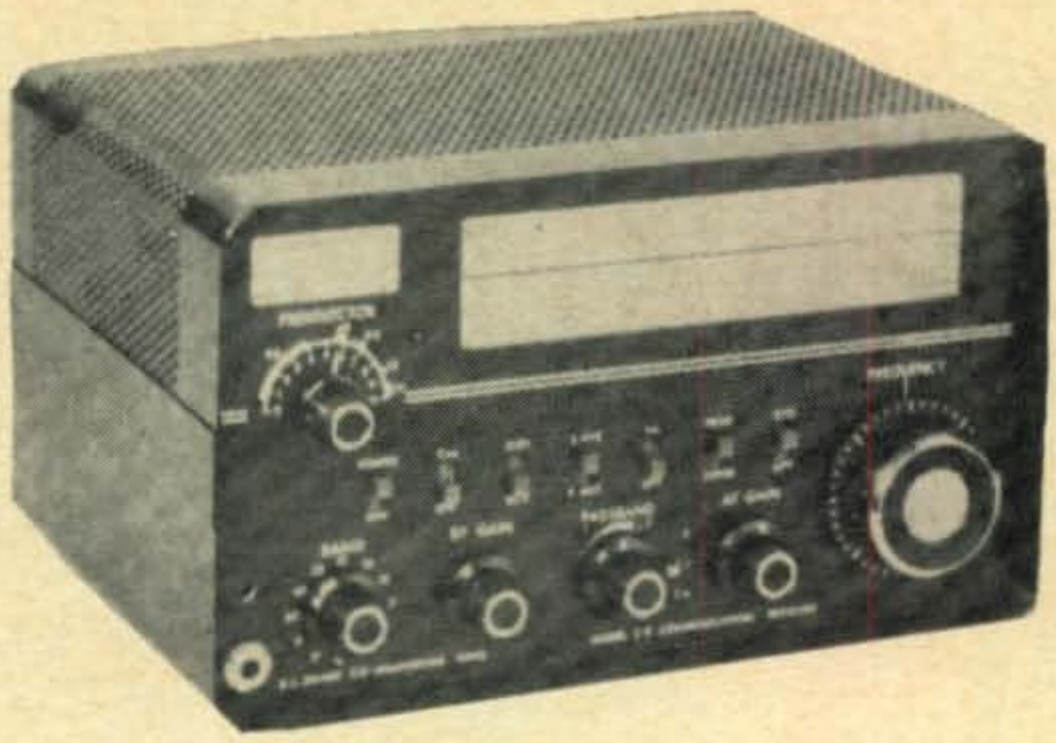
After a short warm-up period, the frequency stability was found far better than required with a.m. reception. Using an external b.f.o., we were even able to hold s.s.b. signals on frequency.

The slide-rule dial, which is calibrated every 100 kc from 144 to 148 mc, is well lighted and the tuning drive is easy and smooth operating along with a nice-feeling serrated knob (there are no incremental calibrations for MARS and CAP frequencies—just band-edge markers). Only four revolutions of the tuning knob allows you to quickly tune over the whole band. Yet, in spite of this, the tuning rate is not too fast when tuning in individual signals. Even during the aforementioned s.s.b. tests, these signals could be easily tuned in. No backlash was experienced and no spurious responses were encountered with the receiver.

The Clegg 22'er is housed in a gray-colored perforated tilt-up cabinet 12" wide by 11" deep by 6½" high. The panel has a satinized white finish and the knobs are in black. The price of the unit is $239.50, with a.c. and d.c. power plugs, but less crystals and microphone. The manufacturer is Squires-Sanders, Inc., Martinsville Road/Liberty Corner, Millington, N.J. 07946.

—W2AEF

Adding Silicons to the 2B



BY ROSS FOX,* W8PZX

IMPROVE the Drake 2B? Sounds difficult, but here is a definite improvement with only three small parts.

With the Q multiplier and the 100 kc marker added, the small power transformer runs warm. By eliminating the 6X4, the filament drain is dropped to the same as before and 3¾ watts of heat is eliminated from the cabinet. This may not sound like much but hold your hand over the 6X4 when the set is on.

Circuit

No expensive adapters are needed. Two 600 p.i.v., 750 ma silicons and a 100 ohm 2 watt carbon resistor are used. The ratings on the silicons may seem high but no transient suppression is needed. The best and cheapest "suppression" in low voltage supplies is more p.i.v. At these ratings good units should last the life of the set.

The 100 ohm resistor has two functions and *must* be used. The set has fixed bias so the B plus voltage must be dropped to the same value as before and also, it makes a good current surge limiter when the set is turned on cold.

Installation

Remove the 6 bottom screws and pull the chassis out the front. Cut the leads of the 3 parts to ½ inch and twist the cathode ends of the silicons and one end of the 100 ohm resistor together at the ends. Leave enough lead length on each part so a heat sink can be clipped on next to the part body when soldering.

The parts standing away from the socket are very rigid and won't short against anything. Thus no insulation is needed. The other ends of the parts are just slipped into the socket lug holes when the lugs are heated and resoldered (clip heat sink on). It is not necessary or desirable to wrap the leads around the socket lugs. The lugs are fragile and if you should want to replace the 6X4 (why?) it takes about 2 minutes to heat the lugs and slip the leads out. No wires are cut or disturbed from the original and it would be easy to go back.

Place a piece of masking tape over the 6X4 socket and print, "Replaced with modern silicon rect." or anything similar. Someone may inadvertently plug in the old fashioned 6X4. ■

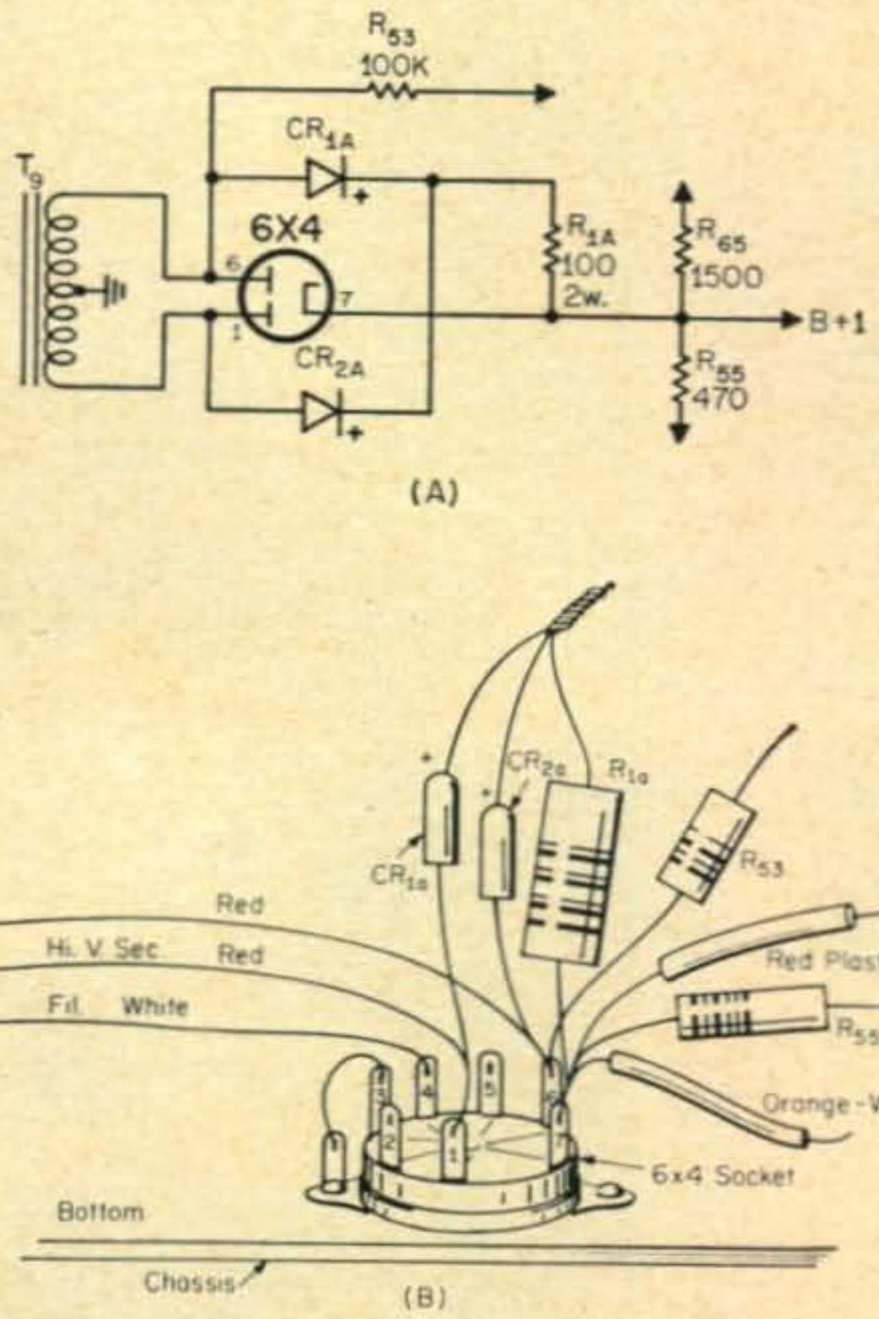


Fig. 1—(A) shows the modified circuit as wired across the 6X4 socket. After the addition of the two silicon diodes and the 100 ohm resistor the 6X4 is no longer used. (B) shows the manner of installation. All three components are self supporting.

*319 Clark Road, Arlington Heights, Cincinnati, Ohio.

DX

BY URB LE JEUNE,* W2DEC

THE pictures accompanying this article are members of the SEANET, the South East Asia Net, a s.s.b. net which reaches from Ceylon to Taiwan and from Laos to Singapore. Meeting daily at 1200 GMT on 14.320, the net serves as a clearing house for technical and personal items of common interest, emergency traffic and a "corner pub" type of meeting place.

Originally conceived in December 1963 by Chuck Swain, XW8AU/K7LMU, in Vietiane, it has to its credit the alerting of British search and rescue forces in Singapore to a ship in distress in the Red Sea, the communications of the XYL of W4UDF/MM when he was suddenly stricken ill in Kuala Lumpur, and the major part of all shipping and operating arrangements for the equipment of WA2WUV, Virgil, that has been used by 9M4LX, Bob, in his activity from VS4, VS5, ZC5, VS9 and 9M4.

Through check-ins from stations in ZS, VK, W/K, KR6 and other Pacific Islands, HL9, and G, the net has been able to keep track of items of interest to it regardless of their locations, many stations relay messages picked up from stations not in skip range. This business does not take the form of routine traffic, but rather items of personal interest to net members with regard to other amateurs and arrangements that will facilitate some activity of amateur radio or one of the net members.

An award, the SEANA—South East Asia Net Award—is given for contact with a majority of the SEANET members. These rules are varied periodically as membership changes; complete data can be gotten from the net award manager, 9M4MB.

Another intent of the net was to develop fast, efficient net operation both for keeping net meetings short and also in the event of actual emergencies. This proved quite satisfactory with sometimes as many as five QSOs going on simultaneously ± 10 kcs from net frequency all ar-

*Box 35, Hazlet, New Jersey 07730.

WAZ and WPX

THE WAZ and WPX certificates are awarded by the *CQ* DX department. WAZ is issued for proof of contact with the 40 Zones of the world as shown on the official WAZ Zone Map. WAZ is issued in three classes, *i.e.* Any mode, all phone and all s.s.b. For complete rules, see the January, 1962 *CQ*, page 50.

WPX is issued in four classes, *i.e.*, all c.w., all phone, all s.s.b. and Mixed. The number of prefixes required are: C.w.-300; Phone-300 s.s.b.-200; Mixed-400. For complete rules, see January, 1962 *CQ*, page 52. WAZ applications, Zone Maps and WPX applications may be obtained from the DX Editor at the address shown at the head of this column. Please send a self-addressed, stamped envelope or a self-addressed envelope and an IRC. All applications should be sent directly to the DX Editor.

SSB DX HONOR ROLL

TI2HP	302	W1LLF	281	G2BVN	263	W7DLR	238
W2BXA	302	W3MAC	281	W2RGV	261	W6YMV	235
WØQVZ	301	G8KS	279	G3DO	260	W3VSU	235
W2ZX	301	K2MGE	278	PJ2AA	258	OZ7FG	233
K4TJL	300	W6UOU	277	KP4CL	256	W2PTM	230
W2TP	299	HB9TL	275	W6WNE	254	W6ZJY	227
W8PQQ	299	DL1IN	275	W4RLS	252	K1SHN	224
5Z4ERR	298	I1AMU	275	K6LGF	250	K2JFV	223
W2FXN	293	PZ1AX	274	W1AOL	250	W3FWD	216
W2VCZ	290	W6RKP	273	W4PAA	249	K1JMV	213
K1IXG	288	K9EAB	273	W4NJF	248	WA2EOQ	210
K8RTW	286	W2LV	271	K4HYL	248	SM5UF	208
WA2IZS	277	W3KT	270	GM3JDR	246	K6CYG	203
W4OM	249	G3NUG	269	XE1AE	246	W6USG	203
W3DJZ	215	G2PL	265	K8ONV	244	W4HUE	201
KØUKN	202	W4SSU	263	YV5AFF	239		

Chuck, XW8AU/K7LMU

Peter, VS6EQ

Jan, 9M2JJ

Drake, VS6EK, with XYL

Colin, 9M2CR

ranged by net control within five minutes after the net opened.

XW8AU served as net control until early '65 when the duties were taken over by 9M4LX. The net also proved to be helpful for those members who traveled in Southeast Asia, XW8AU checking in from BVI, VS6 and HS1, all in one week.

For some personal glimpses of the original member stations, all of whom are somewhat rare.

XW8AU, Chuck: better known for K7LMU/3W8, now in the US; while in Laos, flew as an aerial delivery specialist for a civilian aviation company, sole survivor after his plane was shot down by unfriendly forces.

XW8AL, Phanh (pronounced "Pon"): Director a Statistics of the Laotian Government. QSL Manager is K6EVR.

XW8AV, Charlie: USAID advisor in the Laotian Bureau of Public Roads.

HS1X, Andy (not pictured): US advisor in maintenance to the Thai Civil Aviation Administration.

9M2DQ, James: British rubber estate manager in northern Malaysia.

9M2JJ, Jan: Peace Corps teacher in electricity and radio. Now in US.

9M2CR, Colin: British ITU advisor to the Malaysian Telecommunications.

9M4MB, Ted: Major in the Signal Corps of the British Army. Designer of the SEANA and award manager. 1059 Upper Changi Road, Singapore 17.

9M4LX, Bob: Sergeant, flying as electronics operator in the RAF. Present SEANET net control.

BV1US, Mike: Now DL4SZ, US Army Warrant Officer in electronic maintenance supply, XYL is DL4SS. No activity from BV1US now.

VS6AJ, Herb: An ex-OZ7, now custodian of the club station of the Hong Kong Amateur Radio Transmitting Society. Seimens representative in a Danish import firm. Recent acquisitions: German XYL who could write a ham's language dictionary, quad, a black cat (the second op).

VS6EK, Drake: retired with his XYL in beautiful surroundings overlooking Hong Kong harbor and the Pacific.

VS6EQ, Peter: Businessman.

9N1MM, Moran: Catholic Father in mission.

4S7IW, Ian: British tea planter in northern Ceylon.

Others active now in the SEANET are XW8AX, Bill and XW8AZ, John (QSL via W6KTE) and XW8AY, Ocie. All are with USAID—Bill and John in Requirements and Ocie in charge of the well drilling program in Laos. *(Tnx K7LMU)*

Here and There

CR5 Portuguese Guinea: CR5AJ is a new station from here working 20 meter c.w. and 15 meter a.m. *(Tnx LIDXA)*.

CR8 Timor: CR8AE, Jaime, operates a.m. fone only and speaks very limited English.

CT2 Azores: CT2AM is active station here working transceive on 14238, 28 March at 2100 GMT with good signals. He is a.m. but copies s.s.b. QSL to PO Box 3, Santa Maria Airport, Azores Islands. CT1JJ may DXpedition there this summer. *(Tnx LIDXA)*.

James, 9M2DQ

Bob, 9M4LX

The following certificates were issued between the period from March 6th, 1965 to and including April 5th, 1965:

CW-PHONE WAZ

2115	WA6MWG	Pete Billon
2116	YU3EA	Bola Battelino
2117	SM1CXE	Roland Engberg
2118	VU2AK	Col. L. King
2119	UA3FU	Victor Zakharov
2120	UP2KNP	Kaunas Politechnical Institute
2121	VK5GG	G. A. Gormly
2122	W2WZ	John Albert Stobbe
2123	SM7CNA	Yngve Trojer
2124	DJ2ZJ	Dr. Dietrich Eckardt
2125	WA5CBL	C. E. Longstreth
2126	G3HFP	Tom Worton
2127	K4ASU	Robert C. Webb
2128	K1PNL	Ernest N. Lefebvre

ALL-PHONE WAZ

292	W4OM	Pressley B. White
293	W2WZ	John Albert Stobbe
294	K6TSY	Ted A. Cullian
296	YV5BBU	Juan Jorge Gugig

TWO-WAY SSB

303	YV5BPJ	Armando E. Aldrey
304	W3DJZ	Arden B. Hopple
305	W8HBI	Bob Check
306	I1PP	Piero Pusone
307	W4OM	Pressley B. White
308	W8IJZ	John H. Bricker
309	W2WZ	John Albert Stobbe
310	ZB1CR	Clive R. Burchell
311	WA5EFL	Moritz Schillmier
312	SM7ACB	Gillis Stenvall
313	JA6AV	Makoto Inami
314	K6TSY	Ted A. Cullian

CW WPX

628	SP5ALG	Andre K. Drzysztofik
629	OE5PWL	Walter Plattner
630	OK1ZW	Zyka Vita
631	DJ6LD	George Stempfle
632	VK3KS	Mavis Stafford
633	ZL4BO	V. Roy Jackson
634	W8LZV	Kurt R. Schmeisser
635	SP5AIB	Waldemar W. Agatowski

PHONE WPX

115	I1BAF	Mino Cuzzoni
116	G3AG	Frank Inchley

MIXED WPX

111	ZL4BO	V. Roy Jackson

300 TWO-WAY SSB

8	W2FXN	Robert Scully

200 TWO-WAY SSB

126	W5KC	Vincent L. Rosso
127	KØUKN	Bill Dennis
128	W3DJZ	Arden B. Hopple

100 TWO-WAY SSB

469	W3DJZ	Arden B. Hopple

Top l. to r., Phanh (pronounced "Pon") XW8AL, Herb, VS6AJ. Bottom l. to r. Father Moran, 9NIMM, Mike, BV1US.

Charlie, XW8AV

Herb, VS6AJ

EA6 Balearic Islands: These islands will see some more activity during the festival and fair of Palma de Mallorca. The station, EA6URE, again will be set up at the Trade Fair, whereas all other EA6 stations, viz EA6, AF, AI, AM, AR, AS, AU, AY, AZ, BC will show more activity during the period of June 20 until July 5. *(Tnx VERON).*

KC6 East and West Carolines: Present stations here are KC6FM, Fred, at Eastern and KC6BO, Bernie, at Western. Larry, KH6BVS, skeds both most nights. Try 14270 at 2300 or 03-0400 GMT. *(Tnx LIDXA).*

LU South Shetland Islands: LU4ZO around 14320-25 kc around 0230 kc looking for USA, particularly Texas stations and speaking English. *(Tnx WGDXC).*

SVØ Rhodes: SVØWF, Jack, 14240-50 kc usually from 1800. QSL via W2PCJ. *(Tnx NEDXC).*

TJ Camerouns: TJ1AC, Fred, worked 29 March at 2200 GMT on 14250, promptly went QRT when the pile up began. QSL to Fred Buchner, c/o Electric City Corp., West Cameroun. *(Tnx LIDXA).*

VK9 Cocos-Keeling Is.: VK9CR on but not very active because his beam is only 15 feet high. He expects to raise it soon and receive some new equipment. Thereafter, he will be more active. Bob was worked by VK3ARX on 5 March at 1230 GMT and has been heard on 14250 at 1200 GMT. *(Tnx LIDXA).*

VKØ Calls. New calls for 1965-6 are VKØTO—Macquarie Island (Trevor Olrog. VK2TO) VKØGW — Mawson Base (Antarctica — Gill Webster, VK6ZW); VKØKH—Wilkes Is. (Dr. Ken Hicks, ex-KC4); and VKØMC—Wilkes Is. (John MacKenzie). *(Tnx LIDXA).*

VR6 Pitcairn Island: VR6TC skeds W5OLG each Monday on 21060 kc at 2000 GMT and if band not open they use 14040 kc at 2100 GMT and failing that they try 7020 kc Tuesday following at 0430 GMT and in either event QSOs will be handled by VR6TC *after* sked is finished. *(Tnx WGDXC).*

XZ2 Burma: XZ2LA, Ed, reported on 14254 and 14270 kc around 1600 GMT. QSL to Box 371, Rangoon. *(Tnx VERON).*

5W1 Western Somoa: 5W1AZ, George, is on 14 mc c.w. around 0700 GMT. *(Tnx LIDXA).*

9J Zambia: The Radio Society of Zambia is organizing a field day station at a location twenty miles west of Kitwe, with the call sign 9J6AA/P. The station will be active from approximately 1300 GMT on Saturday, June 12th to 1500 on Sunday, June 13th.

Two transmitters will be used. The 'A' station will operate contest style on c.w. throughout the period, on all bands from 1.8 to 28 mc, and will be particularly interested in contacting European portables although all calls will be answered. The 'B' station will concentrate more on local publicity and will operate a.m. fone and c.w. at a more leisurely pace.

All contacts will be confirmed and will count double points for the new Worked Zambia Award to be announced shortly.

The call sign allocation for Zambia consists of the blocks 9IA, 9IZ and 9JA-9JZ. At present only 9J is being used and all individual amateur callsigns are in the 9J2 series. However, any of the other numeral prefixes from 9J1 to 9JØ may be used for special activity stations such as exhibitions, field days, etc., and from time to time the Society will organize and operate such stations. *(Tnx 9J2W).*

73, Urb, W2DEC

Ian, 4S7IW

Ted, 9M4MB

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

June	4-7	CHC/FHC/HTH Party
June	6-7	Bermuda Contest
June	12-13	National Field Day
June	12-13	ARRL VHF QSO Party
June	26-27	ARRL Field Day
July	3-5	Venezuelan Contest
July	16-18	Colombian Contest

CHC/FHC/HTH Party

Starts: 2300 GMT Friday, June 4
Ends: 0600 GMT Monday, June 7

This one was fully covered in last month's CALENDAR. The scoring becomes a bit involved because on the many different categories. It is highly recommended that you review the rules if you have intentions of partcipating.

The awards are many and varied so it might be worth your while to take a crack at it.

Mailing deadline for your log is July 5th and they go to: Clif Evans, K6BX, Box 385, Bonita, Calif. 92002.

Bermuda Contest

Starts: 0001 GMT Sunday, June 6
Ends: 0200 GMT Monday, June 7

This is a two week-end affair and the above dates are for the second half. The first section has already taken place. Full coverage was given in last month's CALENDAR.

Your entry must be in the hands of the Contest Committee before July 15th. Address: Radio Society of Bermuda, P. O. Box 275, Hamilton, Bermuda.

National Field Day

Starts: 1700 GMT Saturday, June 12
Ends: 1700 GMT Sunday, June 13

If you hear any of the Europeans signing /p you will know that they are partcipating in the Field Day. This being a European activity we are not elegible to compete, but we are invited to work these low powered portables and help them build up their score.

No special log form is requested but you should list your contacts progressively (e.g. 579001) and indicate the band of operation and times in GMT. Send your logs to the RSGB Contest Committee, who knows, they might have some kind of an award for overseas stations that submit the best list. Address: 28 Little Russell Street, London, W.C.1, England.

*14 Sherwood Road, Stamford, Conn. 06905.

ARRL Field Day

Starts: 2100 GMT Saturday, June 26
Ends: 2400 GMT Sunday, June 27

We have our own Field Day over here too and it really stirs up the "pea patch." From the stand point of participating operators this one probably tops all amateur competition.

The June issue of *QST* will give you all the details.

Venezuelan Contest

Starts: 1000 GMT Saturday, July 3
Ends: 2400 GMT Monday, July 5

The Radio Club Venezolano has organized this contest to commemorate the 154th anniversary of the Independence of Venezuela.

Bands: This is a phone only contest. All bands, 3.5 thru 28 mc, a.m. or s.s.b.

Serial Nrs: The established 5 digits, RS report plus a progressive 3 figure contact number starting with 001.

Valid Contacts: *Stations in the Americas:* With YV, other American countries and rest of the world. *Stations on other Continents:* With YV and other American countries only.

Scoring: One point per contact and one multiplier for each country and each YV prefix worked on each band. (The same station can be worked once per band.) The score for each band is the number of contacts multiplied by the number of countries and YV prefixes on the band. The final overall score is the sum of the score from each band.

Logs: Your log must contain in this order: Date and time in GMT, station worked, number sent and received and multiplier. (First time worked only.) Use a separate sheet for each band and include a summary sheet showing the number of contacts, multiplier and score for each band, as well as the *Total Score*. (Sum of scores from each band. Add the last column.) And don't forget to sign the usual declaration and your call, name and address in BLOCK LETTERS.

Awards: Certificates to each station that establishes the following contacts: *Stations in the Americas;* 10 YV stations and 10 other countries. *Stations on other Continents;* 3 YV stations and 3 other American countries. (s.w.l's must show 100 and 50 contacts respectively.)

Special Awards: A Trophy for the YV and Foreign champion. A medal to the YV and Foreign sub-champion. And a special award to the station, including YV, contacting the greatest

Winners 1964 New England QSO Party

K1WJD (Mass.)	**20460**	K1LBH (Conn.)	13,224
K1YKT (Mass.)	15,660	K1UZG (Ver.)	8,784
W1SWX (N.H.)	17,820	K1WZY (Ver.)	2,856
W1CTW (N.H.)	5,016	W1EIO (Maine)	7,776
W1BGD (Conn.)	16,896	W1UOT (Maine)	6,300
K1EWL (R.I.)	1,950		

number of countries. Medals will also be awarded to the Continental winners, plus four Central and South American areas.

It is requested that a remittance of $1.00 or its equivalent in IRC's be included with your log if you are eligible for an award. This will be returned if you do not qualify for a certificate. Entries must be in the hands of the Committee before September 15th and they go to: The Radio Club Venezolano, P.O. Box 2285, Caracas, Venezuela.

Colombian Contest

Starts: 0000 GMT Saturday, July 17
Ends: 2400 GMT Sunday, July 18

This is a new one, organized to celebrate 100 years of communications in Colombia. Its the world working the HK's, all modes c.w., a.m. and s.s.b. and all bands 3.5 thru 28 mc.

Serial Nrs: The conventional 5 and 6 figures, RS/RST report plus a progressive 3 digit contact number starting with 001.

Scoring: *Stations on the American continents:* 3 points for each HK contact and a multiplier of 1 for each HK prefix on each band. *Stations on other Continents:* 5 points for each HK contact and a multiplier of 1 for each HK prefix on each band. The Final Score will be the total QSO points multiplied by the sum of HK districts from each band.

Logs: Use a separate sheet for each band and each mode. Logs should show in this order: Date and time in GMT, station worked, serial number sent and received, multiplier, contact points. A summary sheet showing the scoring for each band and the final score is also requested. And your call, name and address in BLOCK LETTERS.

Awards: Special awards will be given to the highest score outside of Colombia, the highest score from each continent and in each country. Awards will be made for each mode and up to third place where justified by the number of entries. Of course the HK's will have awards for their own high scorers.

Logs must be in the hands of the 20th of July Contest Committee before October 20th. They go to: The L.C.R.A., P.O. Box 584, Bogota, Colombia, S.A.

QCWA 1965 Party Results: top ten scores

W8NBK	**217**	W[illegible]CDJ	91
W6ZPX	177	W3BIP	88
K6GIL	125	W7LQ	76
W3EIS	113	W6PLS	76
W9VZP	112	K2KD	68
W1AQE	68		

Editors Notes

Are you kidding, who has time for notes? Have a wonderful summer.

73 for now, Frank, W1WY

1964 New Hamp. QSO Party Results

The top man in the state was **W1SWX** with 6270 points on c.w. **K1NBN** headed the phone list with 176 points.

Top Ten out of State

W3AIZ	520	W3AYS	320
K1HVV	432	K8GWK	320
W3MPX	378	W2KTR	304
K1EWL	360	K3HNP	304
K1VII	320	WB2MFX	294

W1SWX, W3AIZ and K1VII were the only stations to work all 10 N.H. counties.

USA—CA Record Book

THIS is it. In staid conservative black and white print, the USA-CA Record Book will not offend or clash with any of the colors in your shack. There are fifty individual maps delineated with over 3000 *(I know it's hard to believe)* separate county boundry lines. Each of these counties are plainly marked and a facing page has them listed in alphabetical order along with several spaces for pertinent information towards the USA-CA Award. Amaze your friends at parties, be a whiz at school, confuse your family, don't be the one who stands idly by when someone asks how many counties are there in Iowa. How much?, you ask, expecting a huge amount to cover the cost of this glimpse into Americana. Only *(don't you hate that word)* $1.25 buys you the complete book brought to your house post-paid. It's little enough when you stop to consider it. Order one soon, maybe tomorrow, today is already shot. By the way, there are 99 counties in Iowa.

HAM CLINIC

CHARLES J. SCHAUERS,* W6QLV

ONE thing that the reputable and long-established manufacturers of ham radio equipment have learned over the years, is that many (if not most) of their ham customers can and often do repair their own equipment—even though they are encouraged to use authorized service centers.

The manufacturer who thought he could "drive" his customers to using his service agency or factory repair facilities by denying legitimate requests for service bulletins or other information has found out that this tactic does not work or the manufacturer has long since gone out of business.

Word travels fast in ham circles when a manufacturer slights his customers by refusing them technical information which they *know* exists.

Recently, one of HAM CLINIC's readers wrote to a newer company and requested some service information. He was told that it is not the policy of this particular company to let customers have service information; that this information was only available at authorized service centers, and that if the ham wanted his set repaired he should not do it himself but take or send his set back to the factory or to a service center located in his area.

Now I happen to know that *this* ham is a good technician and does have excellent test equipment. Why should he pay someone else up to $10.00 per hour for doing service work he can do himself? In this case, the reader had found out through another ham that there *was* a modification (the factory had discovered) that would make the set a lot better. He did not ask for any trade "secrets." We hope this manufacturer will learn as did the others.

We have found that most manufacturers are very cooperative with their customers. It is only natural for them to want their ham customers to use established service center facilities, especially if the customer's set is still under warantee.

Generally, if a manufacturer makes a modification to one of his sets that improves operation, he is anxious to see that his customers (who are properly registered as owners) receive the necessary information. This is good business!

What would you do if you received a letter like this from a factory service manager? "We do not ship component parts ordered by our amateur radio customers, but always refer them to the nearest authorized service agency which stock most of the parts required for proper repair work."

The ham who received this letter visited the agency he was referred to and tried to obtain the parts. He was told that he would have to wait 10 days or so because the parts were *not* in stock. The anger generated by this situation is, in my estimation, justified.

Why didn't the service manager tell the ham customer that he was sending the parts ordered to the service agency and could be picked up there? Instead of alienating a customer he would have made a friend.

Ham customers are no different than anyone else when it comes to expecting service after a sale. It takes no customer relations expert to see that all other things being equal, the manufacturer who renders the *best* service through his dealers or distributors will get the *most* repeat business.

HAM CLINIC files contain many letters from factory service managers or customer relations personnel thanking us for helping out their customers. We have been able to do this because the manufacturers involved send us service bulletins, instruction manuals and special information which we can use to help the hams who write directly to us. Sometimes we are able to help, sometimes not.

If you are a manufacturer and you know that HAM CLINIC is not on your service mailing list, we can help you to help yourself if you put us on your list.

Surplus Equipment Info

We continue to receive letters from hams who have obtained surplus components such as transformers, chokes, tuning assemblies of all kinds, power supplies, odd cathode ray tubes etc. These hams want us to tell them *what* they have bought. Although we do try, our "batting average" is very low, and here's why. Unless the part is listed in a *Federal Stock Catalog* or is a part of currently available *whole* surplus items, we're stuck. Please do not ask us to try to identify a surplus component by appearance or schematic number. We cannot.

Information Wanted

Anyone out there in hamland ever put together a *pre-selector* using a Mallory Inductuner using a W.E. 417-A tube? Now we do not mean a converter. If so would you please send us the information so we can pass it on to those seeking it—especially to one *persistent* reader who seems to be stuck with a *lot* of tuners?

Using Clevite Transfilters

The diagram of a typical i.f. amplifier using Clevite Transfilters (reg.) is shown in fig. 1.

The Transfilter is a three terminal piezoelectric ceramic filter designed to replace conventional i.f. transformer assemblies. The small size of the Transfilter, freedom from alignment (they

*c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., N. Y.

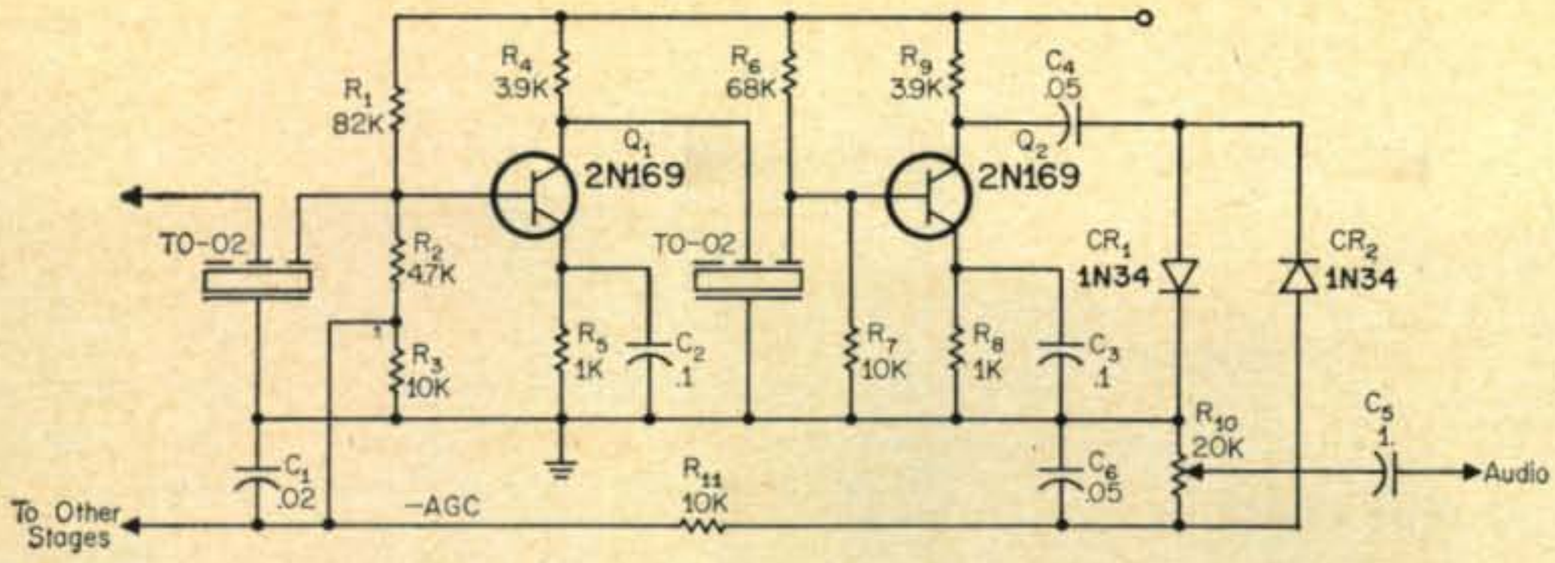


Fig. 1—Typical i.f. amplifier using type TO-02 Clevite transfilter elements instead of conventional i.f. transformers. The diode detector can be replaced with a ring demodulator for s.s.b. work as explained in the text.

are fix tuned), modest cost and excellent time and temperature stability make the unit very desirable for use in transistorized receiver construction.

Referring to fig. 1, transistors (NPN) Q_1 and Q_2 are used as i.f. signal amplifiers with two model TO-02 Transfilters providing the desired selectivity. In operation, the i.f. signal obtained from the receiver's converter stage or a preceding i.f. stage is applied to the input terminal of the first TO-02 Transfilter. The signal developed at its output terminal is applied to the base of Q_1. Proper forward base bias is supplied to Q_1 by the resistance network composed of R_1, R_2 and R_3. R_1, R_2 and the base-emitter junction of Q_1 form the a.c. load impedance for the Transfilter, as the lower end of R_2 is bypassed to ground at the signal frequency by C_1. R_2 and R_3 provide the d.c. resistance for proper biasing of Q_1. In many conventional circuits, one resistor serves both these purposes. However, the optimum a.c. load impedance of the Transfilter is often different from the required d.c. bias resistance. The value of R_2 is selected to provide this optimum load impedance for the Transfilter.

The amplified signal appears across the collector load resistor, R_4. In conventional circuits, the primary winding of the following i.f. transformer provides both an a.c. load and d.c. path, for proper transistor collector voltage. But since the Transfilter does not pass d.c., R_4 provides this d.c. path.

The signal appearing across Q_1's collector load, R_4, is applied to the input terminal of the second TO-02 Transfilter. The signal appearing at its output terminal is coupled to the base of the second transistor, Q_2. Forward bias is supplied to Q_2 via R_6 and R_7.

The signal developed at the collector of Q_2 is coupled by C_4 to the voltage doubler diode detector consisting of CR_1 and CR_2. Resistor R_{10} serves as CR_2's load resistor, with C_6 bypassing it at signal frequencies. The audio signal is recovered from the tap on R_{10} and coupled via C_5 to following stages of audio amplification.

The automatic gain control (a.g.c.) voltage is developed from the "hot" end of R_{10} and applied to the base of Q_1 where it effectively varies the base-emitter forward bias. The values of R_{11} and C_1 are chosen to provide the proper a.g.c. time constant.

Many variations of the basic typical i.f. amplifier circuit shown are possible. Impedance matching in the circuit shown is obtained by choice of the type of Transfilter, proper values of R_2 and R_4 and the transistor required for the circuit.

Other transistors which may be used in the typical i.f. amplifier to replace the 2N169's shown, are: 2N78A, 2N168A, 2N449 and 2N1217.

A ring demodulator can be used also with this circuit for s.s.b. demodulation instead of the single 1N34 diode (CR_1). CR_2 (for a.g.c.) can be moved to a stage ahead of the demodulator.

SSB Ring Demodulator

Fig. 2 shows a ring demodulator which I am currently using in a receiver I have under construction. This circuit can be adapted to circuits using tubes as long as the impedances are adjusted for the input values shown.

The b.f.o. signal injected into the demodulator should be a good sine wave signal and be stable.

Warm-up Drift in Low Priced Receivers

We have had a number of letters from readers who have purchased low-priced ($100 to $200) receivers complaining about warm-up frequency drift. One reader complained about drift as high as 30 kc.

As we have pointed out before, warm-up drift is just *that*. Regardless of whether or not all voltages are stabilized, *all* components in a receiver are subjected to varying temperatures and the heat *does* change component values. Some components (especially in frequency determining circuitry) are affected more than others, but if the set is left on long enough, component values tend to "settle down."

To reduce warm-up drift we recommend a separate filament transformer for oscillator tubes. This transformer is *permanently* connected (without a switch) to the a.c. line. We also recommend using silicon rectifier plug-in replacements for the rectifier tubes used—for the rectifier tubes do get hot. We also recommend heat absorbing tube shields for the final a.f. tubes feeding the loudspeaker—these also get mighty

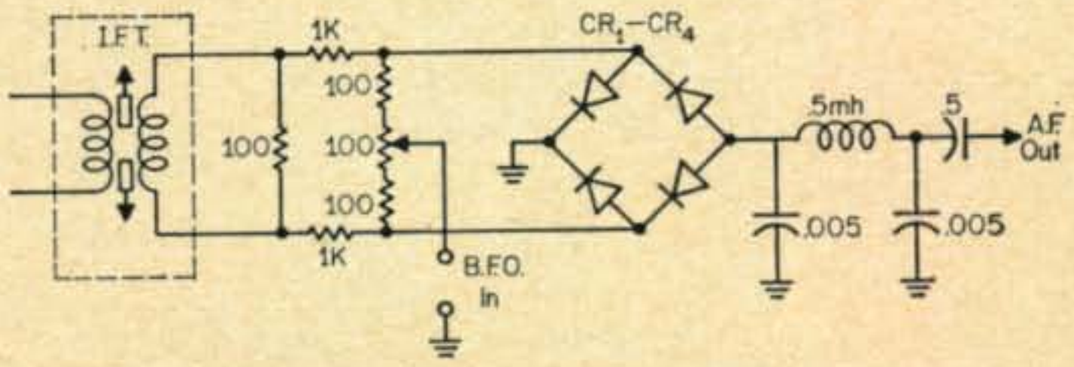


Fig. 2—Ring demodulator (detector) for s.s.b. Diodes CR1-CR4 can be any good low front to back resistance types. The author used 1N78B type.

hot. We do *not* recommend the installation of a small fan for cooling the inside of a receiver, for if the fan is not installed properly it will do more harm than good. Furthermore, the vibration caused by a fan can often "modulate" the set too and this is undesirable.

For those of you who use a set containing a 6AU6 oscillator, we suggest that you try the 6AH6. The latter requires a little more filament current (but not much). In some cases where the tube-switch has been made, stability has improved a great deal.

If you own a receiver whose speaker emits a "ping" when the cabinet is struck lightly, try swaging (tightening) the variable capacitor plates in the set and installing a good heavy *extra* ground on both ends of the tuning gang. If this does not cure the trouble, you may have a microphonic tube and if a new tube does not help, you may have to "float" or spring mount the tube socket away from the chassis. Problems! Problems!

Spotting Switch For The T-60

Mike Griffin, WA3AZI sends us his scheme for installing a spotting switch in his T-60 transmitter. Fig. 3 shows his connections. In one position the keying is normal, in the other, it permits operating the oscillator only for spotting, calibration or zeroing in on a frequency without on-the-air QRM. Thanks Mike.

Questions

Interference From a TV Set—"Since moving to my new location I am bothered by interference from a couple of TV sets in my apartment building. The interference seems to be around every 15 kc across the dial on my receiver. A regular high-pass filter on the set helps a little but not much. What can I do? The neighbors are very cooperative."

Cut a piece of 300 ohm ribbon line to exactly 22 inches. Connect one end *across* the TV set's antenna terminals. Short the other end (tie both ends together), then in series with the shorted ends connect a .01 mf ceramic capacitor to ground If this does not cure the trouble completely, then, near the a.c. output socket of the TV set connect two .01 mf capacitors *in series* across the two a.c. input terminals. Ground the center of these two capacitors. If you still have trouble, then wrap the wires going to the picture tube with aluminum foil and ground this. Do *not* of course, wrap the *high voltage* lead going to the picture tube. The measures indicated will clear up about 99% of the 15 kc horizontal sync interference. If the above does not completely eliminate the QRN, then install a piece of copper screen under the TV chassis. Bring an *outside* ground to the TV set. Good luck!

NCX-3 Power Increase—"I'd like to increase the output power of my NCX-3. How about changing the 6GJ5 tubes to something more powerful? Now don't tell me to buy a high power linear."

I suggest that you *do* buy a higher power linear. Those final tubes are working at maximum efficiency in the NCX-3. I hear NCX-3's over here in Europe consistently operating "barefooted" (without a linear).

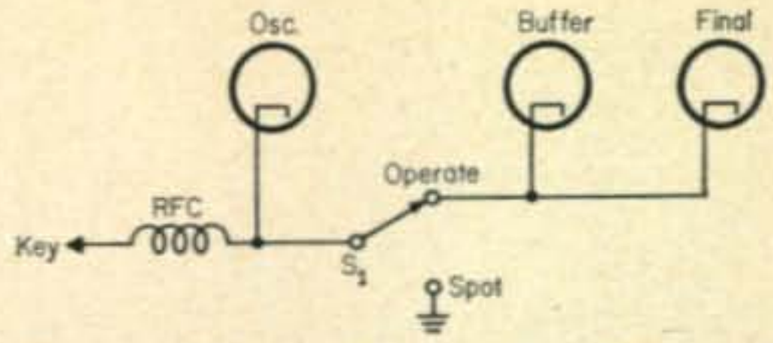


Fig. 3—The spotting switch for the T-60 and similar transmitters is installed between the oscillator and buffer cathodes. S1 is a d.p.s.t. switch.

CR-88 Receiver Modifications—"I own an old RCA model CR-88 receiver. Any modifications you can suggest that will partially modernize this good old set?"

Yes. First replace the r.f. amplifier with a 6BZ6—a new socket will be needed. Replace the rectifier 5Y3GT with a silicon plug-in replacement. Stabilize the voltage on the b.f.o. (6J5) with a *separate* v.r. tube or zener diode. Add a product detector. The ring demodulator shown in fig. 2 can be used by switching it in and out along with the b.f.o. injection voltage. This set has plenty of good selectivity if the crystal filter is operating properly.

HT-40 Mk-1 Questions—"How about replacing the 6DQ5 with the new RCA 6146B in my HT-40 Mk-1 transmitter? Will I have enough power available to handle the new tube? Next, what causes the parasitic choke PS-1 to burn out? I have replaced this four times. Finally, will the SB-10 work good with this fine little transmitter and do you suggest trying to go on s.s.b. with it?"

I do *not* recommend replacing the 6DQ5 final tube for more power. No, you do not have enough reserve power. The parasitic choke PS-1 (like any parasitic choke) will sometimes burn out when the s.w.r. is too high—make sure you are using the proper antenna for the band in use. The SB-10 will work with the HT-40 and well. However, I suggest using a *separate* power supply for the SB-10.

Thirty

We have enough questions from readers for publication for at least three years, every batch of mail brings them in. Although we try to keep current with our correspondence this is a physical impossibility—so we try to answer the pressing questions first. We define "pressing questions" as those received from hams who have tried "everything" and every source before coming to us as a source of last resort—we receive many of these questions. If your questions are routine and you are not in a hurry, *please* tell us, so we can help the less fortunate. If you have no "sympathy" for us—especially when we are faced with answering a stack of 300 letters or cards, at least you will have a little patience waiting for your own reply.

For this month then, 73 and 75 to all our readers and especially to those who take out the time to let us know we have helped them and who thank us for our efforts.

73, Chuck, W6QLV

NOVICE

WALTER G. BURDINE,* W8ZCV

WELL, here it is June and the summer doldrums have set in and the amateur would rather go fishing or picnicking than operate the rig from a hot old shack. This is an annual affair and does relieve the QRM on the lower bands for the new comer. It does not help the v.h.f. operator to get more activity to help extend the DX record on these bands, and this is the time that favors that part of our hobby. Increased activity will help extend our ground wave contacts as well as those caused by ionospheric disturbances. The serious DXer will be in there watching the band for any openings on these bands. It appears that the translator on OSCAR has quit functioning, still we can call it a success. The fact that the technician was unable to participate in these contacts has likely caused less amateur activity than any other reason. I think the low-frequency ham has not realized the full potential of the two meter bands due to his bigotry, his attitude toward the v.h.f. bands and his lack of knowledge and *just* possible technical ability. I well remember once hearing an amateur with class A privileges squawk to high heavens about the so-called class D licensee being allowed on the air and later that same day having another ham offer to help him make his required three c.w. contacts so that he could get his license renewed (that dates me, doesn't it?) I have always thought that he didn't have the ability to get something on two meters and hated to be shown up by any one. This was before the Novice license was issued. I hope I never live long enough to get that way.

I want to thank all of the readers that took time out of their busy lives to thank me for the column on licensing procedures. I did not include enough about the procedure for the General and higher class licenses and have had to answer a few letters from the readers about that. They should get the Rules from the FCC and get acquainted with the laws governing amateur radio. That is their duty.

I was advised by Perry F. Williams, W1UED, Assistant Secretary of the American Radio Relay League that they have available to the amateur (giving tests as a volunteer examiner) free copies of form S-45. This will satisfy the FCC for the information required when giving the test. They are available to all comers upon the receipt of a self-addressed stamped envelope. Thanks, Perry for the copies that you sent me.

*R.F.D. 3, Waynesville, Ohio 45068.

Let's Play It Safe

While our hobby is the world's greatest hobby it is fraught with many dangers. This hobby is safe only so long as it is operated with care, otherwise it can deal a swift death-dealing blow. Proper safety precautions can make it as safe as playing with a baby kitten but without proper regard to simple safety rules, you *have a tiger in the shack*. It only takes a few moments to do the job correctly, and the life you save may well be your own. I think there has been much too little written about this important phase of amateur radio. This applies to all electrical equipment. A few simple rules for safe operation of your equipment can help save your life.

NEVER work on any equipment with the a.c. cord still plugged in the wall outlet. Your clothes might catch the switch and turn the equipment on, thus causing a possible electrical shock. The a.c. mains have one side of the circuit grounded at the meter and the switch box. If the other side is "hot" and you accidently touch the grounded side *or* any object that is grounded, your body acts as a conductor carrying a current limited only by the resistance of your body. A wet body has less resistance than a dry body, therefore it carries more current. The muscular reaction to electrical shock can often cause more serious results than the initial shock. Many serious accidents have been caused by a small electrical shock.

NEVER trust bleeders used to discharge the high voltage filter capacitors. They may open, and the capacitors can retain the charge for a long time. Always be sure, discharge all capacitors before working on the equipment. It is safer that way. Good capacitors can hold their charge for a long time.

Do not depend on switches, interlock switches or bleeder resistors to make it safe for you to work on the equipment.

Always ground your equipment to a good earth ground system. Never use a gas line for grounding your equipment. A water pipe may be used in an emergency as a ground but it is best to have a good ground system besides this method. A good ground system usually adds to your DXing ability. If each and every part of your station is well grounded, and there should happen to be a short in any of the power supplies, the fuse will blow and this is the best indication that something is wrong. Check carefully when you find a blown fuse, there is always a reason for it.

When building a new piece of equipment for the ham shack, be sure and add a fuse to the primary of all transformers connected to the a.c. mains. This is one of your best safety precautions. Do not use a fuse that will carry more current than needed, except for a small amount for temporary overload caused by the initial surge of power due to switching. This protection costs very little, and it can also save an expensive power transformer.

"I say there Ole Man QRS, even if the RSGB is fifty years old I can't understand your English" quoth Robert, Novice Extraordinary, son of Paul C. York, 20-20 Calyne Drive, Fair Lawn, New Jersey. Paul says Robert is the world's best unsorter of sorted parts. He grabs the microphone everytime he is close to the station. Paul's call is WB2HUX.

Never work on equipment when standing in water or on a wet basement floor. One of my friends was nearly electrocuted while using an electric drill to make some holes in his boat while standing in the water, he knew better but just took a chance that nearly cost him his life. THINK before doing any thing like that, it may save your life.

Another crazy thing that we attempt to do is install an antenna near power lines. If the tower should happen to go awry, it can fall on the power line and put you in the obituary column. We read quite often of this kind of an accident. Always tell your helper never to try to pull you off until the power has been shut off as he would likely be electrocuted also. Never install an antenna near power lines, no use courting the Silent Keys column.

Another safety precaution that we often fail to heed is the installation of adequate lightning protection. Lightning arrestors cost very little for the protection they afford. If you want to have a beautiful fireworks display, try hooking a group of neon bulbs to a good long wire antenna and watch the glow at the approach of a big electrical storm. I have seen the discharge from my 940 foot long wire jump a ½ inch spark gap during a good storm. Just what do you think that would do to the primary of the antenna coil in your receiver? A good, well installed, grounding switch would be the best protection. A lightning arrestor, properly installed will protect your valuable receiver from static discharges caused by lightning. Follow the installation instructions carefully.

Finally, instruct the family where to turn off the power if an accident should happen. Tell them NEVER try to remove any one that is connected to any electrical circuit until the power is OFF. Study first aid and be sure that someone in the family knows what to do in case of an emergency.

The foregoing statements are not intended to scare you in any way. They are made to make you aware of the dangers lurking within your transmitter, it is just as safe as it ever was, you are the unsafe agent in this deal. I have been reading the back issues of those magazines that I've been collecting and was amazed to find the number of hams that have lost their lives by electrocution, just because they didn't take the proper precautions when working on their station. Not all of these have been beginners, some of them had been hams for nearly 25 years, one very well known ham was killed with only 500 volts. Voltages of less than 100 volts can cause death. Many people have been killed by having a small house radio fall into the bath tub with them. Many have died installing radio or television antennas, we just can't afford to loose any of our ham fraternity.

JUST BE CAREFUL. Think. SWITCH TO SAFETY.

Letters

My old friend, Allan Herridge, G3IDG, 96 George Street, Basingstoke, Hampshire, England sends three notes with the following information. "I want to thank you for mentioning my need for March, April and June 1945 *CQ* Magazine, and K2EEK for sending the June issue." *(We have some mighty fine readers of this column, Allan.)* Allan sends a long list of Novices heard in England. Allan usually works novices on the weekends.

Alan sends a few pointers along to the prospective DX novice.

"When a station sends KN (as distinct from K) after an "over" it means he is already in QSO and does *not* want others trying to break into a two-way QSO. Only this afternoon I had a KN3 calling me while I was in contact with a KNØ. This kind of action makes a bad name for an operator, so keep silent when you hear KN.

"When you have called CQ DX and received a reply from foreign parts do not include your address and ask for a QSL, there has been nothing to confirm yet and that is what a QSL does. Wait until the second or third over before asking for a QSL.

"Appreciate that, when asking for a QSL that the DX station can have no idea of your address. Pass it during the contact if conditions permit: otherwise look the DX station's address in the *Call Book* and send a card *FIRST*. The great majority of overseas operators only buy the *Call Book* occasionally so it is rarely up-to-date with the U.S. address.

"Check the QSL Bureaus, most DX stations send their QSL via the bureau to reduce operating cost of our ham stations. Do not expect our cards next week, our mail goes by surface carrier. Do not send cards to ARS xxx, this is no address and is rarely known by the postal authorities *(ed: see what I told you)* if it is necessary express it "Amateur Radio Station xxx" this will be of some help. Always put the best address on the envelope that you can get, it is best to enclose the card in an envelope to insure the card arriving in fair condition. The *Call Book* lists the address of most foreign DX stations and most of them can be addressed at their *Call Book* address. If you want a card by Air-mail send sufficient postage or International Reply Coupons to defray postal charges. *(ed. note: U.S. Postal stamps can not be used by DX stations to send cards back to you, it is possible to buy foreign stamps from some sources to send the DX station, otherwise send International Reply Coupons.)"*

Well, fellows there is proof that you are getting out and will have to listen more carefully to the stations calling you. Working DX is quite a thrill and I personally want to thank the foreign stations for reporting the reception of your stations. It proves the ability of the novice and also proves that the novice isn't a second rate ham and is well on his way to becoming a fist that

has to be reckoned with when the DX is calling. Well done, fellow hams.

Another letter from Hajime Suzuki, Inokashira 2-33-12, Mitaka-Shi, Tokyo, Japan tells me that he was very thankful for the many letters that he received from the readers concerning his receiver and that he is not willing to sell it for any price. He intends to confirm 200 countries with the receiver and by the way I also intend to build a copy of the receiver as a back-up receiver for my station. It is very much like the first receiver that W8ZCV used when he became a ham. Mine used a 6D6 regen with a 76 first a.f. and a 41 as the output tube. I worked many stations with that and a 6C5-6L6 transmitter and a long wire antenna. Too many beginners think that it is necessary to have an expensive station to have fun on the ham-bands. I guess they want to be "sugar-cured hams." Try low power.

I want to thank the readers that so kindly helped Vasco Félix, CTØ102, Est. de Benfica-713-2Ø-Frente, Lisbon 4- Portugal to get the small parts to put his BC-611 on the air, it is now on 3700 kc. He will be on with a v.f.o. into a 6146 amplifier before long and helping to give many of us another country. Well done fellows, he has promised us some pictures of the home-brewed shacks of many young Portuguese hams for this column. We just might make this a column for the beginning ham the world over if we can keep letters like that coming into the column. I will also be receiving some literature from overseas manufacturers in the near future from CTØ102 and this will add to our files for answering the many questions that come our way. Again, thanks to one and all. Read the following letter.

"Dear Walt: Just a note to advise you that your favorite statement of "Two meters is the most used band" is a most correct statement. As of this date, 22 March, I have just finished 505 days of consecutive daily contacts on two meters. I believe no one could say the band is dead. After taking a dare jokingly from you, I decided to try to better the 500 day record. If this isn't a record I would like some one to prove it. In our contact on March 18 it made 501 days, 1009 contacts with 218 different stations. *(Bob, I believe I can better your record, Ha).* The most power used was an ARC-3, with most of these contacts being made with a Heath Twoer into a ten element Finco beam, 32 feet high. The receiver was an RME-50A with an Ameco converter.

"Walt, as for your friends overseas who need small parts for their construction I work two blocks from a large supply house and would be glad to purchase parts and mail them overseas. Your foreign friends have only to write me and we can get together on things. You see in addition to ham radio, I am also a stamp and coin collector. I can purchase almost any small part needed for any circuit. Be glad to do it for your friends.

"I will send you a picture soon. Your friend, Robert O. Flint, WA8KJN, 83 Ruby Avenue, Wilmington, Ohio, 45177."

Remember an April letter about the "have and have not club"? Read this letter and you can see that it could be a big success. Never attempt to put a new ham on the air if he can do it himself, you can often help more with GOOD advice and the right information. Doing the job for a fellow that is able to do for himself just makes him more dependent, that is not help. If a fellow is too lazy to try, we just don't need him. Helping a disabled aspirant is a different story.

"Dear Walt: Keep up the good work with the novice section, I enjoy it very much.

It seems to me to be a darn shame that many Novices are not on the air. There are two Novices here in my neighborhood who could be on the air and just don't realize it.

I was talking to one of them yesterday and asked him why I haven't heard him on yet and his answer was 'I don't have enough room for an antenna.' Well I decided to investigate, sure enough he was right. The longest antenna we could put up was 47 feet of #19 wire.

The transmitter (a T-60) wouldn't load on any band so we dug into the junkbox and found an antenna tuner from my novice days and it worked! A quick check with the s.w.r. bridge showed a 1.1 to 1 s.w.r.!

Today he informed me that he has worked 7 states on 40 meters and 80 meters but no one on 15 meters. I use the same tuner with my rig and a 60 foot long-wire. My rig is an NCX-3 and a TA-31 for 20 meters. I've worked a KL7, KH6 and a JA3 on the novice bands (40 meters) with the long-wire! I have enclosed a diagram for the long wire tuner.

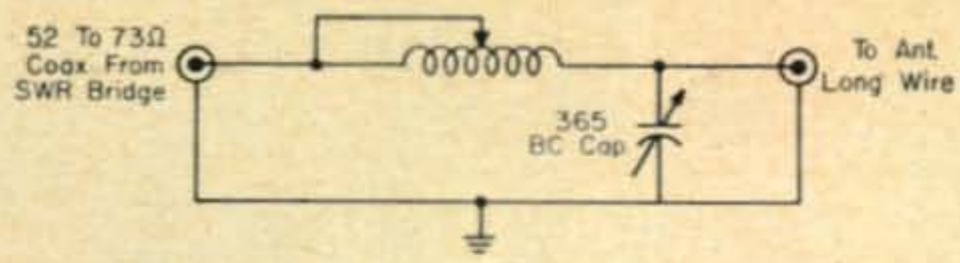


Fig. 1—An antenna tuner for loading longwire antennas. The coil is 30 turns of Airdux #1010 or equivalent with every other turn depressed for ease in clipping the adjustable tap. A multicontact switch could be used for a switchable adjustment.

At least I tried, Walt. *(That is a lot more than some of them do, Tom, Thanks.)*

73. Tom Cullen, 2 Westview Drive, Wallingford, Connecticut."

Well Tom you were wrong, I did publish it and this is what I have been trying to get all of you to do. I know that many of you have little tricks for doing something to improve the operation or output of your station, or for helping to put out a better signal or just put out a signal from some kind of transmitter. These are the letters that we need, with just enough letters telling about the DX that you work, to whet the DX appetite of the newcomer to get him going. We CAN make this the best read column in any magazine if you will help.

I am printing a diagram of the tuner that Tom sent and if it doesn't do the job for you don't forget the handbook section on antennas. Remember the article we had in the NOVICE column on limited space antennas? I believe that if we really want to get on the air with some kind of radio signal that we can do it.

This is only a part of a letter as I am running short of space and want to get some of this information in this month as next months letters will fill up their space.

"Dear Walt: I have been reading *CQ* for quite a while now and I like some of the articles you have had published. I am only a Tech now but my conditional is in the mail. I am 17 at this writing but I was first licensed at 13.

After a year as a novice I got enough nerve to tackle v.h.f. and started with a 30 watt transmitter, dipole antenna and an FCV-2 converter into an ATCS receiver. As all things go, I got older and I hope "wiser" and have graduated to an SRR-13A, a 29 tube dual-conversion superheterodyne with a 6CW4 nuvistor preamp and converter. All this is helped with a 5 element Hi-PAR, beam (10 db gain) 38 feet high fed with RG-8U. But on the other end I decided for reasons of TVI to reduce power and ended up with a 1½ watt homebrew rig.

With the low power I have confirmed 20 states and 5 countries, VP7, VP5, KP4, VE1 and CO2 and heard 43 states plus XE and FG7 plus many VEs and VPs.

Walt, I am very much interested in n.b.f.m. and wish to know what you are using.

73. Dave Gearheart, WA4GVT, WA3? ? ? 417 Church Street, Snow Hill, Maryland."

Dave there seems to be a good deal of interest in narrow band f.m. in our ranks so we will get the information to you soon and maybe tell some of the news in the column. Definitely you will have less TVI with that method of modulation and it is the cheapest method of modulation except c.w.

"Dear Walt: My brother and I decided to write you a letter and tell you how much we like your NOVICE column in *CQ*. We are enclosing a picture of us and the rig here. We thought maybe you could use it in your column. See photo last month.

Larry and I are 15 year old twins and we attend Anacortes High School where we are sophomores. My call is WN7BMQ and Larry's is WN7CAV. I have worked 11 states and also Midway Island. Larry has 5 states worked.

The rig is a Heath DX-20 with a separate power supply running 50 watts. The receiver is a Hammarlund

[*Continued on page 104*]

THE VHF COLUMN

BY BOB BROWN, K2ZSQ
AND ALLEN KATZ, K2UYH*

AFTER many seasons of sheer procrastination co-columnist K2ZSQ finally hopped on the bandwagon to Dayton for the big April 10 bash. The XYL, unfortunately, couldn't be coerced into a jet flight, so we packed off for W8 territory with luggage, jr. op., and a nervous chihuahua in our borrowed VW. Truly a trip to remember. . . .

To make a long story short, we hit Columbus the Thursday prior where we stayed with relatives while contemplating the virtues of the "perfect VHF terrain" (quote from K8REG). We arrived at the height of a typical Midwestern downpour which promised to die down in a matter of minutes only to linger on until Saturday. After the Hamvention we were gingerly ushered out by 36 tornadoes, the most devastating twisters in many years. Fortunately we were situated at the very edge of the holocaust, but many towers plummeted to earth across Ohio, Indiana and Illinois. Well, so much for the weather, the ride and K8REG's "perfect VHF" land.

Our welcome at Dayton, though, made the entire effort worthwhile. Never have I attended a convention where I walked in at 9 A.M. and was late! The central arena was packed solid that Saturday and it literally took 20 minutes to travel across the aisle. By mid-afternoon one felt that the entire ham population of at least half the country was there. But perhaps more impressing was the friendly air of greeting that awaited the tired personnel at the *CQ* booth.

For some obscure reason, the Dayton Hamvention has always been a central gathering place for VHF'ers. Save the Syracuse affair in the fall, Dayton offers perhaps the finest array of speakers and forums geared to the v.h.f. enthusiast you'll find anywhere. Shame I hadn't given in sooner and made the trip.

Needless to say, we'll be back. But we'll do it by plane next time.

How Will the New Rules Affect VHF

At the Dayton gathering and just about everywhere else right now, the excitement centers around the proposed rule-making to alter the structure of amateur licensing in the U.S. Basically, we feel that this is a good thing and one which at least makes an attempt towards the betterment of American hams in general. And it is widely felt that these rules will probably turn into law pretty much as is.

The question arises: How will these regulations affect VHF? If you have read the provisions of the proposal you are aware that the primary emphasis is on the international low-frequency DX bands where the greatest majority of ham radio addicts thrive. The six and two meter bands are apparently left pretty much the same as they have been for years.

After the completion of the FCC's two-year plan, operation below 50.250 and 145.000 mc would be restricted to holders of the new Amateur First Class and standard Extra Class licenses. In addition, there will be an absence of Novices in the 145-147 mc area.

At first glance, these changes do not appear revolutionary. Indeed they are not. But they will breed change, a change in average age of the operator, a change in operating procedure, and an overall change in the calibre of inhabitants. Spectrum space has not been vastly altered, nor even reallocated seriously. But we do feel that the basic structural changes in licensing will affect our two primary v.h.f. bands more than you may realize.

A change in the average age of the operator. Though not something you could sum up as either good or bad, the fact is that with the extension of the Novice term to 2 years and the relinquishment of all 144 mc privileges, the influx of "new blood" to the v.h.f. bands through this medium will cease. In many ways this is good, for only the graduating Novices with a sincere desire to experiment on the frequencies above 50 mc will put signals on the air. The idea of going for the Tech only to continue using existing two meter gear when the license expires has been nipped in the bud. Our prediction is that the graduating Novice who does go v.h.f. will get far more from it in years to come, as well as make more contributions to the true art, than ever before. But this will come at the expense of the 2 meter new-comer population. By the time he does get on two, though, he will be older and

FLASH: New 432 Mc Records Set

W5LUU of San Antonio, Texas, worked W4UWH, Auburndale, Fla., WA4BYR in Englewood, Fla., and W4GJO in Sarasota, Fla. A rough check of distances looks like about 1000 to W4GJO, 1010 to WA4BYR and 1040 miles to W4UWH. All contacts were made on 432 mc April 11 at 2050 CST. K5SDM & K5TUP (Houston area) also worked into Florida.

All these excede previous distances recorded for non-moonbounce 432 mc contacts by a wide margin according to information available.—*K2UYH*

*c/o Allen Katz, 48 Cumberland Avenue, Verona, New Jersey. This QTH is to be used until further notice.

This brilliant auroral display was photographed by Dr. C. W. Gartlein of the National Geographic Society and illustrates, as well as can be expected in black and white, what a good visual aurora looks like.

more eligible, perhaps for Civil Defense activities and society membership.

A change in operating procedure. Here we are talking mostly about six meters. Today, most everyone tunes 50.1 mc up. With the majority of amateurs above 50.25 there will be an obvious shift in frequency and perhaps some antenna trimming, but nothing serious enough to get disturbed about. Unfortunately, however, a good many AREC, CD and club net operations will be pushed upward with everyone else, but it shouldn't cost more than another set of surplus crystals and a few grumbles.

You'll find most opinions regarding procedure change contrary to ours. There is consternation in some circles over the Generals losing 144-145. It is our contention, however, that the General Class licensees, perhaps more than others, are better prepared to advance immediately to Amateur First Class to retain that privilege. The vast majority of high-speed c.w. inhabitants on two meters are Generals, and they shouldn't have much trouble climbing 3 w.p.m. to hold onto their keys.

The 50 mc band represents more change in operating tactics for the DX-chasing Technicians, since they will have to learn new ways and means of penetrating through band-edge QRM to avoid the accompanying TVI found in the more open frequencies above 50.500 mc.

Overall change in calibre. Overshadowing everything discussed thus far is the intangible item: the quality of ham populating the v.h.f. bands in years to come. With abolition of Novice phone privileges, rank beginners will come from another source: Citizens Band. This trend has already started and will only become reinforced by the new regulations, should they be adopted. A CB'er, and their numbers are approaching 800,000, will be more apt to go for his Technician right off the bat, since it will be the only remaining license available by mail (other than Conditional) with phone privileges. However, there is another side of the coin.

With a more technically-oriented licensing structure will come a gradual transition to a better class of ham in general. New Technicians will be communicating with Generals, Firsts and Amateur Extras. Therein lies his incentive, if he should need one.

It is our hope that the CB'er who grasps for a Technician license will progress upwards in amateur ranks, rather than stand alone among a large group of "true art" constituents. For him to fully appreciate the magnetism of amateur radio, he must first understand it. And this can best be done while learning. With this goal in mind, he will probably wind up on the low frequencies on s.s.b., the modern-day intrigue for many new hams.

The real Technician, on the other hand, needs no such incentive nor prodding. His license should not stand as an intermediary, but only as the means for permitting him operation in the v.h.f. region. The license was created for the experimenter and the ham who took v.h.f. seriously. And it should stay that way.

Our prediction is that over a long period of years six and two meters will return to the calibre of the early 1950's, when the bands were new, exciting and worth serious exploration. The challenges are *still* there. It only takes the right type of person to uncover them.

We do not feel that there will be any substantial loss in the v.h.f. population, contrary to what a great deal of people are saying. We predict a healthy increase of interested amateurs—hams who will get as much fun out of building as operating.

Comments are invited on this subject.

Canadians Get c.w. Bands

In line with recent efforts towards communicating via OSCAR III, the Department of Transport (DOT) has changed the rules for Canadian amateurs to permit only c.w. in the lower 100 kc of the six and two meter bands. These changes, now in effect, are intended to protect stations involved in weak-signal DX work, such as moonbounce, auroral reflection, etc.

Strong rumor also has it that the ARRL is once again urging the FCC to apply a similar restriction on the two meter band. At present, c.w.-only is permitted on 50.000 to 50.100 mc

and 147.900-148.000 mc. It is interesting to note that in spite of the comparatively intense c.w. activity by Americans in the first hundred kc of two, only a "gentlemen's agreement" insures its continuance. Perhaps *now* we'll have some action in Washington?

Aurora on the Rise?

Well not really, but if you used our mail as a yardstick you might be inclined to wonder. For six meter enthusiasts, especially, the complaint is that until you actually experience an auroral reflection, you never heard of it. "What is aurora?" seems to sum up a good deal of our manuscript-sized queries lately, so even though we're a bit out of season, here come some hilites (ooh).

Aurora displays as pictured in this month's column are seldom seen by the average person. But when one is sighted, it is a magnificent once-in-a-lifetime experience. Just this morning *CQ* Technical Director W2AEF was telling of the time he was night-fishing on an obscure lake in northern New Jersey when suddenly the sky was ablaze with color. Bill described the sight as "beams of multi-colored light emanating from every conceivable direction towards a central point." His aurora looked like a brilliant cartwheel, Fourth of July variety. Most people report an "eerie sensation" after sighting a bright aurora at night, particularly if there is no artificial light nearby to detract from the spectacle.

W3ASK has described the widespread display of March 1-2, 1957 as bands of "weird red, purple and yellowish-green dancing ribbons, violently throbbing rays and draperies of this great aurora throughout most of the country."

Rarely are the northern lights visible in southern states, although at times, such as the 1957 display, they have been sighted as far down as Del Rio, Texas.

Apart from the visual beauty of the lights, though, is their effect on the v.h.f. frequencies, especially six meters.

Auroras, at least the big ones, are believed to be caused by corpuscular radiation from active sunspots or solar flares which at certain times bombard the atoms and molecules of gases present in the upper atmosphere of the earth, causing them to ignite.

Intense auroras cause violent upheavals in the regular layers of the atmosphere causing low-frequency radio blackouts, varying in length of time and density. At the same time a sporadic formation of an intensely ionized layer about 60 miles above the earth permits v.h.f. propagation of several hundreds of miles.

This temporary reflective layer is of such a churning, ever-changing nature that regular communications even on v.h.f. frequencies is next to impossible. Regular a.m. phone transmissions are generally garbled beyond any recognition, although some have had success with extremely slow, repetitive speech.

The best way to use an aurora when it exists, is to swing your beam, preferably a long yagi, to the northwest, peaking the antenna on an aurora signal. This can be recognized by its garbled, rasping quality. Then convert operations to c.w. *(Don't stop reading. Aurora communications are generally made in the 5-10 w.p.m. area, and many are found calling CQ at three!)*

You will be pleasantly surprised at the signals you'll copy. Here in the NYC area it is not at all unusual to work into W8, W4 and VE3 call areas on a typical aurora. Contacts have been made with moderate transmitters coast-to-coast via auroral reflection, although this is rare due to the relatively low height of the ionized layer.

Phone operators with s.s.b. facilities are reporting good success using this mode instead of c.w. Even with the garbling side-effects, speech is still intelligible and more information can be conveyed in a shorter time, enhancing your chances of getting that rare-state QSL.

Few aurora signals will be S9 or even S5 for that matter. The intensity as well as the tone will be of sporadic quality, but seldom should you lose your captive. The most dramatic loss of signal comes as the aurora reflection dies down. This can be a gradual reduction of all aurora signals over a period of an hour or, more commonly, a rapid fade-out in a matter of minutes.

Auroras occur most frequently at the extremities of the earth. In the northern hemisphere they are seen on more than half the nights of the year along an arc swinging across northern Alaska, central Canada, the southern tip of Greenland, Iceland, over the northern tip of Norway and off the northern coast of Russia and Siberia. The visual displays are seen less often as you move southward, away from the area of maximum occurrence. Over the northern sections of the United States traces of aurora activity can be seen between 10 and 40 nights each year, while in southern areas of the country several years may pass before one is actually seen.

It is important to note that the visual sighting of an aurora display *is not necessary* for one to communicate via this propagation on the 50 mc band. In fact, in most instances, you won't even see a glow in the sky. The brilliant displays do yield fantastic results for v.h.f. operators (especially at two meters, where aurora work is not nearly so common), but good results can be obtained just by turning the beam northwest every so often to listen for "garbly" signals. If after a few minutes you are confident that the stations you're hearing are auroral signals, scoot down below 50.1 mc and give out with a c.w. "CQA".

There used to be a rule-of-thumb on six regarding "A" DX: You must run at least 100 watts to succeed. Today, you can expect to read on the back of an aurora contact's QSL: "Xmtr—10 watts." Naturally, the more power you have at hand the better your chances of making contact via a mediocre aurora, but this is not anywhere near as significant a factor today as it used to be. Why? Over the last ten years sub-

[*Continued on page 103*]

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June, 1968

Propagation

BY GEORGE JACOBS,* W3ASK

TWENTY meters is expected to continue to be the best band for DX openings during June. The band is forecast to open at sunrise, and it is expected to remain open to one DX area or another well into the hours of darkness. During periods of exceptionally good propagation conditions, 20 meters may remain open for DX almost around-the-clock.

Good 15 meter DX openings are forecast during the daylight hours to southern and tropical areas. An occasional opening to other areas of the world may also be possible during the month.

Few 10 meter DX openings are predicted for June, but some may be possible to southern and tropical areas during the afternoon hours.

In general, DX propagation conditions on 10, 15 and 20 meters are expected to be somewhat better this June, than last year. This improvement should result from the somewhat higher level of solar activity expected as the new sunspot cycle begins to rise.

The winter-time DX openings on the lower frequency bands are coming to a close until next fall. Seasonally high static levels and fewer hours of darkness in the northern hemisphere are both expected to result in poorer DX propagation conditions on 40, 80 and 160 meters during June and the summer months. While signal levels are likely to be weaker and the band noisier than during the winter months, some fairly good DX openings are forecast for 40 meters during the hours of darkness. Some 80 meter DX openings are also predicted for June, during the hours of darkness and the sunrise period. Few 160 meter DX openings are likely to occur during the month.

Atmospheric noise levels (static) increase considerably in June, and are expected to be noticeably high on all bands during the month.

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for June

	Forecast Rating & Quality			
Days	(4)	(3)	(2)	(1)
Above Normal: **1, 5, 9-10, 18, 28**	A	A-B	B-C	C
Normal: **2-4, 6, 8, 11, 14-17, 19, 21-22, 24-27, 29-30**	A-B	B-C	C-D	D-E
Below Normal: **7, 12-13, 20, 23**	C	C-D	D	E
Disturbed: **None**	D	D-E	E	E

HOW TO USE THESE CHARTS

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

3—With the forecast rating noted above, start with the numbers in parentheses at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating higher than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating reception conditions (signal quality, noise and less than 4). The letter symbols (A-E) describe fading levels) expected for each day of the month and have the following meanings: A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4—This month's DX Propagation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 1000 watts d.s.b. into a dipole antenna a quarter-wave above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

5—Local Standard Time for these predictions is based on the 24-hour system.

6—The Eastern USA chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9 and Ø areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid through July 31, 1965, and are prepared from basic propaganda data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

V.H.F. Ionospheric Openings

Recent sporadic-E propagation research[1] indicates that this type of propagation peaks during the month of June. Almost daily sporadic-*E* short-skip openings can be expected on 10 meters during June, with the skip distance ranging between approximately 500 and 1300 miles. Frequent 6 meter openings are likely to take place between distances of approximately 750 and 1300 miles, and some openings at a distance of approximately 1200 to 1400 miles also may be possible on 2 meters. During periods of intense sporadic-*E* ionization, "two-hop" openings, up to distances of approximately 2400 miles, may take place on 10 and 6 meters.

Sporadic-*E* openings are most likely to occur between 9 A.M. and 1 P.M., local time, and again between 5 P.M. and 9 P.M., although some openings may occur at any time. For a more complete discussion of sporadic-*E* propagation, and hints for predicting v.h.f. openings, see "Notes On Sporadic-*E* Propagation" in the June, 1962 issue of *CQ*.[2]

*11307 Clara Street, Silver Springs, Md. 20902.

[1]Monroe and Monroe, "50 Mc. Propagation Effects," p. 82, *CQ*, Nov. 1964.

[2]Jacobs, G., "Some Notes On Sporadic-E Propagation," p. 60, *CQ*, June, 1962.

No major meteor showers are expected to occur during the month, and very little auroral activity is expected during June. Check the "Last Minute Forecast" appearing at the beginning of this column, since v.h.f. openings are likely to occur during periods of ionospheric disturbances, or below normal conditions.

Sunspot Cycle

The Federal Solar Observatory at Zurich, Switzerland reports a monthly average sunspot number of 11 for March, 1965. This results in a 12-month running smoothed sunspot number of 10 centered on September, 1964. Solar activity appears to have remained practically constant at a minimum value of 10 during the four-month period June-September, 1964. A smoothed sunspot number of 18 is forecast for June, 1965, as the new sunspot cycle begins to rise.

This month's *CQ* Propagation Charts contain DX predictions to all areas of the world for June *and* July. Short-skip predictions for June, for distances between 50 and 2300 miles, and from Hawaii and Alaska, appeared in last month's column. Instructions for the correct use of this month's DX Charts appear directly below the "Last Minute Forecast" at the beginning of this column.

73, George, W3ASK

CQ DX Propagation Charts

JUNE AND JULY, 1965

Time Zone: EST (24-hour Time)

Eastern USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe & North Africa	15-18 (1)	05-06 (1) 06-09 (3) 09-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	19-22 (1) 22-00 (2) 00-02 (1)	21-23 (1) 23-00 (2) 00-01 (1) 23-01 (1)†
Northern Europe & European USSR	*Nil*	05-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-19 (1)	22-00 (1)	22-00 (1)
Eastern Mediterranean & East Africa	11-13 (1)	05-06 (1) 06-07 (2) 07-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-19 (1)	20-00 (1)	21-23 (1)
West Africa	14-17 (1)	04-06 (1) 06-08 (2) 08-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	21-00 (1) 00-02 (2) 02-04 (1)	00-02 (1)
Central & South Africa	*Nil*	05-06 (1) 06-07 (2) 07-14 (1) 14-16 (2) 16-18 (1) 01-03 (1)	22-23 (1) 23-01 (2) 01-03 (1)	23-01 (1)
Central Asia	*Nil*	05-08 (1) 18-21 (1)	*Nil*	*Nil*
Southeast Asia	*Nil*	05-06 (1) 06-08 (2) 08-10 (1) 18-21 (1)	*Nil*	*Nil*
Far East	*Nil*	06-07 (1) 07-09 (2) 09-11 (1) 20-23 (1)	*Nil*	*Nil*
Guam & Pacific Islands	18-20 (1)	16-22 (1) 22-00 (2) 00-06 (1) 06-09 (2) 09-11 (1)	01-02 (1) 02-05 (2) 05-06 (1)	02-05 (1) 02-04 (1)†
Australia & New Zealand	19-22 (1)	15-22 (1) 22-00 (2) 00-06 (1) 06-09 (2) 09-11 (1)	01-02 (1) 02-05 (2) 05-06 (1)	03-05 (1) 03-04 (1)†
North & Central South America	13-15 (1)* 15-17 (2)* 17-18 (1)* 08-09 (1) 09-11 (3) 11-13 (2) 13-14 (3) 14-17 (4) 17-19 (3) 19-21 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-16 (2) 16-18 (3) 18-21 (4) 21-22 (3) 22-00 (2) 00-06 (1)	19-21 (1) 21-00 (2) 00-03 (3) 03-05 (2) 05-06 (1)	22-01 (1) 01-04 (2) 04-05 (1) 01-03 (1)†
Southern Brazil Argentina, Chile & Uruguay	14-17 (1)* 08-11 (1) 11-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	05-06 (1) 06-10 (2) 10-14 (1) 14-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-01 (1)	21-00 (1) 00-02 (2) 02-06 (1)	00-04 (1) 02-04 (1)†
McMurdo Sound, Antarctica	14-17 (1)	14-16 (1) 16-18 (2) 18-22 (1)	03-07 (1)	*Nil*

*Predicted 10 meter openings, all others in column are 15 meter openings.

†Predicted 160 meter openings, all others in column are 80 meter openings.

JUNE AND JULY, 1965

Time Zones: CST and MST (24-hour Time)

Central USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe & North Africa	15-17 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-20 (1)	20-22 (1) 22-00 (2) 00-01 (1)	21-23 (1)
Northern Europe & European USSR	*Nil*	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-18 (1)	21-23 (1)	*Nil*
Eastern Mediterranean & East Africa	*Nil*	05-06 (1) 06-07 (2) 07-14 (1) 14-16 (2) 16-18 (1)	20-23 (1)	*Nil*
West Africa	*Nil*	05-06 (1) 06-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-20 (1)	21-00 (1) 00-01 (2) 01-03 (1)	00-01 (1)
Central & South Africa	*Nil*	05-06 (1) 06-07 (2) 07-14 (1) 14-16 (2) 16-18 (1) 00-02 (1)	22-23 (1) 23-00 (2) 00-02 (1)	22-00 (1)
Central Asia	*Nil*	05-09 (1) 18-21 (1)	*Nil*	*Nil*
Southeast Asia	*Nil*	05-06 (1) 06-09 (2) 09-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	*Nil*	*Nil*

Far East	21-23 (1)	06-07 (1) 07-10 (2) 10-20 (1) 20-22 (2) 22-00 (1)	04-06 (1)	*Nil*
Guam & Pacific Islands	14-18 (1) 18-20 (2) 20-22 (1)	02-06 (1) 06-09 (2) 09-17 (1) 17-19 (2) 19-22 (3) 22-02 (2)	00-02 (1) 02-06 (2) 06-07 (1)	01-06 (1) 03-05 (1)†
Australia & New Zealand	15-17 (1) 17-19 (2) 19-22 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-18 (1) 18-20 (2) 20-23 (3) 23-01 (2) 01-03 (1)	00-02 (1) 02-05 (2) 05-07 (1)	02-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)†
North & Central South America	14-15 (1)* 15-16 (2)* 16-17 (1)* 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-06 (1)	19-21 (1) 21-23 (2) 23-02 (3) 02-04 (2) 04-05 (1)	21-23 (1) 23 02 (2) 02-04 (1) 00-02 (1)†
Southern Brazil Argentina, Chile & Uruguay	13-16 (1)* 08-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17--9 (4) 19-21 (3) 21-22 (2) 22-00 (1)	20-23 (1) 23-01 (2) 01-05 (1)	23-04 (1) 01-03 (1)†
McMurdo Sound, Antarctica	13-15 (1)	12-16 (1) 16-18 (2) 18-21 (1)	03-07 (1)	*Nil*

Far East	12-14 (1) 20-22 (1)	06-07 (1) 07-09 (2) 09-18 (1) 18-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	01-02 (1) 02-05 (2) 05-07 (1)	01-04 (1)
Guam & Pacific Islands	14-17 (1) 17-20 (2) 20-21 (1)	02-07 (1) 07-09 (2) 09-11 (1) 11-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2)	23-01 (1) 01-04 (3) 04-06 (2) 06-07 (1)	23-01 (1) 01-04 (2) 04-06 (1) 02-04 (1)†
Australia & New Zealand	14-17 (1) 17-20 (2) 20-22 (1)	01-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-18 (1) 18-20 (2) 20-23 (3) 23-01 (2)	23-01 (1) 01-04 (2) 04-07 (1)	00-02 (1) 02-04 (2) 04-06 (1) 02-04 (1)†
North & Central South America	14-17 (1)* 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (2) 18-19 (1)	06-08 (3) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-20 (4) 20-22 (3) 22-23 (2) 23-04 (1) 04-06 (2)	19-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-04 (1)	20-22 (1) 22-00 (2) 00-03 (1) 00-02 (1)†
Southern Brazil Argentina, Chile & Uruguay	12-14 (1)* 08-11 (1) 11-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-18 (1)	05-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (4) 18-20 (2) 20-22 (1)	20-22 (1) 22-01 (2) 01-04 (1)	22-04 (1) 00-02 (1)†
McMurdo Sound Antarctica	12-16 (1)	11-16 (1) 16-18 (2) 18-20 (1)	19-21 (1) 02-07 (1)	*Nil*

JUNE AND JULY, 1965

Time Zone: PST (24-hour Time)

WESTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe & North Africa	*Nil*	20-22 (1) 05-06 (1) 06-08 (2) 08-13 (1) 13-16 (2) 16-17 (1)	19-23 (1)	*Nil*
Northern Europe & European USSR	*Nil*	05-07 (1) 07-09 (2) 09-16 (1) 20-22 (1)	20-22 (1)	*Nil*
Eastern Mediterranean & East Africa	*Nil*	06-11 (1) 11-14 (2) 14-16 (1) 20-22 (1)	*Nil*	*Nil*
West & Central Africa	09-11 (1)	21-23 (1) 05-06 (1) 06-08 (2) 08-13 (1) 13-16 (3) 16-17 (2) 17-18 (1)	20-23 (1)	*Nil*
South Africa	*Nil*	05-07 (1) 07-08 (2) 08-13 (1) 21-23 (1)	19-20 (1) 20-21 (2) 21-22 (1)	19-21 (1)
Central Asia	*Nil*	07-11 (1) 17-18 (1) 18-20 (2) 20-21 (1)	*Nil*	*Nil*
	(1)	(1)	(1)	*Nil*

SPACE COMMUNICATIONS

BY GEORGE JACOBS,* W3ASK

THE v.h.f. translator aboard the OSCAR III communication satellite is silent. It appears to have ceased operating on March 25, 1965, after the satellite had completed more than 230 orbits. The telemetry beacon on 145.85 mc, however, continues to operate as the satellite orbits the earth every 103.5 minutes.

During the operational life of the translator, March 9-25, more than 100 successful two-way QSO's took place through the satellite, between radio amateurs on at least three continents. The translator's life was about two weeks shorter than had been originally anticipated. A preliminary examination of telemetry data transmitted back to earth from the satellite indicates that the cause of failure was due to prematurely low primary battery voltage. A normal battery level of approximately 17.5 volts was recorded until March 23. Beginning with orbit 187, it appears that the battery voltage became erratic, dropping below the minimum required for operation of the translator for short periods of time. By March 25, the primary battery had apparently deteriorated to the point where the translator failed completely.

As the primary source of power failed, an internal relay switched the satellite's telemetry transmitter to an auxiliary 10.5 volt battery, which is rechargeable by a small bank of solar cells mounted on the satellite's outer surface. Telemetry data examined during late April indicates that the transmitter on 145.85 mc is operating very well during periods when the satellite is in sunlight, but it fails occasionally when OSCAR III is in darkness. The transmitter is expected to operate for at least the next several months, and possibly as long as a year.

The OSCAR III *project has not ended with the silencing of the translator.* Telemetry data (battery and internal temperature readings), from the satellite is now more important than ever. Operating data is still required that will enable an even more efficient OSCAR IV satellite to be designed and launched. For this reason, Project OSCAR headquarters urges that as much telemetry data as possible be obtained during the remaining life of the beacon transmitter.

Methods for decoding OSCAR III telemetry data, including temperature and voltage calibration curves, can be found in the SPACE COMMUNICATIONS column in the March, 1965 issue of *CQ*. Telemetry reception reports should be forwarded directly to Project OSCAR, Foothill College, Los Altos Hills, California, USA. Orbit predictions for the OSCAR III satellite, made for an entire month in advance, can also be obtained from the above address.

*11307 Clara Street, Silver Springs, Md. 20902.

Preliminary Results

Excellent results have been reported during the satellite's 17-day life as a space-relay of 2 meter signals. More than 100 two-way QSO's through the satellite have been verified, and reports continue to be received at Project OSCAR headquarters. On some orbits, as many as 50 different stations have been reported heard through the satellite, and on one orbit, 70 stations in no fewer than 8 different countries were identified!

Use of the satellite by radio amateurs in the United States and Europe was good. Regretfully, no reports of activity have as yet been received from South America, Africa or Asia, and only a trickle from Australia and New Zealand. An earlier report of a two-way QSO between the United States and Argentina was in error.

Now that the translator aboard OSCAR III is silent, Project OSCAR headquarters is compiling a list of all two-way QSO's confirmed, as well as a list of all stations reported heard through the satellite. While it may be some time before these lists are completed, the following are summaries of information received from radio amateurs in various parts of the world.

From Alaska, France, Russia, Etc.

KL7CUH in central Alaska reports working K2IEJ and WA6MGZ. He also reports hearing the following stations:
K2GUG, WA2WEB, W3SDZ, K4YYJ, W4WNH, K5TQP, K5WXZ, W5UKQ, K6GCD, WB6JZY, WB6KAP, W6GDO, W6TYM, K7DZG, K7ICW, K7SDK, W7EGN, W7UAB, W8NNH, K9AAJ, K9UIF, KH6DEM, VE6NT.

From France, F3NB reports hearing:
DJ2AQ, DJ3EN, DJ4AU, DL3YBA, DL9GU, EA4AO, G3EDD, G3LTF, G6AG, G6GN, HB9RG, I1HC, K2MWA/2, LZ1KBA, OK2WCG, ON4FG, ON4TQ, SM5BIZ, SM6PU, SM7BA, SM7BCX, SM7OSC, W1BU.

F8DO reports hearing:
DJ3ENA, DL3YBA, G6OX, HB9RG, K2IEJ, ON4TQ, SM5BSZ, SM7OSC, SM7ZN, W1BU.

From Lithuania, UP2ON reports that OSCAR III caused considerable excitement among the v.h.f. radio amateurs in the Soviet Union. As the satellite streaked along its orbit 585 miles in space, a network of Russian radio amateurs located in seven Soviet Republics tracked its signals. UP2ON reports working HB9RG, SM5BIZ and SM7OSC through the satellite, as well as hearing DL3YBA, EA4AO, G6AG, OH1NL and ON4FG on c.w., and DJ4JC on s.s.b. UP2ON used a kw amplifier and a 9-element Yagi antenna for OSCAR QSO's. UP2ABA, however, reports working SM7OSC using only 120 watts, into a 13-element Yagi antenna.

In Estonia, UR2BU, UR2CQ, UR2DE and UR2CB tracked the satellite and reported hearing DJ2RSA, DL3YBA, EA4AO, G6AG, HB9RG, OK2WCG and SM7OSC.

The first Finnish radio amateur to hear OSCAR III appears to have been OHØAZ, who copied the telemetry beacon at his Aland Island QTH on March 10. On March 11, OH2AZT, OH2-BAA, OH2BBA and OH2DV teamed up to operate OH2DV's equipment to become the first Finnish radio station ever to communicate through a space satellite when they worked DL3YBA.

In the Arctic area of Canada, VE8BY reports hearing all US districts using a simple converter and a ground-plane antenna. While from down-under, ZL2APC reports hearing ZL2CD, who was using only a 60 watt transmitter.

K9AAJ reports 11 confirmed QSO's through the satellite, in 9 different states, as follows: K2IEJ (NY), WA2WEB and K2MWA/2 (NJ), WØIDY and WØNWX (Iowa), K4QIF (N.C.), KØCER (S.D.), K5TQP (N.M.), W6KEV (Cal.), W1HDQ (Conn.) and WØEYE (Colo.).

K1HTV heard 63 different stations in all continental USA call areas, as well as VE3, using an Ameco converter and an 11-element Yagi, only seventeen feet off the ground. K1HTV ran 25 watts into this antenna during one of OSCAR's flyovers, and was reported heard through the satellite by W1VTU!

In northern Italy, I1ER, I1BBB and I1TOC formed a tracking team, and between them they managed to track the satellite around-the-clock, catching almost every orbit that passed within range. They report hearing the following stations:

DJ3EN, DJ3NC, DJ4ZC or DJ4JC (s.s.b.), DJ9DI (?), DL3ODA, DL3YBA, DL9GUE, G6AG, HB9RG, SM7OSC.

Mario, I1ER, reports that several other stations were heard on ssb, but could not be identified. He plans to recheck the thousands of feet of tape recordings made in an effort to establish positive identification of some of these stations. Mario reports that listening to signals relayed from OSCAR III recalled to mind for him the long nights he spent more than forty years ago listening to the first radio amateur trans-Atlantic signals on shortwave.

Antenna problems limited activity at the International Amateur Radio Club in Geneva (4U1ITU), but they did manage to hear DL3-YBA and HB9RG. While an early report from SV1AB in Athens, Greece, verifies reception of HB9RG, DL3YBA and several other German stations.

While there were no reports of any Irish stations working through the satellite, interest was very keen in the Emerald Isle. EI6D reports that he, EI2A and EI4Q teamed up to track the satellite, and they report hearing good signals from a number of European stations, in particular, DL3YBA, G6AD, HB9RG and SM7OSC. They also report strong signals from the East Coast of the United States, led by W1BU, K2GUG, K2MWA/2 and W9ZIH.

OSCAR Malfunctions

Although the OSCAR III experiment has been an historic achievement for amateur radio, and beyond the wildest dreams of a few years ago, some malfunctions in the equipment aboard the satellite have been reported. The c.w. beacon transmitter on 145.95 mc failed to operate; the translator's passband was approximately 15 kc lower than originally planned, and the translator's sensitivity was about 12 db lower than expected. The reduced sensitivity made it more difficult for lower power stations to work through the satellite than had been expected.

Based upon preliminary examination of telemetry and other data, Project OSCAR headquarters attributes the failure of the c.w. transmitter and the 15 kc shift in the translator's frequency to the influence of the 200 G force which acted upon the satellite at the moment it was ejected from the carrier rocket. It is theorized that this force shattered the crystal in the beacon transmitter causing it to be inoperative, and chipped the crystal in the translator, causing it to shift frequency.

The cause of the reduced sensitivity in the translator is still under investigation.

Kudos Kudos

The OSCAR III communications satellite, officially catalogued as 1965-16-F, has been hailed as a success not only for amateur radio, but for space communications in general. Although built entirely by radio amateurs, and operating in the 2 meter band, the satellite became the first truly free, multiple-access communication satellite to be placed in orbit. That is, it was available for use by radio amateurs in any country of the world, freely and on an equal basis. In many instances, radio amateurs communicating through OSCAR III (for example, amateurs in Australia, Switzerland, Finland, Lithuania, etc.) marked the *first time* that space communications experiments were conducted in these countries.

Orbiting high in space, the OSCAR III communication satellite not only opened a new era for amateur radio, but it is also a harbinger for the way in which man will communicate with one another in the future, with greater freedom, efficiency and economy.

Congratulatory messages have poured into Project OSCAR headquarters from all parts of the world. They come from individual radio amateurs, from radio amateur organizations, and from government officials. The following is a sample of but a few.

Congratulations . . . on successful launch and operation of OSCAR III. *In creating an amateur relay satellite, radio amateurs have again achieved a notable "first" in the field of radio communication.*—E. W. Henry, Chairman, FCC

Congratulations . . . This outstanding feat reflects the highest credit upon all radio amateurs associated with the project. Once again . . . (the) radio amateur has proven his ability to contribute to the advancement of the art and the enhancement of international goodwill. —Rear Adm. Roeder, Director Naval Communications, CNO.

Congratulations . . . on behalf of ARRL . . . on a magnificent job of creating OSCAR III . . . *This is another great achievement for amateur radio . . .*—Herbert Hoover, W6ZH, President, American Radio Relay League

Congratulations . . . This is another milestone in the

[*Continued on page 96*]

the USA-CA PROGRAM

BY ED HOPPER,* W2GT

THE big story this month is—"COUNTY HUNTERS' NET SAVES 8 LIVES"—but first let me review the awards and endorsements issued up to April 8. Louis, K8IWI and Pappy, WA9AJF, received USA-CA-2500 awards for mixed operations. For mixed operations, John, K8YGU and Carl, WØVFE, received USA-CA-2000 awards and John, K8YGU, received USA-CA-1500 and USA-CA-1000 both for All 7 mc s.s.b. as well as having his USA-CA-500 award endorsed for All 7 mc s.s.b. Chas, W9HUF, received USA-CA-1500 for mixed operations. USA-CA-1000 award went to Robert, K9WSL for mixed operations and he also received USA-CA-500 endorsed for All 7 mc s.s.b. USA-CA-1000 awards for All 7 mc s.s.b. went to Joseph, W2JWK and Glenn, K8VZW. Seven USA-CA-500 awards for mixed operations went to: WA5FRN, WA9FXJ, K9KCQ, WA9KHW, WAØDGW, KØEQY and LA2MA who is the second Norway station to receive any USA-CA award. Three USA-CA-500 awards for All 7 mc s.s.b. went to W2JWK, K8VZW and K9WSL. K9QJT merited one for All c.w.

County Hunters' Net Saves 8 Lives

Amateur Radio proved itself again during one of the worse winter blizzards in Minnesota history when it provided a communications link between eight stranded motorists, their families and state authorities last March 17-18. Many thanks for all the letters received with all the details, I will try to quote from them all and especially those from WØKZZ, K8CIR and W9ICF.

It started when Carl, WØKZZ, who was enroute from his home in Fargo, N. Dakota, to Minneapolis, was trapped in drifted snow on a highway near Paynesville, Minnesota. Although the storm had developed slowly, it struck with sudden force about 11 A.M., shortly after Carl had left Paynesville. He was able to go about five miles before his car became stuck. Within a short time, six other cars became stranded in the same location. WØKZZ had been operating s.s.b. mobile on the 40 meter "County Hunters' Net" during his trip. As soon as it was apparent that the cars were trapped for the duration of the storm and that help might not be available for some time afterward, the County Hunters established an emergency net on their 7.223 mc frequency. From the beginning, K8CIR and W9ICF were alternate net controls. One of the first contacts was KØSPH who patched Carl, WØKZZ to his XYL. All during the day, messages were relayed to the families of the snowbound men. The highway patrol and highway department both were alerted for possible rescue attempts.

No rescue or relief was possible the first night, as the strength of the winds increased to over 50 m.p.h., and the total snowfall of 16 inches produced packed drifts up to 15 feet or more. Visibility was zero. Thus, it was impossible for plows to work, although two were sent out—unsuccessfully. The temperature dropped to 10 degrees, further communication was suspended as the motorists doubled up in cars to conserve gasoline so that adequate heat would be available as long as possible.

Communication was again established at 7 A.M. the next morning. By this time, the men had been without food or water for 24 hours and the situation was further complicated because one of the men had a severe case of ulcers and required a special diet.

During the morning, WØKZZ was on the air only at half-hour intervals to conserve a steadily-depleting supply of gasoline. Additional attempts to send snowplows proved futile and the high winds and zero visibility made it impossible for any air drops of food or fuel.

All local radio stations and television stations were telling about the stranded motorists and fortunately, Boyd Brown, a farmer living within less than a mile of the spot, heard these broadcasts and recognized the area and made his way to the cars and offered his home to the men. An official of the highway patrol advised the men to leave their cars and walk to the house because plows would not be able to get through for another 24 hours.

A measure of the storm's intensity can be gained by the fact that it took about one hour to walk the ¾ mile to the house, one man had to be carried most of the way, and the farmer's two teen-age children—who had come out to help—also had to be assisted back to the house.

By this time, the group had been without food or water for over 30 hours. The farmer and family fed them and provided lodging for them for the second night.

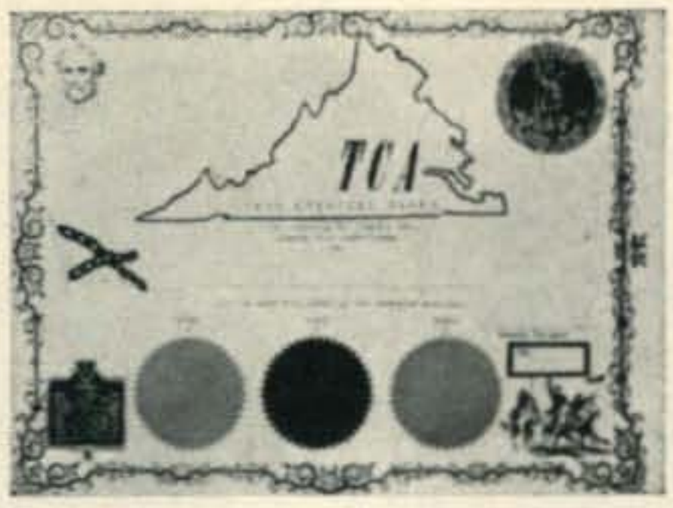
Finally, during the morning of the third day, snowplows were able to reach the stalled cars.

*103 Whittman St., Rochelle Park, New Jersey.

USA-CA HONOR ROLL

3000		1500		500	
K9EAB	1	K8YGU	31	K9WSL	466
		W9HUF	32	K8VZW	467
				WA9FXJ	468
2500				WAØDGW	469
K8IWI	9	**1000**		WA5FRN	470
WA9AJF	10	K9WSL	72	WA9KHW	471
		K8VZW	73	W2JWK	472
		W2JWK	74	KØEQY	473
2000		K8YGU	75	K9KCQ	474
K8YGU	18			LA2MA	475
WØVFE	19			K9QJT	476

Metropolitan Nashville Award



TCA—Twin Counties Award

CARNATION Award

After additional shoveling, the men were able to drive to Eden Valley, a small town four miles ahead, to re-fuel and then drive home.

When the plows reached the cars, all were nearly out of gas. We will leave it to you to figure what could have happened to them all, if there had not been amateur radio on the job again. The fact is that ham radio provided a great public service during this emergency. It reassured families, notified authorities for rescue efforts, provided information to news media and undoubtably saved lives. Proving again that amateur radio is more than "just a hobby."

Unfortunately, not everyone cooperated. One western lid (a WØ who certainly should know better) seemed to take a special delight in QRMing the frequency and refusing to acknowledge the emergency, perhaps someone had time to take this deliberate QRMing down on tape and will forward it to the FCC. Among the many who really helped are: K8CIR, W9ICF, W2JWK, W3CTN, WA4NBC, W4OHP, W4ZDK, W6DIX/6, K8IWI, K9BLX, KØAHH, WAØCSL/Ø, WØJWD, WØMBD, WØMLY, WØRHT, KØRTH, WØRVO, KØSPH, WØVFE, KØZFE, WØZQB, KØZZR and any that we missed, plus the many fine public servants in the various state departments.

County Identity

Another appeal for fellows (or YLs/XYLs) who are willing to help DX stations to locate counties. Maps and P.O.D. #26 are hard or impossible for them to get, and in the past MANY U.S. stations failed (and some still do) to mention their county on their QSL. In fact if anyone has an extra P.O.D. #26 they would like to donate to a needy DX Station, I will be happy to supply call and QTH of the needy DX station, so that the giver will get full credit and thanks W5EMZ, Raymond A. Forman, 706 Comer St., Carthage, Texas 75633 is willing to help *ANY* ham locate counties. Of course this is a fine way to get a pen pal, or some foreign stamps or help yourself with a foreign language.

Directory of Islands

Geoff Watts, 62 Belmore Road, Norwich, Norfolk, NOR. 72.T, England, well known for his weekly *DX News-Sheet,* now has a Directory of Islands containing some 500 entries which will be the rule book of the Islands On The Air Award to be available by the time this item is in print. Cost of the Directory (including postage) is: U.K. 2/- or 4 IRCs, abroad 4 IRCs; by air mail: Europe 6 IRCs, U.S.A. 8 IRCs, Pacific 9 IRCs.

Caravan and Rare Counties

Pete Grillo, W5LZG (ex-DL5HI, K9PDH) of 1214 3rd Ave. North, Texas City, Texas 77590, writes—"Beginning the morning of 3 July and terminating the 18th of July, I will set forth on a 4,000 mile rare county caravan through Texas, New Mexico, Colorado, Wyoming and Montana. Approximately 100 counties will be traversed including about 40 in Texas. C.w. frequencies will be 7030, 14060 and s.s.b. on 7215, 14330. The general route planned is as follows: Texas City, Austin, Ft. Stockton, Albuquerque, Denver and then up U.S. 87 to Lewistown, Montana at W7QYA. The return trip will vary slightly so as to cover as many rare counties as possible. As I have never been a county hunter myself, I know little concerning the rarity of certain counties, so please have county hunters write me about rare counties and other suggestions. Mail can still reach me at the callbook address in Houston or the above address. All persons contacted from any county will receive a special QSL with QSO information confirming each contact regardless of number of contacts made by one station. One ham can follow me all the way for a QSO in each county and thereby receive QSLs for 20% of a USA-CA award. So, fellows write about those rare counties and I will try to arrange overnight stays in motels in the more rare ones."

Bud Yeider, K4DNF, writes– "I am employed at Yellowstone National Park and will operate from there June, July and August this summer. I will be on 80-40-20-15 and 10 and will start on 14300 at 2330 GMT June 15th. This will be from Teton County, Wyoming."

Phil R. Greene, WA2NDC, Box 188, Lowville, N.Y. writes. ."I supply many QSOs and of course QSLs from Lewis County, not many operating from this county, especially on c.w. and even less on lower frequencies. I operate mostly on c.w. and at present most mornings from 6:30 A.M. to 7:30 A.M. on 3650 ks and sometimes s.s.b. on 3950 kc."

Letters

Carl, WØVFE, writes– ". . . On the net, the noted saying is, I don't just collect the counties, I collect many new friends."

The PENNA Award Series

55 County Club

WPA—Worked Piqua Award

Clyde, WA9AJF (Better known as Pappy) writes—". . . County hunting is still a *GREAT* program and no matter what net you check in, you will hear one ham ask another what county he is in, etc.

The greatest hunt I ever heard was today in various s.s.b. nets through the day. They were looking for a blood donor from a person over 17 years old that had had chicken pox in the last 30 days for a 6 year old girl in Billings Hospital in Chicago, in an attempt to save her life. I was in the Noon No. Central net and heard it, then went to 20 meters in the CHC/FHC svc. net and everyone from Alaska all over was checking the various military bases for such blood. At 4:25 P.M. CST the operator in Chicago announced the blood had been located, this was a great boost for amateur radio. Here I am still plagued with those darn anginas entirely too frequently so am going for my 54th cardiogram before long. . . . I must take care of myself as I've got to get those 3,000 counties."

John McColly, WB2LZF/W9OIJ writes—". . . From time to time I make County-expeditions with my Illinois call—to keep it active for renewal purposes—and I will try to keep you posted in time to make *CQ* deadlines. I am building a special little portable rig which will run about 150 watts c.w. to take on expeditions for various QSO parties, etc. It should be ready this summer."

Awards

CARNATION AWARD, sponsored by the Ohio VHF CHC Chapter 14 is a truly representative of the State of Ohio to advertise Ohio, to publicize its colors, the Seal and to get more amateurs to work into Ohio, preferably on v.h.f. The award is available to all amateurs, regardless of bands. To receive it one must work 14 members of this organization from the State of Ohio, 7 from all others, however 2 from the 7 must be from the State of Ohio. DX need only 3 contacts with no limitations. Send GCR list and 75¢ to George Buza, W8FKU, 465 Forestview Road, Bay Village, Ohio 44140. For membership list sent s.a.s.e. to K8VMY. This is a new and beautiful award.

WPA, The Worked Piqua Award sponsored by the Piqua Radio Club of Piqua, Ohio. The design on the award is rather unusual and is a copy by a local artist depicting the theme of an old legend about some Indians burning a man at the stake. They saw a vision of the man coming up out of the smoke and were startled, and exclaimed "Man Out of Ashes." Piqua with a population of about 20,000 is the only city in the world with a nuclear power plant for municipal power and also has the first rural electric power pole in the U.S.A. Requirements: Stations in U.S.A. work 5 Piqua amateurs, DX work 3. No time limit, all bands and modes ok. Send GCR list with date, time, band information and $1.00 fee to Darrel Fogt, W8BZX, 917 Grant St., Piqua, Ohio 45356. Active Piqua hams are: K8 BLC, CEV, CIW, DSP, ETA, LVK, LYU, LZD, MDB, OGN, TOS, UAS, UXM, VYO. W8 BZX, CPR, ICQ, IHJ, JDQ, JEI, JYK, KOJ, LOF, OHU, ORK, PFC, QHV, SWS (Club), THJ, W4FES/8. WA8 CFS, DWG, EAI, ECC, KCB, LSR.

The PENNA Award series is a series of 5 awards sponsored by the Lake Shore Amateur Radio Association.

1. **PENNA Cities**—for working 10 largest cities in Pennsylvania—1. Philadelphia, 2. Pittsburgh, 3. Erie, 4. Scranton, 5. Allentown, 6. Reading, 7. Harrisburg, 8. Bethlehem, 9. Altoona, 10. Chester. DX stations need 8 cities and may substitute Wilkes-Barre, Lanchester, York and Johnstown.

2. **VHF** for Pennsylvania contacts on 6 meters and above. Pennsylvania stations work 25 stations in 15 counties, rest of U.S. and VE work 20 stations in 10 counties. DX work 10 stations in 5 counties.

3. **Pennsylvania Novice**—Penna. stations work 25 novices in 15 counties, rest of US and VE work 20 novices in 10 counties. DX work 10 novices in 5 counties.

4. **Pennsylvania YL**—Penna. stations work 25 YLs in 15 counties, rest of U.S. and VE work 20 YLs in 10 counties. DX work 10 YLs in 5 counties.

5. **Pennsylvania Mobile**—Penna. stations work 25 mobiles in 15 counties, rest of U.S. and VE work 20 mobiles in 10 counties. DX work 10 mobiles in 5 counties.

No endorsements, no starting time. Fee is 50¢ or 5 IRSs. Send GCR list (Not QSLs) to Gerald

[*Continued on page 105*]

RTTY

BYRON H. KRETZMAN,* W2JTP

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc on h.f.

80 meters	3620 kc
40 meters	7040 kc
40 meters (narrow shift)	7140 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.60 mc
2 meters	146.70 mc

MACHINES, machines. "Fine, but where can I get one?" This is question number one. Question number two is, "What model should I get?" Another version of question number two is, "What kind of tape gear should I get?" These are the questions most frequently asked, by mail and even by telephone. At this time we will try to answer each of these briefly, within the space limitations of your RTTY Column.

Which Machines are Available

First of all let us discuss *used* machines, and we will refer only to those machines made by the Teletype Corporation. (Those made by any other company are far too few.) Under the general heading of "page printers" lie these models:

Model 12–This is the most ancient, and most complex electrically, of printers used by the RTTYer. It is noisy both mechanically and electrically. It cannot be used on the h.f. bands without extensive rewiring, shielding, and the use of electronic keyer tubes. Since later model machines that don't need this treatment became available, most Model 12's lie in cellars or in junk yards. *If* they can be found, they can usually be had for free (if you carry it away) or for just a few dollars.

Model 26–This light duty machine was used mainly in the Bell System TWX service. Its manufacture was discontinued in 1937 but it was retired from active service largely during the years 1955 to 1960. It is more quiet and lighter than the newer Model 15, quite suitable for RTTY. Their cost runs about $55 to $75, the higher price prevailing if the machine is equipped with the W9UE automatic carriage return and line feed, now unavailable.

*431 Woodbury Road, Huntington, N. Y. 11743.

Model 15–This machine at present is the most available, many via MARS as the TG-7B. It was used to replace the Model 26 in the TWX service, and is still used by most commercial radio communications companies although its manufacture was discontinued in the early 1960's. The Model 15 was made for heavy duty so it is considerably more rugged than the Model 26. It sells now for $75 to $100 to the RTTYer, depending upon condition, type of motor, and with what gears it is found. (The military versions usually come with series governed motors rather than synchronous motors, and many of the ex-commercial machines come with 75 w.p.m. gears.)

Model 28KSR– This machine, still in production, is a heavy duty machine, availability being limited to those re-built by certain energetic individuals. Their cost to the RTTYer runs about $200 to $400. Some Model 28's have been let out by MARS, many of these with series governed motors rather than synchronous motors.

Secondly, let us discuss *new* machines. Up until very recently not even new machines could be bought by the individual radio amateur directly from the Teletype Corporation. Now it is possible for us to buy, as individuals, directly from Teletype, the new Model 32KSR page printer. This is a light duty machine designed initially for TWX use but quite suitable for use by the RTTYer. Its cost, including shipping, runs between $400 and $500.

Tape Equipment

For obvious reasons it is not recommended that the newcomer to RTTY invest right away in a more complex machine that handles perforated tape. In this category lie the Automatic-Send-Receive machines:

Model 19–This is a *set* which includes a special desk-size table upon which is mounted a Model 15 page printer equipped with a different keyboard to enable the operator to perforate tape. Also mounted on the table is a Model 14 Transmitter-Distributor that permits automatic constant-speed transmission of the punched tape. Of the same vintage as the Model 15 page printer, the Model 19 is also still used by the commercial radio companies. It sells for $250 to $400, depending again upon condition, motors, and gears with which it is equipped. These also have been known to be gotten via the MARS program, some with 75 w.p.m. gears which must be changed for ham band use.

Model 28ASR– This is also a *set* which includes a desk-size console, rather than a desk, and the page printer is of the Model 28 series as is the tape TD. Some Model 28ASR's also come with a typing reperforator. Like the Model 28KSR, it is still in production and has limited availability. Rebuilt machines can be bought by RTTYers for around $1,000 from individual rebuilders.

Perhaps, under the category of "tape" equipment, we should mention the Model 14 "strip" printer. This is a small machine with a type basket like the Model 15 page printer but it prints out the characters on a narrow paper

tape, unperforated. Not too many of these are around now although they were used to a fair extent around 1955, when page printers were more scarce. As the result of the present low demand, these printers go for anything from $6 to $25, depending again upon condition and with what motors they may be equipped.

Where to Get Machines

The first place you should check to obtain a *used* machine should be the organized RTTY society. Among these are:

The RTTY Society of Southern California, Inc.
372 Warren Way, Arcadia, California 91007

The Illiana Teleprinter Society
9630 S. Greenwood Ave., Chicago, Illinois 60628

The RTTY Society of Michigan
4152 Cumberland, Berkley, Michigan

Northern California Amateur Radio Teleprinter Society, Inc.
46 Chicago Way, San Francisco 24, California

Florida RTTY Society, Inc.
P.O. Box 6047, Daytona Beach, Florida

Portland (Oregon) RTTY Club
3705 S.W. Stephenson St., Portland 19, Oregon

Wisconsin Amateur Teleprinter Association
5215 Morningside Drive, Greendale, Wisconsin

The second source that should be checked are those individuals who rebuild and deal in machines. These are: Les Johnson WA9HDG, RR 1, Tinley Park, Ill.; Larry Amelung WØNOY, 3409 St. William St. Ln., St. Ann, Mo.; Felix Esteban W2ZKV, 8424 57th Ave., Elmhurst 73, N.Y.; Elliott Buchanan W6VPC, 1067 Mandana Blvd., Oakland 10, Calif.; and, J. Thomsen W9YVP, 11001 S. Pulaski, Chicago 60655. We might mention at this point that the necessary gears to get speeds down to 60 w.p.m. are also available from most of the above sources.

To obtain a *new* Model 32KSR, contact Mr. Ralph Larson at the Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois. While you are at it, you might check with him the price and availability of the *new* Model 32ASR tape set.

Occasionally we also get a question like, "Who can I get to properly adjust my machine?" Of course the individuals mentioned above are the most likely. In addition to these, however, there are some non-ham fellows who do a little moonlighting. At the moment we can list only two of these; Robert J. Tetrault, 17 Dick Street, Clifton, N.J., and Dick Gonzales, 1738 Main Street, Pittsburgh, Pa. 15215. We will be happy to add to this list if you drop me a post card with the information.

We would like to point out that details on the above machines are contained in the *New RTTY Handbook* ($3.95 postpaid, direct from Cowan). Also, the best way to stay with this RTTY business is to subscribe to *CQ* so that you can follow the RTTY Column, a monthly feature not contained in any other amateur radio magazine.

W9RSV, Chicago, Illinois, operator: Dick Kempa, transmitter: DX-100, receiver: NC-88, machines: Model 15 and an FRXD, converter (TU): Twin City TU with HO-10 'scope.

On the Bauds

W1ILV of Middlebury, Conn., is on 80. W2QFR of New Rochelle, N.Y., uses tape on both 20 and 80 with a 200V driving a Viking KW with an FSC-250 TU hooked to a Model 28. K2GWY of Haddenfield, N.J., is building a transistorized tuning fork standard. *(See page 68 of the October 1962 CQ for additional info, Al.)* WA2CSE of Bayonne, N.J., just received a TG-7B (military Model 15) and has lots of questions. *(Contact Bob Tetrault, Dick.)* WA2PQW of Demarest, N.J., has Models 15 and 19, and uses an AN/FGC-1 TU on dual diversity. W2KCX of Sea Cliff, L.I., is on 80. K2TNI of White Plains, N.Y., runs 75 watts input and uses a dipole on 80. WA2IVK of Aurora, N.Y., also runs tape on 80.

K3YAH, near Harrisburg, Pa., uses tape on 80 as does W3ILZ of Philadelphia, Pa. K3WNO of Maple Glen, Pa., works both 20 and 80. W4KAY "inherited" a CV-89A/URA-8A TU and is looking for a manual. *(Try Propagation Products Company, P.O. Box 242, Jacksonville 1, Florida, Ray.)* W4MGT of Lexington, Kentucky, now has a Model 32 to go with his Model 28. W4CQI of Warrenton, Virginia, is active on 80 meters with tape gear.

W6LDF of Pasadena, Calif., worked DL3IR on 20. K6RZL of Pasadena, too, has a Kleinschmidt Model 150 for sale for $200. W6CQK, formerly of Redwood City, Calif., is now at Apartado 9361, Caracas, Venezuela, and is patiently (?) waiting for a reciprocity agreement. WA6HUW of San Diego, Calif., reports RTTY QRM on his "Soup Nut" c.w. net on 7140 kc, which meets at 10 a.m. (California time) Saturday mornings. *(Don't get excited, Van; no reason*

[*Continued on page 104*]

YL

LOUISA B. SANDO,* W5RZJ

In mid-December '64 flood rains began pouring down on Oregon and northern California. There was no "ark" to rescue them, but an "angel" from Paradise brought help to many stricken people, and is credited with saving the lives of some. She is Marie Welch, WB6DNW, and her stint which began Dec. 21 lasted for five weeks.

Marie was working with the Oregon Civil Defense net that day when the messages became grim. For the next ten days WB6DNW was on the air at least eight hours a day. Because her QTH, on a hilltop plus a 65-ft. high antenna, at Paradise (100 miles north of Sacramento) was ideally situated for transmission and reception of signals into southern Oregon and she could be heard on receivers that could not pick up the official disaster transmission areas. Marie was designated a net control. Her family didn't even see her for Christmas.

By Jan. 1 the situation had improved, but on the 4th Marie returned to the air with the Red Cross Emergency Net handling traffic for northern Calif., and with this she often worked 7 to 8 hours a day. There were numerous messages from Navy rescue groups from Hamilton Field, instructions for traffic and communication, delivery of food and clothing by helicopter, hay for starving cattle, rescue of flood stranded people, and she relayed traffic from an emergency net set up by the Navy and Coast Guard.

On Jan. 7 K7RQZ, Alice, broke into the net, saying she was picking up a weak distress call but could not read it. Ears glued to the receiver, Marie picked up the signal—it was K6BMB, Philip Bradley, located on the Blue Heron ranch ten miles north of Somesbar on the Klamath River in Siskiyou Co. He and his wife Shirley, WA6LMP, their five children (the youngest only 6 weeks old), and nine other persons from nearby ranches had been completely isolated for two weeks. Their only food was some deer meat and coffee, and he was low on gasoline to run his generator. This was his first contact since their ordeal had started two weeks earlier.

Marie relayed the information to Eureka. The following day when she was in contact with K6BMB he told her a helicopter was landing. However, it had only food enough for a family of five, but several days later another helicopter, from Yreka, landed on the ranch with a larger food supply and other needs. Marie kept daily skeds with Philip. His signal often was very weak and so unstable it was hard to copy and most of the time she was the only one who could read him. When the emergency was over she still maintained contacts, and it was not until mid-March that the Bradleys could finally leave their ranch by car.

For her FB contribution during the flood disaster, Marie received a letter of thanks from Oregon's Governor Hatfield expressing the gratitude of hundreds of people in the state who were victims of the flood and whose only communication link for several days was through Marie's station. Civil Defense officials also called by phone to thank her. In addition, Marie had a nice letter from the Calif. State Legislature thanking her for her work in the Humboldt and Siskiyou Co. floods.

Marie came up with her General license in Feb. '63 after becoming interested through her son Howard, WA6SES, now 18 and a senior at Paradise High. 90 percent of her time is spent on c.w., the rest on s.s.b. They use a Heath Apache and SB-10 and a grounded grid linear, and are putting up a tower and beam. It all started so the family could keep in touch with Howard when he goes to college. Marie's OM, a representative for Pacific Gas & Electric, has no interest in hamming. She belongs to TOO.

Marie has another keen interest; she teaches sewing and tailoring in the adult education classes in the high school night school program, and currently has 25 in the tailoring class and 22 in sewing.

Congratulations, Marie, for a job well done! Marie adds that WA6YZA, Suzie, also worked on the Red Cross net.

Congratulations

To W6NAZ, Lenore, for receiving a scroll from the U.S. Air Force, personally signed by Curtis LeMay and Secretary Eugene M. Zuckert, in appreciation for the phone patches she has handled for servicemen at Sondrestrom AFB, Greenland (KG1FR) and their families. It was

WB6DNW, Marie Welch, handled traffic for five weeks during and following the Dec.-Jan. flood disasters in Oregon and northern California.

*4417 Eleventh St., N.W., Albuquerque, New Mexico 87107.

Multiply this by three and you have the Deck family, well half of them, anyway, at Palo Alto. This is Liz, with her call K6MTQ on her car plates. Her dad is W6JVI and her mom is WA6JVF, and both have *their* calls on *their* cars. Rest of the family includes three younger sisters, the youngest, aged 9, having recently taken her Novice exam. Then there is Grandpa, who is W9PHE, and Liz says the main purpose of their set-up is to keep daily skeds with him in Illinois. Liz, now 17, has held her license for 10 years, starting as one of the "youngest YLs" with Novice at age 7. She is a senior at Cubberley High, and other hobbies include dating, horseback riding, surfing and skiing. Liz also is working for her 1st class commercial phone ticket.

presented to her in person by Col. David Woods, Commander of the Western Communications Region of Hamilton AFB. This special recognition covers the specific period between 1962 and 1964, but actually W6NAZ's skeds have been going on for eight years.

Here and There

A recent H.A.W.K. News Letter recounted the emergency operation by hams at Richmond, Indiana when fire in the main switchboard of the telephone office put 25,000 phones out of service. Mobile units were rushed to Richmond. Red Cross mobile units were in operation with hams at the controls, and the Indiana Phone Net worked with the mobile units.

Elected at the annual meeting of the Buckeye Belles in March: Pres., K8RZI, Fran; V.P., K8CEN, Louise; secy, WA8FSX, Ruth; treas., WA8CJP, Ruth.

We hear that Nell Corry, G2YL, is planning a trip to VE and W lands in Aug.-Sept.-Oct. and is hoping to see as many YLs as possible.

Correction

In the YLRL Anniversary Party results, Feb. *CQ*, P. 93, W8HWX was listed as 8th district c.w. high score (as well as phone). The list should show W8WUT as high score on c.w. as Avis earned 864 points in this section of the contest. Sorry, gals.

New Book Chapters

We are very hapy to announce there are two additional chapters for our book *"CQ YL"* just off the press. Totaling 12 pages, they are Chapter Six-A, covering the 3rd International YLRL Convention sponsored by WRONE and held at Cambridge, Massachusetts in June, 1960, and Chapter Six-B, covering YLRL's 25th Anniversary Convention sponsored by the Buckeye Belles at Columbus, Ohio in June, 1964.

Thanks to the YL clubs, you may get these chapters as *free supplements* to your copy of *"CQ YL"* just for the asking! The Buckeye Belles paid for *all* of the printing of the chapter on their convention, and a number of other clubs contributed to the cost of printing the earlier convention chapter.

If you have a copy of *"CQ YL"*, send your request for the new chapters to this column editor (QTH at beginning of column). Please do include a couple of 5¢ stamps to cover the cost of mailing. The chapters will be mailed flat and all pages are slotted for easy insertion into the spiral binding of the book. If you don't yet have one, copies of *"CQ YL"* are still available ($3, postpaid) and all copies mailed will be completely up to date with the earlier published supplements as well as the new chapters.

(NOTE: YL Clubs will receive bulk shipments for distribution to members. Also, if you attended the Columbus convention, you will be sent copies of these new chapters. Please notify W5RZJ if you have changed QTH since June '64.)

33, Louisa, W5RZJ

New Amateur Product

Hammarlund Manufacturing Company

The Hammarlund Manufacturing Company has issued its new capacitor catalog. The new catalog's 12 pages are devoted to listing 88 types of standard variable air capacitors stocked by their distributors. Each listing has a photo and accompanying mechanical drawing. Besides the standard models, mention is made of [illegible] capacitors for OEM use. Copies are available without charge from the Hammarlund Manufacturing Company, 73-83 Hammarlund [illegible]

Phone Results [*from page 61*]

PY7GV	....	"	59,534	211	29	74
PY7AGC	..	"	35,492	168	26	50
PY2PC	....	"	19,500	90	27	51
PY2BGO	..	"	5,577	56	16	23
PY6NW	....	"	576	12	8	8
PY4ND	....	**7**	**2,996**	**41**	**13**	**15**
Chile						
CE2HW	....	**21**	**2,046**	**41**	**11**	**11**
Colombia						
HK4EB	....	**A**	**362,518**	**685**	**64**	**127**
HK3AFB	..	**14**	**36,762**	**198**	**20**	**46**
HK3RQ	....	"	35,376	188	23	44
Ecuador						
HC2JT	.....	**A**	**586,713**	**928**	**81**	**142**
HC5IJ	.....	"	64,464	308	31	48
HC5NW	.....	**14**	**20,128**	**205**	**15**	**19**
Netherlands, W. I.						
PJ2CR	....	**A**	**104,280**	**316**	**49**	**71**
PJ3CD	.....	**14**	**19,950**	**153**	**15**	**35**
Paraguay						
ZP5OG	....	**A**	**106,396**	**294**	**45**	**89**
Peru						
OA4KY	....	**A**	**124,650**	**307**	**62**	**88**
OA4PD	....	**14**	**121,023**	**387**	**34**	**79**
OA1W	.....	"	6,545	70	19	26
Uruguay						
CX3BH	....	**A**	**617,148**	**924**	**84**	**153**
CX2CN	....	**21**	**9,024**	**75**	**20**	**28**
CX2CO	....	**14**	**414,005**	**950**	**27**	**118**
Venezuela						
YV5BIG	..	**A**	**757,874**	**1263**	**71**	**135**
YV3KX	....	"	21,600	186	20	20
YV5BWP	..	"	11,232	80	22	32
YV5BQF	..	**14**	**249,096**	**796**	**27**	**80**
YV3LD	....	"	96,412	410	24	57
YV1LA	....	"	69,552	346	22	47
YV1DP	....	"	40,800	272	17	33
YV5BUK	..	"	10,148	73	26	33
YV5BNW	..	"	8,721	53	21	36
YV5ANS	..	**3.5**	**7,161**	**86**	**10**	**21**

MULTI-OPERATOR
Single Transmitter
North America

United States

K2IEG	.....	**487,326**	**620**	**95**	**188**
		(K2IEG, K1ANV, W2OCM, K2OII)			
WB2CKS	....	175,336	314	63	139
		(WB2CKS, W2PCJ)			
W3WJD	.....	**396,706**	**527**	**87**	**191**
		(W3WJD, K3JJG)			
W3KFQ	.....	150,300	304	63	117
		(W3KFQ, K3JGJ)			
K3JCT	.....	112,340	255	55	109
		(K3JCT, K3LJZ)			
W3MWC	.....	77,352	204	47	85
		(W3MWC, K3JL			
W3IYE	.....	46,973	159	37	70
		(W3IYE, W3TGF)			
K3WFX	.....	4,860	68	20	34
		(K3WFX, K3VTO)			
K4CAH		**131,880**	**295**	**50**	**118**
		(K4CAH, W4KET, W4PJG)			
WA4NGO	..	117,107	247	62	119
		(WA4NGO, K4RLO)			
W8REE/4		27,888	110	42	70
		(W8REE, WA4UHW)			
W6AM	....	**232,547**	**360**	**90**	**149**
		(WA6EPQ, WA6GLD, WA6IPY)			
WA6YGV	....	20,400	119	35	45
		(K2LBM, W4UYR, WA5FRL, W9YLE, W1TQS)			
WA6TFZ	....	20,150	115	21	44
		(WA6TFZ, WA6QWN)			
W8SH		**63,506**	**215**	**38**	**75**
		(K8MFO, K8MPF, K8JUW, W1IEF, W8PWZ, K8IRB, WA8GPX)			
W8NGU	.....	45,628	143	44	78
		(W8NGU, W8FIR, WA8KTK, W8MSN, W8HVM, K8IMN)			
WØYDM	.....	**100,340**	**255**	**47**	**98**
		(WØYDM, WAØIC			
WAØEMS		1,917	30	13	14
		(WAØEMS, WAØAGM, WAØDGG, KØHGW)			

Bermuda

VP9BY	.....	**92,300**	**432**	**37**	**63**
		(VP9BY, VP9BO, W5HWR/VP9)			

Canada

K1LNV/VE8		**40,866**	**178**	**33**	**65**
		(K1LNV, W3AKD)			

Costa Rica

TIØRC	.....	**740,526**	**1354**	**81**	**168**
		(TI2SS, TI2PI, TI2JIC, TI2QKX, TI2HGA)			

Mexico

XE1AB	.....	**334,305**	**888**	**62**	**109**
		(XE1AB, XE1JI)			

Puerto Rico

KP4BPG	.....	**91,982**	**607**	**28**	**46**
		(KP4BPG, KP4BFG)			

Africa

Ethiopia

ET3USA	.....	**133,311**	**444**	**42**	**103**
		(K1QHP, K2PWS, K4YFE)			

Malawi

7Q7GN	.....	**51,908**	**249**	**30**	**58**
		(7Q7GN, 7Q7OL)			

Asia

U.S.S.R.

Asiatic

Club Stations

UAØKIF	.....	**22,422**	**215**	**15**	**22**
UA9KSC	.....	8,448	68	12	36

Azerbaijan

UD6KAR	.....	**100,674**	**324**	**33**	**88**
		(UD6BQ, UD6CC, VLAD)			

Estonia

UR2KAA	.....	101,801	452	35	88

Japan

KA2RG	.....	**127,300**	**432**	**33**	**62**
		(KA2RG, KA2FF)			

Ryukyu Islands

KR6FY	.....	**90,496**	**402**	**40**	**61**
		(KR6FY, KR6UD)			

Europe

Czechoslovakia

Club Stations

OK3KAG	....	**55,640**	**428**	**32**	**98**
OK1KPR	....	28,452	238	23	79
OK3KGI	.....	5,850	120	13	32

Finland

OH2AM	.....	**310,980**	**717**	**61**	**152**
		(OH2BBM, OH2BC, OH2BS, OH2SB)			

Germany

DL1JW	.....	**701,274**	**954**	**93**	**109**
		(DL1JW, DL1KB)			
DJ2BW	.....	423,300	785	56	148
		(DJ2BW, DL4HU)			
DL9VZ	.....	198,303	397	70	143
		(DJ2SK, DJ2US, DJ2VO DJ6YT, DL3BL, DL9VZ)			
DL9JL	.....	129,033	381	58	119
		(DJ2VS, DJ3OI, DJ4XS, DJ5PA, DL6UN, DJ8EQ, DJ8GB, DL9JL)			
DLØNS	.....	58,512	317	27	65
		(DL6QV, 9YP, DL1TY, 1UF, 2AW, 3OZ, 4YY, 6MQ, 7NX)			
DM3ML	.....	**47,236**	**255**	**29**	**69**
		(Club Station)			
DM3BL	.....	3,034	59	11	26
		(Club Station)			
DL4OL	.....	**173,512**	**685**	**31**	**61**
		(DL4DW, DL4VV, DL4OO, DL4UL, DL4HI, DJØBS)			
DL4DD	.....	44,464	208	39	73
		(DL4TX, DJ6FO)			

Hungary

HA5KBB	....	**145,838**	**570**	**44**	**110**
		(HA8WH, HA5DM, HA8-703)			

I.T.U.

4U1ITU	.....	**16,409**	**145**	**19**	**42**
		(W1IKE, W6GPQ, HB9UD, HB9YK)			

Italy

I1RB	.....	**649,000**	**1007**	**79**	**196**
		(I1RB, I1OLI)			
I1LCJ	.....	18,836	125	22	46
		(I1CCO, I1FUG, I1HBO)			

Netherlands

PI1PT/M	....	**8,576**	**98**	**18**	**49**
		(Club Station)			

Norway

LA1K	.....	**180,752**	**589**	**49**	**94**
		(LA1EE, LA3JJ, LA3QI, LA1UI, LA5UF, LA6LH)			
LA3T	.....	28,900	256	19	31
		(LA1CI, LA2NI, LA5II, LA6II, LA9XH)			

Sweden

SM6CAS	.....	**346,086**	**631**	**73**	**161**
		(SM6VR, SM6CAS, SM6BSK, SM6BJI, SM6CKV, SM6BGG, SM6AOE)			
SM5AZU	....	112,574	391	48	106
		(SM5MC, SM5ATN, SM5BGM, SM5AZU)			
SL2AD	.....	22,080	235	23	41
		(SM2CDW, SM3BZL)			

Wales

GW3NWV	....	**403,782**	**919**	**55**	**118**
		(GW3NWV, GW3DIX)			

Union of Soviet Socialistic Rep.

Club Stations

European

UA3KAA	.....	**262,300**	**762**	**79**	**165**
UA4KED	.....	83,475	335	47	112
UA3KAO	....	12,870	141	18	48
UA1KIA	.....	5,920	105	8	32
UA1KBA	.....	3,276	84	10	26

Kaliningrad

UA2KAK	....	12,238	167	14	40
UA2KAP	.....	460	24	8	15

Latvia

UQ2KAX	....	**43,010**	**270**	**34**	**76**
UQ2KGV	....	6,345	134	12	33
UQ2KCT	.....	1,775	61	6	19

Lithuania

UP2KAB	.....	**29,696**	**282**	**19**	**45**

Moldavia

UO5KRU	....	**3,528**	**88**	**9**	**27**

Ukraine

UB5ARTEK	..	**12,411**	**139**	**19**	**44**
UT5KKG	.....	8,060	111	13	39
UB5KEP	....	2,821	59	8	23
UB5KYA	....	1,060	49	5	15

South America

Ecuador

HC2LDA	....	**524,208**	**923**	**76**	**125**
		(HC2MO, HP, FB, FC, WB, ML, OC, CW, CC, BJ)			

Venezuela

YV9AA	.....	**1,382,036**	**1645**	**87**	**205**
		(YV5AEC, YV5AGD, YV5ANF, YV5BBU, YV5BPJ)			

MULTI-OPERATOR
Multi-Transmitter
North America

K2GL	.....	**1,094,591**	**1084**	**104**	**255**
		(K2GL, W1GYE, W2GLM, W2IWC, W6KFV, K2DGT, K2TXC, K2UYG, WB2MFX, WA2RAU)			
KZ5AF	.....	**672,105**	**1598**	**64**	**121**
		(KZ5AF, KZ5AZ, W5FNB)			
K6EVR	.....	**411,312**	**581**	**93**	**171**
		(K6EVR, K6JIC, K6YRA, W6GFE)			
W5KFT	.....	**328,263**	**491**	**83**	**164**
		(W5KFT, W5FYX, K6LSG)			
W8NGO	.....	**200,990**	**372**	**66**	**133**
		(W8NGO, W8CLR, K8LSG)			
K6SEN	.....	170,768	320	83	125
		(K6SEN, K6TSY)			

Asia

K7LMU/3W8		278,600	450	62	138
		(W9WNV & XW8AU)			

Europe

OH5SM	.....	**944,790**	**1553**	**93**	**237**
		(OH5SM, OH5NW, OH5NO, OH5TM, OH5TH)			
OH2AA	.....	**390,576**	**880**	**69**	**168**
		(OH2WI, OH2HN, OH2ER, OH2LP, OH2RZ)			

South America

YV5AKU	.....	**1,463,871**	**2043**	**78**	**171**
		(YV5AKU, YV5AFH, YV5AHG, YV5AKP, YV5AQS, YV5BED)			

Our thanks to the following who were considerate enough to send us their report which we found useful as check logs:
CT1NG, EA2CR, GI3PKY, GI4RY, K1YRO, KZ5FH, OH1TM, OH6AB, OZ7DX, PAØLOU, PY2CVT, PY2SO, SM5KG, SM5RY, SM7ACB, TG8IA, UF6UB, W2GT, W2PEO, W4IKS/mm, W4GOL, W6ECM, W6YSZ, WA6FOL, ZC4TJ, 9Q5KC.

RTTY from A-Z [*from page 43*]

538-A relay in the relay socket which has previously been checked out, suspend the 538-A relay from its handle, and give the side of the case a sharp rap with the knuckles. This will cause the excess mercury on the capsule contacts to return to the mercury pool, and normal relay operation will be obtained when inserted in the socket.

Other Trepac Relays

Trepac manufactures numerous other relays and other solid state devices for teletypewriter and other telecommunication srvices. The 538-A model relay just covered probably has more direct interest or appeal to the amateur since it is a direct replacement for the W.E. 255-A. The Trepac 538-B/2, a replacement for the Automatic Electric PTW 202-A polar relay, is electronically identical to the 538-A but equipped with a banana plug base. The Trepac Model 538-A/O, a replacement for any octal based polar relay such as the Sigma 72, is also electronically identical to the 538-A except that it is equipped with an octal plug base. If you wish to use a Trepac relay but are not replacing a 255-A relay, it might be simpler to select a 538-B/2 (with banana plug base) or a 538-A/O (with an octal plug base) unless you just happen to have a 255-A socket lying around. The octal base plug for the 538-A/O is shown in fig. 74. Additional data on Trepac relays may be obtained from K4MUB.[16]

Distortion

Various types of distortion are encountered in RTTY. Invariably, like so many RTTY names and terms, the names of RTTY distortion also have an unfamiliar ring to the beginner. Part 12 will cover Bias Distortion, End Distortion, Fortuitous Distortion and Characteristic Distortion.

[*To be continued*]

[16]Hal A. Trenner, Trepac Corporation of America, 30 West Hamilton Avenue, Englewood, New Jersey.

Phone Results [*from page 61*]

teams at CE1FX, CT1EY and FG7XL. However Carola and her family are still putting OH5SM in the top listing of the multi-operator group. Also add to the ever increasing list of YL operators the calls of WB6CGA, W8NNH, 6O6BW and XE1HHH. (After you see Marilu's photo on these pages I am sure Zone 6 will be the most sought after multiplier in next year's contest.)

We didn't expect to break any records this year but were pleasantly surprised to find that we more than held our own. The number of entries was practically the same, 730 logs as compared to 717 last year. And although the recorded country total was down considerably, 105 as against 117, we know that more than 120 countries were active over the week-end. Its a pity that we did not receive anything from some of these rare spots. There will be 273 certificates mailed out during the summer. This total could

have been much higher if we had received entries from some of these missing stations. And cross checking of logs would also have been made much easier for us. That is why we always request your log regardless of the number of contacts.

Getting this material out in time for this issue was quite a chore. Never would have made it without the initial help of the office gang, Dick, Al and Marcia Getting the c.w. report together in time for the next issue will be up to Ben, W2JB, Andy, W1GYE and yours truly. Even you fellows who have been on contest committees have no idea of the job ahead of us, over 300 logs from the USSR and associated countries. You didn't have anything like that in your experience. 73 for now, Frank, W1WY

Millen *(from page 55)*

high voltage-breakdown characteristic, but also is one that is most resistant to arcing and arc tracking.[1]

There are large air gaps between circuit elements and long leakage paths between contacts. The switch shaft also is insulated against high-voltage breakdown between the switch circuitry. The switch is ruggedly built and it is rated to handle at least 1 kw of r.f. power.

The price of the Millen Switch No. 51001, as yet unannounced, is expected to be under $9.00.

[1]Although the switch itself is designed to withstand a "hot switch", it is not suggested that such type of operation be a general practice, inasmuch as this would endanger other components in the equipment; nevertheless, in the event of an accidental hotswitch, you're at least protected against switch damage.

CQ Sender *(from page 48)*

corded with a pure single-frequency tone such as that supplied by a good audio signal generator. A keyed single frequency tone feed into an s.s.b. transmitter will produce only keyed carrier (A1) output. However, a multiple frequency audio input (such as a distorted sine wave) will cause the transmitter to generate sideband frequencies. One last caution—if operating vox, be sure that the audio output from the recorder is cut off when you rewind the tape. ■

Space *(from page 86)*

long list of valuable contributions to the art of communications made over the years by the amateur radio service . . . What a wonderful event to have occur during the 100th anniversary year of the International Telecommunication Union.—Gerald C. Gross, Secretary-General, International Telecommunication Union, Geneva, W3GG/HB9IA

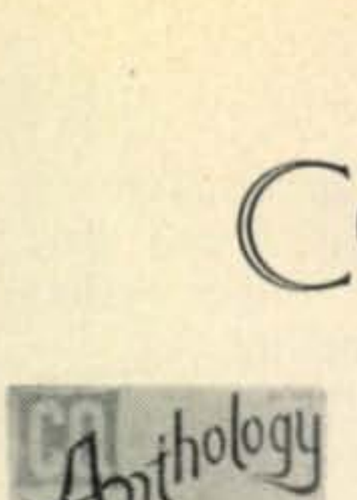
OSCAR IV

Even before OSCAR III was launched, plans were already in the works for OSCAR IV. What will eventually become OSCAR IV was originally the back-up satellite for OSCAR III, to be used in the event anything went wrong with the launch. The satellite will be the third [illegible]

CQ TECHNICAL BOOKS

CQ ANTHOLOGY I

We've looked back through the years 1945-1952 and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out and are unavailable.



ANTENNA ROUNDUP

A common denominator for all ham stations is the antenna. Here at last is the cream of antenna information packed into a 160 page book. Forty-seven information-packed articles that will dispel much of the mystery surrounding antennas.

CQ ANTHOLOGY II

Top favorite CQ articles from 1952 to 1959 . . . including some you may have missed . . . compiled into one new information-packed book! No more need to try to locate sold out back copies of CQ. This Anthology includes past articles of lasting interest to every amateur radio enthusiast. Over 250 pages of text. Over 75 different articles. A definite Must for your shack!

SIDEBAND HANDBOOK

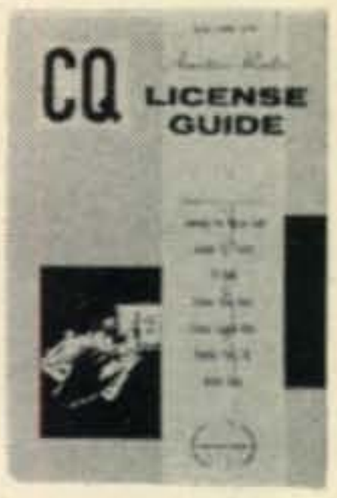
Written by Don Stoner, W6TNS, who was almost one full year in the preparation of this terrific volume. This is **not a technical** book. It explains sideband, showing you how to get along with it . . . how to keep your rig working right . . . how to know when it isn't . . . and lots of how to build-it stuff gadgets, receiving adaptors, exciters, amplifiers.

VHF FOR THE RADIO AMATEUR

If you are, or are planning to be a VHF operator, you can't afford to be without this dynamic new handbook written especially for you. Filled from cover to cover with all new and original construction material presented so you can understand it. Written by Frank C. Jones, W6AJF, nationally acclaimed for his VHF pioneering.

SURPLUS SCHEMATICS

This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available. Trying to figure out the circuitry and [illegible] many-times more difficult than the most involved puzzle. [illegible] instruction book [illegible] $2.50.



CQ LICENSE GUIDE

212 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator.

THE NEW RTTY HANDBOOK

A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section in getting started, all written by Byron Kretzman, a well known authority in the field. First printing sold out. Second printing on hand.

MOBILE HANDBOOK

This new Mobile Handbook by Bill Orr, W6SAI, has been getting raves from top experienced mobile operators. Written for advanced, as well as beginning mobile operators, much of this information cannot be found anywhere else. This is NOT a collection of reprints.

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UNLIGHTED GLOBE	19.95	☐
ATLAS	15.00	☐
CODE RECORD	3.50	☐
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SSB LOG SHEETS (100)	1.00	☐
HAM'S INTERPRETER	1.50	☐
TVI HANDBOOK	1.75	☐
BINDER—YEAR WANTED	4.00	☐
DX ZONE MAP	3.00	☐
DIODE SOURCE BOOK	2.50	☐
USA-CA RECORD BOOK	1.25	☐

SIRS: My check (money order) for $_____ is enclosed. Please send the following items to:

Name_____

Address_____

City_____Zone____ St____

III telemetry data now being undertaken by Project OSCAR headquarters. It is hoped that OSCAR IV will be available for a longer period of time as a communication satellite, and its sensitivity will be such that radio amateurs with considerably lower power equipment will be able to work through it.

At present, plans call for the launch of OSCAR IV sometime during next fall or winter. More information concerning OSCAR IV will be found in this column as more definite plans for its launch materialize.

No doubt the countless hours that have been devoted to the project by the OSCAR headquarters gang is appreciated by radio amateurs throughout the world. The design, the construction, the testing, the negotiating for a vehicle, the communications arrangements, the tracking coordination would be a tremendous task for full-time professionals. It becomes even more of a task when it is done out of devotion, as something extra to one's daily work. This is the story of the Project OSCAR headquarters group. Each member of the group has his daily work, each has his family, each could devote his time to a dozen other more relaxing things around the house, or with his family . . . but each has chosen instead to do whatever he can to make the amateur radio satellite project a success.

OSCARS I, II and III have been successful because of the enthusiasm of this dedicated group of radio amateurs, and their unstinting contribution of time and knowledge. But time and knowledge aren't enough to build a satellite. Thanks to the generous contributions of equipment, material and funds from several companies, groups and individuals, the project has been able to come as far as it has. The Editor of this column, however, has learned recently, that many of the headquarters gang have had to lay out considerable sums of their own money to help pay for many of the costs involved in the success of OSCAR III. Isn't this being too demanding upon such a small group, and isn't this an area in which we can all pitch in and help? All radio amateurs bathe in the aura of success of the OSCAR project. The project helps secure the future of amateur radio for us all. Isn't it fair that we all contribute towards it financially, if in no other way? Project OSCAR *does not* intend to solicit public financial assistance, but this Editor supports the ARRL in its suggestion that radio amateurs *voluntarily* contribute financially to the support of OSCAR IV. Contributions should be sent to Project OSCAR, Foothill College, Los Altos Hills, California.

73, George, W3ASK

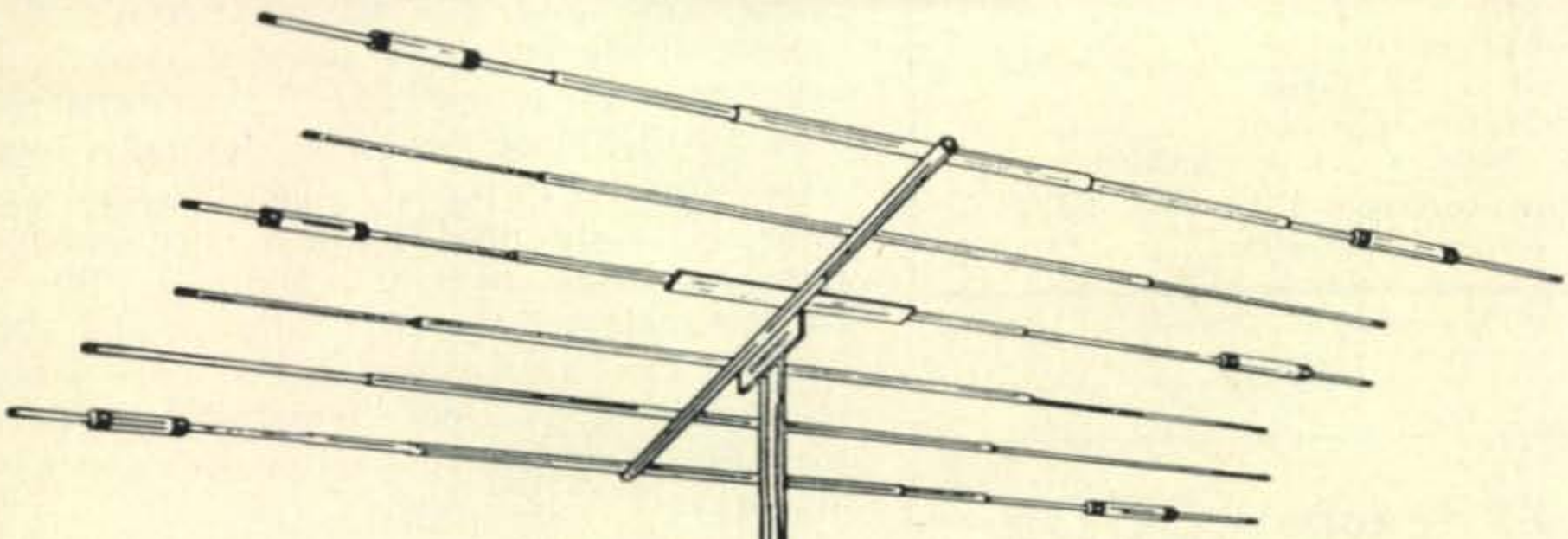
W4HJZ 2M Conv. *(from page 32)*

Sockets which accept tube shields are used for all tubes. The r.f. amplifier stages are shielded with black ventilated shields to keep bulb temperatures down.

Alignment Instructions

Before power is applied all coils should be

It's HARVEY ...for the best ham buys



MOSLEY TA-36

Optimum design for 10-15-20 meters.

Wide-spaced, 6-element configuration: 4 ele. on 10, 3 ele. on 15, 3 ele. on 20 meters. 200 lb-plus wind loading. Needs only 1 coax feed line. Takes max. legal amateur power input. Max. ele. length 29'; boom size 24'. Turning radius 19'3". Feed impedance 52 ohms. A great buy at $132.10.

MOSLEY V-4-6

For 10-15-20-40 meters. (80 meters when used with D-4BC-A).

Your solution to a space problem for multiband work. Rated for max. legal amateur power input. Pre-tuned, predrilled and color coded for easy assembly on heavy duty base mount, supplied. Telescopes to 20'. $28.50.

MOSLEY D-4BC-A BASE LOADING COIL

For 75/80 meters operation. Quick, easy mounting to V-4-6. $16.45.

For a ham-to-ham talk at Harvey see:

Roy—W2CF	Richard—WA2FBH	Bert—K21BK	Anton—W2KWY	Leo—W2LJA	Jack—W2LZX
Celso—PY4EH	Ron—WN2MZI	Abe—W2QOA	Harold—K2QOP	Jerry—K2QPC	Joe—W2TBJ

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HARVEY RADIO CO., INC. OUR 38TH YEAR

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For further information, check number 38, on page 110

checked for resonance with a grid dip meter. For some, a light stretching or squeezing of coils may be necessary. Next, disconnect filament power from the 7788 and apply all other voltages. Check at 7788 grid for bias voltage. Set the bias for −3 to −5 volts. Reconnect filaments and monitor 7788 current. From here on out keep an eye on 7788 current, and keep it under 40 ma at all times.

The oscillator slug L_8 should be adjusted so the oscillator is operating strongly and will go into oscillation readily when voltage is first applied. Check with a grid dip meter to be sure the crystal is operating on its 3rd overtone frequence only and that no sub harmonics are present. If the slug, L_8 is tuned incorrectly and sub-harmonics are present, the converter will have birdies. Once the proper setting is found, secure the slug in position. Tune C_{19} for maximum i.f. noise output which corresponds to maximum local oscillator input. Set 7788 bias for approximately 20 ma total plate and screen current. Peak all r.f. and mixer tuned circuits for maximum i.f. signal strength. Keep reducing the r.f. signal as the converter gets closer into alignment.

Repeat the tuning sequence several times to get everything just right. No birdies or images should be present and the n.f. should be between 3 and 4 db if you followed the layout closely.

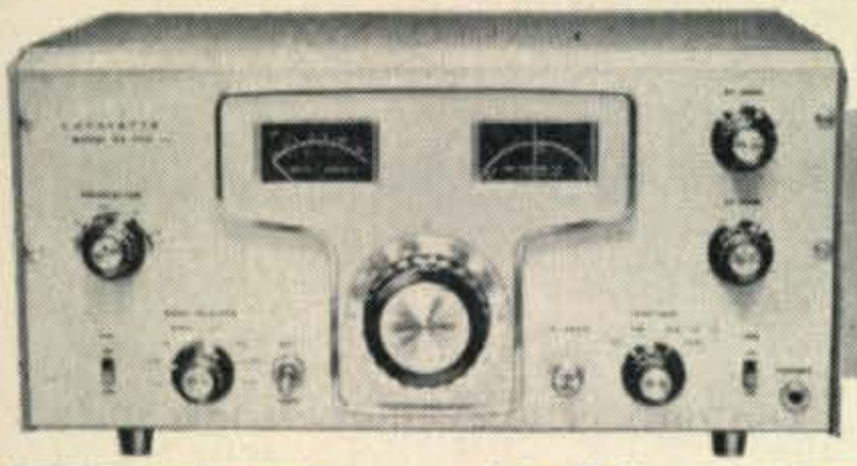
The final tuning for n.f. should be done with a noise generator for best results. Since the r.f. stage is running very close to perfectly neutralized and with very low inductance cathode and screen leads, the best n.f. and maximum gain occur at very close to the same tuning of the input circuit.

The noise figure is dependent on several factors which can be simultaneously optimized if one has enough hands and patience. The variables that one can optimize are Plate current, Screen #2 current, Antenna Tap, and Grid Tap.

The higher the plate current the better the tube g_m and R_{eq}. The higher the screen #2 current the greater the partition noise contributed by the screen. Input impedance of the tube is a function of cathode current so this means that the optimum grid tap varies with tube d.c. conditions.

The author optimized these variables and came out with a relatively high screen resistor (47K) to keep screen current low, relatively low bias voltage (close to zero volts) when measured at the power supply terminals, and a best tube current of 20 ma total screen and plate. If you have the time this is an interesting area in which to cut and try. Lacking the time, just use the results presented here. A good intermediate approach is to use the 47K and 20 ma as recommended, but optimize the taps on L_1. Try up to ¼ turn in ¼ turn increments from the values

NEW! LAFAYETTE AMATEUR RECEIVERS



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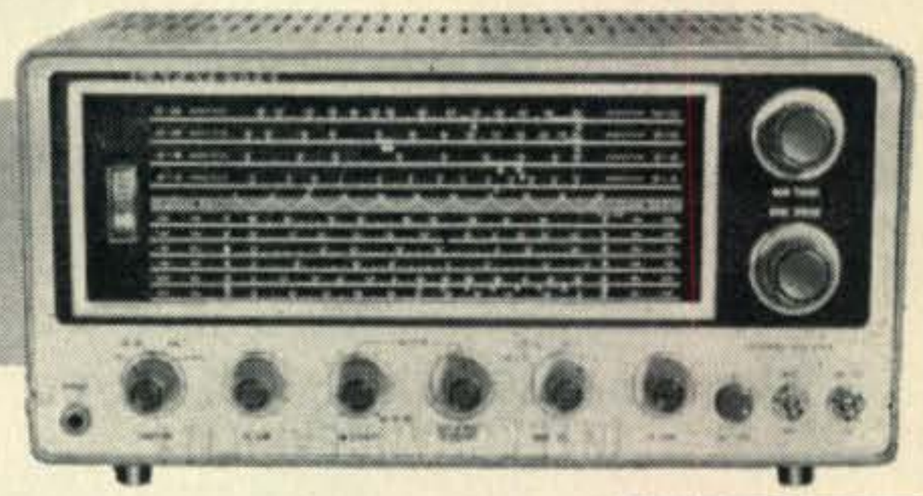
MODEL HA-230



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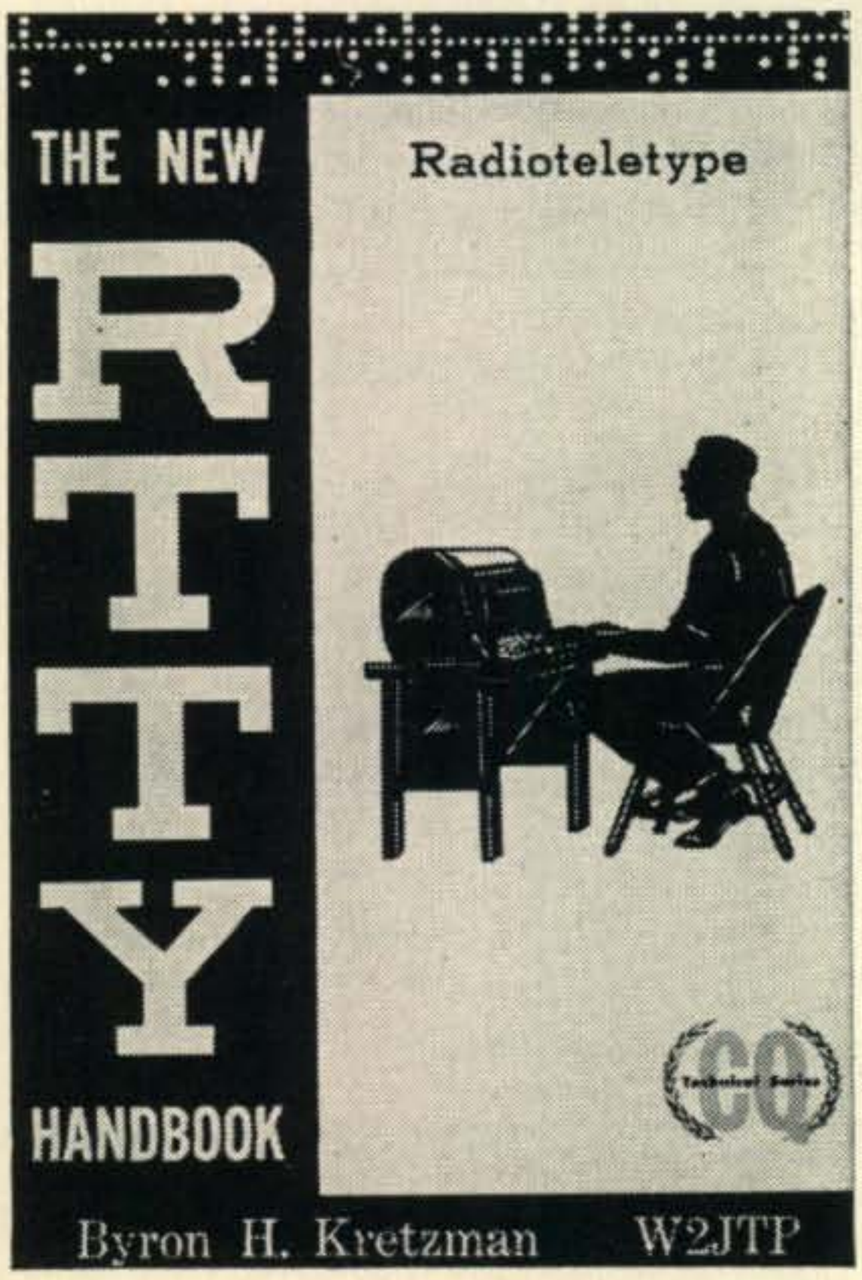
FREE! Lafayette 516—Pg. 1965 Catalog No. 650. Write: Lafayette Radio Electronics Corp., Dept. CF-5, P.O. Box 10. Syosset, L. I., N. Y. 11791

For further information, check number 42, on page 110

"THE NEW RTTY HANDBOOK"



A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by Byron Kretzman, W2JTP, a well known authority in the field. This book is a must for your library! Only $3.95.

CQ Magazine
14 VANDERVENTER AVENUE
PORT WASHINGTON, L.I., N.Y. 11050

SIRS: My check (money order) for $_____ is enclosed. Please send _____ copies of the "The New RTTY Handbook."

Name_____

Address_____

City_____ State_____ Zip_____

The power supply and the control unit each contain an operating bias adjust pot. Let us say that the optimum tube current is found to be 20 ma. Turn the CONTROL UNIT pot to maximum current and then set the power supply pot to give the 20 ma. Lock it in place. Now the Control Unit pot may be used as an R.F. GAIN control, varying the 7788 from cut off up to optimum current, without the need for a meter to constantly monitor 7788 current.

Measured Performance

Overall Gain	≈ 30 db
Gain Reduction with R.F. GAIN control	> 50 db
Image Response	> 70 db
Spurious Responses—20 to 100 mc	> 55 db
Spurious Responses—100 to 200 mc	> 70 db
I.F. Feedthrough	≈ 80 db
Overload point above noise[3]	≈ 70 db
Gain change[4]	≈ 8 db
Noise figure[5]	2.8 to 3.6 db

[3]Defined as signal strength required to cause cross modulation with a weak signal approximately 10 db above the noise and 200 kc away.
[4]The Gain Change is measured over 2 mc portion of the band when peaked at 144.2 mc.
[5]The range of 2.8 to 3.6 db on the noise figure depends upon the noise generator correction factor used.

G4ZU X Beam [*from page 28*]

gain measures 5-6 db and the front-to-back ratio is 18 to 20 db. It will definitely take a back seat to the full size G4ZU "Birdcage" or a Quad but it is a good performing beam and it will definitely get you into the "ballpark" which is reserved for the beam fraternity.

Variations

Other variations have to do with trying to ground various elements of the beam to avoid any insulation difficulties. GM3HMU, for instance, works his X beam with the director elements directly connected to the mast as originally developed by G4ZU. He reports fine performance with the beam dimensioned as given without any need for tuning the director. Of course, tuning of the director can still be accomplished by varying the length of the director arms as a "plumbers delight" Yagi is tuned. One could go a step further and also connect the driven element directly to the mast as was suggested by G4ZU in his original "Birdcage" article thus making a "plumbers delight" version of the X beam. With this construction, the driven element would then have to be fed through a "T" or "gamma" matching arrangement. I have not tried this type of construction but there is no reason why it should not work the same as it does with other beam types. I would be most interested to hear from anyone who does construct the "plumbers delight" version.

I wish to especially thank G4ZU and GM3HMU for all the information they supplied about the X beam and which resulted in my experiments with the design. Leave it to the English and the Scotch to squeeze the most out of the least! ■

VHF *(from page 80)*

stantial advances in receiver design, converter efficiency and the overall desirability of most v.h.f. inhaler setups have stepped up the distance capabilities of many stations to the extent where utter dependence on high powered transmitters has all but vanished. In addition, there has been a trend to bigger and better long-yagis lately which bring dbs far more economically than by employing kilowatts.

Don't be afraid of aurora. You can expect it regularly in the spring and fall (perhaps a bit better towards October than at any other time) so you might as well use it. All you need is a key and b.f.o. (No b.f.o.? Beat with your v.f.o.!).

From the Mailbag

Phil Redman, WA9EJA/4 on radio astronomy: "I read the piece on radio astronomy in the March *CQ* and thought I'd let you know that I'm interested in corresponding with others on the subject." *Okay, Phil, you're on.*

"I am interested in astronomy and I like amateur radio. So I have decided to combine my two hobbies.

"I think it would be proper if I told you about myself. I am from Clinton, Illinois and have held a Technician ticket for about three years. I attended Tri-State College in Angola, Illinois, for three years and was working towards a degree in Electrical Engineering. I am now in the U.S.A.F. I am in school studying radar repair.

"I am hoping that this experience will help me with my project of building a radio telescope when I get out of the service." *Prospective pen-pals are invited to write to Phillip E. Redman, WA9EJA/4, 3394 Sch. Sqdn., CMR4 Box 15028, Kessler AFB, Miss.*

Wes Miller, W5QNK/HB9 on ATV: "I just read your p'eas for us to write you in the February *CQ*, which just arrived. I agree with your editorial slant, but would suggest you ignore and make little mention of undesirable letters you get." *Interesting point, Wes. Since that editorial, our flow of "What to buy" queries has increased threefold.*

"Thanks a meg. for the dope on ATV. I'm a Baptist Missionary on duty now in Switzerland. When I get back to the states I plan to go on 440 mc TV—I am following the development of ATV through your v.h.f. column." *Don't judge ATV by this column, Wes. It's vastly more accepted and advanced throughout the U.S. than we could ever do justice to here. Get in touch with KØKYQ when you return.*

"Let me urge you to compile an ATV Handbook to join the wonderful library of *CQ* Technical Series. I, for one, would buy one as soon as it was announced." *We're working on it, but need more contributions from the ATV people to make it worth preparing. One nominee for the book would be VE7TK.*

Bob Jennings, K1ZGH, on the Century Club mania: "Enclosed find my application for the VHF Century Club. The paper work on this one has been tremendous—sorting out cards, separating them, etc.

"After all this work, I find I have almost enough cards for another certificate and have started QSLing recent QSO's in an effort to round up the balance." *That's the spirit, Bob!*

Thirty

If you have found yourself wondering about the rather non-technical slant of this month's column, you can put the blame squarely on K2ZSQ's shoulders. Co-conspirator Katz, busy trying to take a well-earned vacation yet still continue experimentation on another foreboding looking microwave monstrosity, promises to return next month with some more goodies. Be thankful he only gets one vacation per year.

Meantime, our periodic request for circuits, photographs and other miscellaneous paraphenalia is again filed. Consider yourself duly beseeched.

73, Bob, K2ZSQ & Allen, K2UYH (AWOL)

RTTY *(from page 91)*

why the RTTYer can't move up or down 5 kc at this particular time; just ask him.)

W8WNO of Cleveland, Ohio, found some "Western Union" Model 14 strip printers for $25 each in a surplus store in Cleveland. *(Watch it, Ken; they could have 75 w.p.m. gears!)* WA8-POU of Dayton, Ohio, uses a 50-foot vertical on 80 and has a Model 28. W8FWG of Laurium, "Copper Country," Michigan, uses a Drake 2B on 80. W8VZ of Marietta, Ohio, got a Model 19 from Navy MARS and has it on 80.

WAØHHV of La Crescenta, Minn., uses a Model 19 with an NCL-2000 driven to 1 KW. KØPEF of Sioux Falls, South Dakota, has a CV-71/URR i.f. type of TU (50 kc) and wants to know how to use it with an HQ180-A (60 kc). *(Sell it, Les, and build an audio-type of TU!)* WØGMU of Holton, Kansas, is looking for an RTTY Society to join. *(We recommend RTTY, Inc., 372 Warren Way, Arcadia, Calif.; $3 per year for a mighty fine monthly bulletin, Don.)*

Comments

Last month we had a word or two to say about the crummy operating procedure observed lately on 80 and 20 RTTY. We would like to list another bad habit that has come up since the relaxation of the "dual identification" Rule that makes it permissible to send just your own call on Morse. Well, quite a few stations have been completely omitting the signing of *both* calls on RTTY, signing only their call on Morse. This is definitely *not* legal. As 'ole Beep might have said, this will result in a suggestion from the FCC for the improvement of your operation. So, don't forget: When you are about to turn it over to the other fellow, type out both his call and your call before you send your call on Morse. 73, Byron, W2JTP

Novice *(from page 77)*

Super-Pro SP-400-X. We both work 80 meters most of the time. The little receiver is a Knight Kit Star Roamer that we built before we got our ticket.

Well, I had beter quit now so keep up the good work and see you later.

Sincerely, Larry and Les Moller, 1220 K Avenue, Anacortes, Washington."

There, it wasn't so hard to write a little note and I think that this is the first letter from twins that I have received during my tenure of NOVICE reporter. I'm sure you fellows are going to have fun as hams and it looks like you have been able to hear those rare ones. I sure hope to work you this winter, I'll be on c.w. very soon with the new rig that is being tested for NOVICE. Good luck.

Help Wanted

Dale Brix, R.R. #2, Assumption, Illinois, 62510, phone 1277 needs help with code. He says he is old enough to drive and would drive a short distance for help from someone in his community.

If you need help send the information to me at home. My address is Walter G. Burdine, W8ZCV, R.F.D. #3, Waynesville, Ohio ZIP code 45068. With that we will sign off for this month and wish you the best of DX and hope that you don't let the hot weather keep you off the air. I have been copying many of you on the SX-111 that I recently bought for my s.s.b. station, it is a very good c.w. receiver. Write a letter, send a picture and watch for me on the air. 73, Walt, W8ZCV

USA-CA *(from page 89)*

L. Struchen, K3PQH, Country Garden Trailer Court, R.D. #1, Lake City, Pennsylvania.

Metropolitan Nashville Award is sponsored by The Radio Amateur Transmitting Society. Stations other than North American (XE, VE, W & K) may qualify by working any 5 Metropolitan Nashville (Davidson County). North American stations, except Tennessee, qualify by working 10. Tennessee stations required to work 25 except if all on six meters, 35 are required. There are about 700 amateurs in Metropolitan Nashville Area, and 32 are members of the Radio Transmitting Society (RATS). Send GCR list with sample of your own QSL to WA4END, Dick Crouch, 131 Taggart Ave., Nashville, Tennessee. Cost is 50¢ for North American Amateurs, 4 IRCs for DX applicants.

TCA, Twin County Award sponsored by The Virginia CHC Chapter #30, issued for working a combination of counties bearing the same name, for contacts after WWII. No band or mode endorsements. Charge is 75¢ to U.S. and Canadian stations, no charge to DX stations. Send GCR list (No QSLs) to Earl Savage, K4SDS, 500 Virginia Ave., Stuarts Draft, Virginia 24477. KL and KH considered DX for award requirements only, s.a.s.e. for endorsements. To qualify, each pair of counties bearing the same name (like Richmond County, Virginia and Richmond County, New York) count as two points. If a third county such as Richmond, Georgia is worked, the total points received is 3, if a fourth is worked the points claimed can be 4. The award is issued in the following classes, with DX being the second number: Class A points required 40/20; Class B requires 26/12 and Class C requires 16/8.

55 County Club certificate is sponsored by the East River Radio Club of Bluefield, West Virginia. Available to all Amateurs and s.w.ls in *three* classes: Basic Award "C" is issued for confirmed contacts with amateurs in 30 West Virginia Counties. Any band or mode may be used and there is no time limit. Class "B" Seal endorsement is for 45 confirmed counties. Class "A" Seal endorsement is for contacts with each of the 55 Counties in West Virginia. QSL cards must be on hand but a certified (GCR) list will be accepted. Basic Award costs U.S. amateurs $1.00 or 7 IRCs if you are DX. Send list including station call, time, date, frequency and fee to Lee R. Brooks, K8BHG, P. O. Box 292, ERRC, Bluefields, West Virginia 24701. For endorsements send s.a.s.e., no fee. Sorry, but I've run out of space again, many thanks for all the fine mail and comments. And how was your month? 73, Ed, W2GT.

PLEASE include your ZIP code number on all correspondence.

Ham Shop

Advertising Rates: Non-commercial ads 10¢ per word including abbreviations and addresses. Commercial and organization ads, 25¢ per word. **Minimum Charge $1.00.** No ad will be printed unless accompanied by full remittance. **Closing Date:** The 10th day of the second month preceding date of publication.

Because the advertisers and equipment contained in Ham Shop have not been investigated, the publishers of CQ cannot vouch for the merchandise listed therein.

100.00 Kc. crystal in HC-13/U Holder—same pins as FT-243. Only $3.00 each with Free Bonus 200 Kc crystal—postpaid, USA, Quaker Electronics, Hunlock Creek, Pa.

Technical Manuals—lowest prices USA, teletypewriters, receivers, transmitters, text equipment and etc. Large lists. Send 10¢ coin-stamps. Quaker Electronics, Hunlock Creek, Pa.

FOR SALE Complete instructions including 28 page booklet and 22" × 36" schematic for converting the ART-13 transmitter to a.m. and s.s.b. Satisfaction guaranteed. $2.50. Sam Appleton, 501 No. Maxwell St., Tulia, Texas.

WANTED—An APR-14, 13 receivers. SG-13, H-p4, SG-1, SG-2, MD-83, 479 Collins, in any condition. T-368-C xmtrs. R-390, 390A, R-388, 389, 391. Receivers. RT-66 thru 70 Rt units RT/77-GRC-9, GRC-10, GRC-19. RCA, Bendix, Collins Aircraft Radio and Radar Equip. Hewlett Packard, General Radio, Tektronix, etc., Test Equipment. GRC, PRC, GRR, TCC, ARC, sets ARM, PRM, URM, UPM, URM, SG Test sets any and all types. You name it. Call E. Charol, Tech Systems Corp., 42 W. 15th Street, N. Y. 11, N. Y. CH 2-1949 Collect.

REMOTE CONTROL UNIT, brand new $5.00. Postpaid. (Cost Navy $125.00) MDC, 923 W. Schiller, Phila. 40.

ANTENNA tuning unit, brand new $3.00 postpaid (cost Navy $85.00). MDC, 923 W. Schiller, Phila. 40, Pa.

FREE CATALOG: Wholesale electronics, Hundreds of items. Why pay more? ROYAL, Box 2591, El Cajon, Calif.

75S-1 at $280 in perfect cond. Richard Petersen, 1719 A Ave. N.E., Cedar Rapids, Iowa. 52402.

Squires-Saunders, SS-1R with SS-1S silencer. Less than 9 mos. old. Original cost $995.00. Will sacrifice $650.00. R. Augustine, 1308 Parson, Columbus, Ohio.

SWL Program Guide, FBCB English language transmissions listed by the hour. $2.00. SWL Guide, 414 Newcastle Rd., Syracuse 19, N.Y.

FREE! Blue Book List. Leo offers hundreds of bargains on reconditioned gear. Viking II $97.70; SX117 $289.00; Collins 62S-1 $598.50; King 500A $259.00; Galaxy 300 $239.00; Heath MR1 $59.46; HQ140X $139.00; Cheyenne $49.18; SX-140 $72.15; SX-101A $229.00; SX71 $99.00—Many More. Free 1965 Catalog. WRL, WØGFQ, Box 919, Council Bluffs, Iowa.

CLEANING SHACK, Transistors and diodes for sale at bargain prices. Write for list. Jack Pritchard, 4336 Livingston, Dallas, Texas 75205.

NEW YORK AREA: For sale—HRO-60R Receiver with 60SC-2 combination coil container and 8" PM speaker. $250 takes it. Gustav Marx, 251 W. 74 St., New York, N.Y. 10023.

GREATER BAY AREA HAMFEST Peacock Gap Country Club, San Rafael, Calif. October 16-17th. Write Box 113 Hayward, Cal.

COLLEGE BOUND—Must sacrifice complete rig. Drake 2B; 2BQ; Eico 730 w/cover; Knight T-150A; Relay; Mike; Key; Coax; Xtals; 40 foot telescopic mast; all interconnecting cables; plus many other goodies! Make offer. Headley Raybourn, 1705 E. Madison, Harlingen, Texas.

CHEYENNE, Gonset super 12, Mike & Mount $99.00—Knight T-150 & SX-99 $170 or trade for A-1 Pawnee. W2PWF (212) FI 3-9382, 78-42 264th Street, Floral Park, N.Y.

NCX-3 with power supply $250. W6BLZ 528 Colima Street, LaJolla, California.

THIS COMPANY is looking for Ham & CB cartoon artists and ideas. $10.00 per idea IF ACCEPTED. For information, write AMBRU PRODUCTIONS, 10 Burbank Street, Yonkers, New York 10710.

INTERESTING OFFERS GALORE in the new "Equipment Exchange—Ham Trader"! Rush $1 for next 12 issues. Brand, WA9MBJ, Sycamore, Illinois.

BRAND NEW 5894 $18.00; 6442 $15.00; 6DQ5 $2.00; 7027 $1.00. Johnson Low Pass #250-20 $10.00. WA9NKT 1235 Hillcrest Lane, Freeport, Illinois.

S.R.R.C. HAMFEST: June 6, 1965. See Announcement section of "CQ" in the May issue or write for details after April 1, 1965. Starved Rock Radio Club W9MKS/W9QLZ, FRD #1 Box 171, Oglesby, Illinois 61348.

SX-140 Receiver for sale, factory wired. $75.00. WØEGC, 2042 North 33rd Terrace, Kansas City, Kansas.

HAMS! Convert any television to sensitive, big-screen oscilloscope. Simple changes. No electronic experience necessary. Illustrated plans, $2.00. Relco-A68, Box 10563, Houston 18, Texas.

NEW TRANSISTOR INSTRUMENT detects buried coins, firearms, treasures, gold, silver. $19.95 up. Free catalog. Relco-A-68, Box 10563, Houston 18, Texas.

WANTED: Complete set or bound volumes of CQ for 1945 and 1946 for private collection. Write Scott Cowan, 73-62 Bell Blvd., Bayside, L.I., N.Y. 11364.

BOUND VOLUME 1964 **CQ** for sale. Order no wand be sure to receive your copy. Limited quantity. First come first served. Send $15.00 to Dept. H.W., **CQ** Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

FOR SALE—Gonset Communicator III 6 meters, 12v., complete with mike and book. Like new. Local sale only. $165.00 K2EEK, 75-15 177 St., Flushing 66, N.Y.

For further information, check number 50, on page 110

For further information, check number 51, on page 110

National NCX-3, NCXD in mint condx, priced for fast sale $300. WA2OHN, 845 Cliffside Ave., No. Woodmere, 11581 N.Y.

RCVR RME-4350A; rcvr ARC-5, 3.5-4 mc convrtd; xmtr T-150A Knight; xmtr Globe Scout 65B, Phone & CW. Write for prices and details. P.O. Box 794, Macon, Ga.

GOOD 75A-1 $159; Excellent Grundig TK-46 Stereo tape recorder w/mike, factory reconditioned like new original cost over $350. FOB $259, K1NNC.

FOR SALE, RCA Electronic Fundamental and RCA Communication correspondence course. Good for 1st class radiotelephone ticket. ½ price. Roger Grundstrom, Red Rock Canyon, Rapid City, So. Dakota.

SELL: Six meter transceiver, Heathkit "Shawnee HW-10." Completely aligned and calibrated. Includes RF nuvistor preamp, heavy duty final, instructions and all accessories. $150. Excellent condition. Tom Myslinski, 1119 Stilwell Ave., Fremont, Ohio.

FINE NEW BOOK—4000 words German-English for Hams and SWL's. Send $1.25 or 11 IRCs for your copy to Christian Zangerl, OE9CZI, Dornbirn, Nachbeurstrasse 28, Austria.

WANTED: Early issues of QST. 1922—Jan., Feb., Mar.; 1921—all but May, June and July; 1920—all but April, May, June & Dec., K2EEK CQ, 14 Vanderventer Ave., Port Washington N.Y. 11050.

DX-100B, FB $110, u ship. Bill Stravinsky, 1039 Langley Street, Chester, Pa.

EICO 720 Transmitter, 730 modulator, HA5-VFO, RME-45 Rcvr-locals can try. $175 plus shipping. John, WB2EUM, 176 Kimball Terrace, Yonkers, N.Y.

75S1 FOR SALE good condition Waters Q Multiplier and notch filter $350.00. Val La Flam, 55 Hendrick St., Easthampton, Mass. Phone 527-4609.

SELL Johnson Signal Sentry $10. Bud Gimix wavemeter $3. 85 feet miscellaneous lengths RG8U coaxial cable @ 6¢ per foot. W2EQS.

LOUISIANA, BC610 Kilowatt RTTY, a.m. and c.w. less accessories. Sell or trade for smaller transmitter like Ranger, Navigator etc. Mac, K5MVN, 113 Woodcrest, New Iberia, La.

FREE! Giant bargain catalog on transistors, diodes rectifiers, components; Poly Paks, P.O. Box 942P, Lynnfield, Mass.

FOR SALE: 75A-4, like new, No. 3193 3.1 kc filter, matching speaker, vernier dial, only $350.00. W8CXK.

PACKAGE DEAL: Collins 75A-4, serial 1926; KWS-1 serial 382; speaker; tubes; Eico oscilloscope #420; best offer over $1200! W8EUU, 1000 Ingersoll, Coos Bay, Oregon.

HAMS convert any television to sensitive, big-screen oscilloscope, simple changes. No electronic experience necessary. Illustrated plans. $2.00 Relcoa, Box 10563, Houston, Texas.

SWAP: 4X500; 4X150; 4CX250 type tubes for electric train locomotives. What have you? Rockwell, W3SYT, 8672 Lincoln Blvd., Pittsburgh 37, Pa.

SAN FERNANDO VALLEY Radio Club, W6SD, 9th Annual Hamfest-Picnic, July 11. Sunset Farms, 16303 Foothill, San Fernando. Tremendous! Free prizes, swimming, contests. Write: WB6GZZ, c/o Box 3151, Van Nuys, Calif.

POWER TRANSFORMERS rebuilt. 30 years experience, save, Kerla, 950 Metropolis Marine City, Mich. 48039.

7TH ANNUAL PENN-YORK Hamfest Mossiron's Restaurant, Big Flats, N.Y. (Between Elmira & Corning, N.Y.) June 19th, 12 noon. Grand Award NCX-3 SSB XCVR. Preregistration $4.50—$6.00 at door. To Earl J. Foster, W3BKF, Chairman, RD #2, Gillett, Pa. Last day for pre-reg. June 12th. Send s.a.s.e. Speakers, swapfest, contests, etc. Smorgasbord dinner, all you can eat. Only 600 tickets available.

ELECTRONICS COURSE—$2.00. A complete basic electronics course for home study Hammond Home Study Courses. Dept. CQ-67, P.O. Box 332, DeLand, Florida 32721.

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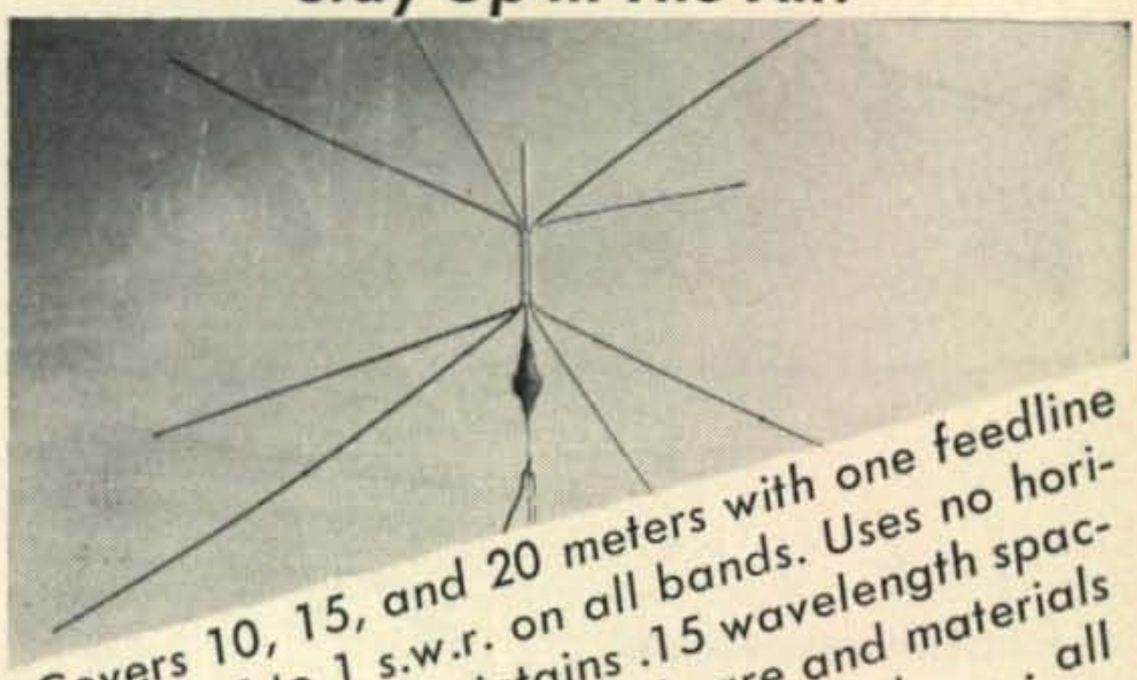

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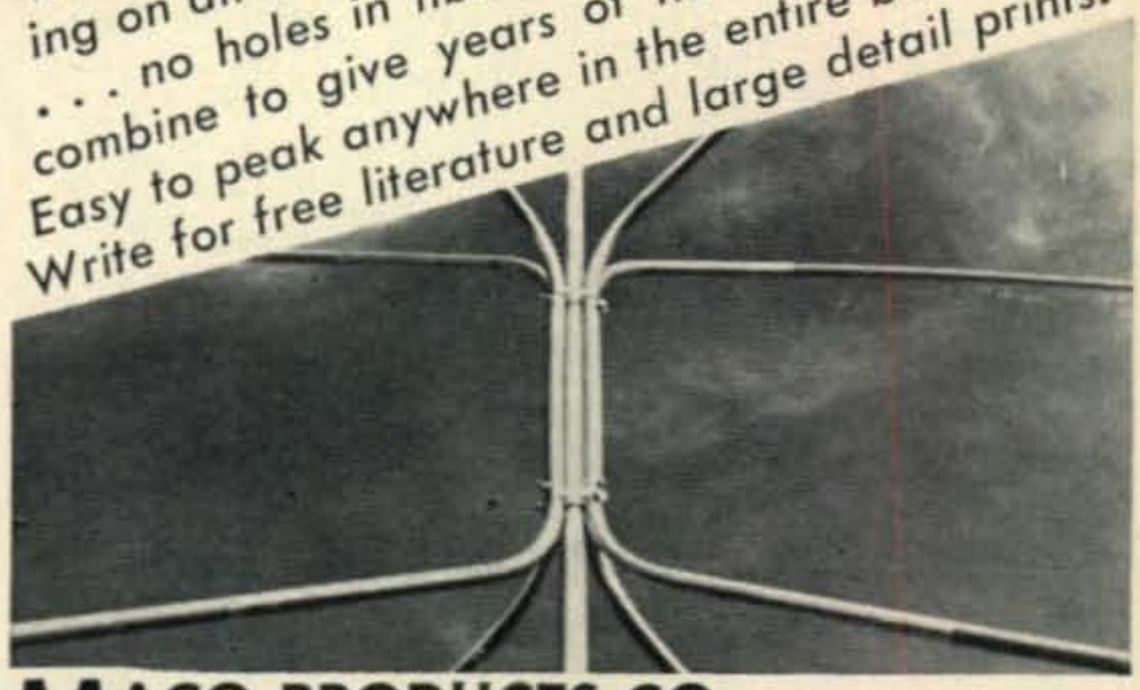

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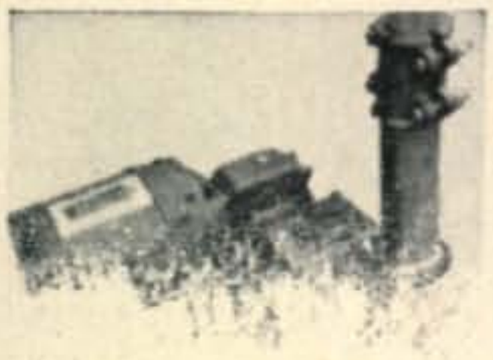

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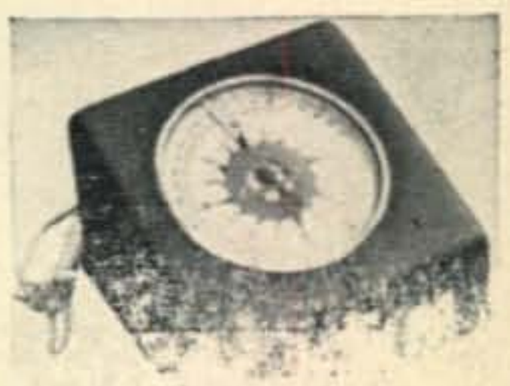

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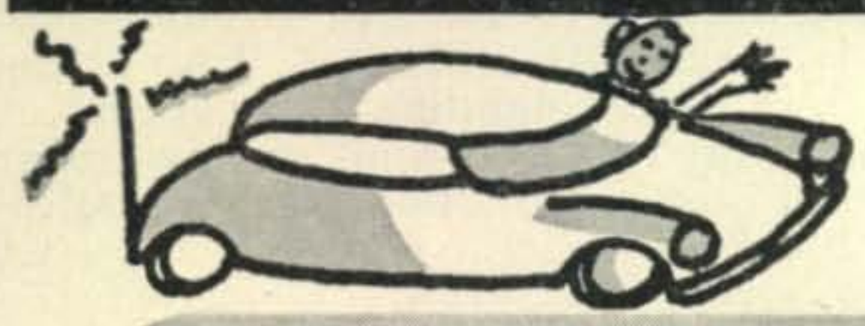

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