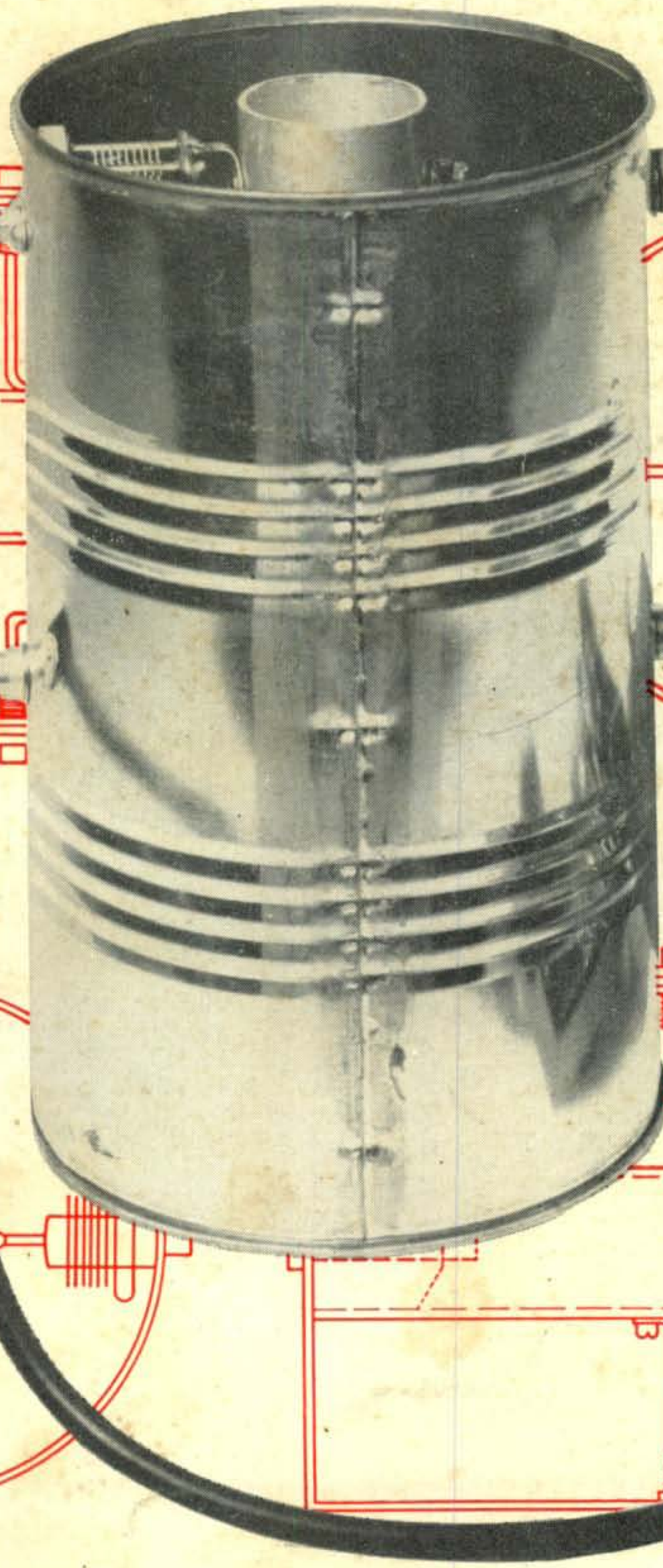
CQ

September 1965
75¢



...w Cost-
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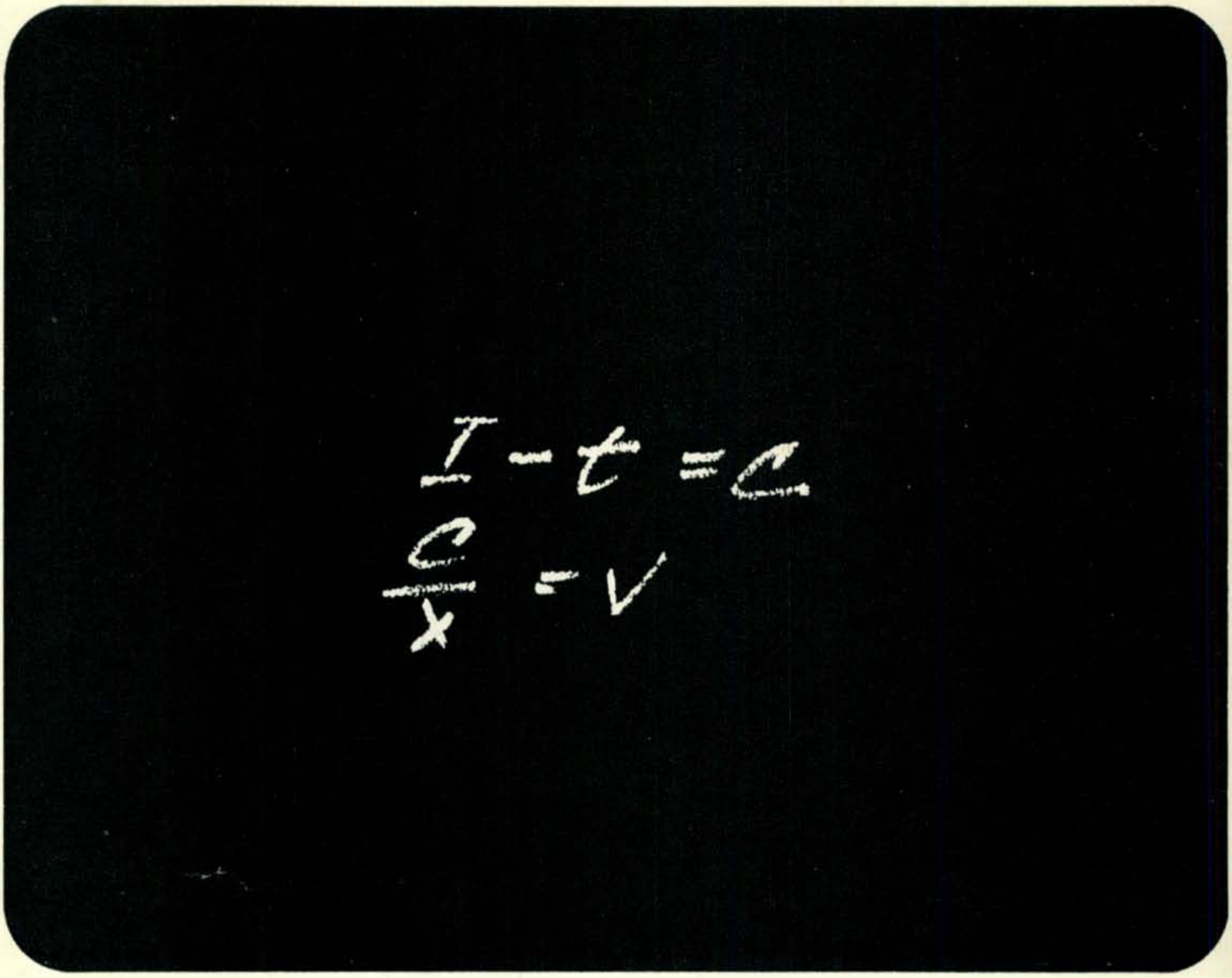
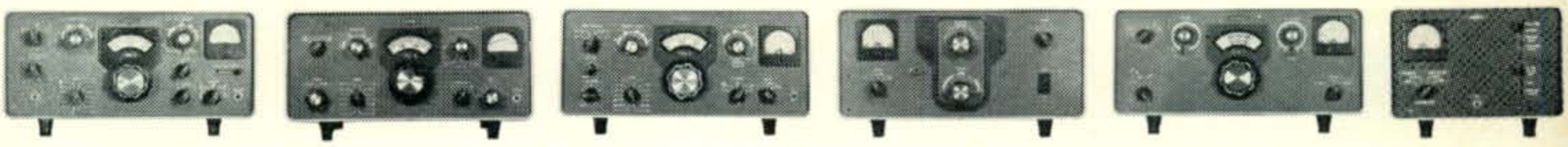
...M. Preamp

The Radio Amateur's Journal



SIMPLE ARITHMETIC

No other equipment on the market holds its value like Collins' S/Line gear. That's one reason Collins is such a good investment. A little simple arithmetic brings home the point. Your initial investment minus trade-in value equals your cost for Collins' S/Line. Divide your cost by the number of years you keep your S/Line gear and you'll have the true value of how little it costs to own the finest. ☐ Check your Collins distributor and compare prices. Then check and compare equipment features. Collins offers you complete station compatibility; frequency stability; frequency calibration; more QSO's per kilocycle; mechanical filters; dual or single PTO control; automatic load control; negative RF feedback; light weight; distinctive simplicity and styling. ☐ Once, these features were all Collins "exclusives." Even today, Collins offers you all ten — Collins is still unexcelled. ☐ Visit your Collins distributor and see the S/Line. Then do your own simple arithmetic. Find out for yourself that it costs less to own the finest.



COLLINS

For further information, check number 3 on Page 110

for high powered mobiles

SOON from *NEW-TRONICS*

T.M.

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Watch for the NEW high Power HUSTLER . . . **Another First from New-Tronics.**

Specially designed for high power mobiles.

Mobiles who have enjoyed the outstanding performance of New-Tronics Hustler antennas will be happy to know that we have developed a new Super Hustler for high power mobiling. **Hams who have seen and tested it say it's great.**

Now you can enjoy all the benefits of going Hustler plus the high power capability.

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See the New-Tronics Conveya-6 and Cliff-Dweller fixed station antennas at your distributors . . . **they're the best.**

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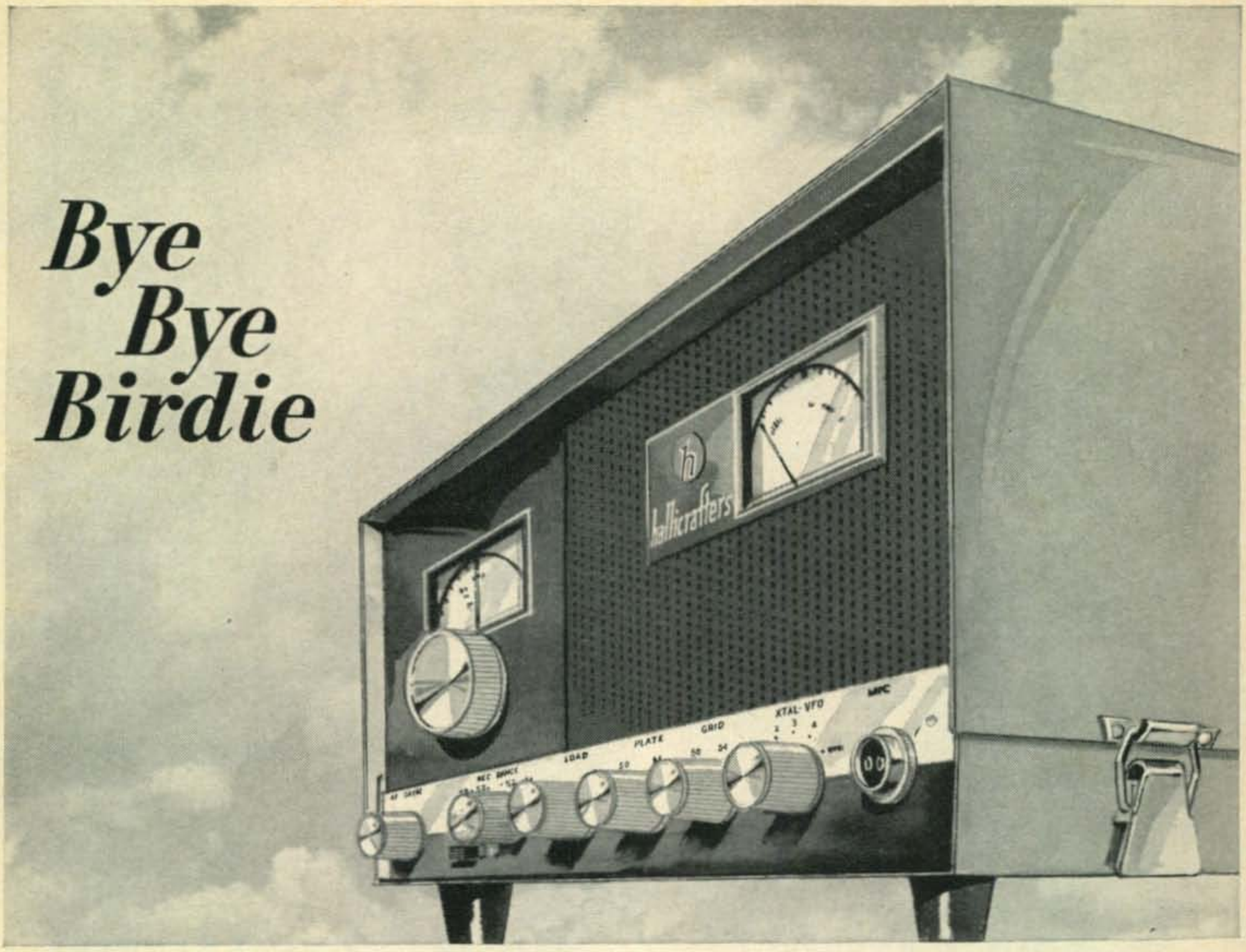
For further information, check number 1, on page 110

Bye Bye Birdie



Efficient filters and selected injection frequencies make the NEW SR-46 and SR-42 VHF transceivers virtually immune to FM and TV interference.

Interference-free reception is only one of many advantages in the new SR-46. Complete six meter band coverage is another. Or full two meter coverage, if you prefer, in the companion SR-42 unit. Both give you double the usual bandspread, through use of dual tuning ranges. A neutralized nuvistor front end boosts sensitivity, and eleven tuned circuits increase selectivity while suppressing interference. Push to talk, of course.

Thorough field testing, before production, by hundreds of operators, assures you of years of trouble-free performance. It all adds up to your top VHF value. See the SR-46, or the SR-42, at your distributor today.

FEATURES

Frequency Coverage: 50 to 52 Mc and 52 to 54 Mc (144 to 146 Mc and 146 to 148 Mc in the SR-42). **Power Input:** 10-12 watts. **Power Supply:** 115 VAC and 12 VDC (vibrator and line cord optional extra). **Transmitter Crystals:** high frequency type; provision for four (one furnished), plus external VFO, switch-selected from front panel. **Tubes:** 10, plus zener diode oscillator control and four diodes (11 tubes, 2 zeners and four diodes in the SR-42). **"S" Meter** automatically switches to RFO. **Cabinet:** "snap-off" type for easy access. **Size:** 5½" high, 12⅛" wide, 8¼" deep. **Shipping Weight:** 17 lbs. **Amateur Net Price:** $189.95.

New **SR-46**

SIX METER VHF TRANSCEIVER and SR-42 for two meters

"Quality through Craftsmanship"

hallicrafters

5th & Kostner Aves., Chicago, Ill. 60624

Export: International Div., Hallicrafters.
Canada: Gould Sales Company, Monttreal, P.Q.

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SEPTEMBER 1965 VOL. 21, NO. 9

CQ The Radio Amateur's Journal

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DEPARTMENTS

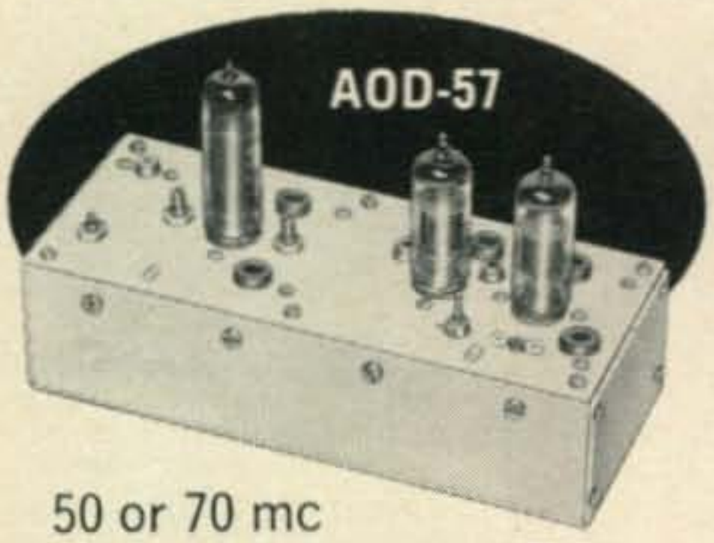
Offices: 14 Vanderventer Avenue, Port Washington, L. I., N. Y. 11050. Telephone: 516 PO 7-9080.

CQ—(Title registered U. S. Post Office) is published monthly by Cowan Publishing Corp. Second class postage paid at Port Washington and Garden City, New York. Subscription Prices: U. S. A., Canada and Mexico, one year, $5.00; two years, $9.00; three years, $13.00. Pan-American and foreign add one dollar per year. CQ does not assume responsibility for unsolicited manuscripts. Please allow six weeks for change of address. Printed in the United States of America.

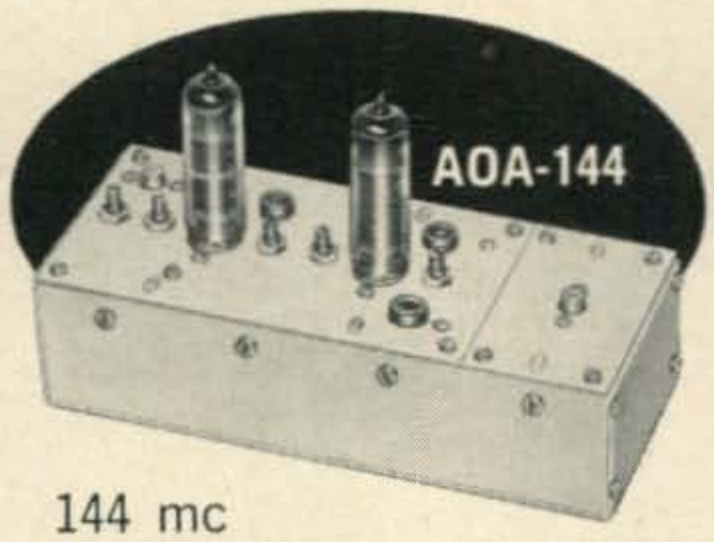
NEW FROM INTERNATIONAL

VHF/UHF UNITIZED TRANSMITTERS 50 mc—420 mc

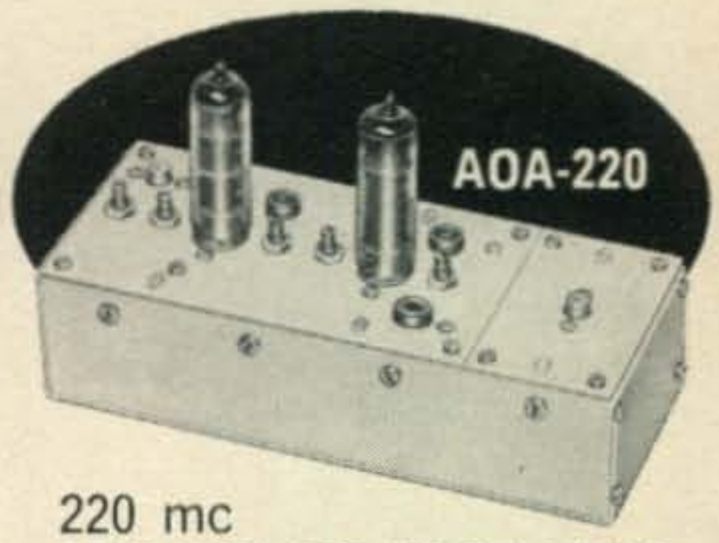
International's new unitized VHF/UHF transmitters make it extremely easy to get on the air in the 50-420 mc range with a solid signal. Start with the basic 50 or 70 mc driver. For higher frequencies add a multiplier-amplifier. All units are completely wired. Plug-in cables are used to interconnect the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



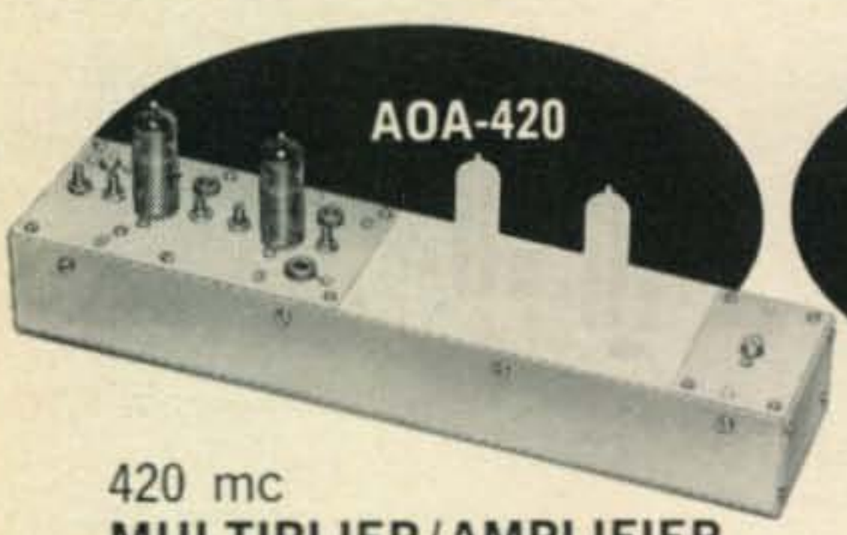
50 or 70 mc
DRIVER/TRANSMITTER
The AOD-57 completely wired with one 6360 tube, two 12BY7 tubes and crystal (specify frequency). Heater power: 6.3 volts @ 1.2 amps. Plate power: 250 vdc @ 50 ma.
AOD-57 complete.....$69.50



144 mc
MULTIPLIER/AMPLIFIER
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



220 mc
MULTIPLIER/AMPLIFIER
The AOA-220 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



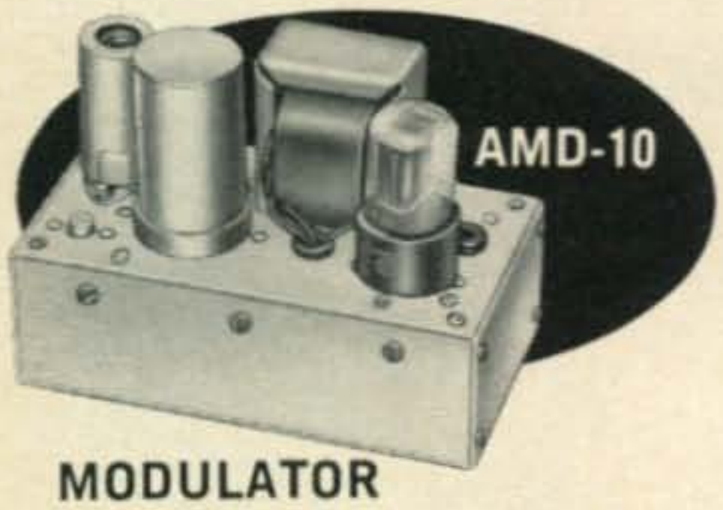
420 mc
MULTIPLIER/AMPLIFIER
The AOA-420 uses two 6939 tubes providing 4 to 8 watts output on 420 mc. Requires AOA-57 plus AOA-144 for drive. Heater: 6.3 volts @ 1.2 amps. Plate: 220 vdc @ 130 ma.
AOA-420 complete.....$69.50

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

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 AOA-420



MODULATOR
The AMD-10 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 mic. (High Imped.) Requires 300 vdc 20 ma, no signal, 70 ma peak: 6.3 vac @ 1.05 amps.
AMD-10 complete $24.50

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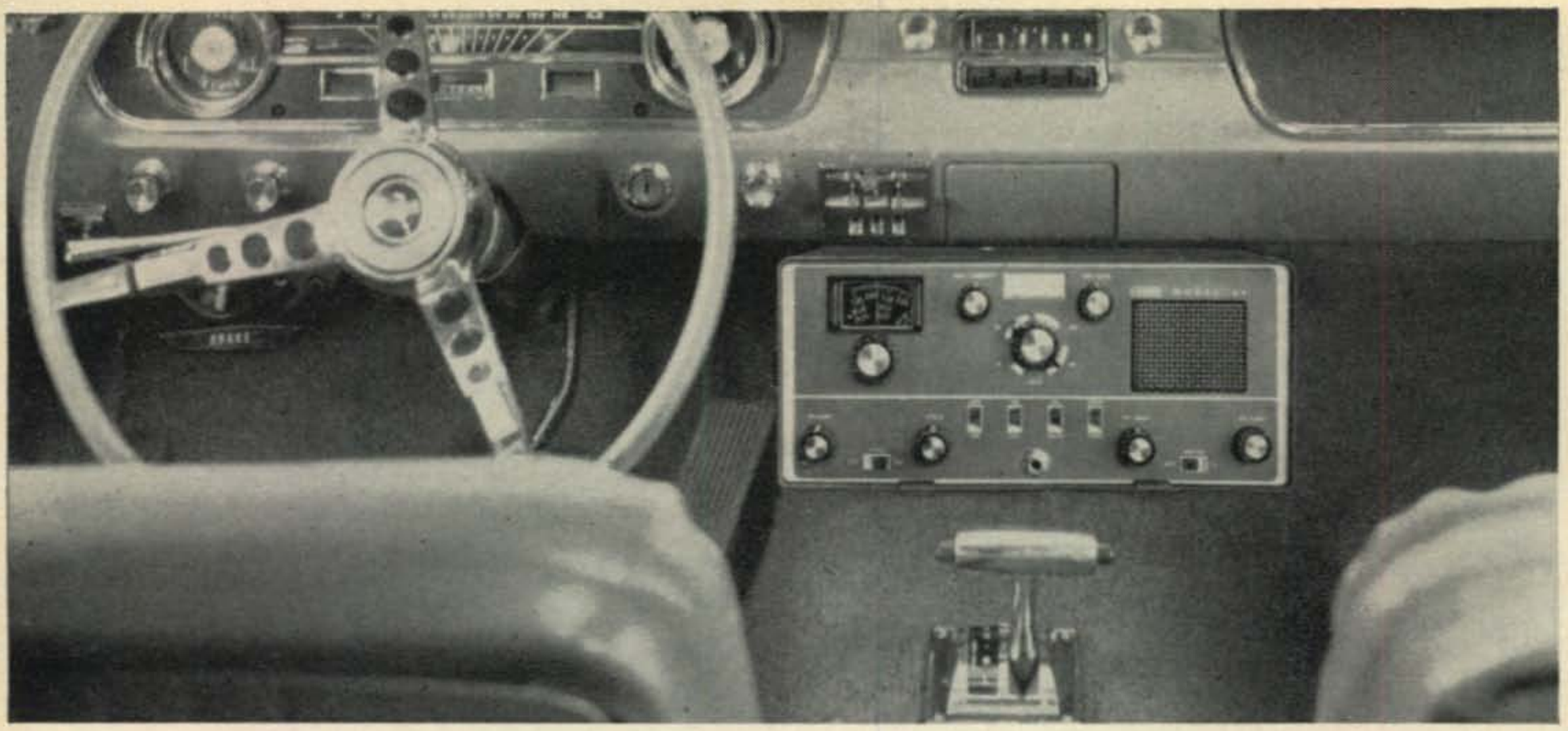
For further information, check number 25, on page 110



1000 watts...neatly tucked in

SB2-LA Linear in trunk.

The small size of the new **SB-34** four-band SSB transceiver really proves its importance when installed in the lively 1965 small cars. In fact, using only standard available SBE equipment, it's no trick at all to tuck in a complete 1000 watt p.e.p. station. Observe in the photo that the **SB-34** fits under the dash—and blends with the interior of this well-appointed car like it was specially tailored. The exceptionally compact **SB-2LA Linear Amplifier** arranges easily in a corner of the rear trunk. Happily too, the **SBE Inverter** that powers this linear finds a made-to-order—and well ventilated—mounting space in the front section of the engine compartment of this popular car. Need we mention that SB-34 has its own **built-in 12V DC and 117V AC universal power supply** thereby simplifying greatly the problem of finding mounting space in a compact car? And if you're wondering how to mount an antenna on that really snug, contoured bumper—don't. Band-spanner H-215 contour mount makes it easy, supports the short-column model of the Band-spanner "Topsider" with its KW coil.

SB-3DCP Inverter in engine compartment.

SB-34 and **SB-2LA** combo add up to the best KW p.e.p. value on the market!

SB-34 Transceiver
.....395.00

SB-2LA Linear Amp
.....249.50

SB-3DCP Inverter
.....249.50

HIGHLIGHTS: 135 watts 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 diode, 1-varactor diode, 2—6GB5's PA, 1—12DQ7 driver. **Speaker built in** (external speaker provisions). Pre-wired receptacles on rear of set accept VOX and 100 kc. calibrator—both items being optionally available. **Size:** 5" high, 11¼" wide, 10" deep. Weight, approx. 20 pounds.

SIDEBAND SBE ENGINEERS

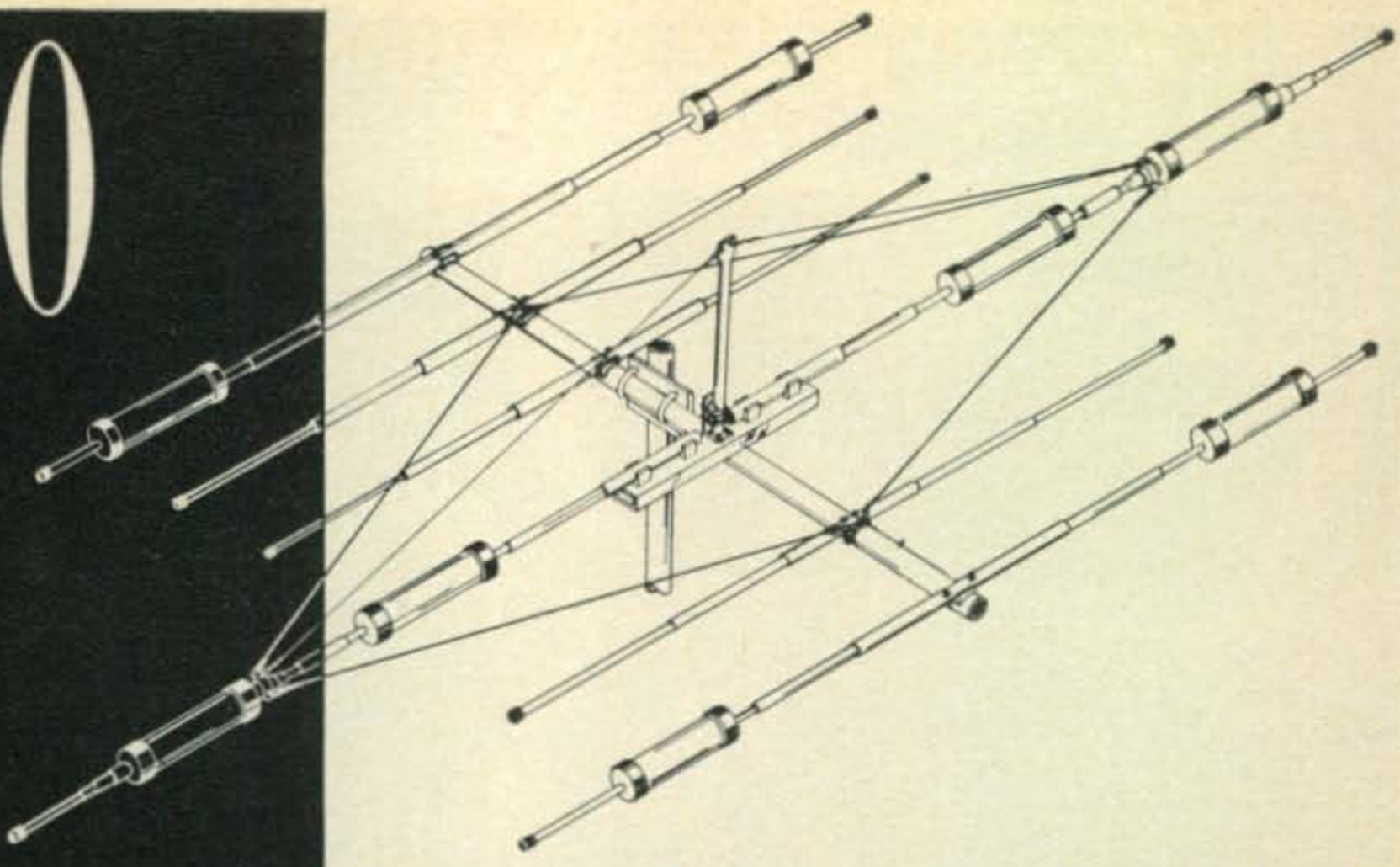
317 ROEBLING ROAD, SOUTH SAN FRANCISCO, CALIFORNIA

Export sales: Raytheon Company, RAYTHEON International Sales & Services, Lexington 73, Mass. U.S.A.

For further information, check number 5, on page 110

TA-3640

for 10 15 20 and 40 meters



Put your signal where it counts. Use the ultimate in Ham beams - - - the Mosley TA-36 with Kit TA-40KR added to radiating element. Employs 4 operating elements on 10 meters, 3 operating elements on 15 meters, 3 operating elements on 20 meters. SWR is 1.5/1 or better at resonant frequencies over all 4 bands. Constructed of heavy-wall aluminum for maximum strength. Rated for full power.

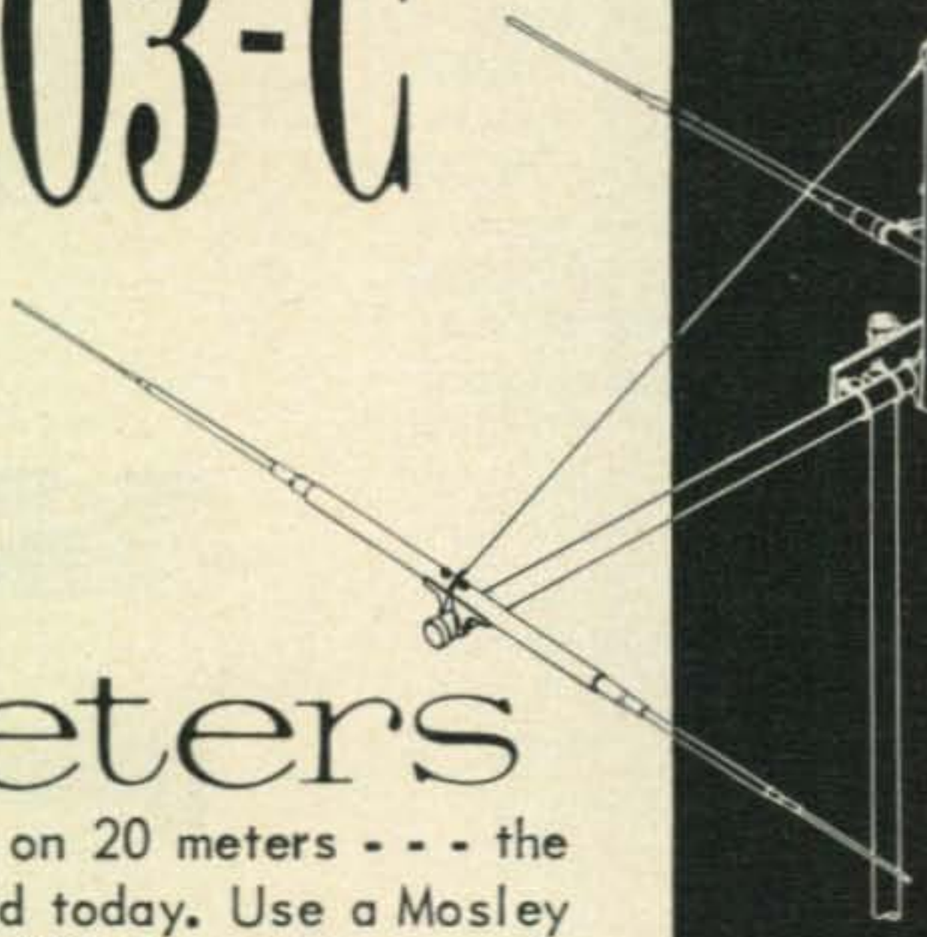
Write for detailed specifications and performance data on the Mosley TA-3640.

Mosley Electronics, Inc.

4610 NORTH LINDBERGH BLVD.
BRIDGETON, MISSOURI 63044

A-203-C

for 20 meters



Concentrate on 20 meters - - - the best DX band today. Use a Mosley full-size A-203-C wide spaced, gamma matched, 20 meter beam. Features: VSWR 1.5/1 or better. Rated for full power. Assembled weight 40 lbs. Turning radius 22 feet.

Exclusive Mosley element design virtually eliminates element flutter and boom vibration.

The Mosley "Quality of Excellence" has become a standard in the industry. Available to you are a wide variety of antennas from which to choose, plus antennas custom made to order. Let Mosley know your antenna needs.

Mosley Electronics, Inc.

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

For further information, check number 6, on page 110

ZERO BIAS

USA-CA

We expect confirmation on the first USA-3079-CA this week. Look for the story in the Oct. issue.

THERE's an interesting bit of nonsense going on these days in the House of Representatives. Seems that at least one grandstanding Congressman, Rep. Frank T. Bow of Ohio, is doing his best to usurp the authority which Congress vested in the Federal Communications Commission with the enaction of the Communications Act of 1934.

Representative Bow, evidently out to pick up some votes, has proposed that Congress endorse House Resolution 377, which is an effort to block the enforcement of the recently adopted CB rules. In addition, Bow recommends "the assignment of the twenty-eight megacycle (ten meter) band, now of limited value to the amateur radio service, to the citizens radio service, or a new hobby service . . ."

It baffles me completely how a supposedly knowledgeable legislator, representing the State of Ohio, can be so utterly oblivious of the nature of a situation, and yet have the gall to present to Congress a resolution such as H. Res. 377.

Let's pick at only two of the many flaws. Bow urges that a study be made of the possibility of taking the ten meter amateur band for CB use. Had Bow taken the trouble to telephone the FCC, he would have learned in short order that it is not within the power of Congress, FCC or the honorable Rep. Bow to give or take the ten meter band from *any* service. Unlike some other Governments these days, the U.S. is proud of the fact that we honor all international agreements we enter into. Since radio communications is, by necessity, an internationally regulated service, the U.S. must, and does, abide by such agreements as those reached by the ITU.

Bow then claims that since the inception of the CB service in 1958, FCC has failed to properly explain to licensees that CB is not to be used for hobby purposes. For this reason, he urges that Congress sanction any resulting illegal hobby use of CB. Does he realize that since 1958, a question has appeared on all CB license applications as follows: "Has applicant read and understand the provisions of Part 95 [formerly Part 19] Subpart D, dealing the permissible communications for which this class of station may be used?" Had Congressman Bow's constituents read the required Subpart D, there would have been no question about the prohibition of Hobby use of CB. But then what's a little perjury on an application among friends!

Thankfully, Rep. Bow is not exemplary of most U.S. Congressmen. Most of them take the time and trouble to investigate before they sponsor a piece of legislation, if for no other reason but to avoid looking foolish when the legislation comes up for discussion. Oh, well, it takes all kinds . . .

Records

Speaking of all kinds of people, I noticed a little letter in *73* Magazine last month, from W5THI, who claimed he never received payment for an article in *CQ* back in Oct. 1957. Wayne checked his records and discovered that '5THI was owed $16.00 for his article in Oct. 1958 *CQ*.

A few comments are in order. First, if *CQ* was in possession of its records instead of Wayne, perhaps W5THI would have been paid. Second, if Mr. Chilton had written to *CQ* about the situation at any time since Wayne left, he would have been paid without a moment's hesitation. Third, I beg to differ with Wayne that responsibility for payment lies only with the bookkeeper and publisher. Any responsible editor who cares about his readers, his authors and his magazine will bend over backwards to see to it that authors are paid for their work. The responsibility can't be shunted off to someone else. Just a small point in passing. Wayne was editor of *CQ* at the time W5THI wrote his article!

Funny how some of the oldtimers here at *CQ* remember how the mysterious S. T. Wilson always got paid on cue. Ask him about that someday!

Vacation—Finally!

After five years of work at *CQ* without a real vacation, I'm finally throwing up my hands and saying "I've had it!" I'll be spending most of the month of August pushing a new Porsche 912/5 around Europe *(heh, heh!)*. Don't count on reading any travelogues in *CQ* when I return, though. If that's what you wanted to read, you could always buy *National Geographic* or even *73*. But you wouldn't want to do that, would you? Nope, didn't think so!

73, Dick, K2MGA

Having Tower Troubles?

This May Be Your Answer

BY DONALD M. FROUDE*, WA2TEQ

For the first time, as far as is known, a New York Community has passed a special piece of legislation to erect towers in one-family residential areas, with the unanimous approval of such legislation by the City Council of New Rochelle in its regular July session. While many cities quietly permit such towers, so far as is known by the Communications Club of New Rochelle, the local law is the first direct legal approval to go on the books.

For the past several years, there has been a continuing "battle" between hams and the city, with the culmination being the institution of a suit against Dr. Sam Rosen, WA2RAU, to force him to remove his tower from his premises. When this came into being, the Communication Club of New Rochelle realized that for the good of amateur radio generally as well as locally, something would have to be done. Under supervision of Gray Berry, K2SJN, past President of the CCNR, a concerted campaign of publicity via all possible media was instituted, culminating in a front-paged letter to call the attention of the Community to the inequable situation that the City had permitted to arise. Much public furor resulted, and the City Manager was instructed by the Council to determine if a suitable piece of legislation could be drawn up. Credit for drafting the actual legislation, and for the priceless day-to-day liaison with City Hall goes to Arthur Brooke, Director of Civil Defense for New Rochelle.

At this point, each City Department involved was directly contacted with the help of the Director of Civil Defense, and the final legislation as presented to the council was passed unanimously after public hearing. There were no speakers at the hearing in opposition, thanks, apparently, to the long and well-executed program of public relations planned by the Club's committee.

In the belief that other individual hams and amateur organizations may find it helpful to have the New Rochelle legislation before them in their discussions with pertinent local political bodies, the text is briefed below. Further details can be secured by writing to the City Clerk, New Rochelle, N.Y. and requesting copies of the recently-adopted amendment to Article V, Section 5.1 Part 1 of District Zoned regulations for the City.

Allowed by special permit upon application to the Board of Appeals on Zoning; D. Radio Towers for licensed amateur radio stations not to exceed seventy-five (75) feet above the established grade provided the following conditions are met: 1. Located at rear of property. 2. Located at least 15 feet from the rear and side lines of the lot. 3. Tower shall have a smooth unclimbable surface to a height of ten feet or else a six foot fence with a locked gate completely enclosing the tower located within 10 feet of the tower. 4. Radio tower to be commercially manufactured with published specifications, standards and stresses. 5. Base of the tower shall be no greater than 2′ 0″. 6. Guy wires shall terminate in a solid structure and be located not less than 10′ above grade."

CCNR feels that the legislation as passed meets most of the usual "objections" heard from non-amateur residents of a community when the subject of towers comes into discussion. And the six-year long struggle to have our city authorize towers for those ham residents who desire them has been successfully brought to a conclusion. Present and future amateur operators residing in New Rochelle, as well as in other communities which will presumably follow the leadership of the Westchester community and pass similar legislation, owe a great debt of gratitude to the CCNR group headed up by K2SJN. ■

*President, Communications Club of New Rochelle.

← For further information, check number 8, on page 110

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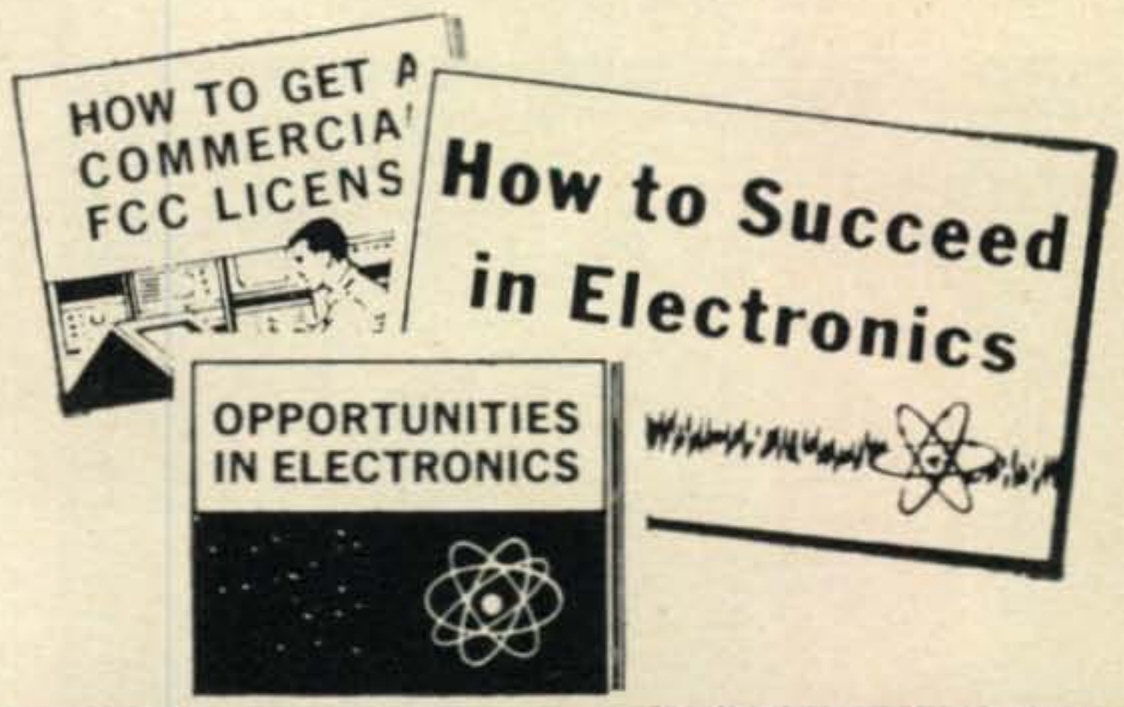

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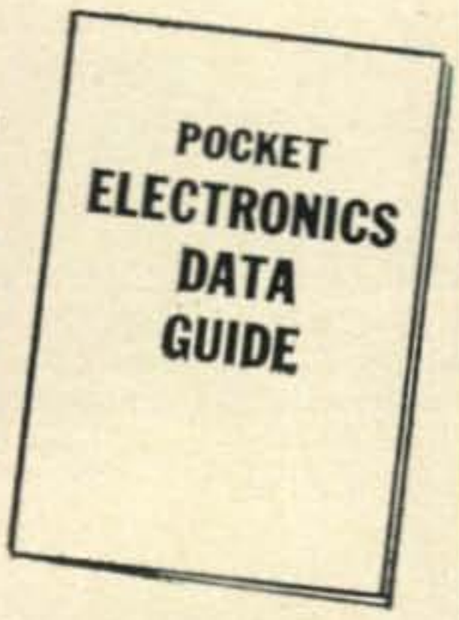

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- ☐ Industrial Electronics
- ☐ Advanced Engineering

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(Print Clearly)

Name _____ Age _____

Address _____ County _____

City _____ State _____ Zip _____

For further information, check number 10, on page 110

CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ

Editor, *CQ:*

Re: "An Automatic CQ Sender," June 65 *CQ*.

This was one of the most unnecessary articles I've ever encountered in an otherwise good issue of *CQ*. Perhaps this particular circuit is a bit modified, I didn't read the article, but it was my understanding that everyone running c.w. these days had automatic CQ senders. You see, it's like this, you hear this beautifully clear clean cut fist coming through and your hopes of a good QSO rises again. But wait, take it easy, leisurely stroll into the kitchen and put on a pot of coffee, and if you like make a couple sandwiches, there's plenty of time.

You finally get back to the operating position and wait a while longer. He finally goes off and you give him a call. Of course, when he comes back without the aid of the recorder, he wants to show off a bit and comes back sending with his left foot. If you can read this garble, it will run something like this: HR1RP HR1RP HR1RP HR1RP HR1RP HR1RP HR1RP HR1RP DE W5ZRP W5ZRP W5ZRP W5ZRP W5ZRP BT BT TKS OM FB CALL BT BT UR FB SIGS RST RST 579 579 BT BT RIG HR RUNNING FULL KW BT BT QTH DOVER ARK IMI DOVER ARK BT BT WX HOT BT BT PSE QSL BT BT SURE BEEN NICE QSO BT BT HPE CU AGN BT BT GUD LUCK ES 73s BT BT HR1RP HR1RP HR1RP ——————

Man just gotta have another cup of coffee before that next fabulous QSO!

David E. Marshall, HR1RP/W5ZRP
c/o U.S. Embassy
Tegucigalpa, Honduras

Customer Relations—Again

Editor, *CQ:*

In regards to K3AHF singing the praises of Swan Electronics and their efforts to satisfy a disgruntled customer, I must whole-heartedly agree with Mr. Crone's comments. I had a similar experience with my Swan 350 and every effort was made by the manufacturer to satisfy. In this day and time when many manufacturers wouldn't give you air in a jug, it is refreshing to deal with a company that acts like they care whether or not you are satisfied with their product. My thanks for Mr. Herb Johnson and his staff, also there shouldn't be any doubt as to what my next rig will be.

Terry Richardson, WA4RYN
1320 Canary Drive
W. Columbia, South Carolina 29169

George Behrends, VE4RO

Editor, *CQ:*

I regret to announce the passing of Mr. George Behrends, VE4RO on the 10th of July, 1965 at the age of 62.

George was one of the pioneers of ham radio starting in Denmark at an early age. He came to Canada in 1924 and was one of the early DX boys and was always known

NOW! A TRI-BAND SSB TRANSCEIVER KIT FOR 179.95

NEW EICO 753 SSB/AM/CW TRI-BAND TRANSCEIVER

Build the finest of SSB/AM/CW tri-band transceivers with 200 watts of SSB punch and every wanted operating facility, plus the extra reliability and maintenance ease inherent in kit design. Assembly is made faster and easier by VFO and IF circuit boards, plus preassembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The new EICO 753 is at your dealer now, in kit form and factory-wired. Compare, and you will find that **only the 753 has all these important features:**

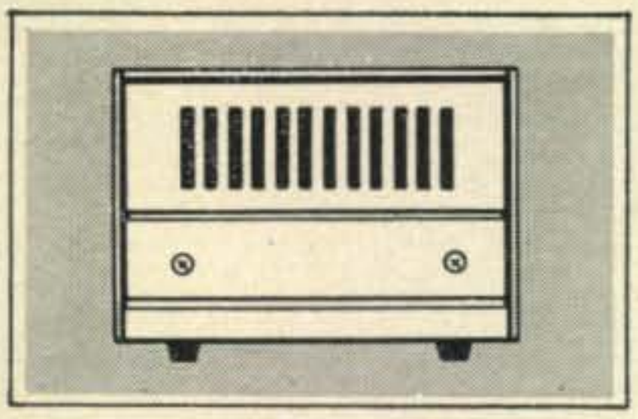
■ Full band coverage on 80, 40 and 20 meters. ■ Receiver offset tuning (up to ±10kc) without altering transmitter frequency. ■ Built-in VOX. ■ Panel selected VOX, PTT & STANDBY. ■ High level dynamic ALC to prevent flat-topping or splatter and permit the use of a linear amplifier. ■ Automatic carrier level adjustment on CW and AM. ■ Dual ratio ball drive permits single knob 6:1 rapid tuning and 30:1 vernier bandspread (over 10 degrees of scale). ■ Position of hairline adjustable on panel. ■ Illuminated S-meter/PA Cathode Current Meter and tuning dial. ■ Fast attack, slow decay AGC. ■ Grid-block break-in CW keying. ■ Product detector for SSB and CW, triode detector for AM. ■ TR relay with auxiliary contacts for use with high power linear amplifier. ■ Includes mobile mounting bracket.

ADDITIONAL SPECIFICATIONS

FREQUENCY COVERAGE: 3490-4010kc, 6990-7310kc, 13890-14410kc. SSB EMISSIONS: LSB 80 and 40 meters, USB 20 meters. RF POWER INPUT: 200 watts SSB PEP and CW, 100 watts AM. RF POWER OUTPUT: 120 watts SSB PEP and CW, 30 watts AM. OUTPUT PI NETWORK MATCHING RANGE: 40-80 ohms. SSB GENERATION: 5.2 Mc crystal lattice filter; bandwidth 2.7kc at 6db. STABILITY: 400 cps after warm-up. SUPPRESSION: Carrier-50db; unwanted sideband-40db. RECEIVER: Sensitivity 1uv for 10db S/N ratio: selectivity 2.7kc at 6db; audio output over 2 watts (3.2 ohms). PANEL CONTROLS & CONNECTORS: Tuning, Band Selector, AF Gain, RF Gain, MIC Gain with calibrator switch at extreme CCW rotation, Hairline Set (capped), Mode (SSB, AM, CW, Tune), Function (Off, Standby, PTT, VOX), Carrier Balance, Exciter Tune, PA Tune, PA Load, Receiver Offset Tune, MIC input, phone jack. REAR CONTROLS & CONNECTORS: VOX Threshold, VOX delay, VOX sensitivity, Anti-VOX sensitivity, PA Bias adjust, S-Meter zero adjust, power socket, external relay, antenna connector, key jack, accessory calibrator socket. METERING: PA cathode on transmit, S-Meter on receive. SIZE (HWD): 5 13/16" x 14 1/4" x 11 1/4". POWER REQUIREMENTS: 750 VDC at 300 ma, 250 VDC at 170 ma, -100 VDC at 5 ma, 12.6 VAC at 3.8 amps.

The Model 753 is an outstanding value factory-wired at $299.95.

Power Supplies Tailored for Optimum Performance of the 753.



Model 751 Solid State AC Supply/Speaker Console.
Matching table-top companion unit. Built-in PM speaker.
Kit $79.95 Wired $109.95

Model 752 Solid State Mobile Supply.
For use with 12 volt positive or negative ground systems. Fully protected against polarity reversal or overload.
Kit $79.95 Wired $109.95

For further information, check number 13, on page 110

EICO For FREE Catalog and 753 Spec. Sheet write to EICO Dept. CQ-9
131-01 39th Ave., Flushing, N. Y. 11352

for his potent signals all over the world.

George was the first Canadian to be awarded DXCC after the war and was also the first to gain WAZ. Since his retirement from business in 1958 he had not been too active as he was kept quite busy on the farm. Even to this day hams all over the world still say, "Give my 73 to VE4RO." We have all lost a good friend and the amateur ranks a good ham.

Chas. E. Johnson, VE4XO
196 Woodbridge Road
Winnipeg 12, Manitoba
Canada

Ignition Noise

Editor, *CQ:*

I have been hamming here in Germany a little less than two years now and find it quite enjoyable. There is something I have noticed and I wonder if others here will bear me out on this: U.S. automobiles seem to generate a great deal more ignition noise than do European cars. I am not referring to European diesel types, but the regular gasoline engines.

I live in U.S. government quarters here in Heidelberg on one of the main thoroughfares, where hundreds of vehicles go by. The only ones with very loud ignition noise in my receiver, on 20 meters, are U.S. models. If a U.S. vehicle parks under my window, with the motor idling, the S-meter on my receiver sometimes registers as high as S-8 from ignition noise. A European model, on the other hand may not make any noise at all, or be only barely audible.

Perhaps the higher compression ratios used in U.S. engines is part of the answer, but it seems to me this subject could stand a little investigation.

John Harvey Chase, DL5DU/WA4TPF
Heidelberg, Germany

Let's Watch That, Marcia!

Editor, *CQ:*

If I didn't know better, I would think you are trying to emulate the numbering system used by a former editor of *CQ* in his contemporary magazine.

I can't resist inviting your attention to the fact that the first six issues of *CQ* for 1965 were numbered from 1 to 6 of volume 21, whereas the 7th issue, July, carries the number 7 for volume 22.

Are we going to lose a WHOLE volume of your excellent publication? Horrors and perish the thought!!!

Col. A. R. Marcy, USA Ret., W4ID
461-3rd Avenue, Sea Park
Eau Gallie, Florida 32937

Oops!—*Ed.*

Charles F. Sheldon, KØDZE

Editor, *CQ:*

My son, Charles F. Sheldon, KØDZE, died on Jan. 24, 1965, at the age of 23. His old "shack" upstairs has many cards on the walls from contacts. Any hams who have cards from him, please send them to me. I would appreciate this.

Thank you, and thanks to any who send me the cards.

C. S. Sheldon
12909 Bond Place
St. Louis, Missouri 63127

Pots 'n Pans, But Not W5BRR

Editor, *CQ:*

I picked up my *CQ* this noon, read the DX Contest results (with satisfaction) and followed with the dope on your new 12 Hour VHF Contest. It sounded good until I turned the page and started reading the rules.

Pots, pans, suitcases, wheelbarrows, and even the old pump in the yard all have "handles," but *I* have a *name*.

Right now, I just might skip your contest! Then, again, I might not.

George T. De La Matyr, W5BRR
170 W. Caldwood Drive
Beaumont, Texas 77707

W2GT Scores Again

Editor, *CQ:*

We wish to thank *CQ* for the certificate and USA-CA Department and also for informing the readers of our Michigan Screw Ball Net Certificate and pin.

We are proud to state we have them in 23 states and several foreign countries now and have issued 214 since

2000 Watts?
Two 3-400Z Triodes?
Less than $500?

See the NEW *SWAN MARK I*
Linear Amplifier

- Two Eimac 3-400Z Triodes in grounded grid circuit.
- 2000 watts PEP input.
- 1000 watts CW and tune.
- Drive requirements: 100 watts.
- Built-in changeover relay.
- Built-in 117/220VAC power supply.
- Wide range pi output.
- Dimensions: 19" x 8½" x 15½"
- Weight: Approximately 55 lbs.

with the usual SWAN reliability and performance.

Price $425 less tubes.
Tubes $ 68 Mfgr. suggested price.
Total $493 incl. tubes.

SEE IT AT YOUR SWAN DEALER!

SWAN ELECTRONICS CORP.
Oceanside, California

For further information, check number 11, on page 110

Feb. 12, 1965. We will have a Screw Ball meeting and display with a house trailer at the Allegan VHF Picnic, Sunday, August 1st at Allegan State Park on Lake Michigan.

This is an annual affair and draws a lot of amateurs from Wisconsin, Ohio, Illinois, Indiana as well as Michgan. Last year about 1200 registered in. Our charter board asked me to write to you for any literature you might want us to display and also for some subscription order blanks as they feel that *CQ* will be our official magazine for Award Hunting Members. We cannot state our feelings about CHC as such except to state we were astounded at letters we received from California when we asked for advice in getting started.

Please believe us, we feel that man is sick, sick, sick, and should be pitied instead of censored, but we sure hate to see the thing fold on chapter levels as it has.

We represent a group of amateurs and our only interest is to promote activity—all bands and modes.

Quite a few I am sure will subscribe to your publications on our advice.

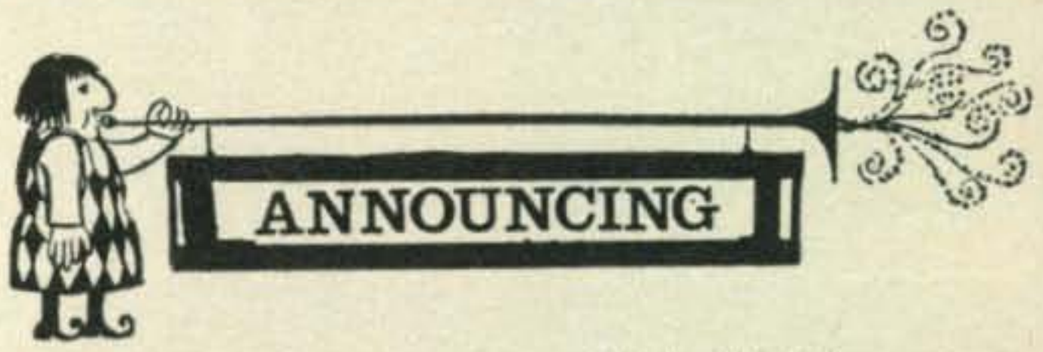
Al Mann, WA8BGU
Michigan Screw Ball Net
P.O. Box 83
Paw Paw, Michigan

20 Meter C.W.

Editor, *CQ:*

Has anyone considered that the 14 mc c.w. band is actually 14,000 to 14,080 kc? The 14,080 to 14,100 kc is occupied by RTTY and it wipes out c.w. From 14,100 to 14,200 kc is strictly foreign phone stations. I feel sorry for the fellows without the Extra class license who will only have 30 kc to operate c.w. Don't let anyone tell you that c.w. has 14,000 to 14,200 kc as stated. This does not happen except in a phone operator's mind.

Ed Marriner, W6BLZ
528 Colima Street
La Jolla, California 92037



Joliet, Illinois

The Joliet Amateur Radio Society will celebrate their 25th anniversary with a banquet at the Blue Willow Restaurant at Lockport, Illinois on Oct. 2. Staber W. Reese Sr., W9DOO, official photographer for the Wisconsin Conservation Department will be the principal speaker. For further information, contact Al Jackson, W9DBJ, 1322 Mayfield Ave., Joliet, Illinois.

Walla Walla, Washington

The Walla Walla Valley Radio Amateur Radio Club will hold its 19th annual all family picnic and hamfest Sept. 18th and 19th at Jefferson Park in Walla Walla. Saturdays activities incude the Northwest Side Band Association banquet in the evening. Sunday there will be displays, swap shop, contests and awards. Check with Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, Washington, for more info.

Malaga, New Jersey

The South Jersey Assoc. will sponsor its annual gala Hamfest on Sept. 12, 1965 at Molia Farms, Malaga, N.J. Advance registration for non-club members is $2.00 with Sept. 6 as the deadline. General admission at gate is $3.00. Day's activities will include 2 and 6 Meter hidden transmitter hunt, swap shop, pony rides, games and swimming for the children. For Mobiles there will be talk in by K2AA on 2 and 6 Meters. Registrations are being handled by Joe Duffin, W2ORA, 247 King's Highway West, Haddonfield, N.J. Telephone 428-5759.

Station VE3WE

The Scarborough Amateur Radio Club will be operating its station VE3WE portable from the Canadian National Exhibi-

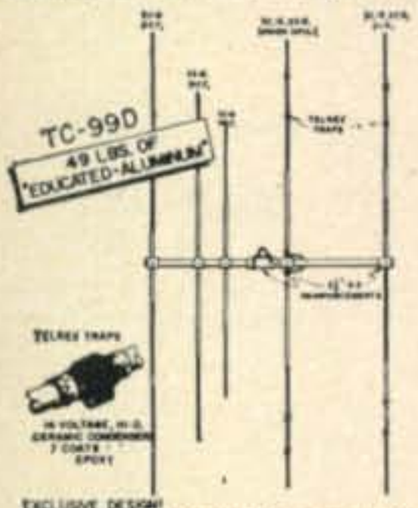
telrex "The-performance-line" WITH A "MATERIAL" DIFFERENCE

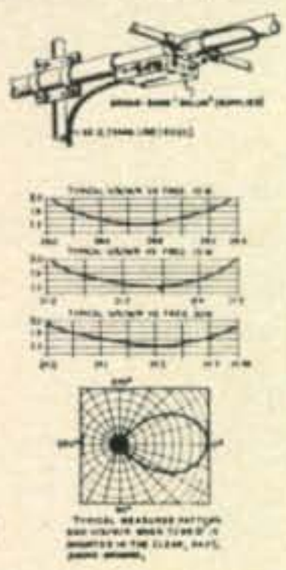
"BEAMED-POWER" — "BALANCED-PATTERN" — "PERFECT-MATCH" ARRAYS

LABORATORY TUNED, MATCHED, & CALIBRATED TO ASSURE PROPER AND EXACT ASSEMBLY

*for "TOP-MAN"-ON-THE-FREQUENCY-RESULTS, AT YOUR SITE!**

10, 15 and 20 Meter MODEL TC-99D Amateur net price $249.00





EXCLUSIVE DESIGN! 3 OPTIMUM SPACED, OPTIMUM TUNED, REFLECTORS, PROVIDE OPTIMUM GAIN, F/B RATIO AND GOOD SWR GAIN-BANDWIDTH ON 10, 15 AND 20 METERS.

TC-99D SPECIFICATIONS

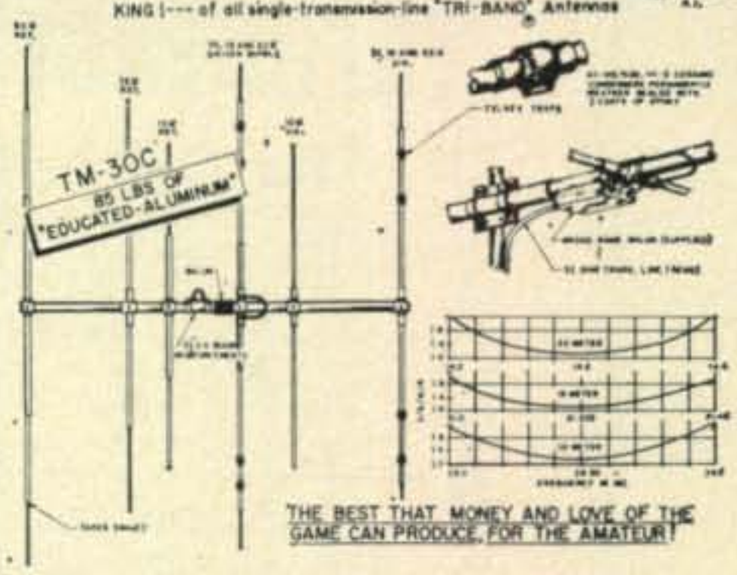
FREQ RANGE: 10, 15 and 20 METERS	POLARIZATION: LINEAR, HORIZONTAL	GAIN - MEASURED: 8.5 DB± AVERAGE
SIDE MALLS: 35 DB	F/B RATIO: 28 DB+	V.S.W.R: 1.5/1 AT RESONANCE, 3 BANDS
WEIGHT: 49 LBS.	ENVIRONMENTAL: 95 MPH	BEAMWIDTH TO 1/2 PWR PT: 60°± 3 BANDS
SHIPPING WT: 60 LBS	WIND SURFACE AREA: 6.6 SQ/FT	WIND LOAD AT 100 MPH: 290 LBS
LONGEST EL. LGTH: 36 FT.	TURNING RADIUS: 21 FT	RECOMMENDED SUPPORT MAST: 2" O.D.
POWER RATING: 2 KW P.E.P.	CONSTRUCTION: ALUMINUM DURAL, MICARTA INSULATION, STAINLESS STEEL ELEC. HDWR. HEAVY-DUTY CAD. PLT. STEEL GUSSET PLT MOUNTING.	RECOMMENDED ROTATOR: 75 MPH AREAS — 5000 TV ROTATOR; 120 MPH AREAS — TELREX MODEL TS-250 RIS
BOOM: ALUM. 2" O.D. x 18' LONG		

TM-30C SPECIFICATIONS

FREQ. RANGE: 10, 15 AND 20 METERS	POLARIZATION: LINEAR, HORIZONTAL	GAIN-MEASURED: 10 DB, AVERAGE
SIDE MALLS: 35 DB	F/B RATIO: 30 DB	V.S.W.R: 1.5:1 AT RESONANCE, 3 BANDS
WEIGHT: 85 LBS.	ENVIRONMENTAL: 95 MPH	BEAMWIDTH TO 1/2 PWR PT: 55°- 3 BANDS
SHIPPING WT.: 114 LBS	WIND SURFACE AREA: 9.5 SQ.FT.	RECOMMENDED SUPPORT MAST: 2" O.D.
LONGEST EL. LGTH.: 36 FT.	TURNING RADIUS: 28 FT	WIND LOAD AT 100 MPH: 500 LBS
POWER RATING: 2 KW P.E.P.	CONSTRUCTION: ALUMINUM DURAL, MICARTA INSULATION, STAINLESS STEEL ELEC. HDWR. HEAVY-DUTY CAD. PL. STEEL GUSSET PLATE MOUNTING.	RECOMMENDED ROTATOR: TELREX MODEL TS-250-RIS OR TELREX MODEL BT 2.95 RIS
BOOM: ALUM. 3" O.D. x 26' LONG		

10, 15 and 20 Meter MODEL TM-30C Amateur net price $378.00

KING [--- of all single-transmission-line "TRI-BAND" Antennas



THE BEST THAT MONEY AND LOVE OF THE GAME CAN PRODUCE, FOR THE AMATEUR!

ALSO AVAILABLE "TRI-BAND©" MODEL TC88D.....$149.00
4 BAND SINGLE TRANS-LINE ARRAY.
4 EL on 10, 4 EL on 15, 3 EL on 20 & 3 EL on 40.....$999.99

"DUO-BAND" MODEL DC-105, 3 EL on 10 & 3 EL on 15M.....$225.00
"DUO-BAND" MODEL DB-99D, 3 EL on 15 & 3 EL on 20M..... 249.00
"DUO-BAND" MODEL DB-30C, 4 EL on 15 & 3 EL on 20M..... 378.00

telrex OPTIMUM SPACED "MONARCH" MONO-BAND ARRAYS

"BALUN"-FED, LABORATORY TUNED, MATCHED AND CALIBRATED TO PROVIDE OPTIMUM PERFORMANCE & BANDWIDTH PER ELEMENT, PER DOLLAR

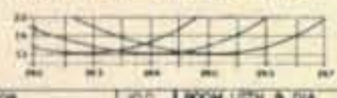
"BALUN"-FED/"BALUN" SUPPLIED/"HAIRPIN" RESONATED

$125.00

RATING - 110 MPH 1.5 KW RAIN or SHINE

10 METER 3 EL. OPTIMUM-SPACED "SUPER-DELUXE" MODEL 10M-313B

AN OPTIMUM 3 EL. PERFORMER AND VALUE--- USED BY ALL THE "BIG-BOYS"



GAIN IN DB	10.0	BOOM LGTH & DIA.	16'6"x2"
F/B RATIO IN DB	24	LONGEST ELEM. LGTH.	16'-0"
1/2 POWER BEAMWIDTH	57°	TURNING RADIUS	12'-0"
WIND AREA SQ. FT.	2.75	NET WEIGHT LBS.	31
WIND LOAD, 100 MPH LBS.	82	SHIPPING WEIGHT LBS.	78

"BALUN"-FED/"BALUN" SUPPLIED/"HAIRPIN" RESONATED

$159.00

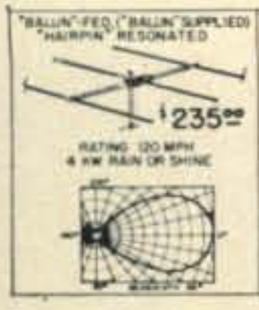
RATING - 120 MPH 1.5 KW RAIN or SHINE

15 METER 3 EL. OPTIMUM-SPACED "SUPER-DELUXE" MODEL 15M-317B

AN OPTIMUM 3 EL. PERFORMER AND VALUE--- USED BY ALL THE "BIG-BOYS"

GAIN IN DB	10.0	BOOM LGTH & DIA.	17'3"x3"
F/B RATIO IN DB	24	LONGEST ELEM. LGTH.	24'-0"
1/2 POWER BEAMWIDTH	58°	TURNING RADIUS	14'-6"
WIND AREA SQ. FT.	3.03	NET WEIGHT LBS.	37
WIND LOAD, 100 MPH LBS.	107	SHIPPING WEIGHT LBS.	48

"BALUN"-FED/"BALUN" SUPPLIED/"HAIRPIN" RESONATED



$235.00

RATING 120 MPH 4 KW RAIN OR SHINE

20 METER 3 EL. OPTIMUM-SPACED "MONARCH" MODEL 20M-326B

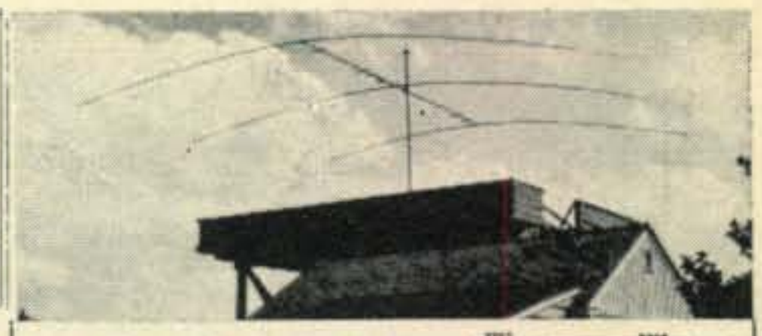
AN OPTIMUM PERFORMANCE 3 ELEMENT PERFORMER USED BY THE "BIG-GUNS"

GAIN IN DB	10	BOOM LGTH & DIA.	26'6"x3"
F/B RATIO IN DB	28	LONGEST ELEM. LGTH.	36'
1/2 POWER BEAMWIDTH	38°	TURNING RADIUS	24'
WIND AREA SQ. FT.	9.53	NET WEIGHT LBS.	71
WIND LOAD, 100 MPH LBS.	256	SHIPPING WEIGHT LBS.	95

ALSO AVAILABLE

10	METER	5	ELEMENT	MODEL 10M-518B	$185.00
10	"	5	"	" 10M-523	285.00
10	"	6	"	" 10M-636	425.00
15	"	5	"	" 15M-525	285.00
15	"	5	"	" 15M-532	365.00
20	"	5	"	" 20M-536	395.00
20	"	5	"	" 20M-546	595.00
20	"	6	"	" 20M-646	688.00
40	"	3	"	" 40M-335	745.00

MANY MORE — WRITE FOR SPEC & PRICE LIST PL66

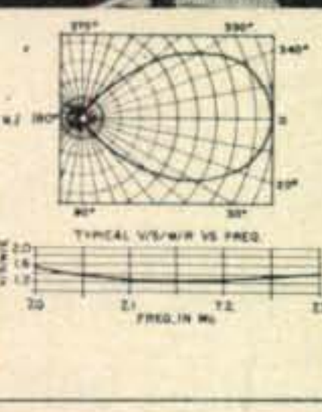


MODEL 40M-346

$895.00 FOB ASBURY PARK, N.J.

CUSTOM-BUILT TO ORDER

SPECIFICATIONS	
GAIN IN DB OVER WAVE DIPOLE	9.0
F/B RATIO IN DB	30
BEAMWIDTH TO PWR. POINT -	59°
WIND AREA IN SQ. FT.	1350
WIND LOAD AT 100 M.P.H. IN LBS.	427
BOOM LGTH & DIA. approx.	46'x3½"
LONGEST ELEM. LGTH approx.	64'
TURNING RADIUS approx.	40'
NET WEIGHT LBS. approx.	177
SHIPPING WT. LBS. approx.	222

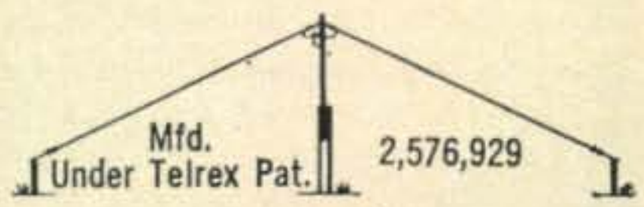


telrex "BALUN" FED INVERTED "V" ANTENNA KITS

SIMPLE-TO-INSTALL, HI-PERFORMANCE ANTENNA SYSTEMS:

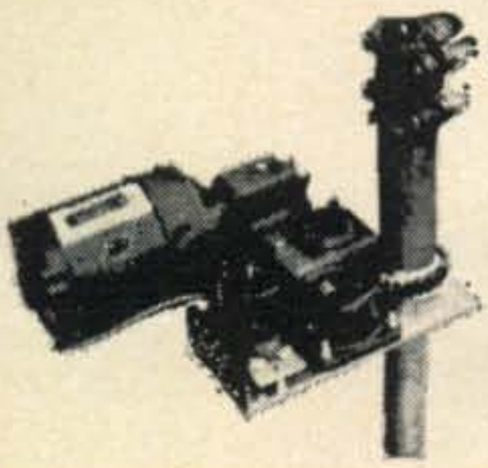
1 KW P.E.P. Mono-Band Kit.....$21.95*
2 KW P.E.P. Mono-Band Kit.....$26.95*
Duo-Band Models — 1 KW.....$38.00 2 KW.....$49.95
"TRAPPED" Duo-Band Models—1 KW..$38.00 2 KW..$49.95

*Kit comprises, encapsulated, "Balun," copperweld, insulators, plus installation and adjustment instructions for any Mono-band 80 thru 10 Meters. Also "TRAPPED" 3, 4, 5 Band Models.



1 KW P.E.P. "BALUN" Only.....$17.95
2 KW P.E.P. "BALUN" Only.....$21.95

TELREX ROTATOR SELSYN INDICATOR System MODEL TS250-RIS



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- MALLEABLE CAST MASTING CLAMP SUPPLIED
- OUTPUT SPEED APPROX. 1 RPM

Really Sturdy **ROTATOR SELSYN INDICATOR SYSTEMS** CUSTOM-BUILT 3-STAGE REDUCTION FINAL STAGE, CHAIN-DRIVEN

$250.00 f.o.b. A. P.

ALSO
TS345RIS..$345.00
TS435RIS..$435.00
TS535RIS..$535.00
TS585RIS..$585.00
BT599RIS..$599.00
OTHERS.

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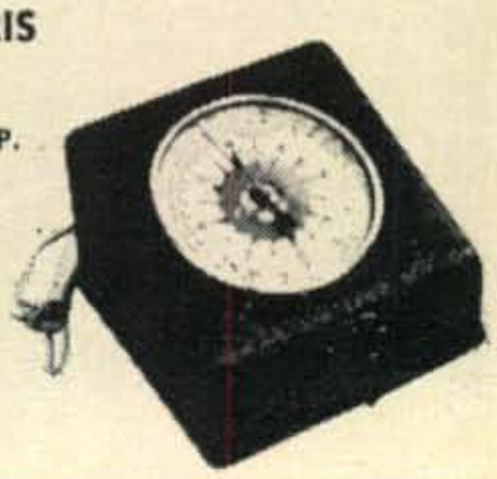

For further information, check number 15, on page 110

tion. The dates of operation are from August 20th to Sept. 6th inclusive, excluding Sundays from 10 a.m. to 10 p.m. EDST. The bands of operation will be 80 c.w. 75 phone, 40 c.w. and 2 meters. Anyone contacting VE3WE/3 during this time can obtain a special QSL card to confirm the contact.

Uniontown, Pennsylvania

The Uniontown Amateur Radio Club is having their 16th Annual Gabfest on Saturday afternoon and evening September 18, 1965. Stag affair. It is taking place at the club grounds on the Old Pittsburgh Rd. North of Uniontown, and about 1½ miles from the Cities Service Station on the corner of Route 51 and the Old Pittsburgh Rd. For the hungry ones there will be usual stand for food and refreshment. Registration is $2.00. For more information write to Joseph M. Sofranko, W3UUZ.

Syracuse VHF Roundup

The Syracuse VHF Roundup will take place on October 2, 1965 at the Three Rivers Inn, located just above Syracuse proper. The fun begins at 10 A.M. Tickets are $6.00 which includes fine entertainment and a dinner fit for a king. There will be forums on the moonbounce communications, Project OSCAR, and the latest advances in Ham TV. For more information write to Rein Madvere, K2OUE, 2217 E. Colvin St., Syracuse 10, N.Y. This is the best attended v.h.f. convention in the world.

Peoria, Illinois

The Peoria Area Amateur Radio Club Hamfest will be held Sunday, September 19, at Exposition Gardens. (Same place as last year.) Located on the Northwest edge or Peoria, Ill. an all-weather site. Lunch will be available at the site. Free swap section, parking, contests and cartoons for the kiddies. Free coffee and donuts at 09:00 to 09:30 a.m. CDT. Registration: $1.00 advance, $1.50 at the gate. Write: Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Ill. 61614.

Cincinnati, Ohio

The 27th Annual STAG Hamfest sponsored by the Greater Cincinnati Amateur Radio Assoc. will be held on Sunday, Sept. 26th all day at Stricker's Grove, on Compton Rd., Mt. Healthy, Cincinnati, Ohio. Coffee and donuts, two picnic meals and all refreshments are provided in the gate registration fee of $4.00. Radio controlled air show, transmitter hunts, equipment and surplus displays, code speed copying contest and plenty of free prizes. For further information write to Bill Goodrich, W8LNL, Sec'y, 1417 Covedale Ave., Cincinnati, Ohio 45238.

Missouri—Illinois

The Egyptian Radio Club will hold its annual Hamboree on Sunday, September 26, 1965 at the Club. One half mile south of the Chain of Rocks Canal Bridge (Hy. 66 bypass) near Granite City, Ill. Games and contests for the entire family. Ample parking space. Soft drinks, coffee and sandwiches. For details write Cletus Woodard, W9IHE, P.O. Box 402, Granite City, Ill.

Ft. Belvoir, Virginia

The Foundation for Amateur Radio Inc., with headquarters in Washington, D.C. will hold a Hamfest this fall on September 19th at Ft. Belvoir, Va., about 17 miles south of Washington. Activities for the ladies and children, auctions, picnics, contests, and many awards are included in the program. For additional information, contact Wm. R. Russell, W3BOS, 1022 17th Street, N.W., Washington, D.C.

County Hunters

K3NGX/1 will operate from Martha's Vineyard Island, Mass., Dukes County, August 3rd to September 7th on s.s.b. (mostly 14250).

Mexico, D.F.

The Liga De Radio Experimentadores, A.C. held its election on the 14th of May. The following Board of Directors was chosen by direct vote of the members: J. C. Juarez, XE1HD, President; I. J. Lozano Ramirez, XE1RN, Vice President; M. Saavedra, XE1LLS, Sec'y; J. Hernandez C., XE1NP, Pro-Sec'y; M. G. Vazquez, XE1MMV, Treasurer; and A. Amoros L., XE1LLF, Pro-Treasurer.

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COAXIAL ANTENNA SWITCH
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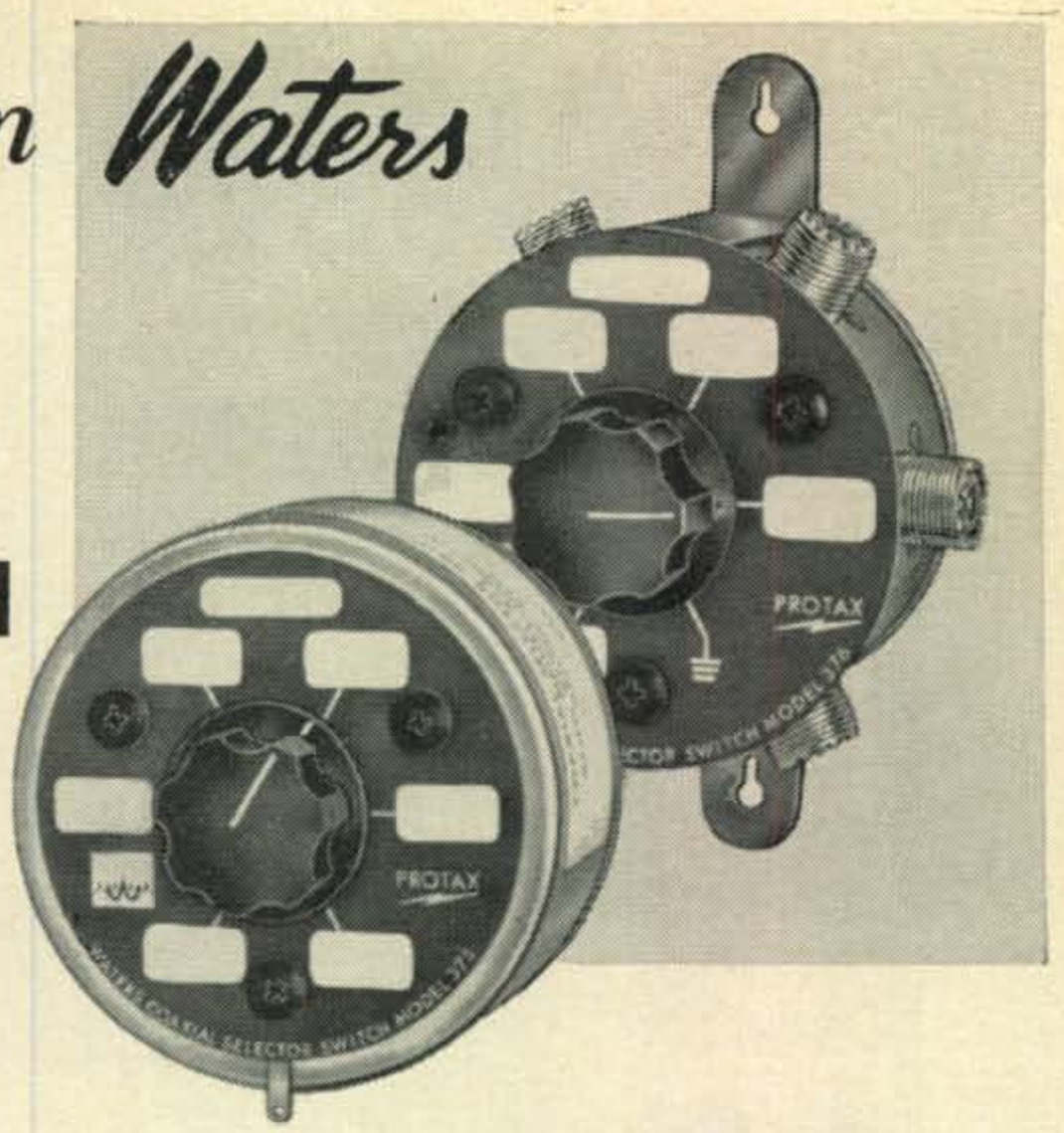

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For further information, check number 14, on page 110

CLUB FORUM

AL SMITH,* WA2TAQ

How is the co-operation among the neighboring amateur radio clubs in your community or general area? It behooves club officers and members to work in close co-operation with other clubs in all matters effecting amateur radio. Many situations can arise in the course of time where an equitable understanding could lead to many benefits for all.

How many times has a conflict arisen where an auction, hamfest, swap night etc. fizzled because of failure to properly investigate whether any other activity was going on at the same time.

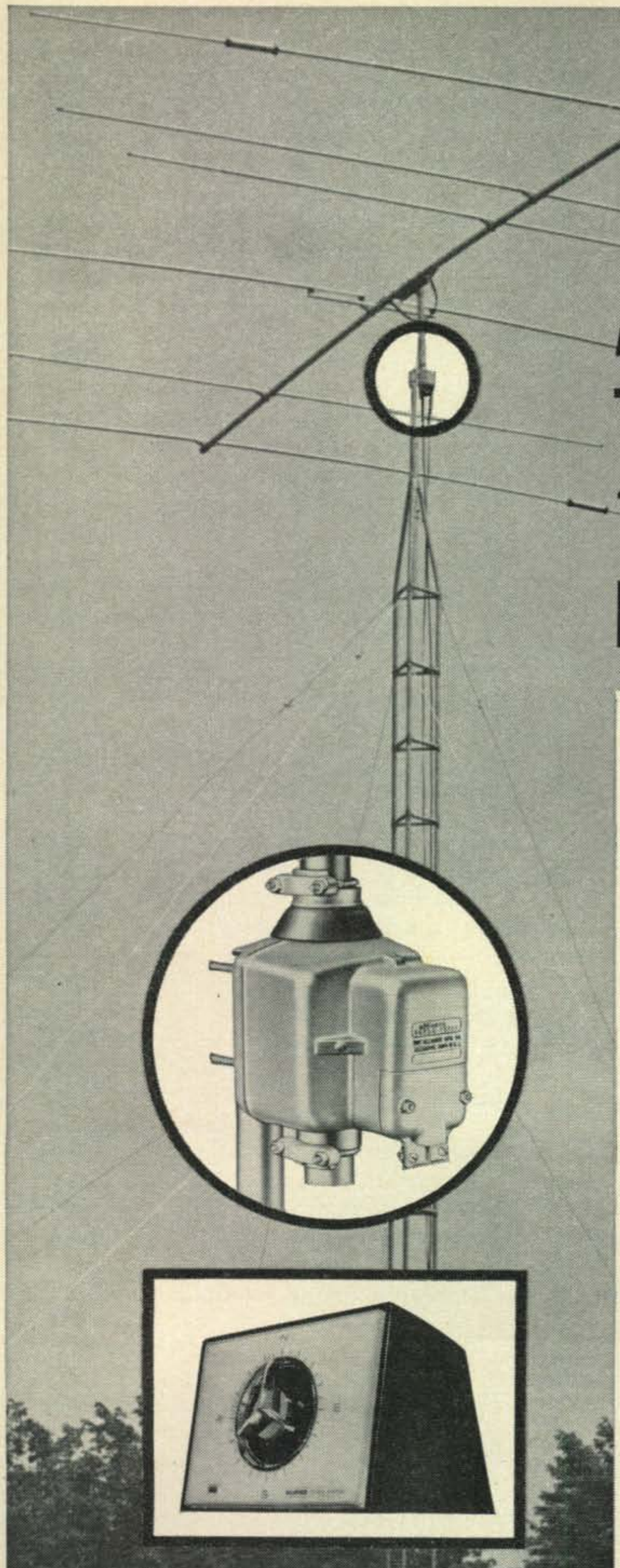
A helpful suggestion may be to seek out a club member to act as liaison between clubs. If by chance there is an amateur that belongs to both clubs and actively attends both meetings, then he or she would be a logical choice for the job.

Of course, the best set up for such a liaison would be better handled by a committee of the club council in your area. Such a committee could issue a monthly or at least quarterly bulletin which could list coming amateur radio club events. Included could also be the regular meeting dates, times and places. It would stimulate activity and serve to pool the ideas of all clubs much like we hope the CLUB FORUM is doing. The scheduled affairs should be listed as soon as a definite date is set up so that other clubs will receive adequate forewarning not to hold their affair at the same time.

Another very important consideration other than scheduling affairs on the same day is setting up events such as Field Day in the same general area. What would the result be if two clubs found themselves on the air for FD just a few blocks apart. The resulting overloading would make such a situation next to impossible and would no doubt force one club or the other to shut down. Imagine all the months of planning and gathering equipment going down the drain. A prearranged plan of co-operation would make such a not-so-hypothetical situation impossible.

There's no doubt that the above suggestions would pay off for established clubs. There is however another cog in the wheel; that being the company Amateur Radio Clubs or impromptu Field Day groups that want to get into the big event of the year in amateur radio. Many times this type of Field Dayer will not have any community ties and will go in most any direction to locate a site to set up. It is to this group that we

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



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CSA approved

For further information, check number 19, on page 110

hope this message gets to. They should check with any known amateur radio club in an area where such clubs exist to be certain that there will be no conflict. After all, doesn't the Home Team deserve consideration? Particularly if it's the type of community club that is doing their share to improve the lot of amateur radio not only for themselves but for all radio amateurs in general.

Similar advise could apply to the established club that may decide to make FD an expedition to someone's summer home or perhaps some mountain top. Check out any and all possibilities that you may be infringing on another club. One sure way is advance publicity in the local gazette. Give the intended FD site that you expect to be operating from for the national public service drill. Any club local to the area could then be advised and would have the opportunity to contact the incoming group or perhaps use an alternate site instead.

What is your club address? Do you use your secretary's home address or perhaps his business address. This makes it convenient for the person handling the club mail, *but* what happens if that person moves, or leaves the club for any reason?

Suppose this fellow has a falling out with the club, isn't it possible that mail intended for club officers may not ever be delivered? Remember that when a person moves, the post office will only forward first class mail and a great majority of amateur radio mailings are 3rd class. Particularly the many amateur radio magazines and club publications, not to mention ballots for ARRL elections.

If you have use of a public building for a meeting place and can also use the building's address then fine. The club will almost always receive its correspondence. However, in the final analysis, the best bet for any organization is to have their own post office box. This has several advantages. The main one being that all club officers can have access to the p.o. box thus making it convenient. You then have a permanent mailing address that will not have to be changed when new officers are elected.

If you have an active interference committee and desire to lend your services to the public, a p.o. box is just the ticket to receive any complaints that may need to be investigated. This is a far better set-up than giving someone's home address which could make for a possible personal visit from some irate TVI customer.

NEW CLUBS: The Delaware Valley area has a new Amateur Radio Club known as the Penn Wireless Association. It is the result of the merger of the Windsor and Bucks County Amateur Radio Clubs. The area covered by the Club is Trenton, N.J., Philadelphia, Pa., north to Doylestown and east into New Jersey. Club frequencies are 29.4, 145.238, and 50.4. Club Pres. is Ben Johns, K3JQH.

In the Central Maine area the Androsoggin Amateur Radio Association has been reorganized. Those in the Maine area effected wishing information can contact the club secretary, Robert Stone, WA1BRV. 73 Al Smith, WA2TAQ.

For further information, check number 22, on page 110

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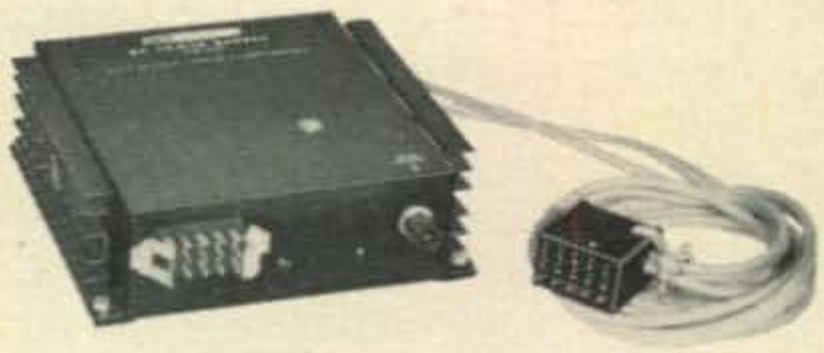

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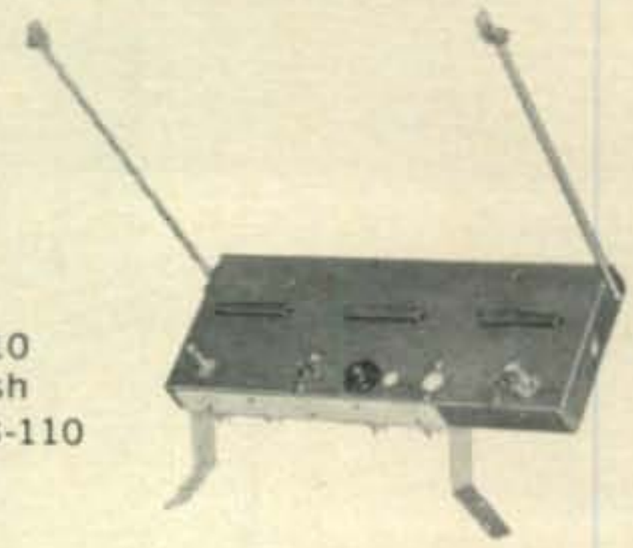

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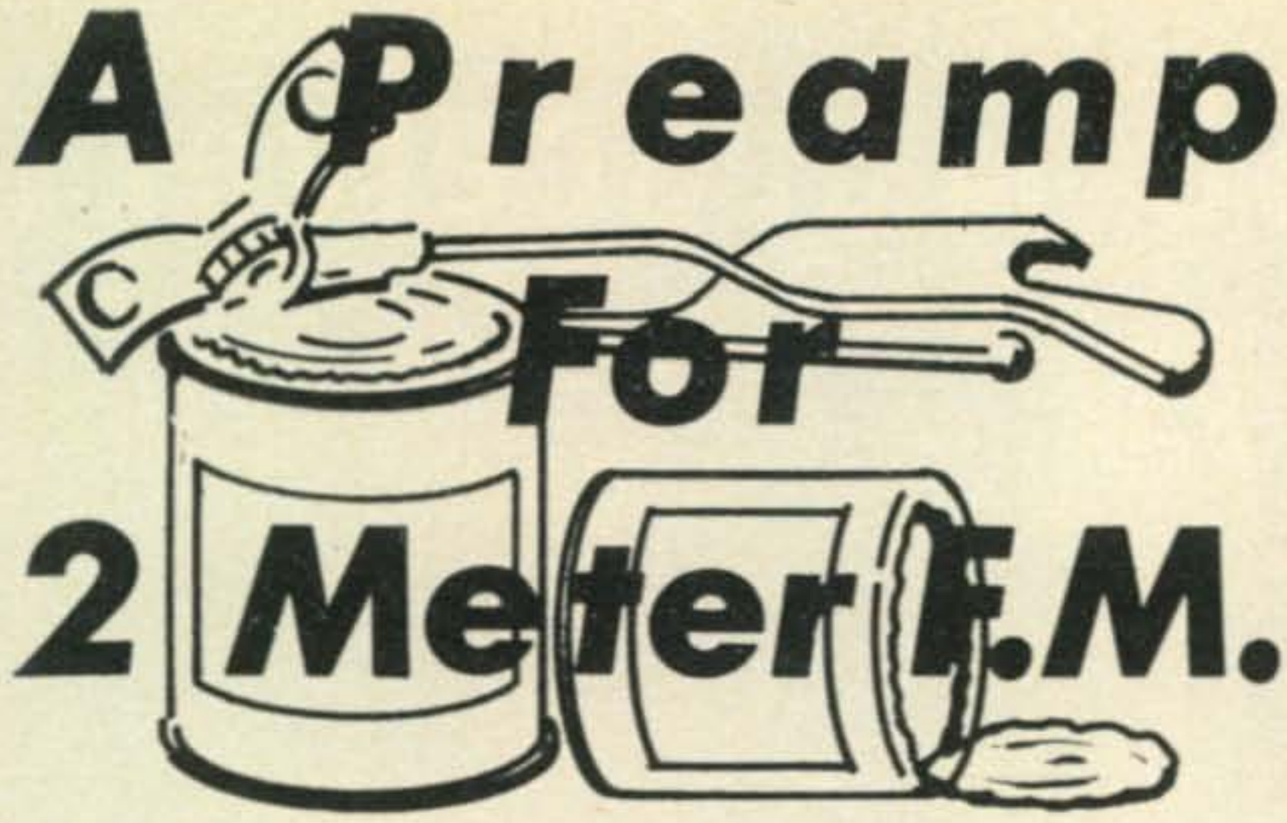
A Preamp For 2 Meter F.M.



BY BYRON H. KRETZMAN,* W2JTP

THERE have been many 2 meter preamplifiers described in *CQ* in the past, all for the usual across-the-band ham type of operation. This preamp was designed especially for the "new"[1] type of v.h.f. operation, f.m., where high quality fixed tuned (crystal controlled) ex-taxicab and police receivers are used. Secondly, this preamp may readily be adapted to serve as a two-set coupler, such as when it is desired to moniter two frequencies simultaneously, using a common antenna (146.94 phone and 146.70 RTTY, for example).

Our preamp makes use of one of the family of new n.p.n. silicon planar passivated transistors designed for small signal amplification at v.h.f. These are packaged in the new case-less epoxy encapsulated form and are manufactured almost completely by automation. The result is that here we have available, across the counter, a high gain v.h.f. transistor for *less* than $1. While several different types are available from different manufacturers, we used the GE type 16L64. This transistor has a gain-bandwidth product of 350 mc and a maximum frequency of oscillation of 650 mc, both at 10 volts and 10 ma.

The Circuit

Figure 1 shows the schematic diagram of our transistor preamp. As you can see, a minimum number of components are used; two resistors, three capacitors, and the *LC* output circuit. The circuit configuration is that of the grounded-emitter type. The base input circuit is at a sufficiently low impedance so that it may be directly fed from a 52 ohm coaxial cable.

Now, before too many eyebrows are lifted at the absence of a tuned input circuit, let us say that we fully realize that in some areas of high density commercial two-way radio operation, intermodulation (mixing) could occur. If *you* have this problem, the solution is simple; add an external coaxial cavity re-entrant filter.[2] Just in case you don't have the referenced issue of *CQ* (back copies are no longer available), fig. 2 shows its constructional details. (We made a slight modification to give a better match to the transistor: Instead of using an output link we tapped up 3 inches on the inner pipe.) All you need to build it in 15 minutes, besides the tuning capacitors and phono jacks, is a large size tomato juice can and a short piece of Reynolds do-it-yourself aluminum tubing, Item 10. The tubing can be fastened to the bottom of the can by either an Item 50 flange or by a sawed-in-half tubing splicer, Item 90. If you like, or if the QRM is exceptionally strong, you can solder the cover back on the can. (We didn't find it necessary, besides visitors can look inside the can if you don't.)

Construction

Our 2 meter preamp is built into a 2¾ × 2⅛ × 1⅝ inch Premier box, number PMC-1000. Actually, the preamp itself is built on a 2½ × 1⅞ inch scrap piece of copper sided printed circuit board, about 1/16 inch thick. Figure 3 shows

*431 Woodbury Road, Huntington, N.Y. 11743.

[1]Kretzman, B., "A New VHF Operation: F.M.," *CQ*, August 1963, p. 74.

[2]Schlesinger, "Cavity TVI Filter," *CQ*, July 1954, p. 14.

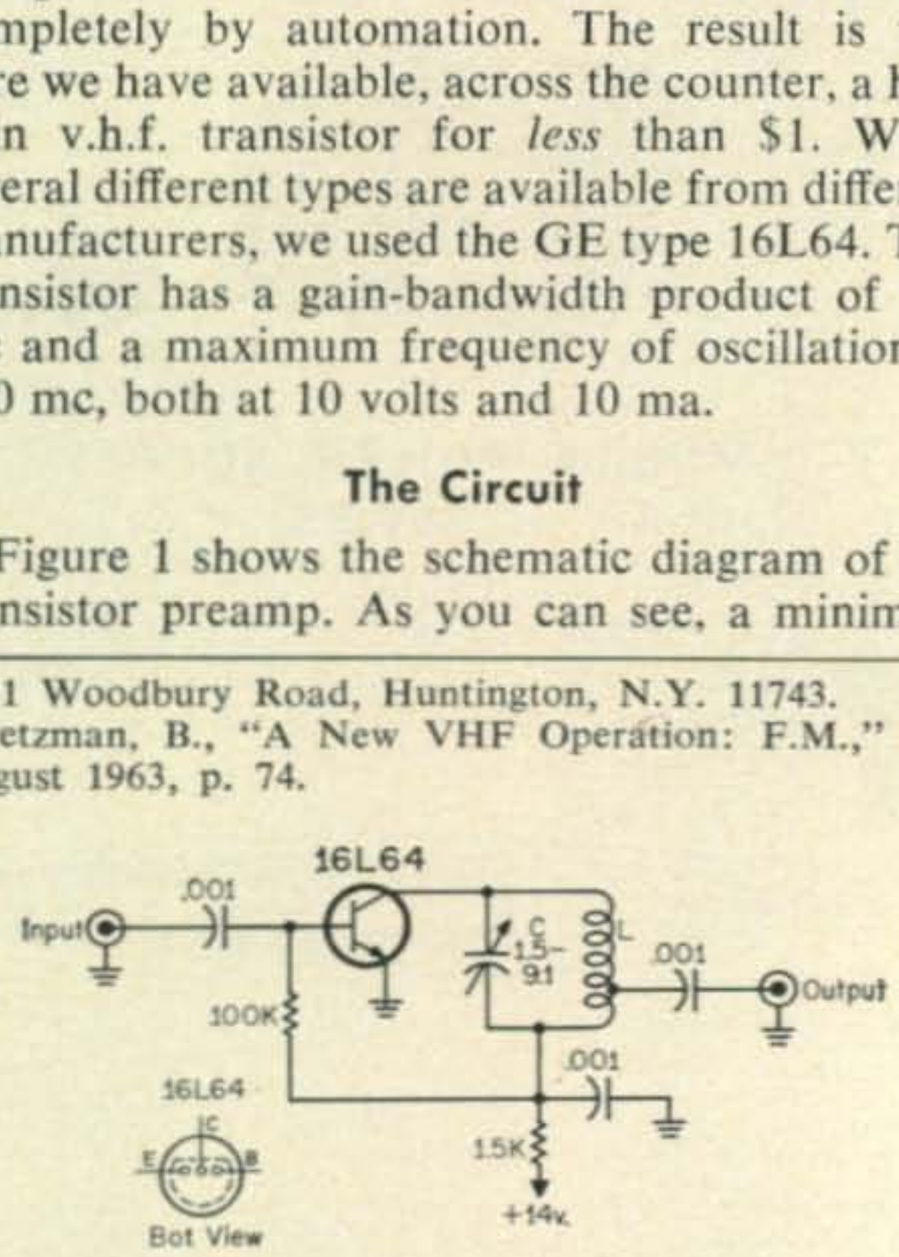
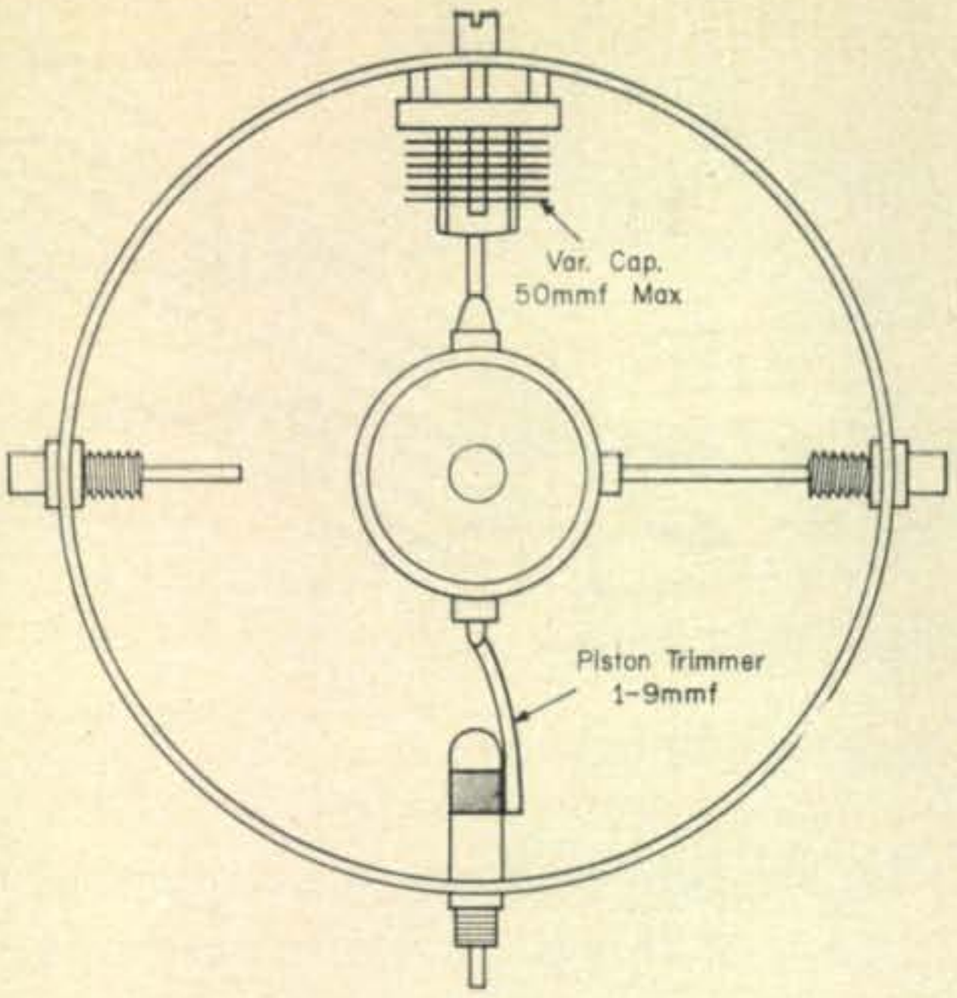


Fig. 1—Schematic diagram of preamp for 2 meter f.m. Resistors are ½-watt, and capacitors are 600 volt disc ceramics. Coil *L* is wound with #14 wire and has 5½ turns, 5/16-inch inside diameter, spaced the diameter of the wire. The output tap is 1½ turns up from the cold end.

Preamp for 2 meter f.m., shown with external high-Q coaxial cavity re-entrant filter, necessary in high density areas.



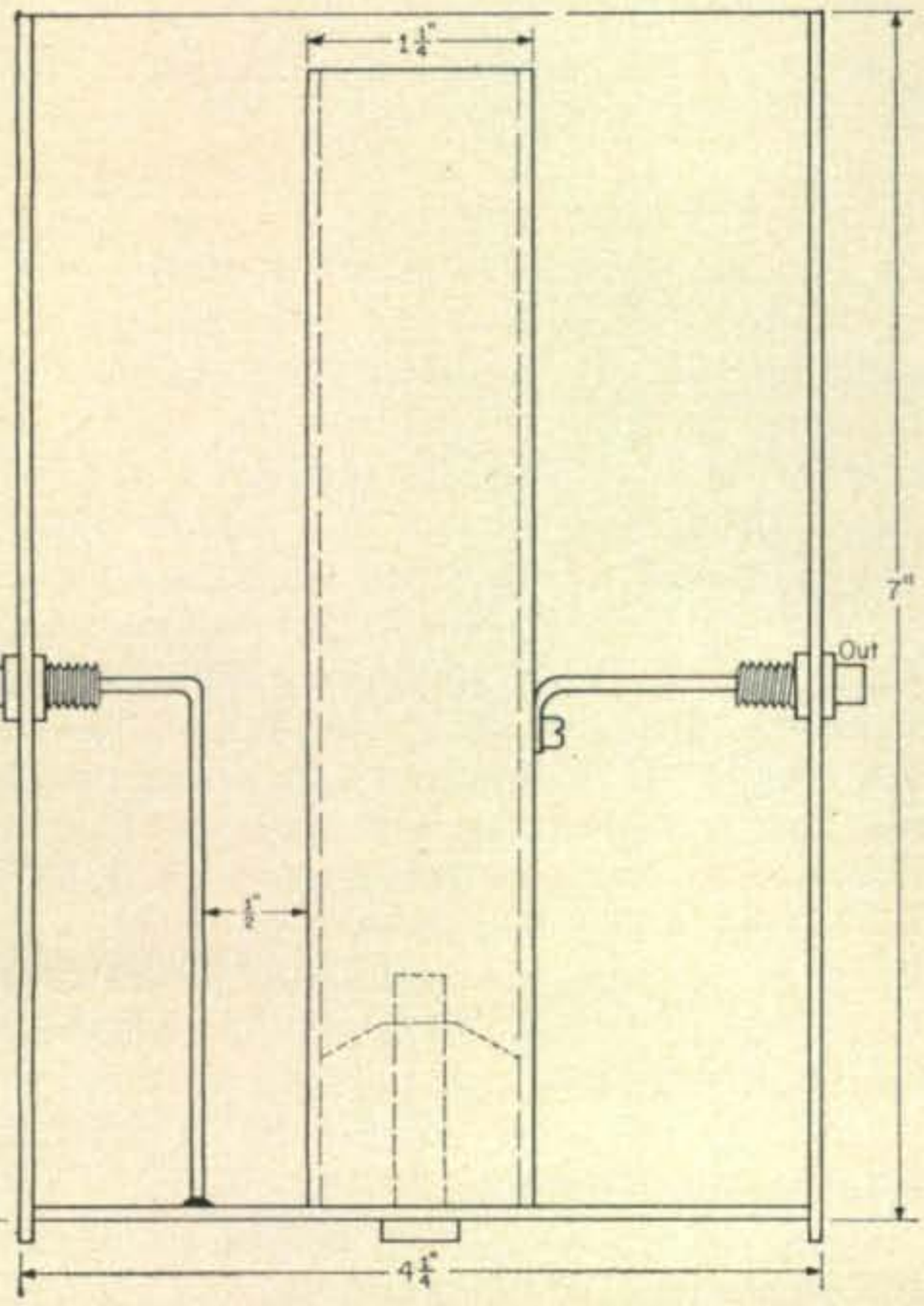


Fig. 2—Coaxial cavity re-entrant filter mechanical details. The IN terminal connects to the receiver fitting on the antenna relay while the OUT terminal connects to the IN fitting on the preamp. RG-58/U is recommended, each cable cut to ¼-wavelength, about 13-inches. (The same length cable should be used to connect the OUT fitting on the preamp to the ANT fitting on the receiver.)

exactly where the holes should be drilled. The board is stood-off from the bottom of the box by a pair of ⅜ inch high tapped metal pillars. The coaxial cable input and output connectors are Switchcraft #3501FP phono connectors. (Down with the eyebrows— such phono connectors are stock equipment on chassis of Motorola, GE, and other commercial mobile f.m. gear.) These are mounted so that their ground lugs may be soldered directly to the copper surface of the board. The transistor is mounted upside down,

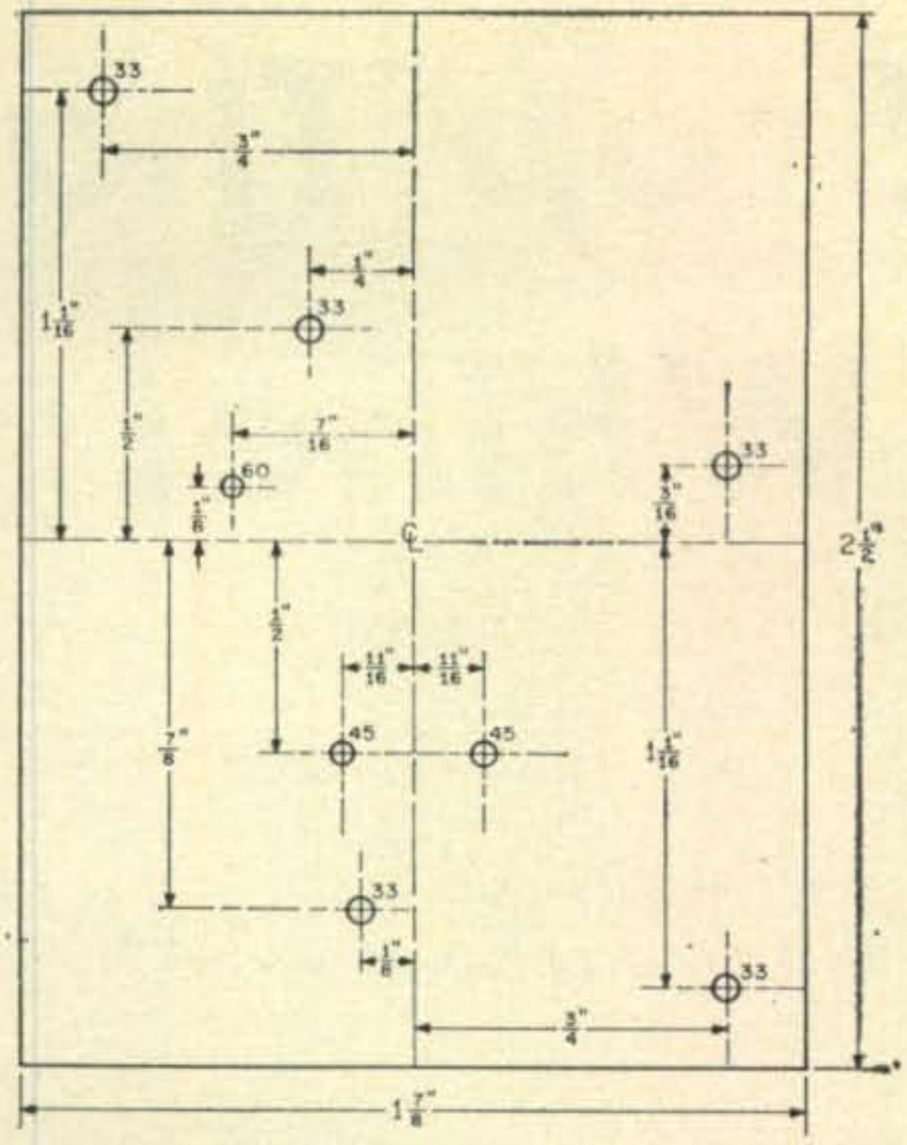


Fig. 3—Drilling details on the circuit board chassis. The board is 1/16 inch thick and preferably with copper on both sides. If just one side is copper, drill as shown from the copper side. The numbers by the side of each hole indicate the drill gauge.

supported on its own leads, with the emitter wire soldered directly to the board. Don't forget to use a pair of pliers as a heat sink when you solder in the transistor.

The tuned output circuit uses a readily available miniature air trimmer, the E. F. Johnson #189-4. This low loss capacitor is soldered to the copper faced board by means of the two tabs provided, but raised above the board by about ⅛ inch by washers. A 4-40 bakelite stud terminal is mounted at the cold or rotor end to serve as a coil terminal. The hot end of the coil, which is wound with #14 wire, connects directly to the stator terminal of the capacitor, as does the collector lead of the transistor. Another bakelite stud terminal is mounted so as to provide a tie point for the base lead of the transistor, the 100K resistor, and the 0.001 disc capacitor which connects to the input coax connector.

The Two-set Coupler

This preamp may easily be modified to permit the feeding of two receivers. The only additional parts required are another #3501FP phono connector and two 22-ohm ½-watt resistors. Simply mount the second connector next to the original output connector and feed the center of each connector through its own resistor from the coupling capacitor. Figure 4 shows the schematic

[*Continued on page 99*]

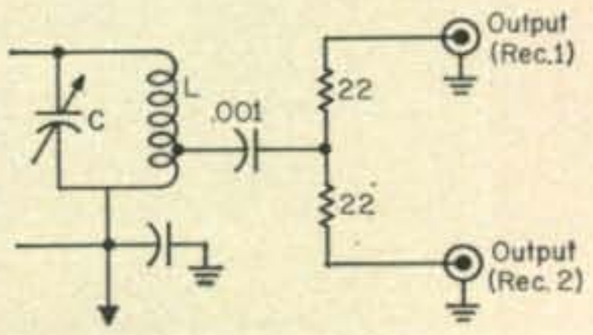
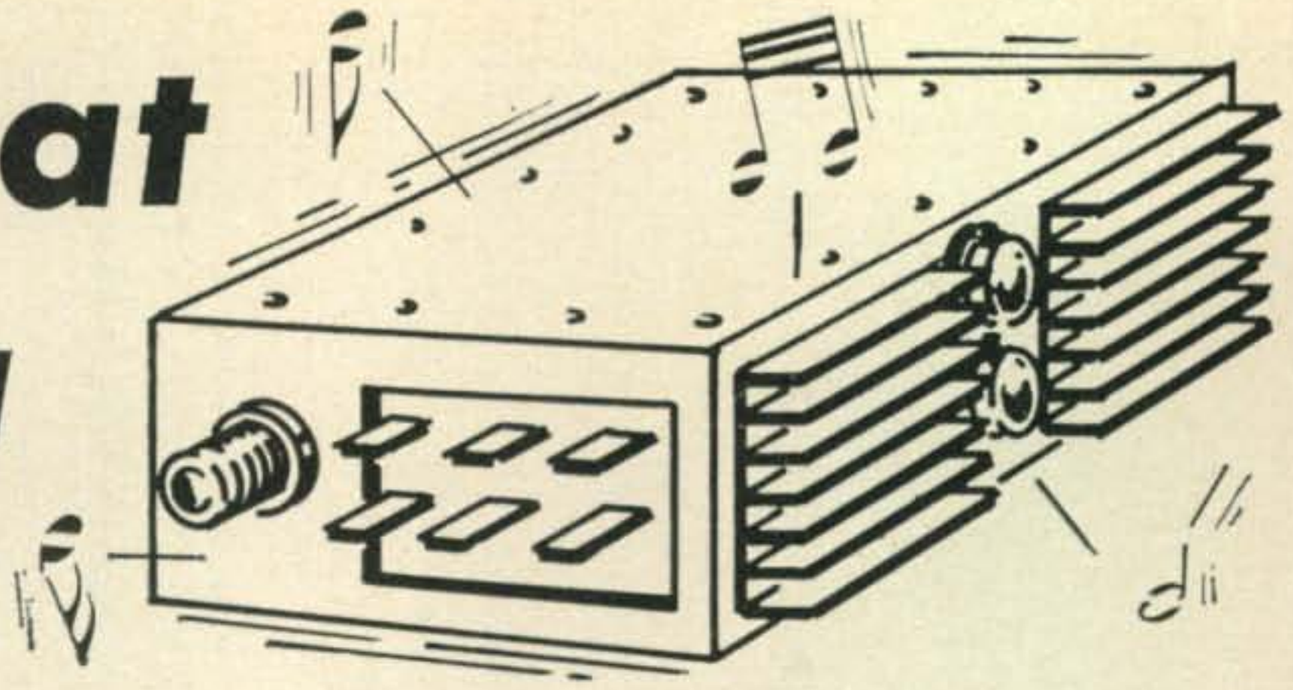


Fig. 4—Circuit modifications for use of the pre-amp as a two-set coupler.

Stop That Whine!



BY ROBERT P. BRICKEY,* W7QAG

The increased use of d.c. to d.c. converters for mobile operation has brought with it the problem of whine. The cause and cure of this problem is explained below.

TRANSISTORIZED d.c. to d.c. converters have almost entirely replaced vibrator power-packs and dynamotors in recent years. Their high efficiency and small size make these supplies very attractive. However, most mobile installations using this type of supply, are plagued with some degree of interference which usually manifests itself as a high pitched whine in the audio of either the transmitter or the receiver, or both.

Those who have been faced with this problem usually find that ordinary bypassing and shielding methods are not very effective against this type of interference. It is the purpose of this article to take a closer look at the causes of the interference and some of the methods of its elimination.

Cause Of The Trouble

Most of the transistorized inverters make use of a multivibrator circuit to alternately switch the current into the two halves of a power transformer primary winding. Figure 1 shows a typical circuit of this type. While there are many variations of this circuit in use, their basic principle of operation is usually the same.

The multivibrator oscillator on the primary side of T_1 has replaced a mechanical vibrator in the job of switching the current from one-half of the primary to the other.

It is this rapid switching of primary current in T_1 which produces most of the interference problems. The square wave, produced by this switching action, contains many harmonic frequencies which can cause considerable interference unless properly shielded and filtered. Also, during the transition of conduction from one transistor to the other, there is a period of time when *both* transistors are conducting; the result is a short duration pulse of high current from the low voltage d.c. source to the multivibrator. In high powered converters this pulse may be as high as several amperes. Even relatively small amounts of resistance in series with the source will result in an appreciable voltage drop during this pulse. If other pieces of electronic equipment are connected through the same common resistance, the pulse of voltage will be coupled to the other equipment, in most cases, causing interference.

This voltage fluctuation can be reduced, and the operation of the multivibrator circuit improved by the addition of a large value capacitor across the low voltage d.c. terminals. This capacitor C_F in fig. 1, will charge during periods

*349 North 250 East, Orem, Utah.

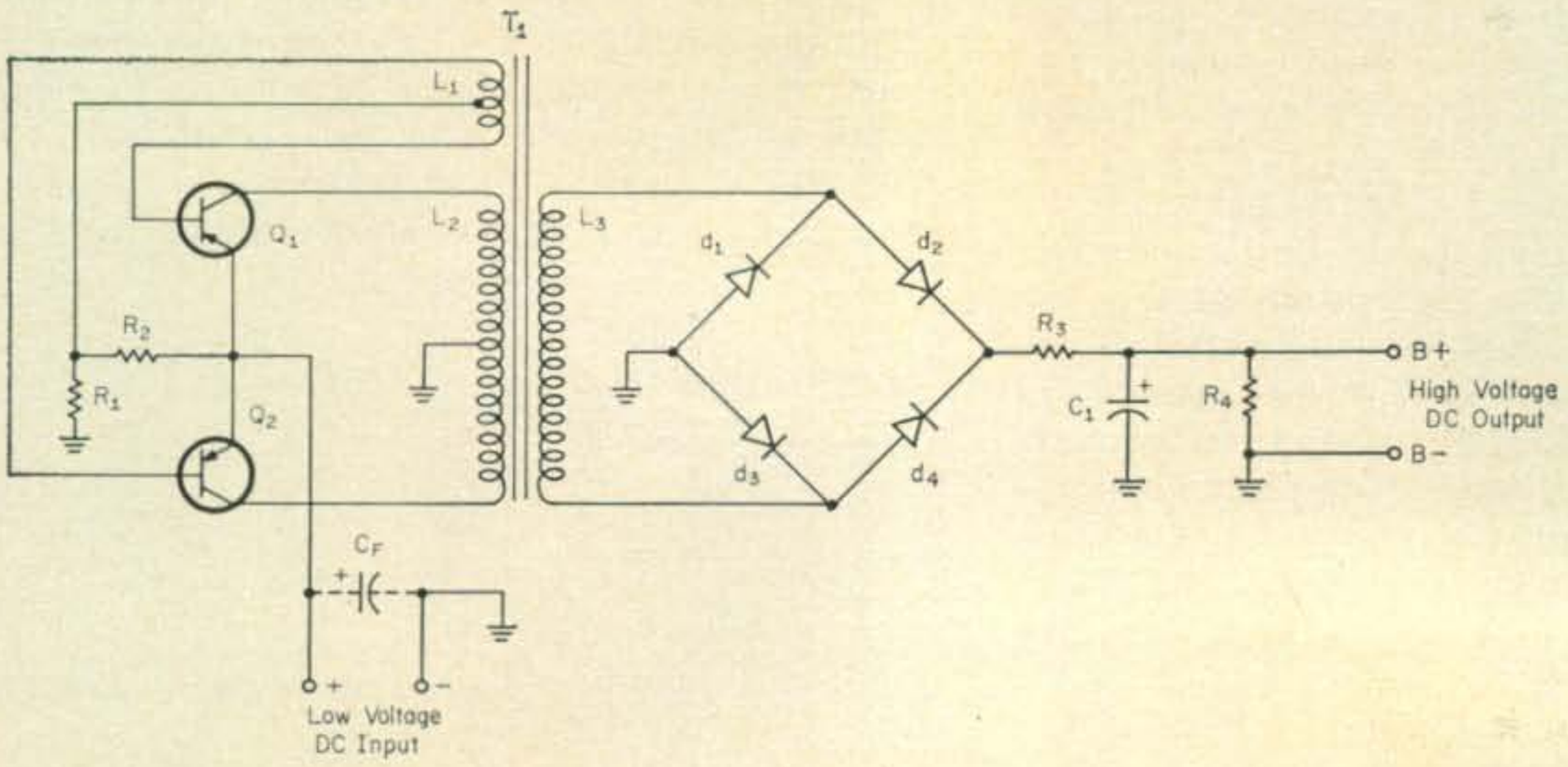


Fig. 1 — Diagram of a typical multivibrator type d.c. to d.c. power supply.

when a lower current is being drawn by the multivibrator and will discharge during periods of higher current drain. If the capacitance value is large the time constant for charge and discharge can be made sufficiently long to prevent most of the voltage variation. It is often difficult, however, to obtain a long enough time constant to be very effective due to the high current drain of the multivibrator and low resistance in series with the source. Most power supplies of this type already contain this capacitor, but it is often not adequate.

Elimination of Interference

In cases where the capacitor across the multivibrator input does not sufficiently reduce the interference, a pi-section filter may be constructed. When building a pi-filter for this purpose it must be remembered that the current flow to the power supply is quite high and, therefore, a filter choke with very low resistance must be used. The choke at the same time should have a large amount of inductive reactance. The only type of choke which meets these two requirements is one wound on a toroidal core. A toroidal core offers very little magnetic reluctance, and therefore, a large amount of inductive reactance can be produced with a few turns of wire having low d.c. resistance.

The dimensions of the core used are not especially critical, and many types of surplus forms are adequate. The common 88 millihenry toroids used in teletype work, and available at low cost, have been used very successfully with multivibrators drawing five to ten amperes. The original windings on the toroidal form should be removed and the core should be wound full of large sized wire. The exact number of turns and wire size is not critical, but a wire table should be consulted to determine a gauge adequate to carry the necessary current.

Winding the toroid is facilitated by first winding the wire on a bobbin of some sort which is passed through the center of the toroidal form for each turn. After the winding is completed it should be protected with a layer of tape.

Figure 2 shows the circuit diagram of a pi-section filter using a toroidal choke. The values of capacitors C_1 and C_2 are not critical but must be quite large in order that their capacitive

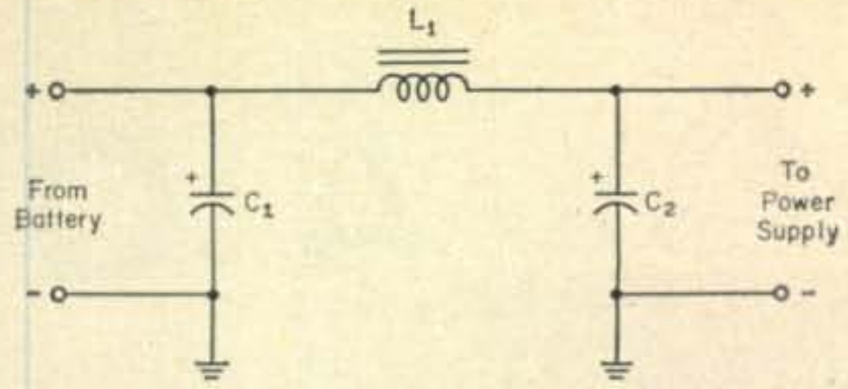


Fig. 2—Filter circuit for reduction of power supply interference encountered in d.c. to d.c. converters.

reactance will be very low. Values between 1000 mf and 5000 mf should be satisfactory. Power for all other pieces of electronic equipment should be taken off on the battery side of the filter. Even better, a separate power lead should be run directly to the battery from the pi-filter and no other loads should be connected to it. In this way any voltage variations across this power lead will not be coupled to other equipment.

In some cases, if the automobile chassis is used for the common return for the multivibrator power supply and also other equipment, trouble will be experienced due to the mutual ground resistance. If the installation of the pi-section filter and a separate hot power lead does not completely eliminate the interference it would be desirable to run a ground lead between the power supply and the grounded side of the battery. For maximum effectiveness the power supply chassis should even be insulated from the automobile chassis in order that the only return ground path will be through the ground lead.

Summary

If the steps outlined in this article are carefully followed it should be possible to almost totally eliminate any trace of interference from a multivibrator type d.c. to d.c. converter. Attempts at eliminating this type of interference are too often directed towards additional filtering of B plus. The square wave produced by the multivibrator action is relatively easy to filter after rectification. The multivibrator usually operates at a frequency above 60 cycles which also makes the B plus ripple easier to filter. So let's attack the problem at its sources and eliminate the interfering whine usually associated with these supplies. ■

New Amateur Product

Aqualarm, Inc.

A NEW alarm to guard passenger cars and trucks against looting is being introduced by Aqualarm. Called the Terralarm, it is set by a tamperproof lock in a front fender well. While it is set, the alarm sounds when the hood is raised, a door is opened, or the trunk is opened. One model priced at $49.95, rings continuously until turned off by key, regardless if a door has been opened and then closed. Write to Aqualarm Inc., 1532 So. Prarie Ave., Hawthorne, California, 90250, for more information or circle 61 on page 110.

A QRM KILLER

[THE SHELBYTRON]

BY EUGENE F. SHELBY,* W6RIS

I HAVE always believed it would be nice to achieve acclaim, but I've always dreaded the thought that some frightful disease would be named after me. After a quarter of a century of electronics, I have finally determined that any such fame should come from a device named after me. With pride, therefore, I hereby christen a device of my invention the "Shelbytron".

As a loyal Ham for more years than I care to recount, I submit to the world this product of my usually lethargic brain. The device is intended to eliminate background noise such as static, *etc.* Of course this is not really a novel thing—but the way it is accomplished is.

Observe the left hand portion of fig. 1A and imagine this to be just plain static. When a carrier comes on the air this static is eliminated as noted by the right hand portion of fig. 1A. With weak signals a combination of both conditions exist. Now, if we could only eliminate the content between *A* and *B* and leave only the content between *C* and *D* we would observe a wave form such as is seen in fig. 1B.

Hams, unite! Should you achieve this your wife might surrender a few more Green stamp books for your next birthday. Assuming you agree (and what red-blooded American boy wouldn't), let us examine how this can be accomplished by a surreptitious raid on the junk box.

Few such boxes fail to offer several diodes, and if you have been an advocate of surplus, you may even find an old pot in the low resistance breed of cats. It is preferable that you select silicon diodes, if possible. The reason for this is seen in fig. 2. This very familiar figure represents the conducting characteristics of a solid state diode. Note that no current is passed until the voltage reaches a few hundred millivolts, and then, like an angry wife, the current reaches for the sky like a dead short.

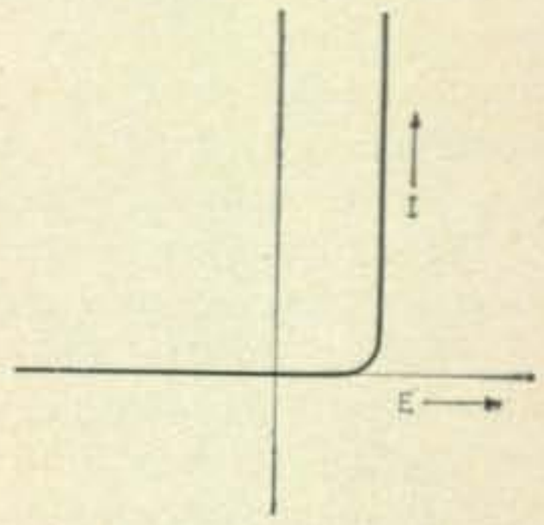


Fig. 2 — Characteristic curve of a germanium power rectifier. No conduction takes place until the forward bias is several hundred millivolts.

Here is where we separate the wonderful Shelbytron from the ancient methods of accomplishing this feat. We can use this device *without* destroying the value of your receiver as no internal changes are required; we connect the Shelbytron between the receiver and speaker!

Examine, if you will, fig. 3. Note that two diodes, CR_1 and CR_2 are connected in parallel but with opposite polarities. Naturally, remembering what we discussed concerning fig. 2, we realize that unless sufficient voltage is developed to place the diode in conduction, nothing passes through. Such being the case, the garbage mentioned between *A* and *B* in fig. 1A is fortunately lost to the eardrums. Eureka—a peaceful household for almost no cost at all.

[*Continued on page 102*]

*526 Chino Canyon Road, Palm Springs, California.

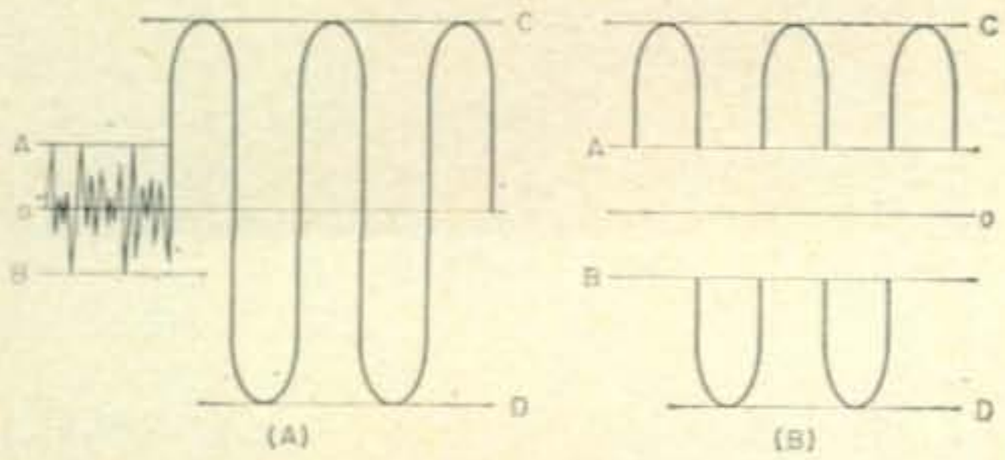


Fig. 1—(A) The left portion of this waveform represents background noise or static and the right portion a carrier. (B) shows the resulting waveform if the carrier remains but the static eliminated.

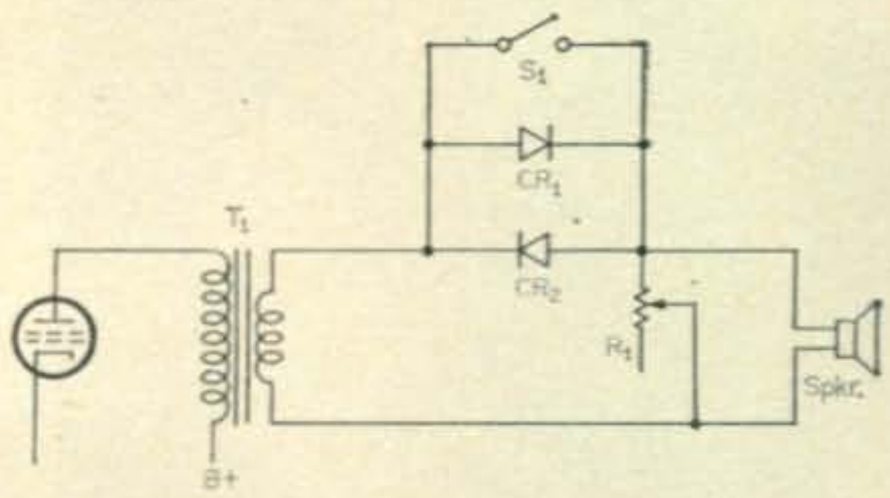


Fig. 3—Circuit of the Shelbytron. The operation is described in the text.

Rules: 1965 *CQ* World Wide DX Contest

Oct. 23-24, Nov. 27-28, 1965

I. CONTEST PERIOD

PHONE: Starts 0000 GMT Saturday, October 23.
Ends 2400 GMT Sunday, October 24.
C.W.: Starts 0000 GMT Saturday, November 27.
Ends 2400 GMT Sunday, November 28.

II. BANDS

Contest activity will be in the 18, 3.5, 7.0, 14, 21 and 28 mc amateur bands.

III. TYPE OF COMPETITION

1. Single operator
   (a) All Band.
   (b) Single Band.
2. Multi-Operator, Single transmitter.
3. Multi-Operator, Multi transmitter.
   (a) Multi-operator will be judged on all band operation only.
4. Inter-Club. (Local DX Clubs)

IV. EQUIPMENT

There is no limit to the number of transmitters or receivers used, and competitors may use the maximum power permitted under the terms of their license.

V. NUMBER EXCHANGE

1. Phone stations will exchange 4 numerals, the RS report plus their Zone.

2. C.w. stations will exchange 5 numerals, the RST report plus their Zone.

3. Stations in Zones 1 through 9 will prefix their Zone number with Zero (01, etc.).

VI. POINTS

1. Contacts between stations on *different* continents will count three (3) points.

2. Contacts between stations on the *same* continent but *not* in the same country, will count one (1) point.

3. EXCEPTION: Contacts between stations in the North American continent *only* will count two (2) points.

4. Contacts between stations in the *same* country will be permitted for the purpose of obtaining a Zone and/or Country multiplier but no QSO points will be credited.

5. Only one contact per band with the same station will be permitted.

VII. MULTIPLIER

Two types of multipliers will be used.

1. Multiplier of one (1) for each Zone contacted on each band.

2. Multiplier of one (1) for each Country worked on each band.

VIII. SCORING

1. The score of *each* single band will be the *sum* of the Zone and Country multiplier for that band, *multiplied* by the total contact points on that band.

2. The total all band score will be the *sum* of Zone and Country multipliers of all bands, *multiplied* by the sum of the contact points on all bands.

3. Those sending in logs for a single band will be eligible for a single band award only. If a log is sent in for more than one band, indicate which band is to be judged, *otherwise it will be judged as an all band entry*.

4. A station will not be eligible for more than one award.

5. Single operator contestants must show a *minimum* of 12 hours of operating time to be eligible for an award. If a contestant operates on more than one band and wishes to be judged for a specific single band, he must show a *minimum* of 12 hours on that band.

6. Multi-operator stations must show a minimum of 24 hours of operating time to be eligible for an award.

IX. ZONES and COUNTRIES

The *CQ* Zone map and the ARRL and WAE country lists will be used as standards. The continental boundaries used for WAC will also be recognized. Should any question arise as to the positive location of a station the official definition will be final.

X. AWARDS

Certificates will be awarded for each section of the contest as follows:

1. To the highest scoring single operator station on each single band.

2. To the highest scoring single operator station on all bands.

3. To the highest scoring multi-operator station in both divisions, single and multi-transmitter.
   (a) In each country.
   (b) Each call area of the United States.
   (c) Each Zone in Australia, Canada, and the USSR.

CQ WORLD-WIDE DX CONTEST CQ Page 1 of 2 Pages

Call W1WY

Single Band ☐ All Band ☒ | Single Operator ☒ Multi-Operator ☐ | Phone ☒ CW ☐ | Single Transmitter ☒ Multi-Transmitter ☐

Band	QSOs	Zone Multiplier		Country Multiplier		Points		Band Score	Band
1.8 Mc	2	2	+	2	×	4	=	16	1.8 Mc
3.5 Mc	18	9	+	12	×	50	=	1050	3.5 Mc
7 Mc	44	22	+	28	×	121	=	6050	7 Mc
14 Mc	128	24	+	53	×	361	=	23571	14 Mc
21 Mc	61	16	+	33	×	164	=	12267	21 Mc
28 Mc	3	3	+	3	×	9	=	54	28 Mc
TOTAL	256	78	+	131	×	714	=	144,226	All Bands

INSTRUCTIONS. To determine All Band score, total each column with double line. Single band stations are permitted to operate on more than one band. However, indicate and total ONLY the band you wish judged.

Club Participation CCWA DX Club

This is to certify that in this contest I have operated my transmitter within the limitations of my license and observed fully the rules and regulations of the contest.

Frank Croker W1WY (Signature)

Name FRANK HAZALONE (USE BLOCK LETTERS) Call W1WY

Street and Number 14 SHERWOOD AVENUE

City SEAMECKD Country CONN., USA

Logs must be postmarked not later than December 1, for Radiotelephone section and January 15, for Radiotelegraph section.

Submit logs to: CQ Contest Committee, 14 Vanderventer Ave., Port Wash., N.Y. 11050

CQ Form 1057 eff. May, 1962.

The Summary Sheet shown here, as well as regular log sheets, may be obtained free of charge upon receipt of an s.a.s.e., or in the case of a DX station, 1 IRC.

CQ WORLD-WIDE DX CONTEST — Page __ of __ Pages

CALL W1DXE Log For 14 Mc Band (Use separate log for each band.) COUNTRY U S A PHONE ☐ CW ☒

DATE / Time GMT	STATION	SERIAL NUMBER Sent	Received	Zone No.	COUNTRY	Points
AUG 27, 1965						
0030	CX2CO	57905	57913	13	URUGUAY	3
01	CX1RY	58905	57913			3
13	LU5AQ	57905	58913		ARGENTINA	3
17	HK1QQ	57905	57909	9	COLOMBIA	3
21	YV5AGD	56905	57907		VENEZUELA	3
25	KP4CC	56905	56908	8	PUERTO RICO	2
27	KP4CK	56905	56908			2
31	VP7NY	55905	56008		BAHAMAS	2
33	W6KGI	55905	55903	3	U S A	0
35	W5TIN	55905	55904	4		0
1320	TF3AB	56905	56940	40	ICELAND	3
25	OX3KC	55905	56940		GREENLAND	3
30	VO2NA	56905	57902	2	CANADA	3
40	VE2NV	55905	55905	5		3
AUG 28						
1200	JA1VX	57905	57925	25	JAPAN	3
10	HL9KH	58905	57925		KOREA	3
15	KL7DO	56905	56901	1	ALASKA	3
25	KH6IN	56905	57931	31	HAWAII	3
35	VK2GW	55905	56930	30	AUSTRALIA	3
45	VK6RU	55905	55929	29		3
TOTAL ZONES, COUNTRIES, POINTS THIS SHEET				13	15	47

CQ Form 10% off. May, 1962.

CQ WORLD-WIDE DX CONTEST — Page 4 of 8 Pages

CALL OH5SM Log For 14 Mc Band (Use separate log for each band.) COUNTRY FINLAND PHONE ☒ CW ☐

DATE / Time GMT	STATION	SERIAL NUMBER Sent	Received	Zone No.	COUNTRY	Points
OCT 23, 1965						
0445	5B4WS	5915	5920	20	CYPRESS	3
47	UO6BR	5815	5721	21	AZERBAIJAN	3
51	UG6KAA	5715	5621		ARMENIA	3
55	UF6FB	5615	5521		GEORGIA	3
0500	MP4BBW	5915	5421		BAHRAIN	3
05	OH3TT	5715	5715	15	FINLAND	0
07	I1AMU	5715	5715		ITALY	1
09	DJ1BZ	5715	5914	14	GERMANY	1
11	G8ZDH	5715	5714		ENGLAND	1
1200	VE3PY	5615	5504	4	CANADA	3
05	W8NBO	5515	5504		USA	3
10	VO2NA	5615	5502	2		3
15	WB2OOO	5515	5505	5		3
OCT 24						
0205	KA2LL	5615	5525	25	JAPAN	3
16	KG1BO	5515	5540	40	GREENLAND	3
25	TF2WAW	5615	5640		ICELAND	1
30	CT2AK	5615	5614		AZORES	1
35	CT3AV	5615	5633	33	MADEIRA IS.	3
TOTAL ZONES, COUNTRIES, POINTS THIS SHEET				10	16	41

CQ Form 10% off. May, 1962.

Here is a sample of a U. S. c.w. log (left) and a DX phone log (right). Zone and country multipliers are indicated to clarify trouble spots found in past contests. Note that point credit is not given for working your own country.

4. Awards to multi-operator stations will be for all band.

XI. SPECIAL AWARDS

A cup will be awarded to the highest scoring station in the world, in each of the following categories, both phone and c.w.:

1. Single operator on a single band, Phone. *(Donated by Barry Briskman, K2IEG)*

2. Single operator on a single band, C.W. *(Donated by Dr. Harold J. Megibow, K2HLB)*

3. Single operator on all bands, Phone. *(Donated by Bill Leonard, W2SKE)*

4. Single operator on all bands, C.W. *(Donated by Larry LeKashman, W9IOP)*

5. Multi-operator, single transmitter, Phone. *(Donated by John Knight, W6YY)*

6. Multi-operator, single transmitter, C.W. *(Donated by Dr. Anthony Susen, W3AOH)*

7. Multi-operator, multi transmitter, Phone. *(Donated by the Radio Club Venezolano)*

8. Multi-operator, multi transmitter, C.W. *(Donated by Hazard Reeves, K2GL)*

9. Single operator, 7 mc C.W. in the world *(Donated by the Israel Radio Club)*

10. Single operator, all band phone in the USA. *(Donated by the Potomac Valley Radio Club)*

11. Single operator, all band c.w. in the USA. *(Donated by the North Jersey DX Association)*

12. A Plaque will be awarded to the DX Club (not a national body) submitting the highest aggregate score of the scores submitted by its members. *(Donated by CQ)*

(a) For a club to enter, an officer of the club must submit a list of its participating members and their scores.

(b) This list may include scores of single and multi-operator stations; both phone and c.w.

(c) Stations that are members of a competing club therefore must indicate this fact on their report forms.

At the request of the donors, previous winners of a Trophy will again be eligible for the same Trophy after a three year period. There are no restrictions to the winning of the *CQ* Plaque.

In countries or sections where the returns justify, second and third place certificates will be awarded. Also such special and/or additional awards will be made as the Contest Committee shall choose.

XII. DISQUALIFICATION

Violation of the rules and regulations pertaining to amateur radio in the country of the contestant, or the rules of this contest, or unsportsmanship conduct, or taking credit for duplicate contacts in excess of 3 per cent of the total number of contacts made, will be deemed sufficient cause for disqualification.

XIII. LOG INSTRUCTIONS

1. In keeping a log, fill in Zone number and country, only the FIRST TIME it is contacted.

2. Use a separate sheet for each band and a tally sheet or report form.

3. Keep all times in GMT.

4. All contestants are expected to compute their scores. Logs should be checked for contact duplications and proper point credit before they are submitted.

5. Make sure name and address is clearly noted on each entry, PRINT or TYPE.

6. Each contestant must sign a pledge that all rules and regulations have been observed and that the report is a true one. Note sample contest report form.

If official forms are not available, use a duplicate form as indicated. The size is 8½ × 11" with 40 contacts to the page.

8. Copies of the Zone Map, log sheets and report forms are available from *CQ*, address listed below. Send a large self-addressed envelope, with sufficient postage. In the case of overseas stations, IRC coupons are acceptable. Indicate quantity of sheets required.

XIV. DEADLINE

All entries must be postmarked NO LATER than December 1, 1965 for the phone section, and January 15, 1966 for the c.w. section. In rare isolated places the deadline will be made more flexible. Send logs directly to:

CQ WW Contest Committee
14 Vanderventer Avenue
Port Washington, L.I., N.Y. 11050
(Indicate Phone or C.W. Section)

(Please circulate this information to your DX friends and radio club.)

G STROKE T

BY DON C. MILLER,* W9NTP

This thatched cottage is the QTH of G3NOX/T, one of the many British amateur TV stations visited and described by the author. Here's a first hand look at ATV "across the pond."

EVERY ham dreams of being on the other side of the world in the places where he works his choice DX. Occasionally this is possible through DXpeditions or by work assignment but even these experiences are Americanized by the use of familiar equipment and living conditions.

We have always been interested in the typical foreign outlook. How is it to sit in a DX station, see the strange equipment and twist unfamiliar knobs?

The XYL, W9CNW and I had been in Europe in 1953 but we had little chance to see anything of the European radio amateur.

For many years I have been an enthusiastic amateur TV experimenter. Years ago I joined the British Amateur Television Club, BATC, and through their very excellent small publication I became well acquainted with the names of British hams actively engaged in amateur TV. Many of the readers of this article will recall that John Plowman, G3AST was the receiver of the first TV pictures sent directly across the Atlantic (not Telstar) by our Cop MacDonald, WA2BCW.

One morning I made a contact with GM3GUJ in Thurso, Scotland, and he became so enthusiastic about our desire to see foreign ham shacks that before the QSO ended it was decided that W9NTP and W9CNW would visit the land of the G. This trip would make it possible to visit many of our old BATC friends and see both amateur and TV stations in operation.

In the weeks that followed shots were taken, reservations made, and plans made to make the most of the 30 day visit. In order to prepare for our visit I reread all of the old BATC magazines and wrote letters to the people that had written articles on subjects that I was most interested. Within the week invitations were rolling in and it looked as if some very definite scheduling would be in order. This was where the XYL became useful and our schedule was arranged around a trip through Ireland, Scotland, and England with a rented Ford Anglia car.

The day of departure finally rolled around. The first leg of the trip was by train to New York City (saved $100), then after a half day in New York we flew by DC-8 to Shannon, Ireland. The trip was quiet, quick and uncrowded. By the time we arrived in Shannon we were walking zombies because of lost sleep on the overnight train and the non-existent night on the eastern bound jet airliner.

After a few days exploring such cities as Limerick, Dublin, and Glasgow we rented our small car and headed for Thurso, Scotland, the QTH of GM3GUJ.

We arrived at Thurso on Sunday morning and immediately drove to our Scottish friends' home. The house wasn't at all hard to find even though it was in a government housing district of similarly converted army barracks. A vertical antenna and long wire antenna sprouted from its chimney.

Greeting hams in other corners of the world is essentially no different than here in the United States. After a few moments of getting acquainted we were led into the ham shack. Jim Lyons, GM3GUJ, is a sideband enthusiast. In his hamshack was his home-made filter transmitter and we beheld his newest acquisition, a Drake 2B receiver. I might add that this was the only commercial receiver that I saw in the British Isles. I won't spend time dwelling on the hours we spent listening to the United States from that side of the world. It was thrilling to hear the exotic calls of Africa, Asia, and continental Europe rolling in as locals; as indeed they were.

We regretfully left Thurso to journey south

*RFD 1, Waldron, Indiana.

The test pattern and call of John Tanner.

A monitor showing a picture taken with Malcom Sparrow's, G3KQJ/T, camera.

past dozens of medieval castles. A few days at Edinburg and a seven mile hike across the moors in Heathcliff fashion to Wuthering Heights left us excitingly anticipating our visit with Jeremy Royle, G3NOX/T, at Saffon Walden. His station had been highly recommended as being the British Amateur Television show place of the British Isles. Jeremy and his charming wife live in a thatched roof cottage that dates back several hundred years.

The timbers in this home are said to be made from old ship timbers of sailing days. In his backyard one is impressed with the 40 foot windmill-like tower with a 64 element array for 70 cm (432 mc) and other u.h.f. antennas. There was also a large five foot reflector setup for 1296 mc on the tower.

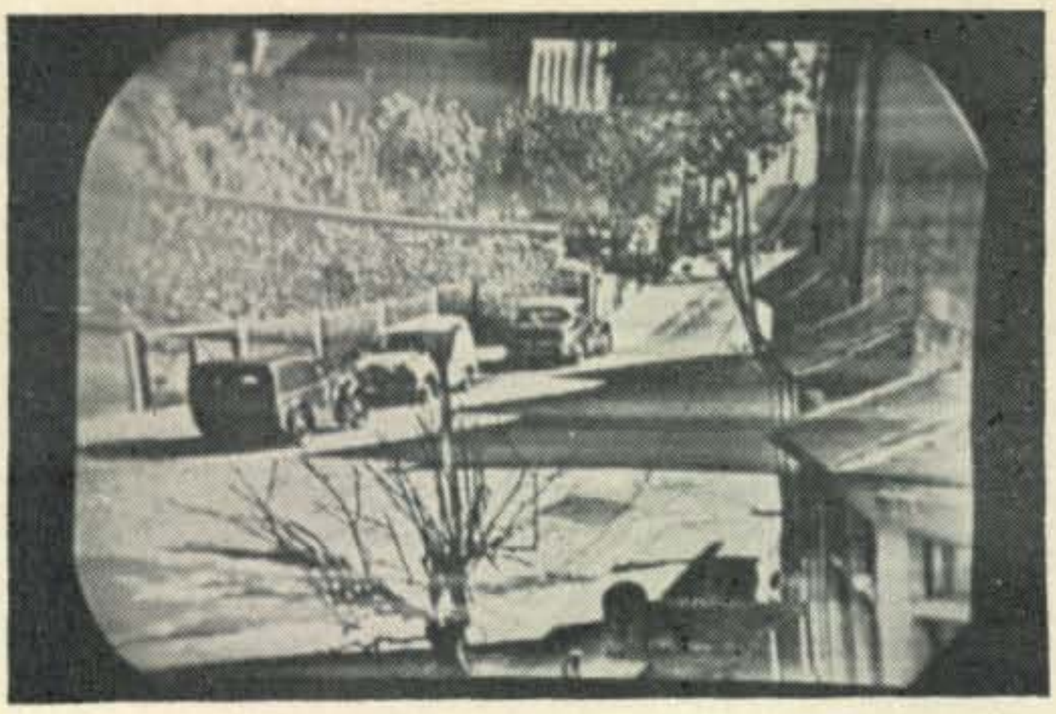
Inside the hamshack was a sight to behold. Dozens of homemade pieces of gear for video and v.h.f.-u.h.f. transmission. A large camera on a dolly sat in the middle of the room. Two monitors showed incoming pictures and outgoing pictures. The station also had provision for video r.f. relay. Can you imagine picking up a picture and relaying it simultaneously over to the next ham a few dozen miles away? The only piece of commercial gear was a surplus (ex-government) AR-88.

Jeremy generates his own sync. pulses and compares them to the BBC standard which is always available on a kinoscope. Both the XYL and myself had an enjoyable time seeing the camera put our pictures on the monitor. As the time rolled on Jeremy suggested that we might tune 70 cm (432 mc) to see how the QRM was tonight. QRM I thought, surely he is kidding! But sure enough a tune of his converter (extremely low noise) showed that the band was open tonight. I later found out that there is so much activity on this band that it is never closed.

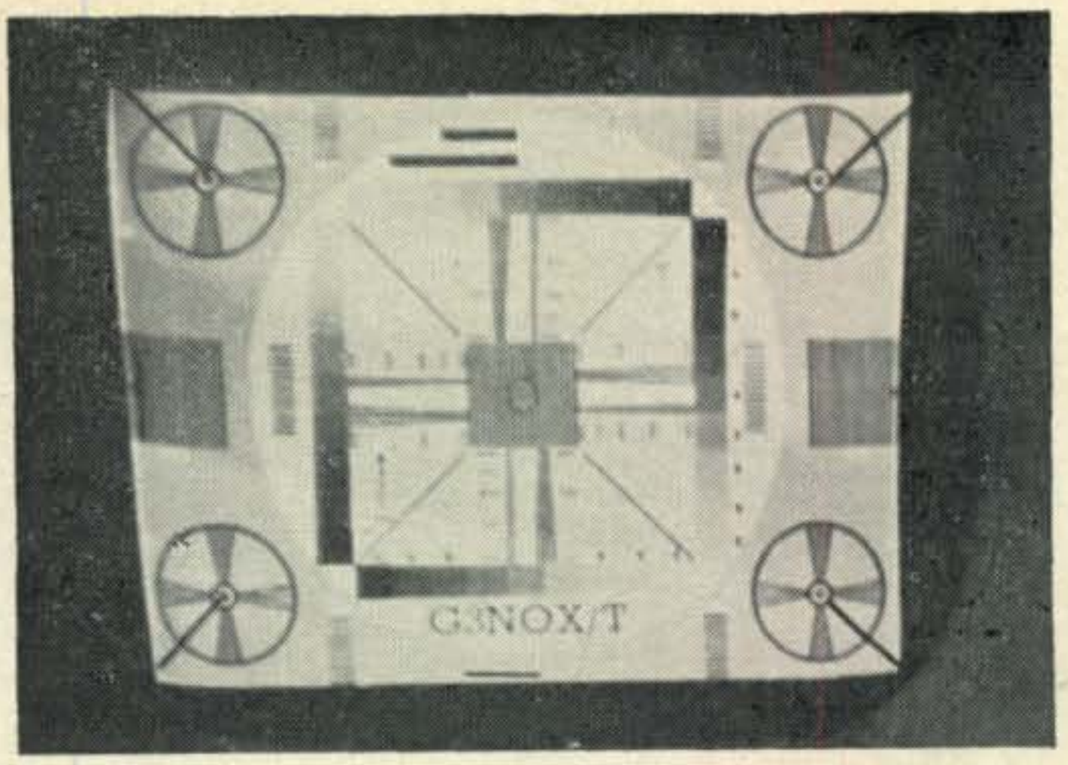
A CQ for video transmission received an answer. A few preliminary remarks set the stage for sound reception and transmission on 2 meters and simultaneously duplexing of the picture on 432 mc. I never ceased to be thrilled seeing the video picture of my contact appear on the monitor. I found out by questioning my video contact that this was Jeremy's father (said he once knew Marconi) who lived about 15 miles away. He introduced us to all his family and we were fascinated by the backyard show that he put on for us from his home.

The quality of these transmissions were very high. The resolution was higher than is transmitted by the BBC. The BATC members use all kinds of schemes to generate pictures. These include flying spot scanners, iconoscopes, orthicons of several types and vidicons or staticons. The r.f. transmitters are mostly 4X150's in cavities and low noise converters built around the A2521 GEC tube constituted the usual setup. Most of the TV enthusiasts have T licenses, that is a call sign that includes a slant T. These amateurs are limited to 400 mc and above. The joke of the evening was my reference to Jeremy's call as G3NOX slant T when they all knew it should be pronounced G3NOX STROKE T. This was only one of the language laughs that we shared. The one that bothered me was the sign for a road detour—"diversion". This was not my

This is what that tower is connected to. Jeremy Royle at the operating position of G3NOX/T.



A live street scene transmitter by John Tanner, G3NDT/T.



Test test pattern of G3NOX/T, Jeremy Royle.

idea of a diversion.

Although the Royles were most gracious hosts we finally had to part. Jeremy guided us into London (rode with us in our car). He took us to all the surplus stores around town and bargains were plentiful.

After a week or so around London and a glass of beer at Dirty Dicks we started south toward the home of John Plowman, G3AST, at Yeovil. Along the way we lunched on the rocks at Stonehenge and before evening came we were discussing slow scan television with John. This time to our surprise we saw no antenna on the roof. Local regulations forbid them but attic antennas are used. John Plowman is not only an enthusiastic TV ham but a builder of all kinds. His accomplishments include model locomotives and tape recorders. He casually showed me racks of homemade gear and even mentioned that he had built the equipment more compactly by designing and building his own transformers!

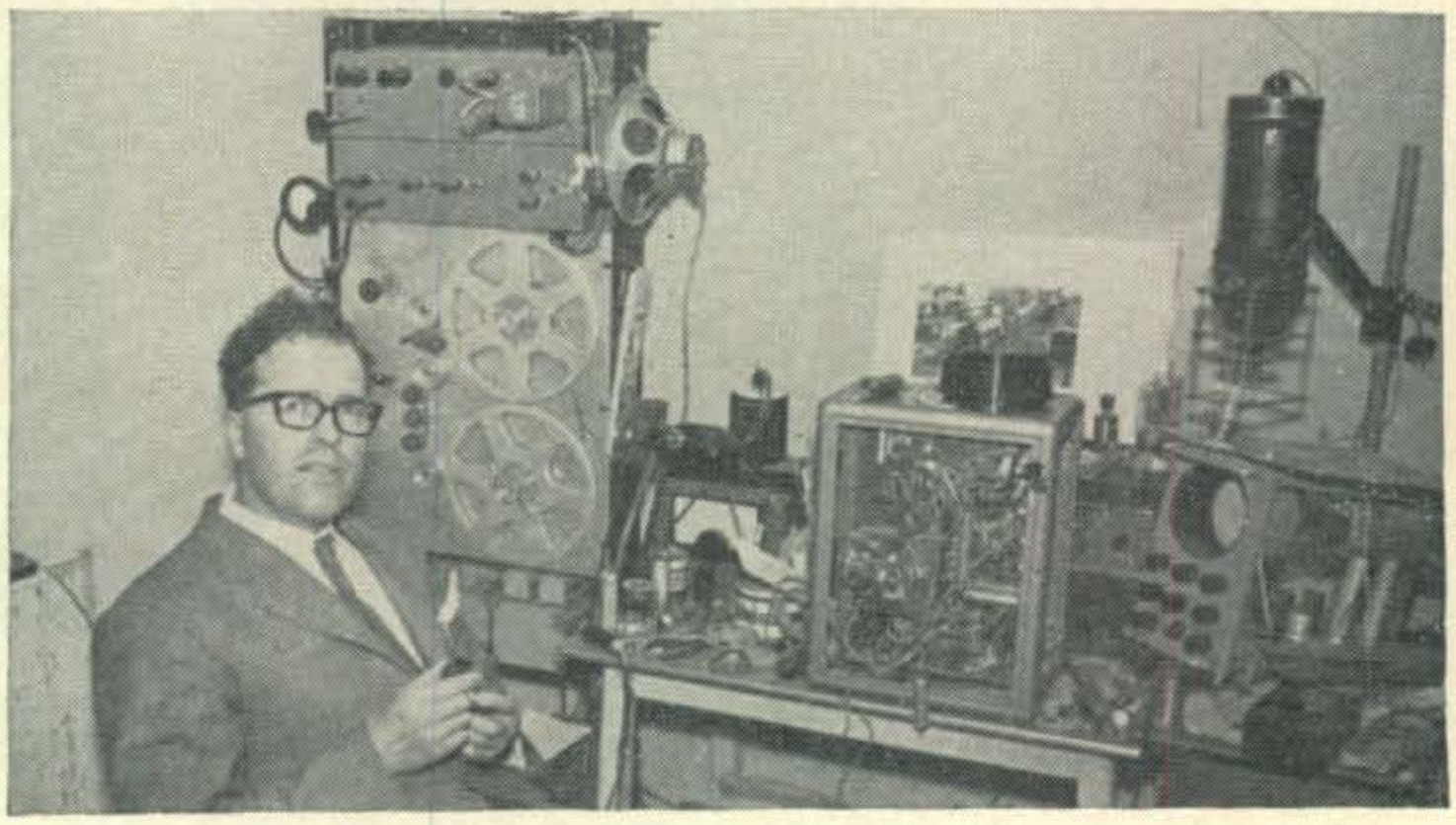
John Plowman showed us two pieces of slow scan gear. One was a home built monitor with a 3 inch cathode ray tube and the other a rack mounted system using a 5FP7 flying spot scanner. This last piece of gear was particularly interesting in that it had a lens system focusing the slow scan raster on the opaque material to be transmitted and then a 931-A photo multiplier tube was used to pick up this reflected-defused light. The systems that we usually use in this country use film negatives and the 931-A photo tube is used directly to pick up the transmitted light. Obviously the lens system is better in that it eliminates parallax from the curvature of the raster tube.

While at John's I was privileged to hear the tape that WA2BCW, Cop MacDonald, made world famous by sending the first TV picture direct to Europe. Considering that the transmitter power was 25 watts and that the 10 meter band was in poor condition, the tape was excellent.

We spent the evening discussing the merits of f.m. versus a.m. subcarrier slow scan. The most popular British slow scan system differs from the American system in that the British use a.m. sync. pulses with the video on the f.m. subcarrier while we use the f.m. subcarrier for both sync. and video.

I was continually amazed at the level of competence that the British hams continued to hold in many fields. As an illustration I might mention the home made wine of excellent quality that was served after the last TV raster had ceased to glow.

Our time was limited and the next day saw us traveling to Bristol via Bath. The Roman ruins at Bath were interesting but so was the laboratory bedroom of John Tanner, G3NDT/T in Bristol. John Tanner showed us his home built complete color TV station. This included the complete sync. generator, transmitter, and receiver all NTSC style. He told us that he had experimented with color sequential for several years using his color RCA tube, but the brilliance of the tube used in this manner was marginal.



John Plowman, G3AST, at his QTH in Yeovil. John builds all his own equipment and winds his own transformers.

Color TV in Britain is new and almost non-existent, so to see a ham with a complete color TV system in his bedroom is almost as astounding as Telstar. John is a telecine engineer for the BBC of Bristol.

We spent a most enjoyable day going through the BBC studios and we especially enjoyed seeing the private showing of a movie of "Matilda", a mobile TV station constructed in an old taxicab that existed as a project of the BATC several years ago. I understand that this old TV taxicab was used by the BBC once as an emergency relay hookup.

John Tanner also winds vidicon TV yokes for a fraction of the cost of those available here in the States. These coils are professional in quality. John demonstrated his black and white camera and showed the tremendous sensitivity of the tube. His image orthicon (BBC reject) did an admirable job and was about as sensitive as the human eye. All his cameras were mounted on dollys and had turret lens. John's original color TV work will probably help him along with his career at the BBC. The BBC is just getting started with color transmissions.

It is interesting to note that none of the hams we met in Britain had electronic degrees and for the most part (John was an exception) did not work in the electronic field. It is difficult to understand how they become so well informed.

While at Bristol we received a call from Malcolm Sparrow, G3KQJ/T, who invited us to spend an evening with them and see his ATV station. Malcolm lives in the outskirts of Wolverhampton. He and his wife were most gracious and we had a good time working with camera and monitors. His small vidicon camera was as good as commercial TV. He used a skeleton slot antenna on the roof. The skeleton slot antenna is a remarkable device first pioneered by the British. It has high gain (16 db) and great bandwidth. For example the bandwidth on 432 mc could be as much as 40 mc. Malcolm had a collection of low noise front ends for 432 mc. I was pleased to see some ARRL-*QST* designs as well as some unknown versions. Even though he is a prosperous steel executive, Malcolm would not think of equipping his shack with commercial gear. It was difficult leaving all of this equipment but commitments to visit Jodrell Bank at Macclesfield to see the world's largest radio telescope were beckoning.

Upon reaching Macclesfield a phone call to R. G. Lascalles, G3AKX, helped us find the proper gate at Jodrell Bank. When the 250' telescope came into view we could scarcely believe our eyes. Could this monster really be an antenna? Sure it was, and our guide G3AKX told us of the exciting radio worlds that they listen to. Our conversation centered about the everyday work, radio astronomy, and the occasional listening job they are asked to do by the Americans or Russians.

Basically this ended our tour of British hamdon. We had looked in on some of the finest hams in the world. We were introduced to the skeleton slot antenna, 430 mc duplex TV and sound, the low noise A2521 grounded grid u.h.f. tube, beautiful British war surplus, amateur TV at its finest and the best home constructed gear in the world. Our appreciation goes to the many amateurs that helped us and contributed to our enjoyment on the trip. Special thanks goes to Don Reid, secretary of the BATC who acted as coordinator for our visits. ■

New Amateur Product

P.A.F. Enterprises

Two new products to be imported by P.A.F. will be the D.80 transistorized closed circuit TV camera, and the VKR-500 video tape recorder. Both are products of Beulah Electronics Ltd., London, England. The camera has a resolution of 5 mc and automatic light control. The model VKR-500 is available as a kit and as such is probably the world's first video tape recorder kit. The units will be stocked and serviced by P.A.F. Enterprises, 32-34 East 22nd Street, Bayonne, New Jersey. For more information either write them direct or circle 62 on page 110. The photograph shows Mr. Fryczynski, President of P.A.F. Enterprises (left) getting a demonstration of the new equipment by Mr. Rose, Managing Director of Beulah Electronics in England.

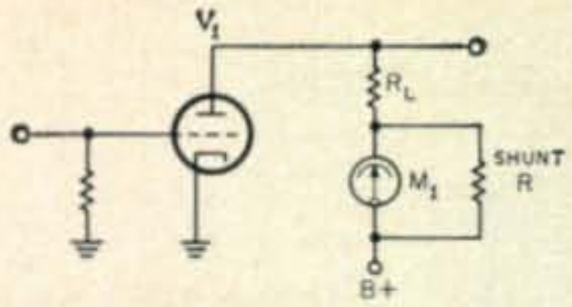


Fig. 1—Shunt method of current metering.

As the state of the art continues to advance, the necessity for using meters and metering circuits becomes more pronounced. To secure optimum performance from equipment, we are required to maintain specific values of grid current in amplifiers which operate in the AB, B and C modes. Cathode currents must be properly balanced in the output stages of many hi-fi amplifiers and grid current must not be allowed to flow in AB_1 amplifiers. The need for metering, in today's electronic age, is of paramount significance.

There are a number of bargain priced meters available through surplus outlets and wholesale distributors. Few of these meters are equipped with the proper movements to fulfill the wide variety of needs encountered by today's experimenter/constructor. Needless expense can be avoided by preparing your own metering circuits, tailored to the particular needs of your circuitry and centered around the basic 0-1 ma meter movement. Since there are an abundance of these meters available at reasonable prices, the builder may choose from new stock, surplus or imported products. The important consideration is that you select a 0-1 ma basic movement.

Parallel Shunts

Frustration is the constant "bed-fellow" of the home technician who attempts to wind parallel meter shunts by the "cut-and-try" method. It not only is a time consuming procedure, but an inaccurate way of doing the job. A less complicated way of doing this effectively is to use the 0-1 ma meter as a voltmeter, reading the voltage drop across a *known* value of resistance.

For the purpose of identification, let's refer to this method of metering as "Voltage Drop Metering". Figure 1 shows the *shunt* method of reading current flow. Figure 2 illustrates a typical circuit which employs the "Voltage Drop" system. As you can see, R_1 is in series with the B-plus feed to the 6146 tube. This resistor must be of sufficiently low value to prevent excessive voltage drop across it, thus insuring against reduced power input to the stage being metered. A 10 ohm, 5 watt unit is suitable for use with

BY DOUG DE MAW,* W8HHS

The importance of metering much of the equipment used in amateur radio cannot be minimized. The author presents a simple method of metering most equipments for current and voltage, using a 0-1 ma meter, in a most painless way.

any tube (or tubes) drawing up to 500 ma. At 500 ma, the voltage drop across R_1 will be 5 volts. By using a voltmeter type circuit consisting of M_1 and R_2, the voltage drop across R_1 is read. The resultant reading corresponds to the current being drawn. For example, with a current flow of 100 ma, the voltage drop across R_1 will be 1 volt. At 300 ma, the drop will be 3 volts . . . *etc.* By selecting the proper resistance value for R_2, any full scale meter reading is possible. Grid current can be measured in the same manner, by simply reversing the polarity of the meter, permitting it to read negative voltage. (See fig. 3.)

It is best to use close tolerance resistors for proper accuracy, employing 5 percent types (or better), whenever possible.

Selecting Values

Chart 1 lists a number of resistance values which will permit any 0-1 ma meter to read the more popular full-scale current ranges. By combining a number of 1 watt resistors of the proper value, in parallel (or series), the wattage rating can be built up to the required amount, while

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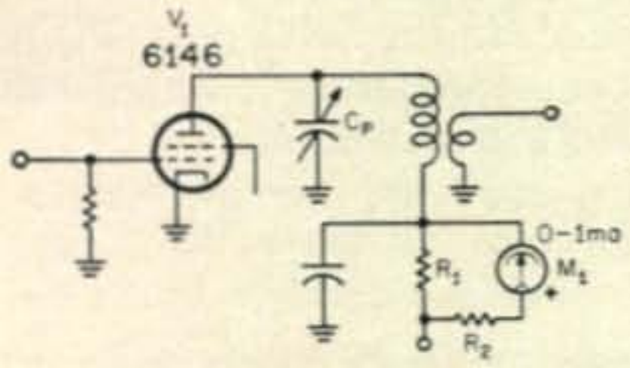

Fig. 2—Voltage drop method of current metering.

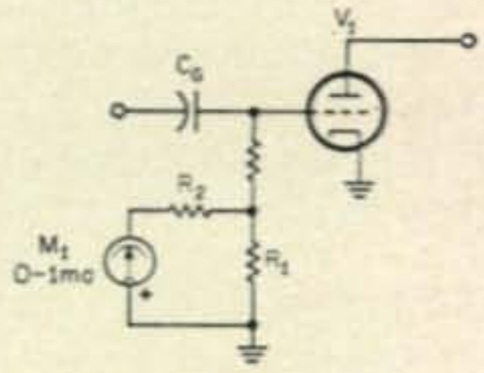

Fig. 3—Voltage drop method of current metering as applied to grid circuits.

Meter Range	R_1	R_2
0—500 Ma.	10 ohms	5K
0—300 Ma.	10 ohms	3K
0—200 Ma.	10 ohms	2K
0—100 Ma.	10 ohms	1K
0— 50 Ma.	100 ohms	5K

Chart 1—Listed above are resistance values necessary to permit a 0-1 ma meter to the current ranges listed.

securing the correct resistance value. In circuits where R_1 will pass 100 ma or less, 1 watt resistors will serve nicely.

Chart 2 lists suitable values for R_1 and R_2, for use in metering lower values of current, such as would be encountered in grid circuits . . . *etc.*

By using Ohm's Law, resistor values for R_1 and R_2 can be calculated to permit *any* full-scale meter reading desired.

Figure 4 illustrates the method used for direct reading of d.c. supply voltages, in connection with a 0-1 ma meter movement. Chart 3 shows the correct value of R_1 for reading the more popular voltage ranges. One watt resistors of the 5 percent tolerance type are recommended.

A single meter can be used for reading a variety of voltage and current conditions in one piece of equipment, by employing a multi-position, 2 pole switch.

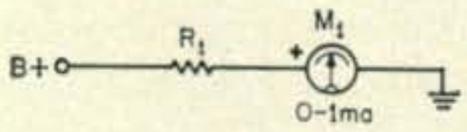

Fig. 4—Basic voltmeter circuit. Meter range is controlled by the value of R1.

Meter Range	R_1	R_2
0—5 ma.	500 ohms	2.5K
0—10 ma.	500 ohms	5K
0—25 ma.	500 ohms	12.5K

Chart 2—Suitable values of resistors are listed above for the metering of low current circuits.

Conclusion

By utilizing a 0-1 ma meter and the Voltage Drop Metering system described in the text, you will be able to solve any metering problem you are likely to encounter. Furthermore, there will be no more little piles of "hair fine" magnet wire and snippings on the workshop floor to remind you of your unsuccessful efforts in attempting to fashion "cut-and-try" parallel shunts. Why not Sugar Coat your next metering project? It's easy. ■

Meter Scale	R	Resis. Use
0—5000 V	5 meg.	5—1 meg.*
0—2500 V	2.5 meg.	2—1 meg.*
0—1000 V	1.0 meg.	2—500K*
0—500 V	500K	1—500K, 1W
0—250 V	250K	1—250K, 1W
0—100 V	100K	1—100K, 1W
0—50 V	50K	1—50K, 1W

Chart 3—The series resistors required to convert a 0-1 ma meter into a volt meter of various ranges are listed above. The resistors marked with the asterisk are placed in series.

Laser Dangers

BY KAYLA BLOOM,* WØHJL

I WAS attracted recently by an article in one of the magazines which described a "laser pistol" which has been developed by IBM. It seems likely that such devices may hit the market at some time in the future. It is also possible that being a ham, you may be toying with the idea of lasers as an experiment. If so, take heed to the warnings in recent research on the subject.

I would like to quote from a report by the Army Surgeon General's office on a piece of research done by Dr. Edmund Klein and Dr. Samuel Fine and supported by the Army. This report said in part:

"Although the laser irradiation caused only superficial external damage when focussed on the foreheads of mice, damage inside the skull was extensive and frequently fatal.

"In other animal studies, laser radiation of the gastrointestinal tract—either directly or through the intact body wall—was followed by perforation, peritonitis, and death.

"In test tube studies, the action of fibrinolysin, a substance which aids normal blood clotting, was reduced by laser irradiation.

"In animal tissue, laser radiation resulted in the formation of "free radicals"—extremely short-lived molecular fragments which some researchers believe may be associated with the cancer process."

Laser beams have already shown themselves to be valuable in the fields of medicine and communications. Apparently it would behoove us to treat them with great respect. It would be a tragedy if one of us, in experimenting with this new tool, were to cause death or permanent injury to one of our children by careless direction of the laser beam without being aware of its potential dangers. ■

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TRACKING A POWER POLE

BY EUGENE B. FULLER,* W2FZJ

For anyone interested in experimenting with various h.f. antenna arrays one of the major problems is that of moving the array from the construction area to the tuning position and then to the operating position. A pole track system was designed to meet these problems. The system can be operated by one man and is capable of handling a 200 to 300 pound load.

In order to facilitate antenna experimentation a pole tracking system was decided upon. After considering the requirements and investigating previous work along this line[1] a two wire track system was decided upon. A carriage rides the track and is operated by a cable and counterweight.

The Track

The track consists basically of two pieces of 4" channel 3½ feet long with two pieces of ⅜" galvanized cable run between them from top to bottom of the pole as shown in fig. 1. The cable is dead ended on the upper side of the top channel by bringing it through a 7/16" hole and bolting a clamp on so that it can not be pulled back through the hole. This dead end must be made on the top side of the channel in order to allow the carriage to seat up into the channel.

The cables are run parallel up the pole with a three foot spacing. A fully threaded 12" eye bolt is clamped onto the bottom of each cable and is run through a clearance hole in the bottom 4" channel. By drawing up the nut on the lower side of the bottom channel, full tension is applied to each side of the track.

To fasten the 4" channels to the pole, a small flat area must be chiseled to create about 6" of flat pole surface. Each channel is fastened to the pole by a through bolt and two ½" × 5" lag bolts and is braced to the pole by ¼" × 1" strap as shown. Care must be taken here to be sure the two channels are properly aligned with no twist along the pole so that they are perpendicular to the axis of the pole.

A ¾" clearance hole must be drilled in the top channel to pass the hoist cable. Here again some care must be exercised to insure that the hole lines up with the cable drop from the pulley on the top assembly.

Carriage Assembly

The carriage assembly is a short tower section fitted with two pieces of 2" channel as shown in fig. 2 and the photographs. This 2" channel fits snugly into the 4" top channel when the carriage is raised thus minimizing any racking or twisting tendency.

The tower section may be purchased or fabricated according to availability and size require-

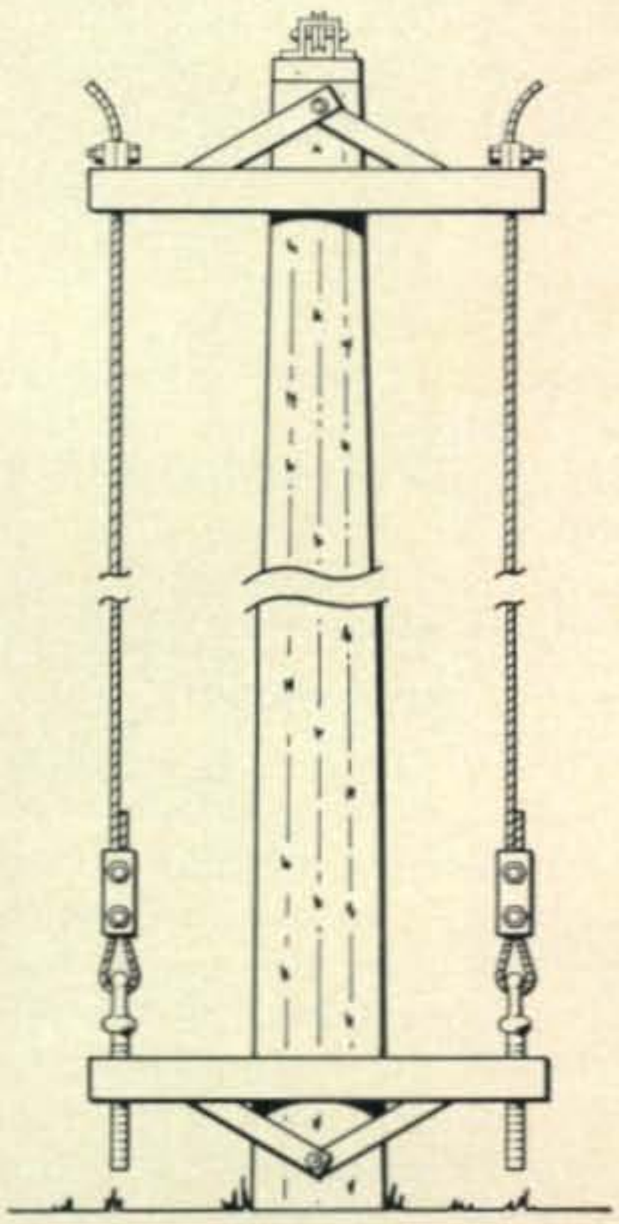


Fig. 1—The above sketch shows how the two guide cables are stretched between the upper and lower channel bars. The cable is clamped above the upper bar as shown by the detailed end view. The lower end of the cables are secured in 12" eye bolts. The manner of securing and bracing the channels is described in the text.

*1183 Wall Road, Webster, New York.

[1]Anderson, C. I., *et al*, "Lower That Beam," *CQ*, June 1949, pg. 28. McGill, R., "Antenna Tracks," *CQ*, July 1960, pg. 51. Smallwood, R., "Beam Hoist for a Wooden Pole," *QST*, August 1963, pg. 48. Aurick, L., "The Ups And Downs Of Pole Tracking," *CQ*, October 1964, pg. 36.

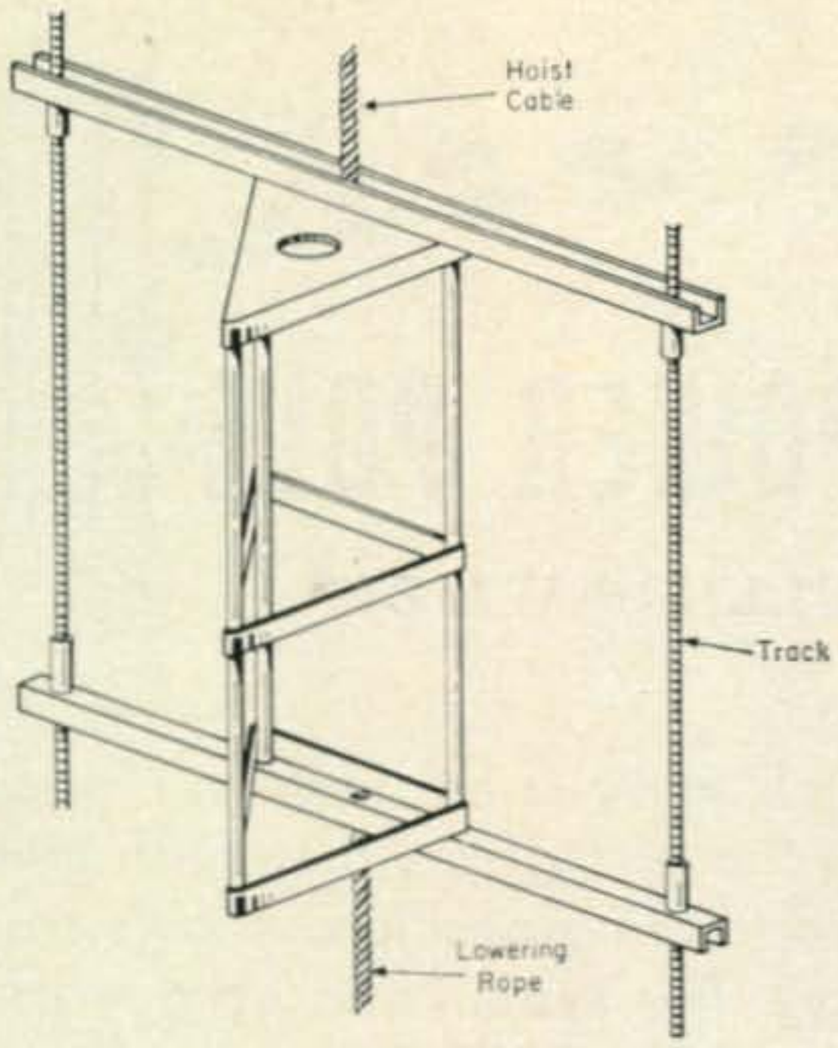


Fig. 2—The carriage, shown above, consists of a short section of triangular tower mounted to two lengths of 2" channel. Short lengths of pipe are welded onto the channels to guide on the cables with a minimum of wear.

ments. The channels should be match drilled with the pole mounted channels to insure proper alignment. The top channel is offset about ¼" toward the pole to compensate for the taper in the pole. This offset must be determined by the taper of the pole and the length of the tower section. Holes are also necessary in the carriage channels for anchoring the hoist cable and the lowering rope.

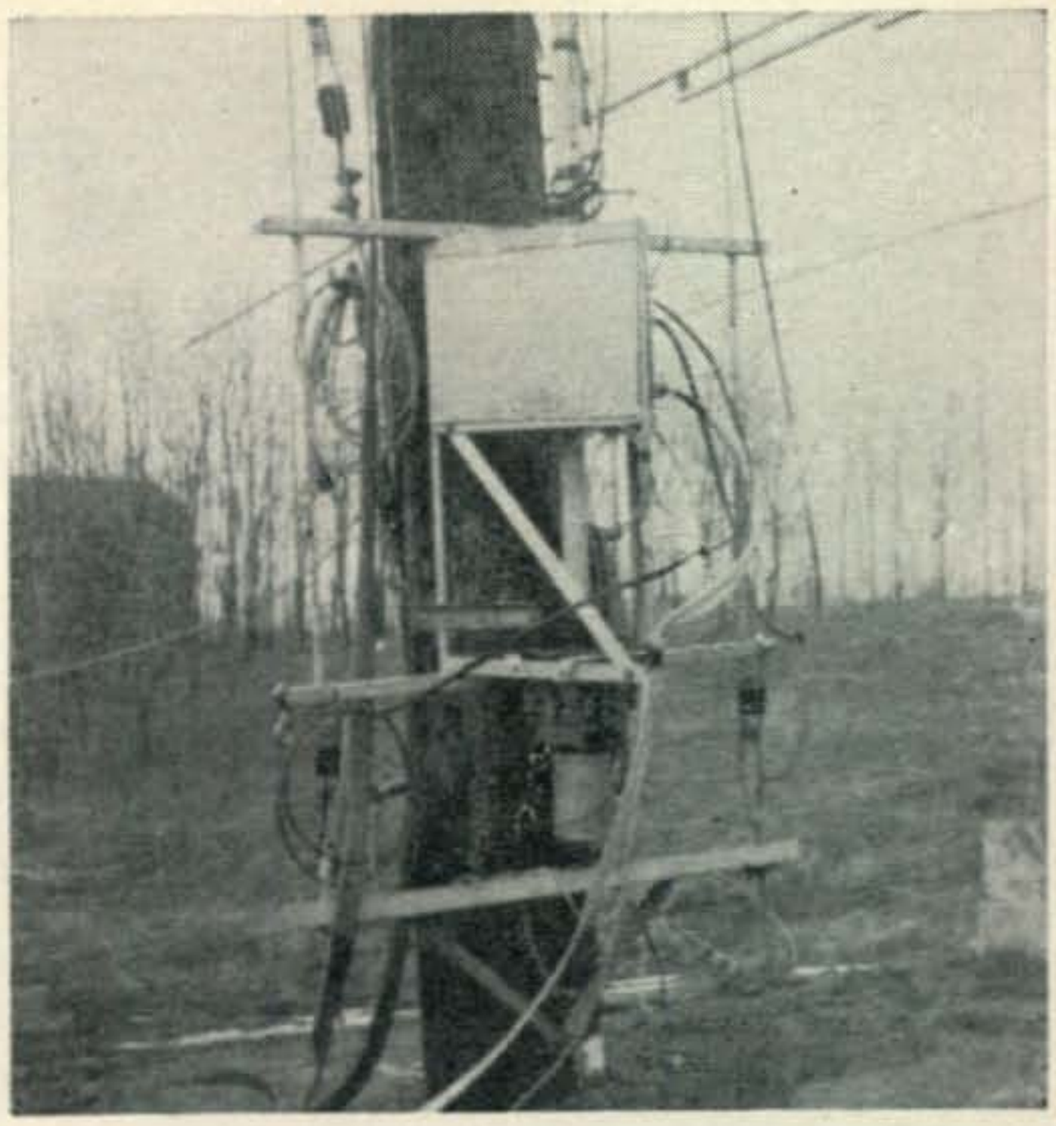
The hoist cable anchor hole must be lined up with the clearance hole in the pole top channel. A set of matched holes was drilled in the top carriage channel and top pole channel so the carriage could be bolted into the top channel if desired.

Where the track cables go through the carriage channels, short pieces of ½" pipe were welded in to act as guides. The pipe and channel should be carefully reamed to help reduce wear on the track cables. It is also convenient to add a small hole on one extremity of the lower carriage channel to attach a pulley and halyard for tying up an inverted-V, doublet or any other wire antenna.

Top Assembly

The purpose of the top assembly is to guide the hoist cable from the carriage, across the top of the pole and down to the counterweight. Basically it consists of a cap with two pieces of angle iron welded on the top and spaced to accept the hoist pulleys. A brace back to the pole was included on the counterweight side and small tabs were tacked across the ends of the angles to preclude the possibility of the cable jumping out of the pulleys.

The band that forms the cap is a 5" width of ⅛" steel and wraps around the pole top. The diameter of the average utility power pole is 8" at the top (for most lengths) and the band should be shaped accordingly. A ¼" steel plate is welded to the top of this cap.



The carriage with a rotor mounted on the bottom as seen in the lowered position.

The pulley frame is made of 1½" × 1½" × 3/16" angle iron 2½ feet long spaced to accept the pulleys used. The brace is 1" angle iron and the entire assembly is then welded to the top of the cap.

The pulleys used were standard V belt types with the hubs cut off. (These were of the type used for belt driving power tools.) They are run on steel ½" diameter bolts. An improvement in performance could be had by the use of ball bearing type pulleys.

It is possible to make some adjustments in the alignment of the carriage side of the cable by using pulleys of different diameters. The pulley on the carriage side must be lined up so the hoist cable will drop through the clearance hole in the pole top channel to the anchor hole in the top of the carriage. The cap and brace are attached to the top of the pole by ½" × 4" lag bolts.

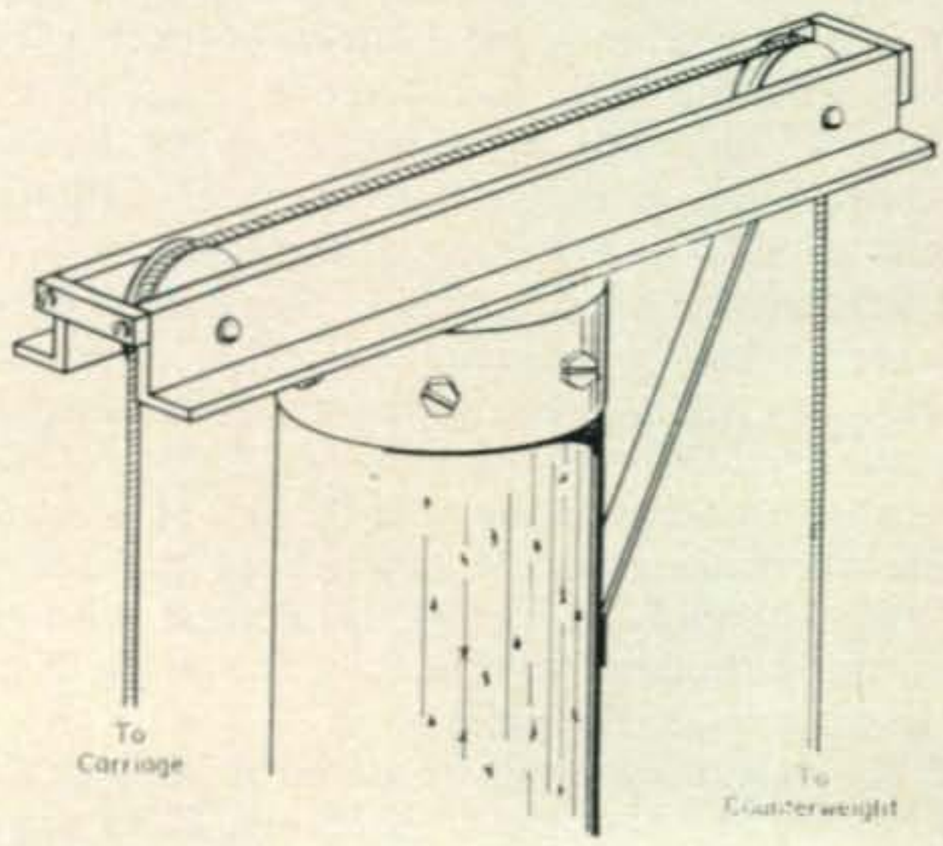
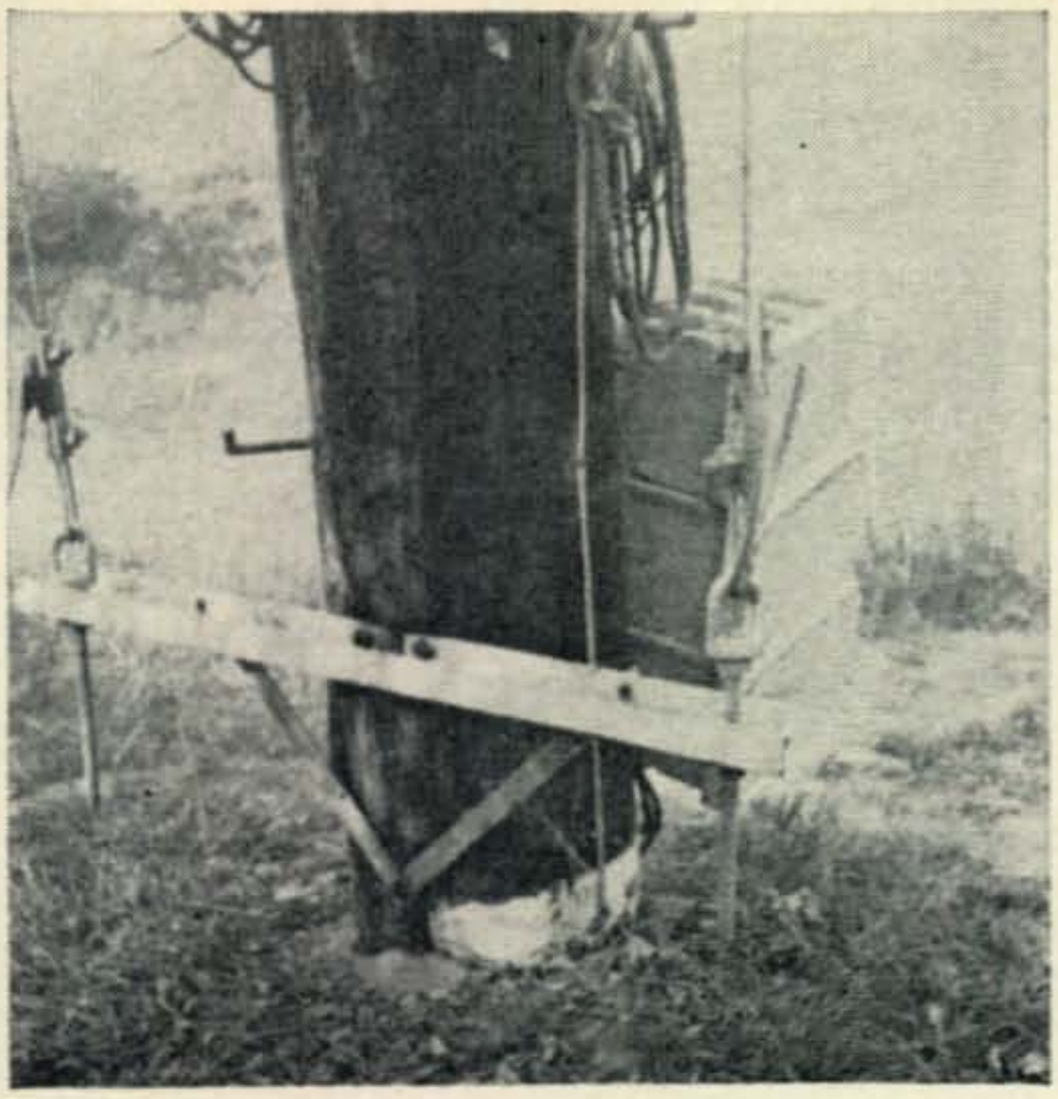


Fig. 3—The top assembly is secured to a band which is lag bolted to the pole around the perimeter. The counterweight side of the pulley bracket is braced with 1" angle iron. The pulley on the carriage side should be aligned to meet the carriage at the correct point.



The bottom channel and counter weight are visible in this view. The 12" eyes are drawn up for proper cable tension. Note the bracing for the bottom channel

Counterweight

To aid in raising and lowering the antenna system, a counterweight was installed on one end of the hoist cable. Concrete blocks are strung on a piece of 5/8" galvanized cable and clamped to the hoist cable. This makes it relatively easy to change the weight when various antennas are used. If only one antenna is anticipated a concrete cast could be poured with an eye bolt in the top for the hoist cable and one in the bottom for a raising rope.

A winch could be used here, bolted onto the base of the pole, however, the counterweight system has proved very effective in handling a rather large array (about 200 lbs.).

Tight Spots

Following is a list of design points to double check when planning your installation.

A—Plan to match drill channels to insure proper alignment.

B—Check dimensions to make sure the hoist cable will drop from the pulley, through the clearance hole in the top channel, to the anchor point on the carriage. Remember that the pole has been flattened to seat the top channel.

C—Be sure the boom of your antenna is high enough on the mast to clear the top of the pole.

D—No beam element should be closer than about two feet to the center of the boom in order to clear the top channel when raising and lowering.

E—If the feedline is run outside the mast, make sure it will not foul in the hoist cable or the top pulley support.

F—If the feedline comes from a remote point and ties on to the pole part way up, be sure the counterweight and antenna will clear it when going up and down.

Preparation and Installation

All the steel parts were wire brushed to remove rust and scale. A coat of Rustoleum was applied and then two coats of an exterior grade paint finished the preparation. After two years no signs of rusting have appeared.

The top cap was installed on the pole before

[*Continued on page 100*]

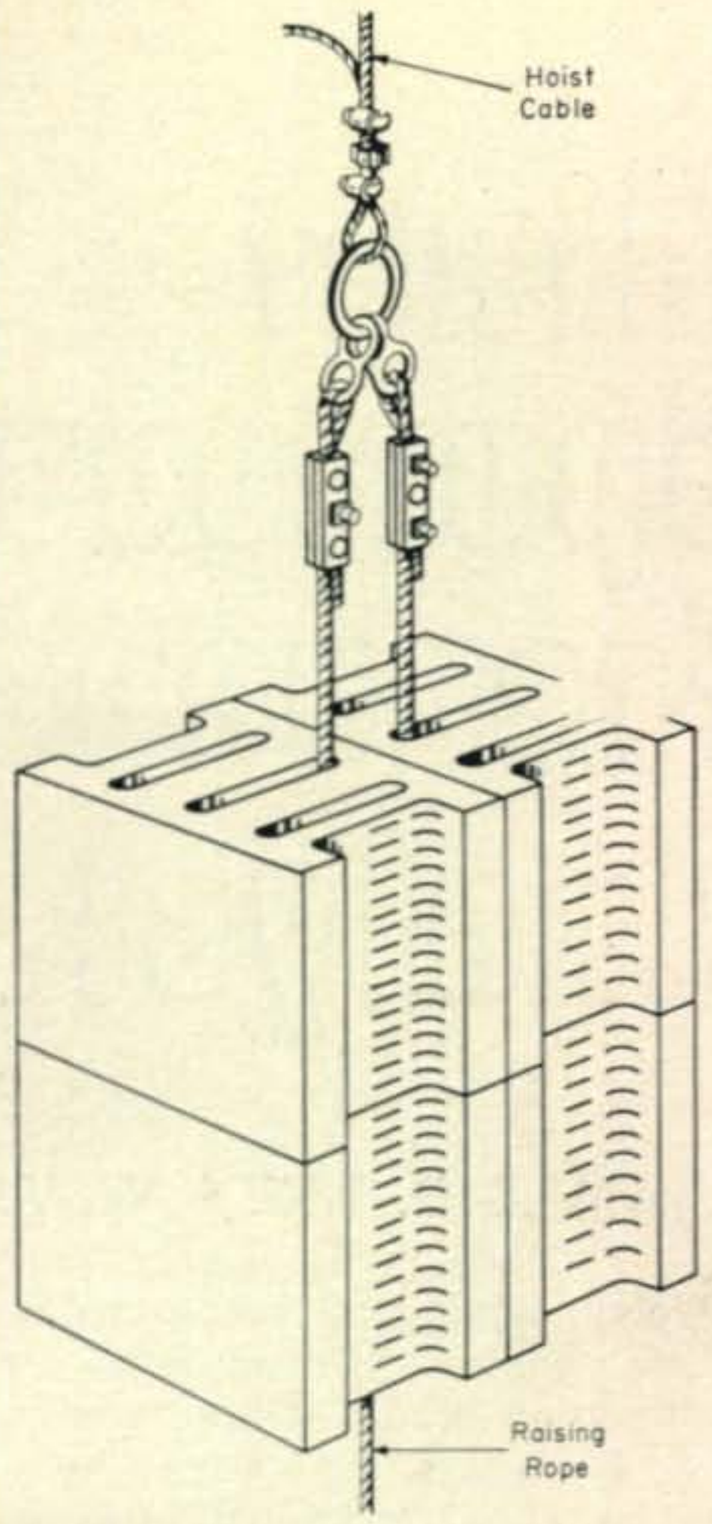


Fig. 4—Details of the counterweight suspension. The number of blocks used is determined by the weight of the antenna.

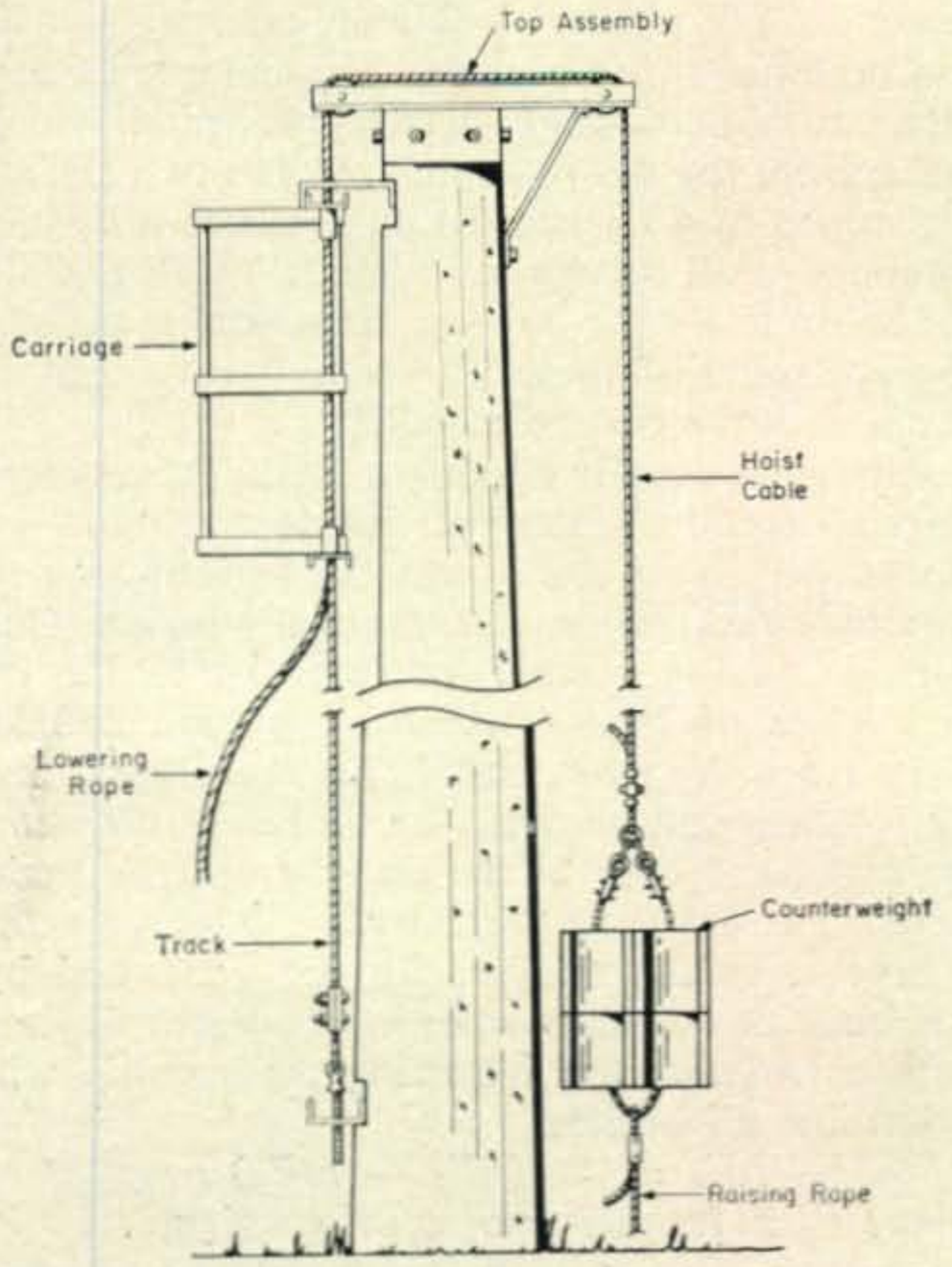


Fig. 5—Drawing of the complete system.

Mixer Spurious Frequency Analysis

The spurious signals generated by a mixer, a heterodyne type v.f.o. or any frequency converter fall both in and out of the amateur bands. They also have varying strengths. The graph and charts presented below will permit you to determine the frequency and strength of spurious signals resulting from various frequency combinations. They will be equally helpful when designing receivers and identifying existing receiver birdies.

BY JAMES G. LEE,* W6VAT

As amateur equipment becomes more complex, control of spurious frequency generation becomes more and more important. S.s.b. mixers, heterodyne-type v.f.o.'s, and frequency converters all have extra signals in their output which were not in the input. Interference from spurious external signals can result in birdies that fall in the receiver tuning range or i.f. passband. These external signals can be b.f.o. or h.f.o. harmonics, images or any other combination of signal plus h.f.o. which differ from the desired signal. When two signals are mixed in a transmitter to produce a certain frequency, all unwanted signals must not be radiated. If proper mixing frequencies are *not* chosen, some of these birdies will be amplified along with the desired signal.

Amateurs usually complain loudly when commercial stations interfere inside the amateur bands. But, how about amateur interference to commercial frequencies? It can happen. One popular mixing scheme for s.s.b. has birdies on both sides of 20 meters and *less* than 250 kc away from the main signal. This means a 2 kw p.e.p. linear can be radiating birdies in the commercial band only 20 db down from the main signal, but more on this later.

Since spurious frequencies are generated by combinations of harmonics in non-linear devices such as mixers, the following relationship will determine all birdies:

$$F_x = \pm (nF_1 - mF_2)$$

where F_x = frequency of spurious signal.
F_1 = first mixing frequency.
F_2 = second mixing frequency, smaller than F_1.
m, n = Harmonic multiple; *i.e.*: $2F_1$ is the second harmonic of F_1.

It should be noted that the signs in the formula are thought of as sum or difference rather than plus or minus or any other indication of polarity. A plus sign is not included within the parenthesis since it would lead to paradoxical results, *i.e.*, negative frequency.

Obviously, hand calculations become very tedious using the formula. However, the formula is easily plotted and the analysis more quickly done by graphical methods. Figure 1 is reproduced here by permission of Collins Radio Company and appeared in their *Fundamentals of S.S.B.* handbook, copyright 1957. Figures 2 and 3 appeared in an August 1946 issue of *Electronics* in an article by R. Badessa and are reproduced here by permission of McGraw-Hill, Inc.

Graphical Calculation Of Spurious Frequencies

Figure 1 is a sample plot of lines conforming to ratios of F_2/F_1 (or m/n) from 1/1 to 1/10. To use fig. 1, note that the very popular s.s.b. mixing scheme of a 9.0 mc s.s.b. generator and 5.0-5.5 mc v.f.o. is plotted on the lower left side. Although the formula has implied single frequencies for F_1 and F_2, either or both may be variable. The combination of one or more variable frequencies produces a line rather than a point. Note further that the plot crosses lines having F_2/F_1 ratios equal to 3/5 and 4/7. These ratios determine the order of the spurious signals generated by this mixing scheme. The burning question, though, is where are these birdies in frequency?

The order of the spurious frequency, k, depends upon whether sum or difference mixing is used and is expressed as:

$$k = m \pm n$$

Figures 2 and 3 are tabulations of each of the k order spurious signals occurring whenever the mixer frequencies plotted in fig. 1 intersect any of the lines. Figure 2 is used for sum mixers and fig. 3 for difference mixers. In general, if k is equal to nine, or more, the birdie will be so weak it usually can be neglected. Spurious signals, 8th order and below may not be neglected.

*Box 357, Cupertino, California.

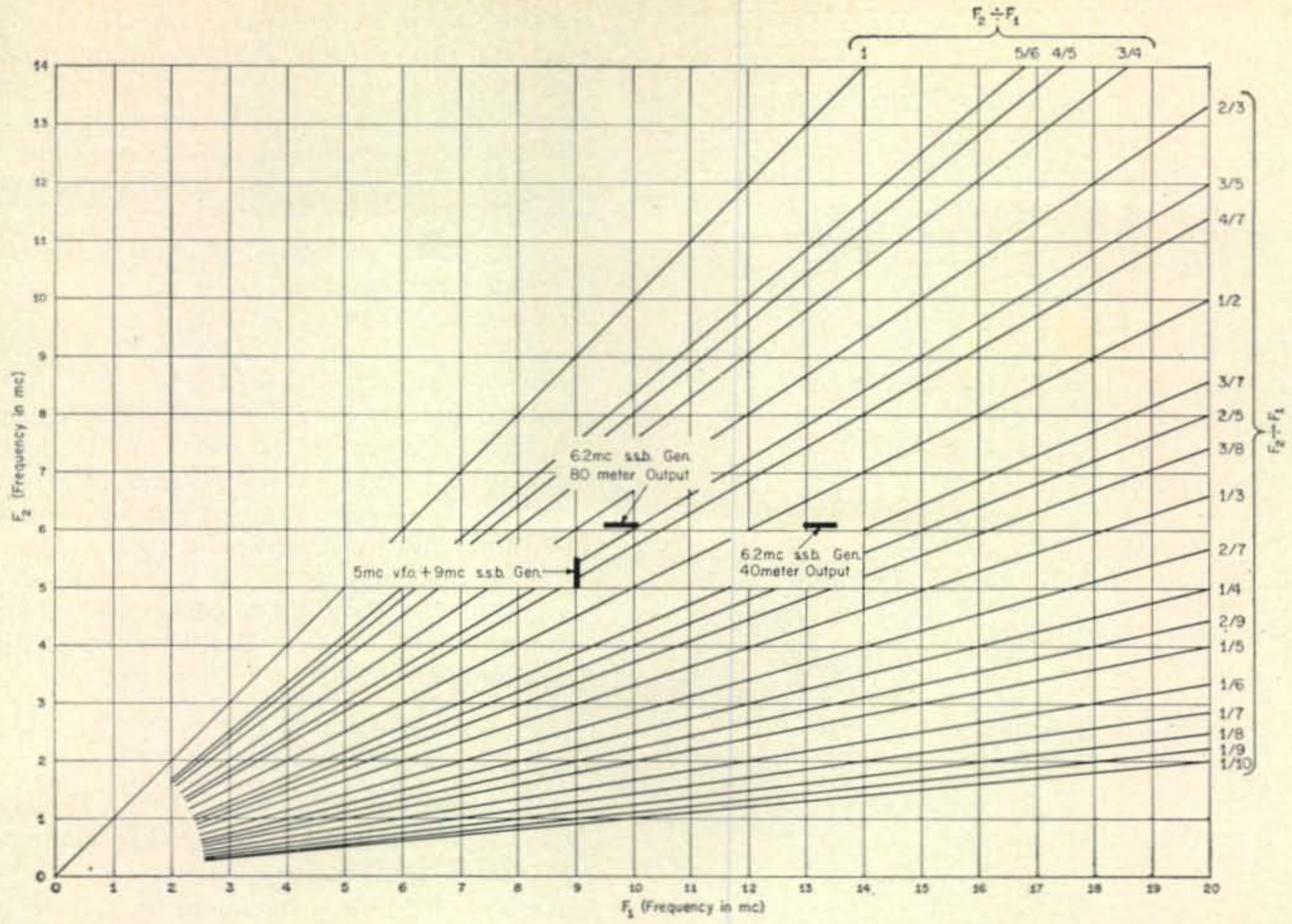


Fig. 1—Normalized frequency chart used to determine F_2/F_1 ratio to aid in calculating birdies. Reproduced by permission of Collins Radio Co., Copyright 1957.

In fig. 1 the 5 mc v.f.o. and 9 mc s.s.b. generator were plotted from 5 to 5.5 mc. The plotted line for F_2 crosses the 3/5 line at 5.35 mc and the 4/7 line at 5.14 mc. In this system additive mixing would be used to provide output from 14 to 14.5 mc.

To determine the spurious signals fig. 2 is consulted since additive mixing is used. The F_2/F_1 column on the left is scanned until the 3/5 and 4/7 ratios are located. Checking across on the 3/5 line we find 8th order (for 5.35 mc) harmonics equal to $4F_1 - 4F_2$ and $6F_2 - 2F_1$ which give $4(9.0) - 4(5.35) = 14.60$ mc, and $6(5.35) - 2(9.0) = 14.10$ mc.

The harmonics generated by the 4/7 ratio are 11th order and can be ignored as previously noted.

So, a 5 and 9'er with an output on 14.35 mc s.s.b. will have one birdie in the band, one out, and both are close enough to the output frequency so they will be amplified almost as well as the desired signal.

Now, let's consider the birdies caused by the difference frequency. The same lines are intersected in fig. 1 and at the same frequencies. Figure 3 gives a 6th order birdie for the 3/5 ratio and a 9th order for the 4/7. The actual output frequencies are then; $4F_2 - 2F_1$ and $6F_2 - 3F_1$ which give $4(5.35) - 2(9.0) = 3.40$ mc and $6(5.14) - 3(9.0) = 3.84$ mc.

Again, one is in the band and the other out. Unfortunately, the 9th order occurs at 3.84 mc when the s.s.b. signal is at 3.86 mc. As a 9th order harmonic it should be very weak, but is it? Old style pentagrid mixers which do not have proper balancing and circuitry will deliver this birdie right on to the next stage for amplification with the desired signal. By rule of thumb this birdie should be 80 db down, but 30 or 40 db of linear amplification after the mixer can raise it right back to a troublesome level. Only the use of such excellent mixers as the 7360 and the 6JH8, plus proper circuitry and mixing schemes, can produce birdie free signals.

If an even closer look is taken at the whole v.f.o. range when applying these formulas, you find that 80 meters has a 4.0 to 2.0 mc and 3.0 to 6.0 mc birdie range, both of which cross the band going in opposite directions. A similar situation occurs for 20 meters. So you don't have a single frequency birdie but one that moves around as you tune your v.f.o.

The obvious conclusion is that a 9.0 mc s.s.b. generator and a 5.0-5.5 mc v.f.o. mixing scheme is not the best choice of frequencies for minimizing birdie output. In all fairness to the 5 and 9'ers, proper tuning, running low power, and operating on frequencies that keep birdies out of the band can give acceptable results for 80 and 20 meter operation. Trying to hit other hands, or driving a 2 kw p.e.p. linear, only makes the situation worse instead of better.

Picking the Proper Frequency

Birdies are highest in amplitude at the precise

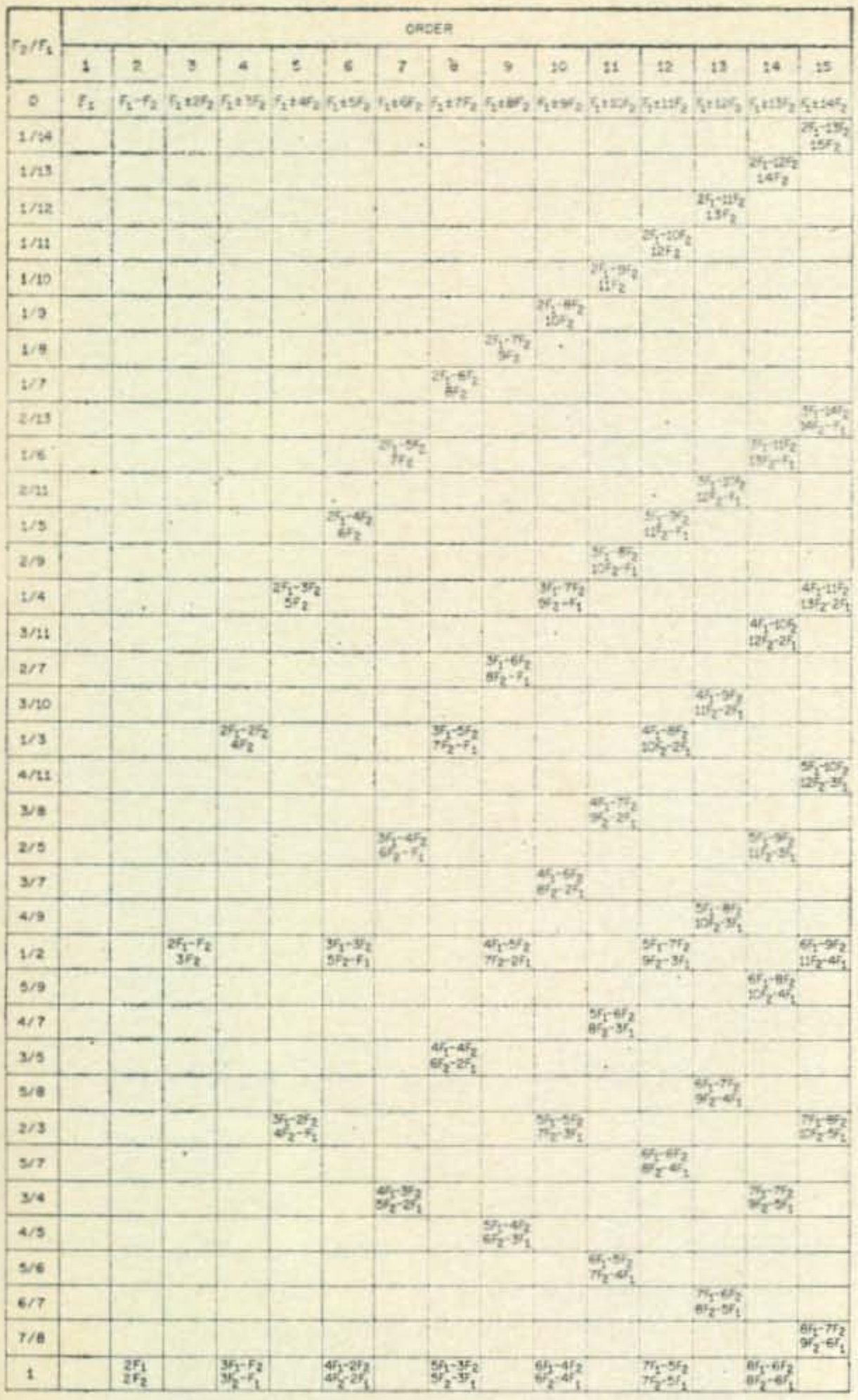


Fig. 2—Chart for locating the frequency and order of the spurious signals for sum mixing, F_1 and F_2.

point of intersection with the lines of fig. 1. Their amplitude drops off rapidly as the v.f.o. moves away from the lines. The only cure for birdies is to properly select the mixing scheme to keep them high order and far away in frequency. This means that there should be no intersection with the lines of fig. 1. This is not always possible, but such intersections should be kept to a minimum.

If the 5 and 9 scheme isn't the best, then what would be a good choice? Using fig. 1, it doesn't take long to spot a frequency of about 6.2 mc as a good choice for the s.s.b. generator. The two regions for 80 and 40 meters using 6.2 mc and the corresponding v.f.o. frequencies are plotted in fig. 1. Note first, that neither plot crosses any sloping line. Since the chart contains all lines whose k order birdies are 8th or below, this means there will be no significant birdie output.

There *are* some close approaches, particularly at 80 meters. A check on the high frequency end of 80, however, shows the 6th order birdie never gets closer than 400 kc to 4.0 mc. This birdie moves away from 80 meters as the v.f.o. moves toward 3.8 mc. A bandpass circuit in the mixer plate and proper tank circuit Q in all amplifiers following the mixer will eliminate this birdie. The 2/3 line to the left of 3.5 mc has a 3rd order birdie at a frequency well outside the band. This line is 400 kc away so the actual birdie will be 800 kc away.

Forty meters is no problem at all. It lies almost halfway between two lines and will have no birdies closer than 1.5 mc. Though not plotted because of the scale limitations, 20, 15, and 10 meters all have no birdies closer than 1.5 mc from the desired output frequencies. All this is not free however. Note the v.f.o. frequencies will not be in the usual low range. This means either a heterodyne v.f.o. or v.x.o. must be used. The same care must be applied when designing the v.f.o. or v.x.o. as in the s.s.b. scheme. The heterodyne v.x.o. should be the optimum method since the crystal frequencies can be chosen higher than lumped constant circuits for the same stability.

Other Uses

The charts are not limited to transmitters alone. If you're about to design a receiver you'll find them very handy. Perhaps you're now plagued with birdies you might be able to identify with the aid of these charts. You may also begin to suspect that some of the interference and birdies you hear on the band are not due to your receiver alone. A 20 db attenuator in the receiver input can give you misleading results since it will reduce any birdie by 20 db as well as signals. Maybe it isn't a cross-modulation problem with your receiver after all. To use the charts for receiver design simply plot the point of intersection corresponding to the lowest frequency tuned and the local oscillator frequency at this point. Do this also for the highest frequency tuned. Now connect these two points

[*Continued on page 105*]

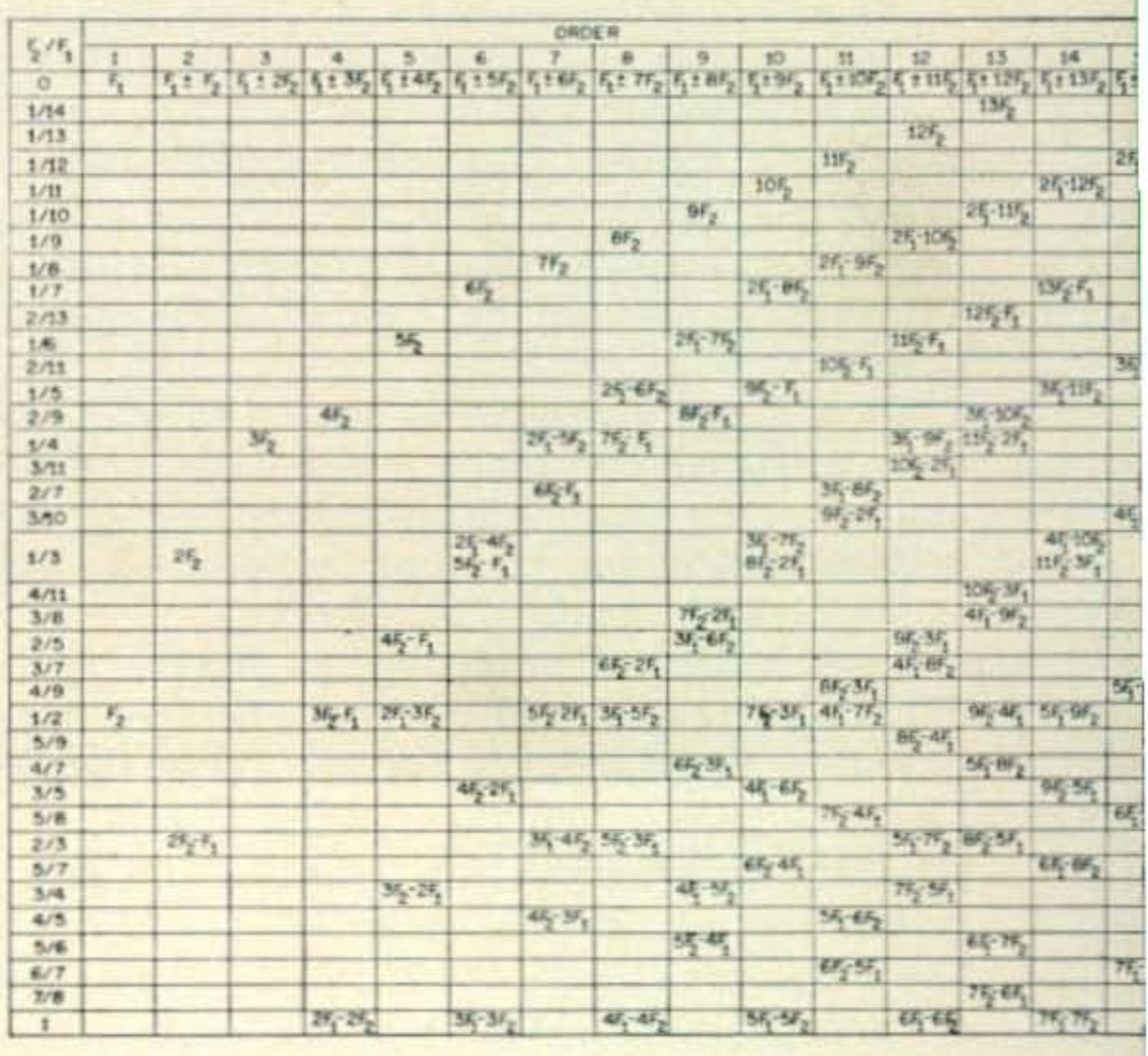
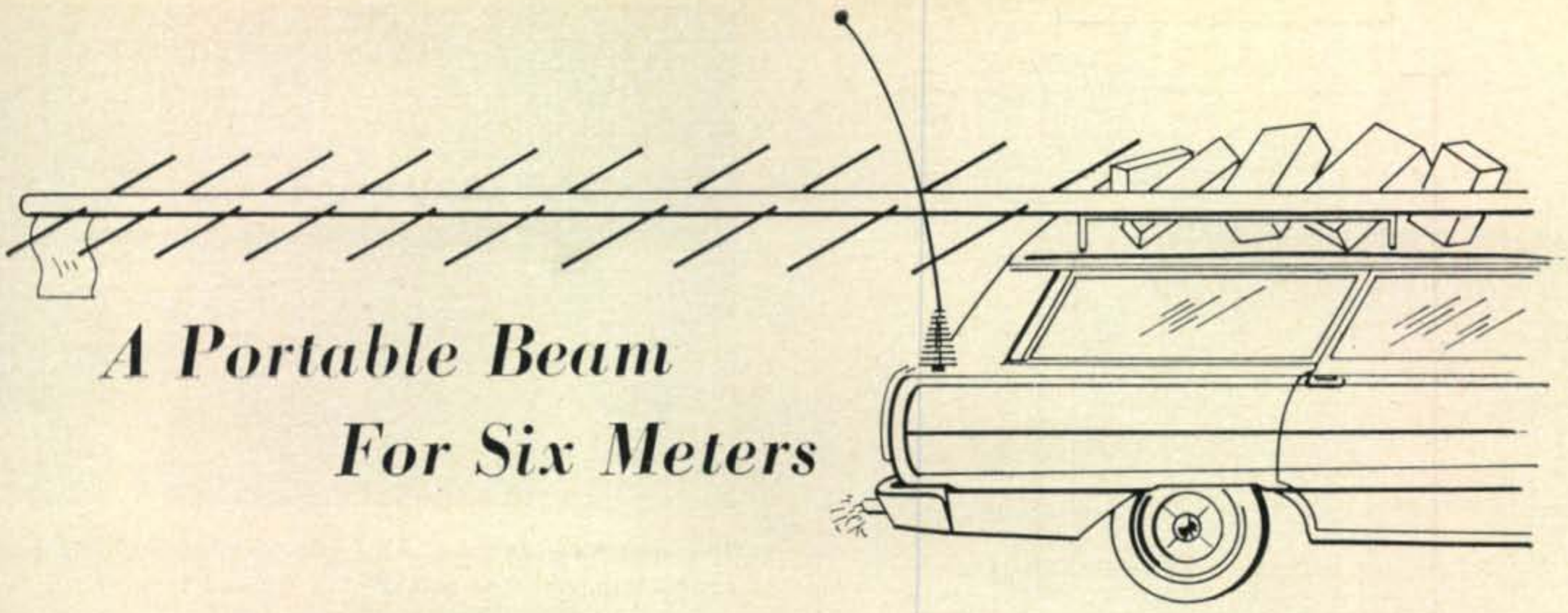


Fig. 3—Chart for locating the frequency and order of the spurious signals for difference mixing, F_1-F_2.



A Portable Beam For Six Meters

BY RONALD LUMACHI,* WB2CQM

Looking for a truly portable beam? Here is one that you can take camping, boating, or anyplace you want to go. It is economical, rugged, and easy to build, an ideal one night project.

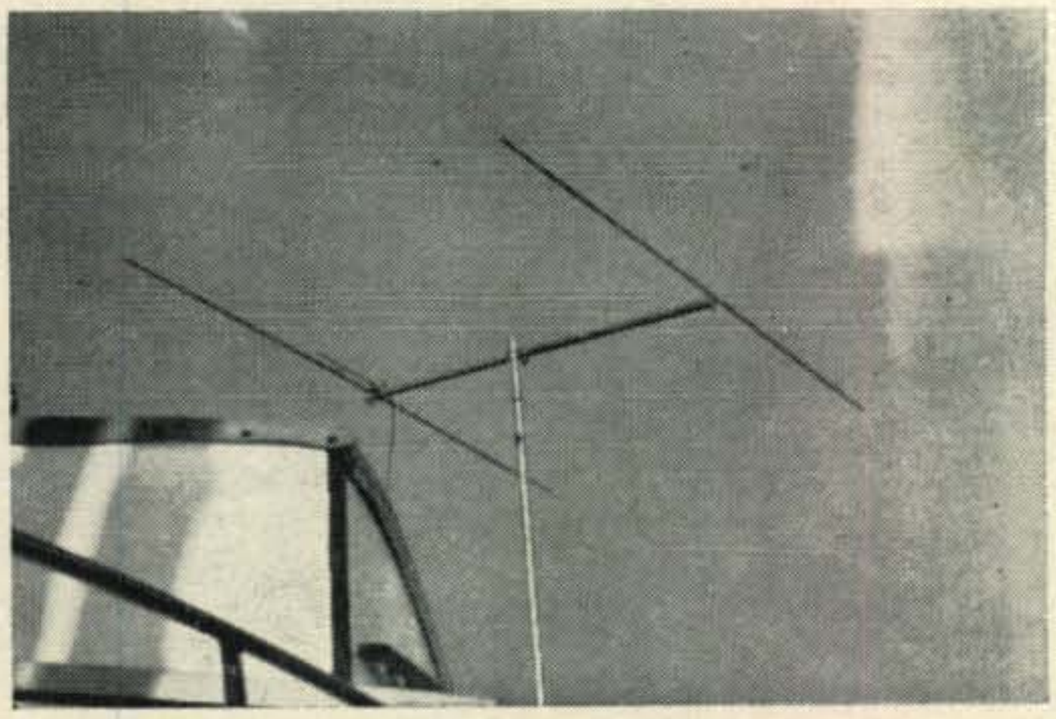
COMMERCIAL radio part's manufacturers are usually quick to anticipate and fulfill the needs of the amateur operator thereby finding a ready market for their wares. Witness for example the antenna configurations available for the mobile operator based on the vertical type array. The small space requirement is ideal in many instances, however, the absence of directivity with the single element, vertically polarized system, leaves much to be desired.

This beam antenna project boasting extreme portability will fulfill several needs: First, no manufacturer truly markets a collapsable beam designed for limited storage area and rapid assembly; Second, the cost of construction will be in accord with the most budget minded amateur; Third, the matching segment utilizing the "QM" match simplifies an often difficult problem of r.f. transfer; Fourth, the 6 meter operator is afforded a 5-6 db gain over the more common halo or vertical array in other than on-the-road mobile operation.

While 6m M/M. operating from the New York area, I discovered that the halo antenna fell short as a radiating system due to the fact that the almost omni-directional pattern precluded directivity. Since the gain of the antenna while transmitting is proportional to the gain while in the receiving mode, both instances suffer with the halo (and vertical) system. It was decided that a yagi beam featuring available hardware, light weight aluminum, and a degree of gain and front-to-back ratio was an absolute necessity. Needless to say, the occasional "hilltopper" and field day *afficionado* will benefit equally when more elaborate systems are not readily available.

The boom and mast are made from two lengths of standard swaged TV tubing (10' × 1¼"). If 5' lengths of aluminum are available the following operation will be much simplified. Each length is halved and butted with a segment from the other length of tubing. One of these combinations will serve as the mast. A small hole is drilled at the union and a self tapping screw inserted. The other telescoped combination will serve as the boom, however, the installation of a single "U" bolt obviates the necessity of a self tapping screw. The clamp will not only serve to join the boom, but will also provide a means of securing the boom to the mast. Cut away both ends of the boom in order to provide a length of 58½" between elements. By utilizing the short lengths it is clearly seen that when the tubing is broken down the storage area requirements are greatly minimized.

The elements are made from two lengths of ⅜" aluminum tubing (0.049" or 0.058" wall thickness) and cut to the dimensions indicated in figure 1. (The resonant frequency is roughly 50.8 mc.) Although the Q of the antenna is reasonable, subsequent frequency changes can be made easily if a length of ¼" tubing is tele-



The antenna is shown aside the bridge of a boat. It is suitable for all types of portable operation.

*73 Bay 26th St., Brooklyn, N.Y., 11214.

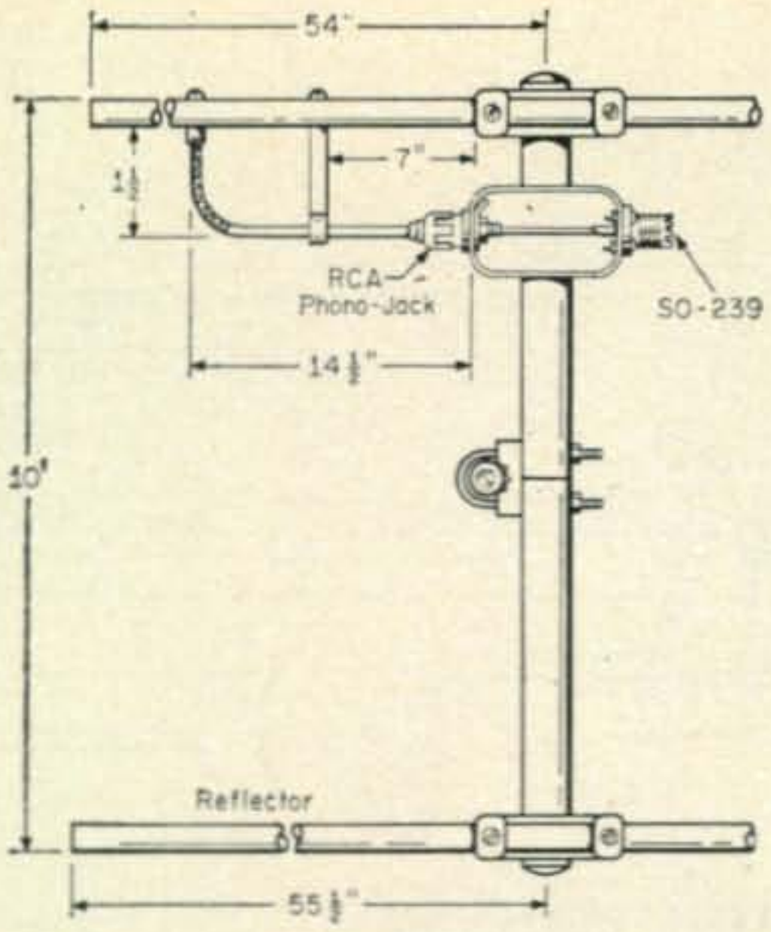


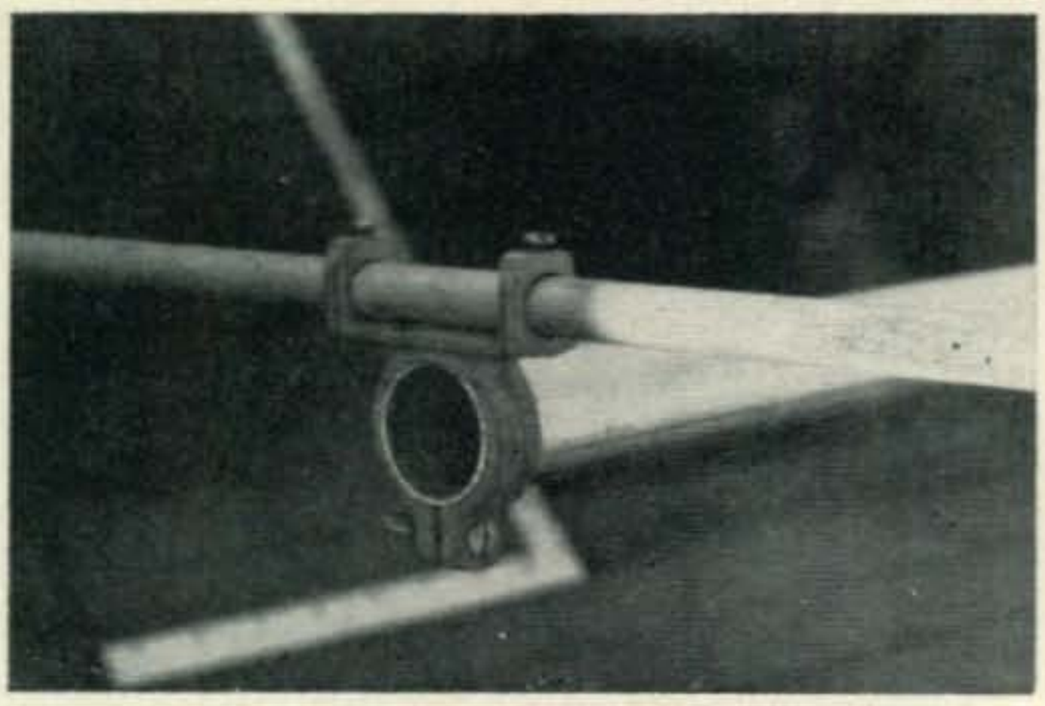
Fig. 1—The portable beam antenna. All parts are standard items. See parts list below.

Part's List

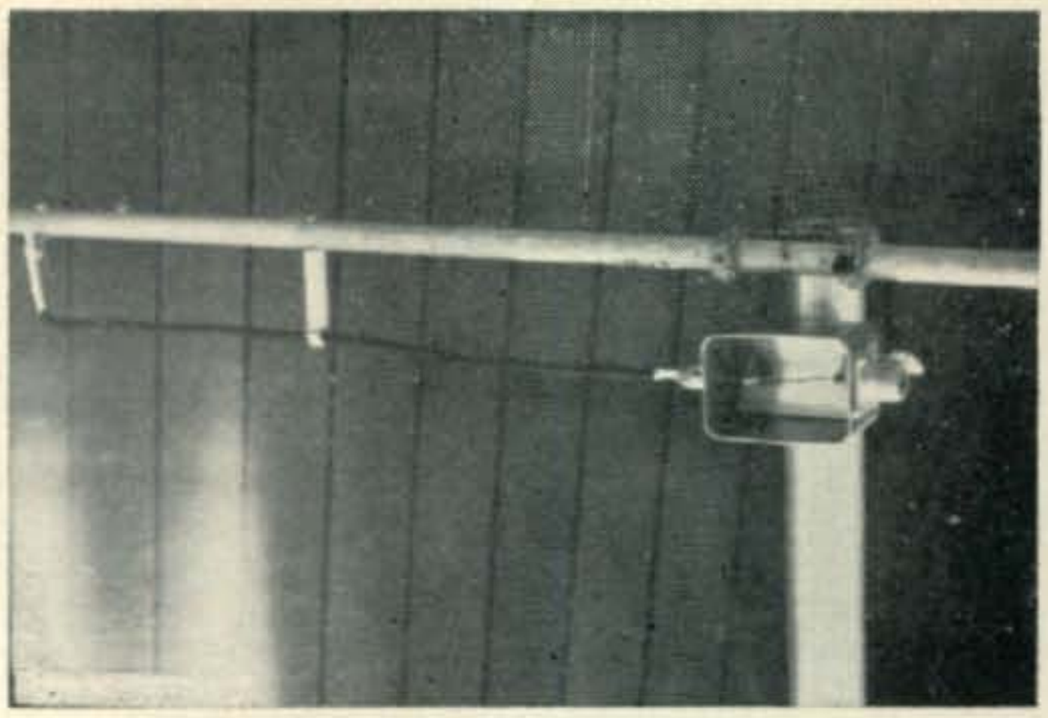
2—12′ lengths of ⅜″ aluminum tubing (0.049 or 0.058″ wall).
2—Cesco Boom-element clamps available from Continental Electronics & Sound Co., Dayton, Ohio.
2—10′ lengths of TV masting 1¼″ (or 4-5′ lengths) Swaged for stacking.
1—TV mast clamp.
1—small minibox.
1—standoff insulator 1½″ (threaded at both ends for 6×32″ hardware).
1—SO-239 coaxial connector.
1—set RCA phono jack and plug.
20″ length of RG-58 U coaxial cable.

scoped into the ⅜″ element. If this method is chosen shorten the longer tubing by about three inches and add about twelve inches of the smaller material at each end. This addition will accommodate moves either up or down the 50 mc band. Slot the ends lengthwise with a hack saw and place a small clamp over the joint for a secure mechanical and low resistance connection.

Cesco boom-to-element clamps are used for the final stage of assembly. The element hole is machined for ⅜″ tubing and the boom opening accepts the 1¼″ masting. The elements are fastened to the clamp by simply tightening the



The elements are mounted to the boom by means of Cesco boom-to-element clamps.



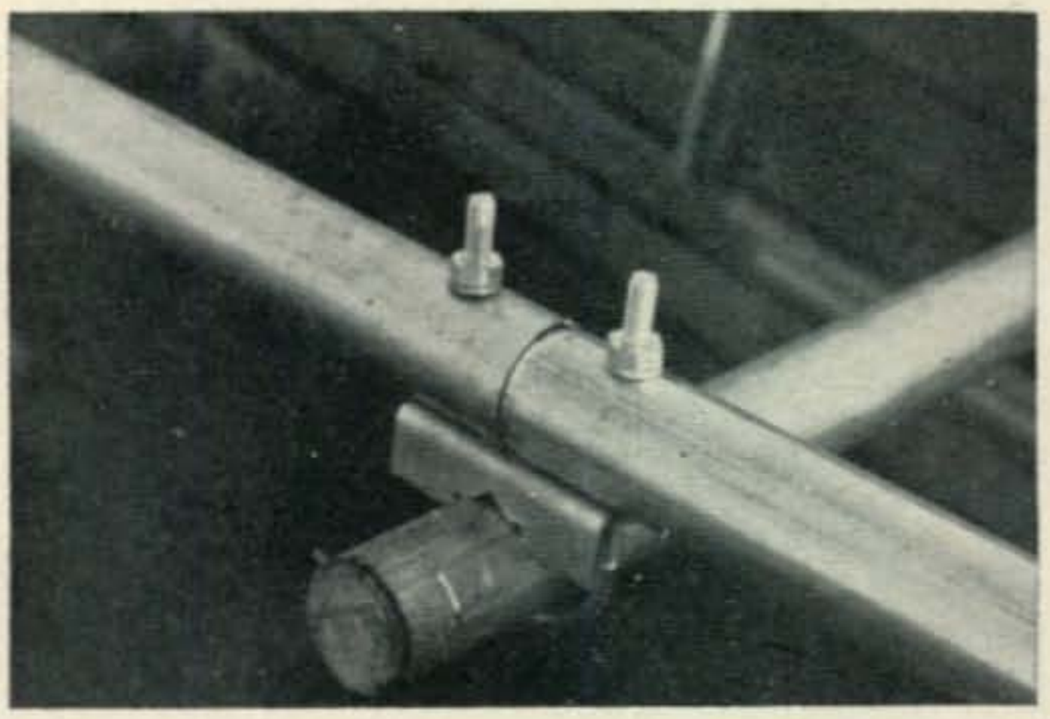
The matching system. A single conductor joins both connectors, and the insulator is spaced to give support to the cable.

two screws on each unit. The element and clamp is then positioned on the boom and secured with one nut and bolt in a collar-like arrangement. Again ease of assembly is apparent.

The "QM" match utilizes the capacitance between the conductor and shield of a length of RG-58/u cable as an assistance in transferring r.f. energy. A small minibox serves as the junction between the feed line and the antenna match. Install a SO-239 coaxial receptacle at the input end of the minibox to mate to the PL-259 normally found at the end of the feeder line. At the output end install an RCA phono jack and wire in a length of center conductor from the RG-58/u cable between insulated terminals. The minibox can be permanently installed on the boom immediately behind the Cesco fitting using either a single 2″ bolt and nut combination or attached by means of a 2½″ hose clamp. Drill a small hole in the minibox and clamp and secure with a ¼″ nut and bolt. The hose clamp can then be positioned on the boom and tightened. The latter method offers an additional degree of ease in assembly and disassembly.

The matching transformer is similar in operation to the more familiar gamma method of power transfer but the "QM" is much more convenient to construct and maintain. A length of RG-58/u cable (16″) is prepared in the following manner. At one end, remove 1½″ of

[*Continued on page 100*]



The U bolt joins the boom sections together and fastens to the mast. The dowel at the end of the mast serves to prevent water from entering and to keep the mast from being crushed by the U bolt.

Eyeball In The Far East

BY TOM WEESE,* K6AJG

RECENTLY my wife and I had an opportunity to visit Japan, Hong Kong, Singapore, Bangkok and the Philippines. While in these areas I visited some of the ham stations which I had previously contacted on the air.

While in Tokyo, I visited Yoshüchi, JA1EF, who I had worked on 40 phone in 1956. Armed with JA1EF's QSL card and a good taxi driver, we found his QTH. He was quite surprised to open the door and find a foreigner standing there with his QSL card in hand. We had several bottles of Japanese beer together and went through many of his QSL cards and found the card I had sent to him. Yoshüchi was very active during his university days, but now he is very busy with his work at one of the local TV stations leaving little time for amateur radio.

This initial meeting was only the beginning, for the next day JA1EF and Kuni, JA1YL, the XYL of JA1CO, my XYL and I, went by train to Kamakura to see the large Buddha. On the way we learned that Kuni was very active on 20 meter c.w., and was very well known among the DX enthusiasts. When we arrived in Kamakura we were met by Tachio, JA1BRK. Tachio is very active on 20 c.w. and s.s.b., and is currently a university student. He is also a very active skier. Our comparisons of ski areas almost overshadowed the radio discussions.

We spent part of the morning and afternoon visiting the famous temples and shrines that Kamakura is noted for. Later we went to JA1BRK's QTH for a cold drink and sandwiches. After the sandwiches, we went upstairs to his shack and fired up his station on 20 meter s.s.b. He is using a Heath HX-10 s.s.b. exciter into a home brew linear. The receiver is a 75A-3 and the antenna is a cubical quad. Needless to say, we had no trouble making stateside contacts. We worked several stations in the U.S. along with a station on Okinawa and one on Formosa wanting a signal report. Later he put the rig on 20 c.w. and worked Frank, K6JIC, who was a former student of mine. Needless to say, Frank was quite surprised to hear that one of his old teachers was in JA1BRK's shack. Unfortunately, the stateside QRM became quite heavy and we lost contact.

A few weeks later we arrived in Hong Kong and had an eye ball visit with George, VS6DS. George is acting head of the Hong Kong post office and also maintains the QSL bureau there. We had planned to visit his home later that evening but due to last minute problems, we were unable to do so.

The next stop was Singapore. In the small town of Changi, just east of Singapore, I met Bill, VS1LV, who is in the communications section of the R. A. F. He is quite active on 20 c.w., working both stateside and having a weekly schedule with his home town in the U. K. The next evening we were pleased that Bill could join us for dinner at our hotel. We spent most of the evening talking about DX, U. S. and British ham radio. It was interesting to note during the discussion, his references to "local" contacts. These contacts would be rare DX to me.

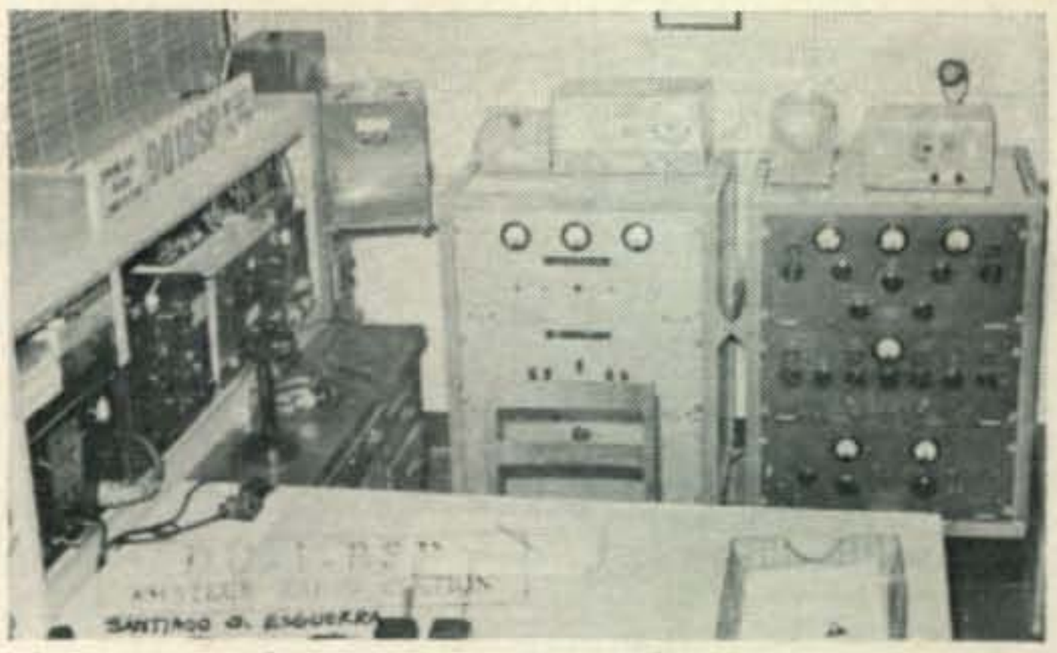
In Bangkok I visited a SEATO training school for teachers. The instructor in the electronics class was HS1AA. After a tour of the classrooms we went upstairs to the school's ham station, which is very active on 20 meters. Each morning the training school holds a schedule with other schools in Thailand. While I was in the shack, we were able to contact HS3AA, which was one of the schools.

In front of the large Buddha at Kamakura are, l. to r., JA1EF, XYL of K6AJG, K6AJG, JA1YL, JA1BK.

*3585 Sepulveda Blvd., Apt. 11, Los Angeles, Calif., 90034.

Next stop Manila. After taking the usual Philippine tourist trips, we visited DU1BSP, the club station of the Boy Scouts of the Philippines. The shack was located on the 3rd floor of the Boy Scout building, a very large building in Manila. Santy, the station trustee invited us in and showed us around. They are active on both 40 and 20 meter phone. On 20 meters they are running a KW into a cubical quad antenna. On 40 meters they use a 40 meter dipole antenna and the rig is a home brew transceiver running 6 watts input. They call it the "Hallabalu." The "Hallabalu" type transceiver is being built by students in the Manila Boy Scout radio classes lead by Santy. Eventually the other Philippine Boy Scout Troops will have the same type of rig in their headquarters, enabling all of the Philippines to be in contact with one another. During the afternoon we worked Romy, DU1RC in Quezon City, Tito, DU6TY in Roxas City, Richardo, DU6RH, Peter, DU9PET on the Island Mindanao and DU1HR, Etoy. All this was done with the "Hallabalu" transceiver. That evening we were invited to dinner by DU1HR and were accompanied there by Santy and DU1RC. Romy is the president of the Philippine Amateur Radio League and is very active in helping with the Boy Scouts beside his regular QSL bureau duties and his private medical practice.

The typhoon Luding was about 50 miles from Manila and the 2nd typhoon warning had sounded. This caused little alarm to the natives, but to a Southern Californian it was the most rain and wind I have seen at one time in my life. Despite the typhoon we managed to arrive at DU1HR's QTH on time. Etoy is the treasurer of the Far Eastern University in Manila and recently has become very active on 40 meters due to the efforts of Santy and Romy. After a very enjoyable dinner with Etoy, his very charming XYL and other guests, all of the hams departed to the shack to work DU1TOM, Tom, and



The Club station of the Boy Scouts of the Philippines, DU1BSP.

Pakito, DU1FR. DU1FR is also active on 20 meter s.s.b. as well as 40 meter phone. Most of the 40 meter contacts were made on 7.025 mc. Plans were being made at DU1BSP to be active with the Boy Scouts "Jamboree on the Air" during October 19 and 20.

From Manila we returned to Tokyo. While there, I was able to visit the Japan Amateur Radio League and QSL bureau, which is in the Tokyo Red Cross building. There I met JA1BYJ, JA1EUV and JA1UM, all who work at the Bureau. Based on the piles of QSL cards being handled by the Bureau, I surmised that the JA's are very active on the air. The Bureau houses the Japan Radio League Station JA1RL. The main transmitter was a BC-610 and the receiver was a super pro. On the way back to the hotel we passed JA1EUV's QTH. He is active on 40 c.w. and makes many stateside contacts.

Throughout our travels in the Far East the personalized eye ball contacts with fellow hams were indeed a wonderful and unforgettable experience. It is wonderful that though a common interest such as ours there exists an international friendship and welcome. I am looking forward to returning the hospitality shown to us on this trip.

New Amateur Product

Computronics Code Typewriter

THE subminiature code generator Model 400 has 21 transistors and an internal NiCad battery supply. For code teaching, Monitor and Speaker use, it produces 1000 cycle tone bursts. For transmitter keying, relay contact output is provided. Speed is continuously adjustable from 5 to 55 wpm. Key action is momentary snap-action with electrical lockout during character plus space duration.

The keyboard contains a mechanical matrix with a 12 bit word length. Six bits are used to program the Mark intervals and 6 bits for Dot numbers and locations.

The Mark interval bits are stored in the Shift-register and the Dot bits in the Dot latches.

The price is $299.50. For more information write to Computronics Engrg., Box 6606 Metropolitan Station, Los Angeles, Calif. 90055, or circle 63 on page 110.

A "Quiet" Weekend in London

BY SYLVIA MARGOLIS*

Two years ago two British amateurs, Joe Steele, G3KZI, and Norman Fitch G3FPK, decided that there are too many "shoestring" events in European amateur radio and nothing plushy for the radio amateur who wants a night out and is willing to pay for it. So they organized the First London SSB Dinner. It was a success, but it ran at a loss. The organizers didn't care because they had achieved something for which there was obviously a big demand, whereas no official body had yet dared to try anything so audacious.

The Second London SSB Dinner, on May 29th at the Waldorf Hotel, was a sensational success. Radio amateurs being what they are, the bookings came in slowly at first, then they began to snowball and the numbers hurtled up. One booking even arrived on the morning of the event. Nobody suffered from this dilatoriness, except the hotel's Banqueting Manager, who will never again be the man that he was!

The week started quietly. Monday and Tuesday were routine days, just plain frantic. On Wednesday I had two very important personal appointments. I was ready to leave the house, complete with a hat whose price was as outrageous as its trimming and the prescribed white gloves, when Cal, K6IWG, our own itinerant James Bond, arrived straight from his latest call EL7B. I had hoped he would have been atomised or something en route but there he was, gorgeous and incorrigible as ever, proposing to occupy our spare bed for the rest of the Summer.

I had to leave him to settle in by himself and go to a business lunch at London's lush Cafe Royal, full of businessmen eating their way happily into coronary thrombosis, all on expense accounts. The number of pound notes my host handed to the waiter while we were drinking our coffee and Drambuie made me choke. Then I went to the Chelsea Flower Show, a prestige annual event which is an established part of the London Social "Season." It was full of "debs" and their bowler-hatted escorts, who flourish their rolled umbrellas the way their ancestors waved their rapiers, so cartoon-British you would never believe it. The ladies' hats at the Flower Show are more important than the flowers.

With feet six sizes larger than they had been that morning, I arrived home to find Maurice (my husband) and Cal blissfully busy taking something to pieces on the dining-room table.

Thursday evening we all went to London Airport, 20 miles from home, to meet K2HLB, Dr. Harold Megibow, and his wife, Dorothy. We noticed there were more ambulances and fire engines than usual careering around the tarmac and that the TWA plane was signalled late. When it did touch down it landed significantly far from the public viewing platforms. But it wasn't until our guests tottered through Immigration and Customs 90 minutes behind schedule that we realized that theirs had been an emergency landing! We rushed them back to the soothing embrace of their London-Hilton suite and, even more disturbed than they were themselves, collapsed into our own beds at 2:30 A.M.

We needn't have bothered because we had to be up again at 6:30 to get to the airport on time to meet the Straubers, K2HEA and K2MGE. This was the first time we had met this famous couple whose voices we knew so well. Dorothy Strauber and I took one look at each other, decided we were kindred spirits, and were soon gabbing away like life-long neighbors.

I had booked them in at the Cumberland, an excellent, middle-price hotel that I always recommend to visitors. G2BVN, Steve, Executive Vice-President of the Radio Society of Great

Sylvia Margolis, wife of G3NMR replying to the "Toast to the Ladies." On her left is John Gayer, HB9AEQ, Hon. Pres. of the IARC in Geneva, who was guest of honor. On her right is Vera Jackson, John Gayer's Secretary.

*95 Collinwood Gardens, Clayhall, Excid, Essex, Eng.

Britain, was there to meet us and took Irv and Dorothy on a sight-seeing tour of London. I paused long enough to pick up a birthday cake from the bakery and rushed home. It was my mother's birthday. I had told her she was to have a birthday party and she said "What's wrong am I dying?" and I said no it just happens to be convenient because I have to spend a *week* at London Airport. I have invited 40 people on Friday so you must come to my house and make your own party.

Saturday morning was quiet, which was just as well, as we had gone to bed at 3:30 A.M. So Maurice and Cal took something to pieces on the dining room table and Maurice worked something exotic which put him in a good mood. This was just as well, because when my 14-year-old son came to try on his best suit it was four sizes too small and we had to rush out and buy him a new one.

There were five of us dressing for dinner all at once and they let me have the bathroom for 2¾ minutes, which was extremely decent of them. Cal put on some of the men's cologne he had bought in Cairo and Maurice explained to him what it made him smell like because it is un-British for a man to smell nice. I pinched some when Cal wasn't looking.

There were 192 people, including about 30 Americans, at the Second London SSB Dinner, from 27 countries. Guest of Honor was John H. Gayer, HB9AEQ, Honorary President of the International Amateur Radio Club in Geneva. There was a trade show and Stu Meyer, W2GHK, President of the Hammarlund Mfg. Co., showed some color-slides of the Hammarlund DX-peditions. The 5-course meal was followed by dancing to a top British band, a cabaret and raffle-draw for some luscious prizes including equipment given by Hallicrafters and Hammarlund.

Those are the statistics. But *I* know there were at least 1,000 people, all of whom kissed me. Even the food was edible and the drinks were lovely. The attendant in the Ladies' Powder Room had been a s.w.l. and thus had to be forcibly restrained from leaving her mink-guarding post to come to hear the speeches. There was a lot of mink to guard.

I made a speech and it was a very sexy speech, which was a nice change for the radio amateurs, and everybody sniggered and Wayne Green took my picture, but he didn't kiss me. After my speech everybody else kissed me, which was very exciting. The largest Scotch I have ever seen kept appearing before me. At midnight the band and the waiters packed up and went home but we didn't want to go home, so we sat around drinking coffee until 2 A.M., making arrangements for the next day. They were so complicated they made the D-Day Invasion Plans look like a Yogi Bear film script. Rene, OE1RZ, complained that he had wanted to dance with me but I had been so busy talking and being kissed there had been no time. I promised we would dance when we visit Vienna and he said ok but

The organizers of the London SSB Dinner, Norman Fitch, G3FPK, and Joe Steele, G3KZI.

he can't do the waltz, only the T-V-I-S-T.

At 2 A.M. John Gayer said he wanted to come out to lunch that day. His Secretary, who was to spend the night at our home, carefully programmed him so that he could find his way out to Ilford by London Transport, swearing he would never make it. We got home at 3 and Cal and Maurice took something to pieces on the dining-room table, but Vera and I went to bed. No sooner had we fallen asleep than John Gayer arrived for lunch. London Transport is the best in the world.

Harold Megibow had asked me to arrange a party at the Hilton for him. I had invited 30 people and Hal invited another 30, so the suite was well filled.

This was a quiet evening to wind up a restful weekend. The food was lovely and the drinks were lovely and the bathroom was lovely. Everybody kissed me and nobody kissed Wayne Green and the waiter kept freshening up our drinks. I felt sick. We had some serious discussion about the future of amateur radio and I think I agreed to do something but I can't remember what because by now I was speaking French to the Austrians and German to the Americans. Stu Meyer lolloped amiably around and Irv Strauber told a smashing joke about a commercial traveller and we looked out of the window at the toy buses and cars 27 floors below (to us in London the Hilton is a skyscraper) and thought what a lovely splat you'd make if you fell.

Now it was Monday morning and the party was really over but nobody wanted to go home. We said goodnight 34 times to Stu Meyer and 29 times to Dorothy Strauber, who was still on Cloud Nine because she had seen the Queen earlier that day. She said the Queen had promised to QSL but we know that Her Majesty only works VHF, not 20 meters s.s.b., so how could Dorothy have worked her?

It was a smashing weekend. At 3 A.M. Cal and Maurice took something to pieces on the dining-room table and I felt sick and nobody kissed me, so I went to bed. ■

DX-60 Key Clicks

(A Remedy)

BY JAMES M. SHARP,* W6DMY

RECENT reports have been received of key clicks observable out to 100 kc each side of carrier frequency as interference in receivers about ten miles distant. This has led to investigation of possibilities for lengthening rise and fall times of the keying characteristic. It was found that the addition of three capacitors and one resistor would reduce clicks to a level where they could not be observed beyond the pass band of modern local receivers. The details of the modifications are passed along to assist those who may also be having key click problems with this transmitter.

During this investigation, the DX-60 output was fed through a T-connector to a Heath HN-31 dummy antenna. A one-foot antenna was connected to the T to provide enough radiated signal to produce S9 plus signal level at a Drake 2-B receiver operating without an antenna. Clicks were examined critically by tuning the receiver to each side of carrier and listening carefully while sending slow dashes. Both crystals and Heath HG-10 v.f.o. were used for frequency control.

The first trial added capacitance across C_4 (directly across key leads). However, capacitance greater than 0.1 mf produced excessive sparking on key contacts at *make*, due to discharge of energy stored in the capacitor. By adding 0.47 mf in series with 100 ohms at this point, additional shaping was secured without excessive sparking.

The next step added capacitance to ground on the tube side of R_9. Here 0.1 mf appeared to be optimum.

The third trial added capacitance in parallel with C_7, but it was found that this increased click intensity, and hence C_7 was left at its original value of 0.005 mf. Removal and increase of R_2 was also tried, without appreciable effect.

The last step was to add capacitance to ground on the keying lead in the HG-10 v.f.o. The optimum value appeared to be 0.1 mf on the lead from 5 of the function switch to the neon lamp. (This is from supply side of R_{10} to ground).

The 0.1 mf capacitors used were disc ceramic types (Sprague 5HK-P10) to conserve space. In the DX-60, on Pictorial 3, wire a 0.1 mf from terminal 2 to 4, and wire a 0.1 mf from terminal 6 to 4 of terminal strip *N*. Mount a single insulated tie point under one fastener for the v.f.o. input jack, and wire 100-ohm ½-watt resistor from this tie point to the ground lug on the v.f.o. jack. Wire a 0.47-mf 200 volt capacitor from terminal 4 of terminal strip *M* to the newly-installed tie point.

In the HG-10 v.f.o., on Pictorial 5, wire a 0.1 mf from terminal 1 to 4 of terminal strip *A*.

After completing these modifications, the clicks were audible on the test receiver only when tuned within 5 kc of carrier. On-the-air checks with stations at 10 miles formerly reporting clicks showed no clicks more than 2 to 3 kc from carrier. The keying characteristic remains sufficiently "hard" for 35 w.p.m. bug keying. In fact, operators accustomed to the "before" keying did not observe enough "softening" to comment on it.

On the higher frequencies, particularly 21 and 28 mc, the v.f.o. stability under keying is unchanged. Although it must be admitted that this v.f.o is not as stable under keying as a conversion type v.f.o., the HG-10 still represents a reasonable level of performance consistent with low cost and simple construction. ■

*RFD 1, Box 230, Santa Paula, California.

"Up all night at your ham transmitter, I suppose."

Dave Badley, K6AMA, on the left and Donald Schliesser, WA6UFW, are shown during "Family Day" at the Lawrence Radiation Laboratory, University of California. This is the day when friends and relatives of employees are invited to visit the lab and see what is going on. The employees are also encouraged to display their hobbies, which Dave and Don are doing.

H. H. Robinson, W3RE, President of the Foundation for Amateur Radio, (left) presenting a plaque to Ivan Loucks, W3GD, on his retirement from the F.C.C. The plaque is in recognition of Ivan's extensive contributions to amateur radio from the Foundation for Amateur Radio, Inc., Washington, D.C.

PEOPLE AND PLACES

Left to right: Bill Thomas, WAØBND, Art Levy, WA1AUU/Ø, Jack Hubby, WAØALW, Al Schulz, WAØDFX. They are all members of The Colorado State University Amateur Radio Club in Fort Collins, Colorado. Using the club call WØQEY and with special permission from the FCC they supplied information and rebroadcast material for the colleges f.m. station during an annual College Days celebration. They also helped the station collect donations for the "Bucks for Books" drive for a new library. The mobile operation included the 1931 Model A Ford and the plane which was piloted by Art Levy.

The gavel is passed to Charles Muir, center, WA2CGD, new president of the Schenectady Amateur Radio Association by Frank Sinkora, second from left, W2DAG. Looking on are Howard Lester, left, W2ODC, vice president; L. T. Huntington, second from right, K2ONF, secretary; George Gunnoe, W2MEK, member of the board of directors. Huntington received the Henry Primm Broughton public service award during the June 7 meeting in Schenectady, New York.

Stan Doben, K2MQS at the operating position in the lobby of the Hotel Rutledge in New York. As Hotel Manager, Stan caters to visiting amateurs with a complete 160—6 meter setup available to all ham guests. He's had quite a few, too, including F8NZ, TI2CRC, E1GU, and I1AB. If you're in the city and are looking for clean, low cost accommodations ($8.00 and up), and would like to know what it's like to work DX with an antenna 11 floors up, drop in at 30th St. and Lexington Ave. Stan will welcome you.

Silicon Diodes and Common Sense

BY R. L. GUNTHER,* W6THN

Silicon diodes are plentiful and inexpensive on todays market. However, the ratings of those sold at bargain prices are frequently not too reliable. The author outlines methods for determining the forward and reverse characteristics and how to use them in a reliable and economical manner.

It would be a good idea for amateurs to consider a few of the basic properties of silicon diodes, and how this knowledge can save them grief, time, and money. They are semiconductor rectifiers, of course, and every ham should be familiar with their characteristic curve, reproduced in fig. 1.

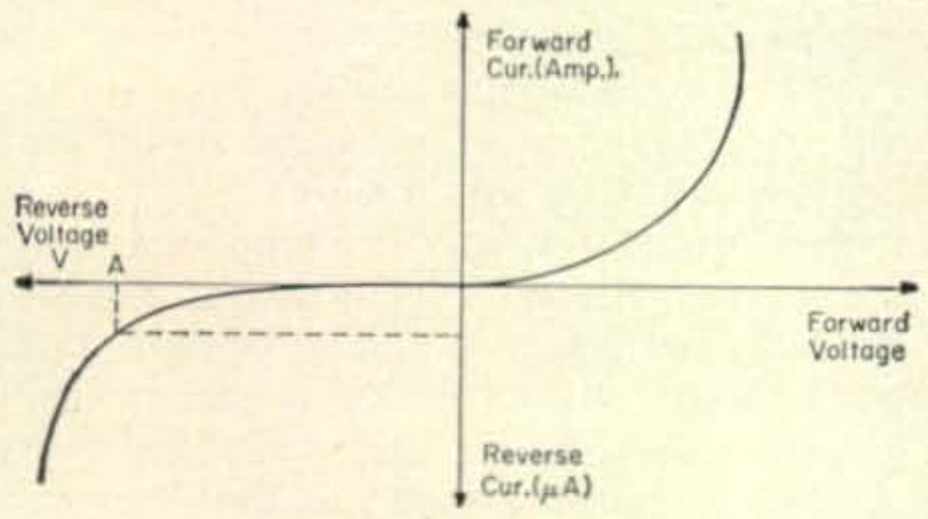


Fig. 1—Characteristic curve of a typical semiconductor rectifier.

P.I.V.

Examination of these curves shows some interesting facts. For one thing, a slight increase in reverse voltage beyond point *A* will cause an enormous increase in reverse current, leading to destruction of the junction, and usually a shorted diode (thereby placing the input filter capacitor across the transformer secondary winding). Therefore the Peak Inverse Voltage rating of silicon diodes is an *absolute maximum*, and should not be exceeded for the briefest time. This requires that switching (and other) transients (fig. 2) be reduced as much as possible, and that the diodes have an adequate factor of safety to take care of what remains.

Transients

Although transient suppression is becoming more widely applied nowadays, one still sees published circuits in which it is omitted or minimized. This is ordinarily done by justifying it on the basis of using a suitably large factor of safety for the p.i.v. rating of the diodes. The RCA Transistor Manual says that an unsuppressed circuit calls for a safety factor of 4 to 5 times the nominal peak reverse voltage applied across a diode. Capacitative transient suppression (fig. 3) allows you to reduce the safety factor to 1½ to 2. Thus, in the full wave bridge circuit of fig. 3, 70 volts r.m.s. across the secondary produces 100 volts peak, and each diode should be rated for an actual p.i.v. of 150 to 200 volts. If no transient suppression were used, each diode would have to be rated for 400 or 500 volts. Since capacitors are ordinarily somewhat cheaper than diodes, transient suppression would appear to be common sense.

How about rectifying the output from a 12 volt winding? If you have 400 volt diodes lying about, and want to use them, by all means use them for this purpose, and no problem of transient suppression need exist. The nominal peak inverse voltage appearing across a diode in a half wave circuit fed from a 12 volt winding, with a capacitor input filter, is about 34 volts. A diode with 50 volt peak inverse rating ought to serve reliably in this application *if* transient suppression is applied. Since the transient-suppressing capacitor ought to have a value inversely proportional to the voltage, it is easier to add it to the primary of the transformer, though another one across the secondary as well (C_2, in fig. 3) can also be used.

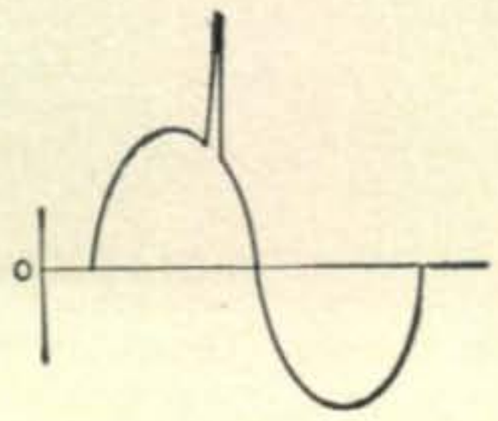


Fig. 2—The transient pulse riding on the a.c. input can, if timed poorly, produce a tremendous momentary, and possibly damaging, increase in voltage.

*1440 South Curson Ave., Los Angeles, Calif. 90019

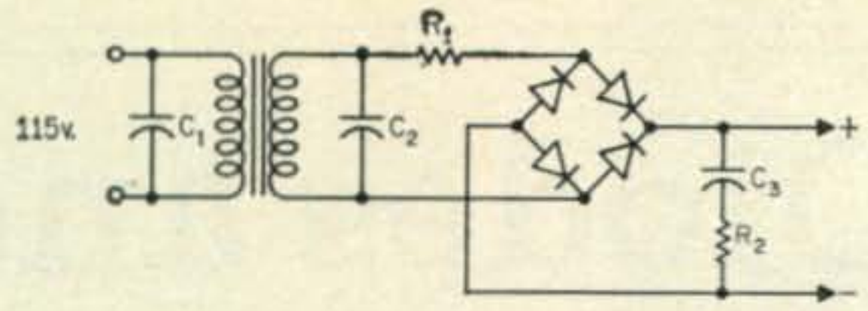


Fig. 3—Transient suppression capacitors can be placed across the primary and/or secondary of the power transformer. Resistor R_1 is used as a conventional surge current limiter for capacitor input circuits. Network R_2-C_3 is used to suppress transients originating from a choke input filter circuit.

P.I.V. Ratings

Recently I wrote to ask about the use of a high voltage diode in a low voltage circuit published in an electronics magazine. The reply stated that the extra safety factor was worth the small additional cost of the h.v. diode. I believe that common sense dictates otherwise for the following reasons:

1—For someone who does not realize the factors involved, it can result in additional expense, and this choice ought to be the prerogative of the constructor, not the author.

2—The use of unnecessarily large safety factors is not only sloppy engineering, but can also lead to hazardous ambiguities. If no transient suppression is employed, how much safety factor are you to use? If the diode in your junkbox does not have as high a p.i.v. rating as the one in the article, can you still use it safely? It depends on the nature of the transient, and that is very hard to predict. It is much easier to use transient suppression, and to apply a definite factor of safety.

3—If an indeterminate safety factor is assumed, and if it is potentially inadequate, it might take some time for a sufficiently large transient to appear. You can be certain that this will occur when a VK7 calls CQ on 2 meters, or when you are showing the boss your hi-fi. If a more than adequate safety factor is assumed, it can be wasteful and expensive. Would you use a 304TL in place of a 6AS7?

If you want to stock your parts exclusively with 400 volt diodes which can be used in low voltage circuits without fussing about details, that's lovely, but know what you are doing, and why.

Capacitor Usage

It is not uncommon to see several diodes placed in series (to raise the p.i.v.) when used to replace 5R4 or 5U4 rectifiers. You will sometimes also see 0.001 mf capacitors across each of the diodes. This is good design because it not only acts to suppress transient voltages but also equalizes the turn-off time of the diodes when switching from conduction to non-conduction. This latter phenomenon (dignified by the name "hole storage effect") can be important when several diodes are used in series. A diode that turns off sooner than others can cause an uneven distribution of voltage along the series chain.

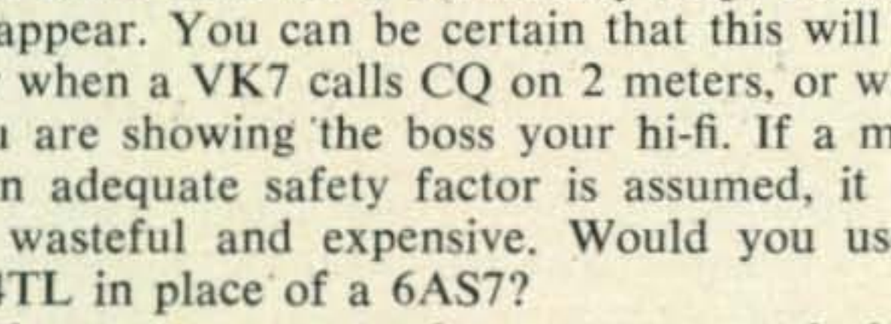


Fig. 4—Half wave rectifier circuit using diodes in series to increase p.i.v. capabilites. The parallel capacitors aid in transient suppression and the resistors are used to provide the proper peak inverse voltages.

Placing the capacitors across the diodes themselves rather than the transformer provides a second advantage. The diodes are also protected against high transient back e.m.f. arising from the choke input filter. If capacitative transient protection is used across the transformer windings, and if a choke input filter is used, an output transient suppressor should be installed, consisting of 0.1 mf in series with 1K, across the d.c. output of the diodes as shown in fig. 3.

Equalizing Resistors

One sees equalizing resistors across series wired diodes even more frequently than parallel capacitors. To use the resistors properly the p.i.v. ratings of the individual diodes must be known. It is definitely worthwhile for the individual experimenter to determine the p.i.v. rating of his diodes for himself, and to determine the rate of leakage. When it is done, equalizing resistors can be placed across diodes in series in such a way as to prevent the use of more diodes than necessary, which is as wasteful as using a higher p.i.v. than necessary.

If you buy bargain diodes to use in the circuit shown in fig. 4, it is certainly possible to obtain units with characteristics differing as widely as shown in fig. 5, even at the same stated voltage rating. If these are put in series they will have the same current flowing through them, and the voltages across them will be distributed as shown in fig. 5 for the given reverse current, I. For the sake of discussion, assume that $E_3 = 100$ v, $E_1 = 300$ v, and $E_2 = 400$ v. If these voltages represent the maximum values that can appear across the diodes, the total maximum voltage across the chain is 800 volts. If you put an equalizing resistor across each diode, and if each resistor has the same value, the voltage across each diode will be 267 volts (800/3). This is obviously too much for D_3, and in fact, the maximum voltage across the chain would now have to be limited to three times E_3, or 300 volts. Therefore, the use of equalizing resistors is *not* always helpful.

Determining P.I.V.

Described below is a method where the experimenter can determine the characteristics of the diodes and can use them to better advantage. The fact of the matter is that diode D_3 has no business being in a chain of high voltage diodes shown in fig. 4 and is best kept for other applications. Surplus diodes are now cheap enough that one can afford to buy a bunch of them, and choose the appropriate ones for each application. This is commonly done with transistors, and is just as practical for diodes.

If you know the p.i.v. of your diodes, and the

type of reverse characteristic curve, you can use them in two different ways in series strings:

1—If they are all the type of curve (1) in fig. 6, they can be used in series without equalizing resistors, if the voltage across *n* diodes is not more than *n* times the p.i.v. of the lowest p.i.v. diode in the string. In fig. 4, if the p.i.v. of the diodes were 300, 400 and 500 volts, respectively, the maximum reverse voltage across the three in series would be $3 \times 300 = 900$ volts.

2—If the diodes are all of curve type (1) in fig. 6, they can be used in series, *with equalizing resistances*, to give a higher total p.i.v. rating than in the case where no resistances were used. This can be done by using a value of equalizing resistance proportional to the p.i.v. ratings of the individual diodes. Thus, in fig. 4, for $D_1 = 300$, $D_2 = 400$, and $D_3 = 500$ volts, you could use $R_1 = 300$K, $R_2 = 400$K, and $R_3 = 500$K. Then the combined p.i.v. rating would be $300 + 400 + 500 = 1200$ volts. Not a bad bonus, that 300 volts, just for knowing the actual ratings of your diodes. Capacitors C_1 through C_3 would remain at 0.001 to 0.005 mf, but of course $C_1 = C_2 = C_3$.

If you don't know the actual p.i.v. of your diodes, because you won't or can't test them, then of course you must use a greater factor of safety, or more diodes. But it seems to me that it is the hard (and expensive) way. I have had the opportunity to test several thousand diodes from a variety of American surplus dealers, and I can enthusiastically recommend that you test them yourselves, before you put one volt across them. On the whole, those diodes are real bargains, but individually they can be catastrophies.

Diode Testing

Now let's consider that matter of actual p.i.v. The ratings and reliability of silicon diodes can vary from one supplier to another, and the cheaper ones are not always the worst. I can show you how to make sure of the ratings of the diodes you do obtain. If you do buy bargain diodes, it *is* wise to test them. This is not difficult, but must be done somewhat more elaborately than in the 'good-bad' testers which have been described in the ham literature.

Consider the circuit of fig. 7, for testing the p.i.v. For 50 volt diodes, E_{in} can be 100 volts R_1 100K, and R_2 50K. For 400 volt diodes, E_{in} can be 1000 volts, R_1 1 Meg, and R_2 500K. Values are not critical. Diode *D* is any good quality silicon and should be rated at 400 volts; it is used to protect the meter. Meter *V* is any sensitive unit (20K/v), and *A* should be 50 microamps on its most sensitive range; 100 microamps would be ok, though somewhat harder to use.

Always start with R_1 at the low voltage end, and increase it until *A* starts to read current. This will be point '*A*' of fig. 1, and for high quality diodes should start to rise sharply above about 10 microamps. The amount of reverse current necessary to destroy a diode varies from perhaps 20 to a few hundred microamperes, depending on several factors. A reasonably safe current is

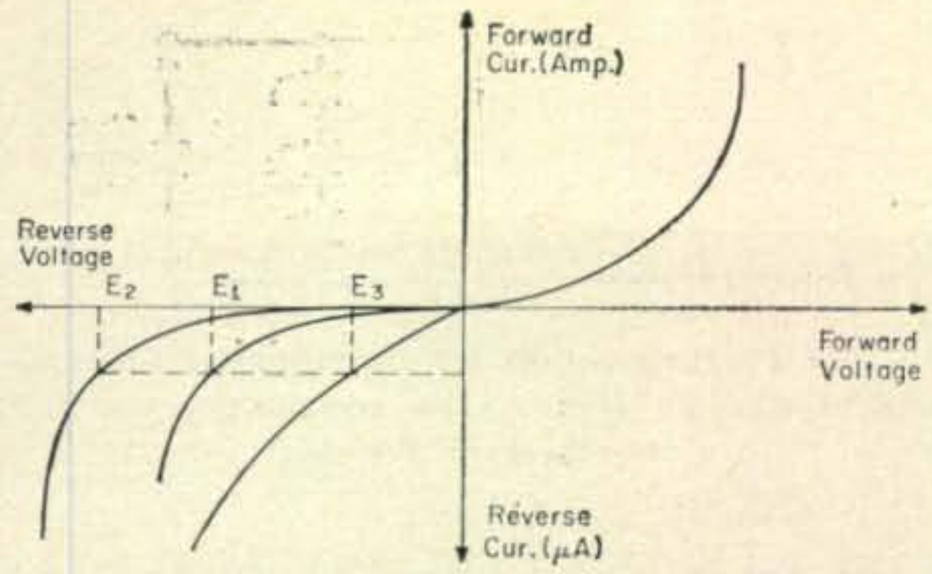


Fig. 5—Shown above are three different characteristic curves possible for each diode to have, as used in the circuit of fig. 4. When placed in series, with the current *I* flowing, the individual voltage drops will not be equal but as shown.

10 μa. When you have found the point where the reverse current starts to rise sharply, note the voltage, and rate the diode for p.i.v. at about *80 percent* of that value. This simple test will give you a stock of diodes whose ratings you know, and which can be used reliably, by employing suitable safety factors. There are more elaborate test methods, but this one will work well for the casual experimenter.

Now, there are a few complications about which you ought to know, which will increase the reliability of this test when applied to bargain diodes. Consider fig. 6. There are three major reverse characteristics found, as shown. Type (1) has been discussed above. Type (2) is often found for bargain diodes rated below 100 volts, though it can appear above that rating. Type (3) is typical for germanium diodes, and will be found for one type of diode being advertised as 'silicon.' Zener diodes have the characteristic of curve (1), but are extremely sharp at point 'A.'

If curve (2) is found, you can take the p.i.v. at about 20 μa, though this will very much depend how sharply the curve rises. The safest procedure is to increase R_1 smoothly and evenly, while watching meter *A* with one eye, and meter *V* with the other. With a little practice you will be able to get a good idea of the shape of the curve by running R_1 back and forth. It is, however, important to increase R_1 slowly the first time, to make sure that you don't run off of the end of a type (1) curve.

If curve (3) is found, don't panic. Germanium junction diodes are quite useful for power rectification, and you have only to be sure that they

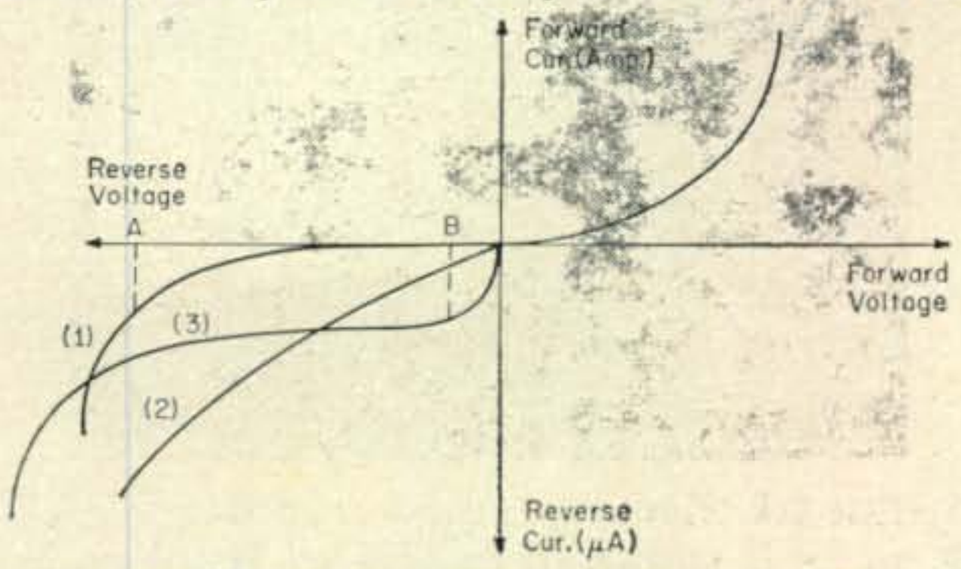


Fig. 6—Possible variations in diode characteristic curves are shown above. Curve 1 is typical for silicons, curve 2 for low voltage rated silicons and curve 3 is typical of germanium diodes.

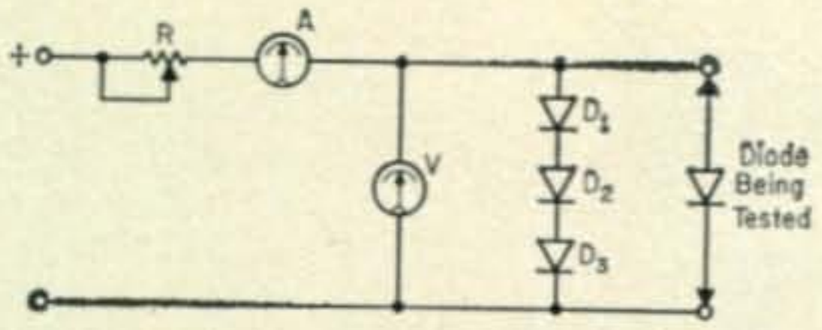


Fig. 7—Test circuit set-up for determining the reverse characteristics of diodes. The component values are described in the text.

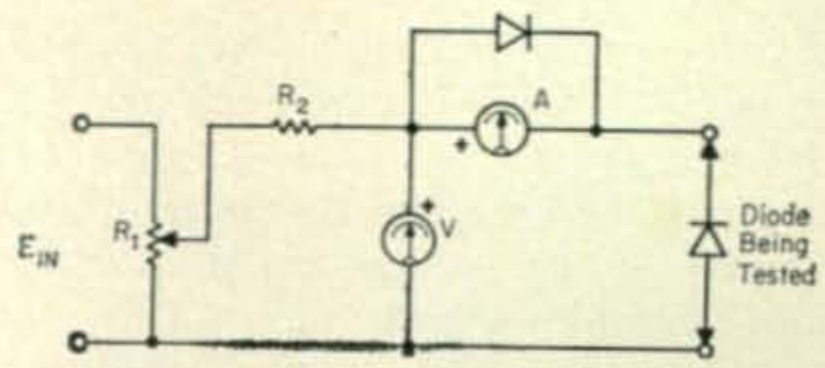


Fig. 8—Circuit for testing the forward characteristics of a diode. The voltage drop across the diode at its rated current is the key as explained in the text. The source must provide adequate current to test the specific diode.

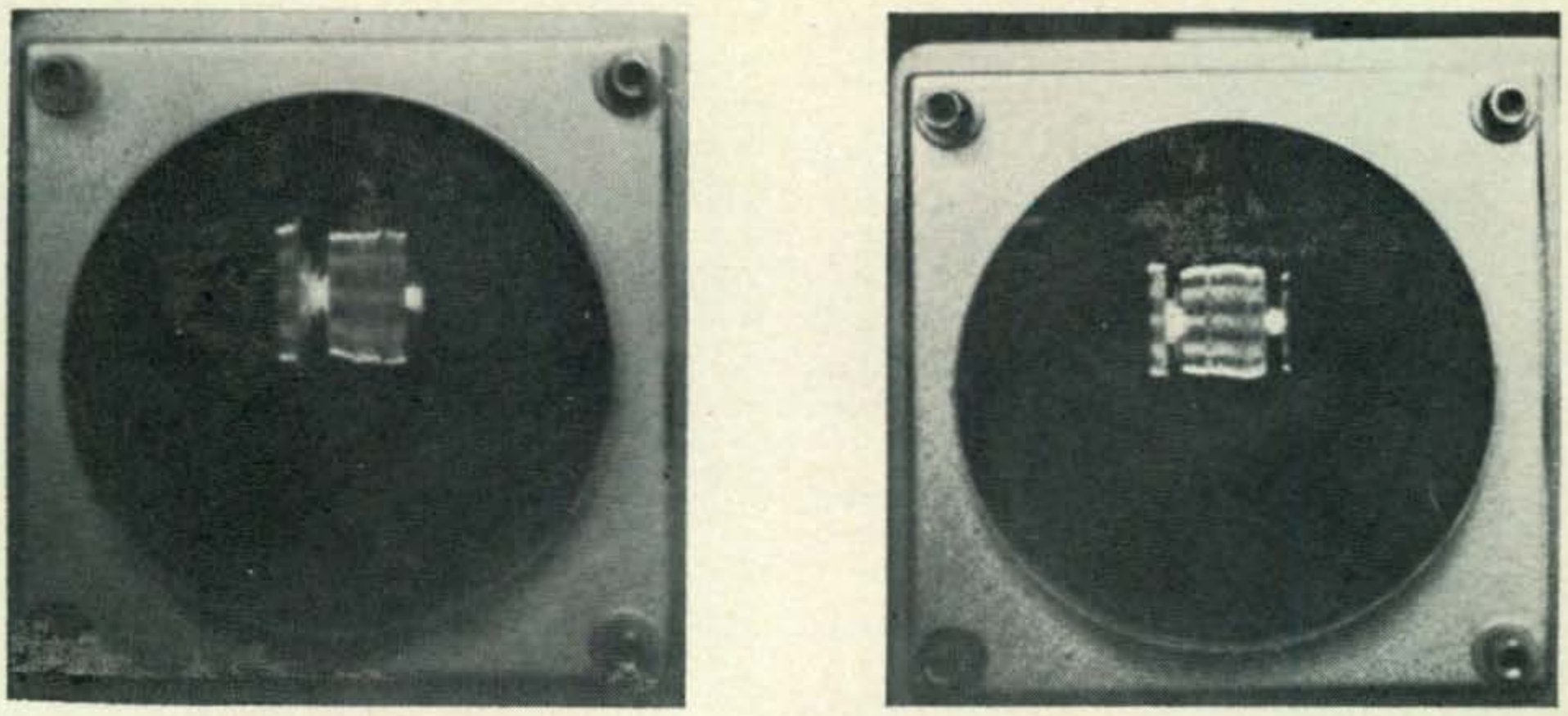
are not put in places where they might get too hot. They cannot be used for meter protections but they are excellent for the meter rectifiers. It is important not to confuse point *B* with point *A*, in fig. 6. If the reverse current rises sharply at some low voltage, continue to increase R_1 cautiously. If the curve continues to rise at about the same rate, it is a type (2) curve. If it levels off, and the current rises only slowly as R_1 is increased, it is a type (3) curve. If it rises even more sharply, it is a type (1) curve, and R_1 should be reduced with all due haste. It is worthwhile to experiment forthrightly with the action of R_1 for a few different ratings of diodes obtained from different suppliers, even though you might destroy a few diodes in the process, because it will definitely save you problems and money in the long run. If, at a given reverse voltage the reverse current tends to creep up rapidly, reduce the voltage until it no longer creeps, and call this the p.i.v., even though you are well back on the curve.

The p.i.v. of a type (3) curve is rather ambiguous, because the current will not increase very sharply at the high end, but it will definitely increase. You can call the p.i.v. the voltage at which the current appears to leave the plateau, *i.e.*, to increase somewhat more rapidly. For germanium diodes, there is some leeway in this rating, and in fact for that reason they are not as susceptible to transient overvoltages as are the silicon diodes.

Forward Tests

The forward characteristic can be tested by the hookup of fig. 8. Note that the test diode is now hooked up in reverse polarity to that of fig. 7. Control *R* should be a high wattage variable resistor of some sort, or a selected value of wirewould resistor(s). Choose *R* to give a current reading of the value for which the test diode is rated. The reason for using a 25 volt supply is that you can then leave *R* at this same value for all diodes of that rating to be tested. A lesser supply voltage can be used, by adjusting *R* appropriately. If a 750 ma rated diode reads more than 1.4 volts or so, rate it at 400 ma. If the voltage rises to more than 3 volts, throw the diode away. A 3a. diode should not read more than about 1.5 volts at 3 amps (don't apply 3 amps to a stud diode more than 15 seconds unless it is firmly mounted on a heat sink), and a 2a. diode not more than 2 or 2.5 volts. If a 3a. diode reads 2 volts, simply rate it at 2a. Diodes $D_{1\text{ to }3}$ in fig. 8 are there to protect the voltmeter, so that you can leave it on the 5 volt scale. It can be any three good silicon diodes, with a current rating at least as high as that of the diode being tested.

It takes a lot of words to describe the above tests, but in fact they are easier to perform than to tell. Don't be afraid of testing your own diodes. It takes a bit of careful work, but it is not difficult, and can be most rewarding. ■



OSCAR III telemetry pulses recorded at *CQ* Headquarters during orbit 613. Only one complete pulse is shown in each case, as the camera-shutter speed was too fast to catch the complete train of pulses in each burst. In the left photo the pulse-width duty factor is 72% which, according to the heretofore published conversation chart, indicates a temperature of 53 deg. C. for the linear amp., at right the factor is 82% for a temperature of somewhat over 60 deg. C. for the battery case.

CQ Reviews:

The Heathkit HO-13 Ham-Scan

BY WILFRED M. SCHERER,* W2AEF

THE Heathkit HO-13 Ham-Scan is a panoramic adapter designed for use with communications receivers. It lets you instantly and simultaneously visually observe the presence and the type of received signals (a.m., s.s.b., c.w. or r.t.t.y.) over a range of up to ±50 kc either side of the center frequency to which the receiver is tuned. It thus provides a continuous monitoring facility whereby you can see what other activity is on the band while you're listening to one specific signal at the same time, making the Ham-Scan useful for finding unoccupied spaces in the band for dodging QRM or just for keeping track of nearby-channel signals especially during contests, round tables or network operations. You also can monitor the band, particularly when there is little activity, to quickly note when and at what frequency signals appear, without necessitating constant searching by manually retuning the receiver for aural indications.[1]

The Ham-Scan also can be used as a test instrument for analyzing the quality of signals (detection of splatter, spurious responses, key clicks, occupied bandwidth, etc.) or as an indicator for nulling out an s.s.b. carrier or for observing unwanted sideband adjustments of s.s.b. gear.

Each signal appears as a "pip" above the baseline across the screen of a cathode-ray tube. The signal to which the receiver is tuned appears at the center of the screen, while the other signal pips show up to the left or right, spaced according to the frequency difference between each other and that between the signal to which you are listening. The c.r.t. graticule is calibrated in frequency increments to show you the frequency separation. If a signal appears toward either the left or right of the c.r.t. center, you can identify it simply by turning the receiver to the point that moves the signal pip to the center, at which time you'll be able to hear the signal too. The type of transmission can be determined even without listening to the signal, just by observing the characteristic and behavior of its pip.

*Technical Director, *CQ*.

[1]If you're not bothered with heavy noise pulses, a useful application is monitoring for relayed signals from a satellite such as OSCAR III.

The Heathkit HO-13 Ham-Scan Panoramic Adapter.

How It Works

For those not familiar with the circuitry of a panoramic adapter, briefly this is how it is done here:

Referring to fig. 2, the Ham-Scan samples the i.f. that appears at the output of the same receiver mixer into which the receiver v.f.o. signal is being injected. This point is ahead of the selective circuits of the receiver i.f. amplifier, so heterodyning of the incoming signals with the v.f.o. signals produces a wide range of intermediate frequencies near the receiver i.f. that follows the mixer. These go to a broadband i.f. amplifier in the Ham-Scan and then to a mixer where they are combined with a heterodyning oscillator to provide an i.f. of 350 kc that is then passed through a highly selective amplifier on to a video detector and thence to the vertical deflection plates of the c.r.t.

The heterodyning oscillator is frequency modulated by an a.f. saw-tooth oscillator, so that it can be swept over a range of ±50 kc. This produces an i.f. signal through the selective amplifier whenever the instantaneous frequency difference between the i.f. signal from the receiver and that of the f.m. sweep oscillator is 350 kc. Each signal then goes through the Ham-Scan amplifier at the sweep-frequency rate and will show up as a pip on the c.r.t. screen. The shape of the pulse depends on the response of the 350 kc amplifier which has a narrow bandwidth obtained through the use of two ceramic filters.

The saw-tooth oscillator also provides the horizontal sweep for the c.r.t. and since all the sweeping voltages are obtained from the same oscillator, the frequency shift of the f.m. oscillator is in step with the horizontal c.r.t. sweep, and the individual position of the signal pips remains fixed at a point, determined by the f.m. oscillator frequency, that produces a 350 kc beat with a signal at the same instant that the horizontal sweep moves past a corelated point along the c.r.t. baseline.

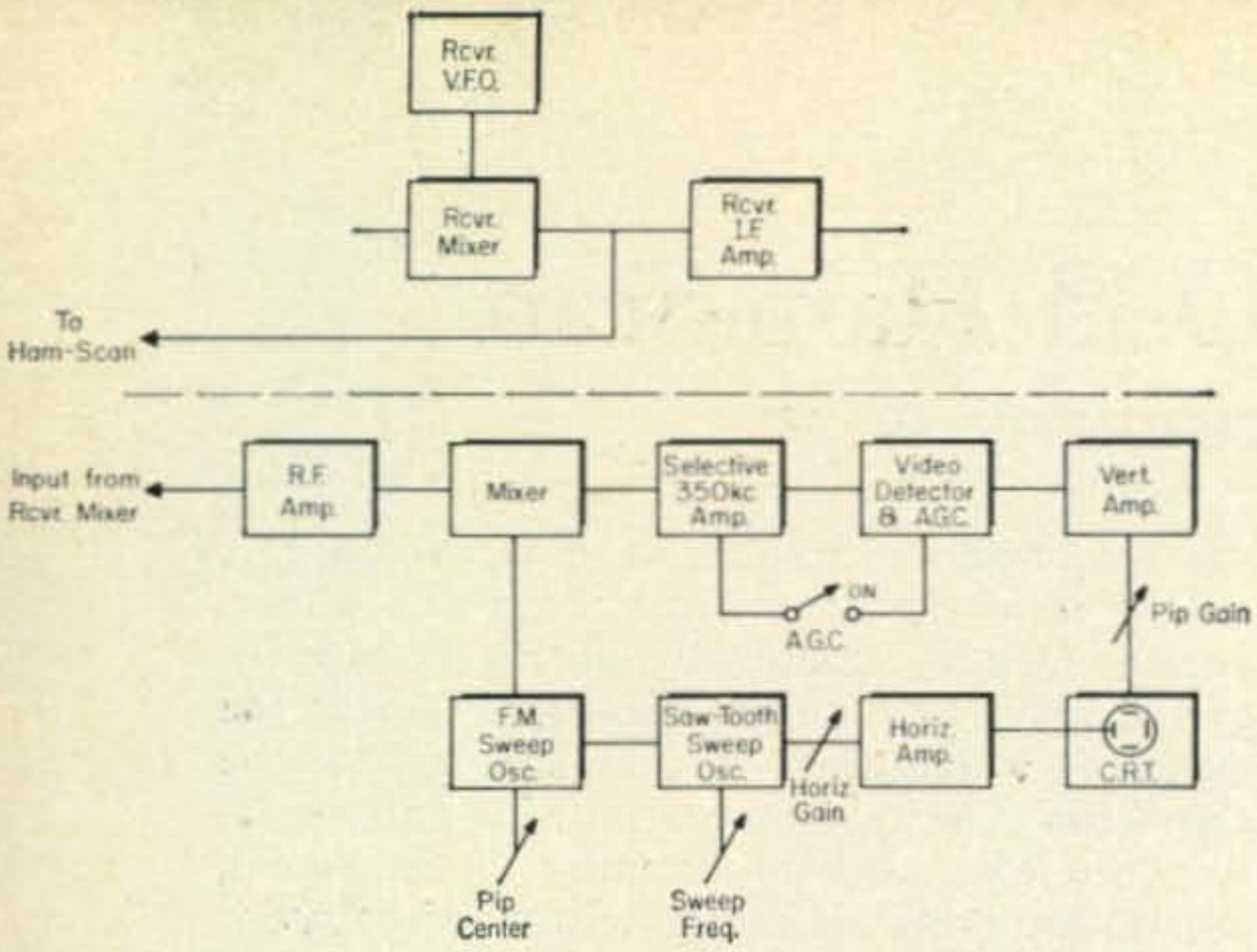


Fig. 1—HO-13 black diagram. Our sharp eyed proof-reader tells us at the last moment that the PIP GAIN should actually be in the R.F. Amp.

The center frequency for the f.m. oscillator is adjusted so that the pip of the signal heard from the receiver appears at the center of the baseline. This, of course, occurs when the i.f. produced by the incoming signal (at the receiver mixer output) is exactly that of the following i.f. amplifier of the receiver. Any signal that produces a pip either side of center may be heard by tuning the receiver until the pip moves over to the center.

Specifications

Many panoramic adapters are designed for use at one particular receiver i.f., usually 455 kc. If operation is desired with receivers that have a different i.f., you'll then have to resort to an additional outboard mixer that will convert the receiver i.f. down to that for which the panoramic unit is designed. The Ham-Scan avoids this necessity, since the Heath Company has made it possible to wire up their unit for use with any of the following popular intermediate frequencies that are found in some of the present-day receivers: 455, 1600, 1650, 1681, 2075, 2215, 2445, 3000, 3055 and 3395 kc.

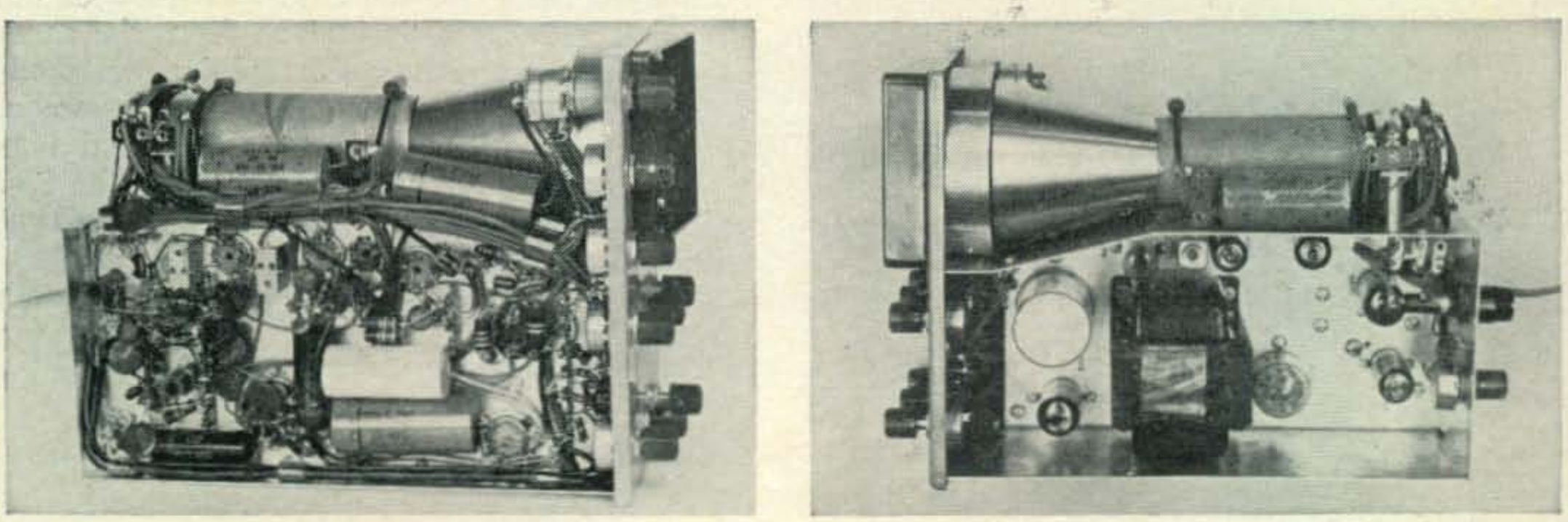
Other specifications are: Sensitivity of approximately 50 μv signal input for 1" vertical deflection at full gain setting, and frequency response of $\pm$0.5 db at $\pm$50 kc from receiver i.f. The sweep frequency is variable from 10 to 50 c.p.s. and the sweep width may be continuously adjusted from near 15 kc to 100 kc for 455 kc i.f. and from about 30 to 100 kc $\pm$20% at other i.f.'s. The resolution is given as 2 kc frequency difference between two 1" pips whose adjacent 3 db points coincide—measured at slowest speed and at 30 kc sweep width.

Performance

The Ham-Scan was tested for 455, 1650 and 3395 kc operation (a portion of the unit had to be rewired in each case as mentioned earlier). It was first wired for 3395 kc use with the Heathkit SB-300 receiver. In order to provide for convenient plug-in installation or removal, the HO-13 was connected to the receiver via one of the spare phono jacks on the rear of the SB-300.

After the preliminary adjustments, the first thing that we noted was that quite a large pip, which appeared at the center of the base line, could not be moved to either side of center when the receiver was tuned. This was due to stray r.f. pickup from the receiver b.f.o. as the result of too much exposure of the connecting leads to the coax cable used to feed the Ham-Scan input. This required that the inner-conductor lead from the cable and those of the coupling capacitor used at the mixer, be made short as possible. This procedure should be followed with installation in *any* receiver. Also, the coupling capacitor had to be positioned parallel with the chassis. After these steps were taken, the b.f.o. pip was insignificant when normal signal levels were involved. On the other hand, by setting the pip gain to maximum, the b.f.o. pip could be raised sufficiently to allow it to be used for a test reference during alignment; and by switching the upper and lower sideband crystals back and forth, we could adjust the sweep when calibrating the baseline frequency steps, according to the frequency difference of the sideband crystals. A b.f.o. pip also serves as a marker for locating the center-frequency point.

When tuning in signals, a situation that at first was disconcerting is that when the signal was heard, its pip at the center of the screen decreased considerably in amplitude compared to when it was off frequency at the side. This occurred because the impedance of the crystal filter (which also is connected to the mixer output)



Interior of the Ham-Scan. Left, under-chassis view; right, top view.

drops to a very low value at the filter resonant point (a condition that may exist with sets having similar type filters), but fortunately the adapter's a.g.c. can be switched on to help minimize the resultant deficiency in the related amplitudes.

In other type receivers where transformer-coupled i.f.'s were used, particularly at 455 kc, the Ham-Scan response was highest at the center frequency, while the amplitude of off-center signal pips dropped off. This is due to the selectivity of the i.f. input transformer which also is connected to the mixer output, but here again use of the Ham-Scan a.g.c. helps equalize the pip levels. A similar condition was experienced when a mechanical filter followed the receiver mixer, and in one such case the insertion of an additional i.f. transformer between the mixer and the filter resulted in a relatively flat bandpass for the Ham-Scan, without affecting the normal filter operation as far as the rest of the set was concerned.

Spurious responses, caused by mixer-oscillator products in a multi-conversion receiver and the Ham-Scan, occasionally show up on the c.r.t. screen. Any pips resulting therefrom at first may be confusing, but although they usually are not heard, they generally can be recognized by noting if they move at a different rate or direction than the audible received-signal pips when the receiver is tuned, and if they still can be seen when the antenna is disconnected.

The manual presents diagrams showing how to identify different types of signals, and after a little practice you'll find it relatively easy to distinguish between an a.m., s.s.b., c.w. or RTTY signal. Key clicks can be recognized too.

The trace on the c.r.t. screen can be made brilliant enough for easy observation in broad daylight and it can be focused to a real fine line. The pips show up sharply and you can readily pick out the various signals; nevertheless, if the band is over-crowded with plenty of QRM all all around or if you're picking up high noise pulses (noise pulses also show up as pips), you might find it difficult to pick out some of the signal pips unless their signal levels are very high.

It takes a little while to get accustomed to to using a panoramic adapter, but once you get the hang of it, it's a piece of gear you'd miss if you had to do without it.

The Heathkit HO-13 Ham-Scan is attractively styled to match the popular Heathkit HO-10 Monitorscope.[2] The size of the unit is 15¼" × 7⅜" × 11" (H×W×D) and it weighs 8½ lbs.

Price for the kit is $79 and it is available from The Heath Company, Benton Harbor, Michigan. —*W2AEF*

[2]*CQ* Reviews: The Heathkit HO-10 Monitorscope, *CQ*, June '64, page 37.

CQ Reviews:

The Clegg Apollo Six Linear

BY WILFRED M. SCHERER,* W2AEF

LINEAR amplifiers usually are associated with s.s.b. operation; however, their use is not restricted to only this mode of transmission, as they may be used to advantage with a.m. and c.w. as well. So whether you're a 6-meter s.s.b. or a.m. operator, you should be interested in the Clegg Apollo Six 6-Meter Linear Amplifier.

It requires only 8 watts of p.e.p. drive to furnish a p.e.p. output of at least 325 watts, while for a.m. only a few watts of carrier, such as can be obtained from many of the popular low-cost 6-meter a.m. transceivers, can be increased to 80 watts (325 watts peak power output)!

Here are the specifications and features of the Apollo Six: 657 watts power input (peak d.c.); 8 watts peak drive; 16 db power gain (40× watts); class AB2 operation using two 8236 high-gain tetrodes in parallel; pi-network for 50-70 ohm output loads; three illuminated panel meters to simultaneously indicate grid current, relative-power output and plate current—no meter switching required; instantaneous transfer between exciter feedthrough or linear operation, merely by the flick of a switch; envelope detector for monitoring output with any type of oscilloscope; air blower; noise-eliminating cut-off bias during receive; plate-overload relay; burn-out protection for plate meter; indicator lamps for plate power and linear on-off; accessory a.c. outlet; built-in power supplies using solid-state circuitry with regulated screen voltage; operates from 120 volt 60 cycle a.c. The unit weighs 35 lbs. and its size is 7" × 15" × 10½" (H×W×D).

*Technical Director, *CQ*.

Circuitry

Referring to fig. 1, the two 8236 tetrodes, which are high-perveance tubes with graphite anodes, are operated in parallel as a class AB2 amplifier using grounded-cathode circuitry. The grids are driven from the exciter through a pi-network that provides a match between the 50-ohm input and a 900-ohm resistive load, R_1 & R_{33}, at the tubes where the grid-to-plate capacitance makes up the output impedance for the network. Resonance is obtained with C_1. The output circuit also consists of a pi-network and it is adjustable for low-impedance loads near

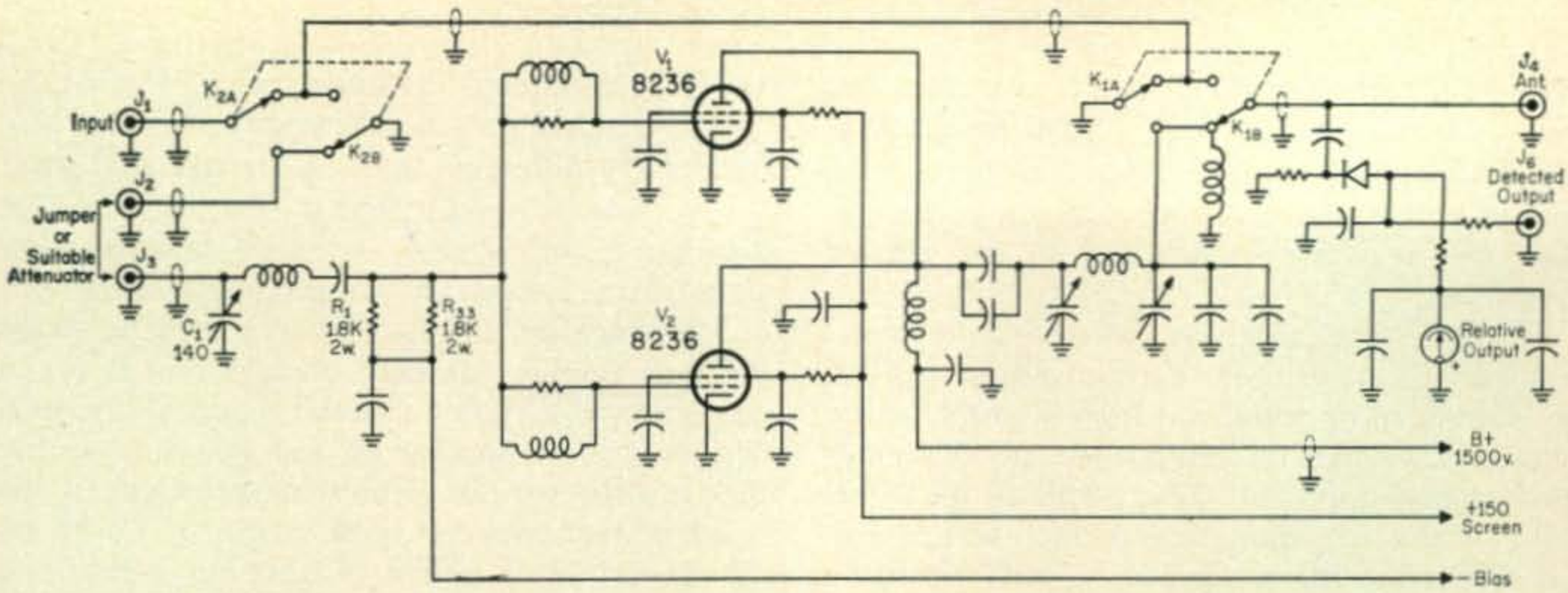


Fig. 1—Circuit of the Clegg Apollo 6 meter linear amplifier. When exciter power output exceeds about 8 watts, a suitable attenuator may be inserted between J_2 and J_3 in place of the normal jumper.

50 ohms. Parasitic supressors at the grids stabilize the amplifier and neutralization is not otherwise required.

R.f. switching between the exciter, linear and the antenna is accomplished through relays K_1 and K_2. If excess output from the exciter requires the use of an external attenuator between the linear and exciter, it can be plugged into J_2 and J_3 in place of the jumper.

An interesting innovation is the relative-output meter arrangement, in fig. 1, whereby demodulated r.f. may be obtained from CR_{14} to provide an a.f. component for operating most any oscilloscope, thereby avoiding the need for a scope with provisions for r.f. input. The circuit is activated during either exciter feedthrough or linear operation.

Also of special note is the measure employed for protecting the plate meter from burnout. The combination of resistors R_{21}, R_{22}, R_{23} and R_{36} makes up the meter shunt and the resistors are so proportioned as to permit negligible current flow through diode CR_{11}. When the plate current reaches 800 ma, the voltage drop that occurs at the point in the resistor network, where the diode is connected, makes the diode start to conduct; at which time its resistance drops, considerably decreasing the total shunt resistance across the meter and thus prevents any further significant increase of current through the meter. This provides burn-out protection for the meter at currents up to at least 5 amperes.

Plate and screen voltage is applied using a momentary-contact switch the actuates holding relay, K_3, closing its normally-open contacts, K_{3A}, to complete the primary circuit of the high-voltage transformer. Contacts K_{3B} also close and since they are connected across the HIGH-VOLTAGE-ON switch, S_2, in series with the normally-closed contacts of the plate-overload relay, K_4, the holding relay, K_3, is kept energized. If the overload relay should trip, its contacts will open, tripping the holding relay and removing power from the transformer. Power then cannot be reapplied until the HIGH-VOLTAGE-ON switch is again pressed to recycle the power-control circuit. Operating the HIGH-VOLTAGE-OFF switch also will trip the holding relay.

Construction

The Apollo Six is styled to match other Clegg gear, particularly the Venus s.s.b. transceiver. Although relatively small in size, it is neatly laid out with plenty of elbow room. It has a 2″ deep heavy chassis and a 3/32″ thick panel. The high-voltage solid-state rectifiers and filter capacitors are on a printed-circuit board. A perforated cabinet and a cooling fan provide good air circulation. Edgewise-mounted meters are recessed behind an oblong window and the indicator-lamp bezels and rocker-type switches are oblong shaped too. The tuning controls are: grid, plate and load.

An SO-239 type connector is used for the antenna at the rear where phono-type jacks are provided for the r.f. input, the scope detector and for an external attenuator if needed. Connections for external-control functions are provided through a screw-type terminal strip.

Installation

The Apollo was tried out with 6-meter s.s.b. exciters ranging in power from 10 to 50 watts p.e.p. and with low-power a.m. transceivers. Although designed primarily for use with the Clegg Venus s.s.b. transceiver, installation with the various other available exciters can easily be made and no accessory relays are required to control the linear amplifier by the v.o.x. or p.t.t. facilities of the exciter, provided a control or transfer relay in the exciter has an auxiliary set

The Clegg Apollo Six 6-meter Linear Amplifier. The three edge-mounted meters are recessed behind a clear plastic window at the center, below which are the three power switches.

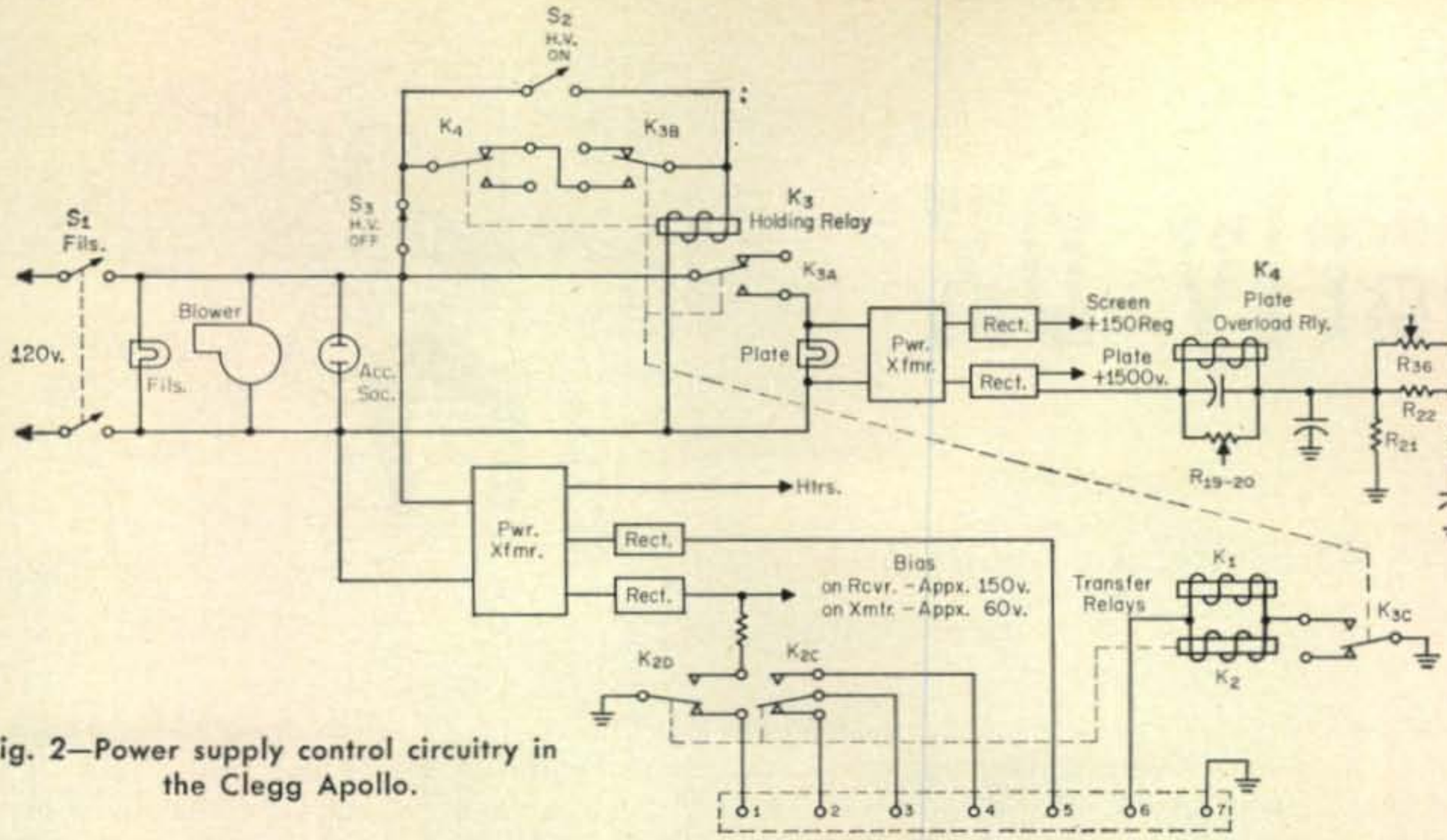


Fig. 2—Power supply control circuitry in the Clegg Apollo.

of normally-open *ungrounded* contacts available that can be connected to the Apollo.

If the full capabilities of *any* high-power linear amplifier are to be realized, the primary-power source must be well regulated and be capable of supplying full voltage under maximum load.

The constants for the r.f. input and output circuits are for 49.8-51.5 mc. A modification is required for operation above 51.5 mc.

Operation

The Apollo Six tunes up quickly and easily without any evidence of crankiness or instability. In short, with the high-voltage of the Apollo turned off, you first tune up the exciter in its normal manner and according to the peak response on the relative-output meter on the linear. You then turn on the Apollo's high voltage and adjust the GRID DRIVE, PLATE TUNE and LOAD in the manner and in accordance to the values specified in the instruction manual. You're on the air in a matter of seconds.

Performance

With 8 watts of drive (single tone or steady carrier) we were able to load the Apollo Six up to the specified 650 watts with a measured power output of 325 watts (at 120 v. line potential). Being a class AB2 amplifier, some grid current flows, in this case it is about 1.5 ma. Using s.s.b., the peak power during voice modulation went to 700 watts input (350 watts out), since the instantaneous plate voltage is slightly higher under these dynamic conditions. Such peak levels were attained while only an occasional indication of slight grid current was indicated and were at the point just prior to flattopping.

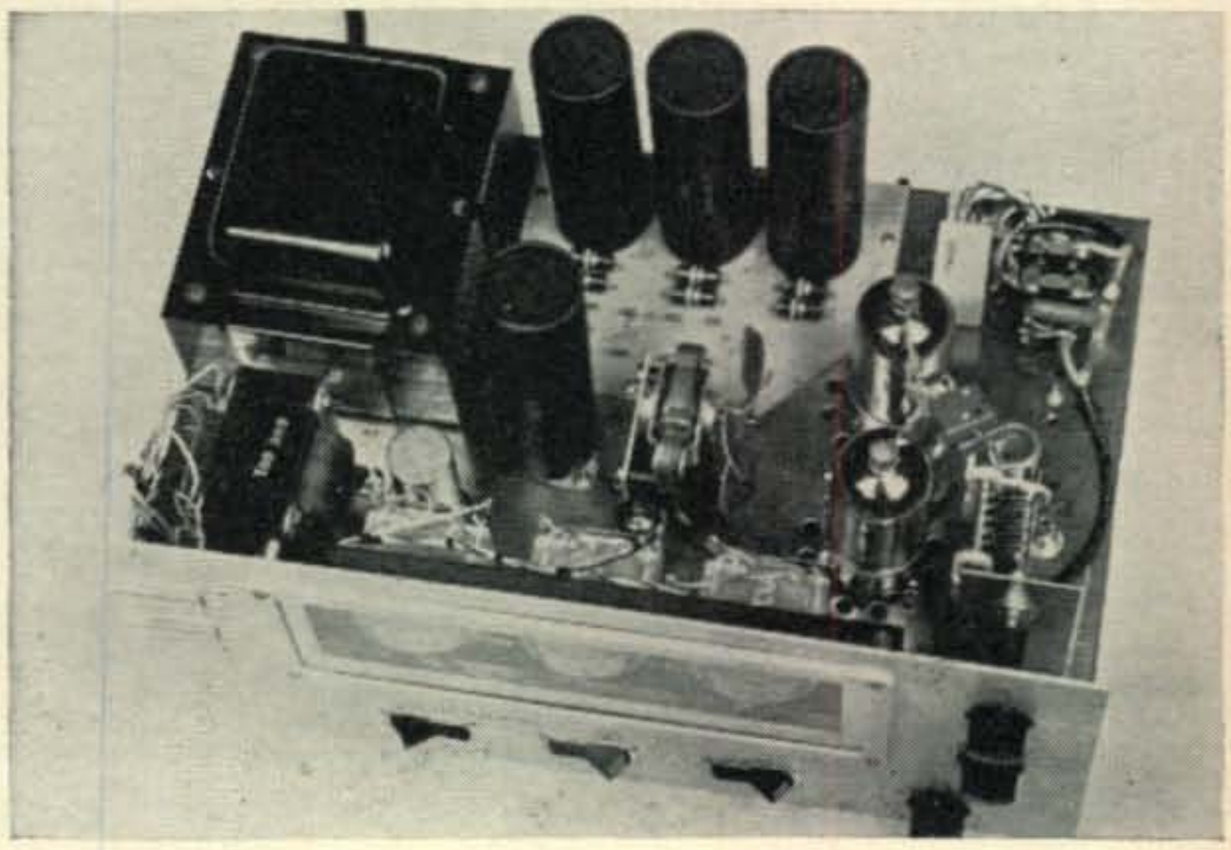
Where the available drive slightly exceeded 8 watts p.e.p., it could be held down by detuning the grid of the linear; however, where the drive power is much higher, a suitable attenuator should be used between the exciter and the Apollo instead.

With a.m., an exciter carrier power of as little as 2.75 watts drove the Apollo to a carrier output of 80 watts, and with full 100-percent modulation from the a.m. exciter, the p.e.p. output was a little over 325 watts. An important consideration with a.m. is that the amplifier must not be driven to more than 180-200 ma plate current with carrier, otherwise proper modulation cannot be realized.

A.l.c. is not provided in the Apollo, so proper operating levels must be maintained by monitoring with a scope connected in the r.f. output line or to the scope detector. You also can use the a.l.c. in the exciter to limit its drive to the linear if a suitable r.f. attenuator is used at the same time.

If you want to burn up the six-meter band, you'll find the Apollo Six will do the job with the greatest of ease. Besides this, if you're using a low-power a.m. transceiver, you can now go to high power with the Apollo which won't have to be discarded if you eventually switch over to s.s.b.

The Clegg Apollo Six Linear Amplifier is priced at $247.50 and it is a product of Squires-Sanders, Inc., Martinsville Road/Liberty Corner, Millington, N.J. 07946.—*W2AEF*



Top view of the Apollo Six. At the rear is a printed circuit board with the solid-state rectifiers, their protective resistors and filter capacitors. At the center is the cooling fan for the two 8236's.

Early DX

BY ED MARRINER,* W6BLZ

For sixty some years operators have been straining their ears trying to find out who could hear or contact the most distant station. It is nothing new, back in 1906, Mr. R. H. Marriott and expert radio aide became interested in long distance tests.

Some of the early tests were made on Dec. 21, 1906, when a Denver station heard Pensacola, Fla. and Dallas, Texas. The unusual part of the matter they could not hear Kansas City which was only a short distance away. In other tests, Denver heard Cape Hatteras on Jan. 3, 1907 and later Brant Rock, Mass. As a result of these tests a more scientific program was inaugurated to determine what caused some of the phenomena.

Mr. Marriott formulated a plan to take in conditions which might affect the ability of the operators to copy weak signals. He wanted to know if it was the weather, a beam antenna or the operator.

A 2 KW spark transmitter was set up on marshy ground at Manhattan Beach, N.Y. using the call sign "DF". A directional antenna was erected that would transmit broadside. Ships at sea were to be used as receiving stations and would rotate to get transmissions both from the sides and ends of their antennas. Marriott's receiving stations were made just as sensitive as possible using air insulation where possible. The ships were outfitted with 1 KW spark transmitters, and the operators were selected for their known operating ability. All were offered a bonus for words copied over 1000 miles, and paid more for than those words copied at 100 miles. A group of poor operators were picked to compare with the other operators. Marriott felt the good operators had better judgment and operating skill and he meant to find out.

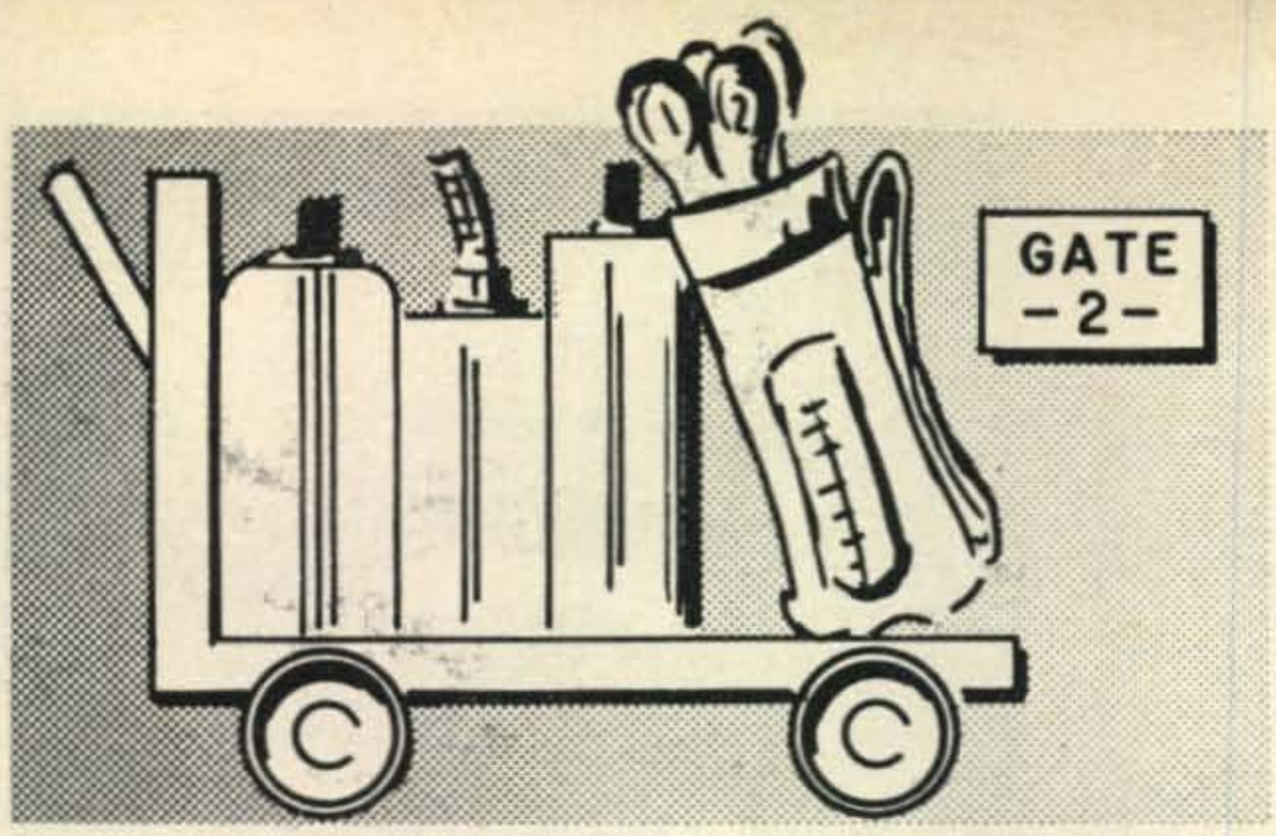
When the tests started, Marriott found the good operators expected better conditions during the winter months and worked harder. During the summer months they got lazy and didn't listen as much because of the static, and became discouraged. Weak signals he found could be received in a warm room and not heard when the room was cold. Whether the temperature affected both the operator and the equipment was not known. One strange thing he found was that some operators could not hear when they had a cigar in their mouth. The selected operators increased their traffic over the poor ones by 2700%. During the maximum moonlight transmission path, greater ranges were experienced than during the times when moonlight was at a minimum. Critics felt that it was the presence of the U.S. Fleets off New York Harbor causing the difference rather than the moon.

Mr. Marriott thought of everything, including the wind and water vapor during the tests. It was noted at Denver that a storm on Pike's Peak would make the spark gap at the transmitter arc four inches when the plate supply was turned off! This was always an exciting experience for the operators on duty, who kept their distance from the rig as much as possible during these storms.

During the tests from 1908-09, using the beam, 12 vessels were contacted at a distance of 100 miles when all of the antennas were broadside to each other. Only two of the ships could be copied when the antennas were placed facing the Manhattan station. One group of operators noticed that when a train passed the receiving station, signals faded out and then came back in again. Marriott noted in his notebook that during a rain storm droplets of water hitting the aerial caused static.

As a result of these tests a paper was presented to the Inst. of Radio Engineers. Mr. A. E. Kennelly suggested that coordinated records on the part of the radio amateurs should be investigated. During the next year 1910 many amateur stations took part in a test to try to shed some light on the mysterious effects which Mr. Marriott had recorded in his notebook. A committee was to be formed to carry out further studies. Whether this was ever done is not known. It is certain nothing was ever done to make use of the basic information uncovered by Mr. Marriott until World War II. He had in his hand the first knowledge of radar, rain static, beam antennas, propagation conditions and human factors studies of radio operators, all of which have kept whole laboratories busy for the past 20 years. Sometimes progress takes a long time and sometimes we keep repeating the same things over again—like the DX contests. ■

*528 Colima Street, La Jolla, California.



CONFERENCE

Geneva A' Go-Go

CONVENTION

CONVIVIALITY

DURING the long weekend of September 17-20, the International Amateur Radio Club of Geneva, Switzerland will hold its third annual convention. This year's affair, besides featuring the marathon operation of stations 4U1ITU through 4U6ITU, will commemorate the 100th anniversary of the International Telecommunication Union and the opening of the ITU's Plenipotentiary Conference in the near-by town of Montreux. In addition, panel discussions will be conducted by leading radio amateurs on several technical topics and other matters of considerable interest to amateur radio. The IARC extends a hearty invitation to radio amateurs throughout the world to come to Geneva and participate in the Convention. The French speaking region of Switzerland is in its full glory during September, and a good time is certain to be had by all! The following additional information concerning the Convention has been supplied by the IARC.

Plenipotentiary Conference

In the picturesque town of Montreux, nestled between the eastern shore of Lake Geneva and a 6,700 foot high mountain called *Les Rochers de Naye*, a two-month long telecommunication conference will begin on September 14. This meeting, a Plenipotentiary Conference of the ITU, is expected to have an important impact on radio communications for at least the next five years. A Plenipotentiary Conference is the most important meeting of the many held periodically under the auspices of the ITU. The Union's charter, or Convention, assigns this conference supreme authority for laying down policy which the Union must follow until the next Plenipotentiary Conference is held. Normally, such conferences are held every five years, with the most recent one held in Geneva during 1959. The Montreux Conference was delayed a year so that it would coincide with the 100th anniversary of the ITU.

The Montreux Conference plans to deal with policy matters concerning the ITU, review the work of the Union since the last meeting, revise the Convention if it considers it necessary, establish the Union's budget and elect the many officials who will guide the Union until the next Plenipotentiary Conference. Finally, because of the Conference's supreme authority, it may consider any other matter deemed necessary. While it has the authority to do so, from the advanced agenda, it does not seem likely that the matter of frequency allocations will be discussed at the Montreux Conference. Because of its importance, the highest ranking telecommunication officials from the 124 countries that are members of the ITU are expected to attend the meeting.

Recognizing the importance of the Plenipotentiary Conference, and the unique opportunity it offers to acquaint high ranking telecommunication officials first-hand with amateur radio, the International Amateur Radio Club has timed the holding of its third annual convention to coincide with the Montreux Conference. While the IARC Convention will be held in Geneva, which is approximately 50 miles from Montreux, arrangements have been made with the Swiss PTT authorities to transport to Montreux by bus, radio amateurs attending the IARC Convention, so that they can observe the Plenipotentiary Conference in session. In addition, the delegates to the Conference have been invited to participate in the IARC Convention.

IARC Convention Program

The IARC Convention wil be held in the recently completed headquarters building of the International Telecommunications Union, which is located near the Geneva headquarters of the United Nations on the Place des Nations. Some of the panel discussions and receptions will be held in the near-by newly built Intercontinental Hotel. The following is the provisional program as supplied by the IARC.

Friday, September 17

Visit to the ITU Plenipotentiary Conference in session in Montreux. Tours of the ITU and UN buildings. Visit to Mont Blanc and the surrounding districts in France. Golf, swimming, sailing, etc. Operation of 4U1ITU and eyeball QSOs with visiting radio amateurs.

5-7 P.M. Informal reception on the 17th floor of the Intercontinental Hotel, with Harold Megibow, K2HLB acting as host.

Saturday, September 18

10:00 A.M. Intercontinental Hotel. Welcome by M. Joachim, OK1WI, President of IARC.

10:15 A.M. ITU Centenary, Keynote address and Opening meeting.

11:00 A.M. Modern Amateur Radio Trends and Techniques.

11:40 A.M. International Amateur Radio.

2:00 P.M. Panel discussions at ITU Building. Frequency Band Allocations and their Use. Chairman: John Gayer,

HB9AEQ.
2:45 P.M. Directive Antennas, SSB, Modern Operating Techniques. Chairman: Chuck Schauers, W6QLV.
3:30 P.M. Amateur Radio's Contribution to the Art. Chairman: Geoff Stone, G3FZL.
4:15 P.M. Amateur Radio in New and Developing Countries, and the Future of Amateur Radio. Chairman: Harry Laett, HB9GA.
5:00 P.M. Operating Techniques and Awards, and DX-peditions. Chairman: Stuart Meyer, W2GHK.
6-8 P.M. Informal reception on the 17th floor of the Intercontinental Hotel, with Bill Halligan, W9AC acting as host.
8:00 P.M. Convention banquet in the Intercontinental Hotel. Advance reservation required. Price $5.
NOTE: IARC stations will not operate on Saturday.

Sunday, September 19

1:00 A.M. Beginning of the 24-hour marathon operation of IARC stations 4U1ITU through 4U6ITU, as well as HB9ITU which will be located at the Plenipotentiary Conference in Montreux. A special certificate will be given to each radio amateur who operates the stations during the marathon period.
During the afternoon, tours will be available for visiting important buildings and museums in Geneva, and for visits to the surrounding French and Swiss countrysides. A large variety of sports will also be available.
5-7:30 P.M. Informal reception on the 17th floor of the Intercontinental Hotel, with Stuart Meyer, W2GHK acting as host.
8:00 P.M. DX-pedition slides and talk. ITU movie.

Monday, September 20

1:00 A.M. End of operation of IARC stations.
1-2 A.M. Informal reception on the 5th floor of the ITU building, with the IARC as host.
During the day, visits have been arranged to observe the Plenipotentiary Conference in session at Montreux, to famous building in Geneva, and to the French and Swiss countrysides. A large variety of sports will also be available.

Advance registration for the Convention, *including* the banquet, is $7 for members of the IARC. Registration at the Convention, including the banquet, is $10 for both members and non-members. Each attendee will receive a free copy of the IARC annual publication, *4U1ITU Calling*.

Based on the success of the first two IARC Conventions held during 1963 and 1964, hundreds of radio amateurs from all parts of the world are expected to participate in the 1965 Convention. It is recommended that arrangements be made as soon as possible for those planning to attend. The IARC will assist in making hotel reservations and other personal arrangements to the extent possible. The Intercontinental Hotel has been selected as the Convention Hotel, and a special rate of $9.50 daily for a single room with bath, and $19 for a double is available for registered Convention participants. If desired, the IARC will make reservations at a less expensive hotel.

Registration fees, hotel reservations, and requests for other personal arrangements can be sent directly to:

Mr. John H. Gayer, HB9AEQ
Honorary President, IARC
P.O. Box 6
Geneva 20, Switzerland

American Express in New York City and Cooks in London are in the process of organizing charter and group jet flights to and from Geneva at greatly reduced rates for IARC Convention attendees. Check with these organizations, or either the ARRL or RSGB for further information.

The President of Peru, the Honorable Fernando Belaúnde Terry (right), OA4FB, receiving his Honorary Membership in the IARC. The certificate is being presented to the President by Natan Sterental (left), OA4OS, Ambassador Member of the Club.

For The Stay-At-Home

For those who will not be fortunate enough to attend the third annual IARC Convention in Geneva, the Club will be standing by on all amateur bands from 2 through 160 meters to make as many QSOs as possible during the 24-hour marathon period beginning 0000 GMT, Sunday, September 19. A special QSL card will be sent to all stations contacted during this period.

At least four, and as many as six transmitters will be operating around-the-clock to provide as many QSOs as possible. For this occasion, the call signs 4U2ITU, 4U3ITU, 4U4ITU, 4U5ITU, and 4U6ITU will be used in addition to 4U1ITU, in accordance with the following schedule:

Band (Meters)	*C.w. Freq.* (kc)	*Voice Freq.** (kc)
160	1810-1830	(listening between 1810-1835 kc)
80	3503-3797	(" " 3803-3810 kc)
40	7003-7045	(" " 7203-7210 kc)
20	14113†-14292	
15	21050-21400	
10	28050-28265	
2	— 145.1	(listening 144-146 mc)‡

*Voice transmissions will be mainly ssb, but a.m. may also be used during some transmissions
†14113 kc may also be voice
‡Voice transmissions only on 2 meters

Frequencies may vary several kilocycles from those shown in order to avoid QRM.

IARC—What Is It?

Much has been written about the International Amateur Radio Club[1], and the following is a summary of a response given to this question

[1]Jacobs, G. "4U1ITU, Amateur Radio Station Of The International Telecommunication Union," *CQ*, Sept. 1962, p. 34.
Wolter, W. "4U1ITU Calling," *QST*, April, 1965, p. 68.
[*Continued on page 98*]

RTTY From A to Z

BY DURWARD J. TUCKER,* W5VU

Part XIV

This installation covers glow lamps multivibrators, flip-flops and trigger circuits.

PERHAPS what sets RTTY apart is that so much of the circuitry used is not common to other phases of amateur radio. A number of these circuitry building blocks were covered in the preceding part. Additional circuits are covered in this part.

Glow Lamps

The neon glow lamp or neon bulb, as it is so commonly referred to, has been with us for a long time. Radio frequency ammeters and other r.f. indicating devices have always been expensive and as a result, the use of a neon bulb as a favorite r.f. indicator has been pretty universal. For some, this is perhaps the extent of their knowledge of the neon glow lamp although it has quite a number of other uses in electronics.

The actual goings on in a neon glow lamp are quite complicated and beyond the scope of this text. In this instance, we are more concerned as to *what* happens than we are with *how* it happens. The thing that interests us at the moment is that the neon glow lamp offers a *high resistance* in a series circuit when the lamp is *non-conducting* and that this lamp offers a *low resistance* in the series circuit after the lamp "fires" and is in a *conducting* state. As the voltage across such a lamp is increased, a value is reached at which the lamp fires and becomes conducting. This voltage is called the *breakdown* or *firing voltage*.

It is possible to design glow lamps for a wide range of currents and initial breakdown voltages. However, the most common currents encountered in commercial lamps range from about 0.1 milliampere to 10 milliamperes. The initial breakdown voltages generally encountered range from 55 to 150 volts and the maintaining voltages usually range from 50 to 80 volts. Discharge lamps such as the neon glow lamp must be equipped with a current limiting series resistor, called a ballast resistor, to prevent instantaneous burnout. The applied voltage, series ballast resistance and other circuit resistance determines the current, light output and life of the lamp.

*6906 Kingsbury Drive, Dallas 31, Texas.

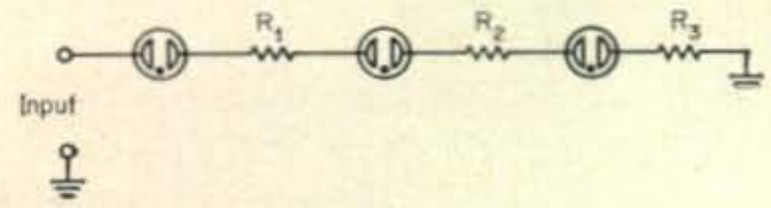


Fig. 90—The use of neon glow lamps as voltage indicating devices, are shown above.

Voltage Level Detectors

The frequency response of a neon glow lamp to normal RTTY audio frequencies is essentially flat. The glow lamp is a very good visual RTTY signal indicating device. It blinks and glows in unison with the RTTY signal. The glow lamp is also a very good voltage level indicating device. The range may be extended by connecting a number of lamps in series as shown in fig. 90. The resistors R_1, R_2 and R_3 are the ballast resistors that are usually placed in the base of the lamps. When the voltage to the input reaches up to the sum of the firing voltages of the three lamps, the lamps fire giving a visual indication that the pre-determined voltage level has been reached. If the voltage is a direct current source the lamps glow with a fixed glow. If the voltage is an a.c. or pulsating voltage, then the glow from the lamps pulsate on and off accordingly in unison with the voltage.

Another use for the neon glow lamp is indicated in fig. 91. The lamps in this circuit are, in effect, a special type of voltage level indicating device and perform an additional function as well. A vacuum tube keyer circuit was given in fig. 83, a cathode follower circuit was given in fig. 86 and a direct-coupled amplifier circuit was given in fig. 88. It will be noted that fig. 91 is a combination of all three with fig. 90 also thrown in. The combination of all four of these basic circuits into the circuit of fig. 91 gives a very useful device that is well known and much used in RTTY circles. In fig. 91 tube V_1 is a cathode follower. The coupling of V_1 to V_2 by means of the glow lamps gives us a special kind of direct-coupled amplifier. The 6AQ5, V_2 is a keyer tube whose

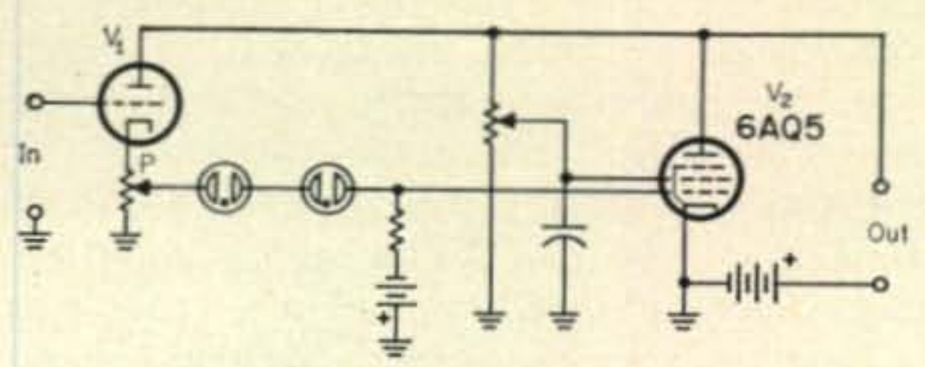


Fig. 91—A basic keyer circuit combining details previously described as explained in the text.

bias, screen and plate voltages are adjusted such that the plate current is cut off when there is no signal to V_1. When the cathode voltage of V_1 at point P to ground increases to the value necessary to fire the neon bulbs, this positive voltage is suddenly applied to the grid of V_2 offsetting its negative grid bias voltage. This condition causes V_2 to suddenly conduct and the tube draws a fairly high plate current. This is a basic terminal unit keying circuit that, with modifications, is used by many RTTY'ers.

Multivibrators

The multivibrator is another circuit that has been around for a long time. For the most part, it was associated with frequency measuring devices for many years. The rapid strides taken since World War II in the development and use of computers has given new emphasis to multivibrator circuits. In fact, the multivibrator has become the work-horse for digital computers. As a result, many configurations of this all-important circuit have been developed. A number of them are just as important to RTTY work. Two triodes, either vacuum tubes or transistors, make up a multivibrator. First one triode conducts then the other one conducts (alternately).

Multivibrators may be divided into three basic types, *astable, monostable* and *bistable*. The basis for these three classifications is the *number of stable end states* associated with each. All three types have definite and valuable applications so they will be covered individually.

Astable Multivibrators

The astable multivibrator gets its name from the fact that it is a free-running or oscillating device and has no *stable state*. Since it has no stable state, it switches from one to the other (oscillates). Such a device requires no input signal unless it is desirable to stabilize or synchronize its operation at a specific frequency. A circuit of an astable multivibrator is shown in fig. 92. This is a plate-coupled type of circuit. The transistor equivalent would be a collector-coupled circuit. Another type circuit is the cathode-coupled (the transistor type being the emitter-coupled circuit). It will be noted that the circuit has two outputs which are identical, except for a 180 degree phase difference; the output may be taken from either. The frequency of oscillation is determined by the component values C_1, C_2 and R_1, R_2. Circuit oscillations are sustained because the output of each stage is connected to the input of the other, giving both amplification and *regenerative feedback*. The waveform of the output signal may or may not be square, depending upon the selection of circuit component values. Usually a small amount of distortion is inevitably present even though the wave shape may essentially be rectangular or square. Such an oscillator is often used as a pulse generator to test digital circuitry. Such an oscillator is also a source of a square or near square wave source to test RTTY circuits.

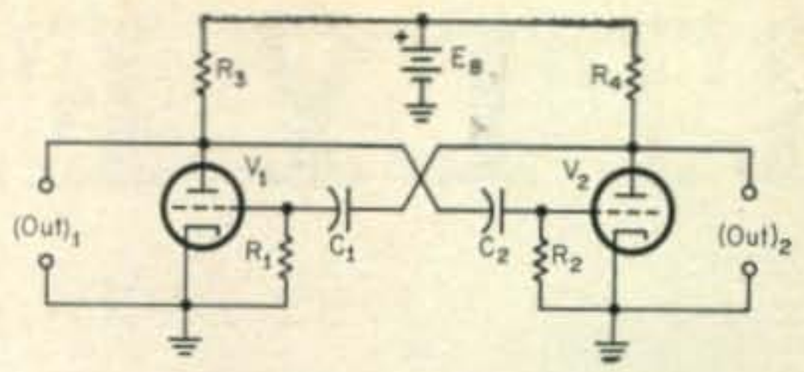


Fig. 92—Basic circuit of an astable multivibrator better known as a free-running multivibrator.

Monostable Multivibrator

The monostable multivibrator is not an oscillator since it has one stable state. The other state is quasi-stable. In the stable state, one tube is conducting and the other tube is cut off such as in the monostable multivibrator circuit shown in fig. 93. The bias voltage, E_{gc}, is chosen so that V_1 is at plate current cutoff. The grid of V_2 becomes slightly positive because of the charge current of C_2 from the power supply voltage applied through plate resistor R_3 and so V_2 conducts drawing saturation plate current. This action is graphically illustrated by the plus and minus signs as shown at plate resistor R_3, grid resistors R_2 and capacitor C_2. When power is first applied, capacitor C_2 starts charging through resistors R_3 and R_2 creating the positive bias to V_2 as shown.

When an external positive pulse is applied to the input of V_1 and it exceeds the negative bias voltage, E_{gc}, it suddenly causes V_1 to conduct and V_2 is at current cutoff due to regenerative feedback. In other words, the circuit changes state so that V_1 now conducts and V_2 is nonconducting; V_2 is biased negatively, far beyond cutoff by the discharge current of C_2 during this quasi-stable period. Eventually the negative charge on the grid of V_2 dissipates to the point where V_2 starts conducting and the state reverses back to what it was originally (V_1 at cutoff and V_2 conducting).

This phenomenon just described is why the monostable multivibrator is often called the "one-shot" multivibrator. The length of the output pulse, during the quasi-stable period, is determined by the circuit time constant.

From the preceding discussion it is seen that triggering a monostable multivibrator causes it to change state and then revert back to the stable state that existed before the triggering signal was applied. It should also be noted that the monostable multivibrator is triggered only by a positive signal and a negative signal has no effect on the grid of V_1. If the triggering pulse is applied to the grid of V_2 this condition is reversed. It would take a *negative* pulse to trigger V_2.

If the triggering pulse is fed through a coupling capacitor in each instance then all of this is reversed. Thoroughly confused? Let us go back to the grid of V_1 which normally requires a positive triggering signal. If this positive signal is coupled to the grid through a coupling capacitor the polarity of the capacitor is plus on the signal side and minus on the grid side. If

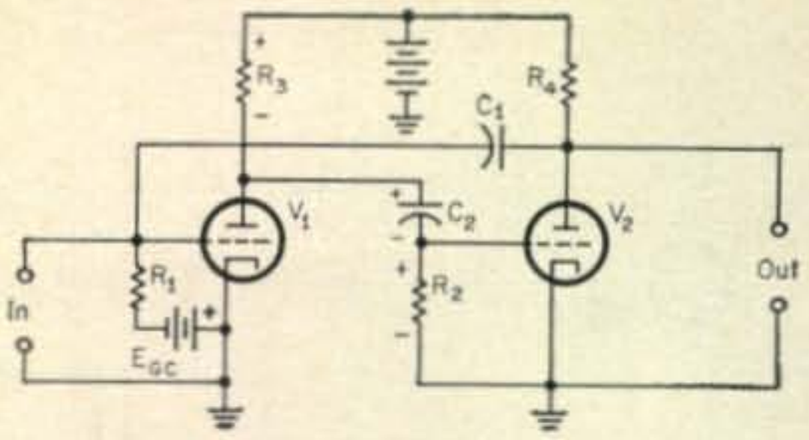


Fig. 93—Basic circuit of a monostable multivibrator also known as the one-shot multivibrator.

a negative signal is applied to the capacitor then the grid (opposite side) side of the capacitor is positively charged and that is what is required to trigger the grid of tube V_1.

A monostable multivibrator is useful in restoring or regenerating pulses that have become distorted.

Bistable Multivibrator

The astable and the monostable multivibrators just covered, both have their applications in RTTY work. They lead us to still another type of multivibrator, the bistable multivibrator. This one is more commonly encountered in RTTY work.

The bistable multivibrator is known by a number of other names, the most popular of which is the *flip-flop*. It is also called the start-stop multivibrator, as well as the *Eccles-Jordan trigger circuit*. A typical circuit is shown in fig. 94. Note the resemblances and differences between the circuits of figs. 92, 93 and 94.

Note that the circuit of fig. 94 is symmetrical and so is the circuit for the astable, or oscillating multivibrator, circuit shown in fig. 92. This naturally leads to the question as to why one oscillates and the other one does not. Furthermore, one may be prone to question why both tubes would not conduct equally well the instant that plate voltage is applied instead of one ending up conducting and the other one non-conducting. Fortunately, what may appear as being identical—tubes, resistors, capacitors, etc. in each half of the symmetrical circuit do not actually turn out that way in practice, so invariably, one tube will conduct more than the other one which results in the circuit flipping to a state where one tube conducts and the other one is cut off.

The bistable, like the astable, is basically a two stage voltage amplifier in which the output of each amplifier is connected to the input of the other. A characteristic of this circuit (astable or bistable) is that a plate current *increase* in one tube results in plate current *decrease* in the other tube. Regeneration is present in each circuit that results in a quick switching action the instant that power is applied. The plate current of one tube rises rapidly to *saturation* and the plate current of the other moves just as rapidly to *cutoff*. The similarity of the two circuits end here as the astable keeps changing state (oscillating) whereas the bistable will rest indefinitely in the end state until such a time that it is triggered from an external source of signal. Two basic circuit differences account for this. First, capacitors provide for the regenerative coupling in the astable, whereas resistors are used to couple the bistable stage. Furthermore, the grid resistors of the astable circuit go directly to ground but in the bistable they connect to a source of negative grid bias. These differences keep the bistable from free-running.

The bistable multivibrator, as the name implies, has two states, being stable in either state. Like the monostable multivibrator, one tube conducts alone while the other is non-conducting. The circuit doesn't oscillate and requires an *external signal* to make it "flip" or change state. It remains in this state until the next pulse applied to its input again flips the circuit. This time it is flipped back to its original state. Unlike the monostable multivibrator, it will *stay* in *either state indefinitely* until it is again flipped by an external triggering pulse applied to its input.

In computer language this circuit is referred to as a *logical flip-flop*. It is considered that the first input triggering pulse *flips* the circuit *state* and the next such pulse *flops* the *state* of the circuit back to its initial state. Thus the name *flip-flop*.

This circuit can be considered to have *storage capacity*, since it will remain in either of its *stable states* until triggered from an external signal source. Let us analyze the circuit of fig. 94. The grid-to-ground voltage at grid of V_1 is the algebraic sum of the voltages resulting from the two voltage sources E_b (plate voltage) and E_c (grid bias voltage). Likewise for the grid of V_2. Voltage E_b, resistors R_4, R_5, R_1, and voltage E_c form a series circuit combination that is a voltage divider for the grid of V_1. Likewise, voltage E_b, resistors R_3, R_6, R_2, and voltage E_c form a series circuit combination that is a voltage divider for the grid of V_2. The values of these resistive circuit components, as well as the circuit voltage sources E_b and E_c, are so chosen that the grid to ground voltage varies from a negative value, that will alternately drive the tubes well past their plate current cut off point, to a positive value that will alternately drive the grids into conduction.

Let us assume that tube V_1, in the circuit of fig. 94, is conducting. The plate voltage of V_1 is low due to the drop across R_3. This *low* positive

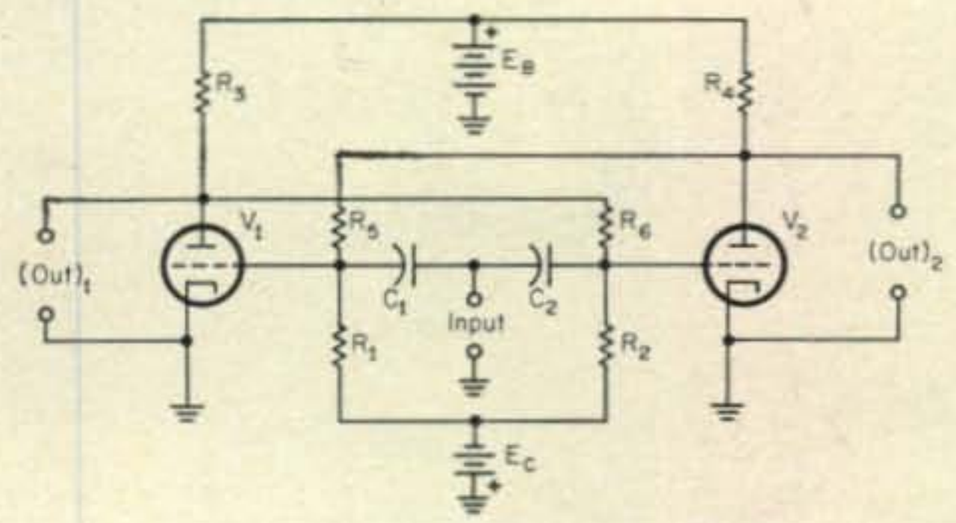


Fig. 94—Basic circuit of the bistable multivibrator also known as the flip-flop or Eccles Jordan.

voltage is connected to the grid of V_2 through R_6. The negative bias voltage, E_c is also connected and results in V_2 being at plate current cutoff. On the other hand, since V_2 is not conducting, there is no voltage drop across resistor R_4 which results in a very high positive voltage from V_1 grid to ground. This high positive grid voltage overcomes E_c and drives V_1 to plate current saturation.

A signal, either positive or negative, will cause the circuit to change state. If tube V_1 is conducting, a negative pulse will counteract the positive bias of V_1 and cause V_1 to cut off. This same negative pulse, which is also applied to the grid of V_2 has no effect on V_2, since it was already biased to cutoff.

Let us see what would have happened if we had applied a positive, instead of a negative signal. The positive signal would have no effect on the grid of V_1 since it already has a high positive bias. The positive signal would have an instantaneous effect on V_2, since it would put positive bias on the grid of V_2, causing it to conduct. From these two examples we can summarize that a *negative* signal will cause the *conducting* tube to *cut off* and a *positive* signal will cause the *cut off* tube to *conduct*.

Another way of stating this fact is that the circuit can be changed from one stable state to the other by applying a negative voltage to the grid of the *conducting tube* or by applying a *positive voltage* to the grid of the *cut off tube*.

Since the triggering signal is applied to both grids at the same time, the polarity does not matter, as has already been pointed out. However, there is one point to consider. Suppose that the selection of components and voltages is such that a tube is negatively biased considerably beyond cut off. This then requires a higher value positive pulse to start the tube conducting. Even then the circuit may only be affected by the peak part of the positive voltage. For this reason, it is generally conceded that this type of flip-flop circuit is more responsive to a negative voltage

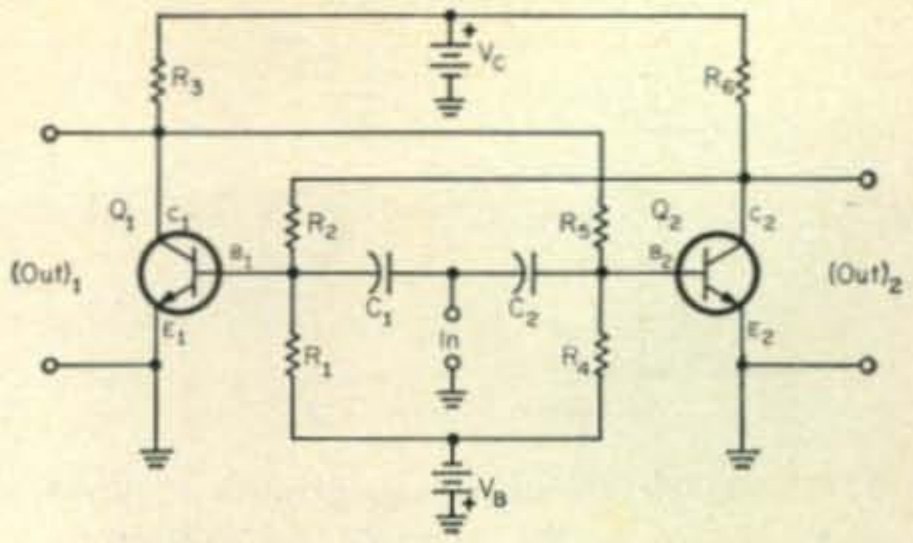


Fig. 95—A transistorized version of the Eccles Jordan flip-flop bistable multivibrator.

than it is to a positive voltage. For instance, a negative pulse of much lower value than the positive pulse may be sufficient to reduce the plate current of the conducting tube. This, in turn, causes its plate voltage to rise. This rising plate voltage is greater than the input voltage to the grid due to the tube gain. This positive voltage applied to the grid of the other tube (cutoff tube at the moment) drives it positive and it starts conducting. The circuit flips or "rolls" as it is sometimes called, especially in computer language. Thus it is seen that although an Eccles-Jordan flip-flop circuit will operate from either a positive or negative pulse that it is possible that it will operate on a lower amplitude negative pulse.

A transistorized version of the Eccles-Jordan flip-flop circuit is shown in fig. 95. The reader should note the close resemblance of the circuit to that of fig. 94. The operation of the transistorized circuit is essentially the same as that of the vacuum tube circuit.

Next month the author will complete the basic coverage of much of the building block circuitry for RTTY with the coverage of the Schmitt-Trigger circuit and give some of the basic requirements and need for some type of simple device to be used in connection with the measurement of RTTY distortion.

[*To be continued*]

New Amateur Product

McCullock, Inc.

A GASOLINE operated electric power generator that weighs only 55 lbs. and produces 650 watts of 60 cycle, 110 volt electric current has been developed by McCulloch MITE-E-LITE, Inc., 1015 Brooklyn Avenue, Wellsville, New York.

In the MITE-E-LITE design the conventional generator principle is reversed, the powerful, permanent magnets spin and the ribbon coils are stationary. Electric power flows directly from the coils to the receptacle. There is no armature, no brushes, no slip rings—no problems of arcing, sparking. There are no field coils that heat up and dissipate power. More watts of power are obtained from each gallon of gasoline used by the Briggs & Stratton engine. Other designs provide up to 3,000 watts. Either write directly for more information or circle 65 on page 110.

DX

BY URB LE JEUNE,* W2DEC

Here and There

CR4 Cape Verde Islands: George, CR4AJ, is active almost daily on s.s.b. Try after 1800 GMT on the low end of twenty. (Tnx VERON)

EA6 Balearic Island: Antonio, EA6AM, is most anxious to set up skeds with stations in Utah and Nevada to complete his WAS. 20 or 15 meter c.w. preferred. He also mentions that someone has been "pirating" his call around 2300 GMT, a time when he is usually sound asleep. (Tnx K7BFY)

EA9 Ifni: If all goes well, TI2HP and EA2CA will DXpedition to Ifni and Rio de Oro during the latter part of September.

KV4 Virgin Islands: KV4CF is looking for Idaho on 14.290 kc at 1230 GMT every Saturday and Sunday.

MP4T Trucial Oman: MP4TBM is active daily between 1300 and 1800 GMT. He uses an NCX-3 and G. P. Antenna although he may have his beam up by the time you read this. (Tnx NCDXA)

TL8 Central African Republic: The only station active from TL8 land is Sid, TL8SW. Look for him after 1800 GMT on both c.w. and s.s.b. on twenty. (Tnx VERON)

ZB2 Gibraltar: Dick, ZB2AO, is a new entry from ZB2 land. He prefers 20 meter s.s.b. QSL via RSGB. (Tnx VERON)

ZD8 Ascension Island: Bud, ZD8BC, reports the following: "I have been following your column in *CQ* for several years. I want to take this opportunity to thank you for providing me many DX tips and I'm looking forward to your info in the coming months.

Approximately four months ago, I transferred from San Salvador in the Bahamas to Ascension Island and I'm planning to be quite active on 20, 15 and 10 c.w. and s.s.b. Since I'll be here for at least a year and will have many QSOs, I would like for everyone to know that W2CTN is my manager. Please indicate same in your column.

DX conditions here are pretty good. We hear many more Asians than in the Bahamas and the Pacific Island boys usually come through about 0900 GMT. Conditions to the states are best on 20 at 1200 and on 15 at 1500 GMT. There are eight active ZD8's now so there should be someone on at most times of the day.

I'll sign for now, Urb, and wish you good DX. If you hear me on in the coming months, give me a shout."

9L1 Sierra Leone: Peter, 9L1HX, reports, "I tried the Professor Heisseluft Bel-Canto system (*CQ* April) and on 21 mc a.m., I obtained 8 db improvement in the audio by putting a peg on my nose and holding my throat at the same time. The reports indicated that it was very distinctive and sounded like s.s.b.!"

9M4 West Malaysia: Thanks to Bud, K4ISV, for this letter from 9M4JW. "Thank you very much for your QSL card and very nice letter. Nice to give you a new country. I returned from 9M6 last Saturday. So far, I have not gotten the cards back from the printers. I am still waiting for my gear to come back from 9M6 land, so am QRT at present. My call here is 9M4JW, so keep your ears open for us. My next trip to 9M6 should be around Christmas time and I will be operating from 9M6 for about ten weeks. The exact dates are unknown at present. Equipment I used on the last trip was TX-KW Vanguard 50 watts, Receiver AR88 and 51J3. Antennas 40-20

SSB DX HONOR ROLL

TI2HP	303	W1LLF	281	G2BVN	263	W6YMV	235
W2BXA	302	W6UOU	281	G3DO	260	OZ7FG	233
K4TJL	302	W3KT	281	W4RLS	259	W2PTM	230
WØQVZ	302	WA2IZS	281	W6WNE	259	WA2EOQ	229
W2ZX	301	G8KS	279	PJ2AA	258	W6ZJY	227
5Z4ERR	300	K4HYL	276	KP4CL	256	W3FWD	226
W2TP	300	DL1IN	275	K6LGF	250	K1SHN	224
G3AWZ	300	HB9TL	275	W1AOL	250	K2JFV	223
W8PQQ	299	I1AMU	275	W4OM	249	W4HUE	219
W3NKM	296	PZ1AX	274	W4PAA	249	W3DJZ	215
W2FXN	293	W6RKP	273	W4NJF	248	K1JMV	213
K2MGE	291	K9EAB	273	GM3JDR	246	SM5UF	208
W4OPM	290	W2RGV	272	XE1AE	246	K6CYG	203
W2VCZ	290	W2LV	271	K8ONV	244	W6USG	203
K1IXG	288	G3NUG	269	YV5AFF	239	KØUKN	202
K8RTW	286	G2PL	265	W7DLR	238		
W3MAC	281	W4SSU	263	W3VSU	235		

*Box 35, Hazlet, New Jersey 07730.

W2GHK operating the 4U4ITU position at the recent 100th anniversary celebration of ITU.

This is the rig and family of Karl, DJ8RR. Karl, as you may notice received WAZ this month.

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

CW-PHONE WAZ

2162	OH2DP	Asko Heinio
2163	W5PIO	Maurice Gayman
2164	W7TDK	Robert S. Wruble
2165	KØIAD	Gary Alexander
2166	WA2JBV	Emil T. Rusin
2167	DJ8RR	Dr. Karl Colling
2168	W9QQN	Norman P. Alexander
2169	ZS2RM	P. B. Buckley
2170	OH2VZ	Pertti Kantanen
2171	TN8AF	Constant Narolles
2172	K6BFZ	Bill Sippert
2173	WB2FMK	Robert J. Rasche
2174	YV5BQF	Miguel Troconis L.
2175	W9GXH	A. R. Dambrauskas
2176	HB9YL	Anny Jenk
2177	W7UZE	Louis E. Anderson
2178	W7FUL	Thomas E. Gilmore
2179	W7GDS	Otto Schenck
2180	W7UMJ	Del Kohler
2181	I1SF	Serafino Franchi
2182	W4SNU	Frank J. Hoose
2183	WA6OET	Jessie Billon
2184	W9ILW	T. Snedden
2185	SM7ANB	Nils-Arne Broberg

ALL-PHONE WAZ

302	YV5BQF	Miguel Troconis L.
303	W1FZ	James E. Thayer
304	YV5AB	Mike Delgado
305	W9ILW	T. Snedden

TWO-WAY SSB WAZ

326	VE5JV	Allan Chesworth
327	YV5BQF	Miguel Troconis L.
328	W9GMY	J. Lawrence Hubbard
329	OZ5BW	Henry Thomsen
330	W9ILW	T. Snedden
331	WØQLX	Evan J. Maloney

CW WPX

653	LA8PF	Per O. Lomeland
654	OH2DP	Asko Heinio
655	K3CNN	Joseph J. Hauptly
656	SM5BDY	Evert Kallander
657	HA5KFR	Collective Radio Station
658	OK3IC	Josef Surmik
659	OK1DJ	Stanislav Novak
660	VE3XQ	Kenneth T. King
661	SM3CJD	Carl-Otto Ragne
662	WA2JBV	Emil T. Rusin

PHONE WPX

118	LU6AL	Jose Azuaga

SSB WPX

213	K4ZJF	Milt de Reyna, Jr.
214	I1TBU	Umberto Pattis

100 TWO-WAY SSB

474	K5HWO	Jim Hammack
475	W2FXE	William Tucker

300 TWO-WAY SSB

9	W3NKM	Stanley S. Springer
10	G3AWZ	George P. Pearson

meter dipoles and a 20 meter vertical dipole. For my next trip to 9M6 I will be using the same gear, if there were someone who could loan me a s.s.b. transceiver, we should be able to do a lot better.

On the last trip we were able to work 1600 QSO in 62 countries, just with 50 watts c.w. and a.m. There are not many spare s.s.b. rigs out this way at all, so I am hoping that someone in the states might be able to loan equipment for the 9M6 DXpeditions.

We had a very sad loss recently. Jim, 9M4GT, was electrocuted while doing some modifications to his equipment. I don't know the exact story on how he died, but it appears he died while repairing his rig. There must have been a short circuit.

Bud, OM, regarding your offer on the QSL manager business, I have had offers previously from the states but have never worried about it. However, seeing that I will be doing a few DXpeditions to 9M6, I would be very proud to have you act as my QSL manager. Let me know how this works as I have never had a QSL manager before. It would be a great help to me at the present time.

Do let me know if there is anyone willing to loan a transceiver for future operations.

A bit about myself. I am 33 years of age, married with two young girls. One 9 years old and the other 6 years old. I am a corporal in the Royal Australian Corps of Signals and this is my second trip to the Far East. I will be returning to Australia in December of 1966.

I have been in the Signal Corps for ten years now. I go back to VK and hope to either get up

This impressive looking station is KX6AO. Omar is WA6PNK (ex W9KEN) stateside. Listen for KX6AO on 21.420 between 2330 and 0030 GMT Monday thru Friday.

Here is KX6AO's antenna set-up.

Jean, 5R8CB, at the operating position of his rig in Diego-Suarez. Jean built the rig himself. It runs 30 watts. The receiver is a much-modified vintage, 1947. The antenna is a rotary dipole.

here again at the end of 1967 or earlier. At any rate, I will let you know in due course as to what is happening. That's about it for now, Bud. I will be uooking forward to receiving a letter from you."

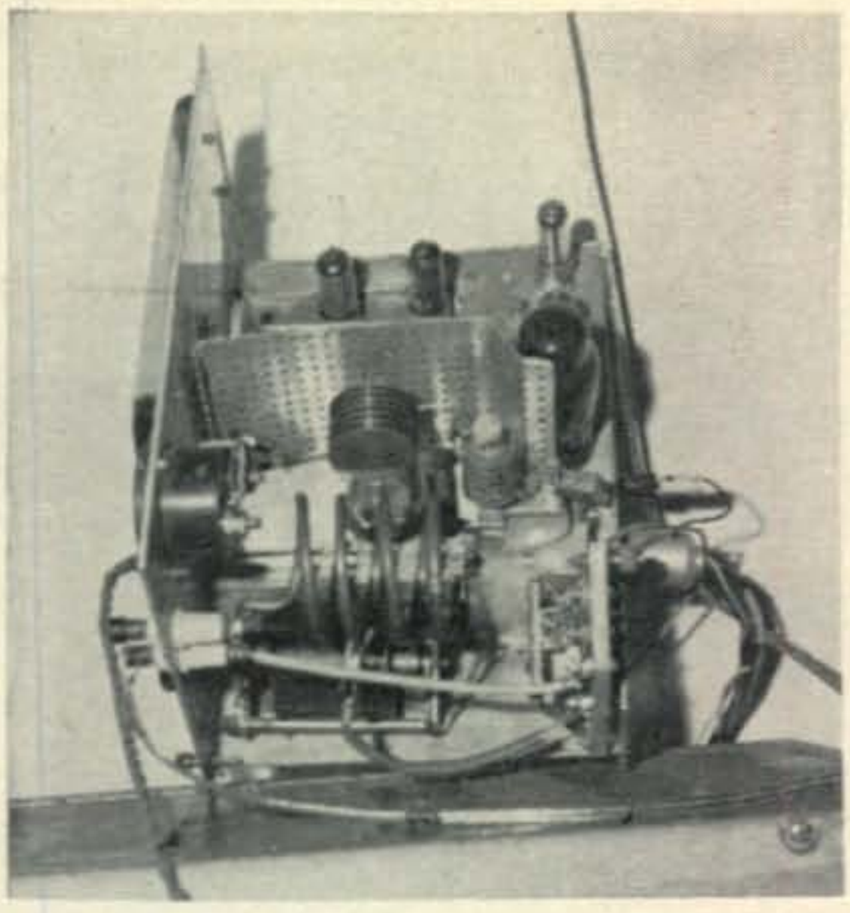
Can anyone help John out with the loan of a transceiver?

9M4 West Malaysia: Ted, 9M4MB, laments via WA5BYV the lack of QSL cards from Rhode Island, Wisconsin, Utah, Wyoming, Delaware, Idaho, Montana, New Hampshire. Ted returns to England in one month so what say fellows. . . .

9X5 Ruanda: 9X5CE is currently active on SSB from Ruanda. Marc is using Heathkit equipment and a cubicle Quad. (Tnx VERON)

UA9/UAØ Zones

Area	Prefix	Zone
Chelyabinsk	UA9A—B	17
Sverdlovsk	UA9C—D	17
Perm-Tagil	UA9E—F	17
Tomsk	UA9H	18
Tyumen-Hanti	UA9J	17
Omsk	UA9M	17
Novosibirsk	UA9O—P	18
Kurgan	UA9Q	17
Orenburg	UA9S—T	16
Kemerov	UA9U—V	18
Bashkir	UA9W	16
Komi-Vorkutu	UA9X	17
Altai-Barnaul	UA9Y	18
Krasnoyarsk-Nobilsk, Cape Chelyuskin, Dickson Island,	UAØA—B	18
Khabarovsk	UAØC—G	19
Sakhalin Island	UAØE—F	19/25
Cape Schmidt, Bering Pevek, Magadan, Wrangel	UAØI	19
Blagovesheensk (Amur)	UAØJ	19
Port Nahodka	UAØK	19
Vladivostok	UAØL	19
Usuriisk	UAØM	19
Buryat-Mongolia Ulan-Ude	UAØO	18
Yakutsk-Olenek	UAØQ—R	19
Irkutsk	UAØS—T	18
Chita	UAØU—V	18
Tanna Tuva	UAØY	23
Kamchatka Petropavlovsk (Tnx RSGB)	UAØZ	19



A close-up view of Jean's rig.

Awards

The Tokyo Northside DX Club issues the Zone 25 Award in four different classes to both licensed amateurs and s.w.l.s all over the world.

Z 24 A-I QSO (or s.w.l. report) with 4 countries in Zone 25.

Z 25 A-II QSO (or s.w.l. report) with 10 prefixes in Zone 25.

Z 25 A-III QSO (or s.w.l. report) with 15 prefixes in Zone 25.

Z 25 A-IV QSO (or s.w.l. report) with 20 prefixes in Zone 25.

Classes II, III and IV must include at least three countries. Applications including a certified list, US $1.00 or 10 IRC should be addressed to the Award Manager, JA1HLR, Hisashi Takakuwa, 2-266 Komagome, Toshima, Tokyo, Japan.

Countries and Prefixes in Zone 25.

Japan: JA1-JAØ & KA.
Korea: HM1-HMØ & HL.
Okinawa: KR6 & KR8.
U.S.S.R.: UAØ & UWØ (Kuril Island & other zone 25 areas)

QTH's and QSL Managers

Jim, WB6GVI, would like to offer his services as a QSL manager. His full QTH is Box 3537, Eureka, Calif. 95502.

CT1LN via WA4AYX.
CT3AQ via K9ECE.
ET3USA via W7TDK.
FL8AK via W7TDK.
FO8AG via K9ECE.
FP8CK via W2JAE.
FP8CV via W2GKZ.
GC2HFD/A via G2HFD.
HBØXCV via DJ6SW.
HC8JG Box 5757, Guayaquil, Ecuador.
HI8XPS via K7EKE.
HM1AX via WB6GVV.
HR1HZY via WA5CNP.
HZ1AB 1141 USAF APO 09616, N.Y., N.Y.
IS1TAI via W4VPD.
JY1AU via W8HMI.
KP4BPW via WA4AYX.
ex KR6OF Bert Bailey, 31 Lemoy, Ft. Bragg, N.C. 28307.

[*Continued on page 99*]

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

September	11-12	WAEDC Phone
September	18-20	Pennsylvania QSO Party
September	18-19	S A C C.W.
September	25-26	S A C Phone
September	25-26	RSGB 21/28 mc Phone
September	25-26	MARC VE/W
October	2-4	Massachusetts QSO Party
October	2-3	WADM C.W.
October	2-3	Oceania DX Phone
October	9-10	Oceania DX C.W.
October	16-17	RSGB 7 mc Phone
October	16-17	ARRL CD Phone
October	23-24	ARRL CD C.W.
October	20-21	YLAP C.W.
October	**23-24**	**CQ WW DX Phone**
October	23-24	VU2/4S7 DX Phone
October	30-31	VU2/4S7 DX C.W.
November	3-4	YLAP Phone
November	6-7	RSGB 7 mc C.W.
November	13-14	ARRL SS Phone
November	20-21	ARRL SS C.W.
November	**27-28**	**CQ WW DX C.W.**

S A C

C.W.—Sept. 18-19 **Phone**—Sept. 25-26

Starts: 1500 GMT Saturday. Ends: 1800 GMT Sunday in each instance.

This year the Scandinavian Activity Contest is being sponsored by the NRRL. (Norway)

It's the world working the Scandinavians on all bands. The following prefixes will be considered multipliers, LA, LA/p, OH, OHØ, OX, OY, OZ and SM/SL.

Complete details in last month's CALENDAR. Mailing deadline is October 15th and your logs go to: The NRRL Traffic Department, P.O. Box 6594, Rodelokka, Oslo 5, Norway.

Pensylvania QSO Party

Starts: 2300 GMT Saturday, September 18

Ends: 0400 GMT Monday, September 20

The eighth annual Pennsylvania QSO Party, sponsored by the Nittany Amateur Radio Club, offers a fine opportunity to earn credits for the Pa. Counties Award, Keystone Award, USA-CA Award and others.

Exchange: Penna. stations; QSO number, RS/RST report and county.

Others: QSO number, RS/RST and ARRL section or country.

Scoring: Penna. stations: 3 points per out of state QSO, 1 point per Penna. QSO; multiplied by the number of ARRL sections and countries worked. Others: 1 point per contact, multiplied by the number of Penna. Counties worked. The same station may be worked on different bands and modes.

Log Data: Date/time in GMT, QSO number, station worked, RS/RST report, county or ARRL section, band and mode used.

Frequencies: 3575, 3875, 7075, 7275, 14075, 14275, 21075 and 21325. Check phone band on the hour, and look for some portable activity from rare counties.

Awards: Certificates to the first place station in each ARRL section and each country. Second and third place awards will be made where justification warrants. In addition, the latest issue of the U.S. Call Book will be awarded to the highest scoring Penna. station and to the top out of state station.

Mailing deadline for your entry is October 18th and your logs go to: Nittany Amateur Radio Club, P.O. Box 60, State College, Pa. 16801.

RSGB 21/28 mc Phone

Starts: 0700 GMT Saturday, September 25

Ends: 1900 GMT Sunday, September 26

It's the world working the British Isles on 21 and 28 mc phone in this one. (G, GB, GC, GD, GI, GM and GW)

1. The usual five figure serial number, RS report plus a progressive 3 digit number starting with 001.

2. For overseas stations, each contact will count 5 points. Only one contact per band with the same station permitted, and crossband operation is not allowed.

3. A bonus of 50 points may be claimed for the first contact with each British Isle country/prefix on each band. (ie: G2, G3, GB2, GC3, GM6 and etc.) A possible 37 on each band.

4. An additional bonus of 50 points can be claimed for every 10 stations worked in each of the 37 country/numeral prefixes, irrespective of the band.

5. Your final score therefore will be the sum of the QSO points and bonus points, no multiplier involved.

6. Log sheets should be columned and show in this order: Date/time in GMT, station worked serial number sent and received, band, bonus points and QSO points.

7. Each entry should also include a summary sheet with name and address in BLOCK LETTERS, and other pertinent information. And don't forget the usual signed declaration that all rules and regulations have been observed.

8. Certificates will be awarded to the leading

*14 Sherwood Road, Stamford, Conn. 06905.

stations, single operator and multi-operator, in each country and call areas in the following: U, VE, VK, W/K, ZL and ZS.

9. There is also a s.w.l. section. Rules are the same as listed above, except that bonus points listed under Rule #3 is 20 points. CQ and test calls do not count. The logged station must actually be working someone, and the call and report to the station being worked must also be listed.

10. Logs go to: R.S.G.B. Contest Committee, 28 Little Russell Street, London, W.C.1, England. Postmark deadline is October 15th.

Massachusetts QSO Party

Starts: 2300 GMT Saturday, October 2
Ends: 0500 GMT Monday, October 4

The annual Massachusetts QSO Party is once again sponsored by the M.I.T. Radio Society to promote friendship and operating ability.

Complete rules in next month's column.

WADM C.W.

Starts: 2000 GMT Saturday, October 2
Ends: 2000 GMT Sunday, October 3

This contest sponsored by the Radioclub of the German Democratic Republic, will be an annual affair to be held the first full week-end in October.

It's the world working the DMs on all bands, 3.5 thru 28 mc, and on c.w. only.

1. There are three divisions, single operator, multi-operator and SWL.

2. The number exchange is the conventional RST report plus a progressive three figure QSO number, starting with 001.

3. Each completed contact with a DM station is worth 3 points, and each station may be worked once per band. (s.w.l.s get 1 point for each new DM call and serial number listed.)

4. The multiplier is determined by the number of DM districts worked on each band. A district is identified by the last letter in the call.

5. The final score is determined by the sum of QSO points multiplied by the sum of the districts worked on all bands. (Scoring is based on all band operation only.)

6. Each contestant will receive a certificate showing his final score and placement in his country.

7. It is requested that separate sheets be used for each band. Also include a summary sheet showing the scoring and your name and address in BLOCK LETTERS.

8. Mailing deadline is October 30th and your logs go to: Radioclub of the GDR, DM Contest Bureau, P.O. Box 30, 1055 Berlin, German Democratic Republic.

DM Districts

A—Resteak	F—Cottbus	K—Suhl
B—Sebwerdn	G—Magdeb.	L—Dresden
C—Neubr.	H—Halle	M—Leipzig
D—Potsdam	I—Erfurt	N—Marx/Stadt
E—Frankf.	J—Gera	O—Berlin

VK/ZL/Oceania DX

Phone—Oct. 2-3. **C.W.**—Oct. 9-10.
Starts: 1000 GMT Saturday. Ends: 1000 GMT Sunday in each instance.

This is a joint activity by the two national amateur radio organizations of Australia and New Zealand, The WIA and NZART.

The following rules apply to all stations other than VK/ZLs. A few modifications have been made, mainly under awards.

Serial Numbers: The usual five and six figures, made up of the RS/RST report plus a progressive three figure contact number starting with any number between 001 and 100 for the first contact.

Scoring: (1) For Oceania stations other than VK/ZL: 2 points for each contact on a specific band with VK/ZL stations; 1 point for each contact with all other stations, including Oceania stations. (2) For rest of World: 2 points for each contact with a VK/ZL station; 1 point for each contact with other Oceania stations other than VK/ZL. (Only one contact per band with the same station.)

Final Score: Multiply total QSO points by the sum of VK/ZL call areas worked on all bands. The same VK or ZL call area counts as a separate multiplier on each band. (All bands may be used, but cross-band operation is not permitted.)

Logs: Must show in this order: Date/time in GMT, station worked, band, serial numbers sent and received and points. Underline each new VK/ZL call area worked and use a separate log sheet for each band. (Phone and c.w. are separate contests.)

Awards: Certificates will be awarded in each country and each call area for W/K, JA and UA. Awards will be made to the top all band scorers only, provided that at least 3 entries are received from that country or that the contestant has scored 500 points or more. (Single band awards have been eliminated.) Other certificates may be awarded, determined by conditions and activity.

Include a summary sheet with your entry, with your call, name and address in BLOCK LETTERS, details of your equipment, and a summary of your score for each band. Sign a declaration that all rules and regulations have been observed.

There is also a Listeners section but VK and ZL stations *only* are to be listed. Logs should be set up similar to the procedure indicated in the transmitter section, showing call of the VK/ZL station heard, the report and call of station worked. Phone and c.w. scores are combined.

Logs must be in the hands of the committee before January 15, 1966. To: W.I.A. Federal Contest Committee, Box N1002, G.P.O. Perth, Western Australia.

CQ WW DX

Complete rules will be found on page 31 of this issue. A few modifications have been made this year, but basically everything remains the same.

1. Par. III. DX Clubs no longer required to have national affiliation. But it *must* be a local DX club.

2. Par. VIII. The minimum required time to be eligible for an award is now 12 hours, regardless of band used. (Many have the misconception that if they do not put in 12 hours of operating time they should not send in a log. This is *wrong*. It's only when you are in contention for an award that the 12 hour rule is in effect.

3. Par. X. Awards in Australia, Canada and the USSR are now based on Zones instead of call areas. The USSR (Asia) will gain an additional award, Australia and Canada probably lose a few.

4. Par. XI. Note increase in awards and change in a few donors.

5. Par. XII. Taking credit for duplicate contacts in excess of 3 per cent of the total can mean disqualification.

That about covers it. Get your request for log sheets in early, especially you fellows in far away places.

Stations planning a DX-pedition should advise us immediately so that we can give them proper publicity.

MARC VE/W

Starts: 2300 GMT Saturday, September 25
Ends: 0200 GMT Monday, September 27

The Montreal Amateur Radio Club once again is sponsoring the VE/W contest. It's the VE/VO's working the W/K's and vice/versa. Some modifications have been made in the multipliers, Canadian geographical areas (13) will be used instead of call areas (9), and there is only one power multiplier.

Only a total of 20 hours out of the 27 hour contest period may be used, therefore it is important that ON and OFF times be indicated on your log.

Bands: All bands and modes may be used and the same station can be worked once on phone and once on c.w. on each band.

[*Continued on page 106*]

THE VHF COLUMN

BY BOB BROWN, K2ZSQ
AND ALLEN KATZ, K2UYH*

EVERY month we say to ourselves, what shall we lead in with this time? And usually we wind up with something timely to editorialize upon which serves to bring the reader into the "meat" of the column, although you could never prove it by our mail. No sir.

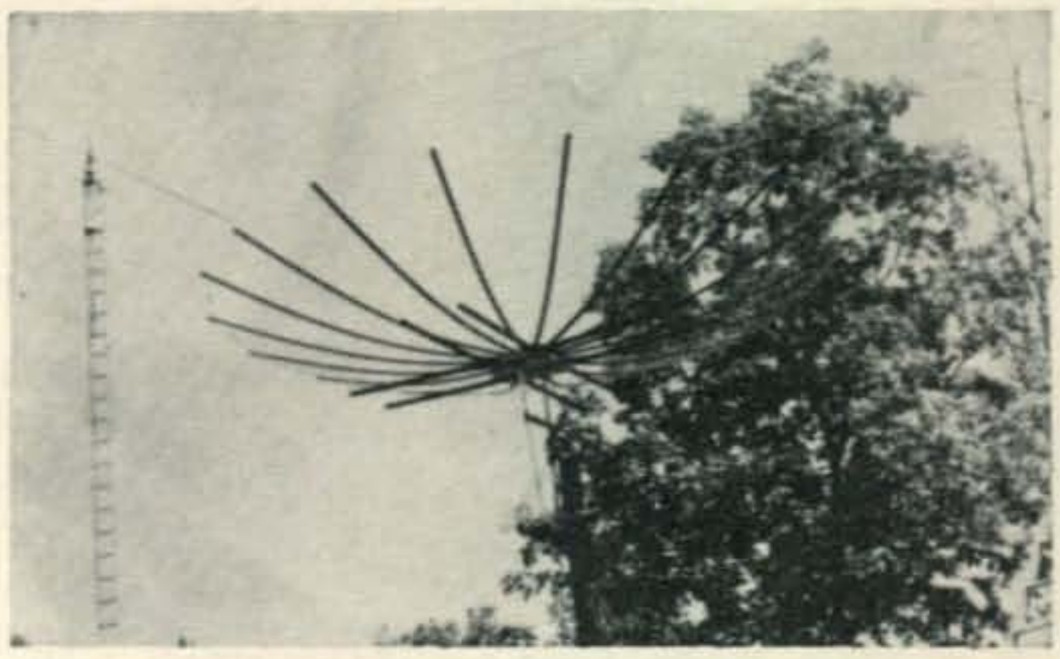
In June, however, we chose to expound a bit on the subject "How Will the New Rules (FCC Docket 15928) Affect VHF?" And on this one, admittedly opinionated, we have been literally deluged with correspondence both pro and con. Perhaps one of the most interesting retaliatory letters was received from Al LaPlaca, K2DDK, who, while he doesn't necessarily agree with all our statements, made several good points of his own:

"Your June VHF column was rather thought-provoking. I thank you for bringing the subject to my attention; I'd little realized that the new F.C.C. proposal would effect changes on v.h.f." *(At first, we didn't either.)* "While I don't seem to be able to draw the same conclusions (nor for the same reasons) you have, I must admit that you have some good points in that write-up." *(Thank you!)*

'What is the prime motive for a Novice choosing to operate on v.h.f.? Is it just so that he might be able to use 'phone? Or are there other factors, such as no room in urban housing developments for 80 meter antennas? Or interest in v.h.f. for its own sake because it is capable of providing relatively QRM-free QSO's with 'people in this area' so that he might develop life-long friendships with those living close by? *(And how about the opportunity to apprentice on a state-of-the-art band? Nice idealistic thoughts, but hardly true. Our years on two meters tell us that most Novices go v.h.f. because it is there that they can use 'phone.)* It is my belief that (my) reasons two and three are closer to the truth than the first reason. If this, then, is true, it would follow that restriction to only A1 transmission won't reduce, by any large amount, the number of new Novices on 2 meters. After all, Novices aren't allowed A3 on 80, 40 or 15 yet they manage to fill those segments with unbelievable QRM!" *(True, but what Novice wants to operate c.w. at 145.1 when all the A1 activity is confined to the frequencies below 144.3? Not only is his distance capability extremely low (when compared to 80, for example), but everyone knows he won't find anyone to talk to above 145. Would* you *try it?)*

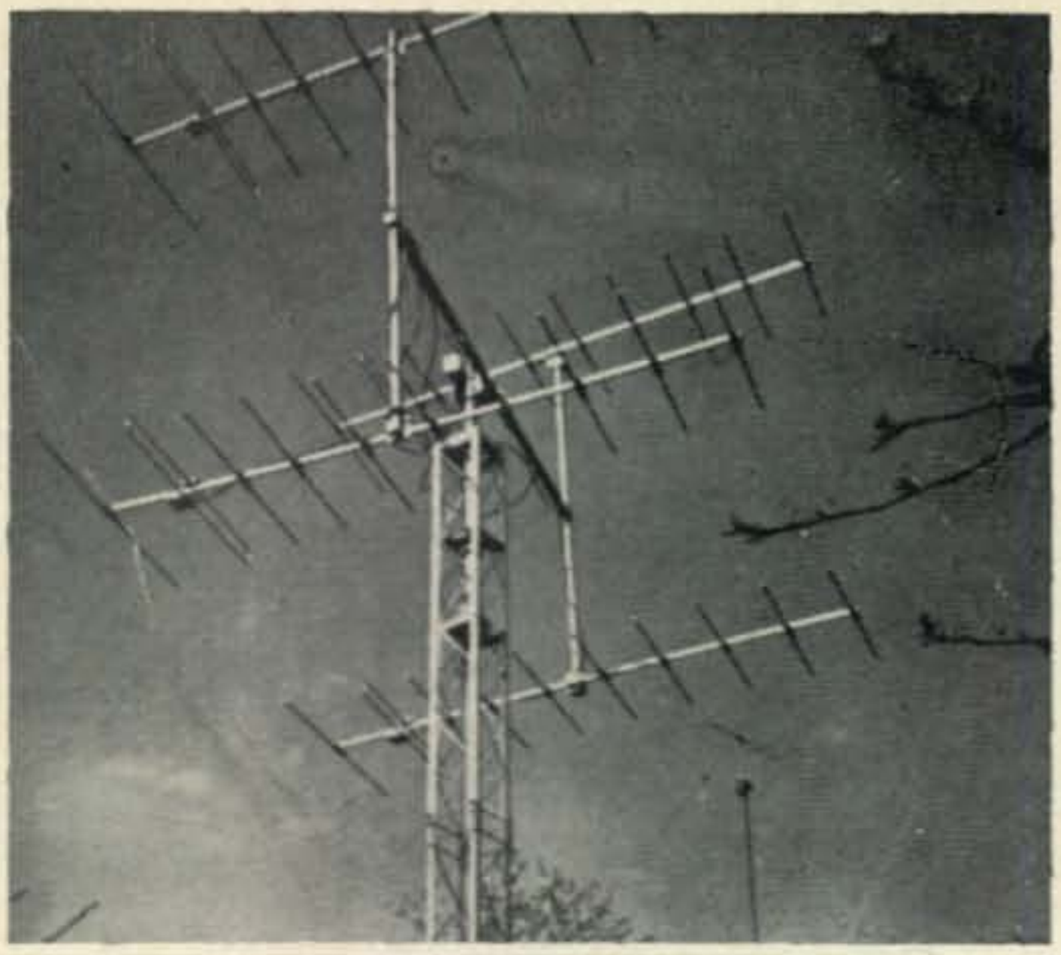
'A Novice is a Novice is a Novice. They come in all shapes, sizes, sexes and ages. I fail to see any grounds for our getting an older crop of Novices on v.h.f. should they be limited to only A1 transmission. *(Did we say that? There are plenty of 50-year old video rangers, too.)* There's just as wide an age spread on 2 meter Novice 'phone now as there is on the 80 or 40 meter Novice c.w. segments. *(So what happens when Novices lose two meter 'phone? Our guess is that they'll spend those first two years on low-band c.w. By the time they get to two, they'll be at least two years older and a great deal more experienced.)*

'While it is true that present General Class licensees are *better* prepared (than Techs) to advance to the Amateur First Class or Amateur Extra Class licenses, the question is, are they *really* prepared? *(Who is?)* I say no. For a little over 2 years I operated in the first 100 kc of 2 meters on c.w.-only to the exclusion of all other bands and modes. During that time I worked 100 different stations c.w.-to-c.w. With good c.w. ops like Ernie, K2IEJ, and a handful of others I could rev up the bug to speeds in excess of 35 w.p.m. and they handled it very F.B. But the vast majority of those contacts *had* to be carried out at less than 15 w.p.m.! These are General Class operators, let me remind you. I found only 14 out of 100 who could copy (or read) 15-20 w.p.m. or more! *(Sure. And if you listen to 6 meter c.w., you'll find plenty of supposedly 5 w.p.m. Techs cruising at 3-4. What does this prove? The General c.w. test is set at 13. Does this demand that after acquisition of that license faster on-the-air code speeds are required? Certainly at two meters, where you are dealing with meteor showers and tropo scatter, you can't expect to duplicate 20 meter c.w.!)* That 3 w.p.m. you spoke of in your column is more like 6-10 w.p.m. when the chips are down. If you don't believe me, be my guest and conduct your own survey for a couple of years (using c.w. only). Good luck! (A lot of us operated 2 meters as Novices, got the v.h.f. bug



K2UYH's newly completed 20' parabolic reflector, constructed by the stress method (see Feb. '61 *The VHF Amateur)* on a polar mount.

*c/o Allen Katz, K2UYH, 48 Cumberland Avenue, Verona, New Jersey, 07462.



New 144 mc array at OE6AP in the Austrian Alps. Alois Pendl, who builds everything from antennas to v.h.f. receivers, also edits *UKW Berichte*, the largest v.h.f. monthly in the world. Worthwhile if you can read German.

and got our code speed above 13 w.p.m. so we could get the General and do serious v.h.f. work at the low end of two. And I guess a lot of us could do it again.)

'What makes you think that when (and if) the Techs get pushed up above 50.25 mc that there will be intercourse with those operating below that frequency? *(What makes you think we like the suggestion in the first place?)* On 2 meters right now there is a 'wall' at 145 mc. Techs don't tune below it and Generals don't tune above it (except those in traffic nets). I predict that the same conditions will exist on 6 meters; two different bands for all practical purposes. *(Sad, but true!)*

'I would not count too heavily on v.h.f. being peopled from the CB ranks in years to come. A $4 license fee plus tougher exams will keep them where they are. Only those 'who should have been hams in the first place' will brave the stiffer exam and part with the extra cash to 'come over to our side.' The F.C.C. is building an even bigger wall between the ham and CB'er." *(Dead wrong. F.C.C. figures will confirm that the greater percentage of new Techs today are coming through CB ranks—not Novice. The 27 mc segment is overflowing to say the least, and you can still take that Tech by mail. The facts are that the cost of being a CB'er is $8.00, compared to only $4.00 for getting a ham ticket. By eliminating Novice 'phone privileges, you only insure the direct transition from CB to Tech.)*

'Many Generals (and higher) will just about give up most of their hamming if these new regs go through." *(Hogwash. If anything, most hams today—judging by the current amateur press and official letters from concerned hams to the F.C.C.—are in general support of Docket 15928, with a few modifications. Communications publications are reporting a gradual upswing in amateur buying since the F.C.C. made clear their intentions.)* Therefore, the v.h.f. population will be trimmed down somewhat. The quality should be higher, I agree, but the numbers less.

'Building of gear will decline (I'm sorry to say) for two reasons: lack of parts (they are getting harder to get) and lack of funds for those parts one can get. Most will find it easier to buy gear "with three years to pay" than to lay out $100 cash for new parts when they want to build something. We 'amateurs' have been commercialized to the hilt! *(We agree, but what is your solution?)*

'We will never be able to return v.h.f. to the good ole days of the early 50's . . . too much has gone on since Commercial gear now fills too many shacks where once homebrew gear and converted SCR-522's rested. OSCAR has taken the fight out of many in the area of establishing new v.h.f. DX records (despite the ARRL ruling that OSCAR QSO's don't count for WAS/v.h.f.). The headlines, too, go to the moonbouncers while the guy with his homebrew 150 watts just reads about it and asks, 'What's left for me?' He feels as though the hobby has somehow passed him by. And he's right, it has! It belongs to the big boys now." *(So who are these mythical "big boys?" Are they people like K1HMU, K2QBW, W6DNG, W2AZL—the people you read about in this column—who homebrew everything? And what about* OSCAR*? Just because a handful of hams spend four years getting a workable satellite into orbit for the rest of hamdom, are we supposed to "give up" to "stop trying" or to resign ourselves to "headline" oblivion? No! Those v.h.f.'ers really worth their salt are taking advantage of the hobby's orbiting satellite by participating in the project. Your "guy" with his 150 watts just might be able to "hop the pond" with* OSCAR IV!

Oscar IV: What's Happening Now?

Late reports indicate that Oscar IV will probably be launched in early 1966. More details in this month's SPACE column. At present, the Project Oscar group (Foothill College, Los Altos Hills, Calif.) is requesting comments on what type satellite interested amateurs would like to see. Here at the VHF column, we want to

Air testing the PH-565 TV cameras at K7VQI. Equipment consists of a 17" Philco portable, the PH-565 camera with converter on top, and slide projector shining right into the ike. (See Al's letter on page 74 August column).

actively publicize all related news as it happens. This means you. Send in reports on who you are hearing through the satellite, what you have worked (if any), signal strength and pass data, etc. We will make every effort to compile and present this information on these pages.

432 Mc Moonbounce

Quite a few enthusiasts who missed the July 3rd opportunity for 432 mc DX took full advantage of the Puerto Rican extravaganza on July 24th. The 1000 foot reflector at Arecibo, was fired by KP4BPZ for amateur moonbounce communications over the total time that the moon was within range (something just over two hours), At this writing it is still too early to get reports on what was accomplished, but we should have details in time for next month's column.

Also in the works, by the way, is another story on the exciting u.h.f. picture in the U.S. under the influence of KP4BPZ. Look for this one.

The Syracuse VHF Roundup: October 2nd

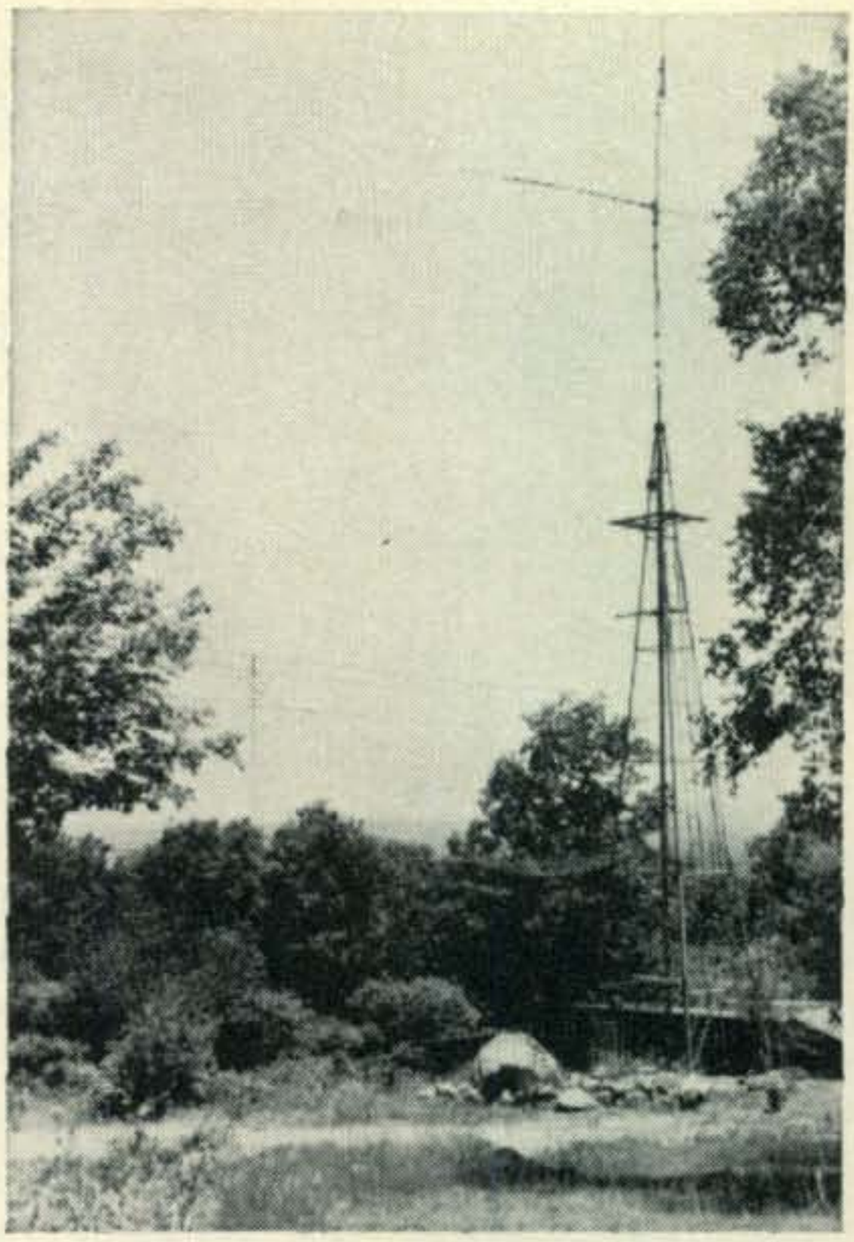
Last night Herm, K2AVA, chairman of this year's Syracuse VHF Roundup, called to see if he could get some hamfest details into this issue. (Good thing, too, because we're late getting the column in this month. Normally we must have our news in by the 20th of the second preceding month.) Although guest speakers are still being recruited at this date, it looks as if this year's Syracuse bash should be one to remember. High on the agenda are forums on moonbounce communications, Project Oscar, and the latest advances in ham TV.

Per usual, the fun will begin at approximately 10 A.M. at the Three Rivers Inn, located just above Syracuse proper, on Saturday, October 2. Tickets, which provide some fine entertainment and a dinner fit for a king, are $6.00 if ordered in advance, $6.50 if paid at the door. Herm suggested you write now to: Rein Madvere, K2OUE, 2217 East Colvin St., Syracuse 10, N.Y. Or phone K2OUE at (315) GI 6-6477. Even if you pay at the door, you must notify Rein to reserve your tickets.

We might mention for the uninitiated that the Syracuse VHF Roundup is the most well attended v.h.f. convention in the world. Enthusiasts fly in from all over the continental U.S. And we might add that we have had the pleasure of meeting many Europeans there in recent years. Be there.

From the Mailbag

Albert Edwards, KR6TAB, on v.h.f. in Okinawa: "KR6's have only two v.h.f. bands. They are six meters, 50-51 mc, with a 1 KW limit, and two meters, 144-148 mc, with a 50 watt limit. The six meter allocation to the KR8's is in the decision stage, but it is assumed that it will be the same as for the KR6's, and is to go into effect sometime in the next three months. *(V.h.f. men take note: In many places, especially those more technically advanced than ours which make use of telemetry, wide band data transmission, etc., the v.h.f.-microwave spectrum is in more demand than the low frequencies!)*



Shack at lower right belongs to co-columnist K2UYH and is located on a mountaintop (natch!) near Stockholm, N.J. Elevation: 1400 feet. Barely visible at left is the tower supporting the 11 el. 6 meter beam. Left of main tower is the new 20' dish, while large windmill-type tower supports a 24' yagi for 2 meters, topped by a 48 el. collinear for 432 mc.

'No DX of any consequence has been worked since this time last year, except for a few instances of E skip into Japan. However, it is expected that the upswing in sun-spot cycle will permit DX operations. The only DX worked (on six) last year were JA's and DU's with a couple of HM's heard only. It is hoped that by the fall we will be able to work the JA's and DU's consistently again. We're looking forward to possible contacts with VS6's, BV's, HM's and HL's. What about some data as to frequency allocations and power for these prefixes? *(What say? Can anyone supply some information to answer Ed's question?)*

'As a guide for stations to the south of us, the troposcatter station (54.2 mc) here on Okinawa can serve as a band-opening indicator, the same as we use the Phillipine tropo station on 49.6 mc and the Russian Channel 1 TV station in Vladivostok on 49.75 mc.

'On two meters, KR6's, FH, LA, RB, RV, TAB, TAD, and USA are active with AD getting ready. On six meters, there are KR6's, AD, CU, DB, DJ, EC, FH, FY, HT, IM, LA, MC, OE, QW, RB, TAB, TAD, TUH, UD, and USA.

'In regards to OSCAR III, we were rather disappointed. On March 31, we had our first official confirmation of launch, etc., via two ARRL bulletins." *(A week after Oscar III quit translating)* "However, no information was given regarding orbit data, except for launch date, time and in-

[*Continued on page 102*]

Propagation

BY GEORGE JACOBS,* W3ASK

SEPTEMBER is a month of changing shortwave propagation conditions. During the early part of the month, conditions tend to remain pretty much the same as they were during the summer months. Towards the end of the month, however, typical wintertime propagation conditions begin to be noted.

Wintertime propagation, as compared to summer conditions, is characterized by higher usable frequencies during the daylight hours, lower usable frequencies during the hours of darkness, lower static levels, generally stronger signal levels, and considerably fewer sporadic-E short-skip openings.

During September, improved propagation conditions are forecast for 10, 15 and 20 meters during the daylight hours, and on 40, 80 and 160 meters during the hours of darkness. Twenty meters is expected to continue to be the best band for worldwide DX openings from dawn until well past sundown, with 15 meters a close second, especially during the afternoon hours. An increased number of 10 meter DX openings is forecast for September, as the band begins to show signs of life with rising sunspot activity.

Forty meters is expected to be the best band for DX propagation conditions during the hours of darkness, with some fairly good openings also forecast for 80 meters. Some 160 meter DX openings may also occur during this period, especially toward the end of the month.

On September 23rd the autumn equinox occurs. This is the day on which the sun crosses the equator on its apparent travel towards southern skies. On this date, day and night throughout the world are of equal length. This solar event has significant influences on shortwave radio propagation conditions. During the autumn equinoctial period, there is generally a noticeable improvement in propagation conditions on long radio paths, extending from the northern to the southern hemisphere (for example, from the United States to Australasia). This improvement takes place on all h.f. bands, and lasts about a month. During this time ionospheric absorption is low, static levels are low and signal levels are high. A similar improvement in conditions also takes place during the spring equinox period.

This month's *CQ* Propagation Charts contain a detailed forecast for short-skip openings between distances of approximately 50 and 2300 miles, as well as forecasts for Alaska and Hawaii. These forecasts are valid for September and October. See last month's column for a band-by-band forecast of DX conditions for September.

*11307 Clara Street, Silver Spring, Md. 20902.

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for September

	Forecast Rating & Quality			
Days	(4)	(3)	(2)	(1)
Above Normal: **5, 9, 14, 20, 28-29**	A	A-B	B-C	C
Normal: **1-2, 4, 6, 8, 10, 12-13, 15, 18-19, 21, 24-25, 27, 30**	A-B	B-C	C-D	D-E
Below Normal: **3, 7, 11, 16-17, 22, 26**	C	C-D	D	E
Disturbed: **23**	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.

On the "Short-Skip" Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. Note the forecast rating for later use.

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 less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and 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 with considerable fading and noise; E—poor opening, or none at all.

4—This month's Propagation Charts are based upon a transmitter power of 75 watts c.w.; 150 watts s.s.b., or 300 watts d.s.b., into a dipole antenna one quarter-wave above ground on 160, 80 and 40 meters and a half-wave above ground on 20, 15 and 10 meters. For each 10 db increase 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—These Propagation Charts are valid through Oct. 31, 1965. These Charts are prepared from basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

V.H.F. Ionospheric Openings

The occurrence of sporadic-*E* ionization decreases considerably during September, but some 6 meter short-skip openings may still be possible over distances ranging between approximately 1000 and 1300 miles. Meteor activity is expected to be at a low level during the month, and few, if any meteor-scatter openings are expected to occur on the v.h.f. bands.

There is usually a seasonal increase in auroral activity during September and the fall months. Some v.h.f. ionospheric openings may be possible as a result of intense ionization which often accompanies auroral displays. Generally, auroral activity coincides with periods of ionospheric storminess. Check the "Last Minute Forecast" appearing at the beginning of this column for periods that are forecast to be disturbed during September.

Sunspot Cycle

The Swiss Solar Observatory reports a monthly sunspot number of 15.5 for June, 1965. This results in a 12-month smoothed sunspot number, upon which the sunspot cycle is based, of 11.3 centered on December, 1964. This represents a rise of one sunspot number above November's level, as the new sunspot cycle increases slowly.

The following are the provisional 12-month smoothed sunspot numbers reported for 1964

Jan.	19.5	May	10.9	Sept.	10.0
Feb.	17.8	June	10.2	Oct.	9.7
Mar.	15.4	Jul.	10.3	Nov.	10.3
Apr.	12.7	Aug.	10.2	Dec.	11.3

A smoothed sunspot number of 25 is forecast for September, 1965.

CQ DX Contest Special

According to W1WY, *CQ*'s Contest Editor, the following dates have been selected for the 1965 *CQ* Worldwide DX Contest:

October 23-24 Phone Period
November 28-29 C.W. Period

As has been the practice for the past fourteen years, next month's PROPAGATION column will be devoted to a special forecast for the Contest periods.

73, George, W3ASK

CQ SHORT-SKIP PROPAGATION CHART

SEPTEMBER & OCTOBER, 1965

AT PATH MID-POINT
(24-HOUR TIME SYSTEM)

Band Openings Given In Local Standard Time

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	09-13 (0-1)	07-09 (1) 09-13 (1-2) 13-21 (0-1)	07-09 (1-0) 09-11 (2-0) 11-13 (2-1) 13-17 (1) 17-21 (1-0)
15	*Nil*	07-09 (0-1) 09-13 (0-2) 13-21 (0-1)	07-09 (1) 09-13 (2) 13-17 (1-2) 17-21 (1) 21-07 (0-1)	07-09 (1) 09-15 (2) 15-17 (2-1) 17-19 (1) 19-07 (1-0)
20	*Nil*	07-09 (0-1) 09-11 (0-2) 11-14 (0-4) 14-16 (0-3) 16-18 (0-2) 18-07 (0-1)	07-09 (1-2) 09-11 (2-4) 11-14 (4) 14-16 (3-4) 16-18 (2-4) 18-20 (1-3) 20-22 (1-2) 22-07 (1)	07-09 (2) 09-13 (4-2) 13-15 (4-3) 15-18 (4) 18-20 (3) 20-22 (2) 22-00 (1) 00-05 (1-0) 05-07 (1)
40	07-09 (0-2) 09-11 (2-4) 11-15 (3-4) 15-17 (2-3) 17-19 (1-2) 19-21 (0-1)	07-09 (2-3) 09-11 (4-3) 11-15 (4-2) 15-17 (3) 17-19 (2-4) 19-21 (1-4) 21-23 (0-3) 23-02 (0-2) 02-05 (0-1) 05-07 (0-2)	07-09 (3-2) 09-11 (3-1) 11-15 (2-1) 15-17 (3-2) 17-19 (4-3) 19-21 (4) 21-23 (3-4) 23-02 (2-3) 02-05 (1-2) 05-07 (2-4)	07-09 (2-1) 09-15 (1-0) 15-17 (2-1) 17-19 (3-2) 19-23 (4) 23-02 (3-4) 02-05 (2-3) 05-07 (4-2)
80	06-08 (3-4) 08-21 (4) 21-03 (3-4) 03-06 (2-3)	06-08 (4-2) 08-16 (4-1) 16-18 (4-2) 18-21 (4-3) 21-03 (4) 03-05 (3-4) 05-06 (3)	06-08 (2-1) 08-16 (1-0) 16-18 (2-1) 18-21 (3-2) 21-03 (4) 03-05 (4-2) 05-06 (3-2)	06-08 (1) 08-16 (0) 16-18 (1) 18-21 (2) 21-03 (4-3) 03-06 (2)
160	16-18 (1-0) 18-20 (2-1) 20-05 (4) 05-07 (3-2) 07-09 (2-1) 09-11 (1-0)	17-19 (1-0) 19-20 (1) 20-02 (4-3) 02-05 (3-2) 05-07 (2-1) 07-09 (1-0)	19-20 (1-0) 20-22 (3-1) 22-02 (3) 02-05 (2-1) 05-07 (1)	20-22 (1-0) 22-02 (3-2) 02-05 (1) 05-07 (1-0)

*GMT or Z Time is 5 hours *ahead* of EST; 6 hours *ahead* of CST; 7 hours *ahead* of MST; 8 hours *ahead* of PST; and 9 hours *ahead* of Alaskan Standard Time in the zone between Skagway and 141 degrees west longitude, etc.
†Hawaiian Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST; 2 hours *behind* PST and 10 hours *behind* GMT.
§Indicates possible 10 meter openings.
‡Indicates possible 160 meter openings.

HAWAII

Openings Given In Hawaiian Standard Time†

TO:	*10§/15 Meters*	*20 Meters*	*40 Meters*	*80/160‡ Meters*
Eastern USA	09-12 (1)§ 07-12 (1) 12-13 (2) 13-15 (3) 15-16 (1)	03-05 (1) 05-07 (2) 07-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-19 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-04 (1)	18-20 (1) 20-23 (2) 23-02 (1) 21-01 (1)‡
Central USA	09-10 (1)§ 10-12 (2)§§ 12-13 (1)§ 07-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	05-06 (1) 06-08 (3) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (4) 17-18 (2) 18-19 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1)	18-20 (1) 20-01 (2) 01-03 (1) 21-02 (1)‡
Western USA	09-11 (1)§ 11-13 (2)§§ 13-14 (1)§§ 06-07 (1) 07-09 (2) 09-12 (4) 12-13 (3) 13-15 (2) 15-17 (1)	06-07 (1) 07-10 (3) 10-14 (2) 14-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	17-18 (1) 18-19 (2) 19-00 (4) 00-03 (3) 03-06 (2) 06-08 (1)	18-20 (1) 20-22 (2) 22-03 (3) 03-04 (2) 04-06 (1) 20-23 (1)‡ 23-02 (2)‡ 02-04 (1)‡

ALASKA

*Openings Given In GMT**

TO:	*15 Meters*	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	21-23 (1)	18-21 (1) 21-00 (2) 00-02 (1)	08-12 (1)	*Nil*
Central USA	21-01 (1)	18-22 (1) 22-01 (2) 01-03 (1)	08-13 (1)	*Nil*
Western USA	20-21 (1) 21-23 (2) 23-02 (1)	17-18 (1) 18-22 (2) 22-01 (3) 01-02 (2) 02-04 (1)	08-11 (1) 11-14 (2) 14-16 (1)	11-14 (1)

the USA-CA PROGRAM

BY ED HOPPER,* W2GT

THE BIG stories for the month are: The number two USA-CA-3000 Award issued to WØMCX; a new award hunters club, The National Award Hunters Club; and two new state counties awards, Iowa and Utah.

Yes, #2 USA-CA-3000 Award, endorsed mixed, went to Arthur, WØMCX who also received all 7 mc 2 × s.s.b. endorsements for his USA-CA-500, 1000, and 1500 awards. Jim, WA4MGC received USA-CA-1500 Award endorsed all s.s.b., and a mixed USA-CA-1500 Award went to Claude, K4VRI. Mixed USA-CA-500 Awards went to Art, K1KCN; Jerry, W2KXL; Leslie, K4ZCP and James, W7BNV/K7JRE. The first USA-CA-500 Award endorsed all 160 meters went to Willie, W8GDQ. A USA-CA-500 Award, endorsed all A-3, went to Reid, W9JWT. The second USA-CA-500 Award to the State of Delaware went to Don, K3VSV, endorsed all A-1, and this was award #23 to the third call area. Gerald, KØQIX received a USA-CA-500 Award endorsed all A-1. Congratulations to all.

New Honor List

The New Honor List, starting in October *CQ*, should show the actual *claimed confirmed* counties, so if you feel you should be in this Special Honor Roll, send me your latest list (By number only) of *confirmed* counties. Good luck.

Massachusetts QSO Party

All amateurs are invited to participate in the annual Massachusetts QSO Party, sponsored by the M. I. T. Radio Society, W1MX, in order to promote friendship and operating ability among the amateurs of the world and to help with needed counties for the many New England Awards.

The party will begin at 2300 GMT on Saturday, October 2 and end at 0500 GMT on Monday, October 4.

Certificates will be awarded to the highest scoring station in each state, province, and Massachusetts county. Additional awards will be issued, if, in the opinion of the Contest Committee, the number of entries from an area warrants them.

For scoring, log and frequency details, see CONTEST CALENDAR by Frank Anzalone, W1WY or send s.a.s.e. to MIT Radio Society, W1MX, Box 558, 3 Ames St., Cambridge, Massachusetts 02139.

*103 Whitman St., Rochelle Park, New Jersey, 07662.

USA-CA HONOR ROLL

3000

K9EAB 1
WØMCX 2

1500

WA4MGC 36
K4VRI 37

500

W2KXL 499
W8GDQ 500
K1KCN 501
W7BNV/K7JRE 502
W9JWT 503
K3VSV 504
K4ZCP 505
KØQIX 506

Every effort is being made to get some stations active from the rare counties like Nantucket, Dukes and Franklin.

County Identity

Alfred Vasko, W8FRD, 208 S. Main St., Swanton, Ohio 43558, writes: "I work in the local post office and will help anyone who wants county locations for USA-CA and other awards. Wonder if any of your Canadian readers would help me on a few towns in Canadian counties?".

Others willing to help identify counties include: Bertha Farr Eggert (Mrs. R. W. Eggert, Sr.), WA4BMC, 1510-17th Ave., N., Lake Worth, Florida 33460. Raymond A. Forman, W5EMZ, 706 Comer St., Carthage, Texas 75633. Dick Hade, K9HSK, 132 South Euclid Ave., Princeton, Illinois 61356.

If any of you have obtained a new P.O.D. #26 and want to send your old one to a needy DX county hunter, let me know and I will send you the name and address of such a county hunter.

Letters

Carl W. Reed, WØKZZ, writes: "Just a short note to thank you so very much for the very fine article and boost to our 7.223 kc county hunter net and the job they did in my behalf on March 17-18 'Operation Snow-bound'."

Ned, W1RAN/FP8BX/DL4II, writes: "Thoroughly enjoy your column. Lack of editorializing is refreshing".

Many letters received about USA-CA rules. Send me an s.a.s.e. and I will be happy to send a copy of the latest rules that appeared on page 75 of January *CQ* (Now out of stock).

The National Award Hunters Club

Purposes: To promote interest in award hunting activities and forming of chapters throughout the nation. To give recognition to amateur radio operators for unusual achievements in many fields of radio operation. To set forth locally,

SPECIAL USA-CA HONOR ROLL TOP TWENTY-FIVE COUNTY HUNTERS

3000
K9EAB
WØMCX

2500
K8CIR
K4VOF
K5SGJ
K5SGK
WØJWD
VE3-9301
K8IWI
WA9AJF

2000
K9UTI
W5EHY
WA8EZW
K8KOM
W8UPH
WØKZZ
K8VSL
K8YGU
WØVFE
W9CMC
W5NXF

1500
K4BAI
W6KG
KØHUU
W9HAS

Worked All Missouri

Utah All-County Award

Potomac Basin Award

nationwide, and worldwide, contributions provided by amateur radio operators in the science of communications and to create understanding and good will.

Membership: Full members composed of 15 award hunter credits. Associate members with less than 15 credits, this to include s.w.l. for full membership and associated members. Non members applying for award will get a NAHC number with the letter C after it, upon becoming a full member a new certificate will be issued at no cost. Only full dues paying members have voting rights. S.w.l. to become full member upon payment of dues.

Dues: Lifetime membership $2.00. OM-XYL teams $3.00. OM-jr. Op $3.00. All certificates GCR and $1.00.

NAHC Awards Program: All awards count 2 points only if endorsed for band and mode of operation, otherwise 1 point. Most awards 1 point, such as: ROHO, REBEL, RCC, ARRL Appointments or ARRL awards (except DXCC), *CQ* Century Club Award (One point per year), B.P.L. one point each year, contest awards, amateur license. County awards in steps, basic if endorsed band and mode, 2 points, each seal 1 point. All awards earned on v.h.f. from outside USA count 4 points (Awards from Canada, KP4, VP land, etc.). No date nor time limits on contacts.

President: Jerry Medlin, WB2FEQ, 47 Hicks St., Brooklyn, N.Y. 11201.

Awards Manager: Harry Smith, WA2SAZ, 108-24 71st Ave., Forest Hills, N.Y. 11375.

Send s.a.s.e. to either for any additional information or membership application.

Membership Award: Basic award 15 credits with seals for 50, 75, 100, and 150 credits.

National Award Hunters Net: Basic award for having signed into, and helping to support the NAH Net on ten Sunday mornings between 1000 and 1100 hours on 50.400 megacycles with additional seals for 25 and 50.

National Award Hunters Achievement Award: Endorsed for band and mode and seal for contacting 25 members.

Awards

Iowa County Award, The Ornate Order of Bloodshot Eyeballs is very happy to sponsor a much needed county award for Iowa. Basic award for confirmed contacts with 25 counties in the state of Iowa. Seals for 50, 75, and 99 counties. No limitations as to date, mode or band. Portable or mobile contacts to show county or city on QSLs. Submit alphabetical list by county, showing station, band, mode and date. USA-CA rules apply, GCR, applications certified by two other amateurs; award custodian reserves right to request any or all QSLs. Applicants send 50 cents or 5 IRCs for certificates. For Seals send s.a.s.e. or IRC. Award Custodian: John Pudans, WAØAWA, 3027 E. State Ave., Des Moines, Iowa 50317.

Utah All-County Award, The Utah Ham Boosters, Limited, and the Northern Utah Amateur Radio Club, of Brigham City, Utah are pleased to announce the availability of a Worker All County Utah Award. This award will be presented to anyone for confirmed QSOs with all 29 counties in Utah. Any type of emission, any date, etc. are permitted but all 29 counties must be submitted at one time. GCR or QSLs will be accepted, cost is $1.00 and no charge for other endorsements. Send alphabetical list with QSLs or GCR and fee to custodian, A. David Middleton, W7ZC, Box 303, Springdale, Utah 84767. Net profits from awards go into an award for

Iowa County Award

Eyewink Award

NAH Net Award

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DICK

Actual Size

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Actual Size

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Your choice of many different colors on your personalized badge. Ideal to wear at conventions and jamborees.

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12 White with Black Letters	**20 White with Red Letters**
13 Red with White Letters	**22 Green with White Letters**
14 Blue with White Letters	**23 White with Blue Letters**

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National Award Hunters Club Membership Award

A.6.Z. Canadian DX Club

New England CHC Chapter #32 Counties Award

meritorious Ham activities by some Utah Amateur.

WAM, The Worked All Missouri Award, issued by The Southwest Missouri Amateur Radio Club. Inc. Here are the new rules for the new and improved Worked All Missouri Counties Award. It is available with the Basic and four additional endorsements for confirmed contacts with Missouri counties. The Basic is still 35 confirmed counties, but new endorsements are for 55 counties (Class C), 75 counties (Class B), 95 counties (Class A), and for all 115 counties (Class AA). For those who win the AA Class endorsements of the award, we will also include an honory membership to SMARC. The award is available to all amateurs everywhere in the World and is issued to them regardless of calls held, operating QTH's, bands modes, or dates. Also available to s.w.l.s on heard basis. To apply send list signed by two other amateurs (GCR), stating that you have the necessary confirmations, to the Awards Chairman, Don Mullen, KØHUU, Route 4—Box 955, Springfield, Missouri 65802. Cost of award is $1.00 or 7 IRCs for new application with any number of endorsements, or the basic award. Additional stickers will be furnished at no extra charge except for s.a.s.e. (Or IRC). For those who have the original certificate a new one will be furnished to them or any higher endorsements for a charge of 50¢ or 3 IRCs. *Important*—At least one half of the confirmed contacts must be fixed stations for any class of this award. Do not send QSLs, but the custodian, as usual, reserves the right to request any or all QSLs.

PBA, The Potomac Basin Award sponsored by the Catoctin Amateur Radio Club for working counties within the Potomac River Basin. 39 counties and the District of Columbia are involved: Virginia Counties of Arlington, Augusta, Clarke, Fairfax, Fauquier, Frederick, Highland, King George, Loudoun, Northumberland, Page, Prince William, Rockingham, Shenandoah, Stafford, Warren and Westmoreland. Maryland counties of Alleghany, Carroll, Charles, Frederick, Garrett, Montgomery, Prince Georges, St. Marys, and Washington. West Virginia counties of Berkley, Grant, Hampshire, Hardy, Jefferson, Mineral, Morgan and Pendleton. Pennsylvania counties of Adams, Bedford, Franklyn, Fulton and Somerset. The Potomac Basin Award is issued in the following classes: Second figure for DX and KL and KH are considered DX for award requirements only.

	Virginia	Maryland	West Virginia	Pennsylvania
Class C	6/4	3/1	3/1	2/1
Class B	12/6	6/2	6/3	3/2
Class A	18/12	9/5	8/5	5/4

Substitute Washington, D.C. for any missing county—once only. Charge $1.00 or 10 IRCs to US, Canada, KL and KH. DX send 3 IRCs. No band endorsements. Apply to John M. Ciganek, W4GYP, RTE 1, Box 380, Leesburg, Virginia 22075. GCR rules apply (No QSLs.) "Note: John is the new custodian of the **TCA,** Twin County Award, described in June *CQ*."

A.6.Z. Award, issued by the Canadian DX Club, 160 Tecumseh Ave., East, London, Ontario, Canada, to all hams and s.w.l.s anywhere in the world who can meet the rules. The "A.6.Z." is basically an alphabet-type award, standing, briefly, for "A to Z in 6 bands". The 6 bands being 10, 15, 20, 40, 80, 160 meter amateur bands. The "A to Z" represents the first letters of the names of the countries, and while there are 26 letters in the alphabet, the letter "X" was eliminated as there is no country beginning with that letter. So, we end up with 25 letters. The 6 bands, when multiplied by the "25" gives a possible total of 150 points. The classes of the award are based on different figures of points. To obtain your score, figure how many letter-countries you have on each of the 6 bands, add them up, then apply for the class of award you can claim. The classes are: Basic for 50 points, "C" for 75 points, "B" for 100, and "A" for 150. Each class is a separate certificate and the cost is 35¢ or 4 IRCs per class. You can, however, apply for, say, Class "B", and you will receive credit for basic and "C" as well. Hams or s.w.l.s

[*Continued on page 104*]

NAHC Award for Outstanding Achievement

HAM CLINIC

CHARLES J. SCHAUERS,* W6QLV

OVER the years we have frequently read in radio amateur publications of the disregard by *some* amateurs of operating rules and regulations. Sometimes these offenders have received FCC citations or had their licenses taken away, but it seems that a number of inconsiderate hams did not get the message.

A ham is supposed to use only as much power as is required for a contact—and no more. However, listening to *some* hams in the U.S. making *local* contacts (especially on 20 meters using a full kw) leads me to believe that these hams are not *real* radio amateurs but an inconsiderate, selfish and narrow group of individuals.

The other evening I heard a "W" working a friend on 20 meters cross town. Both of these hams were using 1000 watts and were putting a beautiful signal into Europe (here). They disrupted a QSO between a "G" and a DX station. Why didn't these two hams in the U.S. use 2 meters, or even 40 or 80 meters? You tell me!

Then there is the guy who busts into a pile-up on a DX station after the DX station has explicitly stated that he would only answer calls from Europeans for a 10 minute go-round, then would call on North American stations, followed by other call areas. I wish I could put the calls of these stations here but it would do little good, for these hams more than likely could not be shamed into operating properly.

So much has been written about long tune-ups on the air that I am reluctant to mention the subject here, but long tune-ups using oscillators or whistling into a mike occur every day. Causing needless QRM is a rule violation too. Every station should use a dummy antenna for tune-ups which require more than a few seconds.

I could go on and on about ungentlemanly behavior on our ham bands but will not—I only hope that the points I have made are read by those who do offend.

Cut your power for local contacts on the DX bands that are open. Be *considerate* and adhere to the rules and regulations.

Extra Class Questions

It is quite evident to me from the mail received that many serious minded U.S. hams are beginning to study for the extra class license examination. Wonderful! Some of the questions received from potential extra-classers are "lulus."

To make the examination easier I suggest that hams use not only available Q&A books specifically written for ham examinations but to obtain the commercial Q&A books available. The latter are more explicit and cover areas which the ham books just gloss over.

When I took the extra class examination in 1952 I used only the commercial book which I had used some years before for the commercial examinations.

As of June 1965 there were only about 3700 extra class licensees out of a total of about 272,000 hams in the U.S. No the exam is not easy!

Questions

GSB-201 Linear Modification—"I have a Gonset GSB-201 linear which is giving me good service. I wonder if there are any modifications out on this set which are worthwhile to make?"

Yes. Write Gonset Inc. 1515 S. Manchester Ave., Anaheim, California for their bulletin "Diode Bridge Modification for GSB-211." This bulletin describes the change necessary to the bridge rectifier to provide a needed margin of safety required for operation at 2kw PEP on s.s.b. The modification to the bridge will increase the P.I.V. to 4800 volts and may be accomplished without removing the rectifier board from the unit. This modification entails the installation of additional diodes and removal of the resistors formerly paralleling the bridge diodes.

903A and 913A 2M & 6M Linears—Gonset bulletin 525-039 describes the addition of a meter shield on the models 903A and 913A 2 and 6 meter linears. You who own the sets can get the bulletin by writing Gonset at the address given above.

Oscillator Filament Transformer—"You advocate using a filament transformer continuously connected to the line to keep the oscillator tube filament on in a radio receiver. The receiver I have has very little space in which to mount anything but a real small transformer. Can you recommend a small unit?"

Yes. Try Stancor's P-6465 (6.3v at .6 amp), $1.91 through Lafayette Radio or try Engineering Associates 434 Patterson Road, Dayton 9, Ohio who offer new surplus transformers 2"×2"×2⅝" (6.3 volts at 0.9 amp), $2.00 plus postage as long as they last. When you mount that filament transformer, make sure you mount it so that it will not induce hum into your audio system and is *not* near frequency determining components. Small transformers do get warm.

Vertical Antenna Radials—"I plan to mount a vertical on top of our apartment house. The roof is flat and is covered with copper sheeting. Will I still need radials?"

No, as long as you ground the copper sheet, but this may be a problem too for it may take a long heavy (No. 6 or so) copper wire. Even if it already seems to be grounded through

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

ventilator pipes etc., I suggest you add another good ground.

SR-150 v.r. Replacement—"How about my replacing the OA2 v.r. tube in my SR-150 with a good zener diode?"

You are talking about V_{12}, the tube that regulates voltage for a number of important circuit functions. I do not recommend replacement in this case. The SR-150 is rock-steady as is.

SB-300 60 Cycle Hum—"I am very happy with my SB-300 receiver but it does seem to have some 60 cycle hum in the a.f. output. I have tried replacing filter capacitors but this does not help. Any tips?"

Yes. Your hum is no doubt coming from the induced field from the power transformer to the a.f. transformer mounted underneath it. K6KA cured his by drilling two holes on the shield plate that is around the mode switch and used these to mount the a.f. transformer below transformer T_3 and tube V_7. Thanks Bill.

If bothered by 120 cycle hum, Heath has an authorized modification for this involving the addition of a resistor and electrolytic capacitor. K6KA cleared the 120 cycle hum up by using an a.f. choke, under 100 ohms and able to pass 100 mils and installed it in place of the 100 ohm resistor in the supply. The choke was mounted in the holes left over after removing the a.f. transformer.

Viking KW Rectifiers—"I own a Viking KW amplifier and would like to know what you think about replacing the 872 tube rectifiers with silicon diodes. What say?"

I think it is a fine idea and why not replace the other two small rectifiers at the same time? Your change will reduce heat and up efficiency.

HT-37 Vox Trouble—"My HT-37 vox stopped operating. What do I look for to find the trouble? The set is second hand and I have no instruction book."

First get yourself an instruction book. Next check tubes V_{13}, V_{14} and V_{15}. If these check out okeh, then check pots R_{42} and R_{49} as well as coupling resistors R_{44} and R_{47}. Check the vox relay Ry_1 last.

Super-Pro Power Supply—"I bought an old super-pro sometime ago and the set has worked fine for me but all of a sudden it quit. I found a blown fuse so I replaced it. When I turned on the set I was watching the tubes in the power supply and noted that there was a lot of flashing in the 5U4G, then a second or two later, the second fuse blew. What do I do?"

Unplug the power supply from the receiver and a.c. Short out the bleeder resistors with a well insulated screwdriver, or short out the filter capacitors to ground. Then disconnect each filter

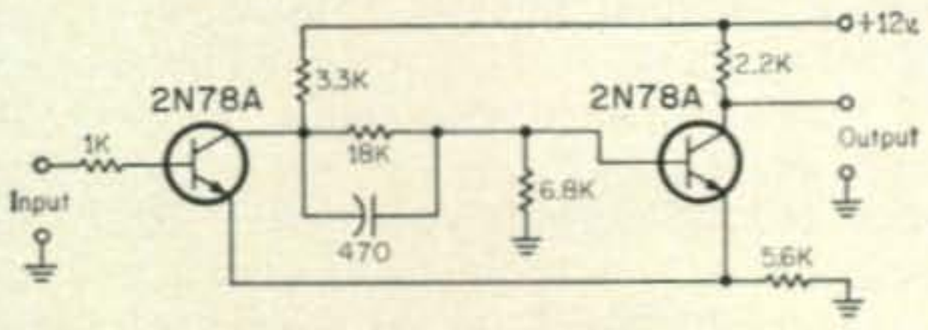
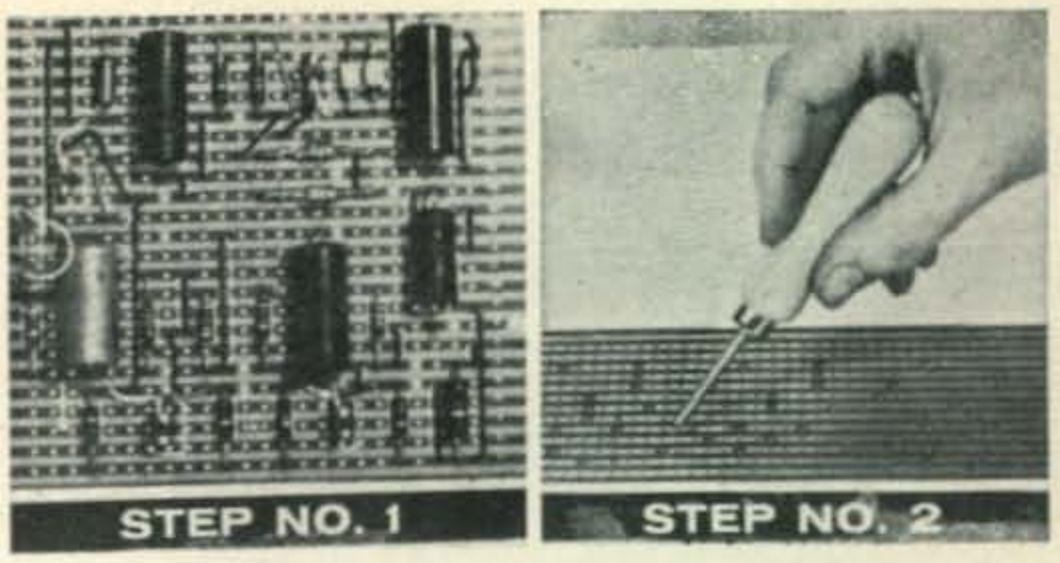


Fig. 1—Schmitt Trigger having a range of 0-1 mc.



Two-step Veroboards make project construction easy.

capacitor and using an ohmmeter on medium scale check for a shorted capacitor—bet you have one, or a shorted bleeder. Your set could also have a shorted high voltage line either through a by-pass capacitor or tube elements.

Ready Circuit Boards—Whenever we can, we always try out a new product that will help us in our equipment construction efforts. Recently, we tried out a Model BK-6 Veroboard circuit kit with excellent results. It is a two-step kit. Components are located on the board (pushing connecting leads through the holes provided in the copper strips containing holes in line), then with the Vero spot-face cutter provided, the circuit is broken where required and components soldered in. Wire leads are used where necessary for some cross-over connections. The job is neat and quick. For further information drop a line to Vero Electronics Inc. 48 Allen Blvd., Farmingdale, N.Y. Their basic kit containing 6 Veroboards, cutter and instruction sells for $5.95. It is a good investment.

3-1000Z Linear—"I was given a couple of 3-1000Z tubes. Now I want to build a linear around them. How about sending me full design and construction information?"

I'm sorry. As I have said before, we simply do not have the time available to do design work on a personal basis. I suggest you consult the *ARRL Radio Handbook* 42nd Ed. 1965 and look at pages 214 through 219. You only need *one* 3-1000Z for legal power with the fine amplifier described.

Converter for 432 Mc—"Please recommend a construction article to me on a crystal controlled 432 mc converter using nuvistors."

Sure. See pages 416-418 of the book mentioned in the last question above.

1Mc Schmitt Trigger—"Please publish a transistorized circuit for a Schmitt trigger that has a range from 0 to 1 mc. I have only 12 volts available for its operation along with other components for a school science project I am working on. Thank you!"

I like the last two words of your request—don't see them too often these days believe it or not.

See fig. 1 for the circuit which should suit you fine. It has a range of 0 to 1 mc; the output at the collector has a 2 volt minimum change level; Q_1 always conducts if the input exceeds 6.8 volts and Q_2 always conducts if the input is below 5.2 volts. Its ambient temperature range is from 0°C to 71°C.

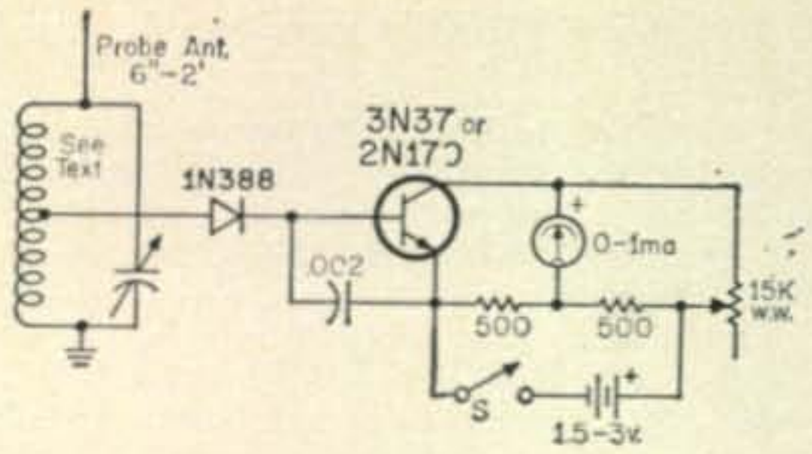


Fig. 2—A field strength meter. Any good NPN transistor will work fine.

For those of you who do not know what a Schmitt trigger is, it is a regenerative bistable circuit whose state depends on the amplitude of the input voltage. For this reason, it is useful for waveform restoration, signal level shifting, squaring sinusoidal or non-rectangular inputs and for d.c. level detection. Transistors which can be used in addition to those shown in the diagram are: 2N1217, 2N169A and 2N1694.

Tube Equivalents—"Please, what are the equivalents for the following European tubes: EBC-91, EC-84, U-50, U-52 and ED-2?"

In order: 6AV6, 6AJ4, 5Y3, 5U4 and 6AL5.

Soldering Irons—"I know that more articles have been written on soldering irons and soldering than just about any other subject, but I have not seen too much on selecting and using a soldering iron for printed circuit work. Tell me, what iron do you use and do you have any tips?"

Yes. I have a collection of soldering irons—from the biggest to the smallest and picking the correct one for a specific job is not always as simple as it looks.

For printed circuit work I generally use the Wall Economaster soldering pencil which sells for $4.95. This little iron *is* rugged, has a very cool handle, is light, fine balance and its tips are easy to change. The one I use is known as the model 6316, 30 watts and the tip size is 3/16". For information on this bargain iron, drop a line to G. M. Nagel, Sales Dept. Wall Mfg. Co. Grove City, Penn. 16127. I have not found a better iron for miniature work.

One of the mistakes the novice generally makes when soldering printed circuit boards is using *too much* heat. The heat causes buckling of the copper facing and weakens the metal. For quick and stable connections the copper on the board must be *clean*. A little ordinary vinegar wiped on and wiped off will do wonders. Never "pile" soldered connections—it is much better to solder two or more connections to the same spot simultaneously; this way you are sure that there will be no cold soldering.

Using too little heat is about as bad as using too much. When you pick your iron make sure that it will *fit* the job. The iron I described above can do about 98% of all of my circuit board soldering without fear of either too much or too little heat. One last tip: keep the iron tip clean. For this I use a small steel wool pad and/or non-corrosive (non-acid) flux which is wiped off the iron with a soft cloth (before soldering).

Field Strength Meter—"I would appreciate it very much if you would print a diagram of a good field-strength meter which is inexpensive and works. Tell me about calibration too."

See Figure 2. The field-strength meter (FSM) shown is a good one and requires only one transistor. It should be built in a metal case. It can be used for adjusting beam antennas, transmitter tune-up and as a monitor by connecting a pair of phones in series with the collector and the meter. If you use plug-in coils, make certain that one is plugged in before turning the unit on or your meter may be damaged.

No tuned circuit values are given on the diagram. One need only to employ the coil available with the correct variable capacitor. However, for those who desire to cover 10, 15 and 20 meters, try 6 turns of No. 22 enameled wire on a one inch form spaced so that the coil covers just a little over a quarter of an inch on the form. Tap the coil at 1½ or 2 turns. Use a 100 mmf variable capacitor.

The antenna probe can be from 6 inches to two feet long depending on the sensitivity required—the latter length being used perhaps for checking out a beam antenna some distance away from the antenna location.

Calibration of the unit can only be "relative." It being a proportional device, the stronger the signal the more deflection obtained. One could with the proper lab instruments calibrate the unit to read in microvolts per meter, but again the reading would only be a relative one.

Using a miniature 0-1 meter such as is offered by Lafayette Radio their model 99G5052, for $2.95, one should be able to build the unit for around $6.00 or so. If Lafayette's 19G2702 NPN transistor is used (two for 59¢), the cost will be even less. These transistors are similar to the 2N170 units.

Miniature Scope Tube—"I'd like to build a transistorized scope and would like you to recommend a 1" or so tube to me that requires low filament voltage and current and has good deflection sensitivity. Help me out?"

Sure. Try Sylvania's Model SC-3016. It requires only 1.5 volts on the filament at 140 mils, and has high deflection sensitivity.

Code Practice Oscillator—"Yea, I'm one of the many U.S. hams now boning up to take the extra class examination and I need an inexpensive code practice oscillator which I wish to build myself. Can you help me (and I know

[*Continued on page 99*]

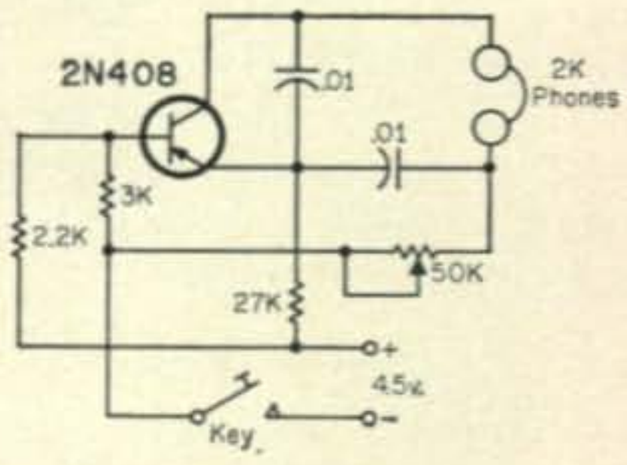


Fig. 3—An easy to build code practice oscillator. Other transistors that can be used are: 2N109, 2N362, 2N217, and 2N407.

SPACE COMMUNICATIONS

BY GEORGE JACOBS,* W3ASK

As this column is being written (July 25), the future of the radio transmitters aboard the OSCAR III satellite is uncertain.

The satellite itself continues to orbit the earth every 103.5 minutes, and is expected to do so for perhaps as long as 1500 years! The radio transmitters aboard the satellite, however, appear to have been silent since July 9. During June, the telemetry beacon on 145.85 mc operated intermittently, but was received with strong signals by many observers throughout the world. The c.w. beacon on 145.95 mc, which appears to have suffered some damage during the satellite's launch, was also reported to have been heard occasionally during June, but with very weak signals. According to reports received at OSCAR headquarters, the last station to copy OSCAR III was W6OJW in California who reports that he received signals from both beacon transmitters on July 9. It is possible that the satellite's transmitters will become active again, and all observers are urged to check reception regularly and report results immediately to OSCAR Headquarters if either of the beacon transmitters are heard.

First Asian Report

From a Tel Aviv newspaper, carrying the headline "Israel Enters Space Age," comes first word that a sucessful 2 meter contact took place between Israel and Bulgaria through the OSCAR III repeater during the two week period that the transmitter was active.

The radio amateurs involved were 4X4DH, operated by Bruno Bienenfeld of Tel Aviv and LZ1AG, believed to be located in Sofia. This is the first report received confirming an OSCAR QSO from an Asiatic station. It also indicates, considering the small radio amateur population of Bulgaria, a relatively high degree of interest in the OSCAR III satellite by radio amateurs in that country. LZ1AG is the third Bulgarian station reported to have been heard through the satellite, with LZ9RO and LZ1KBA reported previously by other observers.

Oscar IV

Progress continues towards the development of the next amateur radio satellite, OSCAR IV. At the present time, consideration is being given to the following possible versions for this satellite.

1. A preliminary review of the OSCAR III satellite data indicates that the translator sensitivity was less than hoped for and, generally speaking, only those radio amateurs equipped with high gain antennas and near kilowatt transmitters could utilize the relay capability of the satellite. One plan being considered for OSCAR IV is to use the same basic design as OSCAR III, but modify the translator to accept considerably lower power signals. In this version, the translator would receive signals on 2 meters and retransmit them on 2 meters, and both beacon transmitters would also operate on 2 meters.
2. In a program to create space communication interest in other amateur bands, another version under consideration would have the translator listen on 2 meters, but retransmit on 10 meters, with one beacon transmitter on 2 meters and the other on 10 meters.
3. Another version being studied would have the translator listen on 2 meters, but retransmit on 432 mc, with a beacon transmitter in each of these bands.
4. Also under consideration is a translator with improved sensitivity that would listen and retransmit in the 2 meter band, but would have beacon transmitters in the 432 and 1296 mc bands, in order to boost space communication interest in the u.h.f. bands.

OSCAR headquarters requests comments on the various versions now under consideration for OSCAR IV, as well as other suggestions that radio amateurs may have. Comments and suggestions should be sent as soon as possible to OSCAR IV, Project OSCAR Inc., Foothill College, Los Altos Hills, California, USA. Early 1966 has been set as a target for a hoped for OSCAR IV launch.

Progress is also being made on the possibility of European radio amateurs developing an OSCAR satellite. Bill Orr, W6SAI, of Project OSCAR headquarters, plans to meet in Europe during September with members of Euro-Oscar, an informal group of European radio amateurs who are planning to develop an amateur radio satellite. They'll be more information about Euro-Oscar in subsequent columns.

Bits and Pieces

Don't miss Bill Scherer's (W2AEF) excellent article entitled "The OSCALATOR—A Really Simple Satellite Locator," which appeared in last month's issue of *CQ*. For the space-listener and the radio amateur who wants to know where a satellite is, when its signals can be heard, and in what direction it will be coming from, without going through complex mathematical manipulations, the OSCALATOR is the answer. It is the "lazy-mans" satellite locator, and can be used simply to track not only OSCAR, but any satellite in space.

A few autographed copies of *Space Communications* by Stanley Leinwoll are still available. This book, the first written on the subject of space communications with the space-listener and radio amateur in mind, handles a complex subject in a simple-to-read, easy to understand language. Published by John T. Rider Inc. of New York, the 166-page soft-cover book can be obtained from your local bookseller or amateur radio supply house for $3.95. Copies autographed by the author are available for $3.95 postpaid by ordering direct from the Editor of

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this column (W3ASK). For more information about *Space Communications* see the review of this book in the October, 1964 SPACE COMMUNICATIONS column in *CQ*.

On April 29, the USA launched EXPLORER 27. This is the third satellite to be placed in orbit in the BEACON ionosphere research series. The satellite is collecting and transmitting information on the structure of the upper atmosphere, the layer of ionized gases that surrounds the earth and acts as an electrified mirror for long-range radio communications. EXPLORER 27 circles the earth every 107.8 minutes, and is inclined 41.2° to the equator. It transmits upon command on the following frequencies: 20, 40, 41, 136.739, 162, 324 and 360 mc.

PEGASUS 2, the second in a series of huge winged satellites used to measure meteoric activity in space was launched by the USA on May 25. PEGASUS 2 is at an inclination of 31.8° with the equator, and completes an orbit around the earth every 97.2 minutes. A telemetry transmitter aboard the satellite operates continuously on 136.890 mc, while a second transmitter operate only on command on 135.410 mc.

The third in a series of Interplanetary Monitoring Platforms (IMP) satellites was launched by the USA as EXPLORER 28 on May 29. The IMP series has been designed to study solar radiation. The satellite is in a highly elliptical orbit ranging between 120 and 158,000 miles above the earth. EXPLORER 28 is inclined 33.9° to the equator and completes an orbit every 142.6 *hours*. The satellite transmits telemetry information continuously on 136.125 mc.

73, George, W3ASK

HI8XL Provides Communication During Dominican Crisis

AMATEUR radio operators are often unsung heros who provide invaluable aid in time of fire, flood, disaster or dire human need.

Alfred A. (Fred) Laun III, HI8XAL, a junior U. S. embassy official in Santo Domingo, has recently added two new and unique chapters to this tradition by:

1—Becoming the first person in the history of the world to actually broadcast "live and direct from on-the-spot" the opening blasts of a genuine shooting war when the Dominican revolution was getting underway, Saturday, April 24, 1965.

2—Staying at the microphone, ignoring almost intolerable heat and dodging sniper fire for over a week while broadcasting official U. S. government messages.

Laun, a lanky six-foot plus graduate of the University of Wisconsin, and a native of Kiel, Wisconsin, has chosen a diplomatic career as his life's work. Saturday afternoon, on his own time he was "on the air" from his home in Santo Domingo talking to an old friend back in Wisconsin when combat broke out virtually at his front door.

The historic broadcast was an inadvertant event on Laun's part. He simply had the microphone switch "open" when rebels opened fire.

The entire broadcast consisted of approximately five-minutes of confused exciting background sounds, electrifying pauses and a small amount of rapid fire first person dialogue, according to Herman L. Greve, W9EWC, a Hilbert, Wisconsin, cheesemaker, who was in contact with Laun.

"Fred was coming in loud and clear," Greve says. "In the background I suddenly heard shooting, auto horns, explosions, shouting and confusion. Fred stopped talking. I could hear him shouting at someone who seemed to be yelling outside his house.

"The explosions continued and I knew something was wrong. Fred came back on the air and hurriedly told me, 'I can't tell you what's happening. I've got to shut down. Call me tomorrow.'"

"We didn't know what had happened until the radio news and newspapers brought us news of the Dominican revolution," Greve says.

The following day—(Sunday)—Greve and Laun, who is acting information officer for the field service branch, Latin American Division of the Voice of America in Santo Domingo, set

[*Continued on page 105*]

Fred Laun, HI8XAL, shown at the operating position he held during the onset of the Dominican revolution.

NOVICE

WALTER G. BURDINE,* W8ZCV

I USE my ham station to make friends. I enjoy hearing all about the new ham contact; what he does for a living, his family, his other hobbies and any thing he wants to talk about. I like to rag chew, none of these three minute contacts. When I say CUL, I really hope to contact him later. I like to get his QSL card as a memento of that contact so that I can always remember the QSO. If you think this is a lot of bosh, take your QSLs and go through them some time and just see how many of them bring back memories of those enjoyable QSOs of the past. In the last twenty years I have had to put black edging around many of my cards, that was the last QSO I will have with him. He was listed in Silent Keys. I fear too many of us are forgetting this phase of amateur radio and are not getting the most enjoyment for our time on the air.

I fear too many of us are collecting wallpaper (certificates or many of the so-called awards) and not really getting the most from our contacts. Every so often I just take some time and tune a band to see what is going on, and I really am amazed to find the change in the operating procedure that has crept into ham radio without our becoming aware of it. I rarely hear a single QSO without some jerk yelling *"Break, Break"* and butting in just because the fellow is in another county or something to do with another award. Actually the breaker did not even get the name of the new contact, he just added another call to his log. I am in favor of awards, but if I have to get it this way, I don't need it. If I can't get acquainted with the other fellow, provided he wants to get acquainted, I'll just find some other county or country and let him pile up his contacts. I figured if I ever got WAS, WAC, WAZ, DXCC, WBE and WAVE, I would be happy. I have WAS on ten meters, WAC on ten meters and WBE plus WAVE on multiple bands. I need two countries for DXCC and 6 zones for WAZ, all on phone with low power. I think I have made many friends in the process of getting the QSLs for these awards. The fact that I did not receive cards from the other 15 countries indicates that I did not impress them that I was really trying to be friendly, at least not enough to make them want to remember me with a card. I'll still work toward the awards by contacting someone else in those countries or get someone in another country. If I don't, I have still enjoyed my contacts very much. I have since added the USA-CA to my list of wanted awards and I'm sure I have enough cards for that one, at least the 500 county award. I should be able to have those on v.h.f. I like to rag-chew.

I think everyone should work all of the bands from 160 meters to 432 mc in order to get the most fun from their license and it need not be with high power to enjoy the QSOs they get. This is one way to sample the endless types of personalities that get on the air. If a new ham has a financial problem (who doesn't) he should try to build within one power level and use plug-in power supplies, and possibly one receiver with crystal controlled converters for the bands not covered by the station receiver. This type of operation gives double conversion for the bands that use converters and it cuts the initial cost of getting on the air. You can add a band as you can afford the extra equipment. I converted an automobile receiver and added a 20 meter Gonset converter. This combination was very sensitive and could be used for c.w. by either of two methods of introducing the necessary beat signal for hetrodyning the signal. One simple method of copying c.w. is to cause regeneration in the i.f. stage. This also increases sensitivity and the apparent selectivity of the set. Many methods are available to build a beat frequency oscillator from an i.f. transformer to beat with the incoming signal. The receiver was one taken from a 1951 Lincoln and it was very sensitive with good tone quality and selectivity. The conversion power was taken from the junk box and the only cost was the chassis. The speaker was a 6 × 9 unit. The dial was adequate for the unit and the converter was tuned to the 20 meter signal with its variable oscillator. It was bought at an auction for ten dollars. This made a very good receiver for less than twelve dollars and it also doubled as a good broadcast receiver. I will give you more dope on this in a future column. I want to build a crystal controlled converter. I have an idea for putting an oscillator on the crystal converter i.f. output for the beat frequency. This would keep you from having to cut in to the auto receiver i.f. stage and make coupling simpler. You see, I am trying to help the fellow who thinks it is too costly for him to be a ham. I know that there are hams in some of the other countries who use a.c.-d.c. sets with converters to get on the lower frequencies. They would be pleased to have a BC-455 or similar surplus receiver. *It is possible* to get on one band with a decent signal for fifty dollars and to work all around the country and the world. I think I'll try it and let you know with pictures and parts needed for the station along with the QSLs.

Utility Power Supply

Along with this idea, one of the handiest things around the new ham shack is a good power supply that will take care of all of the new station's power requirements, both receiver and transmitter. I think some of the ideas in this

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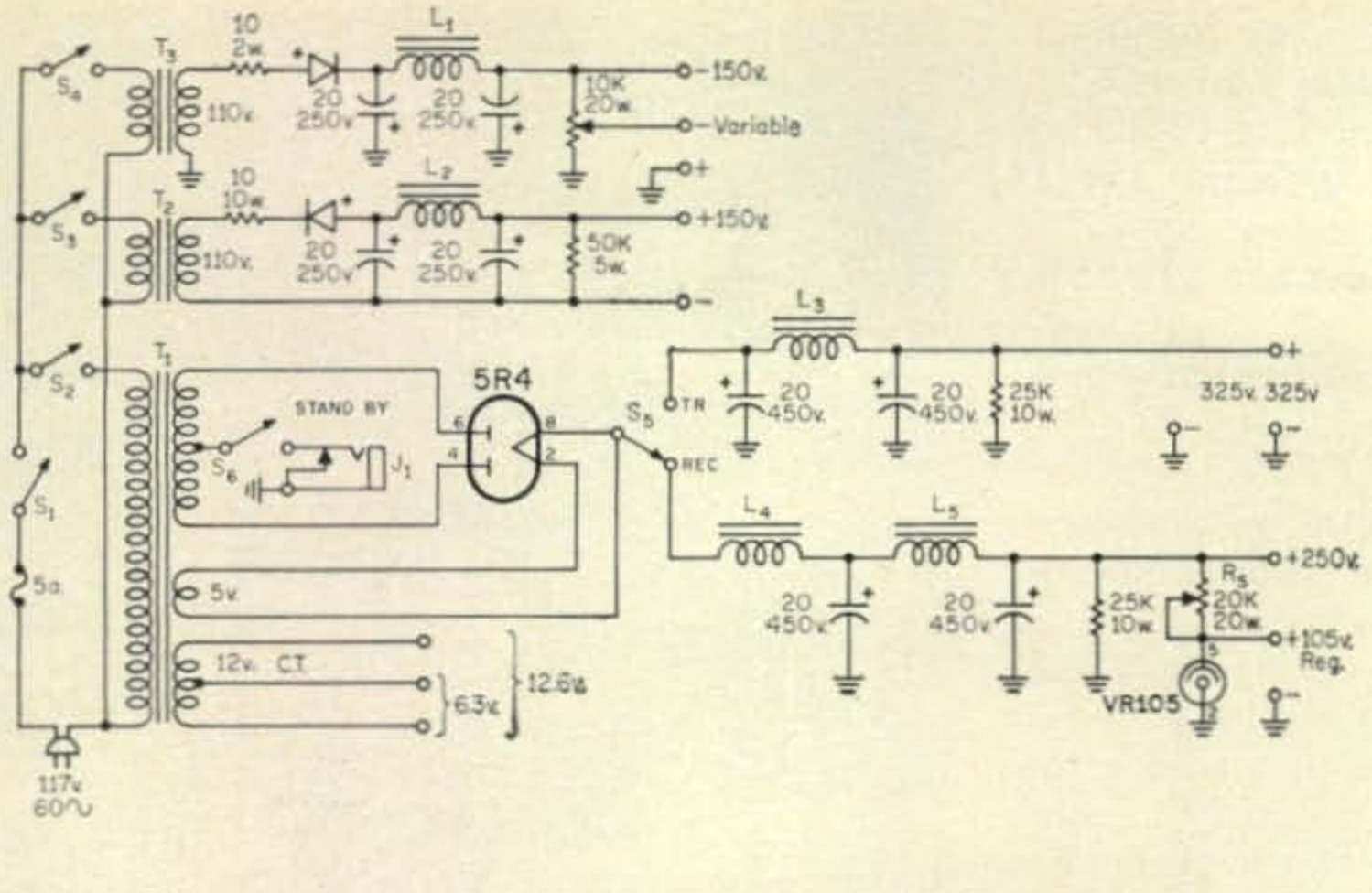


Fig. 1—A general purpose power supply. See text for details.

power supply could be used to advantage in almost any station, and for a portable station to take along on the trips. I have used this to supply communication on field day v.h.f. stations and for my six meter station in six states. I haven't missed a day above 50 mc for 3747 days and this unit has helped keep it going.

The first thing in the construction of a power supply of this sort is to decide the requirements and then select the transformer to supply those requirements. Don't be stingy with the power transformer's size and power output. It should have a good safety factor. I used an old TV transformer that supplied 340 volts at 350 ma with 5 volts at 6 amperes and 12 volts center-taped at 6 amperes. This would power almost any low-powered unit and the receiver and converter at the same time. Right now I am using it to power the small transmitter shown in *CQ* for November, 1955 and the crystal controlled converter as shown in the June 1963 NOVICE column. It has powered almost all of the equipment shown in NOVICE for the last few years. I have used it on all bands from 160 meters to 220 mc and never had to replace any part of the unit.

The need for about 250 volts required a little thought and was easily solved by using double choke filtering with choke input to the filter. This reduced the voltage to the required 250 volts and also gave the necessary better filtering for quiet reception of weak signals—almost no discernible hum with this filter system. Using capacitive input filtering gave us more voltage for the transmitter with adequate filtering. Connection to the power-supply was made with 5 prong tube sockets and matching plugs. Both 6.3 and 12 volt filaments were made available at the sockets for use and for testing experimental equipment. As some converters require 250 volts and others require a regulated voltage, these voltages were made available at the converter power socket. I use 108 volts regulated for the Nuvistor converter and 250 volts for the two meter converter. By the way, the Nuvistor converter is about the hottest thing I ever had for six meters but I must tell you that *the diagram in CQ is wrong. Forget the .001 mf capacitor in the plate circuit of the second 6CW4 plate circuit.* At the present time I am using this converter ahead of a Hallicrafters SX-110 and *I* hear them if anyone does.

Another of these power-supplies has been built with a separate power transformer for the converter and one for a negative voltage for a linear that I am planning for the six meter transmitter. I bought the transformers from Barry and they are the nicest small transformers that I have ever seen. They are made by RCA and are just about right for small converters and bias supplies. They cost $1.40 and deliver 150 volts at 30 ma and 6.3 volts at 1.5 amps. They measure 1⅞ × 1⅞ × 1⅝ inches and weigh 14 ounces. I think this is one of the best transformer buys that I ever made. I used tube rectifiers when I built this power supply because silicons were not as plentiful then as now. You may use them if you care to. It will give you more high voltage for the transmitter. I used replacement 200 ma filter chokes from old television receivers which are available from some companies at three for a dollar. Use good capacitors, not dried up surplus units. Good new capacitors cost only a little more and they do a better job of filtering.

Another thing about using a television transformer is the extra parts available to build the converter and possibly the transmitter with very few parts needed from the local radio store. If you don't have an old TV receiver, you can get one very reasonably from your TV repairman. He will very likely help you select the one with a 12.6 volt center-tapped filament winding. Get a clean old set as they had more tubes. They have better parts and are not quite so crowded below the chassis, making it easier to take apart and salvage parts for other projects. Don't forget TV sets were made to operate continuously while the amateur will have intermittent service.

In the power supply, switching can be done manually or by relay, as you wish. I use switches for changing from transmit to receive.

Use matching sockets on all equipment and make cables to connect the units together so

that you can use this power supply for all the units that you build in the shack. This unit will power the converted automobile receiver and any converter that you may have or build. The 12 volts could be used with a bridge rectifier to power a transistor automobile radio (It won't operate on the 12 volt a.c. from the transformer). You'll never be sorry you built this power supply.

Voltage Regulation

Where it is desired to stabilize the voltage in a circuit to a load that requires 20 to 30 ma, the glow-discharge voltage regulator tube can be used. Examples of circuits requiring this stable voltage are: local oscillator in a receiver, tuned ocsillator stage in a v.f.o., oscillator of a frequency meter, or any circuit requiring a source of low voltage that is nearly constant. A number of gas regulator tubes are available for this purpose with ranges near 75, 90, 108 and 150 volts and they can be connected in series for higher voltages. The 0A3/VR75, 0B3/VR90, 0C3/VR105 and the 0D3/VR150 have octal sockets. The 0A2 and the 0B2 are miniature 7 pin regulator tubes. I prefer to use the octal based type when space is not a problem. A series resistor is usually needed and should be adjusted until the tube fires (indicated by a glow between the inner elements of the tube). The current through the regulator tube should be about 10 ma.

Use of tie points and lugs will help to make this power supply a neat unit. I usually put a .01 mf capacitor across each switch to help hold down transient voltage surges that occur while switching. They should be rated at not less than 600 volts in this unit. A 300 ma meter can be plugged into the closed circuit jack to measure the total current drawn from the power supply.

Letters

"Dear Walt: I just finished the June *CQ* and what intrigued me was the picture of you and the small size of the Burdine Special.

'And now the question: What are the chances of getting a schematic of the Burdine Special? I would like a rig of ths sort for v.h.f. and this looks exactly like something we could build.

'I do know of all the mail you must have to answer, but will stand by and wait my turn for your answer. 73. Flo Cerwin, WA9KEG, 5944 North Knox Avenue, Chicago, Illinois.' "

Well, Flo and all the others that wrote in about the small transmitter, the transmitter was the subject of an article in the November 1955 *CQ* and has been reprinted two or three times in pamphlet form and also included in the *CQ* anthology number two. There are no extra issues (I understand) of the November issue, but the Anthology can be bought from many of the mail order catalogs.

By the way I am still using this little transmitter, but I now use a 12BH7 as the oscillator-multiplier. I have used the National 6N2 v.f.o. with this little unit and it works well. I use it with the power-supply described in the column. I plan a linear for this unit as the kilowatt boys make it too hard to work the DX stations. The transmitter is built on a 4×6×2 inch chassis as is the converter. The article also describes a very good 5 element beam. Let me know what you think of the little station when you get on the air.

Help Wanted

The following have indicated a desire to have someone

This neat station has brought in 44 states and some DX for B. Gordie, WN6NKJ, Route 2 Box 7A, Brawley, California who is 110 feet below sea level. The rig is a Hallicrafters HT-40 with an HE-80 receiver and a dipole antenna. He says, "Best of luck to you. (although you don't need it)."

contact them for help on the road to becoming an amateur. If you have the time to offer, I am sure that you will get more enjoyment from your hobby if you will help someone to become an amateur. Thank you in advance for helping. If *you* need help, just write me, Walter G. Burdine, W8ZCV, R.R. 3, Waynesville, Ohio and I will put your name in our column. Those needing help this month are:

Bill Alexander, CT3, 45 NW Sec GRU Okinawa, Box 1635, APO San Francisco, California. TCL 24284 Rm 343. Bill could use help with code, but should have sufficient theory. He was a former WN6EMU.

John A. Czupowski, 3746 South Central Avenue, Cicero, Illinois 60650 needs help with code and theory.

Mrs. James M. Helton, Conroe, Texas. Phone PL 6-5921. Says she and her husband would like to meet a local to get some first hand experience with ham radio.

Would someone please get in touch with Mrs. Geneva M. Johnstone, 1706 Ferris Avenue, Royal Oak, Michigan whose husband was W8EWV. She would like to know how to learn enough to get W8EWV for her own call. Help, fellows.

73, Walt, W8ZCV

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

RTTYers have hesitated to use the surplus AN/FGC-1 dual diversity terminal unit for two main reasons: its size and weight, and its complexity. As we have said before, if you have room for this fabulous monster, and if you can receive in diversity, it is well worth the trouble in finding out how to set it up and operate it. (We explained a bit about the diversity in the July '65 RTTY Column) Unfortunately, the technical manual, TM 11-356, for the AN/FGC-1 is a bit scarce at a reasonable price. We therefore began, in the July issue, a detailed description, complete with simplified schematic diagrams. The Limiter Panels were described in last month's RTTY Column. If you have any thought of using the AN/FGC-1, we suggest that you start collecting back issues of *CQ*, starting with the July 1965 issue. (The best way we know is to *subscribe* to *CQ!*)

*431 Woodbury Road, Huntington, N. Y. 11743.

The AN/FGC-1, Part III

The Detector Panels and Noise Suppression

Figure 1 is a simplified schematic of the detector circuits of one of the Detector Panels. The lumped-constant *mark* and *space* channel filters are not shown. Note that they are connected "normal-through" the jack system, provided for line-up and trouble shooting purposes. The characteristics of the channel filters were shown last month in Figure 1. It should be borne in mind that the output stages of both *A* and *B* Detector Panels are tied together to the 255-A polar relay, REC, of the Receive Relay Panel, to be described in detail next month.

Detection

The detector sections of the Detector Panels take constant amplitude signals coming out of the Limiter Panels, separate the *mark* and *space* frequencies, and rectify the information contained into d.c. pulses to operate the polar relay. If you refer to Figure 1 you will see that each detector circuit has two similar branches; one for the *mark* channel and one for the *space* channel. The *mark* frequency is 2125 cycles and the *space* frequency is 2975 cycles. Each filter has a 2 db loss so the signals have a level of approximately —8 dbm at the detector inputs. From the filters the signals pass through an input transformer which matches the 600-ohm filter output to the 25,000-ohm input to the first tube, designated MVA for the marking channel and SVA for the spacing channel. A screwdriver-adjust pot designated ADJ REC GAIN is placed in each of the inputs to adjust the output to the desired level. After amplification, the signal passes through a transformer to a full-wave copper-oxide rectifier. Connected across the output of this rectifier is a 0.025 mfd capacitor which bypasses most of the high frequency noise to ground. The rectified current, which has a wave shape similar to the a.c. wave, is impressed on the control grid of tube MVB in which it is amplified. The amplified signal from tube MVB passes through the marking winding of the polar relay REC. In a similar manner spacing signals are amplified and rectified in the spacing de-

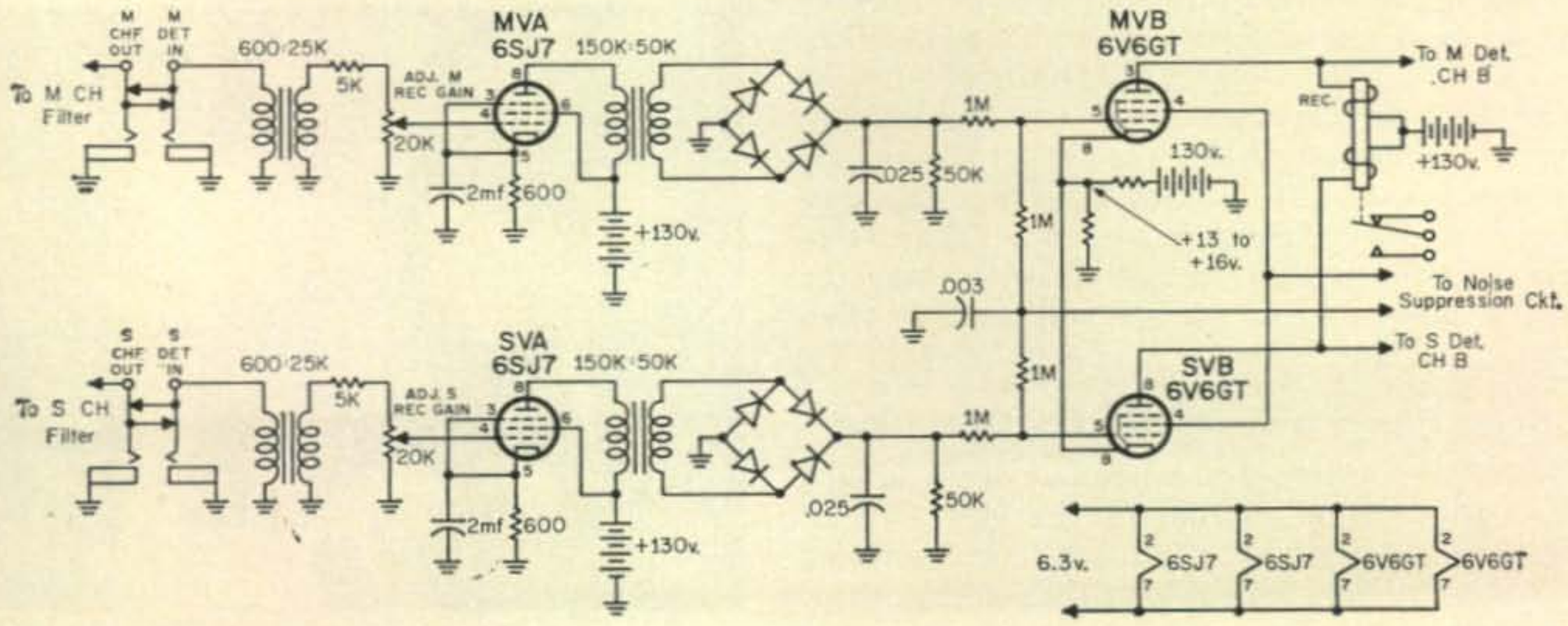


Fig. 1—Simplified Schematic of Detector Circuits in the AN/FGC-1

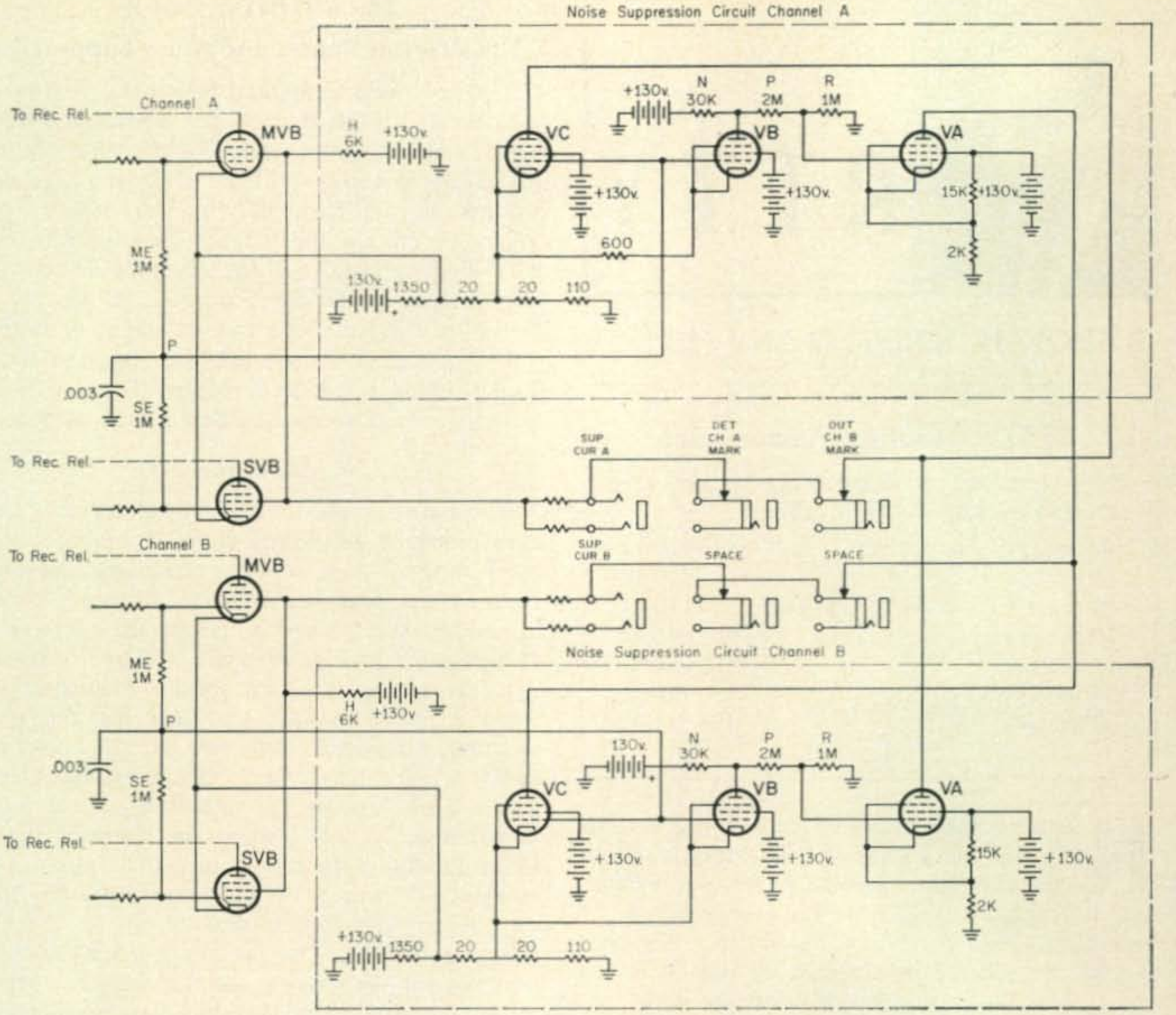


Fig. 2—Noise Suppression Circuit between Detector Panels

tector, and the rectified spacing signals pass from the plate circuit of tube SVB to the spacing winding of the polar relay REC.

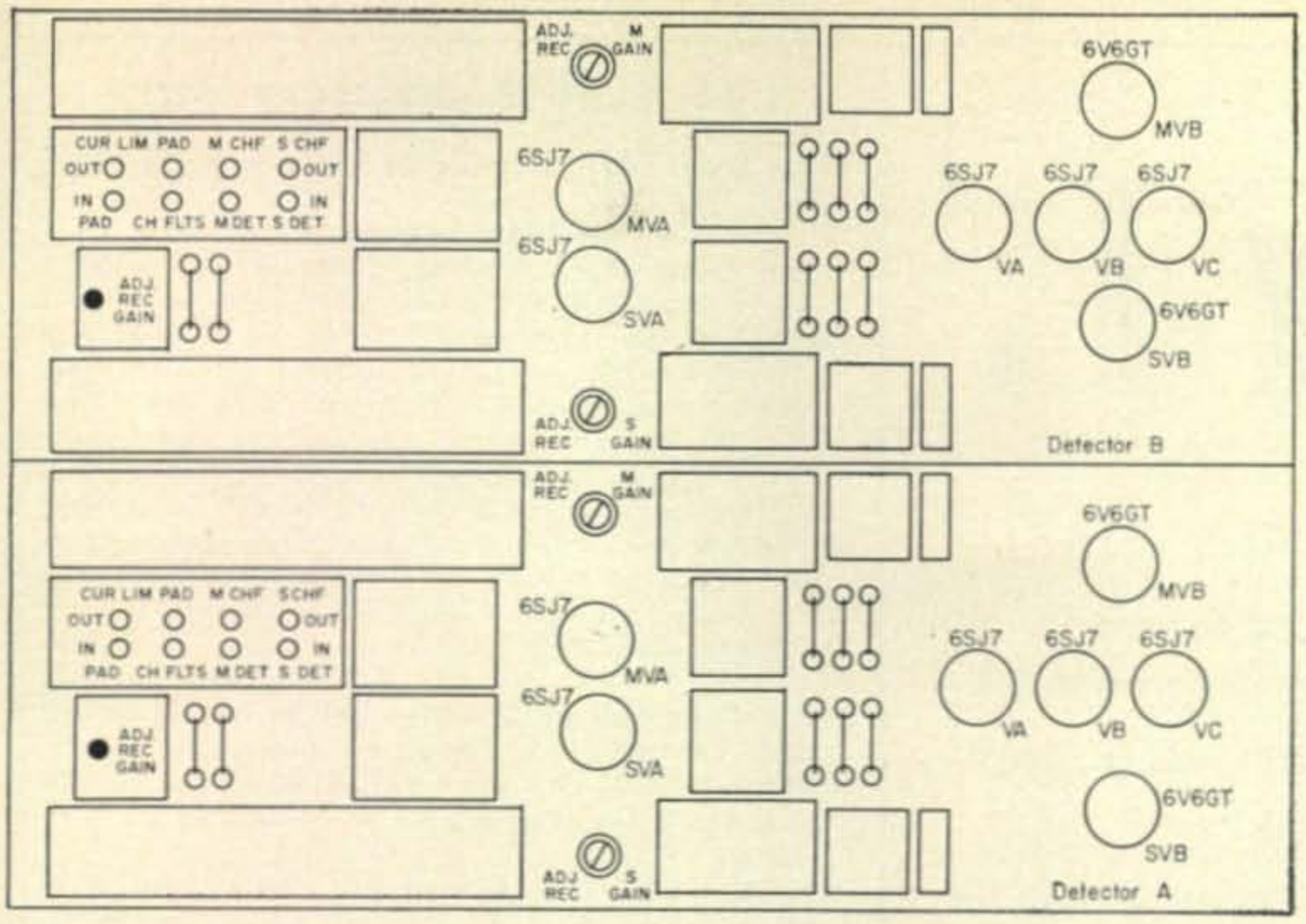
Under the conditions of a steady marking signal, the normal current supplied to the receiving polar relay is 15 ma from each of the marking detectors, provided no noise is present. The output of the detectors of channels *A* and *B* are connected in parallel to the polar relay windings. Therefore the total current through the marking winding is 30 ma, and the current in the spacing winding is zero. With a steady spacing signal these currents are interchanged. When only one channel is connected to the polar relay as in the case of some tests or fades in one antenna, the current from the detector carrying the signal will be 30 ma, while there is zero current from the other detector. The polar relay operates to the marking contact when marking current flows and to the spacing contact when spacing current flows.

Noise Suppression in Diversity Operation

Figure 2 is a simplified schematic of the unique noise suppression circuit of the AN/FGC-1. (Note how this circuit is interconnected between the *A* and the *B* channels.) If a signal in one of the channels is decreased, due to fading, that channel may receive considerably more noise or static than the other. The noise suppression circuit reduces the current supplied to the polar relay winding by the channel with a low signal to noise ratio and increases the current supplied by the channel with a higher signal to noise ratio. This results in a great reduction of noise in the final output.

Three tubes are used in each noise suppression circuit in each Detector Panel. The first decreases the gain of its own detectors when noise is present, while the second and third tubes increase

Notables K8DKC, on the left, and VE3SD, on the right; at the last Dayton Hamvention. Photo by K8ERV.



The Detector Panels as they are installed in the AN/FGC-1. The large rectangles in the upper and lower left part of each panel are the channel filters.

the gain of the detectors of the other channel. This is done through control of the screen grid voltages on the tubes designated MVB and SVB.

Upon reception of a steady marking signal, the rectified voltage on the control grid of tube MVB is about +16 volts. At the same time the voltage on the control grid of tube SVB is zero if the circuit is not noisy. When a steady spacing signal is received, the above voltages are interchanged. A point which is electrically one-half way between these two grids, therefore, is normally at a potential of +8 volts. Such a half-way point is the junction between the two 1-megohm resistors *ME* and *SE*, designated *P* in Figure 2. The control grids of tubes *VC* and *VB* in the noise suppression circuit are connected to this junction point.

Should a channel get noisy, some of the noise currents are rectified in the spacing detector while marking current is rectified in the marking detector and vice versa. Therefore the potential at the control grid of tube MVB or SVB which is not carrying a signal is raised above zero and so *P* has a potential greater than +8 volts. This voltage on the grids of tubes *VC* and *VB* causes the plate currents in these tubes to increase above their normal values. This increased current in tube *VC*, flowing through the 6000-ohm resistor *H*, causes the voltage on the screen grids of tubes MVB and SVB to decrease, thereby decreasing the current from the plate of MVB or SVB into the winding of the polar relay.

The increased plate current in tube *VB*, flowing through the 30K-ohm resistor *N*, causes the plate voltage to decrease. A voltage divider consisting of resistors *P* and *R* maintains the potential on the control grid of tube *VA* at one-third of that on the plate of tube *VB;* and so when the plate voltage of *VB* decreases due to noise, the grid of tube *VA* becomes less positive and its plate current decreases. The sum of the plate currents in tubes *VC* and *VA* remains practically constant at 9 ma. The plate current of tube *VA* in channel *A* passes through the resistor *H* of channel *B*. As the result, when its current decreases, the voltage on the screen grids of tubes MVB and SVB in channel *B* increases and so the plate current increases. The polar relay current is therefore maintained at a nearly constant value of 30 ma, but the portion of it contributed by the noisy channel is reduced, while that contributed by the quiet channel is increased. The current from the noisy channel may be as low as 5 ma in extreme cases.

Should both channels be equally noisy, the potentials of point *P* in both channels *A* and *B* are raised equal amounts above 8 volts and, though the plate currents in *VC* and *VA* depart from their normal values, the two channels change symmetrically. Therefore the sum of the *VC* plate current in one channel plus the *VA* plate current in the other remains constant at 9 ma, and no voltage change will occur on the screen grids of tubes MVB and SVB in either channel.

For test purposes, if the noise-suppression circuits are disabled by inserting open-circuit plugs into CH A MARK, and SPACE jacks, the drain through the 6k-ohm resistors due to tubes *VC* and *VA* is removed, allowing the screen grid potential of tubes MVB and SVB to rise. This causes the current from channel *B* through the marking or spacing winding of the polar relay REC to increase. If the CH B MARK and SPACE jacks had been opened instead, the current from channel *A* would have increased. Therefore the polar relay current is substantially constant at about 30 ma, regardless of whether one or two channels are connected to the noise suppression circuit.

Next month we will give the details on the Receive Relay Panel and the interesting manual mark-hold (automatic release) circuit that is a feature of the AN/FGC-1. Watch for it.

On the Bauds

W1QFB of Hadley, Mass., is on 80 as is K1RYP of Walpole, Mass. K2YEQ of Babylon, L. I. and WA2CUB of Woodbury, N.J. also work 80 meters. K2ADY of Syracuse, N.Y., is on 20. W3GUS of Dover, Delaware, is on 80. K3GIF of Bethesda, Md., uses narrow shift for dx-ing on 20.

KP4BCA/4 at 330 32nd Ave., Columbus, Ga. 31903, is in need of a power transformer, T-801 (UTC F-1834, RCA 453149), for his CV-57/URR converter. W4PXM moved from Dadeville, Ala., and now uses an HT-32 with a Warrior linear amplifier and a Model 26. WA4DXP of Huntsville, Ala., works 20. K5TRI of Austin, Texas, has both RTTY and f.m. gear for sale.

W6MOQ of LaPuente, Calif., makes printed circuit boards. The Northern California Amateur Radio Teletypewriter Society, Inc., has available *to members* Model 19 and Model 15 machines, for $75 and $50 each, respectively. The usual waiver of commercial use is required. The QTH of NCARTS, Inc., is P.O. Box 295, San Carlos, California. K7WSW of Grants Pass, Oregon, has a Model 15, a Twin City TU, and is looking for a way to f.s.k. his Viking 122 v.f.o.

W8UUS of Kalamazoo, Mich., is on 20 with tape and is interested in 10-meter RTTY. *(Is anybody using 10 for RTTY? It is legal, you know.)* W8BQV of Wheeling, W. Va., has a copy of the *New RTTY Handbook* and is trying to decipher the tape on the cover. (!) K8JTT of Detroit, Mich., advises that the official address of the RTTY Society of Michigan is P.O. Box 2484, Detroit, Mich. 48231. They have machines and parts, ". . . for active hams, only." KØAEK of Denver, Col., uses tape on 20. WØDKN of St. Paul, Minn., reports limited use

[*Continued on page 99*]

YL

LOUISA B. SANDO,* W5RZJ

WE salute with great admiration the all-ham Thomas family of Portland, Oregon—OM Don, K7VFD; YF and mother Cecil, K7VFC; jr. YL Linda, K7RMW, and jr. op David, K7VFB.

It all started with Linda when she was a freshman at Reynolds High and decided to join the school radio club. She was the only girl to ever stick with the club. Cec says they have always been an all-for-one, one-for-all type of family, so as Linda practiced code, David picked it up (he was in 7th grade). Then they all took to it and, she adds, the real fun began around the dining room table. "The OM had c.w. in the Air Force as a pilot and could remember the code, but he had no speed. Don or Linda sent code to us. They always went too fast for me and I would yell 'stop' and have them repeat what was sent, and then I'd say there was *no* such letter—whereupon everyone would laugh at me. We had such good fun doing it together!"

They started out with a Drake 2B receiver and obtained a vertical antenna from a destroyer to use for an inverted-V antenna. Meanwhile all they could do at home was listen, but Linda could go on the air with her Novice license at school. So they worked together until Don, David and Cecil finally took Novice tests together. A ham friend and neighbor lent them an Ark-5 and a ham shack was quickly formed in the basement. Cec says she thinks they had more fun as Novices than most people since they all helped copy any time any one of them went on the air.

Soon the OM was absorbing theory like a sponge (he's a bridge engineer with SP&S Railway). Don passed his General, and now he could *talk*. Theory classes started strong along with the nightly code sessions. Cec says she absorbed theory "like a rock." But eventually Linda, David and Cec all passed their Generals.

They acquired a TCS unit and were soon on 80. The school ham club has the full Collins S line and Linda and David got lots of hamming. They also had hamfests at which the boys stayed up all night to ham, play pingpong, swim and eat and eat and eat. Cec says she feels the school ham clubs are grand—that the children always became good students and develop an easy relationship with adults from ham contacts. "There never will be a juvenile delinquent who has joined a ham club," says Cec, "It keeps their interest going in excellent directions during free time, and they help promote good will all over the world."

The family also acquired a mobile and last year's vacation was spent on a camping trip to Glacier and Yellowstone National Parks with

*4417 Eleventh St., N.W., Albuquerque, New Mexico 87107.

1965 YLRL Anniversary Party

Time: CW—Start—October 20, 1965, 1200 EST (1700 GMT)
End—October 21, 1965, 1800 EST (2300 GMT)
Phone—Start—Nov. 3, 1965, 1200 EST (1700 GMT)
End—November 4, 1965, 1800 EST (2300 GMT)

Eligibility: All licensed YL and XYL operators throughout the world are invited to participate. YLRL members *only* are eligible for the Cup Awards. *Non*-members will receive certificates. *ONLY YLRL MEMBERS* are eligible for the Corcoran Award. Contacts with OMs will not count.

Operation: All bands may be used. Cross band operation is not permitted. Only one contact with each station will be counted in each contest.

Procedure: Call, "CQ YL".

Exchange: Station worked, OSO number, RS/RST, ARRL Section or Country. Entries in log should show the time, band, date, transmitter and power.

Scoring: a) CW and Phone sections will be scored as separate contests. Submit *separate* logs for each contest.

b) **Important! Note Change in Scoring From Previous Years!** All YLs located within an ARRL Section, score 1 (one) point for each QSO with another station located within an ARRL Section. Score 2 (two) points for each contact with a station not located in an ARRL Section. (ie; DX). DX YLs (by definition all stations not located within an ARRL Section) shall score 2 points for each contact with a station located in an ARRL Section. Score 1 point for each contact with another DX station.

Note: It is imperative that each YL know her Section. Do not use the name of the "country" if it is an ARRL Section. Hawaii, Puerto Rico, Cuba, Virgin Islands, Alaska, etc. are not DX as they are in ARRL Sections. (Section lists are available from the Vice President. Send s.a.s.e. to receive one).

Multiply number of contact points by total number of ARRL Sections or countries worked.

c) Contestants running no more than 150 watts DC input at any time, may multiply this score by 1.25 (low power multiplier).

d) SSB contestants running 300 watts P.E.P., or less, at all times may use the low power multiplier.

Awards: Highest CW score—Gold Cup (YLRL Member only). Highest Phone score—Gold Cup (YLRL Member only). Highest phone and highest CW score in each district and country shall receive a certificate. Highest *COMBINED* Phone and CW scores (YLRL Member) will receive the Corcoran award.

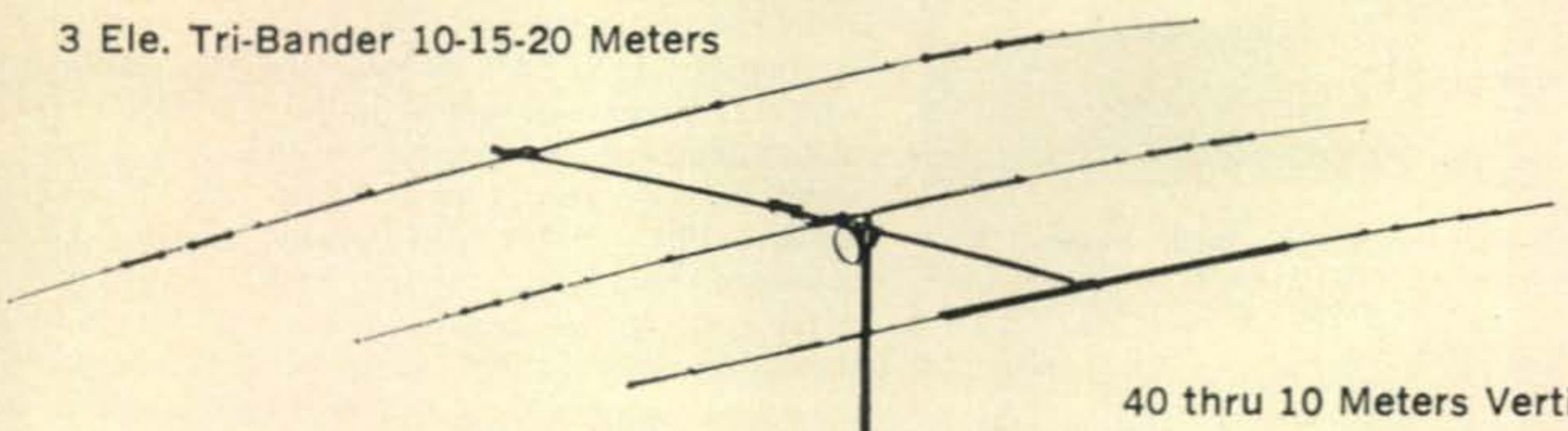
DX Awards: Given by Arlie Hager, W4HLF. Highest *Combined phone and CW scores*. From North and Central America, including Greater and Lesser Antilles—Cup. DX YL from any other part of the world—Cup. Please send logs airmail to be sure of qualifying.

Logs: Copies of all logs must show claimed score, be signed by the operator, postmarked no later than November 24, 1965, and received no later than December 10, 1965, or they will be disqualified. Send copies of logs to: Kayla Bloom, WØHJL, Vice President, YLRL, 175 So. Jasmine St., Denver, Colorado 8022.

No logs will be returned. Be sure it is a copy of your log that you send. Carbon copies which are smudged in mailing and handling and become unreadable will be disqualified.

HY-GAIN ANTENNAS IN STOCK AT HARVEY'S

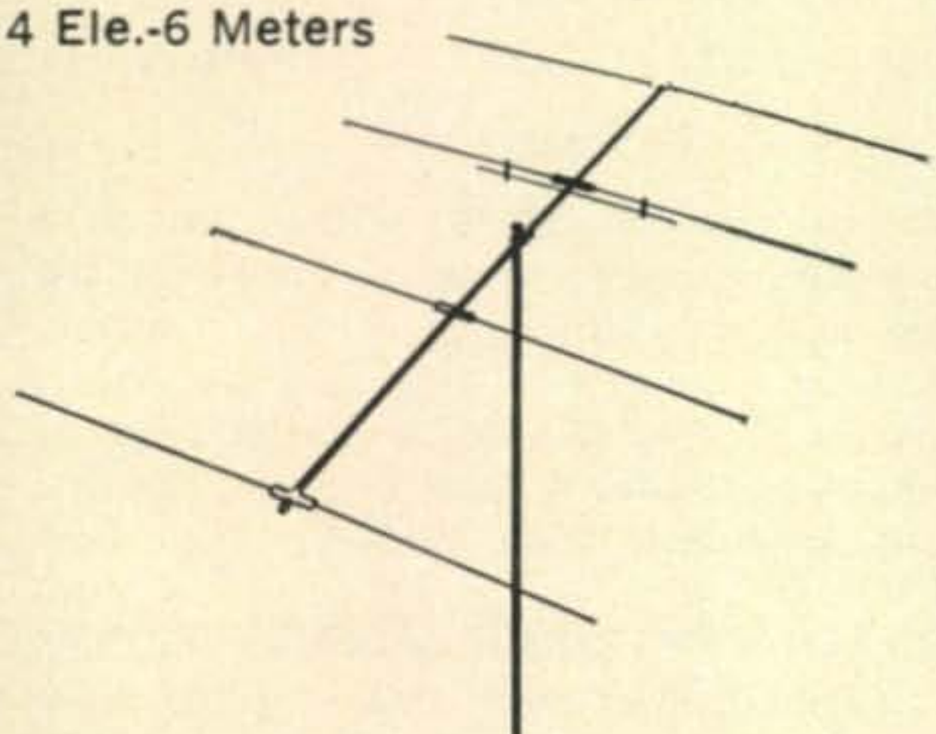
3 Ele. Tri-Bander 10-15-20 Meters



Model 64B
$21.50

9'11" max. Ele. length. Boom 12'. Turn radius 8'. Net wet. 8 lbs.

4 Ele.-6 Meters

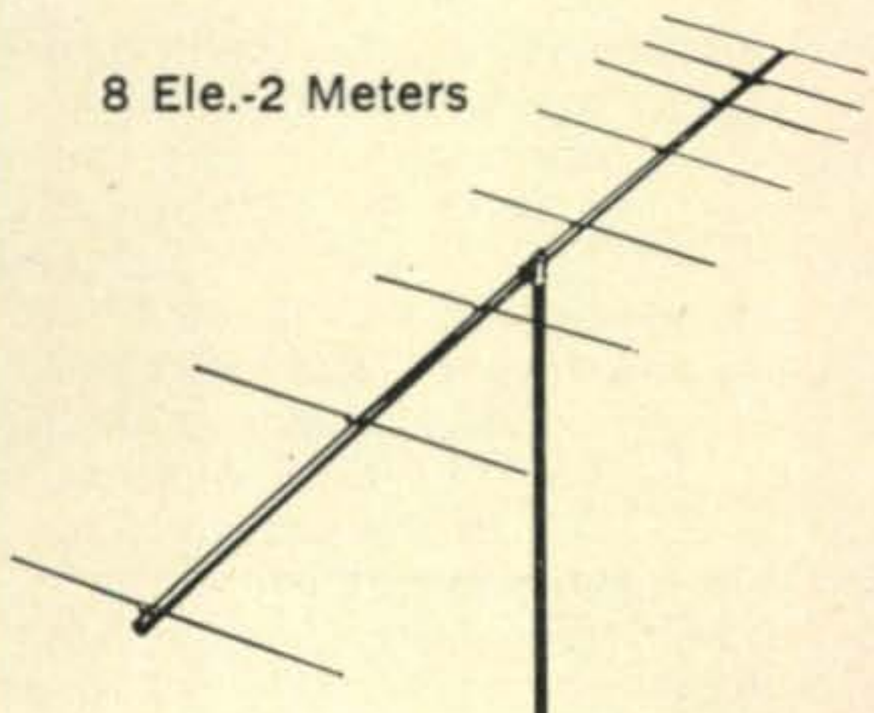


Model TH3MK2
$99.75

New "Hy-Q" Traps. 28' max. Ele. length. Boom 14'. Turn radius 15.7'. Net wt. 36 lbs.

40 thru 10 Meters Vertical

8 Ele.-2 Meters



Model 28
$16.50

3'6" max. Ele. length. Boom 14'. Turn radius 7'6". Net wt. 7 lbs.

Model 14AVQ
$29.95

New "Hy-Q" Traps. 12" Double-Grip Mast Brackets. Overall ht. 18' Shipping wt. 10 lbs.

For a ham-to-ham talk on all your needs, come to Harvey — midtown New York's leading ham center — and see:

Roy-W2CF Celso-PY4EH Richard-WA2FBH Elliot-WA2HDP Bert-K2IBK Anton-W2KWY Leo-W2LJA
Jack-W2LZX Ron-WN2MZI Jerry-WB2NUZ Abe-W2QOA Harold-K2QOP Jerry-K2QPC Joe-W2TBJ

HARVEY RADIO CO., INC. OUR 38TH YEAR

103 WEST 43rd STREET / NEW YORK, N.Y. 10036 / (212) JUdson 2-1500

For further information, check number 30, on page 110

The all-Ham Thomas family of Portland, Oregon, l. to r.; Don, K7VFD; David, K7VFB; Linda, K7RMW, and Cecil, K7VFC.

their Ham neighbors, and they mobiled back and forth all the way. Cec adds they all belong to AREC and work on any rescues. With four in the family they can give 24 hour duty if needed. Cecil belongs to Portland Roses and is president this year.

Cec comments one reason they built their home on NE Weidler was because there were no overhead wires—they still laugh when they look at it now with antennas for 80, 40 & 20, plus all the guy wires!

Don and Cecil have gotten their Extra Class tickets and Linda and David planned to work on theirs during the summer. David loves c.w. Linda is good at theory; has her 3rd Class Commercial and plans to get 2nd and 1st this summer. This fall David will be a junior in high school, while Linda goes on to Oregon State Univ. to take nuclear engineering.

As for other hobbies, Cec grows orchids in her living room. She also collects old clocks. She and Don built the case for a Grandfather clock. David loves music and is very artistic. Linda belongs to many school organizations and both enjoy math and science. Cec concludes, "Our little ham family is certainly happy to be members of the great big ham family!"

Truly it is a rewarding hobby for the Thomas family, and we can be proud that they are part of the ham clan.

YLRL 26th Anniversary Party

Rules for YLRL's annual Anniversary Party are being published earlier than usual this year, especially for the benefit of the DX YLs. V.P. Kayla calls your attention especially to the change made in the rules to add stimulus to encourage the U.S. YL's to listen for DX stations who may have weak signals. In the past, DX YL's have attempted to participate in the contest and some have succeeded in working only 2 or 3 YL's in 30 to 35 hours. Naturally, this has discouraged them from entering. YLRL is truly international in its organization and the A.P. should be also. Under the new rule change it means working a DX station will be the equivalent of working two YLs located in ARRL sections. W4HLF has given the incentive for the DX gals to participate by offering her DX awards; now let's all work a little harder at providing contacts with the DX stations.

W8MBI

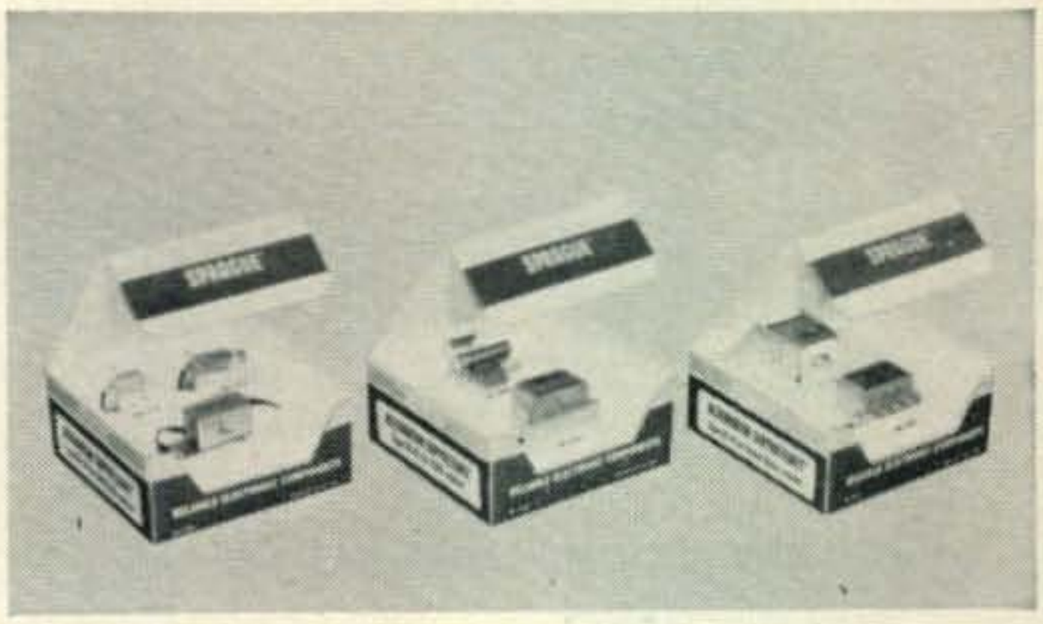
When you hear the call W8MBI on the air it will be operating as a memorial station by the Buckeye Belles in memory of Marie Helminski who became a Silent Key July 5, 1964. Marie was licensed in 1952 and was a charter member of the Buckeye Belles as well as being the first certificate custodian. The Buckeye Belle memorial station will be on the BB net 3900 Monday 8:30 EST twice a month, on other bands and nets at various times, and also portable from different locations in Ohio. Trustee of W8MBI is Ruth Rickett, W8LGY, 7390 Sawmill Rd., Worthington, Ohio, 43085, and QSL's should be sent to her. At the present time a contact with the memorial station counts as one contact toward the Buckeye Belle Certificate. QSL's are being designed for this special call; however, QSL's are not required for the Belle Certificate.

33, Louisa, W5RZJ.

New Amateur Product

Sprague Electric Company

THREE new suppressor kits have been added to the Sprague line. Called Suppressikits, the units are designed to eliminate r.f.i. in vehicles with alternator systems. The SK-10 fits Chrysler cars and trucks, the SK-20 is for Fords and the SK-30 fits General Motors vehicles. Prices are respectively $16.92, $26.03, and $24.14. For older model vehicles, Sprague offers the SK-1 for d.c. generators at $17.85. For more information write to Sprague Electric Company, North Adams, Mass., or circle 65 on page 110.



Geneva A' Go-Go [*from page 64*]

recently by John Gayer, HB9AEQ, Honorary President of the IARC:

The IARC came into being at the inauguration, in June 1962, of the new International Telecommunication Union headquarters building in Geneva. Allocated the call sign 4U1ITU from the United Nations series, the Club commenced operation on the amateur bands on June 10, 1962 with equipment donated to the Union by the Government of the United States.

The IARC is a voluntary, non-profit, international Club, membership of which is open at all. The Club's patrons are U Thant, Secretary-General of the UN; Gerald C. Gross (HB9IA and W3GG), Secretary-General of the ITU; and G. A. Wettstein, Director-General of the Swiss PTT. Miroslav Joachim, OK1WI, an ITU official, was chosen president in 1965.

The aspect of *internationalism* is of utmost importance to the Club. More than 60 countries are represented by its present membership. Not only does it maintain a "home station away from home" for radio amateurs passing through Geneva and for telecommunication officials with amateur radio licenses who are visiting the ITU on behalf of their governments, but the Club also provides an unique opportunity to demonstrate and explain amateur radio, particularly to those policy and decision making delegates to ITU conferences who have either no, or at best only a vague, conception of what amateur radio is and what services it can perform. The Club feels that there is a real need for direct and personal "public relations" of this nature if amateur radio is to survive in the future.

We have repeatedly emphasized that the IARC has no aspirations whatsoever to be a national or supranational organization. The Club does not compete with, but wholeheartedly supports the efforts of national amateur radio societies and, in particular, the activities of the International Amateur Radio Union. Seen in this light, IARC membership and membership in a national society are not only compatible, but really complement each other towards preserving the rights and privileges of the amateur radio service.

Membership in the IARC is open to everyone. The categories of membership are Honorary, Ambassador/Life, Member, Associate Member, Student Member and Shortwave Listener. Honorary and Ambassador Members are chosen by the Club on the basis of outstanding service to amateur radio.

Members must be licensed amateurs, Associate Members need not be licensed, but must have a special interest in amateur radio. Member and Associate Member annual dues are $5. Student and Shortwave Listener Membership dues are $3 annually. Each member receives a membership certificate, a lapel pin, quarterly newsletters and a copy of the Club's annual publication *4U1ITU Calling*. Applications for membership and requests for additional information should be sent to the Secretary, IARC, P.O. Box 6, Geneva 20, Switzerland.

Conviviality

Geneva is a gay, festive city. Ian Fleming, the creator of James Bond, ranked it among the world's most thrilling cities. For those fortunate enough to attend the IARC Convention of September 17-20, escape from amateur radio just a little while to enjoy Geneva and the surrounding area.

Sip the new wine, which is pressed during September; try the Fondue bouguignonne, a local specialty consisting of small cubes of raw steak which you spear on a stick and cook yourself in boiling oil and butter at your table; wash it down with a good Swiss red Dole wine, or a tangy Pinot Noir; linger awhile over an aperitif at a sidewalk cafe on the Quai du Mont-

Blanc and watch the world go by; walk through the narrow streets of the Old Town and bath in the aura of antiquity; stand on the Quai Turrettini and listen to the roar of the River Rhone as it flows majestically through the city; stand under the tingling spray of Geneva's trademark, its 500-foot fountain of water called the *jet d'eau;* breath the sparkling crystal clear air of the countryside; pub-crawl from watch store to watch store and look at mouth-watering bargains; and above all, don't miss Geneva's nightlife, which experts claim to be as exciting (but considerably less expensive), as anywhere else in the world. In short, have a ball. ■

RTTY [*from page 93*]

of a.f.s.k. on 52.60 f.m. in the Twin City area. *(KØWMR left town!)*

SM5MX of Johanneshov, reports increased activity in Sweden, mostly with Creed 7B machines CX8AAW of Montevideo, Uruguay, hopes to be on soon with an NCL-2000. VE3DSX of Timmons, Ont., would like to start a Northern Ontario Net. Rudy reports that he has Models 19, 15, and 14, and 500 watts; VE3DVT on 80 with a Model 26; and, VVE2SH/3 and VE3FFE soon on with Model 19's. XE1YJ of Mexico City chats in French on 20. KH6AX is also on 20. KG4CG uses narrow shift and tape on 20. KG6AKZ of Agana, Guam, has a Model 19 and is building W2JAV transistor terminal gear.

Comments

Getting technical manuals, at a reasonable price, for not just Teletype machines but f.m. gear as well, has always been a problem to the RTTYer. The RTTYer who uses f.m. on 6 and 2 meters will be happy to learn that at long last someone has compiled all of the schematics, and other useful information, of the commercial surplus Motorola f.m. sets that are now available to hams. The *Motorola FM Equipment Schematic Digest* is now available from Two-Way Radio Engineers, 1100 Tremont Street, Boston, Mass., for $3.95, postpaid. We have one, and we can say without reservation that it is well worth the money. (How we got along without it is difficult to understand.) 73, Byron,W2JTP.

Ham Clinic [*from page 85*]

others) by publishing a circuit using only one transistor and a pair of headphones as the main items?"

Certainly can. See fig. 3. I would say that about $2.00 would buy the parts. Should take you about 20 minutes to put it together. Good luck!

KWM-2 Power Supply Modifications–"I'm overseas where as you know, the voltage regulation of the a.c. mains in some areas (and especially mine) is simply awful. My voltage sometimes scoots up to 140 volts without much warning. I have installed an a.c. voltmeter nearby my operating position as a warning that the voltage is going up or has gone down. Tell me, has Collins any suggested modifications out to handle the situation for the KWM-2?"

Yes they have. I suggest that you write Collins for Bulletin No. 1 dated April 17, 1963, subject: extension of design specifications for input voltage limits. The modification is not intended to allow continuous operation at higher voltages but to allow operation under wider fluctuations of line voltage such as those encountered in military installations having poorly regulated primary power sources. The suggested modification takes about 3½ hours, but is worth the effort for it protects the set from *momentary* primary surges up to 150 volts without subjecting components to breakdown.

Thirty

I hope that I shall get the chance to see you in Geneva, Switzerland for the International Amateur Radio Club (IARC) convention from the 17th through the 20th of September. I shall be chairing one of the panel discussions. So drop over and see us. 73, Chuck, W6QLV.

2 Meter Preamp [*from page 27*]

diagram of the modified output circuit. The purpose of the resistors is to isolate the tuned input circuits of each receiver from each other, so that there is no interaction in tuning.

Performance

This extremely simple-to-build 2 meter preamp is not the least bit unstable. We even tried a coil and capacitor tuned input circuit, temporarily mounted inside the box, and it showed no evidence or inclination to take off. The applied voltage was 14.5 positive, and the current drawn was 4.9 ma. Using a Measurements Model 80 signal generator, fed to the preamp through a 50 ohm pad, we found that the actual gain, at 147 mc, was in the order of 10 db. Several such preamps were constructed, and this gain figure was found to be fairly uniform. (Using the 20 db quieting method.)

The outboard coaxial cavity filter, when used, adds about 0.6 db of loss, relatively insignificant. The use of this high-*Q* filter does, however, increase the "front end" selectivity of a receiving system significantly. With the high quality f.m. receivers of the Motorola -80D, use of this filter makes possible the operation of in-band repeaters, or in-band duplex operation. (The latter is *very* unpopular in high density areas!)

We would like to express our gratitude for help from K2AAA in developing this useful device, and from his associate, Werner Brock, who provided not only the original circuit but many helpful suggestions. ■

DX [*from page 71*]

KV4CF	via K3AHM.
KX6AO	via K6QVT.
LA5CI/P	via LA1NG.
LX1DO	Box 26, Esch, Luxenburg.
ON4NM/LX	via W2CTN.
ON5DI/LX	via W2CTN.
PJ2MI	via VE3EUU.
PJ4AA	Theo Van Der Hoeven, Maxwell Straat 6, Aruba, Netherlands Antilles.
PX1EQ	via DL9JL.
SL1CF	via W2CTN.
SVØWR	via WA4AYX.
TA2BK	via DJ2PJ.
TI2DX	via WB6BSJ.
TI2WD/8	via W2CTN.
ex VK4TE	11A Valley Parade, Glen Iris, Victoria, Australia.
VP2GL	via W5OMJ.
VP2KD	via VE3ACD.
VP2MN	via W6FET.
VP2SM	via WA4AYX.
VR2EK	via W6AL.
VR1B	via VK2EG.
ZD8TV	via WA4AYX.
ZS8G	Box 379, Maseru, Basutoland.

4M (ALL)	via Hammarlund, GPO, Box 7388, N. Y. 10001.
4X4HW	via K4WMB.
4X4TP	via VE3ACD.
5N2AAC	via G3PCY.
5W1AZ	via K6EXO.
9E3USA	via K7UCH.
9L1HX	Peter G. Dodd, Sierra Leone Development Co. Marampa Mines, Box 7, Freetown, Sierra Leone or via VE4OX.
9M2EF	via W7TDK.
9X5CE	Box 272, Kigale, Ruanda.

Don't Blame Urb

Inadvertently the captions were mixed up in the June DX column. The photo marked Charlie, XW8AV, should be Bob, 9M4LX. The one showing Ian, 4S7IW, is really Drake, VS6EK. Jim, 9M2DQ, should be the caption for the photo labeled Drake, VS6EK. The photos on the bottom of page 67 are l. to r.: Charlie, XW8AV, and Ian, 4S7IW. The group of four photos on page 68 has the top right photo marked Herb, VS6AJ, it should be Dom, W9WNV.

Tracking a Power Pole [*from page 41*]

it was raised. If the pole is up, your ideas on how to mount the cap are as good as any I can provide.

Conclusion

The system as pictured was built by the author and has been very useful. It is handling about two hundred pounds of antenna (four 45′ elements on a 30′ boom) with no problem. Although a considerable amount of time and effort goes into such a project, the convenience of being able to build an antenna "on the mast", raise it to 15 or 20 feet for tuning, and then just pull up into operating position, makes the project very attractive to the antenna experimenter. ■

Portable Beam [*from page 46*]

the outer cover and braiding leaving the center conductor and polystyrene insulation in tact. Remove ¾" of the center conductor insulation and fit an RCA type plug to the exposed wire. Exercise care in allowing sufficient spacing between the braiding and outer shell of the plug. *No* connection is made to the shell of the RCA plug! ! At the other end of the RG-58/u cable strip 2" of rubber insulation away insuring that the braiding remains intact. Push the braiding back and snip off 1½" of the center conductor and insulation. Apply heat from a soldering iron to the polystyrene jacket (center conductor insulation) and mold it over the conductor. This will insure that the braiding will remain insulated from the center conductor. Restretch the braiding and lightly tin. Position a 1½" porcelain insulator on one side of the driven element roughly 7" from the Cesco clamp by drilling a hole for a 6-32 × 1" bolt. This will support the cable (by means of a cable clamp) and maintain the proper spacing relationships. 14½" from the element center drill a small hole and mount a solder lug with a self tapping screw. The tinned end of the matching cable can be soldered to this lug. This point is the 50 ohm

terminus along the element length. This was determined by the trial and error method using an impedance bridge and grid dip oscillator combination. The theory employed was that an antenna when resonant presents a purely resistive load to any device looking into the array. When the antenna receives a signal from the g.d.o. that is at the same frequency as the electrical length antenna, the reactance is zero and the bridge reads pure resistance.

The antenna exhibits a 24 db front-to-back ratio and a better than 30 db front-to-side relationship. Forward gain is estimated at a reasonable 5 db.

Consideration was given to driving the reflector element but in the interest of a better front-to-back ratio the more normal method was chosen.

Every practical consideration was given in the preparation of the antenna for portable use however element length, admittedly long, was not overlooked. It would be a simple matter to provide a telescoping facility to the elements by purchasing a 12′ length of ⅜" and ¼" tubing and assembling the array in this manner.

The degree of collapsability is dependent upon the space saving requirements of the individual amateur. ■

QRM Killer [*from page 30*]

Oops, I forgot to mention that you may have to turn the volume up rather high to accomplish our desired results. This, however, might wake the baby or even encounter the wrath of the mother-in-law so something must be done to correct this potential catastrophy. In R_1 we have the answer. Using your receiver volume control in conjunction with R_1 (a 10 to 20 ohm pot) solves our problems.

Control R_1 also aids in solving another problem, distortion. Since a very brief period of time will elapse between cut-off at A and on at B, some distortion will result as seen in fig. 1B. This can be kept at a minimum by setting R_1 at its lowest useable resistance.

All would now be tranquil except for one minor factor. There comes the time when the local bar closes and turns off its neon signs and the great Shelbytron no longer serves a purpose. We, therefore, installed S_1 for such an eventuality. By closing this switch and opening R_1 your receiver functions in its normal fashion. A really resourceful builder might even find a pot like R_1 with a built in switch.

If the Shelbytron has saved your marriage this humble writer asks no praise—just send me 10% of what your attorney would have charged and we'll both feel better—especially me! ■

VHF [*from page 76*]

clination. The bulletins were more concerned with who worked who. Had orbital data based on sighting been given, it could have been extrapolated for use here. Various amateurs in the Far East were reported to have worked through OSCAR III, but no one could be contacted from here on low frequency bands that had actually

used the satellite."

Thirty

Next month we have something brewing you can build that should prove interesting. In the meantime, bear in mind that we always appreciate news and would like to hear from you.

73, Bob, K2ZSQ & Allen, K2UYH.

USA-CA [*from page 82*]

wishing mode endorsements can get them *only* as new classes are applied for, endorsements for lower classes will be added to higher class applications as they are processed. (Multiple Endorsement Rule). When applying, list alphabetically by band, giving letter-country-station only, no need for full log details, as there is no date restrictions in force. Send no QSLs, but have application signed as sighted and correct by two other s.w.l.s or Hams. (General Certification Rule).

The New England CHC Chapter #32 Counties Award is issued for working CHC'ers in New England Counties. Basic certificate for working 25 counties, including 2 states and 5 CHC'ers. Seals issued for 35/4/7; 45/5/9; 55/6/10 and 67 counties/6 states/ and 13 CHC (CHC'ers being 20% of contacts). Endorsed AOMB/M . . . General Certification Rule and one dollar or 10 IRCs (DX) to Awards Chairman, Chapter #32, Henry Trepanier, K1PMJ, 31 Tame Buck Road, Wolcott, Connecticut 06716. Top Class Rule and Multiple Endorsement Rule apply. For later seals s.a.s.e.

Eyewink Award is sponsored by CHC Chapter 33/73 to help generate good fellowship in personal meetings with CHCers. Basic award requires 12 points; Seals each 12 points, no date limits. In W-land each eyeball QSO with CHCer counts 1 point on exchange of Eyeball QSL; DX exchange counts 2 points. Applications listing CHC #, Names, Calls, Place of meeting and date to: Kanawha Avenue, S.W., South Charleston, West Virginia 25309.

Again many thinks for all the wonderful mail, sorry all space gone. Did you write and tell me, how was your month? 73, Ed, W2GT.

HT8XL [*from page 87*]

up an emergency channel and spent the entire day relaying messages and phone patches from Santo Domingo to the States.

"We relayed over 100 messages and phone patches in all, advising families and friends in the U. S. that their relatives and friends in Santo Domingo were well," Laun explains. "We continued to handle this civilian traffic until Monday evening when I was asked to switch my station to MARS frequencies to cooperate with the U. S. Military Advisory Group which had arrived in Santo Domingo."

"We continued to operate from my house," Laun says, "by then the closest heavy action was the booming and shelling of the National Palace about six blocks away. Then at nightfall on Tuesday a machine gun opened up only two doors away. I decided to move."

Laun packed a suitcase, grabbed his SR-150 and hustled them into his compact, rear-engine car.

For one stretch of more than 96-solid hours (over four days) of continuous night and day service, Laun operated from his compact car with the motor idling constantly to keep his battery charged up. Temperatures inside the car topped 125 degrees.

Three Marines were assigned to help Laun operate the station. Finally on Wednesday, May 2—nine long days and nights after Laun started his evacuation broadcasts—he was told he could close down his station. Regular military transmitters were available to take over.

The fact that Fred Laun was "on the air" at all from Santo Domingo was a lucky coincidence for the government and thousands of Americans and their families involved in the evacuation from Santo Domingo.

Only a year before the revolution broke out President Johnson signed an agreement with the Dominican government permitting reciprocal operation of ham radio stations.

"If it hadn't been for that, my equipment would have been back in Wisconsin," Laun said. "Personally I'm mighty glad it was here." ■

Mixer Analysis [*from page 44*]

with a line. If this line crosses any of the chart lines, you proceed exactly as in the transmitter case to find the birdie frequency. The birdie can be in the tuning range of the receiver or in the i.f. passband. You'll have to calculate it to find out.

For your own use, make at least two graphs. Use large size graph paper such as Keuffel & Esser 359-14L paper. You will be able to plot 25 mc vertically and 38 mc horizontally. This is usually enough spread for most h.f. uses and you can read the points of intersection to about 50 kc. The second chart should simply be an expansion of the 5 mc by 7 mc corner of fig. 1. This chart will give you about 10 kc resolution.

The charts can be extended to just about any

frequency range since they are normalized to frequency. Simply multiply both scales by the same factor and proceed as before. For example, multiply both scales of fig. 1 by 10. This gives the v.h.f. region with F_2 going to 140 mc and F_1 going to 200 mc.

Examination of figs. 2 and 3 seem to indicate that ratios of 1/8 and lower give very high order birdies. This is true, but image and tuned circuit selectivity problems become excessive due to the closeness of the mixing frequencies, particularly in transmitter design. Receiver design generally uses an i.f. of about 10% of the highest frequency tuned. Therefore receivers can use these high ratios without too great a risk in passband birdies. Strong signals on the image frequency or near the desired tuning range can give birdies that come and go with the time of day. Double or triple conversion superheterodynes require the same careful attention as transmitters due to secondary images and birdie possibilities.

Now if someone will only manufacture a 6.2 mc s.s.b. crystal filter. . . . ■

Acknowledgement

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Contest Calender [*from page 73*]

Exhange: QSO number, RS/RST report and ARRL section for W/K's, geographical area for VE/VO's.

Scoring: Two points for each completed exchange.

Final Score: W/K's total QSO points × Canadian areas × Power Multiplier × 20. (ratio factor) VE/VO's, QSO points × ARRL sections × power multiplier.

Power Multiplier: Stations using a power input of 200 watts or less qualify for a multiplier of 1.5.

Awards: Certificates to the highest scorer in each USA ARRL section (67) and each Canadian section (9). Also a Trophy to the overall winner.

Logs: Your log should show in the order: On the Send side; time in GMT, contact number and RS/RST report. On the Receive side; contact number, station worked. RS/RST and section or area. Additional columns showing band/mode, sections as worked and QSO points should also be included.

You are expected to score your own log and check for duplicate contacts. Include a summary sheet giving your call, name and address in BLOCK LETTERS, ARRL section, number of operating hours, power used and summary of your score. Also sign a declaration that your station has been operated legally and all rules have been observed.

Canadian Areas: Nfld/Lab., PE1, NS, NB, Que., Ont., Man., Sask., Alta., BC, VQC, YU,and NWT. (A total of 13)

This year your logs go to: Contest Chairman, R. A. Eberts, VE2AE, 1535 St. Croix Blvd., St. Laurent 9, Quebec, Canada. Mailing deadline is November 8th.

Editors Notes

After many years of faithfully donating a Trophy for our World Wide contest, Don Wallace, W6AM is retiring to a less active participation. Many thanks Don, the gang is grateful for your support. The Radio Club Venezolano will fill the vacated spot.

At this time, the third week in July, the XYL and yours truly are looking forward to a trip to Caracas in about a month. The Radio Club Venezolano is celebrating the unprecedented feat of its members winning 4 of the available 8 Trophies, in our last World Wide DX contest. Anne and I have been invited to join in the festivities, and also make sure that the Trophies are safely delivered. How about that? Guess our Hon. Editor is not the only one who will be enjoying an overseas vacation.

73 for now, Frank, W1WY.

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.

QSL's? WPE's? CB's? Samples 25¢ (refunded). Sackers, W8DED, Holland, Michigan.

QSL Special—100 two color—$1.65. Quality. Free Samples. Kanuck, 1945 Riverside, 123, Dayton, Ohio.

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PICTURE of yourself, home, equipment etc. on QSL cards made from your photograph. 250—$7.50 or 1000—$14.00 postpaid. Samples free. Write Picture Cards, 129 Copeland, La Crosse, Wis.

CREATIVE QSL CARDS free, new catalog and samples. Personal attention given. Wilkins Creative Printing. P.O. Box 787-2, Atascadero, California.

RUBBER STAMPS for QSL Cards. Kits available. Free sample impressions. E & R Stamp Co., 50 Gerald Rd., Rantoul, Illinois.

QSL CARDS $2.50 per 100 in three colors. Samples and catalog free. Garth, Box 51C, Jutland, New Jersey.

QSL CARDS. As low as $2.50 per 100. Samples free. Radio Press, Box 24C, Pittstown, New Jersev.

QSL's 3-color glossy. 100 $4.50. Rutgers Vari-typing Service. Free Samples, Thomas Street, Riegel Ridge, Milford, N.J.

QSLs Samples 25¢. Rubber Stamps; Name Call, Address, $1.55. Harry Sims, 3227 Missouri Avenue, St. Louis, Mo. 63118.

QSL's Samples, dime, Print Shop, Corwith, Iowa.

QSL's . . . 18 samples 10¢ . . . Filmcrafters . . . Martins Ferry, Ohio.

QSL's WSL's XYL-OM's (Sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing eye-catching comic, sedate, fantabulous. DX-attracting, Protopay, Snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSL's BROWNIE—W3CJI . . . 3111 Lehigh, Allentown, Pa. Samples 10¢ with catalogue 25¢.

QSL's FREE SAMPLES . . . Ace Printing, 5506 Detroit Ave., Cleveland 2, Ohio.

QSL's CB, WPE Samples 10¢ Nicholas & Son Printery P.O. Box 11184, Phoenix, Arizona 85017.

QSL CARDS—100 3-color, glossy $3.00. World globe in silver; report form on reverse side; Free samples. RUSPRINT, Box 7575 Kansas City, Missouri, 64116.

QSL CARDS—Free Samples—Catalogue 20¢—Knight Printing Co., 1550 Downey, Indianapolis, Indiana.

HUNDRED QSL's: $1. Samples, dime. Meininger, Jesup, Iowa.

"GOLDEN CALLS" QSLs, samples 10¢. Samco, Box 203, Wynantskill, New York 12198.

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LOOK, Brother Ham! 150, 2-color QSL Cards, plus other printed goodies, $1.70 postpaid. Merchants Press, Taylor, Texas.

QSL's—Ham and CB, related products. Free Samples. April Sign Co. 56290 Van Dyke, Washington, Michigan.

PEORIA HAMFEST, September 19, Exposition Gardens, Peoria Area Amateur Radio Club, Advanced registration $1.00 until Sept. 11, Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Illinois.

BIGGEST? Nope. BEST? Heck yes! Warran ARA Hamfest, Aug. 29, Newton Falls, Arrows from RT. 534 & Turnpike Warren Exit 14. Details: WARA Hamfest, Box 809, Warren, Ohio.

GREATER BAY AREA HAMFEST—Peacock Gap Country Club, San Rafael, Calif. October 16-17th. Write Box 113, Hayward, Cal.

MISSOURI-ILLINOIS: Egyptian Radio Club Hamfest, Sept. 26, 1965. See ANNOUNCEMENT section of **CQ** this issue. For details, write, Cletus Woodward, W9IHE, P.O. Box 402, Granite City, Ill.

SWL Program Guide, FBCB English language transmissions listed by the hour. $2.00. SWL Guide, 414 Newcastle Rd., Syracuse 19, N.Y.

For further information, check number 39, on page 110

CRAZY . . . NOT QUITE. LET'S DEAL. . . . We want to become Nevada's largest ham store! Look! . . . Swan, Transcom, Galaxy, Hallicrafter, Hammarlund. . . . No honest deal refused. Write: Sierra Electronics, P.O. Box 212/ Sparks, Nevada.

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REMOTE CONTROL UNIT, brand new $5.00. Postpaid. (Cost Navy $125.00) MDC, 923 W. Schiller, Phila. 40.

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GONSET TRANSCEIVER #3121—143.90 to 149 mc—$150. Gonset Linear Amplifier #3063—$75; Poly Comm—68-2 $240. Donald K. Szathowski, 706 West Wylie, Bloomington, Indiana K9UOD.

COLLINS 310B Transmitter $80. 813 Final in 28 inch steel cabinet with power supply $60. Combination $125. Power supply gives 1500 1750 2000 volts at 500 MA. Spare 2E26 and 813 tubes. Leland W2WL 2457 Loft Ave., Baldwin, N.Y.

SELL: Power Transformers 3000/2700/1600CT. 1000 MA.CCS excellent regulation for Class B, Custom Built by UTC. Compact, $35. Also 3000/2700/1700 CT. 500 mills. $25. Boye Hagerty, Honesdale, Pa.

I NEED AND WILL PAY top price for a ZENITH 3R or 4R receiver for my antique radio collection. Same also applies to GREBE, WIRELESS SPECIALTY, AMRAD, PARAGON and similar material. WORCESTER, R.D. 1, Frankford, N.Y.

WANTED: Two GORDON SPECIALTIES CO., Chicago, Ill.—or equal DPDT KW RF antenna relays—your price—W1BB.

SELL—Apache transmitter $130. HQ 110C Receiver $100. WA2RFH 227 N. Jackson Ave., Endicott, N.Y. ST 5-6763.

Bandit 2000A Linear Serial 439 complete with Hunter Bias Modification excellent condition $375.00. Also Newtronics 80-40 meter Cliff Dweller Serial 503 good condition $50.00. Both units F.O.B. K4ZJF, Milt deReyna 4030 Hallmark Drive, Pensacola, Fla. Phone 433-6552.

HEATH SB-400 Exciter, Hy-Gain TH-4, CDR TR-44, Brush BA-200-2, Misc Ham Station Parts. Money back guarantee. Make offer or send for price list. W9FMW, 1567 Southfield Road, Evansville, Indiana 47715.

FOR SALE: NC 303 brand new, in original carton plus extras $300. EZ Way 400 foot tower with ground post, CDR Ham rotor and Hy-Gain 4 element Tri-Bander beam antenna $300.00, or Package Deal $450. McCormack 35a Edgewater Pl. Edgewater, N.J. 07020.

WANTED—QSTs for private collection. 1920-Jan., 1919-Jan., Feb., March, April, May, 1918-All, 1917-March, October., Nov., Dec., 1916-Feb., May, June, July. K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I. N.Y. 11050.

STAMP COLLECTORS: Will swap stamps (your choice) for amateur and military radio equipment, supplies, tech manuals, etc. John Reilly, 35-19 167th Street, Flushing, New York 11358.

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IDEAL MOBILE—same type #3012 (152-162 M.C.) and (40-50 M.C.) tuners for sale. Receive highway patrol, police, fire, secret service, taxi, mobile, telephone, etc. Also, Federal "DIRECTOR" Electronic Siren-PA, 12 volts all transistorized. 4 lbs. 150 watts siren, 125 watts audio output w/two speakers. Richard M. Jacobs WAØAIY, 1015 Glenside Place, University City, Missouri 63130.

COLLINS 75A-4 OWNERS: Don't trade up! Investigate our conversion that makes the 75A-4 a real dream. W2VCZ—30 Pitcairn Ave., Ho-Ho-Kus, N.J. 201-652-8494.

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Wanted: Complete set, preferably bound volumes, CQ for 1945 through 1963. Must be in excellent condition. Write Charles Miller, W4AXV, 2875th GEEIA Squadron, Box 460, APO San Francisco 96323.

BOUND VOLUME 1964 **CQ** for sale. Order now and 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.

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For further information, check number 49, on page 110

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RME model 4350 Receiver, 80-10 Mtr.	124.00
National HRO-60, with coils	195.00
Hammerlund HQ 110, with clock, 160-6 Mtr.	119.00
Hammerlund HQ 129, .54—31 mc.	110.00

TEST EQUIPMENT

Tektronics 513D, Scope with delay	$275.00
Heath 1A1, Ignition tester scope & book	35.00
Eico 460 Scope, D.C.—10 MC, color or Blk. Wh.	79.00
Precision ES-500 A, 5 inch Scope	69.00
Dumont 208—$45.00; #241—$49.00; 303	85.00
Precise 300-C, 7 inch Scope	69.00
Ballantine 300, V.T.V.M.	42.00
Hewlett-Packard model 400-A V.T.V.M.	42.00
Freq. Meter, Navy LM type with Orig. book	45.00
Freq. Meter, BC 221, Orig. book & 115V.P.S.	75.00
Hewlett-Packard, 200-CR Audio generator	55.00
Signal Gen., Eico 315, 75 KC—150 Mc.	$ 22.00
Signal Gen., RCA, 170 KC—50 Mc.	18.00
Lab. Std. meter, Sensitive Research-THATCH	245.00
Tube Checker, Simpson 1000, Plate Con.	70.00
Precise 116, tube tester, for quick test	55.00
Signal Gen., Precision E-200, 95 KC-150 M.C.	22.00
Vacuum Tube Bridge, General Radio 561-D	45.00
Signal Gen., Type LAD, 2700-2900 MC	28.00
Precise 630, TV marker & Bar generator	19.00
Signal Gen., General Radio P-522A, 50-100 mc	65.00
Berkley 1000, counting rate computor	45.00
Megger, Assoc. Research 218 Vibrotest	19.00
Freq. meter, 906-D, 150-225 Mc.	12.00
Wavemeter—Oscillator, OAP, 150-230 Mc.	24.00

MISCELLANEOUS

Freq. Shift Adaptor, RCA CFA-45 & Power Suplpy	$ 75.00
QJB echo ranging equipment—brand new in crates, write for details	
RCA Modulator, 345-485 watts, 230V. PRI.	45.00
TG-34A Keyer, with 6 code reels	24.00
Xmitter, Lettine 240, 160-10 Mtr. 40 watt	29.00
Arkay, short-wave Receiver Kit, .53-18 mc	15.00
Brush Devel'pt. Co. OA1 Recording Amp.	10.00
G.E. Amplifier, 25 watt, 6 tube	12.00
HRO coils, many frequencies	$6.00 & 8.00
TBS Xmitter, 60-80 Mc., also Receiver, each	24.00
B.C.1000, FM portable, 40-48 M.C. Receiver	25.00
RBS-2, Receiver, 2-20 mc, navy type	39.00
RBS-2, 115V. AC supply for above Receiver	12.00
BC-620, FM Xmitter-Receiver 20-27 mc	15.00
Power Supply, chassis, 2500 V C.T. 300 ma	25.00
ARC-4, Xmitter-Receiver $25.00; TA-12	24.00
Mark II, B29, Xmitter with 12 V. Supply	24.00
RDZ Receiver, 200-400 mc	50.00
MN-26 or BC-433 radio compass receiver	15.00

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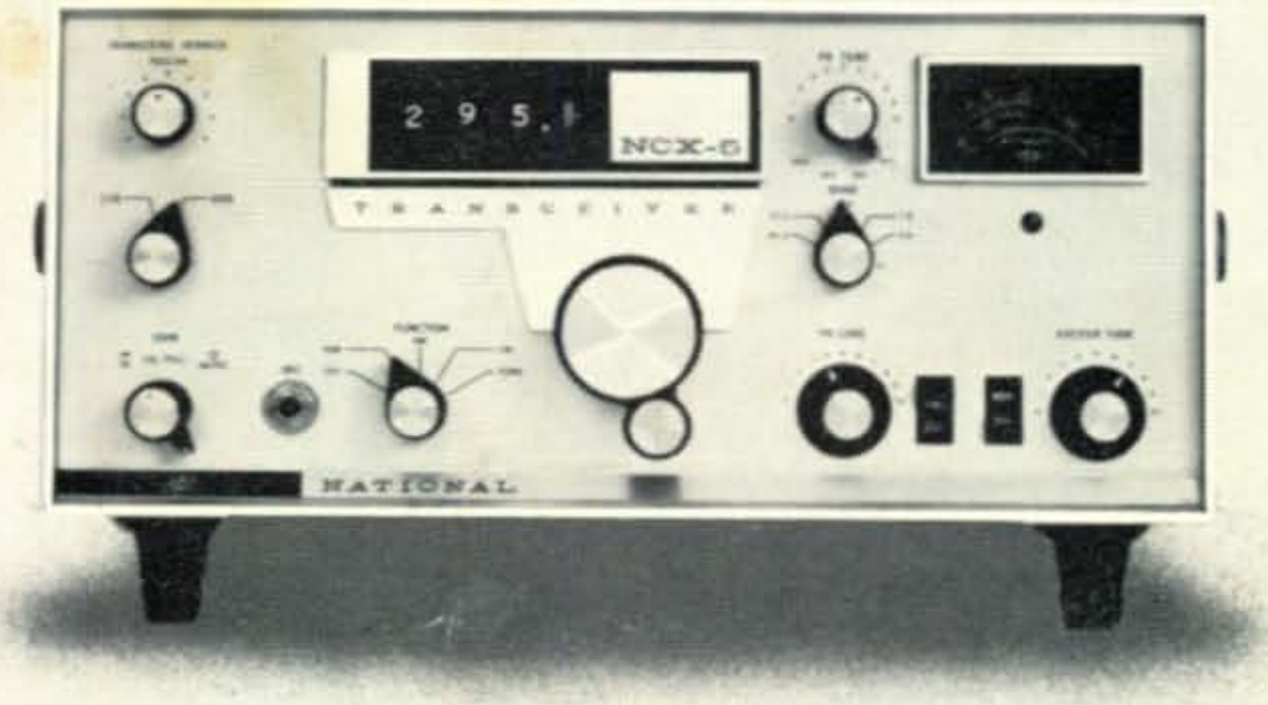

improved

One thinks long and hard before making a change in a rig like the NCX-5 — after all, it has proven itself as the finest transceiver ever offered the amateur at any price. But we have designed a new balanced modulator circuit which offers such high performance that we felt it should be incorporated in new NCX-5 production. The new balanced modulator is a solid state ring-type device which is totally unaffected by external or magnetic influences, on-off cycling, aging, or warm-up time. Minimum carrier suppression is 50 db through all of these variables, and typically can be adjusted to provide even 65 or 70 db! In fact, the circuit cannot be unbalanced far enough, using the carrier balance control, to provide sufficient carrier for AM or CW operation of the NCX-5. We therefore replaced the carrier balance control with a new Carrier Insertion control to provide a gradual increase in carrier as the control is turned clockwise. Carrier is also now inserted automatically in the AM or CW positions of the NCX-5 mode switch. "Carrier balance" has become an internal factory adjustment which need never be touched.

The new NCX-5 is designated Mark II, and is identical in appearance to previous units. The superb dial calibration, stability, selectivity, and all other maximum performance features of the NCX-5 are, of course, unchanged (including the remarkable price of only $685).

When we make performance improvements during production we try to make certain that owners of earlier units can similarly improve their equipment, if they wish. So our Customer Service Department has a Mark II kit available for satisfied NCX-5 owners so that they can become satisfied NCX-5 Mark II owners. The NCX-5 is the finest transceiver on the amateur market, proven in operation by amateurs the world over. The Mark II NCX-5 is even better.

See us at Western SSB Convention, Frenso, California, September 3 to 5

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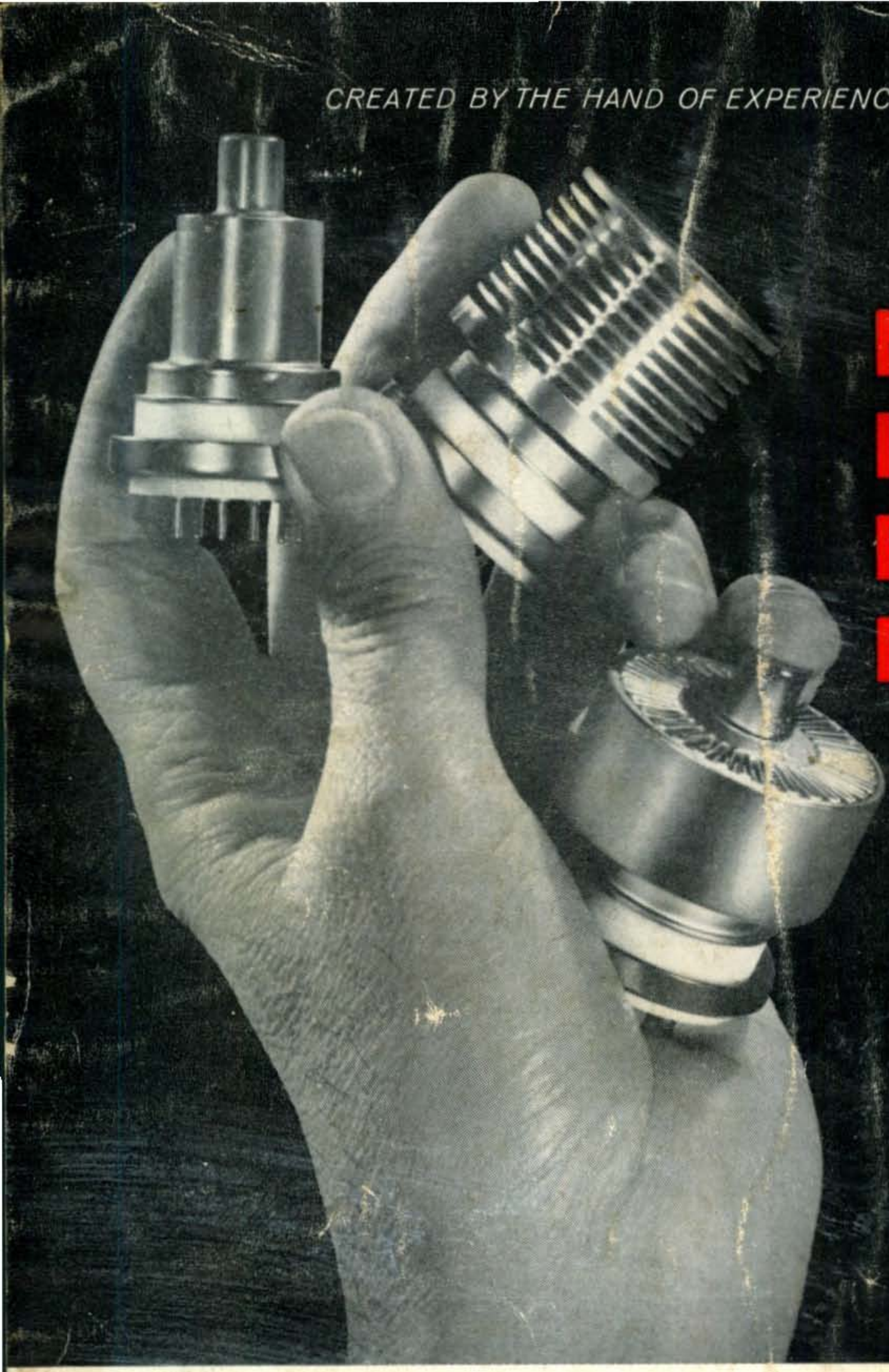

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Type	Cooling	Maximum Plate Dissipation (watts)	Plate Voltage (volts)	Frequency (Mc)	Useful Power Output (watts)
8072	Conduction	100*	700	50 175 470	110 105 85
8121	Forced-air	150	1500	50 470	275 235
8122	Forced-air	400	2000	50 470	375 300
8462 (Quick-heating)	Conduction	100*	700	50 175 470	110 105 85

*May be higher, depending on heat-sink design

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