December 1963
50¢

ICD

CQ

Next Month—

VQ9HB Tells About

VQ8BFA/Agalega

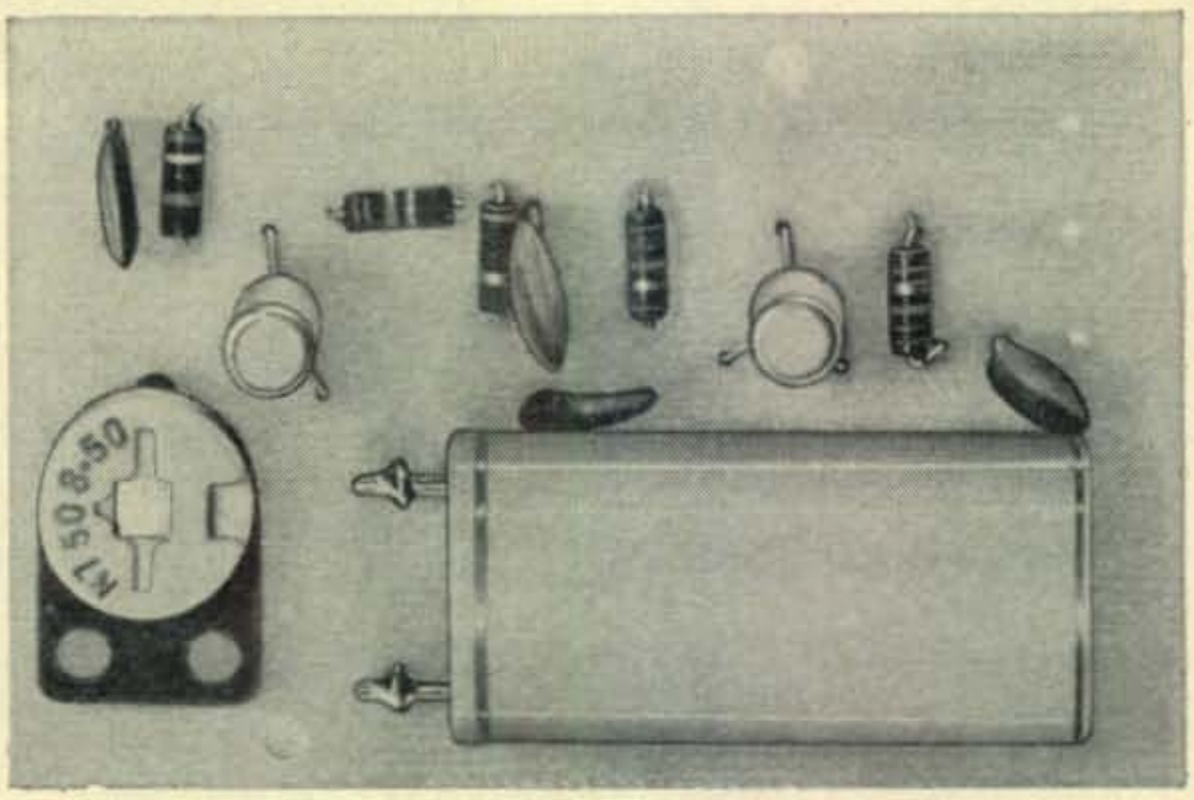
Season's Greetings To All

SEASON'S GREETINGS

COLLINS

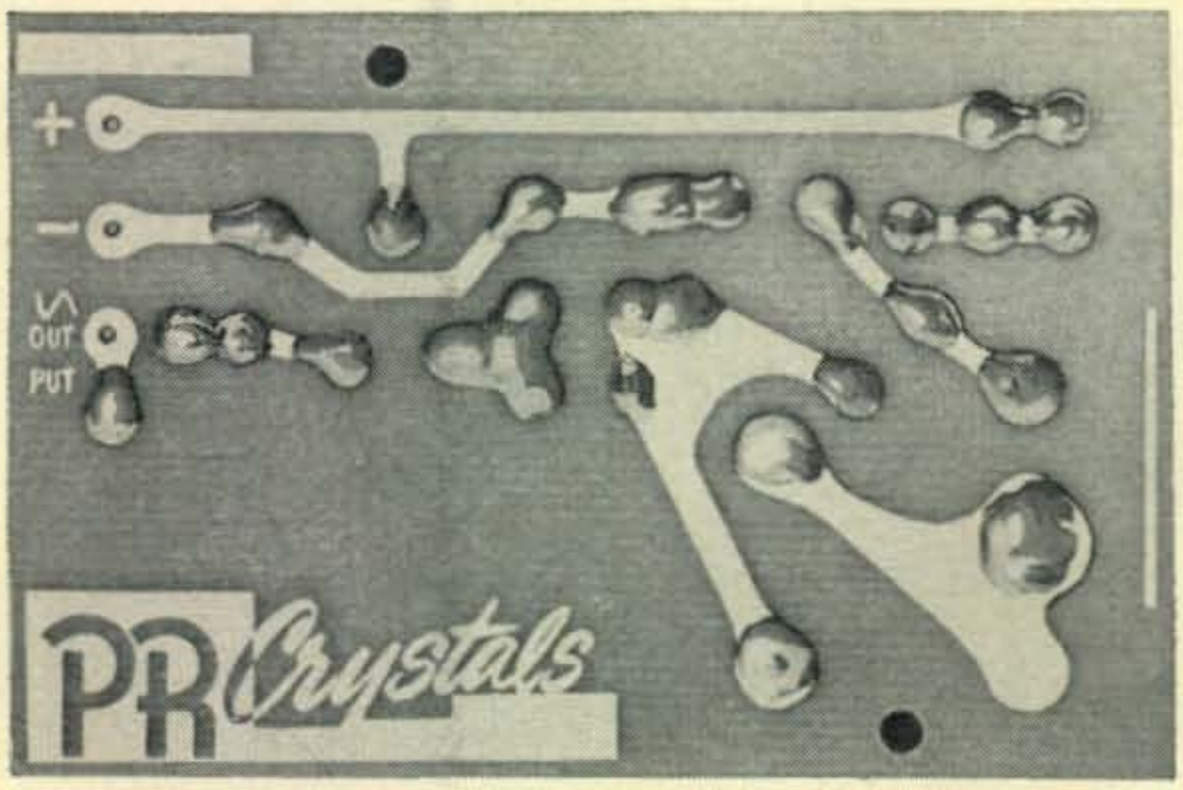
Use PR and Know Exactly Where You Are!

With this new PR-100 you can check harmonics at 100 Kc. intervals through 54 Mc. This means your receiver, transceiver and exciter will be "right on the button" all of the time!



Actual size of PR-100, top side.

The PR-100 is a precision 100 Kc. Transistorized oscillator, fully wired and ready for installation. Every PR-100 is guaranteed for one year, when used in accordance with these specifications. Power requirements: 12V DC @ 14 ma. Observe polarity. Power is to plus and minus terminals where an off/on switch may be used, (either wire) or by disconnecting a battery terminal.



Bottom side, actual size

The 100 Kc. oscillator output is connected to receiver antenna, high side. A ground connection from oscillator may be used if required.

PR-100 Transistorized Oscillators, completely wired, and including a Z-6A Crystal, are priced less than you would pay for the individual parts. Base is 1-7/8 x 2-13/16 inches. Negligible mounting space required. Net weight 2 ounces.

$12.95

GET YOUR PR-100 TODAY FROM YOUR JOBBER

PR Crystals

Since PR 1924

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
COUNCIL BLUFFS, U.S.A.

For further information, check number 1, on page 106

No finer service
can be rendered to mankind
than communication of
the greatest of all ideas
... the hopeful message
of Christmas

the hallicrafters co.

CQ

The Radio Amateur's Journal

Vol. 19, No. 12 December 1963

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Departments

BETTER THAN EVER FOR '64!

Clegg's GREAT NEW

INTERCEPTOR

B

HERE'S THE ULTIMATE RECEIVER FOR THE SERIOUS VHF OPERATOR WHO WANTS TOP PERFORMANCE ON AM, CW, OR SSB

Now the top favorite of VHF Amateurs everywhere, Clegg's INTERCEPTOR receiver, in 1964 offers even more spectacular performance.

The new "INTERCEPTOR B", now available at your dealers, is a dual conversion 50-54 mc receiver with a self-contained crystal controlled converter for 144-148 mc reception. A switchable crystal lattice filter permits extremely sharp selectivity for SSB and CW as well as providing 8 KC of bandpass for strong local signals and net operation. Both diode and product detection are provided. Automatic and variable threshold noise limiters function respectively for AM and SSB/CW reception. A new electrical band spread control provides ± 1 KC to the receivers main tuning dial for ease in tuning SSB and CW signals.

Converter input provides for 220 - 432 mc and up, as well as for excellent general coverage of the lower frequency bands using Clegg's new ALLBANDER converter/speaker combination (described to the right).

Space will not permit a complete description of this fine new receiver, but we'd like to suggest that you see one at your dealers or write to the factory for complete data

Shortly after the first of the year, Clegg Laboratories will release the new INTERCEPTOR ALLBANDER, converter/speaker combination which will extend the tuning range of your Interceptor (either B or earlier model) to superb general coverage of all frequencies between 3 and 30 megacycles.

Designed to sell as $129.95, this unit, in matching cabinet, will not only provide excellent coverage of the 80 through 10 meter ham bands, but also the intermediate frequencies where many desirable signals (WWV, citizens band, foreign broadcast, etc.), are found.

For other Squires-Sanders products see opposite page.

Visit your distributor today and see the famous Clegg family that is making VHF history.

ZEUS 6 & 2 meter
transmitter 185 watts
AM & CW . . . $695.00 amateur net

THOR 6
6 & 2 meter transceiver
. . . $349.95 amateur net.

VENUS 6 SSB Transceiver
85 watts PEP
. . . $475.00 amateur net.

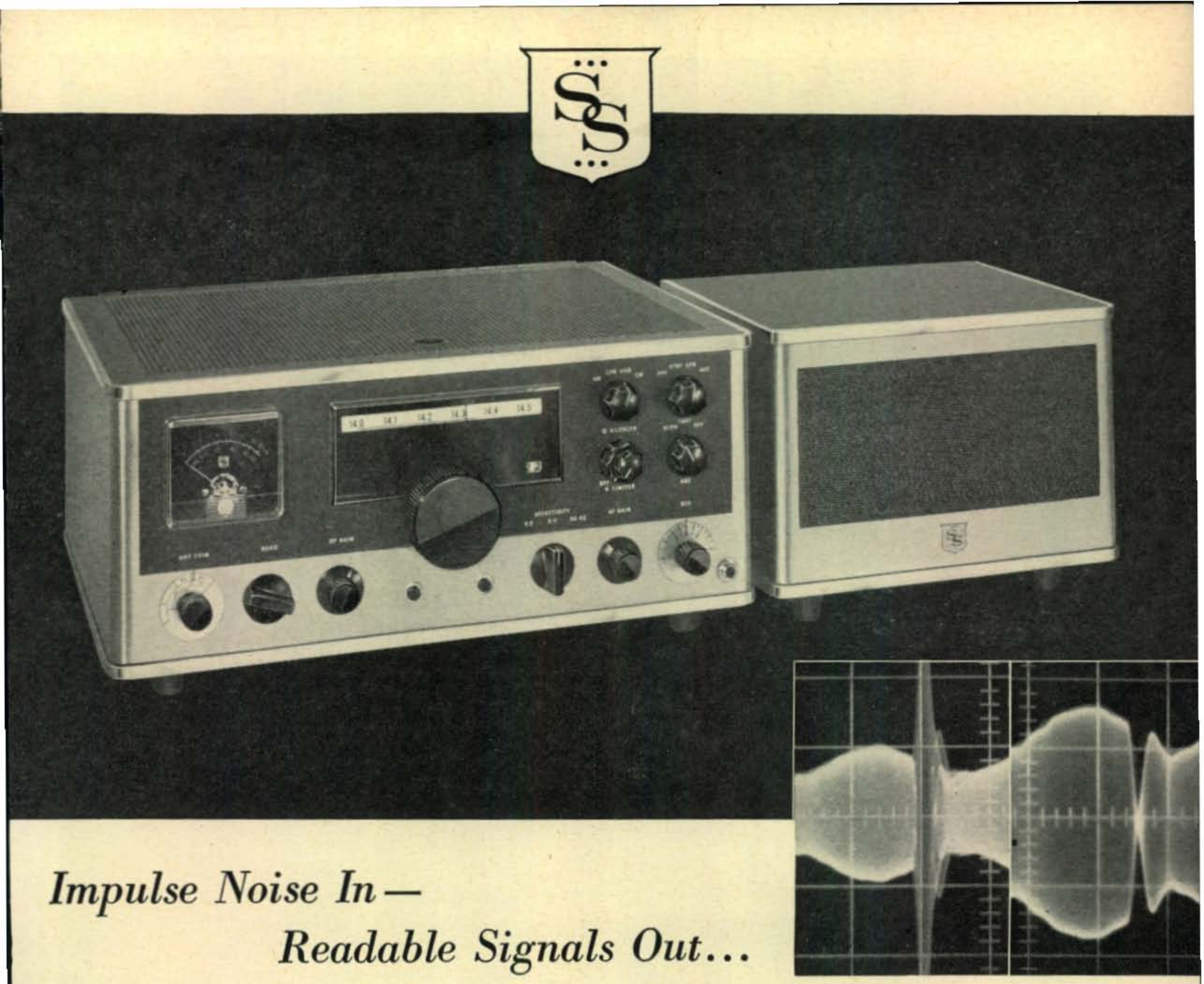
99'er six meter 8 watt
transceiver . . . $159.95
amateur net

See your Distributor or write for information.

Clegg LABORATORIES
Division of Squires-Sanders, Inc.

RT. 53, MT. TABOR, N. J.
TELEPHONE 627-6800

For further information, check number 4, on page 106



Impulse Noise In— Readable Signals Out...

The SS-1S Pre-IF Noise Silencer[1] makes possible *solid copy* of barely detectable signals (S2 or less) in the presence of overwhelming (S9 or greater) impulse noise caused by ignition, neon signs, switches, power leaks and similar high peak, short duration disturbances. The truly spectacular performance of this accessory results in part from the exceptional overload and cross modulation characteristics of the unique SS-1R Receiver design[2] as well as from two most important design concepts: a) broad band noise detection (*full receiver front end bandwidth*), and b) gating the receiver (quietly and rapidly with low insertion loss) *before the noise pulse has been lengthened by receiver selectivity*. The oscillograms at right show the net effect of this silencing.

The SS-1R offers other extremely attractive performance characteristics: frequency precision and stability exceeding that of most frequency meters; digital frequency display requiring no mental arithmetic; autocalibration of all amateur bands with WWV; easy and exact sideband tuning (10 kc. per revolution with manual control) plus push button motor tuning fast traverse — to mention just a few. SS-1R is *The New Standard of Performance*. Now available at your favorite dealer.

[1]"A Pre-IF Noise Silencer", W. K. Squires, W2PUL, QST, Oct. 1963. [2]"A New Approach to Front End Design", ibid., Sept. 1963

SPECIFICATION PROFILE

- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** ½ μv, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a **10** μv signal with 2.5 kc. selectivity, an unwanted **0.1 volt** signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack — 1 ms., **Slow** release — 1.0 sec., **Fast** release — 0.1 sec. Audio rise less than 2 db from 5 μv to 0.3 volt
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7¾" H x 16¼" W x 13" D, 25 lb.

For other Squires-Sanders products, see Clegg Laboratories advertisement, opposite page

Squires-Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

For further information, check number 5, on page 106

Wouldn't You?....

.....Sure You Would, even the last dollar. Mosley engineers would bet that you couldn't find another antenna that would compare to their 2 and 6 meter Scotch-Master Beams. Why! Because Mosley Scotch-Master 2 and 6 meter beams offer unmatched performance, dependability and features not found in any competitive beam. When you install a Mosley Scotch-Master Beam there is no need to bluff a good signal or fold because of QRM.

Please send me FREE of charge your brochure (form no. SM-2-6) on the 2 and 6 meter beams.

Name .....

Address .....

City/State .....

Mosley Electronics Inc.

4610 N. Lindbergh Blvd., Bridgeton, Mo. 63044

For further information, check number 6, on page 106

ZERO BIAS

The American Radio Relay League has finally filed its incentive licensing proposal with the Federal Communications Commission. Despite ten months of intensive editorial comment and many personal appearances by high League officials at amateur conventions, an exact licensing scheme was not publicly revealed until the issuance of W1AW Bulletin 917 on October 3rd, followed by full coverage of the subject in *QST* for November.

The "band-a-year" plan which the League now proposes is, in our opinion, a fair-minded approach to an extremely thorny problem. However, the deceptive and secretive tactics used to keep the proposal from its members is a cowardly and self-degrading act.

Having an idea that the ARRL licensing proposal would take the shape of the now defunct Class A, B & C amateur plan, *CQ*, in its ZERO BIAS for August reviewed and outlined this structure for those who received their license after 1951. As it turns out, this is exactly what was proposed with the exception that Amateur Extra licensees would retain identical privileges as the "new" Advanced Class operator. No one at the League, prior to October 3rd had even dropped the slightest hint that this was the manner in which incentive licensing would take shape.

Probably the most important point of the proposal is that of the time factor involved to upgrade ones self to retain voice operation. General Class amateurs will be required (if the proposal is passed) to obtain their Advanced Class license by July 1, 1965 to retain phone privileges in the twenty-meter band. By July 1, 1966, phone operation will not be permitted General Class amateurs in the 15 and 40 meter band unless the Advanced License is obtained and last, 75 meter phone operation will be withheld from General Class operators if they have not received an Advanced License by July 1, 1967.

We ask our readers not to confuse *what* has been proposed with *how* it has been done! We still feel incentive licensing is an extremely important factor for the future retention of our bands. There has, however, been so much political intrigue connected with this recommended legislation that many amateurs have lost the true meaning behind its original intent.

It is our understanding that many of the Directors were not even aware of the League's method of implementation. To quote from the proposal "The Board directs the officials of the League, with the advice of its Executive Committee to proceed with the implementation of these [incentive licensing] objectives." As we read this, it clearly states that the elected officials of the League left a serious policy-making matter in the hands of non-elected officers; a serious affront to all League members, for if we cannot control our League with the votes we cast, how is the League to retain its democratic status?

S. 920 Passes Senate

We are pleased to report that the reciprocal operating Bill, S. 920, passed the United States Senate with unanimous approval on October 15th. The Bill received only minor revisions. It now goes to the House of Representatives where it will be placed before the Committee on Interstate and Foreign Commerce. It is expected that the same hearings will be held in the House as in the Senate. Representative Oren Harris of Arkansas is Chairman of the Commerce Committee and we're sure he'll appreciate having your views on the Bill.

S. 920 remains alive for the duration of the 88th Congress. Should the House not schedule hearings on the Bill, or should it become bogged down in the 1st or 2nd Session, it will have to be reintroduced once more and the *entire* procedure repeated!

It has taken an awfully long time for Reciprocal Operating to come this far; we therefore urge you to write your individual Congressman explaining the importance of S. 920's passage.

OUR COVER

This shot shows the *Marsouin* at anchor off the island of Agalega. Harvey, VQ9HB will relate the exciting story of his voyage to that remote island in the pages of *CQ* next month. Watch *CQ* in the coming months for additional DXpedition stories.

LETTERS TO THE EDITOR

Incentives

Editor, *CQ:*

. . . I would suggest that other hams do as I have done; do not renew their subscriptions to the official magazine when they expire. The League would then realize that they could not finance their program on contributions from the chosen few.

Tom F. Karr, K8PTE
P. O. Box 67
Willard, Ohio

Editor, *CQ:*

. . . It heartens me to see that *CQ* has taken a favorable stand alongside the ARRL in advocating incentive licensing and restricted phone bands. Don't let the "status-quo'ers" shout you down.

John E. Pitts, W6CQK/YV1
Apartado No. 36
Cabimas, Edo. Zulia

Editor, *CQ:*

I am 100% against the ARRL Incentive Licensing program.

Jack Franey, K3LKB
2332 S. 25th Street
Phila. 45, Pa.

Editor, *CQ:*

. . . Since amateur radio is by its nature international in organization, we are going to have more and more difficulty in persuading nations to keep commercial stations out of the frequencies. . . .

. . . If we cannot prove our worthiness to occupy these bands beyond the ability to turn a set on and off, we are faced with the inevitable end result—complete loss of the bands. I do not say "our amateur bands," for old timers clearly remember that changes could and did take place.

Raymond A. Cook, W4JOH
Professor of American Literature
Georgia State College
Atlanta, Georgia

Editor, *CQ:*

This is to advise you that the South Philadelphia Amateur Radio Klub wishes to go on record as being unanimously opposed to the incentive licensing program of the American Radio Relay League.

Joseph J. Puleio, W3ORS, Sec.

Editor, *CQ:*

. . . I have been hamming since December, 1962 together with my sons, David, (age 13) WB2GAO and Andy (age 9) WN2GAP. . . .

I have in hand Herbert Hoover's address to the Atlantic Division Convention dated Sept. 1, 1963. He sets forth clear logical explanations for the upgrading program recommended by the ARRL. . . .

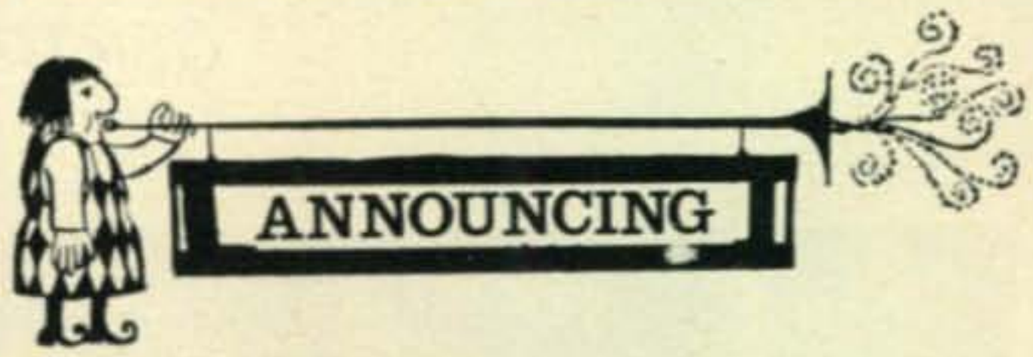
I am, and have been for 12 years, a manufacturer of consumer (not ham) radio equipment. I feel reasonably

For further information, check number 8, on page 106

well qualified to discuss various statements made on depressed values in ham equipment resulting in the drop out of amateurs after incentive licensing becomes effective. The best answer for this thinking is the present CB situation. The FCC has announced its curtailing and restricting the bands for CB use. Despite this well advertised official position, the sale of CB equipment is bigger than ever. . . .

My sons and I are looking forward to acquiring the knowledge needed to pass the advanced exam two years hence. . . .

Arthur Gould, WB2GAQ
1 Wilshire Dr.
Lake Success, N. Y.



ATTENTION!

The United States Information Agency is forming an exhibition on Communications which will tour the Soviet Union next spring and summer.

Amateurs holding a General ticket or better and have some knowledge of the Russian language will join the tour. All expenses will be paid as well as regular salary.

In order to conserve time, interested amateurs, who feel they may qualify should call Mr. Flynn *collect* at Washington, D. C. exchange DUDLEY 3-4452. Please call *only* if your business will permit your leaving the country for a few months.

Revised Examination Procedures

As reported last month, new procedures have been instituted by the FCC concerning volunteer examinations. The volunteer examiner must now be 21 years old and hold at least a General Class License. The volunteer examiner will now request that the written examination be forwarded him for Novice, Technician and Conditional tests, only *after* the code requirement has been satisfactorily completed. Text of the Order follows.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of

Amendment of Sections 12.22 and 12.44(*c*) of the Rules governing applications and examinations for Amateur Radio operator licenses

ORDER

At a session of the Federal Communications Commission held at its offices in Washington, D. C. on the 16th day of October, 1963;

The Commission having under consideration Section 12.44(*c*) of its rules [as amended by its Order (FCC 63-813, 28 FR 10206) adopted September 11, 1963 and effective November 1, 1963] and Section 12.22 of its rules, both of which govern, in part, application and examinations for amateur radio operator licenses; and

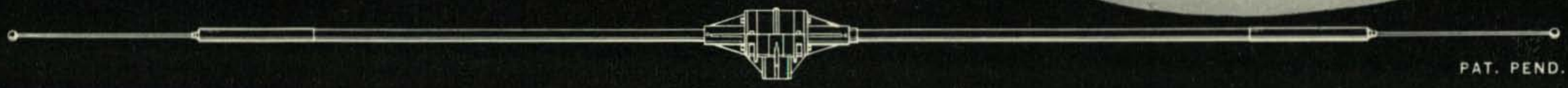
IT APPEARING, That, Part 12 of the Commissioner's Rules should be amended to specify that the filing of a formal application (FCC Form 610) at the District Field Office involved is a prerequisite for applicants desiring examinations conducted by such office, and that when the examination will be supervised by a volunteer examiner the request for the written portion of the examination must be made in writing by the examiner after the applicant has passed the required code test and submitted a formal application (FCC Form 610) to the

FIRST and ONLY..

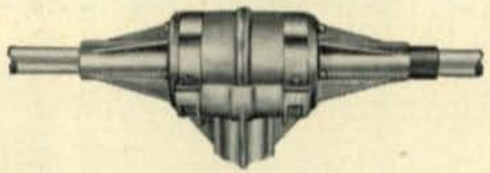
remotely tuned ROTATABLE DIPOLE!

DESIGNED SPECIALLY FOR 40 AND 75 METERS IN LIMITED ANTENNA SPACE

NEW-TRONICS CLIFF-DWELLER™



PAT. PEND.



Housing for motors and gear trains with mounting yoke

Resonance and band switching control

ELECTRICAL FEATURES

- Antenna resonance finger tip controlled from transmitter location in shack.
- VSWR: 1.1 to 1 or less across entire band
- Feed-point variable to compensate for antenna environment
- No traps . . . no baluns . . . no matching devices of any kind
- Feed direct with any length 52 ohm cable
- Power handling capacity — maximum legal limit

The CLIFF-DWELLER is another New-Tronics first. Here's a tuneable dipole ideal for hams who live in apartments or in homes on small lots. The CLIFF DWELLER will give you unbelievable performance even in limited space.

MECHANICAL FEATURES

- Approx. lengths

28′-6″ — 26′	7.0-7.3 mc
30′-6″ — 26′	3.5-4.0 mc
31′-4″ — 26′	Two-Bander

- Self supporting, accepts 1¼″ threaded pipe for mounting in standard rotators
- Maximum turning radius approx. 15′-8″
- Sturdy aluminum die cast housing for motors and gear trains which drive end sections of dipole
- Heat treated aircraft type, 1¼″ heavy wall aluminum tubing
- Completely waterproofed resonators and housings

MODEL NO.	FREQ. MC	WEIGHT	NET PRICE
CD 40	7.0-7.3	Under 20 lbs.	$ 92.50
CD 75	3.5-4.0	Under 20 lbs.	99.50
CD 40-75	Two Bander	Under 20 lbs.	129.50

See the CLIFF-DWELLER and other fine NEW-TRONICS products at your distributor or write us for descriptive literature.

NEW-TRONICS CORPORATION

3455 VEGA AVENUE • CLEVELAND 13, OHIO

For further information, check number 11, on page 106

Commissioner's Office at Gettysburg, Pennsylvania; and

IT FURTHER APPEARING, That, the requirement that a formal application be filed for obtaining a duplicate license is no longer necessary; and

IT FURTHER APPEARING, That, subparagraph (1) of Section 12.44(*c*), as adopted by the Commission's Order, FCC 63-813, effective November 1, 1963, should be superseded by the amendment of Section 12.44(*c*) in this Order so as to reflect the rule change adopted herein; and

IT FURTHER APPEARING, That, the effective date, November 1, 1963, of the Commission's Order, FCC 63-813, should be stayed until the effective date of this Order; and

IT FURTHER APPEARING, That, the amendments adopted herein and set forth in the attached Appendix are procedural in nature and hence are not subject to the prior notice provisions of Section 4(*a*) of the Administrative Procedure Act; and

IT FURTHER APPEARING, That, authority for the issuance of these rules is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended;

IT IS ORDERED, That the effective date of the Commission's Order, FCC 63-813, adopted September 11, 1963, is stayed until the effective date of this Order; and

IT IS FURTHER ORDERED, That, subparagraph (1) of Section 12.44(*c*), as previously adopted by the Commission's Order, FCC 63-813, is superseded; and

IT IS FURTHER ORDERED, That effective December 1, 1963, Sections 12.22 and 12.44(*c*) of Part 12 of the Commission's rules are amended as set forth in the attached Appendix.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE
Secretary

APPENDIX

1. Section 12.22 is amended to read as follows:

§12.22 Application for Operator License.

(*a*) An application (FCC Form 610) for a new operator license, including an application for change in operating privileges, which will require an examination supervised by Commission personnel, shall be submitted to the district field office of the Commission which exercises jurisdiction over the area in which the applicant resides. Upon receipt of the application, and any necessary filing fee (See §12.86), the district field office will make arrangements for conducting the required examination either at its location or at an examination point within its area.

(*b*) An application (FCC Form 610) for a new operator license, including an application for change in operating privileges, which requests an examination supervised by a volunteer examiner under the provisions of §12.44(*c*), shall be submitted to the Commission's office at Gettysburg, Pennsylvania 17325. The application shall be accompanied by any necessary filing fee (See §12.86) and by a request for the written examination material (See §12.44(c).)

(*c*) An application (FCC Form 610) for renewal and/or modification of license when no change in operating privileges is involved shall be submitted, together with any necessary filing fee (See §12.86), to the Commission's office at Gettysburg, Pennsylvania 17325.

2. Section 12.44(*c*)(1) is amended to read as follows:

* * * * *

(*c*) * * *

(1) Within ten days after passing the required code test, an applicant shall submit an application (FCC Form 610), together with any filing fee prescribed by §12.86, to the Commission's office at Gettysburg, Pennsylvania 17325. The application shall include a written request from the volunteer examiner for the appropriate examination papers. The examiner's written request shall include (i) the names and permanent addresses of the examiner and the applicant, (ii) a description of the examiner's qualifications to administer the examination, (iii) the examiner's statement that the applicant has passed the code test for the class of license involved under his supervision within the ten days prior to submission of the request, and (iv) the examiner's written signature. Examination papers will be forwarded only to the volunteer examiner.

NOTE: When the applicant is entitled to examination credit for the code test pursuant to §12.46(*b*), an application may be submitted without regard to the ten

If you, like many of today's amateurs, find yourself with your interest fairly equally divided between working AM/CW and SSB, there's a real feeling of frustration with most available equipment. Why? Because most AM rigs require extensive modification to operate SSB—and no SSB rig offers high level AM and Class "C" CW—and the end result is compromise in one mode or the other!

Not so with the Viking SSB Adapter/Valiant II combination, for here's the package that gives you 275 watts CW and SSB plus 200 watts high level AM phone! Now, keep your contacts and work old friends no matter what portion of the band they are operating in, and no matter what mode they are using—and do it with maximum punch!

VALIANT II SSB ADAPTER

SSB ADAPTER

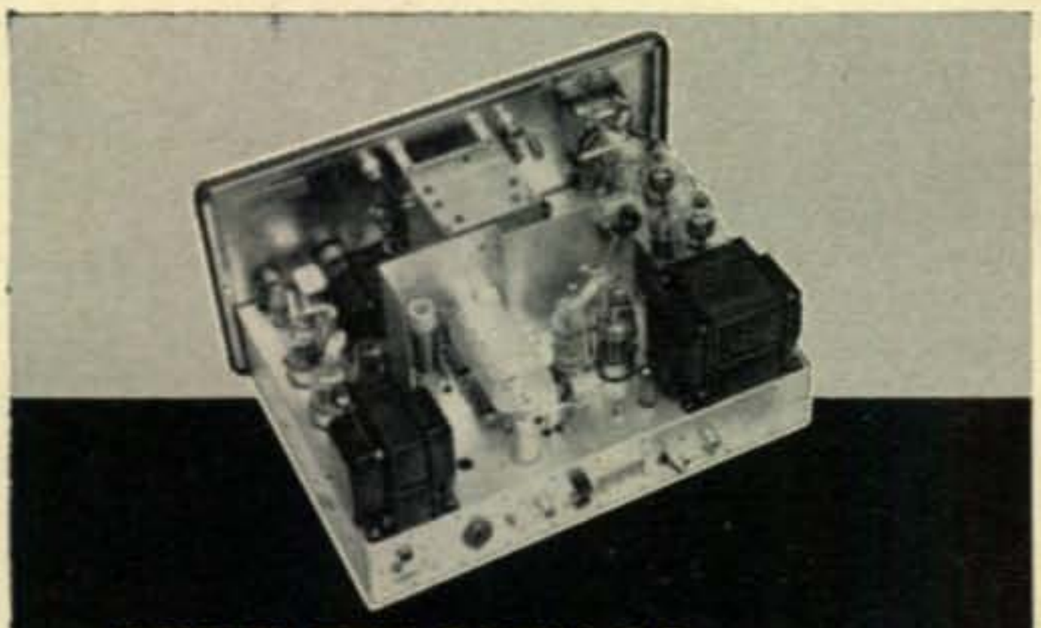
Filter-type SSB generator—bandswitching 80 through 10 meters—more than 50 db sideband suppression—more than 45 db carrier suppression. Features built-in multiplier requiring VFO input only—design and front panel make operating practically foolproof!

Cat. No. 240-305-2 . . . Wired, tested . . . **Net $369.50**

VALIANT II

Outstanding flexibility and performance in a compact desk-top rig! Bandswitching 160 through 10 meters—275 watts input CW or SSB (with Viking SSB Adapter) and 200 watts AM!

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



COMPLETE CATALOG

Drop us a card and we will send you Amateur Catalog 962, which gives the full story on the "Viking SSB Adapter" and the "Valiant II", as well as detailed information on our complete line of amateur transmitters and station accessories.

E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.

For further information, check number 13, on page 106

day limitation. The examiner's request should then state that a code test was not administered for that reason. The applicant should furnish details as to the class, number, and expiration date of the Commercial radiotelegraph operator license involved.

License Fees

License fees become effective the first of January and the FCC has clarified their points of fees for modifications and/or renewals. No charge is made for Novice, RACES, applications.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Amendment of Parts 7, 8, 9, 10, 11, 12, 14, 16 and 19, to incorporate therein the schedule of fees for filing applications for Commission authorizations.

ORDER

At a session of the Federal Communications Commission, held at its offices in Washington, D.C., on the 25th day of September, 1963;

IT APPEARING, That, on May 6, 1963, the Commission, in the proceeding in Docket 14507, adopted a fee schedule for its licensing and regulatory activities, effective January 1, 1964;

IT FURTHER APPEARING, That today the Commission granted in part various petitions for reconsideration filed in the above-mentioned proceeding and made certain changes in the schedule of fees and denied those and other petitions in all other respects; and

IT FURTHER APPEARING, That the fee schedule as revised and the rules pertaining thereto appear only in Part 1 (Subpart G) and that the pertinent portions of the fee schedule and rules should be included in the rule parts governing the Safety and Special Radio Services; and

IT FURTHER APPEARING, That the rule amendments ordered herein are editorial in nature in that they codify in other rule parts the rules (Subpart G, Part 1) adopted following a public rule making proceeding, and therefore the prior notice and effective date provisions of Section 4 of the Administrative Procedure Act are inapplicable;

IT IS ORDERED, pursuant to authority contained in Sections 4(*l*) and 303(*r*) of the Communications Act of 1934, as amended, That Parts 7, 8, 9, 10, 11, 12, 14, 16 and 19, ARE AMENDED, effective January 1, 1964, as shown in the Appendix attached hereto.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE
Secretary

APPENDIX

1. * * * *

6. Part 12 is amended by adding two new sections to read:

§12.85 Payment of fees.

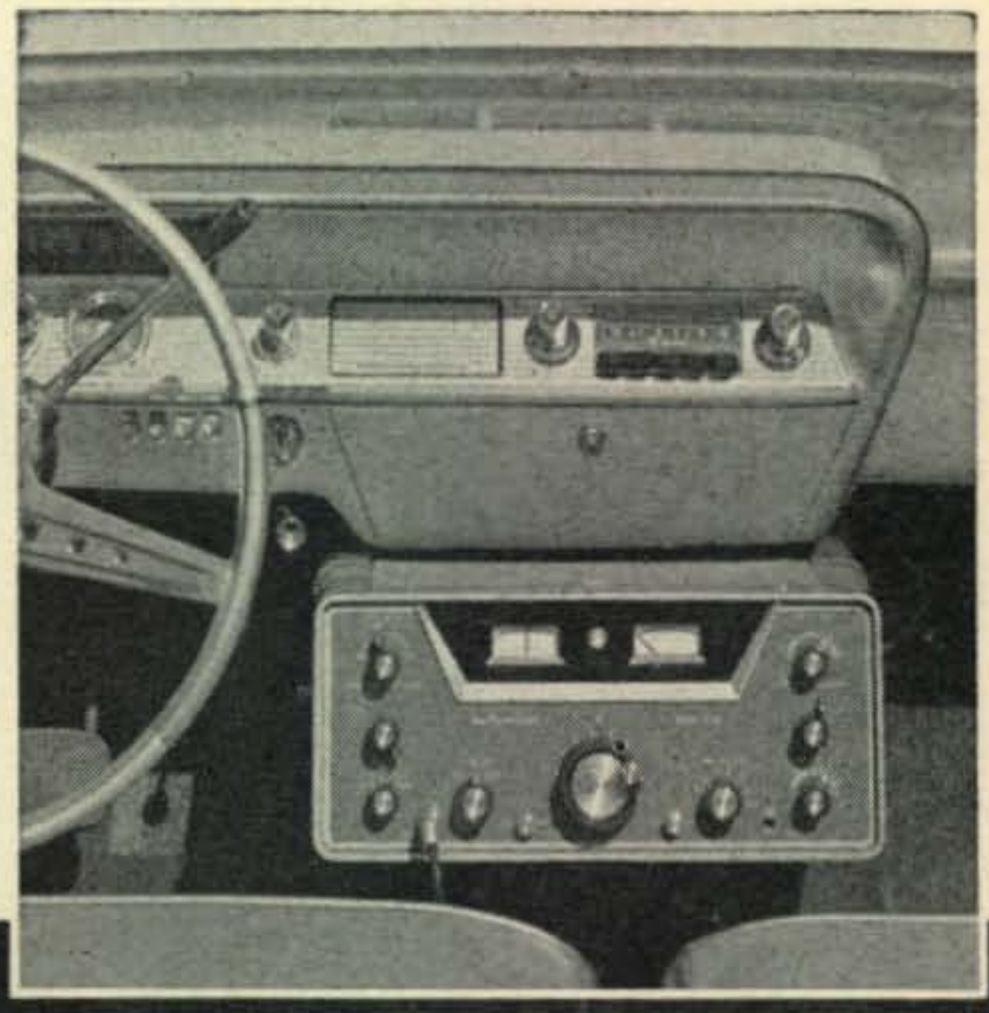
(a) Each formal application for which a fee is prescribed in §12.86 must be accompanied by a remittance in the full amount of the fee. In no case will an application for which a fee is prescribed be accepted for filing or processed prior to payment of the full amount specified. Applications for which no remittance is received, or for which an insufficient amount is received, may be returned to the applicant.

(b) Fee payments accompanying applications submitted to the Commission should be in the form of a check or money order payable to the Federal Communications Commission. The Commission will not be responsible for cash sent through the mails. All fees collected will be paid into the United States Treasury as miscellaneous receipts in accordance with the provisions of Title V of the Independent Offices Appropriation Act of 1952 (5 U.S.C. 140).

[*Continued on page 84*]

All this performance for only $650.00!

Full amateur band coverage, 80 through 10 meters • Hallicrafters exclusive new R.I.T. (Receiver Incremental Tuning) for ± 2 kc. adjustment of receiver frequency independent of transmitter, and AALC (Amplified Automatic Level Control) • Receiver AF gain and RF gain controls • SSB operation, VOX or PTT . . . CW operation, manual or break-in • 1650 kc. crystal filter . . .



SPECIFICATIONS

Frequency coverage: Eight-band capability — full coverage provided for 80, 40, 20, 15 meters; 10M crystals furnished for operation on 28.5 — 29.0 Mc. Other crystals may be added for full 10 meter coverage without adjustment. Available for operation on specified non-amateur frequencies by special order.

Front panel controls: Tuning; Band Selector; Final Tuning; RF Level; Mic. Gain; Pre-Selector; R.I.T.; Rec. RF Gain; AF Gain; Operation (Off/Standby/MOX/VOX.); Function (CW/USB/LSB); Cal.

General: Dial cal., 5 kc.; 100 kc. crystal cal.; VFO tunes 500 kc.; 18 tubes plus volt. reg., 10 diodes, one varicap. Rugged, lightweight aluminum construction (only 17½ lb.); size—6½" x 15" x 13".

Transmitter Section: (2) 12DQ6B output tubes. Fixed, 50-ohm Pi network. Power input—150W P.E.P. SSB; 125W CW. Carrier and unwanted sideband suppression 50 db.; distortion prod., 30 db. Audio: 400-2800 c.p.s. @ 3 db.

Receiver Section: Sensitivity less than 1 μv for 20 db. signal-to-noise ratio. Audio output 2W; overall gain, 1 uv for ½ W output. 6.0 — 6.5 1st I.F. (tunes with VFO). 1650 kc. 2nd I.F.

Accessories: P-150AC, AC power supply, $99.50. P-150DC, DC power supply, $109.50. MR-150 mounting rack, $39.95.

New SR·150 **Fixed/Mobile Transceiver** ***hallicrafters***

Overseas sales: Export Division, Hallicrafters • Canada: Gould Sales Co., Montreal, P.Q.

5th and Kostner Aves., Chicago 24, Ill.

For further information, check number 15, on page 106

OUR September "Tower" cartoon cover brought a great many replies and we're finding out that hams, in general, have a pretty good sense of humor.

We can't possibly print all of the captions received but here's a pretty fair sample. There was an amazing amount of similarity in many of the captions and if you don't see yours it's probably because of the duplication.

"I'd give anything if my XYL would let me put up a beautiful tower like yours."–*K5OPT*

"It cost me 1,000,000 points in the MARS program, but it's worth it!"–*K2DDK*

"Sorry–one corner of that tower is on my property and we're going to plant a peach tree there." –*WA2VKK*

"I told you a thousand times don't throw surplus nuts and bolts out the window!"–*K8DDC*

"So you got your new tower up. So what else is new?"–*WA2GKM*

"Wait 'til the Tax Assessor sees *that!*"–*WA6CWZ*

"I picked it up surplus for $9.95 but the shipping was murder."–*W4YND*

"No ladder?"–*K5BQJ*

"It sure shook up that jet."–*K1PLR*

"There, that ought to keep my mother-in-law away!"–*K1WMQ*

All day long "Fe-Fi-Fo-Fum!"–*WN2FLA*

"Of course I'm afraid of lightening Edgar, but my goodness . . . !"–*W3YAG*

"I get S-9 in Europe," Tom said, toweringly.–*WA4MLA/2*

"Well, I had this cow see–and I took her to market and traded her for some beans . . . you follow me?"–*VE3DIJ*

Gullible's Travels–W0KA

"I still think you should have gotten your ticket first!"–*W5YFS/7*

"No–it doesn't crank down!"–*WA4KOP*

"We're getting ready to send up a search party." –*WB6BOW*

"D-D-dear A-A-are we in the T-T-twilight zone?" –*WB2HOK*

And finally from WA4EYK . . . "Lookit all those idiots out there trying to make up funny captions for this crummy picture."

Oh yes! The cartoonist's caption . . .

"Just for once couldn't you order something second best?"

INTRODUCING THE NEW SWAN-TCU

TRANSMITTER CONTROL UNIT

COMPANION FOR YOUR SW-240

PROVIDES FOR SEPARATE TRANSMIT-RECEIVE FREQUENCY CONTROL

Full coverage of 20, 40, and 80 meters. 100 kc calibrator. 15 mc reception of WWV. Vox control operation. Built-in speaker. AC power supply may be included if desired.

$115 complete with connectors and installation kit for use with all SW-240s.

available at your SWAN dealers in January

THE FABULOUS SW-240 TRANSCEIVER

240 watts PEP input. High frequency crystal lattice filter. Precision tuning mechanism. Exceptional frequency stability. Receiver sensitivity better than one microvolt.
Automatic gain control.
Break-in CW operation.
14,000-14,350 kc
7,000- 7,300 kc
3,650- 4,000 kc*

*Kit for full 80 meter coverage available.

$320

SWAN ACCESSORIES

MOBILE MOUNTING KIT
Locking type, including speaker switch, with front-mounted mike jack. **$19.50**

SIDEBAND SELECTOR KIT
Provides both opposite sideband and AM receive position. **$18**

SW-117AC Power Supply.
With 5 x 7 speaker and phone jack. **$95**

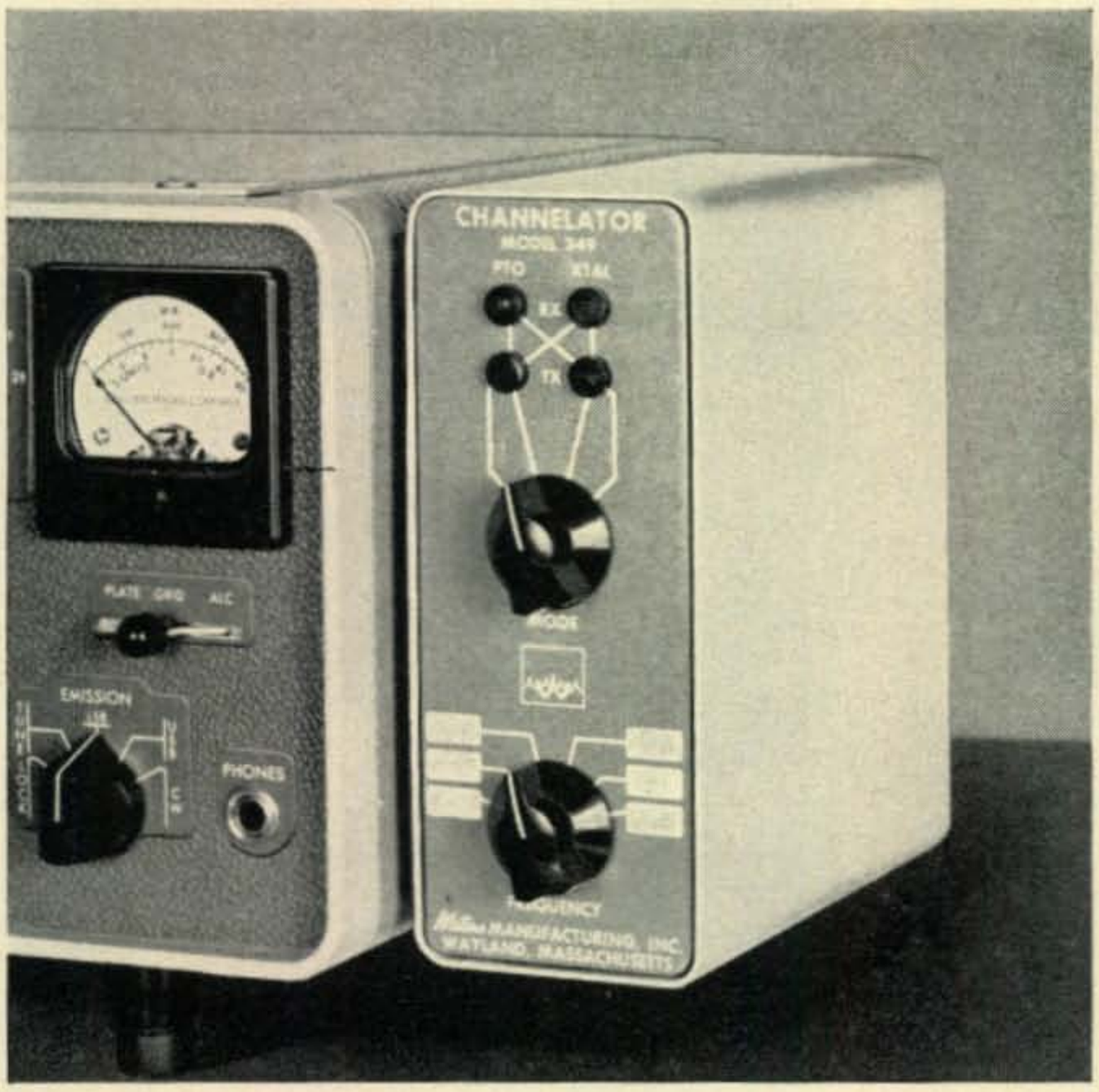
SW-12DC Power Supply for mobile operation.
Has pre-wired cables and installation hardware. **$115**

NOW A NEW SWAN AC POWER SUPPLY—THE SW-117B
Designed to fit inside the Swan TCU cabinet or may be used separately to power the SW-240. **$75**

For further information, check number 17, on page 106

SWAN ELECTRONICS CORP.
Oceanside, California

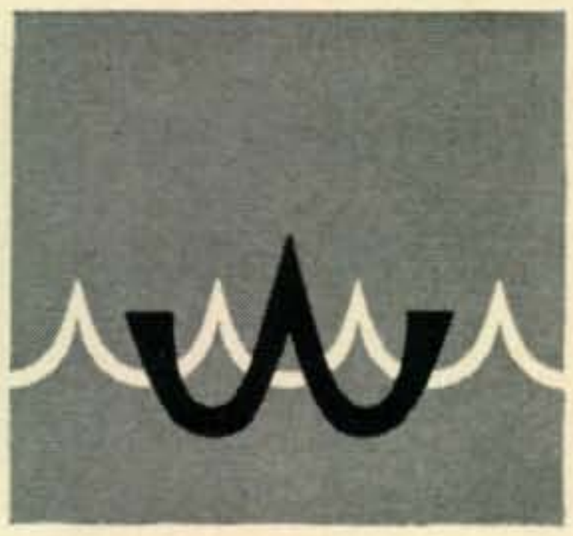
WATERS ACCESSORY PRODUCTS FOR COLLINS KWM2/2A



CHANNELATOR[tm]
Crystal Frequency Control

The CHANNELATOR resolves KWM2/2A transceiver tuning problems. Instantaneous switching to any of six pre-selected, exact crystal frequencies; covers complete PTO range. A built-in heterodyne frequency meter and "pullable" crystals permit exact frequency adjustment for NET or ROUND TABLE operations. You can operate normal PTO or "split channel." The Channelator installs in minutes — all cables and plugs are furnished, only cable to solder — no drilling; operates from any fixed or mobile KWM2/2A power supply. PRICE, less crystals: **$75.00** Crystals, any frequency, USB or LSB: **$6.00** each

EVT[tm] Electronic Vernier Tuning gives you 20-to-1 tuning ratio in your KWM2/2A. A stable, solid-state varactor tuning device, EVT attaches to your PTO *without* wiring changes. Precise, slow-rate tuning makes small frequency changes easy, especially when "mobiling" in traffic. Tuning range is ±500 cycles from any PTO setting. Zener regulator maintains well-known Collins stability. EVT may be used with *any* power supply. PRICE: **$23.95**



Q-MULTIPLIER/NOTCH FILTER[tm] Eliminates heterodynes and other unwanted signals with over −40 db notch tunable over the entire IF passband. Assembled and ready for installation, the Q-Multiplier/Notch Filter becomes an integral part of your KWM2/2A with escutcheon plate and knobs matched to the Collins panel; no drilling. PRICE: **$53.75** (Also available for Collins 75S-1: **$39.95**)

AVAILABLE AT LEADING DISTRIBUTORS

WATERS MANUFACTURING, INC., WAYLAND, MASSACHUSETTS

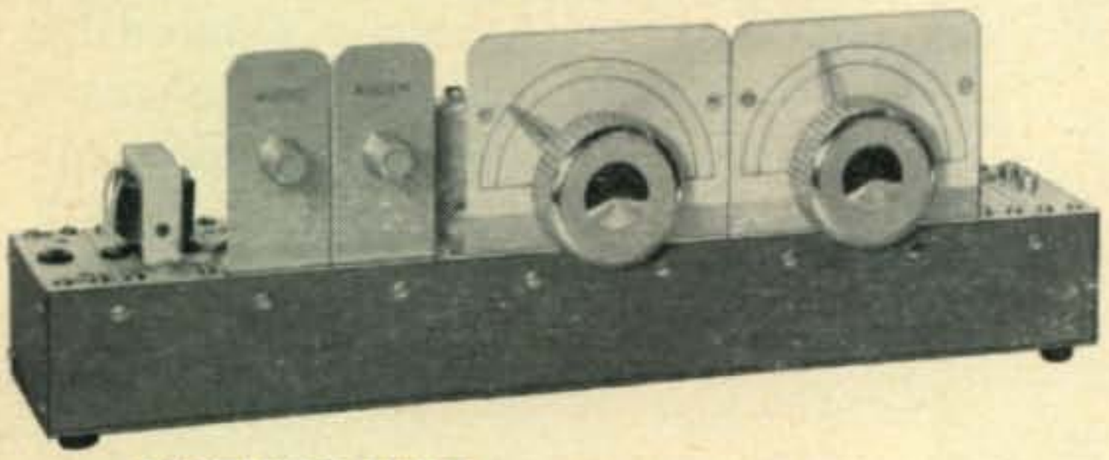
Other Waters Products: Coaxial Switches – Dummy Load/Wattmeter – "Little Dipper[tm]" (Transistorized Dip Oscillator)

For further information, check number 19, on page 106

EXPERIMENTER, SWL or RADIO AMATEUR

Select your receiver, transmitter, or VFO from easy-to-build International A O C kits.

Simple step-by-step instructions show you how to assemble factory prewired units. Designed for top performance at a low cost!



RECEIVER KITS

This new line of International receiver kits cover a wide range of amateur, citizens band and special frequencies. Designed for AM, CW, or SSB reception, this basic receiver using a superheterodyne circuit* with regenerative second detector may be expanded to a more elaborate receiver by the addition of other Add-On-Circuits. Sensitivity usable to below 10 microvolts for voice and 1 microvolt for code. Nuvistor rf amplifier, mixer, oscillator, I.F. transformer, detector/1st audio, and power audio amplifier. Tube lineup: 6DS4 nuvistor, 6BE6, 6U8, 6AQ5. Shipping weight: 15 lbs.

Receiver kit includes 4" speaker and power supply.

Kit	Frequency	Price
AOR-40	Special	$69.00
AOR-41	150 kc — 450 kc	62.50
AOR-42	2 mc — 6 mc	62.50
AOR-43	6 mc — 18 mc	62.50
AOR-44	80 meter/40 meter	62.50
AOR-45	15 meter/10 meter	62.50
AOR-46	6 meter	66.50
AOR-47	2 meter	66.50
AOR-48	Citizens 27 mc	62.50

*AOR-41 uses a tuned rf circuit with 6BA6

TRANSMITTER KIT

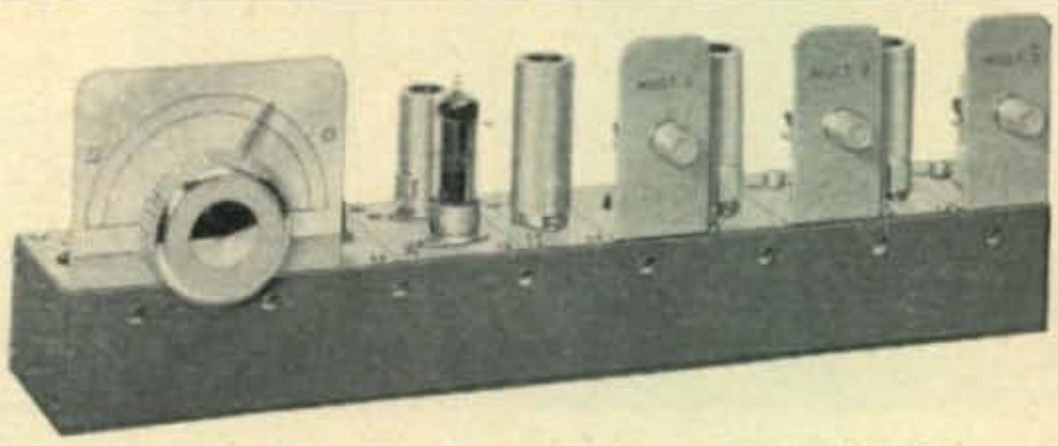
A compact package delivering a plate input of 50 watts for CW operation on 80 or 40 meters. 12BY7 crystal oscillator—6DQ6 power amplifier. Pi-network final. When used with AOR-44 receiver, transmitter operates from receiver power supply. Meter and TR switch.

AOT-50 transmitter kit less power supply and key, but with one 40 meter novice band crystal. Shipping weight: 5 lbs. **$35.00**

POWER SUPPLY KITS

AOP-100 350 volts, 150 ma intermittent or 100 ma continuous service, 6.3 volts @ 5 amps. Shipping weight: 8 lbs. **$18.50**

AOP-200 650 volts, 250 ma intermittent or 200 ma continuous service, 6.3 volts @ 10 amps. Shipping weight: 10 lbs. **$32.50**



VFO KITS

The International AOF series of variable frequency oscillator kits is available in three versions. For example, the AOF-91 kit is a complete driver unit to be used with 6 meter and 2 meter transmitters. Approximately .5 watt of power is available on both bands. Tube lineup: 6BH6 oscillator, OB-2 voltage regulator, 12BY7 buffer-amplifier/multiplier. Shipping weight: 5 lbs.

Kit	Frequency	Price
AOF-89	VFO 8 mc — 9 mc and buffer	$22.00
AOF-90	VFO 8 mc — 9 mc plus buffer multiplier and 6 meter output	29.00
AOF-91	VFO 8 mc — 9 mc plus buffer multiplier, 6 meter/2 meter output	36.00

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Include sufficient remittance to cover postage. See shipping weight.

INTERNATIONAL
CRYSTAL MFG. CO., INC.
18 NORTH LEE · OKLA. CITY, OKLAHOMA

For further information, check number 20, on page 106

Build the best ham shack in town with EICO

2 great transmitters plus a series of instruments that provide top flight performance, at lowest cost

Eico 720 90-Watt CW Transmitter 'clean' 90W, CW, 65W, AM/Phone with EXT plate modulation. 80 through 10 meters. Kit **$89.95**; wired **$129.95.**

Eico 723 60-Watt CW Transmitter 'clean' 60W, CW, 50W, AM/phone with EXT plate modulation. 80 through 10 meters. Kit **$59.95**; wired **$89.95.**

Eico 722 Variable Frequency Oscillator (self powered). Approaches crystal stability. 80 through 10 meters. Kit **$44.95**; wired **$59.95.**

Eico 706 Transistor Code Practice Oscillator Select variable tones, flashing light or both together. Phone jack for private use. Clean, loud signals. Kit **$8.95**; wired **$12.95.**

Eico 730 High-Level Universal Modulator-Driver Delivers undistorted audio for phone operation. Can plate-modulate Xmitters with RF inputs up to 100 W. Unique over-modulation indicator. Kit **$59.95**; wired **$89.95.** E-5 Cover; **$4.50.**

Eico 710 Grid-Dip Meter Continuous coverage 400 kc to 250 mc. 500 μa meter. Includes complete set of coils for full band coverage. Kit **$29.95**; wired **$49.95.**

Eico 430 General Purpose 3" Scope Compact, portable, lightweight. Flat-face CRT; sharp, bright trace. Flat from 2 cps to 500 kc, 25 mv/cm sens. (vert.); 2 cps to 300 kc, .25 v RMS/cm sens. (horiz.). Easy, direct connections to CRT vertical plates. Kit **$65.95**; wired **$99.95.**

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- ☐ Send free Catalog & name of neighborhood distributor.
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- ☐ Send 36-page STEREO HI FI GUIDE: 25c enclosed for postage and handling

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Add 5% in the West

For further information, check number 21, on page 106

For further information, check number 22, on page 106

GSB-201 RF LINEAR AMPLIFIER

GONSET'S LITTLE POWERHOUSE!

$297.00
AMAT. NET

Powerful with 1500 watts PEP, GSB-201 is an outstanding example of the modern trend toward high power in a small package. And this little powerhouse is really small...only a foot across the front ...fits neatly on your desk or table top...integrates smoothly with your existing equipment. Fine looking, functional, with every operating convenience. Finished in attractive blending light colors.

Powerful in all transmission modes: 1500 watts PEP for SSB... 1000 watts input for CW...400 watts input AM. Can be driven by exciters in the 65-150 watt category, GSB-100 and similar equipment. Stable, efficient grounded-grid circuitry. Substantial portion of drive power appears as useful amplifier output.

Versatile. Full bandswitching with pi network output for five bands, 80, 40, 20, 15 and 10 meters. Full vision panel instrument reads plate current or relative RF output...simplifies loading, monitors output. Panel switch allows tuneup at low power.

Economical. Four, low-replacement-cost 811A's are used in output. Long life silicon diodes in HV power supply eliminate less modern vacuum-tube-type rectifiers. Antenna changeover relay and bias supply are built-in.

TVI-Proofing. All control leads from amplifier are shielded and filtered.

SPECIFICATIONS:

Coverage: 80, 40, 20, 15, 10 meter bands.

Power input: 1500 watts PEP, SSB.
1000 watts input, CW.
400 watts input, AM.

Power consumption: Approx. 2000 watts peak.

Driving requirements: 65 to 150 watts depending upon input.

Input impedance: 50 ohms nominal.

Output impedance: 50 ohms nominal with SWR less than 3:1.

Output circuit: Pi network. Antenna relay built-in.

Tubes: 4—811A's. (Silicon diodes used in bridge circuit for high voltage supply.)

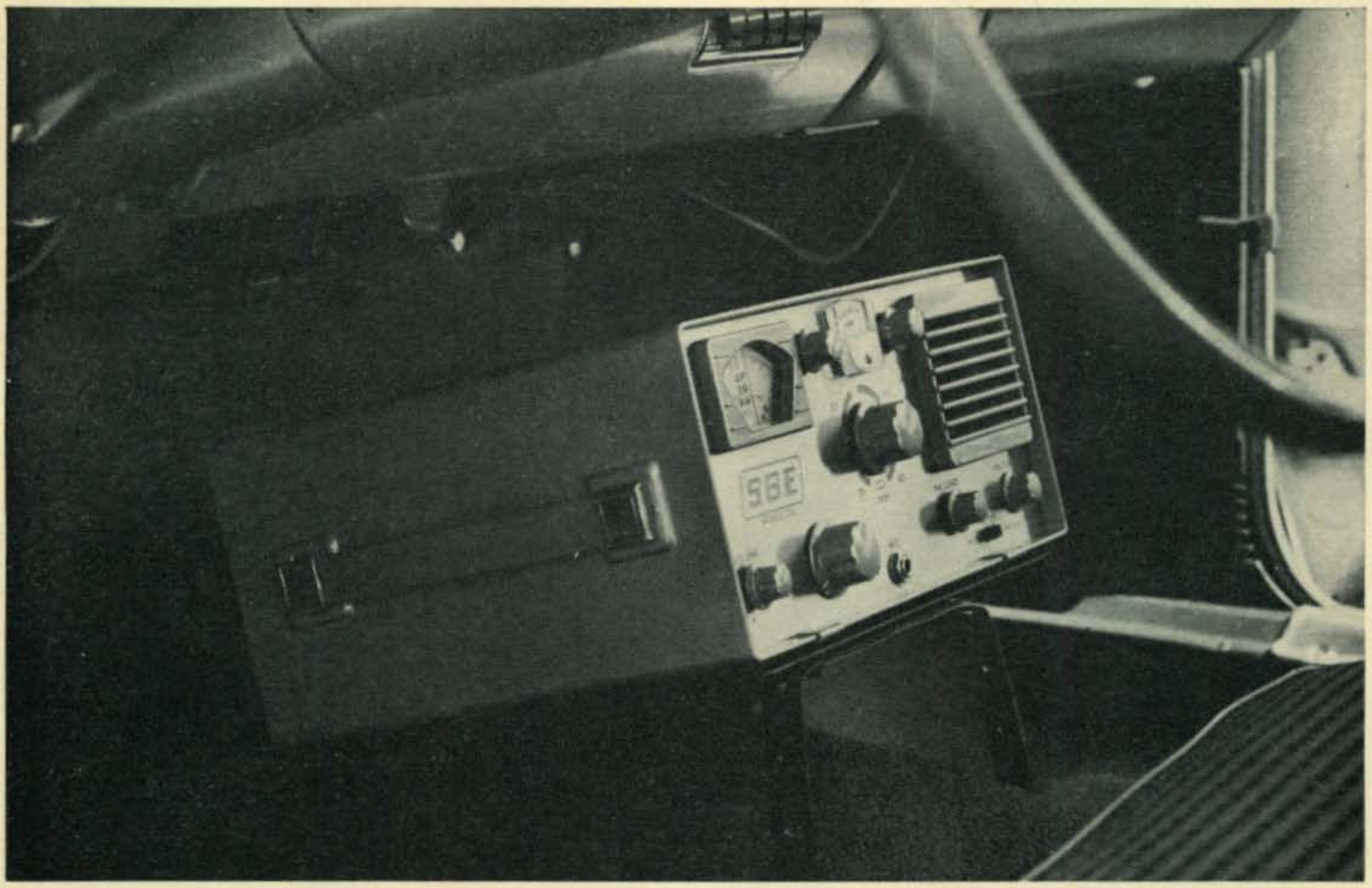
Dimensions: 8½" high, 12⅝" wide, 17" deep.

Model number: #3340.

GONSET, INC.
A Subsidiary of
Altec Lansing Corporation
1515 SOUTH MANCHESTER AVENUE
ANAHEIM, CALIFORNIA

GONSET

For further information, check number 23, on page 106



SMALL INVESTMENT..BIG RETURN

SB-33, SSB transceiver is an exceptionally small package, but a few hours of on-the-air operation will convincingly point up the fact that the *only* thing small about SB-33 *is* its size. (and its price). Performance, on a multi-band, work-the-world basis is *big*—operating pleasure, owner satisfaction are in keeping.

This small size—5½"H, 11¾"W, 10¼"D—ideal for mobile—is achieved primarily by advanced techniques—by using transistors and diodes (18 of each) to replace vacuum tubes in all but PA and RF driver stages. These reliable solid-state devices offer many other advantages; no filaments—far less current drain—lower internal heat. *And because life expectancy is great, long-term savings on ultimately-replaceable tubes can be substantial.* There's more.

SBE uniquely uses "Bi-lateral" solid-state amplifiers and mixers which operate on both transmit and receive, and thereby reduces circuit elements and complexity, lowers costs while maintaining performance at high level.

Each investor wants the most for his dollar. *Compare SB-33.* Read all the fine print carefully! *SBE* gives you:

Four bands . . . 75-40-20-15 meters

and . . . built-in 115V AC power supply

and . . . upper or lower sideband selection by a front panel switch

and . . . a steep-slope Collins mechanical filter

and . . . a built-in speaker

Here indeed is a small investment with big return.

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Please send me brochure giving full technical information on **SB-33** and **accessories, VOX, carrying case, mounting plate, etc.**

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SIDEBAND ENGINEERS

317 ROEBLING ROAD,
SOUTH SAN FRANCISCO,
CALIFORNIA

An operation of Webster Manufacturing Company.

For further information, check number 10, on page 106

For further information, check number 25, on page 106

SEASON'S

FROM THE

meet the men who design

JOE SHAFER K8DCE
Senior Amateur Radio Engineer

BILL DENK
W8LUH

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HEATHKIT DELUXE SSB RECEIVER: 80 thru 10 meter coverage. Linear tuning with features for finest reception!
Kit SB-300 . . . 17 lbs. . . . no money dn., $25 mo. . . **$264.95**

HEATHKIT "MARAUDER" SSB TRANSMITTER: Deluxe features & performance make it the most versatile ham transmitter. 180 WATTS SSB & CW 80 thru 10 meters.
Kit HX-10 . . . 95 lbs. . . . no money dn., as low as $22 mo. **$334.95**

HEATHKIT SSB SINGLE-BAND TRANSCEIVERS FOR 80, 40 OR 20 METERS: Perfect for "mobile" or "fixed" amateur communications! 200 watts P.E.P. input. 15 lbs. ea.
HW-12 (80-Meter), **HW-22** (40-Meter),
HW-32 (20-Meter) . . . . . **$119.95 ea.**

HEATHKIT MONITOR SCOPE: Displays envelope, AF & RF trapezoid transmitted patterns, and received envelope patterns. Simple to install. Use on 160 thru 6 meters.
Kit HO-10 . . . 11 lbs. . . . no money dn., $6 mo. **$59.95**

W8CXY	W8LTV	K8SYI
K8GND	K8GNA	K8JGZ
K8SSD	K8IXS	K8HYV
K8INM	K8IXT	K8GMY
W8UVK	K8LZY	WA8BTK
K8SAJ	W8YRW	WA8IHH
K8DKY	WA8KEW	WA8KEV
K8MBI	K8WJS	W8DEJ
K3GHR/8	WN8IFJ	. . . and more

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HEATHKIT HAMS

Heathkit gear!

NEAL LITRAL
K8NVR

PAT DUFFNER
W8CXY

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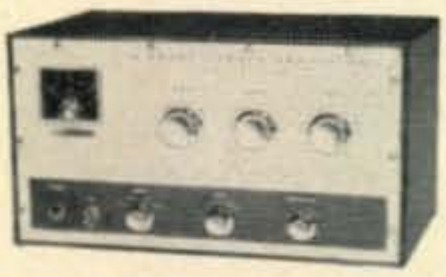
HEATHKIT HX-30 6-METER SSB TRANSMITTER: Operates SSB upper/lower sideband, AM & CW. Completely self-contained. A tremendous value for the VHF amateur!
Kit HX-30 . . . 46 lbs. . . . no money dn., $18 mo. . . **$189.95**



HEATHKIT 6-METER LINEAR AMPLIFIER: Perfect companion for HX-30 transmitter! Provides extra power for extended-range communications. 125 watts P.E.P. input SSB, 75 watts DC input AM.
Kit HA-20 . . . 38 lbs. . . . no money dn., $10 mo. . . . **$99.95**

HEATHKIT DX-60 PHONE & CW TRANSMITTER: 90 watts input phone or CW on 80 thru 10 meters. An excellent rig for the novice amateur! Beautifully designed throughout for easy assembly.
Kit DX-60 . . . 24 lbs. . . . no money dn., $8 mo. **$79.95**

HEATHKIT NOVICE HAM BAND RECEIVER: Tunes SSB, AM & CW signals 80 thru 10. Ham band coverage only for maximum stability & accuracy! An ideal first receiver with pre-built, aligned front-end!
Kit HR-10 . . . 20 lbs. . . . no money dn., $8 mo. **$79.95**

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AM-134

For further information, check number 27, on page 106

The 22 Watt Monster

An Inexpensive Evening's Project for the Beginner

BY MYRON M. SCHWARTZ*, K6MVD

This transformerless crystal controlled transmitter is constructed from inexpensive parts, many of which can be scrounged from old a.c.—d.c. radios. It can cover 80 and 40 meters as designed and load into most antennas with its pi-network output.

BEHOLD, 22 watts of good c.w. hamming with a 50L6 and a transformerless power supply circuit! Wait, before you turn the page! The chassis is grounded, and the key can't bite you badly either. The reason is a safe voltage doubler circuit with adequate r.f. bypassing. The voltage doubler circuit is safe because the chassis can be grounded directly to a water pipe. These were nearly the same words W3BQU published in the August '56 issues of *CQ*. The article intrigued me immensely, but the 117L7's he used are hard to come by and go for better than nine dollars a set. I decided to strain my mind, rather than my billfold, and came up with the "22 Watt Monster."

This rig is a combination of two articles published in past issues of *CQ*, and contains the best features of both. The first article was entitled "The Mighty Four Watter."[1] The circuit was beautifully-simple and inexpensive. But it had one drawback, four watts.

The second article appeared in *CQ* also and was called the "The Lil' Rig."[2] It contained a push-pull oscillator and 117 volt tubes, plug-in coils, and link coupling. The tubes are expensive, link coupling is annoying to adjust, and plug-in coils take up time and add to the total expense. Extensive bypassing was needed to keep TVI down.

By combining W3BQU's ideas on voltage doubling and power overloads versus time, and W6QXH's simplicity of design, I have come up with an excellent rig with very inexpensive, easy to come by tubes, fair power, and convenience of operation (no plug in coils or links to adjust). A single 50L6 can handle much more power in overload than the combined tetrode sections of two 117L7's.

To provide a safety feature one wire is used in the line cord. The second wire is the ground. After securing the ground lead, plug into the a.c. outlet. If the tubes will not light, reverse the plug. They will light in one of the positions.

This system assures us that the chassis is at ground potential at all times and thus is not a shock hazard. A 1:1 isolation transformer can be used if desired but increases the cost considerably with no benefits.

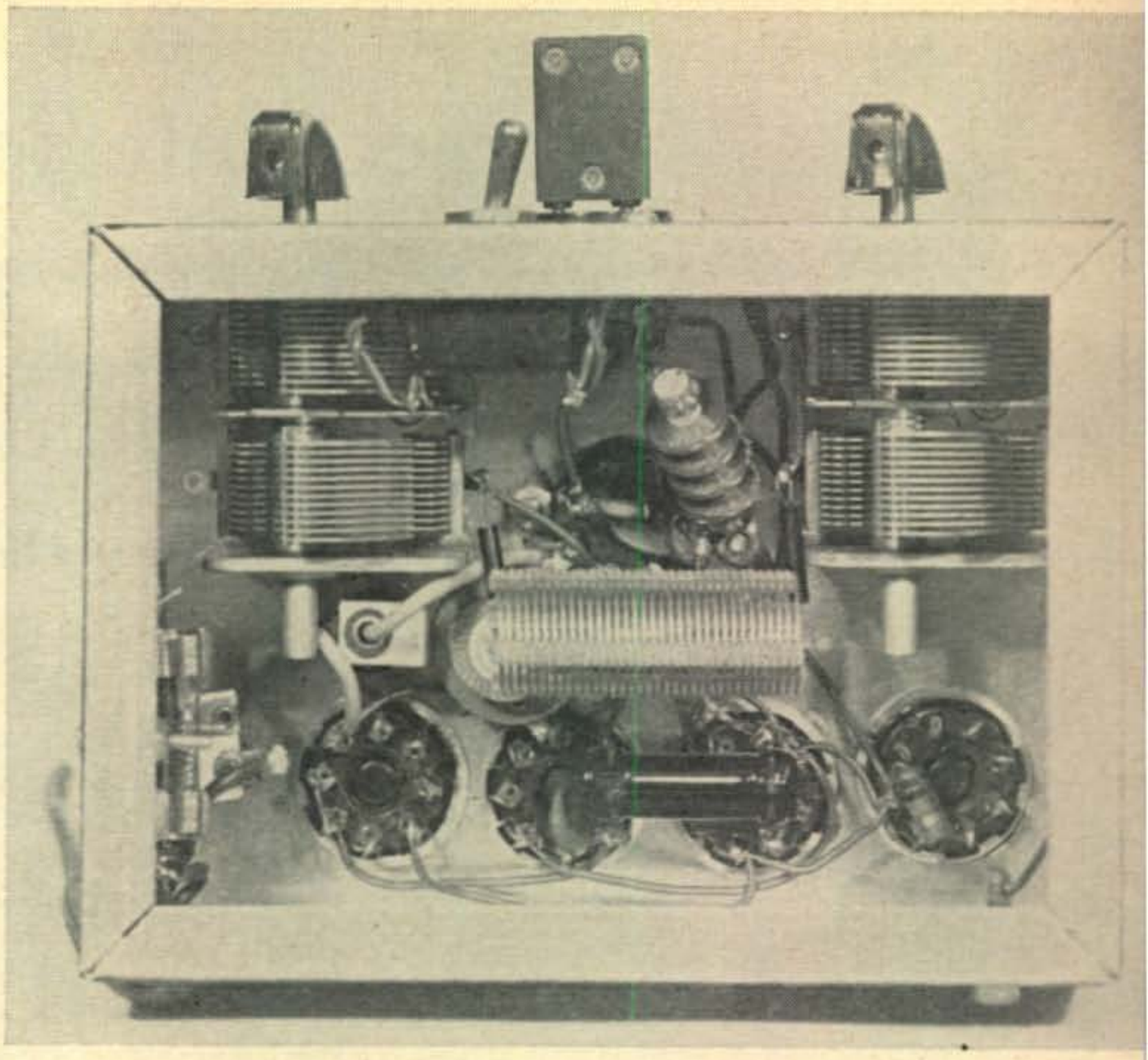
Front view of the simple 80-40 meter c.w. transmitter. The electrolytics are modified for plug-in assembly to save room beneath the chassis and for insulation purposes. The controls on the front panel are PLATE TUNING on the left and ANTENNA LOADING on the right. The crystal and key plug into the octal socket in the center. The pilot light, used as a plate tuning indicator is in front of the left electrolytic. As a safety precaution the electrolytics should be taped or otherwise insulated since the outer cans of some may be hot at the line potential.

An antenna coupler is not required because of the flexibility of the pi-network output. Keying is excellent, with either key or bug, even at very high speeds.

Construction

The circuit lends itself to quick, compact, and inexpensive construction. Construction should be even less expensive with the aid of an a.c.-d.c. radio with its supply of sockets, resistors, capacitors, and possibly tubes. Octal sockets are especially helpful to mount crystals (every other pin

*3570 Tilden Avenue, Los Angeles 34, California.
[1]Weisberg, H., "Mighty 4 Watter," *CQ*, April 1956, p. 28.
[2]Buerger, H., "Lil Rig," *CQ*, August 1956, p. 28.



Bottom view of the inexpensive twenty two watt transmitter shows the simplicity of construction. Inductor L_1 may be seen between the variable capacitors, C_1 on the left and C_2 on the right. The series filament resistor is visible just below L_1.

in an octal tube base will fit the standard FT 243 crystal holder). The same socket will accept the key plug. An FT243 holder with its crystal removed serves as a plug nicely. Electrolytics may be mounted in octal plugs thus saving sub-chassis space.

A note of caution. To use the octal base of an undesired tube for mounting electrolytics, break the glass with a hammer, but first wrap the tube with a rag or paper bag for implosion protection.

Inductor L_1, in my unit, when used with C_6 and C_7, will resonate for both 40 and 80 meter crystals. Yes, the 80 meter crystal will harmonically tune to 40 meters.

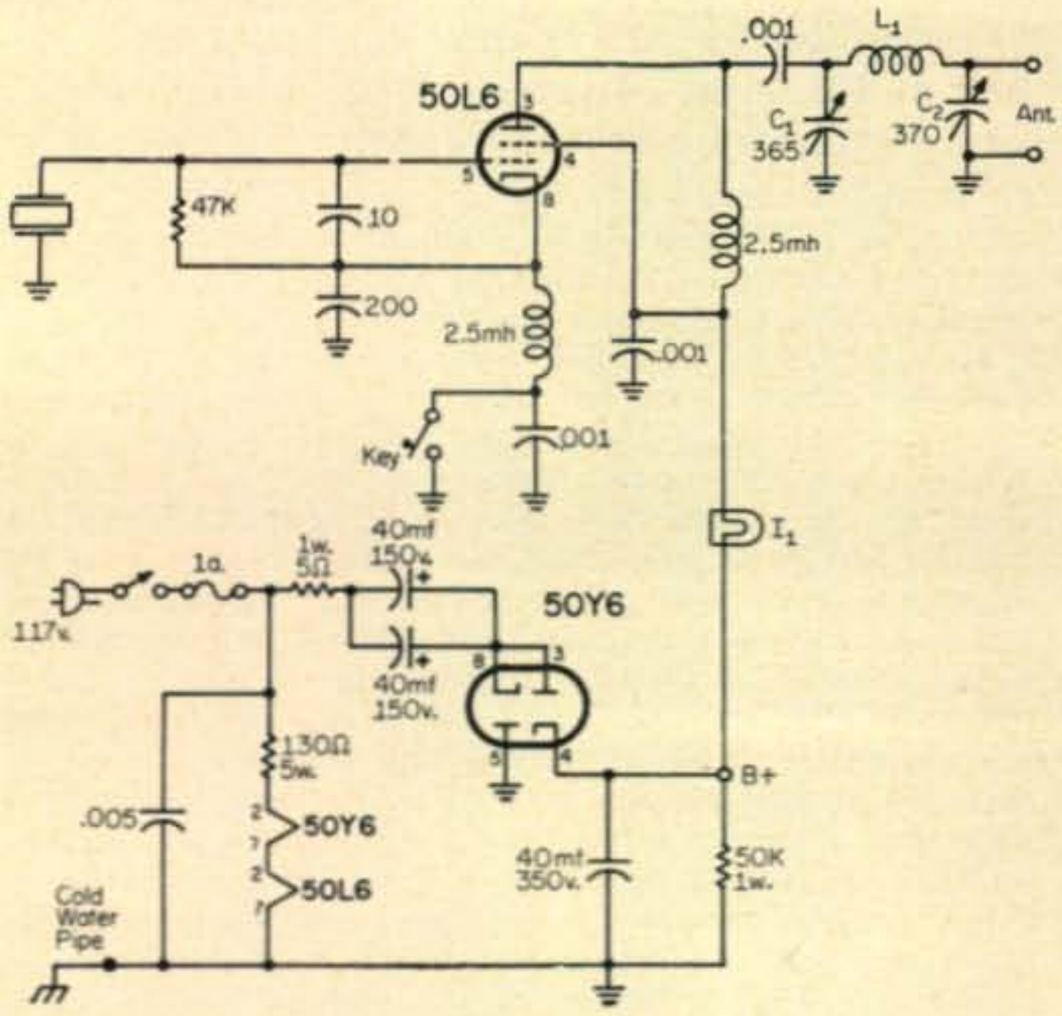


Fig. 1—Circuit of a 22 watt c.w. transmitter using a transformerless power supply. Capacitors C_1 and C_2 are broadcast type variables with 365 mmf per section. For C_1 only one section is used but for C_2 both sections are paralleled. Inductor L_1 contains 34 turns of B&W #3011 coil stock. Capacitors not marked should be rated for at least 400 volts breakdown. All capacitors greater than one are in mmf and less than one in mf unless otherwise noted. I_1 is used as a plate current indicator and is a #47 lamp.

Operation And Testing

This little rig really works like a charm. As shown in the schematic, a pilot light is used as the plate current resonance indicator.

Now connect a 25 watt light bulb between the antenna terminal and the chassis to serve as a dummy antenna. With the line voltage normal, and tubes fully lit, look for a current "dip" in the plate current resonance bulb. Watch your receiver because this rig puts out a good signal. The rig should light the 25 watt bulb to nearly full brilliance. Now remove the dummy antenna and connect your antenna between the output terminal and the chassis.

TVI

I built two models of this transmitter. The first was experimental. It was bread-boarded, had long leads, and practically no shielding, and as I expected it "wiped out" almost all the lower TV channels. Short leads, good shielding, and adequate r.f. bypassing helped to eliminate TVI, as proven in the final unit.

Conclusion

I am very satisfied with the results. It puts out nearly as much as my commercial 50 watt transmitter, it is much more compact and much less expensive. A word of warning—the 50L6 is overloaded with key-down condition so I do not recommend holding the key down long—although I've done it for 60 seconds with no apparent damage. ■

Project Interference

Part III, Conclusion

BY JOHN H. GRADY*, K4TUA

Part III, the conclusion of this series, describes in detail, a program designed to reduce the QRM on the amateur bands. The cooperation of radio clubs, DX clubs and all willing individuals is required for Operation Quality Cleanup.

In searching for methods to minimize interference, attention was centered on the basic fundamentals of the problem rather than on seeking a more sophisticated way to solve the problem. In the author's opinion, the basic solution to our interference problem lies not in a hoped-for expansion of our bands, or in the use of lower output power, nor in improved quality of purchased amateur equipment, but in learning how to manage our frequency spectrum and operating practices more wisely and efficiently.

K4TUA recently started a one-man crusade in an attempt to reduce interference by calling 183 s.s.b. stations having a signal bandwidth of 7 kc or greater, and suggested in a courteous manner, that they cut back their audio gain control. Of the 183 stations contacted, 151, or 82.5%, took immediate corrective action and reduced their bandwidths to 5 kc or less. Many of these stations requested assistance to reduce their bandwidth and expressed their sincere thanks at the conclusion of the test.

A variety of answers were received from the other 32 stations, or 17.5% of those contacted.

The reactions to constructive criticism of amateurs contacted divided them into two categories: conformists and non-conformists.

For the purposes of this article a conformist is considered to be an amateur having some degree of consideration for his fellow operators. He is interested in minimizing interference and poor operating practices, and will take steps to do so.

On the other hand, a non-conformist is one who is primarily interested in amateur radio from his own standpoint. He has little consideration for fellow amateurs and can seldom be convinced that his operating techniques are anything less than perfection.

Among the conformists contacted were many amateurs who were unaware of their trouble and either took immediate steps to correct it or asked for advice and assistance in correcting it. Some others admitted being aware of the defect in their signals, but had tried all available means to correct it with no success. These fellows also asked assistance. In general, this group was appreciative of having the situation pointed up and was very cooperative.

Many different reactions were noted from the second group, the non-conformists. Among these were some old-timers who were not about to be told anything by a newer ham. These fellows claimed so much experience that they needed no outside assistance.

Some amateurs admitted having trouble, but insisted on maintaining their operations until time was available for corrective action. Others took a belligerent attitude when informed of the poor quality of their signals, questioning the author's "authority" to criticize and rejecting the established signal quality standards.

To some, the thought that their equipment might be faulty or poorly operated was too much to accept and either took refuge behind their equipment operating manuals or suggested that the author's receiver was defective.

F.C.C. Regulations

Listen on an active amateur band and you will find that the following FCC regulations are violated daily by both conformist and non-conformist amateurs:

Section 12.113, excerpts: Sideband frequencies resulting from keying or modulating a carrier wave shall be confined within the authorized amateur band.

Section 12.133, excerpts: Spurious radiation from an amateur station shall be reduced or eliminated in accordance with good engineering practice. In the case of A3 emission, the amateur transmitter shall not be modulated to the extent that interfering spurious radiation occurs, and in no case shall the emitted carrier wave be amplitude-modulated in excess of 100%. Means shall be employed to insure that the transmitter is not modulated in excess of its modulation capacity for proper technical operation. (A spurious radiation is any radiation from a transmitter which is outside the frequency band of emission normal for the type of transmission employed, including a component whose frequency is an integral multiple or submultiple of the carrier frequency-harmonics and subharmonics, spurious modulation products, key clicks and other transient effects and parasitic oscillations.) The frequency of the emitted carrier wave shall be as constant as the state of the art permits.

Section 12.151: Each amateur station shall be operated in accordance with good engineering and good amateur practice.

Section 12.160: No licensed radio operator shall willfully and maliciously interfere with or cause interference to any radio communication or signal.

Communications Act, Section 324: The transmitting equipment shall be adjusted in such a manner as to produce the minimum radiation necessary to carry out the communication desired.

Amateurs must recognize the fact the FCC

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regulations must be obeyed. Those amateurs who are either careless or willful in their disregard of FCC regulations are vulnerable to drastic action.

Why wait for the FCC to step-in and either crack down to insure regulation compliance or apply more severe regulations? Internal resolution (and it must not be handled any other way) can be accomplished simply by having each amateur notify other amateurs of any deficiency on their signal.

Operation Quality Cleanup

Operation Quality Cleanup was developed to achieve more effective and efficient operation on the amateur spectrum with a significant lessening of interference.

It is a program whereby part-time assistance from thousands of amateur operators (members of local amateur radio clubs, *etc.*) to monitor the amateur spectrum by checking on-the-air quality of transmitted signals, against pre-established performance standards, notifying operators having defective signals and suggesting corrective action.

The following actions will be required to implement Operation Quality Cleanup:

1—Establish an Advisory Committee at national level to spearhead the project.

2—Implement a nation-wide publicity campaign. If the greater benefits obtainable through lessened interference are to be realized, the essential ingredients must be recognized, encouraged, publicized by amateur magazines, DX publications, and club bulletins. Emphasis must be placed on improved amateur relations, showing courtesy and respect to all amateurs at all times.

3—Secure the cooperation and assistance of all local amateur radio clubs and DX clubs.

It is necessary that the officers of the local radio clubs motivate the members to apply the Operation Quality Cleanup program along the desired lines. The problems of creating and maintaining an atmosphere which will develop such motivation is the human relation task facing the club officers.

4—Local radio clubs must establish a committee to administer the program and furnish guide lines to the club members for checking on-the-air quality of signals.

5—Each club must establish a technical committee to help those local amateurs (club members and otherwise) requesting technical assistance to cleanup their signals.

6—In order to successfully implement the program, the assistance of thousands of voluntary amateurs, willing to contribute a portion of their operating time must be enlisted. These amateurs will establish an internal, self-policing crusade to clean up our ranks, eliminating defective signals, by calling attention to signal deficiencies.

One difficulty is that, up to now, very few amateurs were willing to stick out their necks by commenting on a poor signal or bad operating manners. This reticence can be eliminated with nation-wide organization of Operation Quality Cleanup because every amateur will be a critic, evaluator and reporter.

Advising an amateur that his signal does not meet good standards of performance is a very delicate task and must be performed with considerable tact and diplomacy. In day-to-day contacts with stations having inferior signals, the human factor must be appraised, for it serves as the foundation which the amateur will use in contacting the deficient station.

Establishing and maintaining good relations with other amateurs involves some circumspection by the evaluating amateur. It must be realized that we cannot be impersonal toward other amateurs if we hope to be effective. Individual behavior is caused to a great extent by habit and emotion, and to a lesser extent by consideration of reason. People are different; they expect and deserve to be treated as individuals. They are generally averse to sudden changes and are more likely to accept them if they are prepared for them. People like to be told in a courteous way when they are doing something wrong, but they also like to be told the correct way or how to improve.

An amateur who thinks in terms of good human relations, who attempts to understand what they are and what role they play in achieving smoothness in operations, will be very effective in his actions.

7—Each amateur must establish and comply with a set of operating standards higher than before. He must put pressure on his amateur friends to become a part of the crusade against interference by supporting the project and set aside a definite part of his operating time to notify amateurs having defective signals.

Operation Quality Cleanup is a gargantuan project and will require the assistance of thousands of W/K amateurs willing to spend a small portion of their operating time to help cleanup the bands and reduce interference.

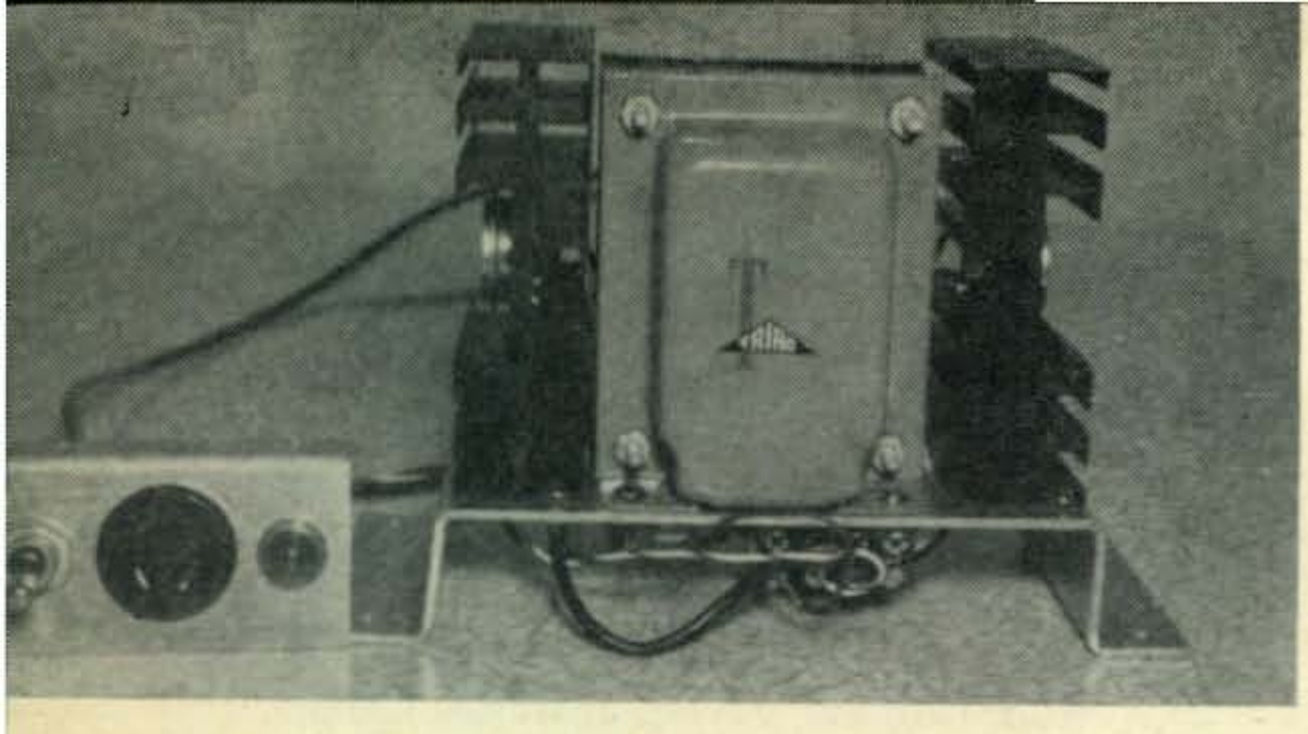
Think of the terrific impact which will be experienced by an operator after two or more amateurs call and advise him of his below standard signal and the objectives of Operation Quality Cleanup.

The aforementioned action items are no panacea to our present interference conditions, but if implemented and complied with, they will significantly lessen the bedlam now found on our bands.

Reduction

Several other techniques will assist in reducing the interference, such as a portion of the present phone operators changing their mode of transmission from a.m. and s.s.b. to c.w. A.m. phone operators might change to s.s.b. Use of the so-called dead-bands for local or short haul phone contacts. Reducing the s.s.b. bandwidth will make it possible for two s.s.b. stations to work

[*Continued on page 78*]



View of the d.c. to a.c. inverter showing major parts location. The output voltage selector switch was not included in this model and may be omitted if desired. The chassis is the heat sink in the 65 watt unit but it is advisable to use commercial heat sinks for the 115 watt model as shown.

A 117 Volt 60 Cycle Mobile Power Supply

BY ROGER H. TAYLOR*, WØGJB

For some time articles have appeared in various publications on d.c. to d.c. converters but relatively few have appeared on d.c. to a.c. transistor inverters. For amateurs, the d.c. to a.c. converter has several advantages. Not only can he plug his small amateur rig directly into an a.c. outlet, but 115 v.a.c. is available for his soldering iron, electric drill, shaver, light, tape recorder, radio and so on. The cost of an a.c. converter is less than a similar d.c. converter. Naturally, the a.c. converter is less efficient in power transfer, but more than makes up for it in versatility and cost. The total cost of the 60 watt unit described here is about $16. The similar 115 watt unit is about $21.

Figure 1 is the schematic recommended by Triad for use with their TY-76A transformer. The grounded collector circuit allows the transistors to be mounted directly on the chassis. The most important part of the unit is the heat sink. The plain chassis shown provides the minimum area for sufficient heat dissipation, *providing* a very good contact is established between the transistor case and the chassis. To aid this contact the transistor and the chassis should be coated, in the contact area, very lightly, with Dow silicon grease. The transistor should be tightened down hard with the largest screw driver you have, and then tightened even more with a larger, borrowed screw driver. Your transistors will last about 10 seconds without a good heat sink. The chassis should be mounted to the car with a large area of bare metal to metal contact for additional heat sink. For the larger unit, (TY-75) a larger chassis, or better still, a commercial heat sink and the larger 2N277 or 2N441 transistors should be used. Two additional straps at the rear of the chassis will help support the weight of the transformer at the rear; these will depend on how and where you mount the unit.

I_{dc} In	A.C. out	Load	Eff. %
2.4 a.	140 v.	0 w.	0
3.8 a.	135 v.	18 w.	40.2
4.8 a.	127 v.	32.2 w.	56.0
7.0 a.	115 v.	60.0 w.	71.0

On heavy loads, such as a 60 watt light bulb, the starting current may be many times the full load current, due to the cold filament. In this case the unit may not oscillate. If it does not, the transistors can overheat. This unit will start with a 50 watt cold load, but not a 60 watt cold load. A neon indicator will tell you whether the unit is oscillating. The frequency is 64 c.p.s. at no load and 56 c.p.s. at full load. The table gives the efficiency of the unit under various loads, and the output voltage at the 115 volt tap. The output is almost a square wave. A 10 microhenry choke will help bring it closer to a sine wave if necessary. ■

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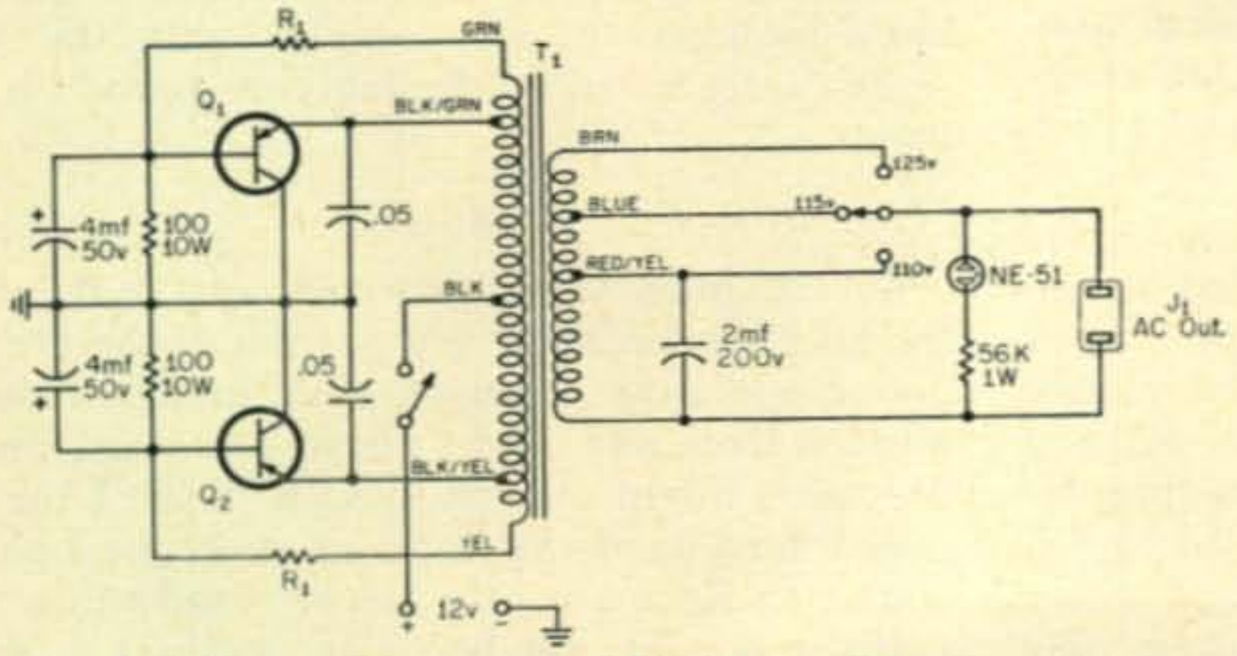

Q_1, Q_2	R_1
Bendix 2N677	4Ω-2w
Clevite 1514	5Ω-2w
Delco 2N277	4Ω-2w
Delco DS506	7Ω-2w

Fig. 1—Circuit recommended by Triad for a 115 v.a.c. power supply using their transformer type TY76A. Any of the listed transistors may be used with the proper value of R_1 as shown in the chart.

Antenna Impedance Matching

Part II (Conclusion)

BY PAUL C. AMIS*, W7RGL

Last month author Amis discussed the determination of initial calculations of antenna impedance networks using a signal generator, an r.f. impedance bridge and a communications receiver. The second and concluding part of this article covers the use of the unique Smith Charts and their application in the proper matching of amateur band antenna systems.

MR. P. H. SMITH described his original Smith Chart as a transmission line calculator, in that it could be used not only in plotting antenna impedance, but also in evaluating impedance, current and voltage at any given point along the transmission line. In last month's example a Smith chart was shown with an allowable 3:1 s.w.r. (see fig. 5). The s.w.r. circle (medium-sized) was constructed by using 1.0 on the vertical scale through the center of the chart as a center, and a radius of 3, our acceptable s.w.r., as plotted on the lower half of the vertical scale. The smallest circle was originally designed by finding its center on the vertical scale tangent to the previous circle at 3.0. The large circle was constructed by locating its center on the vertical resistance scale tangent to the s.w.r. circle at the minimum value of *R* passing through the point of infinity at the bottom of the chart. The area between the circumferences of these two circles represents the series boundaries within which the antenna curve can be transformed with a series reactive component to fall within the allowable s.w.r. circle.

Since trying to lay out the imaginary impedance plot of an imaginary antenna might prove sticky, we will use an example of an actual wire antenna originally designed to cover the frequencies from 6 mc to 18 mc with a desired maximum s.w.r. of 3:1. After obtaining the figures for this antenna from our data sheet, we will plot these values on a Smith Chart. To begin with, we draw a 3:1 s.w.r. circle on our chart, along with circle *A* and circle *B*. For this example, let us assume our completed data sheet looks, in part, like this:

Freq.		$\frac{R}{Z_o}$	$\frac{X}{Z_o}$	Dist
6mc		2.2	+3.8	
8mc		4.8	+3.5	
12mc		1.8	+4.0	
16mc		1.9	+2.6	
18mc		1.0	+2.4	

To plot this impedance curve, we start at 6 mc and find 2.2 on the vertical resistance component scale. Since the reactance is indicated as positive (inductive), we follow this curve clockwise until it intersects the curve +3.8 as found along the outer rim of the right-hand side of the chart. Where these two curves intersect, we mark a dot, and label it 6 mc. We do the same for 8 mc, 12 mc, 16 mc, and 18 mc. After the five points are located and labeled, we draw a smooth curve (always in a clockwise fashion) connecting these points. Using this curve, we can approximate, if necessary, additional points in our frequency coverage (see fig. 5, plot *A*). We now have a graphical representation of the impedance of our antenna over a 6 mc to 18 mc frequency range. As you can tell, it certainly isn't anywhere within the acceptable 3:1 s.w.r. circle, so we are going to have to fiddle around with it a bit.

To rotate an impedance plot we can add reactance; a series capacitor will rotate the plot counter-clockwise, with all points staying on their respective resistance curves, and a series inductor will rotate the plot clockwise. If we add a series capacitor to our antenna, it will rotate the plot counter-clockwise, but from 6 mc to 10 mc will still be out of the acceptable s.w.r. circle. However, this is a start, so by observation, if we rotate the 6 mc point along its resistance curve 2.2 from +3.8 to −2.2, (the left side of the resistive component line on the chart being the minus or capacitive region), the other points will follow along. Since a series capacitor will move the low frequency end faster than the high end, we set up an inverse proportion to find the point for the high end. With Smith Charts, the distance a point is moved equals the location of the final point minus the location of the initial point, or, for 6 mc,

Distance Moved = (−2.2) − (+3.8) = −6.0

Setting up an inverse proportion to solve for the distance the 18 mc point will move, we have:

$$\frac{6mc}{18mc} = (-6.0) = -2.0$$

Therefore, the final point for the 18 mc end of the plot will move two units in the minus (counter-clockwise) direction, or from +2.4 to +.4.

Since we have only a few intermediate plot

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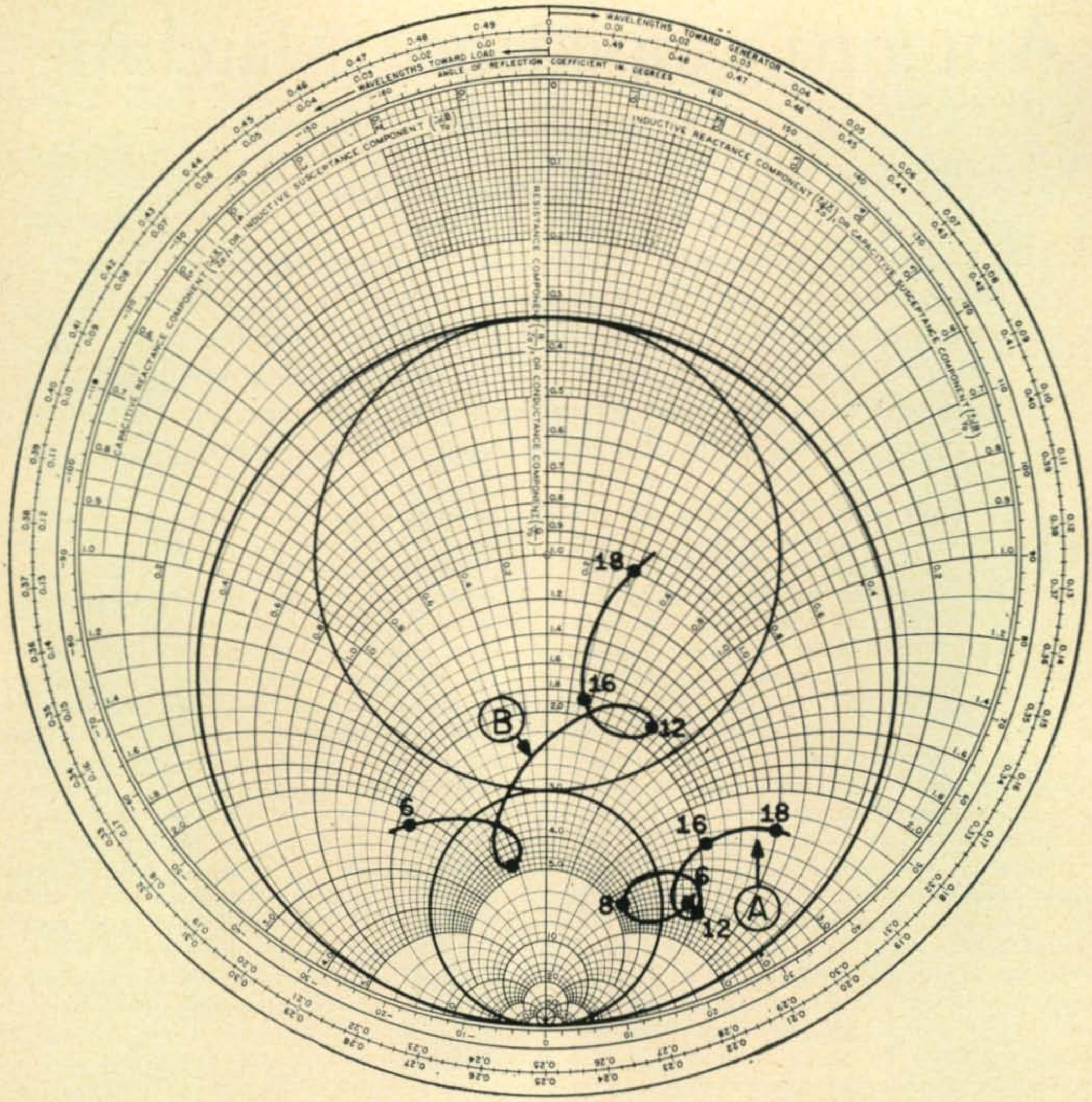


Fig. 5—Plot A is a graphical presentation of the impedance of the antenna from 6 to 18 mc. Note that it does not fall into the 3:1 s.w.r. circle. Plot B is the result of having added a series capacitor.

points, we could use the above proportion for all of them, or, if we had an unwieldly number of points, prepare a line graph, with the vertical scale at the left divided off in suitable "distance moved" values, and the horizontal line in frequency. Drawing a straight line between the point of 6.0 at 6 mc and .4 at 18 mc, we could pick off all the in-between frequencies. In either case, after we find how far our five points must move, we replot the curve as shown in fig. 5, curve *B*. Our matching network, up to this point, looks like this:

Computing the value of capacity needed, we can use the data obtained for 6 mc. Distance moved was —6.0, so 6.0 times the characteristic impedance of our transmission line (50 ohms) equals 300. This is X_c, and plugging it into the formula

$$X_c = \frac{1}{2\pi FC}$$

and solving for C, we obtain a value of 88 mmf.

It can be seen that any further series components, either capacitive or inductive, will not improve our plot at all. We must pull the plot up towards the center of the chart. To do this, we try a parallel component.

The reciprocal of impedance is admittance. You might say that admittance is the mirror-image of impedance. When dealing with parallel reactive components it is advantageous to convert the impedance curve to an admittance curve. We can do this by striking in projection lines from each point on our impedance curve through the center of the Smith Chart, and drawing in new points on these projection lines of equal distance from the center on the opposite side of the chart. Or, which I find simpler, trace the impedance curve through on another chart which is turned 180°. This admittance curve will appear on the top of our chart. See plot *C* on fig. 6.

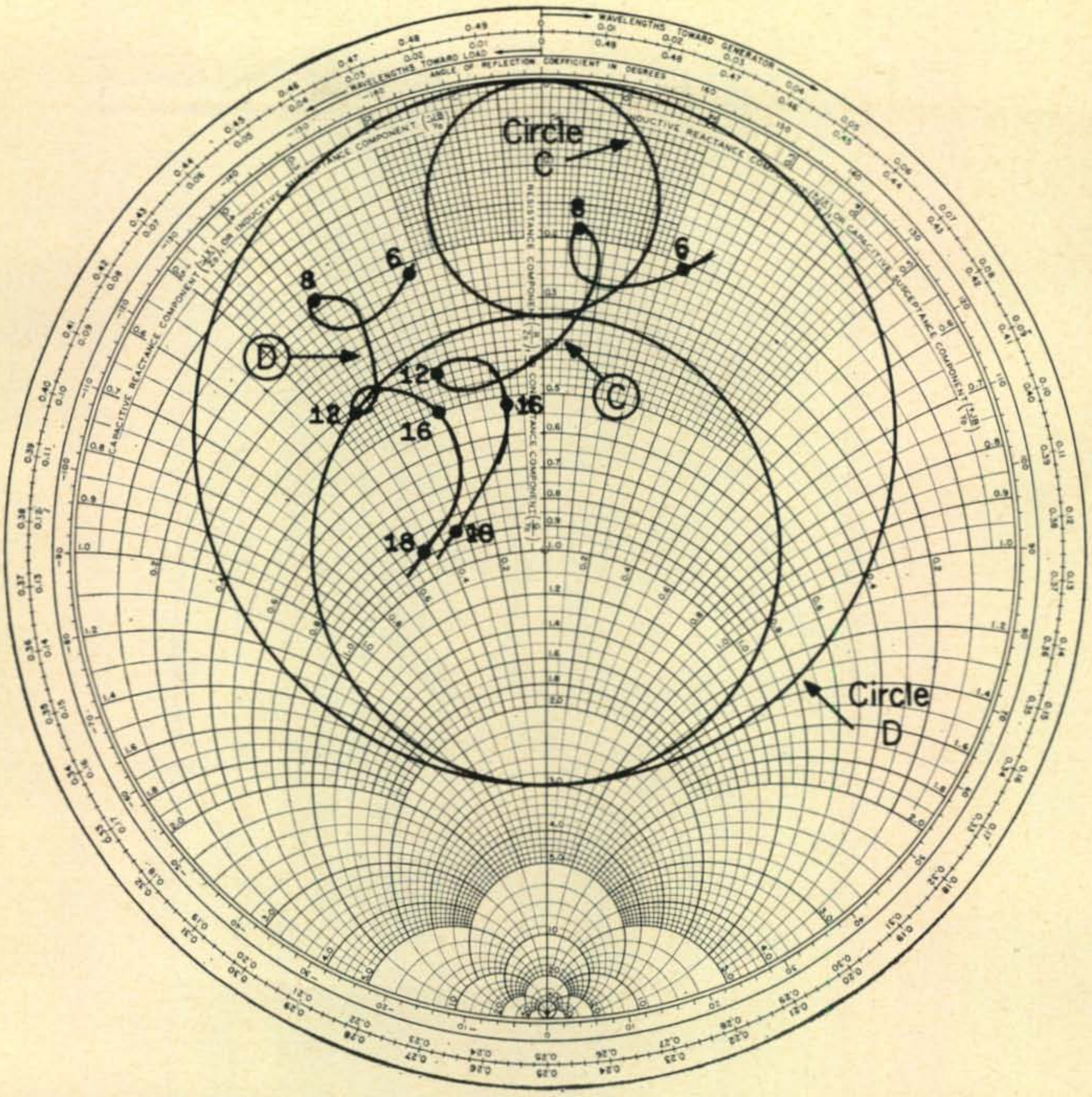


Fig. 6—When adding parallel components to the matching network it is desirable to work with admittance, the reciprocal of impedance. Shown above is the same chart as that of fig. 5 but redrawn, as explained in the text, to represent admittance.

Adding a parallel inductor across the antenna, (but on the transmitter side of our newly added series capacitor) will rotate the admittance plot counter-clockwise, each point still following the value on the vertical resistance scale, and conversely, adding a parallel capacitor will rotate the admittance plot clockwise. Since a parallel inductor will move the low frequency end of the plot faster than the high frequency end, we will try that first.

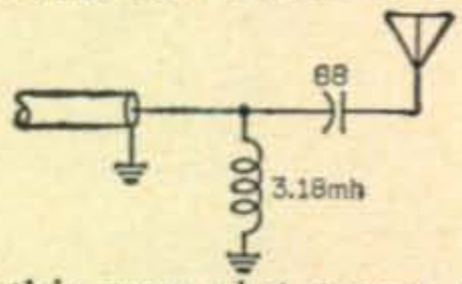
Moving the point 6 mc from +.22 to —.22 will result in the curve shown in plot *D*, fig. 6. We set up our inverse proportion as before, find all the points, and replot the new curve. Since we are dealing with admittance (the reciprocal of impedance) we can't solve for inductance or capacity in terms of our old friends

$$X_L = 2\pi FL \text{ and } X_c = \frac{1}{2\pi FC}$$

but must take their reciprocals;

$$X_L = \frac{1}{2\pi FL} \text{ and } X_c = 2\pi FC$$

In our example, the value of inductance turns out to be 3.18 microhenries. At this point, our matching network now looks like this:



Lets see if this new plot seems usable. If we draw a new circle *C* on our Smith Chart between the tangent point on the minimum resistance side of our 3:1 s.w.r. circle and the 0 resistance point, as shown in fig. 6, we will have the reciprocal of circle *A*. We can also draw in the reciprocal of circle *B*, calling it circle *D*. Observation will disclose that our new plot is located within the series boundary of circle *D* now, and entirely outside of circle *C*. Therefore, after we have re-transformed it back to impedance, (using the same method we previously used to transform the plot to admittance) we have plot

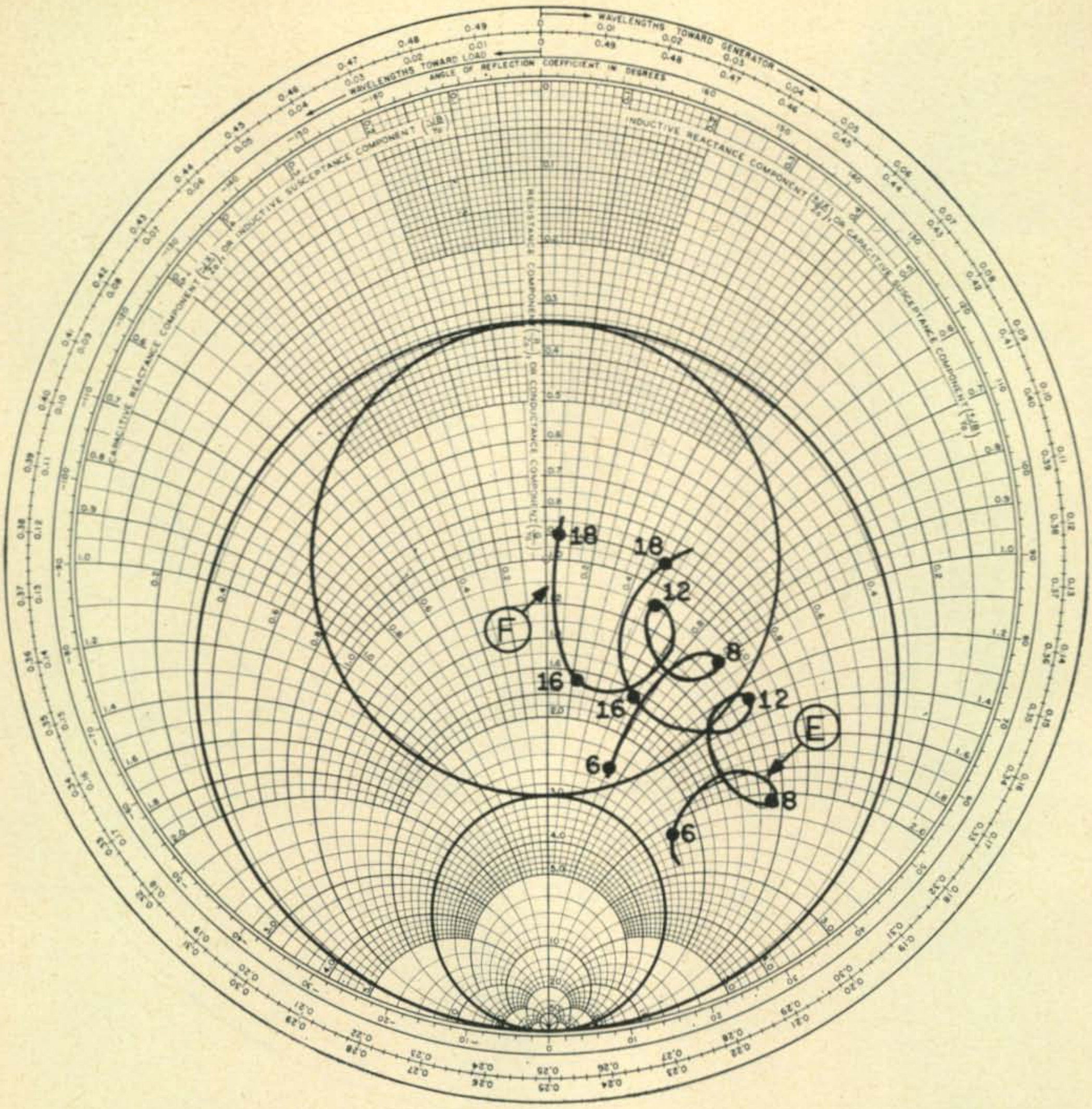
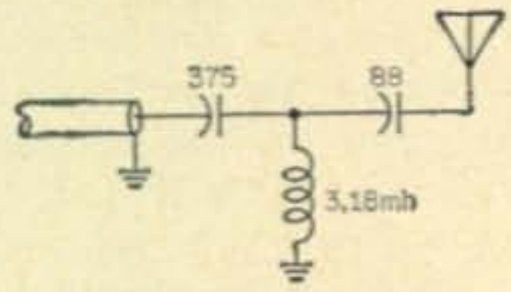


Fig. 7—Plot E represents plot D of fig. 6 transformed back into impedance values. A second series capacitor rotates plot E to a position completely within the 3:1 circle (plot F).

E on fig. 7. If we are lucky, (which, since I'm picking the example, we will be), another series capacitor should rotate plot *E* counter-clockwise so that it falls entirely within our 3:1 s.w.r. circle. As a start, we move point 6 mc from +2.2 to +.8, still using inverse proportion, and plotting all the intermediate points, we will arrive at a quite acceptable plot, *F* on fig. 7. This is our final result, and computing the value of the capacitor needed using the method we have used before, it turns out to be 375 mmf. Our finished matching box will now look like this



We build such a matching unit, and after the components have been installed within the shielding box, but *before* the interconnection leads have been hooked-up, we set their values, then install the interconnection leads, put the lid on the box, and go through the bridge measurement procedure again for verification. It is most unlikely that the plot so obtained will exactly resemble our computed plot, since considerable distributed capacity and inductance are sure to be present within the box, but minor (we hope!) adjustments to the components will correct this.

Depending upon the power of our rig, component ratings can be selected by general rule-of-thumb, and there you are—a matching box which will be the envy of our friends, and even work!

Feedline Calibration

The above is all very well and good in the case where our antenna terminals are easily accessible. But what happens when the antenna terminal is located some fifty feet over our heads on a mast? In this case, we can use a calibrated length of 50 ohm coaxial cable, long enough to reach from the antenna termination to the test bench, and short out the alligator clips at the far end of the cable. Then, using our bridge set-up, we run through all the frequencies we

intend to take, marking the bridge data down on a data sheet in the same fashion as we would if the antenna was terminated at the bridge. Using the Smith Chart, we convert these impedances to fractions of a wavelength. After we have obtained the electrical length of this cable (with the far end shorted) for each of the frequencies at which we plan to compute our antenna, we un-short the far end, clip the cable on to the antenna terminals, and obtain the impedance curve for both coaxial cable and antenna. By "rotating-out" the effect of the calibrated cable, what we have left is only the antenna impedance. Let's go through an example of this method. Using the shorted section of cable and the bridge, we plot all the points on a Smith Chart, identifying the points as to frequency. Then, by laying a straight-edge from the chart center through each point, we can read the fractional electrical length of the cable for each plot point on the WAVELENGTHS TOWARD GENERATOR scale on the outer rim of the chart, since the rim is divided up from 0 to .5 (or a half-wavelength). We mark the fractional wavelengths thus obtained for each frequency in our data sheet. After all the points have been recorded, we hook the cable to the antenna termination, re-measure, and plot the impedance of the antenna plus coaxial cable. From these points, though, we must remove the effect of the wavelength of the cable as recorded previously. For example, if a point is plotted, then a line is drawn from the center of the chart through this point to the rim scale marked WAVELENGTHS TOWARD GENERATOR, we find it cuts the outer scale at 0.090. Using a pair of dividers, the exact distance from the center of the chart to our plotted point is obtained, and the dividers are set aside for the moment. We know, by referring to our shorted cable data sheet, that the fractional wavelength at this particular frequency is, say, 0.360. Since the amount of wavelength we must subtract is larger than the plot wavelength, we can add 0.5 (or half wavelength) to the plot wavelength, then subtract the shorted cable wavelength. In this example, our plot wavelength is 0.090, adding this to 0.5, we get 0.590. Subtracting 0.360 from 0.590, we get 0.230, our new plot wavelength point. Locating 0.230 on the outer rim of the Smith Chart, we draw a line from the center of the chart through our new wavelength plot point, and using the pre-set dividers, locate the new point along this line the distance from the chart center as shown by the dividers. This is the impedance point of the antenna by itself, with no reaction from the coaxial cable transmission line we used to measure with. We do this for each point, frequency-wise, we have chosen, and so draw a plot of the actual antenna impedance.

I hope I haven't given the impression that all antenna impedance curves are docile and easily transposable, and that casually slopping in two or three reactances will transform a curve to less than 2:1 s.w.r. in nothing flat. A large number of antenna plots will tend to defy the stoutest heart. Rotate the low frequency end of the curve, and the high end will speed clean off the chart; hold in both ends and an insignificant-looking loop will blossom out to 7:1 or, have the plot straighten out until it becomes impossible to stuff inside the acceptance circle. These are the times which try men's slide-rules. Some broad-band antennas prove, after hours of maddening transformation, completely unmatchable. In this case, the antenna itself must be modified, and the procedure done over again.

It's too bad that more r.f. impedance bridges are not available to amateurs, but they are a highly specialized piece of test equipment, and a good one is costly. In some cases, it might be possible to borrow one from some firm or laboratory, or perhaps those of you interested in doing antenna measurements might "chinese copy" one of the commercial units. This, by the way, would make an excellent club project. At any rate, the procedure is one that more hams should be familiar with.

Smith Charts usually can be obtained from college book stores, or the larger stationary stores. Several Smith Chart Calculators are available on the market, such as the Radio Transmission Line Calculator, manufactured by the Emeloid Co., Inc., Hillside 5, New Jersey.

So now you know all about antenna impedance matching. Fun? Not particularly. It can be fascinating, frustrating, time consuming, and tedious. But it is invariably rewarding, both technically and signal-wise. By using this method, and armed with much patience, you can match anything to almost anything, from a wet noodle to the XYL's wash. ■

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The Spectrum-Inspector

A Complete Panoramic Receiver

BY FRED JOHNSON*, ZL2AMJ

By connecting an oscilloscope and a receiver together, and making some small modifications, a panoramic display of a part or the whole of an amateur band can be produced. This is one way of making good use of a "standby" receiver and oscilloscope that would otherwise stand idle. By using a crystal-controlled converter, many bands may be covered.

DOES your shack boast a standby receiver? If so, how much use does it get? How much use do you make of your oscilloscope? If the answers to these questions reveal that you have equipment lying idle, then perhaps you will be interested in a way to connect a receiver and a scope together to provide a "panoramic" display. This is a useful aid to amateur-band operation and you will make full utilization of your idle equipment. The time, effort, and expense in setting up this arrangement is negligible. Unfortunately, with the vast number of types and models of receivers and oscilloscopes available today it is possible to show here only the outlines of what is involved. The principles of this type of panoramic receiver will be covered to enable you to make the modifications to your own equipment.

System Principles

Many articles have previously covered the principles and equipment necessary for panoramic reception[1]. The system here differs in that no audio output is obtained. This is not an "adaptor" or an accessory to the main receiver, but a complete receiver used for panoramic reception only.

The "adaptor" type of panoramic receiver (which is the usual type) connects to the main shack receiver and presents the signal being heard from the speaker at the center of the c.r.t. screen. As the shack receiver is tuned across the band, the picture moves across the screen, displaying only a part of the amateur band to view. The bandwidth can be varied but is usually about 25 to 50 kc above and below the signal being heard from the speaker.

The "Spectrum-Inspector" as described here, differs from the usual in that it is arranged to display the complete band across the screen (500 kc—all of the 3.5 to 4.0 mc band in the example quoted here). To examine part of this band in detail, use is made of the oscilloscope horizontal amplifier gain control (or "sweep expansion") and horizontal centering control to "spread" the picture and shift it across the screen to the portion under examination. There is no connection with the main shack receiver at all.

Obviously, some form of frequency marker is necessary in order to detect the frequency of signals under observation. This is quite simply provided by a g.d.o., v.f.o. or heterodyne frequency meter. A c.w. signal from this source is allowed to leak into the antenna circuit of the panoramic receiver. The response produced is shown in fig. 1 (signal A). When the g.d.o.

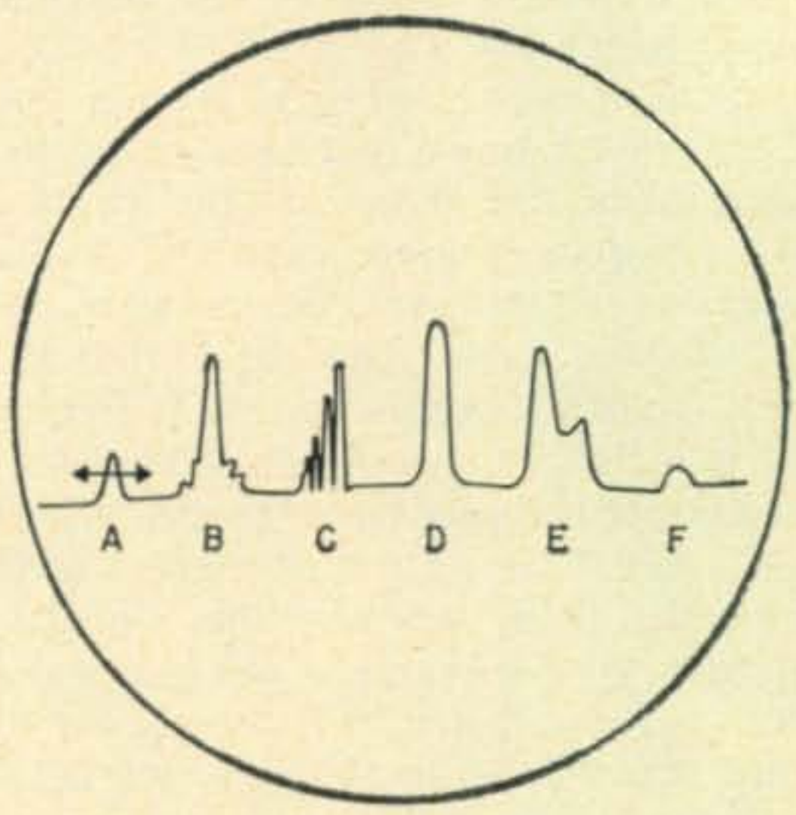


Fig. 1—Typical Panoramic display on the c.r.t. screen. Different types of signal are shown (A) represents a "calibration pip" which is variable in position and used for frequency checking.

(*etc.*) is changed to frequency, this "pip" moves across the screen. To check the frequency of a signal, the "pip" is placed over the signal being inspected and the frequency read from the dial of the g.d.o. or frequency meter. The receiver part of the "Spectrum-Inspector" requires no adjustment at all once set up. All controls required are on the oscilloscope. The receiver itself can therefore be hidden out of sight in the shack and only the scope itself need be accessible. A g.d.o., v.f.o., or heterodyne frequency meter should be handy to the operating position for frequency checks, as already mentioned.

*15 Byron Street, Upper Hutt, New Zealand.

[1]Hutton, L. I., "The Pan-scope," *CQ*, Feb. 1960, p. 46. Johnson, F., "The Scan-pan," *CQ*, Aug. 1962, p. 28. Swift, F. T., "VHF Panoramic Receiver," *QST*, Feb. 1963, p. 70.

Signals, as seen on the screen, vary from instant to instant. Figure 1 shows an a.m. signal (B), s.s.b. signal (C), c.w. signal (D), two signals causing mutual QRM (E) and a weaker c.w. signal (F). It is difficult to describe the many advantages an aid of this kind can be. Experience produces many new ideas for the information obtained from its use. The display shown in fig. 1 represents about 60 kc of band space.

The "Spectrum-Inspector"

A block diagram is shown in fig. 2. Note that all components shown above line *BD* are found in a conventional receiver, and below line *BD* in a conventional oscilloscope. The only components to be added are those to the left of the line ABC. The "broadband tuning" makes use of the existing receiver coils, so there is even less to add than this diagram would suggest.

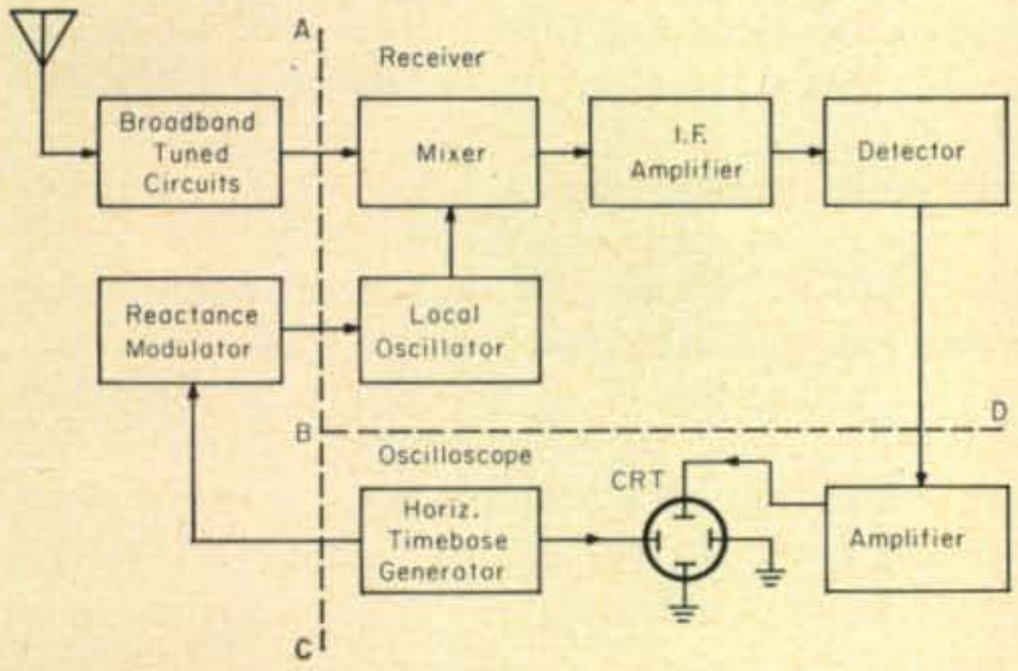


Fig. 2—Block diagram of a simple panoramic receiver. Note that all components above line *BD* are found in a conventional receiver and below line *BD* in a conventional oscilloscope. The only added components are those to the left of line *ABC*.

The scope horizontal timebase generator sweeps the spot across the screen and at the same time frequency-modulates the receiver local oscillator. The signal that passes along the i.f. channel is a "sampling" of the amplitude of the signals received over the bandwidth being investigated. The scope "Y Amplifier" ("Vertical") gain control adjusts the height of the responses on the screen.

Because of the wide variety of equipment available it is not possible to detail the connections for every combination of make of receiver and scope. The detailed diagrams to follow, therefore, represents the most general case using conventional equipment.

The Reactance Modulator

A voltage-dependent silicon capacitor or Varicap® diode is used to provide the variable reactance component, which in turn frequency-modulates the local oscillator. The wiring detail is shown in fig. 3. The diode used is a 1N3182 but there is no reason why any others available with a capacity swing from about 20 to 50 mmf, should not prove just as suitable. The r.f.c. is a 2.5 mh type and should be mounted close to the diode and the 0.001 capacitor. Other leads can be any length and need have no special precautions taken with them. The CENTERING and SWEEPWIDTH controls are preset and may be tucked away within the receiver. The diode may be connected either way around but better linearity is obtained with the cathode grounded. Note

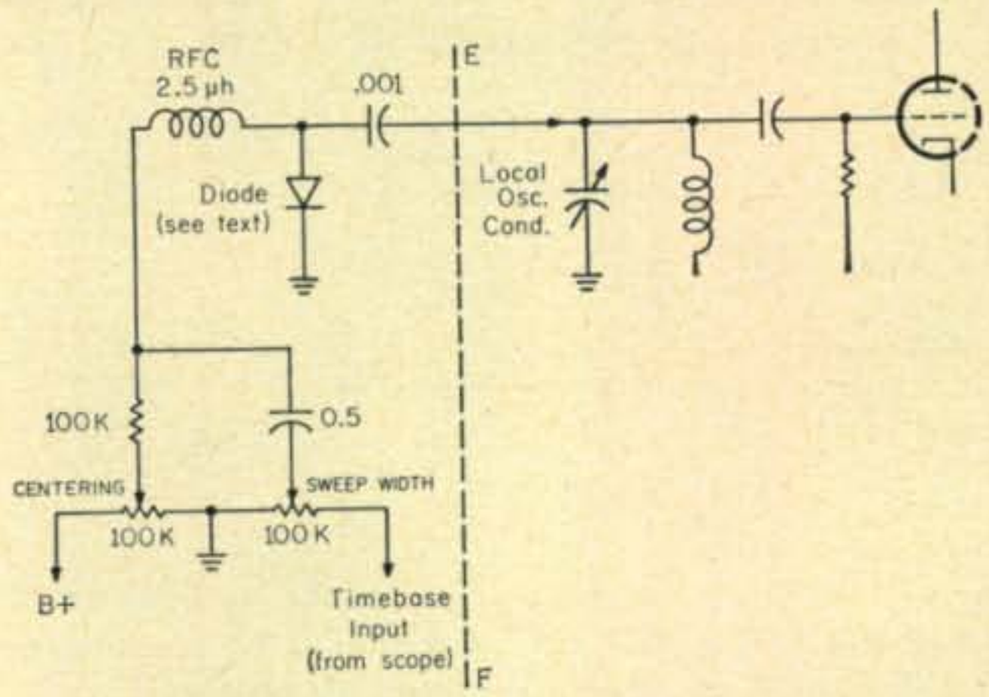


Fig. 3—Detailed circuit of the reactance modulator. Components to the right of line *EF* already exist in the receiver. Components to the left of line *EF* are added to form the reactance modulator.

that the CENTERING control in effect adjusts the d.c. bias on the diode while the SWEEPWIDTH control adjusts the amplitude of the scope sawtooth sweep signal appearing at the diode. Both controls interact, but this will be discussed later.

Broadband Tuning

The r.f. amplifier tube is removed and the leads from the two sections of tuning gang disconnected. This is shown in fig. 4. Two trimmer capacitors of similar capacity replace the gang

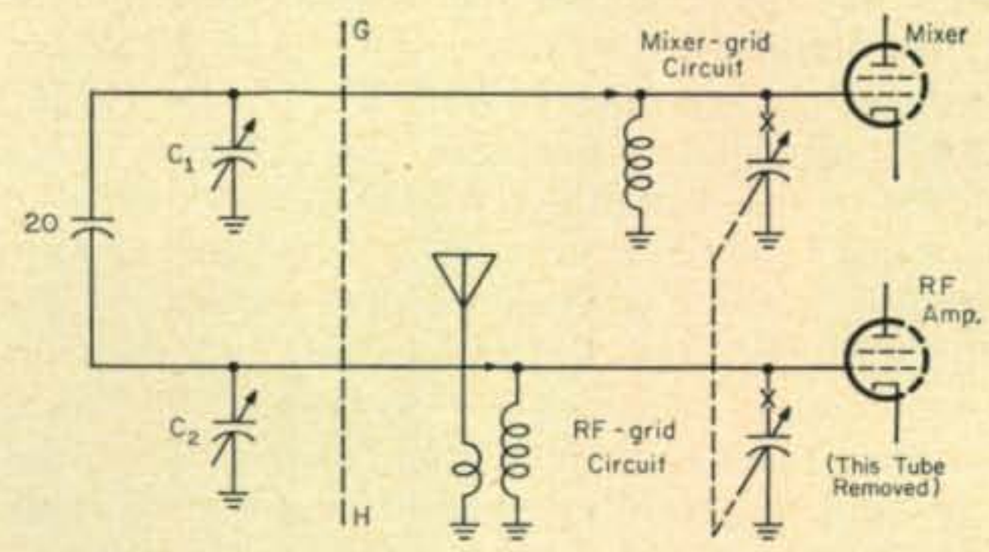


Fig. 4—The broadband tuning arrangements. The RF tube is removed and the two tuned circuits top-coupled. The ganged receiver tuning capacitors are disconnected and replaced with trimmer capacitors of similar value. Components added are shown to left of line *GH*.

sections just disconnected. The reasons for this will be mentioned during alignment. The two tuned circuits are coupled by a small fixed capacitor (about 20 mmf). Note that the two coils concerned are shown grounded at one end. If a.g.c. is applied to the tube grids via the coils, these modifications are still the same. The a.g.c. can in fact be ignored.

Other Scope Connections

The Y Amplifier input is connected to the moving arm of the a.f. gain control, as shown in fig. 5. The a.f. output tube is removed to eliminate noise from the now unnecessary speaker. The timebase output signal from the scope is taken from the "timebase output" termi-

nal if one is supplied. If you have to provide your own output terminal, try connecting a lead to the moving arm of the "timebase coarse" switch. This is usually a satisfactory point. The timebase is adjusted to give a sweep frequency of 20 to 30 cycles per second. If you have power

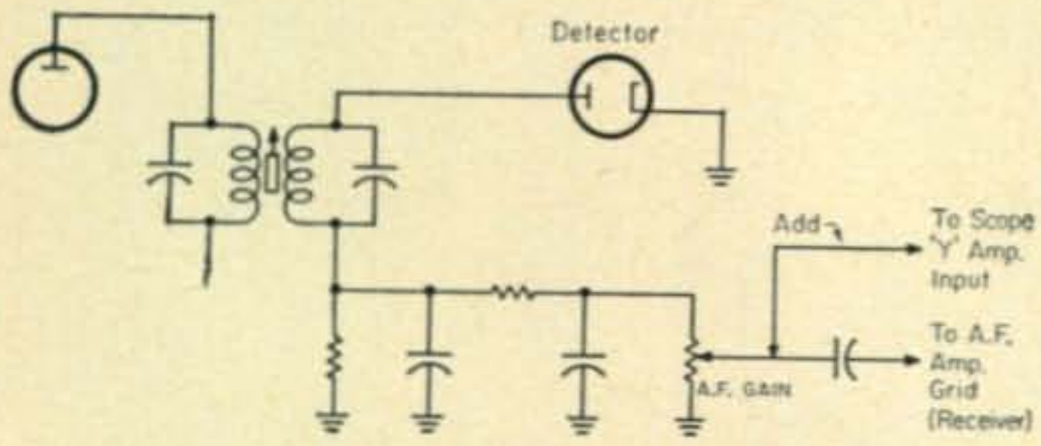


Fig. 5— Typical connection point for the vertical amplifier of the scope. The a.f. Amplifier tube is removed so that no speaker output is obtained

supply hum trouble, the 30 c.p.s. setting will minimize its effect on the picture. The scope should have good flyback suppression (retrace blanking) for otherwise the picture becomes confused.

Set-Up And Alignment

With the modications done and the apparatus connected, disconnect the antenna and use a g.d.o., v.f.o., or heterodyne frequency meter to supply a c.w. signal for alignment purposes. Set the SWEEPWIDTH and CENTERING controls to about mid-position. Set the scope up as usual. Swing the g.d.o. (*etc.*) through its range. At some point on its scale, a "pip" will be seen. This "pip" will move across the screen. Take a note of the frequency settings. The local oscillator tuning capacitor and centering controls should both be adjusted so that this "pip" appears in the middle of the screen when it is in the middle of the band under inspection. Using the SWEEPWIDTH control it should be possible to see the "pip" as it traverses the whole band. All controls interact so it is necessary to adjust the local oscillator tuning, centering and sweepwidth controls until the complete band sweep is obtained. Take no notice of the changes the "pip" may make in amplitude. When correctly set up, the low and high frequency ends of the band should appear at each side of the screen, and the center of the band in the middle of the screen. Reverse the diode and try these adjustments again if the "pip" varies greatly in "width" as it traverses the screen. This "width" should remain constant as the "pip" position changes. It may be necessary with some receivers to replace the local oscillator tuning capacitor with a smaller one. The diode adds about 30 mmf of extra capacity so the tuning capacitor has to be decreased by this amount.

That details the sweep circuitry adjustments. It only remains now to adjust the broadband network. Controls C_1 and C_2 (see fig. 4) are adjusted until the *height* of the "pip" remains more-or-less constant as it traverses the screen. Again both controls interact to some extent. It may be necessary to shunt the coils with resistance to achieve this bandwidth. Receivers without an r.f. stage can still be used to form a "Spectrum-Inspector." An additional tuned circuit will need to be added to give the required "broadband" front end. The shape of the "pip" is the response of the receiver i.f. channel. This is the response that would be displayed using a sweep generator for alignment.

When these adjustments have been made, reconnect the aerial and adjust the gain levels until satisfactory signals are observed. Once all adjustments have been made there is no further attention required. The SWEEP EXPANSION (or HORIZONTAL GAIN) and HORIZONTAL CENTERING controls are all that require attention. These setting up adjustments are far more difficult to explain than to do, so do not get the idea that it is difficult.

If this panoramic receiver is set up to cover the 3.5 to 4.0 mc band, a broadband crystal-controlled converter can be used ahead of it to enable the same facilities to be used on other bands. Twenty meters has to be *seen* to be believed!

If your receiver uses a series heater connection, removal of the r.f. amplifier and audio tubes will of course disable the set completely. In this case it will be necessary to find some other way of rendering these two stages inoperative. Disconnection of the voltage supply to these two stages is perhaps the best approach. Do not overlook the screen circuits.

Conlusion

A panoramic receiver is a fascinating device and you will find it a great aid. The type numbers of U.S. receivers and scopes do not mean a great deal in New Zealand, so if any enquiries are forthcoming, please give very full circuit details. U.S. stamps are useless in ZL-land, so please enclose three IRCs for an air-mail reply. All mail received will be answered. ■

Operation "Sky Top"

WN4MIV, K4AIP and W4WRO, as reported in our July issue (p. 48), DXpeditioned" to some of the rare counties on the east coast. Operation "Sky Top" was a huge success with over 2,000 QSOs chalked up using all bands.

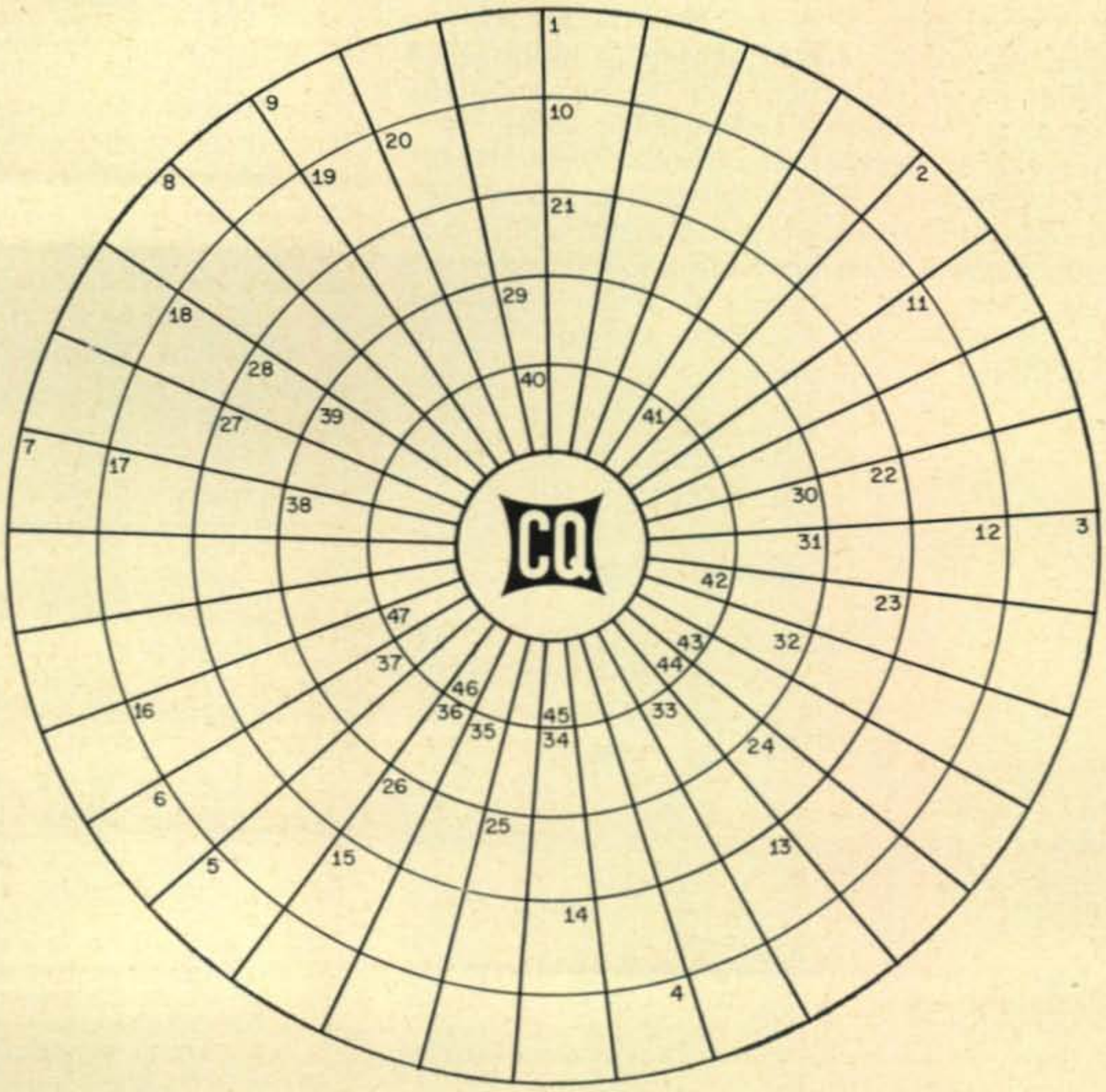
Before their return to Georgia the "Sky Top" gang stopped off at 43rd Street in N.Y.C. to say hello. Their Ford Econoline van carrying assorted transmitters, receivers and antennas is shown here with their sleeping quarters not too far behind.

CRANIUM QUERIES

Before you flip the page, why not try your hand at this five minute polargram? All the words in this puzzle are to be tied together in succession so that the last letter of one word is the first letter of the next. After completing each rotation, jump down one ring toward the center and begin again. Letters do not carry over from one ring to another. If you've filled in the five concentric circles properly, three hidden words should appear. Solution will appear in the next issue.

CLUES

1. Undesirable code character tone variation.
2. Voice communication.
3. Handled by antenna.
4. Ham license classification.
5. Vacuum tube bias (abbr. letters).
6. Glowing tube. What's wrong?
7. . . . . is a quartz crystal cut (letter and word).
8. Irritates neighbors (abbr.).
9. Interrupted c.w.
10. Wavelength measuring wires.
11. Type of frequency meter.
12. Folded . . . . . .
13. . . . potential lines—system of lines drawn in magnetic field.
14. Used in reference to power rating of parts (abbr.).
15. More than one signal.
16. Noise-generating effect in electron tubes.
17. Communications exchanged.
18. Sometimes found in a ham's wallet.
19. Signal sent by satellite OSCAR.
20. Vacuum tube rating (letters symbol).
21. Zener characteristic.
22. Stable oscillator (abbr.).
23. Circuit condition indicated by ohmeter.
24. Found on meter face.
25. Antenna effect.
26. Four element oscillator tube.
27. Negative.
28. Name of amateur radio satellite series, the first launched Dec. 12, 1961.
29. Antenna element not directly driven.
30. Calling any station.
31. Quadrature phase sub-carrier signal.
32. Periodic disturbance.
33. Given by FCC.
34. Highest usuable frequency (abbr.).
35. Fine business.
36. Inscription on front of communications receiver.
37. Type of tube base.
38. Hams inscribe in it.
39. Tube elements
40. Detector type.
41. Directional antenna.
42. How . . . . . you?
43. Where are you . . . . ?
44. You can obtain this license (w/o exam) if you held a ham ticket prior to 1917.
45. Well-known amateur radio association.
46. Extended coupling.
47. Inventor of flat-top beam antenna.
48. Found at connection points.



Reviewing The Radio Classics

The "Collins" Pi

BY DAVID T. GEISER*, WA2ANU

Number 11 of a series

THE "Collins" pi antenna network was the "talk of the Thirties" on the ham bands, some praising and some damning its use. It is sufficient to say that every modern designer of ham equipment must consider its possible use in the equipment he produces. To quote Arthur Collins, WØCXX, "The article . . . is on page 15 of the January 1934 issue of QST. With the benefit of hindsight I would now qualify some of the statements made in the article, although I believe for the most part it could be let stand as is . . . Of course, there is nothing novel in the application of a low pass network to the output system of a transmitter, but the practice seems to have been widely adopted after amateurs took hold of the idea."[1] This reviewer fully concurs, and hastens to point out that the name "Collins Pi" not only was *not* claimed by Mr. Collins (or even acknowledged) but also has honorable precedent in the naming of the Wheatstone Bridge after its popularizer rather than its inventer, Christie.[2] Mr. Collins presented the pi to the radio amateurs.

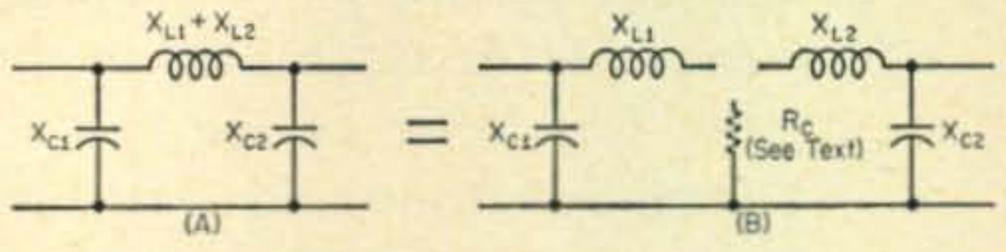


Fig. 1—The pi-network shown in (A) may be transformed into two L networks as shown in (B). Load resistance R_r is around to the right in the discussion.

The Circuit

The pi network is so called because of the similarity of its parts arrangements to the Greek letter, π. In this circuit, fig. 1, two capacitors shunt a transmission line that has series inductance. If we separate the input and output parts of the network (fig. 1b), two impedance-transforming networks emerge. On the left, a high impedance is transformed to a low impedance in the center, and then back to a high impedance on the right. The equations that this reviewer has found most useful are:

$$X_{C1} = R_1 \sqrt{\frac{R_c}{R_1 - R_c}}$$

$$X_{L1} = \sqrt{R_c R_1 - R_c^2}$$

$$X_{L2} = \sqrt{R_c R_2 - R_c^2}$$

$$X_{C2} = R_r \sqrt{\frac{R_c}{R_r - R_c}}$$

where $X_C = \frac{1}{2}\ \pi f C$

$X_L = 2\pi f L$

C = capacitance in farads (1,000,000 microfarads).
L = inductance in henries (1,000,000 microhenries).
X_{C1} = left capacitive reactance.
X_{L1} = left inductive reactance.
X_{L2} = right inductive reactance.
X_{C2} = right capacitive reactance.
f = frequency in c.p.s. (megacycles × 1,000,000).
$\pi = 3.14$
R_1 = desired plate load (ohms).
R_c = nominal "center" resistance.
R_r = load resistance (antenna or transmission line).

Of course, L_1 and L_2 may be combined and the two necessary inductances be made one coil.[3]

The foregoing implies you know the desired plate load and the load resistance. It is not too hard to figure out a "resistance" for the plate load for a class C amplifier; 500 times the plate voltage divided by the plate current (in ma) is commonly used. The "center" resistance (which is used *only* in calculations) is less than either the plate load or the load resistance. It may be calculated by dividing the plate load by the desired Q (10 to 20) squared. An example of this procedure is:

A 6146 is to feed a pi-network while drawing 90 ma d.c. at 600 volts in class C operation. What is the center-resistance of the pi network?

$$R_1 = 500 \times 600/90 = 3333 \text{ ohms}$$

Let the Q of the network be twelve (harmonic rejection goes up with Q).

$R_c = R_1/Q^2 = 3333/12^2 = 3333/144 = 23.1$ ohms

If we know the load resistance is to be 50 ohms, the conditions for match are met and the design is possible. All that remains is the calculation of the right-hand side of the network.[4]

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*Snowden Hill Road, New Hartford, N. Y. 13413.

[1] Unpublished letter, Arthur A. Collins to the reviewer, July 8, 1963.

[2] Hague, B. *Alternating Current Bridge Methods*, Fifth ed., Sir Isaac Pitman & Sons, London, 1959, p. 2.

[3] This general approach seems to have been popularized by W. Bruene, "R. F. Coupling Circuits", *Electronics*, May 1952 (see also Henney, *Radio Engineering Handbook*, fifth ed., McGraw-Hill, New York, 1959).

[4] In this example, the right-hand side of the pi will tune very broadly.

Extensions

A major contribution of the original article was the pointing out that the antenna did not have to provide a perfect match with this network if the capacitors were adjustable. If an antenna or a transmission line is too long or short to look like a pure resistance, it will appear somewhat reactive. This may often be corrected by *reducing* C_2. If not, C_2 may be increased. As common variable air capacitors may have a capacitance range as much as 10:1, a considerable range of mismatch may be accommodated even if the inductor is fixed. This accommodation results from a change in the apparent Q of the plate load, but the usually allowable 10-20 range of the Q value does not inconvenience a class C amplifier. Thus it seemed that a pi-network would match any common load.

Sideband

The advent of sideband brought the linear amplifier—and these are not class C. The A, AB, or B amplifiers require rather definite loads to give maximum output as linear amplifiers. The result is that "most of us have spent a great deal of time in the intervening years trying to improve the antennas themselves."[1] When there is a known load, the pi-network can be precisely calculated and will give a precise match.

The Pi-L

As shown in the left side of fig. 1b, an L-shaped network will reduce impedance. If two L networks are combined (fig. 2), a high impedance may be stepped down to a moderate impedance with a Q of 10-20 (too high a Q drops efficiency) and then another L will reduce the impedance to the desired level. It is thus possible with this variation of the pi to economically feed a high-impedance source of energy into a low impedance.

Tuning and Adjustment

If C_1 and L_1 as calculated have very nearly the same value of reactance, the following tune-up procedure is recommended: (It is also assumed that the circuit is the pi-output of a final amplifier.)

1. Set C_2 for full or nearly full capacity. This usually reduces the amount of power transferred.
2. Rotate C_1 for the common "resonance" plate current dip.
3. Unmesh C_2 until the plate current rises 25 to 50%.
4. Re-dip C_1 for minimum plate current. Repeat steps 1-4 until the "dipped" plate current is the design value for the amplifier. Do not keep an unloaded amplifier on for more than a few seconds or the tube and other parts may be endangered.

The pi network may also be used other places than the final amplifier; for instance, to match a 50 ohm line to a 72 ohm load. In this case there may be considerable advantage to make the circuits (*not* the parts) with a low operating Q, for

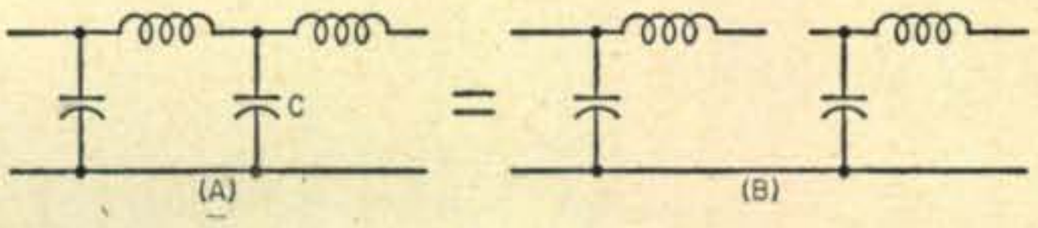


Fig. 2—The pi-L network shown in (A) may be visualized as two L networks if split as shown in (B). If the center capacitor is mentally split we may divide (A) into a separate pi and L network.

the circuit will then show a greater frequency bandwidth. Here, for instance, if we picked a "center" resistance for 40 ohms, X_{C1} would be 100 ohms, X_{L1} would be 20 ohms, X_{L2} would be 35.7 ohms, and X_{C2} would be 80 ohms. Calculation shows this is very little coil and an amazing amount of capacitance. Use of either fixed capacitors or broadcast variables set for the calculated capacitance give good results. If a problem such as this is met, it is best to tune up with an s.w.r. meter or bridge.[5]

The Ham Influence

The history of the pi-network in this reviewer's belief did not start with the amateur. There were several practical points that were proved by amateur use, however. The pi-net is not a perfect cure for harmonics.[6] The pi will not "match everything."[7] The radio amateur proved, through use, that proper application of this circuit was feasible in mass-produced and generally-used equipment.

Acknowledgment

This reviewer was materially assisted by correspondence with Arthur A. Collins, WØCXX, President of Collins Radio Company, though no approval of this review is implied. It is to be noted that each of the references included in this article (except possibly Hague) were authored by licensed radio amateurs. ■

[5] There is very little harmonic rejection (but some) in this last example becaues of the low Q of the pi halves.
[6] Harmonic rejection also depends on load impedance *at the harmonic frequencies*. Antennas that look like pure resistive loads at fundamental frequencies may differ widely at harmonic frequencies both in impedance and their effect on the harmonic-reducing capability of the pi.
[7] See the limitations in the examples.

"I suppose if I let you buy a mobile rig you'll start moaning for a car."

CQ Reviews:

The World Radio Laboratories Galaxy 300 Transceiver

WORLD Radio Laboratories has reversed the trend of rising amateur equipment costs with the Galaxy 300 s.s.b. transceiver. Not only is it relatively low priced, but it also provides a transmitter which packs a solid punch at 300 watts p.e.p. input. This is an attractive asset for those desiring a good amount of power without the additional expense of a linear amplifier.

As with many transceivers currently being marketed, coverage is limited to the 20, 40 and 80 meter phone bands; however, unlike some, the selection of either upper or lower sideband operation for each range has been included, thereby maintaining the full potentialities of s.s.b. In this respect, the use of either sideband should be encouraged, since restriction to a particular sideband throws away useable channels and does away with an advantage to be gained through s.s.b. operation.

The transceiver also may be operated on a.m. using a single sideband with a peak power input of 300 watts, equivalent to a regular a.m. transmitter with 75 watts of carrier. C.w. can be used too at 300 watts power, but such operation is limited to within the phone bands, except on 40 where c.w. use is possible from 7050 to 7200 kc.

V.o.x. operation is available with an optional plug-in module at extra cost. This is a justifiable arrangement for keeping the initial cost of the unit down inasmuch as many operators do not care to use v.o.x. anyway. Besides this, v.o.x. is seldom handled as it should be for true break-in operation, its use being confined mostly to a method of turning the transmitter on and off in a push-to-talk fashion which can be done a lot cheaper and almost as handily with a microphone button.

The Galaxy 300 may be used as a fixed station or in a mobile setup. Power is obtained from a separate unit which for home use is the PSA-300

The Galaxy 300 s.s.b. transceiver for operation on the 20, 40 and 80 meter phone bands with selection of either upper or lower sideband at 300 watts p.e.p. input.

console a.c. power supply with a self-contained loudspeaker. An optional electric read-out type clock and timer is also available. The mobile power supply for 12-volt d.c. operation is the G-300 DC.

Circuitry

A block diagram of the transmitter section is shown in fig. 1. Two stages of speech amplification are provided by two cascaded sections of a 6D10 Compactron triple triode, V_{14A} and V_{14B} The audio is then fed to the balanced modulator. V_{15}, which is a 7360. A crystal-controlled carrier frequency of 9099.939 kc for one sideband or 9103.144 kc for the other sideband is also fed into the balanced modulator from the sideband-switching oscillator, V_{5A}, which is the pentode section of another Compactron, a 6M11. The carrier is nulled out in the balanced modulator and the two sidebands are passed on to the 9.1 mc crystal lattice filter which has a bandpass of approximately 2.7 kc.

The s.s.b. signal is then amplified by V_{16} and is applied to a 6BA7 mixer, V_4, where it is combined with signals from the v.f.o., V_{6A}, which for 20 and 80 operates in the 5100 to 5300 kc region. The sum frequencies, 14200 to 14400 kc are used for 20; the difference frequencies, 3800 to 4000 kc for 80. For 40 meter operation a different v.f.o., V_{6B}, is switched in. This v.f.o. operates from 5383.3 to 5483.3 kc. A frequency multiplier, V_7, triples to the 16150 to 16450 kc region. The difference with the 9.1 mc s.s.b. signals then covers the 40 meter band from 7050 to 7350 kc.

The two v.f.o.'s are mounted in the same box, each using a separate half of a 6J11 Compactron. The oscillators are gang-tuned to a common dial calibrated in 5 kc increments. The drive mechanism for this arrangement provides a tuning-ratio choice of 12:1 or 72:1. Due to the fact that the sum and difference frequencies are used on different bands, the calibration and tuning on the 80 meter band are in the opposite direction to those for the 20 and 40 meter bands.

When the carrier generator crystals, Y_1 and Y_2, are switched for changing sidebands, the v.f.o. frequency must be shifted at the same time. This is done by means of diode switches, CR_1 and CR_2, which control the insertion of appropriate padders C_1 and C_2.

Driver and Final

The transmitter mixer is followed by V_3, a 6CL6 driver which pushes a paralleled pair of 6HF5 TV horizontal deflection type tubes to 300 watts p.e.p. The plate potential used is 800 volts. A conventional Pi-network matches the

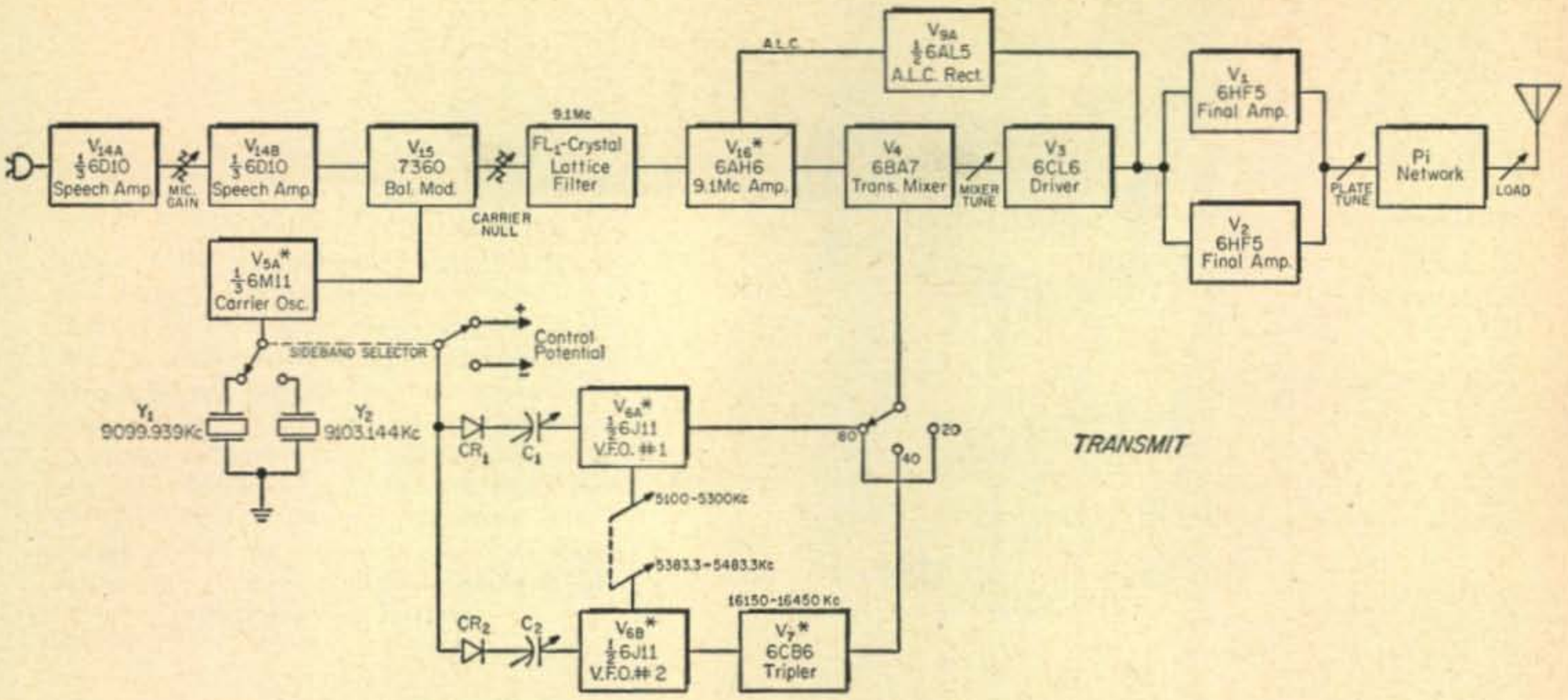


Fig. 1—Functional block diagram for the transmitter section of the Galaxy 300 Transceiver. Elements common to both transmit and receive are marked (*). Driver (V_3) output circuit is bandswitched with fix-tuned circuits.

final to resistive loads of from 25 to 100 ohms. Well regulated screen potential for the final tubes is obtained from an 0A2 regulator tube.

A.l.c. is obtained through V_{9A}, a 6AL5, which rectifies any excessive potential developed at the grids if the final. The resulting d.c. is applied as a bias to V_{16} to control its gain.

For a.m., a carrier is inserted with a panel control. Carrier is also inserted for c.w. work with grid-blocked keying applied to V_3, V_4 and V_{15}.

Receiver Section

The receiving arrangement is indicated in fig. 2. The r.f. stage, V_{10}, is a 6BZ6 pentode the input side of which is coupled through a 10 mmf capacitor to the Pi-network of the transmitter final amplifier.

The converter section of a 6X8, V_{11A}, is used next as a mixer for the incoming signals and the frequencies from the transmitter v.f.o. which is cathode coupled to the mixer through the triode section of the 6X8. Following the mixer are the 9.1 mc crystal filter and two 9.1 mc amplifiers V_{16} and V_{17}. The triode section of a 6M11 Compactron, V_{5C}, is used as a product detector in which the 9.1 mc s.s.b. signals are combined with the sideband carrier frequencies from V_{5A} to produce an audio component which is amplified by V_{5B} and V_{14C}. The a.f. output stage is a 6AQ5. During transmission periods V_{10}, V_{11} and V_{17} are made inoperative by removal of screen potential. The last two a.f. stages are also disabled.

A.G.C.

A.g.c. for the receiver is obtained by rectifying the audio signal (by V_{9B}) which appears at the output of V_{14C} and then applying the resulting d.c. bias to the two 6BZ6 stages, V_{10} and V_{17}. A slow release time-constant provides smooth a.g.c. action without pumping.

Controls

Besides the v.f.o. dial, the panel controls are the MIC and AUDIO GAIN concentrically grouped

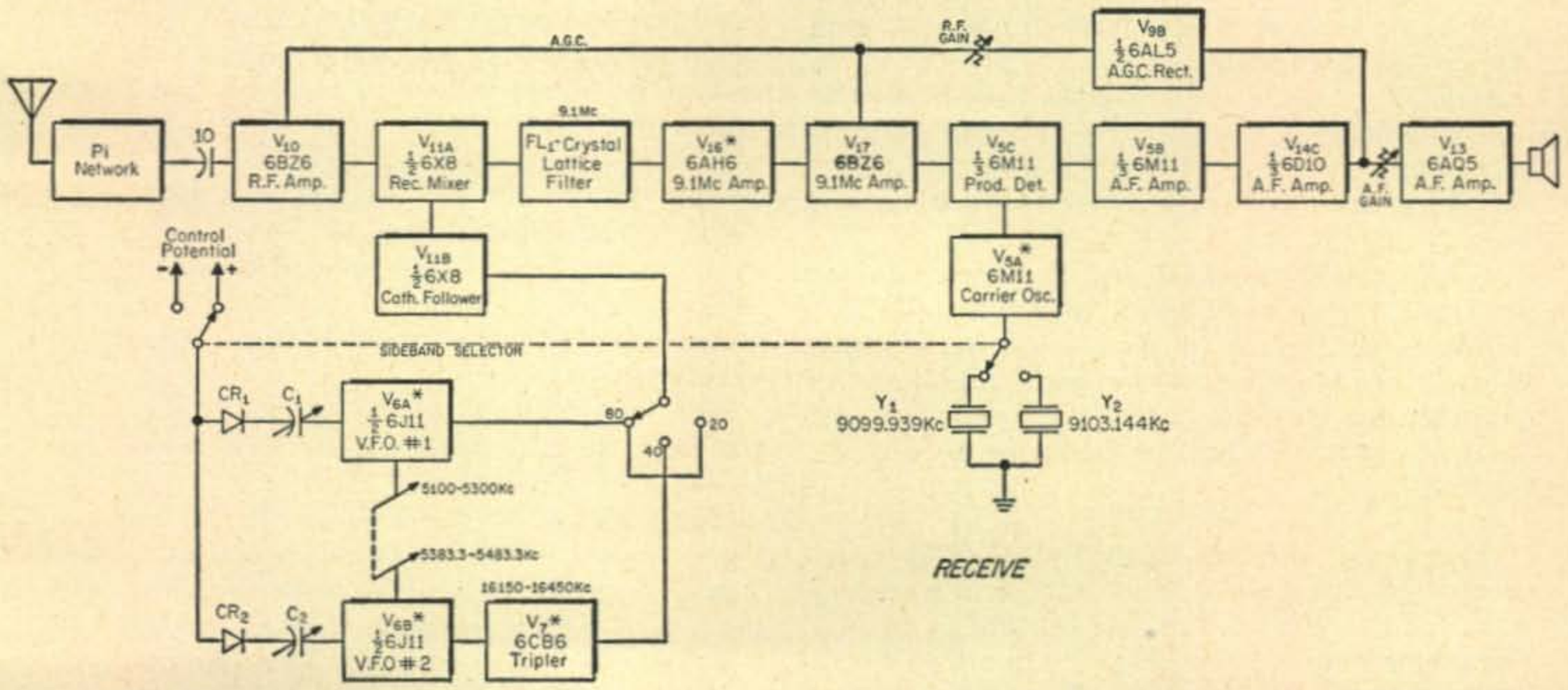
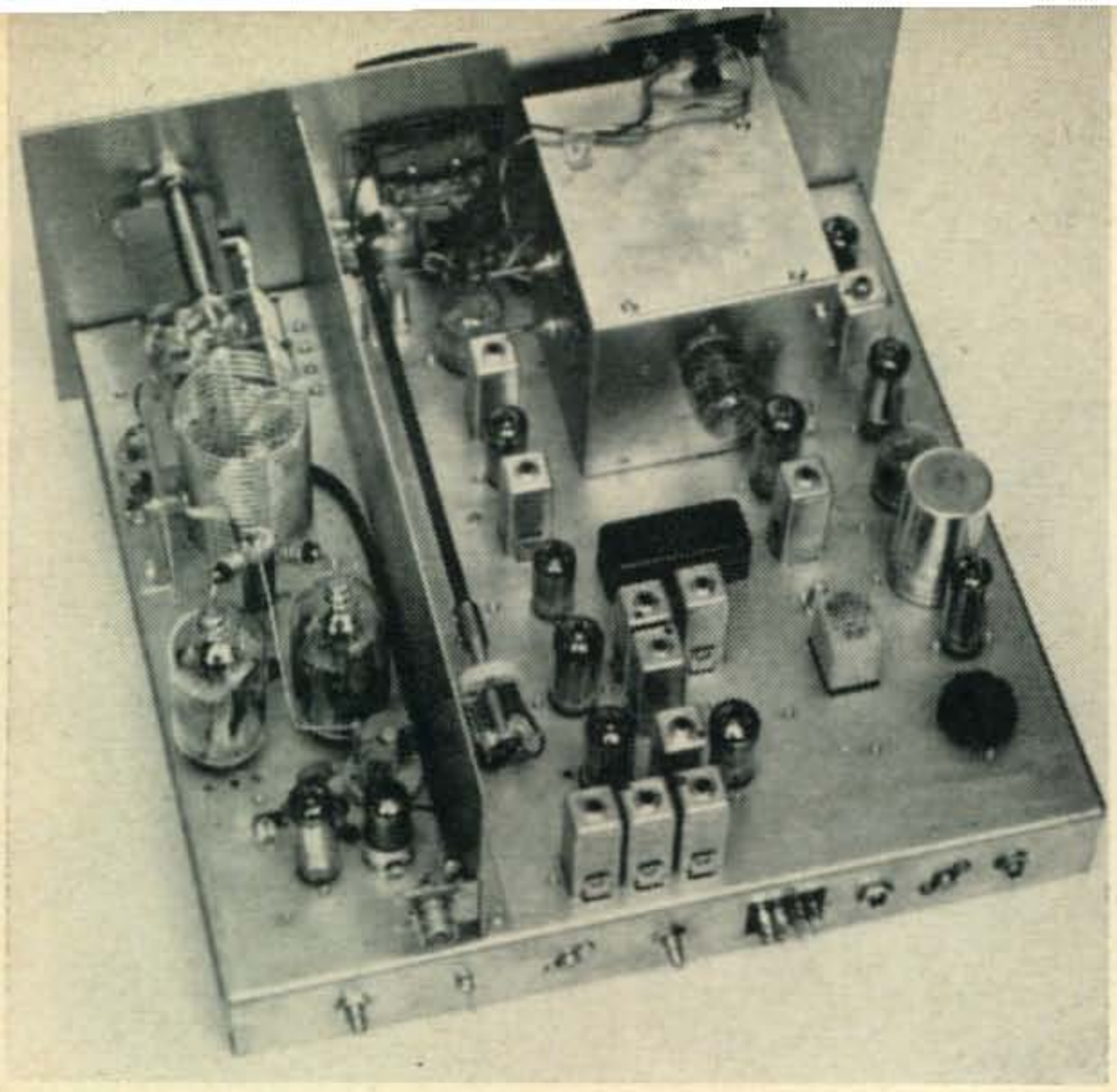


Fig. 2—Functional block diagram for the receiver section of the Galaxy 300 Transceiver. Elements common to both transmit and receive are marked (*). Receiver mixer (V_{11A}) input circuit is bandswitched with fix-tuned circuits.



Top chassis view of the Galaxy 300. The dual v.f.o. is in the box at the upper right with the Compactron oscillator tube protruding from one side of it. The crystal filter is in the small black box just behind the v.f.o. The capacitor with the long shaft tunes the transmitter mixer. The final amplifier compartment is at the left. The two 6HF5 tubes are at the center with the 0A2 regulator and the 6BZ6 r.f. amplifier toward the chassis apron. The final bandswitch is inside of the lower part of the tank coil.

on one shaft. The R.F. GAIN and CARRIER NULL are likewise mounted. Other controls are: BAND SELECTOR, FINAL GRID TUNING, FINAL PLATE TUNE and FINAL LOADING. Upper or lower sideband operation is selected with a toggle switch. Another toggle switch is a three-position one which selects the functions of receive, tune or transmit. In the TUNE position full carrier is applied for tuning the transmitter to rated input. In the TRANSMIT position the carrier null control is used either to balance out the carrier for s.s.b. work or to insert the amount of carrier needed for a.m. or c.w. operation.

During receive, the panel meter indicates signal level in S-units; during transmit it indicates final cathode current.

An adjustable hairline fiducial is provided for setting the dial calibration to frequency; however, no crystal calibrator is supplied, so calibration must be made against an external source of known frequency.

Performance

In regard to the receiver section, sensitivity was measured at an average of 0.5 μv for a 20 db signal-to-noise ratio. Sideband suppression at 1 kc was found to be 45 db on one sideband, 40 db on the other. This probably could be equalized by readjustment of the 9.1 mc oscillator trimmers. A.v.c. action is smooth without annoying pumping effects. Like many transceivers, a noise limited for mobile work has not been included.

Audio quality is good and the high ratio of the v.f.o. drive mechanism provides easy and comfortable tuning of s.s.b. signals. Relative S-meter readings below S-8 were found to be considerably less than 6 db per S-unit, but calibrations at the top half of the range were good.

Stability

Frequency stability both mechanically and electrically is excellent. The short term warm-up drift for the first 15 minutes, starting at normal room ambient, was found to be within 500 c.p.s., after which it settled down to a negligible amount. From the alignment instructions, dial calibration accuracy at its worst should be within 5 kc; however, the unit under test was good to within 1.5 kc.

Subjecting the Galaxy to a drop and vibration test did not produce even the slightest quiver of the frequency.

Transmitter

No problems were encountered in tuning up the transmitter following the instructions furnished. Using the a.c. power supply and with the transmitter adjusted for 300 watts p.e.p. input, the output was measured as 190 watts, at which point good linearity was obtainable. Although the a.l.c. prevents severe flat topping, some still exists before the a.l.c. takes hold. Sideband suppression, of course, was the same as experienced in the receiving position, with carrier suppression down near —45 db when using either sideband. The audio quality sounds clean and pleasant.

The 6HF5 final amplifier tubes give a good account of themselves with no indication of overheating when operated with a carrier input of 300 watts over extended periods.

On-the-air reports of a.m. operation indicated good performance. On c.w. keying was excellent, but from an operational standpoint, a beat note cannot be obtained from a received c.w. signal unless the transceiver is tuned slightly off frequency.

The Galaxy 300 is mounted in a perforated gold-colored cabinet, size 15" w. × 13½" d. × 7" h. The panel is an anodized gold-colored finish with black knobs and panel markings. The meter is an edgewise-mounted type. Weight is 22 pounds.

The PSA-300 a.c. power supply is the same size as is the transceiver and is likewise finished. It weigh 44½ pounds.

The Galaxy 300 is priced at $299.95 and the v.o.x. module is $24.95. The PSA-300 a.c. power supply is priced at $119.95 with the clock and timer and $99.95 without. The G-300 DC 12 v.d.c. supply is also $119.95. The manufacturer is World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.—*W2AEF*

Using Alkaline Batteries for Portable Equipment

BY ROBERT P. BRICKEY*, W7QAG

Power on the order of 10 watts or more is usually difficult to supply in hand-held portable equipment. Rechargeable Alkaline batteries, however, provide a flexible and inexpensive solution to the problem. Outlined below are some of the fine points concerning their use.

In the past few years there have been a number of significant changes in the electronic components available to the constructor which now makes it possible to design equipment that would have been impractical just a few years ago. Of course one of the most important changes has been miniaturization of many of the old components, but also of great importance is the introduction of entirely new devices. Many of these new devices have simplified some of the greatest design problems encountered when contemplating the construction of portable equipment.

Power Source

One of the first problems to be considered when planning portable equipment of any type, but especially a portable transmitter, is the type of power source to be used. In the past, dry batteries have been the rule, and while they have some advantages they also have several drawbacks; they are not well suited for short time high drain applications, they are not rechargeable and they are relatively expensive. Lead acid cells have also been used and while they are capable of supplying large amounts of power and are rechargeable, they require a considerable amount of maintenance, exhaust dangerous fumes, are quite heavy, expensive, and must usually be operated in one position. Past experience with other portable equipment has indicated the desirability of using rechargeable batteries. It is a little difficult to enjoy operating when you have to be concerned about expensive dry cells running down and it is sometimes hard to find a replacement battery when using the equipment in remote areas.

Nickel Cadmium Batteries

Nickel cadmium batteries are now available in a wide range of sizes and being rechargeable as well as having most of the other desired charactertistics they would be ideally suited for a portable power source except that their initial cost is high enough to be quite discouraging.

Alkaline Batteries

Union Carbide (Eveready) now has available a rechargeable alkaline battery that is recommended for use in portable devices requiring more energy than is economically available with other types of batteries. This battery, nets for only $3.50. It can be recharged approximately fifty times, has a no load output of 7.5 volts and a maximum recommended discharge current of 0.5 ampere. Alkaline secondary cells are maintenance free, hermetically sealed and may be operated in any position. They are an outgrowth of the heavy duty alkaline primary cells.

Life Cycle

Each No. 560 battery is comprised of five 1.5 volt D sized secondary cells using electrodes of zinc and manganese dioxide with an electrolyte of potassium hydroxide. At the 0.5 ampere discharge rate the battery may be discharged for approximately four hours. It should not normally be completely discharged as after its rated discharge, during its early cycle life, there is a power reserve which usually amounts to between 100% and 200% of the rated ampere-hour capacity. If the battery is completely discharged there is a secondary electrochemical reaction which is not reversible and the battery can not be recharged. This reserve could be used however in emergencies where immediate power is considered more important than maximum battery life.

As the battery is discharged the terminal voltage decreases, and after the battery has delivered its rated ampere-hour capacity, the terminal voltage will be about 5.75 volts in a new battery while the discharge current is flowing. During the last part of the cycle life the terminal voltage will drop to about 4.75 volts under rated load.

Recharging

The most desirable method of determining the

Typical installation of four Eveready 7.5 volt Alkaline batteries. In this unit, a two meter portable transceiver, provision is made to charge each battery through a separate dropping resistor. All batteries are connected in parallel in operation.

*Utah Trade Technical Institute, 349 North 250 East, Orem, Utah.

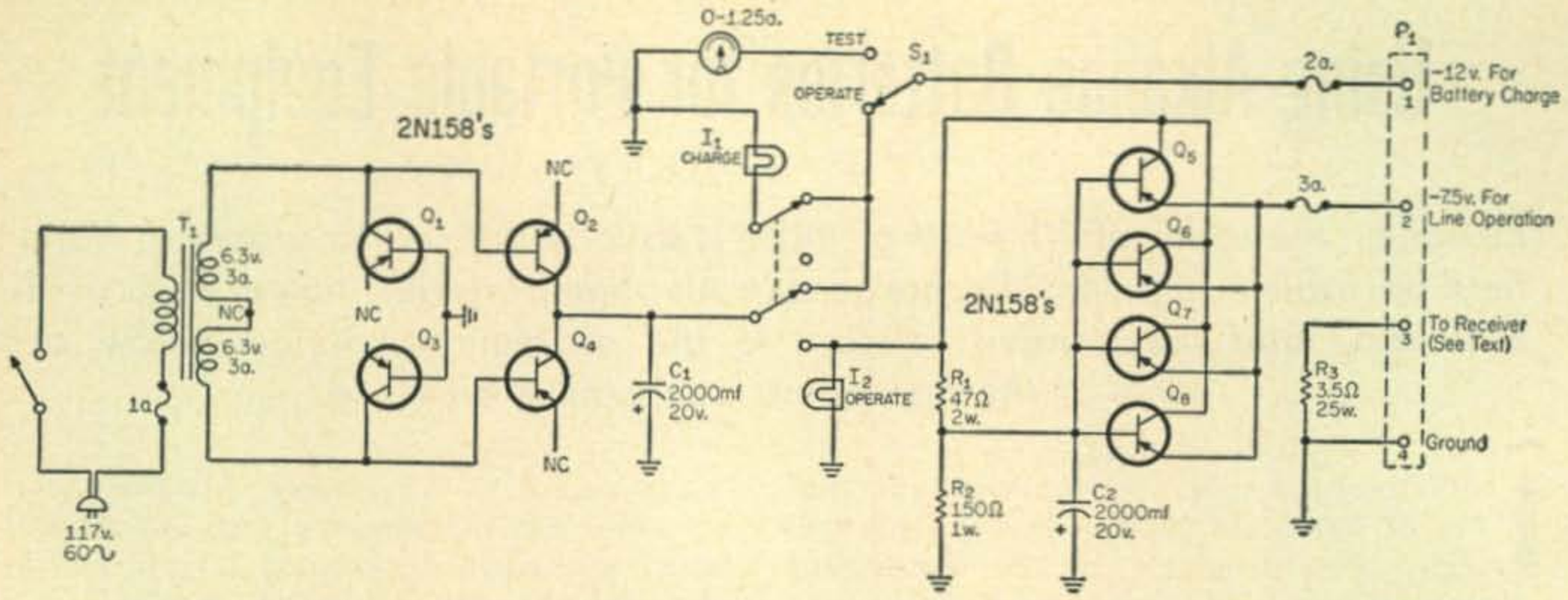


Fig. 1—Circuit of the transistorized battery charger and eliminator built into an LMB case #W-1A. All capacitors are in mf.

P_1—Cannon XLR-4-12C.
PL_1, PL_2—14.4v, 0.1a, pilot lamps #1813.
R_1—Approx. 47 ohms. Adjust for —7.5v. output.
T_1—117v. to 12.6 v.a.c. Thordarson 26F63 or equiv.

amount of discharge would be to use some type of timer or ampere-hour counter to control the discharge, however this would involve additional space, weight and expense. The time when recharging is needed may be determined with somewhat less accuracy merely by making periodic checks of the battery terminal voltage under full load. If some method of determining the ampere-hour withdrawal is available, 120% of the ampere-hours removed on the previous discharge should be replaced at a charging current of 0.25 ampere. If the battery is discharged for the rated 4 hours at a 0.5 ampere rate it should be recharged at 0.25 ampere for ten hours. While it is not recommended that the batteries be purposely overcharged they may be overcharged for many hours at the 0.25 ampere rate without appreciable damage. New batteries should always be discharged before being charged to prevent damage.

Multiple Batteries

It was decided in the early planning of the portable, that in order to obtain the desired amount of output power it would be necessary to have a power source that could supply about two amperes of current at 7.5 volts. Since the alkaline battery just described is rated at only 0.5 ampere. Eveready was consulted about the advisability of using four batteries connected in parallel. They indicated that it would be satisfactory to discharge in parallel but due to the differences between the internal resistances of different batteries, they did not recommend charging in parallel. For this reason individual dropping resistors are used for charging each battery and the batteries are switched in parallel for discharging. Four of these batteries have been in fairly heavy use in this fashion for about ten months and they are still going strong.

A Battery Charger-Eliminator

Figure 1 shows a circuit diagram of a battery charger-eliminator for use with these batteries. It provides a charging output of —12 volts which, when used with 24 ohm dropping resistors located in the transmitter-receiver case, provides a charging current of 0.25 amperes per battery. The battery test ammeter provides a means for determining the battery potential under load, since when the battery test switch is activated it connects the batteries in series with their charging resistors and the meter. When the terminal voltage of the batteries is 7.5 volts each battery contributes 0.3125 amperes making the total current through the meter 1.25 amperes.

The power supply also provides a —7.5 volt output which can be used to power a rig when commercial power is available. As it is difficult to obtain very low values of ripple with a high load current using conventional power supply filters, an electronic filter was employed. With this type of circuit the effective filter output capacitance is approximately equal to the base filter capacitor, C_2, times the current gain of the transistors used (h_{fe}). This high effective output capacitance resulted in a measured output ripple voltage of only 0.67% under full load. Equally effective filtering by conventional means would have required a very large and expensive inductor or capacitor at this load current.

As power transistors have excellent characteristics for use as rectifiers, four of them were used in a bridge circuit. In this application the

[*Continued on page 90*]

A power supply capable of supplying 12 volts d.c. for charging Alkaline batteries, doubling as a battery eliminator when portable operation is not required.

160 Meters And The Mills Trophy Race

BY WILLIAM E. SMITH*, K8LFI

Truly a grueling test of man and vessel, The Annual Mills Trophy Race is held on Lake Erie over a 110 mile triangular course, requiring more than eighteen hours to complete. Amateurs in the Toledo, Ohio area have played a major role in this historic race by providing reliable communications on 160 meters. The following is an account of their efforts.

THE Mills Trophy Race is designed to test the seamanship and navigation ability of the crews and skippers. The Merrill B. Mills Trophy, for which the race is named, is one of many available to the Cruising, Racing and Dragon Class boats eligible for the race. It was first awarded in 1907 and is the most coveted of all the sailing trophies.

For the second consecutive year amateurs in the Greater Toledo Area had volunteered their services in providing communications for the race.[1] Here was an opportunity to perform a real service for which they were eminently qualified. Need for good communications is evident when it is realized that the race was over a 110 mile triangular course and required more than eighteen hours to complete. The course was patrolled continuously by the U. S. Coast Guard but the presence of additional boats with amateur communication facilities aboard spotted at strategic points on the lake did much to assure the safety of the participants. The boats also provided the land lubbers with a running account of the progress of the race.

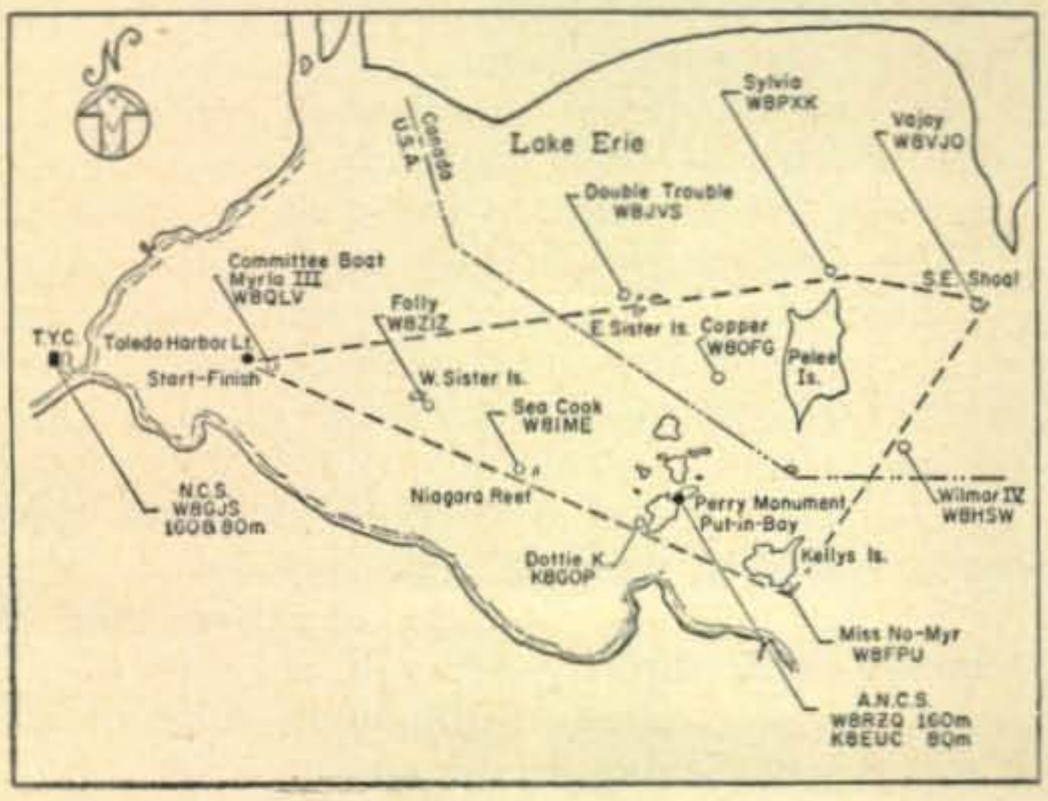
There were several reasons for choosing 160 meters as the most logical band to use for the race, one of them being that many amateurs in the Toledo Area have very efficient 160 meter mobile equipment. Another highly pertinent reason was the opportunity to show how effectively they could use a band actually belonging to the U. S. Coast Guard in cooperating with them. Their ability to monitor this band combined with the fact that most of the picket boats and net control station were able to monitor Channel 51, the Coast Guard emergency calling frequency at 2182 kc, established a unity of effort which virtually could not fail.

Organization of the effort was a tremendous task begun months in advance under the General Communications Chairman Ralph Hanna of the Toledo Yacht Club and the Amateur Chairman Gus Hall, W8OFG. Chairman Hall took upon himself the task of recruiting amateurs along with their mobile equipment to go along with the picket boats. Gus also performed yeoman's duty in supervising and assisting with the installation of the equipment in several of the boats and served as floating mobile control during the race.

Assisting Gus and accepting responsibility for all land based operations was Dave Alex-

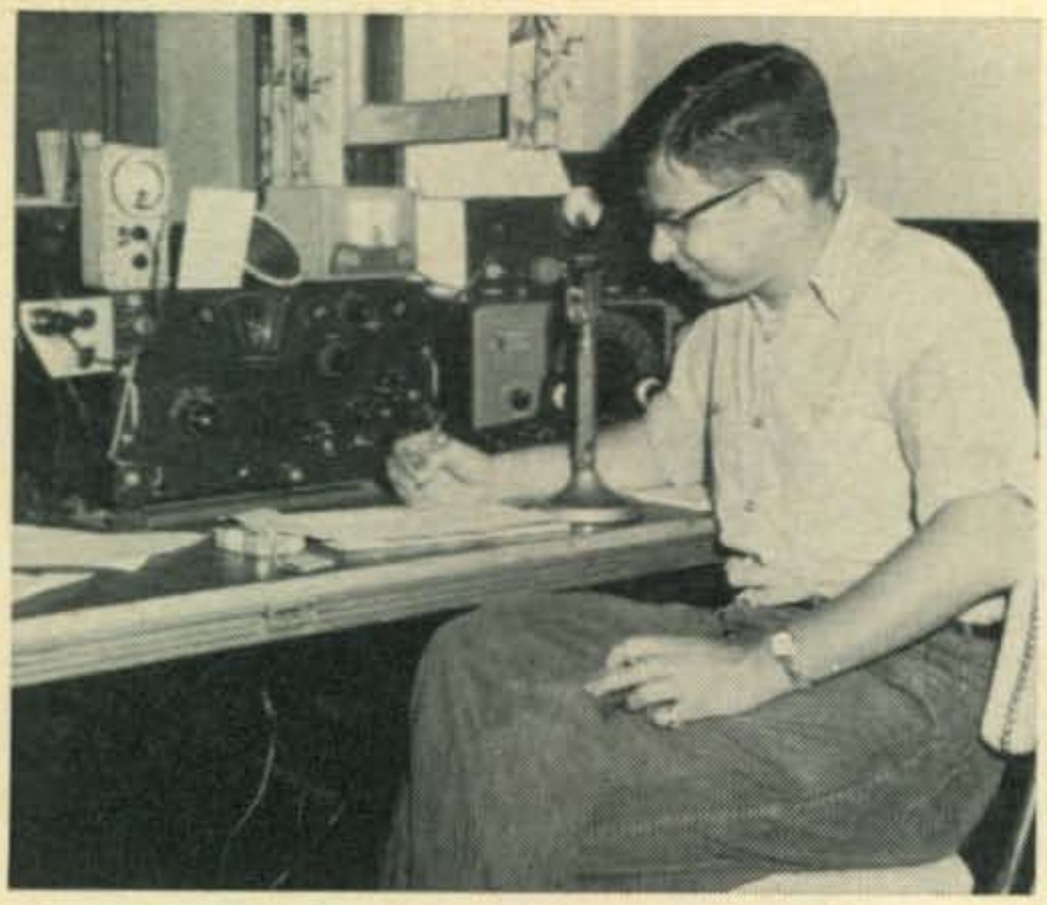
*5030 Janet Ave., Sylvania, Ohio.

[1] This event was the 41st Annual race sponsored by the Toledo Yacht Club and took place on June 17, 1961. Sailing craft, 25 feet and longer qualify.



Map of the western part of Lake Erie. The race was run along the course indicated by the dotted line. Circles indicate positions of maritime mobile stations.

The Commodore Perry Monument at Put-In-Bay. Alternate Net Control station was located inside the monument at the base while antennas were strung down the 300 foot side.



Net control station, with W8KIX at the mike.

Flashing the results of the race via teletype.

ander, W8TSD. Dave not only supervised the installation of the net control station and assigned operators for it but also assigned responsibility for setting up and operating the alternate net control station in the Perry Monument at Put-In-Bay. Permission to use the monument had been secured from the National Park Service weeks in advance by Chairman Hanna.

Named chief operator of the net control c.w. operators for the 80 meter back up link station at Toledo Yacht Club was Bill Golding, W8GJS whose call was used. With him were Russ Flora, W8DN, as assistant, Joe Furfaro, W8NBD in charge of 160 meter phone operators and Al Sniadowski, W8KIX in charge of with alternate net control.

Installation of the base station had begun two weeks before when W8NBD, W8KIX, W8TSD, W8GJS, K8LUE, K8DHU, W8PXK and W8FPU met at the Yacht Club to install the antennas, a 125 foot inverted "L" with a 60 foot vertical portion for 160 and an 80 meter doublet 35 feet high at the center. Equipment at net control consisted of a Viking Ranger and a BC-342 receiver for 160 with a Viking Navigator and an HQ-110 for 80 c.w. The final installation at the Yacht Club was a closed circuit teletype link between the communications shack and the bar in order to avoid the inevitible congregation of the curious in the shack during the final hours of the race. These devices were installed between the hours of 0200 and 0400 the morning of the race by K8ZCS, and W8SDZ.

The alternate net control station at the Perry Monument operated under two calls. The 160 meter phone station used the call of its chief operator W8RZQ, who was assisted by W8RZM, W8CZH, and K8VYG. The 80 meter c.w. station was set up and manned by K8EUC. Equipment here consisted of a Globe Scout and an HQ-129X on 160 with a DX-100 and an HQ-110 on 80. The station was located at the base of the monument with half wave end fed verticals for both 160 and 80 meters hung down from the top some 300 feet above. Near this spot on the island Dr. Lee DeForest made what was probably the second ship to shore radio phone contact in history with the yacht *Thelma* during the Interlakes Regatta in July of 1906. Unfortunately Dr. DeForest did not have the monument to support his antenna hence the official mode of communications for that regatta was carrier pigeon.

Each of the ten mobile stations was installed and tested by its owner-operator during the weeks preceding the race. Since several of the boats were stationed in Canadian Waters, these operators had applied for, and received, Canadian Licenses along with special permission to use the 160 meter band as a boatmobile, normally specifically forbidden under Canadian regulations. Equipment was so varied (much of it home brew) that several pages would be required to describe each mobile installation in detail.

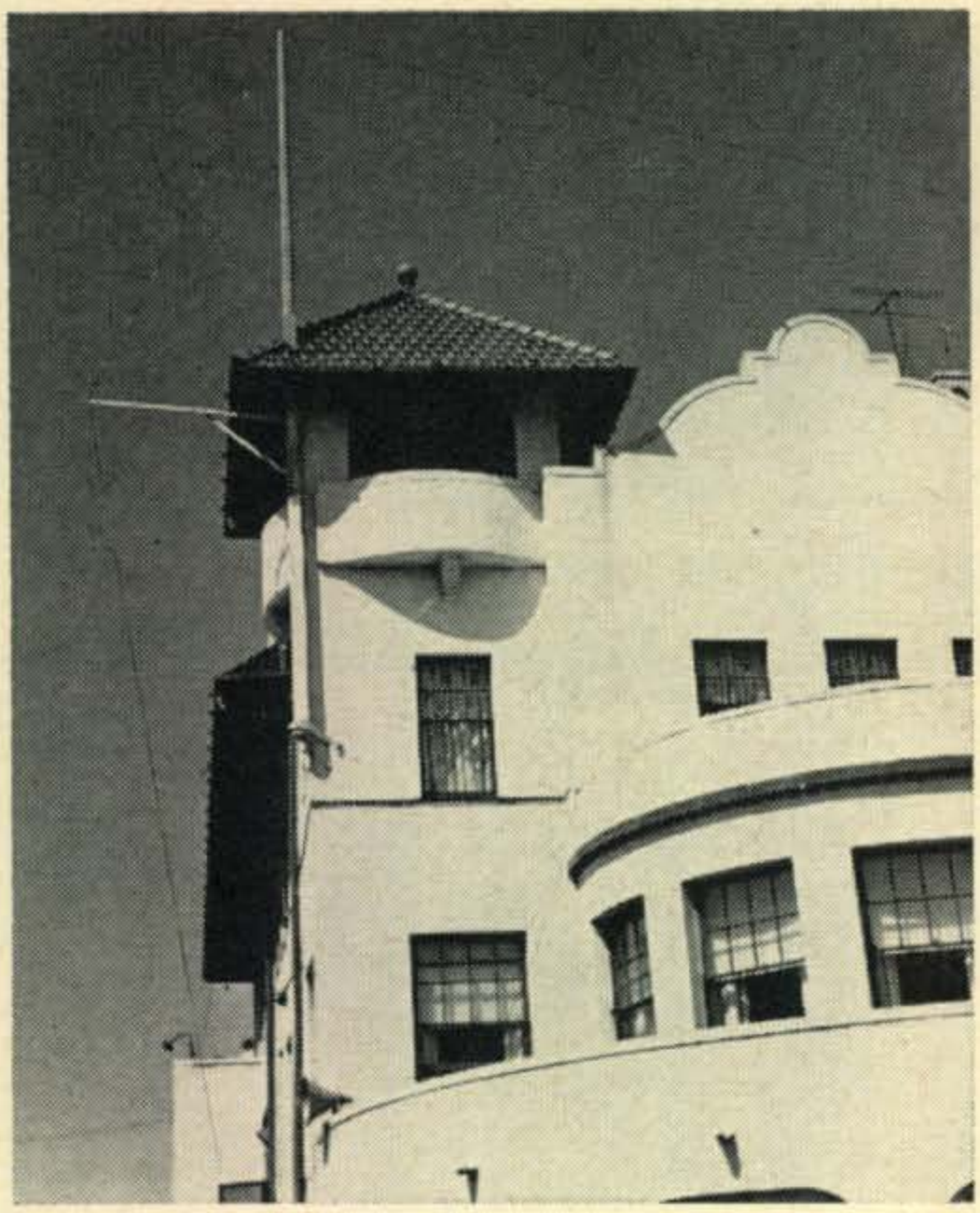
The mobiles were deployed for the race as shown on the map, each boat leaving its shore berth in plenty of time to reach its assigned position before the race. The operator calls were as shown on the map except for the *Folly*. Station W8ZIZ was operated by W8WDL, Jim during the early hours of the race then jointly with Burge when he had finished his work ashore.

In view of all the organization and preparation which had been made, the race itself was virtually anticlimactic to the amateurs involved.

The weather was literally perfect for sailing or hamming as the race got under way. The sky was clear and sunny with the temperature a cool 70° and a gentle breeze of 8-10 knots blowing from the east.

The net control station maintained close radio contact with all the mobiles as they proceeded to their stations and was able to communicate directly with all but two of the most distant stations throughout most of the race. A single relay by the alternate net control station filled in all gaps.

The c.w. link between net control and alternate net control was set up on 3503 kc to provide assistance in communicating with the



East wing of the Toledo Yacht Club, location of the Net Control Station. The 160 meter antenna can be seen strung to the top of the pole and across the building.

W8TZO plays checkers on the air at 35 w.p.m. to keep the frequency clear.

eastern leg of the race in case atmospheric QRN or QRM made 160 meter phone untenable or traffic became too heavy. The frequency was monitored at both ends throughout most of the race and was operated several times for test purposes by W8KIX, W8TSD, K8LUE, K8IUA and W8TZO. In fact, W8TZO, played checkers with K8EUC at 35 w.p.m. during a critical portion of the race in order to hold the frequency. However, the circuit was never actually needed thanks to the beautiful weather and an able assist by our old friend, Reverend T. C. Williams, W8NSF of Midland, Michigan. He checked in during the early evening as the band opened up to give us a fine signal report and stayed around for several hours at our request doing a beautiful job of clearing our frequency (1812 kc) of the threes and nines who were rolling in but were unable to hear our signal. Our experience here indicates that the amateurs on 160 meters are among the most courteous and cooperative of all and deserve a real expression of thanks from all of us who participated in this event.

A few minor difficulties were encountered but thanks to adequate preparation and a little ingenuity they were overcome before they could damage our effort. The *Dottie K* with K8GOP aboard developed engine trouble when almost to her assigned position. She was towed into the harbor at Put-In-Bay by the *Copper* with W8OFG aboard who then returned and took up the position originally assigned to the *Dottie K*. Here was utilization of a planned function of the *Copper* and the reason she was stationed initially near the middle of the course.

With the *Copper* in service in place of the *Dottie K*, the *Folly*, first picket boat on the course then became a floating mobile as soon as the race passed her station.

The 160 meter receiver aboard the *Double Trouble* with W8JVS as operator failed to function because of a faulty crystal. Stan had a transistor portable with him which he pressed into service as a substitute; however, he found that he could not receive the net control station on it from his position even though his signal was loud and clear at the Yacht Club. He could copy other nearby mobiles however, so a relay system was used. Before the race passed his position he was back in direct contact with net control by the simple trick of link coupling the transistor receiver to the tranmitting antenna through a loop of wire.

Identification of the passing boats was difficult during the night hours. Many of them passed the picket boats some distance away so that the sail numbers were the only identification the mobiles had. It was learned early that many of the sail numbers did not correspond to the identifying list supplied by the officials. Nevertheless, each time a boat passed a mobile, word was flashed back to net control so that the progress of the race was known at all times. The mobiles were permitted to secure their positions one at a time as soon as the bulk of the race had passed except for the *Copper* and the *Folly* which remained afloat all night.

The first complete listing of positions came from W8FPU, Parks, aboard the *Miss No Myr* off Kellys Island as the boats swung sharply around the first turn in the race during the early evening. A single relay by the monument station was required.

A second complete report came from Chairman Hanna's boat during the early hours of the morning. His boat, the *Vajoy*, was stationed at the Southeast Shoal, the most distant point in the race. A single relay via W8PXK aboard the *Sylvia S* was required.

Aboard the *Vajoy*, was W8VJO, Rita Hall,

[*Continued on page 90*]

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

The following certificates were issued between the period from September 6th, 1963 to and including October 5th, 1963:

CW-PHONE WAZ

1836	K6CYG	S. C. Shallon
1837	W8AMZ	Henry C. Johnson
1838	W8LOF	W. M. Hildebrand, D.V.M.
1839	W8PHZ	Ralph A. Dage
1840	W6DLN	Richard E. Huddleston
1841	VK9XK	S. Russ Coleston
1842	W4NNH	Bob Willoughby
1843	I1NU	Roberto Ortensio
1844	W7LZF	Arthur E. Olson
1845	W4MS	Edward J. Collins

ALL-PHONE WAZ

201	W5LBI	B. W. Weinland
202	G3HDA	Michael E. Bazley
203	W2TP	H. G. Mustermann
204	WØLIL	Leo J. Elm
205	VE6NX	C. J. Gawlicki
206	WA6ZIQ	Bob Lane

TWO-WAY SSB WAZ

181	G3HDA	Michael E. Bazley
182	W2TP	H. G. Mustermann
183	K1JMV	Mike E. Buczek
184	K6ERV	Jack A. Brollier
185	W6NWZ	Merl L. Ralph
186	K2JFV	Jack Williams
187	W6USG	P. T. Brogan
188	GI3CDF	Leslie M. Lyske
189	VE6NX	C. J. Gawlicki
190	WA6ZIQ	Bob Lane

CW WPX

482	SP5HS	Krzysztof J. Slomczynski
483	CP5EZ	Ivo Tadic D.
484	W4GYP	John M. Ciganek
485	W2IP	Charles Harold Campbell
486	W4ZYS	Meryl C. Burns
487	W4ZYQ	Patrick C. Burns
488	K6JIC	Frank W. Pfeiffer

PHONE WPX

96	YV2CJ	Alvaro Guevara-Urbina
97	W1BPM	T. Richard Dunn

SSB WPX

146	K3BNS	John B. Johnston
147	SP5HS	Krzysztof J. Slomczynski
148	K2YIY	William R. Rufe

MIXED WPX

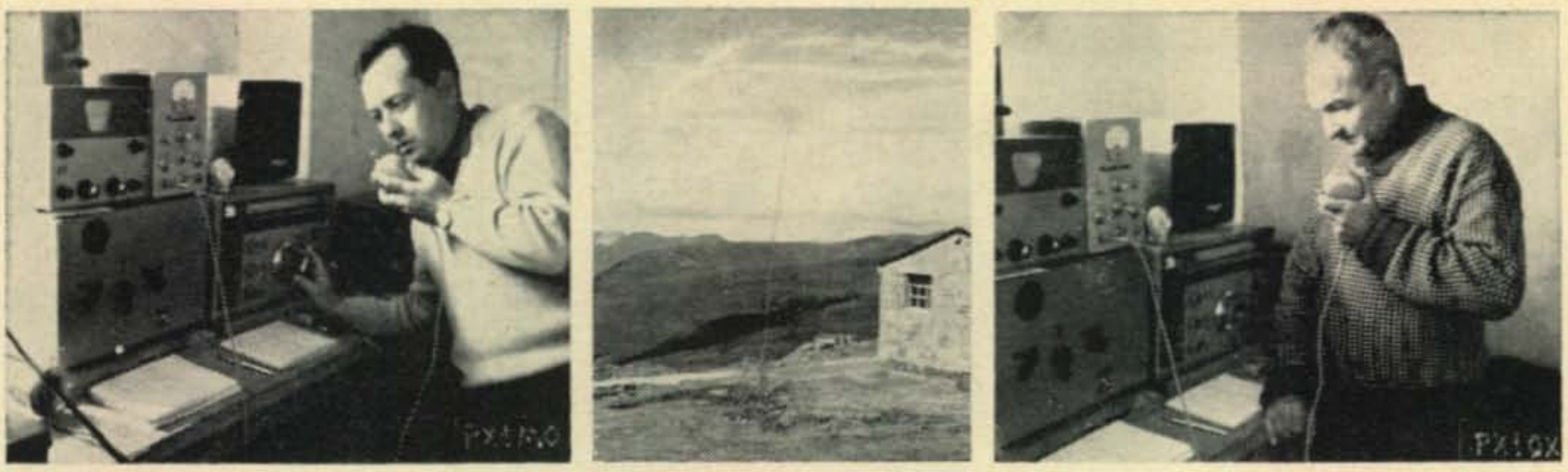
76	VK2DI	Gordon F. Cole
77	G2BOZ	John Edward Bazley

AMATEUR Radio in Hong Kong and in the entire world of DX lost a well-known and well-respected figure on the 30th of September, 1963 when Patrick Jerome O'Brien, VS6AE died on his 60th birthday in St. Paul's Hospital, Hong Kong. Only until a few days before his death he was apparently in normal health and on the air regularly as has been his custom for many years. Pat was first licensed in 1925 with the call sign AC1PA; later from 1929 he operated under the call VS6AE apart from a short spell in 1934 when he was XU1B. It is, however, as VS6AE that he has become a notable figure in Amateur Radio circles, not only in Hong Kong and the Far East but also throughout the world. He has given a great many years of service to the Hong Kong Amateur Radio Transmitting Society, as founder member, President, Secretary, Treasurer and Council Member over many years. He was also very much concerned with the pre-war publication of the Hong Kong Amateur Radio Magazine *DX*.

He will be sadly missed by his many friends in Hong Kong and throughout the world for his unfailing cheerfulness, good humor and ever ready assistance to old timers and newcomers alike. Perhaps it would be fitting to end this

One of the most potent signals from all of Asia starts on its way from this shack. The ever-present CR9AH dishes them out on c.w., a.m. or s.s.b. Shown visiting John is Don, HL9KH of KG6ID and W9WNV/KG6R fame *(Tnx HL9KH)*

*Box 35, Hazlet, New Jersey 07730



The site, antenna and operators of the recent PX1MO, PX1QX DXpedition to Andorra. F2MO is at the left and F2QX at the right.

tribute to Pat with an extract which he himself quoted in his article, "Through the Years to the birth of Amateur Radio in Hong Kong" and which in turn was taken from the pre-war Hong Kong Amateur Magazine *DX*.

"Only the Master shall praise us, and
Only the Master shall blame
No one shall work for money, and
No one shall work for fame;
But each in the joy of living, and
Each in his own true way,
Shall do the things as he sees it for
The God of things that they are."

Our sympathies are extended to his sister and family in Hong Kong.

Pierre, FM7WQ, through his QSL Manager Joe, W4OPM, (Route 1, Box 152, Bayside, Va.) advises his antenna was lost in Hurricane Edith and his rig was inundated in the resultant flood; therefore, he is off the air. Pierre and Joe will welcome any help toward re-activating this rare station that has helped many DXers. Joe, W4OPM, will act for Pierre in coordinating any contributions. The above address is correct but the *Callbook* address is *not*.

Some time ago, I announced that I keep a large file of QTHs and QSL Managers and would be pleased to furnish assistance whenever possible. This offer still stands and an s.a.s.e. or s.a. post card will bring the information if it is contained in our file.

At one time, there was only a handful of QSL Managers and they could almost be committed to memory; however, their number has risen to an amazing level. In an effort to provide a ready reference, a list of QSL Managers is presented below. This is a selected list of stations which are presently active or have recently been active. Every effort has been made to keep this list accurate but any corrections or additions will be most graciously received.

When applying for a card from a QSL Manager include a self-addressed, stamped envelope and use GMT at *all times*. A note with a few kind words would also be very welcome.

This neat, completely home-brew station has worked over 200 countries for Andy, SP9ADU. Andy has been QRV since 1959. *(Tnx K2UKQ)*

QTH and QSL Managers

AC3PT via W4ECI.
AC5A/AC4 via W4ECI.
AC5A via W4ECI.
AC5PN via W8PQQ.
AC7A via W4ECI.
AP2AR via W8QWI.
AP5GB via W4ECI.
CEØZI via W4QVJ.
CN2BK via W2CTN.
CN8EU via W6EDU.
CN8GB via W2CTN.
CN8MB via K4VUR.
CP5EL via W1BAN.
CP5EZ via W2CTN.
CR6CA via K4ICA.
CR7CI W/K *only* via K9GZK.
CR7IZ via K2HQJ.
CR8AB via W4QCW.
CR9AH via W7ZAS.
CT2AH via K8RTW.
CT3AV via W3KVQ.
DL5CR via W5ADZ.
DL5QA via W1YIS.
DU1JC via W6ZJY.
DU1VQ via W6ZJY.
EA8BA via W4MXL.
EI8P via W4OPM.
EL3A via W3NNC.
EP2RC via K1KOM.
EP2RV via G5RV.
ET3FW via K3HQJ.
ET3JK via K3HQJ.
ET3LM now W7KMF.
ET3PP via K4QDC.
ET3RC via K1KOM.
ET3RS via W2JXH.
FA3CT via W2CTN.
FA9UO via K4TWF.
FB8YY via F9AH.
F9RY/FC via HB9TL.
F9UC/FC via DL9PF.
FG7XJ via W2CTN.
FG7XT via K5AWR.
FH8CE via W4ECI.
FK8AU via VK3AHO.
FK8AW via W2CTN.
FL5A via W4ECI.
FM7WQ via W4OPM.
FO8AN via W8EWS.
FP8AS via W2EQS.
FP8BD via VO1FB.
FP8BR via K1MOD.
FP8BX via W1RAN.
FP8CA via K2OJD.
FP8CB via WA2WBH.
FP8CD via K2UTN.
FP8DC via W1ISO.
FS7GS via K9KDI.
FU8AF via W6UOU.
FU8AG via K7GGN.
FW8BH via W4ANE.
FW8DW via W8EWS.
FY7AA via K4KYB.
FY7YE via W5JLU.
FY7YI via W4JQM *(s.s.b.)*.
FY7YI via W3AYD *(other)*.
GB3RAF via G2BVN.
GC8KS via G8KS.
GI3OQR via ISWL or RSGB.
GW2DUR via KØRDP.
GW3DUR via K2LTI.
HC1LE via W2MUM.
HC5CN via K8TBR.
HC5RG via K8TBR.
HH2CE via K8TBR.
HH2OT via KØGZN.
HH2P via KØRDP.
HI8CLU via K4BMS.
HI8JES via WA4AYX.
HI8MMN via W2CTN.
HI8XAA via W8NWO.
HI8XAG via W2CTN.
HI8DGC via W8UMR.
HK1QQ via W4DQS.
HK3RQ via W2CTN.
HKØAB via W4DQS.
HKØZU via W4BJ.
HL5X via W6ZY.
HL9KH via W9VZP.
HL9KN via W3MVK.
HM1AP via K6QPG.
HM4AQ via W8BF.
HM5BF via W5VA.
HP1IE via W2CTN.
HR2FG via W2CTN.
HR3JW via K3COW.
HS1L via W7YB.
HS1P via W4CKB.
JA5FQ via WA6PMK.
JY2NZK via HB9PL.
JZØHW via W6DLN.
K8ETO/KL7 via W8FMJ.
K8YUW/KJ6 via K8YUW.
KC4AAB via W9LGR.
KC4AAC via K4MRT.
KC4AAD via WØBAT.
KC6BO via W4YHD.

KC6PE via W9SFR.
KG4AM via W2CTN
KG4BX via W2CTN.
KG6ID via W9VZP.
KG6SX via KH6FBJ.
KG6SZ via VE7ZM.
KH6PD/KG6 via W2VCZ
KJ6CA via KH6DOX
KP4BCL via W9AQW
WA6CJL/KP6 via W6AFI.
KR6LY via K5PSO.
KS4BF via W4DQS.
KS6AM via W1BYH.
KV4CI via W2CTN.
KV4CM via WØGEK.
KZ5LC via W2CTN.
KZ5MQ via K5VTA.
LA9RG/P via LA8LF.
LU8XH via LU4DHR.
LX3KP via W2CTN.
LX3MA via DL4US.
LX3QX via ON4QX.
LX3TA via DL1TA *or* DARC.
M1SVZ via I1SVZ.
M1ZDP via W7ZDP.
MP4BDD via W2JXH.
MP4QAQ via W2JXH.
MP4QBB via K4TJL.
MP4TAI via W2JXH.
MP4TAM via MP4TAC.
MP4TAO via DJ1BZ.
OX3JV via SM7ACB.
PJ2AF via K4OGT.
PJ3AR via KØRDP.
PJ5CG via KØGZN.
PJ5CG/B via KØGZN.
PJ5CH via KØGZO.
PJ5CH/B via KØGZO.
PJ5MB via K9KDI.
PJ5MC via W2ZQ.
PJ5ME via W1JYH.
PJ5MF via VE6TP.
PX1BE via PAØBEA.
PX1FO via W2CTN.
PX1HX via F8HX.
PX1IK via HB9KU.
PX1OK via HB9DX.
PX1KK via K2JFV.
PX1MO via K2JFV.
PX1OAC via F7OAC.
PX1OX via DL2OX.
PX1VW via F9VW.
PY1MCC via WA6UZA.
PZ1AX via W2CTN.
PZ1BH via WA6SBO.
PZ1CE via W1NTH.
SP6FZ via W2JWK.
SVØWQ via W4YWX.
SVØWT via KØRDP.
SVØWZ via W7FTU.
TI2J via K5PSO.
TA2AR via PAØWWP.
TA2NK via DJ2NY.
TA4RZ via K4WIS.
TC3ZA via W2JXH.
TF2WFX via K4IUV.
TF2WHB via K4MQD.
TF2WHT via K9RNQ.
TF2WIG via K9RNQ.
TG5FJ via K2DDK.
TG6PB via WA4AYX.
TG9AL via W2CTN.
TI2CME via W2CTN.
TI2J via K5PSO.
TI2WA via K9TZH.
TI9RC via W4ECI.
TL8AC via W8KML.
TL8SW via W4YWX.
TN8AM via W2CTN.
TT8AG via W3KVQ.
TT8AJ via K2UYA.
TU2AL via W3KVQ.
VE8MZ via KØRDP.
VK2VC/LH via W4ZRZ.
VK4JQ via W6HYG (Willis Is.).
VK8TB via W8DPF.
VK9NT via W2CTN.
VK9GK via W2CTN.
VK9GP via VK3AOM.
VK9PC via WØAKR.
VKØVK via KTQXG.
VP1WS via K8ONV.
VP2AC via VE6BY.
VP2AL via K4LRA.
VP2AP via W5NOP.
VP2AR via W3KVQ.
VP2AV via W2CTN.
VP2CC/C via W8EWS.
VP2DA via W3AYD.
VP2DU via W3AYD.
VP2GAA via W4OPM.
VP2GAC via W4OPM.
VP2GAQ via K9UTI.
VP2KJ via W4SSU.
VP2LD via W2CTN.
VP2LS via K8ONV.
VP2MB via W4CKB.
VP2MC via W/VE W4OPM. DX G8KS.
VP2ML via K8ONV.
VP2MM via K8ONV.
VP2MZ via W2ZMT.
VP2SL via K4LRA.
VP2SM via WA4AYX.
VP2SQ via K3COW.
VP2SY via K2MRB.
VP2VH via W2YTH.
VP2VS via VE6TP.
VP3YG via G2BVN.
VP4BY via VE6BY.
VP5AH via K4UFE.
VP5BB via W3MRR.
VP5BP via VE3CJ.
VP5LG via K4UTE.
VP6LJ via W2CTN.
VP6PV via W2CTN.
VP6WD via W4OPM.
VP6WR via W9JFJ.
VP6ZX via W9JFJ.
VP7BC via W4CNS.
VP7BP via W2CTN.
VP7CT via W3LBJ.
VP8AI via W2CTN.
VP8BP via G8FC.
VP8GQ via W5QK.
VP8GB via W5QK.
VP8HE via GM3JDX.
VPØGAC via W8EWS.
VQ2AB via W6ZAF.
VQ2EW via W2CTN.
VQ2WM via W2CTN.
VQ4ERR via KØLFY.
VQ4RF via W4MCM.
VQ8AM via W8EWB.
VQ8BFA via G8KS.
VQ9A via W4ECI.
VQ9AA via W4ECI.
VQ9AC via WA2WFW.
VQ9HD via G3PEK.
VR1G via W6BSY.
VR1H via VR2EH.
VR1M W/K via W1HGT. DX via GW3LQP.
VR1Z via VE7ZM.
VR2EA via G3JFF.
VR2EK via W6AL.
VR4CU via W6UOU.
VR4CV via K6EC.
VR5AA via W9ADN.
VR5AR via W9EXE.
VS1GZ via W4YWX.
VS1JV via W6BAF.
VS9AAC via W3KVQ.
VS9ADV/P/4W1 via VS9AAA.
VS9ALD/P/4W1 via W9JJF.
VS9APH via W3HQO.
VS9ASS via W4ECI.
VS9KDV via W4ECI.
VS9PHH via W2CTN.
VU2JA via W4YWX.
VU2JA via W2CTN.
VU2LNZ via W2ODZ.
VU2NR via WØZSZ.
VU2RM via W3KVQ.
VU2SO via W8QNW.
W4BPD/4W1 via W4ECI.
XT2Z via HB9ZY.
XW8AL via K4KTR.
XW8AM via W2JXH.
ex-XW8AS via KH6FBJ.
XZ2SY via W4ANE.
YA1AN via DL3AR.
YA1AO via DL6YI.
YA1AW via K5YYP.
YI2WS via SM5CCE.
YJ1RH via W4ANE.
YN1TAT via KØRDP.
YN3KM via K1KDP.
YNØKVC via K4KCV.
YNØNWO via W8NWO.
ZB1BX via W2CTN.
ZB1HC via W4MS.
ZB2AD via W3AYD.
ZD1A via VE7ZM.

As one of the first ON5 stations, Willy, ON5AX, was kept very busy by the prefix hunters. The wallpaper shows that he has since done very well with working DX himself. He is ex-DL2ON and one of the operators of the LX3AA DXpedition. *(Tnx K2UKQ)*

ZD1CM via W3KVQ.
ZD1S via K8MTI.
ZD3P via G2BVN.
ZD6HK via W3ELW.
ZD6OL via G3JUL.
ZD7BW via G3PEU.
ZD8DW via W5SWX.
ZD8WF via W3PN.
ZE1JE via W6YMV.
ZD4JN via W5RHW.
ZE5JJ via W6BAF.
ZK1AR via K4LRA.
ZK1BS via W7ZAS.
ZK1BY via W8EWS.
ZK1PK via W2CTN.
ZK2AB via W6ZEN.
ZK2AD via W9GFF.
ZL1ABZ via ZL2GX.
ZM6AB via K8RTW.
ZM6AW via W8EWS.
ZP5CN via K4RSM.
ZS2GF via W1BPM.
ZS2MI via ZS1OU.
ZS3E via K4PUS.
ZS3EW via W2CTN.
ZS3LW via W1BPM.
ZS4PB/ZS9 via W8SMQ.
ZS7M via W2CTN.
ZS1RM/8 via K2QXG.
3A2BW via W4ECI.
3A2BZ via DL9KP.
3A2CZ via ON4QX.
3A2DA via HB9AAW.
3V8CA via W4YWX.
4S7WP via W2KVQ.
4X4DK via WA2KNC.
4X4IX via WA2KNC
5A3TR via W3ZZE.
5A4TC via W2CTN.
5A4TH via K5ODD.
5B4CZ via W2CTN.
5B4TC via W2CTN.
5H3BJ via W7PHO.
5H3HH via W2CTN.
5H3HV via W2CTN.
5N2ACB via W2CTN.
5N2JKO via W4MCM.
5N2NFS via K9QIZ.
5N2PJB via W7VEU.
5N2RSB via K3MNJ.
5R8AD via W8QNW.
5R8CJ via W6BAF.
5U7AC via W9RKP.
5U7AH via K9EAB.
5X5IG via W2CTN.
6O1KH via OE1SJ.
6W8BQ via W9RKP.
6YABL via W3AYD.
6YAMJ via KØTYO.
7X2VX via W4UWC.
9A1TAI via W4VPD.
9G1BQ via W2CTN.
9G1CY via K1EJO.
9G1DE via K8IQQ.
9G1DN via VE4IM.
9G1DT via W4HUE
9G1DZ via WØEQN
9G1EF via W4HUE.
9G1EO via VE4OX.
9G1GN via VE4OX.
9K2AM via W3KVQ.
9K2AQ via G3FJU.
9L1GM via W3BYX.
9L1JC via WA4CXR.
9M2AF via W8DPF.
9M2GV via W7EMU.
9N1MM via W3KVQ.
9Q5AAA via W2HMJ.
9Q5AB via W2HMJ.
9Q5GE via W8WBT.
9Q5PW via HB9GX.
9Q5RK via LX1RK.
9Q5TJ via DJ4OP.
9Q5YM via W8TMA.
9U5JF via VE3DGX.
9U5JH via W4YWX.
9U5ZZ via W4ECI.

[*Continued on page 86*]

It looks like Our Man "Gus" has already been to this spot as Coca Cola is well represented at this DXCC transmitting station. The location of this station is actually the Philippine Islands.

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during December, 1963. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (December 4, 26 and 31), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be disturbed, etc.

PREDICTED DAY-TO-DAY PROPAGATION CONDITIONS AND CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating higher than 6)* 4, 26, 31	*Normal Days (WWV rating 5-6)* 1-3, 5-7, 9, 11-12, 17-18, 21, 23-25, 27-30	*Below Normal Days (WWV rating 4)* 8, 10, 13 16, 19, 22	*Disturbed Days (WWV rating less than 4)* 14-15, 20
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—is an excellent opening with strong steady signals.
B—is a good opening, moderately strong signals, with little fading and noise.
C—is a fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.
D—is a poor opening, signals generally weak, with considerable fading and high noise level.
E—is a very poor opening, or none at all.

EXCEPT for an occasional opening on some north-south paths during the daylight hours, propagation conditions are not expected to support 10 meter DX openings during December. Fifteen meters is expected to open to most areas of the world during the daylight and early evening hours, but openings are expected to be considerably less numerous than during previous years of higher solar activity. Twenty meters is likely to be the optimum band for DX during the daylight and early evening hours. Fairly good openings are predicted to most areas of the world from sunrise until a few hours after sunset.

With static levels at seasonally low values, and the hours of darkness at a maximum in the northern hemisphere during December, a considerable improvement in DX propagation conditions is expected on 40, 80 and 160 meters. The 40 meter band should open for DX during the early afternoon hours, and remain open to one area of the world or another during the hours of darkness and the early daylight hours. Frequent 80 meter DX openings, often with exceptionally strong signals, are forecast to many areas of the world during the hours of darkness. DX conditions on 160 meters are expected to be still better this winter than during the record breaking conditions of last year. DX openings on this band are predicted to many areas of the world during the hours of darkness.

11307 Clara Street, Silver Spring, Md. 20902

VHF Ionospheric Openings

Geminids, a major meteor shower, is scheduled to take place during the second week of December. It is possible that short-skip v.h.f. openings up to distances of approximately 1000 miles may take place as a result of ionization produced by the meteors as they enter the earth's atmosphere.

V.h.f. ionospheric openings over several hundred miles are also likely to occur during periods of auroral displays or ionospheric storminess. Check the "Last Minute Forecast" appearing at the beginning of this column for those days that are expected to be "disturbed" or "below normal."

Sporadic-*E* propagation often reaches a minor seasonal peak during December (the major peak occurs during the early summer months). This should result in a number of short-skip openings, between distances of approximately 800 and 1400 miles, on 10 and 6 meters.

Sunspot Cycle

A smoothed sunspot number of 16 is predicted for December, 1963. This is about the same level of sunspot activity which occurred last during December, 1953.

73 and Season's Greetings,W3ASK

Propagation Forecasts begin on the following page.

DECEMBER 1963 & JANUARY 1964

Time Zone: EST (24-hour Time)

EASTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	08-11 (1)* 07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-14 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-16 (1)	15-17 (1) 17-18 (2) 18-23 (3) 23-00 (2) 00-03 (2) 03-05 (1)	18-20 (1) 20-23 (2) 23-03 (3) 03-04 (1) 20-00 (1)† 00-02 (2)† 02-03 (1)†
Eastern Europe & European USSR	07-08 (1) 08-10 (1) 10-13 (1)	06-07 (1) 07-10 (2) 10-15 (1)	17-03 (1)	19-02 (1) 21-01 (1)†
North Africa & Southern Europe	08-12 (1)* 07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-14 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (3) 13-14 (2) 14-16 (1)	15-17 (1) 17-18 (2) 18-19 (3) 19-22 (4) 22-01 (3) 01-02 (2) 02-05 (1)	17-19 (1) 19-20 (2) 20-23 (3) 23-00 (2) 00-01 (1) 19-01 (1)†
South Africa	09-13 (1)* 06-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	18-19 (1) 19-21 (2) 21-00 (1)	19-22 (1) 19-22 (1)†
Eastern Mediterranean	07-08 (1) 08-10 (2) 10-12 (1)	07-08 (1) 08-11 (2) 11-15 (1)	19-00 (1)	20-23 (1)
Central Asia	07-10 (1) 18-20 (1)	07-09 (1) 18-21 (1)	06-08 (1) 19-22 (1)	*NIL*
Southeast Asia	08-11 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-12 (1) 18-21 (1)	06-08 (1) 17-20 (1)	*NIL*
Far East	17-21 (1)	06-09 (1) 18-21 (1)	05-08 (1)	*NIL*
Pacific Islands & New Zealand	13-17 (1)* 07-12 (1) 12-16 (2) 16-19 (1)	03-07 (1) 07-10 (2) 10-13 (1) 18-21 (1)	01-02 (1) 02-04 (2) 04-07 (3) 07-08 (2) 08-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)†
Australia	16-19 (1)* 09-12 (1) 15-17 (1) 17-19 (2) 19-21 (1)	06-07 (1) 07-09 (2) 09-15 (1)	04-06 (1) 06-08 (2) 08-09 (1)	05-08 (1) 05-07 (1)†
South America	07-11 (1)* 11-15 (2)* 15-17 (1)* 06-07 (1) 07-14 (2) 14-16 (4) 16-17 (2) 17-19 (1)	06-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-01 (2) 01-06 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (2) 04-07 (1)	19-21 (1) 21-02 (2) 02-05 (1) 21-04 (1)†
McMurdo Sound, Antarctica	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1)	06-07 (1) 07-08 (2) 08-12 (1) 17-19 (1) 19-22 (2) 22-04 (1)	23-07 (1)	*NIL*

Time Zones: CST & MST (24-Hour Time)

CENTRAL USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	07-09 (1) 09-11 (2) 11-13 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-16 (1)	15-17 (1) 17-23 (2) 23-03 (1)	17-19 (1) 19-21 (2) 21-02 (1) 20-01 (1)†
Eastern Europe & European USSR	07-12 (1)	07-08 (1) 08-10 (2) 10-13 (1)	18-01 (1)	20-00 (1) 21-23 (1)†
North Africa & Southern Europe	08-11 (1)* 07-09 (1) 09-11 (2) 11-14 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-17 (1)	15-17 (1) 17-18 (2) 18-23 (3) 23-01 (2) 01-03 (1)	17-19 (1) 19-22 (2) 22-01 (1) 18-00 (1)†
Central & Southern Africa	09-13 (1)* 07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	08-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-21 (1)	18-20 (1) 20-22 (2) 22-00 (1)	19-22 (1) 19-22 (1)†
Eastern Mediterranean	07-11 (1)	07-09 (1) 09-11 (2) 11-15 (1)	18-23 (1)	20-22 (1)
Central Asia	07-10 (1) 19-21 (1)	07-09 (1) 19-21 (1)	06-08 (1) 19-21 (1)	*NIL*
Southeast Asia	09-12 (1) 17-20 (1)	07-09 (2) 09-12 (1) 17-20 (1)	06-08 (1) 17-19 (1)	*NIL*
Far East	16-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-20 (1)	03-09 (1)	04-07 (1)
Pacific Islands & New Zealand	13-17 (1)* 09-11 (1) 11-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	17-19 (1) 19-22 (2) 22-07 (1) 07-09 (2) 09-12 (1)	23-01 (1) 01-06 (3) 06-07 (2) 07-09 (1)	00-01 (1) 01-06 (2) 06-08 (1) 03-07 (1)†
Australia	14-18 (1)* 08-14 (1) 14-17 (2) 17-20 (1)	06-08 (1) 08-10 (2) 10-15 (1) 19-21 (1)	01-03 (1) 03-07 (3) 07-08 (2) 08-09 (1)	03-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)†
South America	07-11 (1)* 11-14 (2)* 14-17 (1)* 06-08 (1) 08-12 (2) 12-16 (4) 16-18 (2) 18-20 (1)	06-08 (2) 08-13 (1) 13-15 (2) 15-18 (4) 18-01 (2) 01-06 (1)	18-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-06 (1)	20-23 (1) 23-02 (2) 02-04 (1) 23-03 (1)†
McMurdo Sound, Antarctica	06-07 (1) 07-09 (2) 09-12 (1) 16-18 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-19 (1) 19-21 (2) 21-04 (1)	00-06 (1)	*NIL*

Time Zone: PST (24-Hour Time)

WESTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	06-07 (1) 07-09 (2) 09-11 (1)	05-07 (1) 07-10 (2) 10-12 (1)	16-00 (1)	18-23 (1) 19-22 (1)†
Eastern Europe & European USSR	07-09 (1)	06-08 (1) 08-10 (2) 10-13 (1)	17-00 (1)	19-23 (1)

[*Forecast continued on page 88*]

Forecast Ratings

The numerical rating appearing in parenthesis following each predicted time of band opening indicates the *total* number of days during each month of the forecast period that the opening is expected to occur, as follows:

(1) Less than 7 days
(2) Between 8 and 13 days
(3) Between 14 and 22 days
(4) More than 22 days

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

The *CQ* DX Propagation Charts are based upon a double-sideband effective radiated power of 600 watts, a single-sideband e.r.p. of 300 watts, and a c.w. e.r.p. of 150 watts, at antenna radiation angles less than thirty degrees. The Eastern USA Chart can be used in the 1, 2, 3, 4 and 8 amateur call areas; the Central USA Chart in the 5, 9 and Ø areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid through January 31, 1964. Propagation information contained in these Charts is derived from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

*Predicted 10 meter openings, all others in column are 15 meter openings.

†Predicted 160 meter openings, all others in column are 80 meter openings.

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

December	7-8	OK DX C.W.
December	14-16	Virginia Party
January	4-5	ARRL VHF SS
January	11-12	ARRL CD C.W.
January	18-19	ARRL CD Phone
January	25-26	*CQ* WW 160
January	25-27	New Mexico Party
February	8-9	ARRL DX Phone
February	15-16	QCWA Party
February	15-16	B E R U
February	22-23	ARRL DX C.W.

ANTICIPATED CALENDAR OF EVENTS

*January	4-5	ARRL V.H.F. SS
*January	11-12	ARRL CD C.W.
*January	18-19	ARRL CD Phone
*January	25-26	*CQ* W W 160
*January	25-27	New Mexico Party
February	1-2	OPEN DATE
*February	8-9	ARRL DX Phone
*February	15-16	QCWA Party
*February	15-16	B E R U
*February	22-23	ARRL DX C.W.
Feb. 29 - Mar. 1		YL/OM Phone
*March	7-8	ARRL DX Phone
March	14-15	YL/OM C.W.
*March	21-22	ARRL DX C.W.
March	23	Pakistan DX
March	28-29	R E F C.W.
April	4-5	PZK C.W.
April	4-5	Helvetia 22
*April	11-12	*CQ* WW DX SSB
*April	11-12	ARRL CD C.W.
*April	18-19	ARRL CD Phone
April	18-19	P Z K Phone
April	18-19	R E F Phone
April	25-26	PACC C.W.
May	2-3	PACC Phone
May	2-3	*CQ* Spring V.H.F.
May	2-3	USSR DX C.W.
May	9-10	OZ CCA C.W.
May	16-17	OZ CCA Phone
May	23-24	OPEN DATE
May	30-31	CHC/HTH Party
June	6-7	National Field Day
June	6-7	ARRL V.H.F. Party
*June	27-28	ARRL Field Day

*Officially announced date. All others unofficial.

OK DX C.W.

Starts: 0000 GMT Sunday, December 8
Ends: 2400 GMT Sunday, December 8

The above times and date are based on last year's information. We have not heard from the Central Radio Club at this writing—middle of October.

This information is passed along assuming that no changes have been made from last year. It was a world wide c.w. contest, each contact 3 points, with Czech contacts worth 6 points. The multiplier was based on the number of continents, *not* countries, worked on each band. You were limited to 12 hours out of the 24 hour contest period.

If you are really interested you can check back to our CALENDAR in the November, 1962 issue, or write to the Central Radio Club, P. O. Box 69, Prague 1, Czechoslovakia. Maybe you will have better luck than I did in getting information out of them.

Virginia Party

Starts: 1500 GMT Saturday, December 14
Ends: 0300 GMT Monday, December 16

All amateurs are invited to participate in the Virginia QSO Party sponsored by the Roanoke Valley Amateur Radio Club.

EXCHANGE: *Virginia stations:* QSO number; RS/RST report and county. *All others:* QSO number; RS/RST report; state; province or country.

SCORING: *Virginia stations:* one point for each completed contact, including those with other Virginia stations. Multiplier is the total of Virginia counties, states, provinces and countries worked. *All others:* one point per contact and the multiplier is number of Virginia counties worked.

Final score therefore will be the total QSO points from all bands, times the multiplier.

AWARDS: The highest scoring station in each state, province and country will receive a certificate. Virginia stations will compete for 1st, 2nd, 3rd, 4th and 5th place certificates.

The same station can be worked once on each band. There is no time limit or power restrictions; and c.w. and phone will be considered as separate contests and separate logs must be submitted.

Besides competing for contest honors this also presents a fine opportunity for CHCers to earn credits toward the Old Dominion County Award, the Virginia Civil War Centennial Award and USA-CA.

Suggested frequencies to watch are: 3575, 3830, 3930, 7030, 7205, 7235, 14,070, 14,250 and 14,350 kc. (What about 21 and 28 mc?)

Logs must be in the hands of the Roanoke

*14 Sherwood Road, Stamford, Conn. 06905

ZK1AR, Trevor Ferguson and his cute little five year old harmonic. Trev was active during both week-ends of the contest, and he usually operates all bands.

Valley Amateur Radio Club, Box 2002, Roanoke, Virginia, no later than January 31st.

New Mexico Party

Starts: 1500 GMT Saturday January 25
Ends: 0300 GMT Monday, January 27

This is the 5th annual New Mexico QSO Party sponsored by the Certificate Hunters Club Chapter 1 of New Mexico.

EXCHANGE: *New Mexico stations:* QSO number; RS/RST report and county. *All others:* QSO number; RS/RST report and state, U.S. possession, Canadian province or country.

SCORING: *New Mexico stations:* one point per contact and a multiplier of one for each state, possession, province or foreign country worked. *All others:* 3 points for each New Mexico station worked. The multiplier is determined by the number of different New Mexico counties worked.

AWARDS: A certificate to the highest scoring station in each of the above areas, plus a special certificate to the highest scoring station in the U.S.A. The New Mexico boys will be competing for 1st, 2nd, 3rd and 4th place certificates, gold trimmed, no less. There will be special awards for multi-operator groups.

There is no time limit or power restrictions. All bands can be used and the same station can be worked on each band for QSO credit. Phone and c.w. contacts with the same station on the same band count as two separate contacts.

Activity will be mostly concentrated on the following frequencies: 3600, 3835, 7030, 7250, 7215*, 14080, 14250, 14300*, 21050, 21300, 21430*, 28100, 28600* and 29000 kc. Also 50.28 mc. (*s.s.b. freqs.)

Mailing of logs must be postmarked no later than February 29th and they go to: CHC Chapter 1, New Mexico, c/o Willie Petty, W5LEF, 3107 Morningside Drive N.E., Albuquerque, New Mexico 87110.

CQ WW 160

Starts: 0200 GMT Saturday, January 25
9 P.M. EST Friday, January 24
Ends: 1400 GMT Sunday, January 27
9 A.M. EST Sunday, January 27

This is now an established world wide contest as proven by last year's participation. (See Aug. 1963 *CQ*)

1963 Helvetia 22 Results

World High		United States			
HB1ACC	159,460	W1KQF	2,475	W4HOS	148
OH2MK	9,006	W1WY	924	K7BVZ	12
W1KQF	2,475	W3MSR	840	K6ISQ	3
UA9DN	2,310	W8NAN	585	**Canada**	
		W2WZ	480	VE2NV	1,248
		W8JIN	216	VE2IL	36

With additional countries and states now permitted 160 operation, it is almost certain that last year's figures will be surpassed.

The lower power restrictions in this country will make it a little more difficult to work DX but the additional activity should make up this handicap.

Rules same as last year and are as follows:

1. This is a c.w. contest *only!*
2. For W/VE/VO stations: contacts with other W/VE/VO stations, 2 points per QSO. Contacts with other countries, 10 points per QSO.
3. For all other countries: 2 points per QSO with stations in the same country, 5 points per QSO with stations in other countries. Except for contacts with W/VE/VO stations, which will count 10 points.
4. For all stations: a multiplier of one (1) for each state, Canadian province or foreign country worked.
5. Final score: Total points, times the total multiplier.
6. Serial number; RST report plus a progressive contact number starting with 001 for the first contact. (W2EQS 579001 NJ)

Hawaii and Alaska will be considered as "foreign countries" for QSO and multiplier credit. And the District of Columbia will count same as Maryland.

Certificates to the Top station in each State, Canadian province and foreign country.

United States Operating Regulations for 160 meters may be obtained from *CQ* as an operating aid during the contest.

Your logs also available from *CQ* for a self-addressed stamped envelope, should be postmarked no later than February 17 and go to: *CQ*, Att: 160 Contest, 300 West 43rd Street, New York, N.Y. 10036.

Ed. Note

At this writing we are anticipating, with high expectations, the coming phone and c.w. week-ends of our world wide DX contest. But by the time you read this, it will be all over.

We have high hopes of high scores and record breaking returns. It's too late to do anything about improving your score but you sure can contribute to exceeding last year's returns by sending us your log. Let's make it a record year fellows.

As a closing reminder, may your Christmas holiday be a real happy one and may 1964 *bring* us continued peace and lots of choice DX.

73 for now, Frank, W1WY

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

THE National Aeronautics and Space Administration has announced recently that the long delayed launching of the ECHO II communications satellite will most likely take place during December, 1963.

ECHO II, called a passive communication satellite, is intended to act as an artificial reflector of radio waves high above the surface of the earth. The satellite is spherical in shape, with a diameter of 135 feet, and weighs about 500 pounds. ECHO II's outer surface is made of a combination of two layers of aluminum and one of mylar. This gives the satellite an extremely smooth surface, capable of reflecting v.h.f. and microwave signals with very little loss. The surface material is also considerably stronger than the material used in ECHO I, the first passive communication satellite which was launched by NASA in 1960. For this reason, ECHO II is expected to retain its shape for a relatively long period of time, perhaps on the order of several years.

NASA plans to launch ECHO II from the pacific missile range into a near-polar, circular orbit at an altitude of almost 800 miles. This means that ECHO II will pass over every area of the earth at least once a day, in a north-to-south orbit over the earth's two polar regions. From an altitude of 800 miles, it should be possible for the satellite to reflect v.h.f. and microwave radio signals over inter-continental distances.

Unlike such active communication satellites as RELAY and TELSTAR, there will be no communication relay equipment aboard ECHO II. High power stations on the ground will beam signals toward the satellite. Upon striking the satellite's surface, these signals will be reflected back to earth up to several thousand miles away. The only electronic equipment that will be aboard ECHO II are two low power beacon transmitters which will be used for tracking purposes. These transmitters are expected to operate on 136.02 and 136.17 mc.

Being a passive reflector, ECHO II will be available for use by any country. Under an agreement announced in the United Nations a year ago, the United States and Russia plan to cooperate in communication experiments using the satellite. These tests will take place on a frequency of about 162 mc. Many other countries are also expected to conduct communication experiments with the ECHO II satellite.

As reported on several occasions previously in this column, radio amateurs also plan to participate in ECHO II communication experiments. Such participation is being coordinated by the Office for Satellite Scatter Coordination (OSSC), and more detailed information concerning radio amateur participation can be received directly from Raphael Soifer, K2QBW, Director of OSSC, whose address is P.O. Box 308, New York City, N. Y. 10003.

The main purpose of the ECHO II project is to determine the practicality of using large artificial reflectors for radio signals high in space.

[*Continued on page 96*]

*11307 Clara Street, Silver Spring, Md. 20902

CORRECTION

Due to a slight mixup it was reported last month that the countdown for Oscar III had begun. This is an error. We hope to report that it will start shortly; in the meantime watch this column for latest developments.

Conference building in Geneva, Switzerland where an international conference on space communications was held during October. Nearly 400 delegates from more than 65 countries participated in the conference, which allocated frequency bands for space communications. The conference agreed that radio amateurs may use space satellites in the band 144-146 mc for the amateur service subject to coordination with all national amateur organizations concerned and affected. More news on the results of the conference in next month's column.

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

THE first step in obtaining reciprocal licensing privileges is over. S. 920 was unanimously approved by the Senate on October 16th. It will now go to the House of Representatives for further inspection and we hope to report soon that approval by the Congress has been granted.

Congressman Oren Harris, of Arkansas is Chairman of the House Committee on Interstate and Foreign Commerce where the Bill has been forwarded for additional comments and action. Drop a line to Congressman Harris and to your own representative. By so doing, you'll be really helping a lot of good people, and at the same time, ham radio in general. How about it?

Questions

HX-20 Carrier Nulling—"I am experiencing a little difficulty in nulling the carrier on my HX-20. Any hints?"

Yes. This difficulty can easily be corrected by disassembling the carrier null trimmer capacitor and cleaning it thoroughly with chloraphene. Also, the carrier null should be set *after* the transmitter has thoroughly warmed up. For full carrier suppression you should wait at least 20 minutes. Simple.

Improper adjustment of the controls can contribute to poor operation in the HX-20. The anti-trip control is very important and should be adjusted properly. Since the HX-20 is fixed loaded, a mobile antenna's s.w.r. should be below 2 to 1 in all instances. This is called out in the manual. However, some set owners have the wrong idea that they can load it into *any* length of wire and it should operate properly and they sometimes get a little peeved when this does not happen. A standard light bulb cannot be used as a dummy load with the HX-20. A 50 ohm load is needed, such as Heath's HN-31. Thanks W8RTY and the Heath Company for the assist.

KWM-1 Modification—Thanks to Collins, here is some information you can use for modification of your KWM-1 to operate a linear amplifier and an external receiver.

In early production KWM-1's, there is an unused contact on relay K_1. This is normally grounded, and opens on transmit. Run a wire from this terminal to feed-through condenser, C_{168}. This then provides a terminal, #18 on P_5, to operate an external receiver. This point would connect to terminal 2 on the 75A-4 standby strip. A ground connection will also be necessary. Late production KWM-1's have this wire already installed.

To operate external relays for a linear amplifier, there are two methods: (A) For d.c. operation, run a wire from terminal 8 on TB_1 to an unused terminal on P_5. This provides a +260 volts in the transmit position. The relays should have at least 10,000 ohms resistance and have a 15,000 ohm 2 watt resistor in series. See the 399B-1 DX adapter schematic for coil hookup. The total current drain should not be more than about 10 ma.

(B) If a.c. relays are to be used, there is 110 v.a.c. available in the transmit position by using terminal 8 on P_1 of the a.c. supply and terminal 2 on either T_1 or T_2. These relays should be low current a.c. relays to prevent switching transients from causing the vox to chatter. When using this method, it is recommended that an interlock be provided to prevent the final amplifier from coming on with an open antenna circuit.

For a.l.c. operation of a linear, bring out a wire from pin 7 of V_{10}, 6AL5 rectifier to feed-through capacitor, C_{166}, which is terminal 17 on J_5.

Philco 2N1742 Transistor—Those of you who have been using the Philco MADT 2N1742 transistor for your v.h.f. work, better pick up a few from distributors while you can; Philco is going out of the transistor business.

S.S.B. for Viking I—"In what issue of *CQ* did information appear on modifying the Viking I for s.s.b.?"

See the October 1954 issue.

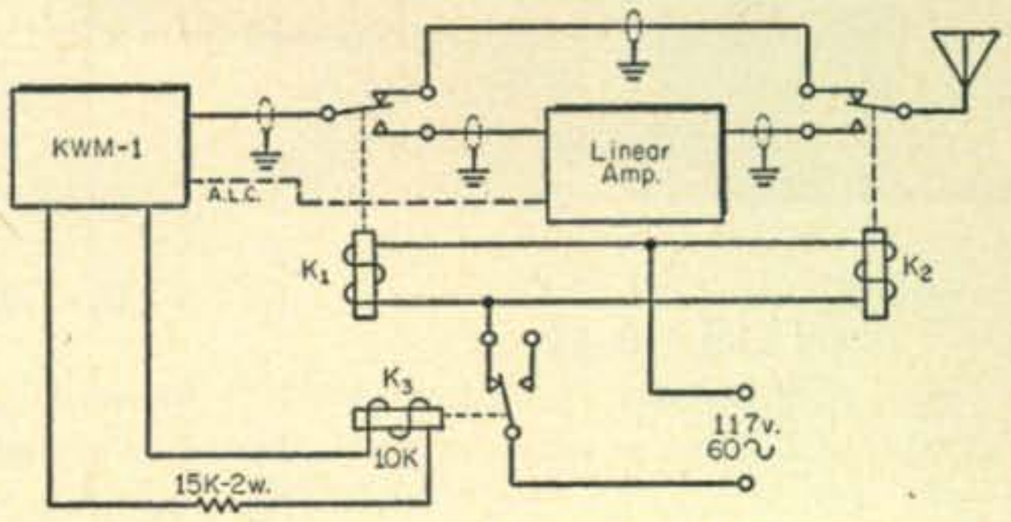


Fig. 1—Circuit of d.c. relay hookup when using the KWM-1 with a linear amplifier. Relays K_1 and K_2 are conventional 110 v.a.c. coaxial relays. Relay K_3 is any 10,000 ohm d.c. relay requiring 10 ma or less for pull-in.

*c/o *CQ*, 300 West 43rd St., New York, N.Y. 10036.

AF-67 to 6 Meters—"Where do I look for information on putting my AF-67 transmitter on 6 meters?"

October 1958 *CQ* page 38.

Allband Attic Antenna—"Being a 'cave dweller' in one of San Francisco's apartment buildings, I would like to go on the air using an 'attic' antenna. Any info on such a 'bird' been printed?"

Yes. Try the November 1958 *CQ*, page 96. Incidentally, contests are being won with such antennas.

Transistor Modulation—"I built up a four transistor transmitter which consists of a modulator, oscillator and final in class C. When I amplitude modulate the final, the pattern on my scope shows down-modulation. How come and what can I do?"

A class C transistor final stage when amplitude modulated will generally saturate. This saturation will lower the gain of the transistor and of course, down-modulation will be indicated. The way to solve the dilemma is to modulate both the oscillator and the final in your rig. Reduce your modulation to the final and try modulating the oscillator about 30%. With the rig crystal controlled, the f.m.'ing effects won't be too noticable. It would be better, though, if you used a buffer between oscillator and final, and modulate the buffer and final.

Hallicrafters SX-73—"When did the Hallicrafters SX-73 receiver come out, what is its military nomenclature and what is the present used price?"

The SX-73 came out in the latter part of 1952. Its military type is R-274/FRR and its current selling price on the used market will vary from $375 to $450, depending on condition.

S.S.B. Booklet & Book—"I am just returning to the hambands after 20 years absence. I understand that s.s.b. is the coming thing. Can you direct me to a book which will give me the real essential information?"

Sure. A booklet entitled *A First Primer Describing SSB* is available from TMC Canada Ltd. RR No. 5, Ottawa, Ontario Canada for $1.00 postpaid.

Transceiver Craze—"Why the craze for transceivers during the last couple of years? Goodness, most of the ads in ham mags are devoted to transceivers. Personally, I think a separate receiver and transmitter are best. What do you think?"

Well, each ham to his own taste. Most hams like the transceiver idea because the station becomes a neat, one-package setup. Then, too, having a transceiver enables one to operate portable more easily. The average ham likes on-frequency operation unless he is chasing DX. On the other hand, a two (or more) unit station is popular because it is more flexible operationally, *i.e.*, you can work cross-band or off-frequency. Personally, I like the transceiver idea for away-from-home operation and the two unit deal when I'm at home.

220 V.A.C. Equipment—"I live in Germany and like many other European hams I think US ham equipment is tops. However, we are discouraged from buying US equipment because in most cases it is designed for 110 v.a.c. 60 cycles. It seems that with international trade an important item on your President's list, that American manufacturers would use power transformers in their equipment which could be connected for 110 or 220 v.a.c. operation. What say about this?"

I agree 100%, for I am familiar with the problem myself. The addition of a few primary turns to a transformer would do wonders for foreign equipment sales, and the cost would not be high. No one likes to see external 220 v. to 110 v. transformers kicking around.

Combination A.F. and 100 Kc Oscillators—"Can you give me a diagram for a combination 1000 cycle a.f. oscillator which can also double as a 100 kc crystal controlled calibrator? It must be transistorized. If not, how about two separate circuits? I want to use them with my s.s.b. transceiver."

See figs. 2 and 3. I have built both of these oscillators and they work fine. Suggest you use 5% resistors (¼ watt) if available, in both circuits. The output of the a.f. oscillator can be switched into the mike position of your rig.

Thirty

This is the season when we review the year's accomplishments. We have answered many questions and have more to go. We want you to know that we appreciate your encouragement and your patience. As we have said so often before, we do not know it all, but we certainly do try to come up with the information you seek. Some of your questions take much time and research, others we have stored in "computer 9" (our brain!). We do wish you a very merry Christmas and a very happy and prosperous New Year. Do send that postcard to your Congressman asking his support for reciprocal operation.

72, 73 and 75 Chuck and Elfriede

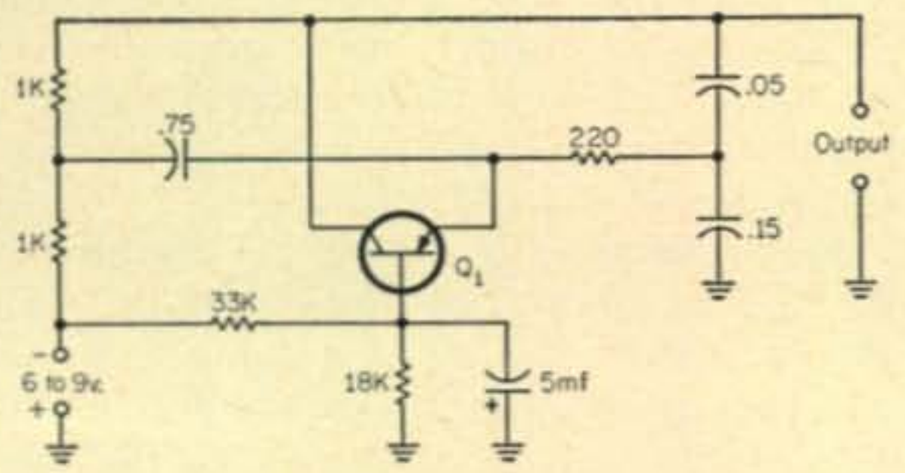


Fig. 2—Transistorized 1 kc oscillator. Q_1 may be a 2N1175, 2N632, 2N324 or 2N109.

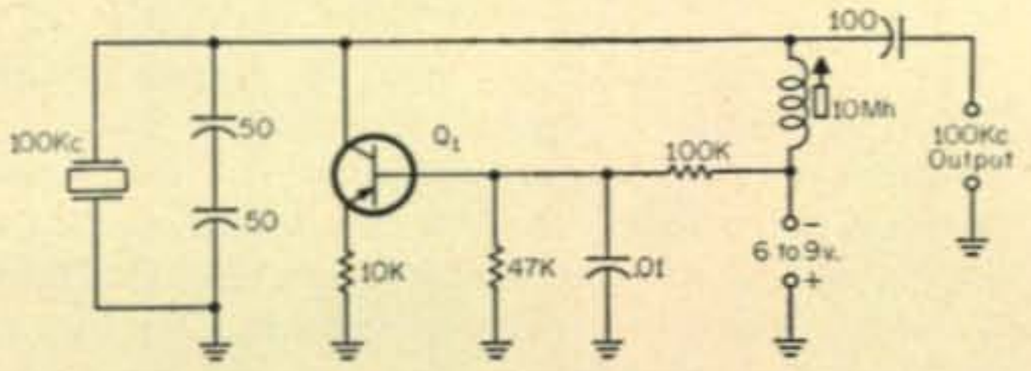
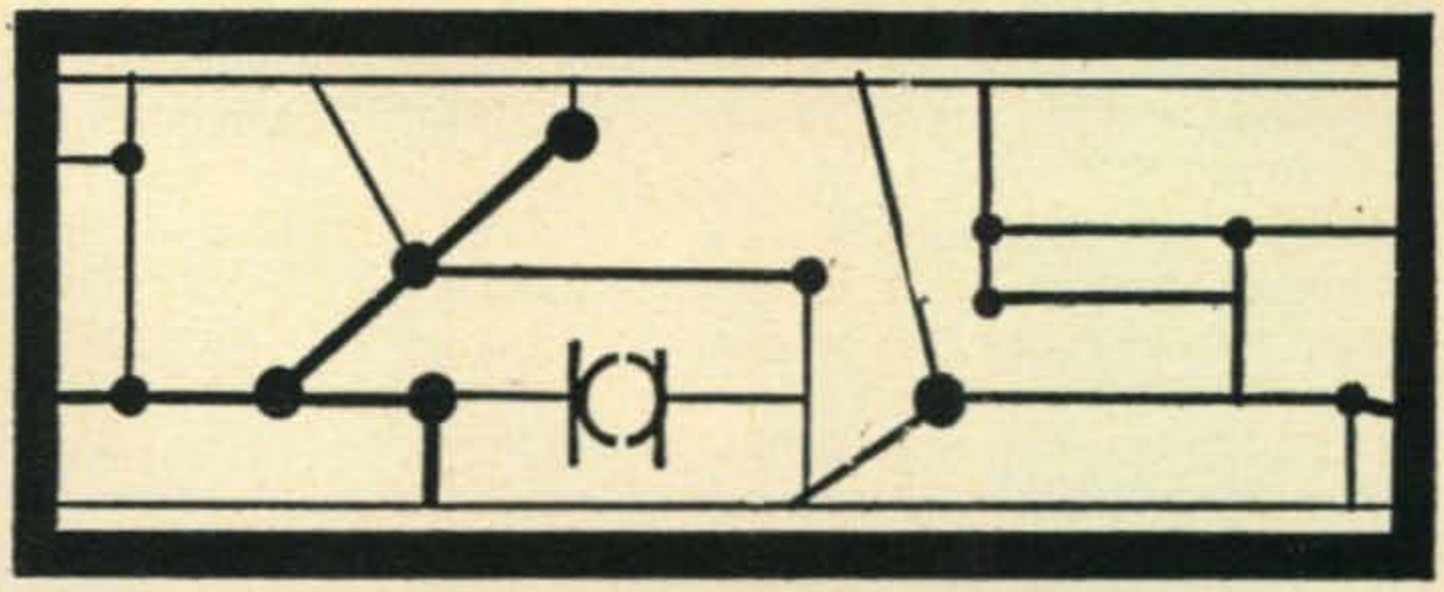


Fig. 3—Transistorized 100 kc crystal calibrator. Transistors used in fig. 2 may also be used for Q_1 in this circuit.

NOVICE



WALTER G. BURDINE*, W8ZCV

ONCE in a while, I get a letter saying that I shouldn't stress equipment building so much. In addition to making me out to be an old-timer, it supposedly marks me as working against the equipment manufacturers. Another complaint is that many new hams are unable to construct their own equipment. What a poor basis for writing a letter! What kind of ham would you be if you could not build even a simple transmitter? A receiver, of course, is more complicated, but nearly any ham should be able to build at least a simple one.

Let me go on record as saying I am *not* against your buying commercial equipment if you can afford it. But many of us can not buy equipment to set up a station, so we must build it. It sometimes costs almost as much to build your own as it does to buy commercial equipment, but you can buy your components as you go. You can usually build a kit cheaper than you could buy the parts alone and a kit makes a nicer looking and working piece of equipment. The resale value is higher than home constructed equipment, an important thing to remember when you start to assemble your station.

I have always heard that one of the reasons for the existance of amateur radio is that we represent a large backlog of experienced operators for national defense and that we formed a pool of potential engineering talent, badly needed at all times. Amateur radio operators are in the forefront of many important new developments in communications and electronics. If, however, we should become a bunch of operators that knew nothing about our equipment except how to flip the switch and make a contact, we surely would not fill any gap in operating or engineering.

Oscillators

One of the most useful circuits in any receiving or transmitting equipment is the oscillator. In a receiver, the oscillator is used to change a wide range of incoming signals to a single common frequency for various purposes. In all transmitters, the primary source of r.f. energy is the oscillator and in s.s.b. transmitters, the oscillator is used to assist in bringing the s.s.b. signal up to the desired frequency.

The variable oscillator uses tuned circuits in place of crystals to determine the operating frequency. In this way, by varying either the inductance or capacitance in the tuned circuit, the operating frequency can be varied. The frequency determining parts of a variable oscillator are normally affected and changed by temperature and vibration, and for this reason the variable oscillator is subject to drift and frequency instability.

If a flat crystal of quartz is squeezed or distorted mechanically, an electric potential will be developed across its two flat surfaces. The magnitude of this potential depends on how much mechanical force was applied. If, now, we apply an electric potential to a crystal which is not squeezed or distorted, it will change its physical shape or dimensions as long as the potential is applied. A greater potential produces a greater physical change.

If the potential applied to the crystal is turned on and then quickly turned off, the crystal will

[*Continued on page 84*]

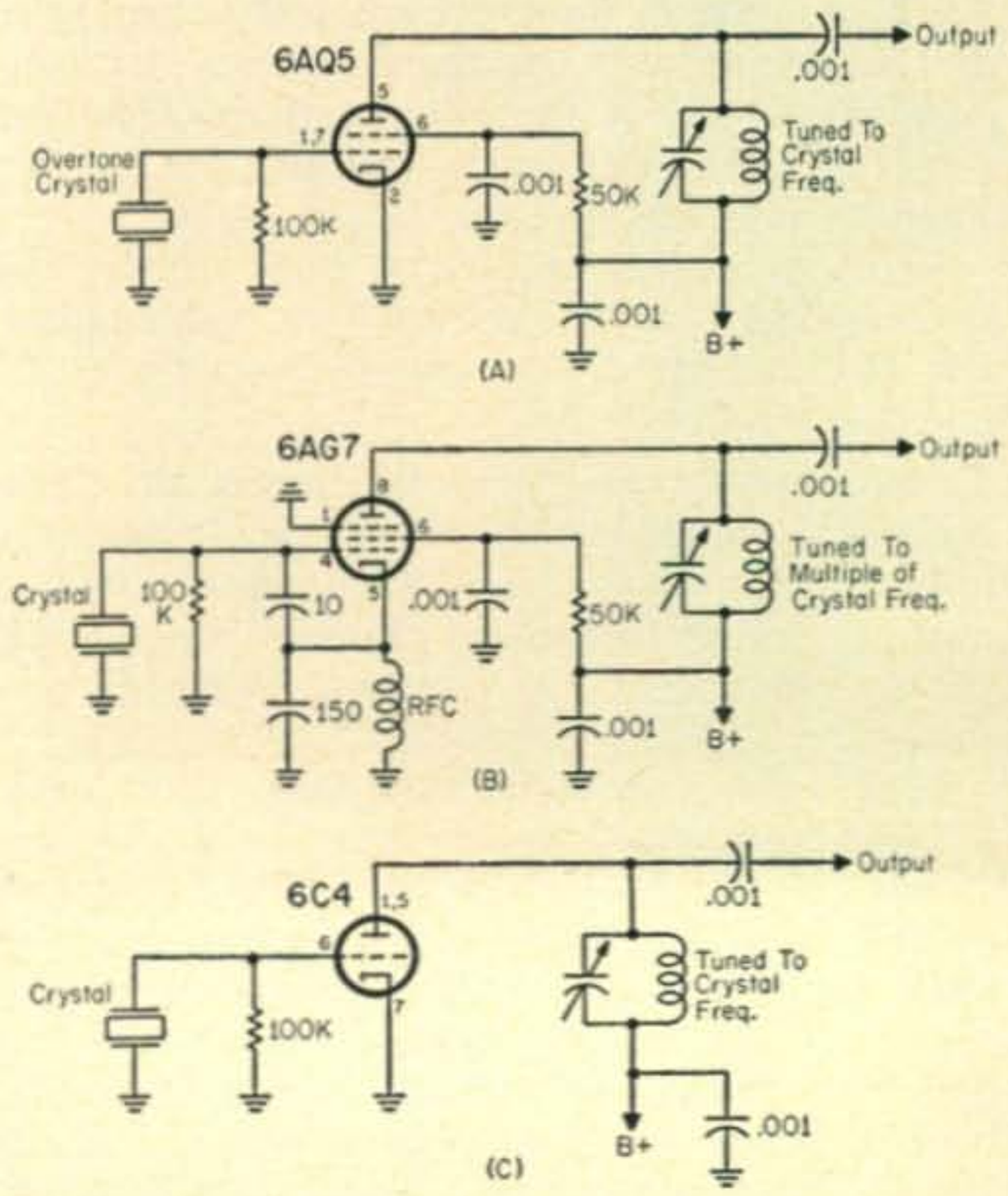


Fig. 1 (A) Conventional crystal oscillator using a tetrode, giving output at the crystal frequency. (B) An oscillator used to obtain output at some multiple of the crystal frequency. (C) A circuit often used in receiver applications and in v.h.f. converters.

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

the USA-CA PROGRAM

CLIF EVANS*, K6BX

LUCKY-Thirteen County Hunters bagged USA-CA-500 during the month of September. Several other seasoned hunters carried home USA-CA-1000 endorsement seals.

USA-CA HONOR ROLL

1000

KØHUU 15	K6BX 16	W8UMR 17

500

W9BJH 273	VP9AK 277	K4KWQ 282
W2FXA 274	K4CEF 278	VE3EUH 283
W4GYP 275	WØVFE 279	K9UCG 284
W4IZR 276	VK7SM 280	WA4KVM 285
	VK3RJ 281	

Of the above, W9BJH, YL, was all A3; W4GYP and VK3RJ were all c.w.; and rest were for mixed operations.

USA-CA Popularity

Popularity grows and grows as awards hunters awaken to the fact that participation in the USA-CA program materially contributes to the achievement of hundreds of other awards which it encompasses and supports. Likewise, more and more sponsors of QSO Parties are adding the worked counties aspect to requirements and as a multiplier. As a consequence, during such Parties, many adventure-seeking folks head for the wilds of rare counties to be on the receiving end of pile-ups. Also, because of the excitement created by Mobiles seeking rare counties to help the hunters, there has been a mass invasion into some states by outsiders, creating mixed feelings by some residents. We will discuss this "Mobile Invasion" factor later.

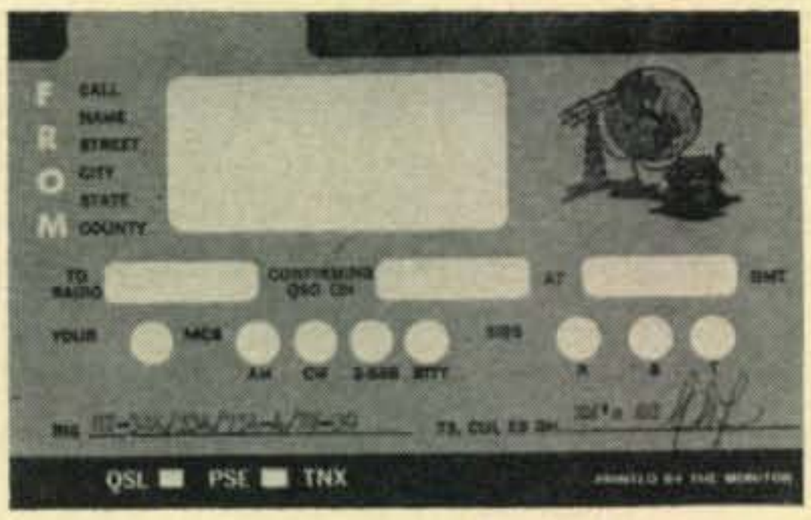
1963 Virginia Counties QSO Party

The Roanoke Valley Amateur Radio Club is sponsoring the 1963 Virginia **Counties** QSO Party in conjunction with the Old Dominion Award. (See pic story of award on page 62 and 102 of October *CQ*). Virginia is blessed with many rare counties and plans include expeditions to most. Contest during 36-hour period from 1500 GMT Saturday, December 14, to 0300 GMT Monday, December 16.

GENERAL CONDITIONS: 1. No power or minimum time limits. 2. Same station may be worked and counted on different bands and modes. 3. General call is "CQ Virginia." 4. Virginia hams in cities must declare one county represented for contest. 5. C.w. and phone scored separately and require separate logs. S.s.b. and a.m. are phone with no distinction. 6. Va. stations will send QSO Nr., report and name county. Out-of-state stations transmit QSO Nr., report and give state, province or country.

SCORING: Va. stations count one point for each contact. Multiply this total by number of states, provinces, countries and Va. **counties** worked to get final score. Out-of-state stations multiply the number of QSO points by the different Va. counties worked.

Suggested frequencies are: 3575, 3830, 3930, 7030, 7205, 7235, 14070, 14250, and 14340 kc. Logs showing dates, times, stations contacted, bands, modes, locations, and final scores must be received not later than January 31, 1964 at Roanoke Valley Amateur Radio Club, Box 2002, Roanoke, Virginia.



At last world-wide hamdom has a universally adaptable mass use QSL card at economic price in what otherwise is an over-priced field. This QSL card, is standard size with red body, white windows and black upper and lower margins. Main window permits one to use own choice of rubber stamp to complete the personalization of the card. The design is both unique and original. The *Monitor Magazine* is now printing them as a service to both hamdom and s.w.l.dom. You may order the cards through W5RYP, P.O. Box 4133, Dallas, Texas 75208 or K6BX.

*United States of America Counties Award Custodian, Box 385, Bonita, California 92002

Ockenden Venture

December, the month of Christmas, is an appropriate timing to illustrate how amateur radio plays important part in humanity ventures the world over. There are several awards, the fees for which are contributed to humanity ventures. Let us tell you about the Ockenden Venture and the Radio Amateur Friends of the Ockenden Venture. First, let me say that there is an award for contacting any five of the "Friends" with a fee of "at least" $1 to the Ockenden Venture.

Ockenden is the name of a house in White Rose Lane, Woking, Surry, England, where 11 years ago 17 children from Displaced Person's Camps in Germany came to stay. These young Latvians, Poles, Lithuanians and Estonians gave birth to the idea of donations-sponsored venture, which today has blossomed into 16 houses or Ockenden homes now providing the needs for over 350 displaced persons. Four-hundred fifty children of Nazi victims have now been helped by the venture. The venture provides all needs for health, education and home life. The majority are about 8 or 9 years of age when they arrive at Ockenden. These children are integrated into regular English schools. As they finish school, the venture seeks to find them appropriate jobs for self survival in society. Miss June Craven, Asst. General Secretary, wrote me a humorous problem . . . seems far too many of the young ladies desire to become hairdressers. The staff spend half their time acting as guinea pigs and as she said, "looking like a cross between gollywogs and Skye terriers." Someone tell me what she means! ! !

Okay, so here you see a large group of radio amateurs banding together as "The Amateur Radio Friends of The Ockenden Venture" with an award as vehicle to draw donations to a worthy cause sponsored by others. Okay again . . . work five "Friends" . . . send along the fee and become a "Friend" yourself so there will be more and more "Friends" to a worthy cause. At the moment the "Friends" are: G2BUL, BVN, FUX, HFD; G3AIZ, ALI, DO, FPK, FTQ, HPH, IFB, KMQ, KSH, KZI, LNT, MCN, MSS, MWG, NMQ, NMR, NMO, NUG, NUY, OGE, VW, YF; G5DJ, GH, LC; G6LX, VQ; G8KS, KW, PL, TY, GC3FMV, GM3-BCL, JDR and K6BX. Apply to F. H. Bliss, G3IFB, 12 Elmsleigh Ave., Kenton, Harrow, Middlesex, England.

Awards Short-Title Code Definitions

Today, there are close to 1,000 awards sponsored by recognized organizations and publications the world over. *The Directory of Certificates and Awards* has successfully standardized awards terminology and procedures applicable to a high majority of sponsors. Out of this standardization concept and rule making has developed a universally accepted usage of short titles which greatly reduce verbiage. Such short titles apply to both organizations, awards, and awards rules and requirements.

It is common today for writers to refer to organizations by short titles. Writers quite frequently are limited in length of columns and do not desire to waste whole lines in long-winded titles. As a consequence, The Quarter Century Wireless Association, Inc., New York, is simply reduced to QCWA and any well read amateur readily identifies. The YL International SSB'ers, Inc., Miami, Florida become a short SSB'ers; the Certificate Hunters' Club is CHC, and so it goes.

With same basic reasoning of brevity, most all the world's achievement awards are given short titles. The Worked All Pacific is W.A.P. The United States of America Counties Award is USA-CA and adequate intelligence to the reasonably informed has been conveyed.

The *Directory* took the need for short titles a bit further in originating many new procedures and handling techniques. After getting the great majority of award's sponsors to agree to requirement standardization, rule codes were originated to boil down a mass of intelligence with brevity. Had it not been done, awards handling requirements would have been so varied between sponsors that even the listing of such would have taken the *Directory* three times its present 120 pages.

Today, writers the world over have 'picked up' *Directory* short title code terminology both because it serves the intelligent and saves valuable column space. A few newcomers complain the abbreviations or codes throw them. If one is interested in the nearly 1,000 achievement awards available, no other source of this information is available other than the *Directory*. It is a non-profit publication that should be on every hunters operating desk for ready reference.

Many awards sponsors state brief rules fol-

Pictured here is one of the most beautifully designed, colorful and significant of the amateur radio achievement awards. The Land of Lincoln Award, (LOLA), sponsored by the Illinois CHC Chapter 17, is in three classes for working various cities in Illinois. For basic certificate, Class C, one must work 30/5 cities, the latter figure being QTH of charter members. Class B seal is for 40/6 and Class A is for 50/7 cities. Send s.a.s.e. to Custodian, Cliff Corne, K9EAB, 711 West McClure Ave., Peoria, Illinois, for list of cities which identify charter member cities. No band/mode endorsements. The certificate is 11" × 14", multi-colored with hand art and color work. Here again is vivid example how significant amateur radio achievement awards can give tremendous good publicity to one's state, counties, cities, clubs and the individual amateurs in a way that far-reaching good public relations is generated.

Pictured on this award by that name is the "Pro-Football Hall of Fame" sponsored by the Canton Amateur Radio Club, Inc., Canton, Ohio. Work eleven members of the club. No charge. Send GCR lis to Custodian Grammer Shirley, K8MZT, 2225 Mt. Vernon Blvd., Canton, Ohio 44709.

Humor has a rightful place in awards programs. Pictured here is the Worked ARCSWL Award sponsored by the Amateur Radio Club of Southwestern Louisiana for working five members. No charge. Send GCR list to Custodian Lou Fontenot, WA5ARV, Rte. 3, Box 185 DC, Lake Charles, Louisiana.

lowed with statement, "All *Directory* Rules apply." Let's look at a few of the most commonly used abbreviations used by both awards sponsors and hunters the world over:

S.A.S.E.: Means send self-addressed stamped envelope of right size and with the postage stamps of recipient's country so that the recipient might return some requested matter to the sender at his expense and/or courtesy. If one cannot send the affixed stamps of the recipient's country, then the s.a.s.e. is reduced to s.a.e. which is self addressed envelope plus appropriate IRCs which the recipient might exchange for postage.

IRC: Means send stated number of International Reply Coupons obtainable at major Post Offices of most major nations. One IRC purchased at a U.S. Post Office costs 15¢ and is good in exchange for one *regular* mail postage stamp anywhere in the world where IRCs are honored by international agreement.

The *Directory* established a world-wide media of monetary exchange between radio amateurs wherein an IRC has 10¢ (U.S.) value. Most awards listed now state handling fees in U.S. monies or IRCs. As a result, many DX amateurs use IRCs as their only available media of monetary exchange. We might add that several national level (government) organizations also use IRCs for payment of awards fees. Today, the U.S.S.R. is the only major country in the world denying its citizens the use of IRCs either direct or through national-level representive organizations. Likewise, Russian amateurs are the *only* hams in the world denied any and all media of monetary exchange outside Russia to the free world.

AOMB/M: Short title to signify that an award sponsor gives endorsements for all one band or all one mode or mixed operations as might be claimed by an applicant with GCR list.

TCR: Top Class Rule means that for awards issued in several and higher classes, one may skip any lower classes and may apply for any higher class without losing credits for any accrued lower classes or endorsements thereto.

GCR: General Certification Rule signifying an award sponsor will accept as proof that an applicant holds listed QSLs, a certification that such have been sighted, signed by two other licensed amateurs, a radio club or organization official, a Notary or other official authorized to take oaths. In no case does GCR mean that *only* log data has been sighted; in all cases log data ,if stated, means the data is the same as inscribed on the listed QSLs in hand. GCR also signifies the sponsor has right to request an applicant to send one or all listed QSLs should doubt arise, or sponsor desires to make routine check of the GCR honor system.

MER: Multiple Endorsement Rule means that under TCR rule above, at the time any higher class of an award is being processed, the applicant may submit proper GCR list requesting all accrued endorsements of whatever nature be appended thereto without extra fees for same.

25% Rule: Originated by the *Directory* to stop past practice of fantastic arithmetic combinations in obtaining Mixed endorsements to awards. The 25% Rule simply means that not less than 25% additional different band/mode contacts must be confirmed before a mixed endorsement can be valid. As example, if one achieves QCWA-25 all 14 mc—all s.s.b., and desires to work for a mixed endorsement, he then must make at least 7 additional contacts on bands and modes other than 14 mc and s.s.b. The same 25% principle applies regardless of combinations, and only one mixed endorsement is valid for any class award regardless of combination. The 25% Rule also applies that if one has all one mode he cannot mix bands and get mixed endorsement because it already is all one mode. The same applies in reverse.

CTY 50% Rule: Originated to meet some sponsors of county awards reluctance to accept invasion of their state's rare counties by out-of-staters. The rule means that for the highest county requirements of an award, not more than 50% of the counties may be achieved (for credit) through contacts with Mobiles. This rule is not recommended and is only illustrated as a simple expedient where differences of opinion arise between county hunters and sponsors. The position taken by the *Directory* is that the primary purpose of any awards program should be to create . . . generate good publicity and public relations toward the sponsor, the state, the counties, the cities and the hams in a state, and any restrictions prohibiting free operations to the contrary creates only ill will and poor PR, nothwithstanding local opinions. If local hams are not willing to activate local rare counties, and out-of-state hams *are* willing to engage in county expeditions as a service to world-wide hamdom, then there should be no barriers.

What's Cooking Department

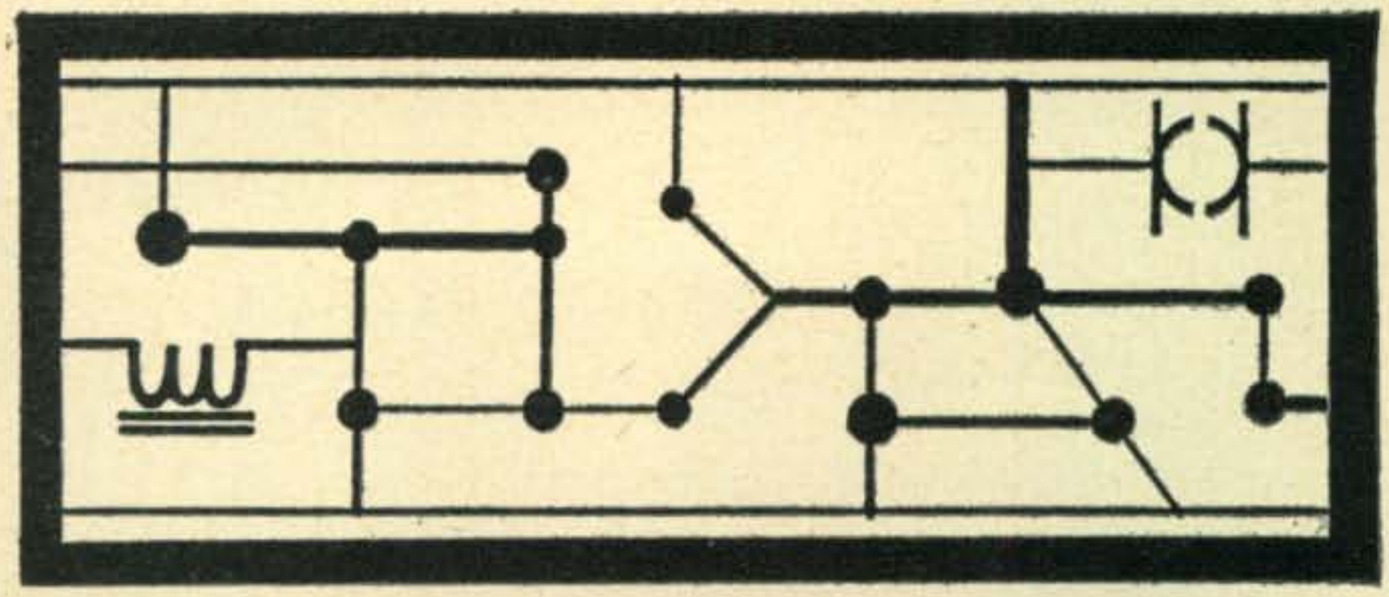
About here each month we are jolted into realization we already have used up allocated column space and possibly guilty of too much verbiage ourself.

Don't fret, we'll start the New Year off with a BANG! ! ! ! we hope. So, keep the news flowing this direction . . . help us help you and others.

To all our readers who have been so wonderfully helpful and kind during 1962, our heartfelt THANKS, a MERRY CHRISTMAS and God Bless you all.

OLD MAN, K6BX

RTTY



BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

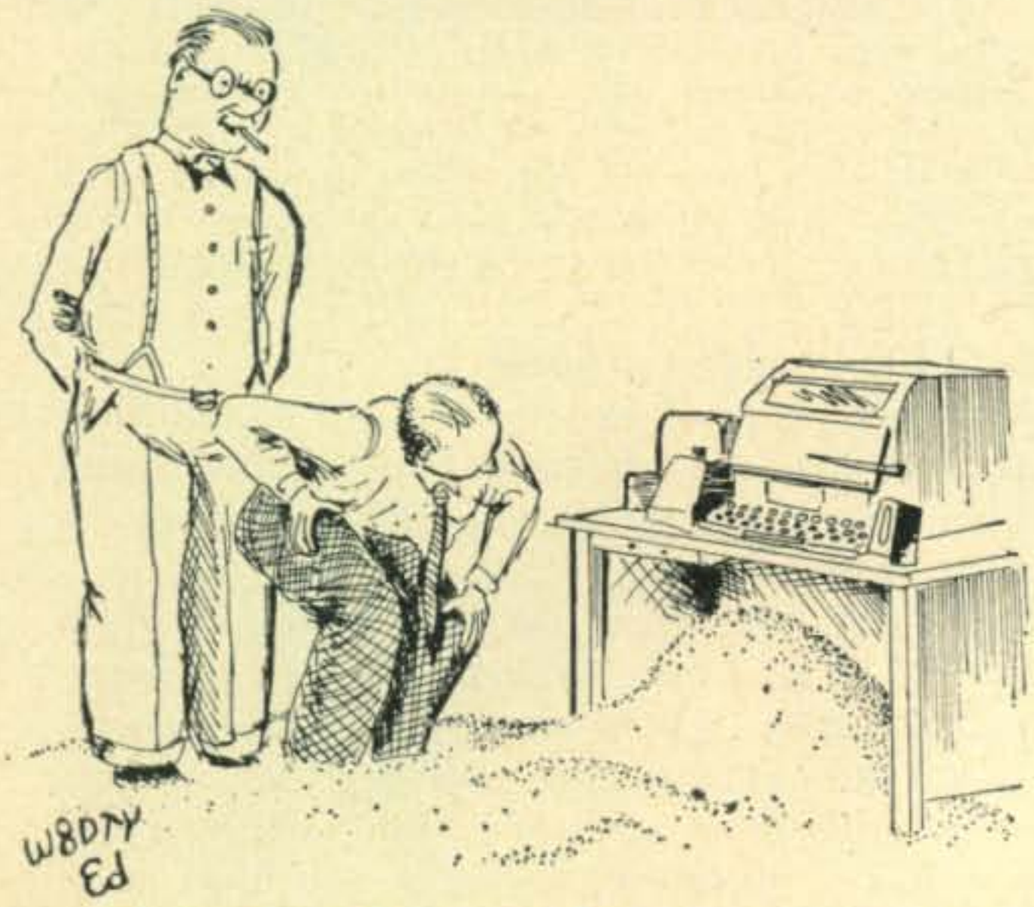
Nets centered on frequencies given; operation usually ± 10 kc on h.f.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.60 mc
2 meters	146.70 mc

RADIOTELETYPE operating procedures haven't been discussed in the RTTY Column in a good many moons. It seems that the time for discussion of this subject is again at hand. Recently a vacation permitted more time than usual for operation. Frankly, we were amazed. How could this come to be? By "this" we mean the sloppy, and inconsiderate, operating procedures of many of the newcomers to this relatively new and different mode of amateur radio. After considerable prolonged operation we came to the conclusion that there were two reasons for this: (1) Nobody ever told 'em how; and, (2) many of the stations are set up in a very haywire manner, making it necessary to be a one-man-bandmaster to perform even the should-be simple operation of changing over from a receive condition to transmit.

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

RTTY The Hard Way...No. 27



"I finally found where all the chads were stuck!"

Station Set-up

Operating an RTTY station doesn't have to be impossibly complex; it should be reasonably coordinated so that it isn't necessary to throw five switches to make a transmission. A fairly simple station set-up is shown in Chapter 5 of the *New RTTY Handbook*. Many variations of the control system shown on page 133 are possible to fit a particular group of equipment.

Apparently one of the main problems in operating is that of performing the FCC-required dual identification with International Morse Code. Most newcomers use c.w. for identification. This, being a mode different from F-1, requires an additional operation. It is much more logical to use narrow shift F-1 for identification instead of A-1. Adding narrow shift for this purpose is quite easy. (Refer to last month's RTTY Column and to page 140 in the *New RTTY Handbook*.) Even using full shift for identification is better than using c.w. because the additional operation in changing from one to the other is then not necessary. Invariably, the mark of the experienced RTTYer is his narrow shift for identification.

Keyboard Operating Habits

We never fail to become annoyed when an RTTY station ends his keyboard transmission in the middle of a line, then abruptly cuts his carrier to identify with c.w. (Unless you are carefully watching, you dive for the motor or mark-hold switch when the machine runs wild.) The correct procedure, established 18 years ago, is really very simple: when you begin a transmission, when you reach the end of a line, and when you conclude a transmission *just before you dual-identify,* hit the following keys in this sequence: two CAR RET, one LINE FEED, and two LTRS. The objective here is to reduce overprinting on the *other* fellow's machine when signals are weak and some of the pulses of these functions are missed.

Also, many stations today have some form of automatic control either for starting and stopping the printer motor or for mark-hold during

tuning, switching, and/or dual identification. This control is based upon standards set years ago that require the reception of a steady *mark* for at least 5 seconds to start the motor (or release the mark-hold circuit and upon reception of a steady *space* of at least 3 seconds to stop the motor (or put the TU on mark-hold). How many stations have you heard that use this procedure? Very few, we are sorry to say. Whether you are on f.s.k. or a.f.s.k., it is a very courteous habit to begin a transmission, *after* dual identification, by sending a steady *mark* for about 5 seconds. That's all. (And if you have tape gear, *never* start the TD before putting on the carrier!) When you finish transmitting RTTY, *before* you dual-identify, hit the BREAK button or switch so that you send a steady *space* for at least 3 seconds; about the time it takes you to count from 1 to 6.

Another standard operating procedure established when amateur RTTY began is to use the BELL signal to tell the fellow you are working that you are about to turn it over to him. Three bells are usually sent before identification; certainly before you send the BREAK stop signal. (The experienced RTTYer seldom watches the machine all the time.)

We hope we haven't been sounding like the "Old Man," but it would be nice if all newcomers, and some old-timers, watched their procedure a bit more. RTTY *can* be fun. If you would like to know more about operation and the special provisions of the FCC regarding radio teleprinter transmissions, refer to Chapter 6 in the *New RTTY Handbook*.

On The Bauds

K1DQV, a high school senior of Orange, Conn., works 80 with a Model 14 strip printer. W1MVH of Hamden, Conn., runs tape on 80. W4EHD/1 in Farmington, Conn., has a Link 50-UFS for 6 meter f.m. W2FAN of Lockport, N.Y., uses tape gear on 80. W2BVE of Maywood, N.J., has some Model 14 gear and some 255-A polar relays for sale. W1BZD/2 at Plattsburg AFB, N.Y., has worked out an f.s.k. system for transceive frequency correlation for the KWM-2A. W2ZKV of Elmhurst, N.Y., has some Model 26's for sale for $50. W2UYX of West Hempstead, N.Y., is getting on f.m., 146.70 a.f.s.k. and 146.94 phone. K2DAC of Great Neck, N.Y., is on 80.

K3LDQ of Elkins Park, Pa., is also on 80. W3VVP of Easton, Md., is looking for an input unit for a CV-57/URR converter. George has a CV-71 already in operation with his SX-88. W4BLK of Oxford, N.C., has a two-headed TD marked XD216AA/GL. *(Can anybody help him?)* K4KLK of Bryson City, N.C., has a TG-7, a TG-26, and a Twin City TU. WA4EVU of Destin, Fla., reports that the TT-160 A/FG, mentioned in the May RTTY Column, is an obsolete piece of crypto gear which uses a prepunched tape as a key and mixes it with the message to produce the garbled output. It is capable of either half or full duplex operation. K4QVD of Melbourne, Fla., is using his Model 26 with a KWM-2 barefoot on 20 meters.

"Madonna and Child," courtesy of Roger E. Gibson, K4KLK.

W6NTK of Oakhurst, Calif., expects to get back into the W6CQK RTTY filter business. K6PAK of Monrovia, Calif., is building a W2JAV transistor a.f.s.k. oscillator. K6IBE is moving to Huntsville, Alabama. K7IMN of Seattle, Wash., is looking for f.s.k. circuits for his Eico 720 and Johnson Ranger. *(See Chapter 4.2 in the New RTTY Handbook, Bill.)* K8DKC of Ann Arbor, Mich., has ordered from W9GRW a Model 28ASR, complete with two-headed TD, gear shift, and stunt box. *(Wow!)* W8BZB will be the operator on the good ship *Hope*. W8DTY reports still no FCC action *(as of October)* on his April petition to eliminate dual identification. A similar petition was filed by the ARRL August 31, 1963. W9HRH of Evansville, Ind., uses narrow shift dual identification on 20. WØJRQ of Lakewood, Colorado, is consistantly good copy on 20 at W2JTP. WØGUS of Newport, Minn., calls CQ-DX on 20. WØNOY of St. Ann, Mo., services machines for RTTYers. Old timer WØRX still holds forth on 20 from Grand Junction, Colorado.

I1RIF is very active on 20, week ends. G2UK has available 425 cycle tuning forks. VE6HM reports the release of 40 Model 15's in Alberta for $25 each. ZS6UR, working W4MGT, DL3IR working K1SDX, and DL1VR also working K1SDX; all copied on 20 meters.

Comments

We have been writing your RTTY Column since August 1955. Every year at this time, as the year draws to a close, we sit back in our rocking chair

[*Continued on page* 96]

YL

LOUISA B. SANDO*, W5RZJ

CONGRATULATIONS to Dorothy Chapman Saunders, W4UF, for reaching the "top of the pile" by earning CHC-200, and hence the Arne Trossman Top Honors Plaque. June *CQ* presented Kay Gaynor, K2UKQ, the first YL in the world to earn this coveted award; now Dot comes in with No. 2—a fitting crown to the many achievements Dot has been piling up since she first was licensed in 1927 at Ridgewood, N.J. as N2BY.

At that time Dot's transmitter was a bread-board affair using a 199 receiving tube with input of about 10 watts; her DX (good for that time and power) was Youngstown, Ohio on 40 c.w. Increasing to 15 w. and a 201 tube (raw a.c.) she worked Europe and the U.S. Marines in Nicaragua and Calif.

Currently she is using the Collins S-line with 30L-1 linear and Hy-gain antennas: 3-element tribander, all-band vertical and all-band dipole. She works c.w. and s.s.b. and is on 80, 40, 20 and 15. She holds DXCC (both mixed and phone).

Dot has been D/C for YLRL and president of Floridora YLs. A member of QCWA and CHC YL Chap. #4, she also is a member of the Flying Hams Club. She received her first private pilot's license in 1935 while a student at U. of Mich. and held one until the mid-50's when she had an eye injury in India. She has owned two private planes; was former Governor of the middle eastern section of the 99's and editor of their newsletter. She was the only woman pilot on the first

[*Continued on page 80*]

*4417 Eleventh St. N.W., Albuquerque, New Mexico 87107.

Dorothy Chapman Saunders, W4UF, second YL in the world to achieve CHC-200 and thereby the Arne Trossman Top Honors Plaque.

Vera Russell, K8BPQ, the first YL to serve as President of the 30-year-old Genesee County Radio Club in Mich. Vera is principal of Grand Blanc Elementary School where she puts ham radio to good use monitoring the local emergency net on 29.480 mc especially for storm warnings. At other times she takes part in this net operating mobile with a G-76 transceiver and at home with a DX-35 in "Project Monitor" by which the hams monitor 29.480 mc 16 hours daily to encourage mobile operation. Vera also works DX on 20 & 40 using S-line gear.

Norma Margot, K6ZEH, of Porterville recently learned she had been honored by being listed in the 20,500-name "Who's Who of American Women." OM Alan, W6FZA, proudly states this is in recognition of her active part in civic, church, political and philanthropic organizations both locally and at state level. She also has raised three jr. ops, is studying water colors and French. Norma is shown here at her 6 & 2 meter a.m. station. She has worked 49 states on 50 mc (needs Arkansas) and earned WAJD on 50, her OM believes the first on the coast and certainly the first YL. K6ZEH is on v.h.f. entirely, operating s.s.b. on 220 & 432 mc, one of the first s.s.b.'ers on the latter band.

Vol. 5, No. 12—Dec., 1963

VHF AMATEUR

BOB BROWN, K2ZSQ

EDITORIAL

An example of what can happen to an amateur causing TVI was recently brought to our attention. We urge you to read on. This incident may have far-reaching implications that could well affect your own future endeavors on v.h.f.

A little over one year ago Charles A. "Butch" Seaman, K3IOP, age 15, acquired his Technician Class license. Ed Lipps, W3BWU, helped equip him with a Gonset G-50 and four element 50 mc Yagi. Elizabeth, Pa., Butch's QTH, is considered to be a fringe area for TV reception and would be safe to say that a passing taxicab could cause considerable concern to viewers. In no time at all K3IOP was up to his neck in TVI. His own TV set was clean, however.

It wasn't long before annoyed neighbors issued him formal complaints and the Monongahela Valley TVI Committee under the chairmanship of W3OC was called in to check out the station. It was found to be satisfactory with TVI attributed to front-end overload of the TV receivers. Most neighbors refused to install high-pass filters, and complaints continued to roll in.

Shortly thereafter, the *Elizabeth Herald* ran a front page story pointing out the interference problem and condemning Butch for it. Week after week exaggerated reports were published. Anonymous telephone calls began to plague the Seaman family. Stones were hurled at their home during the night. K3IOP continued to operate.

As the months progressed and more stories were appearing in the *Herald*, other newspapers in the area joined in the growing crusade to put Butch off the air. With the exception of a few "Letters to the Editor," no real effort was made by these papers to present a true account of the incidents. Again the TVI Committee appeared due to pressure. Again he was cleared. Many times throughout the winter FCC field engineers investigated and also determined that K3IOP was being operated and maintained legally. Results of these findings never made the papers.

In early February, 1963, FCC men called at the Seaman residence requesting Butch to accompany them for re-examination. Although he was given no advance warning nor study period, he passed with flying colors (100%). The press failed to pick up this story, however. More stones were thrown during the night. K3IOP stayed on the air.

Throughout the spring and summer months, the FCC continued to "check out" Butch's operations. So did the TVI Committee. In the first weeks of August K3IOP succeeded in passing his General Class exam. Bearing in mind the efficient processing of applications these days, Butch rather expected to hear from Gettysburg within a few weeks. But no word came, save the continuing onslaught of FCC field engineers pursuing their pet TVI case. (It should be added here that one-half the Elizabeth town council were experiencing TVI.) The *McKeesport Daily News* jumped on the bandwagon. Meanwhile, Butch's mother and sister were accosted in the street and shoved into an alley. Police were "busy with other matters" and couldn't be bothered. The Seamans barricaded their home. The FCC is reported to have brought 150 high-pass filters into Elizabeth, although what they did with them remains to be seen. At about this same time Congressman Elmer Holland filed a formal request that the government pass legislation empowering local governments with the authority to put an amateur off the air should he refuse to conform to their wishes. (*Congressional Record* A-4983).

Not long after Holland filed his remarks, Butch paid a visit to ARRL Headquarters in Newington, Conn. He was advised that the League was already in touch with both the regional and national FCC offices on the matter and was doing everything in its power to alleviate the situation. Butch returned to Elizabeth.

By now the situation had deteriorated to the point where the Seaman family's mere existence in the community had been threatened. Attempts were made by concerned hams to present the newspapers with the facts, but the copy never reached type. No one, least of all local authorities, was at all interested in the truth. On Thursday, October 17th, 1963, more rocks hit the house and the family was greeted by a deposit of garbage on their front porch.

On Friday the 18th the FCC posted a letter to K3IOP notifying him of the status of his General Class application. Portions of this letter are reproduced below:

. . ."For the past year there have been numerous complaints of television interference in Elizabeth, Pa., allegedly caused by operations in the frequency band 50-54 mc under your Technician Class license. Repeated and extensive Commission investigations of this matter have confirmed that interference is caused by your operation. Although these investigations have not revealed any impropriety in your operations, the gravity and continued nature of the

[*Continued on page 92*]

Results of the Summer, 1963 *CQ* V.H.F. Contest

COMPILED BY BOB BROWN, K2ZSQ

WELL, what kind of a contest was it? It was a contest where WA8EHI/8 in Brecksville, Ohio, walked away with the 50 mc Ohio honors with operator K8MMM's grand total of 458,880 points to set a new record in this type competition. (It might be added here that no one anywhere in the country topped this score). Operation was from the Cleveland 50 Mc DX Club's station in Cuyahoga County using a Heath HX-30 and Drake 2B receiver to a four element Yagi *180 feet high*. The HX-30's a.m. output? Two watts. And Tom promises more big things in our Spring contest. It was also a contest where K1PDA/1 up 2500 feet on Pack Monadknock amassed his unbelievable total of 251 contacts in 30 counties, more than eight times the score of his nearest New Hampshire competitor. And if you were near enough to hear the conglomeration of signals in the Pennsylvania battle, you were sure to be astonished at the concentration of top-notch contest personages fighting to the death. Emerging as winner was Stan Smith, K3IPM, with his 425,472 points (just under WA8EHI/8's) with W3MFY, K3LOM, K3ACR/3 and K3HGA close behind and all well over the 200,000 point mark. Making a concerted effort to topple Stan was Bert Simon, W2UUN, who easily took New Jersey from K2ZSQ with his 48 counties and 247 contacts. Gear? Hammarlund HX-500 exciter, Simon Sideband 6TRC transmitting converter, Johnson Thunderbolt (700 watts input on a.m.) with his homebrew 417A converter into a Collins 75A2A. Antenna employed was the Telrex 11 element Spiralray.

It was a contest where mountaintoppers K4BEI/4 (Ala.), KØZZM/Ø (Colo.), K4RWY/4 (Ga.), WØZXO/Ø (Kan.), WA4DKR (Ky.), K9KHW/Ø (Nebr.), WA2GHN/2 (N.Y.), K4JWZ/4 (N.C.), W8KNC/Ø (S.D.), K4EJQ/4

This is W9OKM/9's contest QSL card. K9HUY was the operator and succeeded in snagging the 144 mc Illinois state certificate with his 60,750 points.

Here's New York state winner for 144 mc, Jeff Miller, K2LOK/2, in Chautauqua County. Equipment used was the Heath Seneca and HQ-129X with Ameco converter and preamplifier hooked into an 8/8 "J" beam up 50'. Elevation, 1750'. Congratulations, Jeff!

(Tenn.), and WA4EBN/8 (W.Va.) all took home first place state awards for their 50 mc efforts in battling the wilds. Ironically, K7OCG/7 decided to go up on Mingus Mountain, Arizona, (8000 feet) portable after persuading friend K7GAT to enter, only to find that the lonely stay-at-home had more than doubled his score. You can't win them all!

Making Alabaman history in the meantime was K4BEI/4 on Cheaha Mountain, the highest point in the state, giving the East Coast boys a real run for their money with his 103 contacts in 45 counties. What was it we said last month about determination and ambition? Well, whatever it took, K4BEI had it; our congratulations for a real fine pioneer effort. It'll take many more contests before we see another total like that out of the South! Another surprise was our 50 mc Colorado state winner, KØZZM/Ø with 108 contacts in 49 counties for a grand total of 132,300. In view of the larger size of counties in that area and with its v.h.f. population sparse to say the least, that score represents a good deal of hard work!

[*Continued on page 82*]

Novice Scores

KN3WQB/2 ..	110	23	22	69,575
WN2FXB	100	17	24	51,000
WN2HYO	67	12	17	17,085
WN2GMR ...	59	14	13	14,024
WN8HTL	43	13	18	13,827
KN1FKW	33	11	14	6353
KN1ETM	19	8	13	2470
WN6GWK ...	20	4	10	1000
WN9IUL	16	5	10	1000
WN6GTT	13	6	10	975
KN7YLB	12	3	9	405
KN1FYS	10	4	7	350
WN4KCO/1 ..	4	4	3	60

50 Mc Scores

Number groups after call letters denote the following: number of contacts, number of counties, hour multiplier, and final score. Note: Since many contestants took advantage of the 1.25 power multiplier, simple multiplication of the number groups shown will not always result in final score presented here.

Alabama

K4BEI/4	103	45	22	101,970
K4NGD	89	31	24	66,216
W4GUP	8	8	4	320
W4DGH	6	5	2	75

Arizona

K7GAT	104	37	20	76,968
K7OCG/7	76	38	13	37,544
K7OYB	38	12	17	9690

Colorado

KØZZM/Ø	108	49	20	132,300
WØHMT	33	21	10	8663

Connecticut

K1SLL	65	27	21	36,855
W1UNW	4	3	4	60

Florida

WA4FVD	69	35	18	43,470
K6PSJ/4	52	37	12	28,865
WA4IVX	22	10	9	1980
WA4AFG	16	9	7	1260

Georgia

K4RWY/4	90	44	13	64,350

Illinois

K9DWR	105	31	24	97,750
WA9FIH	65	10	17	13,813
W9EET	51	17	12	13,005
WA9ETP	52	14	17	12,376
K9ZIJ	25	8	13	3250
K9DTB	14	3	11	577

Indiana

WA9ASZ	110	20	24	66,000
WA9AOT	64	14	15	16,800
K9SHP	45	17	15	14,344
WA9GZJ	11	10	5	550

Iowa

WAØCVA	38	22	15	12,540

Kansas

WØZXO/Ø	9	6	6	405

Kentucky

WA4DKR/4	81	39	23	90,821
WA4ERI	60	31	24	55,790

Maine

K1TOL	30	24	9	6480

Massachusetts

K1DKX	66	28	21	38,808
W1QXX	48	26	12	14,976
WA2GWM/1	44	17	15	11,220
K1ZKA	27	6	15	2430

Michigan

W8HJR	132	40	23	121,440
WA8CDF	116	46	21	112,056
K8YYE	106	39	19	98,182
K8LIO	94	39	23	84,984
W8BDV	102	34	23	79,764
K8IVW	63	29	15	32,256
WA8CQM	56	13	23	20,930

Minnesota

WØTRD	97	49	24	104,072
WØIRO	60	27	21	42,525
WAØEIK	41	12	16	9840

Montana

W7SFK	3	3	1	11

Nebraska

K9KHW/Ø	30	13	20	7800
KØFLE	16	11	5	1100

[1]Staff, ineligible for award.

New Hampshire

K1PDA/1	251	30	24	225,900
W2NSD/1	73	34	12	29,052
W1IQD	15	8	7	1050

New Jersey

W2UUN	247	48	24	284,544
K2ZSQ[1]	225	39	24	263,250
WB2JGO	57	30	17	29,070
WB2GWS	47	11	17	10,988

New York

WA2GHN/2	139	48	24	200,160
WB2DDP/2	150	33	24	148,500
WA2SWG	98	24	23	54,096
WB2EXM	95	17	20	32,300
K2FCE	62	15	21	24,413
WA2WIH	29	6	8	1392

North Carolina

K4JWZ/4	128	52	21	174,720
WA4BBY	42	26	16	21,840

Nevada

K7ICW	38	17	8	5168

Ohio

WA8EHI/8	239	64	24	458,880
K8CLA	136	53	24	180,192
K8OLB	158	32	19	96,064
WA8EWT	94	30	15	52,875
K8PXX	55	30	16	33,000
WA8JEM	43	8	17	5848

Oregon

K7GWE	43	17	15	12,456

Pennsylvania

K3IPM	277	64	24	425,472
W3MFY	246	51	24	325,104
K3LOM	223	54	23	276,966
K3ACR/3	200	44	24	264,000
K3HGA	188	45	23	243,225
K3ISH	88	48	18	95,040
K3YOA	90	28	24	75,600

Rhode Island

K1JFI	57	15	15	16,031

South Dakota

W8KNC/Ø	66	44	10	36,300

Tennessee

K4EJQ/4	75	41	19	73,031
WA4FOE	78	36	18	64,430

Texas

K5MLD	85	27	20	57,375
K5ARU	88	28	20	49,280
K5DCQ	69	19	19	31,136
K5CMC	67	13	18	19,598
K5DRF	28	16	15	8400
K5IVB	40	10	10	5000
K5BSN	20	4	9	900

Vermont

K1FJF	75	19	22	39,188

Virginia

K4VWH	62	28	18	42,408
WA4JWC	34	11	21	9818
K8ZSY/4	37	16	7	5180

Washington

K7QFW	96	22	20	52,240
K7IVC	85	12	24	24,480
K7TBM	25	9	9	2025

West Virginia

WA4EBN/8	72	39	19	66,928

Wisconsin

K9YGR	5	3	1	19

144 Mc Scores

Alabama

K4HPR	76	5	13	6175

California

WA6OQD/6	91	21	20	47,775
W6SAW	109	16	16	34,880
WA6LRF	63	15	17	20,081
WA6QQH	59	12	19	16,815
W6NLO/6	70	7	17	10,413
WA6YYM	63	8	14	8820
WA6ZPK	25	4	10	1250
WN6GWK	20	4	10	1000
WN6GTT	13	6	10	975
WA6ZLU	12	4	7	420

Connecticut

K1PLR	78	19	20	37,050
KN1FKW	33	11	14	6353
K1RTS	25	9	15	4218
KN1FYS	10	4	7	350

Georgia

K4YZE	16	5	15	1500

Indiana

K9WZB	90	42	17	80,325
K9OYD	68	23	18	35,190

Illinois

W9OKM/9	81	30	20	60,750
WN9IUL	16	5	10	1000

Maine

K1MTJ	19	5	7	831

Massachusetts

K1YLU/1	81	30	20	48,600
KN1ETM	18	8	13	2470
K1PUA/1	15	7	11	1444

Michigan

K8PBA	176	60	24	253,440
K8HNW	119	52	20	123,760
W8VRH	62	23	16	22,816
WN8HTL	43	13	18	13,827
W8CLH	33	11	9	4084
WA8DZF	22	9	12	2970
W8ZGW	19	10	6	1140
WA8GRI	10	7	6	525

New Hampshire

K1FYP	88	53	12	55,968
WN4KCO/1	4	4	3	60

New Jersey

WA2VRB/2	164	41	22	147,928
WB2EFB	121	28	24	101,640
KN3WQB/2	110	23	22	69,575
K2HHS	108	21	18	53,530
WA2HNI	66	19	14	21,945
WN2HYO	67	12	17	17,085
WN2GMR	59	14	13	14,024
WA2VEB	39	12	12	7020
WA2VTE	6	4	4	60

New York

K2LOK/2	126	42	23	152,145
WN2FXB	100	17	24	51,000
W2RPZ	54	17	18	20,655
WB2GFE	51	12	22	16,830
WB2CPC	54	15	16	14,200
WB2HHS	20	9	14	3150

North Carolina

K4QIF	49	20	17	16,660
K4BE	40	12	12	7200

Ohio

K8ZES	149	63	20	187,740
W8KKF	73	19	21	36,409
K8KFY	35	21	16	11,860
WA8HMN	50	10	22	11,000
K1CRQ/8	18	6	16	1728

Oregon

K7SJQ	23	4	10	920
KN7YLB	12	3	9	405

Pennsylvania

K3RVS	6	3	6	135

Wisconsin

K9VNM	90	39	20	70,200

Ontario

VE3CXK	46	12	20	13,800
VE3AIB	42	14	15	11,025
VE3FNV/3	32	14	17	9520
VE3EUV	31	6	15	3488

220 Mc Scores

K4HPR	3	1	3	11
K7GWE	2	1	2	5

432 Mc Scores

K7GWE	2	1	2	5
K4HPR	1	1	3	4

VHF REPORT

an exclusive feature of The VHF Amateur

BY BOB BROWN*, K2ZSQ

SO MUCH HAS HAPPENED in the last few weeks that we hardly know where to start first. As mentioned last month, WA2IHY and I are in the midst of some tropospheric experiments in an effort to determine what clear-cut relationship there is between weather conditions and one's "normal working radius." We were well along in these on-the-air studies when disaster struck. The twenty-seven foot Yagi at K2ZSQ crashed to the ground bringing contemplated operations to an abrupt halt. The antenna was a complete loss but the tower appears still serviceable and plans call for installation of a 36 foot replacement 50 mc Yagi in the near future. Meantime, the accent here at least is by necessity on 144 mc. By the time this reaches type, we should be on with 16 elements and 100 watts ready for action at the low end. Schedules would be much appreciated. In looking back on our efforts in the past year, perhaps it was a good thing that six meter Yagi took the plunge. At least now our study can be expanded to take in 2 meter conditions, thereby being of more value to us in the long run. And we'd still like to hear from you if you've been doing any substantial tropospheric work on v.h.f. dependably over several hundred miles. And don't scoff because December is already here. It can still be done.

Installation for 144 mc contest work in the Austrian Alps. On the left is Alois Pendl, OE6AP, securing his 9 element Yagi for the high winds. Elevation here (according to the Atlas) approaches 7000 feet above sea level. Many countries including Finland and Great Britain have been contacted from here with relatively low power equipment. V.h.f. paradise?

Miscellaneous Tech

Simple 10 Watter for Six: Once again we turn this section over to Doug DeMaw, W8HHS, editor of the *VHFER*, for a jim dandy of a 50 mc low power transmitter. (By the way, the *VHFER* is readily available by subscription from Comaire Electronics, Ellsworth, Michigan. Write for a sample copy. You'll like it). The circuit shown in fig. 1 employs standard 8 mc crystals, keeping its simplicity by use of a double-ended oscillator plate tank inductor which will properly couple into the p.p. grid circuit of the push-push doubler final. Excellent efficiency is secured from the 12AU7 inasmuch as this is the main feature of push-push doublers. The modulator, by the way, can be used separately with any low powered transmitter whose input doesn't exceed 10 watts. The modulation transformer, T_1, is an inexpen-

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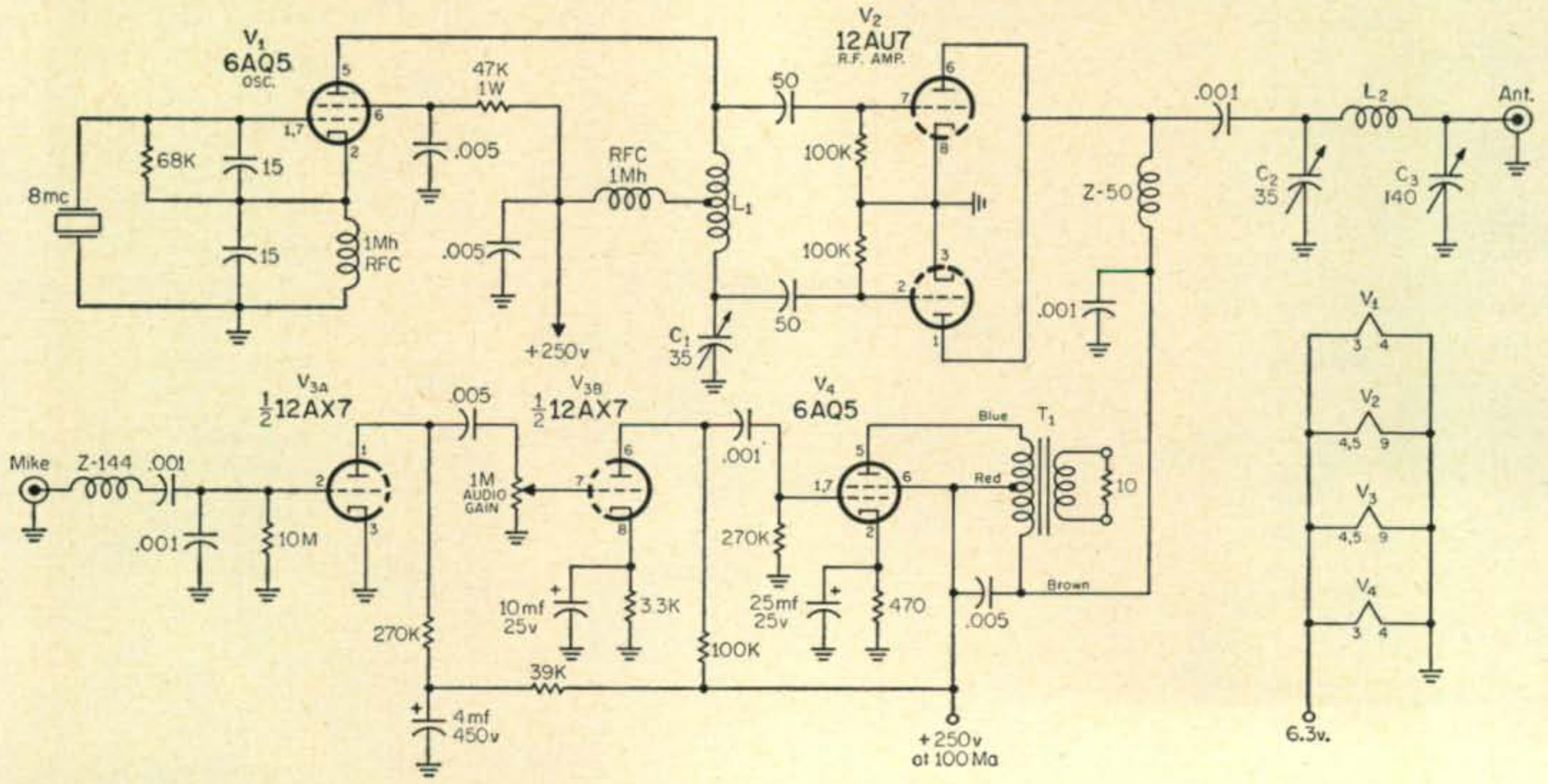

Fig. 1—Schematic diagram of the 10 watter for 6. The 12AU7s act as push-push doublers providing output at 50 mc from 8 mc crystals and require no neutralization. The modulator is straight-forward and can be employed separately in other transmitters with no more than 10 watts in the final. Coil data may be found in the text. All capacitors are in mmf unless otherwise stated and all resistors are ½ watt.

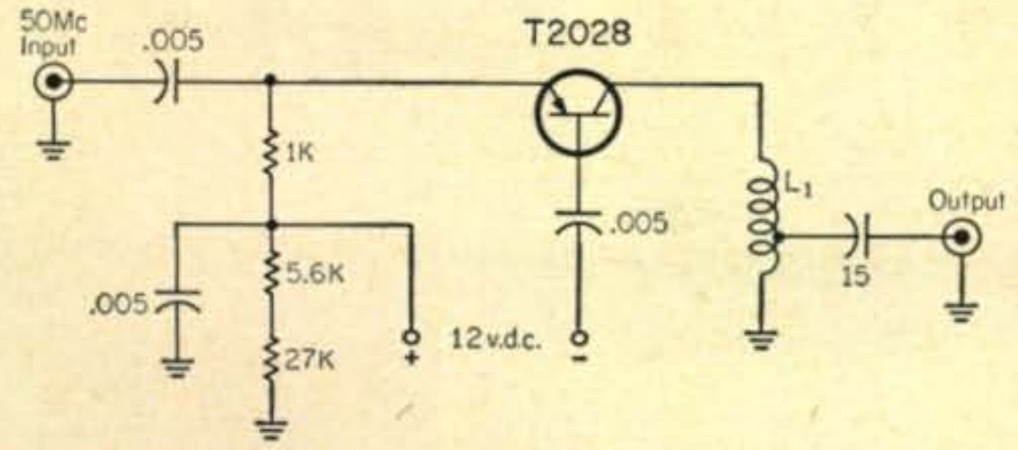

Fig. 2—Simple one transistor 6 meter preamplifier providing 12 db gain. Coil data may be found in the text. All capacitors are in mf unless otherwise stated and all resistors are ½ watt.

sive 8 watt p.p. output transformer. The voice coil winding is not used. The modulator requires a high impedance crystal or ceramic microphone. The 1 meg potentiometer in the second stage serves as the AUDIO GAIN control. Going back to the r.f. unit, the output circuit features a pi-network tank. This will help eliminate TVI and will work well into a low Z transmission line.

Coil L_1 should resonate at 25 mc. Twelve turns of #16 enameled wire on a 1" diameter form should do the job. This coil is center-tapped as shown in the schematic. The r.f.c. connected to this point can be either a 500 μh video coil or a 1 mh r.f.c. Coil L_2 is a 5 turn air-wound inductor whose inner diameter is 1". It is made from #12 enamel or bus wire. Tune-up is simple. Adjust C_1 for maximum output as noted with a grid dip meter. Next place the final amplifiers into their sockets and apply power to the rig. If loading into the antenna, observe forward power on your s.w.r. bridge and tune both the oscillator and final amplifier capacitors (C_1 and C_2) for maximum output. Adjust loading with C_3. A suitable dummy load for tune-up can be made from two 47 bulbs in series. APC-type tuning capacitors can be used for both the oscillator and final circuits. All capacitors in the balance of the circuit should be silver micas or ceramics. Keep all leads short and direct. Other tube types can be employed in the oscillator stage if desired. Tubes such as the 6CL6, 6BQ5, 5763 and 6AN5 are ideal. In the p.a. stage, the 12BH7 is a little more rugged and has a higher plate dissipation.

Transistor Pre-Amp for 50 Mc: Here's another goodie for the tinkerers with a grid dip meter and a 12 volt battery. We can't supply you with too much information at this time, but suffice it to say that the preamplifier shown in fig. 2 has a low noise figure and will provide about 12 db gain. L_1 is made to resonate at 50 mc with a 15 mmf capacitor tapped ⅓ of the length from the grounded end of the coil. The Philco T2028

[*Continued on page 76*]

UHF ROUNDUP

an exclusive feature of The VHF Amateur

BY ALLEN KATZ*, K2UYH

A little over a year and a half ago while taking a course on analog computer theory, we came up with a way (we thought) to detect very weak signals in the noise. An analog computer is made up of a series of integrators, an integrator being little more than a d.c. amplifier with its output connected across a capacitor. The charging of the capacitor in effect adds up the d.c. output voltage of the amplifier or integrates the waveform of the applied voltage. If a constant d.c. voltage is applied to the input of an integrator, the output voltage across the capacitor will look like a ramp (constantly increasing voltage). See fig. 2A. The ramp will, of course, level off as the capacitor comes close to full charge. We must, therefore, remember to use a capacity of a much larger time constant than the period for which the integrator is used.

Now consider what happens when the audio output of a receiver (tuned to no signal) is rectified and applied to such a device. Say we integrate for a period of one minute, then stop and measure the voltage stored in the capacitor. We, of course, have some fixed value of voltage, let's say 5 volts for the sake of discussion. If we discharge the capacitor and repeat the process (integrating again for one minute), we should read approximately the same voltage. The reason the voltage is approximately the same is due to noise's inherent randomness. See fig. 2B. The longer we integrate, the more likely is the chance that the voltage read each time is the same. This effect is expressed by the formula $\triangle p/p$ $(T\triangle f)^{1/2}$ where T is the period of integration and f is the receiver bandwidth. However, if a very weak signal should be present on the frequency of our receiver and we integrate for one minute, the accumulated charge on the capacitor will not be 5 volts, but some higher value. This effect occurs because the signal fills up some of the spaces between the noise pulses, although it may be well below their peaks (see fig. 2C). The theory above sounds almost too good to be true. And it is, if certain limitations are not understood. First of all our system should be gain-

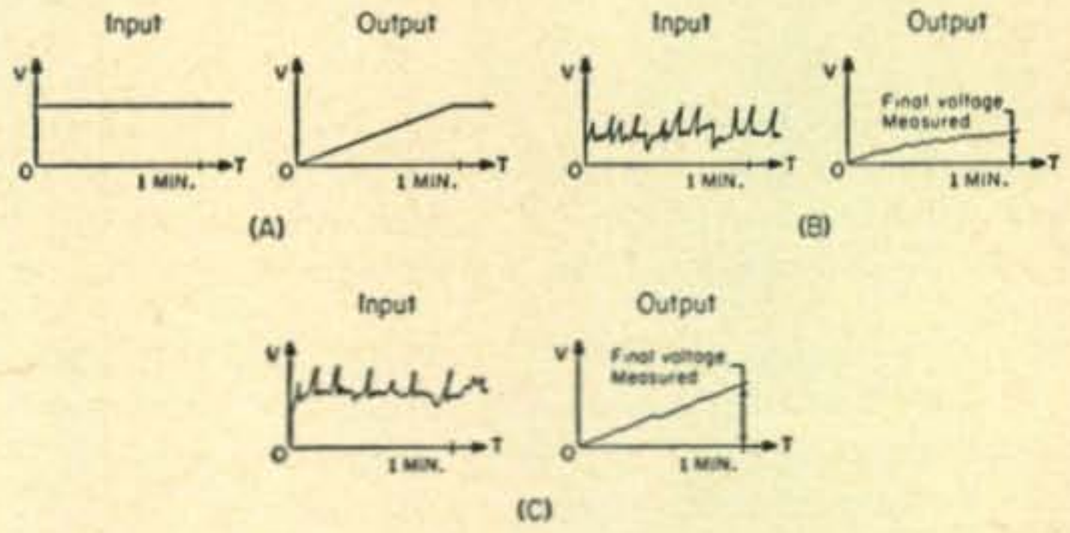

Fig. 2—This is what we will read on a v.t.v.m. connected as shown in fig. 1. In (A) above if constant d.c. is applied to the capacitor, our output will look like a ramp until the capacitor approaches full charge. When irregular noise is applied from the receiver (no-signal condition) as shown in (B) above, the final voltage measured will be the total of the bursts over the same period of time. In (C) above, overall voltage level is slightly higher due to presence of signal. Since there will be less "holes" in the input, output will be greater and therefore distinguishable from a no-signal condition. See text.

stable. That is, a change in receiver gain or cosmic noise will throw our readings off. This problem can be circumvented. The simplest method is to keep checking your no-signal voltage reading. Secondly, there is possibility of mistaking the presence of a signal when one is not present, due to the element of chance introduced by anything random. In general the smaller the positive increment in voltage accepted as indication of the presence of a signal, the lower the probability. Heisenberg's uncertainty principle, eh? This complex problem leads right in to the theory of statistical detection—quite a sticky subject. For our purposes, however, the fact that a message makes sense should be a good enough check. Third, we have the problem of long time constants, which calls for completely new operating procedure. This will call for a bit of imagination since your dits will have to be over a minute long.

The idea of long integration times and two hour contacts (if not longer) may sound "way out." However, a bit of digging (in the library, that is) has turned up the fact that long time constant integration is not a new idea. Early in 1946 the first moon bounce contact was made not by the Signal Corps but by a Hungarian named Bay. In theory his system was very similar to the one described above. He used about 5 minutes of integration time and was able to get better than 10 db gain. Our experiments with integration times up to one minute gave gains of up to 3 or 4 db (relative to no integration). The Venus echo was also received by a similar method. Sound interesting. Well, why not give it a try? We will be very interested in your results.

73, ALLEN, K2UYH

*48 Cumberland Avenue, Verona, New Jersey.

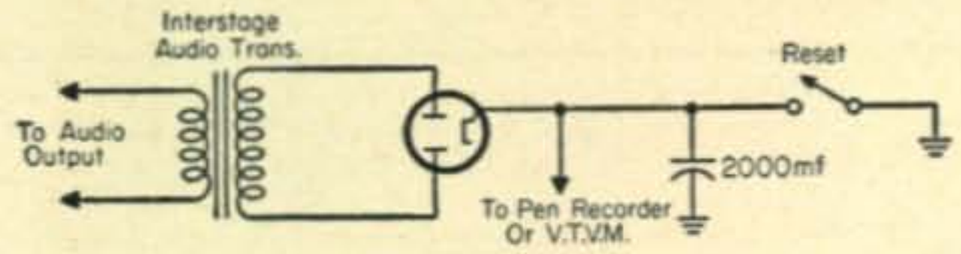

Fig. 1—Simplified circuit of a method by which very weak signals are detected at K2UYH. The 500 Ω audio filter is hooked directly to the station receiver with all measurements taken from the tube's cathode (such as 6AL5, etc.). After the given time segment (such as one minute) for the capacitor to charge, it is manually discharged and our operation begins again. See text.

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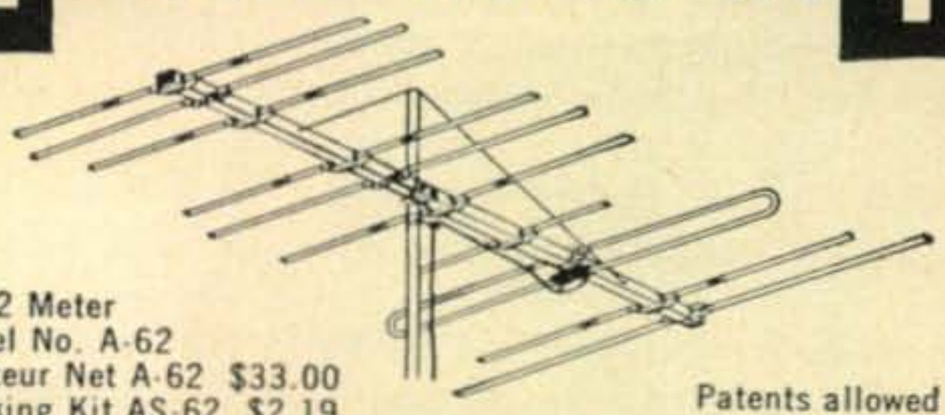

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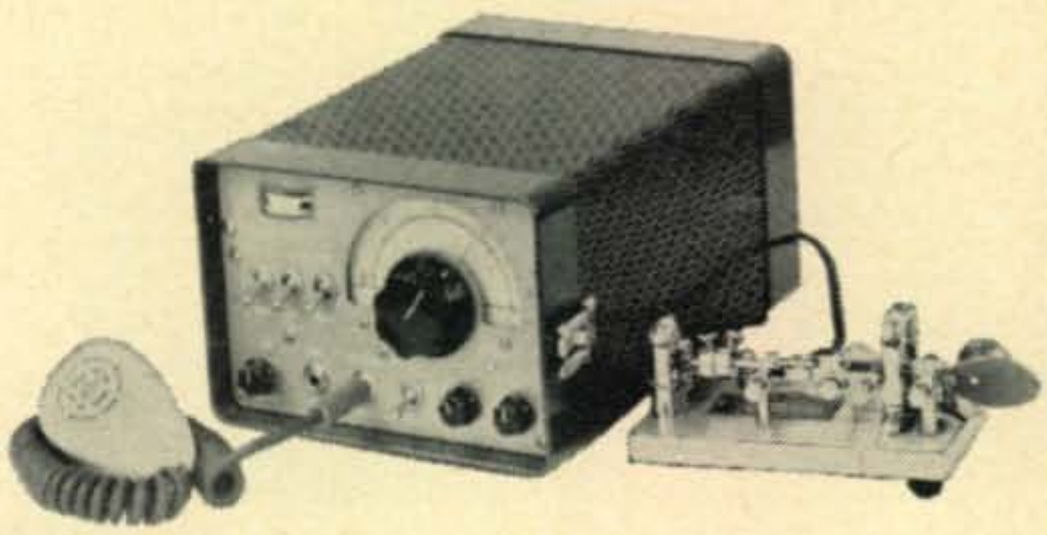

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VHF Report [*from page 73*]

transistor is readily available through Allied Radio at $4.50. It can be constructed in a small minibox inside the station receiver.

East Coast VHF SSB Association

About sixty amateurs attended this group's Sideband Dinner on Saturday, September 21st, making it one of the biggest successes yet. In case you don't recall, The East Coast VHF SSB Association is an active group of primarily 50 mc sideband enthusiasts from the New York City metropolitan area. Lately, however, the lure of a "special-special" club has attracted great numbers of new members from all over the country. Abe Cutler, WA2ONB, sect.-treas., tells us that on a recent Sunday evening an excellent 50 mc aurora provided a nice four way sideband QSO between Massachusetts, Michigan, New Jersey and Virginia. In another note, Abe informs us that on September 29th, thirty-five sidebanders checked into the six meter net all the way from Maine to Virginia. "We thought you could let the a.m. operators know how well we sidebanders have been doing *without band openings*."

The Aurora

Another good reason for all of us to concentrate a bit more on 144 mc is the record-breaking aurora "openings" occuring this Fall. More specifically, we're talking about the evening of September 14th, when possibly the most effective aurora in v.h.f. history was recorded in logs across the country. Reports are still coming in, indicating the vast geographic extent of this condition. To begin with, it appears that the 50 mc men felt the initial impact of this aurora quite early in the evening. As the hours wore on, more and more c.w. buzzes were heard in the first 100 kc of the band. And while the key-clickers were busy racking up new states, the s.s.b. crew were busy proving theories. (To the uninitiated, the v.h.f. sidebanders have long argued that more intelligence can be communicated reliably on s.s.b. during aurora than on any other mode.) Whether or not they have sold off their Vibroplexes remains to be seen, however. Meanwhile things were perking up on two meters. As you well know, the "aurora m.u.f." seldom reaches 144 mc, at least by comparison to its frequency on 50 mc; but this one did. We recall tuning the band from 144.0 to 146.9 with hardly a spot to inject the v.f.o.! Many East Coasters worked 15 states that night! And we must admit that there *was* sideband activity on two . . . more so than has ever been heard on the band before.

Sign Off

Well, that just about brings us down to the bottom of the pile for another month. Meantime, get busy checking your QSL cards against Directory #26 and the USA-CA Record Book and remember to send in for details on our new Counties Box listing for v.h.f.

73, Bob, K2ZSQ

For further information, check number 36, on page 106

Project Interference [*from page 31*]

simultaneously on upper and lower sideband on the same frequency without interference. This action requires adequate s.s.b. suppression and depends on the relative signal levels of the wanted sidebands. Some so-called "monkey chatter" will be present but the signal will be readily understandable. Make a short "interference check" transmission before calling a CQ. Simply inquire "Is this frequency occupied?", and sign your call. This practice will further assist in reducing interference.

Progress Report

The scope of Operation Quality Cleanup is so vast we cannot afford to withhold evaluation until interference has been significantly reduced. It is of the utmost importance that we maintain continuous surveillance to keep operations on the right track.

The author will gladly act as the clearing house for compiling names of participating amateur radio/DX clubs and individual amateurs along with results of performance progress reports for publication.

Each radio club and amateur working individually is requested to forward to K4TUA the following data:

1. Post card or letter indicating that the club or amateur will wholeheartedly support and fully comply with Operation Quality Cleanup.

2. Monthly progress report consisting of: date of coverage, name of club or individual, number of amateurs participating, band used, number of stations contacted with defective signals, number of stations (by mode) which agreed to correct deficiency, and reason for defective signal, whether due to distortion products or broad bandwidth.

Conclusion

Implementation of the techniques outlined will significantly lessen amateur spectrum interference. The organized efforts of thousands of amateur operators complying with Operation Quality Cleanup will serve as a tremendous weapon in the day-to-day battle against interference.

The decision is up to you, the individual amateur operator, as to what course of action you will follow regarding the most serious problem on the amateur bands, namely, interference. Either continue to assume a lackadaisical attitude toward attempting to alleviate interference, or assist in Operation Quality Cleanup in order to achieve more effective and efficient operation on the amateur spectrum with a substantial lessening of interference. Let's put our shoulders to the wheel and reduce the interference level. K4TUA will do more than his share. Will you do your share?

Grateful appreciation and thanks are given to Frank E. Ferris, W4TYZ, and Carlton E. Mason, K4VPU, for their valuable suggestions and technical assistance. ■

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This is a collection of reprints, containing all of the available information on the conversion of the popular "Command" transmitters and receivers into good ham transmitters and receivers. Invaluable for Novice, Technician, General, Advanced and Extra class operators. 136 fabulous pages, only *$1.50* postpaid.

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212 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator. All this for only *$2.50.*

SIDEBAND HANDBOOK

Written by *Don Stoner, W6TNS,* was almost one full year in the preparation of this terrific volume. This is not a technical book. It explains sideband showing you how to get along with it . . . how to keep your rig working right . . . how to know when it isn't . . . and lots of how to build-it stuff, gadgets, receiving adaptors, exciters, amplifiers. Price, only *$3.00.*

CQ ANTHOLOGY

Most amateurs do not have a good file of back issues of *CQ*. So we've looked back through the years *1945-52* and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out. The price is a mere *$2.00.*

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flight (1935) of the U.S. sportsmen pilots from all over the U.S. to Miami, Fla. which was an annual event for many years. Dot says she flew the earliest "bathtub" Aeronca with a cruising speed of 60 m.p.h. and a gas capacity of 110 miles, and adds, "Coming back I ran into very bad weather and had to make a forced landing north of Birmingham, Ala.—found through the rain I'd landed within the walls of a Benedictine Monastery where I stayed two days and nights until it cleared enough to take off again. My first forced landing was near Detroit in Henry Ford's experimental planting of soybeans. Never a dull moment in those days!"

A graduate of Syracuse Univ., Dot took her M.S. and Ph.D. in Biology at the U. of Mich. She is Phi Beta Kappa and Sigma Xi. In 1930 she became an instructor in the Nat'l. Rifle Assn. and an Examiner in Red Cross Lifesaving. She taught 4 years in a girls' college in Pa., lived in Peru for 3 years, has been a research agriculturist with U.S.D.A. in Peru, Ecuador, El Salvador, Cuba and Guatemala.

In 1947 Dot married Dr. George Saunders, a research biologist with the U.S. Fish and Wildlife Service and together they did field research in Mexico for several winters. Asst. Prof. of Biology at U. of Fla. in 1953-54, this was followed by a Fullbright post-doctoral research scholarship to Egypt in 1955-56 where Dot worked on blood parasites of fishes of the Red Sea. Since early 1955 she has been research assoc. at the Cape Haze Marine Lab. in Florida. From Sept. '62 to Sept. '63 she did research on blood parasites at this lab. under a grant awarded her by the National Science Foundation.

Dot's other hobbies include playing the piano, violin and alto recorder. She and her OM share a keen interest in photography. In addition Dot speaks Spanish, French and some Arabic. She operates W4UF from Englewood and also Gainesville, Fla. This last summer she had a marvelous two months traveling around Europe with a Danish friend in a new Volkswagen she picked up in Rotterdam.

Comments from an OM

OM W4ID writes: "This is a belated acknowledgment of receipt of your fine book, *CQ YL*. My only excuse is that I found it so interesting I wouldn't take time out from reading it. I was particularly interested in Chapter 8, Long-Time YLs, 1915-1925." Tnx for the kind comments, Al.

Now don't you think *you* would find *CQ YL* interesting? The Long-Time YL chapter W4ID mentions is only one of 18 covering every facet of YL participation in ham radio. Over 500 photos. Order an autographed copy for yourself or a gift from this YL editor, QTH at head of column, $3, postage paid.

Feliz Navidad y próspero Año Nuevo, amigos!

W5RZJ

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VHF Contest [*from page 68*]

Scooting along now to two meters, we find that it was quite a contest here too. The overwhelmingly universal comment about 144 mc conditions was in one word "poor," but the boys found no stumbling block here. Just had to work a little harder. Some flew to the hills like their 6 meter brethren and racked up some fantastic scores for their effort. Typical was New York's high scorer, K2LOK/2, who amassed 126 contacts in 42 counties for a total of 152,145 points. And the location was *not* in the NYC metropolitan area, but rather in Mayville, Chautauqua County, upstate. Right behind Jeff was WA2VRB/2 leading New Jersey from the famous v.h.f. peak at High Point State Park in Sussex County, New Jersey. Operator at WA2VRB/2, by the way, was Collin Deakin, WB2CUD, who made his mark earlier this year in *The VHF Amateur* contest in March, and in the *CQ* Spring V.H.F. Contest in May by walking away with the Novice awards. And we mustn't forget to mention the fine work put forth by K1YLU/1 up on Mt. Wachusett, 2018 feet above sea level, who took home the first place Massachusetts certificate for his trouble.

The countrywide 2 meter boom is reflected everywhere in our scores. In California WA6OQD/6 and W6SAW were battling for state honors but it was WA6OQD/6 who finished first by simply outlasting his competition with his hour multiplier of 20. Michigan's effort was rewarding also with a big show from that state. One hundred seventy-six contacts were logged at K8PBA for a final score of 253,440 points, more than doubling that of K8HNW who wound up second in the state. K8PBA's point total, by the way, was the highest submitted by any station in the 144 mc competition.

The East Coast newcomers dominated the Novice scene, but it was KN3WQB/2 in East Brunswick, New Jersey, who took the honors. This is the first year for separate Novice 144 mc competitional listings in our v.h.f. contests and their accompanying certificates. Response has been favorable and with each contest more and more newcomers are taking part.

All in all, the first annual Summer *CQ* V.H.F. Contest proved beyond any shadow of doubt that a single-band single-operator contest can be a lot of fun. Next on the agenda is the Spring 1964 *CQ* V.H.F. Contest patterned after the 1963 affair, including the three classes of competition: general; all band, multi-operator; and club aggregate. Check future issues for time, date, and rules.

Comments

. . . *K1PDA/1*—I gave it my very best until the end. If I'd had a v.f.o., I possible could have added another 100 contacts. Tell W2UUN and W3MFY that I tried to give them a run for their money . . . *W2UUN*—Comments? Sob, sob, sob . . . *K7OYB*—Suggest rule change to allow operators of unmodified Sixers to have added multiplier . . . ■

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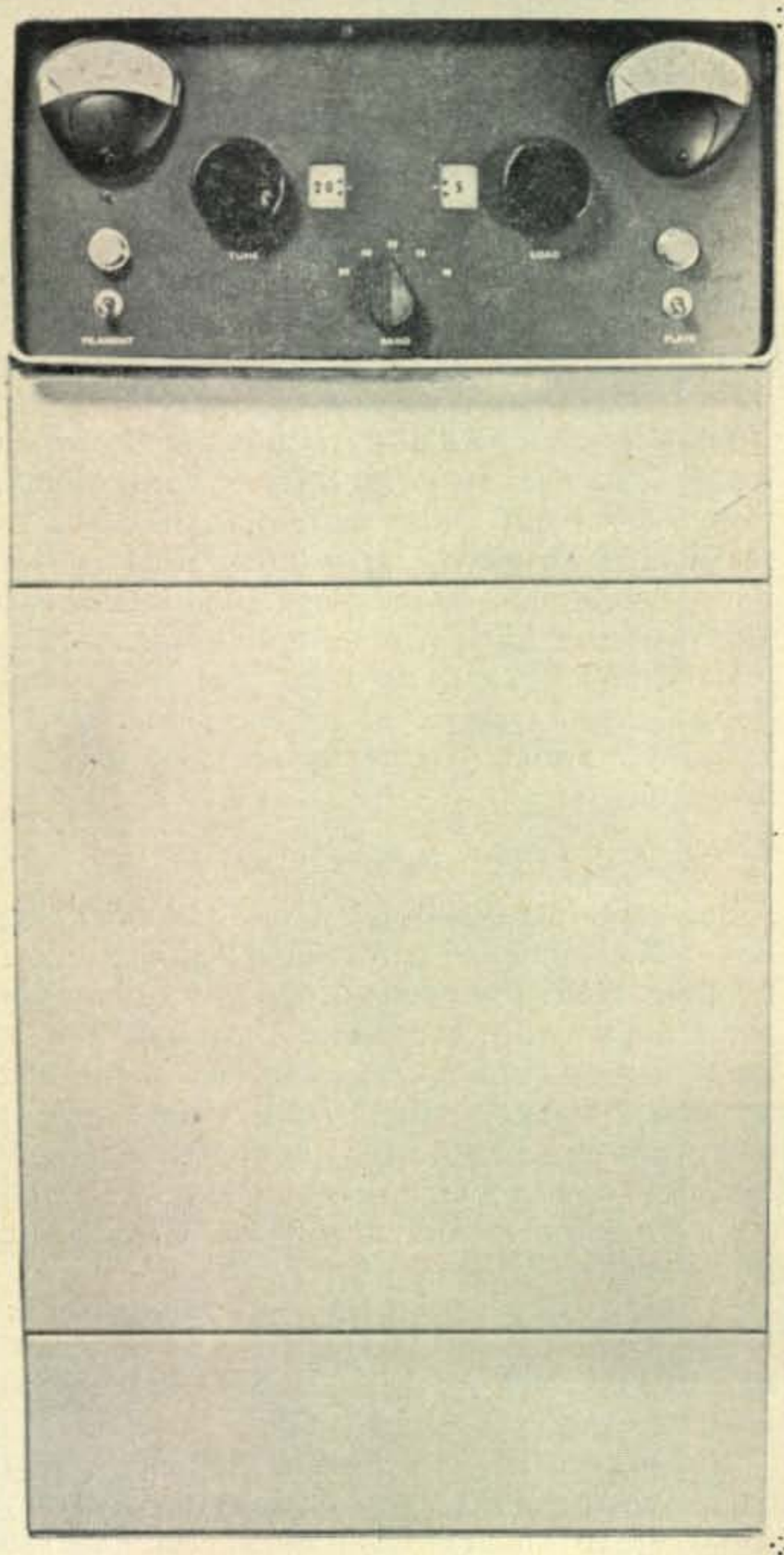

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Announcements [*from page 14*]

(c) Receipts will be furnished upon request in the case of payments made in person, but no receipts will be issued for payments sent through the mails.

(d) All fees will be charged irrespective of the Commission's disposition of the application. Applications returned to applicants for additional information or corrections will not require an additional fee when resubmitted. Refunds will be made only in the case of payments in excess of the fee prescribed in this subpart.

§12.86 Schedule of fees.

(a) Except as provided in paragraph *(b)* of this section, applications filed on or after January 1, 1964, under this part must be accompanied by the fees prescribed below:

Applications for initial license, including new class of operator license, and applications for renewal of license	$ 4
Applications for modification of license without renewal	2
Applications for a combination of modification and renewal of license	4
Application for a specific call sign pursuant to §12.81 *(a)*	20

(NOTE: Reassignment of a specific call sign held under an expired license is not subject to this fee if an application for renewal is filed within 1 year after the expiration date of the license.)

(b) Fees are not required for the following types of amateur applications:

Applications for Novice license.

Applications for a license for a station for recreation under military auspices.

Applications filed in the Radio Amateur Civil Emergency Service.

Mexico

The Amateur Radio League of Mexico (LMRE) will hold its National Convention 28 to 31 May, 1964 at Guaymas. Swimming, boating, fishing, etc., is nearby and a visit to the U.S. Satellite Tracking Station is also anticipated. Permission is now being arranged to allow U. S. amateurs to operate mobile in Mexico. Interested amateurs should write the Liga Mexicana De Radio Experimentadores, Sinaloa 9 5 Piso, Mexico 7, D. F.

Canada

The Saskatoon Amateur Radio Club will hold a QSO Party from 0600 GMT, 18 Jan., to 0600 GMT, 20 Jan., 1964 with the express purpose of promoting their "Wheat Belt Award." All bands and modes will be used. Logs should go to the club QTH: P. O. Box 751, Saskatoon, Saskatchewan.

Peace Corps

Applications are now open for February and June appointments to the Peace Corps. They may be secured from the Division of Recruiting, Washington, D. C. 20525. Special literature will be sent on request to those indicating the particular area of their skill and when they would probably be available.

Corrections

In "A Test Set for F.M.," *CQ*, November, page 74, two changes should be made. First, on page 75 a speaker jack may be connected between terminals 9 and 10 in fig. 1. On the same page (first column, second paragraph) it should have been brought out that the test set reads one half the plate current to *both* halves of the final tube in the 140-D transmitter.

The caption for fig. 1 of last month's HAM CLINIC column omitted the signal characteristics of the scope patterns (page 98). They should read: (1) No signal; (2) Linear; (3) Overloaded; (4) Too much bias; (5) Low static plate (current; (6) Phase-shift between scope amplifiers.

In "Construction and Calibration of a V.F.O.," July, page 42, an error appeared in fig. 1. The 100 mmf capacitor situated between *RFC*s and pin 3 of the 6F6 should be placed between *RFC*s and pin 5 of the 6L6G.

Novice [*from page 62*]

distort and then, while returning to its natural form, will generate a potential across its surfaces *opposite* the applied potential. Thus, the potential across the crystal takes the form of a sine wave and we have generated an a.c. signal.

The frequency of this signal is determined by the physical dimensions of the quartz crystal; the smaller the crystal, the higher the frequency. The frequency may change slightly with temperature and with age but is normally quite stable. Crystals can be obtained for frequencies from about 10 kc all the way up to 75 mc. For frequencies higher than this, frequency multiplier circuits are used.

Some crystal oscillator circuits are shown in fig. 1. The one shown at (A) is conventional tetrode oscillator whose output is the same as the crystal frequency. It is often used in low power rigs in the 3-15 mc range. Figure 1B shows a pentode in a frequency multiplying circuit. The plate circuit is tuned to either the crystal frequency or a harmonic of it. The circuit shown in fig. 1C is usually used with "overtone" crystals in converters.

Letters

Steve Bonine, WN4NUJ, 5706 Briercliff Road, Knoxville, Tennessee sends along this nice letter:

"Dear Walt: I've been putting this off now for about six months, ever since I got my Novice ticket. I took the General exam last month and am now waiting for the FCC to drop the N. I now work 80 and 40 meters with a Knight T-60 transmitter and a Knight R-55 receiver. Antennas are a dipole for 80 and an end fed ¼ wave wire for 40 meters.

"I would like to have a few more ham pen-pals. I haven't worked any YLs yet, and I sure would like to know where they are hiding. I am 14 years old and in the ninth grade.

"I'll be glad to help anyone that needs it. I have a tape recorder and will make tapes of any speed up to about 15 w.p.m. I also have an Allied Radio Code Course record that I will loan.

"Walt, talk about a coincidence. When I contacted WN4ODB there was nothing unusual about the QSO. But we later discovered that we had a few things in common: Name, age, Transmitter, Receiver, Antennas and grade in school. 73 and keep up the good work, Steve."

Thanks Steve and the next QSO may be just as exciting, this is one of the joys of amateur radio, I've had quite a few surprises myself.

"Dear Walt: I have been reading the NOVICE column in *CQ* for several years now, and have finally decided to throw in my 2¢ worth.

"After being inactive for a while due to service I got my new call sign a few days ago. I will be operating strictly 40 meter c.w. as KA2WH from the Yokohama Japan area.

"I have done a lot of listening on the Novice portion of the band and I'd like to tell the Novices that their 20-30 watts *does* reach Japan. In fact more Novices are heard here than General

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HQ-180AC	General Coverage Receiver	449.00	16.03
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HXL-1	Linear (Available Soon)	395.00	14.08
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class stations on 40 meters. The QRM over here is terrible and only the 7005-7020 kc portions of the band is reliable for c.w. work. The Novices can be heard (all call areas) in between the commercial stations.

"I would be most happy to arrange a sked with any Novice desiring a QSO with Japan. I would listen for them on the Novice portion of the band and I would operate on the lower portion. Such skeds should be arranged at least a month in advance as I am stationed aboard ship, but can be on the air about 10 to 15 days per month. Don't forget the difference in time zones.

"I am running about 60 watts to a 5763-6146 combination into an 80 meter Windom about 30 feet in the air surrounded on 3 sides by a 100 foot cliff. The receiver is an 8 tube homebrew. The station is built entirely from junk, but does put out a good signal. The best DX is Germany to the West and the USA to the East. Yours truly, Bill Hunt, KA2WH (K2IRT), Box 297, Navy #570, c/o FPO, San Francisco, California."

Thanks, Bill, I hope to work you myself and I'm sure you will get many letters for skeds.

Help Wanted

SP5 Walter R. Wan (RA 10 812 698) Military Police Company, Fort Monmouth, New Jersey, 07703 offers to help any one get a Novice license if they will get in contact with him. Thanks Walt.

James G. Plimpton, Box 68, Coleman, South Dakota needs help for the Novice ticket.

Larry Johnson, 3115 Hazel Street, Erie, Pennsylvania needs help.

That just about winds up the column for this year and for this month. Many of you will get this about Christmas time and to those I would like to extend my wishes for the best year of your life to be the one just coming. May we have some indication that "Peace On Earth will not be just a wish, but will become a reality for all time. Peace on earth must come from the hearts of all of us, it can not be regulated by presidents and kings. Merry Christmas and Happy New Year! 73, Walt,W8ZCV

DX [*from page 54*]

It's that time of year when the Jolly Old Man brings gifts for everyone (no, I don't mean Gus, W4BPD), and I hope you find all kinds of goodies under your tree.

I would like to take this opportunity to thank all you wonderful people for the help and cooperation you have shown me this past year. The nice notes and letters were greatly appreciated.

DX has been nothing short of amazing this year. Conditions were much better than anyone had expected. The impossible became reality. The man from South Carolina continued his "impossible" accomplishments. AC3, AC4, and AC5 fell like straws in the wind and as if that wasn't enough, he added AC7 to the list. Who will forget the sleepless nights trying to work VK4HG/VK4WV on Willis Island? VK4JQ

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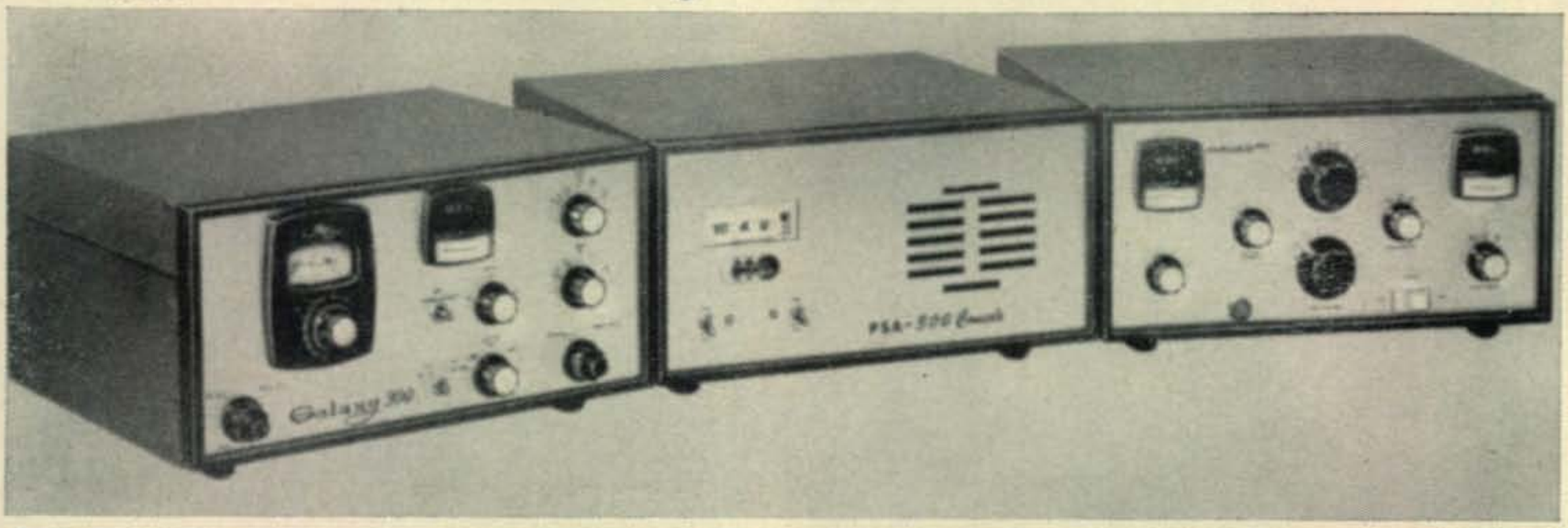

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For further information, check number 43, on page 106

came to the rescue and gave the boys Willis at last. 4W1 was removed from the rare list by no less than three separate operations. Some of the other things that made '63 a vintage year for DX were: TI2HP making 300 countries on 2×SSB—the wonderful job Ron, VS4RS, did to give the gang a new one—the controversy over KG6ID and VQ8BFA—Wally, W9JJF, from CR8AA, 4W1, and CR5AA—the retirement of Danny Weil—Les, G8KS, giving the boys a new one as GC8KS—W9WNV/KG6R—WØMLY as TI9RC—KC6BK/KC6BO dishing out Caroline Island QSOs from both east and west—100 different U stations on s.s.b. for the phone contest—YVØAA—CEØZI—the /FC operation by Hammarlund as well as VK9BH/VK9DR/VR1N—ZD7BW—BY1PK and BY9SX driving everyone crazy—JT1CA on s.s.b.—Since we started with Gus, let's finish with him. 1963 saw FR7ZC/T/G/J, 4W1, FL5, VS9K, 9N1, YA, FH8, as well as the ACs fall prey to his charm. What does 1964 hold in store? One thing is obvious, most of it will be happening around 14035 and 14065 kcs.

73 es DX, Urb, W2DEC

Prop [*from page 56*]

WESTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Southern Europe & North Africa	06-07 (1) 07-09 (2) 09-11 (1)	05-07 (1) 07-10 (2) 10-14 (1)	16-18 (1) 18-22 (2) 22-00 (1)	18-22 (1) 18-20 (1)†
Eastern Mediterranean	07-09 (1)	07-10 (1)	18-22 (1)	*NIL*
South Africa	08-13 (1)* 06-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-16 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (1)	18-21 (1)	18-20 (1)
Central Asia	08-10 (1) 17-19 (1)	07-10 (1) 17-20 (1)	05-07 (1)	*NIL*
Southeast Asia	15-18 (1)* 09-11 (1) 15-16 (1) 16-18 (2) 18-19 (1)	03-09 (1) 09-11 (2) 11-12 (1) 15-20 (1)	01-04 (1) 04-07 (2) 07-09 (1)	04-07 (1)
Far East	13-15 (1) 15-17 (2) 17-19 (1)	03-10 (1) 13-14 (1) 14-16 (3) 16-18 (2) 18-20 (1)	22-00 (1) 00-06 (3) 06-08 (2) 08-10 (1)	00-01 (1) 01-05 (2) 05-08 (1) 01-06 (1)†
Pacific Islands & New Zealand	10-17 (1)* 09-12 (3) 12-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	07-08 (1) 08-10 (2) 10-17 (1) 17-19 (2) 19-21 (1)	20-22 (1) 22-00 (2) 00-05 (3) 05-07 (2) 07-09 (1)	00-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)†
Australia & New Zealand	12-16 (1)* 08-10 (1) 10-12 (2) 12-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-03 (1) 03-05 (2) 05-07 (3) 07-09 (1)	03-05 (1) 05-06 (2) 06-08 (1) 04-07 (1)†
South America	07-09 (1)* 09-14 (2)* 14-16 (1)* 06-07 (1) 07-12 (2) 12-14 (4) 14-16 (2) 16-18 (1)	14-16 (2) 16-18 (4) 18-22 (2) 22-05 (1) 05-07 (2) 07-14 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-04 (1)	20-22 (1) 22-01 (2) 01-03 (1) 22-01 (1)†
McMurdo Sound, Antarctica	06-07 (1) 07-09 (2) 09-12 (1) 16-18 (1)	16-18 (1) 18-22 (2) 22-03 (1) 06-07 (1) 07-09 (2) 09-12 (1)	00-05 (1)	*NIL*

[*End of Dec.-Jan. Forecast*]

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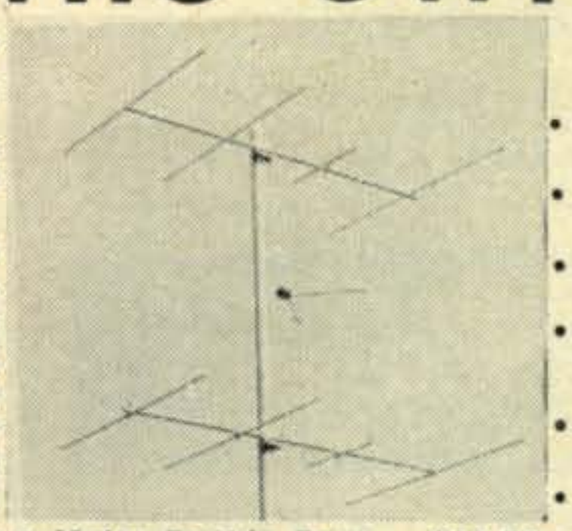
Why is the "J" beam better? Well, for one thing they are custom built to your specifications — no short cuts anywhere — and commercially engineered to produce maximum results under all conditions. Guaranteed SWR of less than 1.5 to 1 over *entire* band! The "J" beam antenna was designed especially for VHF bands and it makes use of waveguide concepts in the feed system which guarantee efficiency far above the ordinary. Stacked "J's" are available from 8 to 180 elements! Free literature available.



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For further information, check number 2, on page 106

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Sensitivity is 1.0 microvolt for 10 db. Signal to Noise ratio. Selectivity is ± 0.8 KCS at — 65db with Q-MULTIPLIER. Available in a semi-kit version with all major components premounted. **Model KT-320 — only 64.95 Complete**

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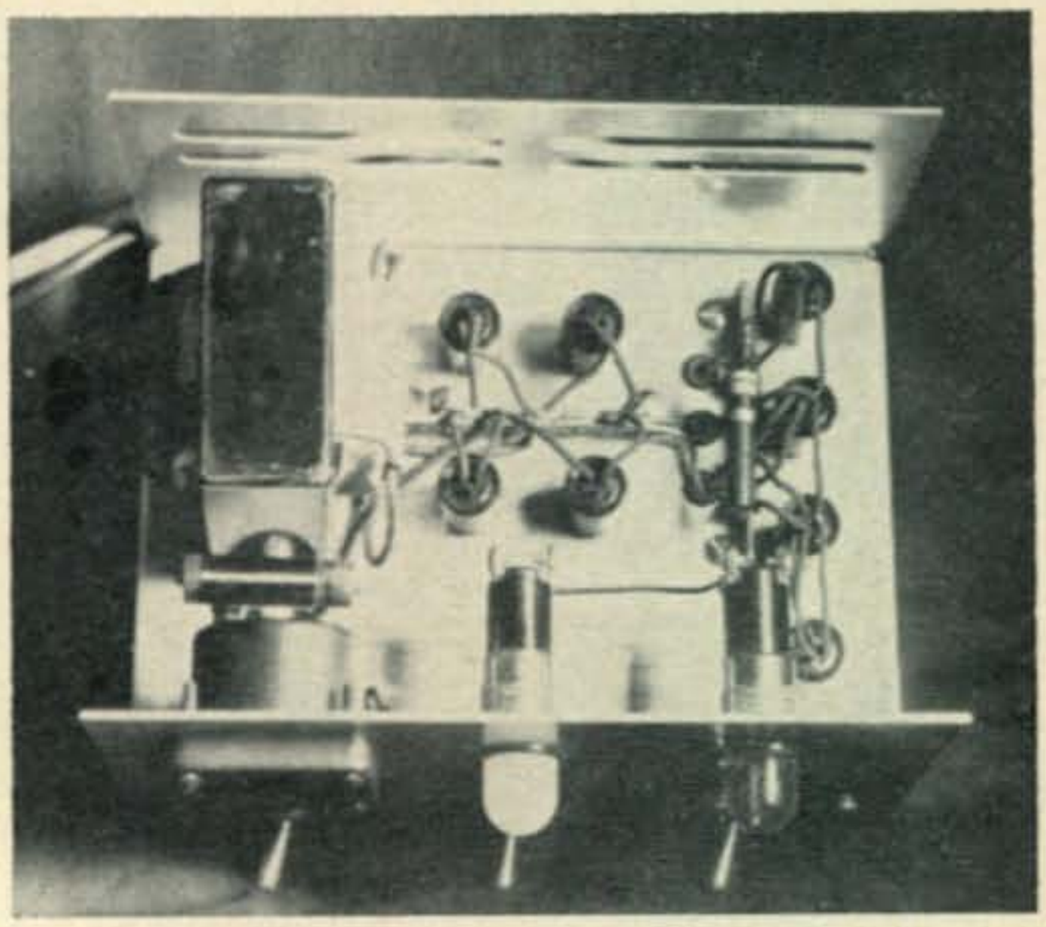
For further information, check number 44, on page 106

Alkaline Batteries [*from page 48*]
collector and base are used as a PN junction diode and the emitter is not used. The low forward voltage drop and high front to back current ration results in a highly efficient rectifier.



Interior view of battery charger/eliminator showing parts placement. To the right of the power transformer are the four 2N158s used as diodes in a bridge circuit. The four 2N158s at the far right are voltage regulators for battery eliminator use.

Current Equalizing

When powering a transceiver from the battery eliminator, provision must be made to equalize the current drain on transmit and receive. In the unit shown, a 3.5 ohm resistor, R_3, is connected across the output of the supply on receive by switch contacts in the transceiver. If it is desired to operate the rig from a 12 volt car battery a 3.5 ohm resistor can be connected between pins 3 and 4 on the external power connector to equalize the load so that a 2.5 ohm 25 watt series dropping resistor can be used to obtain the necessary —7.5 volts. ■

Mills Trophy Race [*from page 51*]
the only XYL operator taking part. She proved that she had the stamina and ability to match the hardiest of the male operators.

From the time the starting cannon was fired Saturday until the first of the Class A Cruisers, the *Merry Maiden*, swept across the finish line at 0800:36 Sunday morning traffic flew back and forth across the western half of Lake Erie at an unprecedented rate.

One Detroit amateur commented that he was hearing a lot of marine mobiles and wondered if they were having some sort of convention at Toledo.

Amateurs who took their turns at operating the net control station in addition to those already mentioned were: W8ITT, W8BCQ, K8ISE, K8LFI, W8DJC and W8HYE.

The *X-Touche*, second boat across the finish line at 0820:17 was the actual winner of the race with the best corrected time with handicap.

All the mobiles had secured by this time
[*Continued on page 96*]

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VHF CONVERTER *for 6 and 2 meters*

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For further information, check number 46, on page 106

VHF Amateur Editorial [*from page 67*]

complaints do *raise a serious question as to whether your operation . . . is in the public interest.*

. . ."The Commission has granted your present application for a General Class license with the condition that *you are not to transmit in the 50-54 mc band.*

. . ."The Commission's rules . . . provide that where the Commission, without a hearing, grants any application with a condition other than that requested, the action of the Commission should be considered as a grant . . . unless the applicant shall within thirty days . . . file with the Commission a written statement refusing the grant as made. Accordingly . . . you may request a hearing . . ."

We have taken the liberty of italicizing key portions of the above text for the sake of emphasis. Deleted for space purposes are more assurances that Seaman hasn't violated any laws and a reminder that if he accepts the General license, the old Technician ticket will be cancelled. Commissioners Bartley and Cox did not agree with this action, but they were in a minority.

The Gargantuan Confidence Game

In our opinion this incident marks one of the most treacherous moves ever inflicted upon an amateur in a free country. We wish to state right now that we cannot possibly support the FCC in their actions, nor can we condone the public's attitude, the appalling behavior of the Elizabeth, Pa., police, the newspapers involved, or the actions of the seemingly influential Congressman Holland. (Unfortunately, *CQ* was unaware of the circumstances until the morning of October 21st, when a copy of the FCC's action reached this desk). We have been assured by many that K3IOP has made commendable efforts in his relatively short amateur career towards advancing himself in the art as well as developing a healthy interest in the bands above 50 mc. In short, he appears to be a well-intentioned young man who could be a valuable asset to his community and the amateur fraternity as well. Just turning sixteen, however, he must have seemed to be small sacrifice for the personal ambitions of certain politicians and the reams of journalistic "news" that undoubtedly built up an impressive circulation for many newspapers.

Personally speaking, we would think that the FCC field engineers would have had better judgment than to march into the Seaman home six times without any advance notice. Here these men by their very actions are in essence condemning a teenage boy in the eyes of his family and neighbors. What ever happened to tact and respect? At no time was Butch found to be a violator, nor was his attitude questioned.

The FCC's final edict is to us perhaps the most dangerous of all. Here, in distinctly setting K3IOP up as an example, they are establishing a precedent for future rulings. With such a precedent on the books, it would be a small job indeed to put a ham off the air in years to come. The Commission questions whether Butch's operations were in the "public interest." Does the government define public interest as the population's addiction to *Gunsmoke?* It certainly is a shame that in today's world public interest is based on Nielson ratings. Is is asking too much for even an ignorant community to have just a bit of pride that one of their youngest citizens is moving rapidly into the electronics age—and not from in front of a TV set? Have Elizabeth's residents ever been informed that amateur radio exists because of the service it renders? We wonder how presiding Commissioner Hyde defines "public interest" . . .

It hardly seems the American way that lawless mob violence should be rewarded by the federal Government's support. The legal basis on which the FCC action was taken was referred to in their letter. It appears from this that if Butch hadn't applied for a General license, he'd still be on six meters. As it stands, however, he can't even operate mobile or portable, or in the wee hours of the morning. Although the situation obviously doesn't warrant such severe restrictions, the FCC still refuses Butch the right to operate six under *any* conditions.

We hope Butch Seaman seizes the opportunity to present his side of the case at a hearing. Personally, I would not blame him if he decided against it, though. How many of us could have endured what he and his family went through the past year? But we feel that if he continues his fight, he has a good chance of winning. He must. It's a black day in amateur radio when an ambitious lad is made to suffer personally for trying to advance himself.

BOB BROWN, K2ZSQ

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Receiver
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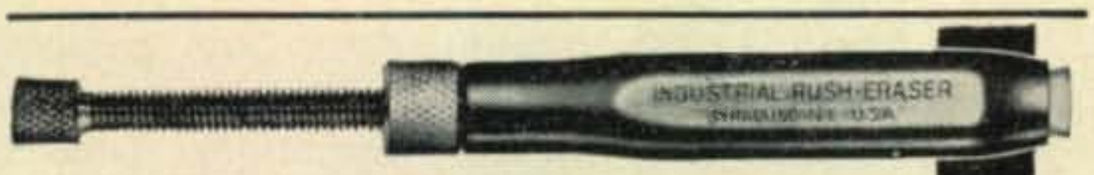

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Mills Trophy Race [*from page 90*]

except the committee boat stationed at the finish line. It continued operation until 33 of the 58 starting boats had finished at 1430 Sunday. The net control station were secured at this time.

It was a bone-weary bunch of amateurs who straggled to their homes Sunday for a rest. In each one however, was a deep sense of satisfaction for a job well done. Each knew that he had been a part of a well planned and organized operation which was a success in almost every detail. They proved they could handle any communications problem for which they might be called. They also proved the value of 160 for this type of operation and most of all showed what a group of amateurs, with perfect cooperation can accomplish.

ACKNOWLEDGEMENT: The authors wish to thank more than thirty Amateurs who participated in this event. Most especially they would like to thank W8TSD, W8KIX, W8NBD and K8ISE for their able assistance and encouragement and for providing information for this article. ■

Space [*from page 59*]

There are some experts who believe that passive satellites, acting as radio mirrors in space, are the simplest of all communication satellite techniques.

Europa OSCAR

As reported last month, plans are going forward for an amateur radio satellite which will be built in Europe. While the International Amateur Radio Club (4U1ITU) of Geneva is coordinating the project in its early stages, the satellite will be built under the auspices of the International Amateur Radio Union (IARU). More information on this project and the OSCAR III active repeater project in next month's column.

Season's greetings and 73 from W3ASK

RTTY [*from page 67*]

and reflect upon hamming, RTTY in particular, since it all began for us back in the mid-1930's. Like the "Old Man" of old, we think operation could be improved. (!) It saddens (and frightens) us that the usual new "ham" buys all of his gear over the counter, building *nothing*. This fellow is almost ignorant of RTTY, the history of amateur radio, and looks upon it as just another hobby. It gladdens us to see a new breed coming into the field, usually through the Technician ranks, a breed of young people who get going on v.h.f., hams who have to build and who *want* to build their own gear. (They can't afford the expensive TU's and other commercial "amateur" equipment available over the counter.) There *is* hope for the future!

Merry Christmas and a Happy New Year to all!

73, Byron, W2JTP

TERRY STERMAN
W9DIA

Shown here is Pete, K9AIF, our traffic manager. Pete's in charge of all outgoing shipments. Read what he has to say about NATIONAL'S new transceiver NCX-3—that you can own for *only*

$13.17 *a month.*

"I have an NCX-3 in my car and I think it's the best transceiver in its price class. A lot of people must agree with me, because I ship more NCX-3's a week than I do all other transceivers combined. See you on 80, 40, or 20 meters. Order your NCX-3 today from Terry, so that I can see that it is properly shipped out."

$5.00 DOWN ...UP TO 3 YEARS TO PAY

JUST $13.17 A MONTH. LOOK AT LOW PAYMENTS AFTER $5.00 DOWN

	PRICE	3-YRS.
6 & 2 mtr. VFO	$49.95	$1.62
NC-60 rcvr	59.95	1.98
NC-121 rcvr	129.95	4.69
NC-140 rcvr	189.95	6.67
NC-190 rcvr	219.95	7.76
NC-270 rcvr	279.95	9.92

	PRICE	3-YRS.
NCX-3 Transceiver	369.00	13.14
NCX-A AC P/S	110.00	3.79
NCX-D DC P/S	119.95	4.15
NC-303 rcvr	449.00	16.03
NC-400 rcvr	895.00	32.13
HRO-60 rcvr	975.00	35.02

	PRICE	3-YRS.
XCU-27 calibr. for NC-140, NC-190, NCX-3, NC-303 and HRO-60	26.60	80¢
NTS-3 spkr for NC-140, NC-190 & NC-270	19.95	62¢
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For further information, check number 31, on page 106

Ham Shop

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Because the advertisers and equipment contained in Ham Shop have not been investigated, the publishers of CQ cannot vouch for the merchandise listed therein. We reserve the right to reject advertising which we feel is not of an amateur radio nature.

QSL's? WPE? CB? Finest samples 25¢ (refunded). Sackers, W8DED, Holland, Michigan. (Religious QSL samples 25¢).

QSL's, CB, WPE SAMPLES, 10¢. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Arizona. 85017.

QSL CARDS Largest selection-Lowest prices. Samples & catalog, 25¢. Refund or 25 extra cards with your first order. Debbeler Printing, 1309-C North 38th Street, Milwaukee, Wis. 53208.

QSL's-SWL's or what have you. You name it and we will do it for you as you wish. Expert art work at nominal cost, enough said? R. McGee, 6258-103rd St., Jacksonville, Fla. 32210.

1964 QSL-size calendars, 100—$7.00. Samples 25¢ Morgan, W8NLW, 443 Euclid, Akron, Ohio.

PICTURE of yourself, home, equipment, etc., on QSL cards, made from your photograph. 250—$7.50 or 500—$10.00 postpaid. Samples free. Write to Picture Cards, 129 Copeland, LaCrosse, Wis.

QSLs SWLs XYL-OMs (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.

QSLs free samples. Fast service. Bolles, 7701 Tisdale, Austin, Texas.

QUESTION Want to design a QSL card? Sampler Instruction Kit 25¢. Wow! what cards you can create. $1.50 and up 100. Samco, Box 203, Wyantskill, N. Y. 12198.

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RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box 7507, Kansas City, Mo. 64416.

QSL's 3-color glossy. 100 $4.50. Rutgers Vari-typing Service. Free Samples, Thomas Street, Riegel Ridge, Milford, N. J.

CALL CARDS Badges, decals, goodies, illustrated literature with samples 25¢. Errol Engraving Att: K1VRO, Westfield, Mass.

QSL's. . . . Nifty . . . Thrifty . . . Dime. Filmcrafters. . . . Martins Ferry, Ohio

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NEW QSL PRINTER with new designs. "2-color" $2.25 per 100. 10¢ for samples. Corneilson, 321 Warren, N. Babylon, N. Y.

QSLS Large selection styles, including photos. Fast service. Samples Dime. Ray K7HLR, Route 3, Twin Falls, Idaho.

Q-STAMPS add a smile to your QSL! Your photo in either of two postage-stamp sizes: 100 small or 50 large, $2.00 per gummed-back, perforated sheet. Free Samples. Send self-addressed stamped envelope to Q-Stamps, Box 149, Dept. 4A, Gary, Indiana 46401.

1964 QSL catalogue. New Designs. 10¢. Longbrook, Box 393-Q, Quakertown, N.J.

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 Jersey.

FREE Write for copy of latest issue. Hundreds of buy, sell and trading ads. Hams Hobbymart, P.O. Box 38, Rowayton, Conn.

WORLD RADIO Laboratories has big discounts on overstock of used equipment, due to so many trades on the fabulous new Galaxy ssb transceiver. Save on reconditioned equipment now. Write for our latest Blue Book list, over 1,000 items. WRL, Leo, WØGFQ, Box 919, Council Bluffs, Iowa.

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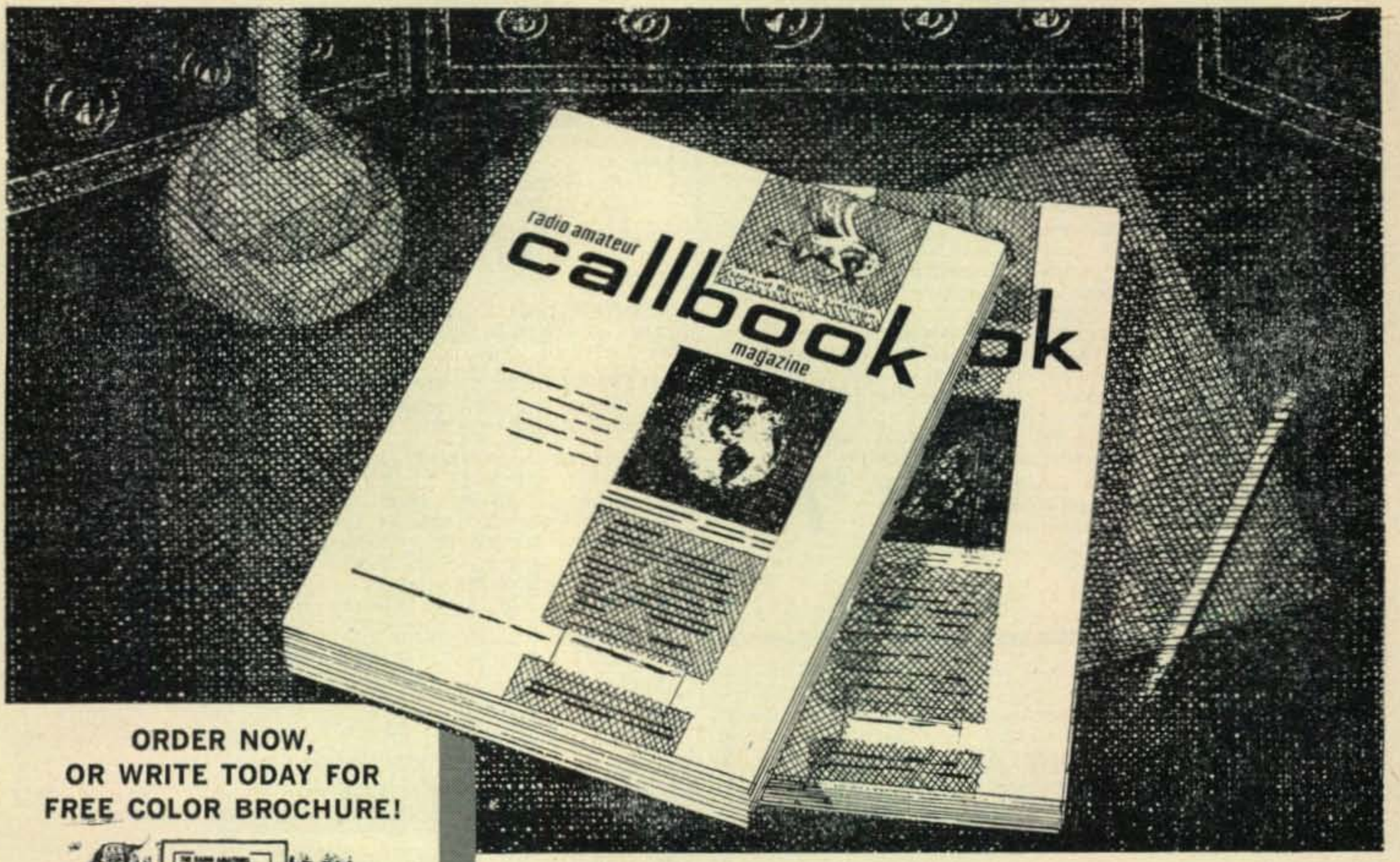

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ESTATE of K9DMZ Heath HX-30, 6 meter SSB, used only 2 months. Johnson 6N2 and Eico modulator, factory wired, reasonably priced. Contact K9PRB, 329 Dwight, Joliet, Illinois.

SWAP equipment, components with other hams! Many offers in "Equipment Exchange." Interesting sample copy free! Write; Brand, Publisher, Sycamore, Ill.

WANTED ARB rcvr, must cover original freqs. Trade Dow Key, HV plate Xfmr, or cash. Hollis Button, 675 W. Parr, Campbell, Calif.

FOR SALE HQ-180C, excellent condition, s.n. 4416. Purchased Dec. 1962; aligned Aug '63. Also, S-2000, excellent. Both for $283. Cary Green, Box 393, Lexington, Va.

SELL SX-101A, like new, $250.00; Eldico SSB-1000, $300.00; Collins 32S1 & a.c. power supply, like new, $575.00; Sony CS-300 stereo tape recorder with 2 mikes, like new—$250.00; Concertone stereo recorder, five heads, 10½ inch reels—perfect—$500.00; Transtenna TR switch outboard—$50.00. Lamb, 1219 Yardley Rd., Morrisville, Pa.

MUST SELL Collins KW-1 transmitter. Excellent condition. Will sell to best offer over $1000. Friar Tom, Saint Anthony, Friary, Hudson, N. H.

SACRIFICE Halli SR-34 deluxe 6/2 mtr transceiver, AC model. Excel op condx & clean outside. Best offer. Box TK2, CQ, 300 West 43rd St., New York, N. Y. 10036.

REPORTING Forms for the "VHF Report" column (see VHF section, this issue) are still available free from CQ. Send a s.a.s.e. to: VHF Report, c/o CQ, 300 West 43rd St., New York, N.Y.

INTERESTED in becoming a member of the Continental VHF DX Association (no fee)? To be eligible, you must be currently active on at least one band above 50 mc and preferably have had experience in some of the more popular VHF contests. Membership is open to enthusiasts in all 50 states by application. After June 1, 1964, membership will be by appointment only. For further information write: Continental VHF DX Association, Box 528, South Rahway, N.J.

SACRIFICING excellent Valiant & HQ-160 for quick sale. Complete information on request. K4KJK, Box 6080, Charlotte, N. C. 28207.

SPECTRUM ANALYZERS. Fit your receiver. Brochure. Halco, Box 283, Saxonville, Mass.

CRYSTALS: FT-243's ± 2 KC . . . $1.00—3500 to 8650. Hundley Crystal Co., 2947 North 35th, Kansas City 4, Kansas.

FT-243 CRYSTALS: 3400 to 8700 kc—± 2 KC $1.00 each. Nets $2.00 each. Denver Crystals, 776 South Corona, Denver 9, Colorado.

PRINTED CIRCUIT BOARDS. Hams, Experimenters. Silver Sentry VFO, $2.85; Converter March CQ, $1.50. Free catalog. P/M ELECTRONICS. Box 6288, Seattle, Washington. 98188.

BARGAINS! Read The Ham Trader. Free copy or 25¢ for current issue. Box 153Q, Franklin Square, New York 11010.

WILL PAY any reasonable price for first class copies of CQ for May and December 1945 and January 1946. Want old regional, local or club ham publications, call books. A. R. Marcy, W4ID, 461-3rd Ave., Sea Park, Eau Gallie, Florida.

SELLING Halli. SX-42 AM/FM receiver. Needs minor work, clean exterior. Best offer. Also Grommes 10 w. mono hi-fi amplifier Model 55C, excellent condx inside & out, in metal cabinet. Only $20. Box TK2, CQ, 300 West 43rd St., New York, N. Y. 10036.

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TOROID RTTY KIT Mark-Space discriminator and bandpass filters. Includes 4-88 mh and 1-44 mh uncased, like new toroids; information sheet, mounting hardware and six mylar capacitors. $5.00 Postpaid. Toroids: Specify 88 or 44, less capacitors, $1.00 ea. 5/$4.00 Postpaid. KCM Products, Box 88, Milwaukee 13, Wis.

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COMPLETE STATION HQ170C—Spkr; GSB-100 (Both mint condition); D-104; SWR meter; Drake low pass; SCR-522 xmitter. $600.00. W3OQX, D. Bachman, 1030 Walnut St., Allentown, Pa.

FOR SALE Ameco TX-86 transmitter, 60 watts, 80 thru 6 meters. Perfect condition with power supply, $99. Also Tecraft 2 meter transmitter, new tubes, 20 watts, 2 Novice band crystals, with power supply. Perfect condition, $79. Write: Ron Brown, WB2AOG, 513 Linden Avenue, Rahway, New Jersey.

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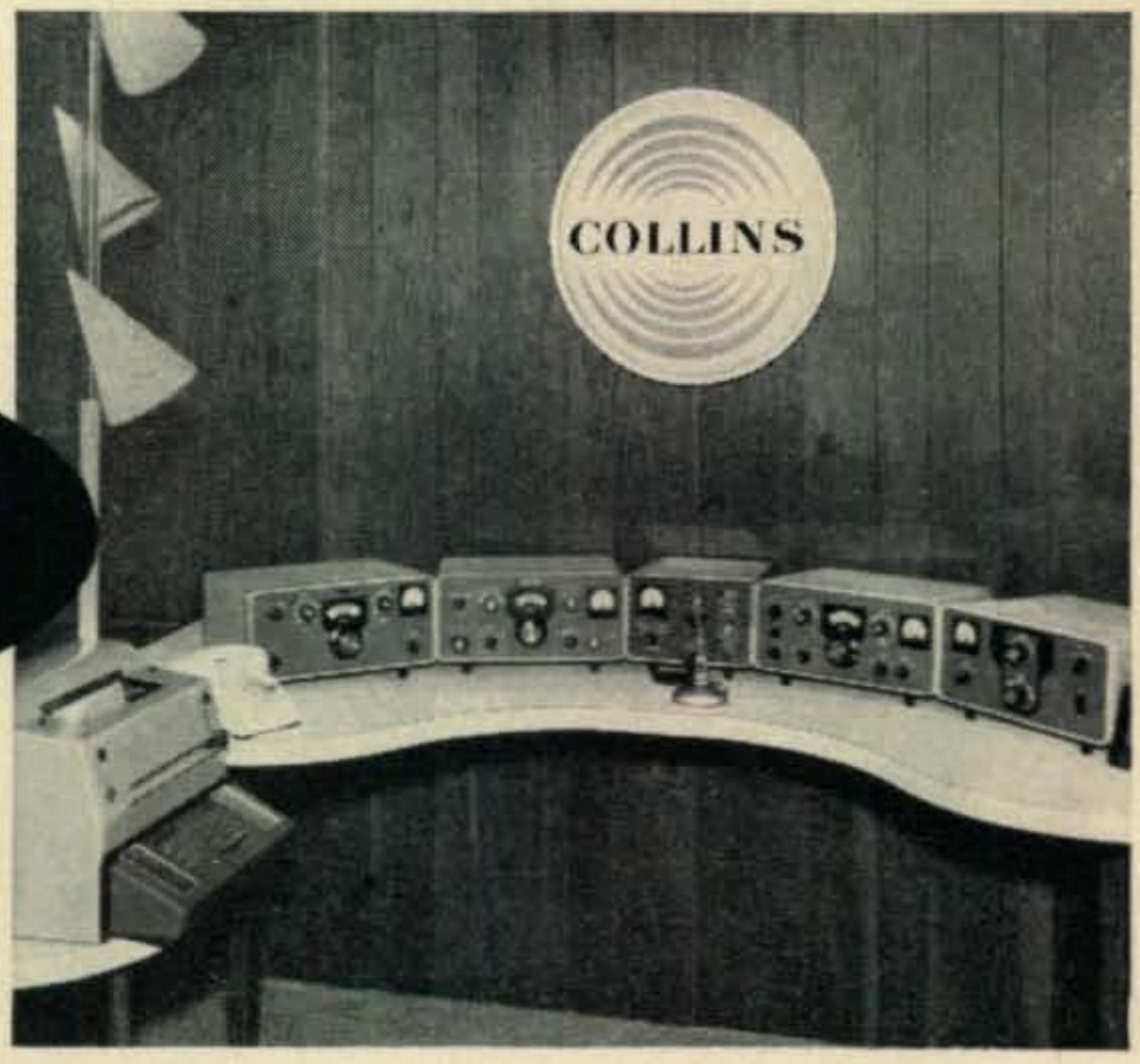

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Here is Howard S. Wayman, W9GVA, 6760 N. Ionia Ave., Chicago, Illinois, accepting the 75S3 Receiver he won at the Big Open House held recently at Chicago Store.

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WANTED: 1945 CQ magazines—Jan., Feb., May, Sept., Alan Dorhoffer, K2EEK, 75-15 177th St., Flushing 66, N. Y.

TOROIDS 88 mh 60¢ each or 5/$2.50. Fasold/WA6VVR, Box 34, Dixon, California.

WANTED A complete set of Radio. State the price and condition. Write: Editorial Dept., CQ, 300 West 43rd Street, New York, N. Y. 10036.

PRINTED circuit resist, applied with ordinary pen. $1.00. Box 19083, Indianapolis, Indiana.

KWM-2 Must sell for school money. $795 includes ac power supply. Bob Wendel, W6KOC, 225 N. Garfield Ave., Alhambra, California.

SCHEMATICS needed. Can't get circuits for TEC S-15 amplifier and FM-15MX tuner from Transistornics. Also need replacement metal cases for these. Updike, W4IAM, 1848 Winston Road, Charlottesville, Virginia.

TRADE or sell. Financing for right party. Factory wired and tested Invader 2000 transmitter, National NC-303 receiver with matching speaker and crystal calibrator. Nine months old, less than 50 hours operating time. FOB Bainbridge, Georgia, W4ZYI, Clyde.

6 MTR 40w mobile xmtr, dyn and ant. relays, $25.00 FOB W6RET, 8831 Sovereign Rd., San Diego 23, California.

SHAWNEE 6 meter Transceiver (Heath), dual conversion receiver, 10 watts out, etc., Used only twenty hours—$185.00. Also Hammarlund HQ-100 excellent condition $130.00. Paul Houpt, 732 Comstock Ave., Syracuse 10, New York.

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HQ-180 to the highest bid above $275. Collins KWS-1 and 75A-4. This equipment in excellent condition and used very little. K7BBB, Route 2, Box 129, Gaston, Oregon 97119.

WANTED HT-37, HX-50 or other comparable ssb xmtr. Cash. Must be reasonable. Also wanted: donations of usable miscellaneous gear for church missionary project. Receipt given for income tax deduction. K9BEM, Marion Shields, Friends Church, Watseka, Illinois.

SX-100 in good working condition $160. K5RQL, 1707 Van Court, Alamogordo, N. Mex.

CANADA HQ-180, like new, $600. Dr. G.A. Asche, VE7AOK, Box 400, Hope, B.C.

FOR SALE HT-32B $450; HT-41 in original carton $295; 75S-1 $295. If interested in any piece contact K5CZC, M. L. Sowell, 3206—32nd Street, Lubbock, Texas.

HT-33A excellent condition with current modifications $550. W5ARV, Route 1, Haslet, Texas.

FOR SALE Knight T-150 150 watt 80-6 m transmitter. $90 or make offer. John, WA5DZK, Daucet Road, Lafayette, Louisiana.

SELL/TRADE Hallicrafters SX-101A receiver, like new $235; Collins ssb/cw transceiver KWM-1 w/a.c. p.s., noise/blnkr, mint $425. W9OZY, 207 Rush Street, Roselle, Illinois.

SX-111 one month old, perfect condx. $110. Viking Challenger, build from kit. Needs new meter, but otherwise fine cond. $50. Package deal $150. Doug Snowden, 4A Logan St., Westover AFB, Chicopee Falls, Mass.

MERRY CHRISTMAS to all DL4QU/K1NNC.

FOR SALE—Collins 75A-1 $325; Central 100V $450. W8EXJ, Vern Page, 1969 Manz St., Muskegon, Michigan.

FOR SALE perfect Clegg Thor VI xcvr. Like new. Shipped freight paid. $305. K5MIR, 3007 Acadia, Marshall, Texas.

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FOR SALE Hallicrafters SX-101A with speaker. Serial 260682. Like new. $275. Walt Newman, 531 Forest Lane, Belton, South Carolina.

COLLINS 32S-1 $400.00; 75S-1, $325; KWM-1, $350; MP-1 d.c. supply, $150; Drake 2-B $210; Drake 1-A $150; 600L $275. W8WGA. Phone 513-277-0409.

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COLLINS 75S1 s/n 152, $325; 10B with VFO, $78; multiphase Q multiplier model D.Q., $15; Heathkit QF-1 Q multiplier, $7; 300 watt UTC modulation transformer, $18; Millen GDO Mod. 90651, $48; 2 meter RME receiver, $10; BC-375E transmitter w/tuning unit, $24; 813's, $7.50 each; 100TH's, $8; Hammarlund 15 watt modulator, $15; 115 v.a.c. 2PDT antenna relay, $2.50. Cleaning out! Write for list of other small items. Tnx, W2LYE.

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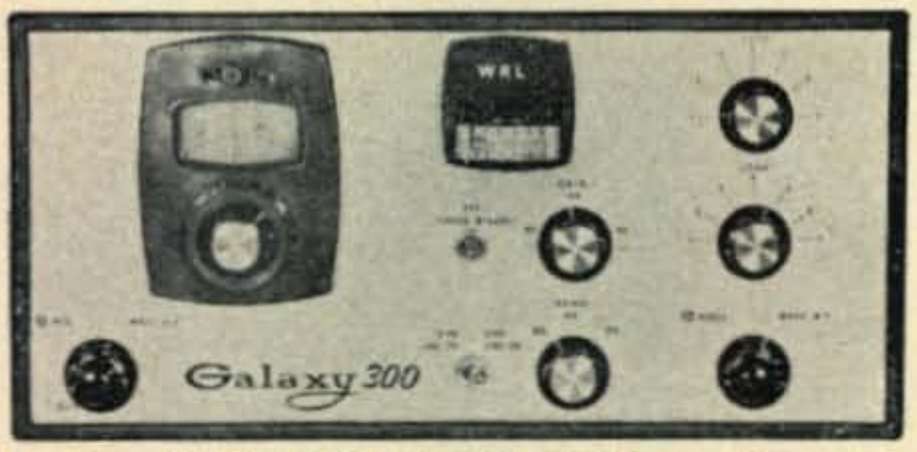

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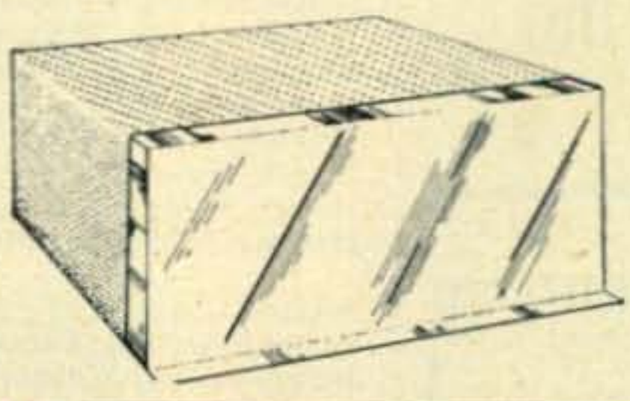

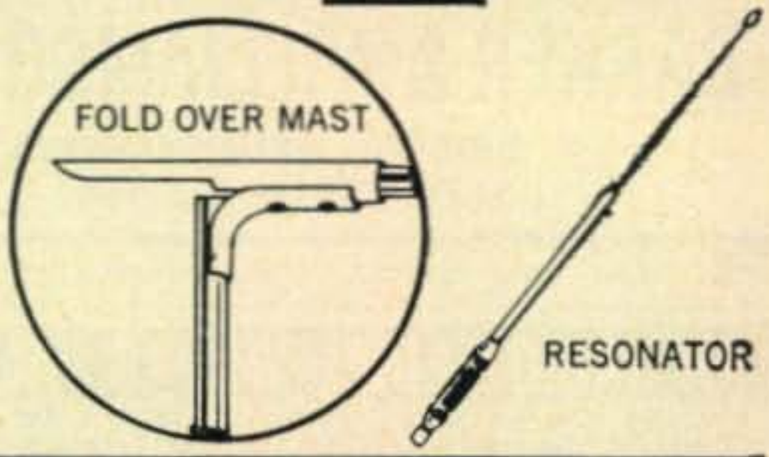

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