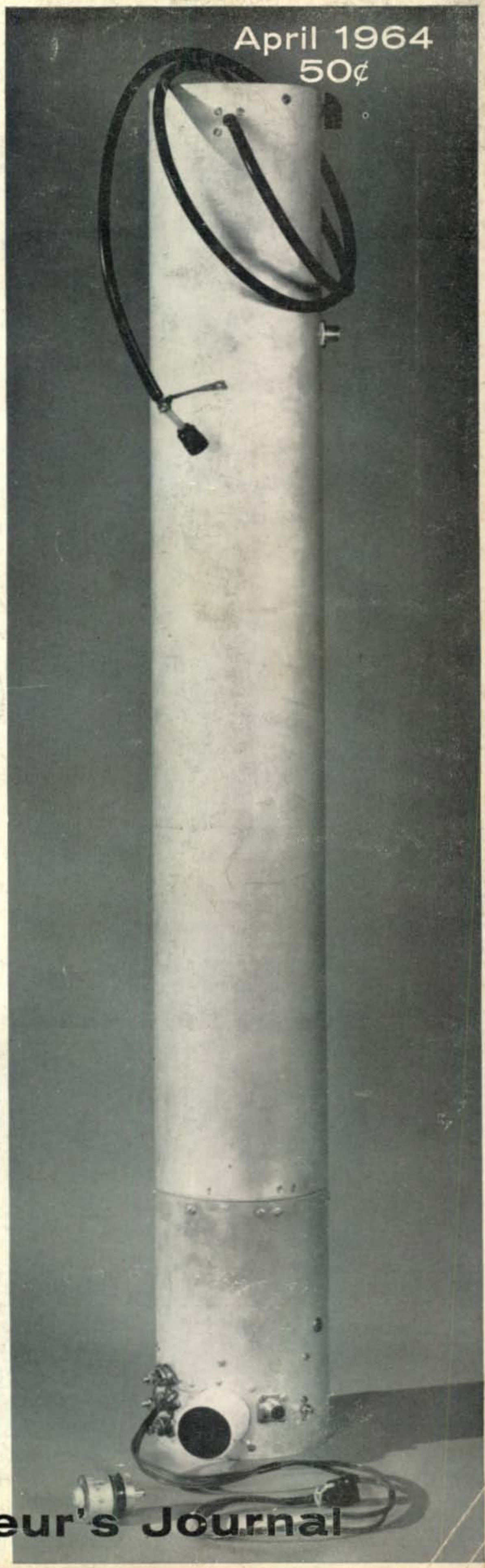
ICD

CQ

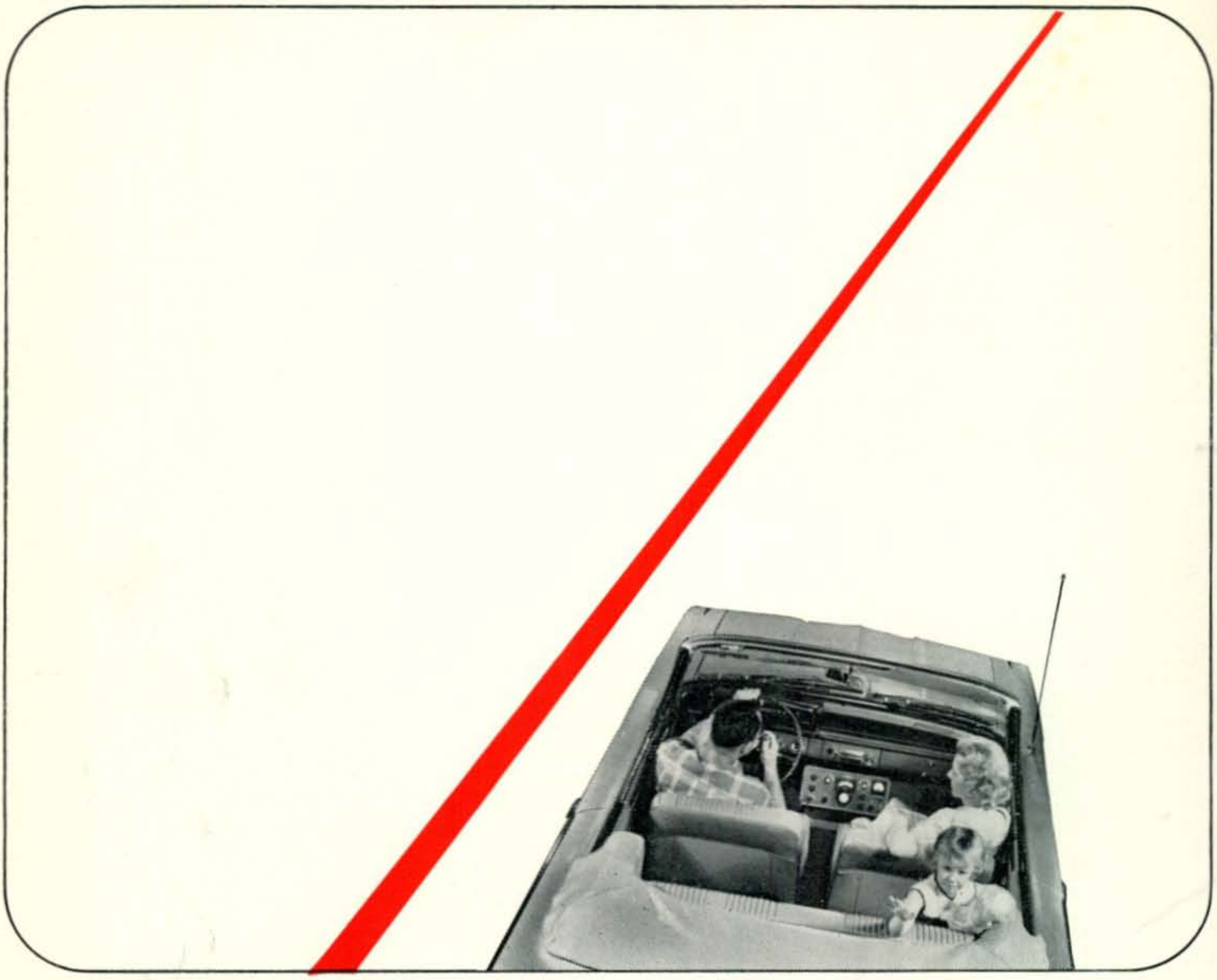
April 1964
50¢



CQ Sideband Contest
April 11-12
Are You Ready?

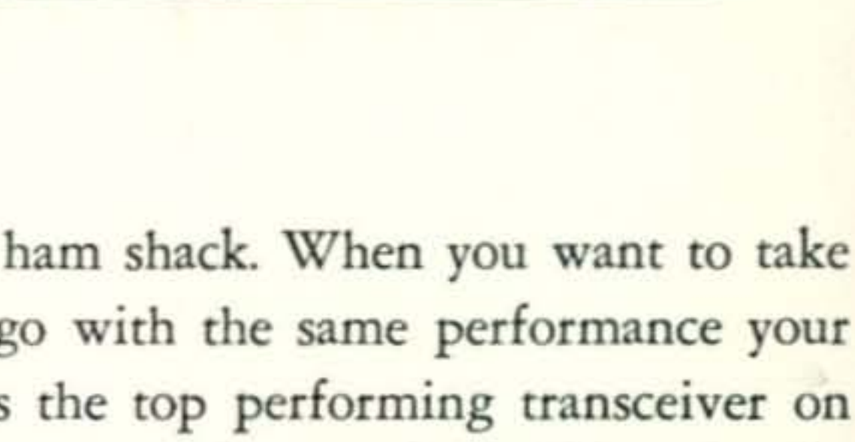
Next Month...
Watch For
A High Efficiency
50 Mc 4X150A Amplifier

The Radio Amateur's Journal



One for the road

That KWM-2 for the road is the same one you use in your ham shack. When you want to take it with you, just mount it in your car and you're ready to go with the same performance your KWM-2 gives you in your ham shack, proven in 5 years as the top performing transceiver on the market. At home or on the highway, this lightweight unit covers the popular HF ham bands. Providing ample power on 80 through 10 meters with 175 watts PEP input on SSB, or 160 watts on CW, the KWM-2 connects automatically in your car's mobile mount. So, whether you're taking a long trip this summer or just going to visit Grandma, put the KWM-2 on your vacation list. Contact your distributor today and find out how little it costs to own the finest.



P.S. If you're going through Iowa this summer, stop during working hours in Cedar Rapids and visit the plant.

COLLINS

For further information, check number 3, on page 110

Many Thousands of Famous PR Crystals In Popular Frequencies Are Always In Stock, Ready for Immediate Shipment

AMATEUR TYPES

FUNDAMENTAL, PR TYPE Z-2—Frequency Ranges in Kcs.: 3,500 to 4,000 (80-M); 7,000 to 7,425 (40M); 8,000 to 8,222 (2M); 8,334 to 9,000 (6M) ± 500 Cycles . . . $2.95 Net

(All Z-2 Crystals calibrated with a load capacity of 32 mmfd.)

Third Overtone, PR Type Z-9A, 24,000 to 24,666 and 25,000 to 27,000 Kc., ± 3 Kc. . .$3.95 Net

6 Meters, Fifth Overtone, PR Type Z-9A, 50 to 54 Mc., ± 15 Kc..... $4.95 Net

Citizens Band, PR Type Z-9R .005% .....$2.95 Net

ORDER FROM YOUR JOBBER

Here is one section of the Stock Room where finished PR Crystals are kept. There are hundreds of crystals in each drawer, and hundreds of drawers in the room. PRs in popular frequencies can usually be supplied immediately out of this stock. Your jobber has a supply of PR Crystals. If he cannot furnish the exact frequency you want, he can get it in a hurry from the factory.

Since 1934, amateurs everywhere have applauded the fine dependability, activity, high output, economical operation and hair-line accuracy of PR Crystals. Get PRs now for your rig, and you'll have the finest precision frequency control that money can buy!

PR Crystals

Since 1934

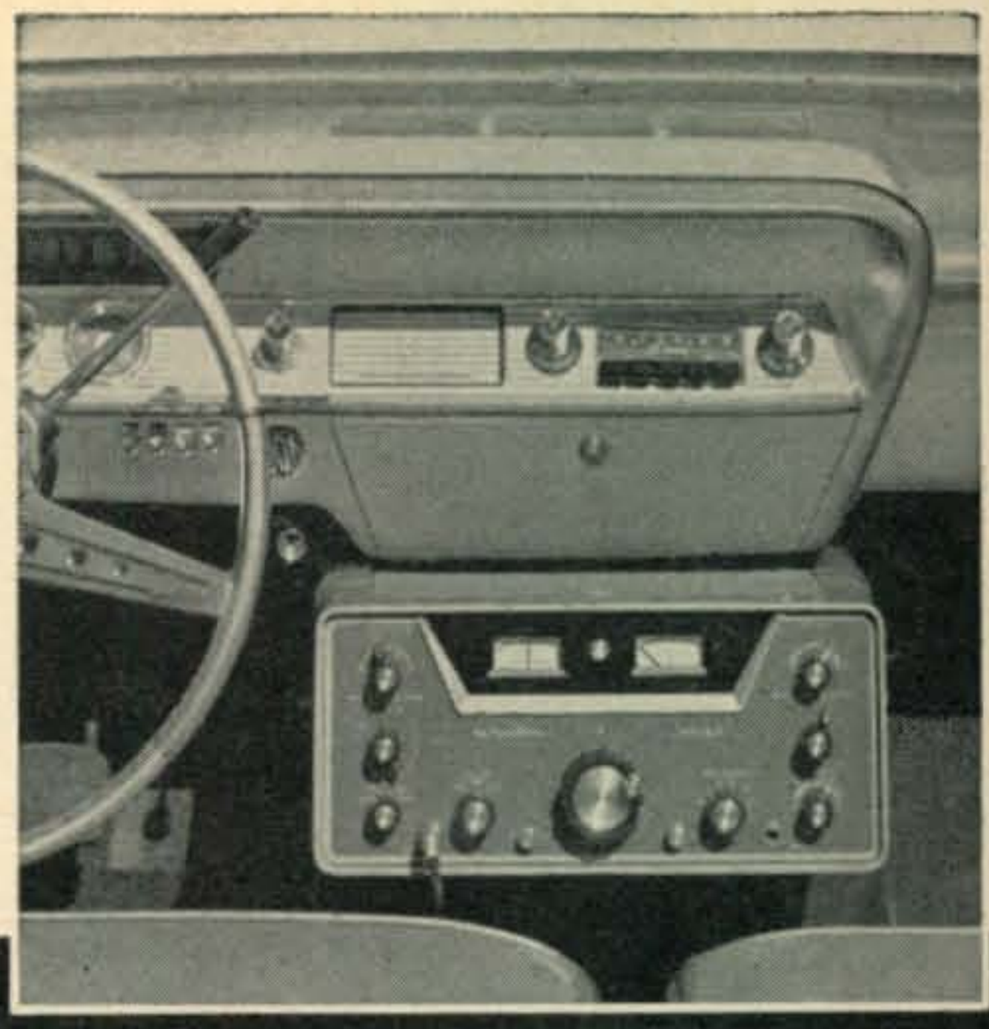
USE PR AND KNOW WHERE YOU ARE

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

For further information, check number 1, on page 110

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 2, on page 110

CQ

The Radio Amateur's Journal

Vol. 20, No. 4 April 1964

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

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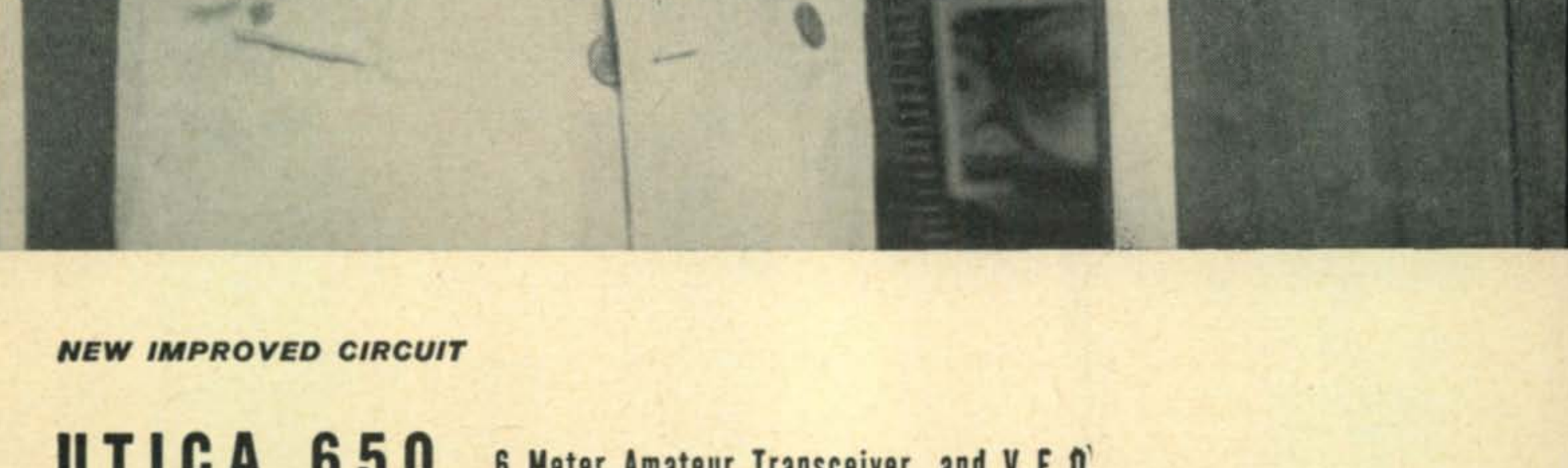
Departments

NEW IMPROVED CIRCUIT

UTICA 650 6 Meter Amateur Transceiver and V.F.O.



- Nominally rated at 22 Watts—input 100% modulated
- Built-in dual power supply for 117VAC and 12VDC operation
- Built-in adjustable BFO
- Built-in TVI filter
- Spot switch for frequency correlation
- 2 crystal sockets on front panel in addition to VFO socket
- Complete push-to-talk operation

Ask any ham why the UTICA 650 is the most wanted transceiver...

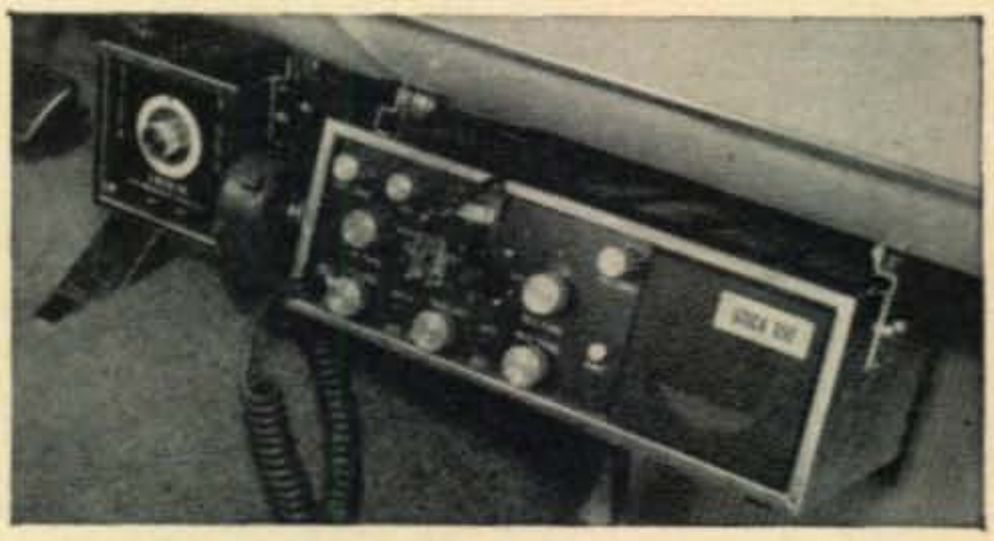
"Top features and more of 'em at rock bottom price," That's the answer

The hottest salesman in the world can't sell a ham just any old set. Hams are technical people. They *know* what they want. They *know* features. They *know* value.

Compare this Utica transceiver with anything on the market. Compare quality. Compare performance. Compare features. Compare value.

If you're an experienced ham, *you know* this Utica 650 is *the* buy. If you're just getting into the field, ask any old timer, or mail the coupon below.

- "S" meter and relative power indicator
- Transmitter indicator light
- Dual conversion superheterodyne receiver
- Series gated self adjusting noise limiter
- Adjustable squelch control
- Adjustable R.F. gain control
- VFO in separate cabinet



$189.95

SHOWN ABOVE — UTICA 650 INSTALLED IN CAR

CLIP THE COUPON AND MAIL TODAY

UTICA
COMMUNICATIONS CORP.
Subsidiary of Continental Marine Corporation
2917 W. Irving Park Rd.
Chicago 18, Illinois

UTICA COMMUNICATIONS CORP.
2917 West Irving Park Road
Chicago 18, Illinois

Please rush full details and specifications on
_____ UTICA 650 6-METER AMATEUR TRANSCEIVER AND V.F.O.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

IT'S HERE!!!

THE NEWEST - MOST POWERFUL - MOST COMPACT FULL COVERAGE 80-40-20 METER 300-WATT SSB/CW TRANSCEIVER ANYWHERE!

GALAXY III SSB/CW TRANSCEIVER

$349.95

THE GALAXY III IN ITS ACTUAL COMPACT SIZE, 6" x 10¼" x 11¼", IS SMALLER THAN THIS OPEN MAGAZINE. WEIGHS ONLY 14 LBS.

STARTLING FEATURES OF THE GALAXY III

1. MOST POWER OUTPUT OF ANY 3 BAND TRANSCEIVER TODAY!
2. SMALLEST 300-WATT SSB/CW TRANSCEIVER. 6" x 10¼" x 11¼" – 14 lbs. Makes it best Mobile – Fixed Station.
3. FULL COVERAGE ON 80-40-20 METERS. 500 KC all bands.
4. SSB UPPER & LOWER SIDEBAND. SHIFTED CARRIER CW. The only 3-bander with these features.
5. BEST FILTER AVAILABLE. Suppression better than: 45db, unwanted SB 55db.
6. NEW! 6-SECTION CRYSTAL FILTER. Exceptional – 1.8 to 1 shape factor at 2.1 KC bandwidth.
7. HIGHEST RECEIVER SENSITIVITY. ½ Mv for 10 db S/N. VOX – $24.95

1. SHIFTED CARRIER CW eliminates transceiver "Leap Frogging".
2. NEW HYBRID CIRCUITRY transistorized AVC/audio/VOX.
3. DUAL VERNIER TUNING 12:1 fast tune, 72:1 slow tune.
4. HIGHEST STABILITY drift less than 100 CPS in any 15-minute period.

GALAXY III ACCESSORIES

1. AC Supply – $79.95
2. Transistorized DC Supply – $119.95
3. Speaker (matching) console – $19.95
4. Remote VFO – $59.95
5. Deluxe Accessory Console: speaker, phone patch, SWR Bridge, 24 hr. Clock – $99.95.
6. Calibrator – $19.95

SEE IT NOW AT ALL LEADING HAM DISTRIBUTORS

GE

GALAXY ELECTRONICS
10 SOUTH 34TH STREET
COUNCIL BLUFFS, IOWA ZIP 51504

For further information, check number 6, on page 110

ZERO BIAS

It may come as quite a shock to some of you (it did to us) that our Worked All Zones award passed its twenty-eighth birthday last February. Yep, the February 1936 issue of *Radio* introduced—as they put it—the "DX Yardstick." Most hep DXers will confirm its difficulty and few will argue its value.

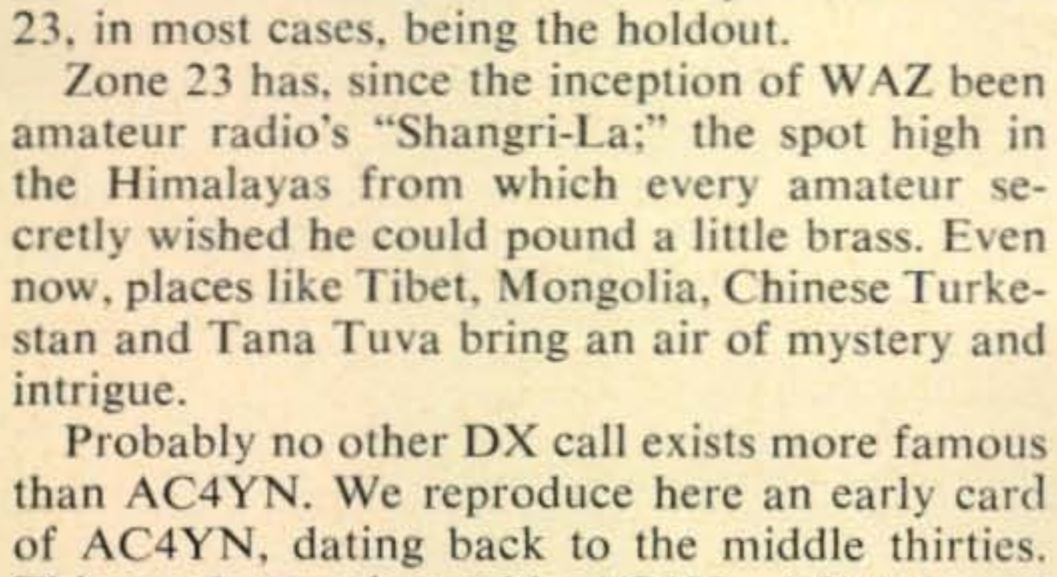
Only three amateurs qualified for WAZ before amateur activities were curtailed by World War II; they were ON4AU (1936) number one; G2ZQ, two; and J5CC three. It is a little nostalgic to note that a handful of ON4AU's forty-zone qualifiers included such exotic calls as: SS2SE (Singapore), Zone 28; MX2B (Manchuria), Zone 24; RAO3 (Siberia), Zone 19; AQ1LM (Iraq), Zone 21 and AC4AA (Tibet), Zone 23.

It wasn't until some eleven years later, in 1947, that W2BXA, W6VFR and W6PFD added their calls to the post-war WAZ history book, taking first, second and third place respectively, all within a few short months.

Since post-war WAZ #1 was issued, over two thousand amateurs have now qualified—Zone 23, in most cases, being the holdout.

Zone 23 has, since the inception of WAZ been amateur radio's "Shangri-La;" the spot high in the Himalayas from which every amateur secretly wished he could pound a little brass. Even now, places like Tibet, Mongolia, Chinese Turkestan and Tana Tuva bring an air of mystery and intrigue.

Probably no other DX call exists more famous than AC4YN. We reproduce here an early card of AC4YN, dating back to the middle thirties. This card, together with AC4JS, AC4AA and C8YR at one time provided amateurs with their only Zone 23 contacts. But, it was not until just before and slightly after the war that AC4YN's popularity increased since he was the station that contributed 95% of Zone 23 contacts. Reg's contribution to amateur DXing was phenomenal and whenever chatter swings around to WAZ, Zone 23 is always a popular subject.



"The Most!"

WPX, our "Worked Prefix" award gains increased popularity every year. Many amateurs, dissatisfied with the current status of "countries," have switched their DXing to include prefixes.

Offering no political, or geographical boundaries, working for prefixes is to us, the modern DXing "Yardstick."

Many active DXers have overlooked the fact that U. S. Prefixes alone can add up to quite a bundle. In California, for instance, W6, K6, WA6, WB6 and KN6 can be worked for WPX credit. In a number of instances we're sure it's been a frustrating grind for DX stations trying to work Novices for WPX credit because the Novice just isn't aware that he's getting out well enough to be heard by a DX station.

Credit for confirmed countries using two-way s.s.b. also continues to gain popularity. With sideband now becoming the accepted radiotelephone mode, amateurs throughout the world can be assured of working nearly all countries via single sideband.

The *CQ* award which has been receiving puzzling wide spread acceptance has been the VHF Century Certificate, requiring one hundred and fifty different stations to be worked on 6 meters, one hundred on 2 meters, fifty on 220 mc and twenty-five on 432, all worked during a consecutive 365-day period.

Originally started as a "gimmick" to increase v.h.f. activity, the VHF Century Certificate should have long outgrown it's usefulness, however, the demand for these awards has increased sharply.

There is no need to go into the devastating impact given amateur radio by our most recent addition, the United States of America Counties Award. If you've been asked what country you're in, you probably know the reason why.

With all the interest in contests, awards, certificates and competitive amateur radio in general, it's hard for us to believe that a petition to the FCC offered by W9AV (RM-562) designed to eliminate contests, awards, honor rolls, *etc.*, could be a popular move with the majority of active amateurs. What do you think?

LETTERS TO THE EDITOR

We feel the following letter, received just before press time warrants special attention. This letter was sent by the League to all ARRL affiliated clubs for circulation among their members.

Readers are urged to be extremely cautious of "The Institute of Amateur Radio," sponsored by *73 Magazine*. To our knowledge no charter for this organization exists nor have we seen a bona fide list of directors elected by a voting body. We seriously doubt the authenticity of this "Institute" and suggest that amateurs refrain from sending any contributions at this time.—*Editor*.

Oops He Goofed

To All Affiliated Clubs:

I believe your members will be interested in the following portion of a letter being sent today [Feb. 24, 1964] to all ARRL directors, vice-directors and assistants:

"The current issue of *73 Magazine* contains, among others, several items of particularly flagrant misinformation. The facts are:

"1) There is no high-frequency allocations conference planned for 1965. There is a *plenipotentiary* conference scheduled for Geneva next year, long-planned to coincide with the 100th anniversary of the founding of the International Telecommunications Union and its predecessors. It will not deal with over-all allocations matters. The magazine's editor apparently does not know the difference between a plenipotentiary conference and an administrative conference. The fact is that the Swiss government has informed the ITU that it does not want an administrative conference to be held in Geneva in 1965. A CCIR (technical study) conference is scheduled for 1966, and it's decisions will be desirable as background for the eventual allocations (administrative) conference. Thus the earliest practical date for an allocations conference is 1967. It is the unanimous opinion of communications authorities in the Department of State, Office of Emergency Planning, FCC, and the ITU itself, with whom we have discussed this subject at length in months past as well as currently, that the conference is at least three years in the future, and more likely four or five. This is, for example, the basis for President Hoover's statement in his convention addresses, as per January *QST*.

"2) FCC is not due to announce in March its decision of RM-499. The Chairman of the Commission has indicated to us that because of heavy workload in other fields (*e.g.*, Citizens Band rules revision in process) and the need for careful study and evaluation of the League's and other related proposals in the same area of regulation, it will be at least several months before FCC can formulate its decision.

"3) President Hoover has said unequivocally that the *73* editorial statement about his impending resignation is totally unfounded, that he remains honored and proud

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

to represent the League and its Board decisions, and that he is willing to serve as president as long as it meets the Board's pleasure. Since the erroneous *73* item is stated as coming from 'responsible sources,' you may be better able to evaluate the accuracy of other statements in the editorial."

John Huntoon, W1LVQ
General Manager, ARRL
Newington, Connecticut

TKS

Editor, *CQ:*

. . . Your magazine is the best of its kind and I hope that you can continue to keep it that way. The technical articles are tops and are very readable. One does not get lost in design data or construction practice. I have found that all the projects I have taken from the magazine have worked the first time. I cannot say this of other magazines. Furthermore, I am an improvisor and your projects adapt to this practice quite readily.

Secondly, HAM CLINIC is a tremendous feature. More litt'e tidbits have appeared in this section than in any other collection of suggestions that I have seen printed.

Lastly, I would like the amateur bands kept for the *amateur*. I do not like the trend toward commercialism that is all too evident on all bands. Homebrew equipment is almost unheard of today. If there must be reallocations let's allocate a section for the experimenter and for the schedule man in each band. And from some of the signals I hear, it would seem a good idea to require that each applicant for a license be required to put a transmitter on the air and operate it properly before further examination is given.

D. Clayton Schario, S.J., W9AZX/8
John Carroll University
University Heights
Cleveland 18, Ohio

Towers & Suits

Editor, *CQ:*

Was intrigued by the article in the July 1963 issue of *CQ* by K2DEM on Legal Liability and Amateur Radio . . .

It seems to me that perhaps a cross suit against the parents or guardians claiming neglect in allowing the child to trespass would be in order.

Here in Tucson most people carry what they call a homeowners policy which protects the owners from almost everything.

You might pass along the following idea: On metal poles you may try either to wax them or grease the upper portion so they will be unclimbab!e. Or put a disc 8 or 10 feet above ground to prevent going further up. . . .

A. S. Johnson, K7VQI, ex-W4LSA
5018 E. Cooper St.
Tucson, Arizona

A Message

Editor, *CQ:*

I would like to suggest to WN4RBX (LETTERS, Jan. 1964) and all other would-be first time construction hams to acquire some knowledge of common names of parts and supplies before becoming involved in a construction project. I highly recommend your November, 1963 issue on tools, uses and care. Also there is available information from brochures, booklets, pamphlets, spec. sheets, catalogs, readers service in *CQ* and other sources which usually can be had for the writing or a nominal fee. These publications constitute a portion of most hams libraries and I find them indispensable when sorting junk box parts, substituting during construction and determining costs if they must be purchased. Most of the gear in the shack is homebrew.

Your letter gives credence to a portion of the ham fraternity which believes that we must construct to deserve our tickets, but I believe it reveals that you failed to ask a fellow ham for assistance. Consider yourself fortunate to live in or near a major metropolitan area, where there are hams willing to help closer than fifty or sixty miles as is the case at my QTH.

Get out that project article read it over, acquire your parts and components, ask your local supplier or a fellow ham about any part you're not familiar with, heat up the iron and give it a go. If it fails to work don't be afraid

to trouble shoot, rework, ask questions, open the handbook, read and reread all the information possible. But please don't put aside a construction project just because terms are unfamiliar.

Ed Coltrin, WA6FWN
P.O. Box 34
Soda Springs, Calif.

About The New License Fees

Editor, *CQ:*

Back some years ago when Slapsie Maxie Rosenbloom was asked why he had a 10 cent cover charge at his new Hollywood nightclub he explained, "It's to keep out the Riff Raff."

Bob Lee, WB6GME ex-9ALG
15984 Wellington Way
San Leandro, California

Magazines Wanted

Editor, *CQ:*

I am now employed by the U.S. Weather Bureau Polar Operations Project and have recently returned from a 13-month tour of duty at Amundsen-Scott South Pole Station, Antarctica . . .

I know that the National Bureau of Standards made a plea to the Amateur fraternity to donate their back issues of *CQ, QST, etc.* and had very little response.

Anything that you can do to help would be greatly appreciated and information in regard to this can be obtained from the National Science Foundation, Wash., D.C., The U. S. Weather Bureau or the National Bureau Of Standard, CPRL, Boulder, Colo.

Jack J. Falkenhoff, W8GHE, ex-KC4USN
293 Hawthorne
Elyria, Ohio

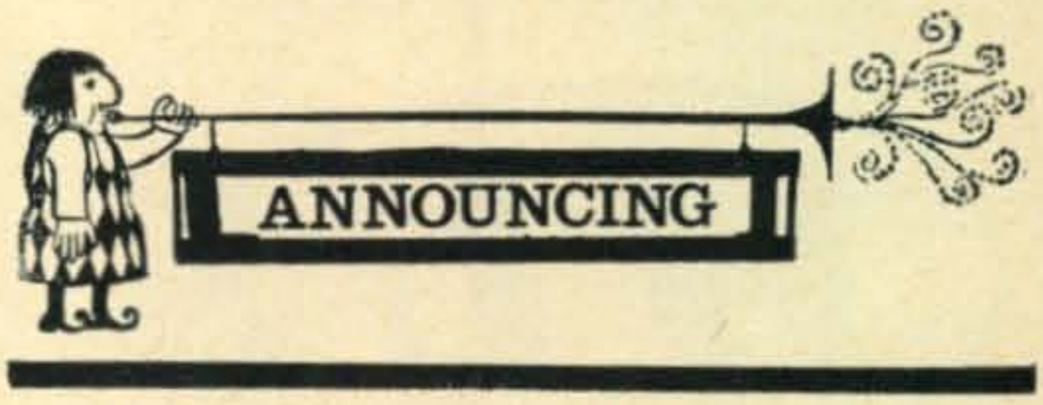
"El Supremo"

Editor, *CQ:*

I was a little intrigued with Gus Browning's statement about W3CRA in "Ahoy Aldabra," February *CQ*.

I would like someone to tell me why Frank's signal has always been supreme. I can well remember back in

[*Continued on page 90*]



Orlando Florida

The Orlando Amateur Radio Club, Inc., is sponsoring the Orlando Hamfest which will take place on April 18 & 19 at the Cherry Plaza Hotel. Registration desk opens at 0730, Saturday morning for the *real* early birds. Price of admission is $1.00 (children free) and convention luncheon will cost $3.95. Transmitter hunts, forums, speakers, YL & XYL activities, s.s.b., v.h.f., RTTY, DX—all will be on the program. Reservations for the luncheon can be booked through Ken Densman, K4NTB, 405 Enka Way, Orlando, Phone, CY 3-0293 and hotel accommodations can be furnished by Hal Shea, W4BKC, 736 Alfred Drive, Orlando.

Broome County Dinner

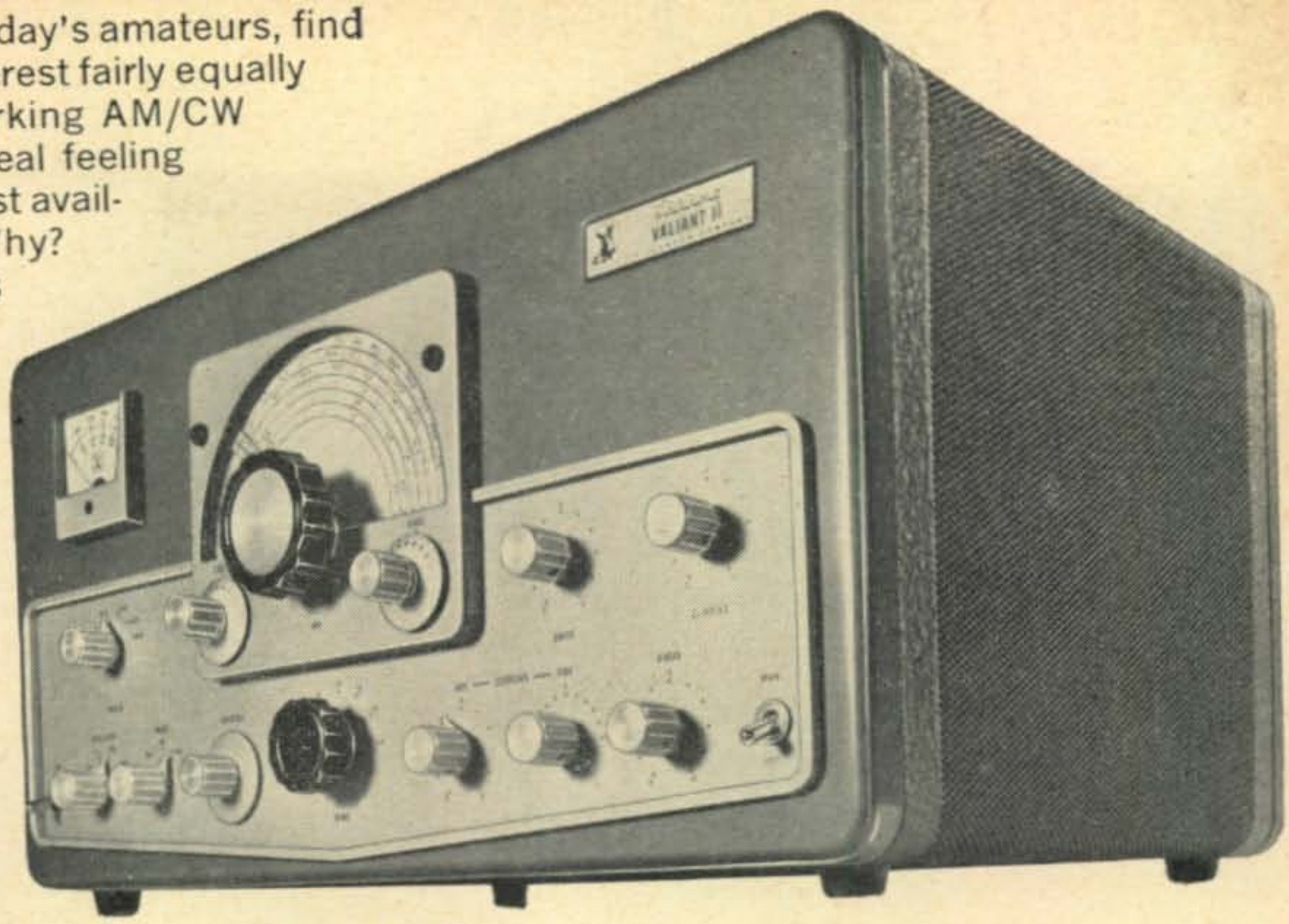
The Southern Tier Radio Clubs of Broome County are holding their Fifth Annual Dinner on April 4, 1964, at St. John's Ukranian Hall, Virginia Avenue, Johnson City, New York. Doors open at 5:00 P.M.; dinner will be served promptly at 7:00 P.M. Tickets are $3.50 per adult and $1.75 per child under 12 years of age and reservations must be made by April 1. For tickets write: Harry Spencer, 1165 Vestal Avenue, Binghamton, N.Y.

4U1ITU

Back in January, the United States and station 4U1ITU signed an agreement allowing amateurs to exchange third

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!

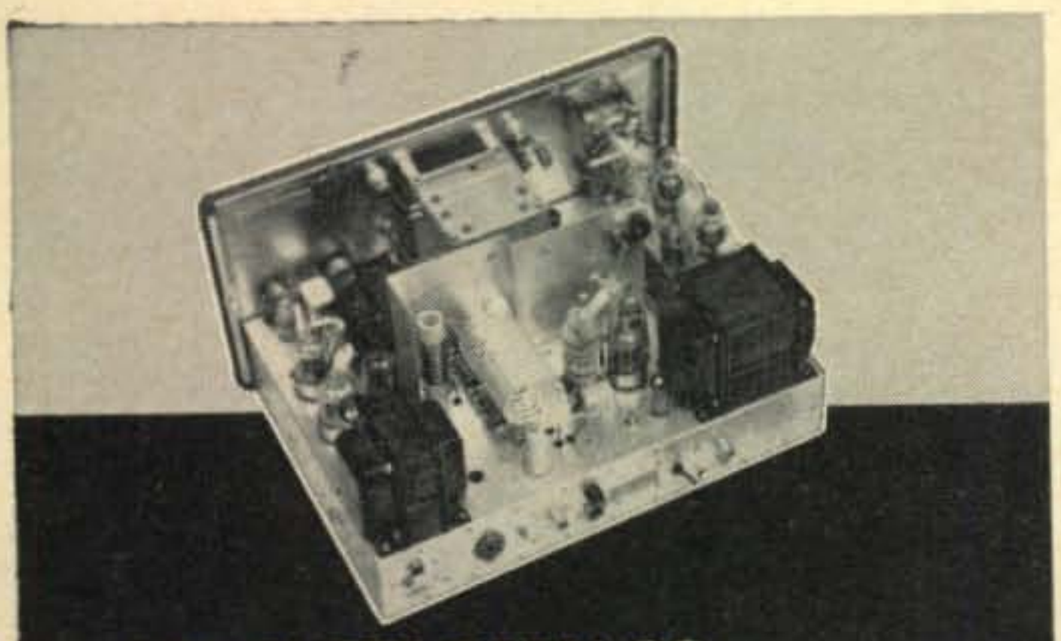


VALIANT II SSB ADAPTER

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 110

party traffic. The agreement ends on July 31, 1964. Remember, only messages of non-importance should be exchanged.

Dayton Hamvention

The Dayton Hamvention has moved to new quarters this year, now camping at Wampler's Arena, Shiloh Springs Rd., Dayton. Free parking and shuttle bus service will be available. The date is April 24-25 (Friday evening and all day Saturday). The new larger quarters are expected to produce an entirely different atmosphere and with it, increased participation. Write P.O. Box 426, Dayton, Ohio for a fine brochure and hotel accommodations.

Lancaster, Pa.

The Lancaster Radio Transmitting Society, Inc. will celebrate their 25th anniversary at a banquet to be held Saturday, May 9th. Hostetters Banquet Hall, Barbara & Pine Streets, Mt. Joy, Pa., is the place and 6:30 is the time. W3OY is taking advance registration; his QTH is 136 Springhouse Rd., Lancaster, Pa. Phone 717-392-6093.

Egyptian Radio Club

The Egyptian Radio Club of Granite City, Illinois (and we'd like to know how they got that name) will stage a fine "Old Timers' Night" on Thursday, April 16, starting at 8 P.M. St. Louis grey beards are particularly invited to watch a very nice film photographed by WØYRX back in the thirties. The Program chairman is K9TCU and he'll give you full details on how to get to their clubhouse on the levee, south of the "Chain of Rocks" bridge.

Atlanta, Georgia

The Atlanta Radio Club should be quite proud of their efforts to provide a blind amateur, WA4KWW with a new sideband station. Collecting funds jointly were the Griffen, Ga. and Atlanta, Ga. radio clubs and the project was completed on January 18th. We'll be pleased to publish any and all announcements of this kind and hope more are in planning stage.

Goose Bay QSO Party

April 1 to April 15 are the inclusive dates for the Goose Bay QSO Party "Marathon." Work as many VO stations as you can (you must QSL) and send your data to GBARC, P.O. Box 232, Goose Airport, Labrador, Canada. They will let you know how you made out.

Delaware Valley

The Delaware Valley Radio Association will hold its 20th Old Timers Night Roundup and Hamfest at the Stacy Trent Hotel in downtown Trenton, New Jersey. Sunday, May 2 is the day and the starting time is 3 P.M. at the Empire Room. Dinner gets underway at 7 P.M. and speakers, prizes and the usual events are expected. Price of admission was not set at press time but W2CCO is General Chairman and he'll be able to fill you in. His phone number is 609-393-0386.

New York/New Jersey

The combined efforts of the Southern Tier of New York State, Northern Pennsylvania Radio Clubs and same area Amateur Radio Emergency Corps are sponsoring the Fifth Annual Dinner and Get-Together on Saturday, April 4, 1964 at 6:30 P.M. The meeting place is St. John's Memorial Hall, Johnson City, New York. All proceeds from this event will be used to maintain and operate AREC in their area. March 30, 1964 is the deadline for tickets, reservations, and prize contributions. Please communicate with K. J. Deskur for information. Address 3609 Lott Street, Endwell, New York.

Baltimore

The Baltimore & Ohio Railroad Radio Club will hold its 5th Annual hamfest and banquet on Saturday, April 11, 1964 at the Waverly Presbyterian Church Hall in Baltimore. Registration starts at 6 P.M. and at 7 P.M. Tickets at $3.00 each are available from W3BVL, B&O A.R.C., Box 7388, B & O Building, Baltimore 1, Md.

[*Continued on page 90*]

NEW for SSB...

THE TURNER 454

The new Turner single sideband Model 454 is finding its way into hamshacks all over the world. And why not? This is the microphone **you** asked for . . . and Turner designed. You'll like it.

Choice of PTT or VOX. Crystal (454X) or Ceramic (454C). Response, 300 to 3000 cps; output level, —48 db, on the 454X and —52 db on the 454C.

Wired for PTT, the 454's feature two separate switching arrangements — push-to-talk, and a lever-lock switch to hold the mike live.

Price . . . just $15.90 amateur net. At electronic distributors everywhere.

THE TURNER MICROPHONE COMPANY

925 17th Street N.E.
Cedar Rapids, Iowa

In Canada: Tri-Tel Associates, Ltd., 81 Sheppard Ave. West
Willowdale, Ontario

Clegg VENUS - SSB Transceiver For 6 Meters

The Clegg Venus is a high quality, compact, attractively styled SSB receiver and transmitter that puts you on 50 mc single sideband without all the fuss, bother and expense associated with adapting low frequency SSB exciters, crystal controlled converters, relays, linear amplifiers, etc.

Employing all the latest circuit techniques, the Venus, in one small package, provides a combination of advanced operating features and conveniences heretofore unavailable in rigs at any price. Some of the outstanding features of the VENUS include a nuvistorized high sensitivity, low-noise front end; crystal lattice filter in both receive and transmit positions; ± 1.5kc receiver offset tuning; broad band circuits throughout providing maximum simplicity and ease of tune-up; and a separate front panel control for smooth injection of carrier for excellent quality AM and adjustable CW output.

ELECTRICAL SPECIFICATIONS

TRANSMIT: *Frequency Range:* 49,975 to 50,475 KC, standard (other ranges available on special order). *Power Ratings:* 85 watts PEP input — all modes (AM, SSB, and CW.) *SSB Performance:* (9 MC lattice filter). Unwanted sideband down more than 50 db at 1000 cycles. Carrier suppression greater than 56 db. Distortion products down more than 30 db at full ratings. *Frequency Stability;* Less than 500 cycle warmup drift after first five minutes. Less than 100 cycles/hour drift after warmup.

RECEIVE: *Frequency Range:* Same as TRANSMIT. *Frequency Stability:* Same as TRANSMIT. *Sensitivity:* .25 μV for 6 db S/N on AM. .1 μV for 6 db S/N on SSB. *Selectivity:* 2.7 KC at 6 db, less than 6 KC at 50 db. *Spurious Responses:* Images and IF leak through down more than 60 db. *Overload Characteristics:* Less than 5% cross modulation results from any two signals separated by more than 20 KC if stronger signal is less than 2 MV across 50 ohm input. *AVC Characteristics:* Less than 10 db change in AF output for input change from 1μV to 400 μV (52 db). Fast attack, panel selectable release times of .15 or 1.2 seconds. *AF Power Output to Speaker:* More than 2 watts at 3.2 ohms. *Physical:* 15" wide x 7" high x 10½" deep. Weight approximately 22 lbs.

Interested in HF? See the Squires-Sanders SS-1R at your nearest distributor.

VENUS 6 TRANSCEIVER — Amateur Net Price $495.00

115 V. A.C. 60 CPS Power Supply — Amateur Net Price $110.00

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 16, on page 110

Professional Performance

FOR AMATEURS WITH Master Mobile MOBILE EQUIPMENT

Deluxe Ultra High "Q" **COILS**

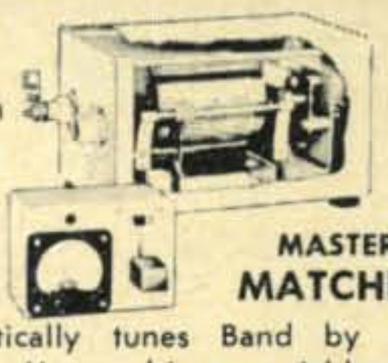
Designed for higher "Q" . . . with power units and SSB. Use with 3 ft base section and 60" whip. **15 or 20 meter, 6.95; 40 meter, 8.95; 75 meter, 9.95; 160 meter, 14.95**

NO. 750
MASTER DELUXE ALL-BANDER

Covers 10 thru 75 frequencies. Silver-plated single turn contact, positive spring. Eccentric cam contact, easy selection of turn. Automatic lock prevents damage to coil.

14.95 NET

with Field Strength Meter



MASTER MATCHER

Automatically tunes Band by remote control. Motor driven variable inductance. All guesswork eliminated.

For 6V Mod. 2495- 6 **24.95**
For 12V Mod. 2495-12 **Complete**

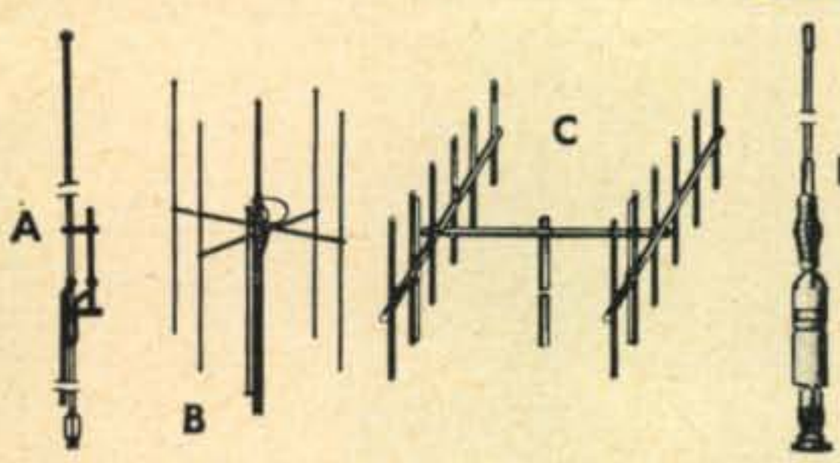
No. 925

MICRO-Z-MATCH

Micrometer Impedance - Matching Inductance - Used on all bands with any type coax. cable to match any mobile antenna. Easily adjustable for minimum standing wave ratio (1:1). Complete with Coax. Adp. Kit

9.95 NET

ANTENNAS



A AM-28 2-meter "J" mobile-fixed antenna provides 2 db gain. 86" hght. **14.95**

B AM-25 all aluminum "cloverleaf" factory pretuned 144-148 mc provides 3 db gain. **12.95**

C AM-5 twin six 2-meter beam with 12 db forward gain. Pre-tuned, aluminum, heavy duty. **16.95**

D (Not Shown) AM-4 same as above except 6 element beam. **8.95**

E AM-7 Sentry "Shorty" 2 meter 1½ wave top loaded fiberglass antenna with mount for CB use. **16.75**

F AM-10 "Shorty" as above except it's 6 meter shortened ¼ wave with mount. **10.95**

G Model 300 ground plane antenna outperforms any type verticle dipole. Ideal for CD and defense nets. **12.95**

H No. 613 Master VHF rooftop antenna for 140-165 Mc. Comes with 10' coax. cable. **4.95**

WHIPS All with Threaded ⅜" stud to fit all mounts. **100-60S 60" 4.95; 100-72S 72" 4.95; 100-78S 5.00; 100-86S 86" 5.15; 100-90S 90" 5.20; 100-96S 96" 5.25; 100-103S 103" 6.95.**

FIBERGLASS WHIPS — Flexible, indestructible universal antenna with ⅜" x 24 thread base fitting chrome plated. **FG-60 60" 4.95; FG-72 72" 4.95; FG-84 84" 5.15; FG-96 96" 5.25; FG-103 103" 6.95.**

E-Z OFF
ANTENNA CONNECTOR

Noise-free. Connect or remove loading coils, whips, or mounts without tools. No. E-Z 295.

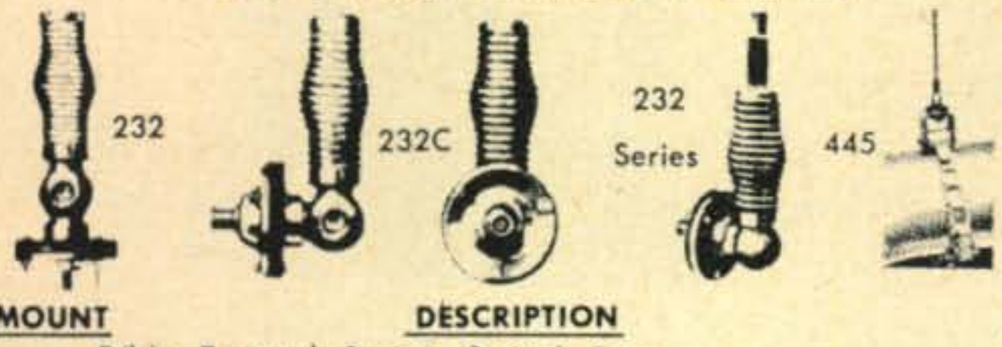
2.95 NET

No. 10-H

TENNAHOLD
Fits All Cars

1.00 NET

BODY AND BUMPER MOUNTS



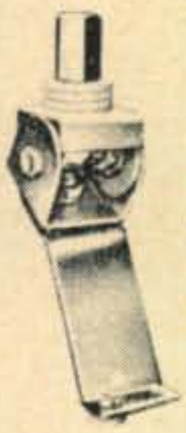
BASE MOUNT	DESCRIPTION	CB NET
232	D'ble Tapered Spring—Swivel Base	8.75
232C	D'ble Tapered Spring—Swivel Base Coax. Conn.	8.75
232SS	D'ble Tapered Spring—Spec. Stainless	12.95
232SSC	D'ble Tapered Spring—Spec. Stainless — Coax. Conn.	12.95
232X	Heavy Duty—D'ble Tapered Spring—Swivel Base	9.85
232XC	Heavy Duty—D'ble Tapered Spring—Coax. Conn.	9.85
232XSSC	Heavy Duty—D'ble Tapered Spring—Spec. Stainless — Coax. Conn.	14.95
232XSS	Heavy Duty—D'ble Tapered Spring—Spec. Stainless	14.95
232XX	Extra Heavy Duty Spring	10.85
232XXC	Extra Heavy Duty Spring—D'ble Tapered—Coax. Conn.	10.85
232XXSS	Extra Heavy Duty Spring—D'ble Tapered—Spec. Stainless	15.95
232XXSSC	Extra Heavy Duty Spring—D'ble Tapered—Spec. Stainless—Coax. Conn.	15.95
445	Universal Mount—Threaded, ⅜"-24—Chain Mount	7.95

GUTTER MOUNT CG-275

Eliminates hole drilling. Positive locking, retractable and adaptable for any ⅜" 24 thread whip.

7.95 NET

UNIVERSAL MOUNT



TM-1
is Chrome plated alloy steel mount for any antenna with ⅜" 24 thread.

4.45 NET

FOR TRUNK LID, COWL MOUNTING

MMM-75 is adjustable for any curved surface. Equipped with coaxial connector.

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BUMPER MOUNT

MM-520 with shaped links adjustable to any width surface. For spring or whip double mount.

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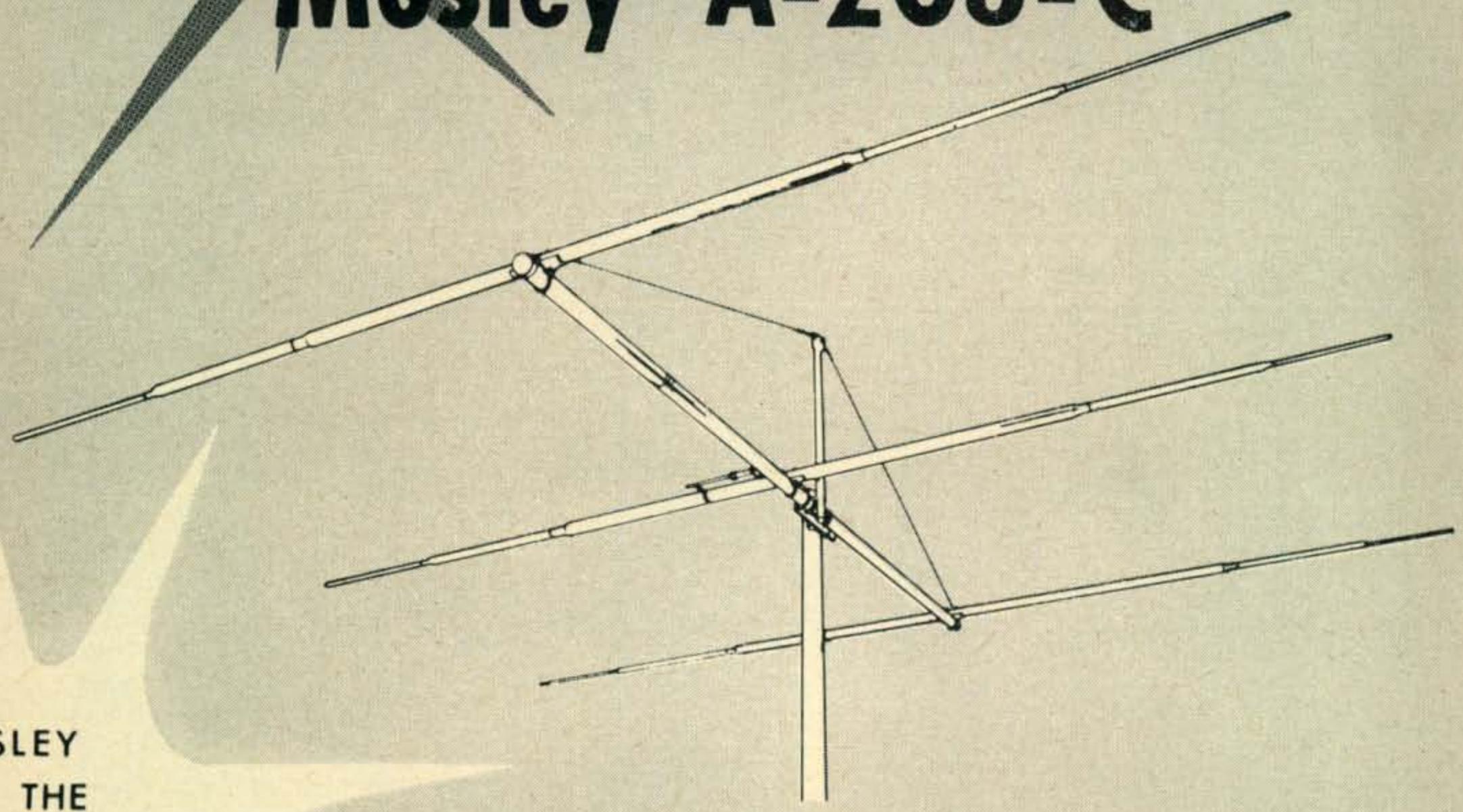
AREA 213, 731-2251 TWX 213-737-1315

For further information, check number 17, on page 110

NEW..... for 20 meter operation
Mosley A-203-C

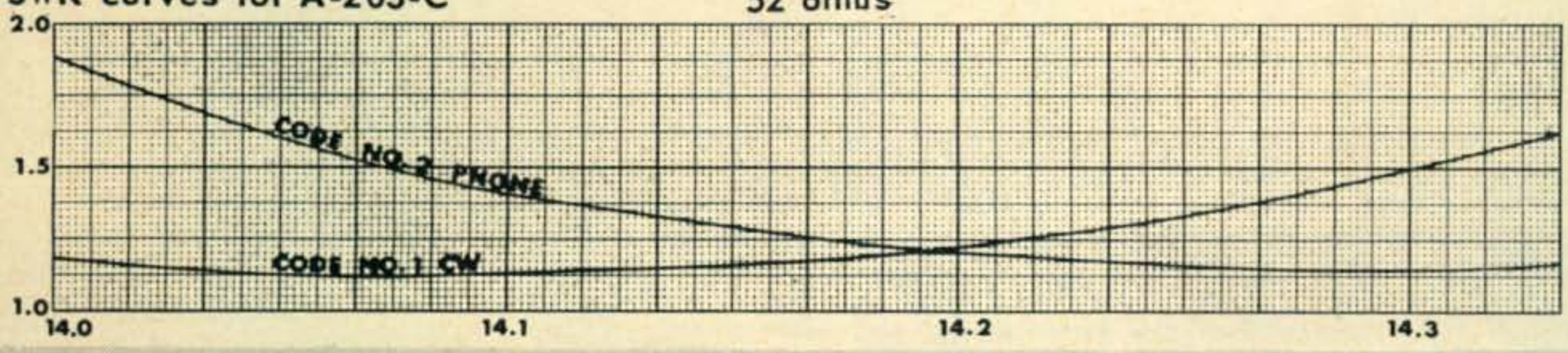


MOSLEY HAS THE OUTSTANDING THREE ELEMENT ARRAY FOR TWENTY METER DX OPERATION.

The new clean-line A-203-C will give you that DX punch that will over-ride QRM. The A-203-C is a three element twenty meter beam using swaged tubing elements to give this antenna rugged durability. The antenna has a special new type element design that virtually eliminates element flutter and boom vibration. A-203-C is a wide spaced, gamma matched, full size beam that every ham needs for the tough competition enforced by the present conditions on the DX bands. This antenna will equal the performance of many four to six element beams without the headaches of large size and heavy weight necessary for these big beams.

- *GAIN (8 db. or better) (F/B 24 db.)*
- *HANDLES MAXIMUM LEGAL POWER*
- *BOOM LENGTH 24 ft.*
- *MAXIMUM ELEMENT LENGTH 37 ft.*
- *TURNING RADIUS 22 ft.*
- *WIND LOAD (80 mph wind) – 140 lbs.*
- *ASSEMBLED WEIGHT 40 lbs.*
- *SHIPPING WEIGHT 49½ lbs.*

SWR curves for A-203-C 52 ohms



MOSLEY ELECTRONICS INC. 4610 N. LINDBERGH BLVD. – BRIDGETON MO. 63044

For further information, check number 18, on page 110

noise....

immunized!

not merely **suppressed**..
not merely **limited**..
but ***immunized***

For this is the term that describes the operation of Hammarlund's HQ-170A or HQ-180A receivers when equipped with Hammarlund's Noise Immunizer.

Forget noise interference caused by domestic or industrial electrical equipment.

Forget "pistol shot" impulse noise created by spark discharges of power line leaks and ignition systems.

Hammarlund's 10 position adjustable selectivity, slot filter, vernier passband tuning and Noise Immunizer combine to bring in contacts that were previously unobtainable.

Some actual field comments:

"A VK9 that couldn't be copied became S-3 and Q-5."

"S-9 Loran interference was slashed to the point where an S-4 signal was perfect copy"

You will have to **try** it to **believe** it. See your nearest Hammarlund distributor and ask for a demonstration of the Noise Immunized HQ-170A or HQ-180A receiver.

Buy DX-PEDITION PROVED..DX-PERFECTED Hammarlund Amateur Gear!

HAMMARLUND
MANUFACTURING COMPANY
A GIANNINI SCIENTIFIC COMPANY
53 West 23rd Street,
New York 10, New York

For further information, check number 19, on page 110

12 NEW AMATEUR BEAMS

from

FINCO®

ALL GOLD CORODIZED

ALL GAMMA MATCHED

3 New combination 6 & 2 meter beams
5 New 6 meter beams
3 New 2 meter beams
1 New 1¼ meter beam

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THE FINNEY COMPANY

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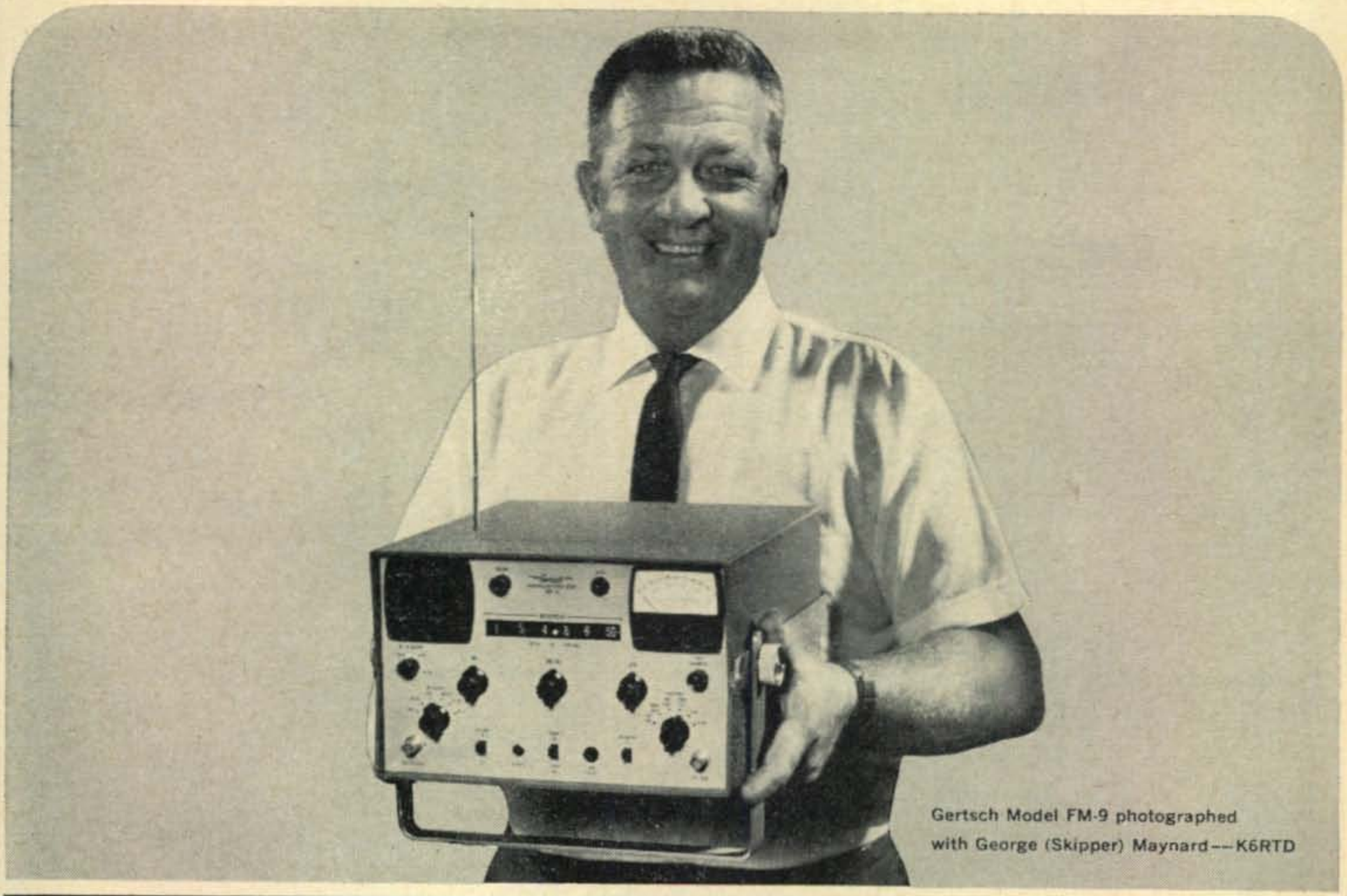
For further information, check number 20, on page 110



Gertsch Model FM-9 photographed
with George (Skipper) Maynard—K6RTD

NOW... GERTSCH COMBINES FREQUENCY METER SIGNAL GENERATOR DEVIATION METER IN A SINGLE, PORTABLE PACKAGE — $1,495

—direct digital reading of *every* FCC assigned channel in the 150-162 mc band.

With this Gertsch meter, you can measure and generate *all* allocated channels in both 150-162 mc and 450-486 mc bands... with .0002% (2 ppm) accuracy. Generated outputs can be attenuated to less than 0.5 μv for receiver sensitivity checks. 400-500 kc output also available for I.F. alignment.

As a deviation meter, instrument measures peak FM deviations... two full scale ranges of 5 and 15 kc.

Simple operation. Just set dials to read desired frequency. No charts, curves or calibration books needed.

Easily calibrated. Accuracy solely dependent on a single 1-mc oven-controlled crystal... easily checked against WWV.

All solid-state circuitry results in a compact package only 8" H x 12" W x 12" Long. Weighs less than 25 pounds.

Operates anywhere... on 115/230 AC line, 12 volt DC, or optional rechargeable battery pack.

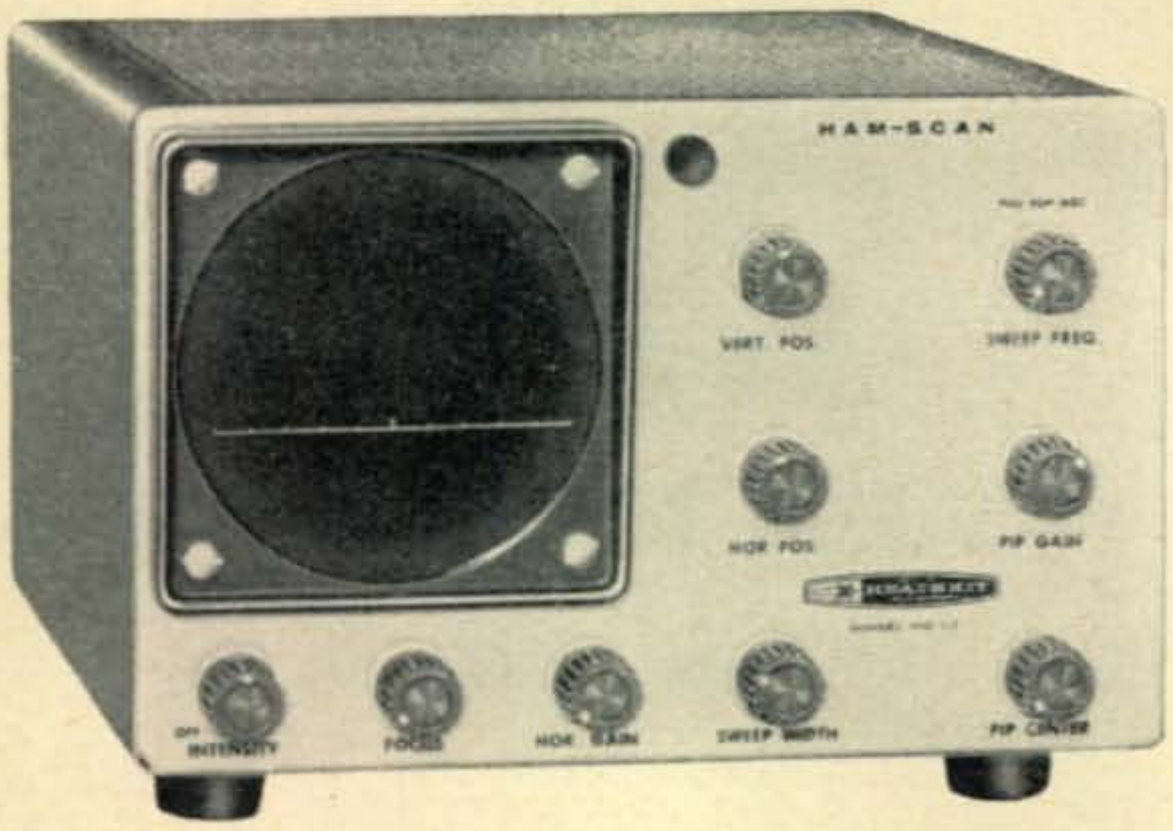
Send for literature on FM-9 Series

Gertsch

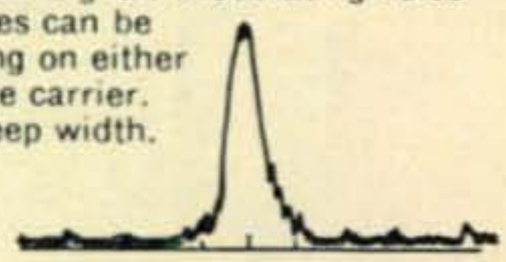
GERTSCH PRODUCTS, INC., 3211 SOUTH LA CIENEGA BLVD., LOS ANGELES 16, CALIF. • UPton 0-2761—VErmont 9-2201

For further information, check number 21, on page 110

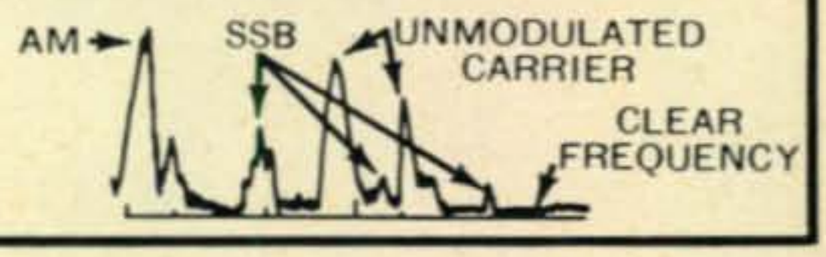
WATCH IT!... WITH THE



Typical AM signal. Modulating voice frequencies can be seen riding on either side of the carrier. 30 kc sweep width.



Typical display at 30 kc sweep width shows various signal types and clear portions of band.



NEW HEATHKIT® "HAM-SCAN" SPECTRUM MONITOR

What many hams have been asking for to supplement their Heathkit HO-10 Monitor Scopes!

Another Heathkit First! The new Heathkit "Ham-Scan" is the first *low-cost* spectrum monitor in kit form and an extremely useful accessory that will greatly increase the versatility and enjoyment of amateur radio operation.

Monitors band activity! With the Heathkit "Ham-Scan" you can visually monitor up to 100 kc of frequency spectrum centered on the frequency to which you are tuned, eliminating "hunting" or unnecessary tuning across the dial to monitor band activity. All signals appearing up to 50 kc on either side of the frequency to which you are tuned are displayed on the screen of the cathode-ray tube as vertical pips. As the receiver is tuned, the display moves horizontally along the baseline with the signal you hear always appearing in the center of the screen.

Identifies signal types. SSB, AM & CW signals are clearly identified with the "Ham-Scan" even though they may be up to 50 kc away and clear portions of the band are easily identified without continuous tuning. It will also prove useful in spotting both phone and CW DX stations operating off your frequency and is invaluable during VHF band openings. Also checks carrier and sideband suppression of SSB transmitters and aids in identifying "splattering" received signals.

Operates with all receivers. The Heathkit "Ham-Scan" may be used with virtually all receivers in amateur service today. Parts and instructions are included to match your receivers I.F. frequency (see specifications). Retaining these few extra parts means your Heathkit "Ham-Scan" will not be obsoleted should you purchase a new receiver.

Order now! Be one of the first to enjoy the many advantages of this most-requested "Ham" accessory! Place your order now with the handy coupon below.

Kit HO-13...11 lbs.....$79.00

SPECIFICATIONS—Receiver IF: 455, 1600, 1650, 1681, 2075, 2215, 2445, 3000, 3055, 3395 kc. **RF Amplifier—Response:** ±0.5 db at ±50 kc from receiver IF. IF—350 kc. **Sensitivity:** Approx. 100 uv input for 1" vertical deflection at full gain setting. **Horizontal deflection—Sweep generator:** Linear sawtooth, recurrent-type (internal). **Frequency:** 10 to 50 cps, variable. **Sweep width:** 30 kc or less, to 100 kc ±20%. Continuously variable. (Approx. 15 kc to 100 kc for 455 kc IF). **Resolution:** 1.5 kc (frequency difference between two 1" pips whose adjacent 3 db points coincide. Measured at slowest sweep speed and at 30 kc sweep width). **Power supply:** Transformer operated, fused at ½ ampere. **Low voltage:** Full wave voltage-doubler circuit provides 250 volts @ 20 ma, & 580 volts @ 6 ma. **High voltage:** Half wave circuit provides −1600 volts @ 1 ma for CRT. **Power requirements:** 120 volts AC, 50/60 cps, 40 watts. **Tube complement:** 3RP1 CRT (medium persistence green trace), 1V2 HV rectifier, 6AT6 detector, 6EW6 RF amplifier, 6C10 sweep generator/horizontal amplifier, (2) 6EW6 IF amplifier, 6EA8 Oscillator/mixer, (4) 500 ma silicon diode low voltage rectifiers, crystal diode, IN954 voltage-variable capacitor. **Controls:** On-off/intensity, focus, horizontal gain, sweep width, pip center, horizontal position, pip gain, vertical position, sweep frequency/AGC, astigmatism. **Dimensions:** 5¼" H x 7¾" W x 11" D.

FREE CATALOG

Fully describes over 250 different Heathkit products at savings of 50% or more! See the complete line of "Mobile" and "Fixed Station" amateur gear plus many others. Send for your free copy today!

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HEATH COMPANY, Benton Harbor, Michigan 49023
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12-4-2

☐ Enclosed is $_____ plus postage. Send model HO-13 "Ham-Scan" Panoramic Adapter.
☐ Please send Free 1964 Heathkit Catalog.

Name_____

Address_____

City_____ State_____ Zip_____

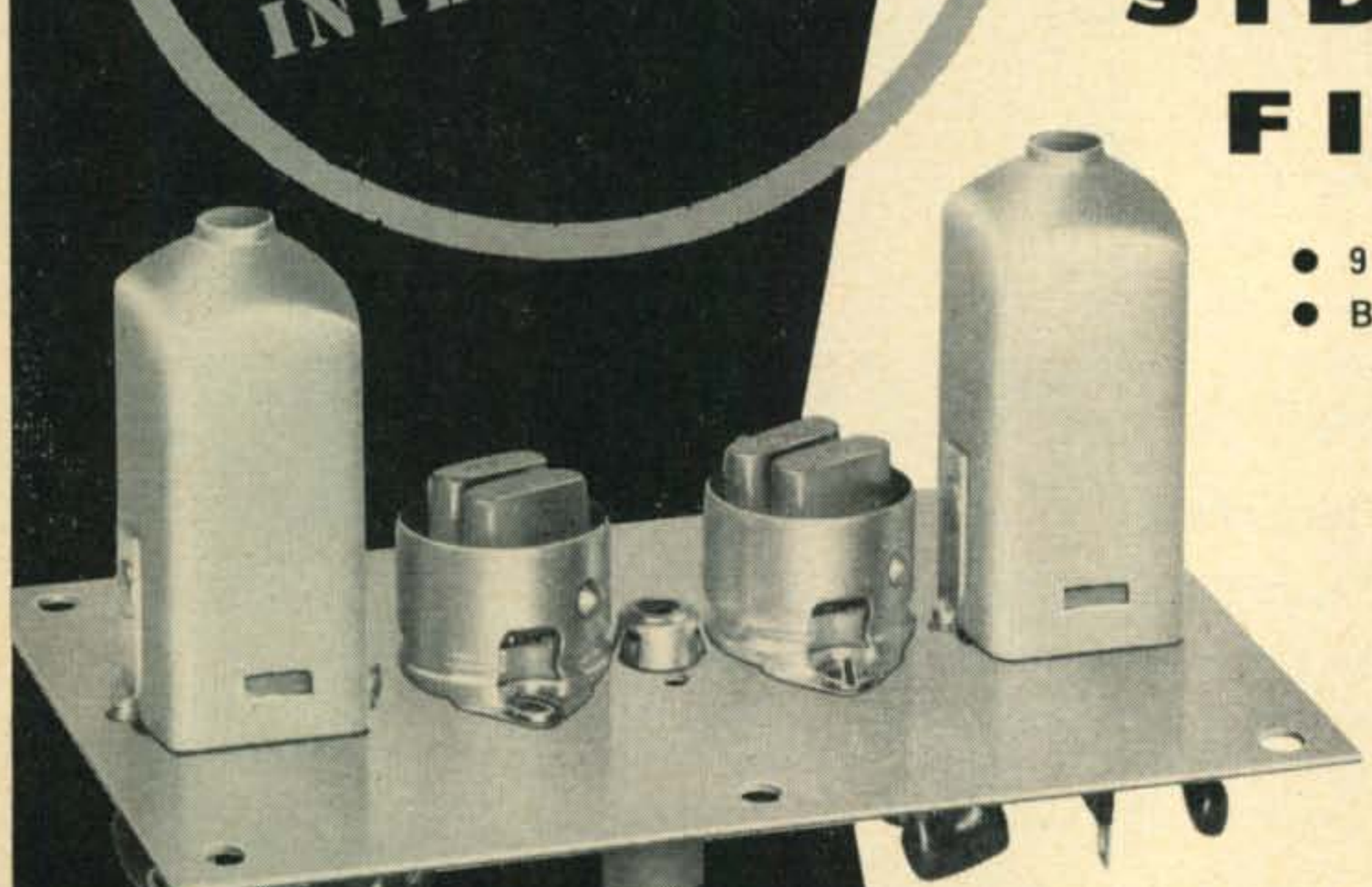
Prices & specifications subject to change without notice. AM-138

For further information, check number 23, on page 110

NEW FROM INTERNATIONAL

AOC*

SINGLE SIDEBAND FILTERS



ACF-4

- 9 mc center frequency
- Bandpass 6 db 3 kc (approximate)

ACF-2 Two-crystal filter circuit using low impedance link input and 2K resistive output load. Unwanted sideband rejection greater than 30 db. **$9.95**

ACF-4 Four-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 40 db. **$18.95**

ACF-6 Six-crystal filter circuit using nominal 600 ohm input and output. Unwanted sideband rejection greater than 55 db. **$27.95**

MATCHING OSCILLATOR CRYSTALS for the ACF filter series. Recommended for use in OS-4 oscillator.
CY-6-9LO **$4.40**
CY-6-9HI **$4.40**

OS-4 Crystal Oscillator **$6.95**

SE-6F Mounting Case
Special AOC case for mounting filter plates. **$5.50**

* Add-On-Circuit

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Please rush 1964 catalog.
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PLEASE PRINT
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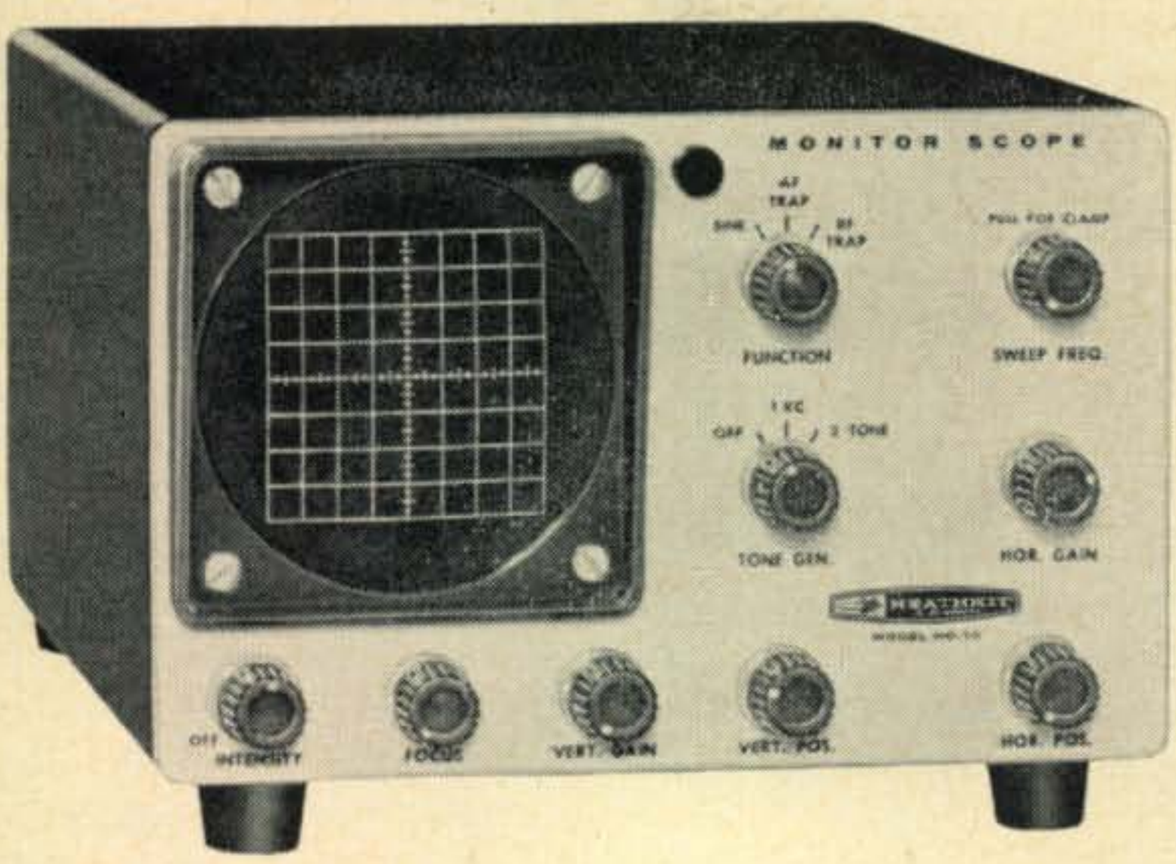
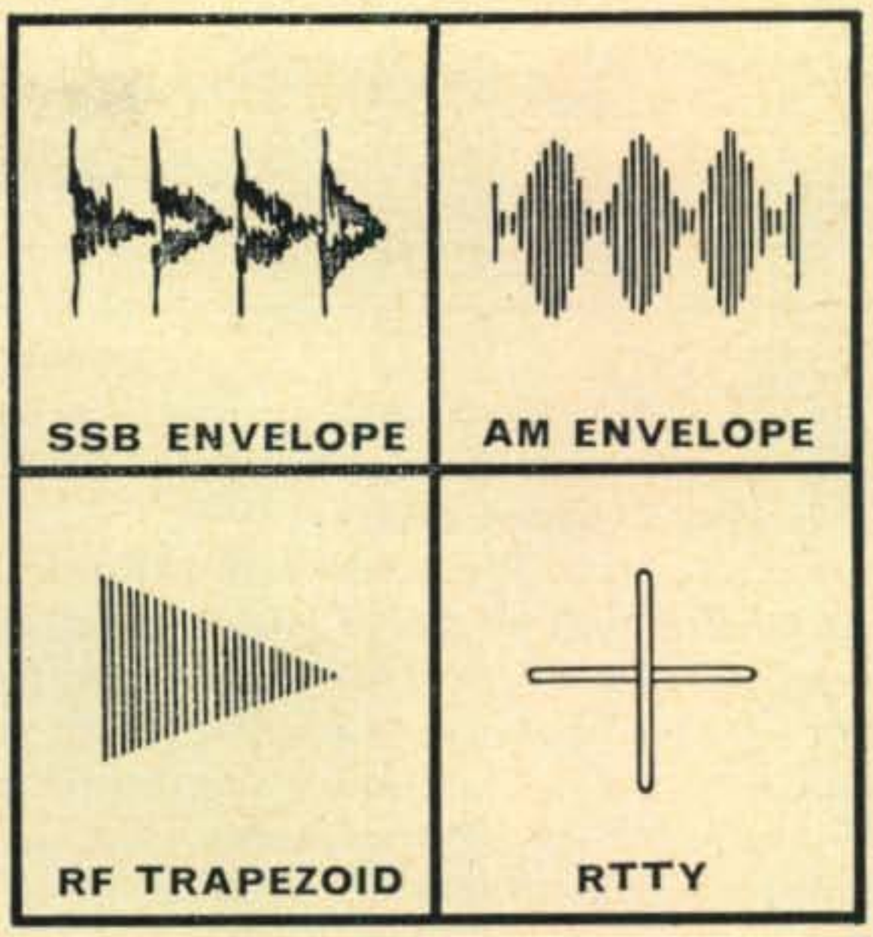
WATCH IT...WITH THE





NEW HEATHKIT® HAM SIGNAL MONITOR

Specially designed for Amateur Radio use. The Heathkit Monitor Scope provides the perfect answer for monitoring the modulation characteristics of both transmitted and received amateur signals. It shows at a glance the quality of your signal and indicates the presence of distortion due to improper tuning or adjustments assuring that the signal you transmit is of the best quality for finest communications results.

Displays Envelope, AF & RF trapezoid patterns. Automatic switching is featured between transmitted & received envelope patterns and a clamping circuit is employed to pull the spot off-screen during "receive" on trapezoid patterns to prevent burning of phosphor on CR tube face. The RF trapezoid pattern is especially useful in checking for "flattopping" and non-linearity in SSB linear amplifiers.

Independent of frequency. The HO-10 requires no additional tuning when used with transmitters on all amateur bands from 160 through 6 meters. It is designed to handle a wide range of transmitter output power (5 watts to 1 kilowatt) and may be used with all tube-type receivers having an I.F. frequency up to 500 kc.

Built-in two-tone test oscillator. Simplifies transmitter adjustments and testing. A 4-position RF level attenuator provides extra convenience in matching scope to transmitter power.

Simple to connect. Standard coaxial connectors are provided on the rear panel for simple connection to antenna system feed line (50-75 ohm) with phono jacks for all other connections. All inputs and outputs are clearly screened on the panel.

Enjoy it now! Add this convenient accessory to your amateur station facilities now . . . enjoy the pride it brings in knowing that your transmitted signal is of the best quality for outstanding communications at all times!

Kit HO-10 . . . 11 lbs. $59.95

SPECIFICATIONS—Vertical response: ±3 db from 10 cps to 500 kc. **Sensitivity:** 500 mv per inch deflection. **Input resistance:** 50 k ohm. **Horizontal response:** ±3 db from 3 cps to 30 kc. **Sensitivity:** 800 mv per inch deflection. **Input resistance:** 1 megohm. **Sweep generator: Recurrent type:** 15 to 200 cps (variable). **Tone oscillators:** Approximately 1000 cps and 1700 cps. **Output voltage:** 15 mv (nominal). **GENERAL: Frequency coverage:** 160 through 6 meters (50-75 ohm coaxial input). **Power limits:** 5 watts to 1 kilowatt output. **Front panel controls:** Function Selector, Sweep Frequency, Tone Generator, Horizontal Gain, Horizontal Position, Vertical Position, Vertical Gain, Focus, Intensity/Off. **Rear control:** Xmtr. Atten. Attenuates 0 to 24 db at approximately 6 db per step. **Power supply:** Transformer operated, fused ½ amp. **Power requirements:** 105-125 VAC, 50/60 cps, 35 watts. **Dimensions:** 5¼" H x 7⅜" W x 10½" D.

FREE CATALOG

Fully describes over 250 different Heathkit products at savings of 50% or more! See the complete line of "mobile" and "fixed station" amateur gear plus many others. Send for your Free copy today!

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☐ Enclosed is $_____ plus postage. Send model HO-10 Monitor Scope.

☐ Please send Free 1964 Heathkit Catalog.

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City _____ State _____ Zip _____

Prices & specifications subject to change without notice. AM-137

For further information, check number 25, on page 110

Ionospheric Amplification

BY JERZY OSTERMOND-TOR*, Ex-YM4XR

Old-timers will certainly remember "Tor," who operated as YM4XR from Danzig for many years before World War II. Besides being an enthusiastic radio amateur, Tor was also a noted Professor in the field of Upper Atmospheric Physics. In this exclusive article for CQ, Professor Ostermond-Tor discusses a unique characteristic of the ionosphere which he first detected more than 25 years ago, and which has now been confirmed by scientific satellites. This characteristic, known as the "Ostermond Effect," makes it possible for the ionosphere to amplify very low power high frequency radio signals so that they can be used for effective communications. It seems certain that this discovery will have a profound effect on amateur radio, since it may herald a trend back to very low power amateur transmitters.

More than 25 years ago, I was active as radio amateur YM4XR in my home town of Danzig, which at that time was a Free State, and one of the most beautiful cities on the Baltic coast. As a radio amateur and a Professor in Upper Atmospheric Physics, I was always fascinated by the great distances that could be spanned by high frequency radio waves using very low power.

During the years 1933-1935, I operated my 5-watt vacuum-tube amateur station on 20 meters. With this low power I managed, as did many radio amateurs of that day using similar low power levels, to work all continents and dozens and dozens of countries. It was amazing how often signals would be exceptionally strong, much stronger than mathematical calculations based on theory would indicate.

In 1935, I raised the power of my transmitter to 100 watts, and the following year, to 250 watts. While I did manage to work more countries with this higher power, I noticed that often my signal report was no better than when I had used 5 watts. This was disappointing to me since electricity was very expensive in Danzig, and on my meager salary as a Professor I could not afford to operate on such high power for long periods of time.

At about this time I had read in the technical literature about the interesting experiments being conducted in Europe by scientists studying the so-called "Luxembourg Effect." A Swiss broadcasting station was being received in Holland with the modulation of a very high power station in Luxembourg, operating on another frequency, superimposed on it. This unusual effect was found to be caused by the radio waves emitted from the Luxembourg station interacting with the radio waves from the Swiss station, *in the ionosphere over Luxembourg*. The importance of these experiments was to show that the ionosphere is *non-linear*, and that it does not necessarily react directly to changes in power.[1]

These experiments aroused my interest, and caused me to think: could this non-linear characteristic of the ionosphere be responsible for my higher-power transmitter not being as effective as I thought it should be?

Based on the possibility that it might be responsible, early in 1937 I received permission from the University and from the Danzig authorities to conduct non-linear ionospheric experiments of my own. I constructed a transmitter in which I could vary the power output from ¼ watt to 1,000 watts. Throughout 1937 and 1938 I made more than 500 DX QSOs on 20 meters during which I was able to vary the power between the minimum and maximum limits. Perhaps old-timers reading this article will recall

[1]Bailey, V. A. and Martyn, D. F., "Theory of Ionospheric Cross Modulation," *Nature*, Volume 133, 1934, page 218.

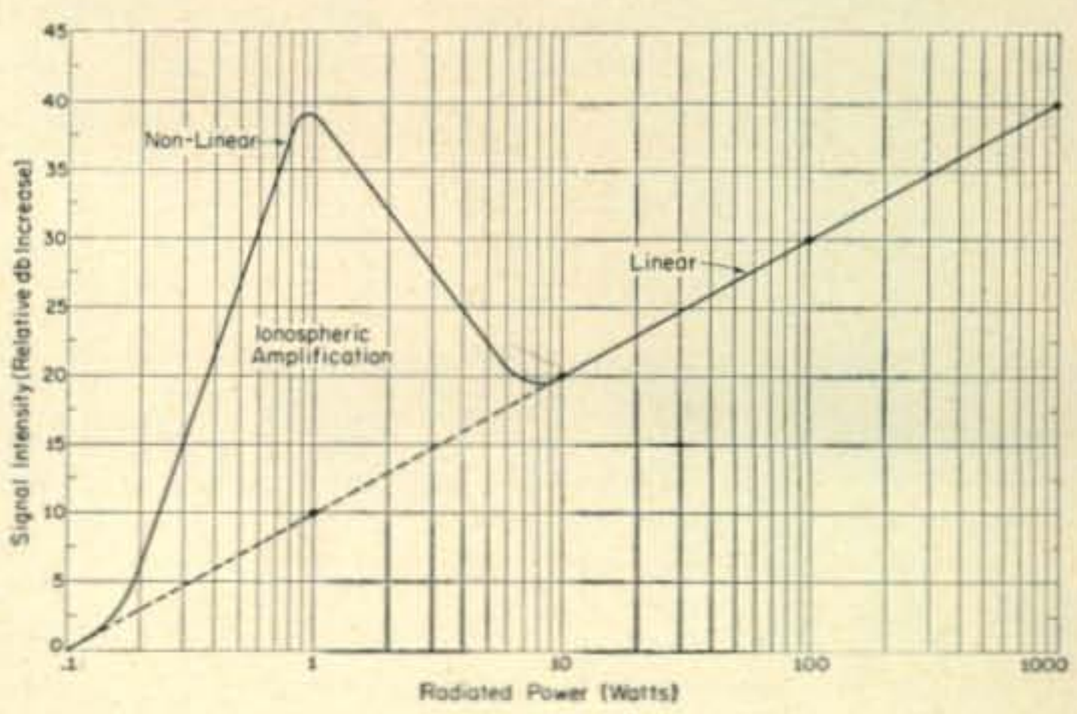


Fig. 1—Smoothed plot (solid line) of more than 500 signal-reports *vs* power recorded by YM4XR on 20 meters during 1937-38. Dashed line indicates theoretical value of signal assuming a linear ionosphere.

*CQ wishes to acknowledge its appreciation to Stanley Leinwoll for providing translations of certain portions of Professor Ostermond-Tor's article which originally appeared in German and Polish. Correspondence to Professor Ostermond-Tor may be directed c/o Mr. Leinwoll, at Radio Free Europe, 2 Park Avenue, New York, N. Y. 10016.

participating in these experiments? I plotted the signal reports at various power levels, with the startling results shown in fig. 1.

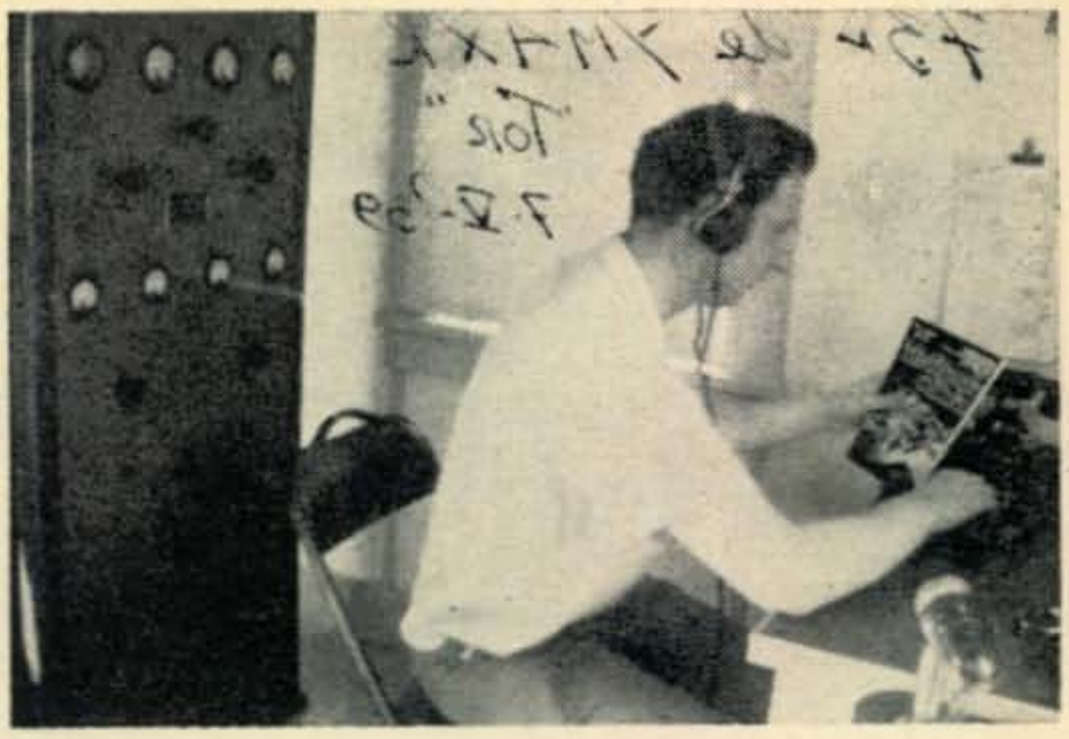
Non-Linearity

Between power levels of approximately 10 and 1,000 watts, the ionosphere behaved more-or-less linear, and signal reports improved as power was increased. Below 10 watts, however, I encountered surprising results. Somewhere between approximately ½ and 10 watts, there appeared a sharp peak in signal level. In fact, careful signal level measurements revealed that the peak occurred at about one watt, and was on the order of 30 db greater than the calculated signal level, assuming the ionosphere was linear. In other words, the signal received when the transmitter had a power output of 1 watt was about the same as when the transmitter power was approximately 850 watts!

These results convinced me that the ionosphere was non-linear at very low power levels as well as at very high power levels, as shown by the Luxembourg Effect. I did not think this too unusual since most natural phenomena seem to follow trends of this nature, often called the hysteresis effect. The fact that it had not been reported previously in the technical press did not bother me. I likened this to the propagation curve published early in the 20th Century which showed that radio waves could propagate only below 200 meters. The non-linear effect I had detected had not been discovered previously, I surmised, because everyone operated transmitters at power levels where the ionosphere did behave in a linear fashion! It took radio amateurs operating above 200 meters to show that radio waves could travel great distances at these wavelengths, and it took my experiments to show that there was signal gain at very low powers, due to the non-linearity of the ionosphere.

In early 1939 I continued my experiments, this time on 10 as well as 20 meters. During that year the 10 meter band was open only until April, so no more than 100 reports could be obtained. While not exactly the same, the effect on 10 meters was quite similar to what I had observed previously on 20 meters. The only difference being that the "non-linear" peak was of greater intensity, being on the order of 40 db *greater* than theoretical values. This indicated to me that the non-linear effect was frequency sensitive, which of course one might expect. During the first 6 months of 1939 I also collected several hundred additional reports on 20 meters, which further confirmed the results shown in fig. 1.

I knew that my discovery was of great importance. Here was evidence that a transmitter with a power output of one watt could do as well as one with hundreds of times greater power. While most radio amateurs were going to higher and higher power in 1939, I had proof that they were going in the wrong direction! My responsibilities as a scientist, however, did not permit



The author, YM4XR, shown in this 1939 photo operating the transmitter with which he discovered the "Ostermond Effect" in the ionosphere. The variable power control can be seen in the lower central portion of the transmitter control panel.

me to publish my results until I could offer an explanation of what was causing the ionosphere to amplify low power signals.

Studies

In July, 1939 I began my theoretical studies. I reasoned that the gain in signal was the result of interaction between the molecules of the various gases that make up the ionosphere. At very low power levels the energy from the radio wave caused the molecules to flow cooly through the ionosphere, with each molecule setting several others into motion in a chain reaction. I attributed the gain in signal to this chain reaction. On the other hand, as the transmitter power was increased, the energy imparted to the molecule was greater, and the molecule began to heat up. This heating effect caused the molecules to slow down before a chain reaction could start, and the amplification process could not take place. Here was my explanation, and I was convinced that I was on the right track.

Throughout July and early August I labored night and day on this theory. By late August I had completed my thesis[2] which contained a complete, but complicated, mathematical proof of my theory. Nothing was missing, every link fit together into a perfect chain. If I may be permitted a statement of self-praise at this point, I believe that my theory would have been called the "Ostermond Effect" if my thesis had been published. But fate did not intend it to be this way.

My thesis was in the process of being printed for publication in the October, 1939 issue of my University's Technical Journal when enemy airplanes bombed my town on that fateful day during early September. The printing office, the University, and much of my beautiful town were destroyed. My thesis never appeared in print, although I still have in my possession a torn, charred copy of the original which I found under a pile of rubble at the end of the war, when I

[2]Ostermond-Tor, J., "Ionosphäre Und Die Stark Strom Effekt," *Rev. Scientif. Physik*, Vol. 10, 1939, page 827. (Unpublished, due to war).

Fig. 2—Charred remains of cover of original thesis on "Ostermond Effect" written by YM4XR in 1939. Document was damaged during wartime bombings. Pages have been removed from the thesis recently by the author for restoration purposes. Note official stamp on bottom of cover.

returned to the site of what had once been the shack of YM4XR.

With the beginning of World War II, there followed for me two decades of agony of which I would prefer not to write about. Suffice to say that concentration camps, slave labor, and living under political systems that were both hostile and foreign to me, turned me away from science and my interest in amateur radio.

For the past five years, thank God, I have enjoyed the freedom of living in this great country, and only now are my former interests returning. I am again reading technical journals and following the latest developments with increasing enthusiasm. In fact, two recent events started me thinking again about ionospheric amplification. The first of these was an international conference on non-linear processes in the ionosphere which was held December 16-17, 1963 at the Boulder, Colorado Laboratories of the National Bureau of Standards, and the second was an interesting letter I received recently from the old country, from an ex-colleague of mine at the University.

The conference in Boulder was attended by several dozen leading scientists from all corners of the world. Dozens of very highly technical papers were given which contained further evidence that the ionosphere is capable of non-linear behavior. One paper in particular, was of special interest to me.[3] In this paper a method is discussed for decreasing the electronic density in the *D*-region of the ionosphere. It is pointed out that with a combination of high frequency and *optimum power level,* a path of decreased electron density can be created in the ionosphere through which a radio wave may propagate with *greatly decreased attenuation, or greatly increased signal level.* I believe, dear readers, you realize why this paper awakened my interests in ionospheric amplification.

The letter from my ex-colleague further stirred me to re-enter the scientific field. I quote the following from his letter:[4]

"I write you dear Tor after so many years because some things have happened here recently which brought to mind the experiments you were conducting with radio amateurs just before the great tragedy befell our beloved homeland. Although they are still guarded state secrets, I want to tell you of some recent results we have achieved from satellite experiments.

"Many satellites launched here contain high- and low-power transmitters which are used for beacons, communication and experiments. About a year ago it was noticed that when these satellites reached an altitude of about 250 miles, the signal from the low power beacon transmitter (about ½ watt) would suddenly become as strong as, or stronger than the signal from the higher power (about 10 watts) telemetry transmitter. At first many thought that this might be due to some malfunction in the equipment. Since then, however, this same effect has been noticed on at least six other satellites, and is greatest on those transmissions near a frequency of 20 megacycles.

"Late last year [November, 1963], a special satellite was launched to further check this oddity. The results were, amazingly, identical to what had been observed previously. When the satellite reached an altitude of about 250 miles, the signal from the low-power beacon transmitter suddenly increased by approximately 30 db, and was stronger than the signal from the higher power telemetry transmitter.

"After these experiments, our University was given the project to attempt to determine what was causing this strange effect. I, and a small staff from the Laboratory, are devoting full time to this now. It is my opinion that there must exist a region in the ionosphere at 250 miles in height which amplifies weak signals. I propose that this region is being formed by an as yet undetermined radiation emitted from the sun which acts diametrically opposite from the radiation that causes the regular regions of the ionosphere to exist. I base my proposal on a parallel in nature, the existence of anti-particles in the nucleus of the atom. I believe that while regular particles are responsible for absorbing a radio signal in the ionosphere, these anti-particles, acting in just the reverse, are responsible for amplifying weak signals. For this reason, I am calling this region the anti-region, or anti-layer in the ionosphere.

"To gain further knowledge about this anti-region, the University is planning to conduct extensive tests and experiments. It is for this reason that I am writing you, dear friend. I recall the experiments that you conducted before the war. I remember very clearly the long nights you spent writing your thesis while the rest of us were enjoying ourselves at the Hofbrau Haus. I have searched the library but I cannot find a copy of your thesis, and I am afraid that it may have been published in an edition of the Journal that was destroyed during the war. Would it be possible, if you have a copy, to loan it to me for a short time? I promise you that full credit will

[*Continued on page 104*]

[3]Molmud, P., "Use of Radio Transmitters To Decrease *D*-Region Electron Density," Space Technology Laboratories, Inc., Redondo Beach, California.

[4]Quotes from private correspondence between the author and Professor Jahreszeit Düssel, University of Neu Drosedow. The letter was dated January 4, 1964—*Ed.*

A Low Pass Filter for the Speech Inverter

BY WILFRED M. SCHERER, W2AEF

"Inverted Audio for D.S.B." in the February issue has apparently stirred the imaginations of many amateurs. Among the many letters received concerning the article, the subject of a suitable replacement for the rather expensive UTC filter appeared frequently. Below is W2AEF's answer to the problem.

CONSIDERABLE interest has been aroused in respect to the Speech Inverter and its possibilities as described in the February issue of *CQ*.[1] An important component required for the device is a 3000-cycle low-pass filter. This is one which must have a very steep cutoff if distortion and unwanted products are to be minimized. Unfortunately, commercial filters of this sort are quite expensive, the one specified in the related article costing $30.00. This can be a tempering influence which may discourage an otherwise potential user or experimenter from proceeding further with the idea.

The simple composite filter described herein was therefore devised for the home constructor. It can be built from readily available components costing between five and six dollars. Besides its considerably lower cost, it provides a much steeper cutoff than does the commercial filter used in the original speech inverter model. Comparison between the two filters may be made from their respective response curves shown at fig. 1.

Circuitry

The circuit and constants for the composite 3000-cycle low-pass filter are given at fig. 2.

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

[1]Warden, E. L., "Inverted Audio for D.S.B.," *CQ*, February, 1964, Page 26.

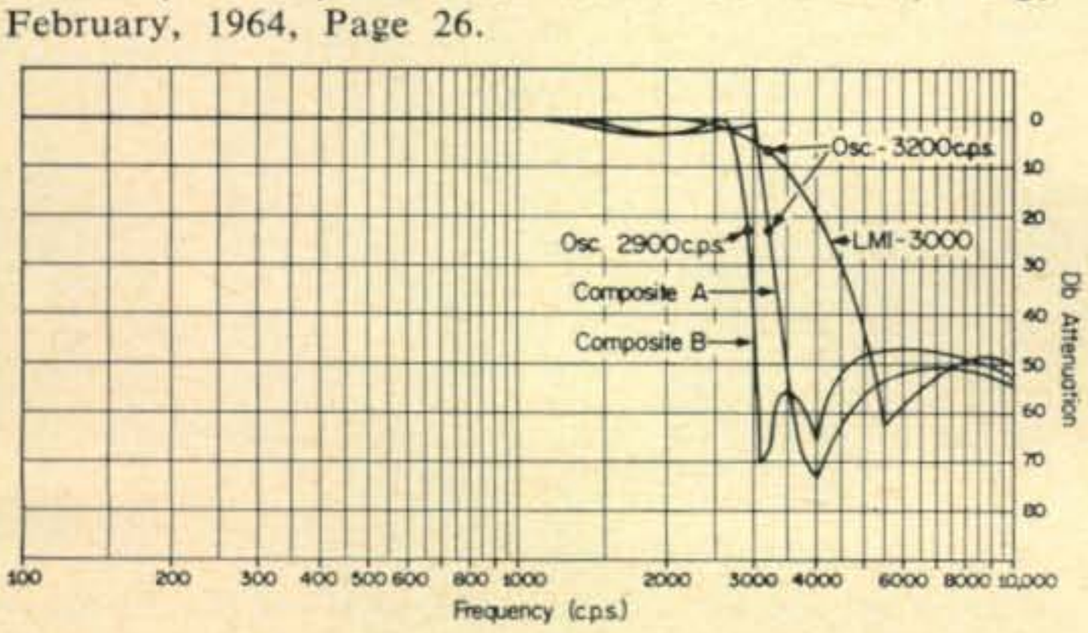


Fig. 1—Response characteristics of UTC LMI 3000 and the composite filters. Composite filter curve A is for 3000-cycle cutoff, B is for 2700-cycle cutoff. Conversion oscillator points are indicated at 3200 and 2900 c.p.s.

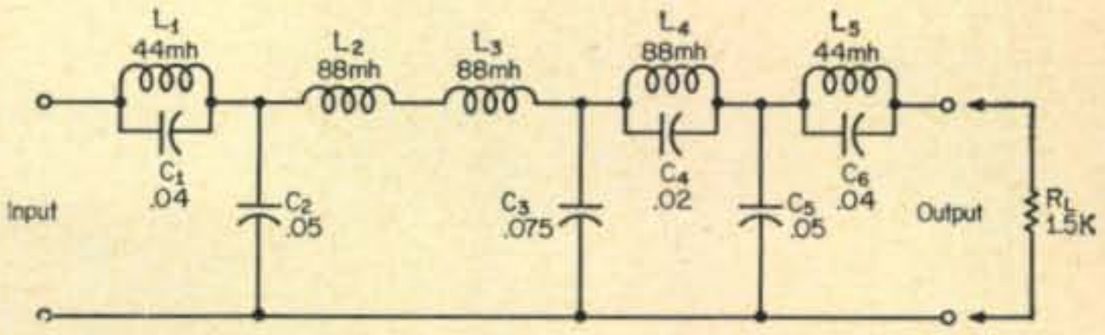


Fig. 2—Schematic of the 3000-cycle composite low-pass filter. Inductances are in millihenrys and capacitances in microfarods, L_1 and C_1, L_4 and C_4, L_5 and C_6 combinations each should resonate at 3800 c.p.s. C_2 shunted across L_2 should resonate at 2400 c.p.s. and C_3 shunted across L_3 should resonate at 1960 c.p.s. Resonance of the individual combinations (not connected to the filter network) may be determined as shown in fig. 3. Cutoff frequency may be lowered to 2700 c.p.s. by making C_1 and C_6 .06 mf each. Resonance with L_1 and L_5 should be 3100 c.p.s.

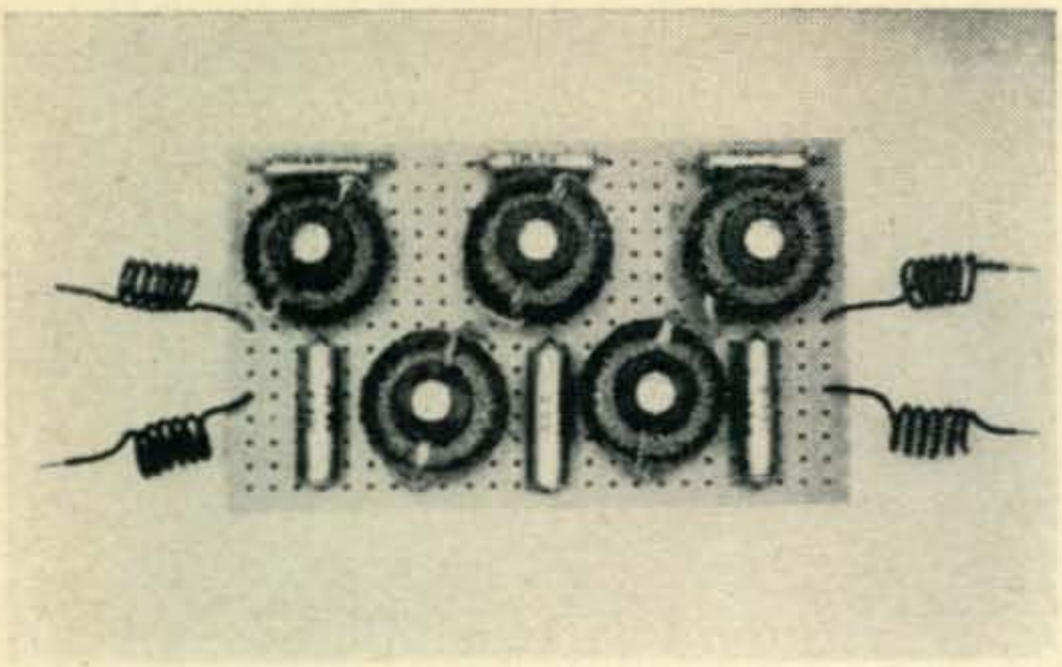
The filter is made up of two intermediate pi-sections, one a constant -*K*, the other a shunt *M*-derived type. The end sections also are shunt *M*-derived. Values for the components were worked out so that standard 44 and 88 millihenry toroid inductors could be used.[2]

Capacitors of 10% tolerance may be employed, but closer conformity with the characteristics of fig. 1 will be realized by the use of capacitive values closer to those specified. Measurements with a bridge or other means will be helpful towards finding capacitors nearest to the optimum values. An audio oscillator, using the setup shown in fig. 3, also may be used for finding the correct size capacitors according to resonance obtained from the various L/C combinations as indicated at fig. 2.

Paper, mylar-dipped, disc ceramic or mica capacitors may be utilized. The voltage ratings of C_1, C_4 and C_6 may be as low as 50 volts, while those of C_2, C_3 and C_5 should be high enough to withstand the d.c. potential of the circuit to which the filter is to be connected, unless a large value capacitor of sufficient breakdown rating is connected in series with the filter.

The composite filter must work out of a low

[2]Available from KCM Products, Box 88, Milwaukee 13, Wisc. Price for the five toroids is $4.00.



The composite 3000-cycle cut-off low-pass filter mounted on a perforated phenolic board. L_1, L_4, L_5, C_1, C_4 and C_6 are mounted across the top. L_2, L_3, C_2, C_3 and C_5 are at the bottom.

impedance and into a load of 1,500 ohms. This will require a low impedance secondary winding on the balanced-modulator's output transformer or a cathode follower stage connected between the present transformer and the filter. An additional a.f. stage also may be needed after the filter.

Use With S.S.B.

Use of the speech inverter with s.s.b., instead of d.s.b., may require a lower cutoff frequency for the low pass filter, depending on the bandwidth of the sideband filter. This may be done by increasing the size of C_1 and C_6. Making these .06 mf each will provide a 2700-cycle cutoff for which the conversion oscillator should be set to 2900 c.p.s. Curve B in fig. 1 indicates the response of this combination, which should be suitable for operation with 2.7 kc bandwidth transmitters.

If an a.f. oscillator and a low-reading a.c. voltmeter are available for measuring the filter characteristics, the constants for other cutoff points may be found by cut and try. On the other hand, the more advanced amateur may calculate his own needed constants, centered around the available toroid inductors, by using the standard filter formulae.[3] In this regard, it should be noted that other inductance values may be obtained using the specified toroids, since the inductors consist of two separate windings on each core. The value of each winding on one toroid is 22 mh and when the windings are connected in series, the total inductance is 88 mh. Similarly, the other toroid has two 11 mh windings which total 44 mh when connected together.

[3]Terman, F. E., Radio Engineers' Handbook, McGraw Hill, Section 3, par. 28, p. 226.

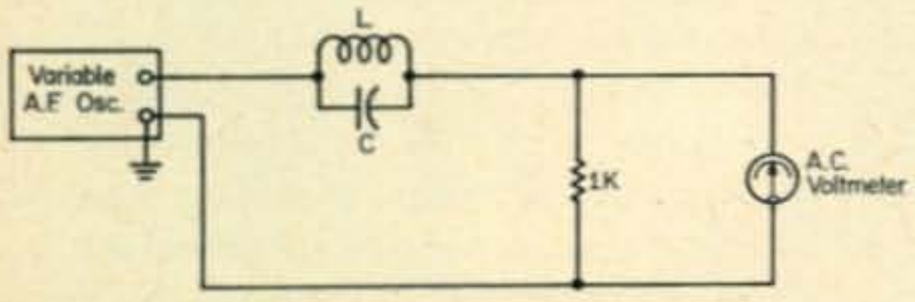


Fig. 3—Setup for determining resonance of L/C combinations for selecting proper size capacitors. Frequency at which the voltmeter reading dips to a minimum indicates the resonant point.

Construction

Two methods of assembling the composite filter are shown in the photographs. In one case the components are installed on a perforated phenolic board[4] which simplifies wiring and mounting. A cone-shaped rubber faucet washer (size ⅜) is placed on each side of a toroid inductor. These are held together and fastened to the board with a 1" screw. Placement of the components is not critical as long as the input and output circuits are well isolated from one another.

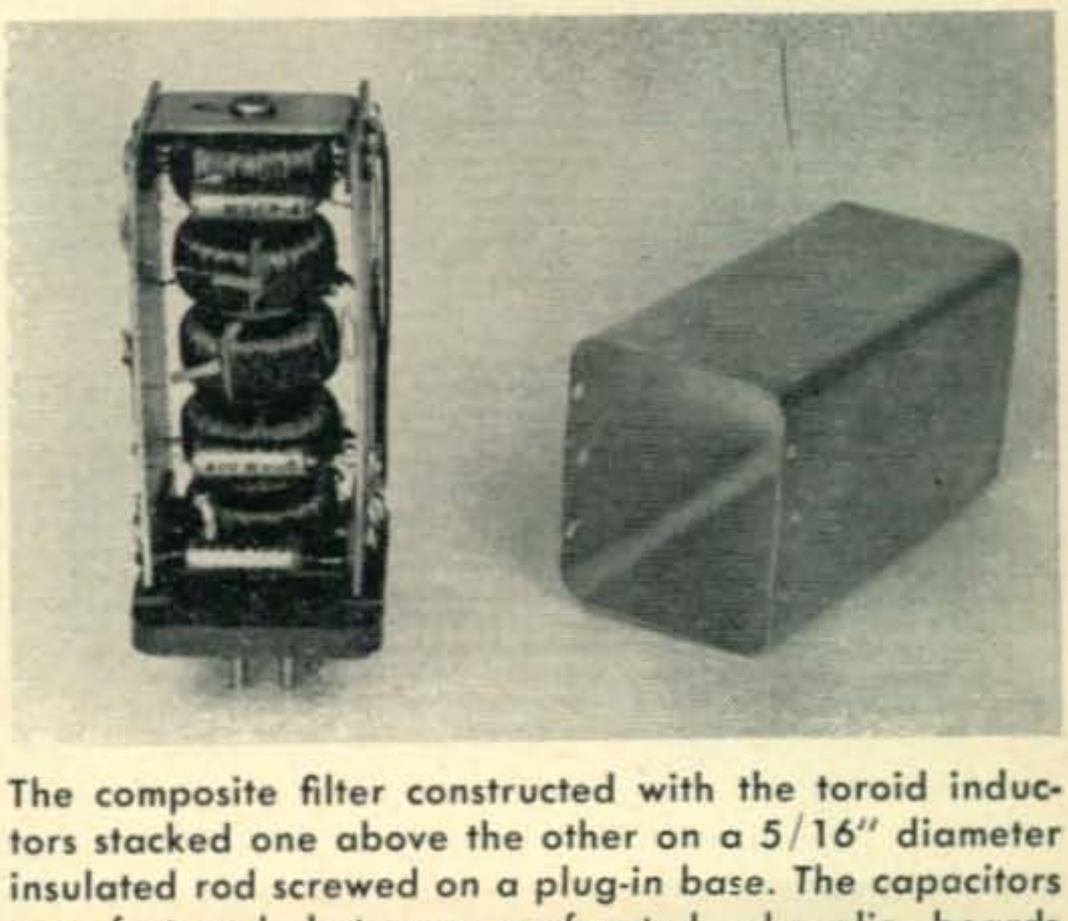
The other arrangement is built into a 1⅞" × 2¼" × 4" shield can having a 5-prong tube base (National PB-10) with the toroids stacked one above another on a 5/16" diameter insulated rod, separated by 1/16" thick fiber spacers. Due to the fact that toroid windings do not have an external field, inductive coupling between inductors does not occur, making this mounting arrangement feasible. The capacitors are installed between perforated boards mounted alongside the toroid stack.

Conversion Oscillator Frequency

It is necessary that the frequency of the conversion oscillator in the speech inverter be correctly set above the cutoff point of the filter. A simple and accurate way to do this is to first unbalance the oscillator NULL control and add capacitance across the oscillator tank to bring its frequency down to within the passband of the filter. A frequency between 1,000 and 2,000 cycles will be best. This may be determined aurally with headphones or visually with an oscilloscope connected across the output of the oscillator or the balanced modulator. Then, with a sensitive a.c. voltmeter or an oscilloscope, measure the potential at the output of the a.f. amplifier following the filter in order to obtain a zero-reference point. Reduce the capacitance

[*Continued on page 104*]

[4]Available from Lafayette Radio Electronics, 111 Jericho Turnpike, Syosset, Long Island, N.Y., Unclad Board, Stock No. MS305, price, 45¢.



The composite filter constructed with the toroid inductors stacked one above the other on a 5/16" diameter insulated rod screwed on a plug-in base. The capacitors are fastened between perforated phenolic boards mounted at the sides. A shield can may be placed over the entire assembly.

The Class C Linear Amplifier

BY D. O. MANN*, W6HLY/W3MBY

Part II

The theory of operation of the Class C linear was covered in Part I. Part II, below, discusses the construction and adjustment of a typical unit. While a specific unit is not presented for duplication, an operating circuit and adjustment criteria are given.

THE Class C linear amplifier was first introduced in the *CQ* Sideband Handbook but no detailed explanation of its operation was included. The theory of a Class C linear was discussed in Part I. We will now discuss the construction and adjustment.

It is not proposed here to give any specific circuit diagram and invite implicit duplication. This is primarily because to do so would probably involve a lot of duplication in construction details which couldn't be followed closely enough, but also because the main objective in this discussion has been to consider circuit operation in general. There are many very good articles on construction of linear amplifiers, both in current magazines and various handbooks, and almost any of these using tetrodes can be easily modified and adjusted to operate more efficiently as Class C Linears.[1] All that is needed is some representative values for the new circuit components and some hints on adjustment for most linear operation.

Representative values for the grid bias circuit which will work for almost any tetrode or combination of tubes for V_1 are given in fig. 4. It is almost essential that means be provided for measuring grid, screen, and plate d.c. currents, and highly desirable, at least initially, the V_1 d.c. screen voltage. For both figs. 1 & 4, grid current should be measured in series with R_3 to ground. Note that R_6 is not intended as a swamping resistor. Resistor R_6, as stated previously, is a cheap and effective stabilizing device which will make neutralization unnecessary if the usual construction cautions on shielding grid and plate circuits, single point ground, *etc.* are respected. It will absorb very little power, and is much smaller, simpler and much more broadband than the formal neutralizing circuitry. Even the lower powered s.s.b. exciters will have ample power to drive a tetrode Class C Linear to the legal limit. Tank circuit L_g-C_g in fig. 4 is usually a multi-band tank.

Amateurs have been building and operating Class C amplifiers for decades as c.w. and a.m. phone finals. Ninety percent of this experience is directly applicable to building and adjusting a Class C amplifier for linear operation. To get both efficient and linear Class C operation requires a little more attention in establishing proper tank circuit element values and approximate angle of plate current flow, as well as a little closer operating adjustment. As a short cut to design of an amplifier, and to avoid getting too technical, it is recommended that the manufacturers' typical operating conditions for the tube/s be used. After examining such manufacturers data for about seven different types of tetrodes ranging from the 6146 to the 4-400A, it was found that the typical operating conditions given for use as a plate (or high level) modulated amplifier resulted consistently in a plate current angle of flow between 120°-130° as determined from equation (6). The data given for a straight Class C (c.w. or f.m.) amplifier was for higher operating angles, up to 150°, which gives higher output but at lower efficiency as discussed before. Most of the needed current and voltage operating information is given in the tube charts, but one or two essential items are usually omitted, for example, tank impedance and grid resistance. Fortunately these can be computed easily from the data given as follows:

$$Z_L \text{ (in ohms)} \cong \frac{5 \times \text{d.c. plate voltage}}{9 \times \text{d.c. plate current}} \quad (10)$$

from which the reactance of either the tank inductance or capacity is determined,

$$X_L \text{ or } X_c = \frac{Z_L}{Q} \cong \frac{Z_L}{15}$$

$$\cong \frac{\text{d.c. plate voltage}}{45 \times \text{d.c. plate current}} \quad (11)$$

$$\text{or } X_L \text{ or } X_c \text{ (in ohms)} \cong \frac{22 \times \text{d.c. plate voltage}}{\text{d.c. plate milliamperes}} \quad (12)$$

The needed tank inductance or capacity for any desired frequency can be found from either a

*Commander, U.S.N. (Ret), 1435 Sunny Crest Drive, Fullerton, California.

[1]Tetrodes with low screen voltage and current (807, 813, 4X150, 4X250, *etc.*) are much preferred.

reactance chart or the common reactance formulas. Likewise, the d.c. resistance in the grid circuit of V_1, measured across C_1 and set by R_1 in figs. 1 and 4, can be determined from the bias voltage and grid current given.

$$R_g \text{ (in ohms)} \cong \frac{\text{d.c. bias voltage}}{\text{d.c. grid current}} \qquad (13)$$

With the aid of equations (12) and (13) and the published tube data it should be no problem to get the amplifier operating Class C with the recommended drive, currents, voltages, *etc.*, and with the approximately correct tank impedance and operating Q.

To finish the adjustment a two-tone generator and an oscilloscope will be required; no linear can even be approximately set up properly otherwise. The scope should be connected to observe the envelope pattern across either the exciter input line and/or the output line to the dummy load. Yes—please use a dummy load until reasonable linearity is obtained! If a single audio tone and the carrier are used to form the two-tone signal, connecting the audio tone to the external synch will be found beneficial for pattern stabilization. The following series of adjustments are recommended;

A. Determine and set the approximate tank inductance (roller-coil) or capacity for the proposed plate voltage and typical operating conditions of the tube/s to be used. In doing this bear in mind two things:

1. The operating conditions given for a plate modulated amplifier take into account the fact that for a.m. high level modulation the peak plate voltage goes to *twice* that for carrier conditions (the screen goes higher too), so if a plate voltage higher than that recommended for straight Class C (c.w. or f.m.) is proposed, use the operating conditions for a plate modulated amplifier, and,

2. The angle of plate current flow *is* not affected by the plate voltage (see equation 6), but the tank inductance and capacity are (see equation 10). If two tubes are to be used in *parallel*, plate and grid currents are doubled and equations (11), (12) and (13) apply directly. If used in *push pull*, plate and grid currents double again and equation (13) still applies directly, but the plate to plate tank impedance or reactance should be *four times* the values given by equations (11) and (12) for parallel operation.

B. Before applying plate voltage, run the control R_3, figs. 1 and 4, to minimum drive (ground) on the clamp tube grid and set controls R_4, fig. 1, and R_7, fig. 4, to maximum resistance. With the amplifier tubes disconnected, the tap on R_9, fig. 4, can be set initially to a voltage approximately 100 volts higher than the maximum screen voltage and the tap R_5, fig. 1, to about 100 volts. Applying plate voltage intermittently, adjust the static current with R_5 or R_4, fig. 1, or R_7, fig. 4, to approximately ½ the rated plate dissipation of tube/s, V_1. Disconnect the exciter during this operation, and be sure no grid current through R_3 shows evidence of any oscillation or instability. Neutralization or a smaller value of R_6, redesign of parasitic chokes, better shielding etc., may be necessary to eliminate oscillation.

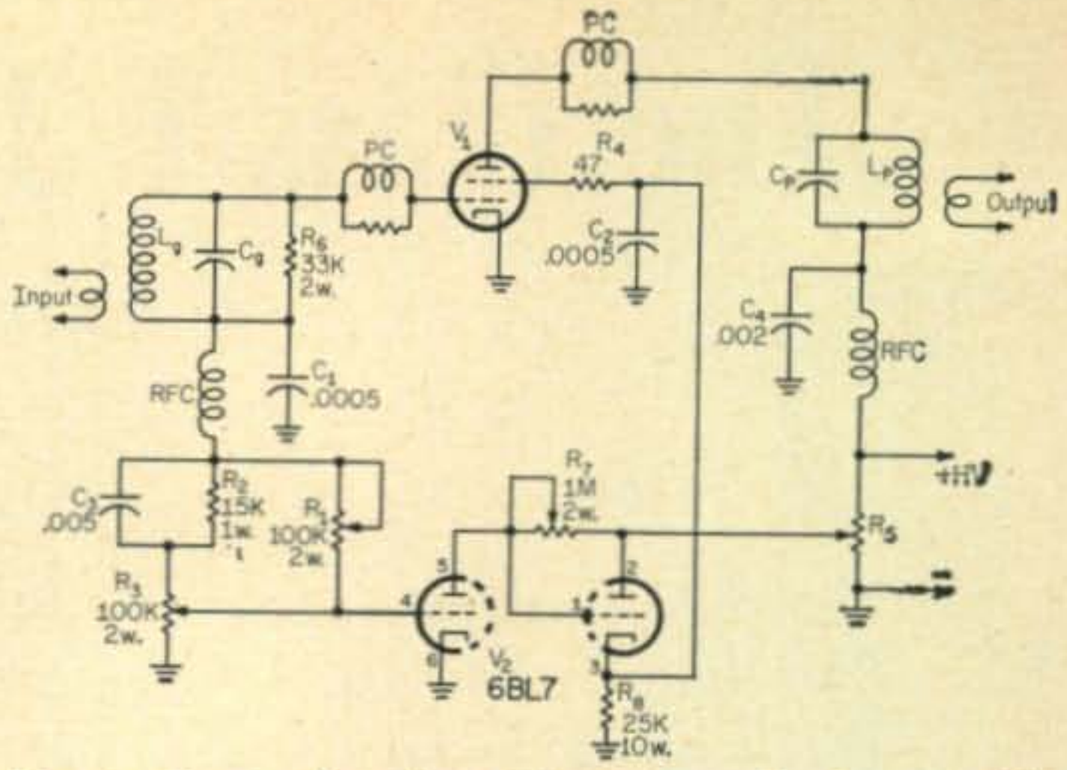


Fig. 4—Circuit of a Class C linear suitable for use with most transmitting type tetrodes from 6146's to 4-400A's. Circuit values shown are typical. See text for design considerations for input and output tuned circuits. All capacitors are in mf.

C. Connect exciter for single tone or inserted carrier (c.w.) input, and set coupling/drive to get the recommended d.c. grid current. Advance control R_3 to increase screen voltage and plate current meanwhile tuning and loading plate tank until recommended p.e.p. (carrier condition for plate modulated a.m.) conditions are attained. Mark or note the envelope amplitude on the scope face to denote the p.e.p. level.

Operating conditions given in tube manuals are not sacred and despite cautions regarding tube life, plate dissipation etc., many will want to push things to the limit. Here are some further suggestions on how to go "up" as desired:

1. If you are short on r.f. drive or plate voltage but want maximum power output regardless of efficiency—increase the angle of flow by decreasing the resistance R_1 and advancing the gain of the clamp tube (to maintain screen voltage) with setting of R_3. Don't go much beyond the recommended operation for maximum c.w. or you may exceed plate temperature limitations.

2. If plenty of r.f. drive and plate voltage is available and you want to get the most out of a small tube regardless of tube mortality (plate dissipation limitation)—then increase r.f. drive, resistance R_1, and decrease clamp tube drive with setting of R_3 to maintain maximum screen voltage. Tank loading should also be adjusted to optimize minimum input with maximum output. Watch the plate. It will probably be safe to put up to 1½ times the recommended modulated amplifier plate voltage on the amplifier, but check equation (11) to see if minimum tank and stray capacities will allow the needed higher load impedance. If this is carried too far, the increased input will be merely wasted in a tank circuit whose operating Q is too high.

3. Along with this experimentation it might be well to point out again that if actual d.c. input with voice operation is intended to be approximately 1 kw, the above p.e.p. c.w. adjustments will have to be accomplished in the vicinity of

2.5 kw! If tubes, power supply, and house wiring will stand this there's no problem, but if not, the QRO will better be done with a two-tone pattern concurrent with linearity adjustments. Even for a two-tone signal at 2.5 kw p.e.p. d.c. input, the average d.c. plate current is $2/\pi \times$ p.e.p. value, or the average d.c. input is still 1.6 kw. See fig. 3 again. Flat-topping is not assumed.

4. Slight reductions in either of the two preceding extremes may also be necessitated by linearity adjustments to follow.

D. Now set up the exciter to produce a 1000 to 1500 c.p.s. difference frequency two-tone pattern. It will be found convenient to be able to vary the entire drive pattern amplitude rather than have to adjust each single tone and/or the carrier insertion independently for equal amplitudes. If this can't be done by control of exciter gain, shunt a fixed load on the exciter and vary the coupling into the amplifier. Check the input pattern with the scope on the exciter line as coupling or amplitude is varied to see that crossover on the zero axis is clean and that no flat-topping of driver input occurs.

E. Re-connect scope across output dummy load; turn on plate voltage and increase two-tone drive until output reaches p.e.p. level marked in step C above. Check the envelope pattern visually for linearity, particularly for peak flattening or irregular crossover. This isn't too scientific a distortion check, but it's better than none at all. Flat-topping can be caused by too high a plate impedance (too loose load coupling) or by cut-off in the clamp tube in fig. 1, or by too low a tap on the bleeder R_5 in fig. 4. It is best to check the loading first by increasing the coupling slightly. If this makes no noticeable improvement, a reduction of clamp tube gain, R_3, the resistance of R_4 in fig. 1, or moving the tap on R_5, fig. 4, to a higher voltage will relieve the limiting action. This produces action and/or interaction effects as described in step C, notes 1 or 2 above, depending upon which course of correction is chosen. Crossover of the envelope on the zero axis should be reasonably smooth straight lines with no flat spots like overmodulation in an a.m. envelope. The setting of R_3 has the most effect in correcting this. Flat spots could also be caused if static current is set too low. Refer to step B above. When you are satisfied with an optimum arrangement of these many variables to give the best compromise with existing limitations, you should have a fairly good looking pattern with the highest p.e.p. output attainable.

F. As a final check, leaving everything else fixed, reduce the two-tone r.f. drive until the peak output is about 1/5 to 1/10 of the p.e.p. value. At this point you may be apprised of the "transition" distortion discussed previously. This isn't too serious providing there are no flat spots on the zero axis or sharp spikes or corners in the envelope. The relative distortion will be very small in comparison with the p.e.p. level; remember—it's down 15 to 20 db from p.e.p. level to start with. Flat spots cause more relative distortion, so increase the clamp tube drive or static current as necessary. This is the best setup for linearity that can be done with test equipment available to most amateurs.

G. Before disconnecting the scope and dummy load, it is highly adviseable to record some tune-up and operating check points for the normal d.c. meters. To tune and load the amplifier it's probably easiest to extend the same procedure used in tuning the exciter. This is usually a c.w. signal at a fixed level and the grid and plate currents are noted which will indicate correct loading *etc.*, if tuned to a different frequency. As a final notation, connect the mike to the exciter and note the gain or a.l.c. settings, grid and plate currents which correspond to keeping the envelope peaks within the markings on the scope indicating the linear p.e.p. level. These currents will be somewhat *lower* than readings for the two-tone signal. You are now ready to operate on the air.

Conclusions

The experience which formed the basis for this article was gained from a pair of 807W's and a 6L6 clamp tube in a circuit similar to fig. 1. It was an outgrowth of the old a.m. rig, pre-WW II, and with the old 500 volt supply rearranged in a bridge to put 1000 volts on the linear—it gives a good account of itself. It operates with about 100° angle of plate current flow so it easily takes 200 watts input c.w. and consequently a 200 watt p.e.p. input for s.s.b. is normal. If contacts on the air were not told it was a Class C Linear, they wouldn't know it was anything new or different. Two close friends, W6KAG and W6EDD, have had similar experiences. W6KAG has been operating a pair of 813's for over a year and is very pleased, particularly with the efficiency over his commercial kit linear. W6EDD has the 4W300B's described in connection with fig. 4. There must be many more too, in addition to the pioneers mentioned in the *CQ* Handbook, but these are pointed out to show that this circuit has some improvement to offer.

Referring again to the advantages of this circuit, it's hard to arrange these in order of preference. It has most of the advantages of other linear circuits and no major disadvantage. It can be operated grounded grid if desired, but unless the exciter has considerable power to spare it would be better to eliminate the last stage of the exciter and grid drive the Class C Linear. This is because it can be shown that if any grounded grid linear is matched for maximum power transfer from the driver, the effective negative feedback is 6 db, or 6 db less intermodulation distortion than if the same amplifier were grid driven. Consequently the resulting distortion can end up much worse with grounded grid where an exciter develops a lot more than this 6 db of distortion when driven to the limit to push a grounded grid linear.

It is fairly obvious that the advantages of this

[*Continued on page 104*]

A "Hi-Lo" Frequency Shift Keyer For The HT-30, 32 & 37

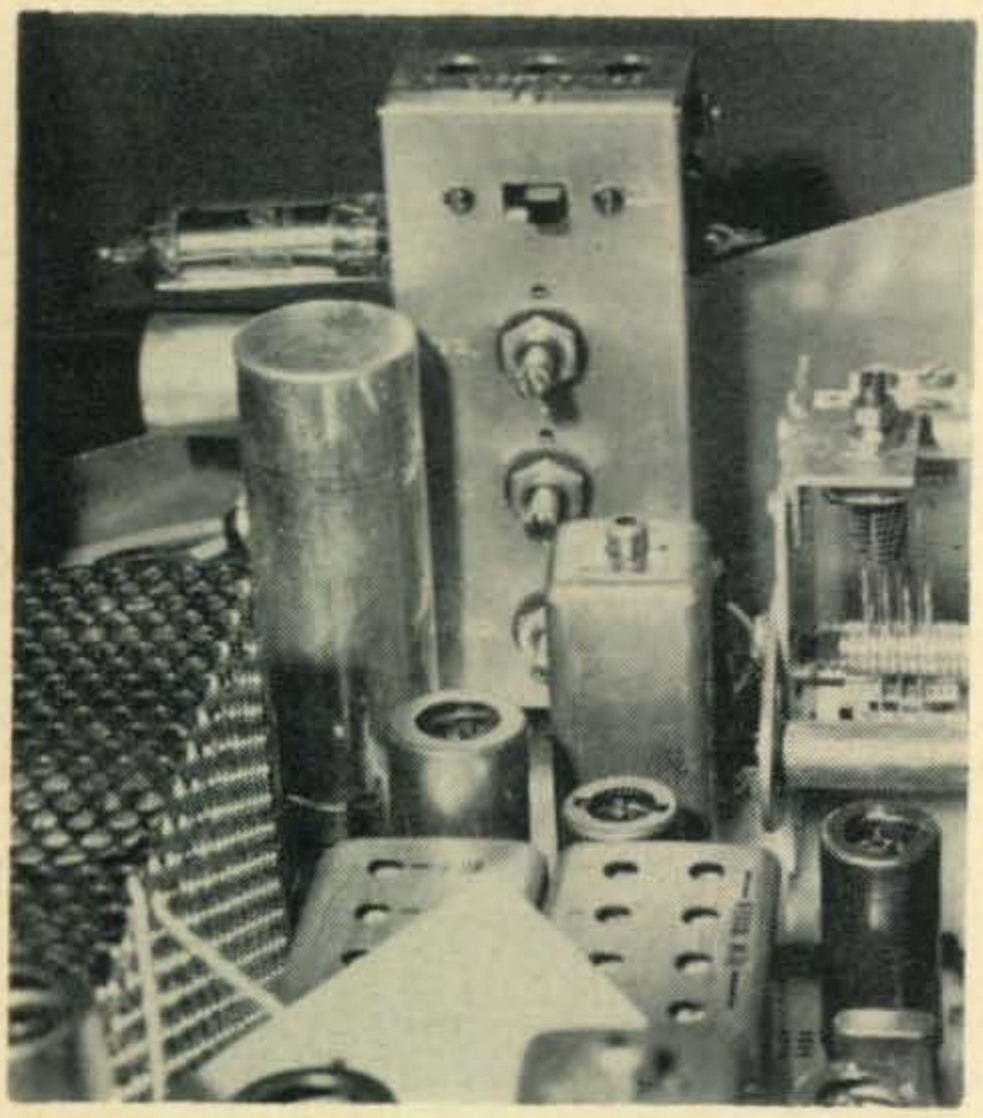
BY WALTER E. NETTLES*, WØAJL

This unit described below was designed for RTTY operation with the Hallicrafters HT-30, HT-32 and HT-37 s.s.b. transmitters. It permits the mark and space frequency shifts to occur in the proper direction and provides a control that allows a shift from 0 to 1000 cycles. It also provides a narrow shift for dual identification.

FREQUENCY stability is of the utmost importance in amateur RTTY. Although the FCC permits any shift that does not exceed 900 cycles, the standard 850 cycle shift is still the most widely used. 170 cycle shift is becoming quite common, and shifts even as low as 40 cycles are currently being used by some experimenters.

The Hallicrafters HT-30, HT-32, and HT-37 s.s.b. transmitters fulfill the requirement of stability but they do not have the RTTY feature built-in. The Hi-Lo f.s.k. unit described in this article makes possible the operation of these transmitters on RTTY with any choice of shift from 0 to 1000 cycles.

*201 South Euroda St., Denver 22, Colorado.



This photo illustrates the method used to install the f.s.k. adapter to the right-hand bracket of the HT-32. Controls from top to bottom include: HI-LO switch; F.S.K. pot.; C.W. IDENT. and the BALANCE POT., behind the i.f. transformer. Holes at the top of the chassis are for ventilation.

Transmitters designed for s.s.b., such as those mentioned above, usually have exciters with mixers that operate on the superheterodyne principle, which means that the signal radiated may be *either* the sum or the difference of the v.f.o. and a fixed frequency crystal controlled oscillator, depending upon the band selected. Consequently, with one ordinary diode shifter connected to the v.f.o., the shift on some bands will be inverted. (Amateur standard is to send *mark* high and *space* as the lower frequency.) The Hi-Lo unit was made to circumvent this problem. It incorporates one "set-and-forget" control which is used to balance the shift up or down, regardless of where the main shift control is set.

An additional feature of the Hi-Lo is narrow shift for secondary identification using International Morse Code. (An FCC requirement.) Very narrow shift is used so that the machine on the receiving end will not jump around and print gibberish as it would if wide shift or c.w. were used for this purpose. A separate identification-shift control is provided, and once set to give a shift just readable by ear, is forgotten.

The Hi-Lo Unit

Figure 1 is the schematic diagram of the Hi-Lo f.s.k. unit. Terminal *B* connects to a source of high voltage in the transmitter used, pin 2 of the 5V4G low voltage rectifier in the case of the HT-32. Terminal *H* connects to a source of 6.3 volts a.c.; pin 9 of the 12AX7 anti-trip and vox amplifier in the HT-32. The ground terminal *G* goes to the nearest convenient screw on the chassis. The four-prong Jones socket J_1 is for connections to the keyboard of the machine and to a telegraph key for code identification.

A 12AU7A dual triode is connected as the keyer tube, and the 0A2 is used to regulate its applied voltage. The d.p.d.t. switch S_1 is the Hi-Lo switch that sets the direction of shift, up or down, for the specific band in use. The NE-2

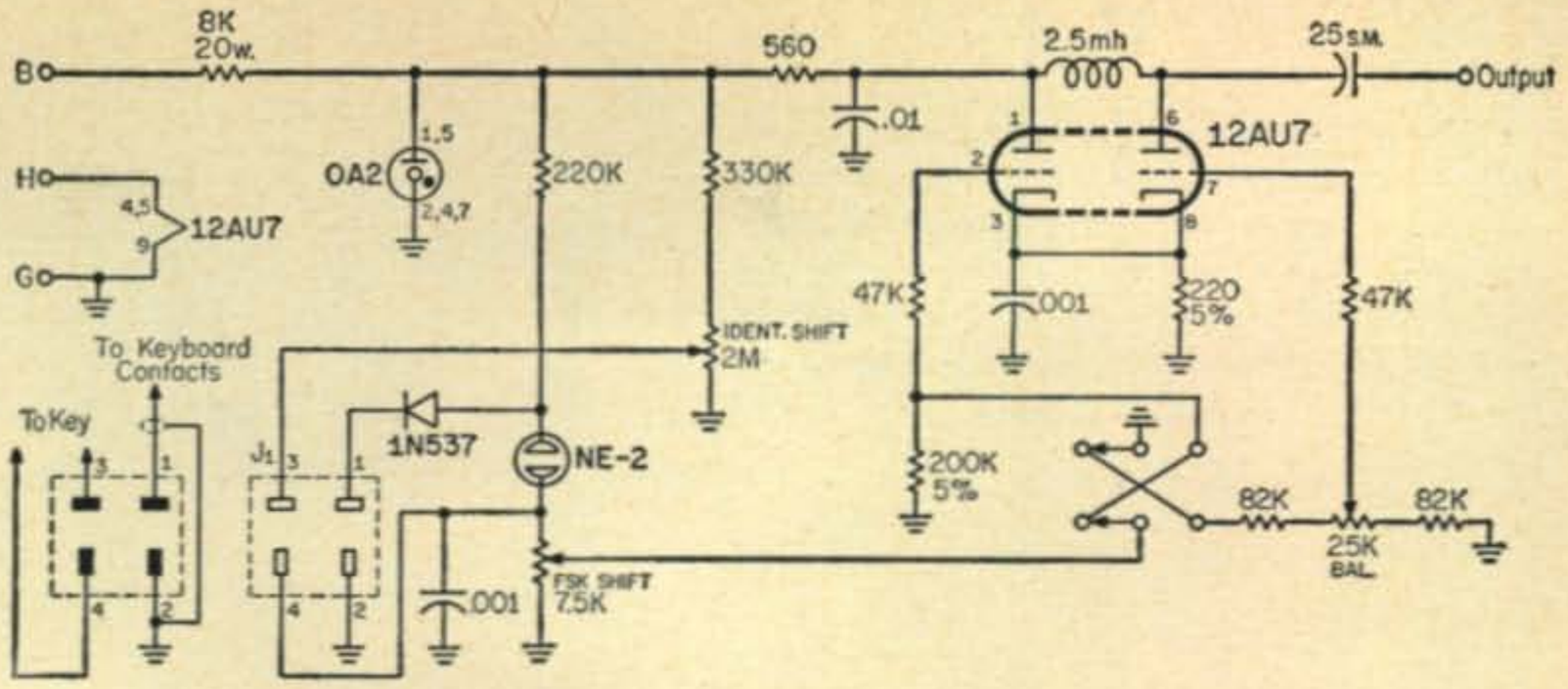


Fig. 1—Diagram of the f.s.k adapter designed to operate with and fit into the HT-32. Power is supplied by the transmitter and no modifications need be made. Resistors are ½ watt 10% unless otherwise specified. Capacitors are disc ceramics unless otherwise marked. "SM" equals silvered mica.

neon lamp switches the controlling grid voltage on the 12AU7A.

The Hi-Lo f.s.k. unit requires that the machine keyboard either be grounded or floating. If floating, a ground is then made through the cable which goes to J_1. It also requires that the open circuit voltage across the keyboard contacts be at least 100 volts and positive so that the NE-2 neon lamp will ignite. The printer coil (selector magnet) and the keyboard of the machine might be connected to the receiving converter, as in fig. 2(A) or (B), in a manner where the above voltage requirement is not met. The solution then is to provide an additional source of voltage such as shown in fig. 2(C).

The twisted pair from terminals 3 and 4 (of the plug that goes into J_1) that connects to the telegraph key should connect to no other equipment nor to a ground.

Connection of the "output" wire is made to the v.f.o. grid, pin 1 of the 6CB6 in the HT-32. As a note of caution, it should be mentioned that, by attaching this unit to the HT-32, dial calibration was altered by about 4 kc. This can easily be corrected by adjusting C_{105} and L_{101} as indicated on the circuit diagram for this transmitter.

Construction

Originally, the aluminum box housing the Hi-Lo f.s.k. unit was made from a standard LMB chassis box, model 108, measuring 2¼ × 2¼ × 5 inches. The sides and ends were sawed off and filed smooth to reduce the depth to 1½ inches in order to be a proper fit for the space available. The ends were drilled and tapped for the 6-32 screws that came with the box. Now we understand that LMB Products, 2528 W. 9th Street, Los Angeles 6, California, is now offering the box chassis modified here as a standard item. The model number of this new box is 108HT.

The photographs illustrate methods of mount-

[*Continued on page 102*]

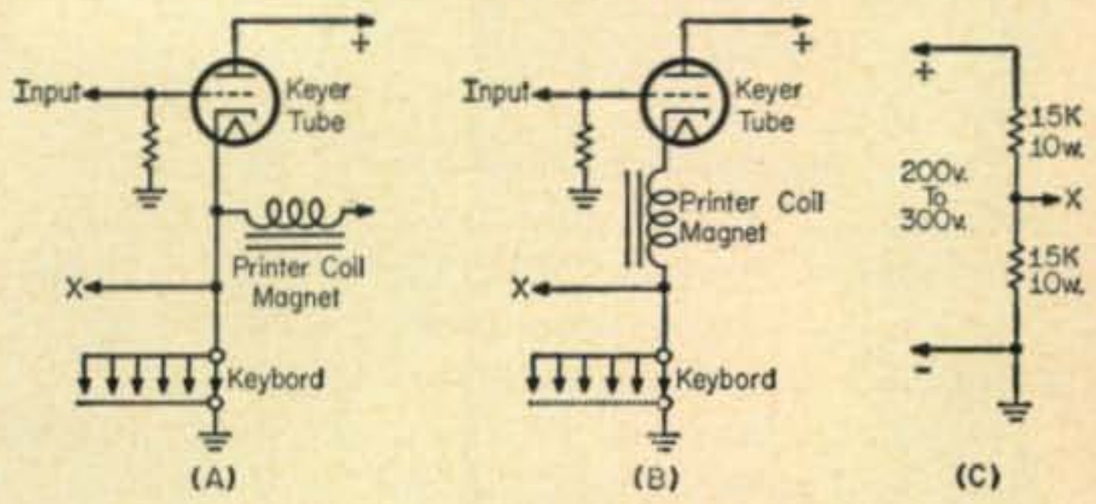
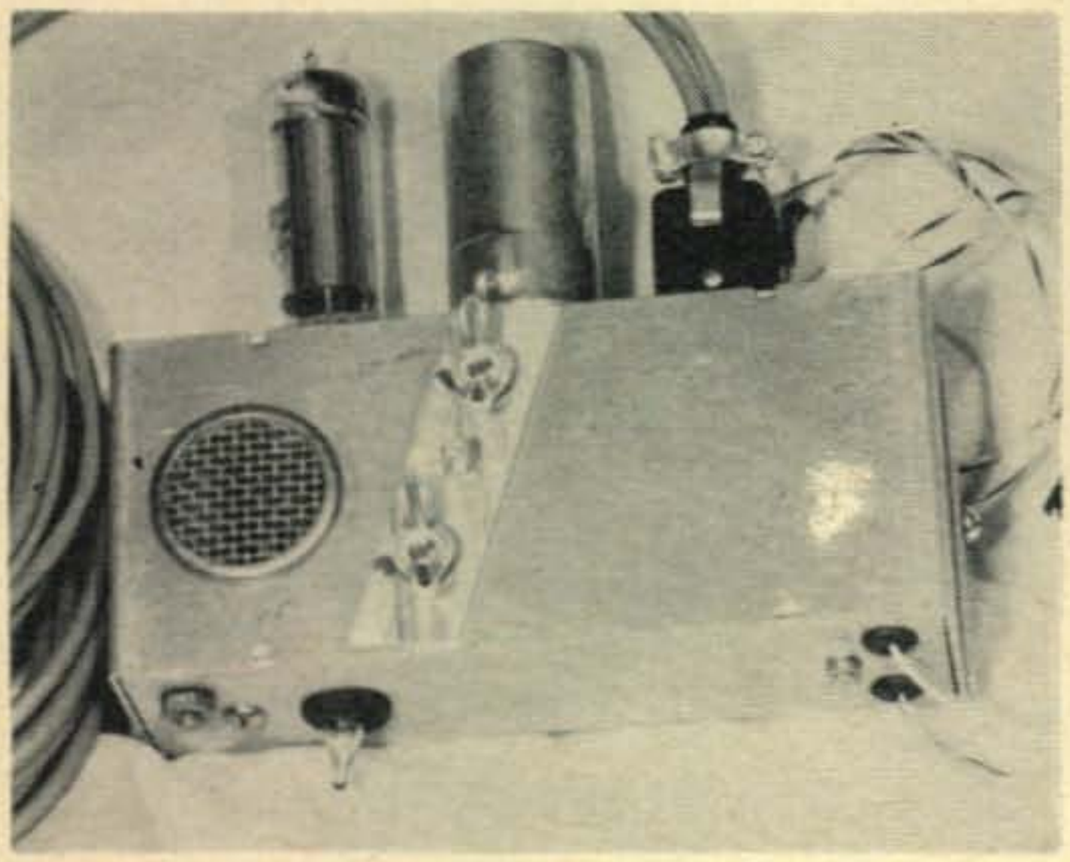
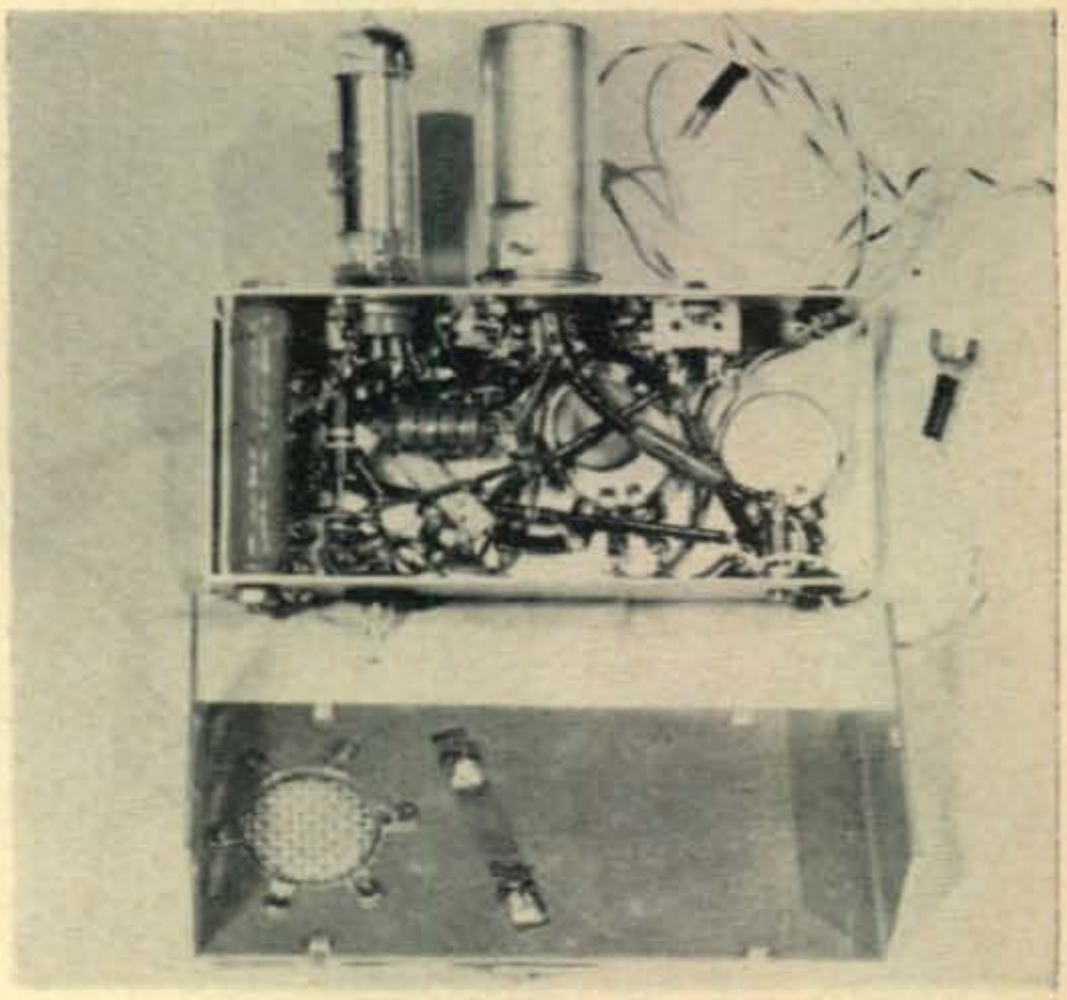


Fig. 2—Circuits (A) and (B) are typical methods in which the printer coil (selector magnet) may be connected. Both of these methods will not supply the voltage required to ignite the NE-2. An additional circuit can be added, as explained in the text, to provide the needed voltage.

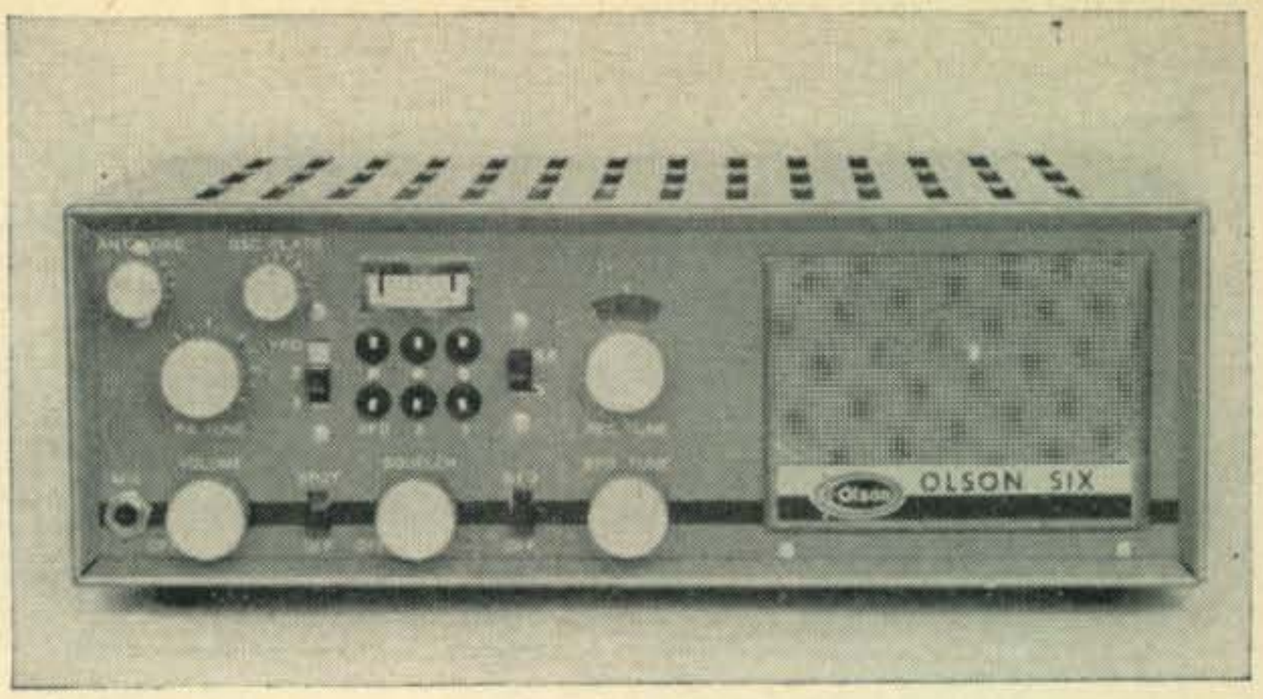


Buttoned up and ready to go, the f.s.k. adaptor is shown with input wires connected to the Cinch Jones P304CCT. The slanted bracket and wing nuts grip the side bracket of the HT-32 and no holes are required for installation. The grill plug allows incoming air to cool the 20 watt voltage-dropping resistor.



Interior view of the f.s.k. adapter showing parts placement and the method used by the author to mount the screws to the removable chassis top. Loose wires are connected to nearby power sources of the HT-32.

The Olson Six Model RA-570 6-meter Transceiver is a compact and neat-looking package. The controls are handily located. The v.f.o. and crystal jacks are directly below the edgewise-mounted meter. The receiver-tuning knob is at the top center. Loudspeaker is on the right.



CQ Reviews:

The Olson Six, Model RA-570 Transceiver

THE Olson Six Model RA-570 is a low-priced six-meter transceiver designed for fixed station or mobile use. It is a completely self-contained unit for operation in either type of service. The frequency coverage is 50-52 mc. The RA-570 consists of a dual-conversion superhetrodyne receiver, rated at a sensitivity of 0.5 μv for a 6 db signal-to-noise ratio, and a crystal-controlled a.m. transmitter with a power input of 15 watts.

Other receiver features include 3 kc selectivity, series-gate self-adjusting noise limiter, squelch, illuminated S-meter, crystal-controlled h.f. first oscillator, tunable b.f.o. and 3.5 watts of a.f. output. A loudspeaker is also included.

Additional transmitter features are: high-level plate and screen modulation, straight-through class C final amplifier, pi-network output circuit, built-in TVI filter, S-meter switching to read transmitter relative output, frequency spotting position, push-to-talk operation and external v.f.o. input jack.

Receiver Circuitry

Circuit-wise, the receiver section of the RA-570 employs a pre-tuned 50-52 mc bandpass r.f. amplifier and mixer stage. The h.f. injection signal for the mixer is obtained from a crystal-controlled 40 mc oscillator, resulting in an output-difference frequency of 10-12 mc which is applied to a second mixer. The input of the latter is gang tuned over 10-12 mc together with the variable tuning oscillator which provides an injection signal 595 kc lower than that of the mixer input. This produces an i.f. of 595 kc which is amplified by two pentode stages and is converted to audio by a diode detector. The a.f. is applied to a squelch-control triode, a diode noise limiter, a pentode a.f. stage and to the audio power output amplifier. A 595 kc variable b.f.o. ($\pm$ 2 kc) is coupled to the detector in the conventional manner.

Transmitter Section

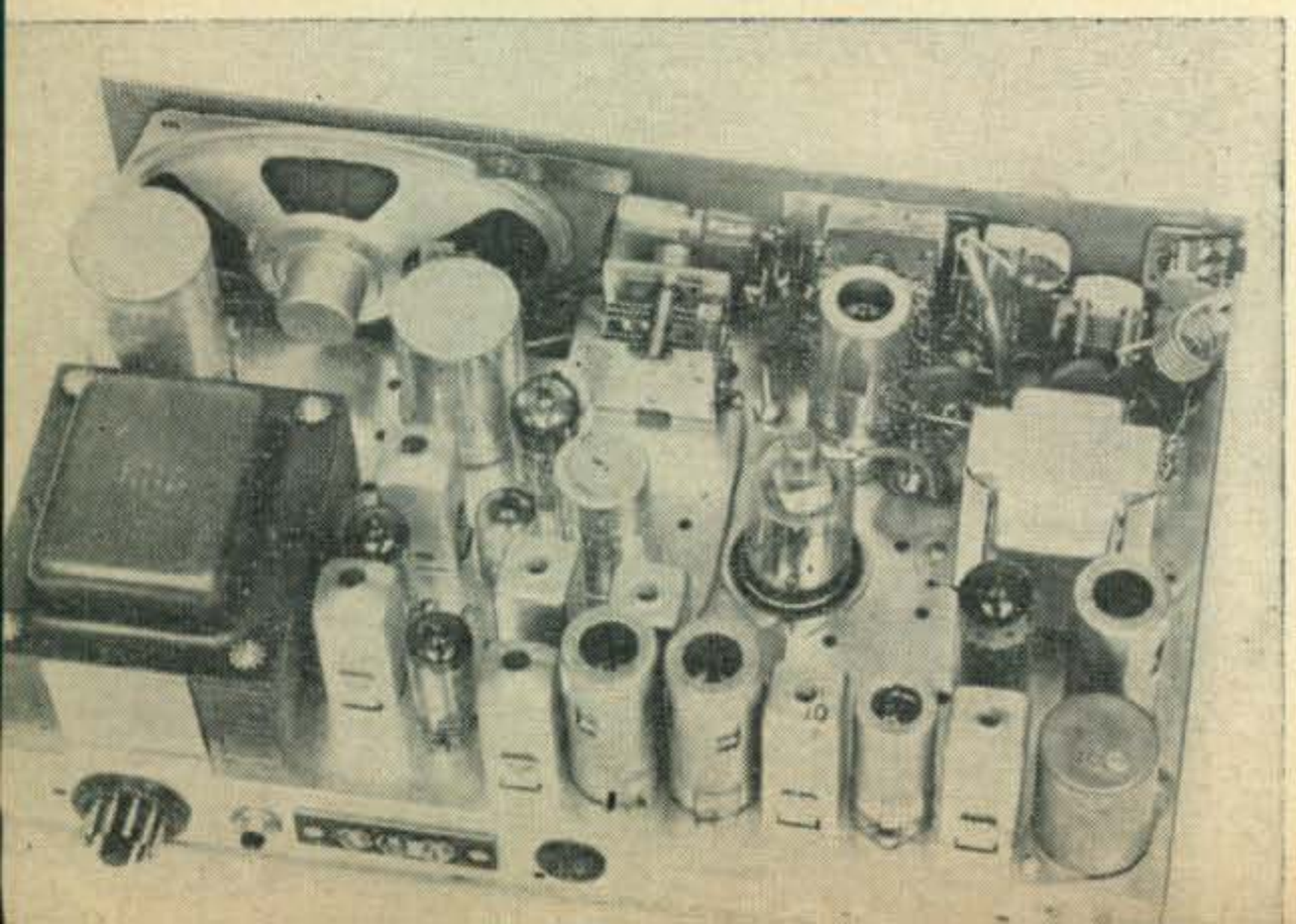
The transmitter section starts out with a crystal-controlled oscillator which operates with 8.3 or 25 mc crystals. Either one of two crystals, plugged into front-panel jacks, may be selected by a front panel switch. Provision also is included for switching to an external v.f.o. which can be plugged into a third front panel jack. The oscillator stage is followed by a 50 mc doubler which drives a 2E26 operated as a class C final amplifier with 15 watts input. A pi-network is used for matching to loads of 30-150 ohms and for attenuating harmonics. An adjustable series-tuned shunt-connected trap is also provided to minimize the possibility of adjacent-channel TVI.

The final amplifier is plate and screen modulated with a single 6BQ5 pentode which is preceded by a two-stage speech amplifier with a high-impedance mic input and push-to-talk circuitry. The same a.f. power stage is used for the modulator and the receiver a.f. output.

Power Supply

Separate windings on the power transformer provide a choice of operation directly from 117 volt 60 cycle a.c. or from a 12 volt d.c. supply for which a vibrator is included. Two silicon diodes are employed in a full-wave circuit for high-voltage rectification.

[*Continued on page 90*]



Top chassis view of The RA-570. The receiver section is at the rear of the chassis. The transmitter section is toward the upper right with the 2E26 final tube near the center.

Front view of the transistorized keyer. Only the paddle and ON-OFF-SPEED control are exposed. All other adjustments are under the cover on the sub chassis.

An Electronic Keyer for Every C.W. Operator

This novel keyer uses a single audio power transistor in a simple circuit that is an easy weekend project for the average amateur. Completely battery operated, it also includes an easy to construct paddle key.

BY HOWARD J. SARTORI,* K6COP

CONSTRUCTING this electronic keyer will be recognized by many readers as an interesting project, not only because of the diversified building techniques, but because this particular circuit lends itself well to familiarization with the theory and operation of audio transistors.

All parts purchased new cost your author twenty seven dollars. Now, the operator of this key might well be wondering just what he will receive for twenty seven dollars. First, the characters are self completing; that is, when the paddle is pushed toward the dash side (left) and released immediately, the keyer will produce a dash of correct length as set by the SPEED control. Should a dot be sent immediately after the dash, the keyer will not jam or in anyway interfere with the dash as the keyer will automatically complete the dash and the correct space following it before producing the dot and its subsequent space.

Then, too, the key is mechanically completely adjustable. However, most operators will find that this mechanical spacing is of minor importance in the operation of electronic keyers. Isolation between controls is quite good; isolation between the inside permanently set controls and the SPEED control is more than sufficient. In other words, once the DOT-DASH RATIO, BIAS, and KEYING RELAY controls are adjusted, the SPEED control will prove to be quite independent and cause no change in any of the permanent adjustments. The SPEED control covers, approximately, the range from eight to sixty words per minute when the batteries are new, and slightly reduced range when batteries are old.

It should be mentioned that no sidetone oscillator was incorporated since many operators have, in operation, monitoring circuits external from the key itself. Another reason for its exclusion was the relays, while rather quiet, offer sufficient monitoring after a little practice.

Stability of the unit is very good; the timing circuits will not be affected by the age of the batteries. Last, but not least, battery life is long

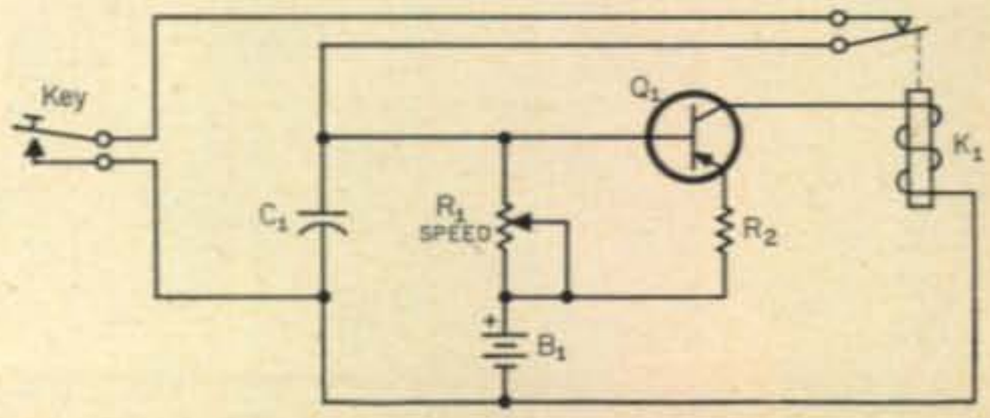


Fig. 1—The simplified timing circuit used in the keyer is shown above and explained in the text.

*U.S.S. *Kitty Hawk* (CVA-63), F.P.O., San Francisco, Calif.

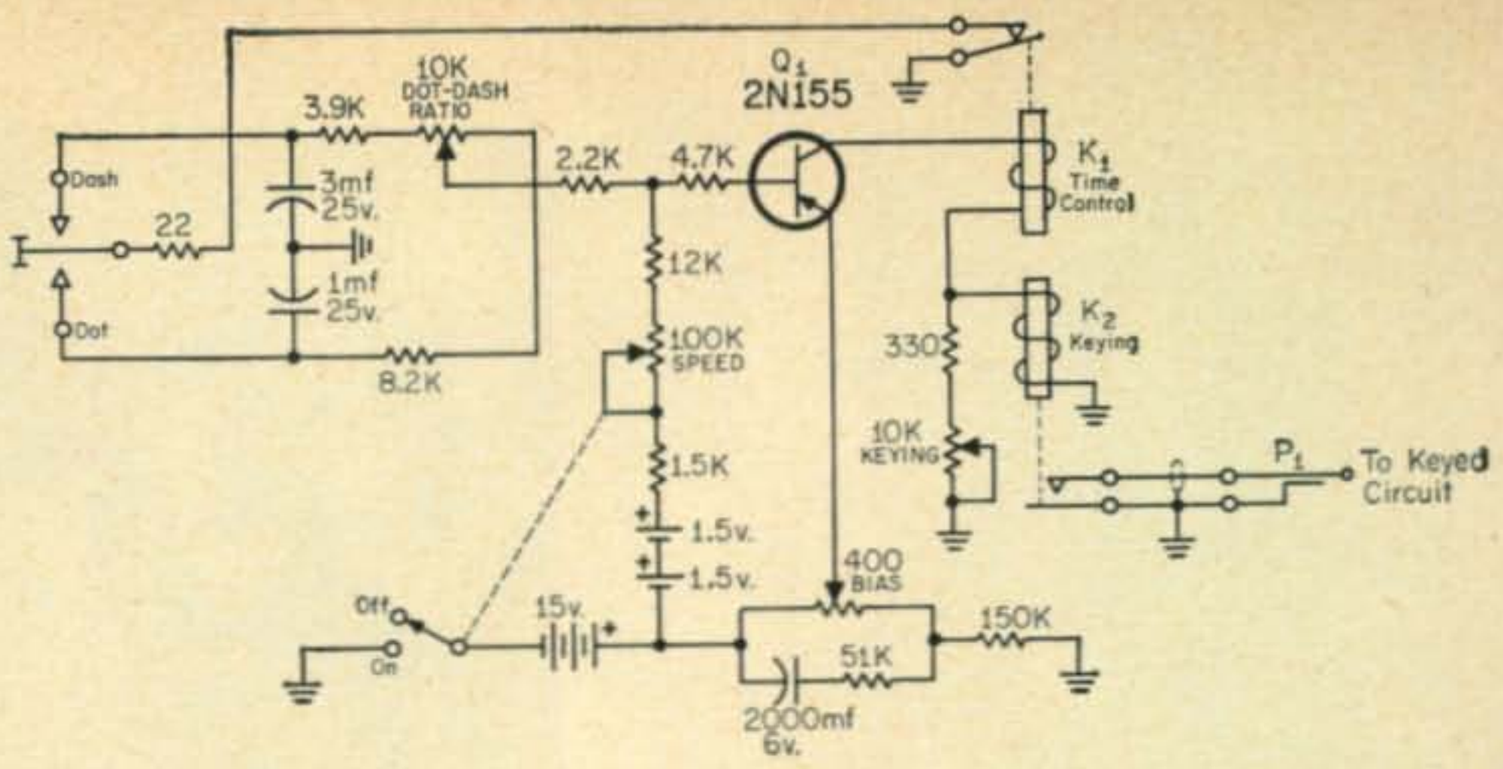


Fig. 2—The complete keyer uses a single audio power amplifier type transistor. All resistors are ½ watt 10% and all capacitors are in mf. The two relays are Potter Brumfield RS5D, 6 v.d.c. s.p.d.t. 335 ohms. All the pots have linear tapers.

inasmuch as the maximum current drawn during keyed conditions is only ten ma and 0.3 ma during non-keyed conditions. In addition, bias batteries will exhibit shelf life. Finally, this key has no memory circuit (that is, a circuit which will allow the operator to stay a character ahead of actual transmission), and no such circuit is felt necessary. After all, the purpose of an electronic keyer is not to approach Teletype but to transmit perfectly formed letters which comprise characters and spaces. Thus, this electronic keyer offers all that a c.w. operator would consider basic to perfect c.w. transmission with a minimum of effort.

Theory of Operation

Basically the electronic keyer consists of an *R-C* timing circuit controlling the collector current of a transistor. Although this function ideally calls for a switching transistor, a high current p.n.p. audio transistor works very well and is much less expensive.

The basic circuit is shown in fig. 1. When the key is open the base-emitter voltage is almost zero and little or no current flows in the collector circuit. Capacitor C_1 is charged to the level of B_1. When the key is closed C_1 discharges and the negative end of B_1 is connected directly to the base placing the base at the collector voltage. Transistor Q_1 is heavily forward biased and the collector current pulls relay K_1 in. This opens the key circuit and C_1 begins to charge; the charge current through R_1 causes a voltage drop that maintains the negative forward bias. When the charging current of C_1 drops too low, the collector current of Q_1 reduces and K_1 drops out. This permits the contacts of K_1 to close the key circuit and, if the paddle key is still closed, the circuit will repeat the character.

The duration of the character is determined by the time constant of R_1-C_1.

The final circuit, shown in fig. 2, is obviously more sophisticated but basically the same. The addition of the 3 volt bias in the final circuit places Q_1 well into cut off during the unkeyed state improving battery life. Also there are two *R-C* time constant circuits, one for dots and the other for dashes, each selected in turn by a paddle type key. The keying relay K_2 and timing relay K_1 are in series and thus trigger together. Relay K_2 does not affect the timing and thus was not discussed or shown in fig. 1.

Batteries

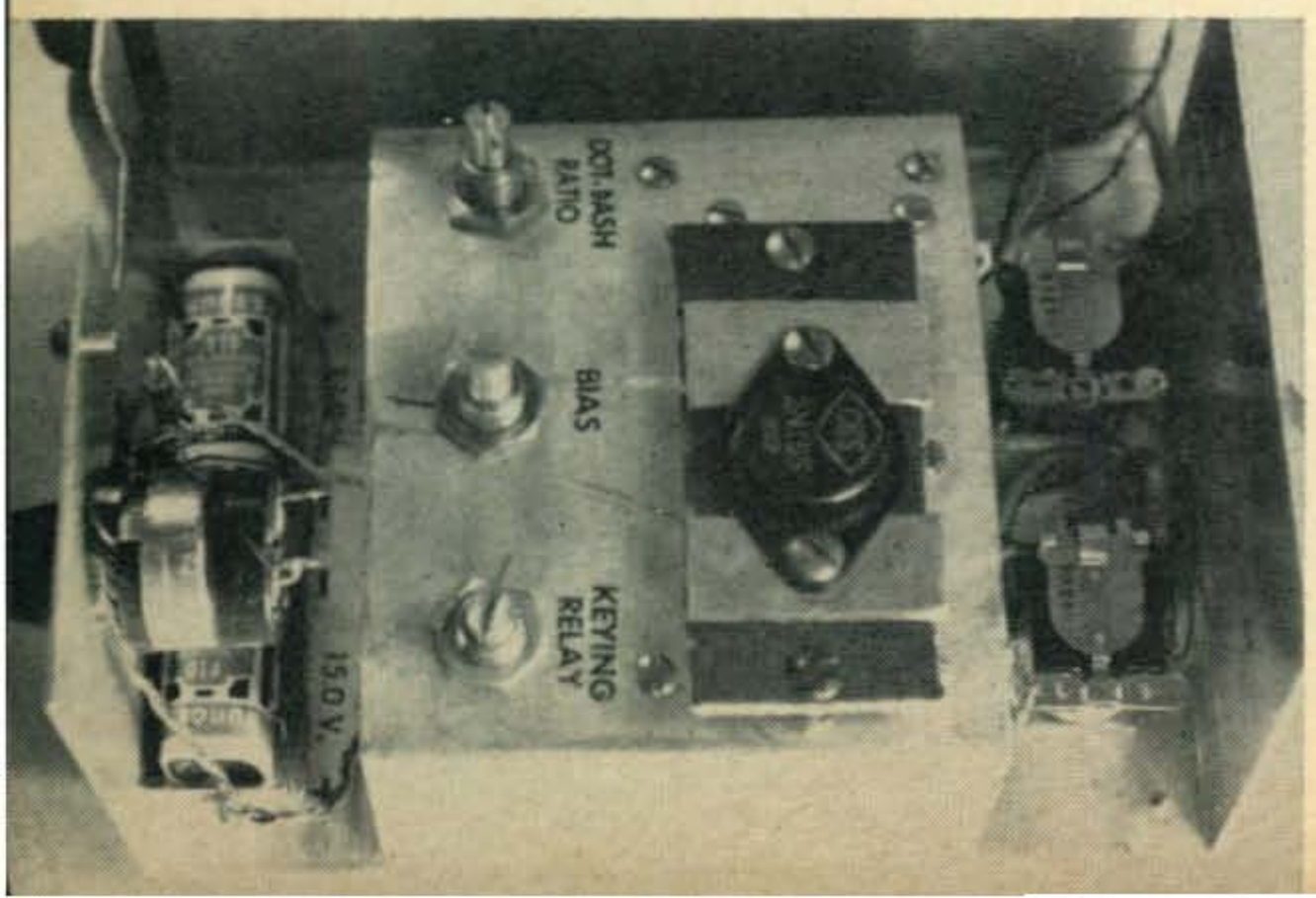
The two bias batteries are ordinary pen light cells placed in series. The holder used is a Philmore BH-60. These batteries should exhibit shelf life. The collector batteries used were a pair of Burgess Y-10's. These are 15 volts each and in parallel provided a long life span. However, batteries in parallel sometimes prove troublesome if the voltage of one should drop below the other. This problem was overcome by using two heavier batteries, Burgess 2N6, 9 volts each, in series. These are comparitively heavy duty transistor batteries. Being somewhat larger than the Y-10's you will have to juggle parts a bit more to fit them in the case.

If the 18 volt battery combination is used rather than the 15 volt unit, omit the 1.5K resistor in series with the SPEED control.

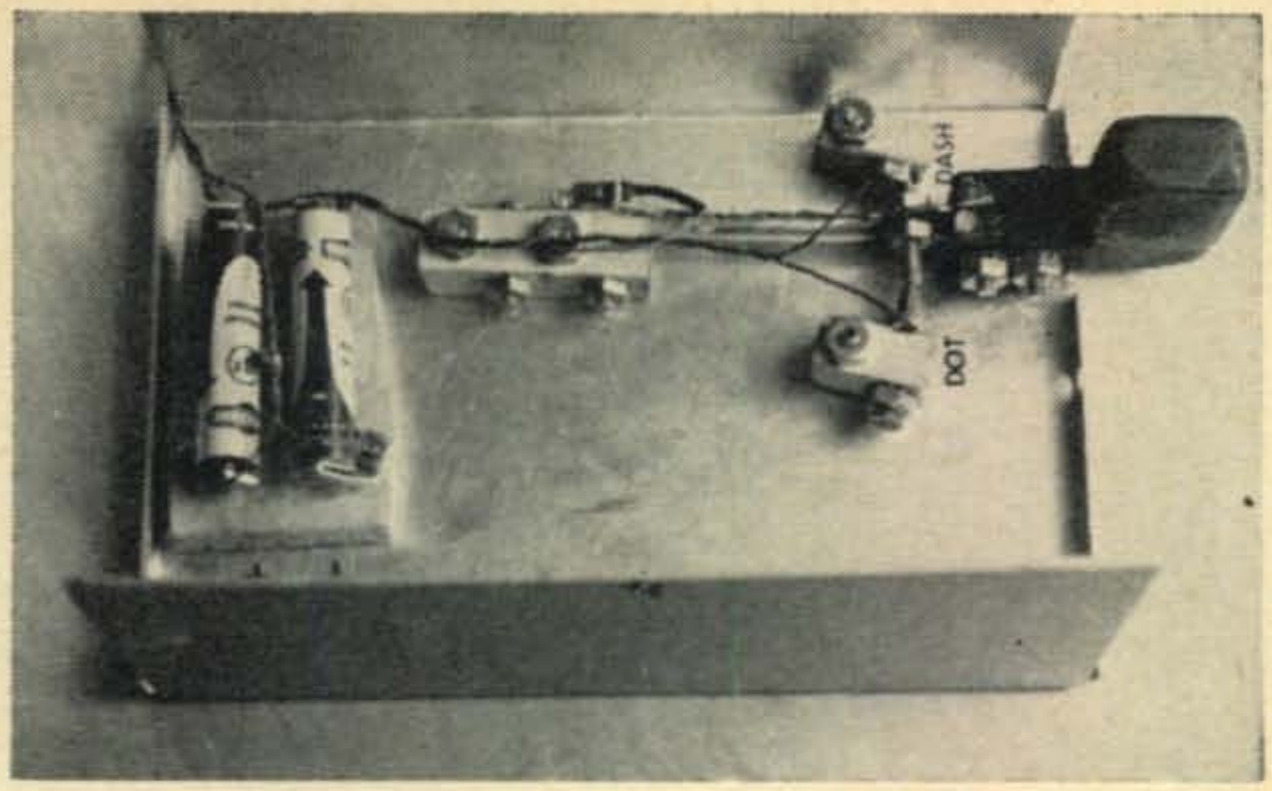
Construction

The entire key and keyer is built into an LMB box (#141) that is 6 × 4 × 3 inches. The paddle key and bias batteries are placed in one half of the box while the other half contains the keyer circuit. The transistor and adjustment controls are mounted on a subchassis.

The transistor is mounted on a piece of insulating material 2¾ × 1½ × ⅛ inches. Two pieces of aluminum 1½ × ½ inches are placed under each end of the transistor to act as a heat



Inside view of the chassis showing the electronics works for the keyer. The transistor is mounted above the subchassis on an insulated board. The two aluminum plates under the mounting screws act as heat sinks and are adequate. The batteries shown under the SPEED control are the two 15 volt units that are paralleled.



Inside view of the top cover of the electronic keyer chassis shows the bias batteries mounted behind the key. Spacing adjustments of the key may be made by pivoting the fixed contacts on the mounting screws.

sink. Since the case is the collector, connection can be made to either mounting screw. This entire assembly is then mounted on the sub chassis using two long screws. Be sure that the transistor case and the aluminum heat sinks do not touch the chassis.

Figure 3 shows the layout and measurements for the paddle key. The key lever is a hacksaw blade 4½ inches long. The tension of this blade can be adjusted by coating it with a small amount of solder until it is satisfactory. The contact on the blade is a ¾ inch screw with the head removed and mounted with two nuts as shown.

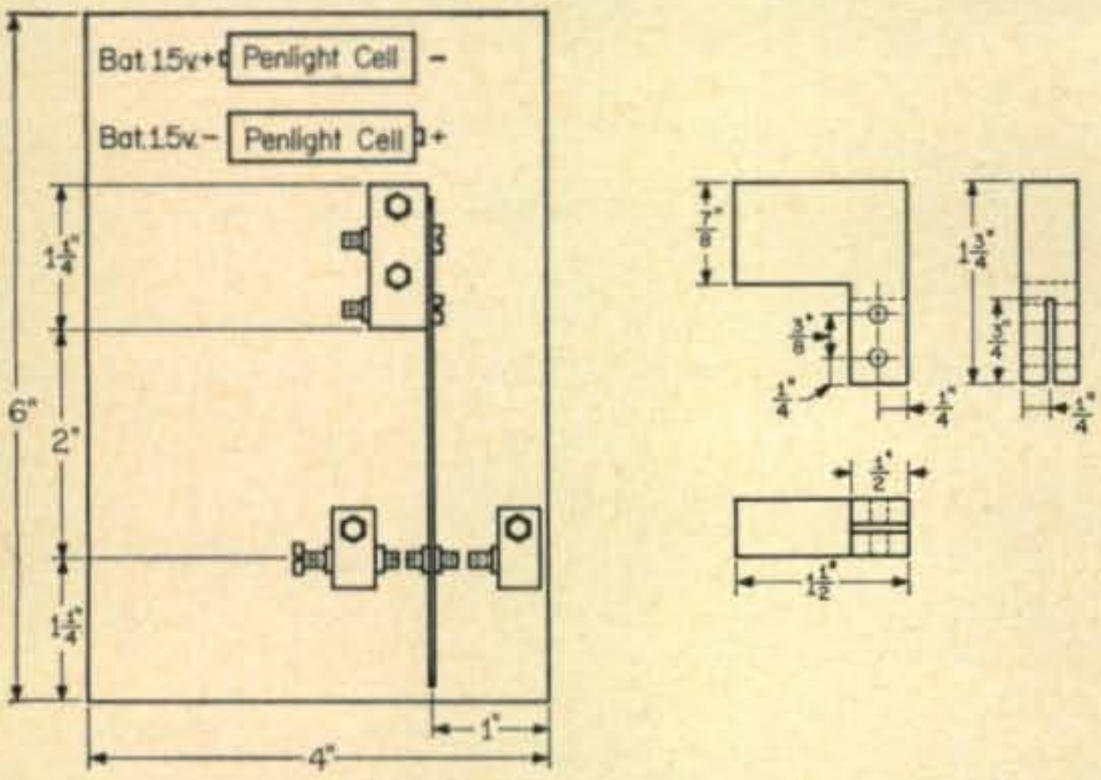


Fig. 3—Key assembly details are shown above. The key is mounted in the chassis cover. Also shown are the measurements for the paddle.

The mounting blocks can be made of wood or phenolic. Just about any workable insulating material will do the trick. Be sure to align the fixed dot and dash contacts with the arm contact. Washers can be used to raise the fixed blocks for proper alignment.

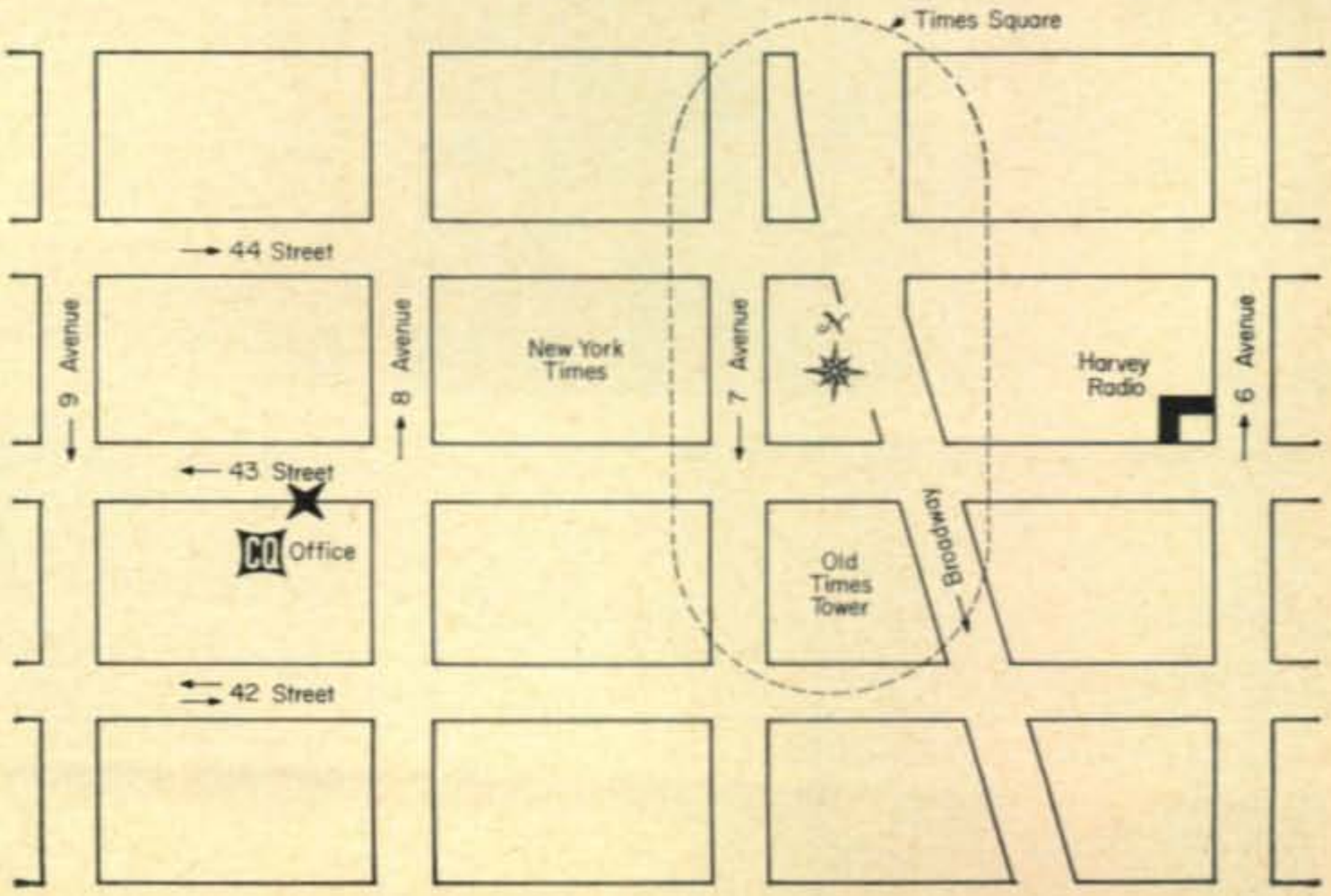
Alignment

Alignment of your new electronic keyer should be very simple. A quick test can be made to check the accuracy of your wiring by connecting a milliammeter across the ON-OFF switch terminals with the SPEED control turned off. Less than one ma should flow during non-keyed conditions. When the capacitor across the BIAS pot becomes charged and the circuit becomes stabilized, the current should be about 0.3 ma. This capacitor can be charged to correct value, initially, (assuming you have wired the polarity correctly) by turning the SPEED control on and off several times. Now, when the keyer is properly adjusted, the meter will average 10.5 ma on dashes and 8.5 ma on dots.

[*Continued on page 102*]

Visiting The New York World's Fair?

Although our daily work schedule is rather tight, we hope amateurs visiting New York City during the World's Fair will take time to drop up at the editorial offices of *CQ* to say hello. We don't have much to show, but our Cokes are cold.



Announcing

The Spring 1964 *CQ* VHF Contest

May 2-3, 1964

ATTENTION v.h.f. addicts! The time has come once again for the annual battle for those coveted contest awards issued to outstanding stations who can fight their way to the top in this year's bash. And it looks as if it's going to be harder than ever before. This magazine has sponsored v.h.f. contests for many years and has seen numerous stations come and go through the ranks of the hallowed winner's "hall of fame." It is interesting to note, however, that in few instances does one station continue to win year after year. The reason is simple: One cannot stand still and remain on top. Even the boys with the mountaintop kilowatts and big antennas can be beaten. By whom? By the more highly *skilled* operator. In this day and age we are beginning to realize that even on v.h.f. it is sometimes hard to distinguish one signal from another (in terms of contrasting signal strength) during a contest. When everyone does their utmost to "put the loudest signal on the band," the result is too often bedlam. Make that bedlam work for you instead of contributing to it.

All-Time Records Broken

Last year for the first time the 408-contact mark was hit by the Peninsula Amateur Radio Klub, WA2VLR, of Bayonne, New Jersey. (Nearest contender was W8HBI/8's gathering of 332 contacts). And for their efforts, the PARK walked away with the All-Band Multi-Op award, more than quadrupling the second high in that category. Try to beat *that* for contacts!

Here's Gary Tater, K1YLU, high and dry on Mt. Wachusett, Mass., in the Spring 1963 affair.

In Brief

For the uninitiated, perhaps a quick summary of our rules is in order. Of 24-hour duration, the competition is split into four major categories: General, All-Band Multi-Operator, Club Aggregate, and Novice. Most all participants will enter under the General category, since it encompasses multi-operator stations using one band and all single-op stations, regardless of band(s) used. The other divisions are almost self-explanatory.

Scoring is simple. Just remember that contacts, counties and hours are added *separately* for contact totals, county totals, *etc.*, before being multiplied out for grand totals. See sample in the rules. Per usual, logs are available free from *CQ* for a self-addressed stamped envelope. Log deadline is June 1st. Don't miss it! (While you're at it, why not slip in a photo of yourself along with your entry?)

Contest Rules

I. CONTEST PERIOD

The duration of this contest is twenty-four (24) hours, starting at 1 P.M. local time, Saturday, May 2, 1964, and ending 1 P.M. local time, Sunday, May 3, 1964. Contacts between time zones will count only when both time zones are participating in the contest.

II. BANDS

All bands, 50 mc and above may be used for this contest.

III. COMPETITION

Three categories of competition are offered in this contest.

A) GENERAL

This group includes multi-operator stations using only *one* band, and *all* single-operator stations regardless of band or bands used.

B) ALL BAND, MULTI-OPERATOR

This group includes all stations operating more than one band and using more than one operator.

C) CLUB AGGREGATE

In addition to a station submitting his score for individual credit, he may also apply his score to his club's total. Logs from categories A and B, above, may be submitted for club aggregate credit. Club members should clearly mark logs as being submitted for club aggregate total.

D) NOVICE

In addition to their own individual state competition, all Novice Class entrants will compete nationally among themselves. (*Note:* All Novice contest participation *must* fall into the General category listed above.)

IV. EXCHANGE

Exchanges will consist of the following information: Signal Report, Serial Number, County and State. The serial number of each band shall consist of the signal report followed by a three digit number beginning 001. Failure to start with 001 will result in disqualification. Example: 59001 (phone), 579001 (c.w.). Contestants call "CQ Contest" on phone and "CQ TEST" on c.w.

V. CONTACT POINTS

Contacts between stations worked for the first time on the same band will count one (1) point. One-way contacts do not count. Mobile-in-motion contacts of any kind will count only for contact purposes and *not* for county multipliers.

[*Continued on page 84*]

WØJRQ Sued to Remove Antenna

A RASH of lawsuits involving amateur radio operators seem to have sprung up around the country—against K3IOP in Pennsylvania, as reported in the v.h.f. section in Dec., 1963 *CQ* and subsequent issues; against K6GHU, K6KCI and WA6IBR in California, as reported in the YL column in this issue, and also against WØJRQ in Colorado. Whereas the first two cases involve the rights of the amateurs to operate, the case against WØJRQ involves his beam antenna and tower.

As reported in *Round Table*, monthly publication of the Denver Radio Club, WØJRQ, Mace Warner, moved into a new home on Dudley St. in Lakewood on Oct. 15, 1956. The following month he erected a beam antenna on a self-supporting steel tower. He now has a Spaulding steel tower on which he mounted a 10-15-20 meter tri-band beam 47-feet high.

Approximately two years ago one neighbor aroused three others to join him in a suit against WØJRQ, in an effort to force Mace to remove the tower and beam, claiming violation of zoning regulations, building restrictions and deed covenants; that the tower was unsafe, not an accessory to the home, created disturbance and was unsightly. The four plaintiffs further demanded damages to the evaluation of their property in the amount of $8,000 because of the antenna. All this despite the fact Mace had lived in the house and erected his antenna before any of the plaintiffs moved in.

The FCC has checked WØJRQ's operation and given him a completely clean report.

A motion for summary judgment was denied by Judge Christian Stoner of Jefferson County District Court on Dec. 2, because of the complexity of the Court's hearing of the motion. This means a full blown court trial must be held and it is tentatively set for March 31, 1964. The estimated time for the trial with expert witnesses is four days. The cost to be $500 per day!

As *Round Table* Editor, KØATZ, "Slats," points out, the effects of such a lawsuit are far reaching. Should this case be lost and set a precedent, which is what the courts go by, there is no doubt but that there would be an epidemic of court cases. No ham could feel secure. WØJRQ could sell his home and move, but he feels he should fight this case to a decision in favor of amateur radio. Mace has already spent attorney fees and costs, well over $1,300 in The Empire Radio Club donated $62.50.

The Denver Radio Club has started a fund to help fight this case, with the realization that in addition to present needs, the case may go on to the State Supreme Court, or higher. In his editorial KØATZ made a plea for all amateurs everywhere to help WØJRQ fight this court case. It is requested that any contribution anyone may wish to make be mailed to Walter M. Reed, WØWRO, at 1355 East Amherst Circle, Denver, Colorado, 80210. *CQ* will keep you advised of developments.

—*W5RZJ*

The Standard-Times, New Bedford, Mass.

Irving Vermilya, W1ZE 1890-1964

A PART of Amateur Radio Americana is gone. Irving Vermilya, W1ZE, ex-VN, 20R, 1HAA is dead.

Irv was born in New York, June 29, 1890 and before he was 15 made the call "VN" known throughout the country from his Mt. Vernon, New York QTH. At 12, the Rev. Charles Tyndall, of Mt. Vernon, escorted him to "Signal Hill" in St. John's, Newfoundland where they witnessed the then young Marconi's historic trans-Atlantic communications test. During Irv's life he later became acquainted with many prominent radio pioneers including Dr. Lee deForest, Major Edwin H. Armstrong, David Sarnoff, and others.

When World War I broke out Irv enlisted in the Navy at Provincetown, Mass., and later became radio officer aboard a destroyer.

Controversy has long raged as to whether Irv was the very first to show up for an amateur examination in 1912 when the Government began issuing licenses. He was always considered to be the first, although no actual proof has ever been found to substantiate the claim. The date of his examination was December 12, 1912 (12-12-12) which Irv often spoke of as an unforgettable date in his memory.

His professional life centered around radio too, founding WDAU in 1921, the third commercial broadcasting station in New England and eleventh in the entire nation. The station later became WBBG in 1923 (at his own home) and WNBH in 1925. In 1934, when the station was purchased by E. Anthony and Sons, Inc., he was named chief engineer and remained on that job until 1955, at which time he retired.

Constantly active since 1901, when he made his first QSO, Irv always drew a crowd wherever he appeared publicly and was the center of attraction at many hamfests during the twenties.

In poor health, Irv was found at his home in Mattapoisett, Massachusetts, January 30th, dead of a gunshot wound.

W1ZE was a member of many organizations and clubs as well as first President of the Old Old Timers Club. His unmistakable voice and ticking clock will be missed far and wide.

Putting The T-14D/TRC-1 On 50 Mc

BY LEROY MAY*, W5AJG

The T-14D/TRC-1 in its original state produces 50 watts of carrier output, narrow band frequency modulated, from 70 to 100 mc. By changing crystals and making some simple modifications in the driver and final it can easily be operated on 50 mc. A modification to operate it a.m. is also covered.

ONCE again, it appears the f.m. mode of modulation is beginning to assume increased popularity in amateur v.h.f. work. This is probably due in some measure to the availability of surplus communication type gear, both military as well as commercial. There is no doubt that f.m. techniques are of great benefit on 50, 144, 220 and 432 mc amateur communication circuits. In some instances, f.m. will probably work nearly on a par with s.s.b., and in other cases, it could be perhaps, even a little better.

One of the surplus military units called the T-14D/TRC-1 is particularly adaptable to 50 mc f.m. use, with only minor modifications necessary. This set is a component of Radio Set AN/TRC-1, and produces a minimum of 50 watts carrier output, frequency modulated, covering the range of 70-100 mc. Phase shift frequency deviation of up to ± 30 kc is possible. The unit operates from 115/230 volt a.c., 60 cycles and is self-contained, with the exception of the microphone. Eleven tubes are used, with the final being a type 829B. The weight is about 65 pounds and the size is 16½ × 10 × 12 inches. The price on the surplus market is around $25.00 or less.

Although the main value of the unit is to make it usable on 50 mc f.m., it is possible to use the T-14D as an a.m., high level modulated transmitter, if an external modulator is provided. The 829 final tube operates as a Class C straight-through amplifier, either for a.m. or f.m. Actually, the efficiency of this stage will run around 60% at 50 mc, and since an input of 100 watts is possible, 60 watts carrier output power is certainly attainable without any great difficulty. This article will concern such modifications to utilize the T-14D on the 50-54 mc band in either the f.m. or a.m. mode.

*9428 Hobart Street, Dallas 18, Texas.

F.M. Modification

Referring to the block diagram of the unit, note that V_1 and V_2 comprise the crystal oscillator and amplifier. These two stages accept crystals in the range of 729 kc to 1042 kc, which when multiplied 96 times by the succeeding multiplier stages will result in output frequencies from 70-100 mc.

Since we desire the new range of 50 to 54 mc, the crystals should fall within the range from 520.803 kc to 562.50 kc, using the same multiplication of 96 times. Additionally, without any changes, crystal frequencies from 1041.606 to 1125.00 kc may be used instead, and the multiplied output will still remain 50 to 54 mc. This represents a multiplication of 48 times instead of the 96 times. This merely means stage V_3 will operate as a doubler in the first case and as a straight through amplifier in the latter case. The crystal oscillator and amplifier stages V_1 and V_2 are not frequency sensitive and will follow the frequency of the inserted crystal.

The next change in operating characteristics is with stage V_8, which was originally a buffer-doubler to 70-100 mc. This 6V6 stage will now become a buffer-doubler operating on 50 mc and act as a driver for the final 829B operating

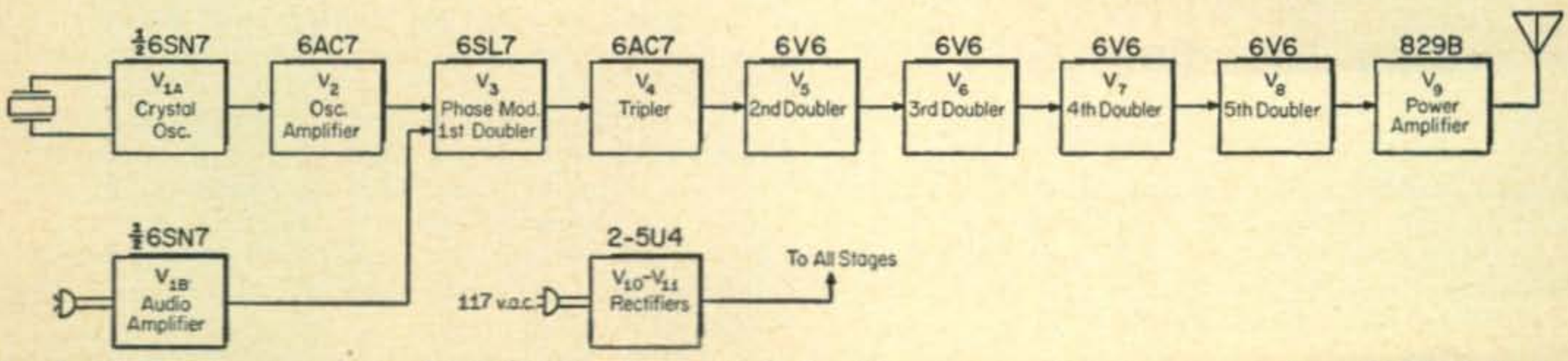


Fig. 1—Block diagram of the T-14D/TRC-1. The crystals for 50 mc operation may range from 520.803 kc to 562.50 kc and are multiplied 96 times. Also, crystals from 1041.606 to 1125.00 kc may be used as explained in the text.

Front view of the T-14D/TRC-1 transmitter. No outward change in appearance results from the modification to 50 mc n.b.f.m. operation.

straight-through. The 829B final will require a newly wound plate coil to resonate in the 50-54 mc band. To actually make these few changes proceed as follows: In buffer-doubler stage V_8, insert a metal 6V6 tube instead of a glass version, should the set come equipped with a glass type. Pad the primary of transformer of T_5 (in the plate of V_8) with an APC or mica type capacitor with a value of 50 mmf. The plate tank of this stage will now tune to 50 mc instead of its former frequency of 70-100 mc.

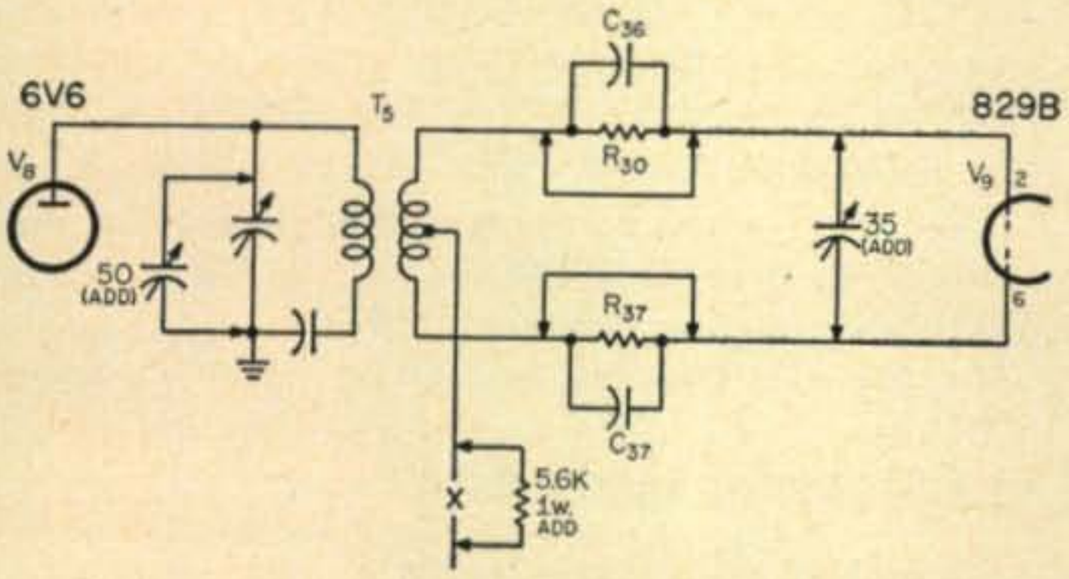


Fig. 2—The driver modification (V_8) consists of the addition of the 50 mmf trimmer across the primary of T_5. Final modifications include the removal of the R-C networks in the grids of the 829B and the addition of the 35 mmf across the secondary of T_5 to bring it down to 50 mc. The final tank is also modified as explained in the text.

In the grid circuit of the final 829B tube, remove R_{30}, C_{36} and R_{31}, C_{37}, and replace with two pieces of stiff tinned bus wire. This is shown in fig. 2. Place an APC type air trimmer capacitor of about 35 mmf across the grid terminals or across these two pieces of newly installed stiff wire, (see photo). This change will form a resonant circuit at 50 mc. Proper adjustment of this new capacitor will merely mean tuning it for maximum grid current on the meter located on the front panel, when in position 5 (P.A. GRID).

While on this stage, install a 1 watt, 5.6K resistor from the center of the final grid coil (secondary of T_5) to the wire formerly at that position. This added grid-leak resistor will improve the efficiency of the 829B stage when operating Class C.

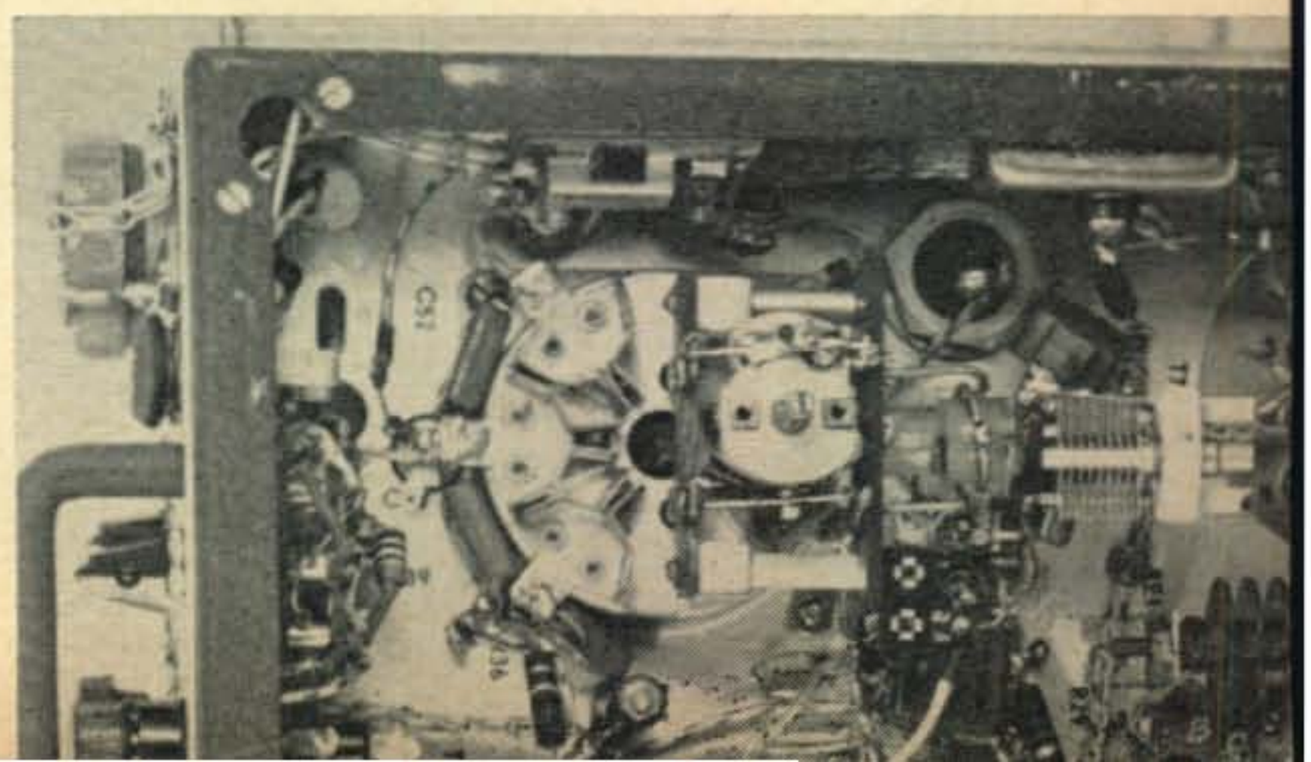
The final plate coil of the 829B is now removed and a new one wound. This may take the form of solid copper wire, about #10 or so—or even 3/16 or 1/8" copper tubing. Six turns should be used on a one inch diameter, with a winding length of 1¾", tapped at the exact center for the B+ point. Grid-dip the tank for 50 mc. Actually these few changes are the only ones necessary to convert the unit to the 50 mc band.

F.M. Operation

Insert the 500 kc range crystal or the 1000 kc range crystal into the crystal stage. At this station, the original crystal oven was removed and an ordinary crystal socket installed in its place. Using a dummy load of some sort and with the HI-LO power switch in the LOW position, rotate the meter switch through its five positions and/or tune for maximum grid current to the final stage by touching up the cans T_{11}, T_1, T_2, T_3, T_4, and T_5. Finally tune the new plate coil of the 829B for resonance or maximum output in the dummy load. When all has been peaked along the line, the power switch may be thrown to HI and an output of 50 watts should be observed. This represents a d.c. input of approximately 83 watts at this location (470v. at 177 ma.). At this point, the grid current to the final should be between 11 and 15 ma, and with the newly installed grid resistor, a bias of —60 or —65 volts is developed, allowing for 60% efficiency in Class C operation. A type T-17 or similar mike

[*Continued on page 82*]

Bottom view of the corner of the chassis housing the 829B final and 6V6 driver. The terminal strip which formerly supported the 829B grid R-C network, located over the socket, now supports the 35 mmf APC type capacitor. The 50 mmf driver capacitor may be seen to the right.



Series and Parallel Mode Crystal Operation for V.H.F.

BY JOHN J. NAGLE*, W3JES

This article describes the difference between series and parallel mode operation of crystal oscillators. Examples of both types of circuits are explained and a method is described for adjusting an oscillator for true series operation, frequently a difficult task, and a practical circuit is presented for 2 meter operation.

An interesting and informative article has recently appeared concerning the performance of overtone crystal controlled oscillators when operated in a high impedance or anti-resonant mode.[1] The use of overtone crystals in a low impedance or series-resonant mode offers several advantages over parallel mode operation. It is the purpose of this article to describe these advantages. This will be done by explaining the principal differences between series and parallel mode operation and examples of both types of circuits will be given. It is the author's belief that the biggest stumbling block to the use of series mode crystal controlled oscillators has been the difficulty in adjusting the oscillator for true series operation of the crystal. A method for doing this is also given.

The author of the above mentioned article describes the use of overtone crystals when operated in a high impedance or anti-resonant mode. The circuit described has the advantage of simplicity and economy of parts. However, it also has the disadvantage that the frequency is dependent on the capacity that is in parallel with the crystal. The major portion of this capacity is the input capacity of the oscillator tube; this capacity, in turn, is composed of grid-to-cathode capacity which is usually constant plus the grid-to-plate capacity multiplied by the voltage amplification of the tube (Miller capacity). Since the voltage amplification depends on the value of load impedance it can be seen that the frequency of oscillation depends on the load impedance.

Series Mode

Before proceeding further it is desirable to consider the difference between series and parallel operation of a quartz crystal unit. A quartz crystal unit may be represented by the circuits shown in fig. 1.

The components L_x, C_x, and R_x represent the piezo-electric effect of the quartz crystal. The capacitor C_s is a physical capacitance caused by the capacity of the electrodes on the crystal, the stray capacity of the crystal holder and socket and the input capacity of the oscillator tube or other device connected across the crystal. At a frequency known as the "series resonant frequency" of the crystal, L_x and C_x are resonant. From the definition of series resonance the impedance of the $L_xC_xR_x$ arm becomes R_x so that the impedance looking into the terminals of the crystal is R_x and C_s in parallel. Typically, the value of L_x is several henries (not millihenries or microhenries, but *henries!*); R_x is less than 50 ohms for overtone crystals operating in the 30-60 mc range. (The author has measured the resistance of one 40 mc third overtone crystal to be 8 ohms!) Since L_x and C_x are resonant at the operating frequency, the value of C_x must be a small fraction of a micromicrofared. As the inductance of L_x is several henries, the reactance at all amateur frequencies will be in the order of several megohms. The ratio of a reactance of this magnitude and the relatively low resistance of 50 ohms or less gives a very high value of Q. ($Q = X_L/R_x$). It is this exceptionally large Q that makes the quartz crystal so useful in frequency control and filter applications.

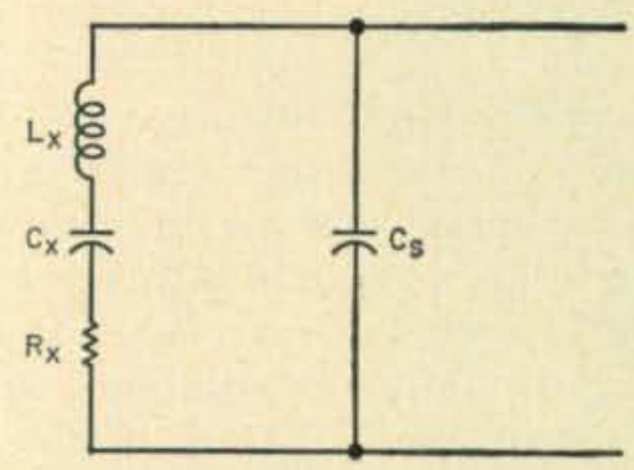


Fig. 1—The equivalent circuit of a quartz crystal. The capacity C_s represents the holder capacity plus the input capacity of the oscillator circuit.

It should be noted that the frequency of series resonance depends only upon L_x and C_x which are intrinsic properties of the quartz crystal itself; this frequency does not depend upon the value of C_s and hence the frequency is independent of the circuitry in which the crystal is used.

Parallel Mode

If the frequency is increased from the series resonant frequency the reactance of the series arm becomes inductive; this is because the reactance of the inductance, L_x, increases with frequency while the capacitive reactance of C_x decreases with frequency so that the difference between the two is no longer zero but shows a net inductive value. At some frequency above the series resonant frequency, the inductive reactance of

*40 Whittier Parkway, Severna Park, Maryland.

[1] Ellis, R., "Frequency Stability of Third-Overtone Crystal Oscillators," *QST*, January 1963, p 58.

the series arm will become anti-resonant (or parallel resonant) with the shunt capacity C_s. This frequency is known as the "parallel resonant frequency" and the crystal circuit appears as a high impedance at this frequency. A crystal controlled oscillator may be designed to operate at either the impedance rise at parallel resonance or the impedance dip at series resonance. The same design will obviously not operate at both series and parallel resonant frequencies. Two points should be borne in mind: First, the parallel resonant frequency is always higher than the series resonant frequency. Second, the parallel resonant frequency depends on the stray capacity that the circuit places across the crystal while the series resonant frequency depends only on parameters of the crystal unit itself. If it is desired to operate a crystal at its parallel resonant frequency it is necessary to specify the value of load capacity that the crystal will see. Within the last few years this value of capacity has been standardized at 32 mmf for most applications. A crystal ground for parallel operation will oscillate at its nameplate frequency (within its tolerance) when the circuit presents a load capacity of 32 mmf across the crystal terminals.

Amateurs using surplus crystals especially World War II surplus, should use caution where accuracy of frequency is important. At the time World War II crystals were manufactured, a standardized value of load capacity had not come into general use and where high accuracy was required it was customary for the crystal user to supply the crystal manufacturer with a sample circuit to which the manufacturer tailored the crystal. Since most amateurs do not have access to equipment for accurately measuring frequency, especially in the frequency region where overtone crystals are most likely to be used, and and since the input capacity of an oscillator tube is not easily determined, operation of the crystal in a manner such that the capacity across the crystal has only a small if any effect on the frequency of oscillation has certain advantages.

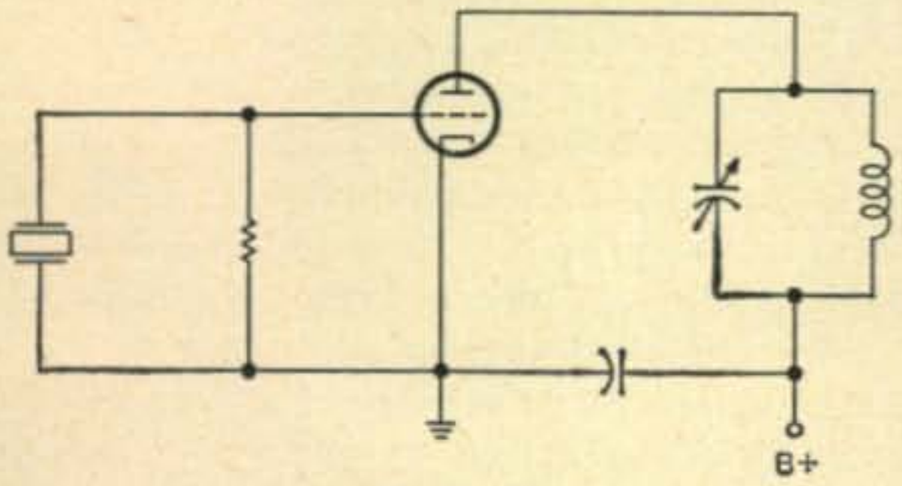


Fig. 2—The Miller crystal oscillator circuit is a modified form of the tuned plate tuned grid circuit.

Typical examples of oscillators which use crystals in the parallel mode are shown in figs. 2 and 3. Figure 2 is perhaps the most commonly used circuit. It is a modified form of the tuned-grid tuned-plate oscillator in which a parallel resonant crystal is substituted for the grid tank circuit and is known as the Miller oscillator. Figure 3 is the well known Pierce oscillator and has the advantage that no tuned circuits are involved. Most

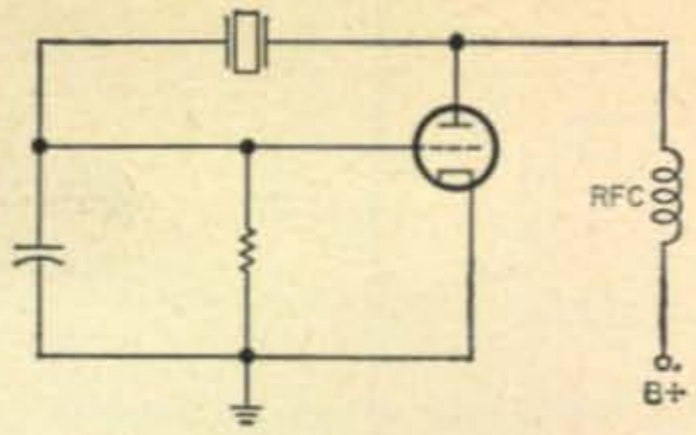


Fig. 3—Basic circuit of the Pierce crystal oscillator. Note the lack of tuned circuits.

of the other parallel mode circuits are modifications of either of the above.

A good example of an oscillator using a crystal in its series mode is the Butler oscillator, shown in fig. 4. Here the crystal serves as a series coupling element. At the series resonant frequency the crystal impedance is the lowest; the feedback is a maximum and the circuit oscillates at this frequency. At all other frequencies the

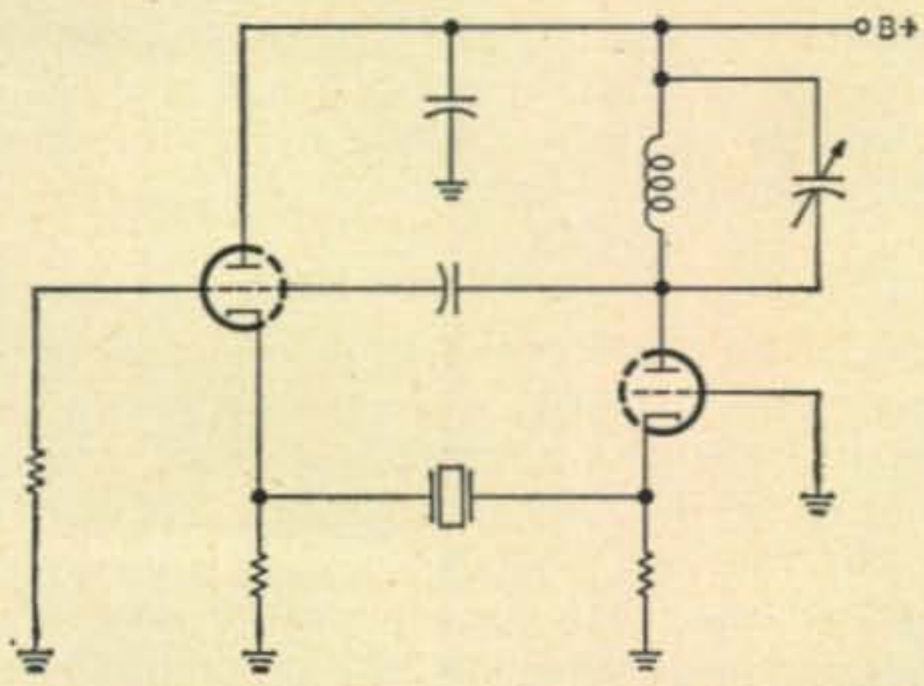


Fig. 4—The basic Butler oscillator circuit uses the crystal as a series coupling element.

crystal impedance is higher; since the crystal is a series element in the feedback path, the feedback will be reduced. If the circuit is properly designed, oscillations will take place only at the series resonant frequency.

Perhaps a more familiar oscillator circuit using series resonance is the Clapp oscillator[2,3] shown in fig. 5. Although this circuit is usually seen as a variable frequency oscillator it was originally developed as a crystal controlled oscillator for a broadcast frequency monitor. The characteristics of this circuit that make it so popular as a

[2] "A High-Stability Oscillator Circuit," *QST*, May 1948, p 42.

[3] Clapp, J., "An Inductance Capacitance Oscillator of Unusual Frequency Stability," *Proceedings of The I.R.E.*, March 1948, p 356.

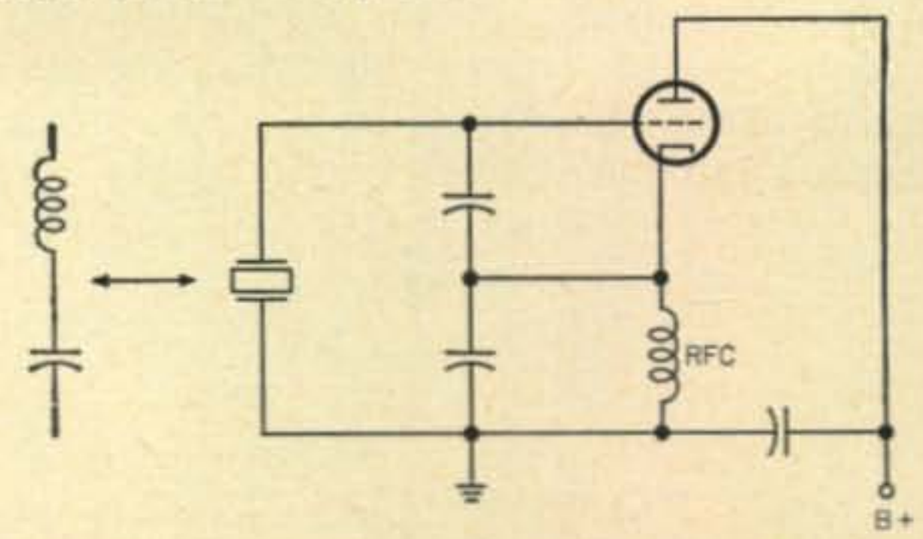


Fig. 5—The basic Clapp oscillator circuit uses the crystal in the series mode. The L-C equivalent is also shown.

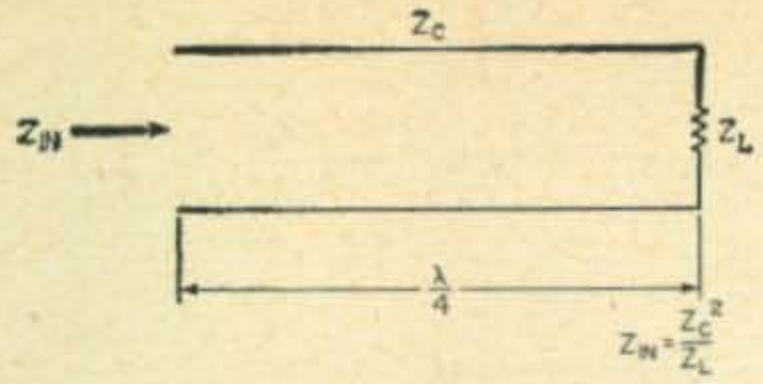


Fig. 6—The impedance inverting characteristics of a quarter-wave transmission line.

variable frequency oscillator apply equally well to the crystal controlled case.

There are many other circuit configurations using series mode crystals, too numerous to describe here. However, a modification of the Miller circuit to use series mode crystals will now be described.

As mentioned above, the series resonant frequency of a crystal will depend only on the crystal unit itself; the stray capacity across the crystal will have only a very minor effect on the frequency of oscillation. The Miller circuit can be easily adapted to use a crystal in its low impedance (or series) mode by use of an artificial quarter-wave line.

Transmission Lines

It can be remembered from transmission line theory that a quarter-wave section of transmission line has an impedance inverting property. In fig. 6, if the load impedance Z_L is less than the characteristic impedance, Z_c, of the quarter-wave section, then the impedance seen at the input terminals of the line, Z_{in}, is greater than the characteristic impedance of the line. Mathematically:

$$Z_{in} = \frac{Z_c^2}{Z_L} \qquad (1)$$

The reverse is also true. The equivalent of a quarter-wave matching section can be made from lumped constants in the form of a pi-section network shown in fig. 7 where X_L equals X_c at the frequency of operator. The characteristic impedance of such a section is given by $Z_c = X_L = X_c$. For our purpose we will place a crystal, operating in the series mode, at one end of the network; this will be transformed into a high impedance looking into the other end of the network. The high impedance end will be connected to the grid of the oscillator tube as shown in fig. 8. In order to obtain as high an impedance as possible at the grid end of the network, Equation (1) shows that (a) the crystal series resistance should be as low as possible and (b) the characteristic impedance of the quarter wave section should be as high as possible. Condition (a) above implies

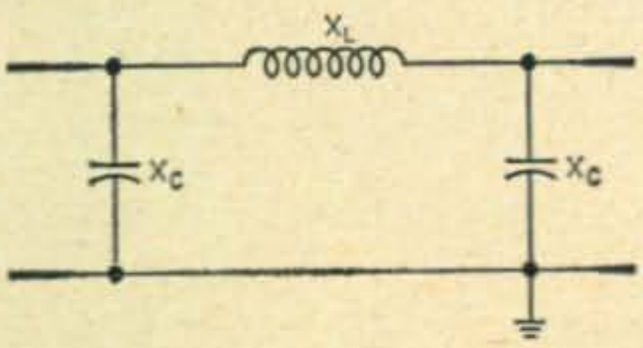


Fig. 7—A lumped constant quarter-wave transmission line. At the operating frequency $Z_C = X_L = X_C$.

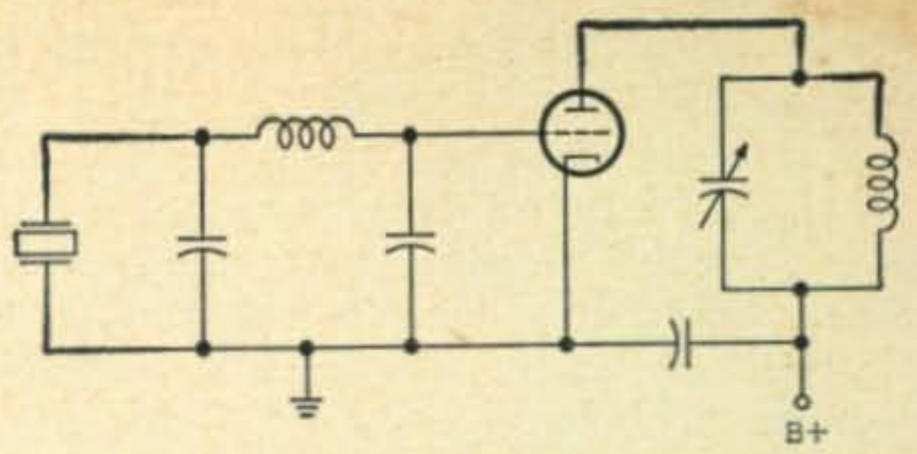


Fig. 8—The Miller oscillator modified by means of an impedance inverting quarter-wave transmission line enables series mode operation of the crystals.

that the crystal unit should have as high a Q as possible. Condition (b) states that the shunt capacity should be as small as possible and the series inductance should be as large as possible, bearing in mind that the inductance and capacity must be resonant at the operating frequency. The minimum possible shunt capacity is equal to the input capacity of the tube, so that by making the input capacity of the tube the shunt capacity of the network, one physical capacitor is eliminated. In practical cases the series resistance of the crystal unit will be small compared to the reactance of the physical capacitor shunting the crystal so that this capacitor can also be eliminated. It is also necessary to add a grid resistor. The resistor can be put at either end of the impedance transforming network; since the crystal end has the lowest r.f. impedance, the grid resistor will be placed in shunt with the crystal. This will not degrade the performance of the crystal unit since a typical value of grid resistor is 100K ohms while the series impedance of the crystal unit is typically less than 50 ohms. The circuit is now as shown in fig. 9.

Coil Data

The only problem that remains is to specify the coil. The coil must resonate at the operating frequency with the input capacity of the tube. As mentioned above, the input is difficult to determine exactly so that the coil must be made adjustable.

The impedance inverting coil used is ¼" long by ¼" diameter close wound with #20 enamel wire (8 turns); the slug is green-dot iron. If the best adjustment seems to be obtained with the slug in the maximum inductance position, the inductance is probably too small and the coil should be rewound keeping the same dimensions, but using the next size smaller wire. If the best adjustment seems to be with the slug removed, the coil is probably too large and it should be rewound using the next size larger wire again

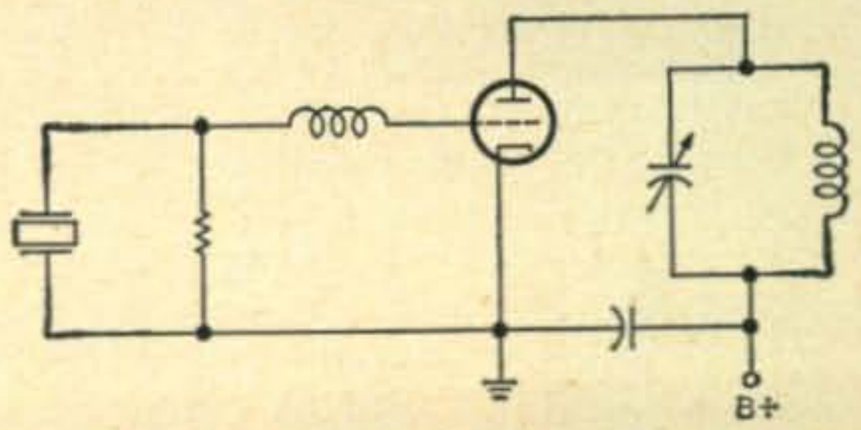


Fig. 9—Practical schematic of an impedance inverting Miller oscillator.

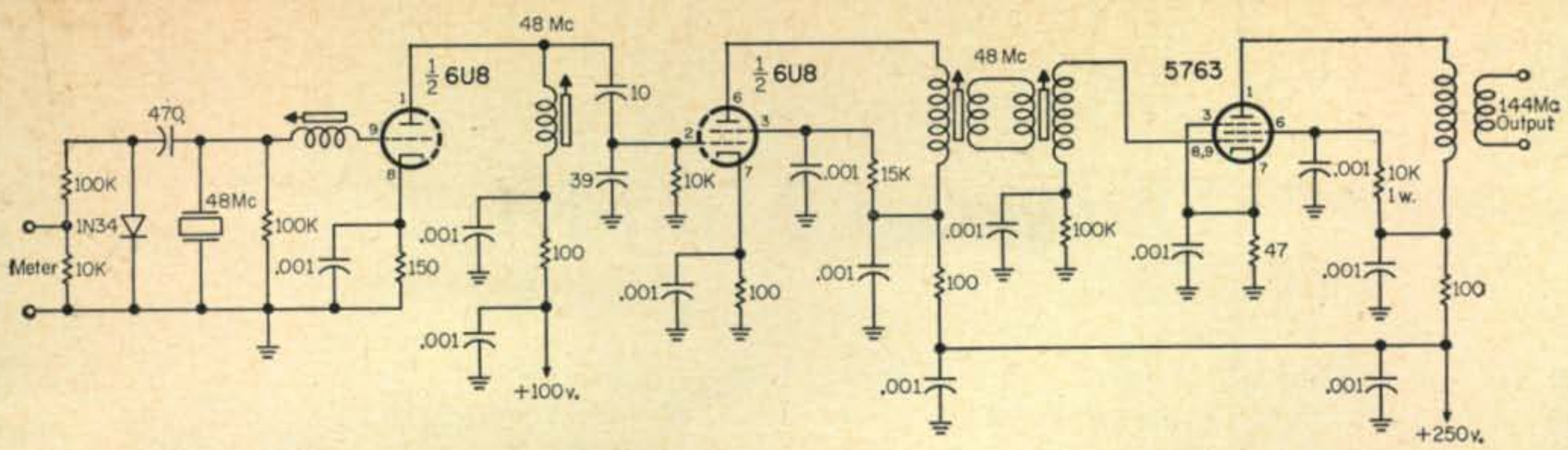


Fig. 11—The oscillator-multiplier chain above uses a series mode overtone crystal. Only two tubes are required to provide an approximate one watt output in the two meter band.

keeping the same dimensions. Keeping the same physical dimensions and changing only the wire size insures that the inductance is changed by controlled amounts. I have found that this is a better procedure than keeping the same wire size and changing the coil dimensions.

If the coil is to be made adjustable, some indication must be provided to tell when the proper adjustment has been made. It is believed that this "proper adjustment" problem has been the principal reason that the performance of series mode overtone oscillators has not been as good as it should be.

Adjustment Method

When the oscillator is operating on the proper frequency, the crystal will be in series resonance and the r.f. voltage across it will be a minimum. Hence by placing an r.f. voltmeter across the crystal and adjusting the grid coil for minimum voltage, operation of the crystal at its series resonant frequency can be determined. For convenience, the voltmeter circuitry can be made a permanent part of the oscillator and a d.c. test meter connected to test points for tune up. A complete oscillator and voltmeter circuit is given in fig. 10. The voltmeter has an input impedance of approximately 50K ohms; since the series resistance of the crystal unit is less than 50 ohms the effect of the voltmeter is negligible. In fact, when testing, connecting the 500 mmf capacitor to the crystal no change in the oscillator beat note could be detected by ear.

The voltmeter also provides a convenient method of measuring crystal dissipation. The d.c. voltage developed across the 100K voltmeter resistor is very nearly equal to the peak value of the r.f. voltage across the crystal unit. The d.c. voltage is given by 100,000 I_{dc} where I_{dc} is the meter reading in amperes. Hence

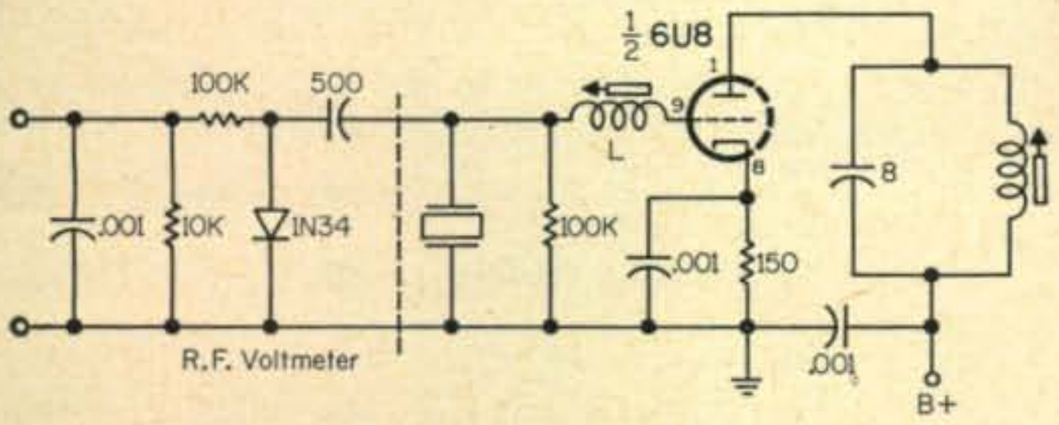


Fig. 10—Circuit of a Miller oscillator modified with an impedance inverting quarter-wave transmission line and an r.f. voltmeter circuit to aid in the adjustment of inductor *L*.

$$E_{d.c.} = 100{,}000\ I_{d.c.} \approx E_p\ (r.f.)$$

The power dissipated by the crystal, P_x, is given by:

$$P_x = \frac{E_p^2\ (r.f.)}{2R_x}$$

where R_x is the crystal series resistance. The dissipation for most types of overtone crystals in the 25-75 mc frequency range should be less than 2 milliwatts.

As a final test, before putting any overtone oscillator into actual operation, a receiver should be tuned to approximately one-third the name plate frequency (assuming a third overtone crystal) for evidence of oscillation at the fundamental. Any signal output indicates that the crystal is oscillating at its fundamental frequency instead of the overtone frequency and that the oscillator tube is acting as a frequency multiplier. The output will therefore be high in harmonic content (harmonics of the fundamental) which would not be present if the crystal were operating on its proper mode. These harmonics are not only undesirable in themselves but they represent energy that could better be used at the desired frequency. In addition, inadvertant operation of an overtone crystal at its fundamental frequency almost always results in excessive crystal dissipation which can cause a high drift rate or even damage the crystal.

The absence of any output at the fundamental frequency or multiples thereof (except of course the desired overtone and multiples of the desired overtone) insures that the crystal is operating in the proper fashion.

Use of the minimum voltage adjustment procedure previously described will give optimum performance of the oscillator.

Although overtone crystals are not capable of dissipating as much power as crystals operating in the fundamental mode, it is possible nevertheless, to obtain, from properly adjusted and controlled overtone oscillators, a reasonable amount of power with a minimum number of envelopes. As an example, the oscillator-buffer-tripler combination used by the author to go from 48 mc to 144 mc is shown in fig. 11. In this arrangement the triode section of a 6U8 is used as the oscillator operating on 48-49.3 mc. The pentode section of the 6U8 is used as a buffer amplifier. The drive for the buffer is tapped down from the oscillator tank circuit to avoid overdriving the

[*Continued on page 105*]

CQ Reviews:

The Atko Mini-Keyer

THE Atko Mini-Keyer is an automatic machine which transmits audible code from a perforated tape for instruction and practice in the reception and transmission of code signals. It also may be used to key other tone sources or a transmitter.

A difficulty often encountered with similar devices is that the sending speed is inaccurate, difficult to adjust and sometimes erratic. Also, special tapes, perforated to fit the particular machine, must be used. The Atko utilizes a standard Wheatstone tape which is perforated in accordance with the standard method. It may be punched out by a regular commercial tape perforator. Accurate and stable code speeds of from 4 to 30 words-per-minute are obtainable at 21 different speed levels.

The Mini-Keyer is a complete unit which, besides the automatic keying mechanism, includes a tone oscillator, loudspeaker, volume and pitch controls. A phone jack also is included from which up to 25 pairs of headphones, connected in parallel, may be operated. An external speaker may be also driven from the phone jack.

A key jack makes it possible to plug in a hand key in order to practice one's own sending using the unit's tone oscillator and speaker. A most advantageous feature, in this regard, is that code tapes are available with double or triple spacing between the characters, so that the student may imitate the characters during the pauses between them by using a hand key plugged into the jack. This will provide sending and receiving practice at the same time. It also will help the beginner to learn the characters more by their sound rather than by a specific number or sequence of dots and dashes. Besides this, it will provide a lapse of time between characters for their recognition and for writing them down on paper.

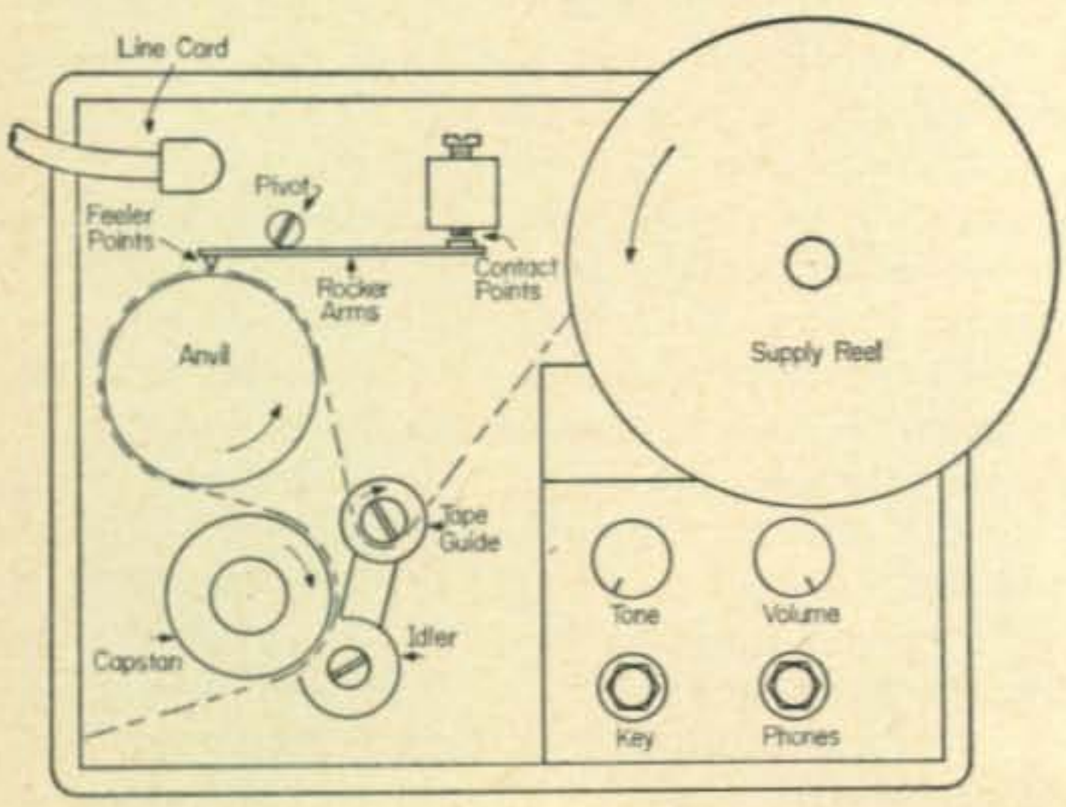


Fig. 1—Threading diagram of the Atko Mini-Keyer. The two rocker arms are stacked one above the other.

The Atko Mini-Keyer automatically transmits code signals from a perforated tape. It is a self-contained unit operated from a 117 volt 60 cycle a.c. source and it includes a tone oscillator with monitoring loudspeaker. The tape is operated by a synchronous motor and its speed can be adjusted, as needed, by changing the capstan for one of a different size. The capstan is at the lower left with the small black knob on top of it.

Circuitry

The Mini-Keyer is powered from a 117 volt 60 cycle a.c. source at a power drain of 10 watts. It employs a transistorized tone oscillator operated at a low d.c. potential from a 6 volt transformer with a solid-state voltage-doubler circuit. The unit is ready to go as soon as the power switch is turned on.

The tape is operated by a 60 cycle synchronous motor which has a built-in speed-reduction gear to provide a capstan speed of exactly 18 r.p.m. The motor runs with the same precision as an electric clock, thereby ensuring an accurately known and stable code speed.

The tape used by the Mini-Keyer is standard commercial, canary colored oiled paper tape, 15/32" wide and .004" thick. Three rows of holes are perforated along the tape. The center row is not used by this keyer. Only the two outer rows contain the necessary code information. Each reel of tape furnishes approximately one hour of code at a speed of 10 w.p.m.

Keying Mechanism

The automatic keying mechanism functions as follows. Referring to fig. 1, the tape is taken from the supply reel, passed over the tape guide, around the anvil and between the capstan and the idler. The motor rotates the capstan, the bearing surface of which is serrated so that it

will grip the tape and pull it along while the tape is held firmly against the capstan by the idler with sufficient pressure to avoid slippage (the idler is rubber-tired and spring-loaded). The speed at which the tape is drawn depends on the diameter of the capstan which is made removable so that different diameter capstans may be interchanged to produce any desired code speed.

Two rocker arms are mounted on a pivot, one above the other. Each arm has a feeler point at one end and a contact point at the other end. As the tape is drawn around the anvil, the feeler points fall into the two outer rows of holes in the perforated tape, causing the arms to swing slightly counter-clockwise and making the contact points close. When one of the feeler points falls into a perforation, the closing of its contact point actuates a relay which turns on the tone. In a similar manner, when the other feeler point falls, the tone is turned off.

Code Speed

The Mini-Keyer is supplied with one 16 word-per-minute capstan. Other standard capstans are available for code speeds of 12, 14, 18, 20, 22, 25 and 30 w.p.m. In-between speeds are obatined by the use of tapes with double or triple spaced characters. When these tapes are used, the train of characters will pass at a word-per-minute rate of one-half or one-third of the speed marked on the capstan in use. For instance; when a 12 w.p.m. capstan is used, the rate with a double-spaced tape will be 12 ÷ 2 or 6 w.p.m. For a triple-spaced tape it will be 12 ÷ 3 or 4 w.p.m. Normal spacing, of course, will provide 12 w.p.m.

When tapes with other than normal spacing are used, it should be noted that although the w.p.m. rate is slowed down, the formation of each character will be made at the speed for a normally spaced tape at the capstan rating. The full effect of a slower speed thus may not be realized; however, by having the individual characters formed at a faster rate, the student is aided in recognizing them by a more rapid sound and thus is better prepared for an ultimately faster overall code speed.

Available Tapes

Three reels of practice tape are furnished with the Mini-Keyer. These contain triple-spaced tapes comprising lessons 1, 2, 3 and 4 from a series of 10 lessons. The remaining lessons are available at additional cost. Special CQ or test tapes with call signs or other material, for automatically keying a transmitter, are available to order. These tapes generally are not wound on reels, but are short lengths with their ends joined together to form a closed loop which makes an endless belt that will repeat the signals continuously.

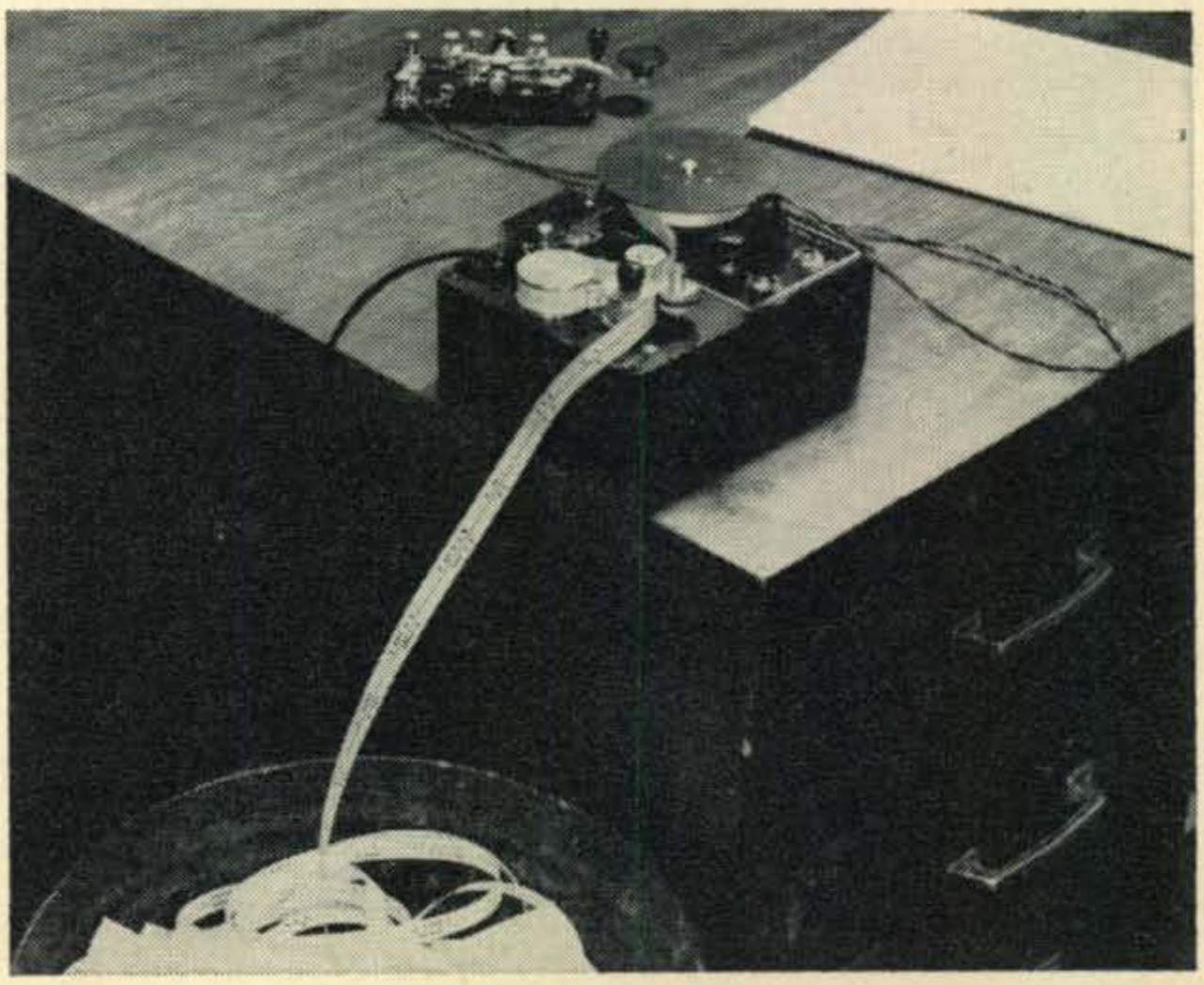
Performance

Putting the Mini-Keyer through its paces proved it to be an excellent device. Accurate and stable code speed, clean keying and tonal quality, convenience of setup and adjustment along with fine overall performance was experienced. No tearing, entangling, jumping, damage or jamming of tapes was encountered, nor was any erratic operation found.

The tapes with extra spacing between the letters and the practice-keying feature, available between characters, proved to be exceptionally helpful to the beginner, and it was surprising to see how rapidly code copying and sending could be mastered as well as the short time that was required for raising one's code speed.

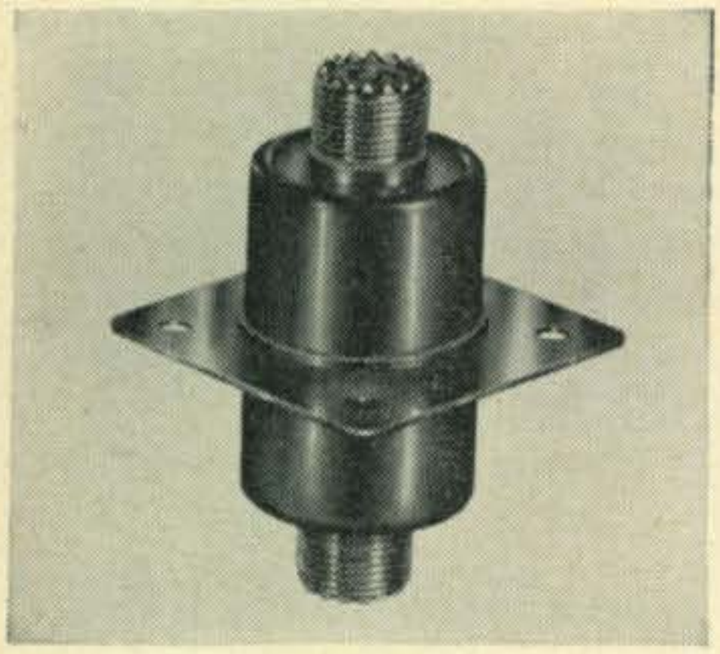
There is no take-up reel for the tape which has passed through the keyer, so the question might arise as to what should be done with the run-off tape. Simply placing the Mini-Keyer near the edge of a table and letting the tape fall into a smooth box or basket placed on the floor below, in the same manner as ticker tape is handled, will keep the tape together and from entangling, thus posing no problems in respect to tape damage or rewinding it back on the reel by hand.

[*Continued on page 105*]



The Atko Mini-Keyer placed near the edge of a desk to enable the run-through tape to fall into a receptacle placed on the floor below. A key may be used for sending practice between triple-spaced tape characters as explained in the text.

New Amateur Products

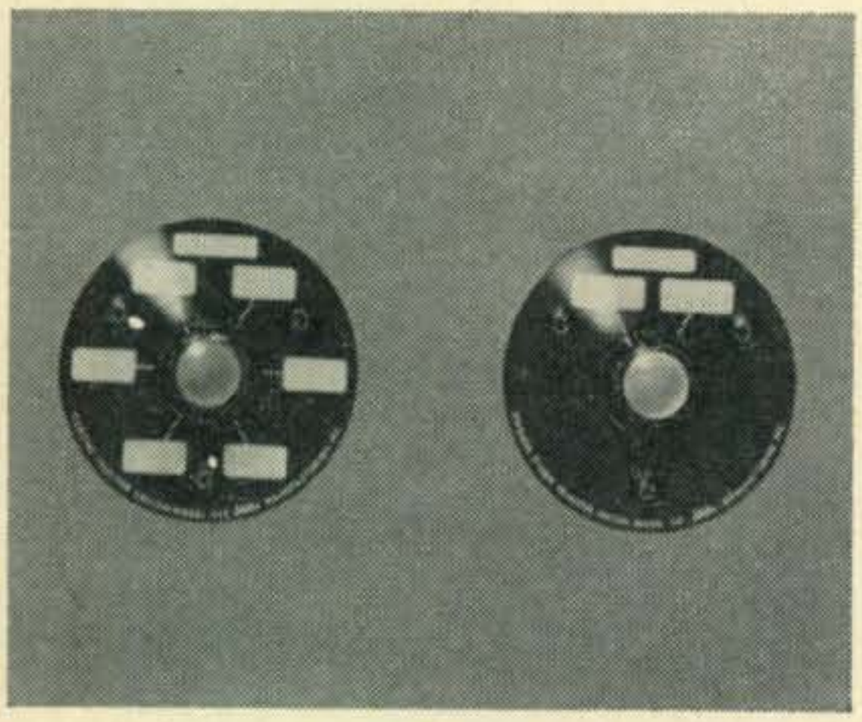


New Lightning Arrester

ADAPTED from a surge arrester originally designed to protect electronic gear aboard military aircraft. Hy-Gain's LA-1 lightning arrester can be easily installed in the 52 or 72 ohm coaxial feedline to any ham antenna. It is claimed to be the only lightning arrester on the market today that will effectively reduce static build-up around any antenna system and safely bypass to ground ten or more direct lightning hits. The LA-1 arrester is available from any of Hy-Gain's distributors for $19.95 net. Circle A on page 110 for further information.

Saturn 6 Matching Transformers

THE old standby of 6 meter mobile enthusiasts, the Hi-Par Saturn 6 halo antenna now can sport a new look with the Model MT-1 Matching Transformer. The MT-1 eliminates the need for the old coaxial balun with its many construction problems. Performance is improved and feeding becomes a simple matter of threading a coax connector onto the MT-1. The price is $4.95. For further information circle B on page 110.



Waters Illuminated Control Knob

FOR the ham who has everything (almost), Waters Manufacturing Inc. introduces an illuminated control knob for use on their coax switches or any other control with a ¼" diameter shaft. The novel item has a red illuminated pointer on the knob and projects a beam of light on the panel. The knob requires no behind-the-panel changes; wiring for the 6-volt lamp is through a single wire with the shaft serving as ground. Price is $5.00. Circle C on page 110 for more information.

Turner Model 454 SSB Microphones

A NEW series of microphones is now available from the Turner Microphone Co., designated the Model 454. Audio response is from 300-3000 cycles, ideally suited for s.s.b. Two variations are offered: Model 454X with crystal cartridge and —48db output level and Model 454C with a ceramic cartridge and —52db output level. Coiled cords are standard. The 454 switching arrangement is versatile, offering push-to-talk or vox operation with the "lever-lock" feature. Amateur net is $15.90. For further details circle D on page 110.

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

The following certificates were issued between the period from January 6th, 1964 to and including February 3rd, 1964:

CW-PHONE WAZ

1896	4X4JN	Uri Benari
1897	K8QJH	R. H. Todd
1898	VE8RG	Reg Beck
1899	W7DLR	J. H. Wilson
1900	UA4KHW	Kuibyshev Radio Club
1901	W4ZYS	Meryl Burns
1902	W1CUX	W. C. Gosch
1903	DL8CH	Herbert Bubel
1904	K6OHJ	R. C. Wilde
1905	YU1EH	Mate Stambuk
1906	W3QQL	Charles M. Allen
1907	ZL1AMO	Ron W. Wright
1908	DJ2YL	Susi Liebig
1909	DL1ME	R. Max Kainer
1910	K6JIC	Frank W. Pfeiffer
1911	HB9JG	G. Wildi
1912	W7BTH	Elwood R. Johns
1913	PY1ADA	Walter W. L. Heininger
1914	W8QWI	A. Altomari
1915	OE1FT	Franz Tuma
1916	K6BPR	E. C. Titcomb
1917	W2WMG	George W. Rosch, Jr.
1918	W71YW	S. Broughton
1919	I1BNU	Francesco De Gironcoli
1920	W5VA	T. Frank Smith
1921	W5QKZ	A. M. Sprague

ALL-PHONE WAZ

225	W7DLR	J. H. Wilson
226	W7BTH	Elwood R. Johns
227	W8WT	Lester A. Jeffery

TWO-WAY SSB

213	VE3BQP	Wm. A. Wragg

CW WPX

518	DL3JV	Oskar Koehler
519	K3LXN	Stephen J. Johnson
520	W9QQG	John Flinn
521	HK7ZT	Antonio Novales

PHONE WPX

107	EP3RO	Conrad Glade

SSB WPX

157	YO3ZA	Dan Antoni
158	KG6AJB	Robert A. McLaughlin
159	KG6ALD	Robert A. Dessert
160	PJ2AA	George S. T. Heeringa
161	G6LX	R. L. Glaisher

MIXED WPX

84	K9LIO	Kermit Lehman
85	W8QNW	John W. Govier
86	K1SHN	George C. Banta

Antarctica: ZS2QK is a new entry to the Antarctic scene. He prefers 14 mc c.w.

Argentine Antarctic: Those stations whose last letter follows the Z are located in the following spots: Antarctica—D, J, P, E, Q, F, B, L, H, N, K, R, W, V, U, X; South Orkneys—A, G, M; South Sandwich—Y; South Shetlands—C, I, O, S, T. *(Tnx NEDXA)*

AP West Pakistan: Ahmet, AP2AD, has been active on 14,290 kc and 14,310 kc s.s.b.

CEØ Easter Island: CEØAC advises through CE3AG that he operates randomly three days per week on c.w. from 14,000 to 14,100 kc usually at 0200 and 1300 GMT. On other days, he cannot use the meteorological radio station.

CEØX San Felix: Early April should see W9EVI, W6HAW and company descended on San Felix *en mass*. All bands and modes will be used.

CR4 Cape Verde Islands: CR4AD now has the HB9TL s.s.b. rig and is active on three crystal frequencies 14,105; 14,121; and 14,127 kc. *(Tnx VERON)*

CR8 Timor: CR8AC is temporarily QRT with receiver trouble, but CR8AD remains active daily with low power in middle of 14 mc c.w. band. *(Tnx WGDXC)*

CX Uruguay: Enzo, CX2AJ, an old timer who will be remembered by pre-war DXers has returned to the air working all bands c.w. and phone.

*Box 35, Hazlet, New Jersey 07730.

WAZ and WPX

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

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

WPX HONOR ROLL

CW WPX

W2HMJ	685	W2KIR	511	VE4OX	461	W7ABO	419	K9EAB	450	LA5HE	351	W3VSU	300	W6YY	570
W8KPL	652	W2GT	510	W9WIO	460	HB9TT	419	W6YY	448	ZS6IW	350	W4NJF	300	W5LGG	565
W5KC	647	K9EAB	510	W9WCE	458	KH6BLX	418	G8KS	430			KØRDP	300	W4BYU	557
W2AIW	617	DL3RK	509	W3BCY	457	UA4IF	417	VK6RU	421	**SSB WPX**		VE3BKL	300	K2ZKU	555
W2EQS	605	W8RQ	505	W7HDL	457	K2PFC	415	W3AYD	420	W4OPM	506	K1SHN	300	W3AYD	552
W4OPM	600	W9UZS	505	OE1FF	457	VK3XB	415	F8PI	418	MP4BBW	462	K2POA	300	YU1AG	552
W6KG	596	PAØLOU	505	F9MS	457	W1DGT	415	PZ1AX	413	HB9TL	452	WØCVU	291	HB9EU	551
ON4QX	579	G3EYN	503	OK3EA	456	W5AWT	412	K2CJN	409	W3NKM	451	G16TK	278	WØMCX	529
W2NUT	571	YU1AG	503	UC2AR	456	W5DA	412	DL3TJ	404	G8KS	450	K5OGP	277	W2GT	528
W8LY	570	W3GJY	503	K4TEA	451	WA2DIG	411	OE1FF	404	K9EAB	439	K8ONV	275	DL3RK	525
W9UXO	566	W6YY	502	W3PGB	450	W2PTD	411	W1ORV	404	G3AWZ	428	VE3ES	274	DJ2KS	524
K6CQM	565	DL7CS	502	DL1YA	450	K5LZO	411	W1UOP	402	G3DO	424	K2JFV	266	G8KS	520
W5OLG	564	K2CPR	501	DL9KP	450	W4DKP	410	W6USG	400	G3NUG	423	K2MGE	263	OE1FF	519
W2HO	563	W9SFR	501	W8JIN	449	W1CKU	408	VE3BQP	386	W3MAC	403	W3AYD	262	K9AGB	510
W5LGG	558	W2EMW	500	W8KSR	449	K4IEX	408	SP7HX	381	W1ORV	370	W4EEU	262	PAØLOU	510
W9DWQ	556	W2FXA	500	W3AYD	443	K4JVE	407	TG3AD	381	W2HXG	359	DL1PM	257	HK3LX	508
DL1QT	552	W2MUM	495	W6UNP	442	W5AFX	407	DL6VM	376	TI2HP	356	XE1CV	256	W4BQY	505
K2ZKU	552	W1WLW	494	VK3XB	439	W4CKD	407	W3DJZ	374	W6YMV	354	G3FKM	255	W3KPD	501
W1EQ	549	LA3DB	491	W3BQA	437	SM5AJR	406	PAØSNG	369	I1AMU	346	UR2AR	255	W8UMR	500
W1IJB	546	OK3DG	488	LA5HE	437			G3FKM	366	PZ1AX	345	W1EQ	253	LA5HE	500
K2UKQ	546	SM5CCE	488	VE3ES	433	**Phone WPX**		W8UMR	363	K1IXG	344	W6USG	252	KP4AOO	500
W9YSX	544	W4BYU	487	G3HIW	433	W9WHM	605	SM3AZI	362	W6RKP	343	K2ZKU	251	ST2AR	489
W9GFF	538	W8PQQ	481	W8UMR	429	CT1PK	603	DL2UZ	361	VE3BQP	334			JA2JW	480
IT1AGA	536	ON4FU	479	WØAUB	429	W8WT	589	SM3EP	361	W4RLS	322	**Mixed WPX**		W3CGS	475
SM7MS	534	W4HYW	478	W2RA	428	G3DO	583	W1DGJ	358	W2VCZ	320	W4OPM	658	W9FVU	474
G2GM	526	W8IBX	476	K5LIA	428	CT1HF	565	W5ERY	358	W1UOP	318	G3DO	624	G3HDA	469
OK1SV	517	W5BUK	475	OK1MB	428	MP4BBW	506	W6CHY	358	W2YBO	318	W9YSX	622	G3FKM	463
K9AGB	515	WØMCX	472	W3CGS	426	DJ3CP	473	W8JIN	356	W8PQQ	315	W8WT	621	DL1YA	456
KP4CC	515	SP6FZ	468	W1EIO	425	W9YSQ	471	G3GHE	356	WA2EOQ	315	K9EAB	606	W1ORV	455
W6WO	511	W3OCU	466	OE3WB	425	W9UZC	462	CX2CN	354	K4PUS	305	W8JIN	605	VK2DI	454
DJ2KS	511	K6SXA	464	KL7MF	424	PAØHBO	453	PY2CK	354	DJ3CP	304	W3NKM	605	WØZBQ	452
		PY4OD	462	SM5WI	424	G3NUG	451	5A5TO	353	WA2SFP	300	W3OCU	588	G3NUG	452
		JA2JW	461	WØPGI	420					K2TDI	300	W9DWQ	571	G16TK	450

FB8WW Crozet Island: Marcel, FB8WW, is now active on 14,040 kc. The best time seems to be 1400 to 1500 GMT. Also watch 21,040 kc at 1300 GMT. Marcel is a good c.w. operator although not familiar with ham procedure. This should count as a new one. *(Tnx W2FZY and WGDXC)*

FM7 Martinique: Joe, W4OPM, and Pierre, FM7WQ, would like to thank the gang for their generous contributions which enabled Joe to get a HT-37 and a Skyline three-band Quad for Pierre replacing the equipment which he lost in a hurricane. The receiver situation is not as yet resolved. Joe will be glad to help anyone needing FM7. He skeds Pierre on Saturday or Sunday at 2000 GMT. FM7WQ is on 14,125 kc and Joe on 14,260 kc plus-or-minus a kc or two, depending on the QRM. Joe will be on five minutes ahead of time on his own frequency listening for a call from anyone wishing to work Pierre.

HC8 Galapagos Islands: True to promise, HC8FN is now on the air. Usually 20 meter s.s.b. QSL via WA2WUV.

HL9 Korea: Aug, K2UVU, should now have his SR-150 on the air. Aug promises some good Asia-type DXpeditions.

KA Japan: Curt, KA2CM, passes on the following news from the FEARL.

Recent election of officers produced the following: President, KA2BW, Bill Weise, Yokohama; Secretary, KA2CM, Curt Carter, Tokyo. This makes the third consecutive time Curt has been elected to that post. Bill, KA2BW, appointed KA2LA, Lacey Austin, QSL Manager, replacing KA2CM, who has held that post since July, 1961. FEARL plans to have its field day in July. Bands and modes are as follows: 10-15-20 meters, c.w. and s.s.b.; 6 meters, a.m.

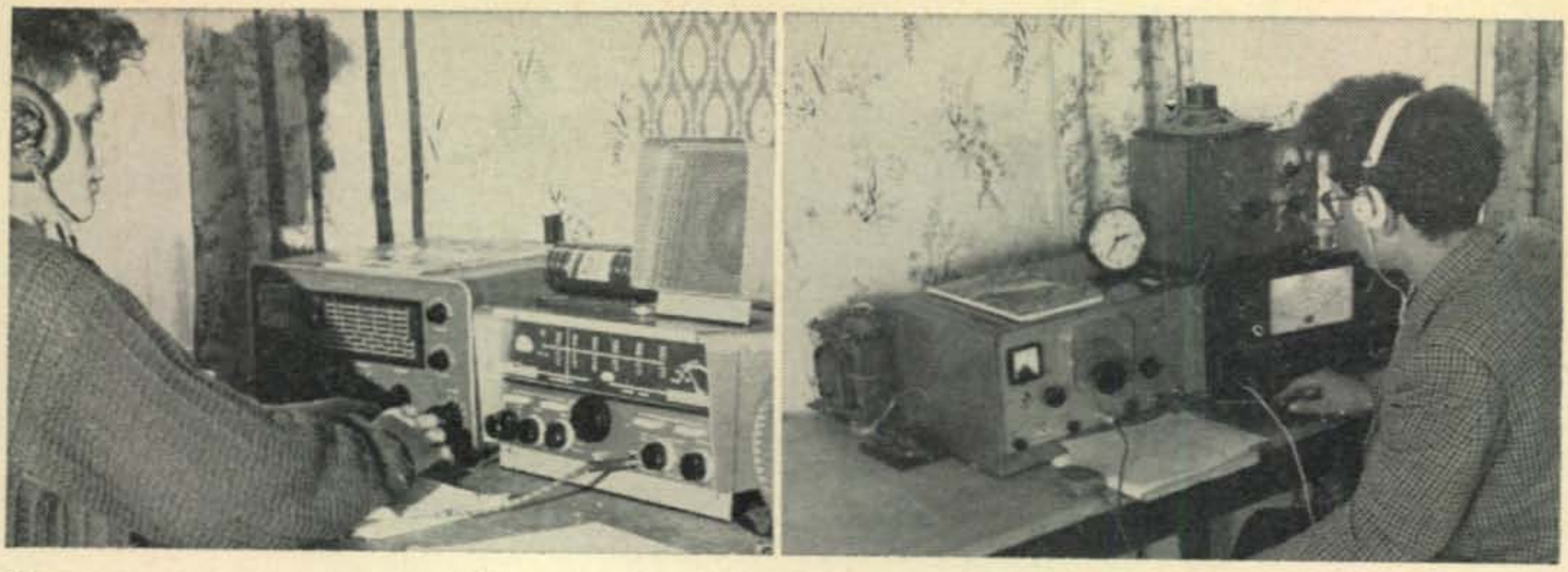
SSB DX HONOR ROLL

W2ZX	288	W6RKP	265	WA2IZS	240
W8PQQ	288	W3LMA	261	W1AOL	238
TI2HP	283	PZ1AX	261	PJ2AA	232
PY4TK	279	G8KS	261	W7DLR	232
K9EAB	279	G3FKM	261	K8NZD	232
K4TJL	279	W5IYU	260	WØCVU	229
W2VCZ	279	DL1IN	258	OZ7FG	228
W2BXA	278	MP4BBW	256	K4AJ	226
W8EAP	278	W3MAC	254	G2PL	225
WØQVZ	278	G3NUG	253	W4UWC	225
K8RTW	276	W6BAF	252	WA6EYP	222
W2TP	276	WØUUV	251	WØPGI	221
VQ4ERR	275	K1IXG	250	WA6HOH	219
K2MGE	272	G2BVN	249	W3VSU	217
W2FXN	272	W6WNE	248	W4RLS	210
W6UOU	270	W6PXH	247	DJ3CP	207
HB9TL	269	W8YBZ	246	W1ICV	205
WØQVZ	268	K6LGF	244	OH2NB	204
W4OPM	265	K6ZXW	243	W9SFR	203

ENDORSEMENTS

VE2BCK	100	ST2AR	100	VE2BCK	50
K1RTB	100	VE2BCK	75	UM8KAB	50
W4LRN	100	K9RNQ	75	K9RNQ	50
W1GOX	100	K1RTB	75	K1RTB	50

Chuck, XW8AU/K4GTZ, showing his rig to the ever popular Phan, XW8AL. Chuck reports that XW8DD and XW8AN are pirates operating on 15 and 20. The only licensed XW8s are AL, AU, AV andAP. Chuck mentions the conditions to the states have been very poor on 20 and he should be giving 40 a try about the time you read this.



The Cambridge University Wireless Society goes on an expedition every year around Easter time. This is G3MZM on the left operating the h.f. rig and G3RSE at the controls of the top-band rig during last year's trip to the Isle of Man where they operated as GD6UW. All bands and modes are used. *(Tnx G3PIT)*

KA2USF will be the League's call for this operation, same as last year. The station will be operational from 0001 GMT 3 July through 2400 5 July 1964. We are looking for any and all amateur radio stations and hope to work 3,000 in 72 hours! Hope the gang all over the world will help us attain that goal.

LA/P Jan Mayen: LA4WH/P is now active on s.s.b. with a HX-20. LA9PI/P is active on 14,025 c.w. *(Tnx NCDXC and VERON)*

SVØ Crete: SVØWGG on 14,105 kc s.s.b. is a new one on Crete. *(Tnx NCDXC)*

SVØ Rhodes: The most active stations on Rhodes are SVØs, WDD, WF, and WG. All are active on both c.w. and s.s.b. between 1300 and 1730 GMT. *(Tnx NEDXC)*

VK9 Christmas Island: Ron, VK9XI, has been very active weekends on 14,129 kc s.s.b. Most preferred time seems to be about 1500 GMT. *(Tnx VERON)*

VP2K St. Kitts: Ken, VP2KM, is again active on 14 mc s.s.b.; his favorite time is around 1300 GMT. *(Tnx VERON)*

VR6 Pitcairn: Tom, VR6TC, reports via W5OLG that there will soon be two additional hams on Pitcairn, one being his fiancee Betty.

ZB2 Gibraltar: Terry, G3NPZ, has activated ZB2AH on 14 mc s.s.b. *(Tnx VERON)*

ZD9 Gough Island: ZD9AM is active most Sundays on 14,130 kc s.s.b. between 1800 and 1900 GMT. *(Tnx VERON)*

ZL4 Auckland and Campbell Islands: In addition to John, ZL4JF, Bill, ZL4LY, is now active. Bill is a newcomer to ham radio and operates on 14,020 kc around 0830 GMT. *(Tnx VERON)*

ZM7 Tokelau: Wyn, ZL3DX, will DXpedition to Tokelau soon.

4W1 Yemen: HB9AET/4W is quite workable on 14 mc s.s.b. between 1000 and 1700 GMT. HB9YG/4W has also been active on 7 mc c.w. *(Tnx VERON)*

5T5 Mauretania: Alban, 5T5AD, has been active weekends on 14 mc s.s.b. He has a very good signal. He is usually between 14,250 and 14,270 kc from 1800 to 1830 GMT. *(Tnx LIDXA)*

6O6 Somali Republic: Bee, 6O6BW has been making this new prefix available on 14 mc s.s.b. but also copies c.w. *(Tnx LIDXA)*

7X2 Algeria: 7X2VR, 14,190 kc a.m.; 7X2VW, 14,110 kc s.s.b.; 7X2DD, 14,060 kc c.w. *(Tnx WGDXC)*

7Z2/8Z2 Neutral Zones: Angus, HZ2AMS, is now duly licensed as 7Z2AMS for the Kuwait-

ATTENTION

SOMETIME in April, twelve men, including Mr. Bjørn Staib, leader of the team, will leave a northern Canadian island in an attempt to reach the North Pole. Normally, this isn't too unusual these days except for the fact that this scientific expedition is attempting it by skis! Amateur radio will be used on the trek across the ice and amateurs the world over are asked to *please* keep their frequency clear. Transmitters used will be a five watt s.s.b. transceiver, a 10 watt transmitter, (c.w.) and a transistorized standby receiver. Operations will take place on 7,105; 7,045; 14,000; 14,115; 14,120 and 14,350 kc. The call used will be LI2C and at various times during the expedition it will be LI2C/2 /3 and /4. This is a Norwegian expedition, so it is expected that most of the communications will be directed to LA-stations. Use good judgement and do not QRM the frequency, P-l-e-a-s-e!

This impressive looking rig, in reality, is a DXpedition! Shown at the operating position is I1CWN and I1NU who operated as 9A1CWN and 9A1NU in San Marino. All modes were used and all bands from 160 meters to 2 meters. *(Tnx W2GT)*

Bob, KA2BC, uses this rig and a vertical to do a real fine job on 20 meter a.m. *(Tnx W2OKM)*

Saudi Arabia Neutral Zone (9K3) and as 8Z2AMS for the other Neutral Zone. Angus will operate from both spots periodically using his KWM-1. He has crystals for 14,000 kc and 14,100 kc for c.w. and many for phone. *(Tnx VERON)*

9K3 Neutral Zones: LU2XL/9K3 is now on the air. He is a W5 and will be there for two years. He has been using a 14,270 kc s.s.b. *(Tnx W2GT)*

9L1 Sierra Leone: Thanks to the NCDXC for the following from Tom, 9L1TL. "Many thanks for your chatty letter. I think the most interesting side-shoot of hamming is the many contacts one makes with people of all places and, because of this, I make it a point to answer each letter with a letter.

"Here in Sierra Leone we have about 12 hams, but less than half of this number are active. The climate plays havoc with gear and we have no corner shop. But, between us we try to keep someone on the air.

"We have recently formed the Radio Society of Sierra Leone which has helped enormously in bringing us together and helping us to assist each other with gear. Members active are myself on c.w. only working 7, 14, 21 mc; 9L1NH, who uses my gear when I don't use it; 9L1JR on 14 mc a.m. (he's practicing c.w. as he has done none for 12 years); 9L1JC, a.m. and c.w. I don't know his band average; and 9L1HX on s.s.b., 14 mc only at present.

"9L1RO is on s.s.b. but know no details as he is at Pepel and I have yet to meet him. As yet, he is the only ham here who is not a member of our Society but we have not yet heard from him on his intentions.

"We have only one ham who is a Sierra Leonean (all others European) and he is not active at present. Now that we are organized, we hope to bring more Sierra Leoneans into the circle.

"My personal regret is that I am not able to ragchew as so many chaps want 9L1 as you can understand. I try to counter this by answering all letters."

9X5 Rwanda: 9X5MH has been active weekends on the low end of the 20 meter c.w. band. He is a good operator and works contest style. QSL via DL1LC. *(Tnx VERON)*

These chaps are no doubt discussing the best way of removing HS from the "ban list." They are, left to right: Phil HS1P/W4LCY; Jonas, HS1SD ex-XU6Q/C6RSM; and John, HS1M/W4EAB. *(Tnx HS1P)*

160 Meter News

Karl, DL1VU, made a new country available to 160 meter buffs when he operated as 9A1VU in San Marino. First W was W1BB for country number 75 for Stu.

All the 160 meter boys will be saddened by the passing of G6GM, Harry Merriman. Harry is renowned for many firsts in 160 meter DXing including the first G/ZL QSO with ZL3AH in 1953.

The "Second Op," designed by W9IOP is a two-sided circular slide rule measuring 10½" which will produce all sorts of good DX information at the flick of the wrist. One buck buys it from Electro-Voice, Buchanan, Mich.

Some really fine DX was worked on 160 this season including VP8GO, 9A1VU, HB9EO, GI6TK, OH3NY, OHØNI, OK3BA, HR3HH, 6YAXG, 5B4TL, 5N2JKO, ZS2FM, K1DSH/KG6 Marcus, K1KSH/KG6 Guam, and VK9GL.

It's not too early to start thinking about a 160 meter antenna for next season.

The Northern California DX Club has recently elected a new slate of officers. They are President, K6OHJ; v.p. W6CBE; Secretary-Treasurer, KL7DTB/6 and Directors W6SC and W4ERS. Congratulations to their *Bulletin* editor Joe, WA6TGY, on the arrival of his first jr. op.

ZS SSB Convention

The first s.s.b. convention of South Africa will be held on May 23, 1964 at the home of ZS6IP.

[*Continued on page 94*]

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

April	11-12	*CQ* WW DX SSB
April	11-12	SP DX C.W.
April	18-19	Helvetia 22
April	25-26	PACC C.W. & Phone
April	25-27	Missouri Party
May	2-3	*CQ* Spring VHF
May	3-4	Bermuda Party
May	9-11	Georgia Party
May	9-10	USSR DX C.W.
May	9-10	OZ CCA C.W.
May	16-17	OZ CCA Phone
May	17-18	Bermuda Party
May	23-25	QRP Party
May 29-June 1		CHC/HTH/FHC Party
June	6-7	National Field Day
June	6-7	ARRL VHF Party
June	27-28	ARRL Field Day

CQ WW SSB

Starts: 1200 GMT Saturday, April 11
Ends: 2400 GMT Sunday, April 12

Rules are along the same lines as our WW DX Contest in October, with one major exception; your multiplier is determined by the number of *prefixes* worked, not the Zone/Countries.

Here are a few of the major items to remember.

1. Contacts with stations on *other* continents, 3 points; the *same* continent, 1 point. You can work stations in your own country for prefix credit but the contact will have no QSO point value.

2. Credit for a given prefix may be taken only once, and *not* once on each band.

3. The contest period has been extended to 36 hours, but the rest period has been retained and modified.

4. There are two classifications, single operator and multi-operator. Single operator stations can compete for single band or all band awards. Multi-operator stations however will be judged on all band operation only. Multi-transmitter operation is not permitted.

5. It is suggested that a separate check list of prefixes (as they are worked) be kept in addition to your log. This list should be submitted along with your log.

*14 Sherwood Road, Stamford, Conn. 06905.

Better check back to the February issue for a detailed rundown of the rules.

It is rather late but log forms are available from *CQ*. A large size self-addressed envelope with sufficient postage of course. In a pinch you can use the regular WW DX contest log forms, with slight modification.

Deadline for mailing your log is April 30th, and they go to: *CQ* WW SSB Contest, 300 West 43rd Street, New York 36, N.Y.

SP DX C.W.

Starts: 1500 GMT Saturday, April 11
Ends: 2200 GMT Sunday, April 12

The rules were a bit late getting to us this year, and the selection of dates leaves much to be desired, but at least they are in time for local distribution.

Due to inactivity in the phone section, this year's contest is a c.w. only affair. It's the world working the Polish amateurs.

1. Use all bands, 3.5 through 28 mc.

2. The serial number will consist of the usual six figures, RST report plus a progressive QSO number starting with 001.

3. Each completed contact counts 1 point and the same station can be contacted once on each band for contact and multiplier credit.

4. Your multiplier is determined by the number of SP call areas worked on each band, SP1-SP9, a possible maximum of 45.

5. The final score therefore will be the QSO points from all bands multiplied by the sum of the multiplier from all bands.

6. There are two station classifications; single operator and multi-operator. Multi-transmitter operation is *not* permitted.

7. Awards will be made to the highest scoring station in each classification in each country. In countries where the participation is high, awards will be issued for 2nd and 3rd place.

8. Use a separate log sheet for each band and sign the usual declaration that the contest rules as well as the conditions of your license have been maintained.

Your logs go to the Polski Zwiazek Krotkofalowcow, Contest Committee, P.O. Box 320, Warsaw 1, Poland. They must be in the hands of the committee no later than May 31st.

A DX-pedition will be made by HB9KC/p to the Jungfrau-Joch. (11,700 ft.) This will be in the rare Canton of Valais/VS. (This year HB stations will use the /p prefix instead of the former HB1 for portable operation.) Here is a view of the Sphinx Observatory from which operations of HB9KC/p will take place.

Helvetia 22

Starts: 1500 GMT Saturday, April 18
Ends: 1700 GMT Sunday, April 19

With a date all their own and activity promised from all 22 Cantons, this year's contest should be a success. Providing of course that the HB boys get a break in the conditions. They haven't been too good the past two years.

This might be the year you work that elusive rare Canton for the colorful H 22 certificate.

Complete rules and a list of the 22 Cantons appeared in last month's CALENDAR, page 63.

Your logs must be postmarked no later than 30 days after the end of the contest. They go to: USKA Traffic Manager, HB9ZY, Meggen LU, Switzerland. Applications for the H 22 Certificate, however, go to HB9RK.

PACC

Starts: 1200 GMT Saturday, April 25
Ends: 1800 GMT Sunday, April 26

This year both c.w. and phone contest have been scheduled on the same week-end, although they are two separate activities. There will be awards to contest winners as well as credits for the PACC Award, for working 100 different PA stations. The committee promises to have at least 100 different stations active.

Rules as well as a list of the 11 Provinces used in the multiplier appeared in last month's CALENDAR, also on page 63.

Include a summary sheet with your log and also a signed statement that all rules and regulations have been observed.

Logs must be postmarked no later than June 15th and go to: VERON, Contest Manager PAØVB, Keizerstraat 54, Gouda, Netherlands.

Missouri Party

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

This is the first Missouri QSO Party organized by the Northwest St. Louis ARC.

Exchange: *Missouri stations*—QSO number, RS/RST report and county; *All Others*—QSO number, RS/RST report and State, Province or Country.

Scoring: *Missouri stations*—1 point per contact and multiply total by the number of states, provinces and countries worked; *All Others*—2 points for each Missouri station worked and multiply the total by the number of different Missouri counties worked.

Awards: To the 5 highest scoring Missouri stations. And to the highest scorer in each state, province and foreign country. (5 QSO minimum) Awards will also go to the 5 highest club scores in the world.

There is no time limit or power restrictions. The same station can be worked on more than one band, phone or c.w., for additional point credit.

Suggested frequencies: **C.W.**—3550; 7050; 14,050; 21,050 & 28,050. **Phone:** 3850; 7250; 14,250; 21,350 and 28,650. V.h.f.ers are also welcome.

Logs must be postmarked no later than May 30 and should be sent to: Rich Zysk, KØGSV, 2528A West Sullivan Ave., St. Louis, Missouri 63107.

CQ Spring VHF

Starts: 1 P.M. Local Time, Saturday, May 2
Ends: 1 P.M. Local Time, Sunday, May 3

See page 40 for rules and other details.

Georgia Party

Starts: 2300 GMT Saturday, May 9
Ends: 0500 GMT Monday, May 11

This is the third annual Georgia QSO Party sponsored by the Columbus ARC. A better choice of dates would have been desirable.

Exchange: *Georgia stations*—QSO number, RS/RST report and county; *All Others*—QSO number, RS/RST report and State, Province or Country.

Scoring: *Georgia stations*—2 points for each completed contact and multiply total by number of states, provinces and countries worked. (Ga. to Ga. contacts are permitted for QSO points and Georgia multiplier.); *All Others*—2 points per contact and total multiplied by the number of different Georgia counties worked.

Awards: Certificates to the highest scoring station in each state, province, country and Georgia county. 2nd and 3rd place awards will be issued

if the number of entries warrant. There are also awards for Novice and Technician in each district.

There is no time limit or power restrictions. The same station can be worked once per band, c.w. to phone is permitted, but crossband contacts are not allowed.

Suggested frequencies: **C.W.**—1805; 3590; 7060; 14,060; 21,060. **A.M.**—3995; 7260; 14,260; 21,310. **S.S.B.**—3975, 7205, 14,290, 21,410. **Novices** should try 3735, 7175 and 21,110.

Logs should show dates, times, station worked, exchanges sent and received, frequency, type of emission, and a signed declaration that all contest rules have been observed.

Your log should be postmarked no later than June 15 and go to: CARC c/o Clifford R. Watson, K4ADU, 5224 Morris Avenue, Columbus, Georgia 31904.

OZ CCA

C.W.–May 9-10, **Phone**–May 16-17
Starts: 1200 GMT Saturday
Ends: 2400 GMT Sunday

This is the 13th OZ World Wide contest. Operation is not confined to working OZ stations only but amateur stations in *all* countries. Contacts with OX, OY and OZ stations however are worth double point value. C.w. and Phone are two separate contests, cross-band contacts are not permitted and participation is limited to single operator stations.

1. Use all bands 3.5 through 28 mc.

2. Serial numbers will be of the usual five and six figure variety, RS or RST report plus a progressive 3 digit QSO number starting with 001.

3. Each completed contact is good for 3 points, however contacts with OX, OY and OZ stations are worth 6 points.

4. The multiplier is determined by the number of countries (ARRL DXCC list) worked on each band. Each call area in the following countries, W/K, VE/VO, PY, LU, VK and ZL will also be considered a multiplier.

5. The final score therefore will be the total QSO points from all bands multiplied by the sum of the multiplier on each band.

6. Certificates will be awarded to the highest scorer in each country and call areas as indicated in rule 4 above.

7. Your log should show in this order: 1. Date and time in GMT; 2. Station worked; 3. Country/country district; 4. Progressive multiplier for each band. 5. Serial number sent; 6. Received; and 7. QSO points.

8. Include a summary sheet showing your scoring, name and address in BLOCK LETTERS and sign the usual declaration that all rules and regulations have been observed.

Mail your logs no later than June 15th to: The E.D.R. Contest, Contest Committee, P.O. Box 335, Aalborg, Denmark.

USSR C.W. DX

Starts: 2100 GMT Saturday, May 9
Ends: 2100 GMT Sunday, May 10

Once again the USSR's Federation of Radio Sport is sponsoring its annual Radio Day DX contest. This year they moved the date to a week later, posing a serious conflict with the OZ-CCA contest.

Rules, awards and etc. are the same as in previous years.

1. This is a c.w. contest *only*, 3.5 through 28 mc.

2. The usual six figure serial number, RST report plus a three digit QSO number starting with 001. (USSR stations will send the number of their Oblast instead of the QSO number. Therefore it will always be the same for each contact).

3. Each contact counts *one* point.

4. The same station can be worked only once on each band.

5. The multiplier is determined by the number of different countries worked on *all* bands. *Not* the sum total from each band.

6. Therefore your final score will be the total number of contact points multiplied by the number of different countries worked.

7. Only 12 hours of continuous operating time out of the 24 hour contest period will be judged in the scoring. Indicate this 12 hour period in your log.

Awards will be made on the basis of all band operation. Awards will be made to both single and multi-operator stations in each country as follows: 1ST PLACE—A 1st degree certificate and a contest badge; 2ND & 3RD PLACE—A 2nd degree certificate and a contest badge. 4TH & 5TH PLACE—A 3rd degree certificate and a contest badge.

Each operator of a multi-operator station will also receive a badge.

Contacts on contest logs can be credited for the following:

1. W 100 U, for working 100 different Soviet stations;

2. R 6 K, for contacting all six continents;

3. R 150 C, for working 150 different countries.

Your logs should be mailed no later than May 30 to: The U.S.S.R. Central Radio Club, Att: Chief Judging Board, P.O. Box 88, Moscow, USSR.

CHC/HTH/FHC Party

Starts: 2300 GMT Friday, May 29
Ends: 0600 GMT Monday, June 1

This year's party has also included the YL International SSB'ers. There will be certificates galore as well as special Trophies for the "Top Banana" in certain categories.

Rules will be outlined in next month's CALEN-

[*Continued on page 96*]

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for April

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

How To Use These Charts

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

3—With the forecast rating noted above, start with the numbers in parentheses at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating higher than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meanings: A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4—This month's DX Propagation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 1000 watts d.s.b. into a dipole antenna a quarter-wave above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

5—Local Standard Time for these predictions is based on the 24-hour system.

6—The Eastern USA chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9 and ø areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid through May 31, 1964, and are prepared from basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

DURING the daylight hours of April, 20 meters is expected to be the best band for DX propagation. DX conditions on 20 are expected to peak shortly after sunrise and again during the late afternoon hours, with fairly good openings predicted to almost all areas of the world. Few 10 or 15 meter DX openings are forecast for April, but some may occur to southern or tropical areas during the hours of daylight.

During the period from sunset to sunrise, 40 meters is expected to continue to be the best band for DX propagation. Fairly good openings to many areas of the world are also predicted for 80 meters during the hours of darkness, and some 160 meter DX openings may also occur during this period.

Ionospheric absorption continues to increase in the northern hemisphere during April, as the sun rises higher in the northern sky. This may result in somewhat weaker signal levels during daytime openings on all bands. Atmospheric noise (static) also increases during April, as thunderstorms become more numerous. This should result in somewhat higher noise levels, especially on 40, 80 and 160 meters.

VHF Openings

Meteor-type v.h.f. ionospheric openings are most likely to occur during the *Lyrids* meteor shower which should take place during April 19-23.

Sporadic-*E* propagation begins to increase during April, and this is expected to result in numerous short-skip openings, up to distances of about 1,300 miles, on 10 and 6 meters.

V.h.f. auroral-type openings are also likely to occur during periods of ionospheric storminess. Check the "Last Minute Forecast" at the beginning of this column for the dates during April which are expected to be "below normal" or "disturbed."

Sunspot Cycle

The Zurich Solar Observatory reports a monthly smoothed sunspot number of 15 for January, 1964. A smoothed sunspot number of 25 is predicted for April, 1964 as the solar cycle continues to decline slowly.

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

New WWV Propagation Forecasts

Propagation forecasts, previously broadcast by WWV at 19½ and 49½ minutes after each hour, are now broadcast every five minutes. The forecasts are given following the station announcement at 4½ minutes past the hour, and are repeated every five minutes thereafter. Given in Morse Code, the forecasts continue to consist of the letter N, W, or U followed by a number. The letter designations apply to propagation conditions as of the time of broadcast, and have the following meaning:

W—Ionospheric disturbance in progress or expected;
U—Unstable conditions, but communication possible with high power;
N—Conditions normal, no warning necessary.

The number designations apply to expected propagation conditions during the subsequent 12 hours and have the following meaning:

1—Impossible; 2—very poor; 3—poor; 4—fair-to-poor; 5—fair; 6—fair-to-good; 7—good; 8—very good; 9—excellent.

The WWV propagation forecasts are intended primarily for trans-Atlantic high frequency circuits. They are broadcast from 6 transmitters located near Beltsville, Maryland on the following frequencies and with the effective radiated powers (e.r.p.) shown in parenthesis: 2.5 mc (1 kw); 5.0 mc (8 kw); 10 mc (9 kw); 15 mc (9 kw); 20 mc (1 kw) and 25 mc (0.1 kw).

Trans-Pacific propagation forecasts continue to be broadcast on WWVH, at Puunene, Hawaii at 9 and 39 minutes past each hour on 5, 10 and 15 mc.

73, George, W3ASK

CQ DX Propagation Charts

APRIL AND MAY, 1964

Time Zone: EST (24-hour Time)

EASTERN USA To:

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

Time Zone: CST & MST (24-hour Time)

CENTRAL USA To:

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

[*Continued on page 96*]

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

BUILDING a communication satellite is a highly complex and difficult task when undertaken professionally, it is an even more difficult task when undertaken as an amateur radio project. Despite major technical difficulties, however, the OSCAR III radio amateur communication satellite is progressing slowly towards completion.

OSCAR III will be a 2-meter repeater satellite. The package will receive a 50 kc band centered at 144.10 mc and will retransmit this band centered on 145.9 mc, with a p.e.p. output of 1 watt. A 25 milliwatt beacon transmitter on 145.85 mc will be included in the satellite. This transmitter will send out, in Morse Code, the letters HI as was done with OSCARS I and II. In addition, the beacon transmitter will have two other channels which will be used to telemeter temperature data from the satellite to ground. OSCAR III will be powered by batteries, and will use separate antennas for beacon, receiver and transmitter. The satellite will measure about 6½" × 12" × 17", and will weigh about 25 pounds.

Late Oscar III News

During the past three months, the linear amplifier, which had presented major technical problems, has been redesigned by Will Alexander, WA6RDZ. The previous problems have been solved, and recent two-tone tests at 144.0 mc indicate the OSCAR III linear amplifier has a power output of 1 watt p.e.p., with intermodulation distortion products better than —27 decibels below peak output. The linear amplifier is ready to go! (See photo).

Jim Ouimet, K6OPO and Herb Vanderbeek are also making excellent progress in completing the receiver portion of OSCAR III. The front-end of the second prototype model now meets specifications, with both bandwidth and sensitivity adequate to do the job. There still remains, however, some instability in the i.f. section of the receiver and both Jim and Herb are busy trying to eliminate it. The keyer and telemetry sections of the OSCAR III satellite are in their final stages of construction, and no problems are expected.

The major portion of OSCAR III's package will be taken up by the large "one-shot" space approved battery which will power the repeater satellite for a continuous period of about three weeks. Lance Ginner, K6GSJ is in charge of building the battery assembly. He is also responsible for designing the three antennas that will be used on the satellite. Marvin Wahl, K9CHU/6 is assisting Lance with antenna pattern measurements.

Oscar III Launch Date

At the present rate of progress, it is planned to ground-check the entire satellite system during March or April. Some problems are expected to develop when the receiver and transmitter are "married" together in the package. Assuming that any problems that may develop will lend themselves to rapid solution, a late summer or early fall launch date seems very possible.

Next month's column will discuss the OSCAR III communication network which is now being developed on a world-wide basis. In the near future, as launch time approaches, this column will also discuss in detail how to use the OSCAR III satellite for two-way 2-meter QSOs, and how to interpret the telemetry data that will be sent back to earth by the amateur radio satellite.

Project Oscar Reorganized

Now that the OSCAR III project is entering its final phase, Project OSCAR, Inc. has reorganized

OSCAR III linear amplifier being tested at Project OSCAR Headquarters. The linear amplifier was measured to have a p.e.p. output of 1 watt, and is ready to go. *(Photo courtesy WA6RDZ)*

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

Transmitting Satellites

Freq. (mc)	*Name*	*Date Launched*	*Inclination* (Degrees)	*Period* (Minutes)	*Modulation*
54	1964-49C	Dec. 5, 1963	90	107	C.w. tone
150	1963-49B	Dec. 5, 1963	90	107	C.w. beacon & continuous telemetry.
162	1964-49C	Dec. 5, 1963	90	107	C.w. tone.
136.020	ECHO 2	Jan. 25, 1964	86	109	C.w. beacon & continuous telemetry.
136.140	RELAY 2	Jan. 21, 1964	46	195	C.w. beacon & command telemetry.
136.170	ECHO 2	Jan. 25, 1964	86	109	C.w. beacon & continuous telemetry.
136.233	TIROS-8	Dec. 21, 1963	58	99	C.w. beacon & command telemetry.
136.319	1964-1B	Jan. 11, 1964	70	103	C.w. beacon & continuous telemetry.
136.620	RELAY 2	Jan. 21, 1964	46	195	C.w. beacon & command telemetry.
136.621	EXPLORER 19	Dec. 19, 1963	79	116	C.w. beacon & command telemetry.
136.651	1963-38C	Sep. 28, 1963	90	107	C.w. beacon & continuous telemetry.
136.803	1964-1C	Jan. 11, 1964	70	103	C.w. beacon & continuous telemetry.
136.888	1964-1D	Jan. 11, 1964	70	103	C.w. beacon & continuous telemetry.
136.922	TIROS-8	Dec. 21, 1963	58	99	C.w. beacon & command telemetry.
136.994	SATURN 5	Jan. 29, 1964	31	95	C.w. tone
324	1963-49C	Dec. 5, 1963	90	107	C.w. tone
400	1963-49B	Dec. 5, 1963	90	107	C.w. beacon & continuous telemetry.
648	1963-49C	Dec. 5, 1963	90	107	C.w. tone

itself to better handle the situation.

On January 13, the following radio amateurs were elected to the new Board of Directors of the Project Oscar, Inc.:

John Sherman, W6KAS, *Chairman*
M. C. Towns, Jr., K6LFH, *Vice-Chairman*
H. R. McClain, K6SPK, *Secretary*
Stan Benson, K6CBK
O. H. Brown, W6HB
Finley Carter, K6GT
W. W. Eitel, W6UF
H. Engwicht, W6HC
H. Gabrielson, W6HEK
Ed Hilton, W6VKP
William Orr, W6SAI
H. Shepherd, Jr., W6QJW

The new Board of Directors met immediately following the membership meeting and elected the following Officers of the Corporation:

William Orr, W6SAI, *President*
Ed Hilton, W6VKP, *Vice-President*
H. R. McClain, K6SPK, *Secretary*
B. Barrick, W6OON, *Treasurer*

The primary purpose of Project Oscar, Inc. at this time is to place in orbit at the earliest moment the Oscar III repeater. Members will be called upon to do their utmost to make this plan a reality. The Officers will exert all possible effort to ensure that the goal is attained!

Transmitting Satellites

There were quite a large number of satellites launched during the first two months of 1964. The table above is a list of those satellites launched by the United States during this period, and which are expected to be transmitting when this appears in print. See February 1964's column for an earlier listing of all satellites transmitting signals as of December 31, 1963.

Space News Broadcasts

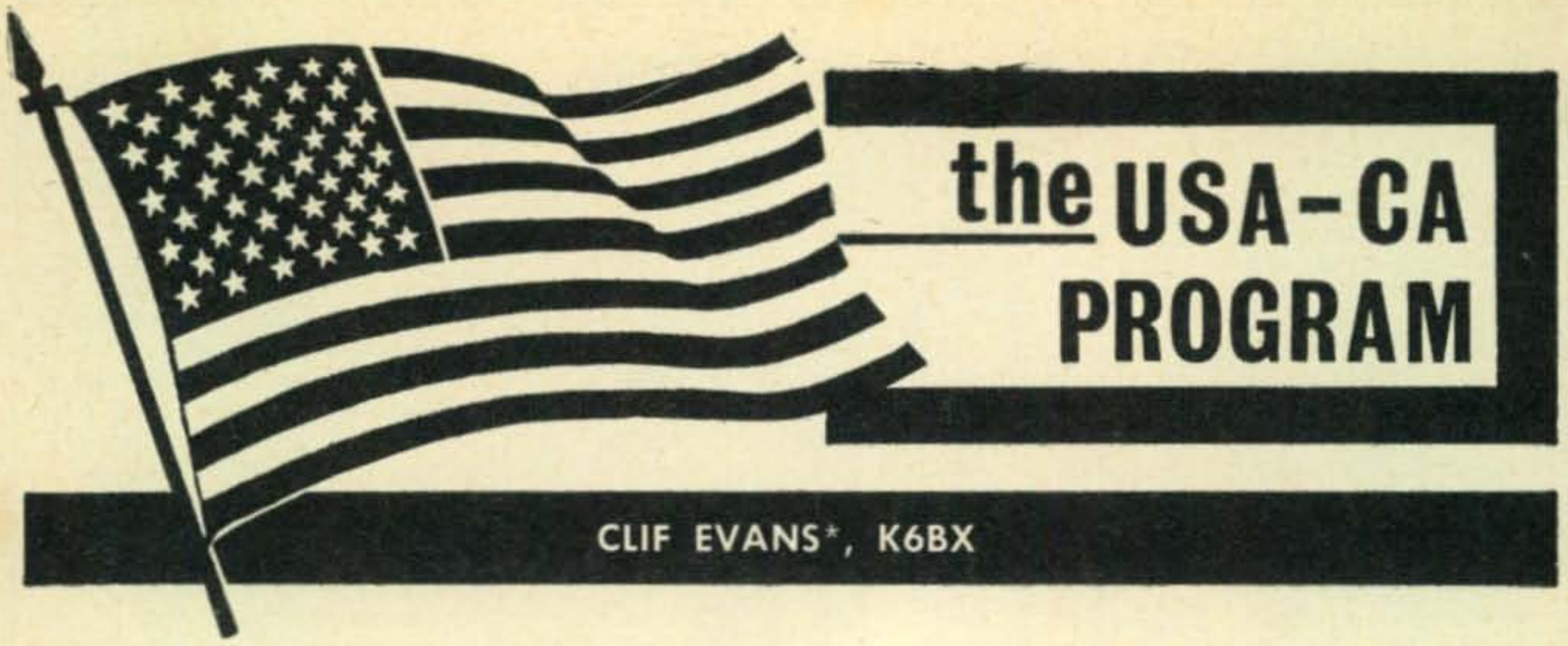
The Voice Of America, in conjunction with the U.S. National Academy of Sciences, transmits a special series of space news broadcasts. These broadcasts, heard on shortwave six days a week (Tuesday through Sunday) from 0330 to 0335 GMT, contain the latest information (including orbit data and radio frequencies) on new satellite launchings and up-to-the-minute revised statistics on satellites already in orbit.

The broadcasts are prepared as part of America's contribution to the international efforts of the Committee on Space Research Council of the International Scientific Union (COSPAR). While intended mainly for tracking stations and scientific organizations in South America, the broadcasts should be received well in many other areas of the world and should prove to be of interest to those desiring latest launching and orbital information.

The programs are in the English language and are called SPACEWARN broadcasts. The following schedule for these broadcasts will be in effect through May 2, 1964: Greenville, 6030 kc; Greenville, 9570 kc; Bethany, 9650 kc; Bethany, 11790 kc; Greenville, 11890 kc.

73, George, W3ASK

"Poor dear. He's spent eight years building that ultra-sub-miniature transmitter."



the USA-CA PROGRAM

CLIF EVANS*, K6BX

TWELVE USA-CA awards or Gold Seals were issued during January. Clyde, WA9AJF, and Earl, K9UTI, came in for the USA-CA-1000 level Gold Seals and Earl went on to win his USA-CA-1500 Gold Seal. Nine others as shown in USA-CA Honor Roll, bagged their USA-CA-500 awards for contacting that many U.S. counties. Of the above, all were mixed except W3YRN, WA6ECF and W4LYV for all c.w.; WA4CLR for all 7 mc, and K9UTI's USA-CA-1000 for all 7 mc 2 way s.s.b.

USA-CA HONOR ROLL

1500

K9UTI 7

1000

WA9AJF 22
K9UTI 23

500

K9IHU 325	WA4CLR 328	W4LYV 331
W3RYN 326	WA6ECF 329	W9IXF 332
W5ONK 327	W9NZS 330	KØDEW 334

Oregon Joins USA-CA Program

The Oregon Chapter of the QRP Amateur Radio Club announces sponsorship of the Oregon Counties Award adding that state to the USA-CA Awards Program. To get the basic award Oregon stations contact 25 Oregon counties; W/VE stations contact 18 and DX stations contact 12. Endorsements thereafter begin with 30 for Oregon stations; 25 for all others and with 36 for all counties. Endorsements given for AOMB/M (all one mode/band or mixed). Send GCR list and $1 or 10 IRC to Custodian, Robert A. Peschka, K7QXG, 13535 S.W. Rita Drive Beaverton, Oregon 97005. See picture of award elsewhere in column. See November, 1963 USA-CA column for listing of all other awards sponsored by the QRP Amateur Radio Club now with over 2,000 members.

USA-CA Is Here To Stay

Earl, K9UTI, in sending along his application for USA-CA-1500 penned these words; (Earl is President of Illinois CHC Chapter No. 17)

". . . can't begin to tell you how much this 53-year-old-boy enjoys the USA-CA Program . . . for sure, USA-CA *is here to stay*. You have certainly centered world-wide interest on the USA . . . it is fantastic hearing folks even without request, naming their counties. It would be impossible to even begin to estimate the honest to goodness good will the USA-CA is generating at home and abroad. We, in our small way, are contributing what we can in support of the USA-CA Program. Please notify readers that an all county hunters net has been formed to operate seven days a week on or near 7219 kc with K9UTI, K8CIR and K9EAB acting as Net Control. To date 43 states and Canada have checked into this net and over 1,000 counties already have been represented. Hope I'm not letting the cat out of the bag reporting plans for the Presidential Award focused on working Presidential counties and states. . . ." NOTE: Suggest folks who plan county expeditions either mobile, portable or on Field Days and during contests, notify one or the other of above.

Rarest of The Rare

We have received many requests from those who would like to take trips and operate from real rare counties in many states. As a result of this developing expedition interest, we will start compiling a "Rare County" list for each state. Likewise, we'd like to compile data on all counties in which there are no resident hams and/or those with only one or two actives. An interesting aspect is that several have written they are soon to retire and intend to locate in

Above is the new Worked Oregon Counties Award sponsored by the Oregon Chapter of the QRP Amateur Radio Club. See story in column. The award has gold border and background with brown trees and black lettering. Oregon is the 41st state to sponsor a worked all counties award.

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

the rarest county they can identify. We request all hands to pass information along to us which will help in above stated compilation.

USA-CA Supports All U.S. Awards Programs

Extracts from a letter from Howard, W9NZS, received with his application for USA-CA-500 tells its own story: "The hunt for counties was great fun, but more than that I have made hundreds of new friends with similar interests. Needless to say I know a mighty lot more about these United States than before I entered the USA-CA Program . . . it is truly a good will program. At first when I read where you said the USA-CA supports all U.S. and Canada awards, I didn't realize the import. Now it is obvious. Some of the calls I have listed are pre-war (W9 in Iowa, W8 in New York, etc.) but the majority are from the last five years. In the process of working for new counties, I now find I have qualified for enough other awards with ample credits to join CHC and application will be along soon."

For a copy of the USA-CA Program Rules, send s.a.s.e. to K6BX, Box 385, Bonita, California.

Amateur Radio Suffers From Poor Public Relations

Through past years Amateur Radio has miserably failed to create a proper public service image before the public and civic and political leaders.

In the main, hamdom journals are directed toward limited 'internal' consumption. A newsworthy hamdom story breaking in a newspaper is such a rarity the public is prone to view such as an exception to the rule.

Possibly not one citizen in fifty has any valid conception of the *who, why, what* and *how* role of hamdom public services. Far too many have built-in image of Amateur Radio as the kid down the street or some nut tinkering with a hobby toy and too often guilty of causing obnoxious TVI to neighbors. This unwanted hamdom image unfortunately is shared by far too many civic and political leaders who's contact with amateurs has been limited to TVI and unsightly antenna installation complaints.

This is the new Florida Orange Award sponsored by the Florida VHF CHC Chapter No. 25 for working members year (or thereafter) they became CHCers. Work Associate members after October 10, 1963. Florida stations work 12; rest of U.S. except KH and KL work 6; all others work 3. AOMB/M endorsements. Endorsements for working members in steps 12/6/3 as above. Available to s.w.l.s. Send GCR list and 50¢ or 5 IRC to Custodian, Catherine White, K4TBG, P.O. Box 528, Lake Worth, Florida.

Above photo shows presentation of honorary Mayer Memorial Awards to the sons and widow of the late E. W. Mayer, KP4KD, made by the Puerto Rico CHC Chapter No. 20. From left to right; Juan Castanera, KP4CC, outgoing Chapter President; Roger Burt, KP4AOO, new President; José Toro, KP4RK, Secretary and Awards Custodian; George Mayer, P4BJ; Mrs. Eppie Mayer, and Robert Mayer, K4PUJ/KP4. To get the Mayer Memorial Award, work 5 members of Chapter 20. Special endorsement if you have ever worked KP4KD. AOMB/M endorsements. Send GCR list, $1 or 10 IRC to CHC Chapter 20, P.O. Box 10525, Caparra Heights, Puerto Rico.

We repeatedly have stated that for an amateur radio club there is no more versatile public relations instrument than a well-conceived awards program designed to promote one's local organization (amateur radio), one's community, city, county and state before the world. Such awards programs open PR doors at all civic and political levels, especially when attuned to state QSO Parties, Centennials, historical events and affairs widely publicized to the general public. It is a public service to serve the public interest of the political bodies of our society. Amateur Radio's image and stature are enhanced when our political leaders include amateur radio's participation in significant public affairs on a continuing basis.

The USA-CA Program has been instrumental in helping in the design of many awards programs aimed to achieve better hamdom public relations. One has but to read back through the issues of this column to realize the number of amateur radio awards sponsored by clubs and supported at state governor level.

Amateur Radio achievement awards or certificates basically are PR instruments. The value of any award is *not* that assessed by a sponsor, nor does value lie in the difficulty in the achievement of an award. On the basis of PR, an award has value in whatever degree it has mass acceptance and participation which has end effect of directing significant good will toward the purposes for which the award was sponsored. To this end, awards should not have built-in ridiculous features which tend to irritate a majority of those who do or otherwise would participate in the program.

For several years this writer, as publisher of *The Directory of Certificates and Awards,* has crusaded to raise the standards of amateur radio awards in a manner that better PR advantages accrue to both the sponsor and hamdom's interests.

Many states still have no significant awards programs. A few awards programs, from standpoint of PR, still retain outworn features. The following chart of awards listed in the Directory have been broken down by general category of area of PR encompassed. With few exceptions the all county awards form basis for the highest level of planned PR especially in cases where such programs sponsor or support a state's QSO Party and other public events. As noted, amateurs in some states are fully cognizant of the PR usage of awards programs; in others, amateur radio has little, if any, PR representation.

State[1]	*Award Level—By . . .*				*State Total*
	State	*City/ County*	*Area*	*Club Members*	
Alabama	..	2	..	..	3
Alaska	..	..	1	1	3
Arizona	..	1	..	..	2
Arkansas[2]	1	..	..	..	1
California[3]	5	8	7	20	42
Colorado	1	2	..	1	5
Connecticut	..	..	..	..	1
Delaware	..	..	..	..	1
Florida[3]	1	4	..	13	20
Georgia	..	..	..	6	7
Hawaii[3]	1	2	..	1	6
Idaho[2]	1	..	..	..	1
Illinois	..	5	..	12	18
Indiana	..	3	1	4	9
Iowa[2]	..	..	..	..	0
Kansas	6	3	..	5	15
Kentucky	1	2	..	1	5
Louisiana	..	3	1	1	6
Maine[2, 4]	1	..	..	1	2
Maryland[5]	..	1	..	6	8
Massachusetts	..	2	..	9	12
Michigan	..	1	2	7	11
Minnesota	..	..	..	1	2
Mississippi	..	..	..	..	1
Missouri	..	2	1	4	8
Montana	1	1	..	1	4
Nebraska	..	1	..	2	4
Nevada[2]	2	..	..	..	2
New Hampshire	..	1	..	..	2
New Jersey	..	1	..	7	9
New Mexico	..	3	..	..	4
New York	..	6	1	6	14
North Carolina	..	..	..	1	2
North Dakota	..	..	..	..	1
Ohio	1	5	1	34	44
Oklahoma[2]	..	..	..	4	4
Oregon	..	1	..	1	3
Pennsylvania	..	7	1	20	29
Rhode Island	..	..	..	..	1
South Carolina	1	1	..	3	6
South Dakota	..	..	..	..	1
Tennessee	..	3	..	2	6
Texas	..	8	1	13	23
Utah[2]	..	..	..	..	0
Vermont	..	..	1	..	2
Virginia	1	..	2	..	4
Washington	..	3	..	10	14
West Virginia[2]	..	..	..	..	0
Wisconsin	1	..	..	..	2
Wyoming[2]	..	..	..	..	0
FINAL TOTAL	25	82	20	197	370

[1]Awards sponsored by publications are not included, and those listed are primarily sponsored by clubs.

[2]No Worked All County Program exists.

[3]Two (2) Worked All County award programs are in effect; all others, one (1) with the exception of Ohio which has three (3).

[4]Included only in the Worked All New England counties Award.

[5]Includes Washington, D. C.

Pictured here is the William S. Haddon Memorial Award sponsored by the CHC/FHC Chapter 16 for working 25 or more members of the Chapter. Members are both Certificate Hunters and Flying Hams. Contacts count after July 16, 1963. Past contact with Bill Haddon, KH6DKA, recently killed in airplane crash, counts two credits. Bill was first President of the Flying Hams' Club now with over 800 members world-wide. The award format is patterned after Bill's famous QSL card ond the border lists the over 200 awards he had earned. Members are: W1DBN/VO2; W1EQ/4; WA1AKE; WA2EIY, GSO, PMW, PWI, SAZ; WB2FTQ; K3BNS, UIG; W3MGP; K4ICA, PXY, RHL, VQP; W4BHG, FNQ, GYP, WHE, WHN; K5LXA, SGK; W5LEF, NXF; K6BX, CJF; W6DIX, EDU, ETR, KG, USG; WA6AJF, ATY, KNE, MIE, MWG; K7KSF, TET, UGA; W7NKK, ZOH; W8WUO; W9JQE, HPS, UMJ; WØCUC; DL9CT, CTA; F9IL; G3PEU; G16TK; HA5AM; HM1AP; HM9AP; KH6BIH, KH6DKA; LU8CW; OH3NM; OH9NC; PJ2AA; SM5BPJ; ST2AR; TG9AD; TG9AZ; TG9BM; VK7SM; XE1ZE; ZS6ATA. To get the award, send GCR and $1 to Custodian, Pete Billon, WA6MWG, 4040 Via Opata, Palos Verdes Estates, Calif. Pete is 1964 President of FHC. For info on CHC or FHC organization, send s.a.s.e. to Executive Secretary, K6BX.

What's Cooking Department

As reported last issue, a Washington State All Counties Award is pending as-well-as a Washington Centennial Program, so keep working for those Washington counties and be patient . . . BIG wheels move slowly. After publication of the awards chart this issue, we will expect a few inquiries concerning All Counties Awards for the states of Arkansas, Idaho, Iowa, Maine, Nevada, Oklahoma, Utah, West Virginia and Wyoming, the only remaining states without such programs. The *Directory* and the USA-CA will recognize such awards *only* if sponsored by an existing Amateur Radio organization; sponsorship by individuals is not acceptable for these purposes. K6BX will gladly assist any responsible organization in seeking best obtainable awards PR. Suggest interested parties, before drawing up plans for any All County Award, research back through this column for the past two or more years to see what others have accomplished in the way of public relations and publicity. Step right up gents.

Old Man K6BX

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

EMERGENCY power for the ham station is an important subject on which little has been written. Although many hams do own gasoline driven a.c. generators, the majority do not. Even in areas often plagued by hurricanes, floods and high snows, most hams are simply *not* prepared for emergency operation of their stations due to the lack of emergency power generating equipment.

One of the public service reasons for the perpetuation of ham radio is that hams are capable of establishing and maintaining emergency communications until commercial communications facilities have been restored.

It is true that in many areas of the United States, organized ham groups devoted to the task of furnishing emergency communications do exist—these groups do have portable power generating equipment; however, there are too few.

Although some CB groups boast that they are better prepared than most emergency ham communications organizations in their areas to render communications assistance, they cannot, like the hams, pass traffic over great distances, and must confine their communications to small areas. This is so because of transmitter power restrictions and the frequencies used.

The ham who owns an a.c. power generator which will carry his ham equipment is an asset to *any* community. If, by chance, he belongs to an organized emergency ham communications group so much the better.

A.C. Generators

The present day highly efficient gasoline driven a.c. generator which puts out 110 or 220 volts at various wattage ratings was the result of pioneering effort by the Armed Forces.

Early power generating equipment designed for portable applications was cumbersome and maintenance was often a big problem. I remember the first generator I encountered in 1935. This unit as large as a modern office desk, powered a low frequency transmitter known as the SCR-136. The transmitter was used by the old Army Air Corps for ground communication between tactical units.

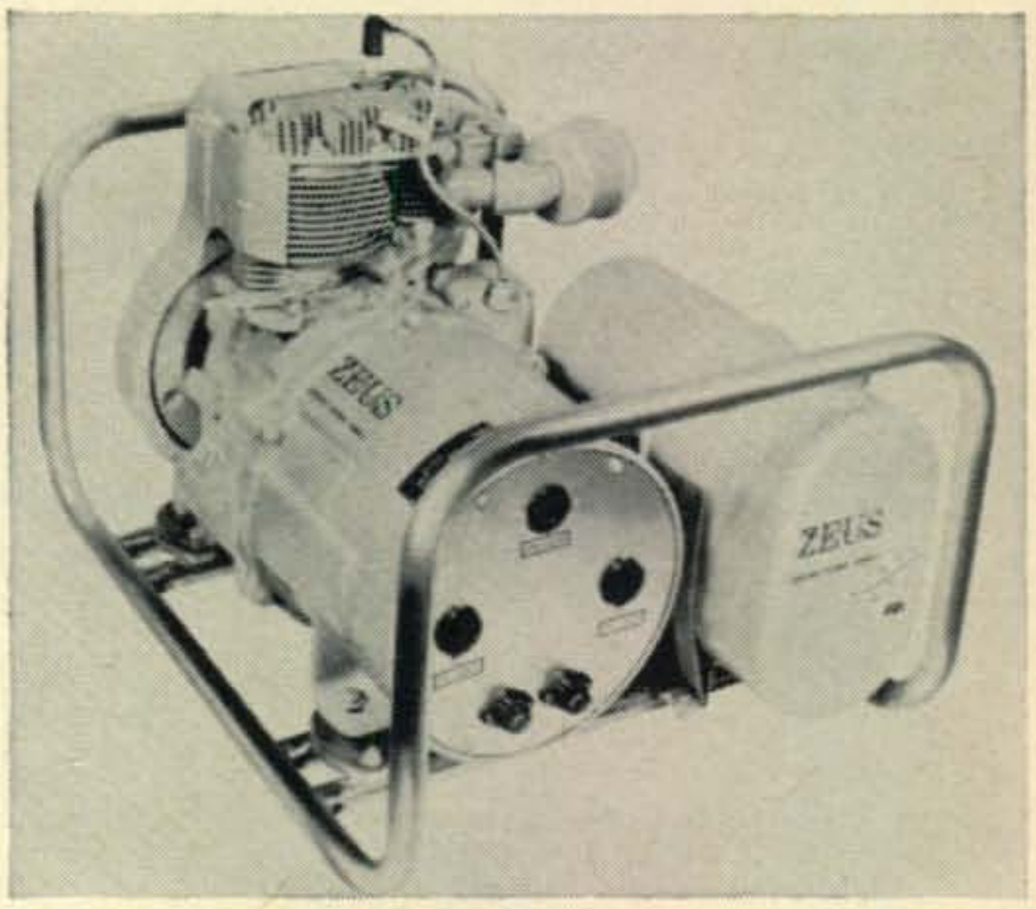
Today, a 1200 watt generator complete with gasoline engine is available which weighs only 65 pounds. Units with smaller power output weigh even less.

Considering the value received, prices for emergency power generating equipment on the market are very reasonable. In fact, the difference in price of a brand new unit and the surplus models available is very small.

To insure long service and trouble-free operation, some portable power plants now use an *alternator* instead of a generator. The alternator of course does not use brushes, commutator or slip-rings. Such a unit is manufactured by Master Mechanic Mfg. Co. of Burlington, Wisconsin. For full information on their alternator line write them at the address given, and do mention HAM CLINIC.

Portable a.c. power units are available in a number of sizes to fit specific power requirements. In choosing a unit, make certain that you calculate the *peak* as well as average power requirements. Do not forget to include a couple of lights (75 to 150 watts) in your calculations.

Generally, a 1200 or 1500 watt unit is ideal for most hams. With it, a receiver, transmitter, lights and other small electric appliances may be operated without fear of overloading.



One of the Antenna Specialist Zeus portable power supplies. This model supplies both 115 or 230 volts output, making it extremely valuable for emergency operation, especially when it's 3000 watt rating is considered.

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

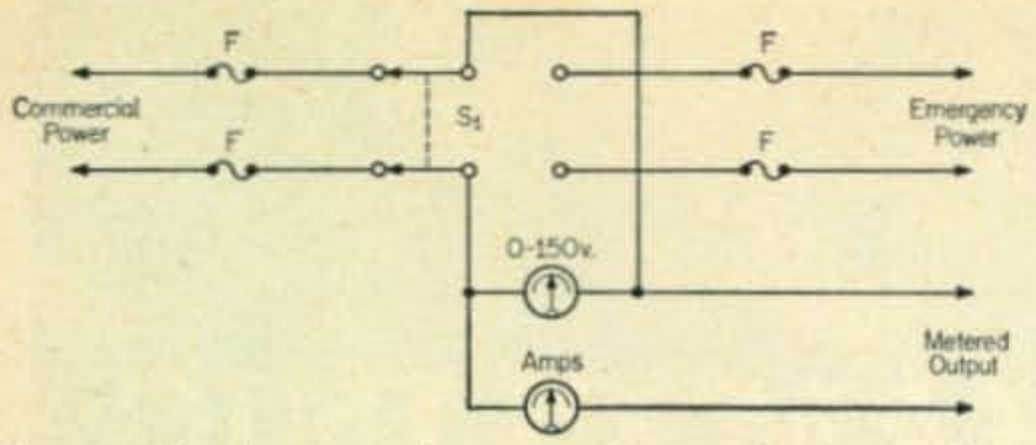


Fig. 1—Simple control system for monitoring voltage and current from commercial or emergency power source. Switch S_1 is a heavy-duty d.p.d.t. knife switch. Fuses are determined by the anticipated load current.

Surplus power units, unless they have been overhauled and are guaranteed, should be avoided. In most instances these units have already seen long service and unless you are extremely lucky you may end up with a unit which will require a major overhaul after a few hours operation. The overhaul is expensive. In fact, a friend of mine who was "stuck" with one such unit figured that he could have purchased *two* small modern guaranteed sets for what he paid for the surplus unit and its overhaul.

When installing a power unit, make certain that you use wire of sufficient size to carry the peak load—the larger the wire, the better. In fact, it is recommended that the cable used be *twice* the size normally required. Although most modern power units have relatively quiet gasoline engines, they still make noise, so they must be installed some distance away from the operating position.

Ignition noise can be a problem with any generator, but the newer sets, due to excellent shielding and noise suppression measures taken by the manufacturer require little attention. But if you do purchase a power unit whose ignition noise bothers reception, install spark-plug and distributor suppressors and do ground the unit at its installation site by using a copper rod 4 feet long or more driven into the ground close to the set.

Some power units not only generate 110-220 volts a.c., but also 6 or 12 volts d.c. for battery charging. Generally, a dual generator is employed in these sets. If commutator noise (from the d.c. source) is bothersome, by-passing brushes with a 0.1 mf capacitor will often attenuate or eliminate it. On the other hand, like the d.c. auto generator, a trap consisting of a coil and postage stamp type capacitor may have to be installed. The trap will of course be tuned to the band bothered and will be installed in series with the generator output lead.

The SK-1 Suppressikit® made by Sprague is recommended for complete noise suppression of noise encountered with the average power unit driven by a gasoline engine.

The Antenna Specialists Co. of 12435 Euclid Ave., Cleveland 6, Ohio make a portable electric generator called the Zeus.® This unit is indeed portable, has only one moving part; no belts, brushes, commutators, voltage regulator or slip rings, and is available in a number of different sizes. Sudden surges or overloads will not damage the unit and its gasoline engine is easily adaptable to use liquid propane gas in addition to the ordinary gasoline. This unit is recommended to HAM CLINIC readers needing a unit one man can handle with ease. Write the manufacturer for more information.

Maintenance

If the maintenance instructions of the manufacturer are followed, (especially those pertaining to oil changes), the modern power generating unit will last a very long time without the need for overhaul.

When storing a power unit for a period of a month or more, it is wise to remove the plugs in the gasoline engine and introduce a light oil into the cylinders. On the other hand, power units should be periodically operated, not only to check them out but to prevent possible rust and acid damage.

Batteries should be trickle charged or stored dry. Non-self starting units (requiring no batteries) are of course easier to handle on field trips.

A control panel containing necessary switches, ammeter and voltmeter should be constructed if one is not available with the unit purchased. A diagram of a simple but effective panel control system is shown in fig. 1. This panel allows measurement of voltage, current and power. A frequency meter could be added if one is desired. The double-pole double-throw knife switch is used to switch from commercial to emergency power. A more elaborate system using cut-over relays can easily be designed, but is not always worth the expense and effort.

Summing up: the ham who has real serious interest in the public service aspects of ham radio will own a small portable electric generator. It is also a nice feeling to know that emergency electric power is available with the push of a button, the pull of a starting cord or the turn of a crank. Are you prepared for an emergency?

Observation

We who hold Extra Class Licenses do not feel that we are any "special breed" of ham. Actually the many EC hams I have met are as human as their Novice cousins. Maybe we *can* copy code at least 20 w.p.m., and maybe some of us are pretty dern good electronic engineers, but there are many in our ranks who are not engineers and who can be found in jobs varying from selling shoes to working for the FCC.

Some of us became EC hams because the examination was a challenge; others because the "Grand-Daddy" clause recognized our seniority and our contributions to radio communications. But there are many of us who acquired our EC tickets because we felt we could belong to a group who would be extended a few special privileges and maybe inspire a few of the younger set to join us. This has not been the case. Are we squawking? Not any more!

When we signed up to write HAM CLINIC for *CQ* we had the understanding that we need not bow to editorial policy, and we *have* disagreed with editors on many issues. But as far as the proposal made in last month's ZERO BIAS *is* concerned, we sanction it 100%! It is a compromise, but a doggone good one!

So—this answers the many letters we have received asking our position on incentive licensing. We believe *CQ*'s approach is fair and we back it.

Questions

Using the New 6146B/8298A Tube—Since RCA came out with the new version of the 6146 we have had many letters asking us if the new tube (6146B/8298A) can be used with transmitter "A", "B", "C", *etc.* In some instances we have told our readers that their transmitters did not have enough reserve power for the new tube—in other instances we told them that other than raising the screen voltage and staying wtihin the plate current limits set by the manufacturer, the tube would work fine.

The *safe* limits for the 6146B depend on the class of service. For example, for s.s.b., the tube has a rated plate dissipation of 35 watts (with 750 volts on the plate, loaded to 220 ma plate current). Class C c.w. power ratings are exactly the same. The screen voltage in class AB_1 (with a d.c. grid voltage of —65 volts) can be set so that the 220 ma plate current is not exceeded. Depending upon the circuit, the screen voltage can be raised as much as 25 volts.

Remember that the old 6146 has a plate dissipation rating of only 25 watts (ICAS). In class AB_1, the 6146 has a maximum signal plate current of about 110 ma at 600 volts; the screen voltage being set at 200 and the bias at —50 volts.

If your power supply is dynamically stable and capable of the extra current demanded by the 6146B you'll have little trouble. On the other hand, if your power supply cannot supply the peak current demands of the new tube, you are out of luck. However, *most* transmitters *do* have the extra power margin required.

When using the new tube, load *below* the manufacturer's ratings at first—then check for

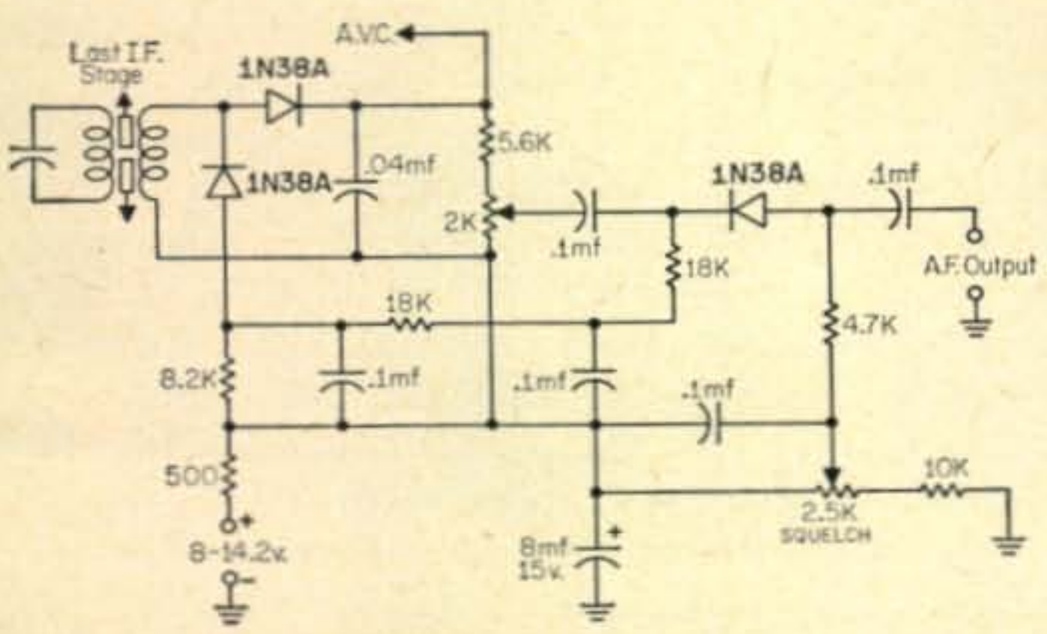


Fig. 2—Combination detector-squelch system designed to replace the original detector in a receiver. The diodes used are not critical, but should all be of the same type.

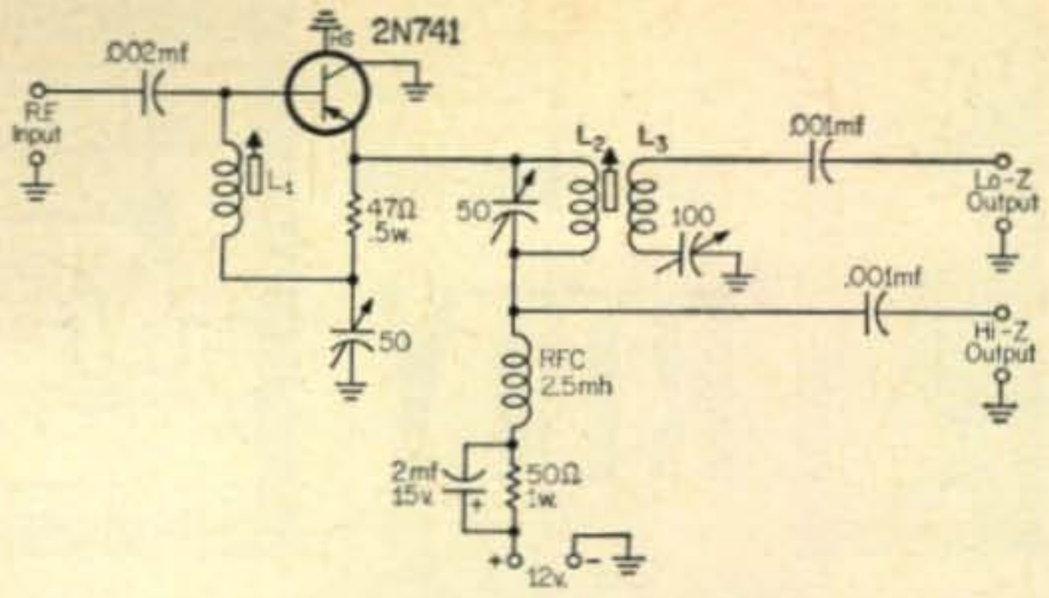


Fig. 3—Transistor r.f. amplifier capable of about ½ watt output. For up to 3 watts output a 2N697 may be used. Capacitors less than one are in mf unless otherwise indicated.

L_1—52 t. #34 e. close wound on ½" dia. slug tuned form.
L_2—45 t. #34 e. close wound on ½" dia. slug tuned form.
L_3—9 t. #34 e. on cold end of L_2.

transformer and choke heating. Even with s.s.b. rigs, this is necessary.

Remember that if you are on s.s.b. you more than likely have voltage regulation applied to the screens of your 6146's. Your particular screen v.r. circuit may need some changes. Using the new tube without changing the screen voltage to a higher value (as recommended by the manufacturer) will not result in maximum output.

RCA has certainly done something by producing this new tube which is a replacement for those work-horses, the 6146, 6146A or 8298. With a power input increase of 33⅓% over the older tubes, the new tube is worth trying. One final suggestion: if your power supply capacity is too close to the peak rating demands, try air-cooling the power supply section with a small blower. This is, of course, not a recommended practice, but being hams we try anything.

Transistor Squelch-Detector—"Would you please give me a circuit (transistorized) for an effective squelch circuit which can be applied to nearly any normal transistorized detector circuit?"

See fig. 2. This circuit is a combination squelch-detector circuit. I suggest you use it as is, rather than trying to adapt the squelch portion to the detector in your set. The circuit shown is also capable of limiting noise via the diode connected in series with the capacitor connected to the center of the 2K pot. The squelch threshold is set by the 2.5K pot. The voltage applied to this circuit can range from 8 to 14.2 volts. Any good diode can be used where shown, however, be sure that they are of the same type.

Transistor Amplifier For 80—"I need an r.f. amplifier to follow a transistorized v.f.o. similar to W3JHR's which appeared in the September 1963 *CQ*. The amplifier should have an output of 250 milliwatts or more. Can do?"

We'll try. See fig. 3. This amplifier uses an exceptionally good (but inexpensive) mesa transistor, a Motorola 2N741. With 12 volts, peak power will approach ½ watt (depending

[*Continued on page 98*]

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

DUAL identification, the bane of radioteletype operation, may soon be relaxed—somewhat. If you recall, we published the April 10, 1963 petition of W8DTY in the August '63 RTTY Column. On January 10, 1964, the FCC released in Docket No. 15267 its Notice of Proposed Rule Making that considered both the petition of W8DTY (RM-465) and one made by the ARRL (RM-435). [See ANNOUNCEMENTS, March *CQ*, p. 12.] The FCC did not agree that filing notice of proposed RTTY operation, as contended by W8DTY, would help monitoring. They did agree with the alternate proposal of W8DTY, and the ARRL, that partial relaxation of the identification requirement (made by sending only the call of the station transmitting) would not, ". . . unduly detract from the Commission's monitoring efficiency."

Docket No. 15267 proposed to amend Part 97 of the Commission's Rules as follows:

§97.87(a)(2) [formerly Section 12.82(a)(2)] is amended to read as follows:

§97.87 Transmissions of Call Signs.

* * * *

(2) The required identification shall be transmitted on the frequency or frequencies employed at the time and, in accordance with the type of emission authorized thereon, shall be by either telegraphy using the International Morse Code, or telephony, except that, when a method of communication other than telephony or telegraphy using the International Morse Code is being used or attempted, the required identification shall be transmitted by that method and only the call sign of the transmitting station need be transmitted by either telephony or telegraphy using the International Morse Code.

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

RTTY The Hard Way...No. 30

"That was my neighbor with TVI. He said he liked it better when I operated on phone so he could tell what I was yakkin' about!"

Narrow Shift Identification

Right here is a good time to explain, for the newcomer to RTTY, present practices of dual identification. First of all, it is *not* required by the FCC that the second (first on RTTY) identification be made by means of c.w. It is perfectly legal to use the normal 850 cycle shift, just so long as International Morse Code is used. It is just as legal, and much more practical, to use *narrow shift* for this purpose. The main idea, to us, is to keep the machine on the receiving end from running wild before the switch can be reached. To the FCC the main idea is, to quote from Docket No. 15267, ". . . that the International Morse identification be easily discernible by ear using a conventional communications receiver." In practice almost any value of shift up to about 200 cycles can be used, just so that the TU doesn't flip from the machine-resting *mark* to *space*.

Circuits that may be used for narrow shift

W2PEE, Upper Brookville (Oyster Bay), Long Island, N.Y. Machines: Model 28KSR, Model 14 TD, Model 14 TR. Receiver: 75A-4. Terminal Unit: W6NRM, modified as limiterless-TU. Transmitters: CE 200-V, with Thunderbolt amplifier. Operator: Elston H. Swanson.

identification have been published many times here in your RTTY Column, and a typical circuit is discussed in Chapter 6.2, part b, in the *New RTTY Handbook*. The only refinement we can suggest, should the Rules be amended as Docket No. 15267 proposes, would be to employ a motor-driven code wheel which could be released at the press of a button.

Technical Tidbit

We have had many letters asking where those printed circuit board connectors for the W2JAV transistorized RTTY gear (Feb., March, and April '62 RTTY Columns) might be obtained. Well, Arrow Electronics of Mineola, N.Y., lists both Amphenol and Cinch-Jones in their catalog. The Amphenol 143-010 for the a.f.s.k. oscillator is $1.06 and the 143-022 for the TU is $1.87. The Cinch-Jones 250-10-76-170 for the a.f.s.k. oscillator is $1.50 and the 250-22-76-170 for the TU is $2.63.

Other letters have asked where transistor sockets might be obtained. Again, Arrow lists several types; the Grayhill No. 22-16 and the Elco #3303, for example. These run about 30¢ each. Lafayette, Syosset, N.Y., lists a "universal" socket, MS-395, for 25¢ each or 22¢ each in lots of 10.

On the Bauds

K1IIK of Newport, N.H., has a Model 15 and wants to know how to f.s.k. a GSB-100. *(See Chapter 4.2 in the New RTTY Handbook, Al.)* K1MIA of Sharon, Mass., has tape gear working on 80 with a log periodic antenna and 800 watts. W1OQC of So. Windsor, Conn., also is on 80. W1ET, the Dartmouth Radio Club, works 80 from Hanover, N.H. W1OUG of Stamford, Conn., runs narrow shift and tape on 20.

WA2QPW of Demarest, N.J., is on 80 with a Marauder and Model 14 strip printer. W2RPL of Gloversville, N.Y., is on 80, too. W2PEE was the MC at the New York RTTY Dinner March 23rd. *(Details next month.)* W2BVE of Maywood, N.J., has an AN/FGC-1 to go with his Models 14 and 15. W2BQB of New York City works 80. *(How?)* W2VMN of Stittville, N.J., and W2NQW of Port Jervis, N.Y., also are on 80. Activity from the 3rd call area seems to be low this month.

K4WJI of Maysville, Ky., has some 255A polar relays for sale at $1.75 and is looking for an inexpensive machine. *(Rusty is 16 years old.)* W4NZY is not looking for an O-5/FR; he has two for sale. Bill is also a source of Teletype parts in his area. WA4RWX of Hampton, Va., built the W2JAV transistor gear and is changing to 1275/2125 for his s.s.b. transmitter. W3HXF/4 works 80 from Fairfax, Va. WA4ECY is on 20 from Pensacola, Fla. W4AIS of Taylors, S.C., is on 80 now with tape gear. W5JPC of Fort Stockton, Texas, is trying to f.s.k. his 70E-PTO. W5QFA of Corpus Christi, Texas, is putting up a beam for 20.

W6UUX/J, with the Far East Network (APO 67, San Francisco) is looking for the chassis and cabinet assembly for a URA-8A. *(He has all the modules!)* K6HEP of Santa Clara, Calif., uses a tape recorder as a long-time regenerator with a.f.s.k. W6AEE and W6CG (RTTY, Inc.) were heard working each other on 20 *(What, no 146.70 f.m.?)* W8CRQ at Kent State U., Ohio, has a *French Sagem Teleprinter No. 6. (Can anyone help with a book?)* K8DKC of Ann Arbor, Mich., is setting up his Model 28ASR for automatic code identification. K9CNG of Vandalia, Ill., got his Model 28ASR from W9GRW. Al is looking for an I-208 or a Model 80 signal generator. *(So am I, Al!)* W9AMF of LaGrange, Ill., has trouble with his AN/FGC-1. *(Can anybody nearby help Jack?)* KØUBY of Affton, Mo., is awaiting his Model 19 from WØNOY. KØDOM of Lincoln, Neb., works 20 as does KØAEK of Denver, Col.

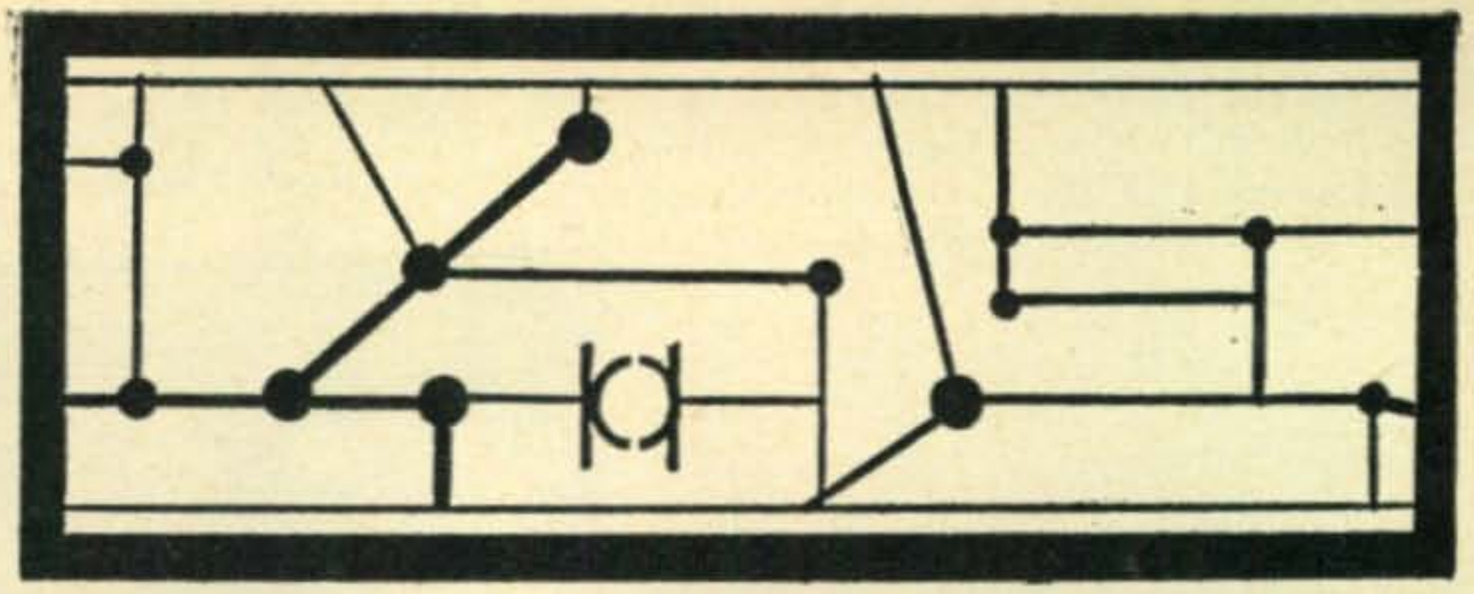
VE3EBR of Don Mills, Ont., has a 15 ready to go. W8BZB/HC2 (the *Good Ship Hope*) works 20 meter narrow shift skeds with K8DKC from Ecuador. YV5AVW of Caracas, Venezuela, works 20 with a consistently strong signal. FG7XT, Guadeloupe, F.W.I., pours a terrific signal into W2JTP on 20.

Comments

RTTY is on the up-swing, judging from our over-flowing mail bag. Most of the letters ask questions, like, "What machines are available to hams; what TU should I buy (build); how can

[*Continued on page 102*]

NOVICE



WALTER G. BURDINE*, W8ZCV

MANY of the letters received here tell me that since this column is written for the Novice and Technician licensee, I should make it a little easier to understand than if I were writing for the old time ham. They say that they have no back issues for reference and that those more advanced hams have all the rest of the book. They ask me to keep it as simple as I can.

Well, I have tried to do just that, but I guess that I forget once in a while that you usually don't have access to any old magazines and that you have to depend upon us for your basic instructions. Of course, I can only get so much in each column and I try to get the most information possible in the allotted space, but radio is a large and complicated subject. There are so many facets of our fascinating hobby that many of them now have their own magazines and books have been written on just one phase of the hobby. I'll do my best to get simple, easily understood information to you and to make the building projects as simple and complete as possbile. Thanks for the letters, that is the way I get my information and this is the way you get mine.

The picture for the 15 watt six meter rig described in January NOVICE are shown this month for those that asked for them. The chassis used for this model was a $7 \times 7 \times 2$ inch aluminum chassis. The front panel was cut from some heavy aluminum sheet and the cabinet was also home made, but any available substitute can be used. If you have a cabinet near this size, use it. You can even use a cake pan from the "five and ten" for a chassis and cut the panel from one of those heavy cookie-baking sheets. I've done this many times in my day. The modulation transformer can be any 10 watt unit that you have or any that is listed in the suppliers catalog, for even if you have a slight mismatch you *will* have enough modulation.

Sometimes it is to our advantage to have a mismatch. If the impedance is too high, it will sometimes restrict the frequency range of the modulation enough to act as a speech forming circuit and make for more "talk-power." The A-53C can be bought from Allied or in almost any other radio supply house.

The coil data as printed was wrong in the January issue and the following data was used by me for my coils. All coils were wound with #24 enameled wire on ⅜" diameter iron core slug tuned forms. The composition of the iron cores can change the number of turns necessary to hit the band, and that was the reason for the term "ball-park." I used CTC forms available at the local suppliers. L_1 is 10 turns. L_2 is 8 turns and L_3 is 6 to 7 turns of #16 tinned wire ⅝" in diameter spaced to be 1" long. When using the grid dip meter to tune the output coil, short the output terminal with a 51 ohm resistor. The first condenser in the pi-network tunes the plate circuit and the last one loads the antenna; tune for the most output. I hope that with this article there will be more activity in some of the hard to get states. We could use more six meter activity in the Western states especially; Montana, Wyoming, Nevada, Idaho and Utah.

The Georgia QSO Party

The Columbus (Georgia) Amateur Radio Club will hold it's third annual QSO Party on May 9 and 10. The contest is of particular interest to Novices and Technicians because separate awards are given to the highest scoring Novice and Tech in each state. For complete rules and scoring information see the Contest Calendar column in this issue.

Who will be the highest scoring Novice and Tech in the country? Let me hear from you and don't forget the photographs.

Operational Procedure

When listening over the bands you will notice many variations of operating procedures. Many oldtimers are as much to blame for the inconsistancy as the newcomers. It behooves everyone of us to operate correctly so that the newcomer will have a correct standard to follow. I guess I am just as much to blame for this state of affairs as you are.

Rules and Regulations part 12 (now called part 97) gives specific instructions for calling, answering and ending a contact, for mobile operation and for operating at locations other than the licensed location.

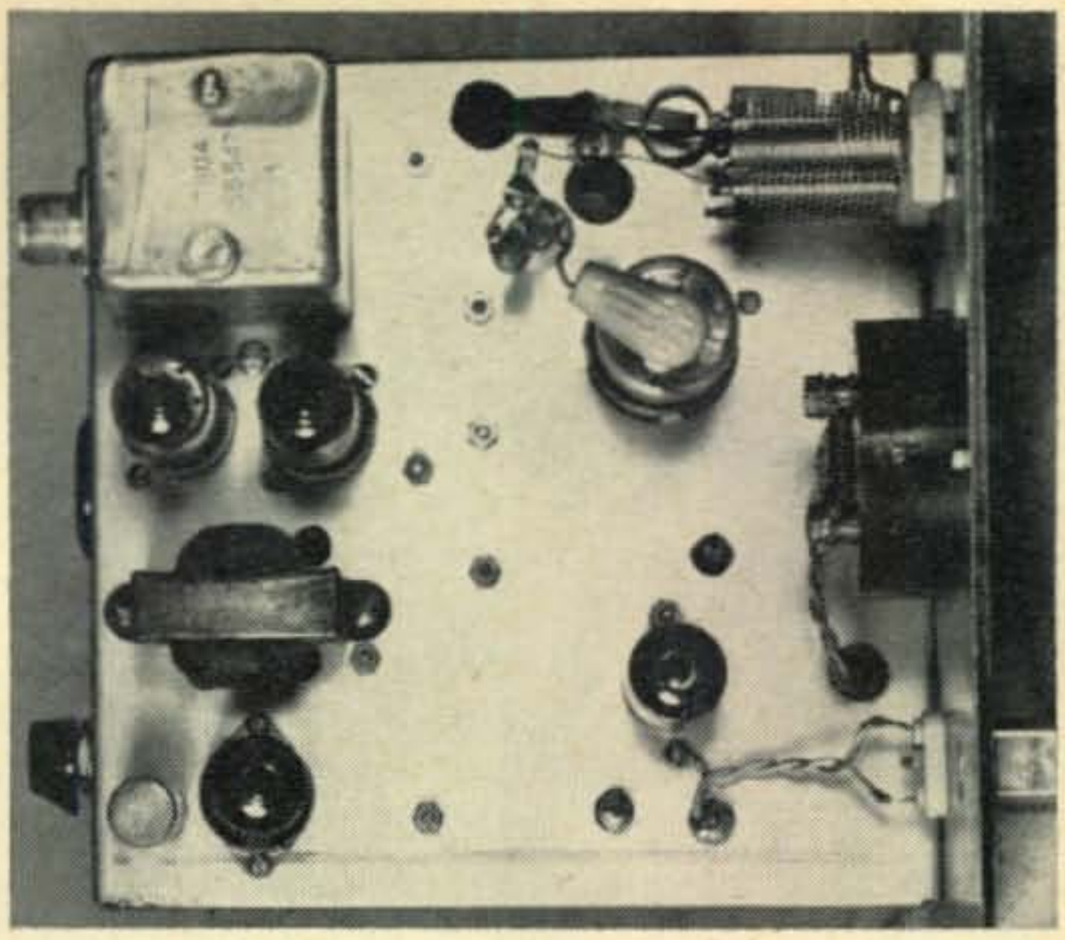
*R.F.D. 3, Waynesville, Ohio 45068.

Stations operating c.w. should call: CQ CQ CQ DE K9BOU K9BOU K9BOU, for a short time depending upon the conditions of the band. He should not call CQ 30 to 80 times, sloppily sign his call once and start the same thing all over again. A "three by three" call repeated three or four times should get an answer if the conditions are good. Always send at the speed you can copy easily and never send your call at a faster speed than your CQ. If you tune the band and hear soneone calling you, send: W8ZCV W8ZCV W8ZCV DE K9BOU, possibly repeated twice. After initial contact is made there is no need to repeat the call more than once. When the station is closing it will sign: SK W8ZCV DE K9BOU CL. This means that K9BOU is closing his station and will not be available for further contacts. The station that you called should always be sent first and the calling station should be sent last in all exchanges.

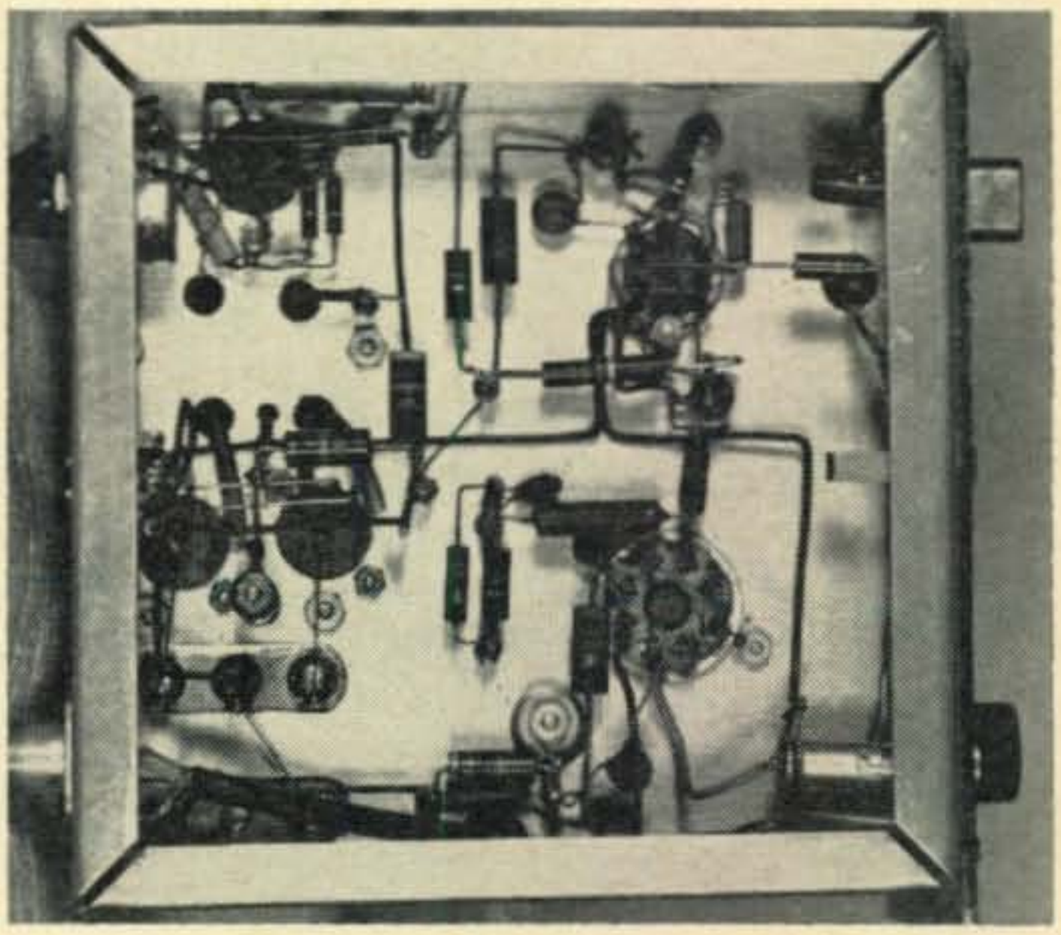
It really seems that the phone man has more trouble operating correctly than the c.w. man. Again the *called* station should be sent first and the *calling* station should be sent last in the calling sequence, as: "K9BOU this is W8ZCV calling." Make short calls and listen for a return; if no return, call again. The station called will say: "W8ZCV this is K9BOU returning." Then follows the contact and it can be terminated as follows: "K9BOU from W8ZCV," or K9BOU this is W8ZCV, over." At the ending of the complete transmission you can say: "K9BOU from W8ZCV clear and closing my station."

Portable operation on c.w. will use the fraction sign and the area number following his call in all exchanges as: W8ZCV/5. Maritime stations will send the fraction bar after his call letters followed by the name of the ship and its location at the beginning and end of each QSO. If the ship doesn't have a name its number can be sent in lieu of the name. Amateurs operating aeronautical mobile will give the aircraft number and its approximate geographical location.

Phone stations operating mobile will say: "This is W8ZCV mobile in the 7th call area near Billings, Montana." Stations operating aeronautical mobile will give the name or number of the aircraft and its location: "This is W8ZCV aeronautical mobile in a Cessna 170B near Jacksons Mills, West Virginia." This short resume of the operating procedures for amateur radio stations is correct as per my last copy of the Rules and Regulations part VI available from the Superintendent of Documents, Government Printing Office, Washington, D.C. for $1.25. A new issue is now available, my order just came in the mail yesterday saying that my copy was being sent soon.



Top and bottom views of the 15 watt six meter transmitter described in the January 1964 issue of CQ. This show the best placement of parts that I could figure for the 7 × 7 × 2" space. See text for more information.



Letters

Wow! What a pile of letters I have received lately. In ten days I have received 49 letters from 33 states and I am attempting to answer them as fast as possible. I will of course answer those first that had stamped envelopes enclosed.

"Dear Walt: for those who missed the XEØICS DXpedition to Ensenada, B.C. Mexico during November 1963.

"I have applied for a reissue of XEØICS for the following periods: 8 to 9 February 1964 (phone), 22 to 23 February 1964 (c.w.), 14 to 15 March 1964 (phone), 21 to 27 March 1964 (phone and c.w.), 28 to 29 March 1964 (c.w.).

If the license is granted I plan to operate 40, 20, 15, 10 meter s.s.b. and c.w., maybe some a.m. Conditions permitting, I will include 6 meter operation on a.m. and c.w. During c.w. times on 40 and 15 I will look for Novices when the band is slow. Please QSL via K6ICS. I will keep you posted. 73, Mike."

This announcement is from Mike Gauthier, K6ICS/XEØICS, 10425 San Jose Avenue, South Gate, California, Phone: 213 LOrain 9-1865. There, fellows and gals is your chance to work a DXpedition and get that XEØ

This letter from Byron C. Weaver, WN2HAL/KG1, USASRPS (6636), APO 23, New York, New York, makes 34 countries that I now know read *CQ*, as I have received letters from that many countries.

"Dear Walt: I really appreciate your articles in *CQ* and particularly your ideas and ideals.

"I am in the Army, from New Jersey, stationed about 15 miles from Thule, Greenland here in KG1 land. I picked up my Novice (WN2HAL) just before coming here. I am waiting for my Conditional in the mail now. I plan to get the extra in a year or so. The only thing that held me back was learning the code, which I thoroughly enjoy.

"I am a firm believer of low power. This is really hamming and a real challenge. I can see high power if the communications is necessary as in a traffic net. Otherwise, the challenge of low power is a good incentive. I am also a firm believer in building my own equipment and also in designing it as much as possible. I like compactness and neatness. I wouldn't even buy a kit, let alone a rig assembled by commercial workers. I think this would make me earn the title of being a ham.

"I am planning to work 160 meters when I return. Also 160 meter mobile. The XYL plans to get her license and she goes along with my views.

"I have just completed a small transmitter on an old 4 by 6 inch chassis for 20 meters which I will use while here. It has a 5763 into a 2E26 with a *Q* of 20 in my pi-net and about 10 or so in my oscillator tank. I had a clean 5763 before for Novice c.w. rig, so I would consider the 2E26 as high power. I am interested in what you are running and of your accomplishments.

"Walt, I am glad they proposed the incentive licensing as it will definitely weed out some of the freeloaders and 'money hams' that have given many a bad impression of amateur radio. This is one of the reasons that many good electronic technicians never become hams, we could use their 'know-how.' Yes, a weeding program is necessary if we are to have something to be proud of as we did in the past. 73, BC."

BC, I do think that many of the new hams should build their own and profit from the experience, but many do not have the time, inclination or facilities to do a job as it should be done and the price of parts have gone up so high that unless you have a big junkbox it would cost more to build than buy, and another thing, the trade-in value of homebrew is way down. I think that too much stress is placed upon the idea that you need high power and the best of manufactured equipment just to get on the air and this is the reason that I have tried to tell the future ham that you do not have to have that kind of set-up to enjoy our hobby. I have said that any one could have an amateur radio station if he would study and build, that simple equipment used as if an expert were at the controls would produce good results and get good signal reports. The operator and the antenna system make up the best ingredients for an efficient station. I have set up a plan to see what can be produced by taking two old discarded TV sets and not more than $25.00 and I'll bet I can build a nice amateur station with no more than these parts and some ingenuity on my part. TV sets can be bought for about five dollars at many second-hand stores. That would make a cheap station for the new ham. I must admit that most of us would like to have commercial equipment but the fact that we can't afford it should not keep us from being good hams and proving it to everyone concerned.

Help Wanted

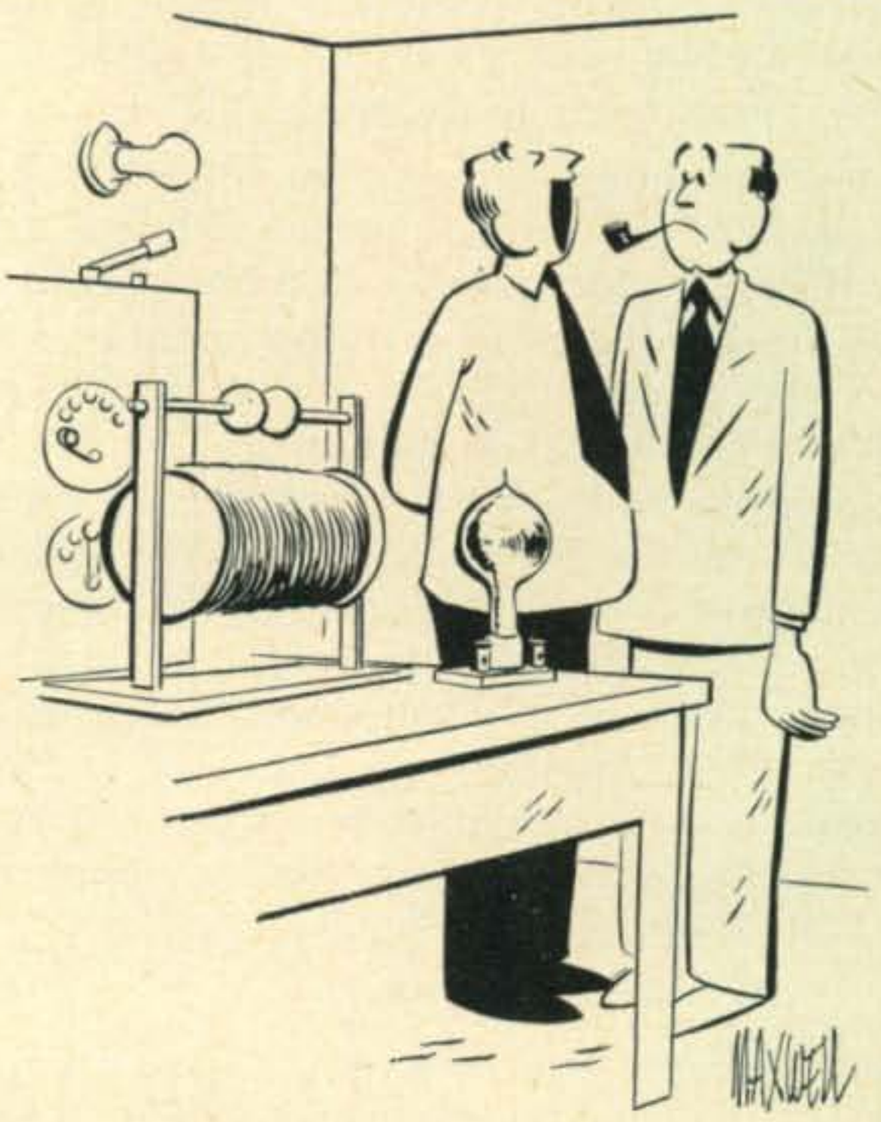
Many letters have been received from those whose names have appeared in this column attesting to the fact that you are willing to help the folks that have asked for help in this column and I want to thank those that have helped to prove that the amateur is the nicest guy in the world. If you can help or if you need help just drop a note with all information to Walter G. Burdine, W8ZCV, R# 3, Waynesville, Ohio 45068 and I will get you topbilling in our column free. Those listed below need help.

Walt Burdine, W8ZCV needs help with letters, pictures, ideas and novice news to make our column the best read one around. *You* can help.

David E. Y. Sarna (15), 370 Riverside Drive # 68, New York 25, New York, Telephone MO 6-2567 would like to have some help learning the code and someone to give the test. He is also wondering about the right transmitter and receiver. How about it fellows? Thank you

Well, that has just about used up my space this month so, see you on the bands.

73, Walt, W8ZCV



"Oh, I still manage to keep in touch with a few of the old-timers."

YL

LOUISA B. SANDO*, W5RZJ

4th YL VHF Contest

TIME: Start—Wednesday, April 15, 1964—12 Noon EST.
End—Thursday, April 16, 1964—12 Midnight EST.

ELIGIBILITY: All licensed YL and XYL operators are invited to participate. YLRL members only are eligible for the top award, a plaque. A non-member will receive a certificate. Contacts with OM's will not count. A special certificate for the higshest scoring Novice operator.

OPERATION: Bands—50 mc and above are to be used —phone and/or c.w. Cross band operation is not permitted. Only one contact wtih each station will be counted.

PROCEDURE: Call *CQ* YL.

EXCHANGE: Station worked, QSO number, RST report, U.S. Possession, VE District or Country. Entries in Log should also show band worked at time of contact, whether A1 or A3, time of contact, date, Xmitter and power.

SCORING: Multiply number of contacts by the total number of U.S. Poss., VE districts or countries worked. Contestants running 50 w. input or less at all times may multiply the above results by 1.25—low power multiplier.

AWARDS: Highest score—plaque (YLRL member only). Top 3 scores will receive Certificates. VE district and country will receive a Certificate. Highest Novice score will receive a Certificate.

LOGS: Copies of all logs must show claimed score, be signed by operator and be postmarked not later than April 30, 1964 and received not later than May 15, 1964. Send copies of log to—Martha Edwards, W6QYL, 44303 N. Date Ave., Lancaster, Calif. 93534. NO LOGS WILL BE RETURNED. BE SURE IT IS A COPY OF LOG YOU SEND IN FOR CONFIRMATION. *Note especially that ARRL Section no longer count in scoring.*

PUBLIC Service or "public nuisance"? We all know that amateur radio exists as we know it today for the very real *public service* its devotees afford in times of emergency, and whenever or wherever communications may be needed. No doubt you all have read in K2ZSQ's VHF section editorial in Dec. '63 *CQ*, and comments in subsequent issues, of the efforts of residents of Elizabeth, Pa. to prevent K3IOP's operating because of interference to TV receivers (in a fringe area), despite FCC's clearing him of any violation. And of FCC's offering "Butch" a "restricted" license, prohibiting his operating on 50 mc, on the basis it is not "in the public interest."

In the meantime in California, the City of Santa Barbara, through its attorney, has brought suit in Superior Court for an injunction to *stop the operation* of amateur stations K6GHU, K6KCI and WA6IBR—owned by Lou, Irma and Lynn Weber—because it claims they are a *public nuisance!* The Webers' troubles started in May '63 when five affidavits were filed against them claiming interference to TV, Hi-Fi, radio and inter-com units. At the same time the Webers presented affidavits from *seventeen* nearby households reporting *no* interference.

The FCC monitored and tested the Webers' operation and found their equipment to be 100% clean and in no way responsible for the interference. There is a building permit for the tower. No deed restrictions are involved. This is strictly an attempt by local authorities to regulate federally licensed amateur radio transmitters.

A demurrer was filed by the defendants' attorney, a dedicated ham who has donated his services, seeking to throw the case out of court on a lack of jurisdiction and other technical grounds. Judge John Westwick over-ruled the demurrer, but refused to issue a restraining order against the Webers and ruled the case should be tried in the local court.

A pre-trial hearing was held January 10, at which time Judge Westwick continued the hearing for 30 days and suggested that the city attorney petition the FCC for action. Since the

The Webers at their Santa Barbara home. L. to r., Irma, K6KCI; Lou, K6GHU, and Lynn, WA6IBR.

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

FCC has already cleared the Webers, it is not certain what the next step will be, but they may have a hearing in Los Angeles. At any rate, it is expected the City of Santa Barbara will pursue the matter.

This case is a clear cut charge of "public nuisance," and is one that all Hamdom should fight. An unfavorable decision at the Superior Court level could affect ham radio indefinitely by setting a very serious precedent; another case would be even harder to defend. The Santa Barbara Amateur Radio Club, Inc. established a "Defense Fund" to raise $1500 to $2000 to obtain the services of a trial attorney experienced in courtroom procedure. Irma comments that response has been most gratifying, and they feel adequate for present needs, so *no appeal is made at this time* for additional funds.

"You can't imagine what a boost to our morale the response has been," Irma adds, "All I can say is that the hams are a very *special people*."

At the same time ARRL's legal counsel has kept in touch with the case and will appear at the trial as a friend of the court should the Webers' lawyers think it advisable. The case may go to a higher court, of course.

These are the facts as of copy deadline, Feb. 1. We'll keep you posted on developments.

It is ironic that hams who devote much time, and expense through their equipment, to public service should have to suffer the indignities of such an attempt to have their hamming stopped. The Webers were planning to move to Santa Maria, for other personal reasons, but have agreed not to move until after the trial, since they feel this threat to all Hamdom must be fought to the finish lest it set a very bad precedent for the future.

Lou, Irma and Lynn all hold General Class licenses. In addition, Lou has a 1st Class Commercial Radiotelephone license, and Lynn holds 2nd Class Commercial. Lynn is a student at the Univ. of Calif. at Berkeley majoring in electrical engineering. Lou and Irma have been in C.D. since their days in Los Angeles in 1955, where Irma earned BPL on 2 meters. They are members of RACES and MARS (AFA6GHU and AFA6KCI). All three have participated in Santa Barbara's annual Fiesta activities for 5 or 6 years helping provide communications. For 5 years the Webers have cooperated with W6OQX in handling communications for Rancheros Visitadores, a riding group, which makes a trek every year into the back country, handling over 100 messages and phone patches for them each year during the 2 or 3 days of the trek, and bringing in emergency medical services when required, including a helicopter one time for a heart victim. The Webers have maintained schedules with Alaska, Guam, Okinawa, missionaries, *etc.* for those who needed communications, and have always been ready to serve when called upon. Their files hold many clippings, letters and certificates of appreciation from those they have helped.

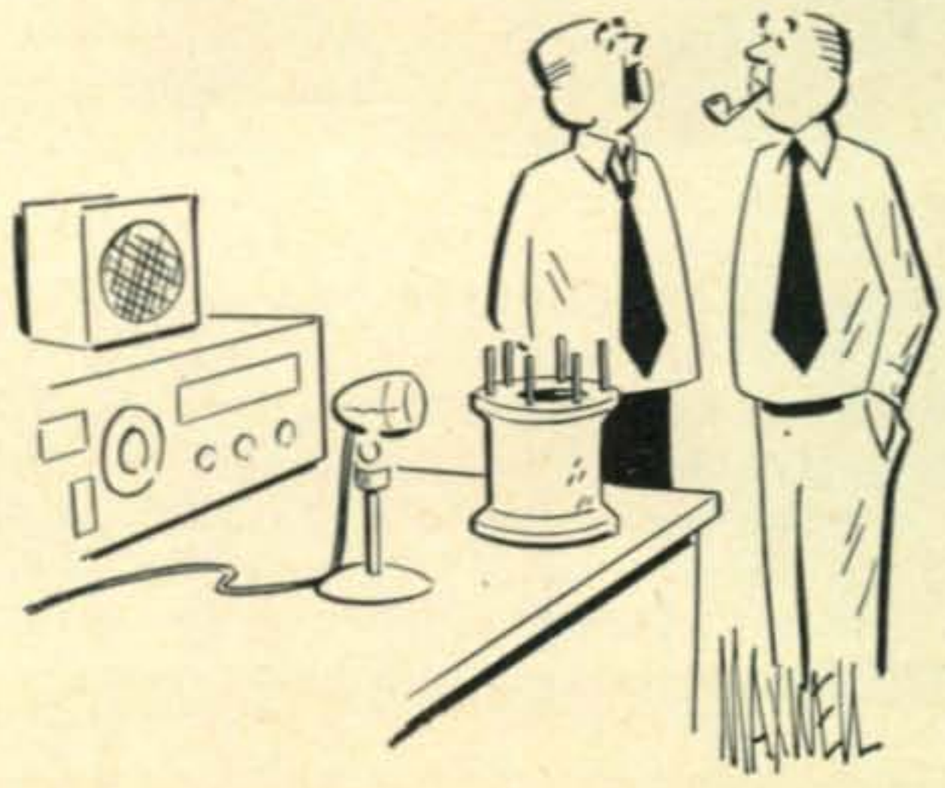
Shirley, K8MZT (left), chairman of YLRL's 4th International Convention, greets Toni, K8PXX, president of Buckeye Belles, hostess club, at Nationwide Inn, Columbus, Ohio. This is the very spot where YLs attending YLRL's 25th Anniversary celebration, June 19-21, 1964, will be greeted as they pick up their ID badges. These, and other personalized gifts are now being made by the Belles, so get your registration in soon to K8UKM, Libby Isham, 474 Darbyhurst Rd., Columbus, Ohio.

Most of you know Irma by her cheery "This is K6KCI at sunny Santa Barbara," on the YL nets, especially on s.s.b., as "official greeter" to YLs visiting Santa Barbara (including the W5RZJ family last summer), and as a member of YLRL and L.A. YLRC. Irma was co-chairman of the first Calif. YL Convention held at Santa Barbara in 1959, and currently is custodian of LAYLRC's Lads 'N' Lassies certificate.

All Hamdom will be awaiting the outcome of this court case, and the absolution of the malicious charges against the Webers.

33, W5RZJ

P.S. At the pre-trial hearing Feb. 14 the judge continued the hearing until March 6 to enable the city attorney to amend his complaint to include reports made by FCC inspectors (which are in the Weber's favor!).



"Oh, I make my own shielded cable nowadays."

VHF AMATEUR

Vol. 6, No. 4—April, 1964

BOB BROWN, K2ZSQ

WE are now into our fifth month of reporting on the K3IOP case[1] and are more than just a little annoyed that this situation remains the number one concern of the v.h.f. fraternity. It should have been remedied last year. Never before has this writer encountered a situation that has spurred so many amateurs to write their local FCC offices, ARRL, TVI committees, etc., in an effort to get action. If we had the space to spare, the letters that have reached this desk in the last three weeks alone could fill another four pages of *CQ*—and in fine type. Our file on the K3IOP case is fairly bulging at the seams with correspondence. But even now Butch's situation remains much the same. He still is denied six meter privileges.

In spite of all the support Butch has received from the press and fellow amateurs, the tedious waiting persists. After nearly a two month period, the FCC finally responded with their concession to a hearing. That was December. Two weeks ago they announced the hearing date as Wednesday, March 4, in Pittsburgh, Pennsylvania. And it will be a closed hearing, to be attended only by those parties accepted by the Commission. (For example if you had wanted to attend, you would have had to file in triplicate to Mr. Ben Waple of the FCC stating your involvement in the case and why it was imperative you be there. If your application was approved in time, and this appears unlikely, you might have been permitted to attend). The hearing was "to determine whether a condition prohibiting operation in the 50-54 mc band, which was attached to the amateur radio General Class license of Charles A. Seaman, Elizabeth, Pa., should be continued, modified or removed. Because of interference to local TV Channel 2 reception caused by Seaman's operation in the 50-54 mc band under his Technician Class license, the prohibition was attached to his General Class license."

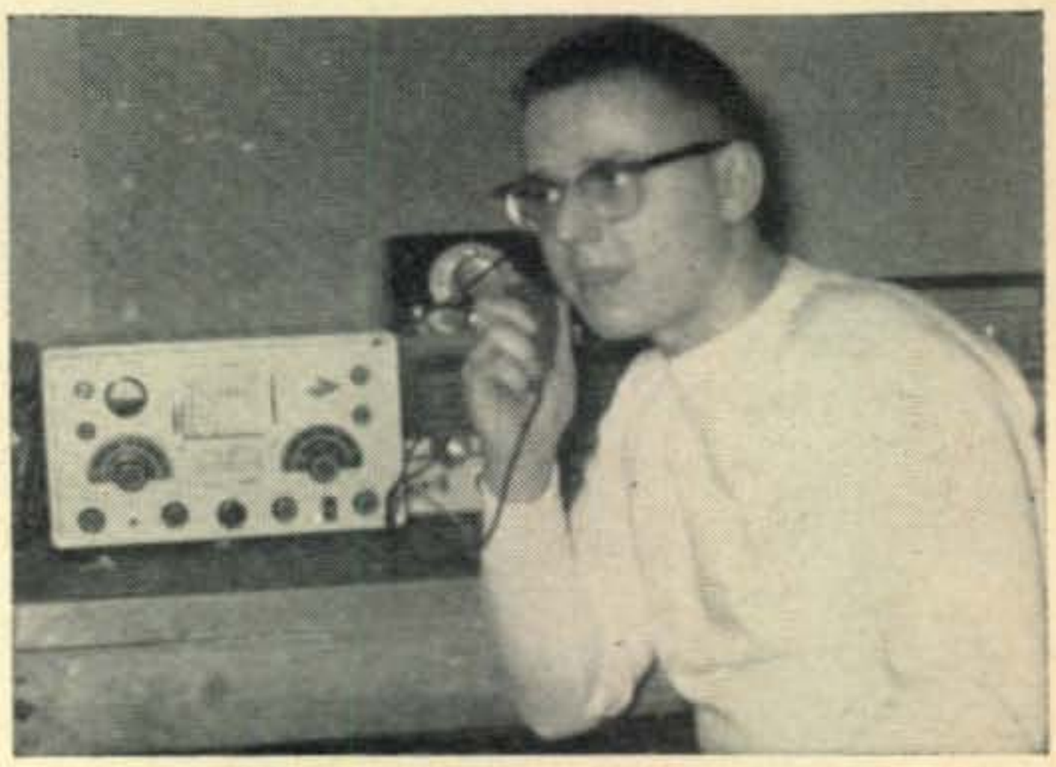
The FCC Public Notice went on to say that it would be the purpose of the hearing to "determine the nature and extent of interference to TV reception in the Elizabeth area created, or likely to be created, by Seaman's 50-54 mc operation." If he is found to be the cause for the TVI, the Commission will see what measures can be taken by K3IOP or his neighbors to eliminate or reduce that interference *in addition* to taking steps with regards to the "conditional" General Class license Seaman holds. The Borough of Elizabeth and the ARRL were made parties to the proceeding. Judge Walter W. Gunther was appointed presiding examiner. At this writing, of course, the results of that hearing are not yet known.

By strange coincidence, just four days ago I was visited at this office by a Commission Field Engineer (of the variety that "checked out" K3IOP's station six times). He, too, had to get in on the act. Although he is only remotely connected with the Buffalo, N.Y., FCC offices, he seemed to have an inside knowledge of how the Commission was going to play their hand in the pending hearing. And it wasn't pretty. Sometimes I get the impression that the amateur public is not sufficiently aware of the true attitude of the Commission in most instances. And perhaps the FCC would like to keep us that way. Maybe confusion is the ultimate goal of the procrastinator. Enough.

How To End TVI Permanently

Burton H. Syverson (call letters not available) has petitioned the FCC for reallocation of v.h.f. TV channel 2 (54-60 mc) to the citizens and amateur radio services. Mr. Syverson, from Aurora, Illinois, noted the harmonic relationship between citizens and amateur frequencies and Channel 2, and discussed the difficulties which are being faced in persuading the TV viewers to install filters. Per usual, no remarks yet from the Commission on the petition. Personally, I think it's a dandy idea.

Bob Brown, K2ZSQ



Charles A. "Butch" Seaman, K3IOP, first U.S. citizen to hold a General license without six meter privileges. Reason? He causes TVI. (Photo by Ed Lips, W3BWU).

[1]See Dec., 1963, p. 69; Jan., 1964, p. 77; Feb., 1964, p. 77; and March, 1964, p. 79.

VHF REPORT

an exclusive feature of The VHF Amateur

BY BOB BROWN*, K2ZSQ

THIS is the time of year when we all begin preparing for the spring and summer v.h.f DX season. With the days getting longer and the weather warmer, more and more rooftops are sporting that familiar aluminum "plumbing" in anticipation of the months ahead. That old enthusiasm returns just as naturally as a bear coming out of hibernation (your XYL will heartily agree on this one) and once again your thoughts, if you *truly* fall into the v.h.f. category, turn to kilowatt finals, parametric amplifiers, and gigantic antennas. Private surveys have shown that the summertime "DX panic" spurs more station improvement in less time than at any other period during the year. One bit of advice: Channel this enthusiasm in a constructive direction. Don't let things get too far out of hand. Sure, your station could stand some remodeling—but not necessarily a complete renovation. Analyze your individual situation. Perhaps you'll find that a few inexpensive modifications to your receiver will buy you noticeably more than another hundred dollars sunk into the antenna system. Rather than view your station comparatively, isolate yourself mentally from "the Joneses" and concentrate wholeheartedly on what is best for you. One heck of a lot of money is wasted every year by hams who must have the latest commercial gear simply because it's the thing to do. Do you really *need* to spend a large amount of cash for a major change, such as the newest transmitter or triple conversion receiver? In short, be practical; a well planned v.h.f. station equipped with an accumulation of varied pieces of homebrew and commercial gear intelligently arranged and in good order will always outperform the overnight storebought boys', and with less headaches.

With the Century Club'ers

Nine certificates were awarded this month to QSL-minded applicants, six to 50 mc men and three for 144 mc. New members are (six meters): Franklin Spitler, WA8GCE; Art Lindsey, K1KCN; Masatoshi Mitsui, JA3BBG; Merle D. Gray, WA8BXS; Charles Watts, WB2DCC; Jerry C. Medlin, WB2FEQ and our two meter friends, Herbert W. Dixon, WA4MFG, Frank Schwartz, WB2ELL and Bertram C. Lewis, WA8CNX.

By the way, if you are interested in joining the ranks of *CQ*'s VHF Century Club certificate holders, see last month's VHF REPORT column. If you don't have a copy handy, drop a card to me at the address at the head of the column and we'll see to it that you get all the necessary information. Okay?

**The VHF Amateur, CQ*, 300 W. 43rd St., New York, N.Y. 10036.

Just a Few More Weeks . . .

And it will be contest time once again. Time for all ambitious v.h.f. addicts to come out of the wood and head for the hills, armed with battleworn equipment and ready for the worst. Just like last year, there will be three major classes of competition: General, All-Band Multi-Op, and Club Aggregate. (Remember that the biggest surprise in the last Spring contest was the intense competition in the Club Aggregate category.) See page xx this issue for details. Mark your calendar: May 2-3rd, 1 P.M. Saturday until 1 P.M. Sunday. Who'll be on top this year?

F.M. Notes and Quotes

What next? Now they are populating ¾ meters! Word arrives from RTTY'er W2JTP that K2IEG and W2OCM of Huntington, Long Island, are on 448.80 mc f.m. using RCA units with ± 15 kc deviation (these are available from FM Sales, Roxbury, Mass.). Antennas are vertically polarized and from all indications most future activity here will likewise be of the base-to-mobile variety. We hear also that before long more of the L.I. 20-meter gang will be making the big jump. And it won't be many more moons until W2JTP himself fires away at 448.80 with his Motorola. Looks like even RTTY men aren't immune to the siren call of v.h.f. f.m.!

Ray Neuman, K6PUW, of Los Angeles fills us in on the West Coast doings effemwise. "After reading in VHF REPORT about f.m. activity, I noticed that not very much information has come from W6-land. So here are a few notes from L.A. 'bout two meters and 450 mc.

"There is not very much work being done on six meters because of channel two TVI. But at

VHF from the word go is K4NEH of Portsmouth, Va. Vern operates six and two primarily, but he has access to higher frequency equipment which he occasionally employs. "First contact on two meters was WA4OGZ and guess what? I was his first contact also!" K4NEH's main preoccupation is v.h.f. weak signal DX work.

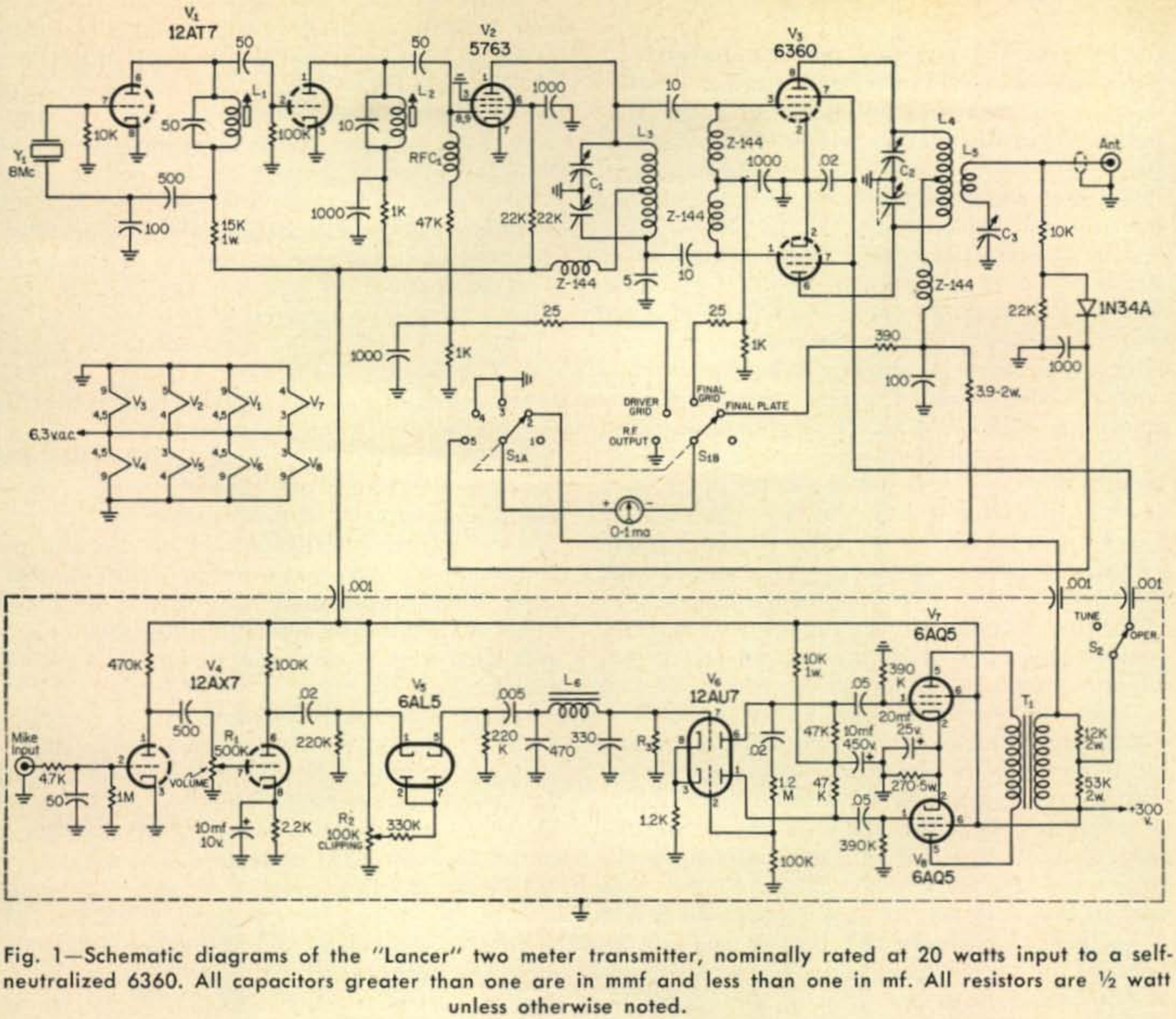


Fig. 1—Schematic diagrams of the "Lancer" two meter transmitter, nominally rated at 20 watts input to a self-neutralized 6360. All capacitors greater than one are in mmf and less than one in mf. All resistors are ½ watt unless otherwise noted.

$C_{1,2}$—11 mmf per section miniature butterfly. E. F. Johnson 160-211.
C_3—20 mmf miniature variable. E. F. Johnson 160-110.
L_1—0.90-1.6 μh slug-tuned coil, wound to resonate at 24 mc. J. W. Miller 4403.
L_2—0.40-0.65 μh slug-tuned coil, wound to resonate at 72 mc. J. W. Miller 4303.
$L_{3,4}$—4 t. #14 c.t., ½" i.d., spaced to ⅞" long. Resonate at 144 mc.
L_5—2 t. #14 wound around center of L_4. See text.
L_5—2 t. #14 wound around center of L_4. See text.
L_6—20 henries, 900 ohms. Stancor C-1515.
RFC_1—2.5 μh r.f. choke. National R-100S.
S_1—2 pole, 5 position rotary switch.
S_2—S.p.s.t. slide switch.
T_1—Modulation transformer, tapped secondary, primary 10,000 ohms plate-to-plate. Thordarson 21M68.
Y_1—8 mc third overtone crystal.

the last estimate there were no less than 250 to 300 active stations on two meters and 450 mc with base-to-mobile type installations. The 440 to 450 mc group is divided into 100 kc channels and is primarily used for repeater control and duplex operation with seven active channels used for 8 mc repeater pairs (for two meter repeat-back channels). Two-meter channels between 146.610 and 147.240 are popular with 146.760 and 146.940 used the most.

"Other channels are 146.620, .640, .675, .700, .760, .830, .865, .900, .940 and 147.240, with no less than 13 repeaters on two meters. There are only two a.m. repeaters in this area.

"My own station consists of a Motorola 200 watt 140-BY 'base' into a Hi-Gain SD-150, a jay pole and a Motorola 140-D 100 watt mobile on 146.675 and 146.760. That's about it from here. C U on 2 f.m.!" Keep us informed on f.m. activity out there, Ray!

Miscellaneous Tech

The "Lancer" Two Meter Transmitter: Some readers have expressed an interest in the "Lancer" two meter transmitter which was demonstrated recenly by K9PMU at one of the meetings of the Waukegan V.H.F. Society, of Waukegan, Illinois. Shown in fig. 1 is the transmitter and modulator, as designed for the emitter portion of K9PMU's 144 mc transceiver (see S_1). The transmitter has a 6360 in the final which operates quite efficiently at two meters with a nominal input of 20 watts. No layout or construction details are presented, as the average v.h.f. enthusiast should already be well aware of the importance of shortest possible leads on everything — including bypass capacitors — in v.h.f. construction. Reminder: at two meters a .001 mf disc ceramic capacitor with a total lead length of ¾" becomes an *all*-pass capacitor in a number of applications. Pay particular atten-

tion to the lead length from the plate of the 5763 to L_3.

Minimize the coupling between L_3 and L_4. Although the 6360 is self-neutralized at this frequency, too much coupling could cause self-oscillation of the final. A tin shield placed across the 6360 socket soldered to the cathode tabs of the socket and well grounded will help isolate the grid and plate circuits.

The oscillator, too, deserves some discussion. As shown in fig. 1, the oscillator is an overtone. The crystal oscillates on its third harmonic, *not* its fundamental. If 8 mc r.f. is present, the oscillator is not properly adjusted. When functioning correctly, the lowest r.f. present anywhere in the transmitter will be 24 mc. Oscillation takes place with L_1 resonated *slightly above* the third overtone of the crystal. If, on the other hand, your favorite oscillator is a Colpits, try replacing the 12AT7 with a 6U8A and use the pentode section as the oscillator and the triode section as the multiplier.

Coil L_5 is coupled to L_4 for proper plate current with C_3 adjusted for maximum plate current while maintaining resonance under load. Be sure to keep the modulator out of r.f. fields. The modulator is shielded in tin with all leads in and out bypassed with .001 mf disc ceramics. On the modulator, R_2 controls the clipped level output of the 6AL5; the higher the level, the greater the percentage of modulation. Obviously, it should be set for less than 100%. It should not be a readily available control. Set it once and forget it. R_1 is the simple volume control and can be brought out to the front panel for accessibility. If you wish, the clipper can be eliminated by simply connecting C_4 directly to the grid of V_6 leaving out everything except R_3. Position one of S_1 merely connects the 0-1 ma meter on the transmitter to the receiving S meter and could be ignored.

Obviously a number of things have been left unsaid, but there should be enough here to put you on two meters if you are at all handy with a soldering gun and grid dipper. The "Lancer" has provided many hours of unusually fine operation out Waukegan way. We hope it does the same for you. It was designed and built by W9ZGS and K9PMU.

DX Doings

Six has been anything but dull according to K1WYS who has caught almost every *E* opening since Christmas. Harry, monitoring from Whitman, Mass., advises us of a short affair at 1830 EST on January 15 to the South that lasted about one hour. No contacts for K1WYS but locals did okay. Get that beam, Harry!

On Jan. 5 WA2JFZ, of Rego Park, N.Y. snagged K2GLQ/3 in the Philadelphia area. Nothing exceptional here but for the fact that this 100 miles was spanned with rather minimum gear: WA2JFZ with 25 watts input to three elements, and K2GLQ/3 with 1 watt to a dipole! WB2AXW dropped by the N.Y. office to say hello and mention that VE3CAU still owes him a QSL dating to last July confirming a six meter QSO. So how about a card for Paul? WB2CWG of Westfield, N.J., reports contacts with many W4s on Jan. 13 and 14, too numerous to mention here. Both days proved excellent for *E* work with S9 sigs consistent throughout the period. Moving up towards Ithaca, N.Y., we find K2ODL as apparently the only six meter man who caught the brief bursts of signals peaking to the northwest at about 2310 EST January 26. The frequency was approximately 50.110 mc and the signals built up fast and decayed slowly lasting only 5 seconds.

WA4HSK of Tuscaloosa, Ala., reports hearing Atlanta stations with S8 sigs on Jan. 25 at about 1400 CST. "I failed to write down the calls," Pat goes on, "because it only lasted a minute or so. Did anyone else have this experience?"

A note from K4NEH asks us to "stop in for an eyeball and have some coffee!" Vernon, operating from Portsmouth, Va., works for Priest Electronics where he comes in contact with many area v.h.f. men. If we're ever down that way, rest assured we'll stop!

RTTY news from Sacramento . . . K6BJQ, K6OLP and WA6GER are now on six meter teletype, usually at 50.200, and will be looking for DX during openings. They are AFSK using Model 15 teletypewriters and *RTTY Handbook* (available from *CQ*) converters and oscillators.

Two lengthy DX reports were sent in by members of the Michigan Six Meter Club through W8MBH listing many Sporadic *E* contacts made since December 6. In all these W8 op's caught openings on Dec. 6, 11, 13, 14, 15 and 16. So who sez six meter DX is a summer sport? Picking up where the Michigan boys left off is K8REG of Dayton who snagged some nice East Coast DX on Dec. 22, Jan. 2, 5, 13 and 14. And don't forget to write Vince for skeds! And while we're talking of skeds, let us not leave out K8VEX of Wayland, Mich., who wants to get tropo into Iowa on six meter sideband. Any takers?

Can anyone beat this? K9HOW was mobile on Christmas at 7:15 A.M. CST and made contact with K9UOK, John, of De Motte, Ind. (Paul, K9HOW, was sitting in his driveway in Chicago!) The QSO lasted for three hours and 15 minutes while Paul traveled a total of 138 miles from that driveway in the south side of Chicago to south of Georgetown, Ill., on U.S. Highway 1 to Florida.

Edenton, N.C., arrived in the form of WA4-LWK for K5RCG/Ø in Bellevue, Nebr., on Feb. 1st. Sigs were S7 two-way sideband. Dick, K5RCG/Ø, uses 12-elements on six meters, six horizontal and six vertical, up 45 feet. He's now using the Clegg Venus and is anxious for skeds to the Dakotas, Minn. and Wisc. W8KNC/Ø in Mohall, N.D., writes to let us know that he'll be travelling once again this season through some of the more choice DX locations and will be on the lookout for sms'ers (six meter skippers). More from Ira next month.

[*Continued on page 81*]

UHF ROUNDUP

an exclusive feature of The VHF Amateur

BY ALLEN KATZ*, K2UYH

ABOUT four years ago when the first man-made passive reflector (Echo I) was put into orbit, there was quite a flourish of amteur interest. The number of reported echos was enough to make one flinch, especially when it is realized that Echo I was theoretically at least 5 db poorer a reflector than the moon . . . But any oldtimer can tell you about theoretical predictions. He might even remember what the experts said about the frequencies above 200 meters. And how about v.h.f. being useful only for line-of-sight communications? You can still find textbooks around which define the distance reliably covered on frequencies above 50 mc as 1.32 times the square root of the antenna heights.

We now know that most of the signals received back from Echo I can be explained by an ionization phenomena similar to that of meteor scatter, which makes the satellite appear a better reflector than it actually is. With this information I guess many amateurs are contemplating giving the new reflector Echo II a try. U.h.f.-wise we could say that Echo II is still *theoretically* several db below the moon, that the ionization effects *should be* negligible on frequencies above 220 mc, and that with the narrow beamwidth antenna in use (and necessary) tracking the satellite should be *close to* impossible. And actually all this should be said, for our point has not been that all theoretical knowledge should be rejected, but rather that it should not be accepted blindly.

Take for instance the world above 2300 mc. Many amateurs still think these frequencies are only good for line-of-sight. You know that only a few years ago the record on 1296 mc was only 225 miles. Now it's over 2,000 miles! These frequencies offer great possibilities for the amateur who wants to do "state of the art" work without a 30 foot dish. The 5650 mc record is only 34 miles, not even half of 10,000 mc record. Pulse techniques could even be used to bridge this gap. Isn't it time to give these frequencies a try?

On the Technical Side

Last year we ran a piece of news about a system of f.m. detection devised by Win, W9JIY, for his APX-6. It seemed only reasonable that since much of the APX-6's modulation is f.m., an f.m. detector at the receiving end might produce better results. Win tried the idea and found he obtained more than two "S" units gain by making the change. At that time we did not have space to print the f.m. detector's circuit. But now with the weather turning warm and the increase in APX-6 activity that brings, we thought that many of the fellows might like to try this modification (shown in fig. 1). It has the added features of eliminating radar signal interference and being adjustable via the buzz control to either a.m., f.m. or a combination of the two.

We received a note from Cal, K2ODL, who is working on his Masters thesis in antenna systems for polarization measurement. Doing much of his research on 430 mc, he has come up with some facts which are quite interesting. "On these frequencies a grounded grid circuit seems to operate best. We use 7077 ceramic triodes in a two stage amplifier. This is followed by a manufactured unit containing a crystal mixer. The measured (and we have the equipment to do it right) noise figure is 6 db, with very little tinkering. This is about 2 db better than a 6CW4 and about 6 db better than a trough line using a 6AJ4." A lot of fellows have been aware of this for quite a while. Of course you need a quiet diode—1N21E or F, etc.—and then there is the psychological comfort of knowing you have an r.f. amp. "I might add that it is imperative that the antenna circuit be tuned. With r.f.c. coupling into the cathode it is impossible to achieve a good noise figure." Take a look at the old Tapetone u.h.f. converters; this is why they used a tuned cavity in front of the mixer. Cal also had some comments on u.h.f. antennas which are worth noting. "For those who are contemplating use of long yagis on 432 mc, I have one word of advice. Forget it!" I do not know, but there must be a secret to success with yagis on the u.h.f. bands. Some of the gang swears by them. W8PT uses four 15's stacked, and his record speaks for itself. There is also Tom, W1EUJ, who did his M.S. thesis on Long Yagi design on 2400 mc. We just don't happen to be one of those people. "I spent about two weeks trying to match a commercial Yagi to 52 ohm coax. It just wouldn't match. I tried everything to no avail. The easiest antenna to construct for this frequency appears to be the corner reflector. An array of eight large ones (60 degree angle and 2 wavelengths on a

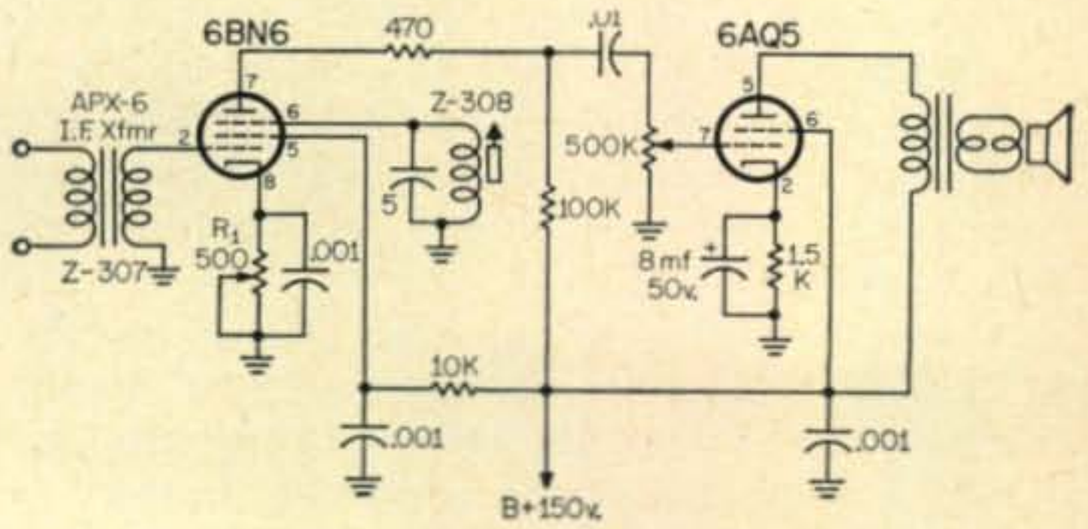


Fig. 1—W9JIY's modification of the APX-6 receiver to an f.m. detector. Remove V_{307}, V_{308} and V_{309} tubes and replace with this circuit. Transformer Z_{308} is used as a quadrature coil and should be tuned for maximum audio. Adjust R_1 for best speech quality and volume.

*48 Cumberland Avenue, Verona, New Jersey. 07462.

side) will give 21 db gain, which is about as much as we get from our 17 foot parabolic reflector." There are a lot of people who agree with your last point; it is just too bad we don't see more corner reflectors on 432 or even some more collinears. Keep up the good work Cal!

Activities

Dave, W9ZRX, sends word of the activities of the Naval Avionics Facility Amateur Radio Club to stimulate interest in 432 mc, especially in area of television. "As a club project we are in the process of building a rotating beacon similar to one in use for several years at the M-O Valve Co. Ltd. in England. The beacon will incorporate a precision frequency standard for equipment calibration, a kilowatt transmitter, and a continuously rotating skeleton slot antenna. Range capabilities may possibly extend from Indianapolis to Chicago, St. Louis, Louisville, Cincinnati, and Dayton.

Due to the wide bandwidth of a video signal the exact frequency placement of this beacon is quite a topic for discussion. It would be quite helpful to us if you mention this project in your *CQ* column. We would appreciate comments your readers might have on the project and the frequency location of the beacon." Will do. I guess most of our readers are aware of the unwritten law limiting amateur television operation to the top ten mc. of the ¾ meter band. This agreement does pose a problem when beacon or translator operation is considered, since the bandwidth of a TV signal without a vestigual sideband filter is about 8 mc. Thus allowing only one station to operate in the television sub-band at a time (in this case the beacon). For a translator, where a TV signal is relayed, another frequency is necessary to retransmit the signal on, only compounding the situation. There are two possible solutions to the problem. One is to see what the 432 phone and c.w. gang think about the use of another video channel between 420 and 430 mc. Most serious narrowband operation is conducted between 432 and 436 mc. What do you say, fellows? The other is to move up to a higher frequency band like 1215 mc which has room for several television channels. With units as the APX-6 around with 60 mc i.f.'s (just right for Channel 2) and wideband transmitters, getting TV on this band is not as difficult as it sounds . . . With groups like Dave's springing up every day, this could become a serious problem. We foresee in the near future the beginnings of an Amateur Television Network—and would appreciate comment.

A serious British moonbounce group appears to have formed under the leadership of Ralph, G2HCJ. At this time the group is concentrating on the 2 meter band with a possible frequency of operation of 145.8 mc. Equipment under construction includes a 1 kw transmitter using 4X500's, a 20 db cross-Yagi array on an alt-az mounting which will track the moon, a two meter parametric amplifier, and a phase-locked receiver. The major difficulty at their end is the development of the lock-in receiver, which is a system of "under the noise" detection more advanced than any yet suggested in print in any amateur publication. Good luck, fellows!

Here in the U.S. present moonbounce efforts center around 432 mc. The Houston group, under W5SDA, has a working moonbounce system and has been able to receive its own echos for several months now. They are severely hampered, however, because their 30 foot dish is not polar-mounted. This problem seems insurmountable due to residential restrictions prohibiting the mounting of the dish. K2TKN has entered the moonbounce picture in full regalia: 1 kw transmitter and a 256 element collinear array! Attempts are being made to contact the Houston group, although the going is rough due to the short period of time when they have a clear shot at the moon. The British may also get into the 432 mc moonbounce picture with G3CCH and G3LTF most actively pursuing this end.

Vic, W5HPT, comes through with another report of u.h.f. doing in the southwest. "Winter season has slowed down our ability to work Houston on 432. The path remains operable from W5AJG to K5SDM (about 200 miles), but signals are not what they were. Finished up conversion of 46ADT unit as crystal-controlled converter for 432 mc using two 8058's; haven't had an opportunity, however, to really check it out. Appears to be on a par with perhaps a little less noise, than the dual 416B converter." How about some more information on that little gem, Vic? Much of the most serious 70 cm work is coming from Texas these days.

That's it for this month. We would appreciate any news, comments, technical ideas, *pictures,* etc. These items are the heart of any column—but more of this next time.

73, Allen, K2UYH

"Oh . . . One day I tried to be helpful and washed his microphone with the dishes."

VHF Report [*from page 78*]

Don Martinez, K6ZXS, sez that after eight long years, "I finally got 1,000 QSLs on six meters . . . It was necessary to work 1,200 stations to get the 1,000 cards. The breakdown was unusual: 75 outside of the USA proper—41 Japanese, 6 Alaskans, 4 Hawaiians, 1 New Zealand and 23 from Canada; 119 USA 1st district, 150 from 2nd district, 56 threes, 26 fours, 20 fives, 412 sixes, 81 sevens, 19 eights, 15 nines, 27 zeros. Of the 200 not replying, even to my blank QSLs, 55 were out of California and 145 inside of my state.

"I cite these figures," K6ZXS goes on, "because QSLing is becoming a lost courtesy and secondly because of the many fine DX contacts that have been made on a supposedly 'line of sight' band (all made with a simple three element antenna)." Interesting story, Don, with perhaps a moral for us all?

New station in Puerto Rico is Ralph Miller, KP4BPH, who you read about several months ago. He's looking for skeds (for test purposes) between 0000-0400 EST any day on 50.154 mc. Other stations active now are KP4's ANG, BCU, BRE, BRI and BMQ.

VP7CX in San Salvador, Bahamas, reports a weak opening on February 1 in which he worked about four stations. Bud, VP7BG, was also on with a Clegg Thor VI and worked a half dozen skippers. And these were his very first contacts on six! All QSLs should go to Bud Clabough, VP7BG, c/o RCA San Salvador AAFB, Patrick AFB, Florida, 32925. (Same QTH as VP7CX). Incidentally, if you'd rather not go direct to Harold in the future, you can send your VP7CX cards through W9VFO. Stand by for a big season, boys!

Doing a bit of bandswitching now, we find KN1FOM from East Boston, Mass., writing that he's made 1,160 contacts on two meter phone since June 22 of last year. And a good portion of this work was accomplished with a Heath Twoer and halo!

Two meter tropo DX is the word at WB2CLN in Flushing, N.Y. Tom reports excellent conditions on Jan. 2, 8, 10, 12, 14, 17, 19, 22, 24 and 27! Most contacts were into Mass., upstate N.Y., etc. And don't forget WB2CLN for skeds! "Any W4's, any frequency, every day in the morning about 6 A.M. or at night after 8 P.M. EST."

Gary Fisher, K9WZB, possibly our most dependable two meter reporter, comes through again this month with news from New Carlisle, Ind. Gary's made contacts with K8VMA, Franklin, Ohio (on sked every nite); WA9FUO, Forest Lake, Ill. (Dec. 22); WA9DOT, Grafton, Wisc. (Dec. 22); W8SDJ, Cincinnati, Ohio, (Jan. 6), and K9TEW in Ossian, Ind. (Jan. 13). And on Jan. 7 came Gary's real pride and joy QSO—

WØDQY on c.w. in St. Louis,—370 miles. Congratulations!

Across the pond G2DHV in Sidcup, Kent, now has a homebrew 10 element close spaced Yagi constructed for portable and mobile work this summer. And this is just part of the story! Big things are in store for two meter G's this season! Will keep you posted.

Wrap Up

We still have plenty of Reader Reporting Forms for the "DX Doings" section of this column. If you are interested, drop me a self-addressed stamped envelope for your supply.

See you in the contest!

73, Bob, K2ZSQ

T-14D Modified [*from page 43*]

plugs into J_1 on the front panel. An antenna change over relay is also contained in the set, with a coaxial receptacle for the antenna and for the receiver.

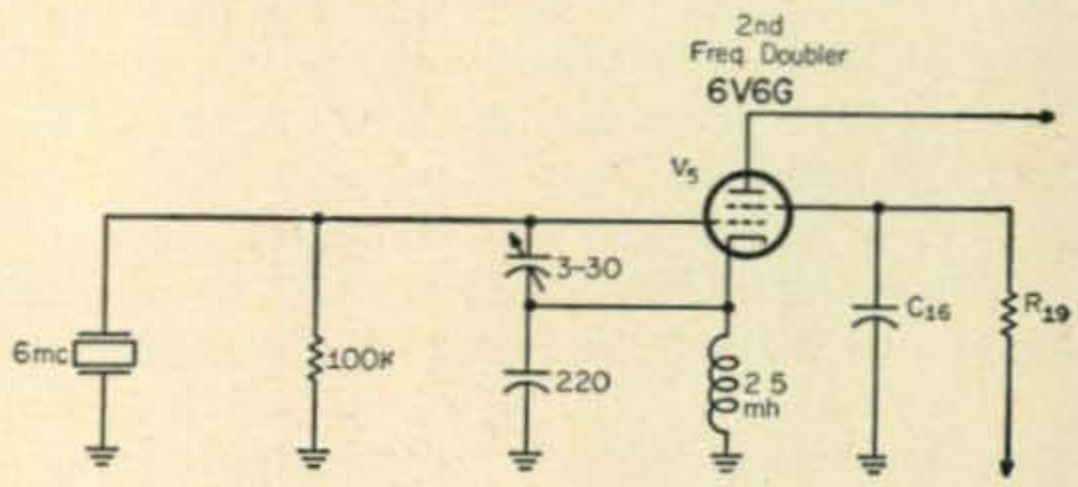


Fig. 3—For a.m. operation, the f.m. modulator is disabled by the removal of tubes V_1, V_2, V_3 and V_4 and rewiring of V_5 as shown above. The addition of plate modulation in the final completes the a.m. modification.

A.M. Conversion

It was mentioned that the T-14D might be used as a 50 watt carrier output conventional a.m. transmitter. This is true and can be accomplished by merely inserting, in the final B+ line, a modulator of about 50 watts audio output. Also, since the phase-modulating portion of the transmitter would no longer be required, it would be possible to bypass several of the stages and insert a higher frequency crystal further down the multiplier line. For instance, using crystals in the 6 mc range, it is possible to convert tube V_5 into a crystal-oscillator stage and use the crystal in its grid circuit. The plate circuit of V_5 would be resonated in the range from 6240-6744 kc and the rest of the transmitter would require no changes. The circuit of V_5 could assume the conventional grid-plate type crystal oscillator. A suggested circuit is shown in fig. 3. Then all previous tubes (V_1 through V_4) could be removed from the chassis in this case.

Used as an f.m. transmitter, the quality is excellent on the T-14D and for the surplus price involved, this represents an excellent value, since the transmitter contains the power supply and is practically ready to plug into the a.c. line. ■

SBE powerful, peak performance pair

SB-33/SB1-LA . . . diminutive duo . . . four-band (80-40-20-15) SSB transceiver/exciter and high power linear amplifier. Bright, state-of-the-art version of a full thumping kilowatt . . . entirely self contained, **including all power supplies** . . . in two tiny cabinets! The only "extras" needed are microphone . . . antenna . . . two lineal feet of mounting space . . . and a strong desire for a clean-cut big signal. And when you look at the photograph above, (the 664 dynamic **does** look big in comparison to the linear amplifier behind it) consider that the SB-33 transceiver on the right also includes **an outstanding receiver** capable of solid-copy reception of the DX that is bound to be stirred up by the KW signal from your powerful pair.

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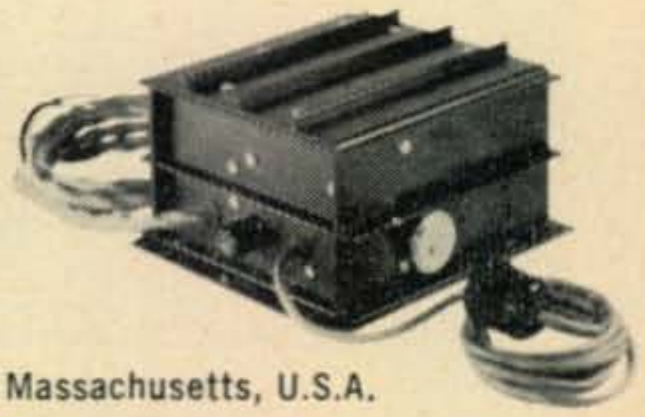

Export sales: Raytheon Company, International Sales & Services, Lexington 73, Massachusetts, U.S.A.

For further information, check number 56, on page 110

VHF Contest Rules [*from page 40*]

CQ V.H.F. CONTEST

Log For 50 Mc Band Call K2ZSQ

(Use separate log for each band.) Page 2 of 7 Pages

DATE / TIME	STATION	COUNTY & STATE	SERIAL NUMBER Sent	SERIAL NUMBER Received	County Mult.
5/4/64-1303	W2FXR	Essex, New Jersey	59071	59006	1
1305	WA2IIO	Passaic, New York	59002	59004	1
1307	WA2LXE	Passaic, New Jersey	59003	59005	1
1313	WA2JVO	Bergen, New Jersey	59004	59035	1
1315	K2UDA	Queens, New York	59005	59001	
1316	WA2HLJ	Queens, New York	59006	59004	
1319	WA2IBQ	Essex, New Jersey	59007	59010	
1323	K2UIB	Bronx, New York	59008	59008	1
1332	W2UIP/2	Passaic, New Jersey	56000	59009	1
1339	WA2NIS	Queens, New York	59010	59007	
1327	K2UTD/0	Nassau, New York	59011	59011	1
1339	W2PAT/2	Cape May, New Jersey	59012	59007	1
1345	W2LCY	Morris, New Jersey	59013	59011	1
1427	W2GHF	Bergen, New Jersey	59033	59017	
1429	K2PAO	Union, New Jersey	59034	59009	1
1433	W2ZYK	New York, New York	59035	59013	1
1441	W2UVB/2	Schenectady, New York	59036	59037	1
1447	K2UTJ/2	Bennington, Vermont	59037	59040	1
1456	K2UOH	Albany, New York	59038	59033	1
1458	K2UOU	Union, New Jersey	59039	59007	
1455	K2UOJ	Union, New Jersey	59040	59011	

CQ Form 1052A eff. Feb. 1963 (other forms may be used)

VI. MULTIPLIERS

Three types of multipliers will be used in this contest.

A) COUNTY

A multiplier of one (1) will be allowed for each *new* county worked on each band.

B) HOUR

A multiplier of one (1) will be allowed for each hour of station operation during which at least *one* contact is logged. The maximum number of multiplier hours allowed for any station in any category will be twenty-four (24).

C) POWER

A multiplier of 1.25 will be allowed for stations which at no time during the contest period run in excess of 50 watts input on any band. Stations exceeding 50 watts input will use a power multiplier of one (1).

CQ V.H.F. CONTEST Page 1 of 7 Pages

☒ Single Operator ☐ All-Band, Multi-Operator ☐ Multi-Operator, Single Band

☒ Check If Power Multiplier Used. Station Call K2ZSQ

	50 Mc	144 Mc	220 Mc	(Other)		
Contacts	112	41	13		= 176	(A)
Counties	39	16	4		= 59	(B)
Hours	15	7	2		= 24	(C)

The maximum number of multiplier hours will be twenty-four (24).

				Sub-Total
176 (A)	× 59 (B)	× 24 (C)	×	249,216

× 1.25 (Power Mult.)

301,520 Total Score

☒ Club Aggregate Scoring Requested. Name of club Radio Mountain VHF Society, Inc.

Transmitter Description and Power 50 mc: Homebrew, 25 watts. 144 mc: Co-muniestor III. 220 mc: 2C39 tripler.

Receivers National NC-183 with nuvistor converters for 6 through 1¼ meters.

Antennas 50 mc: 11 element long-john. 144 mc: 4 element Quad. 220 mc: 8 elements.

Other operating aids VFO, checksheet.

Remarks (Suggestions, Criticisms, and Comments)

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

Robert M Brown (Signature)

Name ROBERT M. BROWN (USE BLOCK LETTERS) Call K2ZSQ

Street and Number 67 Russell Avenue

City Rahway County UNION State New Jersey

Submit logs to: CQ, 300 West 43rd St., New York 36, N.Y. Att: VHF Contest Committee

CQ Form 1061 eff. March, 1963.

VII. LOG INSTRUCTIONS

A) Use separate log sheets for each band. (Logs available from *CQ* – Please include a large self-addressed envelope).

B) All times are to be kept in *local* time.

C) Fill in the date (required only once), time, call, county and state, serial number sent and received. PRINT or TYPE.

D) All contestants are expected to compute their own scores. Logs should be checked for duplication and proper point and multiplier credit before submission.

E) Be sure to include a signed pledge stating that all rules have been obeyed and that all logged data is accurate. This pledge is included on standard summary forms also available from *CQ*.

VIII. SCORING

Scores will be computed by multiplying the *total* contact points × *total* county multiplier × *total* hour multiplier × 1.25 (power multiplier, if applicable).

EXAMPLE:

100 Contacts
× 10 Counties
1000
× 10 Hours
10,000
× 1.25 Power Mult *(If applicable)*
12,125 Final Score

Multi-band stations will compute their score by *adding* contacts, counties, hours on all bands; then proceeding as below.

EXAMPLE:

200 Contacts (100 on 50 Mc– 100 on 144 Mc)
× 20 Counties (10 on 50 Mc– 10 on 144 Mc)
4000
× 20 Hours (10 on 50 Mc– 10 on 144 Mc)
80,000
× 1.25 Power (Use only *once* if applicable)
100,000 Final Score

IX. AWARDS

A) Certificates will be awarded to the highest scoring station in each state or country on each band or bands. In addition, high-scoring Novice Class entrants will receive certificates issued on a national basis. Additional awards will be made in this category at the discretion of the Contest Committee.

B) A certificate will be awarded to the highest scoring entry in the club aggregate competition. In addition, an engraved trophy will be awarded by *CQ* on a rotating basis to the overall high scoring club in the club aggregate category.

X. DISQUALIFICATION

Violation of the amateur rules, the rules of this contest, unsportsmanlike conduct, or insufficient log data will be deemed adequate cause for disqualification. Amateurs entering this contest agree to abide by the decision made by the Contest Committee.

XI. DEADLINE

All logs must be postmarked NO LATER than June 1, 1964. Logs received after this date will be used for checking purposes only! Results of this contest will be published in *CQ* for August.
Send logs directly to:

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300 West 43rd Street
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- ★ Changing Crystal Frequencies
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- ★ Trouble Shooting
- ★ T-R Relays
- ★ Improving Your Phone Rig
- ★ Improving C.W. Operation
- ★ Receiver Hints And Modification
- ★ Ideas For Your Transmitter
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30S-1 Linear Amplifier	1556.00	122.53	57.05	34.79
32S-3 Transmitter	750.00	59.06	27.50	15.81
62S-1 VHF Converter	895.00	70.48	32.81	20.01
75S-3 Receiver	680.00	53.55	24.93	15.20
75S-3A Receiver	750.00	59.06	27.50	15.81
KWM-2 Transceiver	1150.00	90.56	42.16	25.71
KWM-2A Transceiver	1250.00	98.43	45.83	27.95
51J-4 Receiver	1464.00	115.29	53.68	32.73
51S-1 Receiver	1828.00	143.95	67.02	40.87
351D-2 Mobile Mount	120.00	9.45	4.40	2.68
MP-1 14V DC Power Supply	198.00	15.59	7.26	4.42
PM-2 Portable Power Supply	150.00	11.81	5.50	3.33
CC-2 Carrying Case	85.00	6.69	2.99	1.90
CC-3 Carrying Case	107.00	8.42	3.92	2.28
516F-2 AC Power Supply	115.00	9.05	4.21	2.57
312B-4 Speaker Console	195.00	15.35	7.15	4.36
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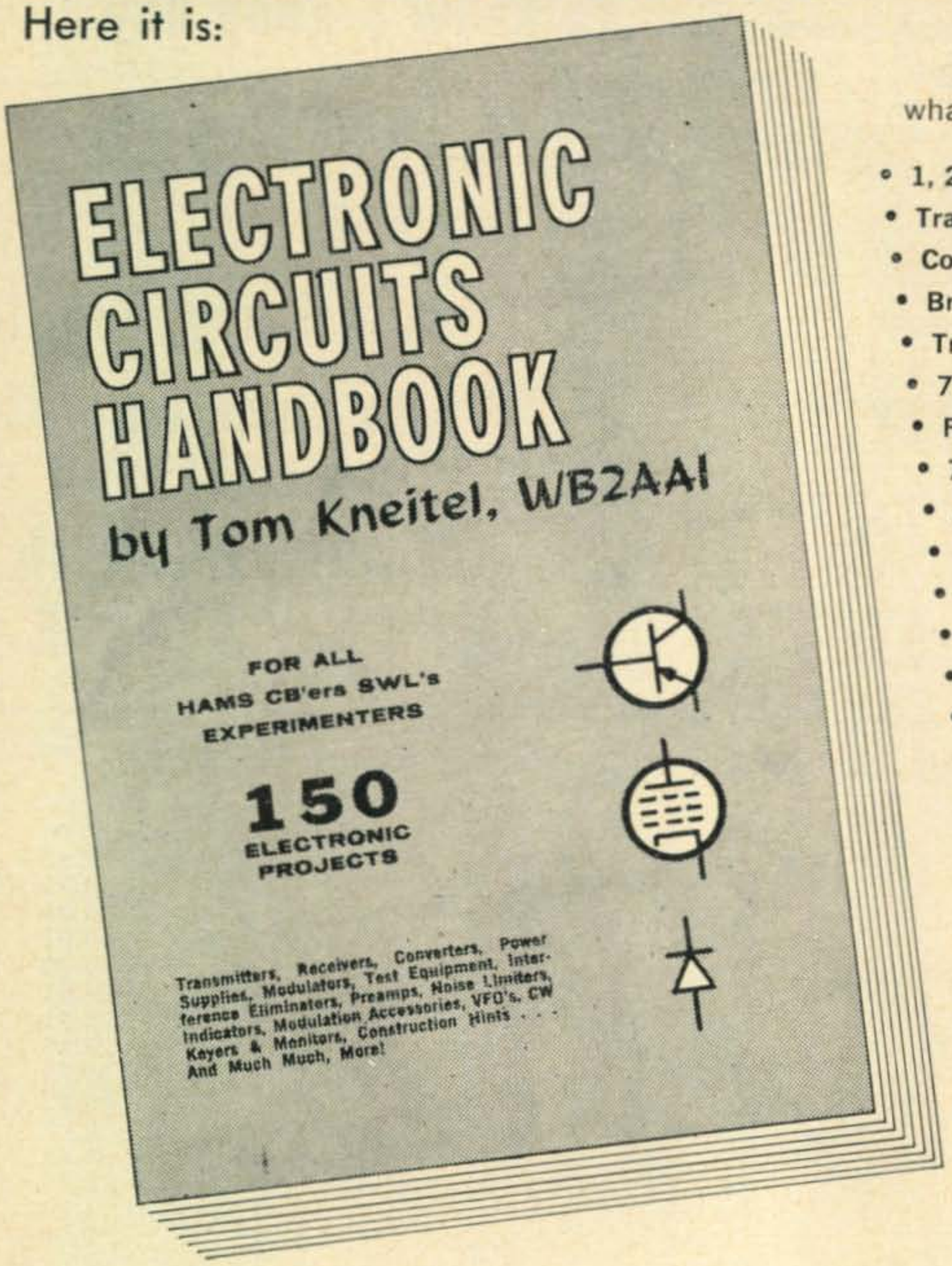

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- A VFO frequency checker circuit
- Electronic keyer circuit
- Zener diode generator circuit
- One tube receiver circuit

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Letters [*from page 12*]

1933-34 when Frank was W8CRA. He was not only the loudest but the only signal coming through on 20 here on the west coast. Frank always operated at the top end of twenty.

There were many occasions when I was on an oil tanker during this period bound for Australia that I would listen for W8CRA on the twenty meter band. Who besides W6QD was S-9 in those days? Why, W8CRA of course. Thereafter I made it a point during the next several years to hear Frank's loud signal while cruising from Japan, China and the Philippines and he was always the strongest and most consistent signal on the band. You figger it out!

How many can remember XU1U in the early thirties? Archie Davis lives in San Diego but has been off the air for many years. He hasn't forgotten that antenna going up the brick chimney in Canton, China though. I expect many can still remember the thrill working that raw a.c. note.

Ed Marriner, W6BLZ
528 Colima St.
La Jolla, Calif.

S.S.B. Reports

Editor, *CQ*:

Regarding K2SYJ's letter, (February *CQ*) about s.s.b. signal reports, I think his bug is out of adjustment.

We all know a c.w. report is RST 599. Why not substitute the last "9" for carrier suppression on s.s.b. A completely suppressed carrier would then be 590; with a trace of carrier 591, and so on up to 599 for no suppression at all.

Brian D. Goodnaugh, VE7WU
Oliver, British Colombia

Announcements [*from page 14*]

North Penn A.R.C.

The North Penn Amateur Radio Club's 11th Annual Dinner Dance will be held at Souderton Fire Hall, Souderton, Pa., on May 23. Festivities begin at 7 P.M. and tickets may be purchased from K3ROK, (price $3.75 each). Jack's address is 309 Prince Frederick St., King of Prussia, Pa. No tickets will be sold at the door.

Illinois

The Moultrie Amateur Radio Klub will hold its annual Hamfest and auction sale on April 26, starting 9:30 A.M. The American Legion Building at Wyman Park, Sullivan, Illinois is the meeting place. Plenty of equipment will be on hand and free coffee and donuts will be served during morning hours. W9PHD, 904 West Jackson, Sullivan, Illinois will direct all interested parties.

Corrections

In the "Wideband Filter For The 75A-4" (*CQ*, January, p. 50) the input to transformer T_2 is actually going to the secondary rather then the primary. Transformers T_1 and T_3 are conventionally connected, *i.e.*, input to primary. The circuit will function quite well, however, regardless of the hookup of the transformers.

"The 22 Watt Monster," in *CQ* for December, 1963 omitted the current ratings of the r.f. chokes. The plate choke should be 100 milliamperes and the cathode, 100 ma.

Olson Six [*from page 36*]

Switching and Controls

SEND-RECEIVE switching is accomplished by means of a 4 p.d.t. relay which transfers the antenna, the high-voltage supply lines for the receiver or the transmitter stages and cuts the loudspeaker on and off. The relay is operated by a push-to-talk switch on the microphone (also supplied) for which there is a standard

Here's Steve W9EAN (Manager of our Milwaukee Store) trying out the "Push Button" Tuning feature of the New Squires-Sanders Receiver.

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SS-1S Noise Silencer	135.00	4.69
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Zeus, 6 & 2 meter Transmitter, Modulator/Power Supply	$745.00	$26.72
Interceptor B, 6 & 2 meter Receiver	495.00	17.69
Interceptor Allbander, HF Frequency Tuner/Speaker	129.95	4.51

DESCRIPTION	PRICE	Look at the low monthly payments after just $5.00 down
99'er, 6 meter Transceiver	179.95	6.31
Thor 6, Transceiver RF	260.00	9.20
Thor 6, model 417 AC Power Supply/Modulator	139.95	4.87
Thor 6, model 418 DC Power Supply/Modulator	159.95	5.59
Venus, 6 meter SSB Transceiver	495.00	17.69
Venus, Model 416 AC Power Supply	110.00	3.79
Lo-Pass Filter, Model 372	14.95	—

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three-way jack on the front panel.

Panel controls are: ANTENNA LOAD, P.A. TUNE, OSCILLATOR PLATE, VOLUME with power switch, SQUELCH, B.F.O. TUNE and RECEIVER TUNING. Slide type switches are also provided for frequency spotting, b.f.o. on and off, crystal or v.f.o. selection and for metering. The latter function transfers the meter between the receiver and the transmitter. The positions are marked R.P. and S, the meaning of which is not at first apparent. R.P. stands for relative power (transmitter output), S stands for S-units (receiver).

Performance

Specifications are 0.5 μv for 6 db signal-to-noise ratio and image rejection of 44 db. Test results came close to these figures. Selectivity of 3 kc (6 db down) is a big help during QRM; however it does make tuning very sharp and sometimes touchy with the 6 to 1 drive ratio used. The tuning dial is calibrated in 250 kc increments which are spaced about ½" apart, an arrangement which makes logging and resetability more difficult than if calibrations at smaller increments (100 kc) were available.

After a brief warm-up period, the frequency stability is very good and no chasing around after a signal is required. Drop and vibration tests indicated no adverse effects on the frequency. Noise limiter operation is effective, as is the squelch. Plenty of a.f. output volume also is available. The b.f.o. is very handy for spotting signals and also may be used for copying s.s.b.; however, the b.f.o. disables the a.v.c. and since there is no r.f. gain control, strong signals will overload the receiver and make the beat note sound "squeegy."

Transmitter

Carrier output power into a 52 ohm dummy load measured almost 7 watts. Maximum attainable modulation was 75% at which point the waveform of the modulated peaks squared off. This type of performance is typical of single-ended modulator operation. Modulation also was slightly downward, but some upward modulation and a little higher percentage could be realized by reducing the size of the cathode resistor of the modulator tube. Tests indicated nice sounding audio quality with good readability, having better modulation than usually heard.

Packaging

The Model RA-570 is housed in a well ventilated gray cabinet. The panel is the same shade gray and has white lettering. The control knobs are polished aluminum and they have a solid feel when operated. The meter is an edgewise mounted type. The size of the unit is 12½" w. × 4¼" h. × 7¼" d. and it weighs 14½ pounds. The instruction book contains complete information on installation and operation, theory of operation, alignment procedures, maintenance and trouble shooting. Data is also given for the construction of a 52 ohm 12-watt dummy load,

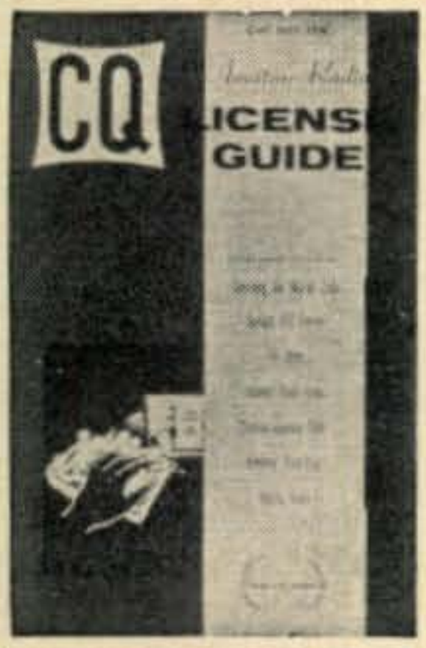
THE CQ HAM MART

MOBILE HANDBOOK

Anyone who tries to go mobile without getting this book, should think twice before going ahead. *Bill Orr, W6SAI* has put everything you need to know in this book, Build-its by the dozen . . . solutions to ignition problems, keeping the battery charged, noise . . . only *$2.95* postpaid.

COMMAND SETS

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.



CQ LICENSE GUIDE

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

THE NEW RTTY HANDBOOK

A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by *Byron Kretzman, W2JTP* a well known authority in the field. This book is a must for your library! Only *$3.95*.

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with indicating meter, for use during tuneup.

In regard to the circuit diagram, an error was noted in the specified frequency for the bandpass coupler between the r.f. stage and the first mixer. T2-1 is tuned for 50-52 mc, *not* 10.7 mc.

The size, appearance, performance and cost of the Olson Six, Model RA-570 Transceiver, should appeal to the low-power six-meter enthusiast. Except for the antenna, it provides a complete station setup which may be conveniently moved about for either fixed or mobile service. No prices were available at press time, but as you read this the supplier (Olson Electronics, Inc., Akron, Ohio) should be able to furnish the information.—*W2AEF*

DX *[from page 54]*

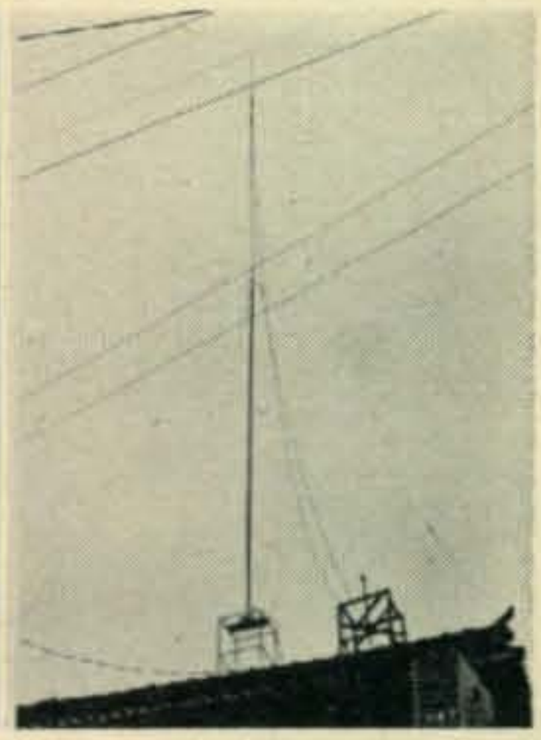
Full information may be obtained from ZS6IP or ZS4OI.

QTHs and QSL Managers

Thanks to the following for this month's collection of QTHs and QSL Managers: CE3AG, W1ETF, K4SHB, KØEZH, K6ICS, W9ADN, W3HNK, VERON, LIDXA, WGDXC, NEDXA, PRDXC.

LA8LF reports that he has been unable to obtain any logs from February 20, 1963 or later from LA5FI/P of Spitzbergen fame. LA5FI is now home in Norway so try your luck direct.

W9ADN also reports non receipt of logs from VR5AA. Owen suggests you try him direct: H. J. Chapman, c/o Head Office Engineering Section, New Zealand Broadcasting Corp., P. O. Box 98, Wellington, New Zealand.



Hiroshi, JA4AKL, uses this rig and the ground plane to put one of the best signals from Asia into W-land. A single 6146 puts all of 16 watts into the antenna. *(Tnx WA6OHJ)*

AP2AD	Box 65, Lahore West Paksitan
AP5GB	via W4ECI
CEØAC	via CE3HL
CX2AJ	Enzo Sommaruga, Box 122, Montevideo, Uruguay
EL2AD	via K5SGJ
EL8AF	via SSA, Stockholm, Sweden
EP2DM	via W2IPB
ET3GC	APO 843, c/o PM, N.Y., N.Y.
FB8WW	via 5R8BC
HC8FN	via WA2WUV
HS1S	Box 2008, Bangkok, Thailand
K1KSH/KG6/VK9	via W1ETF Bruno Puglia, Box 373, West Haven, Conn. 06516
K4JLD/6O1	via WA4QNY
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Standard scan, compatible with domestic receivers, uses horizontal frequency of 15,750 cps and vertical frequency of 60 cps (synchronized by power line). Check with EIA test patterns demonstrates high resolution and linearity. Modulated RF output at 25 mv is enough to feed any number of TV sets; direct video output is 1 volt p-p. Output is matched to RG59/U cable (not included). Draws negligible power (approximately 18 watts) from standard 115-volt a.c. line. Camera comes with 25mm F:1.9 lens, but the C-mount lens base accepts all common 16mm motion-picture lenses, such as wide-angle, telescopic, zoom and others.

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The HV-13A closed-circuit TV camera has many uses in the home, in industry and in the laboratory. It can be used for keeping an eye on the baby in another room or on the lawn, for remotely observing hazardous operations or experiments, and for providing service to sports fans at race tracks or arenas. It can be combined with a microscope to present highly magnified views to numbers of people in educational TV or other applications.

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YA1AN	via DL3AR
XEØICS	via K6ICS
YA5A	via W4ECI
ZD7SE	via WØGDX
ZE4JS	via W3HNK
ZK1AR	via K4SHB (new QSL Manager) 423 Palermo Ave., Coral Gables, Fla. 33134
ZS2QK	(Queen Maudsland Antarctica) Box 253, King Williams Town, Union of South Africa
5X5JG	Box 4326, Kampala, Uganda
5Z41V	via W2CTN
6O6BW	via WA4FXE
7G1IX	Box 477, Conakry, Republic of Guinea
9X5MH	via DL1LC

73, Urb, W2DEC

Contest Calendar [*from page 57*]

DAR, or better still, write K6BX, Box 385, Bonita, Calif. for his latest news releases on the doings of the Certificate Hunters Club.

Ed. Note

Space does not permit much comment this month. But I must report the howling success of our 160 meter contest, as all of you who participated know. European crossings were a dime a dozen, some were even made in the early evening hours, and the top contenders reached totals of better than 200 contacts. How about that?

Due to the record number of logs received this year and the fact that a great number of foreign logs had to be scored, the results of the *CQ* WW DX Contest will be a month late. Phone results will be in the June issue and c.w. results will be in the July issue.

73 for now, Frank, W1WY

Prop. [*from page 59*]

Argentina, Chile & Uruguay	12-16 (1)* 06-08 (1) 08-13 (2) 13-16 (3) 16-17 (2) 17-19 (1)	11-15 (1) 15-18 (2) 18-20 (3) 20-22 (2) 22-06 (1) 06-09 (2) 09-11 (1)	18-21 (1) 21-03 (2) 03-05 (1)	20-04 (1) 22-02 (1)†
McMurdo Sound, Antarctica	14-16 (1)	10-12 (1) 16-17 (1) 17-18 (2) 18-20 (1)	01-06 (1)	*NIL*

Time Zone: PST (24-hour Time)
WESTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	*NIL*	05-11 (1) 11-12 (2) 12-15 (1) 20-23 (1)	19-22 (1)	*NIL*
Northern Europe & European USSR	*NIL*	06-10 (1) 19-22 (1)	19-22 (1)	*NIL*
Southern Europe & North Africa	12-16 (1)	06-11 (1) 11-13 (2) 13-16 (1) 20-23 (1)	19-22 (1)	19-21 (1)

Eastern Mediterranean	*NIL*	08-12 (1) 18-21 (1)	*NIL*	*NIL*
Central & South Africa	10-13 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-19 (1)	19-21 (1)	20-21 (1)
Central Asia	*NIL*	08-14 (1) 20-22 (1)	04-06 (1)	*NIL*
South-east Asia	16-20 (1)	07-10 (1) 20-23 (1)	03-06 (1)	03-05 (1)
Far East	19-21 (1)	07-09 (1) 09-12 (2) 12-19 (1) 19-21 (2) 21-23 (1)	01-02 (1) 02-05 (2) 05-07 (1)	02-03 (1) 03-05 (2) 05-06 (1) 02-05 (1)†
Pacific Islands & New Zealand	12-16 (1)* 09-11 (1) 11-16 (2) 16-18 (3) 18-20 (2) 20-21 (1)	01-07 (1) 07-11 (2) 11-18 (1) 18-20 (2) 20-22 (4) 22-23 (3) 23-01 (2)	23-01 (1) 01-05 (3) 05-07 (1)	00-02 (1) 02-05 (2) 05-06 (1) 02-05 (1)†
Australasia	15-19 (1)* 12-18 (1) 18-20 (2) 20-22 (1)	20-22 (1) 22-00 (2) 00-07 (1) 07-09 (2) 09-13 (1)	00-01 (1) 01-05 (2) 05-06 (1)	00-02 (1) 02-04 (2) 04-05 (1) 02-04 (1)†
North & Central South America	12-13 (1)* 13-15 (2)* 15-16 (1)* 06-08 (1) 08-13 (2) 13-15 (4) 15-17 (2) 17-19 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-06 (1)	18-20 (1) 20-01 (3) 01-02 (2) 02-05 (1)	19-20 (1) 20-01 (2) 01-04 (1) 20-01 (1)†
Argentina, Chile & Uruguay	12-16 (1)* 06-07 (1) 07-13 (2) 13-16 (3) 16-17 (2) 17-19 (1)	12-15 (1) 15-17 (2) 17-20 (3) 20-23 (2) 23-03 (1) 03-05 (2) 05-08 (1)	18-20 (1) 20-02 (2) 02-04 (1)	19-03 (1) 20-01 (1)†
McMurdo Sound, Antarctica	14-16 (1)	06-07 (1) 10-12 (1) 16-17 (1) 17-18 (2) 18-20 (1)	03-06 (1)	*NIL*

*Predicted 10 meter openings, all others in column are 15 meter openings.
†Predicted 160 meter openings, all others in column are 80 meter openings.

Ham Clinic [*from page 67*]

on input). With up to 14 volts, nearly 750 millivolts out can be obtained. The 2N741 transistor can be mounted directly to the chassis for good heat sinking. This r.f. amplifier is highly stable and works very well, especially on 80 meters—if it is not driven too hard and the transistor ratings are not exceeded. By changing coil and capacitor values it will operate nicely to 28 mc.

NC-183 Microphonics—"What causes my NC-183 to 'ping' when I change bands or when I rap the cabinet?"

No doubt a microphonic tube. You can find it by turning down the sensitivity control, and with headphones on, listen for the loudest 'ping' as you strike each tube with the eraser end of a pencil. This old receiver certainly has done well.

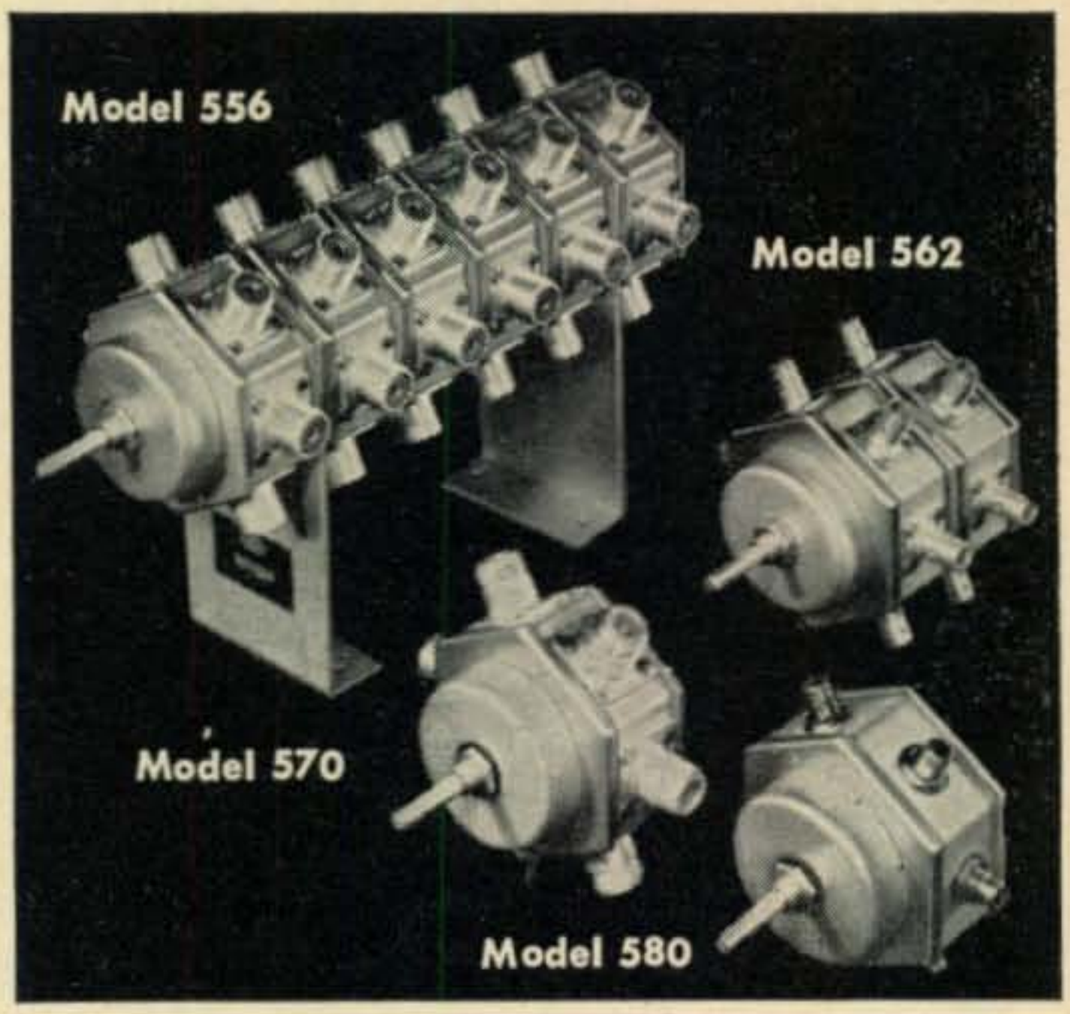
P.E.P. Output and Input Power—"Some manufacturers rate their s.s.b. transmitters at a given p.e.p. input power, while others rate theirs at a given p.e.p. output power. Please enlighten me."

Using a two-tone test signal, the p.e.p. output power will generally be in the neighborhood of

COAXIAL TYPE SWITCHES

. . . multi-position, single or multiple gang

Now you can switch coaxial line circuits quickly and without error. These handy, inexpensive units are available with "UHF", "BNC", "N" and Phono type connectors for use with either 52 or 75 ohm lines. Phono connector types are specific for Hi-Fi applications. Other types are designed to handle RF Power up to 30 MC, 1 KW input.



Stock items ready for shipment are:

Model 550A—Single gang, single pole, 5 position switch with UHF connectors. Price: **$8.25** each.

Model 551A—Single gang, 2 pole, 2 position special purpose switch with UHF connectors. Ideal for switching any device in or out of series connection in coax line circuits. Price: **$7.95** each.

Model 560—Single gang, single pole, 5 position switch, same as Model 550A except with BNC type connectors. Price: **$11.95** each.

Model 561—Single gang, 2 pole, 2 position special purpose switch, same as Model 551A except with BNC type connectors. Price: **$9.95** each.

Model 570—Single gang, single pole, 5 position switch, same as Model 550A except with N type connectors. Price: **$13.35** each.

Model 580—Single gang, single pole, 5 position switch, same as Model 550A except with Phono type connectors. Price: **$7.35** each.

Multiple gang types, up to 6 gang for single pole—5 position switches, and as required for 2 pole—2 position switches, are made to order with any connector types listed above. Prices on request.

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Foreign Sales—Royal National Corp., 250 West 57th St., New York 19, N.Y.

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For further information, check number 37, on page 110

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Imported

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A great 2-in-1 combination. Tuned interstage circuits and 2 stages of RF amplification assures higher signal-to-noise ratio, improved I.F., image rejection. Easy to install.

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twice the d.c. (average) input power, considering final rf stage efficiency, *etc.*; but the p.e.p. input power will generally be around 1.57 times the d.c. input power—when measurements are accomplished using a two-tone test. What goes into the antenna is what counts. All tests of course must be made at the minimum distortion point, *i.e.*, below the peak compression and flattening areas. Remember: a one kilowatt s.s.b. signal has the same communications effectiveness as a 4 kilowatt a.m. signal, all other things being equal.

Antenna With S.S.B. and A.M. (Power Rating)—"If I have an antenna which is rated with a peak power rating of 1000 watts, how many watts a.m. and how many watts s.s.b. can I use on this antenna?"

You can use 1000 watts p.e.p. on s.s.b., because all power is in a sideband—or 250 watts a.m.—for when a carrier is modulated 100%, the a.m. p.e.p. is *four* times the carrier power.

A Real Public Service—As the world knows, our U. S. Peace Corps has certainly established a reputation for helping others to help themselves! They can be found today scattered over the globe doing their assigned jobs quietly without fanfare, propaganda and big salaries.

What about amateur radio in the emerging nations (especially in the lands of our African friends)?

What I (and many others) would like to see started, is an "Amateur Radio Liaison Division" within our Peace Corps to acquaint the emerging nations with the importance of ham radio as an educational hobby, a public service devoted to improving the communications technologies of their citizens and to afford an additional means of routine and emergency communications.

Some Peace Corps workers *are* hams and all they need is the equipment—they will take care of teaching some of the people with whom they are working and living, and really introduce ham radio!

On the other hand, a "Division" in the Peace Corps composed of about six technically qualified and patriotic amateurs could do much. With the help of American manufacturers who would donate equipment (tax deductible), they could assist selected people in emerging nations to become hams who in turn could teach others.

Perhaps the ARRL would be interested—they should be.

Let us hear from you on the subject with some *concrete* ideas. We'll forward selected letters to the Chief of our Peace Corps. Write today!

Thirty

Jet airmail to my present QTH in Luzern, Switzerland, at 4 Lützelmattstrasse takes about 7 hours. The postage for your letter is 15¢ and the return postage (airmail) to you costs up to 30¢. In order to speed replies, I have been paying airmail postage for as many as 200 letters each month. You can see that this cannot go on. Surely your question and the time that we spend

on it is worth 45¢ postage. The service we render is free otherwise. There are no consultation fees. So when you write to us, either at my home QTH or to *CQ* please include two International Postal Reply Coupons or 25¢.

We will appreciate this and will give you real quick service.

72, 73, and 75, Chuck

RTTY [*from page 69*]

my FB-7 receiver be used on RTTY; how can I convert my TR-4 for f.s.k., *etc.*?" And, of course, "Where can I get an RTTY handbook?" Not all the questions can be answered by reading the *New RTTY Handbook* ($3.95, postpaid, from Cowan) or by reading regularly your monthly RTTY Column, so we try to answer every letter. The letters answered first, though, are from those thoughtful enough to enclose a self-addressed stamped envelope.

P.S.: How about a photo of *your* RTTY ham shack?

73, Byron, W2JTP

Electronic Key [*from page 39*]

Turn the SPEED control to minimum resistance (maximum speed), KEYING RELAY and BIAS controls to maximum resistance and then key dots. Now, turn BIAS counter-clockwise until dots are properly formed. Then turn BIAS further until dots are slowed to a smooth rate (this position is about 100 ohms from ground). By adjusting the KEYING RELAY (actually the weight of the characters) the definition of the dots can be improved. However, do not put the adjustment near the critical point, but about a quarter of a turn from it so that when the batteries drain, no further adjustment need be made. After alignment of the DOT-DASH RATIO so that a dash is about three times as long as a dot, the electronic keyer is completed. Correct operation will result until the collector batteries are drained to about 10½ volts under load. Many hours of pleasant telegraphy transmission will pass before the electronic keyer needs any attention by way of replacing the batteries.

The story of this electronic keyer would not be complete without grateful acknowledgment of K6YVZ, Ken Benson's splendid pictorial contribution. ■

Freq. Shift Keyer [*from page 35*]

ing components. Shown is the configuration for the HT-32B. Other models are almost identical. The "sandwich" clamp is made from a scrap strip of aluminum. Two 8-32 by ½-inch screws and two wing nuts make the unit easily removable. Since the transmitter is not altered in any way its resale value is retained.

The total cost of parts, using catalog prices, is about $12, and considering the crystal-clear keying that results (sounds like a press station going full blast), it is well worth it.

With this unit properly installed, it is almost

LEO MEYERSON WØGFQ

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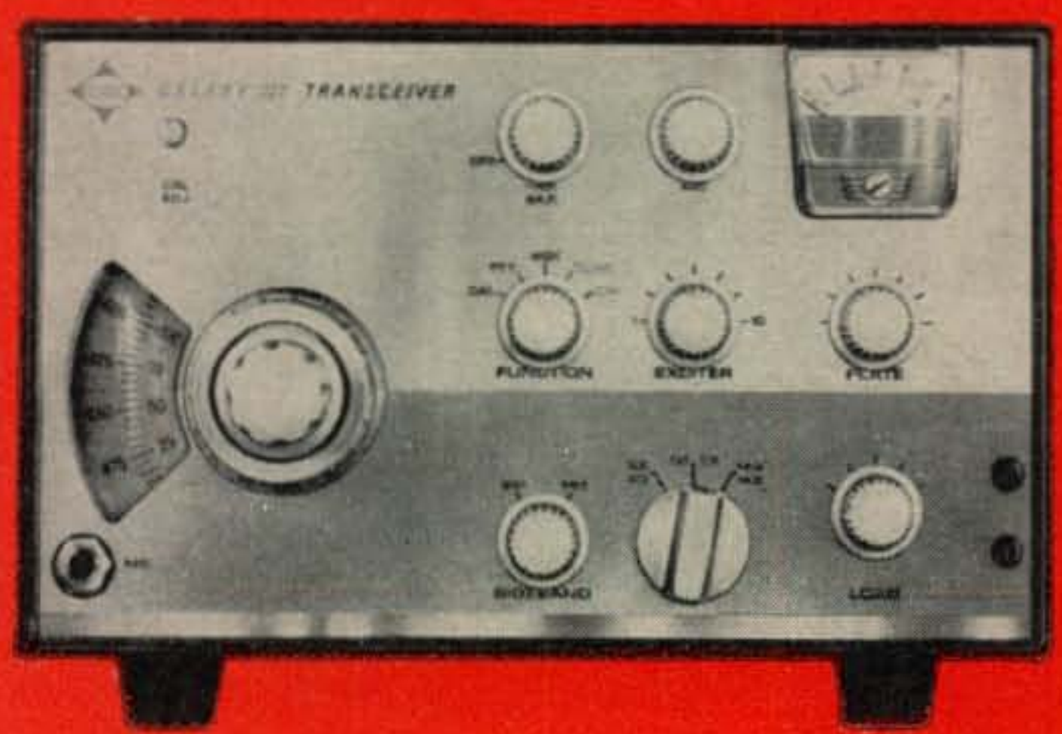

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City_____ State_____

For further information, check number 33, on page 110

impossible to have one of those "yerpy" sounding signals that are so difficult to print, especially if a little QRN, QRM, or QSB crowds in. ■

Class C Linear [*from page 33*]

linear are made to order for mobile s.s.b. Mobile operation is no place for low efficiency, big tubes, low stage gain, or circuits allergic to poor supply regulation.

Last, but not forgotten, the c.w. man should find this a welcome circuit in that, if he operates s.s.b. occasionally, he doesn't have to change operating conditions in the final to get his customary high efficiency in c.w. operation.

Building and experimenting with the Class C Linear has been interesting and rewarding. It can be for you too. ■

Low Pass Filter [*from page 30*]

across the tank in small steps until the frequency rises to a point where the measured potential drops to one-tenth that of the reference potential. The oscillator frequency will then be —20 db down the skirt of the filter as indicated in fig. 1. ■

Ionospheric Amplification [*from page 28*]

> be given to you for the early work you did in this field, and I propose to call this anti-region in the ionosphere the "Ostermond Layer," in your honor. I must beg you though, dear friend, to keep the contents of this letter to yourself, since the data is still closely guarded by the country that launched the special satellite. I believe that you understand what I mean."

Yes, unfortunately, I full well understand what my ex-colleague means. But, as a scientist I cannot let a political wall block scientific progress. I have severed all my relations with my old country, and soon I expect to become an American citizen. I believe, that since I was the first to discover ionospheric amplification, radio amateurs in this country should be the first to benefit from it. This is a small contribution I can make to show my love for my new homeland. For these reasons I have decided to publish the letter from Professor Düssel, and this article.

On April 1, 1964 I shall become an American citizen. The first thing I will do after taking my oath will be to go to the nearest FCC office and take the amateur license examination. If all goes well, by the time that this appears in print, I may already be on the air, and the handle "Tor" will again be familiar on the ham bands. I am planning to conduct extensive experiments with low power transmitters on the amateur bands, and I will rewrite my thesis to include even more convincing data obtained from ground and satellite experiments already referred to in this article.

It is possible, that as a result of ionospheric amplification, in a very short time radio amateurs will be using lower and lower power transmit-

ters, instead of the ever increasing trend toward higher power evident during the past several years. This, of course, could revolutionize amateur radio in the future! ■

Series and Parallel Modes [*from page 47*]

pentode section and to provide better isolation between the pentode and the oscillator. The output of the buffer amplifier is more than sufficient to drive a 5763 as a tripler to its full output of approximately one watt at 144-148 mc. The d.c. current through the 100K resistor in the r.f. voltmeter circuit is less than 2 microamperes; the crystal resistance was measured to be 15 ohms so that the crystal dissipation is less than 2 milliwatts. Thus in two envelopes it has been possible to use an overtone crystal oscillator, with the crystal operating well below its maximum ratings, to go to the two meter band with sufficient power output to drive a high power amplifier. This arrangement has an advantage as far as TVI is concerned: no harmonics of the oscillator fall in a television channel and TVI problems are simplified.

The same basic oscillator circuit can also be used in the 6 meter band with excellent results.

Summary

In conclusion the difference between the series and parallel modes of a quartz crystal unit has been described; examples of oscillators using each mode have been presented. A modification of the Miller oscillator using an impedance inverting quarter wave transmission line and a method for adjusting the oscillator to true series made crystal operation and for measuring the crystal dissipation has been given. It has further been shown that the series resonant frequency of a crystal depends only on the crystal itself while the parallel resonant frequency depends on the capacity placed in parallel with the crystal. ■

Atko Keyer [*from page 49*]

When the Mini-Keyer is used to operate a transmitter or other external equipment, a relay is used in the unit to break the keyed circuit. The contacts of this relay are not designed to break high potentials or heavy currents. If the equipment can be keyed directly with a separate hand key without visible sparking at the key contacts, it will be safe to use the Mini-Keyer for automatically keying the transmitter. When this does not appear possible, an external transmitter-keying relay, operated by the Mini-Keyer, must be used.

The size of the unit is 7" × 5¼" × 3¾" and the weight is 3¼ pounds. The Atko Mini-Keyer is priced at $49.50 complete with one 16 w.p.m. capstan, three reels of practice tape and an instruction manual. Additional capstans for other code speeds are $2.00 each, as are additional reels of tape. The unit is produced by Automatic Telegraph Keyer Corporation, 33 West 42nd Street, New York 36, N.Y.—*W2AEF*

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Rates for the Ham Shop of 5¢ per word for advertising which in our opinion, is non-commercial in nature. A charge of 25¢ per word is made to all commercial advertisers or organizations. Since we do not bill for Ham Shop advertising, full remittance **must** accompany all orders.

Closing date is the 15th of the 2nd month preceding date of publication. Your copy should be typewritten, double spaced on one side of the page only.

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's? CB's? SWL's? Regular samples 20¢. Deluxe 35¢. Religious 20¢. (refunded). Sackers, W8DED, Holland, Michigan.

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A QSL card that is different! 100 3-color glossy $4.25 postpaid. Free sample. K4NVI Press, 17 Logenberry Circle, Valdosta, Ga.

QSLs large selection including photos, rainbows, cuts, etc. Fast service. Samples 25¢, includes beautiful 4-inch call letters for your shack. Ray, K7HLR, Box 1176, Twin Falls, Idaho.

QSL's Free samples. Little Print Shop, Box 9363, Austin, Texas.

CREATE a QSL with a Sampler Instruction Kit, 25¢. Cards $1.50 up per 100. Samco, Box 203 Wynantskill, N.Y. 12198.

Q-STAMPS Now $1.50! Postage stamp size photographs for QSL's! 50 large or 100 small, $1.50 per gummed-backed, perforated sheet. Free Samples. Q-Stamps, Box 149, Dept. 4A, Gary, Indiana. 46401.

QSL's Samples 25¢. Rubber Stamps; Name, Call, Address, $1.55. Harry Sims, 3227 Missouri Avenue, St. Louis, Mo. 63118.

QSL's—Brownie, W3CJI—3111 Lehigh, Allentown, Pa. Catalog with samples, 25¢.

QSL's 100/$4.00 High gloss, three color. Free samples, quick service. B&R Printing, Box 8711, Orlando, Fla.

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.

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.

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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.

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NOW! 1000 gummed name & address labels with call, $1.00; self-inking pocket name & address rubber stamp with call, $1.00. Boss's, Box 7-A, Grandville, Michigan.

For further information, check number 54, on page 110

RTTY TERMINAL Need your cash or ssb gear for high quality, ex-commercial-type FSK converters & afc & power supply. Compact, 3½" × 19", new in original boxes, 850 cy or narrow shift, 110-220 vac 50-60 cy dual or space diversity. SM5KI, Hans Goldschmidt, Persikogatain 74, Vaellingby, Sweden.

BULLETIN BOARDS for QSL cards. Now tack your cards on cork tack boards. These boards are trimmed in aluminum and come in all sizes and colors. Cork samples are 25¢. Robert Williamson K2UWM, 124-37th Street, Union City, New Jersey.

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FREE two or six meter coaxial antenna for ham in each state for test report. QSL Gotham, 1805 Purdy, Miami Beach, Fla.

GOVERNMENT SURPLUS, tubes, transformers, small parts, new and used. Free list. D. Reed, 1604 Grange Ave., Racine, Wis.

BEST CASH OFFER takes Collins 32V-2 Xmtr and 75A-1 receiver. Overseas, cannot ham therefore no trades. R. Glass Box 9 APO 63 San Francisco.

VIKING-1 (TVI-proof) $65; Heath vfo $15; Hallicrafter S-76 $65; Millen R-9er (20m thru 10m) $10; Heath Lab Generator LG-1 $20; Ultra-Modulation Clipper $25. Geo. Paules, 231 Sherman Ave., NYC-34.

FOR SALE Gonset G-77 Smtr, 12v. Power Supply, Modulator, All Cables, Mounting Brackets (excellent conds) $89.00 Regency ATC-1 converter (good condx) $29.00 & schematics. Both for $114.00. First check or money order takes. Will ship. KØTLV, Emmett, Kansas, 66422.

TRADE Twoer with ptt, Ev 714 mike, 2m halo, & cable, BC-459 xmtr, plus extras for T-150 or 80-6m xmtr. WB2JMN, N.Y. Tel TW 9-9147.

LOOKING for bargains? College expenses necessitate disposition of complete station. AF-67, HQ-100C, Globe Scout 680, SB-10, rotators, test equipment, surplus gear, xtals, all kinds of components. Send postcard for complete list and prices. Max Berendzen, K5HVR, 213 Sandra Drive, Irving, Texas.

FOR SALE Hallicrafers SX-71 $65. J. Towle, 103½ White Park Rd., Ithaca, New York.

FOR SALE HQ-129X with speaker back issues of QST complete from 1935 through 1957 also broken sets of QST and CQ from 1935 through 1963. Any reasonable offer considered. Write Mrs. Charles Mitten, 842 North Grant Ave., Indianapolis, Indiana 46201.

HAMMARLUND HX-500 with all factory installed modifications and instruction manual all in original carton $400.00. Hallicrafters HT-33A completely converted to a model "B" less cabinet as unit is now rack mounted $275.00. National NC-300 with xtal calibrator, speaker, in mint condition $200.00. Can ship all of above freight collect and have all instruction manuals. Eric Hansen, W6HOG, 1010 Pine St., Menlo Park, Calif. Phone 415-326-8489.

MUST SELL Complete years QST 1925 to 1929 incl. 1931 to 1963 incl. want six dollars per year, write for list of entire collection W9LX, North LaPorte Chicago, Ill. 60630.

G-76 with a.c. p.s. best offer over $200. SX-71 $100. Complete all band mobile $100. Supersix, Superceiver, TBS-50D, Heath vfo, 12v genemotor power supplies, 25 watt modulator, cheap. W8DRV, 7716 Big Creek, Cleveland, Ohio, 44130.

EXCELLENT KWS-1 and 75A-4 with three filters and speaker. All for $1100.00. cash and carry. K4UMC, 107 Chatham Lane, Oak Ridge, Tennessee.

FOR SALE Drake 2B receiver with 2BS speaker, ten meter crystals and crystal calibrator $215; Heathkit Twoer with mike and crystal $38; Heathkit HO-10 monitor scope $50; Knight T-150A transmitter $75; Heathkit transistor power supply HP-10 $30; W8PZQ, Howard J. Klinger, 26834 Parkington Ave., Roseville, Michigan 48066.

SALE Johnson Valient Transmitter, Johnson 250-30 Matchbox $275; HQ-129-X with matching speaker and eHath Q multiplier $100. Both units for $350. Pick-up only Glenn Farnsworth, 4409 Sharon, Pennsauken, New Jersey.

INVERTER 110 dc to 110 ac. 10 amps output at 60 cycles. No reasonable offer refused. Francis Hillisbush, K3KVK, RD #1, Ringtown, Pa.

FOR SALE ARP-5 $50; ARC-4 $15; ARB $25; National HFS 27-250 mc $50; Gonset 6 m Conv. $30; APT-26 TV xmiter $50; TN-19/APR-4 $15; ARR-8 conv. 70-520 mc. $15; Pair 4-400 New $20 each; TRC-8 220 mc $20; BC-924 27-39 mc. xmit vfo $20. All in excellent condition and working. K9RLF 830 N. Waller Ave., Chicago 51, Ill.

FOR SALE Hammarlund HK-1B keyer (perfect)! Wanted 813's, RTTY machine and TR switch. Letters answered. K4WJI, Route 1, Maysville, Kentucky, 41056.

FOR SALE Lafayette HE-35A 6m transceiver and Cushcraft 6m Halo. Write WA2RUW, RD 5 Box 159, Kingston, New York 12401.

CQ's FOR SALE April '45, May '46 and July '46 through November '58. Highest bidder. J. R. Palmer, 7425 Schuyler Dr., Omaha 14, Nebr.

WANTED Heath Twoer, reasonable condition, in trade for $60 tape recorder—2 speed 2 track, w/mike, full reel, spare, hardly used. Doug Martin WN2LQP, 301 Nason, RPI. Troy, N.Y.

RETIRED, going House Trailer no room. Viking II professionally wired excellent, all new tubes. Viking 122 VFO both $140.00. SX 111 nearly new perfect $150.00, all with manuals. About 160 CQ & QST back to 1948, not all years complete, 30 cents each for the entire batch. Bowman, W6NJF, Sacramento 25, Calif.

NCX-3 with ac supply new—less than 20 hours on the air—original cartons $350. K2TRU, Marty Schiff. Phone 212 CO 6-7387. Write: 1684 W. 8th St., Bklyn, N.Y., 11223.

COLLINS 75S-3 and 32S-3 in excellent condition would like to sell for M2. No trades. Highest bidder gets rack mounts free. John B. Holmes, Jr., Box 4125 Austin, Texas 78751.

HR-20 ssb and/or am Heath Rec'r. Very clean and professionally wired. Only $115. K3SBQ, R.D. #1, Montgomery, Penna.

SX-28 by Hallicrafters, beautifully reconditioned with new condensers, voltage regulator, 6BZ7 RF stage, complete modification plans and schematics. A classic receiver with real possibilities, only $75. WAØFPQ 115½, N. Covell, Sioux Falls, South Dakota.

CQ back issues 1946 to 1950 one fifty per copy; 1951 to 1962 one dollar per copy. Johnston, W5COC, Walnutsprings, Texas.

KWM-1 TRANSCEIVER complete with cables, 312B-1 speaker, 516F-1 ac supply, 516E-2 dc supply, 351D-1 mobile mount. All mint condition $595. FOB WØCVU.

WANTED converter and receiver 45 megacycles fm 12v dc also 45 mc 110v. Jack, W1AUD, 24 Lockwood, Watertown, Conn.

CERTIFICATE will be issued by Henry Ford Museum to any station that works Motor City Radio Club station W8MRM during the 24 hours prior to the Old Timers' Night banquet and program. Work W8MRM on May 30 (GMT) on 1.815, 3.660, 3.877, 7.040, 7.172, 7.215, 14.060, 14.230, 29.610, 50.178, 146.94 or 147.3 mc. QSL for certificate.

LAMPKIN Model 205A dual scale fm modulation meter. Manual and calibration scale excellent condition $187; (or more) postpaid. K7ZKZ, ex-K1JVN, Monson, Mass.

WANTED Precision Royal Scintillator and preamplifier also Esterline Angus Recorder 0-1 ma. Will pay cash or trade new amateur equipment. W5DON, Bryan Edwards 2430-33 St., Lubbock, Texas.

RTTY gear for sale. Write for list. 88 or 44 Mh Toroids. Five for $1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

ATTENTION HAMS! We buy, sell ham gear. Repair and alignment facilities available. Hold Advanced and First phone. Used gear always reconditioned. Money back guarantee. KitKraft Company, P.O. Box 406—Canal St. Station, New York N.Y. 10013.

BARGAINS Reconditioned guaranteed shipped on 15 day trial subject to sale. SX-99 $99.00, SX-110 $119.00, SX-100 $179.00, HT-32 $299.00, HT-37 $299.00, HQ-100 $119.00, HQ-110 $149.00, HQ-170 $229.00, HQ-180 $289.00. HRO-60T $239.00. NCX-3 $289.00, SW-240 $259.00, 75S-1 $349.00, 75S-3 $495.00, 32S-1 $395.00 to $495.00. Many other items. Write for list. Henry Radio, Butler, Missouri.

ATTENTION Have you seen Equipment Exchange? Interesting buy, sell, swap offers galore! Rush name for interesting sample. Brand, Sycamore, Ill.

PRINTED circuit boards. Hams, experimenters. Many different projects. Free Catalog. P/M Electronics. Box 6288, Seattle, Washington 98188.

NEW YORK area hams—Sell your used gear for cash through Amatronics PPA Service. We have the customers. See page 95.

COMMUNICATIONS teletype, unusual surplus bargains. Free flyer, MDC, 923 W. Schiller, Phila. 40, Pa.

ANTENNA tuning unit, brand new $3.00 postpaid (cost Navy $85.00). MDC, 923 W. Schiller, Phila., 40, Pa.

REMOTE CONTROL unit, 9 tubes, AN/ARW-26, brand new, complete, $5.00 postpaid (cost Navy $125.00) MDC, 923 W. Schiller, Phila., 40, Pa.

FOR SALE Collins 75A-4 Model No. 5195 with all latest modifications with 4 mechanical filter, 800 cycles 2.1, 3.1, and 6.1, plus matching speaker—Best offer. Also, Viking Ranger II like new—make offer. Call JU 2-4460 (NY) between 10:00 a.m. and 4:00 p.m. ask for Miss Mark.

WANTED URA—8A/CV89A cabinet less plug-in units. State price and condition. K1AJE, 50 Crabapple Lane, Groton, Conn.

FOR SALE: Collins 32V-2 in like-new condition, $175. Local sale preferred. K2QMM, 79-35 209 St., Flushing 64, N. Y.

WANTED: Early CQs. Jan., Feb., May, 1945. Last issues needed to complete collection. Write: A. M. Dorhoffer, 75-15 177 St., Flushing, N.Y.

BUY used equipment with confidence. See Amatronics ad page 95.

FOR SALE Complete instructions including 28 page booklet and 22" × 36" schematic for converting the ART-13 transmitter to a.m. and s.s.b. Satisfaction guaranteed. $2.50. Sam Appleton, 501 No. Maxwell St., Tulia, Texas.

FOR SALE New and used CB and 2-way F.M. radio equipment. Send for list. Dealer inquiry invited. Becom Co., Seminary Heights, Weatherford, Texas. 76086. 817 LY 4-5172.

TECHNICAL MANUALS for surplus electronics. Free list. W3IHD, 4905 Roanne Drive, Washington, D.C. 20021.

75A3, crystal calibrator, speaker, product detector, two filters, $300. TG10 keyer with 5 Army tape code lessons, $20. Apt #1, 424 W. Prairie, Decatur, Ill.

WANTED Panadapter for 455 kc I.F. in working condx. Mil surplus unit okay if p.s. included. State lowest price first letter. Box TK2, CQ, 300 W. 43 St., New York, N.Y. 10036.

SELL Hallicrafters HT-30 S.S.B. transmitter, $120; Johnson Ranger, $160; Early Heathkit SB-10 excellent condx, $50; Revere C-153 16 mm 100' Rollfilm Turret Movie Camera, $100. Want KWM-2 with portable a.c. supply and carrying case; also want Collins mechanical filters, advise model and price. Contact W4ADU or K1YYM.

TWO METER NOVICE STATION: Heathkit Twoer cleanly modified for push-to-talk operation and rotary switch crystal selection. Price, $55 postpaid. Includes three Novice band crystals, Turner 350C PTT mike and 110 v.a.c. cord. See photographs of this unit on pages 34 and 35, October 1963 CQ. Will ship immediately on first come basis: Bob Brown, K2ZSQ, 481 W. Grand Ave., Rahway, N.J.

JOHNSON DESK KILOWATT—new side band modification kit—Ranger PTT sequence keying—factory wired—Kilowatt Match Box swr bridge—new tubes—extra spares 4—400A's—810's—872 A's—not surplus—complete cables ready to operate—condition like new—$900.00 cash. Ted Brix—5573 No. Van Ness Blvd, Fresno 5, California.

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.

Did You Know

. . . that it costs only 5¢ a word to insert an ad in *CQ*'s Ham Shop? That's right; only 5¢ a word will buy you an ad that will be seen by more active amateurs than *anywhere* else! So, why wait to sell that extra piece of gear or those spare parts? Simply send your typewritten copy along with your remittance (based on 5¢ per word) to: Ham Shop, c/o *CQ*. The Radio Amateurs Journal, 300 W. 43rd St., New York, N. Y. 10036. You will find that your ad has more than paid for itself.

SACRIFICE: Almost new, mint condx 220 mc Communicator IV and same condx Gonset 6/2/220 vfo. Must raise cash. Best offer over $200 takes this station worth over $550. Box SN, CQ Magazine, 300 West 43rd St., New York, N. Y. 10036.

PHOTOSTAMPS 100—$1.50, Brochure, samples 10¢. Hank W8NLW, 443 Euclid, Akron, Ohio.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N. Y.

GLOBE CHIEF Transmitter Model 90A, Guaranteed. $39.95. Write Jim Howard, 10 Kenilworth Road, Wellesley, Massachusetts.

RUBBER STAMPS for QSL Cards. QSL kit includes: 2 stamps, ink, pad, plus 5 year QTH & call change certificate. Write for free information. E & R Stamp Shop, 50 Gerald Rd., Rantoul, Illinois 61866.

TOP QUALITY QSL's. 500—$6.50, 1000—$9.50 Postpaid. Send dime for brochure and samples. Adcock Printing, Marion, N. C.

SELL RTTY STATION CV 57-388-390A receivers. Central Electronics 200V. Model 19 Complete. Amico, 188-05 50th Ave., Flushing, N. Y.

CANADA: HRO, coils 180kc-30mc, ham bands bandspread, $150; fully converted R1155A, 85kc-18.5 mc, 150/1 tuning, Q-multiplier, anl, power supply, shaping filter, $80; all in excellent condition, offers. Jim Ellerington, VF6QJ, Box 73, Barrhead, Alberta.

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10 25′ Coils of Hookup Wire ONLY **98¢**

Top buy in stranded copper wire, tinned and untinned; assorted colors, gauges and insulation. 10 coils. 1 lb. No. 39 A 935.

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2A

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Capacities from 5 mmf to 1000 mmf. Working voltages from 600 to 5000 volts. Parallel wire leads. Pkg. of 40. 6 oz. No. 39 A 688.

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Audio Power Transistors 2 for **79¢**

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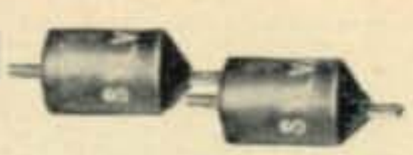
7A



Epoxy Silicon Rectifiers 2 for **77¢**

SAVE on rectifiers made by Sylvania to military specs. Rated 750 ma at 100 v. PIV. For power supplies, TV sets, kits, etc. Pkg. of 2. 3 oz. No. 30 A 669.

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3 9-Volt Batteries ONLY **59¢**

Quality long-lasting replacements for Burgess 2U6, RCA VS323, Eveready 216 and others. Lowest price; from Japan. 6 oz. Pkg. of 3. No. 55 J 147.

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Bargain Phone Plugs 3 for **78¢**

Standard ¼" plugs for extensions, speakers, headphones, monitoring equip.; 2 cond., unshielded. Pkg. of 3. 12 oz. Specify red or black handle. No. 39 A 020.

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Zener Diodes 12 for **$1.98**

Famous-brand Zener diodes, from miniature mw. units to stud-mounted 10-amp. types. 3-30 v. range. With diagrams. Pkg. of 12. 7 oz. No. 39 A 008.

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11

50 Tubular Capacitors ONLY **98¢**

Wax-impregnated capacitors; ranges from 100-600 WVDC in popular values. Various sizes. All values and working voltages marked. Pkg. of 50. 12 oz. No. 39 A 385.

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5-inch Round Speaker ONLY **98¢**

Quality PM replacement; good fidelity. Power cap. 3.5 watts. Imp. 3.2 ohms. Magnet weight 0.53 oz. EIA mounting dimensions. 12 oz. No. 39 A 009.

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13

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Wide-range; with hi-frequency whizzer cone. 12 oz. magnet; 40-14,000 cps; cap. 25 watts; imp. 8 ohms; standard mountings. 7 lbs. No. 39 AX 742.

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Pocket-size neon-type voltmeter; measures AC/DC from 65-800 v.; determines grounded side of line. 4 oz. No. 58 A 426.

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Ship me the items circled below in quantities shown:

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1		5A		9	Red / Black	13	
2A		6		10		14	
3		7A		11		15	
4		8		12		16	

NO COD's PLEASE: $_____ enclosed
(Please include postage; remit 15¢ per item ordered)

Name_____
PLEASE PRINT

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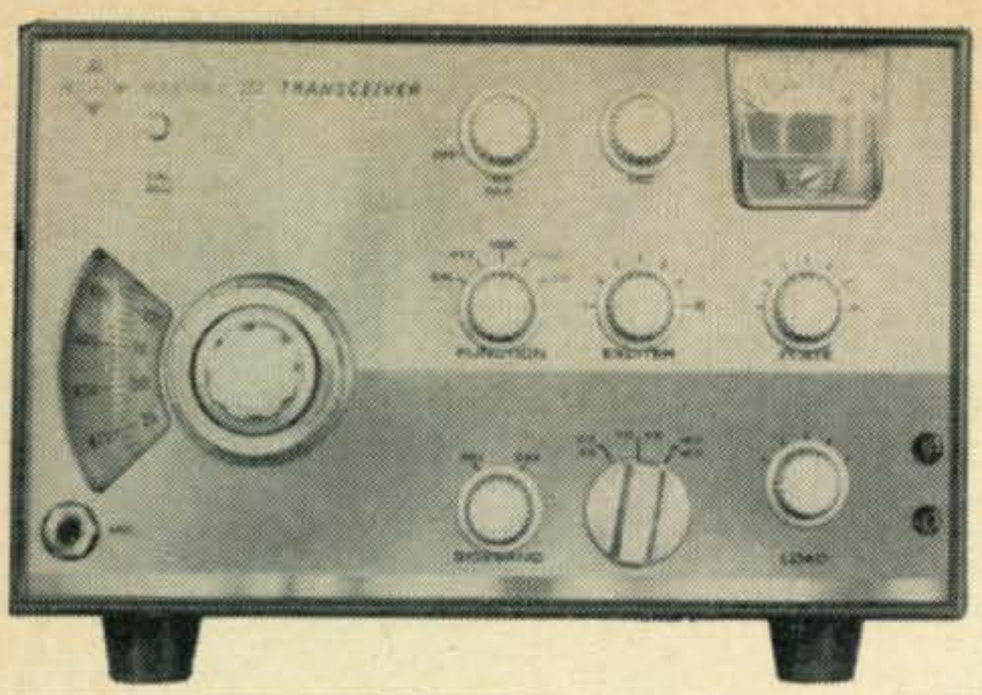

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STAY ON THE AIR PLAN
Not only will I give you a terrific trade-in allowance, but you can keep your equipment until you receive your shipment.

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If ordering on terms, please list following information on separate sheet and enclose with this order: Name, address, age, married? children? Employed by? Salary? How long? Own or Rent Home? To whom renting? or buying from? Wife employed? Own car?—who buying from? Three to five credit references. The more information you give, the faster we can approve your credit.

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ADDRESS _____

CITY _____ STATE _____

☐ Check for latest reconditioned bulletin.

For further information, check number 31, on page 110

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ave been in amateur (and commercial)
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the most enjoyable and interesting rig I
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In comparison with a higher priced unit
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ooks considerably better than the
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erformance and styling is much better
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W9K--, Park Ridge, Illinois

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Finest piece of communications gear
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've had the NCX-3 just over a month now,
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your advertisements say and then some.
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et amazing signal reports on mobile
Most fun I've had since I got on the
Very excellent piece of electronic
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3 is untouchable in its class.
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absolutely unbelievable, fabulous.
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This is one of the nicest pieces of
equipment I have ever had the privilege
to own.
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years and I am sure that this is the best
piece of radio equipment ever to enter my
room. Keep up the good work.
W9R--, Belleville, Illinois

Best VOX I've ever used!
K5R--, Dallas, Texas

Words cannot express my ultimate satisfaction with
the NCX-3. Thanks to National for putting such a
rig on the market.
K9M--, Peoria, Illinois

Am quite surprised and pleased with my
investment in the NCX-3. SSB reception
quality is best I've heard. Good job
National! K9A--, Cicero, Illinois

This rig is the best rig I have run for
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Best investment in amateur equipment I
ever made! WA4A--, Colonial Heights, Virginia

Couldn't be happier. Wouldn't trade this
NCX-3 for the world!
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Best piece of amateur radio gear on the
market for performance and price.
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I wish to state the performance is beyond
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Outperforms any other transceiver I have
heard. National has done it again.
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You have a wonderful rig in the NCX-3! I wouldn't
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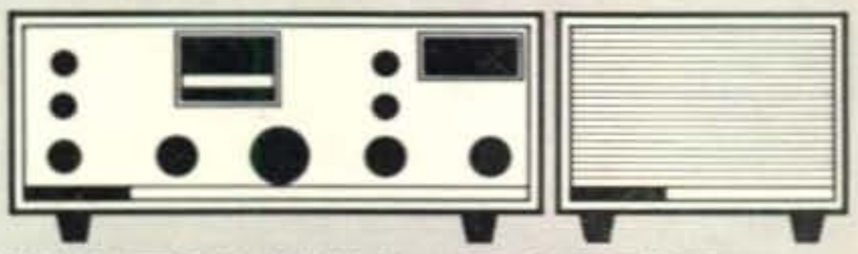
finest rig I've ever owned!
WØP--, Independence, Kansas

The nicest piece of equipment I've had
in many a year. W8L--, Lansing, Michigan



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For further information, check number 7, on page 110

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For the mobile man who wants a hefty signal from a compact rig, RCA High-Perveance Beam Power Tubes are the answer.

High-Perveance design enables you to get the power you want at lower plate voltages—making it easier to work with practical values of pi-network components, use more compact tank circuits and lower voltage-rated filter capacitors, simplify rf and dc insulation problems.

Another feature of RCA Beam Power Tubes for mobile service is their special heaters—designed to withstand the strain of repeated on-off operation and to operate efficiently over the wide range of voltages encountered in car electrical systems.

At "cruising" speed or engine "idle", RCA Beam Power Tubes have the ruggedness and performance capability it takes for mobile service. Check the Power Chart for the types you need.

Available through your RCA Industrial Tube Distributor.

Select your Power and Tube Number

Plate Input Watts			RCA Tube Type
CW	AM	Conditions	
9.9	—	CCS Max.	8077/7054
17	15	CCS Max.	6417
24	17.5	ICAS Max.	7551
40	27	ICAS Max.	6893
85	55	ICAS Max.	6850*
120	85	ICAS Max.	6883B/8032A, 8552
210	175	Typical	8072

*Twin Type (total for both sections)

For more technical data on any of these RC Beam Power Tubes, write: Commercial Eng neering, Sect. D-15-M, RCA Electronic Co ponents and Devices, Harrison, New Jerse

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