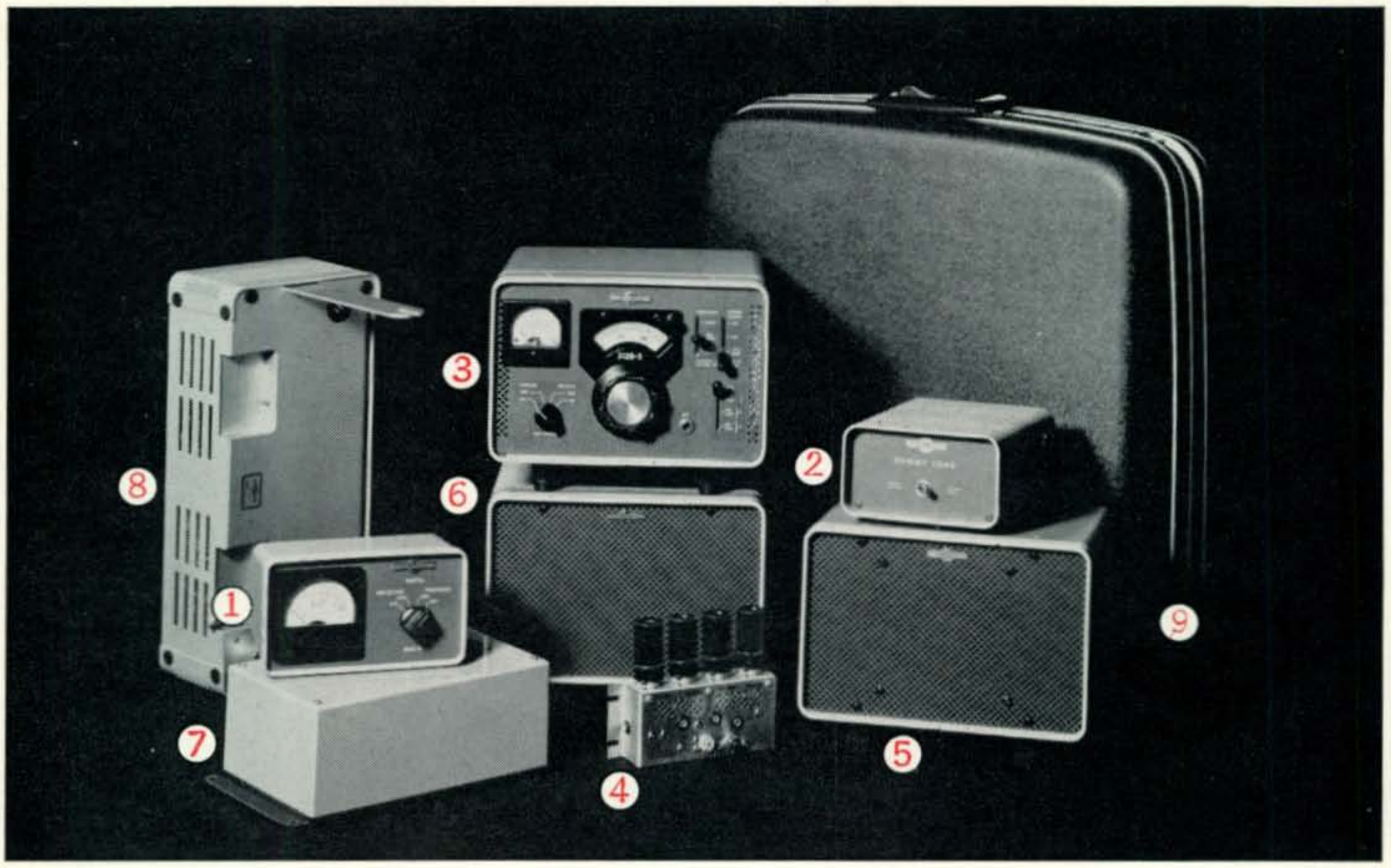

ICD
CQ
June 1963
50¢
Results of the
1962 CQ World-Wide DX
(C.W.) Contest
BY FRANK ANZALONE*, W1WY
Top Ten
ALL BAND—SINGLE OPERATOR
Top Five
MULTI-OPERATOR
SINGLE TRANSMITTER
Top Five
MULTI-OPERATOR
MULTI-TRANSMITTER
C. W. Results
SINGLE OPERATOR
North America
Europe
Asia
Africa
South America
Oceania
The Radio Amateur's Journal
H.A. Miller
1381 East Bates Pkwy.
Englewood, Colo.

Improve your rig with these Collins accessories



1. 302C-3 Directional Wattmeter — For fixed or mobile applications. Measures forward and reflected power on 200- and 2000-watt scales accurately (3.4 to 30.0 mc) without calibrating adjustments.

2. DL-1 Dummy Load — A 100-watt resistive load for all HF frequencies. Connects permanently in antenna coax line, with in-out relay switching. Provides easy comparison of antenna SWR and nonband interference tune-up. Type N and RCA antenna connectors are provided.

3. 312B-5 Speaker Console and External PTO — For use with KWM-2 in fixed station operation. Provides limited separation of receive and transmit frequencies, speaker, directional wattmeter, and switching for functional control system.

4. 136B-2 Noise Blanker — For use with KWM-2 in mobile operation. Effectively reduces impulse-type noise in the transceiver. Requires separate antenna resonance at 40 mc.

5. 312B-3 Speaker — Contains a 5″ x 7″ speaker and connecting cable. Styled to match S/Line and KWM-2.

6. 516F-2 AC Power Supply — Operates from 115 v ac, 50-60 cps. Provides all voltage for 32S-3 and KWM-2.

7. MP-1 Mobile Power Supply — Transistorized inverter powered from a 12 v dc automobile, aircraft or boat storage battery to the voltages required for operating the KWM-1, KWM-2 or KWM-2A.

8. PM-2 Portable Power Supply — Compact, lightweight and supplies all voltages needed for KWM-2. Operates from either 115 v ac or 220 v ac at 50-400 cps to give you a completely portable SSB station. An auxiliary speaker is included.

9. CC-2 Carrying Case — Specially designed Samsonite Silhouette case for KWM-2/PM-2 or 30L-1. Molded Royalite interior protects equipment against rough handling. Also available in model CC-3 for accessories.

These are just a few of the Collins accessories which can help you improve your rig. There are many more... mounts, microphones and adapters, to mention a few. Ask your authorized Collins distributor to demonstrate the advantages of Collins accessories. A new Collins book, *Amateur Single Sideband,* will be an invaluable addition to any ham's library.

Traveling through Iowa this summer?
Stop and visit our Cedar Rapids plant.

COLLINS

For further information, check number 48, on page 110

SUREST WAY TO T9X

PR CRYSTALS give you the finest frequency control that money can buy! PRs are built to PERFORM...under good conditions and bad. They have that extra measure of stability and dependability BUILT-IN . . . that *plus* of rugged precision that means years of unfailing service.

With PRs in your rig, you KNOW your signals are going out clear and strong and right on the frequency. You get longer distance, clearer reception, less drift. Yes, PRs are the SURE ROAD TO T9X. Get them from your radio parts jobber. EVERY PR CRYSTAL IS UNCONDITIONALLY GUARANTEED.

PR CRYSTALS

AMATEUR TYPES

Fundamental, PR Type Z-2

Frequency Ranges in Kcs.: 3,500 to 4,000 (80M); 7,000 to 7,425 (40M); 8,000 to 8,222 (2M); 8,334 to 9,000 (6M).

Rugged. Low drift, fundamental oscillators. High activity and power output. Stands up under maximum crystal currents. Stable, long-lasting; ± 500 cycles . . . . . **$2.95** Net

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

AMATEUR TYPES

Third Overtone, PR Type Z-9A

Hermetically sealed; calibrated 24,000 to 24,666 and 25,000 to 27,000 Kc., ± 3 Kc.; .050" pins. . **$3.95** Net

6 Meters, PR Type Z-9A

Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 Mc., ± 15 Kc.; .050" pins.

. . . . . **$4.95** Net

CITIZENS BAND CLASS "D"

Type Z-9R, Transmitter

FCC assigned frequencies in megacycles: 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225, 27.255, calibrated to .005%. (Be sure to specify manufacturer and model number of equipment) . . . . . **$2.95** Net

Type Z-9R, Receiver

Calibrated to .005%. (Be sure to specify manufacturer and model number of equipment . . . . . **$2.95** Net

Type Z-9R, Radio Control

FCC assigned frequencies in megacycles: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255; calibrated to .005% (Be sure to specify manufacturer and model number of equipment.)

. . . . . **$2.95** Net

Type Z-1, MARS and CAP

Official assigned frequencies in the range. Calibrated to .005%. 1600 to 10000 Kc. . . **$3.45** Net

Type 2XP

Suitable for converters, experimental etc. Same holder dimensions as Type Z-2. 1600 to 12000 Kc., (Fund.) ± 5 Kc. **$3.45** Net

12001 to 25000 Kc. (3rd Overtone) ± 10 Kc. . . . . **$4.45** Net

Type Z-6A, Frequency Standard

To determine band edge. To keep the VFO and receiver properly calibrated. .050" pins. 100 Kc. . . . . **$6.95** Net

PR Crystals

Since 1934

USE PR AND KNOW WHERE YOU ARE

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

COMMERCIAL CRYSTALS AVAILABLE FROM 100 KC. TO 70 MC. PRICES ON REQUEST.

For further information, check number 17, 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 μv 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 4, on page 110

CQ

The Radio Amateur's Journal

Vol. 19, No. 6 June 1963

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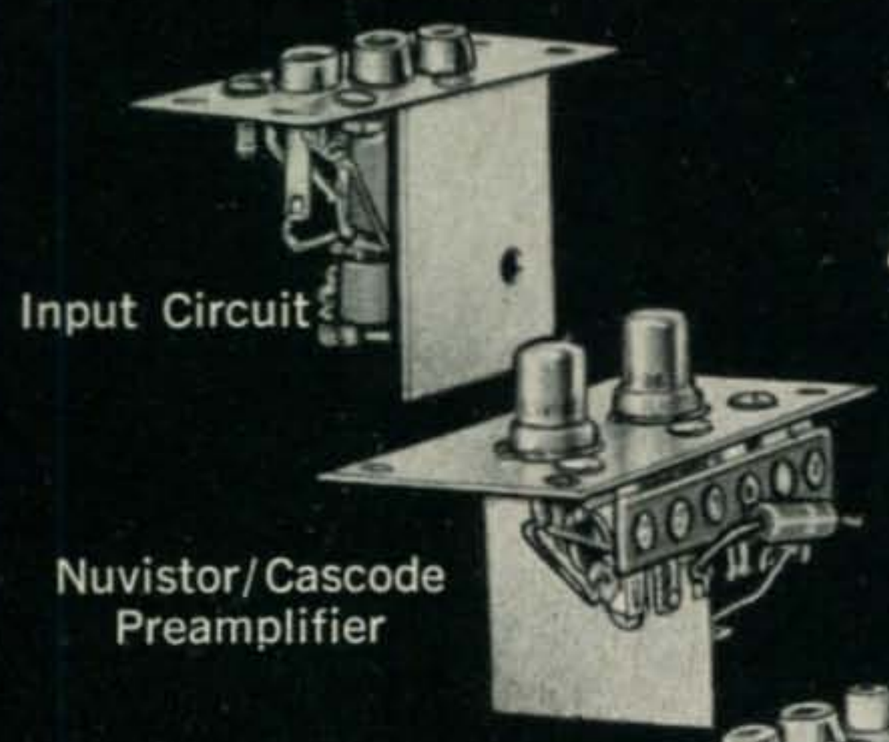
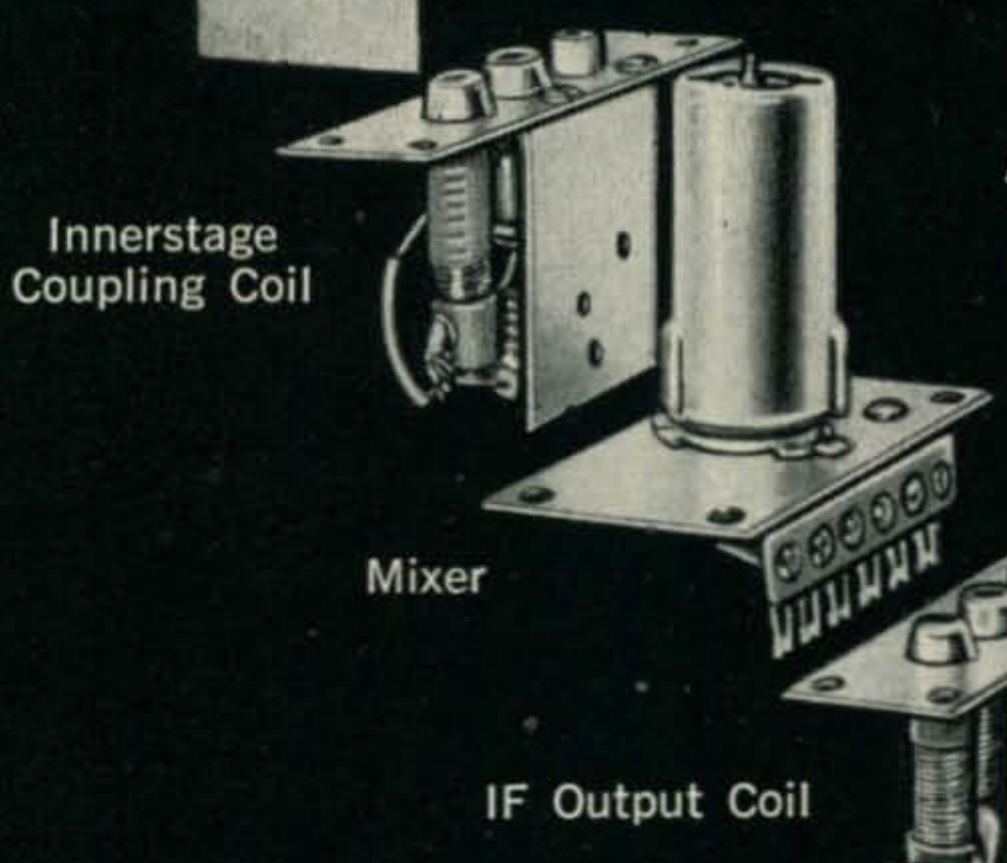
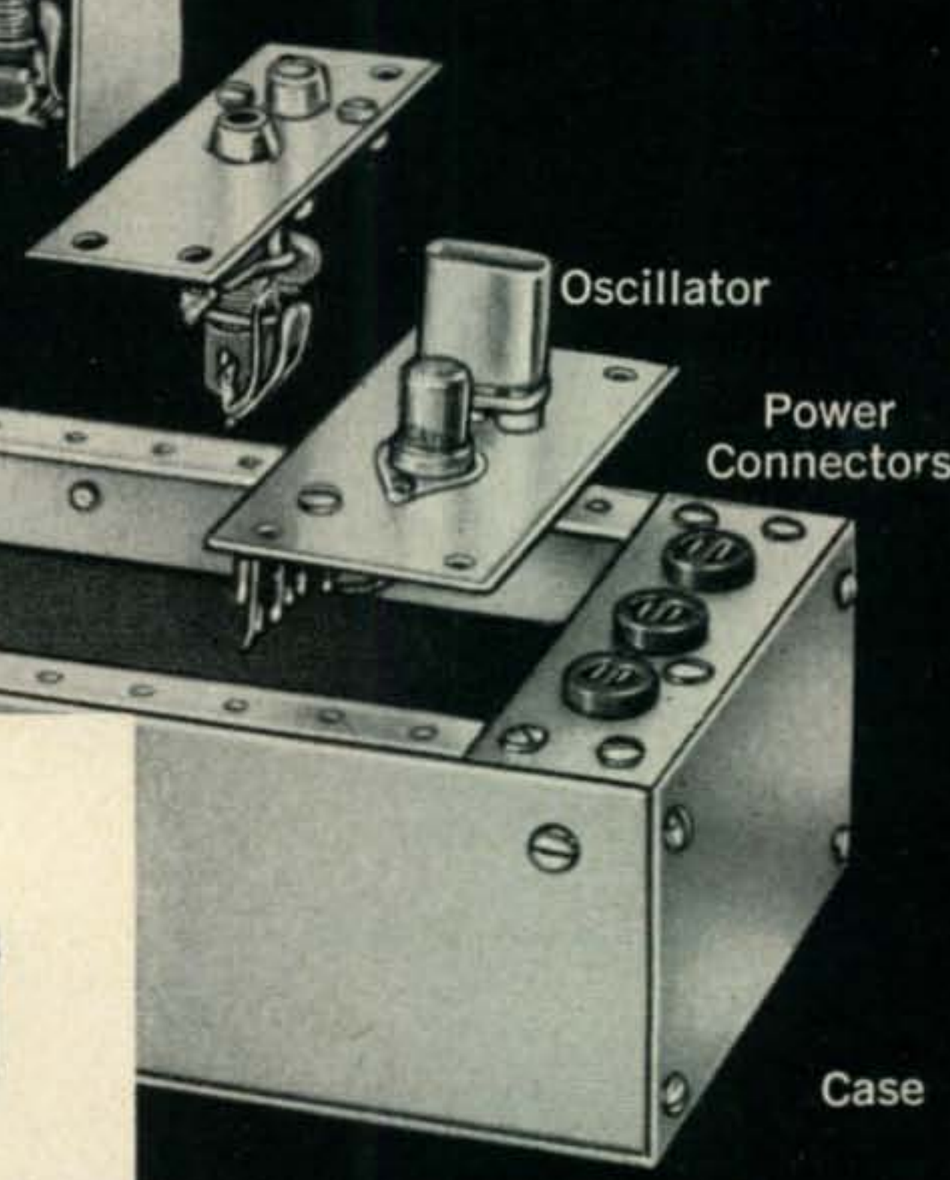
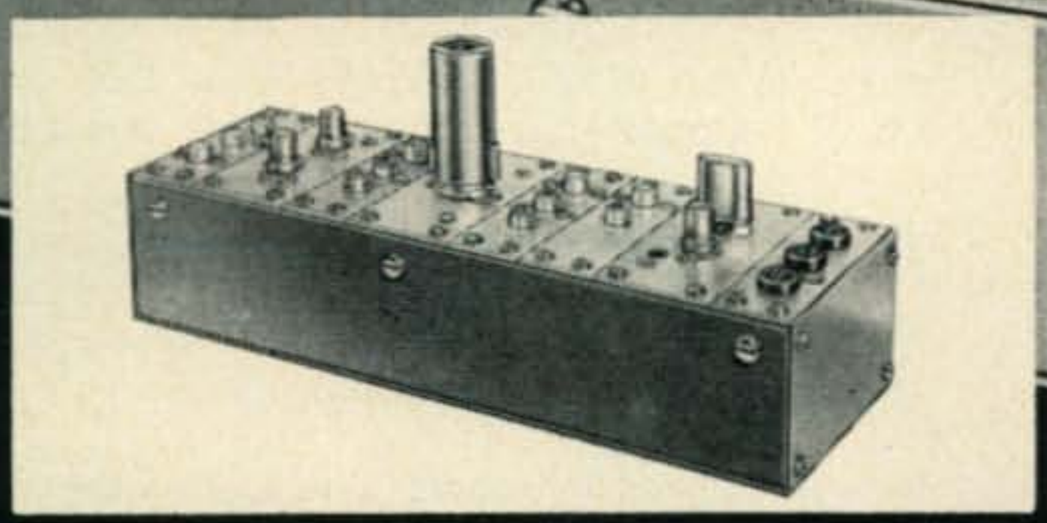
NEW FROM INTERNATIONAL

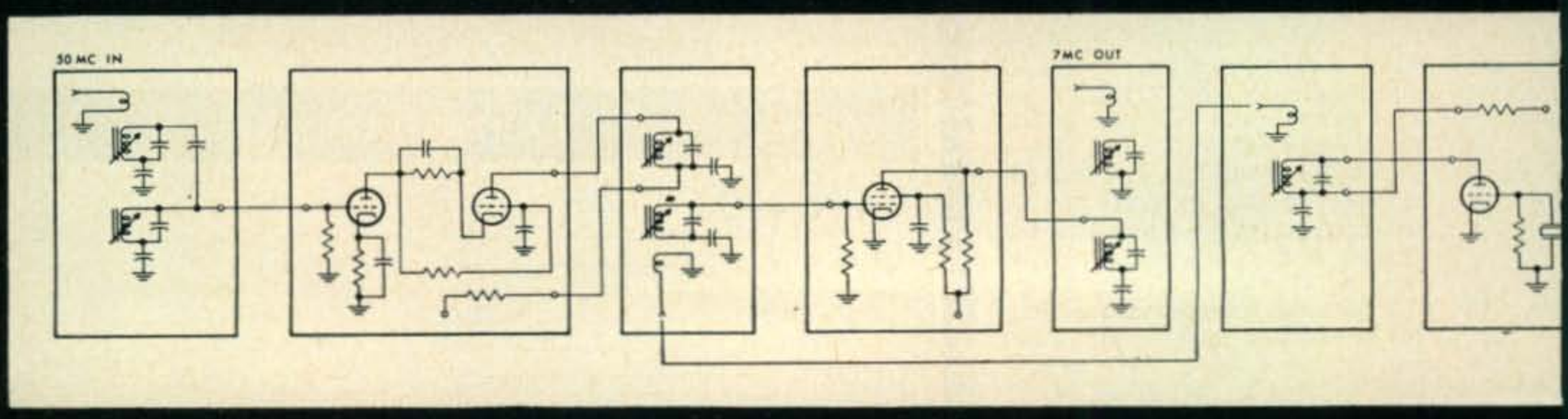
AN EXCITING NEW APPROACH TO DESIGN AND CONSTRUCTION ...AM-FM -SSB -DSB











AOC*

*Add - On - Circuits

Amateurs and experimenters will discover a new and easier way to build a wide variety of communication and electronic gear with International **AOC** units . . . individually wired oscillators, preamplifiers, detectors, etc., each tested and mounted on miniature metal chassis.

For example, the eight **AOC** units (illustrated) have been assembled to make a 6 meter converter. Each circuit may be removed to make modifications, or build other equipment. Simple to build, and so easy to change.

AOC units permit custom building for a wide range of frequencies, modes, and power. RF coils are available from 200 kc to 450 mc. IF transformers are available from 262 kc to 10.7 mc. Transmitter power to 100 watts. Matching cases, complete with hardware, available in a variety of lengths.

If you are planning to build a receiver, transmitter, converter, or other electronic equipment use International **AOC** units.

PREAMPLIFIERS • MIXERS • OSCILLATORS • INTERMEDIATE FREQUENCY AMPLIFIERS • DETECTORS • DISCRIMINATORS • BUFFERS • POWER AMPLIFIERS • MODULATORS • FREQUENCY MULTIPLIERS • SPEECH AMPLIFIERS • RECTIFIERS • FILTERS • REGULATORS • POWER TRANSFORMERS • OSCILLATOR BRIDGES •

AOC units are moderately priced from.....**$2.00** up.

INTERNATIONAL ANTENNAS FOR 6 METERS

BASE STATION VERTICAL

This antenna offers exceptional improvement of signal to noise ratio. Shunt fed, grounded radiator. Rigid aluminum and cadmium plated steel construction. Vertical length adjustable. Cat. No. 160-129 . . . . . **$27.95**

MOBILE

Base loaded whip antenna for installation on roof of auto. May be mounted on trunk lid or door facing with International blind mounting bracket (Cat. No. 160-126) Sealed loading coil-adjustable whip. Cat No. 160-130 **$19.95**

For complete details, mail coupon today.

INTERNATIONAL
CRYSTAL MFG. CO., INC.

18 NORTH LEE • OKLAHOMA CITY, OKLAHOMA

International Crystal Mfg. Co., Inc.
18 North Lee
Oklahoma City, Oklahoma
Please rush details on AOC units.

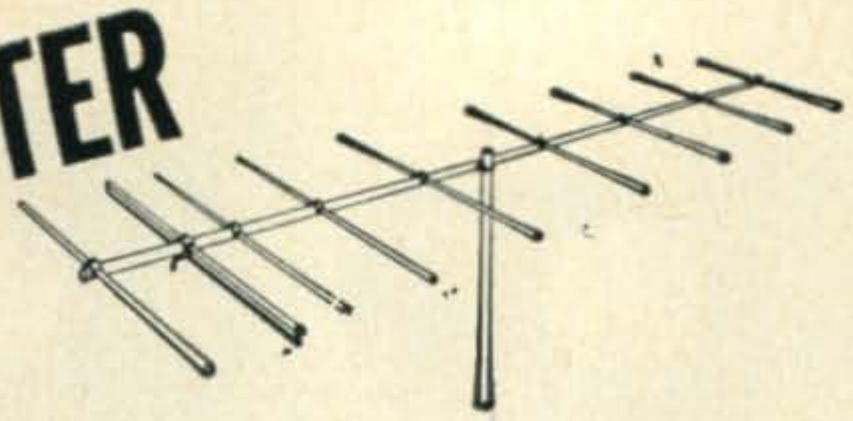
Name_____

Address_____

City_____ Zone___ State_____

For further information, check number 5, on page 110

NEW! SCOTCH! MASTER



2 & 6 Meter Antennas

MOSLEY Model A-92-S

An introduction to the New MOSLEY SCOTCH-MASTER two meter beam. This nine element antenna may be mounted vertically or horizontally, providing excellent front-to-back ratio, handling maximum legal power, amplitude modulated or 2,000 watts P.E.P. SSB. Mounting bracket fits masts up to 1½ inch OD. Antenna is matched for 300 ohm balanced line. Boom is made of sturdy medium weight wall 1¼ inch OD aluminum tubing to achieve maximum strength with minimum weight and wind loading characteristics. Stacked arrays feature 300 or 75 ohm balanced feed.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 14 DB. Front-to-back, 20 DB. SWR, 1.5 to 1 or less at resonant frequencies. Maximum element length, 41 inches. Boom length, 12 feet. Turning radius, 6.5 feet. Assembled weight, 4 pounds. Maximum wind surface area, 1.25 square feet. Wind load, 25 pounds. Antenna is shipped in kit form. **Amateur Net $16.40**

MOSLEY Model A-76-S

Also introducing for the first time, the MOSLEY SCOTCH-MASTER six meter beam. This seven element array provides maximum forward gain with excellent directivity. SCOTCH-MASTER will handle the full legal power, amplitude modulated. Mounting bracket fits up to 1½ inch OD mast. Antenna is "Gamma" matched for 52 ohm unbalanced line. Boom is of heavy guage 1¼ inch OD aluminum. Easily rotated with TV rotor and can be mounted vertically or horizontally.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 12 DB. Front-to-back, 20 DB. Boom length, 24 feet. Turning radius, 13 feet. Assembled weight, 12.5 pounds. Maximum wind surface area, 2.5 square feet. Wind load, 51 pounds. Antenna is shipped in kit form, complete with detailed instructions. **Amateur Net $35.10**

MOSLEY Model A-56-S

The New MOSLEY SCOTCH-MASTER six meter beam features five elements, maximum forward gain and excellent directivity. This gamma matched beam will handle the full legal power amplitude modulated. Can be mounted vertically or horizontally. Feed with 52 or 75 ohm line.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 10 DB. Front-to-back, 20 DB or better. SWR, 1.5 to 1 or less at resonant frequencies. Maximum element length, 118 inches. Boom length, 12 feet. Turning radius, 7 feet 8¾ inches. Assembled weight, 6.5 pounds. Wind load, 32 pounds horizontally, 56 pounds vertically. Antenna is shipped in kit form, complete with detailed instructions. **Amateur Net $ 28.16**

••Mosley SCOTCH·MASTER Stacking Kits••

MOSLEY Model A-92-S-SK1

A kit for stacking two horizontally polarized A-92 SCOTCH-MASTER beams, one above the other. Comes complete with matching transformer, insulator, complete instructions and phasing line. Feed point impedance - 300 ohm balanced line. This stacked array will attain 3 Db additional gain over a single horizontally mounted beam. **Amateur Net $3.15**

MOSLEY Model A-92-S-SK2H

A kit for stacking four horizontally polarized A-92 SCOTCH-MASTER beams, two over two. Complete with support members, mounting plates, phasing line, insulators, hardware and instructions. Feed point impedance - 75 ohm balanced line. This stacked array will attain 6 Db additional gain over a single horizontally mounted beam. **Amateur Net $44.35**

MOSLEY Model A-92-S-SK2V

A kit for stacking four A-92 SCOTCH-MASTER beams, two over two, in the vertical plane. Comes complete with support members, mounting plates, insulators, phasing line, hardware and instructions. Feed point impedance - 75 ohm balanced line. This stacked array will attain 6 Db additional gain over a single vertically mounted beam. **Amateur Net $44.35**

Mosley Electronics, Inc. 4610 North Lindbergh Blvd. Bridgeton, Mo.

For further information, check number 42, on page 110

ZERO BIAS

As this is being written, the ARRL Board of Directors congregates for its annual meeting to determine the course to be taken on a great many problems of American amateur radio. Sixteen men, duly elected by League membership, sit in council hoping that your wishes will be fulfilled.

At the top of the list is the matter of incentive licensing and restricted phone-segment operation, as previously announced by the League in February.

If our correspondence is a good barometer of amateur feelings, then from the basket of mail received on this subject, both pro and con, a considerable number of amateurs are going to be quite upset should this proposal be initiated.

We would like to remind amateurs, however, that unpopular legislation often turns out to be beneficial in the long run; and with commercial interests continually seeking spectrum space, the amateur not only has an obligation to "obey the traffic laws" but to ride herd on the maverick who makes life miserable for everyone.

Incentive licensing must work — no matter what form it takes. It is imperative, at this point, that we show the FCC and commercial interests that we are responsible users of the amateur bands, for if something isn't worked out through our own organization we may be leaving ourselves open to stiffer legislation, forced upon us on a take-it-or-else basis.

We would also like to remind amateurs of the recent FCC-proposed crackdown on citizens band operators. We are certain that this group would not have had such drastic measures taken against them had they been properly organized and self-policed. For that matter, it is not likely that any action would have had to be taken if the citizens band operators were properly versed on operating techniques and regulations. We hate to think of amateur radio reaching such a state of affairs as the citizens band, with its resultant FCC crackdown.

Since the amateur radio population is on a continual upward climb with more and more people earning their licenses, the problem of where the newly licensed amateurs are going to fit is becoming increasingly critical.

CQ will soon be featuring a three-part article on the use of the amateur spectrum, together with a serious statistical analysis of bandwidth characteristics found on the air. The figures will astound you as well as bring to light the poor use we amateurs make of our bands. Just how many s.s.b. signals are 3 kc wide?; how many a.m. signals are 6 kc wide?; are we using a kilowatt when the same results could be accomplished with 10 watts?; are ten stations interfering with each other when there is actually room for twice that number? All these questions will be answered . . . but the solution. . . .

The problem boils down to one simple fact: if restricted voice sub-bands and incentive licensing postpone immediate action by commercial radio interests, thus preventing re-allocation of part of our now narrow amateur spectrum, then by all means, it should be done.

Remember, the FCC has the power to introduce changes in our licensing structure as well as alter the frequencies we now use. Is it not better that the changes come from the League (who will certainly look for a slower and more gradual change), rather than pressure from commercial interests who consider amateur radio as just another annoyance? The growing competition for frequency allocations is not some future concept we may have to deal with at a later date; it is a realistic problem presently upon us and we should make every effort to settle matters through our own organization before someone else settles it for us.

Our Cover

Band conditions: terrible; sunspots: low; activity: tremendous . . . and with that, we sum up the 1962 World-Wide DX contest. Results of the c.w. section again top all previous years and show no signs of diminishing as band conditions continue to slacken. Tune in on page 42 for the full story.

FLASH

As we go to press we have just heard that United States amateur licensing fees will become effective January 1, 1964. Initial licenses and renewals will cost $4.00 and for modifications, $2.00 will be charged. Novice and RACES licensees will be exempt from *all* charges. There are considerable complications as to just what a "modification" entails and we hope to bring you complete FCC wording next month.

"I.E.M."

Editor, *CQ:*

Read your feature article in the April issue and a great big thanks for a good, hearty laugh! I guess "I.E.M." is here to stay.

The article was well written except for the spelling of a town in Rumania. In your article it is spelled "Cluj." The correct spelling is "Klooge." My secretary, Donna Belivit is a refugee who recently escaped from behind the anti-radio curtain to confirm this unspeakable error.

We are taking this tremendous idea and designing a solid state Varnak Integrator to measure gaussian distribution of the exosphere.

Stan Wernick, W6BCT
RF Systems Engineering, *Apollo*
North American Aviation
Downey, California

[*Editor's Note:* OM Wernick's secretary is wrong! Mr. Noe confirms that the correct spelling is Cluj—and he should know—he was there!]

Editor, *CQ:*

I was held spellbound by Mr. Noe's article in your April issue.

The I.E.M. is a fascinating device and its potential should not be underestimated. Perhaps a phase inversion at the Sterba Curtains would result in a two- or three-hundred per cent improvement in propagation conditions, thereby making the device constructive rather than ruinous. . . .

Stanmore C. Cooper, K4DRD/6
Box 6843
Vandenberg AFB, California

Editor, *CQ:*

I read the article in the April 1963 issue of *CQ* entitled "I.E.M. An Anti Radio Device" with considerable disgust and irritation. Perhaps *Jokers Wild* would be a more appropriate name for the magazine than *CQ*.

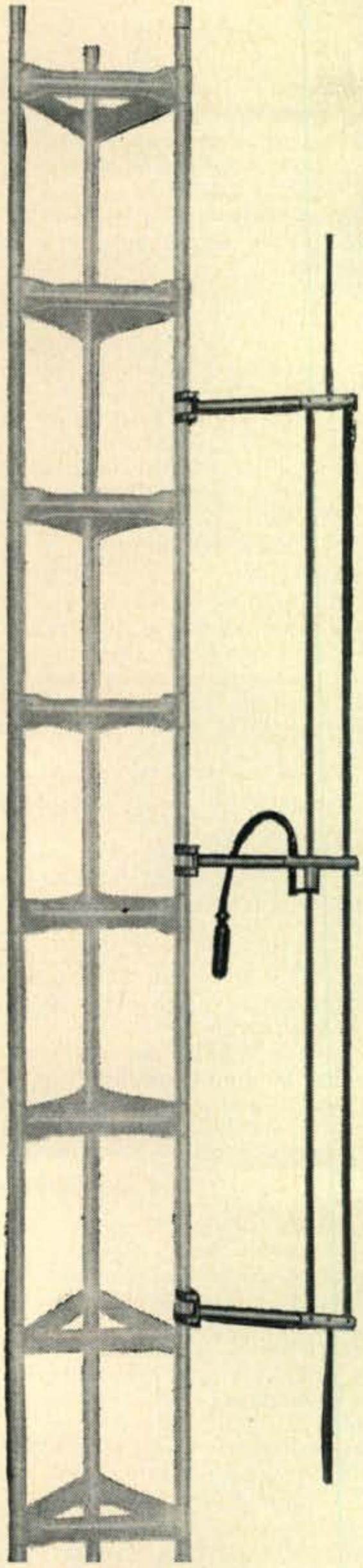
Gaines M. Crook
Member of the Technical Staff
Space Technology Laboratories, Inc.
Redondo Beach, Calif.

Editor, *CQ:*

Congratulations to you, *CQ* and Howard U. Noe. You have topped the best efforts with an article of this type. "I.E.M." is very interesting.

R. Stephen Howe, K1MZB
172 Main Street
Gorham, Maine

For further information, check number 24, on page 110



C-P COMMUNICATION ANTENNA SYSTEMS

—mean

CERTIFIED PERFORMANCE!

CAT. NO. 320-509, FREQUENCY RANGE 30-54 MC*

BASE STATION SIDE-MOUNT ANTENNA

*Exact frequency must be specified

Cat. No. 320-509 Side-Mount 2.5 db Gain Antenna is designed for applications requiring an antenna which must be side mounted on existing or new towers. This antenna has essentially a cardioid pattern and has approximately 2.5 db gain in the forward direction. High strength aluminum alloy is used for all antenna parts, except the mounting clamps, which are made of stainless steel. All insulators are made of the best available materials for the various uses involved. Each antenna is supplied cut to the desired operating frequency and is assembled ready for installation.

SPECIFICATIONS

Electrical:

Nominal input impedance	50 ohms
VSWR	1.5:1
Bandwidth	±1.0%
Maximum power input	500 watts
Flexible terminal extension	18 in. of RG-8A/U
Termination	Type N male with Neoprene housing
Lightning protection	Direct ground

Mechanical:

Radiating element material	6061-T6 aluminum
Insulated support material	Phenolic
Feed point insulator	Polycarbonate
Overall length	10 ft. at 50 Mc, 16½ ft. at 30 Mc
Spacing from tower	8"
Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs. at 30 Mc
Weight	15 lbs. at 30 Mc

Stainless Steel Mounting Clamps supplied to mount antenna on round tower legs 1 in. to 1½ in. diameter.

SINCE 1933

COMMUNICATION ANTENNA SYSTEMS FOR AMERICAN BUSINESS

Communication Products Company

DIVISION OF

PHELPS DODGE ELECTRONIC PRODUCTS

CORPORATION

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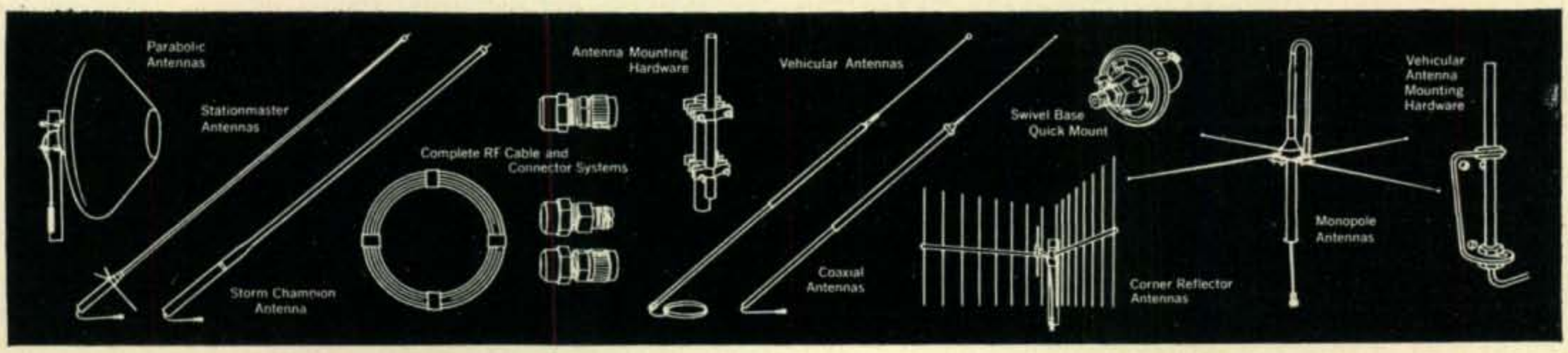


Reciprocity

Editor, *CQ:*

We have, in the past, criticized *CQ* and others through *The QRZ Bulletin* when we thought that the articles on reciprocal licensing privileges appeared lacking in information, biased or unfair, with no animosity towards the writers.

When an article is justly accomplished in a fair-minded presentation, we also feel that a letter of commendation should be forwarded.

Therefore, I want to thank you for the fine article that appeared in your January, '63 issue of *CQ*, under the title of ZERO BIAS. A similar not-too-infrequent presentation like this article is whole-heartedly endorsed by the exponents for Reciprocal Licensing privileges. . . .

John F. Barrows, DL4HU
Co-Editor of *The QRZ Bulletin*
36th Civil Engineering
APO 132, New York, N. Y.

Patch Privileges

Editor, *CQ:*

Just finished reading the March edition of *CQ* and it's refreshing to read a magazine with forthright, outspoken editorials. Although I don't necessarily agree with your remarks, they are well worth reading, and I'm sure all your other readers feel the same way. . . .

Your LETTERS column is another striking part of the magazine, and is the main reason I couldn't resist writing this. KL7YK/KG6 and WAØDLG had some interesting comments, but I can't say that I agree with too much they had to say.

I operate maritime mobile aboard my ship, and inasmuch as the ship just finished a 3½-month stint in the Hawaiian Islands area, I have had the occasion to run a considerable number of phone patches—mostly to the West Coast.

In the beginning, I used to ask for a "clear channel" while running these patches; however, one day a fellow ham admonished me for using this terminology, so I promptly abandoned it. I don't censure others for using this phrase though, it simply means: "we're trying to run a patch on this frequency, boys; how about picking another frequency on which to call CQ?"

. . . Granted, there are people who abuse this phone patch privilege; however, I think it's mainly due to poor operating procedures—there are just as many hams who abuse other privileges, just as flagrantly, and probably more so. It's up to all of us to educate our colleagues and influence them to use better, more thoughtful, operating procedures. In this way, we can alleviate the many abuses found across the band.

By the way, if the young naval officer put through "a patch to the campus back home just to say 'Hello' to the boys," I say more power to him. This is his privilege as a ham operator.

Gerry L. Preston, Lt. J.G., U.S.N., WA5ERL
U.S.S. *Outagamie County* (LST-1073)
c/o FPO, San Francisco, Calif.

More QSOs, Less Power?

Editor, *CQ:*

While reading the interesting article "More QSOs, less QRM" (*CQ*, April, 1963) the tail end of it makes me wonder.

It reads: "The latest rumor on the bands will sound something like this: "Did you hear that Central Hallicollins is coming out with the new Single Side Conserband Rig?"

This, we believe, is actually the center and crucial difficulty of amateur radio today. Accepted that the majority of the ham fraternity is still very much interested in experimenting, I believe that amateur radio has become so much commercialized that it is rapidly losing its character. It seems to me that such a perfection of utilization of the amateur bands which would have to be of high commercial quality is beyond the capability of the average ham.

To save the character and usefulness of ham radio, the solution seems to be a drastic reduction in allowed output power. This of course will be so strongly opposed, both by those selling the equipment and those having the financial possibility to buy it, that it does not seem to have any chance of success.

1st Choice Among Nation's Amateurs!

Matched Pair

Outstanding performance on SSB, AM and CW with absolutely no compromise on any mode!

"SSB ADAPTER"—The new filter-type SSB generator—with bandswitching 80 through 10 meters . . . more than 50 db sideband suppression . . . more than 45 db carrier suppression! When used with the Viking "Valiant" or "Valiant II" it places 275 watts P.E.P. at your command. Two compact units and interconnecting cables . . . RF unit is only 8" wide—may be placed on your operating desk. Power supply unit may be placed in any convenient location. Features built-in multiplier requiring VFO input only—band-pass interstage couplers require no tuning—design and front panel make operating practically foolproof. Superb audio fidelity and balanced audio response; excellent sideband, spurious and carrier suppression. Other features: positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay. With remote power supply, tubes and crystal filter, less microphone.

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

INVADER—More exclusive features than any other Transmitter/Exciter on the market today! Specially developed high frequency, symmetrical, multi-section band-pass crystal filter for more than 60 db sideband suppression—more than 55 db carrier suppression! Instant bandswitching 80 through 10 meters—no extra crystals to buy—no realigning necessary. Delivers a solid 200 watts CW input: 200 watts P.E.P. SSB input; 90 watts input on AM! (25-30 watts output—upper sideband and carrier). Built-in VFO—exclusive RF controlled audio AGC and ALC (limiter type) provide greater average speech VOX and anti-trip circuits. Fully TVI suppressed. Self-contained heavy-duty power supply. With tubes and crystals.

Cat. No. 240-302-2 Wired, tested.....Net $619.50

INVADER 2000—Here are all of the fine features of the "Invader", plus the added power and flexibility of an integral linear amplifier and remote controlled power supply. Rated at a solid 2000 watts P.E.P. SSB, 1000 watts CW, and 800 watts AM! (250 to 300 watts output—upper sideband and carrier.) Wide range output circuit (40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. With power supply, tubes and crystals.

Cat. No. 240-304-2 Wired, tested.....Net $1229.00

HIGH POWER CONVERSION—Take the features and performance of your "Invader" . . . add the power and flexibility of this unique Viking "Hi-Power Conversion" system . . . and you're "on the air" with the "Invader 2000". Wired, tested, includes everything you need—no soldering necessary—complete conversion in one evening.

Cat. No. 240-303-2.....Net $619.50

"VALIANT II"—Outstanding flexibility and performance—bandswitching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Other features: TVI suppression; time sequence (grid block) keying; high gain push-to-talk audio built-in low pass audio filter; self-contained power supply; and single control mode switching. As an exciter drives any popular kilowatt level tubes and provides quality speech driver system for high power modulators. Provision for plug-in SSB operation with no internal modification. With tubes, less crystals.

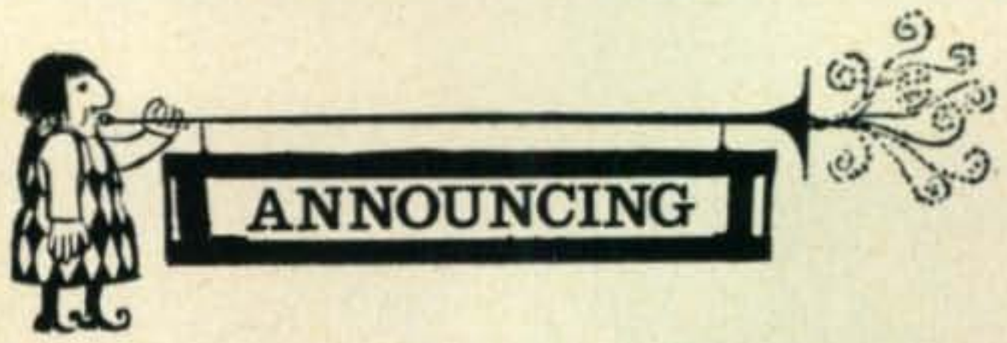
Cat. No. 240-105-1—Kit.....Net $375.00
Cat. No. 240-105-2—Wired, tested.....Net $495.00

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

For further information, check number 41, on page 110

May I add that those having the ability of building and adjusting such an ideal system as the Single Side Conserband Rig would, in practice, probably be connected with a commercial research laboratory. Is this still amateur radio?

Roger LeClaire, VE3CNV
Dept. of Physics
Laurentian University
Sudbury, Ontario, Canada



Maryland

The Anne Arundel Radio Club, Inc., will hold its "Surfside Hamfest" on Saturday, June 29th at Kurtz's Pleasure Beach on Chesapeake Bay, near Pasadena, Maryland. Registration begins at 10 A.M. and activities start at noon. For complete details and tickets, contact: W3DTN, 823 Dale Road, Glen Burnie, Maryland.

Illinois

The annual Mississippi Valley Hamfest sponsored by the Quad City Amateur Radio Club will be held at the Rock Island County Fairgrounds, on routes 2 & 80, East Moline, Illinois, June 30, 1963. The grounds have all weather buildings and food will be served. Contact W9DGV for further details.

Nebraska

The Tri-City A.R.C. will hold its 6th annual Hamfest/Picnic at Riverside Park, Scottsbluff, Nebraska on Sunday, June 30th. Tune 3850 kc for talk-ins and/or follow the "Condensor Signs" to location. KØDZG will fill you in on the program.

The Pine Ridge Amateur Radio Club, of Chadron, Nebraska will hold its annual shindig at Chadron State Park on June 2nd. No registration fee, but lots of fun expected. Further queries should go to KØEMU at 913 King St., Chadron, Nebraska.

Penn/New York

The Penn-York Hamfest will be held, beginning at 12 noon, June 15th, at the Ingersoll-Rand Recreation Hall, Athens, Penna. Pre-registration, $4.00; at the door, $6.00. Registration goes to "Ticket Committee," Box 301, Corning, New York. Four big clubs from the area are the sponsors and this should be a fine show.

Ohio

Father's Day, June 16th at Maca Park, two miles east of Tallmadge, Ohio on Route 18 will be the time and place for the Northeastern Ohio V.H.F. Groups 8th annual Picnic. K8TZ will give you more details via 356 Grand Ave., Akron 2, Ohio.

North Carolina

The 9th Annual Charlotte Hamfest will be held Sunday, June 30 at the National Guard Armory, Municipal Airport, Charlotte, N.C. A fine program is planned; many king sized prizes as usual, and a delicious barbecue lunch will be served. W4FHI is chairman.

Boy Scout Bus Trip

Starting June 14th from Denver, Colorado and ending one month later, a group of twenty-five to thirty Boy Scouts will be leaving on a chartered bus trip across the country. Places to be visited include: New York City; Maine; and then on to Canada; Nova Scotia and Prince Edward Island, re-entering the United States via Northern Wisconsin. KØBSA has been officially assigned by the FCC for this trip. Other calls aboard will be: WAØBRE, WNØFIS and KØIIX. They'll be using a KWM-2 and promise special QSL cards to commemorate this journey.

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Amazing but True...

ALL BANDS . . 2 THRU 160 METERS IN ONE CONVERTER

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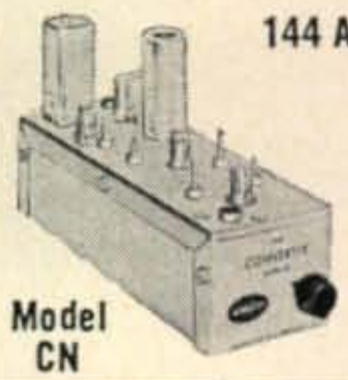
The NEW AMECO Model CMA

Model CMA covers all frequencies from 1.7 to 54 Mc. and 108 to 174 Mc. The output can be fed to a standard broadcast set or any communications receiver. The CMA has better than 1 microvolt sensitivity. It can be operated from an internal battery or from the 12 volt car battery. Model CMA has an RF stage, tuned by a panel dial for best image and spurious rejection. Up to 10 crystals can be selected by the band-switch. Size — 3¾" x 6" x 6¾". For more detailed information, write for special "Converter Information Sheet".

Model CMA, wired and tested, less crystals $64.95
Crystals each 3.50

NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE



Model CN

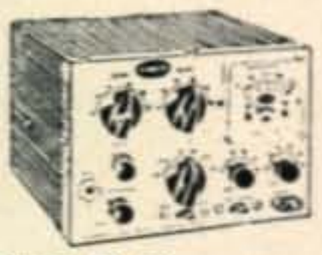
Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply.

TRANSISTORIZED MOBILE CONVERTERS. CRYSTAL CONTROLLED

Model CHT

Model CHT will convert any single frequency or band between 108 and 174 Mc. down to the broadcast band or any other IF output. Has a ½ microvolt sensitivity.
Complete with one crystal ... **$35.95**
Model CLT same as above except that it receives any frequency or band between 2 and 54 Mc.
Complete with one crystal **$35.95**

COMPACT 6 THRU 80 METER TRANSMITTER



Model TX-86

Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. Size — only 5" x 7" 7 7" — ideal mobile or fixed. Can take crystal or VFO. **Model TX-86 Kit $89.95 — Wired Model $119.95. Model PS-3 Wired $44.95. Model W612A Mobile Supply wired $54.95.**

CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
CB 6W — wired & tested ... $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix, 6J6 osc. $23.95
CB-2W — wired and tested. ... $33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. **PS-1K — Kit ... $10 50**
PS-1W — Wired $11.50

EASY TO UNDERSTAND AMECO BOOKS

Amateur Radio Theory Course	$3.95		
Amateur License Guide	.50		
Radio Operators' Lic. Guide, EL 1-2	.75		
EL 3	1.75	EL 4	1.25
Amateur Log Book	.50		
Radio Electronics Made Simple	1.95		

CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear. Dept. CQ-6 **Ameco equipment at all leading ham distributors.**

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Affiliated with American Electronics Co. and Ameco Publishing Corp.

For further information, check number 55, on page 110

Miami

Special event station K3ROA/4 will be in operation June 12-15 from the lobby of the Americana Hotel in Miami Beach during the 37th annual convention of the Reserve Officers Assn. of the U.S. Special QSLs will be sent; operation will be around 14.3 mc s.s.b. Local amateurs are invited.

Single-Sideband on 160

Effective April 15, 1963 the ban on use of single-sideband emmission was lifted on one-hundred sixty meters. Text of the Report And Order follows, indicating some changes in the Gulf area will be made as you read this.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D.C.

In the Matter of Amendment of Parts 2 and 12 of the Commission's Rules to modify the availability of frequencies in the band 1800-2000 kc for use by the Amateur Service on a shared basis with Loran stations.	RM-298

REPORT AND ORDER

By the Commission: Commissioner Lee absent.

1. The Commission's Order of February 13, 1963, in the above-captioned matter (FCC 63-137) was published in the Federal Register on February 22, 1963 (28 F.R. 1734). Among other things, that Order prohibited amateur use of single sideband emission in the band 1800-2000 kc after April 15, 1963.

2. This prohibition was adopted pending determination of the interference potential of single sideband emission on the Loran-A system of radionavigation, with the possibility of a subsequent revision of the restriction to permit this mode of operation.

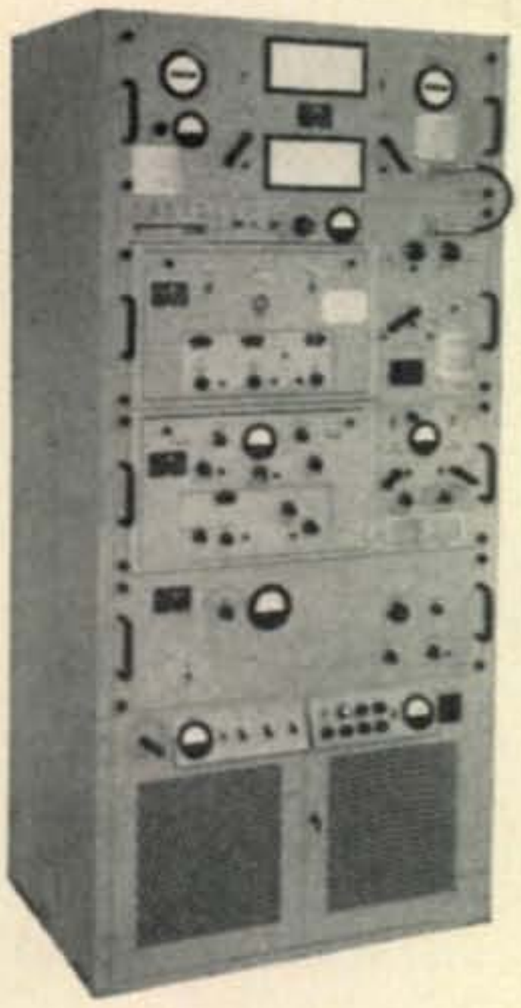
3. The Commission has been informed by the Director of Telecommunications Management that the study of the interference potentialities of sideband emission has produced sufficient data to indicate that the use of this emission is compatible with Loran-A and it is feasible to permit its use by the Amateur Radio Service subject to the power limitations as specified.

4. The Director of Telecommunications Management has also informed the Commission that the Loran-A system of radionavigation operations on 1900 kc will be extended to the area of the Gulf of Mexico beginning June 1, 1963, and suggests that the Amateur Radio Service be advised at this time of the impending restrictions in the bands 1875-1900 and 1900-1925 kc in the Gulf area. The Loran-A stations are located at Cape San Blas and Venice, Florida and Biloxi, Mississippi. Prior to June 1, 1963, the Commission will amend its Rules to further restrict amateur operation in the above bands in these areas.

5. The changes ordered herein relieve proposed restrictions on amateur operations in this band; Government operations in this band will not be adversely affected by these changes; the Director of Telecommunications Management has agreed to the proposed changes; and hence compliance with the public notice and effective date requirements of Section 4 of the Administrative Procedure Act is unnecessary.

6. In view of the foregoing, IT IS ORDERED, effective April 15, 1963, That the aforementioned prohibition against amateur use of single sideband emission in the band 1800-2000 kc is rescinded; and, pursuant to the authority contained in Section 4(*i*) and (*j*) and 303(*c*), (*f*), and (*r*) of the Communications Act of 1934, as amended, Parts 2 and 12 of the Commission's Rules are amended as set forth in the Appendix hereto,

PRECISION-ENGINEERED **COMMUNICATIONS EQUIPMENT** FOR QUALITY PERFORMANCE



Here is a complete line of communications equipment—Transmitters, Receivers, and Terminal Units; AM, CW, FSK, SSB, FAX and Diversity—engineered to the highest standards, and still attractively priced. Meets or exceeds critical military specifications wherever practicable.

TR-302 (AN/FRT-17). This 500 watt, AM/CW, 10-channel, crystal-controlled transmitter is shown complete with frequency shift keyer, frequency synthesizer and antenna coupler. As shown: $7270.00. Basic 500 watt, AM/CW, 10 channel transmitter. $4150.00.

PO-304 (O-212/FRT). Precision master oscillator maintains any selected output frequency within the 2 to 4.5 Mc range to an accuracy of $\pm 5 \times 10^{7}$/day. $1750.00.

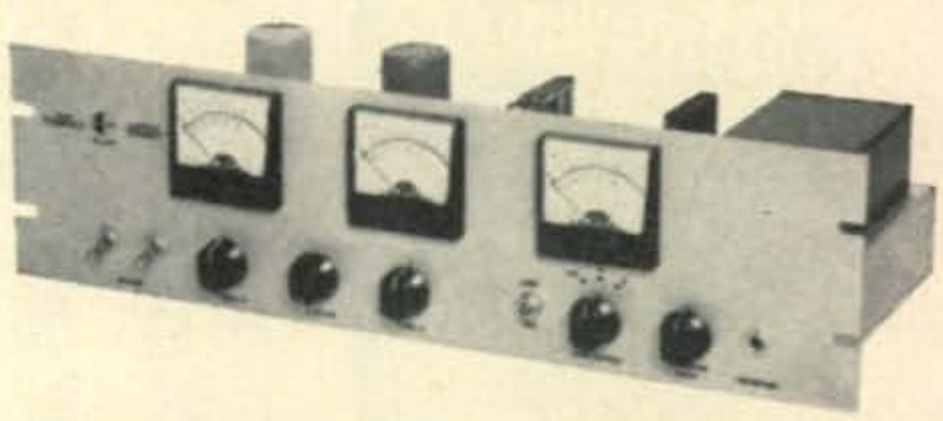
PS-307. Power supply for PO-304. $200.00.

RC288A. Single-sideband receiver converter for use with communications receivers. Performance equal to or better than Mil. type CV-157/URR. $2825.00.

FS-303 (MD-200/FRT). Produces "mark" or "space" carrier shift for teleprinter or telegraph signals or linear carrier shift for transmission of FM telephone, facsimile or telephoto signals. $475.00.

PS-308. Osc./power supply for FS-303. $200.00.

DC-309. Provides a simple means for combining two voice or tone channels being received in either space or frequency diversity. Optimum ratio-square law combination is provided over a dynamic range of 25 db. Available for triple diversity reception on special order. $650.00.



Write for technical bulletins . . .

- Facsimile Diversity Converters . . . . . Tech Bulletin #256, #266
- Facsimile Tape Storage Recorder . . . . . Tech Bulletin #290
- Master Oscillator . . . . . Tech Bulletin #313
- Single-Sideband Signal Generator . . . . . Tech Bulletin #311
- Single-Sideband Modulator . . . . . Tech Bulletin #312

MARS

MARS ELECTRONICS, 135 Eileen Way · Syosset, L. I., N.Y.

For further information, check number 6, on page 110

which supersedes in part the Appendix to the Commission's Order of February 13, 1963.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE
Acting Secretary

APPENDIX

§2.106 [Amendment]

1. Paragraph (*a*) (3) of footnote NG 15 to section 2.106 is amended to read as follows:

NG 15 (a) * * *

(3) Only types A1 and amplitude modulated double and single sideband telephony emission shall be employed;

2. Section 12.111 (*b*) (3) preceding the table is amended to read as follows:

§12.111 Frequencies and types of emissions for use of amateur stations.

* * * * *

(*b*) * * *

(3) Amateur operations shall be limited as follows: [*Editor's Note:* See page 14, April, 1963 *CQ* for original RM-298 and table of frequency and geographical limitations.]

Contest Calendar

Due to the tremendous work involved in compiling the results of the *CQ* W.W. DX (C.W.) Contest, Frank Anzalone's regular CONTEST CALENDAR column does not appear this month. However, for the benefit of the avid contester the Anticipated Calendar of Events appears below. CONTEST CALENDAR will return next month.

ANTICIPATED CALENDAR OF EVENTS

August	4-10	Chattanooga Party
August	10-11	WAEDC C.W.
August	17-18	WAEDC Phone
August	24-25	JARL DX C.W.
Aug.	31-Sept. 1	LABRE C.W.
September	7-8	LABRE Phone
September	7-8	Peruano C.W.
September	14-15	Peruano Phone
September	14-15	S A C C.W.
September	21-22	S A C Phone
September	28-29	MARC VE/W
October	5-6	Oceania Phone
October	12-13	Oceania C.W.
October	12-13	ARRL CD C.W.
October	19-20	RSGB 7 Mc Phone
October	19-20	ARRL CD Phone
October	26-27	*CQ* WW DX Phone
November	2-3	RSGB 7 Mc C.W.
November	9-10	ARRL SS
November	16-17	RSGB 21/18 Mc Phone
November	16-17	ARRL SS
November	23-24	*CQ* WW DX C.W.
December	7-8	OK DX C.W.

Wisconsin

The Wisconsin Nets Association will hold its 17th annual family picnic at East Park, Hartford, Wisconsin on Sunday, July 14. Registration begins at 10:00 A.M. Refreshments, contests and games will be featured with prizes for all. For further information contact K9BLN at 520 Fourth St., Hartford, Wisc.

Correction

"A Compact Mobile Transceiver," in the April issue on page 26 has an error in fig. 1. The lead coming from the power plug to the normally closed section of S_{2A} should go to the normally *open* section of S_{2A}. Section S_{2B} is correct.

[*Continued on page 88*]

For further information, check number 32, on page 110

LAFAYETTE RADIO

QUALITY AMATEUR GEAR SINCE 1923

INVITATION: Stop in at any of our locations and visit our fully stocked **HAM SHACKS — FREE DEMONSTRATIONS** without obligation. Lafayette carries a complete line of famous brand amateur equipment and accessories.

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HE-80WX

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NO MONEY DOWN

1. NEW LAFAYETTE HE-80 Professional Quality 14-Tube Amateur Communications Receiver

● 5 Bands: 550KC to 54MC ● Extra RF Stage, Mixer/OSC For Dual Conversion on 6-Meters ● 1 RF Plus IF Stages for High Gain Reception on all other Bands ● Product Detector Circuit for Improved SSB Reception ● Separate BFO and Q-Multiplier Circuits (can be used simultaneously) ● Crystal Calibrator for Checking Receiver Calibration Markings ● Improved Automatic Noise Limiter ● Voltage Regulated Power Supply

Designed for Today's Congested Amateur Bands

KT-390

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NO MONEY DOWN **Made in U.S.A.**

New!

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2. *STARFLITE*™ 90 WATT PHONE and CW TRANSMITTER KIT

● 90 Watts Phone or CW on 80 Thru 10 Meters ● Built-in 3-Section Low-Pass Filter ● Clear, Chirpless, Grid Block Keying

Dollar for dollar you can't beat this new Lafayette Starflite transmitter. Easy to build and operate, it glistens with quality and performance all-over.

3. LAFAYETTE HE-45-B DELUXE 6-METER TRANSCEIVER

● High Efficiency—Up To 100% Modulation ● New Modulation and Power Transformers plus 7868 Power Pentode ● New Heavy-Duty Communications Vibrator ● Front Panel Antenna Loading Controls ● New Standby Switch; VFO Power Jack ● Sensitive Superheterodyne Receiver ● Built-in 117 VAC and 12 VDC Power Supplies ● Rugged Push-to-Talk Ceramic Microphone

LAFAYETTE HE-50A 10-METER TRANSCEIVER

Similar to above except for 10-meter operation.....**89.95**

HE-30

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4. THE LAFAYETTE HE-30 Professional Quality Communications Receiver

● Tunes 550 KCS to 30 MCS in Four Bands ● Built-in Q-Multiplier for Crowded Phone Operation ● Calibrated Electrical Bandspread on Amateur Bands 80 Thru 10 Meters ● Stable Oscillator and BFO for Clear CW and SSB Reception ● Built-in Edgewise S-Meter

Sensitivity is 1.0 microvolt for 10 db. Signal to Noise ratio. Selectivity is ± 0.8 KCS at —6db with Q-MULTIPLIER.

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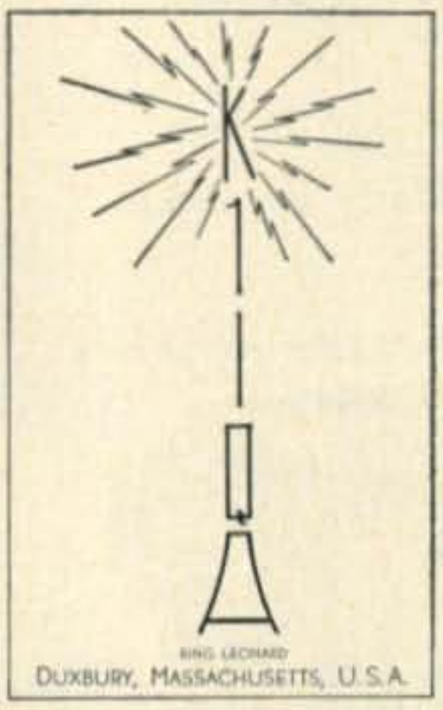
For further information, check number 20, on page 110

QSL contest

THIS month's top honors go to KZ5JC with a four color card bearing the seal of the Canal Zone, Isthmus of Panama. Runners up include K1IQA, SM7DTE, W5AFC and WA6-TAG whose card is actually printed on a bright red shipping tag!



RUNNERS UP

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Let us quote you on:

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62S-1—Both 6 & 2 meters Tx & Rx. 100 W. PA for 6 & 2. System engineered for KWM-2 or S-line (will work with any 14 mc equipment providing proper voltages). Power supply built in (except high voltage supplied by 516F-2). Crystal controlled for high stability. 1 kc calibration on 6 & 2! ALC controlled.

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A-1 RECONDITIONED EQUIPMENT

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We can supply any Collins equipment.

62S-1 Converter	$ 895.00
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30L-1 Linear Amplifier	520.00
KWM-2 Transceiver	1150.00
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516F-2 AC Power Supply	115.00
MP-1 12V DC Power Supply	198.00
30S-1 Linear Amplifier	1556.00

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World's Largest Distributors of Short Wave Receivers

PICK A BAND . . .

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TAKE YOUR CHOICE . . .

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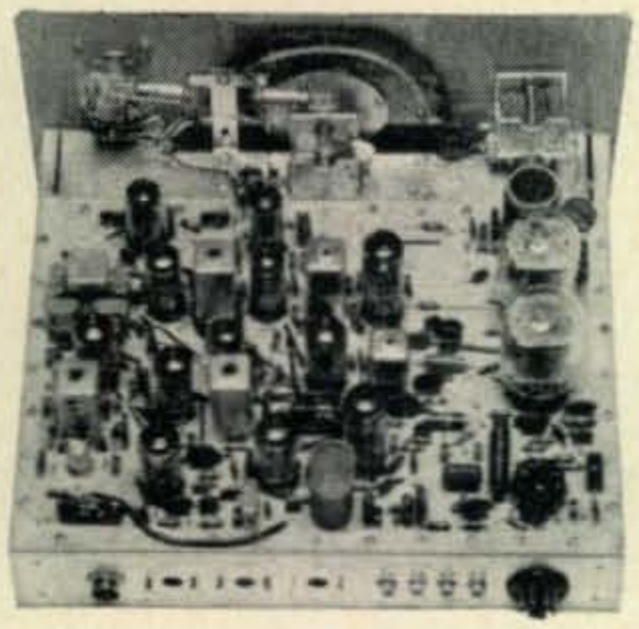
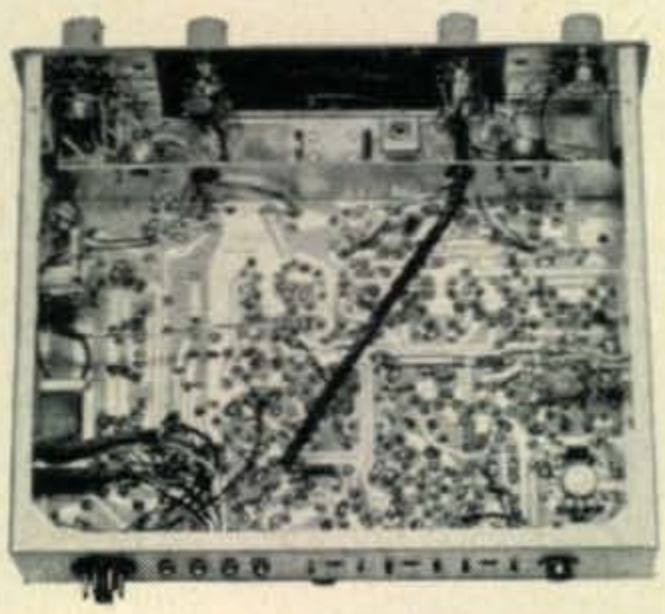


80, 40 & 20 METER SSB TRANSCEIVERS—Brand new! More features . . . better performance . . . at one-third the cost of three-band units. Save by buying only the bands you need • True Transceiver for one band, one sideband operation • Crystal filter type SSB generator • Automatic level control • PTT and VOX circuits built-in • Low frequency VFO (1.5—1.7 mc) for greater stability than comparable units • 2KC dial calibration; 6″ of bandspread; vernier tuning • Provision for operation with linear amplifier • Easy assembly with heavy-duty circuit board, rugged steel chassis and wiring harness • Welded and braced one-piece steel chassis & cabinet, gimbal mounting bracket • Accepts Heathkit HRA-10-1 100 KC Crystal Calibrator as plug-in accessory • Uses GH-12 push-to-talk microphone • Operates with new Heathkit HP-13 (DC) or HP-23 (AC) power supplies; also Heathkit HP-10 (DC) or HP-20 (AC) supplies **HW-12, 80 meters,** available June, no money dn., $11 mo. **$119.95. HW-22, 40 meters,** available July. **HW-32, 20 meters,** available August.

...TRANSCEIVERS JUST $119.95 EACH



SPECIFICATIONS—RF Input: 200 watts PEP, **Tube Complement:** Fourteen tube heterodyne circuit; (3) 6EA8 mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amps., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12), Het. osc and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc., product det.; (1) 6EB8, Audio amp. and output; (2) 6GE5 R.F. output. **Sideband Generation:** Crystal lattice bandpass filter method. **Stability:** 100 cps overall after warm-up. **Carrier & Unwanted Sideband Suppression:** 45 db. **Frequency Coverage:** HW-12, 3.8—4.0 mc; HW-22, 7.2—7.3 mc; HW-32, 14.2—14.35 mc. **Receiver Sensitivity:** 1 uv for 15 db S+N/N ratio. **Receiver Selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32 USB. **Audio output:** 1 watt @ 8 ohms. **Mike Input:** Hi-Z. **Panel Controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter. Front panel screwdriver adjust for S-meter and VOX delay. **Rear Panel Controls:** Mike gain, tune level, final bias. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, —125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet Dimensions:** 6" H x 12" W x 10" D.

...80, 40 or 20 METERS

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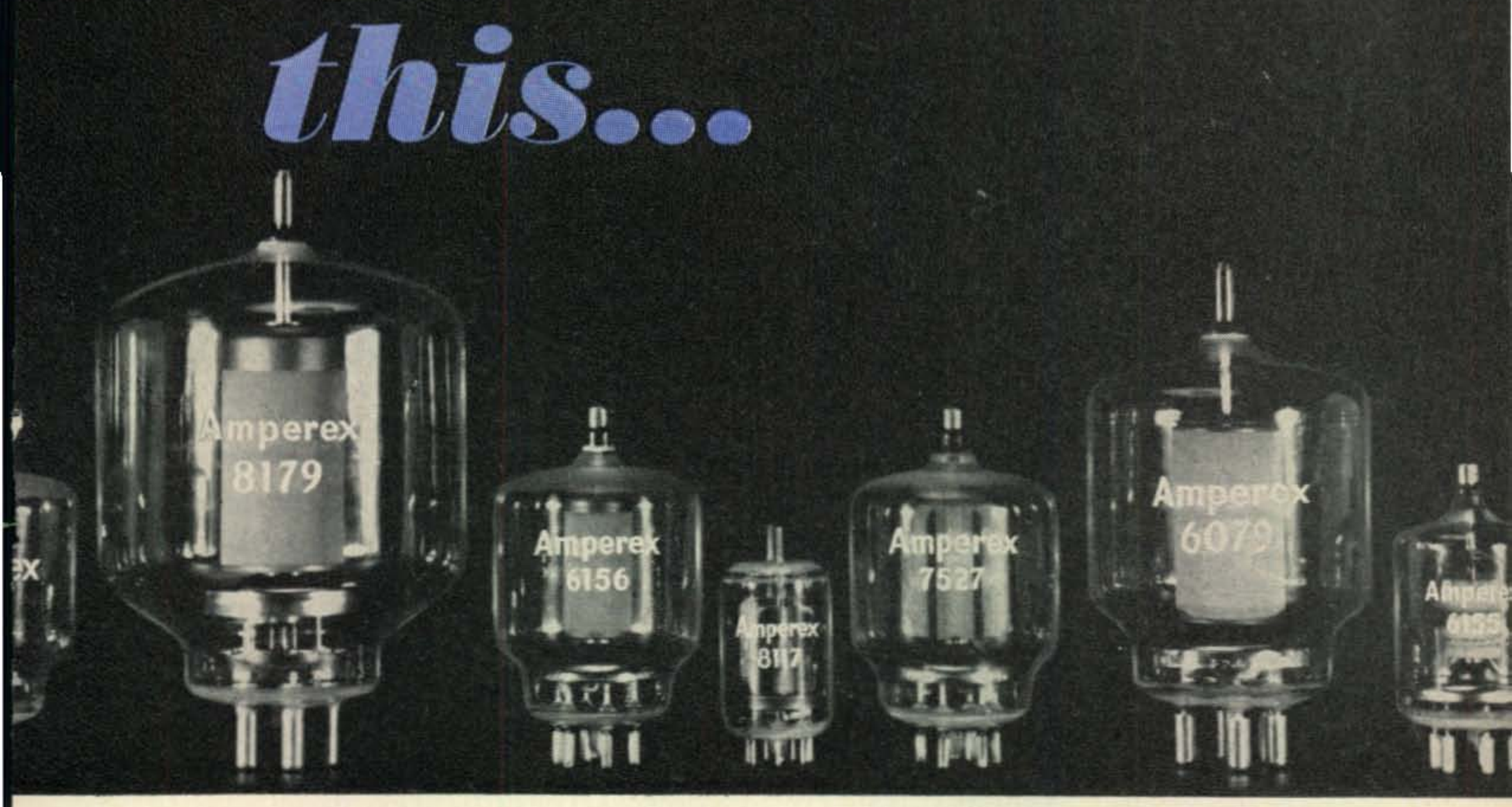

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Peak Envelope Plate Power Output *(watts)*	1410	421	158	723	1032	206
3rd Order Intermodulation Distortion *(db)* (without feedback)	34	35	30	35	35	30
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For further information, check number 7, on page 110

A Unique C.W., S.S.B. and F.S.K. Receiver

BY FRED STANLEY HOWELL*, W6MTY

This double conversion receiver makes use of a reflex crystal detector. It is this detector that provides the gain and stability that reduces the demands on the other circuits. The front end of the receiver consists of four crystal controlled converters, for 160, 40, 20 and 15 meters; eighty feeds through to the first i.f.

I HAVE built transceivers. I have built converters. I have built every transmitter I have ever owned. But, until recently I had never had the nerve to try building a first-class communications receiver for the shack. The reason is simple. Until recently there did not seem to be techniques available for the average home constructor like myself which would allow him to build a receiver that could hope to compete with commercial manufacture. Commercial receiver manufacturers have developed, around intermediate frequency amplifiers, techniques (better called arts) of the trade which usually spell the difference between success and failure of a receiver design, because, in a conventional receiver, the sensitivity and selectivity are almost completely dependent upon the i.f.

Recently, while building a transceiver, I developed a technique which may change this situation. The technique is a crystal oscillator used in a reflex circuit as a detector.[1] This circuit combines such sensitivity and stability in a single circuit that it vastly reduces the demands on other circuits required for a communications receiver. For example, receivers which are designed for narrow bandpass characteristics have, in the past, gone to very low frequency i.f. amplifiers, or to expensive filters. Both of these techniques require either special tools, special test equipment or a special pocketbook.

I have seen many articles on the use of *Q* multipliers or the use of ARC-5 low frequency i.f.'s to soup up low performance receivers, and I must admit I have observed excellent performance in some of these equipments. But that is not quite the same thing as building a receiver from the components, a receiver which will not take a back seat to any other receiver, in selectivity, sensitivity, stability or looks, and yet be within reason in cost.

In designing the new receiver I specifically restricted myself to components that can be bought off-the-shelf in a local radio store or mail order house, and to construction techniques of drilling and punching round holes in metal with a hand drill or a socket punch.

When you examine the circuit, you may accuse me of discriminating against a.m. phone, but in building this receiver I was trying to look ahead, and a.m. phone has little consideration in my future hamming plans. You may also accuse me of discriminating against v.h.f., but my approach to v.h.f. will be to build crystal controlled converters which will not degrade the performance characteristics of the receiver.

*9173 Croydon Avenue, Los Angeles 45, California.

[1]Howell, F. S., "A 40 Meter C.W. Station for Novice or Mobile," *CQ*, October, 1961, p. 56.

Front view of W6MTY's impressive receiver. The main tuning dial is a Millen 10035 with a Waldom 303 for vernier. The control functions are, lower row, left to right; A.V.C. DELAY, BANDSWITCH, AUDIO GAIN, STANDBY. The I.F. GAIN is above the BANDSWITCH and the CRYSTAL FILTER switch is above the AUDIO GAIN.

Circuit

This receiver is basically an 80 meter receiver with individual crystal controlled converters for 160, 40, 20 and 15 meters. The 80 meter receiver consists of a 6BJ6 r.f. amplifier, a 12AT7 conversion detector-conversion oscillator, a 6BJ6 i.f. amplifier, a 12AT7 reflex quartz crystal detector-first audio and a 6AQ5 audio output. Since the bandpass filter is a crystal filter and since the detector is a crystal controlled detector, there is only one circuit in the whole receiver which effects frequency stability that is not crystal controlled—the conversion oscillator. A series tuned Colpitts was selected for the conversion oscillator because of its ability to accept tube characteristic changes with little effect on frequency, and great care was taken to design the tuned circuit for the oscillator and to protect it from mechanical motion and heat sources within the receiver. For instance, the i.f. trans-

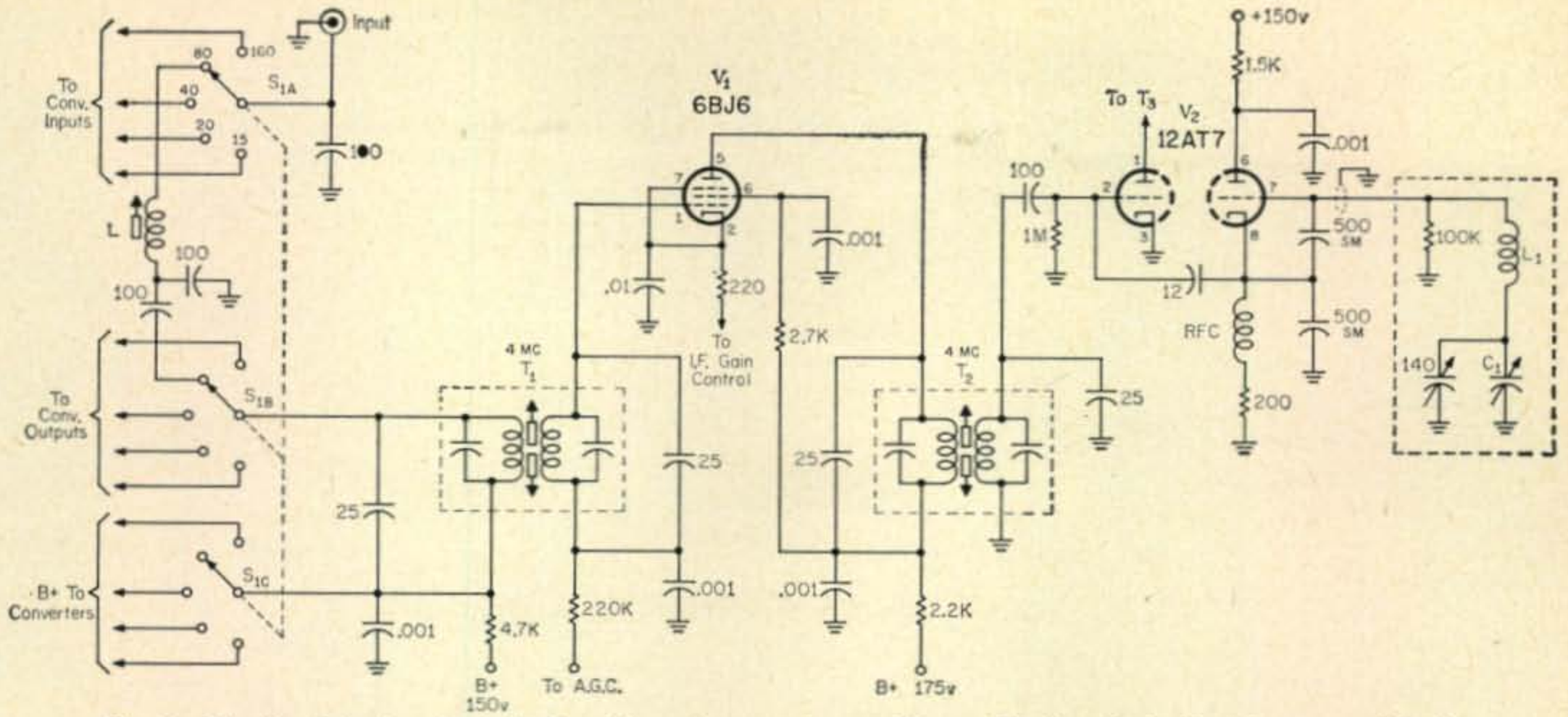


Fig. 1—Circuit of the bandswitch, first i.f. and conversion oscillator. The bandswitching is accomplished by switching in the desired converter except for 80 meters in which case the signals are fed directly to the first i.f. amplifier. All resistors are ½ watt; all capacitors greater than 1 are in mmf, less than 1 in mf.

C_1—20 mmf, Hammarlund MC20-S.
L—Olson Akrad L-76.
L_1—57t B&W #3012.
T_1, T_2—4.5 mc, J.W. Miller 6203 or equivalent.

formers are used to form a heat shield around the tuning circuit compartment. Tubes have been mounted so as to either be heat shielded from the tuning circuit compartment or to be located with the maximum possible physical separation.

The r.f. and i.f. transformers that were used were normal shelf items since it was realized that the 4 mc i.f. transformers would at least have to be stagger tuned to cover 500 kilocycles and might have to be padded with resistors to obtain flat response over the band. Therefore, high Q in the 4 mc i.f. transformers was not desired. Since the effective bandwidth was to be almost wholly dependent on the half-lattice filter, the 1600 kc i.f. transformers were required primarily for coupling and any bandpass characteristic was a secondary consideration.

Converters

The converters for 160, 40, 20 and 15 meters were built as separate units to make construction simpler and to make bandswitching easier. These converters were mounted above the chassis in such positions that holes for leads to the band switch compartment could be drilled in one operation and thus obtain a maximum of shielding. A great deal of effort was put into simplifying the converters because once they were wired to the band switch, it became necessary to unsolder 4 wires to get into one of the converter compartments. Naturally, these converters were checked out completely before they were wired in place. Although it is difficult to get into the converter compartments, all of the resistors can be checked by resistance measurements at the tube socket pins, so it is easy to trouble shoot these circuits if it becomes necessary.

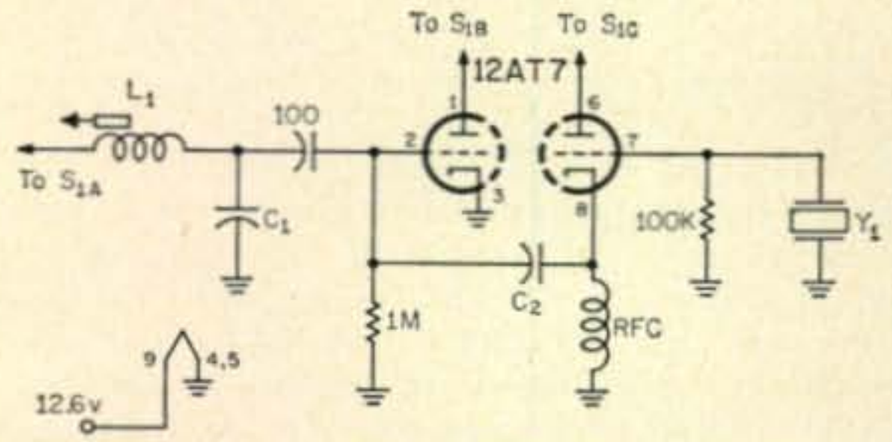


Fig. 2—Converter circuit for 160, 40 and 20. The crystal frequencies listed below are in mc (parallel resonant) and the capacitances in mmf. The inductors are in microhenries and are made by J.W. Miller.

Band	Y_1	C_1	C_2	L_1	*Stock No.*
160	5.5	140	15	20	4407
40	3.4	50	7	10	4406
20	10.5	35	5	3	4404

Coupling to the Filter

One problem that has disturbed me for some time in building receiver circuits is the problem of coupling an i.f. transformer to a half-lattice crystal filter. Most approaches, I have seen, involve removing the secondary of the output transformer and winding a bifilar secondary. Somehow, I have a dislike of buying a component and then tearing it up to use it. I attempted to couple out of the transformer with coupling networks but ran into a nasty snag. The distributed capacitance in the secondary is not

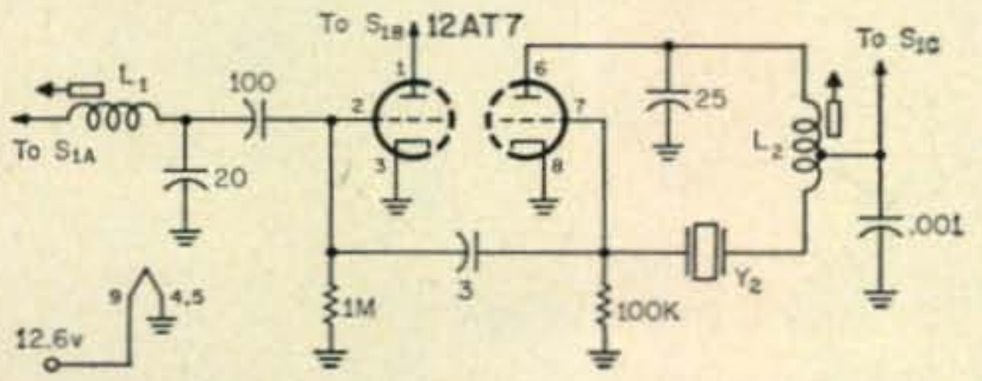


Fig. 3—Circuit of the 15 meter converter. The crystal, Y_2, is a third overtone 17.5 mc unit. Inductor L_1 is made by J.W. Miller, #4403, 1 microhenry and L_2 is 10t of #18E., tapped 3t from the crystal, wound on a J.W. Miller #4400 form.

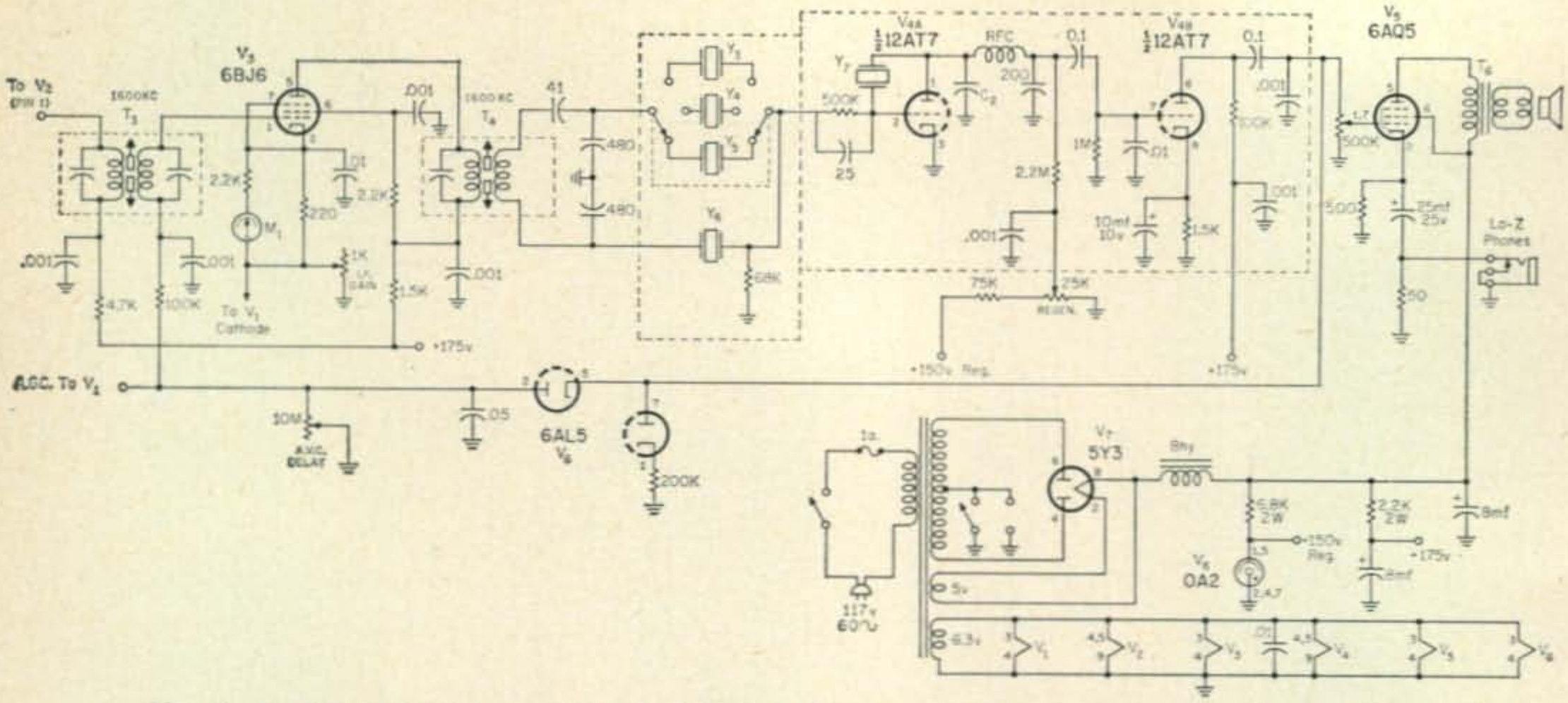


Fig. 4—Circuit of the i.f. ampilfier, half lattice filter, quartz crystal detector, audio amplifier and power supply. All resistors are ½ watt unless otherwise noted. All capacitors greater than one are in mmf, less than one in mf unless otherwise noted.

C_2—See Text under "Tuneup."
M_1—0-1 ma.
T_3, T_4, 1600 kc i.f. transformers, J.W. Miller 12W-1.
T_5—Power transformer, Stancor PC-8404 or equiv.
T_6—Output transformer, Triad S-51-X or equiv.
Y_3—1598 kc series tuned.
Y_4—1600.5 kc series tuned.
Y_5—1602 kc series tuned.
Y_6—1600 kc series tuned.
Y_7—1600 kc parallel tuned.

symmetrical and therefore the matching networks were always unbalanced. I finally solved the problem by removing the tuning capacitor from the secondary and using it outside the i.f. can to series tune the secondary winding and load into a balanced capacitance circuit as shown in the diagram.

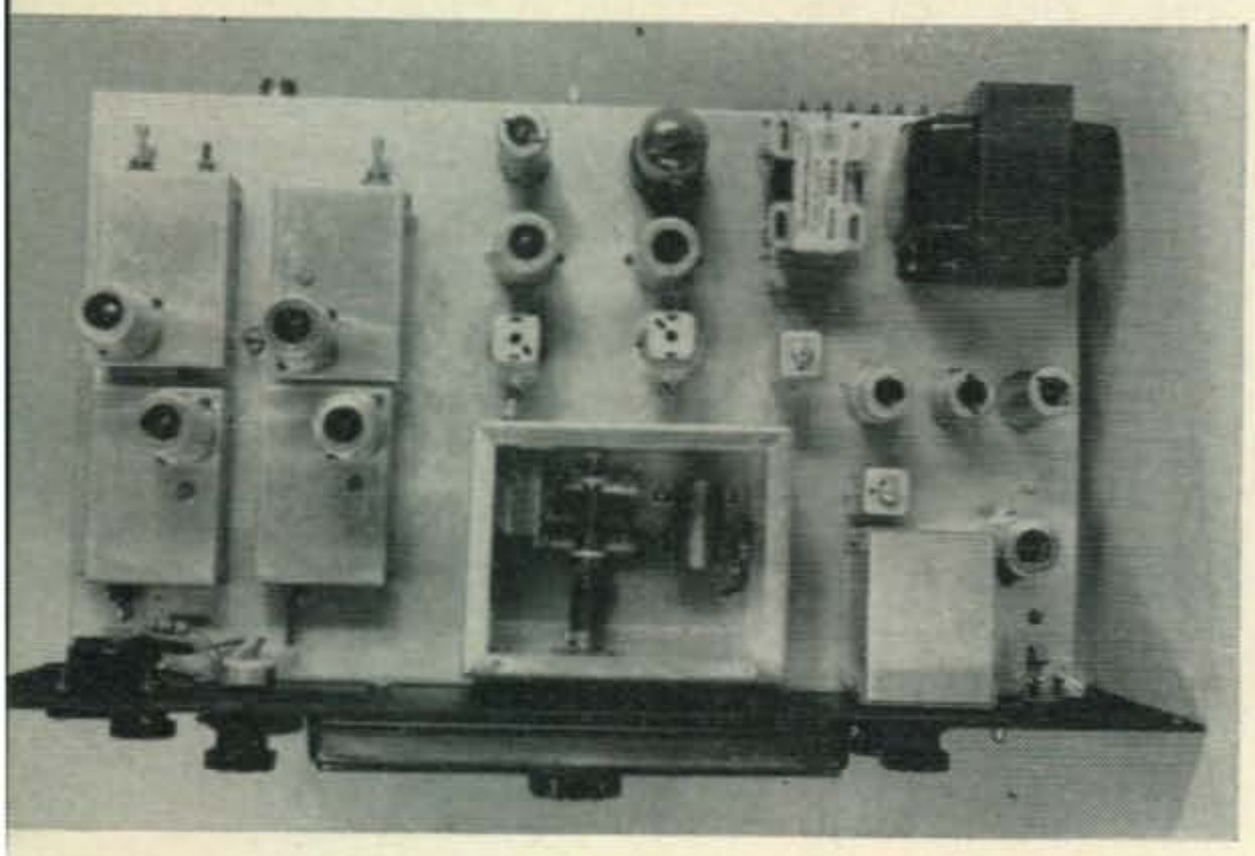
There are not many critical circuits in this receiver. One that has been mentioned is the Colpitts tank. Another is the input to the reflex-Pierce detector. This circuit must be well shielded and isolated from signals other than those which come through the half-lattice filter. This detector is practically a receiver by itself, and if there are signals to be picked up, they *will* be. The detector circuit was built inside a shield box under the chassis and the input lead run through a hole that was drilled simultaneously through the bottom of the half-lattice filter compartment, through the main chassis and into the detector compartment. Some care was also taken to isolate the input and output of the half-lattice filter to prevent signals from leaking across.

Construction Details

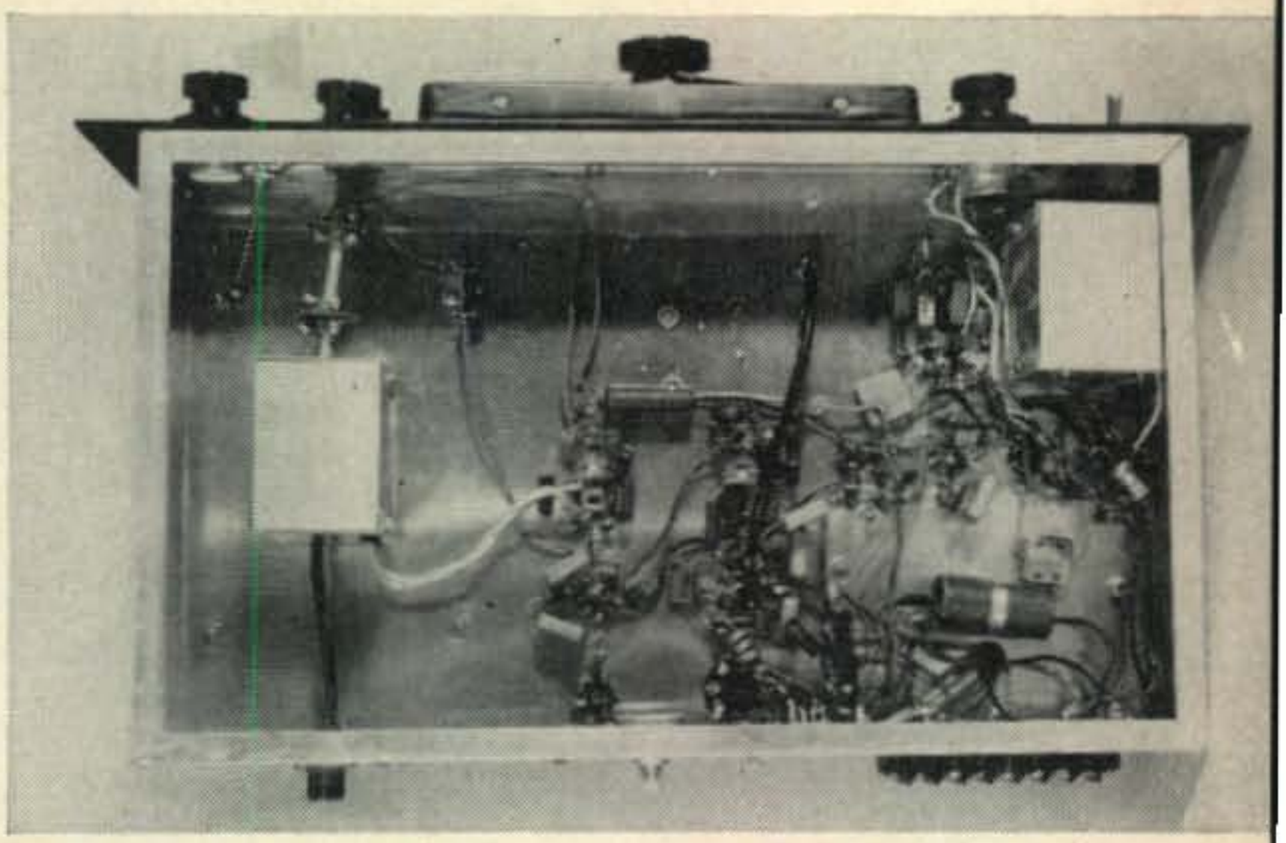
A lot of careful thought has been used in the layout of the receiver circuits and the front panel so that it will not only have good performance but will also look like a professional job and be a pleasure to operate.

Grounding was very carefully planned before wiring was started. All tube sockets had two mounting bolts and under the chassis a solder lug was placed under the mounting bolts for each tube. One of these lugs was used for the filament ground and the other was used for signal ground. It is essential to ground the center posts in the tube sockets of the i.f. amplifiers for if they are not grounded the stages will be unstable.

Since there are generally few components per stage, they were laid out around each tube socket with as short leads as possible. Two-terminal tie points were used to support decoupling resistors and the B plus and a.g.c. busses



Top view of the receiver shows the four converters for 160, 40, 20 and 15 clustered to overlap the bandswitch compartment under the chassis. The Colpitts tuning compartment has been opened to show the location of the coil and capacitors. The B&W miniductor is cemented to a plexiglas rib which is bolted to the chassis by four angle brackets. The tuning compartment is made of a Bud utility cabinet type AU-1029 bolted directly to the chassis. The compartment containing the half-lattice filter is next to the tuning compartment on the side opposite the converters. The half-lattice filter compartment is made from an LMB Tite-fit box chassis type T-F771. It is mounted to overlap the compartment under the chassis which contains the quartz-crystal detector.



This view shows the general layout of components beneath the chassis. The compartment directly behind the antenna coax plug is the band switch. Due to the size and shape of the converter compartments, and a desire for symmetrical location of front panel controls, it was necessary to slightly offset the bandswitch knob and use flexible couplings to accommodate the offset. The compartment which houses the quartz crystal detector is at the other end of the chassis and has been located to overlap the half-lattice filter compartment above the chassis so that a hole can be drilled simultaneously through the two compartments and through the chassis. All leads entering this compartment, with the exception of the input signal lead are by-passed for r.f.

as necessary. It can be seen from the photograph of the chassis bottom that there is very little crowding of components.

Data on the i.f. amplifiers and audio amplifiers may be obtained from handbooks although no real difficulties were experienced with these stages.

The Colpitts oscillator gave no performance troubles; it was quite a chore trimming the Miniductor to just cover 3.5-4.0 mc and I recommend that the layout and main tuning capacity be used as listed to save an evening of cutting and trying.

Crystals

It should be noted in ordering the crystals for the half-lattice filter and the detector, that the filter crystals must be set to frequency in a series resonant mode while the detector crystal must be set to frequency in a parallel resonant mode. On 1600 kc there will be about 400 cycles difference between these two modes. It is easy to change the frequency of the detector crystal and it is easy to determine what its frequency is because with the cover off the detector compartment and with operating voltages on the detector it is possible to hear it in a frequency meter, but the filter crystals are almost impossible to move by padding and it is difficult to tell if you have moved them except by detecting a filtered signal. This can best be done by either using a sweep generator and scope with a diode on the output of the half-lattice filter, or if a sweep generator and scope are not available, an equally satisfactory although much more tedious method is to use a frequency meter and a diode hooked to a milliammeter to plot the filter response.

Tuneup Procedure

For the benefit of those who have limited test equipment I will outline a tuneup procedure using only a BC-221, a volt-ohm-milliammeter, and a diode.

1. After completion of the wiring, turn on the receiver and check to see that the tubes are lit and the voltages are approximately correct.

2. Remove the shield cover from the quartz crystal detector compartment and set the voltage on the B plus end of the 2.2 meg plate resistor to 10 volts.

3. Lightly couple (by use of a wire held near the crystal) the BC-221 to the detector crystal and find the crystal frequency in the BC-221. If the signal does not appear, advance the voltage control pot, (screwdriver adjustment on back of chassis) to 15 volts, and then 20 volts. Don't go beyond 20 volts since the circuit should operate with as little as 5 volts. When the signal appears, adjust the crystal frequency to zero beat at 1600 kc by adjusting the value of the capacitor between plate and ground.

4. When the crystal frequency has been found in the BC-221, set the beat to about 500 c.p.s. and turn up the audio gain in the receiver. The same tone that appears in the BC-221 should be heard in either loud speaker or phones of the receiver.

5. Replace the detector shield cover. Couple the BC-221 lightly (by hooking the end of a piece of insulated wire over the grid) to the 12AT7 conversion detector. Turn the i.f. gain control to maximum. It should still be possible to hear the tone in the receiver output and this should be maximized by adjusting the tuning slugs of the 1600 kc i.f. transformers. (Note: It may be that the BC-221 is set on the wrong side of zero beat for the position of the half-lattice crystal switch. If the tone is not heard through the i.f. amplifier, try switching the filter.)

6. Leave the BC-221 coupled to the detector and set it to 5100 kilocycles. Tune the 140 mmf padding capacity so that with the receiver dial set on 3.5 mc the Coplitts oscillator frequency is zero beat with the BC-221.

7. Place the bandswitch in the 80 meter position. Uncouple the BC-221 from the 12AT7 grid and couple it lightly to the antenna input. (Fold a piece of insulated wire and insert the fold into the coax plug.) Tune the 4.5 mc i.f. transformers for maximum signal output. Replace the coupling wire with an antenna, preferably the 80 meter antenna the receiver will be used with, and couple the BC-221 lightly to the antenna. (A piece of wire about 1 foot long sticking up from the BC-221 output terminal

[*Continued on page 84*]

Practical Design of a D.C. to D.C. Converter

BY CANTRELL SMITH*, K4JQG

Part II

Part two of this three part article covers the design parameters of the input voltage, input current, power output, wire size and oscillating frequency. The accumulated data is then used to design the transformer which will be discussed in the concluding installment next month.

SEVERAL things must be considered before the design of a transistorized power supply is started. After due consideration of these items anyone will be able to design a supply to suit his own particular power requirements without making a carbon copy of someone else's circuit and parts list. The following are the design considerations.

Input Voltage

The input voltage could be anything from 6 to 24 volts provided the components had the proper ratings. It will be assumed that the supply being designed is to be operated from a 12 volt automobile system. In a 12 volt system the actual voltage can vary over quite a wide range, depending on condition of the battery, driving speed, idling, motor off, etc. The usual range here is about 11 to 16 v.d.c. A design center near the middle of this range will be selected, 13.6 volts. This is a commonly used design center for medium power supplies. Light duty supplies use a design center a little higher than this and heavy duty supplies use one a little lower. This is because the voltage at the battery terminals decreases somewhat in proportion to the amount of current drawn from it.

Power Output

How much power must the supply deliver to the load? That, of course, depends entirely on what is to be operated from the supply. It will be assumed that the requirements are 200 milliamperes at 350 volts and 30 milliamperes at 175 volts. Total power output is approximately 75 watts.

Input Current

The input current must be approximated by working backwards. An efficiency of 80% will be assumed for the supply. A figure of 80% is conservative for this unit. If the power out is 75 watts and the efficiency is 80% then:

$$P_{out}/P_{in} = Eff.$$
$$75/P_{in} = 0.80$$
$$P_{in} = 94 \text{ watts}$$

The input current is equal to the power input divided by the input voltage:

$$I_{in} = 94/13.6$$
$$I_{in} = 6.9 \text{ amperes}$$

Seven amperes will be used for the calculations.

Wire Size

The calculations of wire sizes will be based on 1000 circular mils per ampere. The input current is 7 amperes but each section of the primary is only carrying current half the time. Therefore, the wire size will be $7/2 \times 1000 = 3500$ circular mils for the primary. The nearest wire size, No. 15 AWG, will be used. Wire sizes are given in the wire tables in the ARRL *Handbook*.

In the secondary winding there is a total current of 230 milliamperes. The wire size will be $0.230 \times 1000 = 230$ circular mils. The nearest AWG size here is No. 26. However, if this supply is to power a mobile unit, it is assumed the full power will be required only when transmitting and this will not be more than 50% of the time. So, in the interest of conserving space, the size can be decreased to $0.230/2 \times 1000 = 115$ circular mils. This gives a wire size of No. 29 AWG. The feedback winding wire size will be determined later. A good grade of magnet wire such as Formex or Formvar will be used for all windings.

Frequency of Operation

Some articles on transistorized power supplies lead us to believe that an operating frequency is arbitrarily selected. This is not the case. If the supply is to be tailored to one's own particular needs, the operating frequency should be carefully chosen. Consider some of the reasons why this is true.

1. Frequency is inversely proportional to the cross-sectional area of the core.
2. Frequency is inversely proportional to the number of primary turns.
3. Frequency is proportional to input voltage.
4. Core losses increase with frequency.
5. Power losses in the transistors increase with frequency.
6. Filter requirements at the output of the supply change with frequency. Less filtering is needed at the higher frequencies.

Keeping the above points in mind the operating frequency will now be selected. Experience indicates that if the frequency is increased beyond 1500 c.p.s. excessive heat sinking for the transistors becomes necessary. For this reason the

*Technical Specialist, Communications Products Dept., The General Electric Company, Lynchburg, Virginia.

maximum operating frequency will be limited to 1500 c.p.s. at full load. At the low end the supply could be designed for 60 c.p.s., but a much larger transformer would be necessary.

Items 1, 2, and 6 above indicate that the higher frequencies will allow the use of a smaller core, fewer turns, and smaller filter capacitors. At the same time items 4 and 5 indicate greater core and switching losses. At these frequencies, however, core losses can be minimized by the proper choice of a core and the top frequency has been limited to a value which keeps switching losses within a practical limit.

At the lower frequencies core and switching losses would be lower but the copper losses would be higher due to the additional turns necessary on the transformer. The output filter capacitors would also be larger, increasing the overall size of the supply.

In a mobile unit compact packaging, consistent with good design, is usually desirable. So in order to keep the unit as small as possible an operating frequency of 1500 c.p.s. at full load will be selected. This supply will shift downward in frequency by approximately 10% from no load to full load. This means that in order to have it operate at 1500 c.p.s. at full load we must design for approximately 1650 c.p.s.

Transformer Core

Ideally, the core should have a square hysteresis loop for fast switching, low coercive force for minimum core losses, and high saturation flux density to reduce the core size. However, these points can be compromised on a little for the sake of economy without greatly affecting the size and efficient performance of the supply. Ferrite cores with saturation flux densities in the range of 3000-5000 gauss and with relatively good square loop characteristics are inexpensive. Toroidal cores are the most efficient but they are also the most expensive. It is also quite difficult to wind a large number of turns on a toroidal core by hand. A U and bar configuration will be selected for this design since this shape lends itself well to hand winding and ferrite cores of this configuration are inexpensive. These cores are widely used in television flyback transformers and used ones can often be had for the asking at television service shops. The core shape is shown in fig. 2.

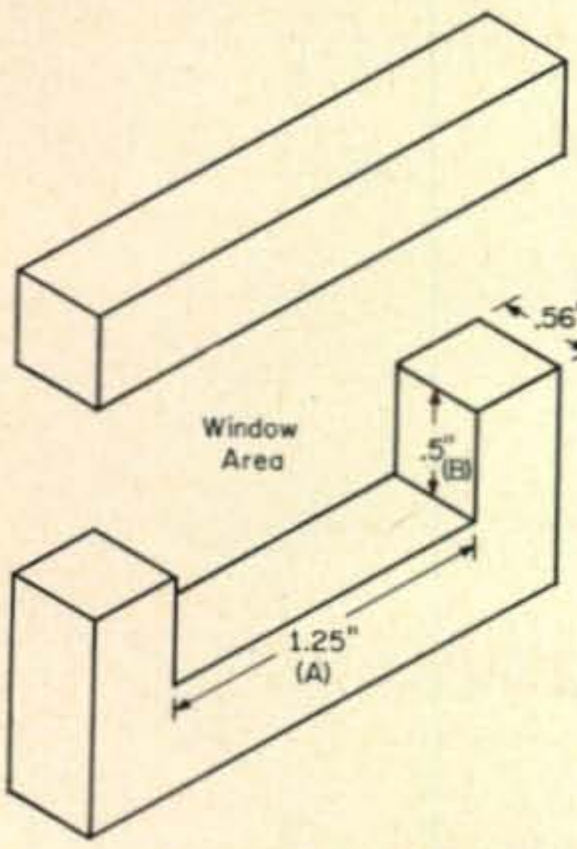


Fig. 2—A three-quarter view of the core showing the dimensions to be calculated. The window area equals A × B or 0.5 × 1.25 = 0.625 square inches. Since the core cross-section is square the area equals 0.56 × 0.56 or 0.314 square inches.

The shape and material of the transformer core have been decided. The next thing to do is select a specific core of the proper size. If everyone had complete manufacturer's data on core materials these things could be calculated with a fair degree of accuracy. However, most of us do not have such complete data available so we must make a guess. It is known that 5000 gauss is a practical figure for saturation flux density so that figure will be used. In order to find the cross-sectional area of the core the following formula is used:

$$A_c = 4E_{in}/(N_p B_m F)$$

Where:

A_c is the cross-sectional area of the core in square inches.
E_{in} is the input voltage (13.6 v.d.c.).
N_p is ½ the total number of primary turns.
B_m is the saturation flux density in kilogauss (5.0 kg).
F is the operating frequency in kilocycles (1.65 kc).

Primary Turns

All the above items necessary for determining A_c, the cross-section area, are known except the number of turns on the primary. There is a rule of thumb for determining the primary turns. The total number of turns on the primary should be at least 3 times the input voltage. In this case $2N_p = 3 \times 13.6 = 40.8$ turns, $N_p = 40.8/2 = 20.4$. Use 21 turns for each half of the primary. The cross-sectional area of the core can now be calculated.

$$A_c = \frac{4\,E_{in}}{N_p\,B_m\,F}$$

$$= \frac{4\,(13.6)}{(21)\,(5)\,(1.65)}$$

$$= 0.315 \text{ square inches}$$

The cross-sectional shape of the core does not have to be square but for the sake of simplicity of calculations assume that it is. This means each side of the cross-section must be

$$\sqrt{0.315} \text{ or } 0.565 \text{ inches.}$$

The total number of turns needed for the transformer must be determined before the remaining core dimensions can be decided on. This will be done later.

Transistors

Power transistors are selected for their switching characteristics and their power handling capability. Units should be chosen which were developed for switching circuits by a reliable manufacturer. If this is done the only two points

to worry about are the collector current and the collector to emitter reverse breakdown voltage ratings. It is better to use transistors with a collector current rating well in excess of the maximum primary current to assure long life. Care must be taken when choosing a transistor for its voltage rating. The rating to look for is collector to emitter (V_{ces}) and *not* collector to base. The V_{ces} should be at least 2½ times the maximum input voltage. This is because each transistor, during its off time, is subjected to the input voltage plus the voltage induced by the other half of the primary plus any switching transients appearing on the waveform. Delco 2N442 transistors will be used in the design of this supply. They are 15 ampere units with a V_{ces} of 45 volts.

Winding Calculations

Most of the information is now available for calculating the number of turns needed for each winding of the transformer.

Primary

$$N_p = \frac{4\ E_{in}}{A_c\ B_m\ F}$$

$$= \frac{4\ (13.6)}{(0.315)\ (5)\ (1.65)}$$

$$= 21 \text{ turns}$$

Therefore, 2 N_p = 42 turns total center-tapped No. 15 AWG.

Feedback

Before the turns needed for the feedback winding can be calculated it is necessary to know the base current needed to make the transistors operate at saturation with a collector current of 7 amperes. It is also necessary to know how much voltage is needed on the bases to get this base current.

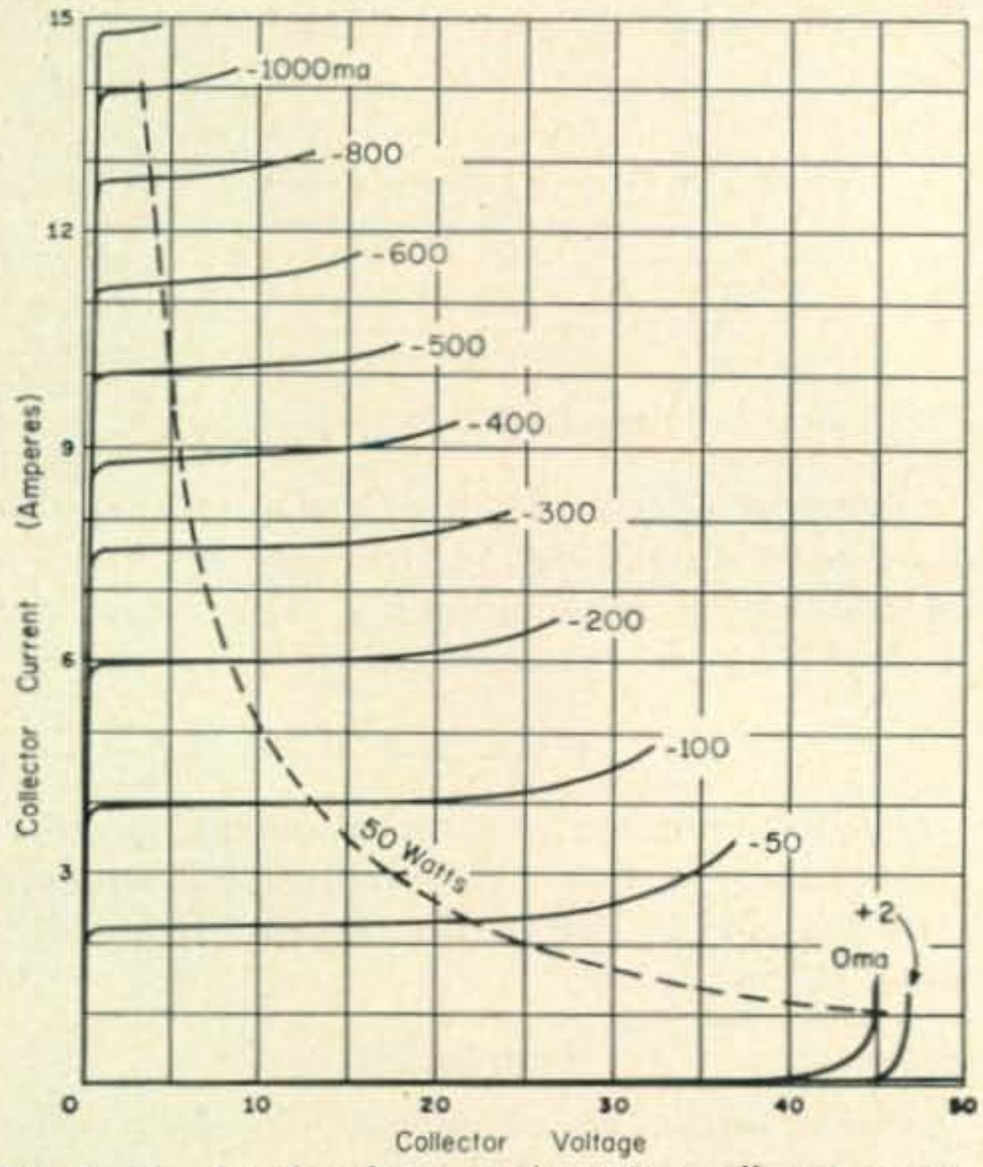


Fig. 3—The family of curves depicting collector current versus collector voltage for the Delco 2N442. It is used to determine the collector saturation point when designing the feedback winding.

The base current for saturation is obtained from the 2N442 collector *EI* characteristics curves shown in fig. 3. It can be seen that about 275 milliamperes are needed for saturation at 7 amperes collector current. This should be increased by about 40% to insure saturation under all conditions. The extra base current will do no harm and it will help insure fast switching. Therefore 400 ma will be used as the design figure. The wire size will be 0.4 × 1000 = 400 circular mils. The wire table shows this to be No. 24 AWG.

The base voltage is taken from the base *EI* characteristics curves shown in fig. 4. The 25° C curve indicates that for 400 milliamperes of base current a base drive of 0.95 volts is needed.

The only other thing to be determined is the value of each section of the voltage divider R_2/R_1. Remember that the voltage drop across R_1 is the starting voltage on the bases of the transistors. It should be a little higher than the base drive necessary for saturation (0.95 v.d.c.). The supply should start and operate at the lowest input voltage we might have. This will probably be about 11 volts. A #1819. 28 volt, 35 ma pilot lamp will be used as R_2 for reasons already mentioned. The cold resistance of the lamp is approximately 50 ohms. If at least 0.95 volts are needed across R_1 at 11 volts input, R_1 can be calculated as follows:

$$\frac{R_1}{R_2} \times E_{in} = 0.95$$

$$\frac{R_1}{50} \times 11 = 0.95$$

$$R_1 = 4.3 \text{ ohms}$$

Any value from 4 to 5 ohms will work nicely here.

Now all the necessary information is available to calculate the feedback turns.

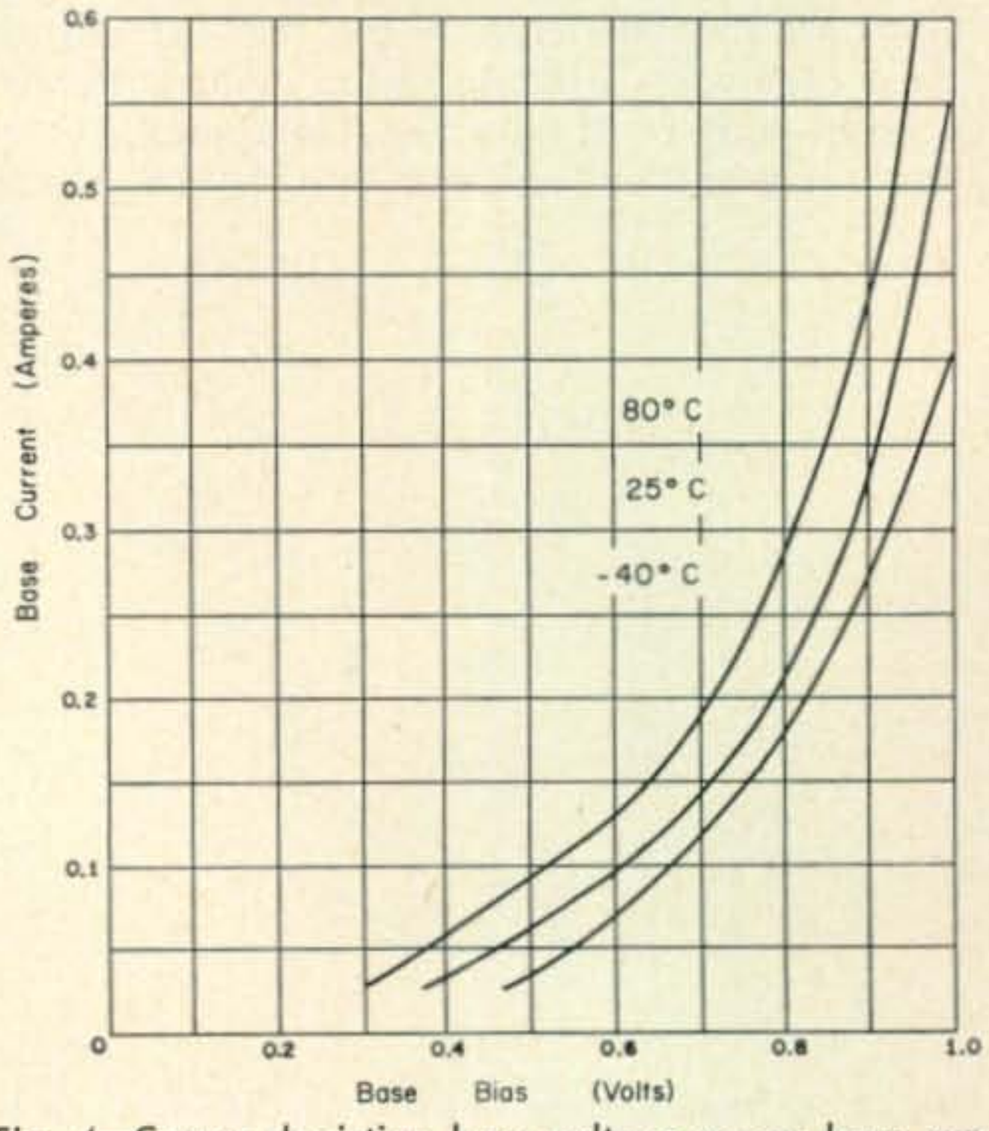


Fig. 4—Curves depicting base voltage versus base current. This curve is used to determine the base drive voltage needed to obtain the base current decided upon.

$$N_f = N_p \left[\frac{E_b + (R_1 I_b)}{E_{in}}\right] \frac{1}{Eff}$$

$$= 21 \left[\frac{0.95 + (5 \times 0.4)}{11}\right] \frac{1}{0.855}$$

$$= 21 \times 0.268 \times 1.17$$

$$= 6.6 \text{ turns}$$

Therefore $2N_t$ equals 13 turns total, center-tapped. This can be made either 12 or 14 turns if desired in order to avoid tapping on a half turn.

Note that a figure of 0.855 (or 85.5%) was used previously when the overall efficiency of the supply was estimated at 80%. Some of this loss is in the transistors and associated circuitry and some is in the transformer. Since only the Transformer losses are of interest here the transistor losses must be eliminated from the efficiency figure. The transistor losses are calculated approximately as follows:

$$P_T = \frac{I_{in} V_s}{2} + \frac{E_{in} I_{in} (t_r + t_f)}{4T} + \frac{2 E_{in} B I_{co}}{2}$$

$$= \frac{7\ (0.3)}{2} + \frac{13.6\ (7)\ (30)\ (10^{-6})}{4\left(\frac{1}{3000}\right)}$$

$$+ \frac{2\ (13.6)\ (20)\ (100)\ (10^{-6})}{2}$$

$$= 1.05 + 2.14 + 0.027$$

$$= 3.22 \textit{ watts}$$

$$= 6.44 \text{ watts for both transistors}$$

Where:

V_s is the saturation voltage (from transistor data sheet).
t_r is rise time (from transistor data sheet).
t_f is fall time (from transistor data sheet).
B is beta (from transistor data sheet).
I_{co} is collector diode current (from transistor data sheet).
T is 1 divided by twice the operating frequency $(1/(2 \times 1500))$.

The efficiency of the transformer is therefore:

$$Eff. = \frac{P_{out}}{P_{in} - P_T}$$

$$= \frac{75}{94 - 6.4}$$

Secondary

The transformer efficiency is used in the calculations for secondary turns also. In this supply the high voltage d.c. output will be equal to the peak voltage of the secondary less the voltage drop in the diodes. This drop is negligible so it can be assumed that the high voltage d.c. of 350 volts is the peak voltage of the secondary.

$$N_S = N_p \left(\frac{E_s}{E_{in}}\right)\left(\frac{1}{Eff.}\right)$$

$$= 21 \left(\frac{350}{13.6}\right)\left(\frac{1}{0.855}\right)$$

$N_s = 624$ turns total, center-tapped

Overall Core Size

The transformer data to this point will be summarized and then the size of the core can be determined.

Primary: 42 turns of No. 15 AWG, center-tapped.

Feedback: 14 turns of No. 24 AWG, center-tapped.

Secondary: 624 turns of No. 29 AWG, center-tapped.

Now the overall size of the core and the window area can be approximated. There are two rules of thumb for this type of transformer which will help in making this approximation.

1—Do not let the overall depth of the windings exceed the smallest cross-section measurement of the core. In this case the smallest dimension is 0.565 inches. This is to keep the leakage flux to a reasonable minimum.

2—Calculate the total copper cross-sectional area and double the result to allow for wire insulation, winding irregularities, and insulation between windings. This figure will give the minimum window area needed in square inches.

Primary	$42 \times 3{,}257 \times 10^{-6}$	$= 0.1370$
Feedback	$14 \times 404 \times 10^{-6}$	$= 0.0044$
Secondary	$624 \times 127 \times 10^{-6}$	$= 0.0792$
	Total Copper Area	$= 0.2206$
		$\times 2$
	Minimum Window Area	$= 0.4412$ *sq. in.*

The next step is to look at catalogs, data sheets, or anything else available giving core data and select a core. Remember that the core must meet the approximate specification calculated above:

1. Saturation flux density of 5000 gauss.
2. Cross-sectional area of 0.315 square inches.
3. Minimum window area of 0.4412 square inches.
4. It must allow a maximum winding depth no greater than the smallest cross-section dimension (0.565 inches).

In the data sheets it is found that Allen-Bradley makes a core which comes close to the above specifications. It is made of their WO4 material and has a saturation flux density of 4900 gauss. The window area is $0.5 \times 1.25 = 0.625$ square inches. The core is square in cross-section and is approximately 0.56 inches per side, or a total cross-sectional area of $0.56 \times 0.56 = 0.314$ square inches. These specifications are sufficiently close to the calculated values.

Now that all the winding data has been found, along with the core sizes, we can procede to wind the transformer. ■

[*To Be Continued*]

THE TEE-KEY

A Transistorized Electronic Keyer

BY MICHAEL I. NEIDICK*, K2ENN

BRASS pounders agree that an electronic key lends the "finishing school" touch to their fist, but at a cost which is prohibitive to but a few. Most c.w. men prefer modest transmitting gear, putting as much money into the receiver as their pocketbook will allow. As the saying goes, "You can't work 'em if you can't hear 'em!"

The Tee-Key is an inexpensive but uncompromised answer to this problem. It is a transistorized unit employing switching circuits, and features variable weighting, variable speed, and self-completion of characters. Once the weighting is set to give the desired sound, it remains constant as the speed is varied. Dot and dash speeds are individually adjustable, providing a large degree of hand tailoring.

Circuit Description

The Tee-Key employs two self-completing, keyed multivibrators and a relay driver circuit. The keyed multivibrator is a variation of the standard free-running multivibrator.

In fig. 1, we have the basic free-running multivibrator, and in fig. 2, the collector and base voltage waveforms. Assume that Q_1 has just switched "on". The collector voltage rises to ground, driving the base of Q_2, through C_1, to a positive voltage $+V_{cc}$, and turning Q_2 "off". The base voltage of Q_1, the "on" transistor, is a few tenths of a volt negative, and C_2 quickly charges to $-V_{cc}$. The collector of Q_1, the "on" transistor, is at nearly ground potential and C_1 is discharging toward $-V_{cc}$ with a time constant $R_{b1}\ C_1$. When the voltage at the base of Q_2 starts to go negative, Q_2 begins to conduct; the positive going waveform at its collector is transferred to the base of Q_1 through C_2, turning Q_1 "off" and further driving Q_2 "on". Transistor Q_1 remains off until C_2 has discharged, controlled by the time constant $R_{b2}\ C_2$, from $+V_{cc}$ to a slightly negative value at which time Q_1 turns on and the cycle repeats. If R_c is small compared to R_b, the "on" time, T_1, equals $0.7\ R_{b1}\ C_1$ and the "off" time T_2 becomes $0.7 R_{b2}\ C_2$ in seconds. The repetition rate is $1/T_1+T_2$.

To control the free running action, it is only necessary to lift one emitter from ground. By interrupting the current flow, the transistor is turned "off" and the collector voltage drops to $-V_{cc}$. Grounding the emitter starts the free-running action as described above. However, if the emitter is lifted during the formation of a pulse character, the character will be cut off. The pulse duration will be equal to the time during which the emitter was at ground.

The self-completion problem is solved by using an inverting circuit as shown in fig. 3. A look at the input-output waveforms in fig. 4 will explain

*931 Walt Whitman Road, Huntington Station, N. Y.

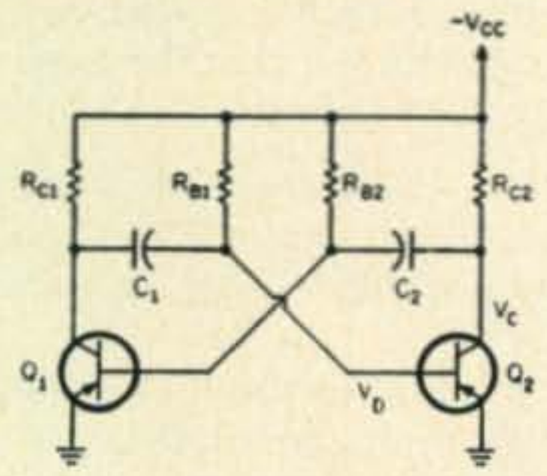


Fig. 1—Circuit of the basic free-running multivibrator.

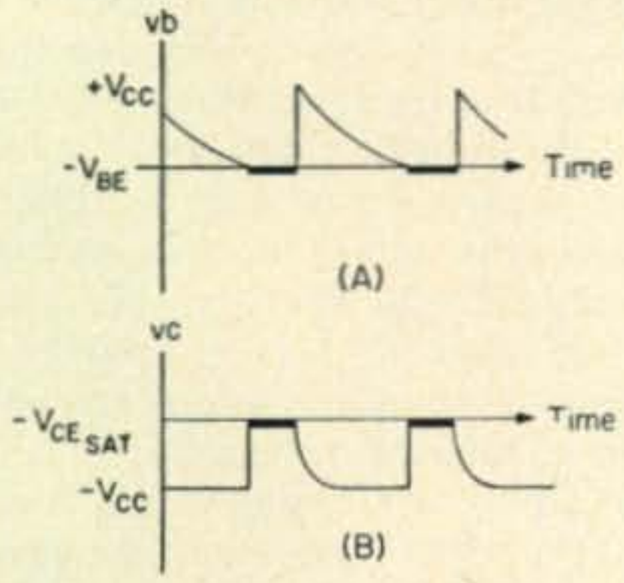


Fig. 2—Waveform (A) appears at the base and waveform (B) appears at the collector of Q_2 when the circuit of fig. 1 is operating

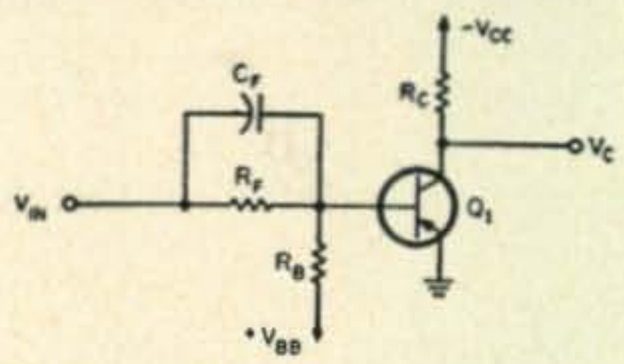


Fig. 3—Circuit of an inverter used to provide self completion.

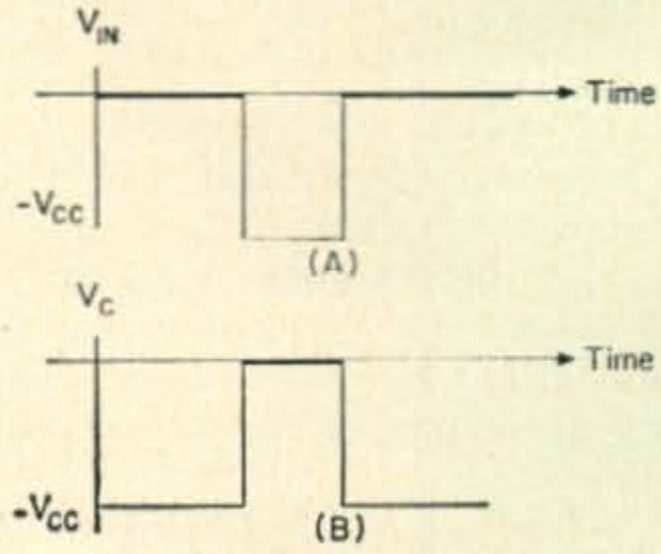


Fig. 4—Input (A) and output (B) waveforms of the inverter of fig. 3.

why the circuit is dubbed the "inverter". In words, the output is near ground when the input is at $-V_{cc}$ and vice-versa. Combining the free-running circuit and the inverter gives the self-completing, keyed multivibrator.

The self-completing action results from connecting the inverted output of Q_2 back to the emitter of Q_1 through CR_1 as shown in fig. 5. To form a character, S_1 is momentarily closed, grounding the emitter of Q_1 and forcing V_c to $-V_{cc}$. The inverter output rises to ground from $-V_{cc}$ and holds the emitter of Q_1 at ground for the duration of the character, even if S_1 is opened before its completion. This action is shown in fig. 6.

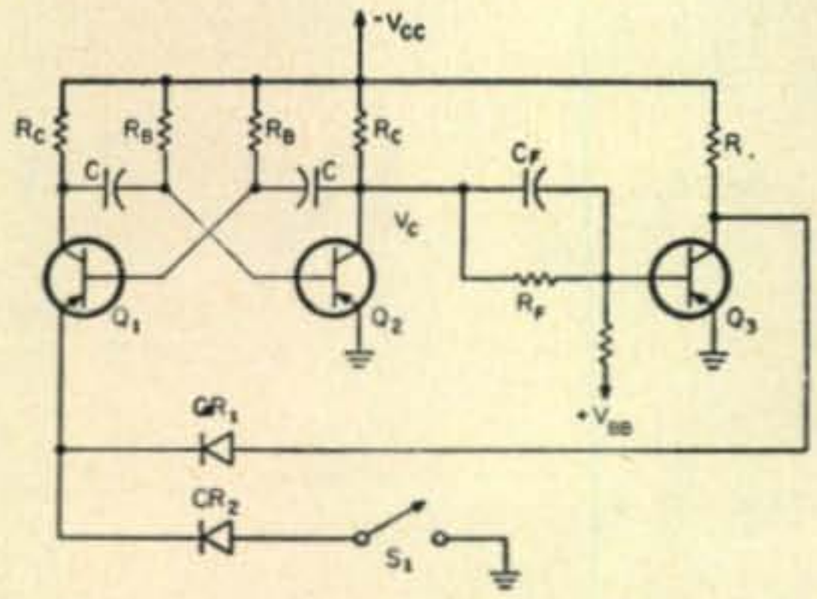


Fig. 5—Circuit of the keyed, self-completing multivibrator combines the configurations of fig. 1 and fig. 3.

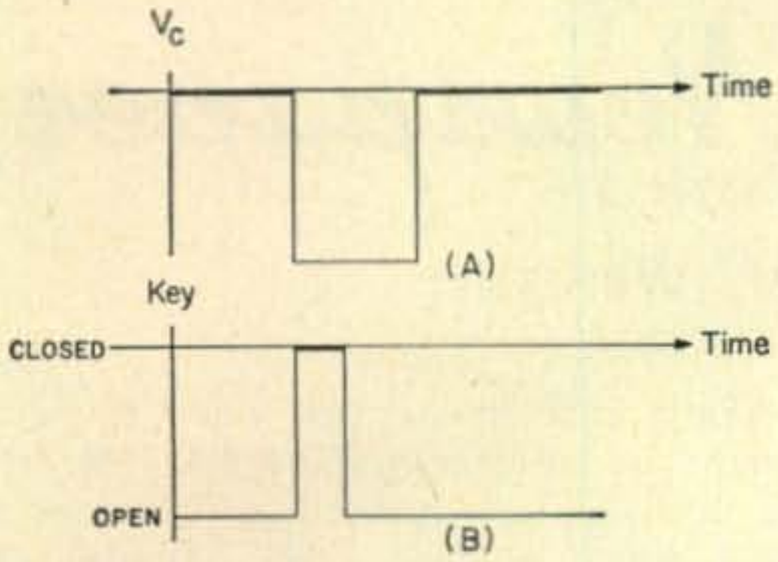


Fig. 6—Self completing action is shown by the waveforms above. The collector voltage (A) completes its cycle when the key (B) is closed for a shorter period.

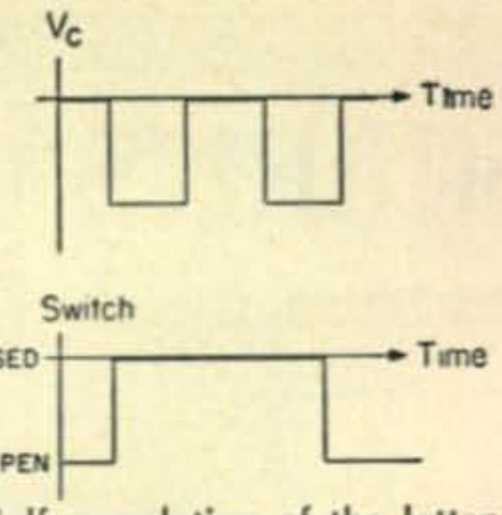


Fig. 7—Self completion of the letter "I".

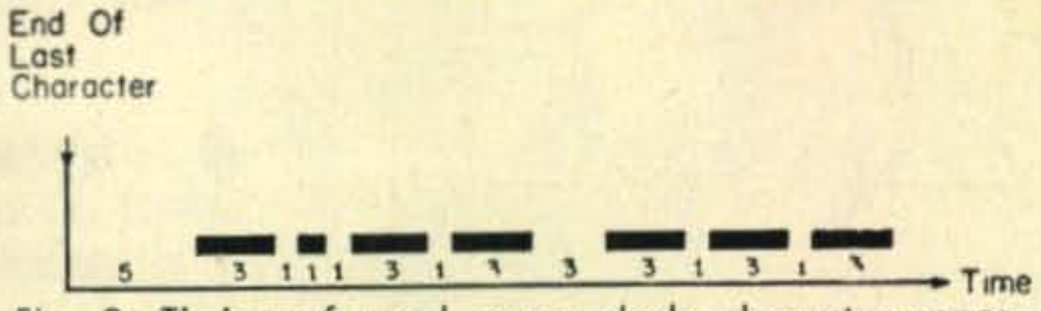


Fig. 8—Timing of word space, dash, character space, dot and letter space.

Should S_1 be held closed longer, a second character will follow. This is shown in fig. 7, where the letter *I* is being formed. Standard dot and dash, and space ratios are shown in fig. 8.

The Tee-Key schematic in fig. 9 is made up of two circuits such as shown in fig. 5, one for dots and one for dashes. The output waveforms of the two are combined through CR_3 and CR_4. This enables either the dot or dash circuit to turn on the relay through its driver, Q_5. The relay driver is similar to the inverter, having the collector load resistor R_c replaced by a 1500 ohm relay and transient suppressing diode CR_7. Switch S_1, when closed energizes K_1 for tuning the transmitter. The base circuit timing resistors on the multivibrators have been replaced with two potentiometers, enabling variation of repetition rate and weighting (ratio of "off" time to "on" time).

Construction

Construction of the Tee-Key is straight forward since there are no critical lead lengths, or dress. Miniaturization is simple, though it is

[*Continued on page 105*]

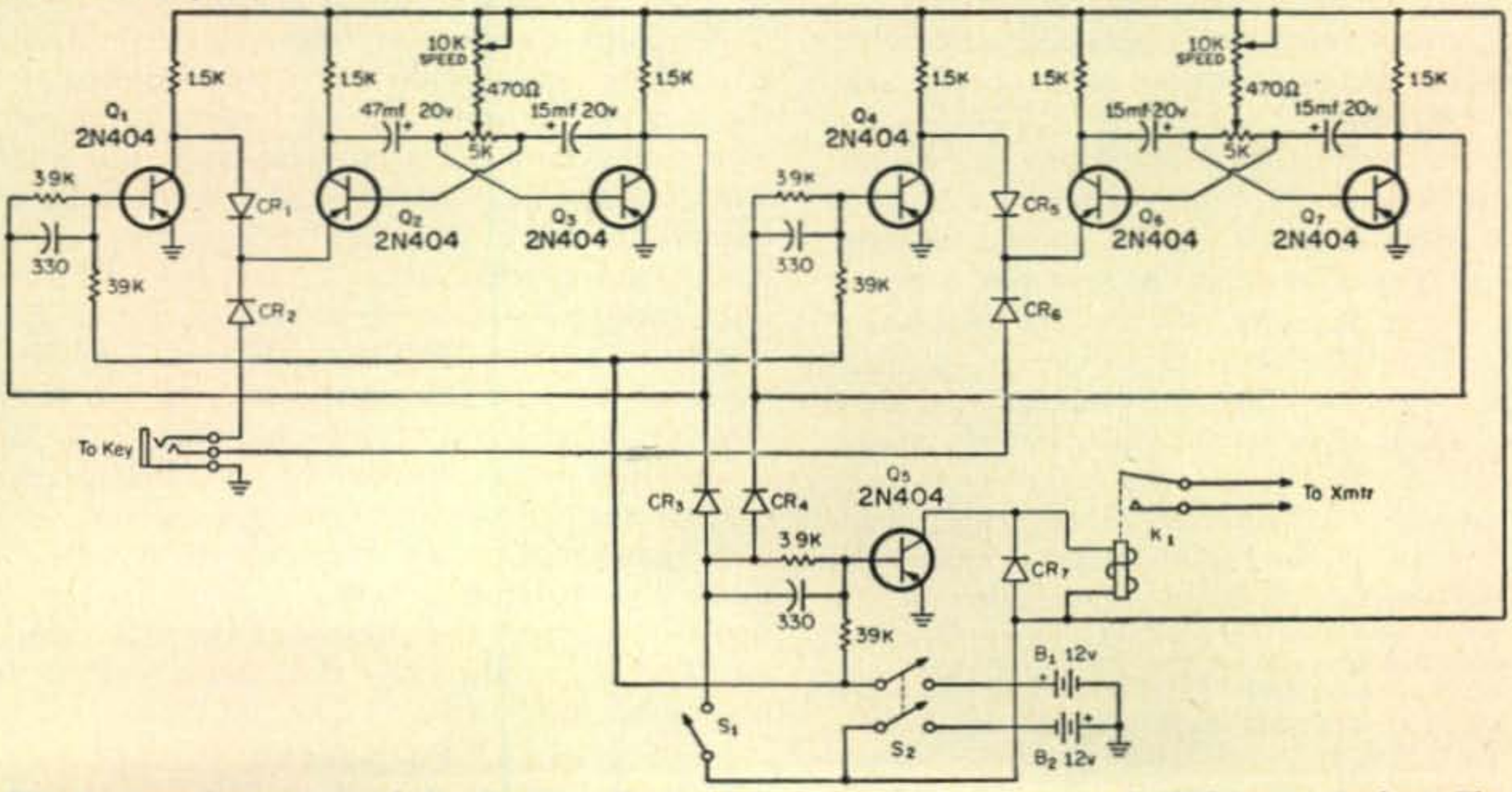
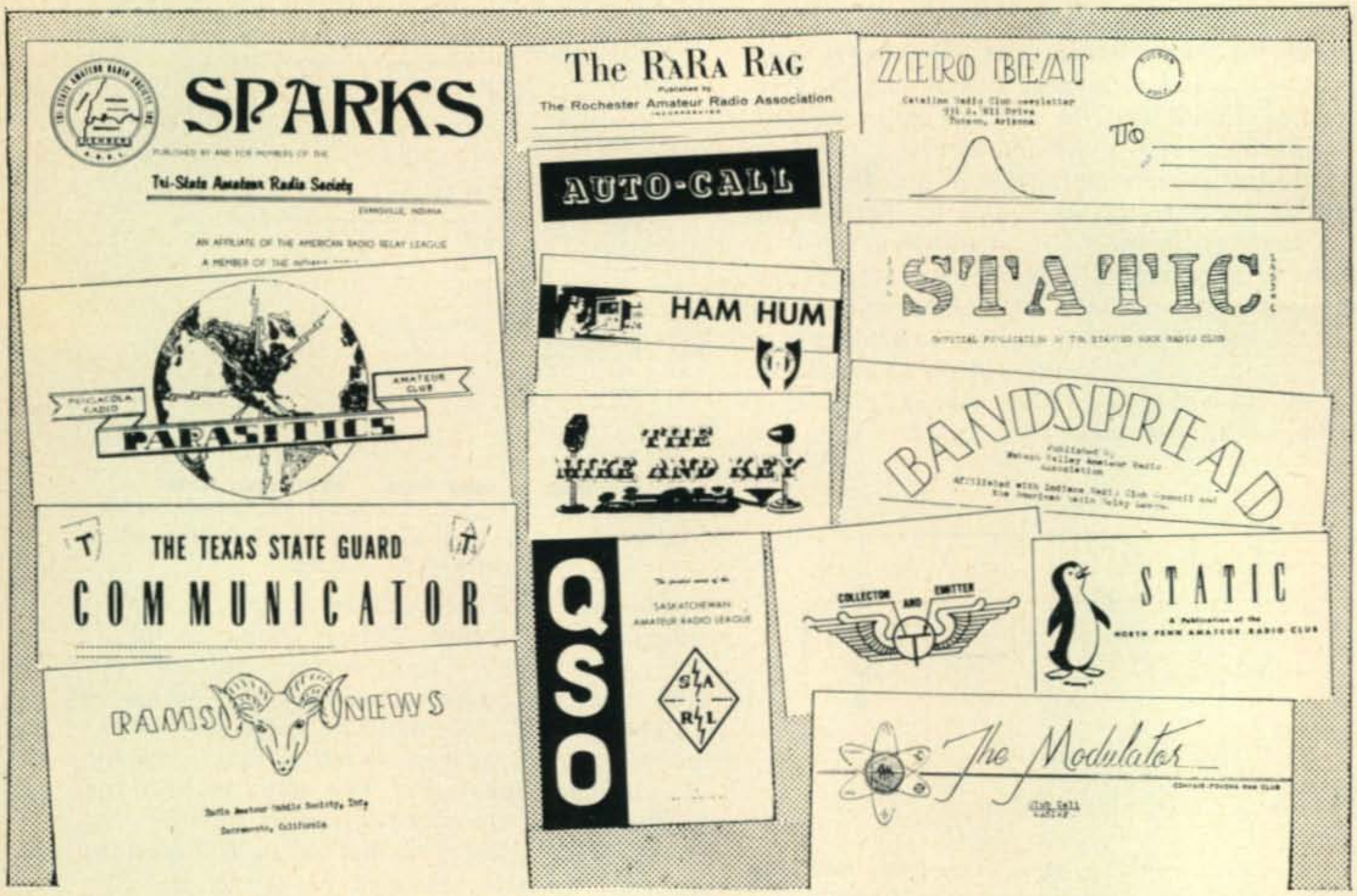


Fig. 9—Complete circuit of the Tee-Key. Diodes CR_1 through CR_7 are type 1N270 or equivalent. The relay, K_1, is a Sigma 11F1500GSIL. All resistors are ½ watt and all capacitors are in mmf unless otherwise noted.



Editing A Club Newspaper

BY EDWIN A. FENSCH*, W8SOU

With the tremendous increase in the number of amateurs being licensed by the FCC there is a corresponding increase in the number of radio clubs coming into existence as these hams band together to swap information and to get acquainted. This development often results in an attempt to improve communications between the club members by the publication of a club magazine or newspaper.

Some of these club publications are small, mimeographed affairs, while a few are becoming quite large in both size of format and the number of pages printed. A few are even so big they have become advertising media for the electronics suppliers.

As the clubs exchange information and data and the club papers are distributed among these local organizations, the interest in such local publications becomes more widespread. Editors of established club papers report an increasing number of inquiries on how to edit and produce a club newspaper, and the newest development is an organization of editors to exchange both know-how and news items for those who are publishing club bulletins—the AREA, Amateur Radio Editors Association, sponsored by W8BAH, the ham radio columnist of the Cleveland Plain Dealer.

As clubs develop an interest in publishing a private magazine, they are immediately faced with the problem of finding a member who understands this publication business and with building a staff of reporters to help the editor of the club paper. Sometimes, in the roster of members, there is someone who has had enough experience in either printing or in writing to handle this assignment. Too often, however, the club has access only to a member who is unschooled in this art but is willing to produce a newspaper for the club. A few suggestions concerning the production of a club newspaper may help in these cases to make the difference between just another expense item for the treasurer to pay and a worthwhile addition to the club's media for communication.

Purposes

Both the editorial staff and the club sponsoring the paper should realize first of all that

[*Continued on page 89*]

*474 Parkview Street, Mansfield, Ohio.
W8SOU has a Ph.D. from Ohio State University and is presently the Assistant Superintendent of Schools in Mansfield, Ohio. He is a certified school psychologist and was formerly a newspaper reporter. He has had a great number of magazine articles published, is a lecturer in psychology at Ashland College and is the Editor of the Inter-City Radio Club *News Bulletin*.

The Attic All-Bander Antenna

BY CHARLES C. TIEMEYER*, W3RMD

Here is a multi-band dipole that covers 10 to 80 meters, for operators who have limited space.

MANY fine articles have been written recently for those of us not in a position to enjoy an antenna farm. The most recent one by W2LCB[1] left much to be desired where multi-band operation is concerned. It described several excellent indoor antennas but each type covered one band and a climb to the attic was necessary when QSYing from one band to another. Wouldn't it be simpler to do all the band-switching from the old operating position? You betcha!

Another article, Little But Oh My[2], described a 40 meter half wave doublet in which the physical length was shortened by the use of series inductances.

The features of these various antennas have been combined in the single antenna shown in fig. 1, a multiband dipole. The sections for 10, and 20 meters can be constructed without any problem, for most attics are long enough to contain them. The 40 meter antenna will function on 15 so that only 10 and 20 need be strung for the higher bands. Of course, there is nothing to prevent the addition of 15 meter elements (each 11 feet long) if desired.

The 40 meter antenna uses the idea outlined in Geisler's[2] article. Each element contains 34 feet; a 15 foot run to a coil containing 15 feet of wire plus an additional four feet after the coil. The coil forms were from an ARC-5 and just hold 15 feet of wire. The additional 4 feet may be bent around and nailed down to the rafters.

Construction

For the 75/80 meter antenna simply double the 40 meter dimensions. I used standard coil stock which comes in 10" lengths such as B&W 3" diameter at 10 turns per inch. Forty turns will provide 31 feet and one 10" length is sufficient for both ends of the 75/80 meter antenna. There should be about 8' of wire at each end, which can be bent back to any convenient mounting to form the end capacity. It must be realized that this antenna will *not* be as good a performer as if it were stretched out in a horizontal plane. If your attic has windows at each end and a convenient place to tie the ends outside the house, by all means do so. However, we wanted to see whether it could be completely mounted in the attic and still do a creditable job. It did, although not as well as our outdoor all-band homebrew trap vertical antenna for 75/80 meters.

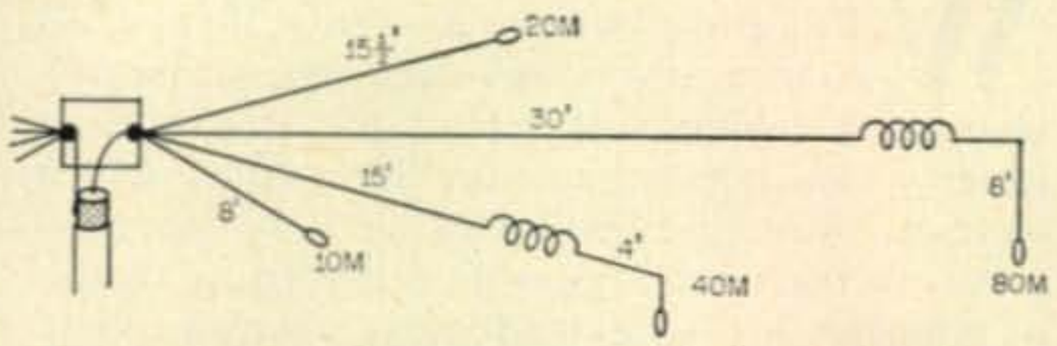


Fig. 1—Structural arrangement of the all-band attic antenna. The coil specifications for the 40 and 80 meter antennas are discussed in the text.

Feeding The Antenna

Frequently, little thought is given to feeding a dipole. The dipole is a balanced antenna and should be fed with a balanced transmission line for optimum performance. If the transmitter output is unbalanced (and most are), a matching device, or balun, must be used. There are two ways of approaching this problem. The balun may be placed at the transmitter output to feed balanced 75 ohm twin lead, or the transmitter may be fed into coax with the balun, to convert from unbalanced to balanced, at the antenna.

The problem with the use of the balun is that it is cut for a specific frequency and in most instances will not function at another frequency. Thus, for a multi-band antenna, several baluns have to be used. The lengths and construction techniques for these baluns may be found in handbooks.[3]

The balun is often simply ignored and coax is run directly to the antenna. The result may be a slight loss of signal and radiation from the transmission line (possible TVI). This is what I have done and the results have been satisfactory.

Results with the all-band antenna described have been most gratifying. Much DX has been worked as well as local and stateside contacts and the signal reports are consistently excellent. In fact, you may have a difficult time convincing other stations that your antenna is skrunched up in the attic! ■

*2515 Linwood Road, Baltimore 14, Maryland.

[1]Mickey, Irving R., "Indoor Antenna Farming," *CQ*, August 1961, p. 40.

[2]Geisler, Leonard E., "Little But . . . Oh My," *CQ*, February 1958, p. 36.

[3]Orr, W. I., "S-9 Signals," *Radio Publications Inc.*, Wilton, Conn, pages 7, 10, 14, 15.

A Heterodyne Converter for 6 Meters, S.S.B.

BY GILBERT J. KOWOLS*, W9BUB

Here is a heterodyne converter that will provide s.s.b. output on 6 meters for a 14 to 14.5 mc s.s.b. input. A power output of ½ watt is obtained without the presence of spurious signals.

WITH the end of cycle 19. The "Goony Box Boys" will either resign themselves to local ragchews or else investigate new techniques which will extend the transmission range. The communication techniques which were exotic at v.h.f., will become more commonplace. In the v.h.f. region there are many modes of transmission to extend range; aurora, backscatter, meteor scatter to name a few.

The use of single sideband in all of these modes has greatly aided in making them work. The use of s.s.b. has caused the introduction of many station characteristics which alone improve communications. These improvements include: 1. Narrower bandpass (receiving). 2. Better stability (receiving and transmitting). 3. More power per cycle of bandwidth (transmitting).

The purpose of this article is to show a simple, cheap way to put an s.s.b. signal on six meters.

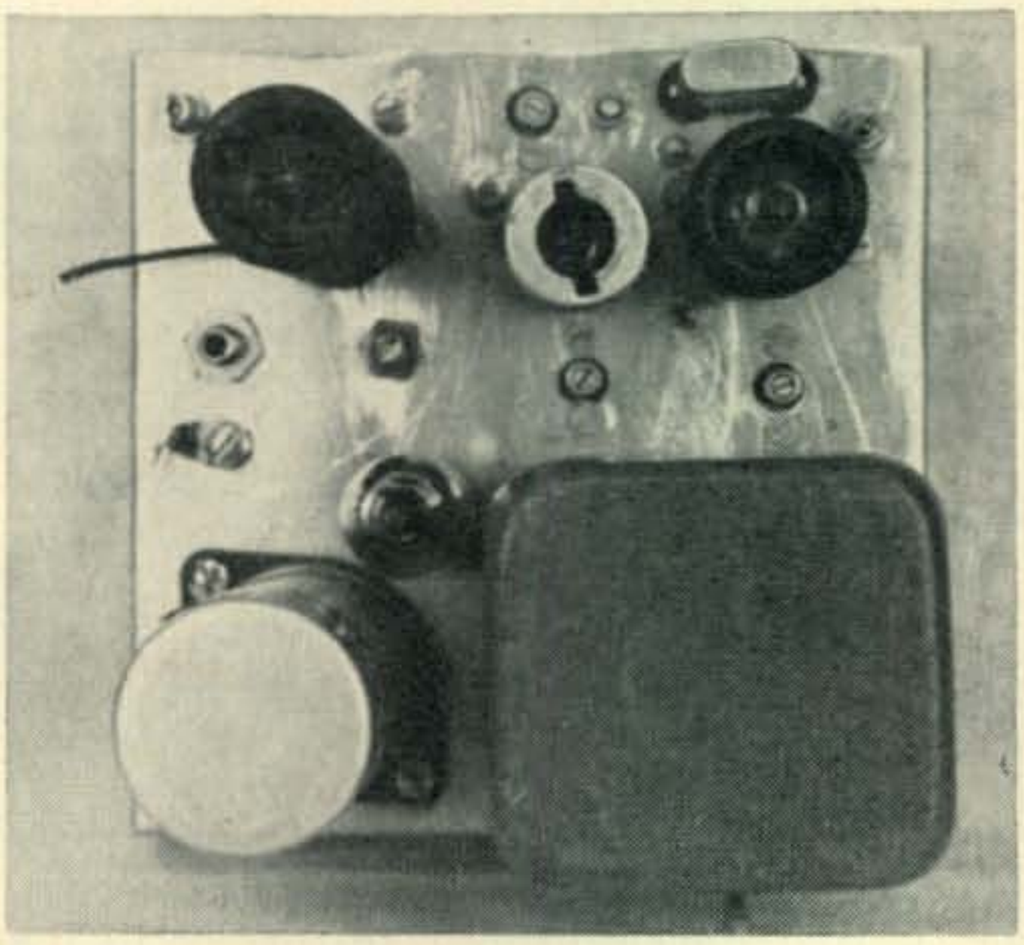
During the past two years, various methods of obtaining an s.s.b. signal on 6 meters were tried. A set of standards was informally set up as a guide. These are:

1. The basic arrangement is the generation of the s.s.b. signal in an exciter which has an output in the present amateur bands 10 meters through 80 meters. This s.s.b. signal is then heterodyned to the v.h.f. band of interest (six meters in this case).
2. V.f.o. operation.
3. No TVI.
4. Fairly small in size.
5. Stability. Since this unit is to go in the linear, it will only be turned on when use is imminent. Thus 5 minutes for warmup is maximum.
6. Sufficient output to drive a class AB_1 final.

With points 2 and 3 particularly in mind, several designs were tried using various mixing frequencies. In most instances the results were not too good because of spurious outputs that fell right in channel two. The final system developed uses a fixed c.w. signal at 64.5 mc with an s.s.b. signal at 14.5 mc.

The low frequency exciter tunes from 14.5 mc to 14.0 mc to cover 50.0 mc to 50.5 mc. The transmitter can be used on c.w. from 50.0 mc to 50.1 mc and s.s.b. from 50.1 mc to 50.5 mc with only retuning.

*7143 West Farragut Avenue, Chicago 31, Ill.



Top view of the 6 meter heterodyne converter showing the compact arrangement on the 5 × 5" chassis. Photo courtesy Carl Swanson, W9EJ.

Circuit Details

A block diagram of the final system is shown in fig. 1. Tube V_{1a} is a crystal oscillator at 21.5 mc. Section V_{1b} triples this to 64.5 mc. Both stages are run at a low level to minimize leakage to later stages. The tripler, V_{1b}, drives a buffer, V_2, which provides isolation. This isolation minimizes oscillator pulling due to loading and thus stabilizes the frequency. The output of V_2 is fed to V_3, the balanced mixer. The balanced mixer also receives the 14.5 mc s.s.b. signal. The output is a 50 mc s.s.b. with a maximum power level, before flat topping, of 500 milliwatts (½ watt).

The power supply uses silicon rectifiers and contains a voltage regulator tube for oscillator stability.

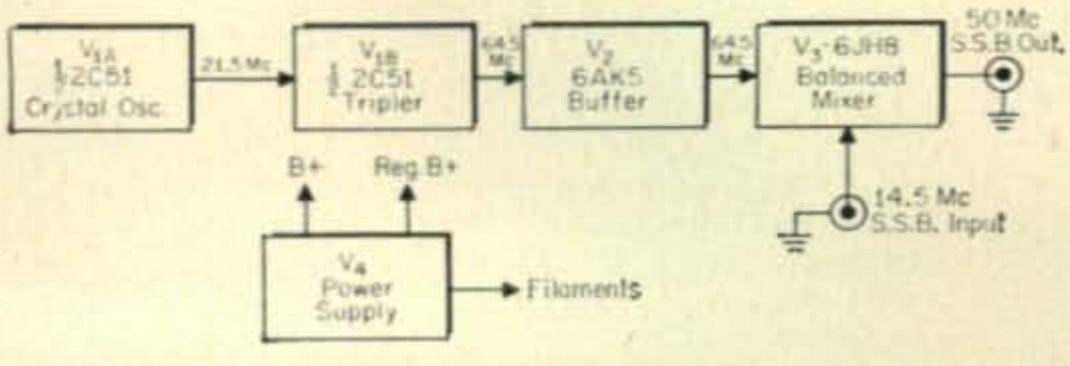


Fig. 1—Block diagram of the six meter transmitter converter that produces output on 50 mc for a 14.5 mc s.s.b. input.

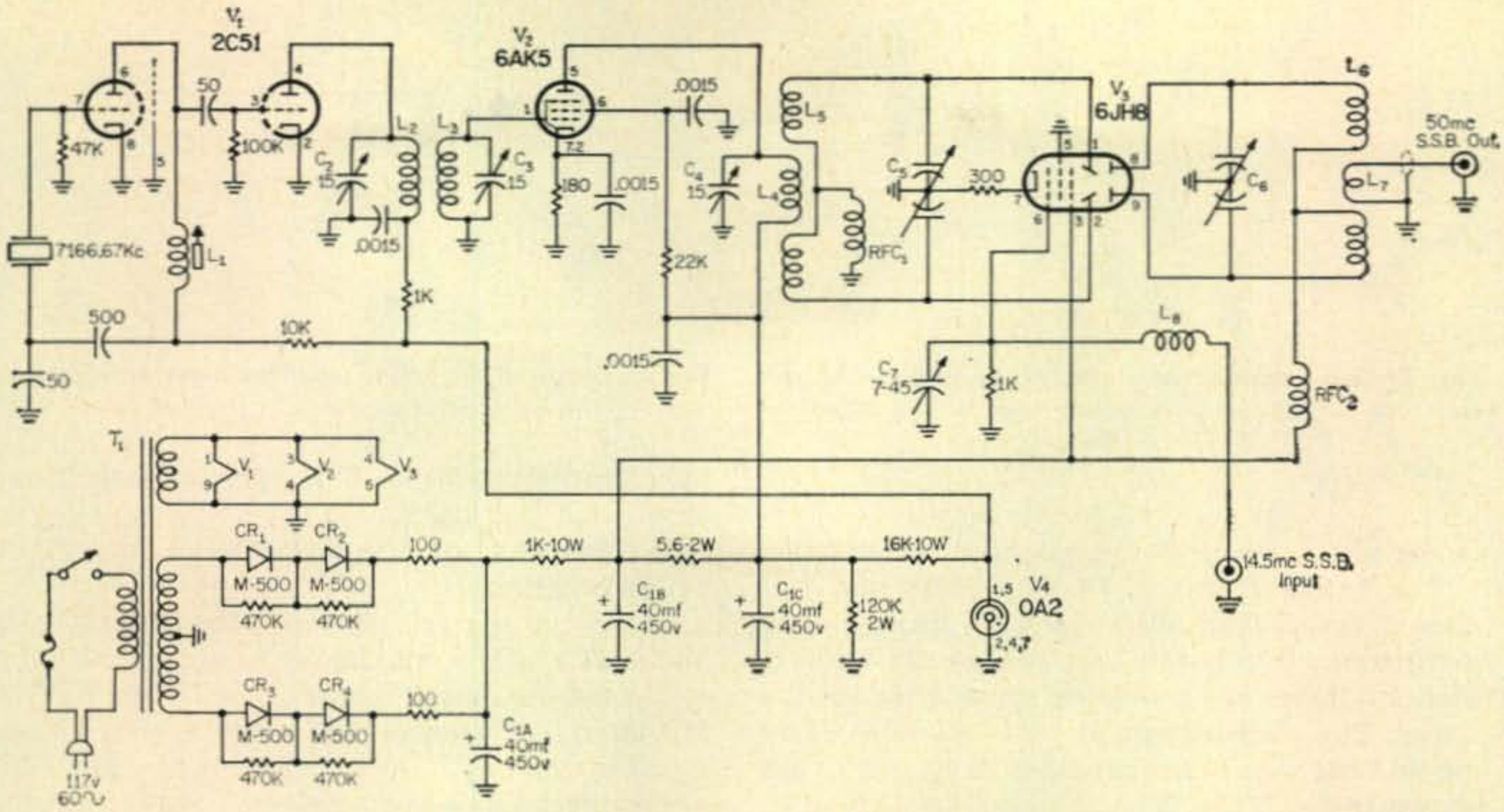


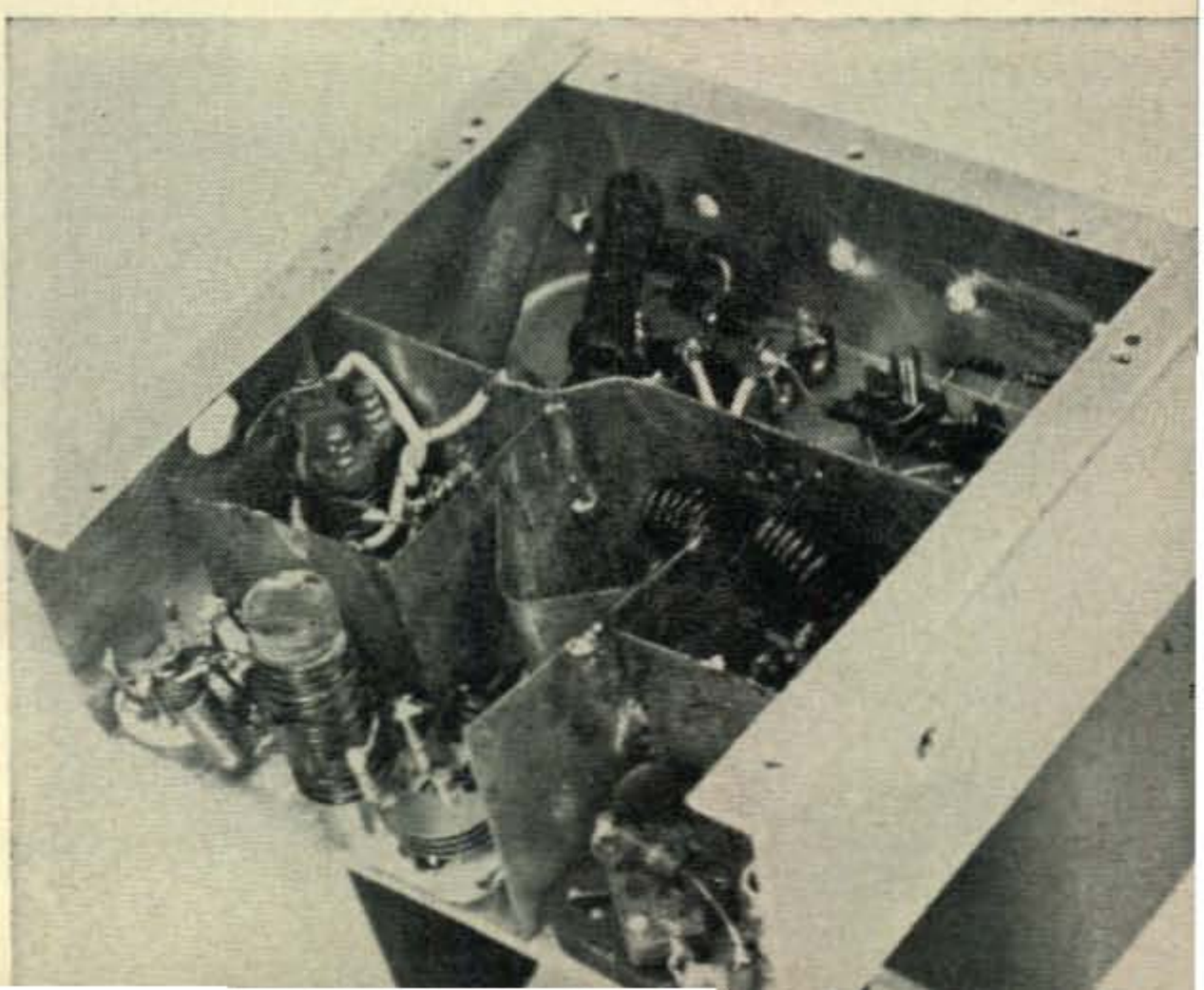
Fig. 2—Circuit of the six meter transmitter converter. All resistors are ½ watt unless otherwise noted. All capacitors, greater than one in value, are in mmf; values less than one are in mf unless otherwise noted.

C_2, C_3, C_4—2.3-15 mmf air spaced. Hammarlund MAPC 15 or equiv.
C_5, C_6—2.8-10.7 mmf butterfly variable. Johnson 160-211 or equiv.
CR_1, CR_2, CR_3, CR_4—M-500, Sarkes Tarzian or equiv.
L_1-30t #26E scramble wound on ¼" slug tuned form. Miller #4500 or equiv.
L_2, L_3, L_4, L_5, L_6, L_7—See fig. 4.
L_8—2.8 uh. Miller #9320-16 or 24t #18 closewound, ½" dia.
RFC_1, RFC_2—Ohmite Z-50.
T_1—650 v.a.c. c.t. at 50 ma, 6.3v at 1 amp.

The schematic is shown in fig. 3. A 2C51 was chosen for the oscillator, tripler (V_{1a}, V_{1b}) because of the shield between the two triode sections. What effect the shield has is hard to say. It was used as a precautionary measure, to minimize the leakage of the 21.5 mc signal to the plate of V_{1b}. The circuit is the "Dollar Oscillator". This oscillator is unique because it operates at the exact multiple of the crystal. The output of frequency of an overtone oscillator is not an *exact multiple* of the crystal fundamental and the crystal has to be specially treated to oscillate in overtone operation. In a normal oscillator multiplier, the oscillator operates at the crystal fundamental frequency and the plate tank circuit is tuned to the wanted harmonic. In the Dollar circuit, the oscillator operates at the desired crystal multiple and *no fundamental is generated*. To see how this works, lets look at the oscillator frequencies used here. The crystal frequency (fundamental) is 7166.67 kc (in an FT-243 holder). The oscillator oscillates at 21.5 mc, the third harmonic, not at 7166.67 kc. The advantage of the Dollar oscillator is that the crystal fundamental is minimized. Thus output frequencies comparable to those obtained by means of overtone crystals are obtained while more economical crystals are used.

At a later date a 21.5 mc overtone crystal was tried with no apparent difference in output or stability (or crystal heating). Consequently, use may be made of whichever type of crystal is more convenient.

The other half of V_1, is a straight-forward, low level tripler. Tank circut C_2 and L_3 is tuned to 64.5 mc. Tank circuit C_3 and L_3 is also tuned to 64.5 mc and couples the 64.5 mc signal to the grid of V_2, a 6AK5. This stage is strictly a buffer used for isolation and stability. The 6AK5 plate tank circuit is tuned to 64.5 mc and is coupled to the balanced coil L_5. The details for coil L_5, the first critical item to be discussed, is shown in figure 3. By paying close attention to circuit layout and parts placement, a fairly close balance can be obtained. The final balance is achieved



Bottom view of the transmitter converter showing the shielding arrangement. The hole on the left side of the chassis is for the output which is passed through a ceramic feedthrough insulator.

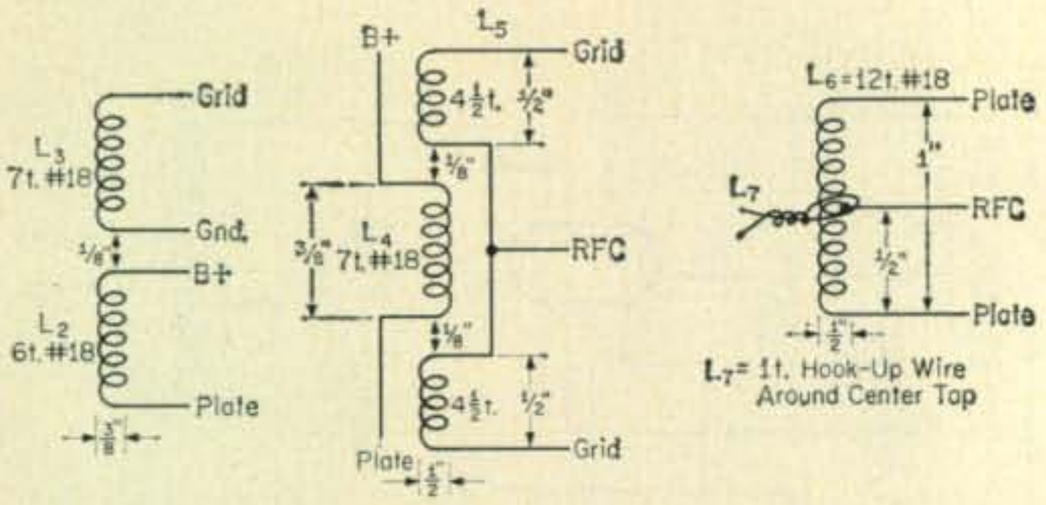


Fig. 3—Coil construction data for L_2 through L_7. All coils are wound on polystyrene rods of the diameter indicated.

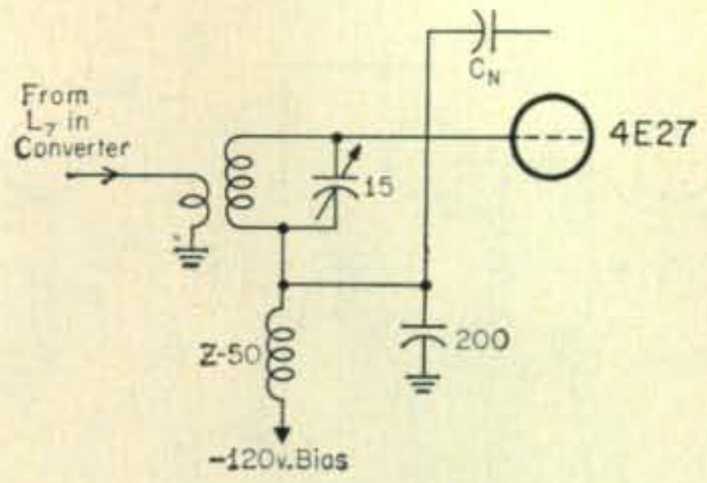


Fig. 4—Circuit of the linear amplifier input showing how the transmitter converter is coupled in.

in the plate circuit of the balanced mixer.

The balanced mixer, V_3, is a 6JH8 and was chosen, rather than other types, for its high plate dissipation. It was felt that this would allow a higher output thus providing spare drive for the linear. The plate circuit of V_3 is resonant at 50 mc and the special construction of L_6 and L_7 are shown in fig. 3.

The 14.5 mc s.s.b. signal is fed to V_3 through an L network.[1] Originally the grid of V_3 (pin 6) was terminated with a 47 ohm resistor to match the coax from the s.s.b. exciter. Since the 6JH8 requires a driving signal of 14 volts r.m.s., the exciter output had to be at least 4 watts. This presented a difficulty since the homebrew exciter only put out ½ watt.

The L network was the answer. This network is essentially an impedance transformer with 50 ohms in and 1000 ohms out. Thus the 50 ohm input impedance of the network terminates the coax from the exciter and the output of the L network is terminated by the 1000 ohm resistor. The required 14 volts is now developed across the 1K terminating resistor.

The power supply is straight-forward. Silicon rectifiers (M-500 or equal) are used to conserve space and keep heat down. The 100 ohm resistors keep the turn-on surge to within a safe value for the rectifiers. A pi filter keeps ripple low. The 120 k ohm resistor is a power supply bleeder and the 0A2 regulates the oscillator voltage.

The entire unit is built on a 5" × 5" × 2" chassis which was made by cutting 2" off a 7" aluminum chassis.

Alignment

Alignment is simple and requires only a grid dipper a high pass filter and a TV receiver.

1. After turning on the power and making sure there is filament and B+ power, couple the grid dipper to L_1, and, using the grid dipper as a wavemeter, tune for maximum 21.5 mc signal.

2. Couple the grid-dipper (wavemeter) to L_2 and L_3 and tune C_2 and C_3 for maximum 64.5 mc signal. Both capacitors should be at approximately ½ capacitance.

4. Feed a 14.5 mc carrier from the exciter into the converter input. Couple the grid dipper (wavemeter) to L_6 and peak C_7 for maximum indication at 14.5 mc. This adjustment is broad because of the low Q.

5. Connect 47 ohm ½ watt resistor across converter output.

6. Couple the grid-dipper (wavemeter) to L_6 and peak C_6 for a maximum 50 mc signal.

7. Feed the output link, L_7, to a Drake TV-300 HP filter. The filter output connects to a TV set tuned to channel 2. Adjust the link, L_7, for minimum interference (herringbone) pattern on the set.

8. Couple the grid-dipper (wavemeter) to L_6 and tune C_6 and C_7 for maximum 50 mc output as indicated by the grid-dipper. The link (L_7) is again adjusted for minimum 56 mc interference on the TV set.

9. Components L_1, C_2, C_3, C_4 and C_5 are always peaked with a grid-dipper used as a wavemeter but C_7 and C_6 may be peaked for maximum output using grid-dipper as a wavemeter or an r.f. probe of a v.t.v.m.

As was mentioned, this unit is intended to drive a high power linear. Running the linear class AB_1, the only loading is the grid circuit losses (the grid coil and the tube grid). In my case, the converter drives a 4E27 into flat-topping (grid current) and full output long before the converter limits. The 4E27 bias is about 120 volts. Thus the converter provides at least this 120 volt peak swing. Figure 6 shows the grid circuit of the 4E27 which has a Q of about 15. If a larger voltage swing is required, this Q could be increased.

The converter has been in use at this station for about a year. During this period no malfunctions have been observed. The stability of the unit is more than adequate. Maximum output is approximately 0.5 watts p.e.p. It should be pointed out here that the packaging of this converter was compact because of the space available in the linear. Much thought was given to grounds, shields, running of leads, etc. Therefore it is suggested that if the space is available, the converter be spread out somewhat. Space between components make an excellent shield. However, if space *is* a problem, the layout as shown can be used with no difficulty.

One word of caution. When tuning up, make sure of the output frequency. It is possible to align the unit on an improper frequency and out of band operation will result. Check your output frequency carefully.

See you on the low end of 6 meters, s.s.b., of course. ■

[1]Griffith, R. H. "Driving the Class AB_1 Linear Amplifier Through L-Networks," *CQ*, June 1961, page 34.

Pepping Up the Pacemaker

BY GEORGE HRISCHENKO*, VE3DGX

A few simple changes permit the installation of a second 6146 in the final of the Pacemaker. Also described are methods of stabilizing the balanced mixers and substitution of silicon diodes for the rectifier tubes.

After living with my second hand Pacemaker for about two years I reached the conclusion that a single 6146, while fine for exciting a high power linear, doesn't cut the mustard when running barefoot. In order to keep the signal above the summer noise one must fire up the linear and this puts 200 watts of heat in the shack on those hot summer nights. Also if you take your Pacemaker out on field day you should find that going to the upper limit of the 30-150 watt group should help your score.

The first problem is to find room for a second 6146 to parallel the present output tube. After this was deemed feasible, power supply factors were considered. Finally, while the chassis would be out it was thought advisable to eliminate several minor annoyances. These are mostly in the balanced modulator and associated controls.

Modifying The Final

The modification is pretty straightforward. If you peer into the final cage of the Pacemaker you will see that, if the final tuning capacitor C_{71} is moved forward, lots of room will be available for another bottle. The worst part of the job is removing the cage around the final stage. Some of the nuts are hard to get at. Use a good slim nut driver—not long nose pliers. After the cage is removed, unsolder all leads to C_{71}; pull the extension shaft out of the coupling and dismount the capacitor from the chassis. Pay attention to the washer assembly and reassemble the same way later. The capacitor is moved ahead 2⅛ inches under the coil and slightly to the left of the old center-line. Make sure it clears the coil taps and the coil mounting standoff. Try it first with the plates fully out and the extension shaft replaced. The coil taps may be bent slightly to gain enough clearance. Resolder the original connections to the most convenient lugs on the capacitor.

The new 6146 socket goes in line with the first one but is 2⅜ inches nearer the power transformer. Use a socket punch to avoid damaging the other components. Four half inch holes were spaced around the new socket to improve ventilation. A cluster of ⅛" holes was drilled in the bottom plate under each 6146. If you should damage the poly coil ribs, a dab of coil dope will remedy the error.

The wiring is duplicated from the old socket to the new one. Take care to provide a good ground, and use a parasitic choke in the grid lead. The perforated cover for the cage was discarded for better ventilation but you may prefer to replace it with coarse screen.

The addition of another 6146 upsets the L/C ratio somewhat but correct loading is still within range even on 10 meters. The tuning capacitor is pretty close to the 100 mark so the purist may want to prune a little off the plate end of L_{12} but use care as you only have one chance!

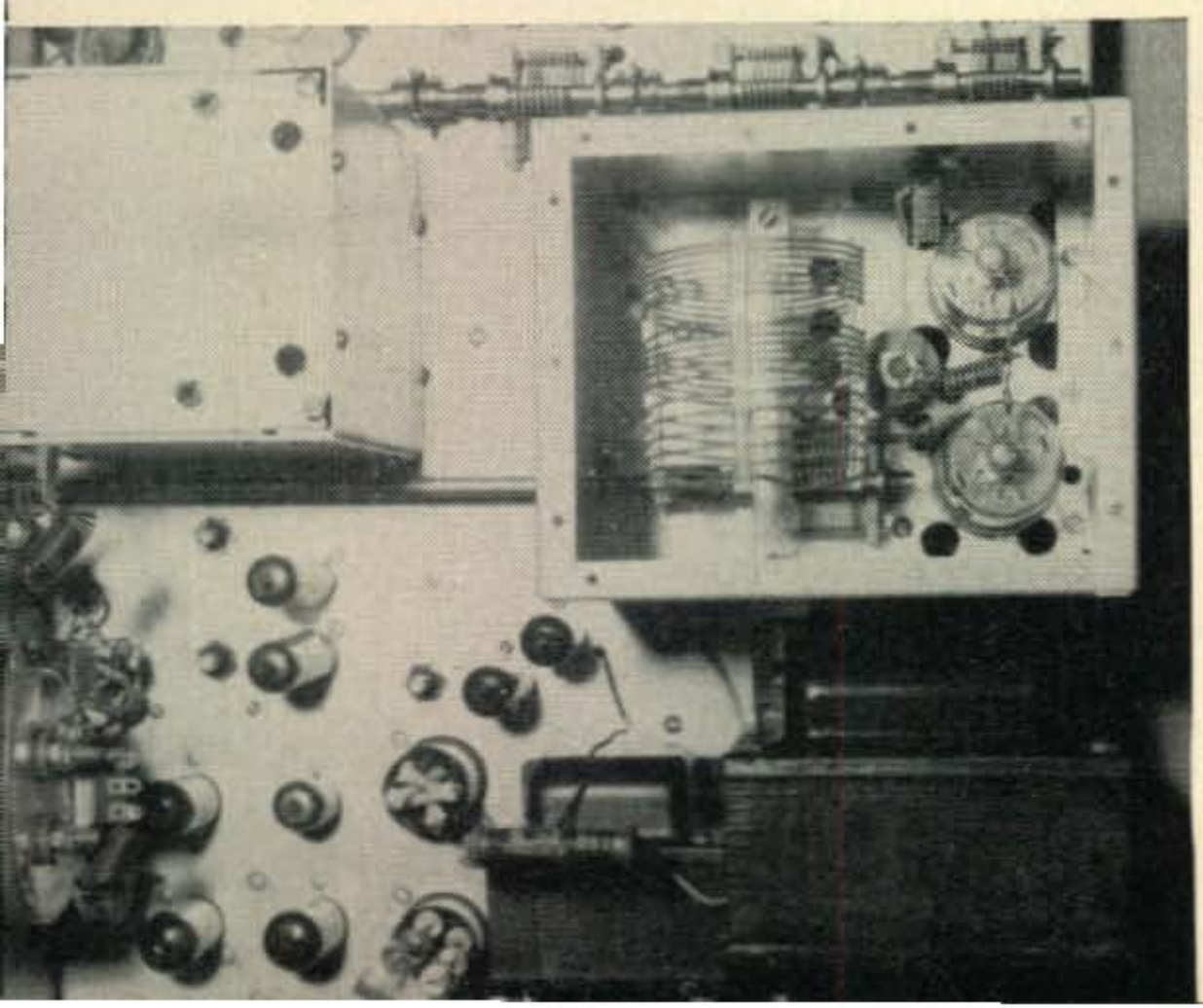
A new shunt will be required for reading plate current. Either shunt R_{85} with one of equal value or wind your own (O.26 ohms) as I did and replace R_{85}. The rig will be loaded up to the usual 110 ma reading (which is now 220 ma of course) with 0.4 ma grid current rather than 0.2 ma.

Alignment And Neutralizing

In order to compensate for the added grid capacity of the new tube, the driver stage must be realigned. To avoid feedback between stages a temporary shield must be used under the coil compartment. This is best accomplished by setting the chassis on a piece of sheet metal so the coil compartments are covered. A few loose rags under the sheet metal will press the temporary shield tightly against the compartments. Make

[*Continued on page 97*]

*R.R. #2, Maidstone, Ontario, Canada.



Top view of the Pacemaker shows the second 6146 in the space created by moving C_{71} forward. The silicons replacing the 5U4 and 5R4 are mounted on octal tube bases to the left of the filter choke and the surge resistor atop the choke. Photo by VE3EQU.

Reviewing The Radio Classics

Noise in Receivers

BY DAVID T. GEISER*, WA2ANU

Number 6 of a Series

FEW realize that before 1928 no one knew that each and every electrical circuit generated noise that limited the weakest signal receivable by the ham receiver. Engineers had found that electrical instruments lost accuracy at extremely low power levels, but did not know why. Brown and Bovari (Swiss) had made extremely sensitive galvanometers to measure d.c., and it was noticed that when shorted, the indicator moved even when there was no known signal in the vicinity. Check of the deflection showed that the amount and speed was random (without apparent reason). This was called "Brownian motion."

A universal law was being noticed for the first time; here is how it affects you.

Johnson and Nyquist

J. B. Johnson had noticed a random effect of noise in use of radio frequencies, and, in the tradition of the Bell Telephone Laboratories, followed the trail to its conclusion. An electrical device of any type is filled with a cloud of electrons, which, on the average, are stationary. "Average" is a deceiving term, for if one electron goes one way and another the opposite direction, the average is nearly constant and zero for the time considered.

At any given instant, however, more electrons are going in one direction than the other. If they are going through a resistor, they will develop a voltage of that polarity given by their direction. Electrons are skittish things, changing direction in billionths of a second. The voltage they generate, *as a mass*, will be evenly generated throughout the whole electrical spectrum. This is called "white noise," for white is the combination of all colors with equal strength. Random noise has equal power in each cycle of bandwidth of the receiver frequency.

Johnson and Nyquist formed an ideal pair[1], for Johnson gave the experimental evidence and Nyquist figured out the mathematical reason for the occurrence. Basically, the noise (random electron motion) power is $K \times T \times B$ where K is a constant (Boltzman's constant), T is the temperature in degrees Kelvin, and B is the bandwidth in cycles per second of the receiver.

Practical Measurement

The first step in the correction of any undesirable effect is the ability to measure the effect. Goodman, crediting Schremp and Gadsen[2] showed that an ordinary vacuum tube operating with a cool filament and its plate current going through a resistor gave the same sort of noise created in an ideal resistor, but stronger. Changing the filament heating gave stronger noise, proportional to filament emission as plate current. Thus, if the receiver was connected to such a noise generator instead on an antenna, the amount of plate current could be used to indicate the amount of noise the receiver was generating to interfere with incoming signals.

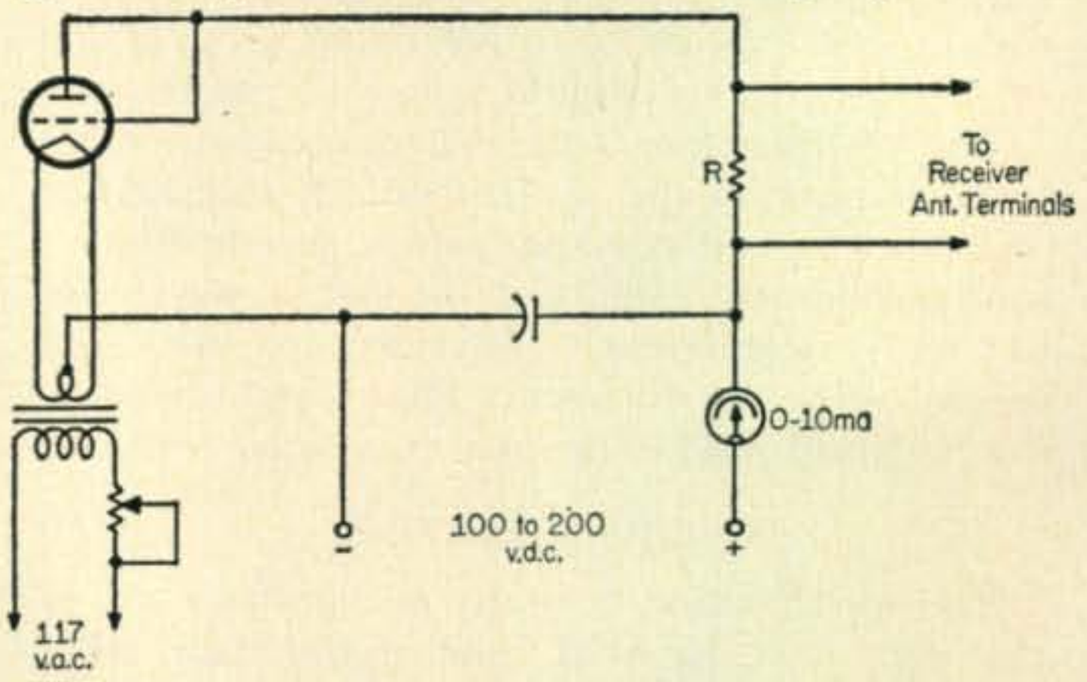


Fig. 1—The basic temperature-limited diode noise generator. Resistor *R* should be composition or film having the nominal antenna impedance (51, 75 ohms *etc.*) at the operating frequency.

The way this is done is simple; without the noise generator (fig. 1) activated a certain amount of noise comes out of the receiver. Its power is measured. The noise generator is then energized and its plate current is increased until twice the noise power comes out of the receiver, (1.4 times the original output voltage). This means that the noise generator power is just equaling the noise that the receiver produces, referred to the antenna input terminals. If the noise generator, for instance, draws a 20 ma d.c. current, one should attempt to adjust the receiver to give this "doubled noise power" on 15 or perhaps 5 ma of current. The receiver would then be capable of receiving a weaker signal.

Engineers speak of the amount of excess noise as the "noise figure," which is the number of times *more* noise that the actual receiver has than an ideal receiver would. This actual noise figure is very close to 20 times the noise generator plate current *in amperes*, times the load resistance R (in ohms).

More often, the noise figure is stated in decibels (it doesn't look so bad that way!); this

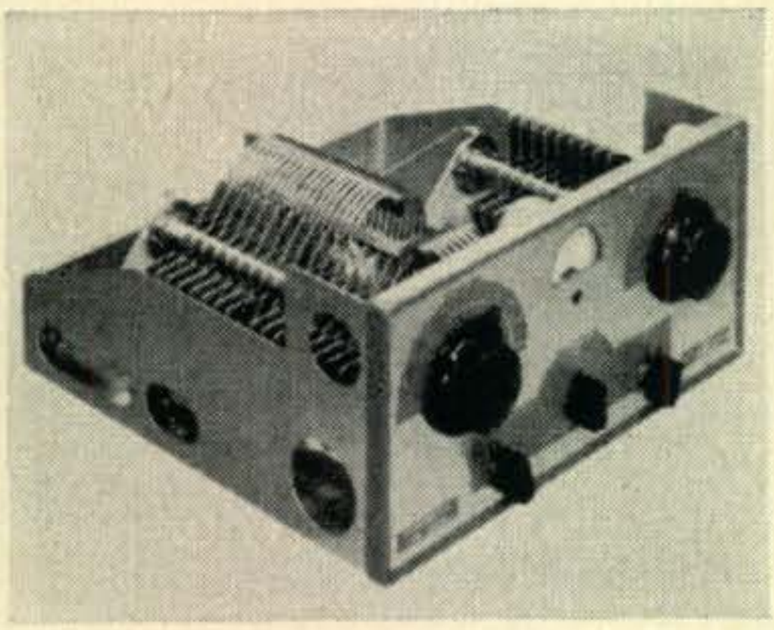
[*Continued on page 88*]

*Light Military Electronics Dept., General Electric Co., Utica, N. Y.

[1] Johnson, J. B., "Thermal Agitation of Electricity in Conductors," *Physical Review*, v. 32, July '28, p. 97. Nyquist, H., "Thermal Agitation of Electrical Charge in Conductors," *Physical Review*, v. 32, July '28, p. 110.

[2] Goodman, B., "How Sensitive is Your Receiver?," *QST*, Sept. '47, p. 13.

New Amateur Products

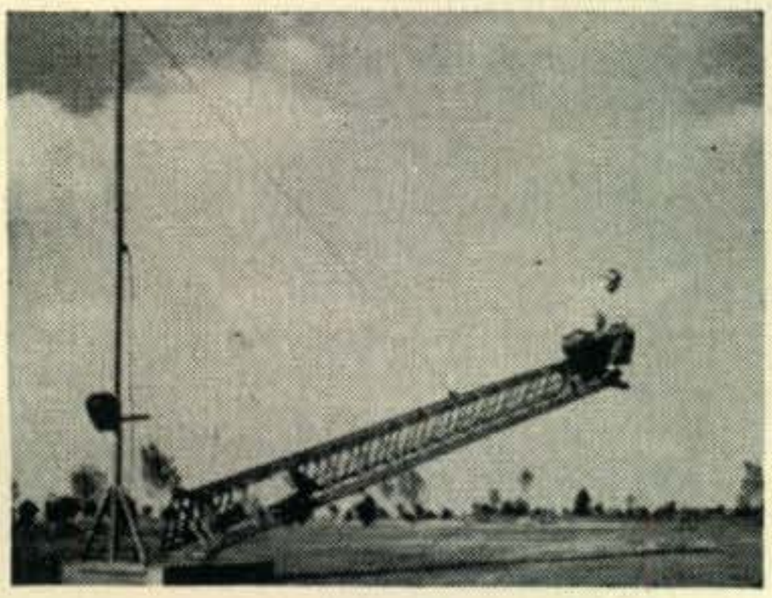


Millen Transmatch

RECENTLY announced at the May Parts Show in Chicago, the James Millen Manufacturing Co., Inc. No. 92200 Transmatch is currently available on the amateur market. The purpose of this device is to convert the impedance of any coaxial fed antenna system to 50 ohms so that the transmitter may work into the impedance for which it was designed at all frequencies. The new transmatch can match any antenna system impedance between 25 and 500 ohms to a transmitter impedance of 50 to 70 ohms. At most frequencies the antenna system impedance may be as low as 10 ohms and still the transmatch will match it to a 50 ohm transmitter output. The 2 kw unit bandswitching unit also contains a reflectometer indicator, and measures 7" x 14" x 13½" deep. For further information circle A on page 110.

Ham Call Signs

NEW Products of Grand Haven, Michigan, has available a new series of ham call signs. These neat display items can be mounted in the rear window of the automobile or in the shack. The signs are made of two-inch die-cut letters in a slot base. The letters are 3/32" silver showcard stock, while the base is satin finish black plastic. Lacquer finish is applied to the letters to guard against fingerprints, *etc*. The new plastic base tightly clamps letters in place when they are assembled into the groove. Shipped postpaid from Box 481, Grand Haven, the ham call signs sell for $1.50. Circle B on 110 for further information.

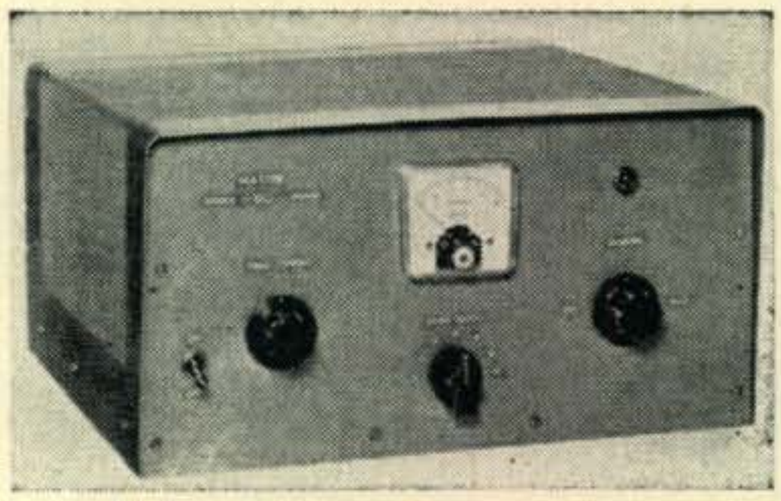


Tower Installation Accessory

ANYONE who has ever tried to erect a tower single-handed will appreciate the value of the new tower erection accessory now being marketed by Triex Tower Corporation. Using the accessory any tower weighing up to 1000 pounds can be raised or lowered to any angle permitting easy beam installation and tuning. After the tower is raised to its final position the device may be removed or left in place for future use. Prices range from $52.16 to $64.02 depending on tower weight. Circle C on page 110 for more details.

Mobile Linear Amplifier

SOMETHING new from Master Mobile in a linear amplifier designed for mobile use. The K-73 linear runs a whopping 750 watts p.e.p. to a pair of 811A's and has a built-in transistorized power supply with silicon diodes in a bridge circuit to supply the high voltage. The wide range pi-network output is bandswitched to cover 80 through 10 meters. Drive requirements are 50-100 watts. The K-73 is metered for plate current and r.f. output and includes provision for remote control and metering with an accessory control box. The K-73 is priced at $289.50. For more details circle D on page 110.



Results of the 1962 CQ World-Wide DX (C.W.) Contest

BY FRANK ANZALONE*, W1WY

CONDITIONS for the c.w. week-end were a repetition of what we experienced a month earlier in the phone section. "Poor to fair" as George Jacobs put it in his contest post-mortem. "W3ASK's propagation forecast for below normal was right on the button," remarked W1UUK. Personally, we found them rather poor on 21 mc, with some fair openings to Europe in the morning, but the rest of the time we had to dig for everything we worked.

A look at some of the scores would indicate, however, that some of the fellows didn't have cause for complaint. Our own Don Miller took full advantage of his rare location and I'm sure it comes as no surprise to see HL9KH at the top of the totem pole. During one of the better periods on 20 he averaged 80 contacts per hour, and on 40 he was working the East Coast late in the afternoon. Fifteen was productive and 80 also added to his multiplier, but 10 was a complete wash-out.

With three element beams on 10, 15, and 20, three quarter-wave phased verticals on 40 and an extended zepp on 80 Don was well prepared for the brawl. Power (?) pair of 6146s. That's what the man said. So where do we send the Larry LeKashman, W9IOP Trophy, out there in Korea or back home in Chicago?

Next in line is 4X4KK, Micky Monastirsky, son of Sam, 4X4BX who was quite a contest man himself not too many years ago and has a trophy to prove it.

By way of equipment comparison Micky used a BC-610 and a Siemens receiver. Antenna farm, three elements on 14, dipoles on 3.5, 7 and 21 mc and a ground plane on 28. Not to forget that desirable geographical location.

And the third "Top Tener" to break a million was HK1QQ, operated by Dale Strieter, W4DQS. Equipment was the same as Herman used in the Phone contest, GSB-101, 75A-3, tri-band beam for the higher frequencies and trap inverted V for the lower bands. Dale's contact total is the highest ever made by a single operator. Unfortunately he didn't have the multiplier to back it up.

The call UT5AA might be a new one in contest circles but not the man behind the key. Leo was the chief operator on the team at UB5KAB, winner of the W3AOH Trophy back in 1960.

With the exception of W3GRF, W4DHZ and W4YHD who upheld the honors for the Potomac Valley, Virginia Century and the USA, the rest of the calls are new to the Top Ten but not in contest competition.

Missing this year was KH6IJ. It just didn't seem like the same contest without Nosey's rapid fire exchanges.

There was plenty of activity in the single band category with most of it and the top scores concentrated on the 14 mc band.

After many years of participation PY4OD finally came up with a winning combination and T. D'Angelo Drummond became the first Trophy winner for Brazil. The John Ryan, W7KVU Cup for the highest score on a single band will soon be on its way to you D'Angelo, congratulations.

An excellent performance was also turned in by Vic Clark (who else). W4KFC looked like a sure winner until we received PY4OD's log.

There were many other fine scores in six figures on 14 mc, among them and deserving special mention are UC2AA and ST2AR. Said Eric, "Conditions generally poor with periods of no signals but did better than anticipated."

Because of the lower m.u.f. the openings on 21 mc were of short duration and it was a mad scramble when the band was open. Missing this year was the ole perennial on 15 meters, W2WZ. Al was temporarily grounded and spent the prior week-end in the hospital. I thought I had a clear field in this one, only to have a new menace, W2HTI and my old rival W3LSG take me over the hurdles.

Evidently the openings over in Africa lasted a little longer because the only six figure scores

Don Miller, HL9KH, top all band single operator station for 1962. Don only had about a month to set up this lay-out.

*Contest Committee Chairman, *CQ*.

on 21 mc came from that area.

ZS6IW gave all bands a try but finally settled on 15 and came up with the highest score on the band. And 5N2JKO, Dr. Mike gave up his usual round the clock operating and settled for a single band so that he could get a little "shut eye."

Although 40 didn't produce the record breaking scores of last year it did create its usual activity. Surprisingly enough the high score is VK3AZZ. With only modest power and conventional antenna system for 7 mc Bob proved that it can be done from "Down Under." The Israel Amateur Radio Club please note, if you are still giving a Trophy for the highest score on 7 mc it goes to Robert J. Gray, VK3AZZ. 18 York St., Reservoir, Victoria.

Bob Martinez, K2DGT made his usual fine showing but the European openings were not as productive as last year and he ran short of contacts. Right now Bob's interests are in other fields and even a long path opening to the JA's wouldn't budge him. But don't relax fellows, I have a hunch DGT will be giving you guys the usual hard time come next November, his YL is very tolerant and understanding.

And speaking of YL's how about JA1YL's score on 7 mc. As I said fellows, just don't relax.

Once again most of the 80 meter activity came from Europe with OK1MG leading the pack by a close margin. Over here, W1BU and his superior antenna farm lead the boys on this side of the pond by a wide margin. This year the man at the key was Ralph, W1HGT.

Although the Single Band entries were few the All Banders used 3.5 to good advantage to fatten up their multiplier but "Oh, those long calls on 80," moaned Ed of the W3MSK crew.

The Top Band enjoyed a good season this year and the few who concentrated on 160 in our contest finally had something to show for their efforts. W2FYT had 8 countries to his credit, nice going Tony. DL1FF will probably be disappointed to see DJ2KS ahead of him. Armin admits he fell asleep while Hans was taking advantage of a good opening on the band.

Ten meters? Forget it, the band was a total washout. Where HK7ZT dug up 65 contacts we don't know.

As in the past, the Multi-Operator Single Transmitter division was dominated by the European and USSR club stations, but it was an old familiar call down South America way that picks up the marbles. This year Ricardo Jr. took on a pardner, Daniel CX7CO. Add another Cup —the Tony Susen, W3AOH Trophy—to the Sierra collection.

It was not a runaway victory for them, the team at UA9KDP made an excellent showing. This is a new group organized by Vladimir. UA9DN also a Trophy winner as single operator the past two years.

The station that everybody was calling. HKØZU was a DX-pedition to San Andres by three members of the Florida DX Club, Ray

Daniel Sosa (CX7CO) and Ricardo Sierra, Jr. at the operating position of CX2CO, this year's winner in the multi-operator single transmitter division.

W4BJ, Bev W4CKB and Ed W4QVJ. Besides having a ball (they submitted a fantastic bar bill to prove it), the boys had the satisfaction of knocking off the most contacts ever made by any station in our contest.

The gang at LZ1KSV improved their score over last year and at the rate they are going they might still land on top one of these days.

Over here the most impressive score was turned in by W1BIH who teamed up with W1JYH to do it. A couple of years ago this duo copped the Trophy.

The club members of W3ADO at the U. S. Naval Academy got special permission which excused them from all week-end assignments and found the contest so exciting that they are planning bigger things for the next one. We had a station from the U. S. Air Force Academy. KØMIC in the phone contest. Now if we could stir up some activity up at West Point we could have an intraschool brawl.

The "Big Boys" had quite a time in their own section. A lot of fellows were wondering where 4X9HQ was located and took credit for a new country, but it was only a club station over in Israel, not just another station but a dream that Bruno, 4X4DH had planned for the past three years. During this time the club members had operated individually in contests and gained valuable experience. For months prior to the contest they had worked on week-ends equipping their Headquarter station 4X9HQ with 5 transmitting positions and 7 different antennas. "Finally this effort came to a climax during the contest," wrote Bruno, "and I hope the score speaks for itself." It sure does Bruno, your boys *and* YL proved what can be done by a properly organized Multi-Operator, Multi-Transmitter station. With that call and location, how could they miss? Dust off a place of honor for the Buzz Reeves, K2GL Trophy in your club room.

The gang at W3MSK again proved that it is the top Multi station over here and added substantially to the Potomac Valley score.

Over on the West Coast W6RW greatly improved its score over last year's. "The new start-

Herman Olarte, HK1QQ and Dale Strieter (W4DQS) who operated the station in the c.w. contest for the highest contact total by a single operator.

ing time is too early for the poor working man in California," complained Roger, so we don't know what to credit their improvement. The other Southern California power house, K6EVR added more operators to its crew so I guess that's the answer to their much higher score.

The German DX Team sent us a complete list of their membership and also an itemized list of the scores of the members that participated in the contest. With 69 stations out of a membership of 109 taking active part, and the Potomac Valley with a close score from their smaller membership, we had quite a job in checking out this one. But there is no question as to where we're sending the *CQ* Club Plaque, its across the sea to DL-land!

The Southern California gang took a giant step forward and made a very impressive showing, as did some of the other USA clubs who made substantial increases over previous years. That is, all except one; the once mighty North Jersey DX Association, who like the Roman Empire has grown lax and lazy and sunk to the depths of oblivion.

Our experiment of trying to increase activity in Central America and the Caribbean didn't work out. The reaction of the rule change of giving 2 points for contacts between stations in North America was about equally divided. W3JTC is very much against it, said Larry, "it didn't generate any more activity and now we can't make a comparison with our scores of previous years." Right you are on both counts Larry, maybe we had better forget the whole idea. Actually with the little activity south of the border it didn't do much to anyones score—except maybe HKØZU.

Well, that just about does it. With only three of us carrying the load it was a rough one this year. We've just got to educate the boys of the USSR and some of the other overseas countries how to keep and score a contest log. Some of you guys over here could stand a little prompting too. Especially when you have to be told by an overseas station that you're in Zone 4 or 5 and not the progressive numbers you keep sending. And those duplicate contacts, one of these days we are going to give out penalties for duplicates in excess of a prescribed percentage.

If you want to show your appreciation, give a vote of thanks to Andy, W1GYE and Ben, W2JB when you hear them on the air. They will probably be on more now that we have put this one to bed. As for me I don't care if I ever see another contest log, except maybe my own.

73 for now, Frank, W1WY

United States Club Scores

Potomac Valley Radio Club	**4,052,481**
Southern California DX Club	3,458,228
Florida DX Club	1,074,480
North Eastern DX Association	1,058,099
Virginia DX Club	869,178
Northern California DX Club	544,001
Ohio Valley Amateur Radio Ass'n	322,480
Nashua Mike and Key Club (N.H.)	293,673
U. S. Naval Academy	260,615
North Jersey DX Association	232,564
San Diego DX Club	200,312
West Gulf DX Club	197,790
Frankford Radio Club	84,560
Lockhead Radio Club (Calif.)	57,134
DX Club of QCWA (New York)	56,282
Willamette Valley DX Club	54,920
Boiled Owls of New Mexico	24,117
Brookhaven Amateur Radio Club (N.Y.)	9,072
U. S. Air Force Academy	8,624

Foreign Club Scores

Deutches DX Team	**4,200,192**
Uruguay DX Club	2,548,661
Central Radio Club of Czechoslovakia	1,892,928
Swiss DX Club	1,350,280
Radio Club of Sofia (Bulgaria)	757,393
Far East DX-ploiters (Japan)	725,220
SP DX Club (Poland)	344,096
Kharkov Radioclub DOSAAF (Ukraine)	217,919
Coral Isle Amateur Radio Club (Guam)	115,080
Warsaw Short Wave Radio Club	103,845
DX King Radio Club (Japan)	96,744
DM Contest Buro (East Germany)	79,971
Narodna Tehnika Radio Club (Yugoslavia)	52,555
Radioway DX Klub (Poland)	35,816
Okinawa Amateur Radio Club	32,821
Tiger Amateur Radio Club (Pakistan)	31,881
Japan DX Radio Club	25,185
Shizuoka Radio Club (Japan)	19,760
Wroclawski Radio Klub (Poland)	19,440
Keihanshin Radio Club (Japan)	14,706
Odawara Amateur Radio Club (Japan)	10,266
Kagoshima Radio Club (Japan)	10,229
Nikola Tesla Radio Klub (Yugoslavia)	10,065
Linkoing Radio Club (Sweden)	6,525
O.S.A. CW DX Club (Belgium)	5,586
Kanazawa Radio Club (Japan)	5,551
Radio Club of Gdansk (Poland)	5,043
Radio Club of Bacau (Roumania)	1,560

Top Ten
ALL BAND—SINGLE OPERATOR

HL9KH 1,142,748

4X4KK	1,039,724	UF6FB	721,112
HK1QQ	1,002,042	W3GRF	445,884
UT5AA	816,408	5A1TW	437,376
HC1DC	759,000	W4DHZ	436,322
	W4YHD 405,876		

Top Five
MULTI-OPERATOR SINGLE TRANSMITTER

CX2CO 1,103,721

UA9KDP	1,033,184	LZ1KSV	604,385
HKØZU	791,280	UA9KCA	456,351

Top Five
MULTI-OPERATOR MULTI-TRANSMITTER

4X9HQ 1,681,988

W3MSK	1,043,415	DJ3JZ	815,490
W6RW	820,725	K6EVR	763,569

Continental Leaders
SINGLE BAND

28 Mc		**7 Mc**	
HK7ZT	3,276	VK3AZZ	82,284
21 Mc		K2DGT	71,040
ZS6IW	153,200	JA1YL	60,532
W2HTI	50,730	OK2KOJ	57,024
OK3DG	48,108	YV5ANT	34,476
JAØSU	27,156	**3.5 Mc**	
PY4BC	11,254	OK1MG	21,000
VK3RJ	1,664	W1BU	12,349
14 Mc		ZL2GS	1,417
PY4OD	**219,230**	JA2WB	990
W4KFC	187,142	**1.8 Mc**	
UC2AA	183,580	DJ2KS	2,576
ST2AR	166,635	W2FYT	416
VK5NQ	137,917		
JA1BWA	107,064		

U. S. A. Runners-up

All Band	K6VTQ	372,252
21 Mc	W3LSG	39,900
14 Mc	W4WDI	129,220
7 Mc	W6JZH/6	43,068
3.5 Mc	K6BPR	4,832
1.8 Mc	WØCDP	171

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

C. W. Results
SINGLE OPERATOR
North America

United States

W1FZ	**A**	**24,153**	**86**	**38**	**59**
W1ACB	"	13,534	70	23	44
W1UUK	"	12,040	64	31	39
W1PLJ	"	5125	43	17	24
W1AJG	"	2112	23	14	18
W1WY	**21**	**36,708**	**173**	**24**	**52**
KN1VSC	"	315	23	8	7
W1PIV	**14**	**88,181**	**278**	**28**	**81**
W1GYE	**"**	**48,616**	**164**	**30**	**73**
W1AGS	"	18,630	80	29	52
K1NHR	"	12,871	76	21	40
W1ZZK	"	12,660	73	19	41
K1OOJ	"	4576	52	13	19
K1RKH	"	1127	20	11	12
W1GVZ	"	518	14	6	8
W1JNV	"	442	12	6	7
K1SDX	**7**	**9550**	**73**	**21**	**29**
K1MLI	"	6762	50	21	28
W6KFV/1	"	4988	42	17	26
K1PMY	"	198	9	4	5
W1BU	**3.5**	**12,349**	**87**	**16**	**37**
WA2OJD	**A**	**145,550**	**254**	**76**	**129**
W2TVR	"	100,480	228	50	107
W2FZY	"	48,670	117	54	101
WA2IEK	"	38,936	122	55	69
K2CPR	"	16,038	71	47	52
W2GKZ	"	5886	42	25	29
W2JB	"	1850	26	10	15
W2JKH	"	1189	15	14	15
K2YFE	28	442	12	8	9
W2HTI	**21**	**50,730**	**201**	**25**	**64**
WA2CYQ	"	9163	68	19	30
W2BOK	**14**	**89,505**	**263**	**31**	**86**
K2UVU	"	41,496	158	29	62
K2EAC	"	21,350	109	24	46
K2UYG	"	18,873	85	27	54
W2MES	"	17,622	94	21	45
K2DGT	**7**	**71,040**	**257**	**29**	**67**
K2GL	"	43,670	169	28	63
W2FYT	**1.8**	**416**	**12**	**8**	**8**
W2EQS	"	80	23	4	4
W3GRF	**A**	**445,884**	**544**	**95**	**197**
W3QQL	"	83,592	187	62	100
W3FDH	"	39,790	128	46	69
W3ZKH	"	22,400	82	38	62
K3MNT	"	48	5	5	3
W3LSG	**21**	**39,900**	**199**	**22**	**48**
K3AIG	"	16,298	97	21	37
W3JTC	**14**	**106,848**	**290**	**31**	**95**
W3PZW	"	94,604	245	34	100
W3AFM	"	58,208	189	29	78
W3BYX	"	53,958	189	27	75
W3ZQ	"	11,781	71	23	40
W3VEQ	"	4326	40	18	24
K3EHM	"	1400	20	9	16
W4DHZ	**A**	**436,322**	**501**	**96**	**217**
W4YHD	**A**	**405,876**	**489**	**109**	**189**
K4LIQ	**A**	**97,632**	**234**	**52**	**92**
W4LVV	"	88,528	189	72	104
W4OPM	"	67,206	174	46	92
K4ORQ	"	51,948	161	43	74
W4LRN	"	38,280	118	49	71
W4ZYS	"	24,534	92	38	56
K4MXE	"	19,488	90	32	52
W4ZYQ	"	17,459	82	30	49
W4OM	"	14,170	74	22	43
W1EQ/4	"	8918	61	18	31
WA4DQM	"	7182	48	25	29
W4GF	"	5994	43	24	30
K4ADU	"	3354	30	18	25
K4JLD	"	2268	29	11	16
K4CXR	"	1350	20	12	18
W4DS	"	1325	18	12	13
W4OMW	"	1102	17	14	15
K4RQE	"	760	15	9	11
W4NTE	**21**	**5375**	**45**	**16**	**27**
W4EEO	"	792	12	10	12
W4KFC	**14**	**187,142**	**474**	**34**	**103**
W4WDI	**14**	**129,220**	**324**	**35**	**105**
W4JJL	"	92,354	261	31	91
W4SNU	"	52,371	186	27	72
W4AVY	"	20,777	95	27	52
W4YGY	"	17,877	106	19	40
K4BAI	"	12,312	76	22	35
K4ASU	"	7056	52	19	30
K4BE	"	3772	31	14	24
K4UVT	"	1092	18	8	13
W4CKD	**7**	**29,465**	**134**	**25**	**58**
W4CQR	"	7379	63	19	28
W4SHJ	**3.5**	**2054**	**32**	**11**	**15**
W5BRR	**A**	**142,923**	**255**	**83**	**130**
W5BUK	"	71,520	167	62	98
K5KBH	"	70,357	163	66	95
W5KKL	"	3315	32	17	22
K5UYF	**21**	**12,432**	**81**	**22**	**34**
K5SEK	"	4218	43	16	21
W5KC	**14**	**40,734**	**157**	**29**	**64**
W5NOP	"	38,279	135	32	69
W5PSB	**7**	**29,526**	**143**	**26**	**48**
K5DEG	"	11,816	80	22	34
K6VTQ	**A**	**372,252**	**493**	**102**	**166**
W6IBD	**A**	**294,176**	**447**	**89**	**143**
K6CTV	**A**	**282,529**	**476**	**83**	**128**
WA6IPY	"	224,924	396	73	124
W6KG	"	175,096	366	75	97
W6GRX	"	129,240	256	71	109
W6ISQ	"	112,391	243	69	98
W6MSM	"	80,772	255	40	66
W6FYM	"	68,552	173	68	84
WA6GFY	"	57,134	192	42	64
W6JFJ	"	55,692	160	47	72
W6UQQ	"	47,674	142	49	72
W6HVN	"	40,800	137	57	63
W6BVM	"	25,020	99	37	53
W6TYM	"	24,087	100	42	51
WA6WVR	"	21,141	98	34	47
W6CHV	"	19,125	80	37	48
K6ASL	"	19,000	75	38	57
WA6QAU	"	18,798	87	33	45
W6ID	"	18,564	67	41	61
W6ERS	"	17,280	82	32	48
W6NEX	"	16,425	77	31	42
K6TZX	"	14,740	83	27	40
K6HOR	"	11,984	73	22	34
W6FLT	"	7480	57	19	25
WA6OJM	"	4558	43	20	23
WA6VAT	"	3128	37	15	19
WA6GLD	"	2442	24	17	20
W6WAW	"	2310	23	15	20
W6BIL	"	1500	20	11	14
WA6DBC	28	45	3	2	3
WA6SBO	**21**	**27,200**	**150**	**23**	**45**
W6BSY	"	19,824	120	23	36
K6EIV	"	15,125	100	21	34
W6HJT	"	13,573	97	20	29
W6KUT	"	10,094	73	19	30
W6EPZ	**14**	**91,214**	**266**	**33**	**85**
W6KNE	"	32,417	148	25	52
W6QNM	"	30,102	121	27	61

WA6UHM	"	24,420	138	23	43
W6NJU	"	17,526	88	25	44
WA6OHJ	"	15,540	90	21	39
W6CYV	"	15,028	77	23	45
W6UQT	"	4042	36	18	25
WA6QGW	"	792	15	11	11
W6JZH/6	**7**	**43,068**	**204**	**28**	**46**
W6PQW	"	33,051	169	27	42
W6ILP	"	31,416	166	25	43
W6FOZ	"	17,980	108	22	36
K6IEC	"	15,548	105	20	32
W6ANN	"	6486	138	20	27
W6VNJ	"	5400	54	16	20
K6SXA	**3.5**	**6120**	**64**	**18**	**22**
K6BPR	"	4832	63	13	19
W7VY	**A**	**239,200**	**408**	**86**	**122**
W7PQE	"	123,255	279	67	99
W7DIS	"	34,608	130	44	59
W7MX	"	14,616	87	24	34
W7ENA	"	6808	51	20	26
W7DLR	"	640	11	9	11
W7BTH	14	480	11	7	9
W7JLU	**3.5**	**3690**	**52**	**13**	**17**
W8JIN	**A**	**267,090**	**332**	**104**	**186**
K8AEB	"	220	7	5	6
W8RQ	**21**	**18,492**	**97**	**25**	**42**
W8TTN	"	18,084	97	22	44
W8WBV	**14**	**49,373**	**180**	**30**	**67**
W8EW	"	6272	47	19	30
K8SWE	"	4472	37	16	27
W8MCC	"	242	8	5	6
W8FGX	**7**	**29,520**	**130**	**27**	**53**
W8BAR	"	9570	66	24	34
K8NMG	"	1798	24	14	17
W8AJW	**3.5**	**2323**	**48**	**10**	**13**
K8SQK	"	1534	29	11	15
W9EWC	**A**	**220,038**	**368**	**79**	**138**
W9IOP	"	112,496	242	65	113
W9ZB	"	19,691	81	42	55
W9CLH	"	7579	51	20	33
K9LVK	"	4592	36	26	30
W9GMS	"	1736	20	15	16
W9YYG	"	1518	20	15	18
K9LIO	**21**	**12,960**	**83**	**20**	**40**
W9JUV	"	6713	52	18	31
W9LKI	"	5874	51	18	29
K9IWS	"	308	8	7	7
W9IU	**14**	**65,090**	**199**	**31**	**84**
K9ZEL	"	41,088	155	30	66
K9DWG	"	1064	19	9	10
W9ERU	**7**	**10,726**	**65**	**25**	**37**
W9OKM	"	630	15	8	10
W9PNE	**3.5**	**2592**	**44**	**11**	**16**
WØDAE	**A**	**55,913**	**156**	**61**	**82**
WØGUV	"	18,042	83	42	55
KØJPL	"	2040	30	19	21
KØVSH	"	1363	20	13	16
WØTCX	**21**	**13,312**	**80**	**23**	**41**
KØODB	"	4017	38	17	22
WØAIH	"	2205	27	14	21
WØEQN	**14**	**15,502**	**93**	**23**	**39**
WØDU	"	15,257	75	24	49
WØCRY	"	250	9	5	5
WØCDP	**1.8**	**171**	**26**	**5**	**4**
WØVXO	"	153	13	5	4

Alaska

KL7DUZ	14	459	20	4	5
KL7JDO	**3.5**	**1188**	**67**	**5**	**4**

Bermuda

VP9BO	**7**	**11,169**	**325**	**8**	**9**

Canada

VE1YB	**21**	**2250**	**29**	**12**	**18**
VE2NV	**A**	**157,896**	**383**	**65**	**107**
VE2YU	"	94,402	251	66	88
VO2NA	"	6936	149	14	10
VE2UQ	**1.8**	**320**	**34**	**3**	**2**
VE3ES	**A**	**18,240**	**89**	**34**	**42**
VE3PV	"	12,342	122	26	25
VE3EBU	"	4068	49	17	19
VE3BMB	**21**	**4144**	**45**	**17**	**20**
VE3AU	**14**	**5513**	**54**	**14**	**23**
VE3AGX	**3.5**	**2814**	**63**	**9**	**12**
VE5KY	**14**	**3580**	**85**	**10**	**10**
VE7EH	**A**	**84,480**	**399**	**45**	**51**
VE7AKI	1.8	72	6	3	3

Greenland

OX3KC	**A**	**36,498**	**252**	**23**	**43**

Mexico

XE1VT	**A**	**13,560**	**241**	**16**	**14**
XE1RM	7	700	70	3	2

Panama

HP1AC	**A**	**11,456**	**177**	**17**	**15**

Puerto Rico

KP4CC	**A**	**40,369**	**226**	**35**	**44**

Africa

Kenya

VQ4IQ	**14**	**46,750**	**196**	**27**	**58**

Kerguelen Is.

FB8XX	**14**	**4551**	**41**	**15**	**26**

Libya

5A1TW	**A**	**437,376**	**749**	**58**	**146**
5A2TS	**21**	**25,543**	**211**	**12**	**29**

Morocco

CN8FE	**14**	**53,735**	**327**	**14**	**41**

Mozambique

CR7IZ	**A**	**29,580**	**156**	**28**	**40**

Nigeria

5N2JKO	**21**	**141,496**	**523**	**27**	**65**

Rhodesia, Northern

VQ2JG	**A**	**67,252**	**263**	**30**	**62**
VQ2W	**21**	**112,347**	**520**	**22**	**51**
VQ2EW	**14**	**67,782**	**301**	**26**	**53**

Rhodesia, Southern

ZE7JV	**A**	**64,480**	**240**	**33**	**47**

South Africa

ZS1O	**A**	**6138**	**70**	**16**	**15**
ZS2AT	"	168	6	6	6
ZS6IW	**21**	**153,200**	**520**	**28**	**72**
ZS2HI	**14**	**115,836**	**408**	**29**	**69**

Sudan

ST2AR	**14**	**166,635**	**503**	**33**	**82**

Tanganyika

5H3HZ	**14**	**40,223**	**210**	**26**	**47**

Uganda

5X5IU	**A**	**76,175**	**278**	**33**	**64**

Asia

Aden

VS9AAA	**A**	**172,080**	**476**	**47**	**97**

Bahrein Is.

MP4BDD	**A**	**18,056**	**108**	**20**	**41**

Burma

XZ2TH	**14**	**21,168**	**136**	**27**	**45**

Ceylon

4S7WP	**A**	**107,680**	**273**	**51**	**109**
4S7RN	21	1488	21	13	18
4S7NE	**14**	**15,318**	**92**	**27**	**42**

Cyprus

5B4WS	**A**	**123,360**	**368**	**34**	**86**

Hong Kong

VS6EC	**14**	**11,832**	**117**	**24**	**34**

India

VU2BK	**A**	**82,779**	**673**	**37**	**86**
VU2AJ	**14**	**49,800**	**280**	**24**	**51**
VU2CK	"	22,570	173	19	42
VU2TH	"	4300	44	17	26

Israel

4X4KK	**A**	**1,039,724**	**1286**	**78**	**206**
4X4LS	"	125,970	372	34	80
4X4BG	"	122,100	390	29	81
4X4MJ	"	36,437	149	31	52

Korea

HL9KH	**A**	**1,142,748**	**1554**	**103**	**221**

Malaya

9M2UF	**14**	**7626**	**116**	**16**	**25**

Mongolia

JT1AG	**14**	**1224**	**50**	**8**	**9**

Ryukyu Is.

KR6ML	**A**	**200,734**	**551**	**72**	**95**
KR6LJ	"	108,272	362	56	78
KR6NAA	**21**	**1026**	**45**	**9**	**9**
KR6BQ	**14**	**40,690**	**295**	**25**	**40**

Pakistan

AP5CP	**A**	**4374**	**57**	**24**	**30**
AP5AH	"	1056	25	14	18
AP5JA	**14**	**2890**	**51**	**12**	**22**
AP5SS	"	868	21	12	16

Singapore

VS1FJ	**A**	**138,112**	**407**	**63**	**103**

Japan

JA1VX	**A**	**320,943**	**584**	**79**	**124**
JA1BK	**A**	**255,285**	**529**	**68**	**115**
JA2AEY	**A**	**170,696**	**434**	**61**	**91**
JA7AD	"	112,320	320	52	78
JA3CUK	"	69,249	202	48	75
JA6ACZ	"	33,675	183	36	43
JA1EM	"	33,375	152	40	49
JA3BEA	"	21,924	109	38	49
JA2BDY	"	21,600	104	27	27
JA2TH	"	19,760	117	37	39
JA3UM	"	19,110	102	36	42
JA1CZG	"	17,850	130	29	41
JA4AS	"	17,775	107	31	44
JA3ASF	"	14,706	104	27	30
JA3ARX	"	13,992	99	32	34
JA6AKW	"	12,537	89	28	35
JA2CA	"	10,416	70	31	31
JA1CPM	"	10,266	79	26	32
JA1EFE	"	7315	86	18	17
JA8AAC	"	6660	68	20	25
JA1BYM	"	6642	58	26	28
JA3AVO	"	6400	60	27	23
JA8BY	"	3672	45	17	17
JA1CXW	"	3313	71	18	17
JA9NB	"	3115	37	17	18
JA9FB	"	2436	28	20	22
JA3CED	"	2432	38	19	19
JA2AXB	"	2185	36	12	11
JA2BIL	"	1944	33	13	11
JA5YAP	"	1444	43	11	8
JA1BUI	"	999	23	13	14
JA3HC	"	416	14	7	6
JAØSU	**21**	**27,156**	**176**	**27**	**35**
JA6PY	**21**	**25,160**	**148**	**22**	**46**
JA1ITX	"	20,862	140	23	34
JA3KM	"	20,696	149	20	32
JA7RH	"	13,431	132	17	20
JA1DFQ	"	11,439	109	18	23
JA8ADQ	"	11,430	101	20	25
JA1IRS	"	10,440	91	20	25
JA1JAT	"	9116	88	19	24
JA1CIB	"	3012	93	12	12
JA3BQU	"	1680	28	12	12
JA4AKL	"	1612	24	16	15
JA1HGY	"	1520	29	10	10
JA1IZ	"	1166	24	12	10
JA7OR	"	442	18	7	6
JA4AQR	"	418	15	6	5
JA1HJE	"	330	16	6	5
JA9UU	"	110	6	4	6
JA1BWA	**14**	**107,064**	**439**	**30**	**58**
JA8BI/1	**14**	**83,898**	**385**	**28**	**51**
JA2ANX	**14**	**36,072**	**197**	**28**	**44**
JA1BN	"	33,966	255	22	29
JA1BLC	"	27,720	169	28	42
JA2DN	"	25,185	142	26	43
JA3AA	"	12,993	88	26	35
JA4AOE	"	12,550	109	22	28
JA6PN	"	11,904	111	19	29
JA8GR	"	10,340	91	20	27
JA6ZV	"	9487	83	23	30
JA1IFP	"	7988	102	19	19
JA6JU	"	7128	85	18	24
JA2BGT	"	5280	68	14	16
JA6HW	"	4520	55	18	22
JA1BEE	"	3990	53	15	15
JA8FO	"	3060	55	16	20
JA1HOM	"	2912	56	11	15
JA2LA	"	2160	44	11	13
JA1YDU	"	1460	36	9	11
JA3DWC	"	1080	35	9	11
JA1AIU	"	795	30	7	8
JA1CJN	"	736	24	7	9
JA3ART	"	338	10	6	7
JA8BB	"	132	6	5	6
JA1YL	**7**	**60,532**	**310**	**28**	**46**
JA1ISB	**7**	**22,828**	**165**	**22**	**30**
JA8LN	**7**	**21,040**	**146**	**23**	**35**
JA8AJS	"	16,362	129	23	31
JA2XW	"	10,880	118	15	25
JA1SA	"	10,608	110	18	21
JA3DAZ	"	8643	86	18	25
JA3DDG	"	7210	83	15	20
JA3CAF	"	6293	84	15	16
JA7AKQ	"	5882	72	16	18

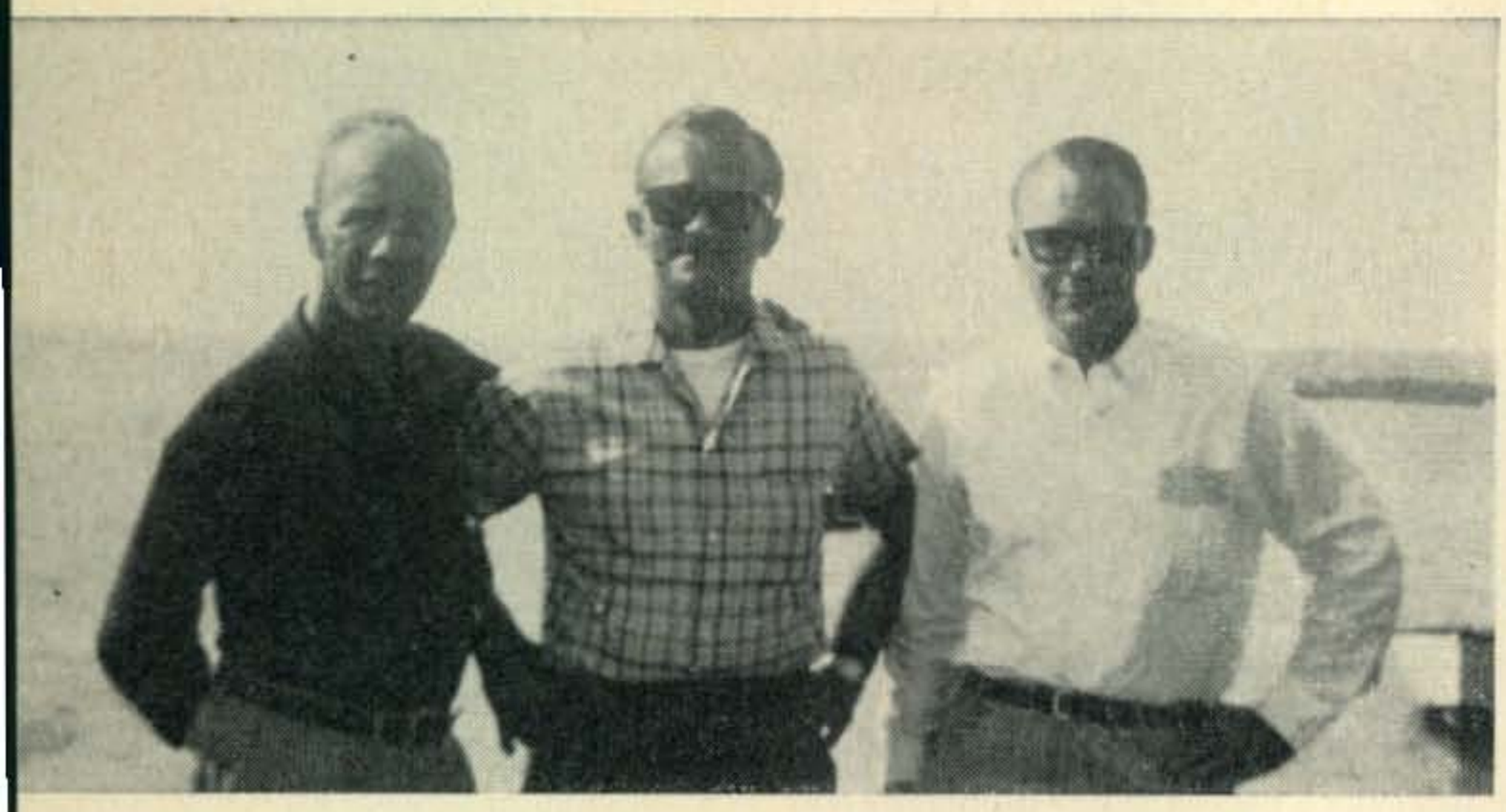
JA0AIF	....	"	2620	58	9	11
JA7IBX	....	"	2340	51	9	20
JA1CXC	..	"	2289	46	10	11
JA4YC	....	"	1944	31	12	15
JA1HLR	..	"	1140	30	9	10
JA8AER	....	"	736	20	8	8
JA1CUM	..	"	225	16	5	4
JA3YBQ	....	"	88	8	5	6
JA2WB	...	**3.5**	**990**	**28**	**8**	**7**
JA1EL	....	"	99	9	4	5
JA7ADV	..	"	10	4	2	3
			U.S.S.R.			
			Armenia			
UG6AW	....	14	330	10	3	8
			Asiatic			
UA9CH	....	**A**	**144,256**	**538**	**44**	**117**
UA9WL	....	"	137,835	392	38	97
UA9WS	....	"	98,098	389	23	75
UA9FH	....	"	24,180	151	19	46
UA9JL	....	"	16,569	116	22	41
UA9FM	....	"	12,740	81	24	46
UA9OC	....	"	11,096	144	12	26
UA9FA	....	"	4704	72	9	23
UA9BZ	....	**14**	**75,112**	**352**	**18**	**64**
UA9WJ	....	"	36,094	208	14	50
UA9OB	....	"	12,466	121	16	30
UA9JH	....	"	10,668	104	11	31
UA9SB	....	"	8995	92	7	28
UA9FO	....	"	3266	58	6	18
UA9KUA	..	"	1935	43	6	9
UA9FV	....	"	1173	23	3	14
UA9XG	....	"	1100	25	9	16
UA0SK	....	**A**	**190,847**	**590**	**46**	**93**
UA0AFF	....	"	39,321	346	21	27
UA0GF	.....	"	31,006	286	34	37
UA0EK	....	"	27,240	243	26	34
UA0LS	....	"	19,224	272	35	32
UA0LL	....	"	11,565	96	19	27
UA0JU	....	"	6204	112	15	18
UA0MF	....	"	2059	52	14	15
UA0MK	....	"	1022	66	8	6
UA0SH	....	**14**	**5850**	**110**	**8**	**22**
UA0VW	....	"	2346	77	9	14
UA0BP	....	**7**	**20,008**	**168**	**18**	**43**
			Azerbaijan			
UD6AM	....	**A**	**35,900**	**172**	**33**	**67**
UD6AX	....	"	25,380	160	17	43
UD6GW	....	"	3922	43	15	22
			Georgia			
UF6FB	....	**A**	**721,112**	**793**	**94**	**232**
UF6AU	....	**14**	**33,750**	**227**	**15**	**39**
			Kazakh			
UL7FA	....	**A**	**127,324**	**407**	**44**	**95**
UL7CH	....	"	24,380	168	17	36
UL7AW	....	"	15,189	91	20	41
UL7HT	....	"	5402	79	13	24
UL7LA	....	**14**	**31,349**	**234**	**12**	**35**
UL7LE	....	7	1806	36	7	14
			Turkoman			
UH8BO	....	**A**	**23,572**	**139**	**23**	**47**
UH8DA	....	**21**	**4640**	**55**	**10**	**22**
			Usbek			
UI8LB	.....	**A**	**101,088**	**356**	**28**	**76**
UI8FB	....	**14**	**29,974**	**193**	**19**	**47**
UI8AG	....	"	2376	36	8	19

Europe

			Aland Is.			
OHØNI	....	**A**	**2016**	**60**	**11**	**25**
			Austria			
OE1RZ	....	**A**	**189,924**	**380**	**74**	**154**
OE3TL	....	**7**	**14,508**	**174**	**15**	**47**
OE3LI	....	"	8037	139	10	37
OE1WO	....	**3.5**	**6150**	**141**	**9**	**32**
			Belgium			
ON4EC	....	**A**	**84,624**	**515**	**33**	**96**
ON5AX	....	"	18,352	197	20	54
ON4XG	....	"	18,172	143	26	51
ON4CE	....	**21**	**972**	**25**	**7**	**11**
ON4QJ	....	**7**	**5586**	**126**	**7**	**31**
			Bulgaria			
LZ2KKZ	..	**A**	**33,201**	**357**	**20**	**73**
LZ1AG	....	**14**	**41,207**	**320**	**24**	**65**
			Corsica			
F2CB/FC	..	**A**	**15,990**	**214**	**16**	**49**

Leo Yailenko, UT5AA leading all band scorer for Europe. Note the W3AOH Trophy won by UB5KAB in 1960.

			Crete			
SVØWZ	....	**A**	**29,716**	**280**	**23**	**69**
			Czechoslovakia			
OK1ZL	....	**A**	**299,455**	**689**	**80**	**189**
OK1GT	....	**A**	**219,912**	**524**	**69**	**162**
OK3AL	....	**A**	**211,703**	**703**	**53**	**157**
OK3CAG	..	"	53,172	352	34	92
OK3IR	....	"	48,396	368	24	85
OK1SV	....	"	47,614	195	47	86
OK2ABU	..	"	22,008	181	24	64
OK2KFK	..	"	21,894	188	29	60
OK3CDP	..	"	19,762	212	18	64
OK2QR	....	"	19,465	155	27	58
OK1JX	....	"	18,333	122	30	67
OK2BBJ	..	"	17,974	134	28	58
OK1OO	....	"	16,632	131	25	59
OK3CAO	..	"	15,616	203	15	46
OK2LN	....	"	12,460	147	21	68
OK1KRF	..	"	11,210	153	14	45
OK2KMB	..	"	10,902	190	10	36
OK1ZW	....	"	9504	93	21	45
OK2LL	....	"	4048	49	13	31
OK1KAY	..	"	2848	80	8	24
OK2BCA	..	"	1254	30	13	20
OK3DG	....	**21**	**48,108**	**236**	**27**	**49**
OK1GA	....	"	14,384	86	24	38
OK1KCD	..	"	2958	36	13	16
OK2EI	....	**14**	**63,072**	**378**	**29**	**67**
OK1AVD	..	**14**	**54,236**	**335**	**29**	**62**
OK1VB	....	"	36,520	234	26	57
OK3OM	....	"	36,182	268	21	58
OK1PG	....	"	22,914	216	21	46
OK1DK	....	"	17,556	200	17	40
OK1MP	....	"	13,680	90	21	51
OK1ADM	..	"	12,528	126	16	42
OK1AVT	..	"	10,516	150	13	31
OK1TW	....	"	3480	76	11	19
OK1AAZ	..	"	221	17	4	9
OK2KOJ	..	**7**	**57,024**	**475**	**19**	**62**
OK3UI	....	**7**	**47,580**	**471**	**18**	**60**
OK1BY	....	"	42,332	362	20	56
OK1KB	....	"	16,128	221	12	44
OK2KMR	..	"	14,148	209	12	42
OK2QX	....	"	11,495	165	12	43
OK3SL	....	"	11,362	218	10	36
OK1RX	....	"	9890	196	11	35
OK2BBI	..	"	6348	105	11	35
OK3KJH	..	"	4278	61	10	36
OK1MG	....	**3.5**	**21,000**	**355**	**8**	**42**
OK3EA	....	**3.5**	**20,304**	**380**	**9**	**38**
OK2KGZ	..	**3.5**	**14,523**	**283**	**8**	**39**
OK1FV	....	"	9460	183	8	36
OK1IQ	....	"	7696	195	6	31
OK1EV	....	"	6475	200	6	29
OK1AAE	..	"	5180	139	7	30
OK3CED	..	"	5134	153	6	28
OK1AFW	..	"	2852	89	5	26
OK2KAJ	..	"	2380	82	4	24
OK3CDY	..	"	2128	77	5	23
OK2BKV/1		"	1914	52	6	27
OK1AGM	..	"	1608	67	4	20
OK2BCI	....	"	1750	69	4	21
OK2BAN	..	"	1350	59	5	20
OK3CEC	..	"	1220	61	5	15
OK2BCN	..	"	1173	45	5	18
OK2BDY	..	"	1104	48	5	19
OK3CEG	..	"	798	52	4	15
OK1KRX	..	"	480	32	4	11
OK2BEC	..	"	468	24	5	13
OK1AFY	..	"	330	22	4	11
OK1KIG	..	"	170	27	3	7
OK1OW	..	"	120	17	3	5
OK2KOF	..	"	96	12	3	5
OK1WT	....	**1.8**	**1644**	**149**	**3**	**9**
OK1AAI	..	"	816	88	3	9
OK1AMS	..	"	676	60	4	9
OK1KNG	..	"	24	4	2	4
			Denmark			
OZ4RT	....	**A**	**55,760**	**275**	**39**	**97**
OZ4H	.....	"	13,908	116	28	48
OZ9QM	....	"	11,033	155	17	42
OZ3LI	.....	"	6592	81	21	43
OZ5DX	....	"	3300	56	12	21
OZ5MF	....	"	1802	32	14	20
OZ4DX	....	"	945	43	5	16
OZ7G	.....	**21**	**4025**	**47**	**14**	**21**
OZ9FH	.....	**14**	**17,355**	**162**	**18**	**47**
OZ7YH	....	**7**	**4862**	**137**	**5**	**29**
OZ1LO	....	3.5	525	35	3	12
			England			
G2DC	.....	**A**	**157,170**	**408**	**52**	**134**
G3DYY	....	**A**	**57,057**	**265**	**44**	**99**
G6VC	.....	"	33,939	210	26	55
G3FTQ	....	"	21,762	162	26	67
G3JKY	.....	"	19,320	154	25	59
G3GJQ	....	"	16,502	144	22	52
G3MGL	....	"	13,110	180	15	54
G3PVS	....	"	12,383	129	17	44
G2NH	.....	"	11,016	136	21	47
G3JVJ	.....	"	10,795	88	27	58
G3MWZ	..	"	8460	79	24	36
G3JFY	.....	"	2923	61	10	27
G4CP	.....	**14**	**102,600**	**480**	**27**	**68**
G3HDA	....	"	69,468	407	25	59
G2AJB	.....	"	18,966	209	18	40
G3MEA	....	"	9400	132	13	34
G8DI	.....	"	5180	108	9	28
G3WP	.....	"	1827	45	7	22
G2KW	.....	"	576	26	5	11
G3EYN	....	**7**	**16,701**	**260**	**12**	**45**
G3ORB	....	**3.5**	**1541**	**78**	**5**	**18**
G3IGW	....	**1.8**	**1098**	**57**	**5**	**13**
G5MP	.....	"	448	33	3	11
			Finland			
OH2BZ	....	**A**	**56,763**	**252**	**44**	**115**
OH2AA	....	**A**	**48,951**	**218**	**39**	**108**
OH2RZ	....	"	37,944	214	42	82
OH2DP	....	"	36,096	208	33	95
OH2BAI	..	"	13,920	108	26	70
OH2ND	....	"	9380	111	16	54
OH3NY	....	"	9288	148	11	43
OH2VZ	....	"	5439	75	13	36
OH3TQ	....	"	5073	72	17	40
OH5UQ	....	"	4116	56	13	29
OH9RI	....	"	1617	45	10	23
OH9RF	....	"	1550	48	8	23
OH2YL	....	"	1426	32	13	18
OH1VR	....	"	1271	35	10	21
OH1WH	....	"	208	10	7	9
OH2RD	....	"	50	6	4	6
OH5UX	....	"	48	6	4	4
OH1TY	....	"	10	5	5	5
OH1TN	....	**21**	**11,907**	**85**	**21**	**42**
OH3NS	....	"	5123	50	15	32
OH9RC	....	"	1029	53	5	16
OH2BC	.....	**14**	**27,456**	**211**	**22**	**56**
OH2QV	....	"	24,975	199	23	52
OH5TS	....	"	15,345	190	14	41
OH3UO	....	"	9024	131	12	35
OH2WI	....	"	7728	118	12	36
OH2FT	....	"	4290	93	8	31
OH2XF	....	"	2822	57	8	26



The boys who manned HKØZU, Ray W4BJ, Ed W4QVJ and Bev W4CKB all from the Florida DX Club.

OH3PX	"	1690	53	6	20
OH9QU	"	780	28	6	14
OH2EW	**7**	**18,356**	**294**	**11**	**41**
OH7NF	"	15,741	228	14	39
OH1VA	"	2773	36	12	35
OH5PG	"	16	4	2	2
OH2UQ	**3.5**	**9200**	**217**	**7**	**33**
OH6TM/2	"	1705	44	6	25
France					
F8TM	**A**	**72,900**	**292**	**46**	**104**
F8IH	"	67,192	214	49	99
F2PO	"	46,580	307	26	59
F3PK	"	26,950	162	50	27
F9BB	"	4,995	63	15	22
F2MA	**21**	**29,829**	**190**	**22**	**39**
F8VO	"	1364	26	9	13
F3BX	14	403	20	4	9
Germany					
DJ1PN	**A**	**140,456**	**388**	**58**	**136**
DJ7IK	**A**	**123,930**	**447**	**53**	**117**
DJ4DN	**A**	**122,537**	**400**	**55**	**126**
DJ2HH	**A**	**120,150**	**357**	**58**	**120**
DJ5JH	"	87,975	381	38	115
DJ3KR	"	86,984	275	55	111
DL7AA	"	86,500	189	59	114
DJ5BV	"	85,162	293	48	106
DM2ATL	"	67,268	351	37	97
DL1JF	"	63,048	256	43	99
DJ5GG	"	60,390	218	43	79
DL7DF	"	54,720	182	49	103
DL7BQ	"	49,200	254	40	83
DL7CS	"	44,450	131	48	79
DL1BO	"	42,672	185	40	72
DL3TW	"	42,245	173	39	80
DJ5IW	"	28,012	128	44	50
DJ2MG	"	26,316	139	39	63
DM2AVL	"	21,560	131	34	64
DL1XS	"	20,056	115	33	59
DL8FR	"	18,746	154	31	60
DJ1UE	"	18,414	136	26	67
DJ2HI	"	18,340	134	26	44
DJ5DA	"	17,901	167	19	62
DJ3YU	"	14,823	104	29	52
DL7CF	"	14,104	125	21	65
DJ4VO	"	12,848	119	18	55
DL9PU	"	12,489	111	25	44
DL8DL	"	10,863	149	17	54
DL6OS	"	10,296	111	21	51
DL1IA	"	10,152	90	24	48
DM3PBM	"	6765	123	21	34
DL1OW	"	6478	120	17	24
DJ3BB	"	6210	90	16	53
DM3VBM	"	6210	115	16	30
DL1EA	"	5684	43	24	34
DJ3WP	"	3354	36	18	25
DL1QT	"	2814	39	16	26
DL6EN	**21**	**48,067**	**237**	**27**	**44**
DL3ZI	"	22,336	131	22	42
DL6DF	"	9585	82	26	19
DJ2DG	"	7260	61	18	26
DL1ES	"	2220	31	11	19
DJ4HR	"	624	15	8	8
DM2AMG	"	416	10	8	8
DJ2RE	**14**	**43,168**	**298**	**21**	**50**
DL3BK	"	30,174	145	30	64
DJØIK	"	24,817	173	25	58
DM3PVL	"	21,696	205	20	44
DJ5VQ	"	20,400	207	18	42
DJ3WU	"	7998	121	13	30
DL6KC	"	7990	111	11	36
DJ2EL	"	2268	62	7	21
DJ3GY	"	1920	32	12	20
DJ2YA	**7**	**23,985**	**302**	**14**	**51**
DJ1ZN	"	10,388	186	14	39
DL1KS	"	10,314	142	13	41
DL1JW	**3.5**	**19,488**	**269**	**12**	**44**
DJ3WE	"	18,717	307	10	41
DJ2SX	"	7437	163	7	30
DJ2KS	**1.8**	**2576**	**190**	**4**	**10**
DL1FF	"	2159	121	5	12
DL1KB	"	296	40	3	5
DL1YA	"	16	6	2	2
DL5IA	**A**	**4017**	**96**	**9**	**30**
DL5DU	**14**	**7008**	**76**	**15**	**33**
DL4FT	**7**	**8610**	**173**	**9**	**32**
Hungary					
HA6NI	**A**	**66,025**	**301**	**39**	**96**
HA1SD	"	26,860	276	22	57
HA7PM	"	6600	152	10	34
HA1SB	"	4608	89	12	36
HA1VA	"	1352	50	9	17
HA5BI	21	1792	25	13	15
HA5DY	**7**	**1365**	**66**	**5**	**16**
HA5BJ	"	190	19	4	6
Iceland					
TF3AB	**A**	**16,650**	**169**	**15**	**35**
Ireland					
EI5AJ	**14**	**59,128**	**455**	**21**	**55**
Italy					
I1GO	**A**	**52,942**	**383**	**30**	**73**
I1WSG	"	540	24	18	30
I1ER	"	248	11	5	3
Madeira Is.					
CT3AV	**A**	**33,198**	**174**	**24**	**42**
Netherlands					
PAØLOU	**A**	**18,060**	**125**	**29**	**57**
PAØWAC	"	7072	64	21	31
PAØYN	"	3572	70	11	36
PAØNIR	"	2484	36	15	21
PAØHY	"	476	22	7	10
PAØSNG	**14**	**8473**	**160**	**10**	**27**
PAØNW	"	1400	53	5	20
PAØVB	**3.5**	**12,427**	**234**	**7**	**36**
PAØLV	"	11,362	272	6	32
Northern Ireland					
GI3OLJ	**A**	**5358**	**58**	**18**	**39**
GI3OTV	**14**	**9956**	**191**	**10**	**28**
Norway					
LA5HE	**A**	**53,193**	**171**	**48**	**101**
LA6U	"	21,060	87	29	61
LA2Q	"	12,702	153	19	54
LA4LG	"	9729	104	23	46
LA3UF	**14**	**3952**	**76**	**8**	**30**
LA2LI	**7**	**1320**	**67**	**4**	**16**
Poland					
SP6FZ	**A**	**141,768**	**479**	**56**	**123**
SP5ADZ	**A**	**104,542**	**449**	**43**	**124**
SP5AFL	"	104,490	445	42	119
SP8YA	"	79,794	405	40	103
SP3KET	"	35,816	361	20	68
SP5AKG	"	20,382	135	26	60
SP6WM	"	19,440	172	28	52
SP6UK	"	2982	64	12	30
SP9AGS	"	1288	35	8	20
SP6LK	"	1025	42	8	17
SP2TG	"	620	20	6	11
SP5AHZ	"	306	10	8	9
SP9RF	**21**	**20,468**	**108**	**26**	**42**
SP5YC	"	8996	62	21	31
SP5ZA	"	7456	57	18	31
SP5AIB	"	6960	54	21	28
SP3PK	"	2291	27	14	15
SP2AAC	"	2268	27	9	15
SP8HT	**14**	**45,069**	**344**	**23**	**60**
SP5AIM	**14**	**24,548**	**193**	**20**	**48**
SP2AEL	"	6660	107	12	28
SP8AG	"	5530	112	8	27
SP5AHW	"	4320	68	9	31
SP3KCC	"	4191	83	9	24
SP2AJO	"	4085	55	12	31
SP8ABQ	"	2720	57	8	24
SP9ADU	"	2409	56	9	24
SP2JS	"	2100	35	7	21
SP8CP	**7**	**18,176**	**203**	**14**	**50**
SP5ALG	"	12,740	203	10	42
SP8MJ	"	11,664	207	8	40
SP4TW	"	7140	190	7	28
SP2CO	"	5520	110	9	31
SP2RS	"	5043	99	7	34
SP4KAI	"	4480	100	7	28
SP5AHQ	**3.5**	**17,952**	**390**	**8**	**36**
SP6BZ	"	6810	227	4	26
SP8HR	"	4264	168	5	21
SP9AMA	"	2996	103	5	23
SP9DH	"	1311	60	4	19
SP6KBR	"	1080	54	5	15
SP8APV	"	480	38	4	11
SP9AAB	"	225	27	3	6
Roumania					
YO2BU	**A**	**75,692**	**484**	**31**	**96**
YO8DD	"	31,004	259	22	70
YO2BQ	"	30,738	217	32	77
YO2BA	"	9639	133	16	47
YO6EY	"	4305	106	13	28
YO8ME	"	1288	43	8	20
YO3AC	**7**	**12,036**	**192**	**11**	**40**
YO7DO	**7**	**8208**	**110**	**12**	**42**
YO4CT	"	3492	86	7	29
YO3JV	"	2106	70	6	27
YO2IS	"	1656	49	5	19
YO8KAN	"	1560	58	6	18
YO6SD	"	1288	56	5	18
YO4SA	"	1176	40	6	18
YO3JW	"	779	48	4	13
YO9HI	"	450	31	4	11
YO8AP	**3.5**	**10,491**	**210**	**7**	**32**
YO8HG	"	324	19	5	13
Scotland					
GM3EOJ	**A**	**35,750**	**211**	**31**	**79**
GM3JDR	**14**	**32,430**	**345**	**19**	**50**
Sicily					
IT1TAI	**A**	**233,289**	**699**	**57**	**150**
IT1AGA	**7**	**6474**	**140**	**8**	**31**
Sweden					
SM5BLA	**A**	**317,580**	**864**	**62**	**175**
SM3TW	**A**	**65,436**	**361**	**38**	**95**
SM5CEU	**A**	**53,710**	**219**	**39**	**92**
SM5CCE	"	52,895	163	46	103
SM6CJK	"	25,812	177	32	76
SM5BDY	"	22,487	143	34	79
SM5CZK	"	18,040	184	20	62
SM6APH	"	16,683	192	17	66
SM2ALU	"	15,946	159	18	49
SM5DUB	"	15,180	162	26	66
SM6DED	"	13,950	227	10	52
SM5BRS	"	12,960	105	24	57
SM6ARH	"	12,267	107	26	61
SM6CAW	"	11,616	156	16	50
SM5CON	"	9240	167	10	45
SM5CMG	"	8122	109	16	46
SM5UQ	"	6958	120	12	37
SM5AJR	"	6528	53	24	40
SM7TV	"	5145	65	16	33
SM5AWF	"	3936	47	18	30
SM5AFE	"	3000	62	13	27
SM5CAK	"	1740	48	9	20
SM5BBC	"	828	14	10	13
SM7MS	"	288	10	7	9
SM2CXU	"	247	16	8	11
SM5BFR	"	230	11	5	5
SM5BOH	"	216	12	5	7
SM5KV	**21**	**12,810**	**91**	**20**	**41**
SM5AHW	**14**	**17,215**	**180**	**15**	**40**
SM3CNN	"	11,128	148	13	39
SM5AIO	"	5680	104	9	31

SM5BEU	"	5565	65	14	39
SM5BEI	"	3600	79	8	28
SM1CXE	"	2325	83	5	20
SM6CDO	"	2250	40	10	20
SM5CXF	**7**	**10,560**	**193**	**10**	**38**
SL2CU	**7**	**5952**	**182**	**7**	**24**
SM7DRB	"	5005	141	5	30
SM6BWQ	"	3904	119	5	27
SM5CCT	"	3277	100	[illegible]	[illegible]
SM5ARQ	"	2581	82	5	24
SM5LW	"	1250	43	5	20
SM4CLR	"	528	21	5	17
SM5BTX	"	300	20	4	11
SM4DRD	"	182	15	3	11
SM5MX	**3.5**	**3364**	**108**	**6**	**23**
SM6JY	"	266	20	3	11

Switzerland

HB9JG	**A**	**245,834**	**468**	**63**	**139**
HB9KO	"	146,216	422	56	140
HB9ZY	"	118,770	286	60	125
HB9NL	"	113,176	301	56	116
HB9MO	"	93,050	310	49	123
HB9HK	"	34,170	216	26	41
HB9UD	"	21,012	122	34	68
HB9QO	"	14,706	108	31	55
HB9DX	**21**	**10,434**	**81**	**19**	**28**
HB9QA	**1.8**	**996**	**83**	**3**	**9**

Yugoslavia

YU3IE	**A**	**14,552**	**128**	**23**	**45**
YU3BU	"	572	27	8	14
YU3FZ	**21**	**5160**	**64**	**13**	**17**
YU1SF	**7**	**9632**	**224**	**7**	**36**
YU1SJ	"	6040	124	7	33
YU3JS	"	1872	62	5	21
YU4FDE	"	1650	62	6	19

U.S.S.R.

Estonia

UR2AT	**A**	**100,430**	**420**	**45**	**121**

European

UA4LE	**A**	**204,590**	**642**	**51**	**154**
UA3XS	**A**	**60,564**	**476**	**25**	**78**
UA1DH	**A**	**60,078**	**323**	**29**	**85**
UA1NA	"	58,320	281	34	101
UA6LI	"	43,992	443	20	52
UA3HK	"	25,300	134	36	74
UA1TL	"	20,002	199	18	55
UA3TA	"	16,320	123	26	59
UA3QV	"	10,556	93	16	42
UA3QI	"	10,065	137	15	40
UA4PZ	"	4961	90	8	33
UA3LR	"	4242	76	11	31
UA3FT	"	4214	99	10	33
UA3GP	"	3640	97	10	25
UA1CC	"	3504	47	15	33
UA1DG	"	2856	73	9	25
UA4NM	"	2387	58	8	23
UA3KLA	"	1674	50	7	20
UA3JD	"	1540	39	10	18
UA3GO	"	1064	31	10	18
UA1PH	"	456	16	6	13
UA6FD	**21**	**3666**	**67**	**12**	**27**
UA1MA	"	3115	43	13	22
UA4PA	**14**	**75,608**	**441**	**28**	**76**
UA4IF	**14**	**60,048**	**279**	**31**	**77**
UW3UF	"	53,424	387	25	59
UA4CN	"	11,546	120	14	50
UA3SG	"	8510	109	11	35
UA1CI	""	7056	123	8	28
UV3TC	"	4956	100	12	30
UA1KBR	"	4662	70	12	30
UA3TP	"	4641	77	11	28
UW3BX	"	3075	126	6	19
UA4IK	"	3010	68	7	28
UA3WX	"	1025	34	8	17
UA3IL	"	714	24	7	14
UA1ND	"	672	26	6	15
UA4QD	"	299	11	6	7
UA1LG	"	243	10	3	6
UA6FL	**7**	**13,340**	**268**	**8**	**38**
UA6MK	"	9840	178	9	31
UA1FI	"	4824	108	8	28
UA3OI	"	216	16	3	6
UA1DZ	**3.5**	**18,126**	**286**	**11**	**42**
UA1CE	"	4247	124	5	26

Latvia

UQ2AB	**A**	**64,083**	**388**	**29**	**94**
UQ2CC	"	18,300	214	17	58
UQ2KCA	"	3264	59	12	36
UQ2GK	7	952	68	3	11

Lithuania

UP2AN	**A**	**40,488**	**269**	**21**	**67**
UP2NV	**14**	**28,220**	**251**	**16**	**52**
UP2CP	"	10,222	171	12	26

Part of the crew at W3ADO, station of the U.S. Naval Academy. Seated: Midshipmen KØDQI, K2UVG, K6ILB, K4OCZ and KØKHP. Standing: WA6EVW and K9MBQ.

UP2CG	**3.5**	**6409**	**215**	**4**	**25**

Moldavia

UO5AA	**A**	**72,036**	**366**	**45**	**93**
UO5GW	"	15,246	237	18	59
UO5SA	**14**	**20,723**	**297**	**11**	**42**

Ukraine

UT5AA	**A**	**816,408**	**1224**	**98**	**250**
UB5CI	"	203,841	476	73	188
UT5HP	"	31,595	241	26	63
UB5TR	"	12,672	136	19	47
UB5KBV	"	12,660	157	16	44
UB5LK	"	6840	71	16	41
UB5FY	**14**	**36,404**	**354**	**18**	**58**
UB5ZY	"	28,690	185	23	72
UB5WO	"	25,259	229	18	49
UT5EW	"	8200	114	15	35
UB5ZB	"	2576	112	6	17
UB5QA	"	1728	44	8	16
UB5DQ	**7**	**14,078**	**190**	**13**	**44**
UT5EH	"	12,737	220	10	37
UB5ZE	"	8668	150	13	31
UB5HQ	"	510	20	6	9
UB5EF	**3.5**	**10,222**	**258**	**7**	**31**
UB5WJ	"	2016	78	5	19
UB5WF	**1.8**	**1500**	**101**	**4**	**11**

White Russia

UC2BB	A	888	31	8	16
UC2AA	**14**	**183,580**	**645**	**34**	**100**
UC2CS	**7**	**4830**	**125**	**6**	**24**
UC2WP	"	2708	98	6	20

Oceania

Australia

VK2GW	**A**	**311,200**	**677**	**63**	**97**
VK2PV	"	83,592	273	40	68
VK2RA	"	43,862	182	38	53
VK2APK	**14**	**55,566**	**251**	**27**	**54**
VK3AXK	**A**	**85,750**	**331**	**41**	**57**
VK3RJ	**21**	**1664**	**37**	**8**	**8**
VK3ACI	**14**	**7020**	**98**	**12**	**14**
VK3AZZ	**7**	**82,289**	**459**	**22**	**39**
VK3XB	"	31,464	238	19	27
VK4SS	**A**	**4050**	**38**	**24**	**30**
VK4XW	**7**	**1530**	**38**	**7**	**8**
VK5NQ	**14**	**137,917**	**474**	**32**	**71**
VK5RX	"	4104	42	15	21
VK5TC	**7**	**11,180**	**156**	**12**	**14**
VK6RU	**A**	**302,670**	**596**	**61**	**116**
VK7SM	**"**	**100,848**	**283**	**56**	**76**

Caroline Is., East

KC6BK	**14**	**23,608**	**176**	**22**	**30**

Cook Islands

ZK1BS	**A**	**235,200**	**691**	**56**	**64**
ZK1AR	"	43,620	259	31	29

Fiji Is.

VR2DK	**A**	**87,990**	**330**	**46**	**59**

Hawaii

KH6EVT	**A**	**182,805**	**610**	**48**	**57**
KH6EJY	"	111,786	628	27	35
KH6EKO	**14**	**108,868**	**554**	**28**	**40**

Midway Is.

W6ZDF/KM6	**A**	**30,510**	**233**	**24**	**21**

New Zealand

ZL2AWJ	**A**	**238,524**	**550**	**64**	**92**
ZL1AMO	"	77,532	324	44	40
ZL4LB	"	70,152	328	33	46
ZL2AYJ	**14**	**39,996**	**232**	**25**	**41**
ZL1TU	"	9480	91	18	22
ZL2GS	**3.5**	**1417**	**39**	**8**	**5**

Philippine Is.

DU7SV	**A**	**112,934**	**479**	**32**	**50**

South America

Argentina

LU5AQ	**14**	**58,695**	**312**	**25**	**40**

Brazil

PY1ADA	**A**	**296,815**	**701**	**59**	**86**
PY1NFC	"	56,635	412	25	22
PY7ACS	"	44,464	270	25	31
PY2BNX	"	10,368	75	25	29
PY7BX	"	900	26	8	4
PY4BC	**21**	**11,254**	**114**	**10**	**24**
PY4OD	**14**	**219,230**	**692**	**32**	**78**
PY4ABH	"	103,680	401	28	62
PY7AKQ	**7**	**19,572**	**252**	**11**	**17**

Chile

CE1AD	**A**	**397,085**	**920**	**63**	**86**
CE1BD	**"**	**51,072**	**197**	**47**	**49**
CE2OF	**14**	**8232**	**106**	**12**	**16**

Colombia

HK1QQ	**A**	**1,002,042**	**1885**	**66**	**113**
HK3AH	"	95,064	334	49	53
HK7AJP	"	35,391	258	26	21
HK7ZT	**28**	**3276**	**65**	**10**	**8**
HK7UL	**21**	**3735**	**139**	**5**	**4**

Ecuador

HC1DC	**A**	**759,000**	**1304**	**74**	**126**

Falkland Is.

VP8AI	**A**	**20,295**	**144**	**25**	**30**

Netherlands Antilles

PJ2AE	**A**	**65,968**	**331**	**30**	**32**

Paraguay

ZP9AY	**A**	**160,038**	**552**	**50**	**52**
ZP5JP	**21**	**6816**	**96**	**11**	**13**

Peru

OA4CG	**A**	**25,760**	**194**	**24**	**22**

Netherlands Guiana

PZ1AH	**14**	**15,200**	**178**	**12**	**20**

Uruguay

CX1RY	**A**	**251,748**	**739**	**44**	**67**
CX1FB	"	50,330	257	32	38
CX1OP	"	4590	54	18	16

Venezuela

YV5AGD	**A**	**307,988**	**710**	**59**	**89**
YV5BZ	"	3116	59	11	8
YV1DP	**14**	**63,046**	**726**	**12**	**17**
YV5BOA	"	6660	113	9	11
YV5ANT	**7**	**34,476**	**297**	**13**	**26**

The New Hampshire multi station, operated by LaMar Ray and Phil Smith, K1NBN.

MULTI-OPERATOR Single Transmitter

North America

United States

W1BIH	**426,075**	**505**	**104**	**195**
	(W1BIH, JYH)			
K1RTB	250,068	418	82	147
	(K1RTB, NBN)			
W2PCJ	**98,208**	**190**	**71**	**115**
	(W2PCJ, WB2CKS)			
W2RA	4284	42	18	24
	(W2RA, WA2CFG)			
W3ADO	**260,615**	**339**	**82**	**153**
	(U.S. Naval Academy)			
W4HOS	**48,240**	**128**	**49**	**85**
	(W4HOS, FRO)			
K7ADL	**87,885**	**220**	**61**	**94**
	(K7ADL, MLO)			
K7CAD	**77,542**	**227**	**59**	**78**
	(K7CAD, W7TML)			
KØUTX	**206,360**	**359**	**80**	**140**
	(KØUTX, LFY)			

Canada

VE4JB	**48,472**	**276**	**38**	**45**
	(VE4JB, MF)			

San Andres

HKØZU	**791,280**	**2251**	**61**	**107**
	(W4BJ, CKB, QVJ)			

Asia

Mongolia

JT1KAA	**11,374**	**142**	**19**	**28**
	(Club Station)			

Saudi Arabia

HZ1AB	**89,444**	**285**	**35**	**83**
	(W1TYQ, W8GCN)			

U.S.S.R.
Club Stations

Armenia

UG6KAA	**67,313**	**285**	**19**	**64**

Asiatic

UA9KDP	**1,033,184**	**1164**	**86**	**246**
UA9KCA	**456,351**	**841**	**55**	**162**
UA9KAG	339,845	785	47	138
UA9KQA	295,470	541	54	156
UA9KTB	94,866	363	23	74
UA9KWS	40,755	212	20	45
UA9KPW	31,171	204	15	46
UA9KAO	18,901	194	10	31
UA9KEC	18,312	118	13	43
UA9KUU	3134	58	8	14
UA9KHA	1400	44	9	16
UAØKSB	**95,078**	**421**	**45**	**92**
UAØKYA	30,429	242	23	46
UAØKKB	22,114	197	32	32
UAØKCA	21,285	292	19	26
UAØKZB	9360	157	18	21
UAØKUA	1416	58	12	12

Azerbaijan

UD6KAB	**45,150**	**205**	**22**	**64**

Georgia

UF6KAF	**80,652**	**336**	**17**	**61**
UF6KPA	64,914	383	10	52

Kazakh

UL7KBK	**67,320**	**251**	**32**	**70**
UL7KUR	22,904	202	21	35
UL7KDT	20,975	145	17	40
UL7KAA	19,796	170	14	35
UL7KKD	6860	91	13	22
UL7KBI	5166	72	16	25

Kirghiz

UM8KAB	**103,896**	**451**	**29**	**75**

Turkoman

UH8KBC	**46,920**	**252**	**18**	**51**

Europe

Bulgaria
Club Stations

LZ1KSV	**602,730**	**1029**	**106**	**256**
LZ1KSZ	257,342	814	54	169
LZ1KBD	133,355	540	52	127
LZ1KBL	64,845	460	22	77
LZ2KBA	24,163	153	17	46
LZ1KSA	10,836	153	17	46
LZ1KAA	10,472	180	14	42
LZ2KRS	8352	232	9	27
LZ1KPW	4860	100	9	36
LZ1KSW	480	29	5	10

Czechoslovakia
Club Stations

OK1KPA	**224,018**	**639**	**62**	**140**
OK3KAG	113,844	548	37	122
OK1ZC	84,840	355	45	123
	(OK1ZC, WR)			
OK3KAS	67,209	415	32	97
OK2KJU	64,517	254	43	106
OK1KSO	48,251	368	24	89
OK3KMS	21,576	331	15	43
OK2KVI	6897	212	5	28
OK2KAU	5148	51	22	30
OK1KSL	3990	90	10	25
OK2KHD	3724	72	14	35
OK3KTD	2250	88	5	20
OK3KGI	1488	31	14	17

England

GB2KW	**83,616**	**445**	**44**	**90**
	(Radio Society)			
G3PPG	11,200	111	20	44
	(G3PPG, PPC, KLZ, DEF, PDX, POM)			

Finland

OH2FS	**82,502**	**369**	**38**	**128**
	(OH2FS, OH2SB)			
OH1SH	57,352	336	28	89
	(OH1SH & friend)			
OH2A	50,516	220	45	101
	(OH2HK, 2YV, XK)			
OH2BR	27,508	199	26	68
	(OH2BR, OH2BAD)			
OH2AF	13,024	127	22	52
	(OH2BG, OH2VB)			

Germany

DJ1ZG	**317,280**	**646**	**72**	**168**
	(DJ1ZG, 3JV, 3CI, 3SM, DL9XO)			
DL1IN	221,760	536	63	135
	(DL1IN, DL9CE, LI, PS)			
DL9VN	152,304	528	50	117
	(DL9VN, DJ2JE, DL3YQ, DJ5LE)			
DLØFT	114,208	381	56	110
	(DL1GW, 1HA, 1HH, DJ2VY, 5HL)			
DJ4FZ	67,536	408	40	94
	(DJ4FZ, 5AZ, 6TK, 6UK, 7SW)			
DM3ML	61,410	277	40	98
	(DM3ML, 3JML, OML, KJ)			
DL9YP	28,615	229	27	70
	(DL9YP, DJ4AN, 2AW)			
DLØDX	11,904	101	22	42
	(Club Station)			

Hungary
Club Stations

HA3KGC	**177,210**	**627**	**51**	**128**
HA5KBP	130,427	648	42	124
HA5KFR	98,560	438	50	104
HA7KPF	64,064	506	26	78
HA5KFZ	31,525	297	19	78
HA6KVC	22,176	182	28	60
HA5KDQ	7080	101	19	40

Italy

I1DFG	**2968**	**100**	**7**	**21**
	(K1SDS, WA6NPW)			

Luxembourg

LX3TA	**55,296**	**422**	**28**	**80**
	(DL1TA, DJØHZ)			

Netherlands

PI1PT	**50,249**	**304**	**35**	**74**
	(Hobby Club)			

Norway

LA1H	**64,032**	**422**	**25**	**62**
	(Club Station)			

Poland
Club Stations

SP8KAR	**61,177**	**304**	**40**	**91**
SP3KAU	25,839	262	23	58
SP2KDS	25,048	176	30	71
SP9AOX	20,923	148	25	62
	(SP9AOX, 9PT, AJM)			
SP3KCC	4191	83	9	24

Roumania
Club Stations

YO3KSD	**116,490**	**495**	**39**	**126**
YO6KAF	36,378	359	18	76
YO4KAK	34,594	271	24	74

Sweden

SM5CZQ	**143,262**	**524**	**51**	**138**
	(SM5CZQ, SM5ARR)			
SM5BAU	106,240	480	36	130
	(SM5BAU, 5BCE, 5BDS, 6AVW, 7LV)			
SL2ZA	56,134	376	31	96
	(School Station)			
SL5AB	46,746	248	37	89
	(School Station)			
SM7WT	10,150	77	23	447
	(SM7WT, SM7CJZ)			

Switzerland

HB1YR	**221,943**	**573**	**55**	**112**
	(HB9MD, HB9EU)			
HB9IV	35,203	177	37	70
	(HB9IV, HB9ACC)			
HB9AAW	23,927	173	27	44
	(HB9AAW, HB9AAV)			

Yugoslavia
Club Stations

YU2AKL	**52,555**	**318**	**29**	**86**
YU4FTU	10,065	157	13	48

U.S.S.R.
Club Stations
Estonia

UR2KAE	**10,440**	**152**	**17**	**43**
UR2KAT	3007	86	7	24
UR2KAH	2295	85	6	21

European

UA3KWA	**164,892**	**633**	**41**	**141**
UA4KHW	**160,908**	**507**	**54**	**158**

[Continued on page 84]

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

The following certificates were issued between the period from March 7, 1963 to and including April 5, 1963:

CW-PHONE WAZ

1791	CR7LU	Lucia Da Silva Santos Tome
1792	SM5BEU	Bruno Etzell
1793	JA1BLC	Fumihiko Yoshimachi

ALL-PHONE WAZ

194	VK6RU	J. E. Rumble
195	VE1WL	R. W. Wilson
196	ZL1AIX	Warren J. Robinson

TWO-WAY SSB WAZ

156	W4LZT	Charles W. Bivens
157	F8DC	Tony Petitjean
158	W2LV	Robert Morris

CW WPX

428	PY5ASN	Gercy Ramos
429	W4CKD	Robert H. Ekleberry
430	VK4TY	Norman R. W. Tyas
431	VE2IL	J. G. McMullen
432	W6ISQ	John G. Troster
433	WA6SBO	W. R. "Bill" Rindone

PHONE WPX

87	ZE1JE	Molly E. Henderson
88	GB2SM	The Science Museum Demonstration Station
89	VE3PV	Peter Victor Travis

SSB WPX

130	W4NOK	Jack Adams
131	K1SHN	George C. Banta
132	DL2AB	Dennis A. Bowde

MIXED WPX

68	VE5JV	Allan Chesworth

Yasme

The following letter from Danny, published in *The* Yasme *News*, requires no explanation.

"The stack of mail which greeted me upon arrival at Suva has taken considerable time to read and digest.

"I did set out to evaluate each letter and answer each and every statement made by each individual but found, in the final analysis, that all letters had the same basic ideas.

"I have decided to turn around and come home to the USA directly, (*Yasme* is fit for sea), after a few VR2 contacts were made with the boys.

"All of you have been very generous in your thoughts and faith in me. I will not betray this faith by making the wrong decisions at this time and I feel it is time to stop now.

"I know that you do not require my reasons for this decision but it makes me feel better to give my personal thoughts along this line.

"It is an impossible situation for me to carry on without Naomi; we have been a team in more ways than one and to carry one with the job feeling as I do is pointless and will only cause much unhappiness to us both. To proceed to the remaining rare spots left in the Pacific would be too costly to be covered by contributions we have been receiving. The distances involved, plus the risk, just don't make the effort worth it.

"*Yasme* cannot be sold here nor would she bring even a fair price in Australia where prices are lower than in the USA. Therefore, to realize enough to cover Foundation debts, eventual USA sale is the best bet. Shipping *Yasme* bodily back to the states (to avoid sailing risks) as deck cargo is impractical as freight charges could be $8,000 or higher.

"Hal's (K5JLQ) offer of employment has been a factor in reaching my decision. I would be a liar to state differently. This is just one factor among many, but I do have to consider the future of both Naomi and myself upon my return stateside.

"Finally, while I hate the thought of giving

*Box 35, Hazlet, New Jersey.

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

C.W. WPX

W2HMJ	668	W5LGG	502	DL1YA	450	W4DKP	410	W8WT	565	W5ERY	358	K4PUS	305	W8WT	588
W8KPL	632	W6YY	502	DL9KP	450	K4IEX	408	G3DO	565	W8JIN	356	W6YMV	304	K9EAB	578
W5KC	629	IT1AGA	502	W8JIN	448	W1CKU	408	W9YSQ	471	PY2CK	354	DJ3CP	304	W6YY	570
W2AIW	617	K2CPR	501	W9UZS	447	K4JVE	407	MP4BBW	454	5A5TO	353	K1IXG	303	W4BYU	557
W6KG	574	W9SFR	501	W8RQ	445	W5AFX	407	PAØHBO	453	W1ORV	351	K2TDI	300	W3AYD	552
W2EQS	572	W2EMW	500	W3AYD	443	W7HDL	405	W6YY	448	LA5HE	351	KØRDP	300	HB9EU	551
W4OPM	571	K2ZKU	500	OE1FF	442	W4YWX	404	G8KS	430	ZS6IW	350	WA2SFP	300	YU1AG	533
K6CQM	565	G2GM	499	W3BQA	437	GI3OQR	404	VK6RU	421			W3VSU	300	W2GT	528
W5OLG	564	K9EAB	497	LA5HE	437	ZS4MG	404	W3AYD	420	**S.S.B. WPX**		WØCVU	291	G8KS	520
W2NUT	550	W2MUM	495	W8UMR	429	K2ZRO	403	W9UZC	418			W4RLS	278	K9AGB	510
W9YSX	544	W1WLW	494	WØAUB	429	W9DYG	403	F8PI	418	MP4BBW	462	K2JFV	266	W5LGG	509
W9UXO	542	SM5CCE	488	K5LIA	428	W9IHN	403	PZ1AX	413	W4OPM	451	K2MGE	263	K2ZKU	508
K2UKQ	535	W4BYU	487	W2RA	428	VE6VK	403	K9EAB	412	G3AWZ	428	W3AYD	262	W9DWQ	508
W1EQ	528	ON4QX	486	OK1MB	428	K4TEA	402	K2CJN	409	HB9TL	423	W4EEU	262	W4BQY	505
W2HO	526	W8PQQ	481	W3CGS	426	WØVBQ	401	DL3TJ	404	W3NKM	402	W4NJF	260	W3KDP	501
DL1QT	518	W4HYW	478	W1EIO	425	IT1TAI	401	W1UOP	402	K9EAB	401	VE3BKL	259	W8UMR	500
K9AGB	515	W3OCU	466	SM5WI	424	VE3JZ	401	G3NUG	400	G8KS	400	XE1CV	256	LA5HE	500
W1TJB	513	K6SXA	464	WØPGI	420	OE3WB	400	OE1FF	382	G3DO	373	G3FKM	255	DL3RK	493
W6WO	511	W2KIR	463	HB9TT	419	SP4JF	400	SP7HX	381	G3NUG	356	UR2AR	255	JA2JW	480
W2GT	510	DJ2KS	462	G3HIW	418	SP6FZ	400	TG9AD	381	TI2HP	356	W6USG	252	WØMCX	476
SM7MS	510	PY4OD	462	W8IBX	416	VE1AE	400	DL6VM	376	W3MAC	354	TG9AD	252	W3CGS	475
W8LY	506	JA2JW	461	WØMCX	416	VE4OX	400	DJ3CP	375	PZ1AX	345			W9FVU	474
W9DWQ	506	W9WCE	458	K2PFC	415	VK3KB	400	PAØSNG	369	W2HXG	324	**Mixed WPX**		G3FKM	463
W9GFF	503	W3BCY	457	W5AWT	412			G3FKM	366	W2VCZ	320			DL1YA	456
G3EYN	503	OK3EA	456	W5DA	412	**Phone WPX**		W8UMR	363	W1UOP	318	W4OPM	629	WØVBQ	452
YU1AG	503	DL3RK	454	K5LZO	411			SM3AZI	362	W2YBO	318	W8JIN	605	PAØLOU	452
		PAØLOU	451	WA2DIG	411	CT1PK	599	SM3EP	361	W8PQQ	315	G3DO	597	GI6TK	450
		W3PGB	450	W2PTD	411	W9WHM	570			W1ORV	307	W3OCU	588	HK3LX	450

up this life, facts have to be faced and fooling oneself won't help one bit. It is a great pity that it has taken the fraternity so long to appreciate the Foundation's work and support it to the degree they are doing presently.

"I feel that it is right to quit now even if I didn't quite accomplish what I set out to do. There is a time when we all have to give up even though it hurts and to write this letter hurts me far more than many can realize. Over the years we have all seen varying sets of circumstances which have basically changed my life. It was fine while it lasted, and I know that without your help none of it could ever have happened. My inadequate 'Thank you for everything' for your help and support."

Thus, one of the great DX sagas ends. Danny has dominated the DX scene for eight years. The fraternity waited in horror while the *Yasme I* broke up on the rocks off the western shore of Australia and reveled as Danny made the rounds of the newly-formed Carribean countries. Danny has at times been the center of great controversy but always provided great excitement. His absence will be sorely felt.

In closing this chapter of DX history, we all would like to wish Danny the best of luck in his new endeavors.

Here and There

AC4 Tibet—Ack, W4ECI, reports via the WGDXC working AC4TD, who gives her name as Joan. She states she is a nurse in Tibet. Frequency was 14034 at 1300 GMT.

CEØ Easter Island—Luis, CE3AG, reports that a new operator will shortly take over the operation of CEØAD with a promise of more 14 mc c.w. activity. *(Tnx CE3AG).*

EL8 Liberia—The rare prefix for WPX is presently represented by EL8C in Ganta, Liberia. Wen is using a Viking II, HRO-60 and a Rhombic. He will be there for three years. W4GJY, Route 5, Box 55, Roanoke, Virginia is his QSL Manager. *(Tnx W4GJY).*

EP Iran—The Amateur Radio Society of Iran will have a Field Day on 28 June 1963. Time will be 0330 GMT to 1430 GMT. All bands 6 thru 160 meters will be used. C.w., s.s.b., and a.m. will be employed. *(Tnx EP2AB).*

FG7 Guadeloupe—John, FG7, recently lost his home and rig in a fire but now has a new SR-150 aboard his yacht. *(Tnx K5AWR).*

LA/P Jan Mayen—LA1LG will be active from Jan Mayen for another year. *(Tnx VERON).*

PYØ Trinidad—During a QSO with Joe, PY-4AS, Joe, W4OPM, learns that PY4AS has received confirmation from the Brazilian Navy that departure for Trinidad would be on 22 June. The trip takes between three and four days. The call has not been assigned as of this writing. *(Tnx WGDXC).*

PX Andorra—The radio club at F7OAF will operate as PX1OAF during the last week in May and first week in June.

SVØ Greece—Someone has been using SVØ-WL's calls lately. Charlie only works s.s.b. so any c.w. or a.m. contacts are n.g.

TA Turkey—TA5SW has been operating on 14301 s.s.b. between 2100 to 2230 GMT. Don't know yet if good. *(Tnx LIDXA).*

Eby, JA1DM and his family in his Tokyo shack. All his equipment is home built and recently earned him the first JA WAZ on two way SSB.

A well-known group of SP8 DXers at the headquarters station of SP8 area. They are, in the usual order, SP8HT, SP8TM, SP8SZ and SP8TK. *(Tnx W6YY).*

VK9X Christmas Island—VS1FJ is awaiting a license and visitor permit to this rare spot. Also, the *Yasme* Foundation may sponsor an all-out trip by ZS6LM. *(Tnx WGDXC).*

VS9M Maldive Islands—VS9MB has been very active on 20 meters s.s.b. between 1400 and 1900 GMT with some c.w. operation between 1500 and 1600 GMT. 14185 and 14050 are the preferred frequencies. *(Tnx NCDXC).*

ZD7 St. Helena—The following letter from Gerry, G3PEU ex-ZB1BW, should arouse more than passing interest.

"The facts are that I am sailing from UK on July 25th and should be on from St. Helena on s.s.b. from about August 7th right through to about mid-November. I have already been allocated the call ZD7BW as requested.

"I shall be taking a KWM-2, 30L-1 with 312B-5 to split frequencies. I hope to take along a K. W. Viceroy and KW77 combination as reserve, and am in touch with ZD7SE so we may both be on s.s.b. while I am on the Island.

"QSLs will be sent out at the end of the year when I return to the UK—so the boys will have to be a little patient for those few months before they get the cards. I have decided to QSL this way rather than accept any offer of manager. So direct QSLs go to G3PEU."

ZL3 Chatham Island—ZL3VB is presently active from Chatham Island. He prefers c.w. on 14065 with occasional jaunts on 40 and 80. *(Tnx VERON).*

5W1 Samoa—The new prefix for Samoa is 5W1. This is the old ZM6 not to be confused with American Samoa which is KS6.

HC Ecuador—A few months back, I had incorrectly listed the QTH of HC1DC. The correct listing is shown in the QTH section.

ST2 Sudan—Eric, ST2AR, has been very active on s.s.b. starting at about 1800 GTM on 14111 or 14133 kc. *(Tnx LIDXA).*

Certificates

Worked Stockholm Radio Amateurs (WSRA)

1. Requires two-way communication with members of SRA as follows: Swedish amateurs, 50 different members; European amateurs, 40 different members; Other amateurs, 10 different members.
2. Any mode may be used.
3. Two bands must be represented.
4. Once every year SRA arranges (usually in September) a weekend field camp where the call SM5XA will be used. A contact with SM5XA will equal contacts with 5 different members. One contact per year may be used.
5. Claims as well as additional information and membership list should be directed to SM5MC, Sten Larson, Sandelsgatan 25, Stockholm, No., Sweden.

Down Under Award (DUA)

This attractive award will be granted to any licensed ham who has QSL confirmation of having worked the following: 1. 50 VKs worked on 3 bands and in 5 areas; 2. 5 Oceania countries.

Send list and declaration by two Club Members confirming QSL sighting together with $1. or 10 IRCs to: Alan Shawsmith, VK4SS, 35 Whynot St., West End, Brisbane, Old, Australia.

SSB WAZ

The following is offered for those working toward WAZ on s.s.b. Presently active on s.s.b. in Zone 18 are UAØ's, BN, SK and WC. Zone 19 boasts activity of UAØ's AV, LA, DK, and EK.

Vlad, UA1CK, will operate shortly as /UAØ in Zone 23.

G 300 Certificate

Available to any amateur in the world for scoring 300 points by means of contacts with *English* stations as follows: G2-2 pts; G3-3 pts; G4-4 pts; G5-5 pts; G6-6 pts; G8-8 pts; any GB-5 pts. All contacts after January 1, 1960 to count. All one-band and all one-mode certificates are available. British stations may only apply for single band (*i.e.* not mixed bands) certificates. Send alphabetical log data and declaration by two other amateurs that they have seen QSL's with 5 IRC to G3PEU, Button End, Church Drive, Linby, Notts. (Stickers of 400, 500, *etc.*).

QTH's

AP2AD	Ahmed Ebrahim, P. O. Box 65, Lahore, West Pakistan.
BV1USF	P. O. Box 106, APO 93, c/o PM, San Francisco, Calif.
CR8AA	via W9JJF.
EL3A	via W3NNC.
EL8C	via W4GJY.
EP1MP	Prince Mahmud Reza Paklavi, Saadadad Palace.

Max, HI8MMN, is a newcomer to ham radio and is furnishing a new country to many on all bands. A prompt QSL is promised. His QTH is listed in the usual section.

DJØIR provides the rare DJØ prefix on all bands on CW and Phone. Don has also operated as PX1IR and LX3KW and should be operating from San Marino as 9A1IR about the time you read this.

EP2AB	Phyllis B. Denham, APO 205.
EP2AI	Andy Cross, Tehran Relay Stn, APO 205.
EP2AK	Byron Nelson, P. O. Box 1783, Tehran.
EP2AL	Dr. Hugh De Glanville, P. O. Box 1527, Tehran.
EP2AM	Arthur Monsees, APO 205 (returns to US June 1963).
EP2AR	Ismael Koutchesfahany, Ave. Soroya 64, Tehran.
EP2AS	Mostafa Skafei via bureau.
EP2BC	George Stracke, APO 205.
EP2BF	Ehrahim Nuban, 19 Damghn St. Tehran.
EP2BH	Lyman Rundlett, P. O. Box 5043, Beirut, Lebanon.
EP2BN	Joseph Mattingly, U. S. Embassy, APO 205.
EP2BQ	Harry McQuillan, P. O. Box 1065, Tehran.
EP2BR	Byron Ioannon, P. O. Box 1423, Tehran.
EP2BU	Bert Vrielink, KLM Royal Dutch Airlines, P. O. Box 1546.
EP2DV	David Walker, Marine House, APO 205.
EP2MA	Motamade via Bureau.
EP2RC	Dick Cormier, APO 205 or via K1KOM.
EP2RH	Ray Hargreaves, U. K. Embassy, Tehran.
EP3HS	Heinz Schmidt, P. O. Box 109, Tehran.
EP3RO	Conrad Glade, P. O. Box 709, Tehran. QSL Manager, EP2BN, Joseph Mattingly, U. S. Embassy, APO 205, N.Y., N.Y. (Tnx to Phyllis, EP2AB, for the above list of all licensed EP's).
ET3PP	S/Sgt. P. E. Perkins, OPNS Co. Box 327, Kagnew Sta. APO 843, c/o PM, N. Y., N. Y.
F7CP	P. O. Box 3012, 1992d Comm. Sq. APO 10, N. Y., N. Y. or Box 3012 Base de la Martinerie Chateauroux (Indre) France.
FG7XT	via K5AWR.
FH8CE	via W4ECI.
FR7ZC/G	
FR7ZC/J	via W4ECI.
FR7ZC/T	
GB3RAF	via G2BVN.
GC8KS	via G8KS.
HC1DC	Donald McClenon, Director, NASA Satellite Tracking Stn, Quito, Ecuador.
HC8CA, HC9CA	via W2MES.
HH2CL	c/o National Bank of Haiti, Port-au-Prince, Haiti.
HI8MMN	Maximo M. Nanita, Jose Reyes No. 27, Santo Domingo, Dominican Republic.
HI8XAA	via W8NWO.
HI8XAG	via W2CTN.
HL9KH	via W9VZP.
ex-HS5OSQ	via KH6FBJ.
JA1EEB/KG6	Marcus Island, Y uu Tsuboi, JA1EEB, 102 Ota Iwatsuki, Saitama, Japan or via JARL.
KB6CP	P. O. Box 5, Canton Island, South Pacific.
KG4BR	Roy Carthen, VP49, c/o FPO, N. Y., N. Y.
KG6SX	via KH6FBJ.
KG6SZ	via VE7ZM.
KH6FBJ	Lt. H. C. Sherrod, Jr., USN, 1132 McMorris Dr., Honolulu 18, Hawaii.
KH6FGL/KM6	1444 Wailuku Dr., Hilo, Hawaii.
KX6AE	Box 472, Navy 824, FPO, San Francisco, Calif.
LA5FI/P	(Svalbard) via LA8LF.
LA9RG/P	via LA8LF.
M1VU	via J. Richter, 8000 Munchen 25, Dietramszellerplatz 3/IV, Germany or via DARC.
PJ5ME	via W1JYH.
PX1BE	via PAØBEA.
PX1IR	via Ivan Hollingworth, 1121 N. Devon Ave., East Wenatchee, Wash.
SVØWL	C. D. Garoutte, APO 223, N. Y., N. Y. or P. O. Box 134, Salonika, Greece.
TG9SC	Box 53, Guatemala City, Guatemala.
UA1CK/UAØ } **UA1CK/UH8** }	via Anatoly Moskalenko, UA2AO. P. O. Box 77, Kaliningrad, obl., U.S.S.R.
UA9KOG	via UA9OAP.
UA9OAP	Vladimir Chavkin, P. O. Box 13, Novosibirsk, Siberia, U.S.S.R.
UQ2FX	Via UA9OAP.
VP2AB	James A. N. Brown, Box 340, Antigua, BWI.
VP2KR	J. Stratfull, c/o Audit Dept. St. Kitts, BWI.
VP2MZ	via W2ZMT.
VP5BP	via VE3CJ.
VP8GQ	via G3PAG, J. J. Davies, 139 The Fairway, Leigh-on-Sea, Essex, England.
VP8HE	via GM3JDX.
VQ5 and 5X5	cards only Box 3433, Kampala, Uganda.
VQ8BI	all QSL direct to VQ8BI (including the W4BPD operation).
VR2EK	via W6AL.
VR3E	Task Group 815 APO 86, c/o PM, San Francisco, Calif.
VR4CU	Box 489 Wellington, New Zealand
VS9AAA	114 M. U. BFPO 69, London, England.
VS9ADV/P/4W1	via VS9AAA.
VS9ALD/P/4W1	via W9JJF.
W5JDX/VP9	Roy Carthen, VP49, c/o FPO, N. Y., N. Y.
WA4LTX/KJ6	Box 100, APO 105, San Francisco.
ex-XW8AS	via KH6FBJ.
YA1AW	via K5YYP.
ZD3P	via G2BVN.
ZD8DW	Charles Shoemaker, 3217 Moon, Mesquite, Texas.
ZK1BS	via W7ZAS.
5N2NFS	via K9QIZ.
5U7AH	via K9EAB.

6YA—If you've heard a peculiar prefix from down Caribbean way it's the new call-sign change made on obtaining Dominion Status for Jamaica. The new 6YA calls became effective April 20th. 6YAAH informs us that no other cards but the following will be accepted at the Bureau.

6YAAA, 44 Fort St., Mont. Bay; **AH**, 38 Brenford Rd., Kings. 5; **AK**, 52 Montgomery Ave., Kings. 10; **AM**, 15 Ballater Ave., Kings. 10; **AO**, 5 Braemar Ave., Kings. 10; **AR**, 12 W. Oakridge, Kings. 8; **AT**, 1 Benson Ave., Kings. 5; **BF**, c/o International Aeradio, Mont. Bay; **BK**, 6 Huntsdene Ave., Kings. 10; **BL**, 20 Queen's Ave., Kings. 10; **BP**, 76 Arnold Rd., Kings. 5; **CC**, 10 Liguanea Ave., Kings. 6; **DM**, P.O.B. 13, Kings. 11; **DX**, 2 Wexford Rd., Kings. 3; **EM**, Wingfield, Constant Spr. P. O; **FR**, 8 Milverton Cres., Kings. 6; **GG**, P.O.B. 176, Constant Spr.; **GH**, 13 Hamilton Dr., Kings. 10; **JB**, c/o Cable & Wireless Ld., Kings.

[*Continued on page 88*]

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

By the time this column appears in print, TELSTAR II may already be in orbit, and NASA may be making final plans for a summer launching of SYNCOM II and ECHO II.

TELSTAR II

TELSTAR II, planned to be launched during late May or early June by NASA, is the follow-up to the highly successful TELSTAR I active communication satellite experiment.

TELSTAR I was successfully launched from Cape Canaveral on July 10, 1962. On July 23, it made communication history by linking together Europe and North America by television broadcasts for the first time. The communication satellite operated flawlessly during its first five months in orbit. All experiments originally planned for the satellite, including overseas telephoney, black-and-white and color television, facsimile, and high and low speed data transmission, were successfully carried out.

During November, 1962, the communication relay equipment aboard the satellite suddenly went dead. Miraculously, a month later, after feverish engineering detective work in the laboratory of the American Telephone and Telegraph Co., the designers and builders of TELSTAR, the trouble within the satellite was corrected by ground control. TELSTAR I remained in operation until early April, when its power supply ran out. Although now silent, the satellite is expected to remain in orbit for hundreds of years.

TELSTAR II is the second step in an experimental program designed to determine the feasibility of medium altitude operational active communication satellites. Like TELSTAR I, it has been built by the American Telephone and Telegraph Co., and will be launched by NASA from Cape Canaveral. A.T.&T. will repay NASA for all costs involved in launching the satellite.

TELSTAR II will bear close resemblance to its predecessor. Made of lightweight magnesium structural elements and an aluminum skin, the three-foot diameter spherical satellite weighs approximately 170 pounds. The satellite's outer surface contains 3600 solar cells, which provide power for charging the 19-cell nickel-cadmium battery used as the primary power supply.

*11307 Clara St., Silver Spring, Md.

Within the TELSTAR II satellite will be a complete microwave relay station. The satellite's receiver will pick-up signals beamed to it from powerful ground stations on a frequency of approximately 6390 mc. The signals will be relayed automatically from the satellite's 2 watt transmitter operating on 4170 mc. Another transmitter aboard the satellite will operate as a continuous c.w. beacon on 136.05 mc. Upon ground control, this transmitter will also be used as a telemetry circuit to earth. The power of the beacon/telemetry transmitter is 0.25 watts. A third transmitter aboard TELSTAR II will operate as a continuous c.w. beacon transmitter on 4080 mc, with a power of approximately 0.20 watts.

A helical antenna extending from the top of the spacecraft will be used for v.h.f. communications, while two antennas extending around the satellite's equator will be used for microwave communications.

One significant difference between TELSTAR II and its predecessor, may be its orbit. TELSTAR I's elliptical orbit varies between approximately 500 and 3500 miles above the earth. The availability of a modified Thor-Delta rocket, more powerful than that used for launching TELSTAR I, may make possible a higher and more suitable orbit for TELSTAR II. A higher orbit will permit a greater amount of mutual visibility time between American and European ground stations, and may extend TELSTAR's range to make possible trans-Pacific experiments as well.

Space listeners should have little difficulty in receiving the 136.05 mc beacon and telemetry transmissions from the TELSTAR II satellite.

Spacewarn Frequencies

Through the cooperation of the Voice of America, special space news broadcasts prepared by the Committee on Space Research of International Scientific Unions (COSPAR), are transmitted on shortwave six days a week (Monday through Saturday) from 10:30 to 10:35 P.M. EST. These broadcasts contain information (including orbital data and radio frequencies) on new satellite launchings, and up-to-the-minute revised statistics on satellites already in orbit. COSPAR, sponsor of these broadcasts, is an

[*Continued on page 88*]

PROPAGATION

GEORGE JACOBS*, W3ASK

The record-breaking DX propagation conditions on the lower frequency bands are coming to a close until next fall. Seasonally high static

[*Text continued on page 88*]

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during June, 1963. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (June 6, 10, 13, 16 and 22), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be disturbed, etc.

PREDICTED PROPAGATION CONDITIONS AND CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating higher than 6)* June 6, 10, 13, 16 and 22	*Normal Days (WWV rating 5-6)* June 1-5, 7, 9, 11-12, 14-15, 19-21, 23-25 and 28-30	*Below Normal Days (WWV rating 4)* June 8, 18, and 26-27	*Disturbed Days (WWV rating less than 4)* June 17
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—is an excellent opening with strong steady signals.

B—is a good opening, moderately strong signals, with little fading and noise.

C—is a fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.

D—is a poor opening, signals generally weak, with considerable fading and high noise level.

E—is a very poor opening, or none at all.

VERY few 10 and 15 meter DX openings are forecast for June and July. The few openings expected on these bands should take place during the daytime hours, and mainly to tropical or southern areas. Twenty meters is expected to be the best band for daytime DX during June and July. The band is expected to open shortly before dawn, and to remain open to one area of the world or another through the early evening hours. When propagation conditions are better than normal, 20 meters may remain open to some areas of the world through the hours of darkness as well.

*11307 Clara St., Silver Spring, Md.

JUNE & JULY, 1963

Time Zone: EST (24-Hour Time)

EASTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	15-18 (1)	05-06 (1) 06-09 (3) 09-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	19-20 (1) 20-23 (2) 23-01 (1)	21-22 (1) 22-23 (2) 23-00 (1) 22-00 (1)†
Eastern Europe & Euro-pean USSR	13-16 (1)	05-09 (1) 14-21 (1)	20-00 (1)	21-23 (1)
South-ern Europe & North Africa	14-18 (1)	04-05 (1) 05-08 (2) 08-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (2) 20-22 (1)	19-20 (1) 20-23 (2) 23-01 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)†
South Africa	09-13 (1)	00-02 (1) 05-07 (1) 14-18 (1)	19-21 (1) 21-23 (2) 23-01 (1)	21-23 (1)
Eastern Mediter-ranean	13-16 (1)	05-07 (1) 14-16 (1) 16-18 (2) 18-21 (1)	19-23 (1)	*NIL*
Central Asia	*NIL*	05-08 (1) 15-21 (1)	*NIL*	*NIL*
South-east Asia	*NIL*	06-09 (1) 18-21 (1)	*NIL*	*NIL*
Far East	*NIL*	07-11 (1) 19-21 (1)	*NIL*	*NIL*
Samoa, Pacific Area & New Zealand	18-20 (1)* 15-18 (1) 18-20 (2) 20-21 (1)	20-22 (1) 22-00 (2) 00-07 (1) 07-09 (2) 09-10 (1)	23-01 (1) 01-05 (2) 05-06 (1)	02-05 (1) 02-04 (1)†
Aus-tralia	19-21 (1)	06-07 (1) 07-08 (2) 08-11 (1) 20-23 (1) 23-01 (2) 01-03 (1)	02-06 (1)	03-05 (1)
South America	14-17 (1)* 06-08 (1) 08-11 (2) 11-13 (1) 13-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	05-08 (3) 08-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-21 (4) 21-00 (3) 00-02 (2) 02-05 (1)	19-21 (1) 21-00 (2) 00-03 (3) 03-05 (2) 05-06 (1)	22-01 (1) 01-04 (2) 04-05 (1) 01-04 (1)†

*Predicted 10 meter openings.
†Predicted 160 meter openings.

Mc-Murdo Sound, Antarctica	14-17 (1)	14-16 (1) 16-18 (2) 18-20 (1)	03-07 (1)	*NIL*

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA To:

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

Explanation Of Forecast Ratings

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

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

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

The *CQ* DX Propagation Charts are based upon a double-sideband a.m. effective radiated power of 600 watts, a single-sideband e.r.p. of 300 watts, and a c.w. e.r.p. of 150 watts, at antenna radiation angles less than thirty degrees. The Eastern USA Chart can be used in the 1, 2, 3, 4 and 8 amateur call areas, the Central USA Chart in the 5, 9 and Ø areas, and the Western Chart in the 6 and 7 areas. The Charts are valid through July 31, 1963. Propagation information contained in these Charts is derived from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

VHF

DONALD L. STONER*, W6TNS

UNDOUBTEDLY the big news to v.h.f.'ers this month is the recent technical breakthrough by Motorola Semiconductor, 505 E. McDowell Road, Phoenix, Arizona. This progressive firm has recently introduced a new series of high frequency power amplifier transistors made by the Epitaxial passivated process. The transistor is mounted in a TO-3 package, that is, the style normally issued with audio power transistors. The new series is specifically designed for applications to 100 mc. Of particular interest, is the new MM-799 and 800. These transistors described in Bulletin DS-5040 have a guaranteed power output of 15 watts at 50 mc, and 20 watts at 30 mc, with a 10 db typical power gain. This means that they need something in the order of 3 watts drive. Even though there have been transistors capable of this type of output, they usually require almost as much drive as they produce in power output. As with most silicon transistors, the MM devices work best at high collector voltages and the 15 watt power output rating is given at 22 volts. However, even at 12 volts, the device is capable of 9 watts output.

Figure 1 shows the schematic diagram for the 15 watt power amplifier. Standard components are used throughout and experimenters should have no difficulty in duplicating the circuit. Figure 2 shows the complete schematic for a 20 watt a.m. transmitter operating from a 15 volt supply. Although the values given are for 30 mc, the same general circuit configuration would apply for six meters. In this circuit, a 15 mc crystal is made to oscillate in a Colpitts circuit with feedback occurring between collector and emitter through a capacitor voltage divider and crystal. The output of this stage is applied to a doubler which supplies 30 mc energy to a driver amplifier. This stage employs an MM-801 which is capable of supplying 3½ watts output at 50 mc. The final amplifier consists of two MM-800's in parallel, mounted on a Beryllium oxide heat sink. Inductance L_4 serves as a step-up transformer to match the low output impedance of the power amplifier to a 50 ohm load. The modulator stage is conventional with the exception of the split winding driver transformer which is used to balance the bias currents required to minimize crossover distortion. The total supply current is 4.1

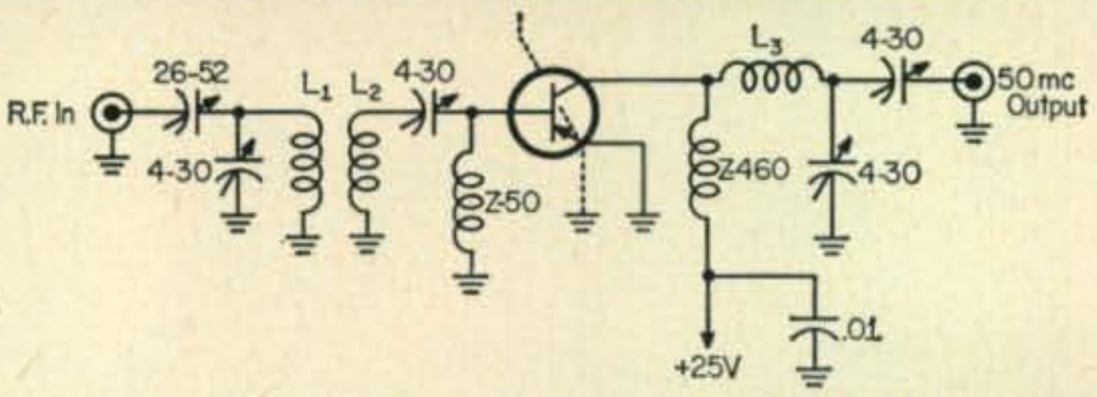


Fig. 1—Fifteen watt power amplifier for 50 mc using one of the new Motorola high frequency power transistors. L_1 and L_2 are 4t. #16, 1" dia. ½" l., spaced ⅛". L_3 is 3t. #12, 1¼" dia. ⅜" l.

amperes. The modulator draws 2.2 amps and the final draws 1.5 amps, with the remainder going to the driver circuitry. Modulating power is 11 watts and the maximum modulation is 80%. Some rapid calculation shows the overall efficiency of the circuit to be 42%. This would compare to 2 or 3% in a vacuum tube rig when you add the filament consumption to the B supply. Although the MM-800 transistors are still rather expensive, (about $45.00 in quantity) they are considerably less than earlier devices capable of performing similar tasks. Production orders and process improvements should reduce the price in the near future.

Also of interest to the technical minded, is a new series of high-Q power varactors manufactured by Raytheon Semiconductor in Mountain View. These devices are specifically designed for use in frequency multipliers in the 2 mc to 2 gc range with power inputs of 0.1 to 10 watts. They may be used for power harmonic generation, solid state microwave power sources, and as parimetric amplifiers and converter in this frequency range. These devices rated at 1 watt dissipation and up to 120 volts reverse breakdown are priced at $15.00 each.

VHF Around The World

Nadav Levanon, 4X4JB, 18 Dubnov Street, Tel-Aviv, Israel, writes to say that there is little or no v.h.f. activity in his country. This is primarily due to the fact that local operating is not very popular and the 7 mc band is used for this type of communication. Most of the Israel hams are active DX'ers and prefer working other parts of the world than around the Mediterranean. Nadav says this lack of equipment accounts for the fact that no reports on Project Oscar (no. 1) were sent from Israel. Nadav also says that he may come to the United States this spring and would very much like to visit with

*Alta Loma, California

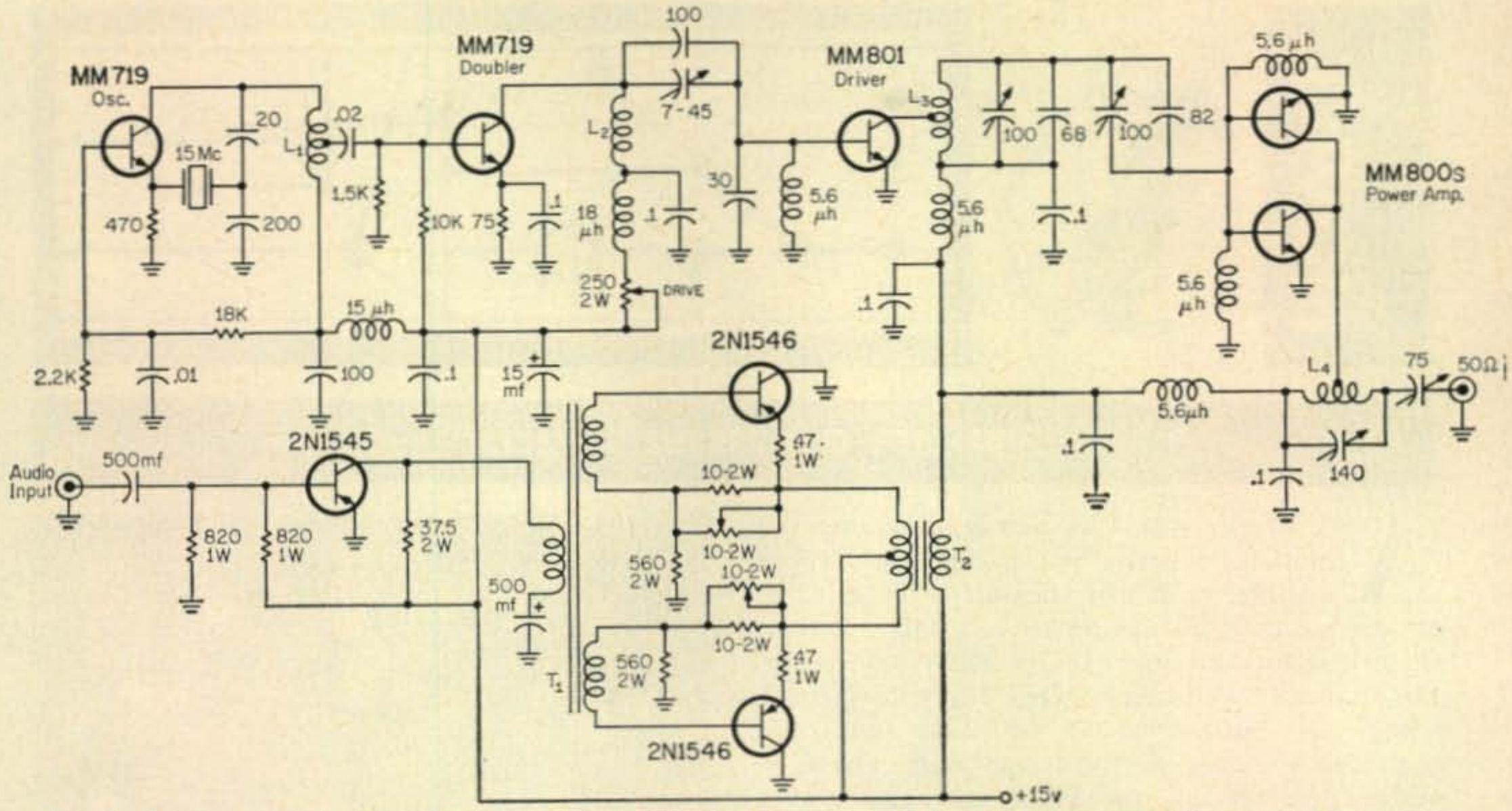


Fig. 2—A 20 watt a.m. transmitter for 30 mc. Simple alterations of the tuned circuits will permit 50 mc operation. Although the new MM800 transistors are quite expensive, it is likely that the price will drop as production increases. All capacitors greater than one are in mmf and all resistors are ½ watt unless otherwise specified.

L_1—25t. #30 e. closewound on ¼" dia. form tap 4½t. from cold end.
L_2—6½t. #22 e. closewound on ¼" dia. form.
L_3—3t. #14½" dia., ¾" l. Tapped ⅝t. from cold end.
L_4—13t. #12¾" dia., 1⅜" l. Tap 2t. from cold end.
T_1—Trifilar transformer, 1:1:1 ratio.
T_2—40 ohm c.t. to 8 ohm transistor mod. trans.

American hams.

The German amateur magazine, *DL-QTC*, recently published a very extensive article on a completely transistorized 2 meter walkie-talkie. Ye olde editor is currently trying to obtain permission to reproduce the material so that American constructors can benefit from the product of this superb German engineering. Reader mail indicates that there is a tremendous amount of interest in such a project. More about this later.

Who's News

Einar H. Morterud, W5FPB, apprises us of v.h.f. activity in his area. Six and two meter nets are quite active, as is the AF MARS net just below 2 meters.

Speaking of MARS, James G. Stewart, AD6HIT/WA6HIT, has established a 432 Army MARS network in Southern California which is known as the R and D network and is affiliated with 6th U.S. Army MARS. They operate every Saturday morning at 1600Z and at 1500Z every Sunday morning. At the present time, there are approximately 20 members in the Los Angeles and San Diego areas and have an average check-in of 10 each morning.

Many thanks to Sam Hicks, WA4ISC, secretary of the Mid South V.H.F. Club of Memphis, for sending a copy of their *V.H.F. Call Book*. You would be amazed at the number of amateurs in the area who operate v.h.f. If you work into this area and need one of their *Call Books*, drop a line to Sam Hicks, 3159 Wilcox, in Memphis, Tenn.

Gary Tater, K1YLU, 40 West Street, Leominster, Mass., is recently joined the V.H.F. C. C. and worked many of his 2 meter contacts using a Heath Twoer. He now boasts a Gonset II and linear and has worked 6 meters from his QTH and operated the March 16th v.h.f. contest. Gary is now trying for a 6 meter and 432 C.C. He is looking for a long, long yagi for 2 meters, that has at least a 30 ft boom with 25 elements which he can use on Mt. Wauchusetts for serious DX'ing. Anyone have any ideas along these lines?

Robert Meadows, 2659 Pinecrest Drive, Vinton, Va., has recently acquired an R2A/ARR-3 and would like information on how to convert it for amateur use. Does anyone have information on this project?

James H. Harrell, W5FAG would like to make skeds for 6 through 420 and can be contacted at 10821 Cordova in Albuquerque.

[*Continued on page 92*]

VHF Century Club

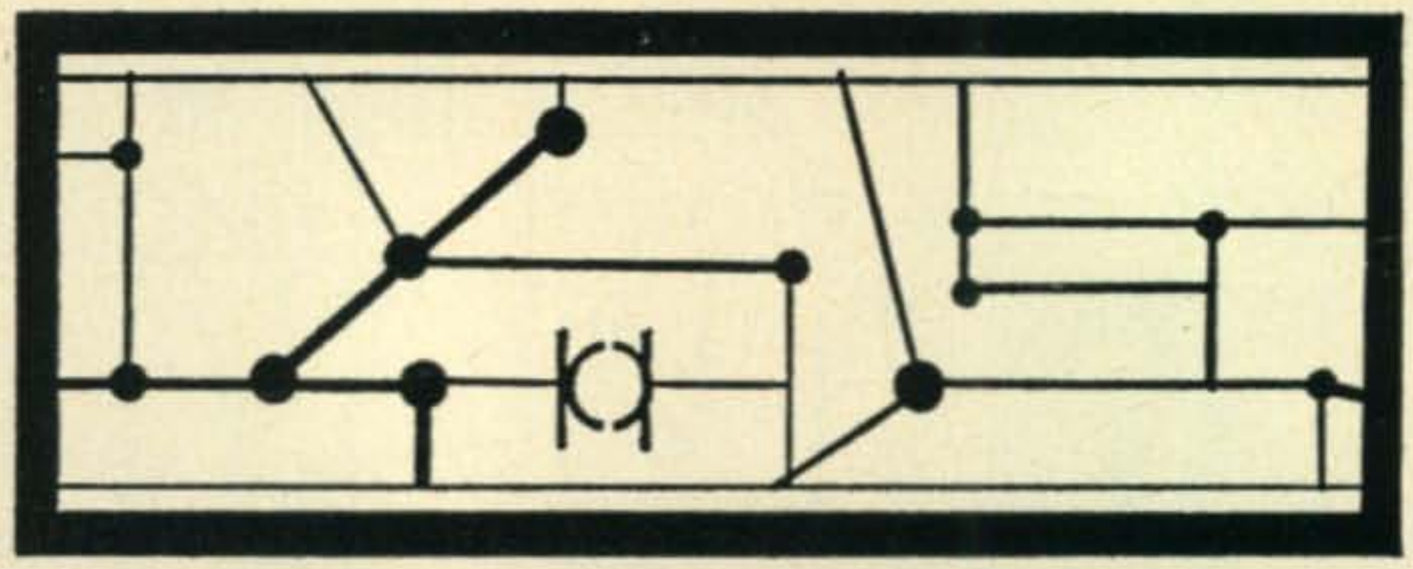
6 Meters

WA6LHS	149	K1QDV	158	W4OGT	167	K4UQM	174
K8ZSY	150	K4TLC	159	WA2PWI	168	K7QMG	175
K7GWE	151	K8QLT	160	W2URP	169	K3LOM	176
WA2TQT	152	K9COS	161	K9CIF	170	K1KCN	
WA2GFP	153	K7QFW	162	K8RUD	171	('60)	177
WA4EBV	154	WA4BNL	163	WA2FNN	172	K1KCN	
WA2EIY	155	WA4FJF	164	K1KCN		('61)	178
K8KTG	156	K4FGI/		('59)	173	W4VRV	179
K7PAG	157	AG4BN	166			K7QMG	180

2 Meters

K4CDZ	124	W9OEQ	127	WA2OOL	130	WA2VIK	133
VE3EUH	125	WA4CXZ	128	WA2EUS	131	K1YLU	134
K1OAV	126	SM3ANH/5	129	K8DCR/M	132	WA6WWG	135

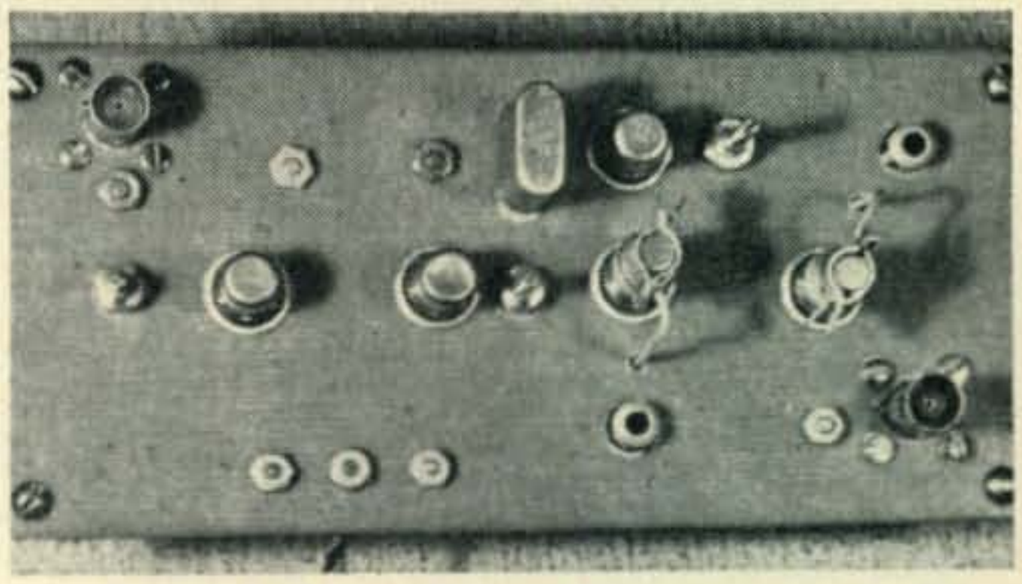
NOVICE



WALTER G. BURDINE*, W8ZCV

ANY v.h.f'er worth his salt is always on the alert for a better way to hear that fellow upstate with the peanut whistle. The good v.h.f.'er is always trying out different converter circuits to improve his receiving set-up. I'm that way and after trying transistors for a while was induced to try nuvistors and I am happy to say they perform very well. The converter described is the result of considerable building and re-building and many hours of testing and listening to local and DX stations. Build it and if you aren't satisfied, rebuild it as I did, a few times. It won't look as nice as when you started, but then the added improvement in performance is usually in inverse proportion to the improvement in mechanical appearance.

The converter was built on a three by six inch piece of copper-clad printed circuit board. This material is an excellent way to get low inductance leads and nearly perfect grounding by soldering parts directly to the sheet copper. The shield, (not shown in the photo) is made of a small piece of the excess material. It can be soldered to the chassis easily and does a good job of shielding.



Top view of the Nuvistor six meter converter.

Coils

Coil data is often given for a construction article and usually involves something that you don't have in the junk-box and have to go out and buy. This isn't really necessary; the object is to get a coil that will resonate at the frequency intended and have a usable Q, there is no hard fast rule that a coil must be so many turns of a certain size wire wound on only one size and type of coil form. Use what you have as long as it is applicable to the frequency used, the main requirement being that it be resonant and have a fair Q. There are exceptions, but they will be specifically mentioned in an article. I wound my coils of number 20 enamelled wire on a piece of ¼ inch drill rod and cut them to size as needed. L_1 was 12 turns and L_3 was 11 turns. These were tuned to resonance by small tubular trimmers. The i.f. coils were 4.5 mc units as used in early television receivers. Any good coil tuning the i.f. will do the job or you can wind a coil using the data from the chart on coils in most

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

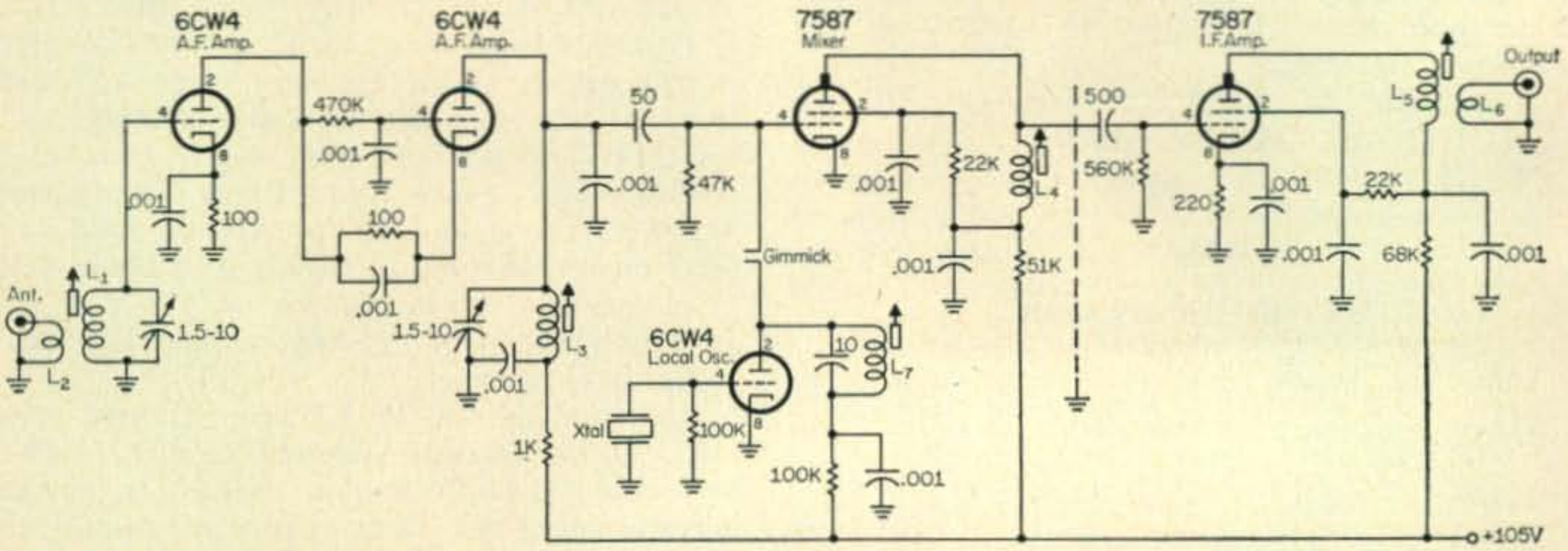


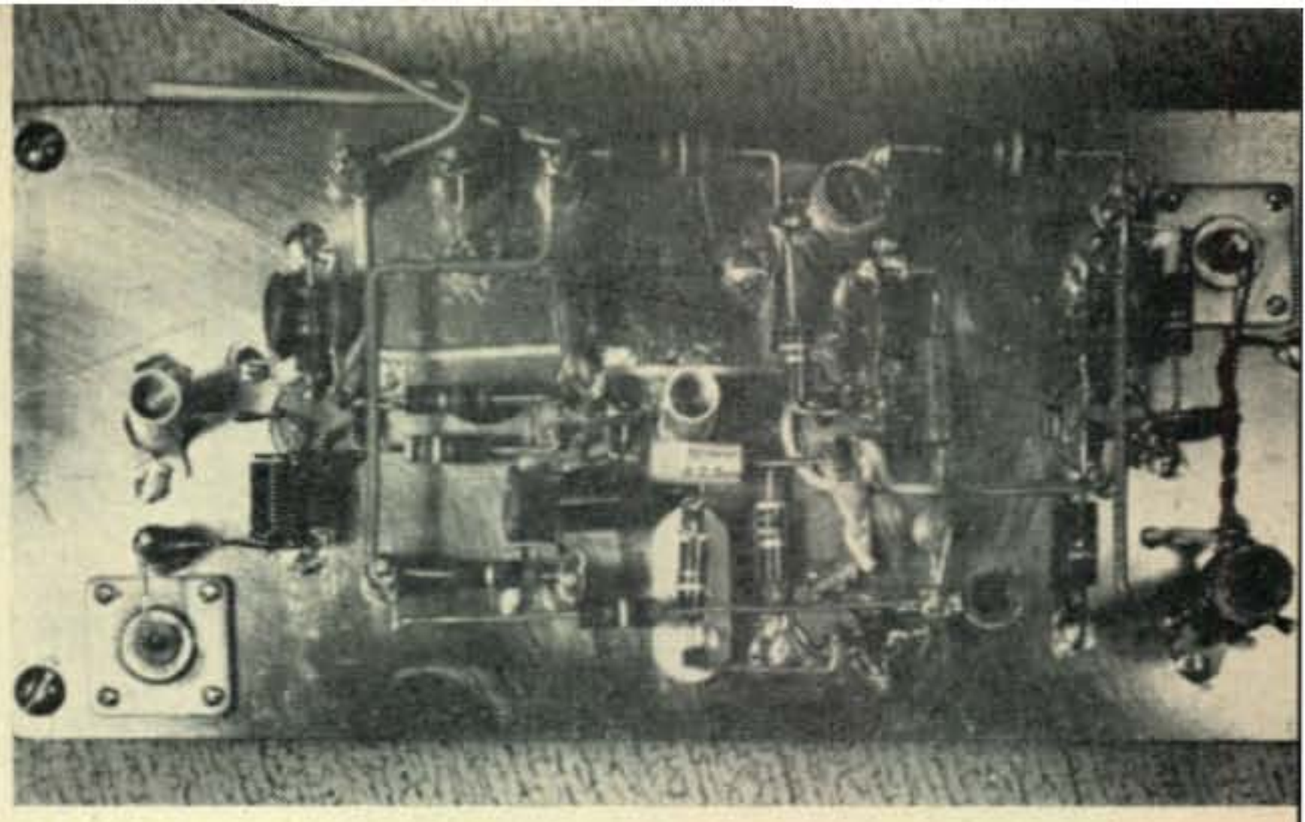
Fig. 1—A six meter converter using the new tetrode nuvistors. See text for discussion of coils and coil winding. All capacitors greater than one are in mmf and smaller than one in mf. All resistors are ½ watt.

L_1, L_3—To tune to 50 mc. See text.
L_2—3t. hookup wire on cold end of L_1.
L_4, L_5—Slug tuned coil to tune i.f. See text.
L_6—4t. hookup wire on cold end of L_5.
L_7—To tune local osc. frequency. See text.

any handbook. You must have a grid-dipper to find the resonant frequency of the coils.

When building this converter, use good clean tools and good construction practices. Don't use too much heat when soldering, keep it clean and do neat work. All by-pass condensers can be connected with short leads at the tube socket. Shield the entire unit and use shielded wire for all external wiring to reduce feed-thru of signals at the i.f.

To find the crystal frequency, subtract the desired i.f. from 50 mc; the difference is the crystal frequency. If you tune 8 to 12 mc for your i.f., the crystal frequency would be 42 mc. I am using this converter ahead of an NC-270 with a 46.5 mc crystal and tuning the receiver from 3.5 to 4.0 mc. I have used it with an HRO-60 and a BC-454.



Bottom view of the Nuvistor six meter converter. The small insulated stand-offs can be replaced with tie points. A shield was soldered between the two i.f. coils (note space between the coils). Shield can be made of surplus chassis material and soldered in place.

Letters

A nice letter from Peter Drew, WIA-L6021, 84 Adelma Road, Nedlands, Western Australia informs me that he is 17 years old and has been an s.w.l. for 3½ years. He works for the P&O-Orient Lines at Fremantle. His code speed is ok but he lacks a little more theory before passing his amateur test. He has a new 8 tube PYE receiver which he says is designed for the short-wave broadcasting bands but he says it covers the 160, 80, 40 and 15 meter bands. He doesn't have a b.f.o. but used the regenerative receiver to act as a b.f.o. [I am sending him some dope on b.f.o. addition for his set] Peter hears most of the 40 meter novices at 6:00 to 8:00 P.M. He hasn't heard any novices on 80 yet but expects to hear them as soon as the PYE is working ok with b.f.o. Peter we would appreciate hearing from you.

The first letter from Utah arrived from Gary R. Cazier, K7TDS, 837 N. 8th, Logan, Utah: "Dear Walt, I am not a Novice any longer, but thought I would drop you a line anyway. The reason for this letter is to possibly help a Novice who wants to go home brew.

"In most libraries, there are probably many old radio handbooks. Thumbing through them I have found quite a few very interesting construction projects for low-power transmitters, simple receivers, *etc*. If some of the Novices are like I am, they are short of money and these articles will give them ideas for a low cost station.

"I am a freshman at Utah State University and I'm ex-KN4VGK and K4VGK from Florida. I live in the Sigma Phi Epsilon Fraternity house and have my station located here. Claude Bramwell, K7GXW, helps me operate my station and we have real good luck.

"The rig is a Globe Chief 90, BC-348 receiver and 20 and 40 meter dipoles plus an all-band longwire.

"Even though I have my General, I still enjoy reading the Novice section. You have a very fine column and a fine magazine and I'm sure it will always be so. Claude and I will be glad to work anyone needing Utah. We operate mostly 40 meters.

"Thank you very much and keep up the good work. Respectfully yours. Gary, K7TDS."

Thanks for the letter, Gary and if you want to be a much sought after station, put K7TDS on 6 meters and get a supply of QSL cards ready. I am still looking for a YL station in Utah for WAS YL phone.

Just part of a letter from Don Simonsen, DJØIR and DJØIRA, Bressler, Park Str. 47, 35, Kassel, Germany: "Dear Walt, I read *CQ* every time I can get a copy. *CQ* is very hard to come by here in Germany.

"I am an American student studying engineering in Germany and I hold the calls of DJØ1R and DJØIRA. Since receiving my calls I have copied about 30 Novices here in Central West Germany. I would love to give a new Novice his first D contact but I have called many at their operating speeds and so far have not contacted one. My equipment is working ok but I think they need better receivers or need to know more about tuning their present receiver. Many of them are not looking for a DX station because they think low-power won't work DX, but on 15 and sometimes 40 meters their 75 watts can be heard half way around the world when the band's open.

"I am running 250 watts to a Viking Valiant on c.w. and using an HQ-140X receiver. I operate on 15 and 20 meters when the bands are good. I will be looking for Novices on 40 and 80 meters. 80 meters is good to the states now.

"I would be glad to schedule the states or any Novice that will write me a letter. I will answer all letters from hams or non-hams who want to know more about Germany. I will be over here for two more years. Keep up the good work, Walt and 73 from West Germany, Don."

Due to the death of my father last August, I have had to spend considerable time in Indiana visiting my mother who was in very bad health and blind so that I was unable to build all of the gadgets that we usually have to add to the station and put them in our column. I am thankful that all of you could bear with me and if I left out anything this month please forgive me as I have been operating under a handicap. My mother will be laid to rest to-morrow. Again thanks to all of you. 73, Walt, W8ZCV

sideband sideband sideband

SIDEBAND

IRV & DOROTHY STRAUBER*, K2HEA/K2MGE

SSB DX HONOR ROLL

TI2HP	282	PZ1AX	254	G2BVN	237
VQ4ERR	282	K2MGE	254	WØCVU	235
W8EAP	277	W3KT	251	K6ZXW	235
W8PQQ	276	G3NUG	251	W1AOL	232
W2ZX	275	G8KS	250	WA2IZS	231
PY4TK	275	W5IYU	250	W2VZV	231
W2FXN	272	W2VCZ	247	YV5AFF	230
W6UOU	269	W6BAF	246	K4PUS	226
HB9TL	268	DL1IN	245	W2NUT	225
K8RTW	265	W6PXH	245	VE3BWY	225
WØQVZ	262	WØUUV	243	G3DO	225
MP4BBW	261	W6RKP	243	PJ2AA	225
K4TJL	261	K1IXG	240	K4AJ	220
W4OPM	259	W8YBZ	240	K6LGF	220
W3LMA	259	K6MLS	240	WA6EYP	220
K9EAB	256	W6WNE	240	W1UOP	211
W1LLF	256			WØPGI	209

SSB DX ENDORSEMENTS

PY4TK	275	W6DLY	150	W9KWC	100
G3NUG	250	WA2TAG	150	G8TY	100
W1LLF	250	WA4ACA	150	K2POA	100
PJ2AA	225	JA2JW	125	K6RFU	75
W2VZV	225	K6EXO	125	WA6KNE	75
W8KBT	200	W5CME	100	K9OYD	50
K4JEY	200	DL1AU	100	W5VSQ	50
VE3BQP	200	CN8AW	100	VE7HJ	50
W7DLR	200			GI3CDF (80m.)	75

HEARTS were heavy all over the world when it was learned that Dr. George Stauch, K6MLS, of Sacramento, California, suddenly became a Silent Key on April 4. All who read this column knew of George's great interest in and love for sideband which was expressed by his plan to award trophies to the first three sidebanders in the world who had 300 countries confirmed and by his daily appearance on 20 meters where his friends were legion.

Not generally known was the fact that George had been in retirement since 1958 from a brilliant career in surgery. Born in Kansas City, Missouri in 1907, George was graduated from the University of Kansas School of Medicine as a Thoracic Surgeon specializing in tuberculosis cases. In 1940, he and Mrs. Stauch moved to Sacramento where he became Chief Surgeon of the Wumar Sanitarium. He later became head surgeon of Mercy Hospital in Sacramento.

George had many other hobbies prior to 1958 when he got his ham license. He was a lover and collector of Oriental art with emphasis on the Ming era; an enthusiastic hunter and fisherman; an accomplished photographer with both still and movie camera. But, due to an interest in electronics, he turned more and more to ham radio and spent the major part of his time on the air, not only making close friendships but also working enough DX to earn WAZ three ways and getting 240 out of 250 countries confirmed.

Our deepest thanks go to Bob Lane, WA6ZIQ, who kindly gathered the background on George for us. As often as we queried George, he always turned all personal questions aside since he was a person of great modesty and character.

Our heartfelt sympathy and that of thousands of George's friends and acquaintances have already gone to Mrs. Stauch. George will be greatly missed and long remembered.

7th Annual CQ Sideband Contest

Seven is a lucky number, they say, and we had high hopes for the Seventh Annual Sideband Contest but "you can't win 'em all"! Blessed with super conditions even as late as last year when the sunspot cycle was descending to its lower level, each of our Contests was a fascinating mixture of enthusiasm, good operating, a

Dr. George Stauch, K6MLS, of Sacramento, Calif., May, 1907-April, 1963. An operator in the finest tradition of amateur radio.

*12 Elm Street, Lynbrook, New York

Here are some of the well-known sidebanders at the Hallicrafters-ARRL Luncheon: l. to r., Noel Eaton, VE3CJ; Bill Leonard, W2SKE; Herb Hoover, Jr., W6ZH; Bill Grenfell, W4GF; Bob Booth, Jr., W3PS; Wayne Green, W2NSD; Bob Dennison, WØNWX, Dale Strieter, W4DQS; and John Alline, K1YRO. In the right photo: Joe Hellmann, W2MES; Fritz Francke; Travis Marshall, K9EBE; Dorothy Strauber, K2MGE; Bill Halligan, W9AC/W4AK; Ken Hudson, W9EPH; Bill Kaufman, W4KVF; John Huntoon, W1LVQ; and Calvin Des Portes, W4ANE.

surprise or two in the way of new countries, and plenty of opportunity to work the world on all bands. The Contest just passed had several of the same ingredients to make it interesting for many operators but activity had to be confined mainly to 20 meters for it was the only band that was really good.

Contributing to our "unlucky seven" was the confusion caused by a printer's error which, happily, was partly caught at the last minute. The error dealt with the new points assigned to this year's Contest wherein the printer completely reversed what we had in mind. Next year, the points will be set up in table form so that it will be easy to see what's what.

All in all, despite these unusual factors, latest reports had everyone enjoying the Contest. The first log was received from Bob Stankus, W2VCZ, whose biggest thrill was "working VK9LA", a comment echoed by another top US Contest operator, Don Sleeper, W1ONK.

Since this is being written only a few weeks after the Contest, we have not received sufficient logs to list even claimed scores. It was noted that two of our regulars were among the missing—last year's winner, Ami Shami, 4X4DK, picked the wrong year to work "only 80 meters" and the 1961 winner, Olliver Pearce, ZS5JY, had business commitments which prevented his participation.

Thanks go to each and every sidebander who took part in the S.S.B. Contest and we urge all of you to submit your log. Naturally, due to deteriorating conditions, scores will be lower than in previous years but don't let that stop you. By submitting your log, you may very well be eligible for one of the beautiful certificates or trophies that are available for contestants. Deadline for receiving logs is June 15—there is still time.

Second Chance for Reciprocity

Thanks to the unceasing efforts of Sen. Barry Goldwater of Arizona, the matter of reciprocity has gained a new lease on life with the introduction of a new bill—S.920—sponsored by a large number of senators from both parties. The purpose of this bill is to "provide that the Federal Communications Commission may, if it finds that the public interest, convenience, or necessity may be served, issue *authorizations*, but not licenses, for alien amateur radio operators to operate their amateur radio stations in the United States, its possessions, and the Commonwealth of Puerto Rico provided there is in effect a bilateral agreement between the United States and the alien's government for such operation by United States amateurs on a reciprocal basis."

Once again we urge every amateur to write to his Senators and Congressmen for strong support of this bill. You don't have to be a DXer to take a personal interest in S.920. You may be travelling in other countries one of these days and, if reciprocity goes into effect, you will have the privilege of operating your rig. Spread the word—support S.920!

All Good Things Come To . . .

. . . he who waits! Our congratulations to the FCC for their prompt reversal of the order prohibiting sideband on 160. Published on Feb. 22, the order was amended on April 10 in plenty of time to permit the continued operation of sideband. Knowing how many other problems with which the gentlemen on the FCC are faced, it is most reassuring to note their sincere desire to reconsider a previous decision after additional study had been made. In the immortal words of W5RHW, we "bow low to the ground and tip our sombrero" to the FCC!

More Lebensraum?

A note from George Heeringa, PJ2AA, highlights a problem that has become increasingly acute on 75 meter sideband. During many months of the year, it is possible for American sidebanders to contact sidebanders in other parts of the world who operate below 3.800 kc. and for these sidebanders to contact each other. However, due to often-deliberate interference by American c.w. stations (and *not* crystal-controlled 75 watt novices), it has become constantly more difficult for such contacts to take place. It seems to us that the Novice band might be restricted from 3750 to 3775 kc with General class c.w. permitted from 3500 to 3750 and the top corridor of 25 kc. kept free of c.w. interference. Anyone else have any thoughts on this subject?

[*Continued on page 94*]

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

DURING the last few months a number of HAM CLINIC readers have written in complaining about radar interference from nearby high power radar installations.

In some of the cases, the interference was so powerful that it could be received on b.c. transistor sets, electric organs, recorders, TV sets, and of course, the hamshack communications receiver.

Most of the interference encountered is of the cyclic type, *i.e.*, only heard when the revolving radar antenna is pointing toward the receiving location. However, the generated noise—whether it occurs periodically or is constant—is annoying; and often some TV set owners blame the local hams for it.

Determining the exact radar transmission frequency is not easy, especially if the set is used for military purposes. But if it is a set operated in conjunction with civil airport navigation and location facilities, all one need do is to call the airport radar operations section to find out what the frequency is.

Eliminating the interference in any case is difficult, especially in equipment used for v.h.f. or u.h.f. reception. But there are some measures that can be taken which will either attenuate the received radar pulse or prevent its rectification.

First of all, the little resonances in various circuits which respond to the basic radar frequency must be eliminated if possible. These resonances take the form of parallel tuned circuits in wiring associated with the input of a tube—either grid #1 or the mixing grid. Sometimes a change in the length of connecting wires will eliminate the noise. The use of small r.f. chokes (from ¼ to ½ millihenry) in series with the grids of some amplifier tubes and bypassing these to ground with a small amount of capacitance will help, as will the insertion of series resistance having a value of from 50K to 100K ohms.

If interference comes via the a.c. lines, brute force filter (see the ARRL *Handbook*) using coaxial capacitors and small bypasses installed at the receiver, recorder, *etc.* may help.

Sometimes the radar is not operating properly and is creating interference. If this is so, the operators of the station would be grateful if you advised them. But do not expect them to reduce power or offer a cure-all, all they can do is to offer you a shoulder to cry on.

*c/o *CQ*, 300 W. 43 St., New York 36, N. Y.

Questions

C.W.-S.S.B. Noise Limiter—"Can you give me a diagram for a simple s.s.b.-c.w. noise limiter, which does not require an engineer to install in my receiver which has a good product detector?

Yes. See fig. 1. Instead of the dual diode, 6AL5 tube, semiconductor diodes may be used, *but* they must have a high front-to-back ratio. This circuit is similar to the one contained in that real fine receiver, National's NC-303.

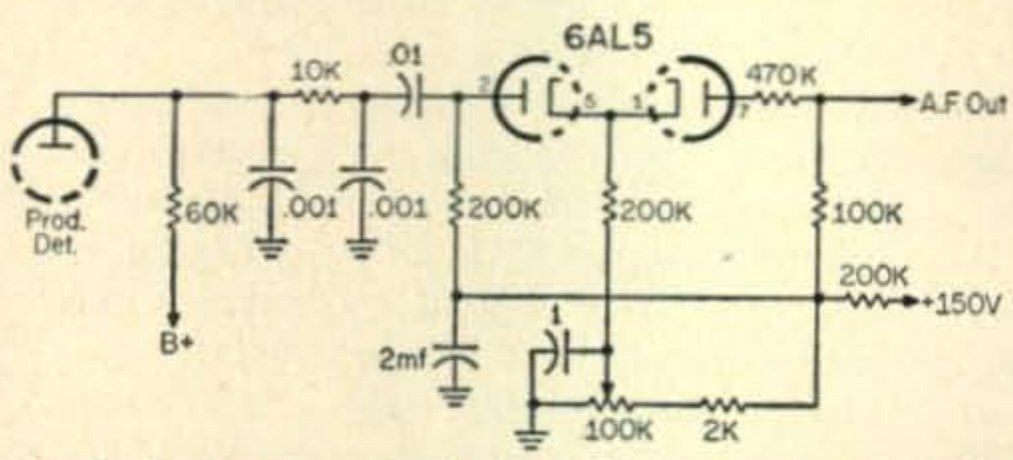
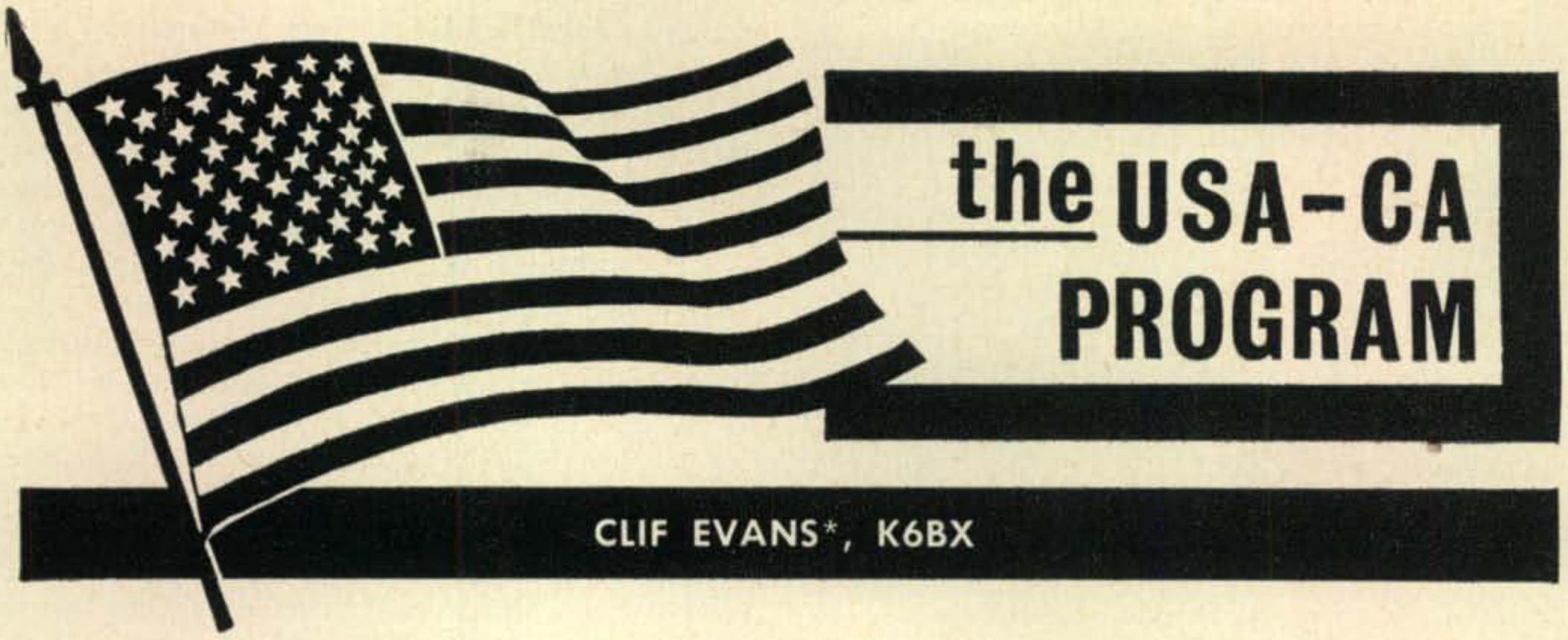


Fig. 1—S.s.b.-c.w. noise limiter. Clipping action may be removed simply by turning the pot to the ground end.

Another Adapt-O-Citer—See the photo for yet another Adapt-O-Citer for inexpensive and easy s.s.b., constructed from information in the June '62 issue of *CQ*. Tom Georges, K6VLB did a very fine job. His unit operates on 20 meters, and incorporates features of the VHF Quacker. Thank you Tom! [*Continued on page 94*]

K6VLB's version of the Adapt-O-Citer described in the June '62 issue of CQ incorporating the VHF Quacker from the Sept. '62 VHF COLUMN. The balanced modulators are at the right front with the r.f. transformers in the shield cans.



CLIF EVANS*, K6BX

Twenty lucky hunters bagged USA-CA 500 during month of March as follows:

USA-CA HONOR ROLL

K5OPT	189	K8KPM	199
KØJPL	190	WA6DWH	200
DL1IB	191	W3AYS	201
CR1IZ	192	WAØAAD	202
CR6CA	193	K4VQP	203
W2-6893	194	W2EWZ	204
WPE2HEA	195	GB2SM	205
K5FTH	196	K1PMY	206
K4CDZ	197	K1CXP	207
K1NJE	198	K7MPQ	208

Of the above, endorsements were for 15 mixed, 5 all c.w., 3 all phone, 2 all 7 mc, and 1 for all 21 mc. GB2SM is the Science Museum Demonstration Station, London and is member of both CHC and SWL-CHC. A correction to previous lists, #90 to WØIJN was erroneously listed as WØIJM.

We Get Letters and Questions

Yes, we really get them . . . process an average 125 letters a day covering about every subject under the moon. Of course, for this column we only pull those that commend things promoted by the gigantic USA-CA Program . . . yes, we said those that "commend" . . . so far, we've never received a 'negative' letter concerning merits of the USA-CA. We try to publish those letters which reflect the overall projected mass opinion.

Gerald, KØPIV/KR6BQ, "Clif, I'm up to 20 credits toward CHC . . . know you are a very busy man and don't expect an answer, but also know you are very human, so want you to know that until we learned of your programs we were just floundering without hamdom purpose. Operated in DL land, then as CN8IF . . . been here in KR6 land almost a year . . . until aware of your programs, QSLs had little value . . . it was pretty discouraging these so-called 'achievement' awards with 25-mile limits and issued to calls rather than to the individual as such, and where service folks like we swabs were 'forced' by somewhat ridiculous rules to start all over . . . and to what 'acceptable' end? You, having spent 33 years in the Navy, know all these frustrations to 'ridiculous' awards rules which destroy all QSL value. Then you came along with your *Directory* and healthy CHC philosophy that individuals and not lamp posts or street numbers achieved QSLs and credits toward awards . . . then your USA-CA program supporting all awards as another new philosophy of hamdom service. Well, I had a lot more to say in praise of the good I believe you are doing for amateur radio (and U.S. 'People-To-People') but I'm not good at praise words . . . so, from my heart believe me when I say thousands appreciate what you are doing and we're behind you 100%, and close on that note." *Old Man's note:* Gerald reflects a natural 'resentment' by tens of thousands of service hams and others whose normal way of life require frequent changes of QTH. They are almost unanimous in calling awards with 25-mile provisions and awards which require them to start all over if call is changed, as 'ridiculous' awards. We'd like to admonish them . . . there are no 'ridiculous' awards . . . there are only 'ridiculous' sponsors.

Ivor, VK3XB, "Clif, my USA-CA has really stirred up some interest down under . . . as out-

Pictured here are left to right, G2BVN, G8PL, G2FFO, G2BUL and G5GH, a few of England CHC Chapter No. 8 members who participated in a large RSGB awards display in London. Steve, G2BVN, writes the DX column "The Month On The Air" in the *RSGB Bulletin.*

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

Governor of Alabama, George C. Wallace, signing special Proclamation establishing an Alabama Amateur Radio Week, April 15-21, 1963, which kicked off Alabama's new County Awards Program as part of the USA-CA Program. Looking on while the Governor signs are Montgomery Amateur Radio Club Pres. Bob Kinsaul, K4UJH; Betty Collier, K4ZNK, Awards Custodian, and Steve Godwin, WA4LYJ formerly KØPXI. *(Photo by K4DOL)*

ward VK3 QSL Manager we get many visitors to the shack and when they see the USA-CA it is all they want to talk about. The word about the USA-CA Program is spreading like wildfire and you can expect many, many more VK's joining the program. We now have 600 U.S. counties confirmed and have our sights set on that USA-CA-1000 gold seal endorsement."

Steve, K4WVT, "Clif, you can't win over our politicos . . . due mergers between counties and cities, Virginia has lost two counties making a total of 96 counties for the state. This also will cause a possible number of counties for the Old Dominion Award to be 96 as Norfolk and Princess Anne Counties are now deleted. Please make this change in the *Directory*."

Continental QSL Club Disaster

A Postal Inspector padlocked the doors of the Continental QSL Club. Armed with an old Post Office Code originated even before the Constitution of the United States, Post Office officials claimed the club was guilty of keeping the Post Office from collecting all nickels possible under the Code which set the Post Office up with dictatorial monopoly powers to prohibit others from handling the mails in a manner to save folks money. In simple words, the Code makes it 'unlawful' if one person puts several folks mail in one envelope and for single postage fee . . . even more simply, regardless of conformance with postal weights, the Post Office Department insists that we each send our QSLs in separate envelopes at 5¢ a crack.

While we can see even monopoly logic in such a Code to prohibit rival Postal Services, it appears a bit ridiculous as applied to the hobby of amateur radio and short wave listeners operating either as individuals or clubs. It will take Congressional action to change this antiquated Code. Such matter is under legal study.

Alabama Joins USA-CA 'Fun Unlimited'

The Montgomery Amateur Radio Club announces sponsorship of the Alabama Counties Award Program with Governor of Alabama, George C. Wallace, kicking off the program with Proclamation of the award, an Alabama Amateur Radio Week, and Alabama Hamfair at the State Coliseum, Montgomery, Alabama.

We won't repeat matter in photo captions; suffice to say, main spark plug behind this Alabama program was Betty, K4ZNK, CHCer, President CHC YL Chapter #4, as we flashed to you in November, 1962, *CQ*.

The Alabama Counties Award is in design and print as we write this; will bring you picture in later issue. Award will be in five Classes with provisions for band/mode endorsements; Class A is 67/67; Class B is 60/55; Class C is 50/45; Class D is 40/35 and Class E is 30/25 with last figure applicable for stations outside the North America Continent. Rules follow *Directory* and USA-CA procedures. GCR list to Custodian, Betty Collier, K4ZNK, P.O. Box 6125, Montgomery, Alabama.

Folks, here again, as we have repeatedly pointed out, amateur radio awards programs can be utilized as high-level public relations instruments which enhance amateur radio's stature within our community and society. Might we point out again that it is USA-CA's and *CQ*'s policy to help others seek greatest possible public

STATE OF ALABAMA

PROCLAMATION

BY THE GOVERNOR

WHEREAS, the Montgomery Amateur Radio Club, located in the Capitol City of Montgomery, County of Montgomery, in the State of Alabama, hereby announces a new certificate for working stations in the various Counties of the Sovereign State of Alabama, in accordance with the United States of America County Awards Program. This program commencing on this 15th day of April in the year of our Lord Nineteen Hundred and Sixty-three.

WHEREAS, the Montgomery Hamfest will be on the last day of the First Amateur Radio Week in the history of Alabama.

WHEREAS, during said Amateur Radio Week of April 15, Amateurs all over the world are encouraged to contact the Amateur Radio operators in any of the 67 Counties of the State of Alabama and a special QSO Party Certificate will be awarded for a certified list of log information verifying contact with 3 different amateurs.

WHEREAS, all Amateurs in the various countries of the world are invited to participate in said QSO Party lasting from the 15th day of April through the 21st day of April.

NOW, THEREFORE, I, George C. Wallace, as Governor of the State of Alabama, do hereby proclaim Amateur Radio Week to extend from the 15th day of April to the 21st day of April 1963.

IN WITNESS WHEREOF, I hereunto set my hand and have caused the Great Seal of the State of Alabama to be affixed by the Secretary of State, at the Capitol in the City of Montgomery, on this the 26 day of March 1963.

George C. Wallace

ATTEST:

Secretary of State

Here is the original Proclamation by the Governor of Alabama, George C. Wallace, which on March 26, 1963, kicked off Alabama's Amateur Radio Week, April 15 to April 21, and established Alabama's County Awards Program as part of USA-CA. The Governor's proclamation, in addition to announcing special Amateur Radio Week awards, made opening statement, "Whereas, the Montgomery Amateur Radio Club, located in the Capitol City of Montgomery, County of Montgomery, in the State of Alabama, hereby announces a new certificate for working stations in the various Counties of the Sovereign State of Alabama, in accordance with the United States of America County Awards Program [by CQ]. This program commencing on this 15th day of April, 1963."

relations and publicity which promotes amateur radio's prestige and constructive interests.

Two Makes One and An Award Is Born

To commemorate establishment of the Metropolitan Government of Nashville and Davidson County, Tennessee, on April 1, 1963, the Radio Transmitting Society, RATS, sponsored an award for working stations in the new Metropolitan Nashville Area after the above date.

To get the award, stations in U.S., Canada and Mexico work 10 stations; DX stations work 5; Tennessee stations work 25 except on 6 meters, 35 are required. Endorsements for all one band or mode or mixed. *Directory* rules apply. Send GCR certified list, sample of own QSL and 50¢ or 4 IRC to Custodian, WA4END, Dick Crouch, 131 Taggart Ave., Nashville, Tennessee.

The new government actually is a consolidation of the former City of Nashville and the Davidson County governments voted in by elections on June 28, 1962, for purpose of creating more efficient administration of services to the metropolitan area's more than 430,000 citizens. Possibly of interest to USA-CA 'hunters' is fact that Mayor Briley now serves as President of the National Association of United States Counties, the world's largest such governmental organization.

Spark plug behind the new Metropolitan Nashville Award was Max Arnold, W4WHN, President of the RATS. CHCer Max also is President of the North American Ham-Hop Association.

Beverly Briley, new Metropolitan Nashville Mayor, signing the first Metropolitan Nashville Award with members of the Nashville "Radio Amateur Transmitting Society" in the background. From left to right they are: First row, William C. Gailey WA4GPC, Alice Bell K4LGW, Secretary, Joyce Ward WN4HUP, George Knight WA4BSL, Rose Russell W4WXN. Second row; Frank Porter K4WPL Activities Manager, Joe Mangano K4ONB, Jim Anglea W4ROC, Paul Startup WA4BCK Vice-President, Max Arnold W4WHN President, Charles Bell K4ETV. Third row; Gene Vaughter K4UES, Andy Poteete W4SQE, Nelson Bryan K4OKW, Dick Crouch WA4END, Bill Bates W4PRY, Milton Fanning WA4GZZ. See text for story.

Florida FINS Jump Chocks—Go International

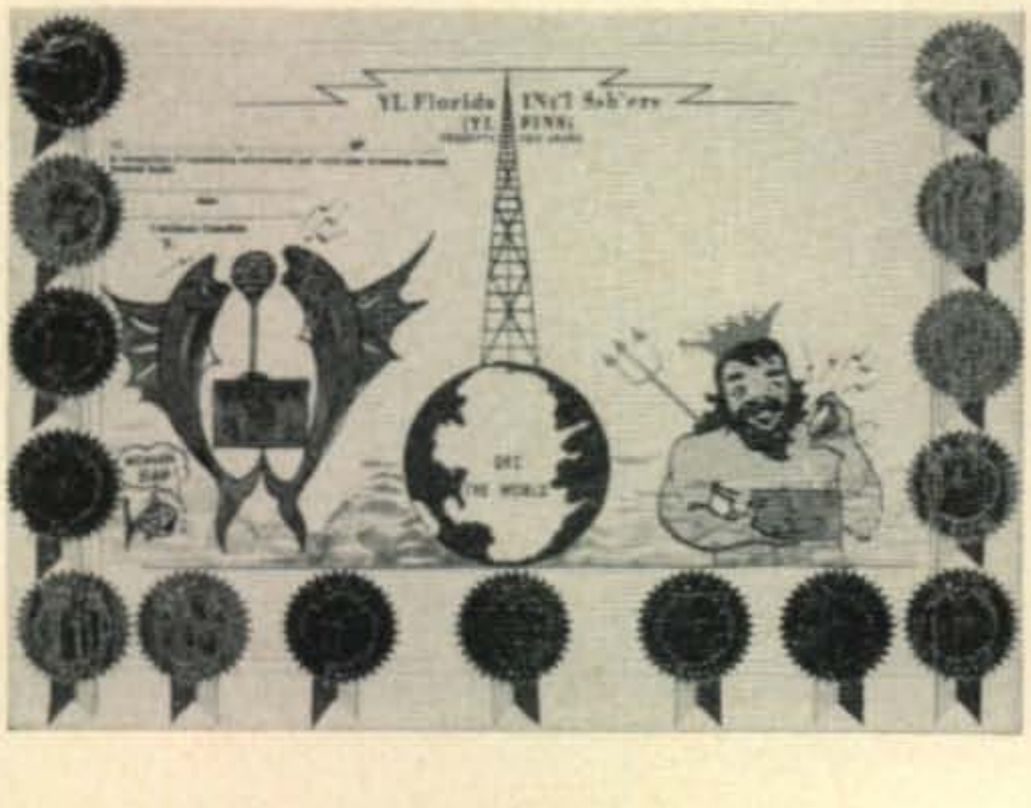
We reported in April issue the creation of Florida YL International SSB'ers. That was yesterday. Today, having broken local . . . even national . . . ties, the organization now is YL International SSB'ers, Inc.

The SSB'ers indeed are international. Originally created as the Florida FINS in 1961, sponsor, V. Mayree, K4ICA, spark plugged formation the new organization to present category. See April issue for list of present officers . . .

There was immediate international high interest and response to this new SSB'ers organization. Commissioned officially on February 9, 1963, membership has jumped to 360 representing 250 DX stations in 75 countries and already has all U.S. states represented. At present rate growth the SSB'ers will hit over 1000 members before year is out. A look at membership list reads like "Who's Who" of hamdom.

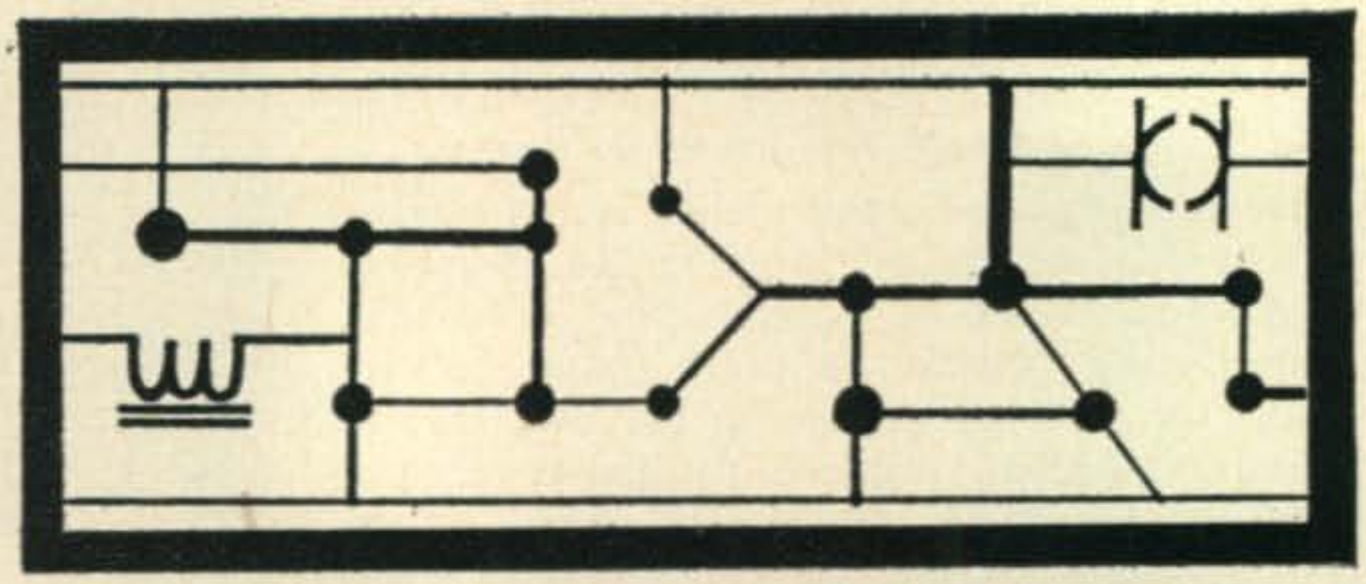
[*Continued on page 85*]

Here is the colorful award by YL International SSB'ers, Inc. for working members this world-wide new organization (see text). The 11 × 14" certificate is multicolored with shades of blue, black, gold and red and the 15 1½" gold imprinted seals with red and yellow ribbons represent the maximum seal endorsements which can be achieved. New version of the award now being printed will drop the word "Florida." V. Mayree Tallman, K4ICA, founder of the new organization, designed the award. As you see, a modern version of Old King Neptune gives the award both nautical and international flavor.



Here you see in foreground, Margaret, K4GKL, 1st Vice President YL International SSB'ers, Inc., seated at one of the two side by side KW stations of V. Mayree, K4ICA, founder this new s.s.b. organization. V. Mayree is permanent secretary-treasurer and custodian of awards. The SSBers organization holds weekly net schedules world-wide and V. Mayree MCs such from organizational headquarters at her home station pictured.

RTTY



BYRON H. KRETZMAN*, W2JTP

THE transistorized radioteletype terminal gear of W2JAV described in the February, March, and April ('62) RTTY Columns has been demonstrated by Phil at RTTY meetings all across the nation. Phil's fairly simple transistor converter (TU) has been duplicated by hundreds of RTTYers who have found that transistors are just as easy to work with as tubes. And, much to the surprise of the old timers, performance has been on a par with the better tube units. Phil, of course, was not satisfied . . . he had to find a way to make it better.

The Double Tuned TU

The primary purpose of the W2JAV transistorized terminal gear was to provide simple but effective equipment for the newcomer, to make it easy for him to get on the air. The original TU design is such that it is easy to build and adjust with the minimum of test equipment. With a little more effort, the performance of the converter can be increased to just about the maximum, on a par with any tube TU. This is done by making the channel *L-C* circuits double tuned. The same printed circuit board as the single tuned unit is used. The added toroids are simply stacked above the original coils. Insulated stand-offs are installed on the board to provide elevated connections for the added capacitors.

*431 Woodbury Road, Huntington, N. Y.

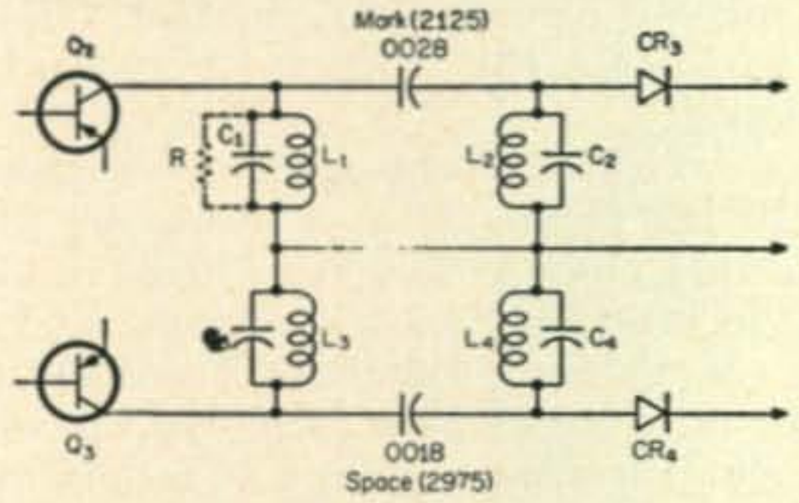


Fig. 1—Double tuned circuits for W2JAV transistor TU.

Figure 1 shows the circuit changes to the schematic originally shown on page 86 of February '62 *CQ*. All of the inductors are the same 88 mh telephone loading coils. The *mark* channel capacitors, C_1 and C_2, are approximately 0.066 mf while the *space* capacitors, C_3 and C_4, work out to about 0.033 mf. Phil found that a loading resistor, R, of about 30,000 ohms was required to flatten out the response of the *mark* channel. Detailed adjustment procedures for these band-pass channel filters are found in the *New RTTY Handbook* beginning on page 169. The only other change was to make the resistor in the common emitter circuit of the 2N585 transistors (Q_4 and Q_5) 3.3k instead of 3.9k.

Performance

When properly adjusted the *mark* and the *space* channel filters each have a band-pass of about 300 cycles. The cross-over point is 20 db down, and the *mark*/*space* rejection is in the order of 20 to 30 db. Like the original single-tuned TU, the sensitivity is 1 mv with full limiting about 0.3 volt r.m.s. The keying waveforms are about the best ever seen on a 'scope. Figure 2 shows both a channel pulse and the output pulse waveform at a square-wave keying rate of about 22 c.p.s. There is no difficulty in obtaining a full 80 point range on the connected machine. [*Continued on page 98*]

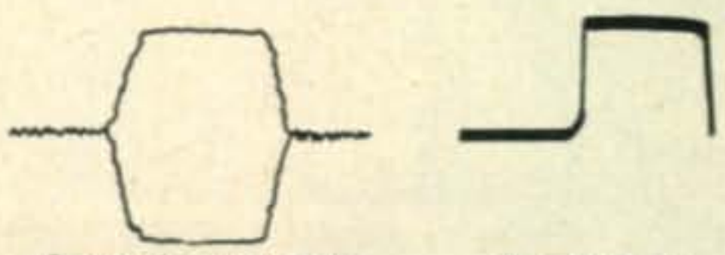


Fig. 2—Waveforms from W2JAV double tuned transistor TU.

RTTY The Hard Way...No. 20

"At last! Three thousand hours! Now I can sharpen them durn hole punchers."

YL

LOUISA B. SANDO*, W5RZJ

THE "1962 CHC Queen of the Hunt" — "YL of the Year" — "top operator" — drag out your adjectives—you'll need all you can find to fit the YL at the very tip top of the pile—KAY GAYNOR, K2UKQ. This gal has achieved the highest awards honors that any OM has, and all accomplished on c.w. DXCC, WAZ, WPX, you name 'em, she has 'em—and now Kay has TOPPED it off by copping CHC-200 Top Honors, the first YL in the world to achieve this award. This also makes Kay eligible for the Arne Trossman Top Honors Plaque.

Looks like you'll have to think up an even higher award, Arne, for Kay isn't resting on her laurels with 200 certificates. As of April 1 she has 209 awards and is awaiting return of QSLs representing another 16, for a total of 225 award credits from 35 countries!

This is Kay's list of "first YL" to receive award: WPX, WPX-500, WUNK EXPERT, MARITIME, NAA II, NJDXA, WA6, SPDX, WHD, 5A, QRP 100, CHC-150, AHC (1st W/K YL). No doubt there are many more "1st YL" among Kay's certificates, but some don't state and, in fact, K2UKQ is "*Mr.* K. Gaynor" to many sponsors. To this list add *award No. 1* (first OM *or* YL) for these: CHC/WPX 100, FHC 10, CHC/QCWA 100, HTH Classes G, F, C, B, AA, HTH-500, HTH-600 (for working 600 members of CHC worldwide, with nearly 100 countries represented), and she's aiming right on up for HTH-1000 (875 at writing).

Kay was the first Ham in her family—the bug having bitten after she received the gift of an S-38D receiver and along with listening to DX commercial stations overheard "K2 John Charlie Fox in Orange, N.J." and discovered the Hams. Kay found trials and tribulations as a lone female breaking into Ham radio, but W2VOJ put her on the right track. Kay got her Novice ticket in Aug. '56. Only then did she learn that "John Charlie Fox" was K2JCF, John, about 10 blocks from her QTH. They both became members of CD.

With the help of K2EB (now Silent Key) and W2LOF, Kay received her General Aug. 29, 1957. As a Novice on 40 c.w. she worked 47 States, Hawaii and Puerto Rico. With her General she worked W7CQP to complete WAS. Dipoles on 40, 20 & 15 were used for most of her DXing and within a year and a half she had DXCC. It took a quad to snag FB8CJ for her 40th Zone and WAZ.

Kay adds she is indebted to her son-in-law Dick, W2IMU, who has maintained her equipment, and is grateful to many others for assistance, including the approximately 10,000 Hams who have sent her QSLs. Kay claims no other hobbies—DX chasing and related activities take up all her time. She has a daughter, Nora, K2OJO, and a son, Gil, not a Ham.

Kay concludes, "The past 6½ years have been the most enchanting of my life. Besides learning a skill, I firmly believe I have been of service to my country in communicating our way of life directly to individuals in other countries where propaganda might have them believe otherwise, if they had not heard with their own ears a message from a U.S. citizen who desires to be friendly with all peoples. To me amateur radio is not only a science but an art, and the A1—c.w. —mode of communications can be made to

[*Continued on page 100*]

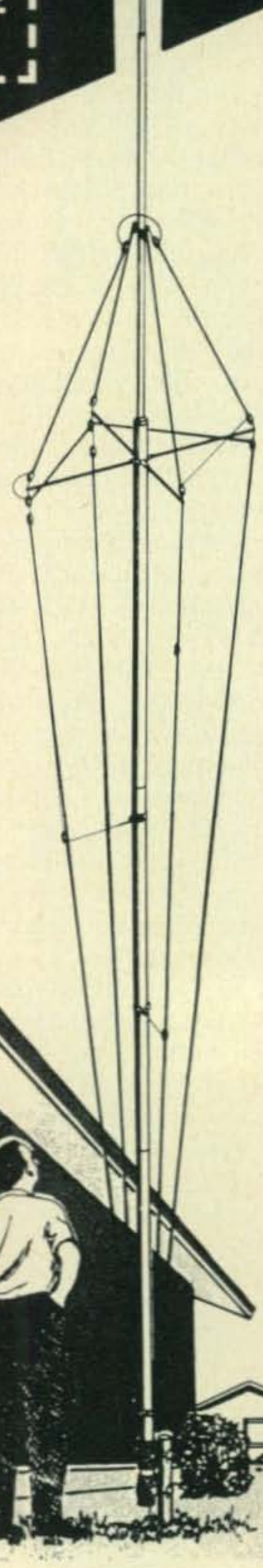
*4417 Eleventh St. N.W., Albuquerque, New Mexico.

Kay Gaynor, K2UKQ, recently was presented with the Arne Trossman Top Honors Plaque by Mayor Nicholas France of Orange, N.J. All of Kay's awards have been earned on c.w.

NEW from hy-gain

FOR IMMEDIATE DELIVERY

HY-TOWER JUNIOR
ALL BAND – TRAPLESS – FULLY AUTOMATIC ANTENNA
MODEL 18 JR.



Another significant engineering "First" from Hy-Gain — The outstanding new Hy-Tower Junior. For the first time you can enjoy top efficiency on 10-15-20-40-75/80 meters with extremely limited space for installation. Only 4 square feet required to install the trapless Hy-Tower Junior . . . and the complete antenna ready to assemble and install for less than $80.00!! This rugged lightweight antenna is designed for easy assembly and "One Man" installation. Look at these specifications.

Electrical Specifications:

Frequency Range . . . . . 80 thru 10M (160 with Loading Coil Accessory)
Maximum Power 1kw, AM; 2kw PEP
Polarization . . . . . Vertical
Pattern . . . . . Omni-Directional
Gain . . . . . Unity
Impedance . . . . . 50 ohms nominal
SWR . . Less than 2:1 at resonance
Band Pass . . 10-15-20-40M, below 2:1 SWR; 250kc below 2:1 75/80M
Multi-Band Technique . . . . . Stub Decoupling
Ground Plane Req. . Copper Plated 6' Ground Rod (not supplied)

Mechanical Specifications:

Max. Wind Survival . . 40 MPH Self Supporting (100 MPH Guyed)
Construction . . . . . 2" to 7/16" Aluminum 6063 T832 Alloy
Wire Elements . . . . . 7-24 Copper Clad Steel
Insulators . . . . . Ceramic and Injection Molded Plastic
Overall Height . . . . . 36'6" Phone; 38' CW
Net Weight . . . . . 30 lbs.
Mounting Requirements . . . . 1½ to 2 inch Steel Pipe – Ground Mount (not supplied)

10% DOWN **$8.00** ($79.95)

ORDER NOW FROM HAMATEUR HEADQUARTERS

THE Lew Bonn CO. 67 South 12th St., Minneapolis 3, Minn.

Distributors of Nationally Famous Amateur Equipment

CALL, WRITE or USE COUPON
Dept. CQ 6 ATT: Joe Hotch FEDERAL 9-6351

☐ Place my order for IMMEDIATE DELIVERY of the New Hy-Gain Model 18 JR
Enclosed find
$_____

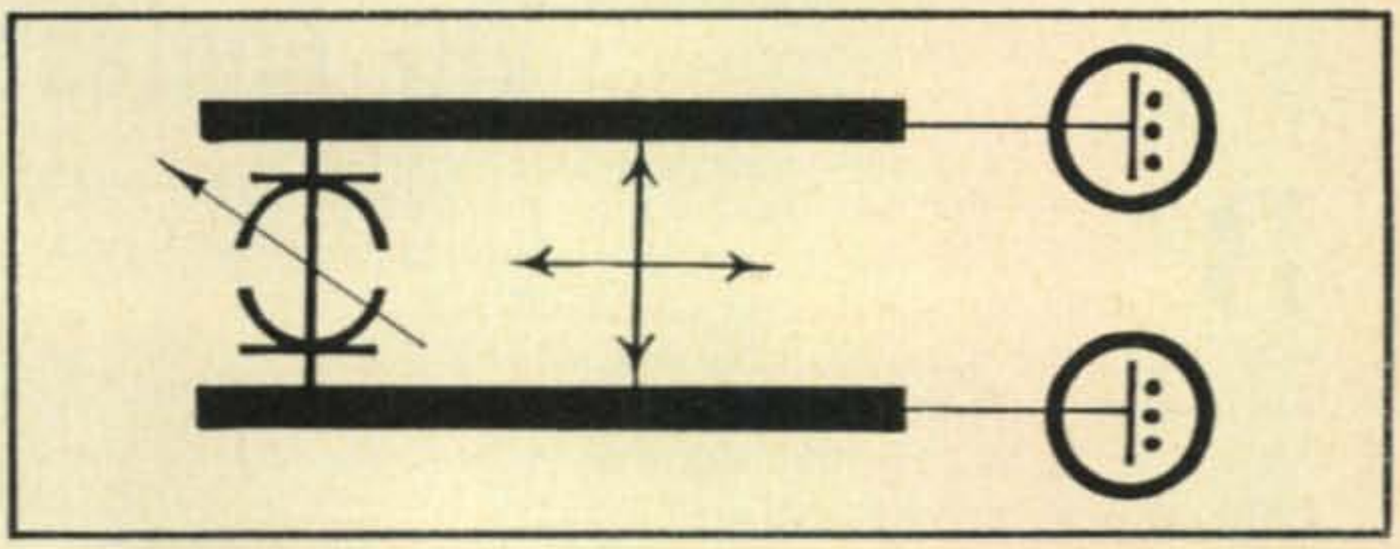
☐ Please send more details & literature.

Name _____ Call Letters _____
Address _____
City _____ Zone ___ State _____

For further information, check number 33, on page 110

Vol. 5, No. 6—June 1963

VHF



AMATEUR

Special: Contest Results Issue

The equipment pictured above is owned and operated by none other than Harry Smith, WA2SAZ, of Forest Hills, New York, who accumulated 219 contacts in 46 counties on 50 mc during our March 16 VHF Amateur VHF Contest—an almost all-time high for any such twelve hour period. Our hats are off to Harry for a job well done!

Results of the March 1963 VHF Amateur VHF Contest

BASED on the number of logs received at this office, the twelve hour March 16 VHF contest far surpassed all previous VHF contests sponsored by either *The VHF Amateur* or *CQ*. Inspired by an idea from Bert Simon, W2UUN, an innovation in VHF competitions was announced in February of this year. Response was overwhelming. Hundreds of logs were mailed out and hundreds participated. We believe that this all proves one point; that a short contest will succeed because of its very nature. Many suggestions accompanied the logs, and all have been considered. With few modifications, *The VHF Amateur* will run a similar contest next Fall.

Most phenomenal 6m entry was that of WA2SAZ of Forest Hills, New York. Smitty comments, "This was my first contest try. Enjoyed it very much." And this came from the man who walked away with top New York state honors on 50 mc, top six meter overall score, and worldwide first place winner. His accumulation of 219 contacts in 46 counties was surpassed only by Dave Vore, K8UQA, of Ohio, but Smitty's power multiplier sent him soaring toward the top.

The addition of a club aggregate listing (see next page) was another new innovation in this competition. Leading them all is the Zephyr VHF Society, Inc., of New Jersey, operating as W2LST. The gang gathered an impressive 182 contacts in 35 counties to almost double the next highest score. Right behind this two meter crew was the Peninsula Amateur Radio Klub (P.A.R.K.) of Bayonne, New Jersey.

A last minute decision to present a Novice division unfortunately was not reached before the announcements were published, but we believe that there is sufficient Novice population on the two meter band to warrant a separate competition. Highest scoring Novices will receive certificates.

HIGH HONOR ROLL

World High	WA2SAZ	241,776
Second Place	W2LST	229,320
Third Place	K1MRI	210,912
Fourth Place	WA2VLR	188,880
Fifth Place	K2YGM	175,392
Sixth Place	K8UQA	171,684
Seventh Place	WA2QOI/2	164,088
Eighth Place	K2ZSQ	154,368

Notes and Comments

K3NXH—Really enjoyed the contest and am looking forward to the next . . . *KØHPQ*—Enjoyed the contest . . . *WB2CSE*—Several reasons I decided to enter: lasted only 12 hours (which went well with my parents), was v.h.f., and that only one band operation was permitted . . . *K8PXX*—I hope your 12 hour contest goes over big! It's an ideal length for me . . . *WA2YXX*—Had a lot of fun and made quite a few new contacts . . . *K4PZT*—Extremely high noise level prevalent during the contest period . . . *K1NAY*—Think the twelve hour contest is much more fun than the long marathon ones . . . *K9ZWU*—How about starting the contest later? Rather hard getting up at 9 A.M.! . . . *WA8ALT*—The OM's boss was so interested that he allowed him to operate portable in the upstairs of the jewelry store . . . *K3AHJ*—I must commend you on such a fine contest . . . *K7NHS*—Hats off to K7SNA and K7NBI who operated portable to provide new multipliers! . . . *K7LQI*—I think your 12 hour contest was the best thing in a long time. It was far more enjoyable for me knowing that we could work the full time and still be able to have a good portion of the weekend for the family . . . *WA8AZY*—My score is very low, but I sincerely enjoyed the contest . . . *W8DRU*—Decided to build a shack on top of a mountain and finished it just in time for the contest. 3360 feet above sea level in West Virginia! ■

Two meters is quite the rage in Europe these days as evidenced by the candid shots here taken on March 16 in Germany. Top photo presents the home of Wolfgang Vieweg, DM3ZMK/p, in Sonneberg. Close inspection will reveal the boom of his 2 meter Yagi at the upper left. In the lower picture we find Friedrich Salzbrenner, DJ3EAA, hard at work in last minute preparations at his QTH in Neudorf. Both stations helped stir interest in Germany.

DIVISION HIGHS

50 Mc	WA2SAZ	241,776
144 Mc	W2LST	229,320
Club	Zephyr VHF Society, Inc.	229,320
Novice	WN2CUD	41,724

CLUB SCORES

Call letters following each club listing designate the highest scoring club member or station. Totals are computed by adding all individual member totals, which also are entered separately in the state scores.

Zephyr VHF Society, Inc. (N.J.) W2LST	229,320
Peninsula A. R. Klub (N.J.) WA2VLR	188,880
Harmonic Hills R. L. (N.Y.) WA2ROJ	177,246
Mt. Airy VHF R.C., Inc. (Pa.) K3LOM	138,750
Midwest VHF-UHF A.A. (Ill.) K9RVG	83,728
Wagner College A.R.C. (N.Y.) WA2PVG	73,370
Marion Co. VHF High Banders, Inc. (O.) K8BZZ	71,124
Crawford Hill VHF Club (N.J.) W2CQB/2	65,904
Five Towns R.C., Inc. (N.Y.) WA2VGX	65,483
Six Meter Club of Chicago K9ZWU	62,296
6 Meter Club of Dallas W5EFH	58,584
Nittany A.R.C., Inc. (Pa.) K3HKK/3	51,792
Greensboro, R.C. (N.C.) W4BUZ	49,778
VHF Repeaters, Inc. (Calif.) K6PXT	49,104
Secane Amateur Club (Pa.) K3AHJ	47,298
Seneca Drums A.R.C. (N.Y.) WA2KLE	35,568
DePaul H.S. A.R.C. (N.J.) WA2WNO	33,858
51.30 Club (Mass.) K1WGA	32,588
South Amboy R.A. (N.J.) K2BEV	32,256
South Jersey R.A. W2ORA	30,744
First State A.R.C. (Del.) K3QBD/3	26,707
Van Wert A.R.C. (O.) K8VGL/8	26,334
Waukegan VHF Society (Ill.) K9PMU, K9HPB	25,416
A.R.C. of Ohio State U., Inc. W8LT/8	19,764
Michigan 6 Meter Club K8TWW	14,616
Oxford Furnace VHF Club (Va.) WA4JNL	12,186
Mid South VHF A. (Tenn.) WA4DPJ	11,244
Communicator Society of W. Leyden H.S. (Ill.) WA9FGW/9	11,136
Manatee A.R.C. (Fla.) K4BDT	7,776
U. of C. A.R.C. (Calif.) W6BB	7,488
Continental VHF DX A. WN2AOG	7,238
Polish Poconos A.R.S. (Pa.) W3RPZ	6,048
Phoenix VHF Club (Ariz.) K7OCG	5,472
Montachusset A.R.C. (Mass.) K1YLU	4,968
Biscayne A.R.C. (Fla.) WA4EYK	3,462
S. Burlington A.R.C. (Vt.) K1WEX	3,450
Windsor A.R.C. (Ont.) VE3EBY	3,060
Newton A.R.C. (Iowa) KØETX	2,150

We've seen quite a few mobile installations in our day, but nothing to compare with WA2VOI/2's during the twelve hour VHF contest. Donn operated from Salamanca, N. Y.

50 MC RESULTS

Number groups after call letters denote the following: number of contacts, number of counties, hour multiplier, power multiplier, and final score.

Alabama

K4BEI/4	74	32	12	3	85,248
K4HPR	51	15	12	3	27,540
K4NGD	68	16	12	2	26,112
W4UAR	7	6	3	2	252

Arizona

K7OCG	57	4	12	2	5,472
K7QXA	40	1	10	3	1,200

Australia

VK2ASZ	27	21	9	3	15,309
VK3ZPT/T	27	21	9	3	15,309
VK2ASZ	9	8	5	3	1,080
VK2ZXY	1	1	1	3	3

California

K6PXT	124	11	12	3	49,104
W6BUR/6	59	12	10	3	21,240
W6NLO/6	84	5	12	3	15,120
W6YKS	25	6	12	3	5,400
W6GZK	49	3	12	3	5,292
WA6NDZ	7	6	3	2	252
WA6NOV	3	3	3	3	81

Connecticut

K1MRI	169	52	12	2	210,912

Florida

K4BDT	36	6	12	3	7,776
WA4EYK	38	2	12	2	1,824
K4LVZ	22	2	8	3	1,056
WA4KNO	9	2	9	3	486
K4BUW	6	2	2	2	48
K4ZNB	5	2	1	3	30

Georgia

K4VGQ	16	8	8	3	3,072
WA4BLM	4	4	3	1	48

Illinois

K9HMB	110	20	12	3	79,200
K9DWR	78	17	12	3	47,736
K9GHR	83	15	12	2	29,880
W9EET	89	13	12	2	27,768
WA9BGU	47	18	12	1	10,152
K9ZWU	27	7	12	3	6,804
K9ZWV	26	7	12	3	6,552
K9AYR	36	4	10	3	4,320
K9BBN	21	5	11	3	3,465
WA9ATE	30	4	9	3	3,240
WA9FIH	41	2	12	3	2,952
WA9CUK	15	3	7	2	630
K9TWF	17	5	2	2	340
K9IOA	7	2	2	3	84
WA9CZS	6	2	2	3	72

Indiana

K9CIF	22	11	6	2	2,904

Iowa

KØETX	19	5	9	2	1,710
KØHPQ	17	5	10	2	1,700
WAØAVV	12	3	7	3	756
WØDRE	11	4	5	2	440
WØGXJ	8	3	3	3	216

Kansas

KØBXF	6	4	1	2	48

Maine

K1NTD	17	7	6	2	1,428
K1NTC	16	7	5	2	1,120

Two meter N. Y. state winner Val Mazzucca, WA2VDO, at the operating position. Val accumulated 112,752 points with 116 QSOs, 27 counties.

Elvin Hart, KØETX, of Newton, Iowa, walked away with the honors for that state in the 50 mc category. KØETX was contributing for the Newton ARC.

Maryland

K3DUA	50	14	12	3	25,200
K3NXH	59	14	12	2	19,824
K3UBC	29	12	11	3	11,484

Massachusetts

K1IGY/1	57	19	12	3	38,988
K1NAY	80	18	12	2	34,560
K1WZS	38	15	12	2	13,680
K1WGA	47	12	12	2	13,536
K1PLA	40	13	11	2	11,440
K1KYB	32	9	11	2	6,336
K1BOU	16	5	4	3	960
K1LWL	8	5	2	2	160
K1JRR	6	3	3	2	108
K1OOM	4	3	2	2	48

Michigan

K8OIB	94	9	12	3	30,456
K8TWW	58	7	12	3	14,616
K8WGF	68	7	11	2	10,472
K8LIO	32	10	12	2	7,680
K8VQN	28	3	8	3	2,016

Minnesota

WØTRD	42	9	12	2	9,072
WØIRO	30	8	8	3	5,760
KØOXR	31	7	12	2	5,208

Missouri

WØEKM	67	6	12	3	14,472
WAØBVV	77	5	12	2	9,240
KØEEQ	30	8	11	2	5,280

Nebraska

KØTVD	37	6	12	3	7,992
WAØDJK	6	2	5	3	180

New Hampshire

K1WGD	62	17	12	1	12,648
W1UGT	33	9	9	2	5,346
K1YTF	23	9	6	2	1,484
K1UDX	13	3	8	3	936

New Jersey

WA2QOI/2	159	43	12	2	164,088
K2ZSQ[1]	134	32	12	3	154,368
WA2VLR	159	32	12	2	122,112
WB2CSE	112	18	12	3	72,576
WA2YXX	78	24	12	3	67,392
K2ZRJ	64	28	11	3	59,136
WB2DLF	117	19	12	2	53,352
W2ORA	61	14	12	3	30,744
W2KXL	46	21	9	3	26,082
WA2WNO	51	15	11	3	25,245
W2EIF	53	24	5	1	6,360
WA2CMG	23	15	6	3	6,210
K3HNP/2	8	4	3	3	288

New York

WA2SAZ	219	46	12	2	241,776
K2YGM	174	42	12	2	175,392
WA2SVY/2	93	31	12	2	69,192
K2SJB/2	66	28	12	2	44,352
WA2WVW/2	100	17	11	2	37,400
WA2KLE	52	19	12	3	35,568
WA2VGX	88	17	11	2	32,430
WA2SPL	70	10	12	3	25,200
WA2KDZ/2	34	20	12	3	24,480
WA2TGC/2	32	13	12	3	14,976
WB2DQO	40	15	11	2	13,200
WA2VCM	33	11	12	3	13,068
WB2CCF	43	13	11	2	12,298
WB2ECO	35	12	4	3	5,040
WA2TBX	22	10	4	2	1,760
WA2SUG	16	3	8	3	1,152
WA2NZA	15	2	9	3	810
WA2VOI/2	9	6	5	3	810
WA2YLO	22	8	2	2	704
WB2BEO	18	8	2	2	576

[1]*The VHF Amateur* staff, not elegible for awards.

Ohio

K8UQA	251	57	12	1	171,684
K8BZZ	45	25	12	2	27,000
K8LCC	82	9	12	3	26,568
K8VGL/8	42	19	11	3	26,334
W8LT/8	61	9	12	3	19,764
W8JRN	64	12	12	2	18,432
WA8FCB	50	10	12	3	18,000
K8OLB	97	14	12	1	16,296
K8KBJ	36	18	11	2	14,256
W8RRB	56	19	12	1	12,768
WA8EWT	48	11	8	3	12,672
K8TQQ	35	10	11	3	11,550
K8PXX	47	9	11	2	11,506
WA8CAX	40	5	10	3	6,000
WA8ALT	21	7	12	3	5,292
K8MAF	12	6	4	3	864

Oregon

W7ADR	14	10	8	2	2,240

Pennsylvania

K3LOM	127	36	12	2	109,728
K3HGA	130	29	12	2	90,480
K3LNU	122	30	12	2	87,840
K3IUY	110	32	12	2	84,480
W3ETB	101	30	12	2	72,720
W3FTU	76	22	12	3	60,192
K3HKK/3	83	26	12	2	51,792
K3AHJ	63	25	10	3	47,250
K3TPS	90	11	12	2	23,760
W3SAO	53	11	11	2	12,826
K3DAQ	43	12	10	2	10,320
W3RPZ	42	12	12	1	6,048
K3KBV	26	8	12	2	4,992
K3KEL	23	9	11	2	4,554
K3SEH	34	5	12	2	4,080
K3UCA	22	6	9	3	3,564
W3CL	31	12	4	2	2,976
W3LDA	14	9	9	2	2,268
W3SLX	10	6	5	3	900
W3EJA	9	4	6	3	648
K3HNP	6	4	3	3	216
K3OEJ	4	3	2	2	48

WA2QOI/2's installation atop a Hotel in Atlantic City, N. J. Here we see WA2WCC and W7CFQ doing their part.

South Carolina

W4VIW	3	2	2	1	12

Tennessee

WA4EBV	55	14	12	3	27,720
K4PZT	54	11	12	3	21,384
WA4DPJ	55	4	12	2	5,280
K4VKJ	24	12	5	3	4,320
WA4IRX	44	4	12	2	4,224
W4YEL	20	2	11	3	1,320
WA4GTW	21	2	5	2	420

Texas

W5EFH	94	5	12	3	16,920
K5MLD	65	6	12	3	14,040
K5CMC	50	5	12	3	9,000
K5ARU/5	67	5	12	2	8,040
WA5CMA	45	5	12	2	5,400
K5IVB	54	4	12	2	5,184
K5FGI	17	4	11	3	2,244
WA5ACF	17	5	11	2	1,870

Virginia

WA4JNL	31	11	12	3	12,186
WA4JMO	4	3	3	3	108

West Virginia

W8DRU	41	14	12	2	13,776
WA8AOW	26	7	12	2	4,368
WA8AZY	3	3	3	3	81

Washington

K7BBO	98	11	12	3	38,808
K7HEF	83	9	12	3	26,892
K7QFW	72	8	12	3	20,736
K7NHS/7	38	17	12	2	17,504
K7LQI	71	5	12	3	12,780

Wisconsin

K9HBT	45	12	12	1	6,480
K9YGR	17	3	9	3	1,377

144 MC RESULTS

Alabama

K4HPR	16	2	12	3	1,152
K4HRF	2	1	2	2	8

Alaska

WL7EPF	7	3	11	3	693

California

K6KCB/6	94	11	9	3	27,918
WA6RRH	74	8	12	3	21,312
WA6LHS	58	9	12	3	18,792
WA6QQI	51	9	12	3	16,524
K6LRN/6	38	12	7	3	9,576
W6PFE	61	5	10	3	9,150
W4ARH/6	31	9	10	3	8,370
W6NLO/6	55	5	10	3	8,250
K6QHC	62	7	9	2	7,912
W6BB	52	9	8	2	7,488
K5YWX/6	33	6	11	3	6,534
WN6DBN	13	8	6	3	1,872
WV6ZLU	15	3	5	3	735
WN6BIG	4	3	2	3	72

Connecticut

W1GB/1	136	38	12	1	62,016
K1PLR	74	17	11	3	41,514
K1RQW	38	15	12	3	20,520
K1WHT	52	13	11	2	14,872
K1VMI	33	12	10	3	11,880
K1RTS	20	7	5	3	2,100
K1TKJ/1	12	9	6	3	1,944
K1YEI	12	5	4	3	720

Delaware

K3QBD/3	53	14	12	3	26,707

Florida

K4LVZ	3	2	1	3	18

Georgia

K4YZE	14	4	12	3	2,016
W4BGE	11	3	7	3	693
WN4LFP/4	2	2	2	3	24

Germany

DJ3EAA	34	8	12	2	6,525
DM3ZMK/p	26	5	12	3	4,680
DL3CS/m	3	5	2	3	36
DM2ADJ	4	2	1	2	16

Illinois

K9PRB	88	18	12	3	57,024
K9RVG	100	14	12	3	50,400
K9VSW	65	12	12	3	28,080

12 year old Johnny Belew, WL7EPF, checking in as youngest participant and only Alaskan contester.

W9NXI	67	11	12	3	26,532
K9ZWU	50	12	12	3	21,600
WA9AEN	46	11	12	3	18,216
K9ZWV	42	10	12	3	15,120
K9PMU	48	11	12	2	12,672
K9HPB	44	12	12	2	12,672
K9CNN	40	12	8	3	11,520
WN9EOD	28	7	8	3	4,704
WA9FGW/9	116	8	12	1	11,136
K9EEC	26	7	7	2	2,548
K9BBN	19	3	12	3	2,052
WA9DMB	42	8	8	3	1,064
K9HOW	15	3	2	3	270
K9YEN	5	3	2	3	90
K9PAF	8	3	1	3	72
K9IOA	3	1	2	3	18
WA9CZS	3	1	2	3	18
Indiana					
K9VTT	96	14	12	2	32,256
W9ZJP	58	14	12	1	9,744
WN9CWE	12	5	7	2	840
WN9EPF	10	4	5	3	600
Kansas					
WØALA	21	3	12	3	2,268
WØOLC	7	1	2	2	28
Louisiana					
W5UKQ	19	9	11	3	5,643
Michigan					
K8ZQE	38	12	12	1	5,472
K8LWP	20	5	7	3	2,100
Missouri					
WØWEQ	88	19	12	3	60,292
Massachusetts					
W1JSM	27	12	8	2	5,184
K1YLU	23	8	9	3	4,968
K1MNO	10	6	7	3	1,260
New Brunswick					
VE1ACX	20	5	10	3	3,000
New Hampshire					
KN1YCD	10	4	6	3	720
New Jersey					
W2LST	182	35	12	3	229,320
K2UYH[1]	148	22	12	3	117,216
WA2VLR	107	26	12	2	66,768
W2CQB/2	172	36	12	1	65,904
WA2YXX	58	22	11	3	42,108
WN2CUD	61	19	12	3	41,724
WA2FVR	69	16	12	3	39,744
WN2GKF	55	19	12	3	37,620
K2BEV	58	16	12	3	32,256
WA2ZCT	59	21	12	2	29,736
W1EUJ/2	74	25	12	1	22,200
WN2DQS	47	19	12	2	21,432
WA2WNO	29	11	9	3	8,613
WN2AOG	31	13	6	3	7,238
WA2CMG	20	12	3	3	1,860
WA2VUN	15	7	5	3	1,575
W2EIF	12	9	3	1	324
New York					
WA2VDO	116	27	12	3	112,752
WA2ROJ	101	36	12	2	87,264
WA2PVG	145	23	11	2	73,370
WB2FCU	66	21	12	2	33,264
K2GSF	45	22	9	3	26,730
WB2CCO/2	90	23	12	1	24,840
WA2ONO	68	20	9	2	24,480
WA2NSJ	41	12	10	3	14,760
WB2BHS	30	14	12	2	10,080
WA2RDE	32	10	12	2	7,680
WB2DQO	23	11	10	3	7,590
W2OOE	28	11	8	3	7,392
K2IJL	27	11	7	3	6,237
WA2VKK	21	11	7	3	4,851
WA2RWV	17	6	5	3	1,530
WA2VJA	15	4	8	3	1,440
WA2RRK	14	3	3	3	378
WA2DRK	9	4	3	2	216
W2HBQ	6	2	2	3	72
North Carolina					
W4BUZ	48	8	12	3	13,824
WA4DKU	47	10	12	2	11,280
WA4CCK	47	9	12	2	10,152
K4GPL	43	9	12	2	9,288
WN4MFG	35	5	12	3	6,300
K4QIF	35	10	8	2	5,200
W4WDH	29	6	7	3	3,654
WN4MST	28	3	12	3	3,024
WA4FLU	24	3	12	3	2,592
K4MHS	22	8	7	2	2,464
W4GG	26	5	4	3	1,560
W4ACY	20	4	2	3	480
Ohio					
K8ZES	50	21	12	2	25,200
K8ALO	43	14	12	2	14,448
K1CRQ/8	26	11	12	2	6,824
K8DEN	13	9	8	3	2,808
K8RXD	3	2	3	2	36
Ontario					
VE3ESE	85	17	12	3	52,020
VE3AIB	75	16	12	3	43,200
VE3CUX	82	17	12	2	23,856
VE3AAH	22	4	12	3	3,240
VE3EBY	17	6	10	3	3,060
Oregon					
K7SJQ	15	5	9	2	1,350
Pennsylvania					
W3SUJ	35	17	12	2	14,280
K3RVS	35	9	12	3	11,340
W3CCX	34	11	8	2	5,984
K3MBR	12	5	2	3	360
W3CL	14	6	2	2	336
Quebec					
VE2SH	40	19	11	2	16,720
South Carolina					
W4VIW	3	1	1	1	3
Texas					
K5FGI	4	3	4	3	144
Vermont					
K1WEX	23	10	5	3	3,450
Washington					
K7BBO	20	6	11	3	3,960
K7JZP	9	3	5	3	405
Wisconsin					
W9OII	54	18	12	2	23,328

220 MC RESULTS

Alabama					
K4HPR	2	1	2	3	12
K4HRF	1	1	1	2	2
New Jersey					
W2EIF	1	1	1	2	2
Pennsylvania					
K3IUV	9	4	3	2	216

432 MC RESULTS

Alabama					
K4HPR	2	1	2	3	12
K4HRF	1	1	1	2	2

NOVICE RESULTS

WN2CUD	61	19	12	3	41,724
WN2GKF	55	19	12	3	37,620
WN2DQS	47	19	12	3	21,432
WN2AOG	31	13	6	3	7,238
WN4MFG	35	5	12	3	6,300
WN9EOD	28	7	8	3	4,704
WN4MST	28	3	12	3	3,024
WN6DBN	13	8	6	3	1,872
WN9CWE	12	5	7	2	840
WV6ZLU	15	3	5	3	735
KN1YCD	10	4	6	3	720
WL7EPF	7	3	11	3	693
WN9EPF	10	4	5	3	600
WN6BIG	4	3	2	3	72
WN4LFP/4	2	2	2	3	24

Second high in the contest, top two meter honors and the New Jersey 144 mc state award all go to this pair operating the Zephyr VHF Society's station, W2LST. In the operating position is Don Lawshe, W2HUX, with John Oldenburg, Jr., WA2EWN, logging. *Congratulations!*

Reliable Dave Vore, K8UQA, member of the famed Cleveland 50 mc DX Club, came through again for us taking Ohio state honors and eighth place worldwide with a record of 251 QSOs and 57 counties for a final score of 171,684 points.

DX report

DANIEL L. PARNES*, WA2DMQ ROBERT M. BROWN*, K2ZSQ

FOR those of us who optimistically are looking forward making 6 meter contacts this season with New Zealand and Australia, good news is at hand. Although the official band for VK's is 52 to 54 mc, special arrangement has been made with the Australian Postmaster-General's Department to permit VK activity over a similar band of frequencies to our U.S. range, 50 to 54 mc. New Zealand's 6 meter band now starts at 51 mc. We understand that the VK authorization ends on December 31, 1963, or possibly sooner due to the probable opening of a new TV channel. Our spies tell us that both the ZL's and the VK's hug the lower edge of their band limitations, a handy bit of information for anyone thinking about some exotic *E* work this Summer.

In South Australia a permanent beacon transmitter has been installed transmitting continuously on 50.5 mc, reception of which would be a most positive indication of possible two-way QSO's. These Australians are ingenius, too. Many six meter operators there have built or obtained panadapters to aid in their DXploitations while yet another operator has a continuously motor tuned receiver which automatically locks on a received signal. S.s.b. is catching on in Sidney, also, with more and more ancient modulation boys converting by the week. We understand these fellows are waiting for the 1963 DX season, well equipped and eager to get at it. Are you?

Late Reports

On May 21, 1963, the asteroid Betula will come quite close to earth, breaking records for such a close approach sez Jim Barnes, K9TFJ, in a quick note. "This may have some effect on the VHF bands. Please pass the word along to expect unusual behavior." Late 2 meter DX: WA4AME, Jensen Beach, Florida, worked W5TYI, Texas (April 9), W5DCV, Texas (April 10), WA4FLM, Alabama (April 11), and WA4KEJ, Alabama (April 11). Sigs 56-8. Distance on W5TYI, 1105 miles. W2RPZ worked W1QAK (Conn.), W3SMK (Pa.), and heard K4WOB in Fairfax, Va., on March 29. All sigs were 20 db over S9 in Massapequa Park, N.Y. Mexico City: Tad, XE1OE/W8WRM, is

Meet active 50 mc man John Korbelik, K7OCG, of Phoenix, Arizona. John can be heard most anytime with an unforgettable signal when that area breaks through.

now running 2000 watts p.e.p. on 6 meter s.s.b., and will soon be on 144.45 mc with a pair of 4-125's (also s.s.b.). Tad needs only Idaho to complete his continental 48 states award. VE3CUX sez that there are over 200 stations on 2 meters within his range, although 50 mc population is low due to Channel 2 in Buffalo.

News from the Mailbag

San Francisco, California: Avid DX chaser George Chong, W6BUR, writes about our weekly news bulletin and Channel 2.

"Bob, your *VHF News Bulletin* sounds great. Here's my first fifteen self-addressed stamped envelopes. I've numbered them so I can keep track and know when to send more." *Good for you, George. Reminder to readers: If you haven't as yet sent in your s.a.s.e.'s for our weekly sheet, do it now!*—ED. "So far no openings here in the Bay area. Our monitor is always set on Channel 2. Saw lots of possible openings last year, but unfortunately I was always at work. I guess I should have a six meter rig here at KTVU (saltmines). I've seen quite a bit of TV DX here before our 'big rig' comes one! Most of these video openings have been either in Texas or Montana."

New Orleans, Louisiana: Charlie Smith, WA5-CWD, president of the Southern Louisiana VHF Club, writes with heaps of news.

"Several things have been happening in the

*300 West 43rd Street, New York 36, New York

New Orleans area on the VHF bands that I thought might be of interest to you. The s.s.b. bug has bitten, and some of the first to be affected are members of our local club. Claude, K5JZF, is on 6 meters with a Heath HX-30. Sam, WA5DRS, is scooping out 50 mc r.f. with a Supreme Electronics rig. K5DKR, from Houma, La., is running a homebrew d.s.b. rig with about 30 watts to the antenna. Rig here at WA5CWD is an SR-150 tooling into a P&H 6-150 with a Thunderbolt for the tailfeathers on the groundwave contacts. A.m. rig here is a Zeus. Antenna is 235 feet above the streets of downtown New Orleans." *Either you've got a mighty tall tower or a top-floor penthouse.*—ED.

"As far as I know, 2 meter activity here is still pretty much 'nil' although W5JGV and K5GVD are both working on 432 mc rigs that'll come pretty close to a gallon. Several members of that club are building a 40 watt p.e.p. d.s.b. rig that was designed by the illustrious Secretary of the S.L. VHF C., W5JGV. These should be ready to add to the cacaphony of the Summer skip season." *Tell your secretary if he's unhappy about present wages to drop a few lines about his brainchild. We pay well and aren't very demanding.*—ED.

"RTTY has reared its lovely head on 6 meters in New Orleans and I must confess that I am one of its staunchest supporters. Those addicts of the green keys that are on the air at this writing are WA5DXP, K5EDV, W5JGV, and myself. Furiously working to get on VHF RTTY are W5CME, K5YAB, K5JZF, K5GVD, and WA5-CDY. All have their machines and will be on the air within the next few weeks." *Sounds like fun!*—ED.

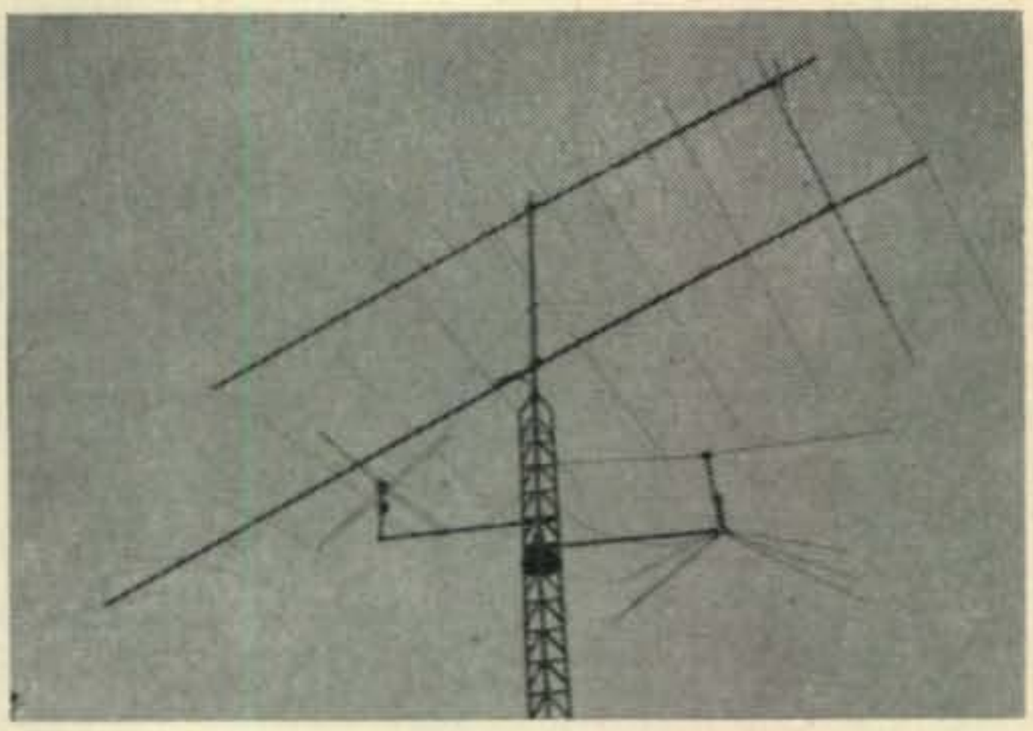
"All VHF RTTY operation so far is on six meters (on a.m. a.f.s.k.) and most of the local ragchewing is done on 50.19 mc. At the present we are trying to decide on a RTTY net frequency somewhere in the 51.0 to 52.0 segment, but nothing has been settled as of this writing. During openings I can be found on RTTY around 51.02 to 51.20. Hope someone finds me there —hi!"

North Chichester, New Hampshire: A real shortie from Don Learned, W1AZK, Bear Hill Road, with a query.

"We have scanned the pages of the February 1963 issue of *The VHF Amateur* to find some clues as to the ownership of the super looking array shown on page 71. Please advise name and address of the owner as we are contemplating a similar array for 144 mc and would like to get some pointers." *Don, you've stumped me on this one. The photograph was laying around the office without ID or caption, but we couldn't resist the urge to run it. Will the real super array man please identify himself?*—ED.

Fairbanks, Alaska: Chuck Kuespert, KL7ECO, B.C.Q. (before fame) friend, reports with jottings from the Icy North.

"Being a previous *VHF Amateur* subscriber and a VHF hound, I thought you might be interested in some info from the largest state." *Take that, W5's!*—ED. On February 8 at 0700 GMT using just my Twoer and homebrew three element beam I made contact with KL7CLH at Tanana by bouncing our signals off Mt. McKinley. This is a 330 mile path! I was using c.w. and KL7CLH was running 240 watts a.m. to a collinear array.



Who says there's no activity in South Carolina? This handsome multi VHF band array is owned by LeRoy Lawhorn, W4VIW, of Greenville, S.C., who has been many station's "first South Carolina, OM (pse QSL!)."

"Regular contacts between KL7IS at Lake Minchumina and myself and XYL KL7ENO are being conducted daily Q5. By bouncing off Mt. McKinley, this makes it a 240 mile path. This has even been done Twoer to Twoer!" *And they told us mountainous obstructions were a disadvantage*—ED. "KL7DMB is now running a Clegg Zeus-Interceptor combination and is the first station in the area to work KL7AUV in Anchorage on 50 mc c.w. Pete (DMB) is on our 2 meter RTTY net and is net control of the local Air Force MARS Net. KL7BET runs RTTY also on 2 meters and has typed KL7IS and KL7CLH. KL7AEQ and XYL AZJ have a new Seneca and are going to drive an amplifier with it.

"KL7BKB at Shaw Creek works into Fairbanks on six and two with no trouble. KL7IS regularly works into Anchorage via Mt. McKinley and has even worked KL7ALA mobile in Anchorage, 210 miles! Dick has worked about 26 of the 45 stations in Anchorage. The Fairbanks area has about fifty 2 meter stations now. There still remains to be worked, however, a Fairbanks to Alaska 144 mc QSO via the 310 mile path of Mt. McKinley.

"Mt. McKinley seems to offer endless possibilities for VHF contacts between stations having a clear shot to it. It is clearly visible in both Fairbanks and Anchorage, as well as many other points on the Alaskan mainland." *We well remember KL7AUV's work through "the hill," Chuck, and recall his early experiments pioneering present communications. Keep these newsy letters coming!*—ED.

Great Falls, Montana: Ira Haws, W8KNC/7, writes from this exotic VHF dream location with his enumerated sure-fire list of DX pointers.

"My travels as an American 'migratory

Only fourteen years old, Edward Tobias, WA2VKK, of New York City, manages to work out "like a bandit" on 2 meters. This photo came in with Ed's March 16 contest log.

worker' have taken me into some rather rare states, six meter wise. I know well how many of the fellows on the East and West Coasts like to add a rare state to their list, for I was once one of the crowd. And, having been on both ends my observations may help the W3's, W2's, and W6's in the forthcoming DX season.

"1. Avoid long calls. Many times I've tuned away from an otherwise good signal because it seemed the op would never stop calling CQ.

"2. Wait until the DX station has signed clear before calling him. He just might get so disgusted with you that he will put on the top of his blacklist.

"3. It is sometimes necessary to wait your turn. Seek acknowledgement from the DX station, then sit tight. When you are called, keep the QSO short, setting an example for others.

"4. *Don't* give him your street address unless he requests it. Not only is it bad manners, but it's unnecessary. He'll return your QSL.

"5. If you can change your antenna polarization, try both to see which works best. In the Summer of 1961 when I was in Cheyenne, Wyoming, for a period of weeks every signal that hit my antenna arrived vertically polarized! The same seemed to be true of signals going out. I can operate using either polarization. Signals that were unreadable on the halo were Q5 copy on the whip. But all at once conditions changed and only horizontal polarization was effective.

"6. Listen for the DX station's tuning point. I mention for example, tuning 50.1 mc "up," and 50.4 mc 'down.'

"As for my future plans, by the time this is in print I expect to be in either North or South Dakota. I'll be looking forward to seeing you on 6." *Okay, Ira, and thanks for the tips. Nice seeing you at Syracuse.*—ED.

College Point, New York: Lou Marchese, WA2PMW, proposes research consultants.

"Just a little note to ask if you ever gave any thought to having research consultants on a volunteer basis to help *The VHF Amateur?* These research consultants could give data reports on band openings, DX, groundwave conditions, etc. Such a program exists in . . . *(censored*—ED.*)*. Why not in *The VHF Amateur?* Will await your answer." *Okay, Lou, here it is: We already have over one hundred reporters submitting Reader Reporting Forms every month. We feel our program covers VHF activities much more thoroughly and comprehensively than do a handful of "research consultants" listed for publicity reasons who only occasionally report local activities. The space occupied in listing our contributors as "consultants" would just leave less space in the magazine for news.*—ED.

Plymouth, Pennsylvania: Emil Carver, K3MZO, long-time correspondent, has a suggestion for summer DX opening monitoring.

"As I imagine that there are others besides myself who would appreciate use of a broadband monitor which would detect appreciable increases in activity and area, perhaps this tip will be of some interest. In my case I converted a Knightkit C-100 (Citizens Band walkie-talkie) to receive roughly 50.3 mc by removing 4½ turns of wire off L_2. You can then use either a whip or external antenna for monitoring purposes.

"There are many of these items (walkie-talkies) that can be purchased inexpensively or even brand new for under $10. Its superregenerative receiver makes a better band monitor than a superhet would, as its selectivity is sufficiently poor to cover a greater frequency range without tuning. As for batteries, one 9 volt battery of the Japanese variety can be bought for about 20¢ in quantities of five. They have a life of approximately 60 hours." *Sounds like just the thing for use here in the office, Emil! Then I could really know how bad off I am when I hear the W4's rolling through!*—ED.

R.R.F. Notes

Before we go into this month's reports, let me remind all readers of our program. We have official *R*eader *R*eporting *F*orms available in any quantity to those of you who would like to become contributing reporters. Just drop a line to me at the address shown requesting your supply. We need more good reporters who can take the time to tell us who they've been working and hearing. Now that we're finished with that, into the news!

Robert Hasty, K9OVR, of 429 S. Main, Summitville, Indiana, sez to tell you to look for him on 145.2 mc anytime. It may well be worth your while, as Bob mentions snagging K3GFD, Blairsville, Pa., on the last day of March with S8 signals! K9OVR's list of March DX includes K9OII, K8WIQ, W3PGW, K3GFD, K3MIW (*wow!*), K8RPB, K8TVT, K8JLW (W. Va.), K8TZZ and K9RVG. Scatter enthusiast and active 6 meter man, Mike Lamb, K7CAZ, worked W6FZA for a nice 1100 miler on March 3. Mike's list also includes K7OCG (Phoenix!), WA6YKL, WA6CDE, K8QAI/6, and K7DTH. Cole Pont, WA2WNY, of Haddonfield, New Jersey, caught a brief opening to Florida to snag K4FWO and K4PBP. Where were you? Dick Bailey, W6IEY, of La Mesa, Calif., on the other

hand, reports no openings during March, but wants the following fellows to know that they were heard on Feb. 25 and 27: K5YYC. W5AIV, W5SFW, W5UFF, WA5AYT, K5EXN, K5WJR. In big red letters K7OCG writes, *"NO DX!"*

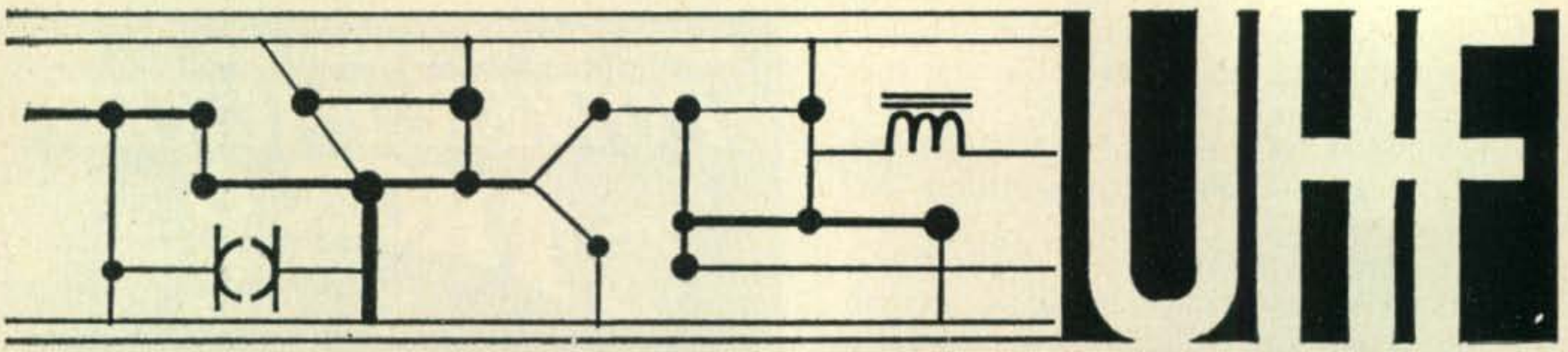
George McGee, K8MNW, of Detroit, has been working some outstanding 50 mc groundwave into Ohio and Illinois with K8VDC, W8UMF, K9OMG, and K8VZZ. W8MBH, who was kind enough to get George's RRF in for us, notes that the following new stations are on most every evening on RTTY on 145.9 mc; K8MDV, K8OMZ, K8RRE. Steve Clifton, WA2TYF, of New York City, comments, "High noise level again this month made DX impossible. Did experience a slightly improved condition towards Boston on March 29." Renown contester Stewart Banks, K1CRQ, now reports from his slant-8 QTH in Lockbourne, Ohio, on March 16 activity. "Conditions during the 12 hour VHF Contest very poor with heavy rain and little activity . . . Not like Connecticut in the old days . . ." KP4BJB was snagged by alert Lou Wilkerson, K4YHG, back in Jan. A five element beam up 32' helps Jim Barnes, K9TFJ, of Greenwood, Indiana, hearing such places as Washington, Pa., with W3UEJ (March 30). Signal was 5×5, but no QSO.

"No skip observed in 156 hours of monitoring," relates Al Hemmalin, WA4IRX, of Memphis. But all is not lost as Al did work K5IPQ via tropo on March 11 in a QSO where sigs rose from S3 to S9 in 49 minutes. K5IPQ is in Jonesboro, Ark. WA4IRX has heard (but not worked) K4BSS and WA4AJC, both in the Nashville, Tenn., area. Moving up to 144 mc, Vic Vicksell, W5HPT, of Bedford, Texas, snagged W5RCI, W5UKQ, W5JWL, W5PEP, W5NY, and K5SDM recently. "Finished s.s.b. mixer (6AK5-6AK5-5763) which mixes in 832-832 output and a converted ARC-5/T-23 receiver. Heard a s.s.b. station on the ARC-5 in Atlanta, Texas, but the final was not yet hooked up!" K1KKE in Exeter, N.H., was worked by Les Cox, K4RNG, in Miami, way back on Feb. 11. Also during that month Les heard VP7CX, Va., W.Va., N.C., N.J., Tenn., Ark., Ala., Tex., La., Miss., N.Y., K6MLA, Mass., Conn., Pa., R.I., N.H., Me., and Vt.! Walt Belsito, K1RTS, worked the following in late March on 2: WA2PZE, WA2-ROJ/2, W2CQB, WB2FEU, W2LST, W1EUJ/2, WA2PZE, and W2IKX. Kerry Hauptli, WB2CWG, of Westfield, N.J., reports that his best 2 meter DX recently has been K1RQW and K1PXE. Look for Kerry on 145.170 mc.

Gene Retske, WA8DSN, of Dayton, worked W9BRN in Liberty Center, Indiana, on 2 meters on April 7, in addition to burning up Summitville, Ind., with K9OVR on April 8. Gene needs Mich., W.Va., and Tenn., skeds. Write him at 612 Hollendale Drive. Mason Cargill, K4VGQ, of East Point, Ga., snagged W4LZW of Birmingham, Ala., on 6 meters March 13.

Okay, fellows, that about wraps it up.

73, Bob, K2ZSQ

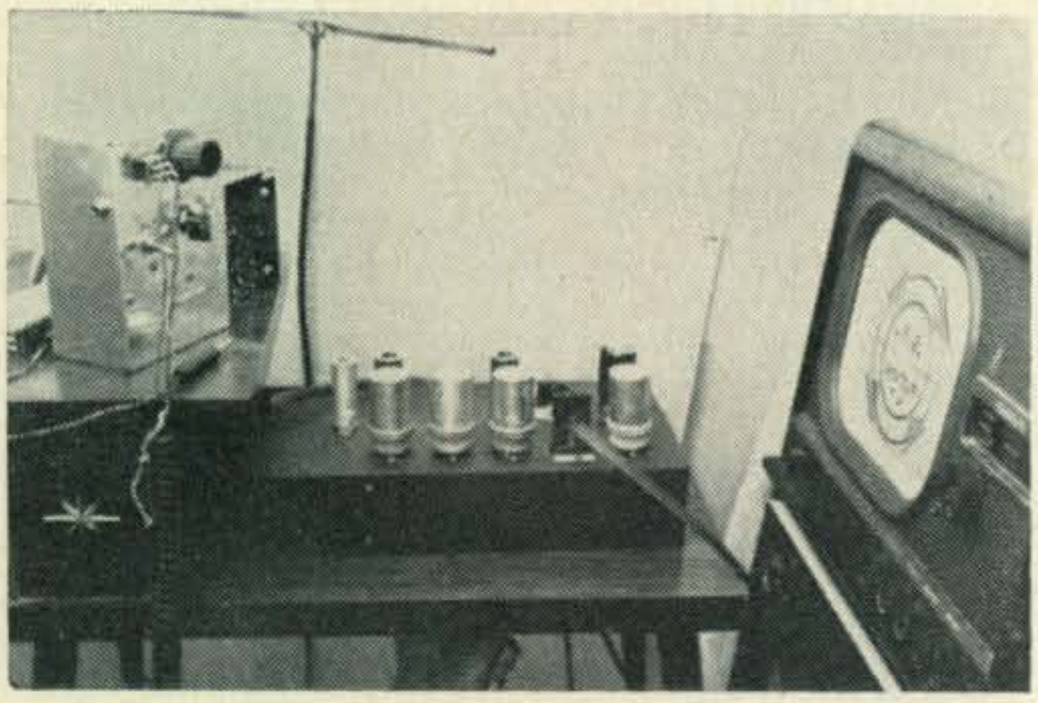


ALLEN KATZ*, K2UYH

CONSIDER a receiver attached to a rotating switch which alternately connects the input from an antenna to a resistor of the same impedance as the antenna. One might expect such a setup, if anything, to diminish signal strength. Yet, the above arrangement is the starting point of a synchronous detector, a device which makes copyable c.w. signals too weak to be detectable by normal means. If we pass the output of the receiver's detector through a tuned low frequency amplifier, and then to a synchronous rectifier (phase-sensitive detector) which is synchronized to the rotation of the switch, we obtain a very useful effect—The output becomes proportional to the difference in power between the load and the antenna. Effectively, we have bypassed the receiver, since the receiver noise will be the same no matter which position the switch is in. Virtual elimination of receiver noise is certainly a step in the right direction. But with the low noise receivers in use today, the noise received from the antenna has become the real limiting factor, even on UHF. Synchronous detection can take a bite out of this type of noise also. Instead of switching from antenna to resistor, we just alternately change the receiver frequency. Here we should obtain basically the same effect. Now we are comparing antenna noise to antenna noise (on a slightly different frequency). Both antenna noise values should be approximately the same, and therefore cancel out along with the receiver noise.

You may have noticed that we sneaked in the word "power." The synchronous detector's

*48 Cumberland Avenue, Verona, New Jersey.



Amateur TV setup at W9VZL/9 at Madison, Wisconsin, patterned after W2VCG's scanner which appeared in April, 1962, CQ.

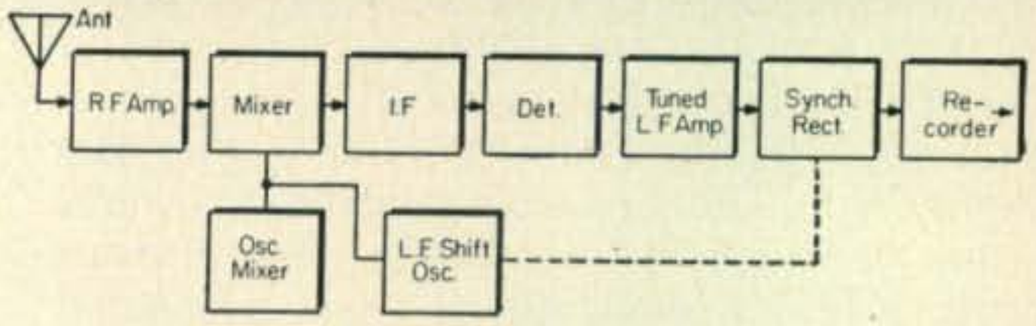


Fig. 1—Block diagram of a synchronous detector.

output is proportional to the *power* difference. The term "power" can be used here because by the nature of its output, the synchronous detector must be operated into a meter or similar recording device. Any meter takes a finite period of time (time constant) to read a voltage's actual value. If the voltage is fluctuating very rapidly, the meter will read an average voltage which is proportional to the power. This is a similar effect to the charging of a capacitor used in integration detection discussed in April. In this respect both methods of "below the noise" detection are similar.

The possibilities of these new systems of detection really stir the imagination. They can even be made useful on the low frequencies. *Who says all the mountains have been climbed?*

Activities

Howard, W8JLQ, writes on a 432 opening: "Two openings which were apparently well spread permitted some very fine solid phone copy between Toledo and Salem, Ohio, as well as Belle Vernon, Pa. W8EDS and W3RUE were worked respectively by W8RQI and W8JLQ. Signals were those of an opening rather than like the ones of the past two years between Toledo and Chicago, which were more suggestive of some type of scatter propagation. W3RUE suggested that the first opening this year (which we know of) was coincident with a 144 mc opening, on March 29, while the opening of April 1 seemed only to occur on 432!"

"Citing the law of diminishing returns as it applies to both power and antenna size is well taken. We need more serious activity of the type not confined to small antennas or high power by itself. I fear, however, that with the higher power limit now on 420 mc, even more dependance upon sheer power will follow. Lets hope that with the higher power 432 doesn't become like many other bands where some arbitrary minimum signal strength (like S7 to 8) becomes the criterion for not calling or answering another fellow." *Very well put, Howard. We agree with you 100%.*

AL, K7VQI (ex W4LSA), on Ham TV in Arizona: "Have found some hams here who are amateur TV minded! Several of them are located at University of Arizona. John, K7JQJ, in particular, has built a flying spot camera and a transmitter with collinear antenna. Now that my Ham TV gear is ready for operation, we are planning a two-way. On the roof we have a 6 "n" 2 topped by 220 and 432 Cushcraft beams and a cone antenna (300-3000 mc). In the shack have ATJ camera with 12AT7 Xmtr on the air. For experiments also have AXT-2, APT-5, T9/APQ-2, APX-6, BC-645, DMQ-2, 6N2, APR-1's and further test equipment. Some junkpile!" *Fine business on planned QSO. How about some pictures when you make it? Incidentally, Al's new address is 5018 E. Cooper St., Tucson.*

Red, W6BLK, of the San Diego Microwave Group: "On the 120 mile APX-6 contact we mentioned last letter, this type of QSO is not unusual for this area. We are blessed with temperature inversions a good percentage of the time. When a duct sets up, contacts are possible with minimum power from 144 mc clear to X band. Under these conditions I have been able to contact Doctor Dillon, WA6EWV, on 432 mc over the 120 mile path. He is using a Gonset Communicator II and a varactor diode tripler. This is certainly conservative communications." *Who else just decided to move to California?*

"I gave two of your report forms to Jim, WA6HIT." *Thanks. We appreciate that.* Jim is Northern Control for the 432 and 1296 mc nets for Southern California, sponsored by the 6th Army MARS. He makes a lot of VHF-UHF noise up in Los Angeles. I am administrator for the Microwave group here. We are concentrating on getting all members active on 432 and 1296 mc. It is an excellent way to generate interest and create activity." *The MARS nets seem to be doing a real job for UHF in California. Possibly with a little more information, some of the fellows might take your group's lead and give similar nets a try in their part of the country.*

Ron, W9ZIH, on high power Ham TV from Chicago area: "I thought the fellows might be interested in the Ham TV activities here in the Chicago area. Stations that are able to transmit a video signal on 432 mc are W9JEC, W9ZZS, W9OJE, W9PBP and K9GRH. W9FHS and W9BOL are also interested, but can only receive video at present. The TV transmitter here consists of a Dage model 101A camera into a 6336 series modulator, modulating a 2C39A which drives a 4X250B at 400 watts input. The receiving chain is 416B, two 6AN4's into a modified UHF TV converter to a standard TV receiver. The antenna is an 80 element broadside array 45' up. Other stations on with high power TV transmitters are W9JEC and W9ZZS. There is TV activity nightly between 6 and 10 P.M. CST on 438 to 440 mc. Usual working radius is about 30 miles, but I expect this distance will increase with activity at further distances." *Ron, it is sure*

Candid Camera

We have many opportunities to publish photographs of amateurs, their shacks, and antennas throughout *The VHF Amateur*. If you have any pictures suitable for publication, send them in. We pay one dollar for each printed. Drop a line for further information.

nice to hear that ATV is so far advanced in your area. With large antennas and high power, I am sure we are going to hear of some TV records this summer.

Ted, W9VZL, is giving Amateur TV a try from Wisconsin: "Interest at the home QTH has taken a decided turn to the UHF bands of late, with experiments in 432 mc TV taking up most of my spare time. The rig at present consists of a flying spot scanner patterned after Marty's, W2VCG, in April, 1962, *CQ*. We 'cheated' a little by getting the B-plus of the scanning set, something which I hope to eliminate in the future as it has some effect on the stability of the raster. On the audio end we are using a 6CW4 in a modulated oscillator circuit. Not the ultimate by any means, but certainly a most interesting and worthwhile beginning. While UHF activity in Madison is not running at a high level, I am hoping to create some interest here and get a few of the boys up on UHF. I have heard of two other fellows working on cameras for 440 mc TV, but so far no sign of them. Yet having someone to talk to is not altogether that important—most of the pleasure derived from Ham TV here is from experiments performed with the apparatus. But just to make sure I was getting out, I must admit I went down the block and tuned myself in on a friends' TV set!" *Just wait until there are some more ATV stations on! There is a real thrill to a two-way TV QSO!*

Reports

Ben, W9OVL, Hammond, Indiana: Ben reports much local activity in the Chicago area on 220 mc. New 220 mc stations include K9HOW, K9WSZ, K9DNG, and W9ROY. Ben is on between 10 and 11 P.M. CST Monday, Wednesday, and Friday looking for stations to the West.

Dick, W6IEY, La Mesa, California: Dick, who uses a 15 element long yagi on 432 mc, reports his first two-way Los Angeles contact (125 miles) with WA6HIT. Dick also mentioned that he is a member of the MARS net. The 432 net is held at 0730 PST on Saturday and Sunday, and Wednesday at 2000 PST. *How about the frequency?*

Ray, W8RQI, and Howard, W8JLQ, Toledo, Ohio: They both use 4X150 finals running 50 watts on 432 mc to 96 element broadside collinear arrays. Stations active in that area include W8HCC (Sandusky), W8RLT, K8AIY, W8CUT (Detroit), and W8MBN (Toledo). In the two openings mentioned earlier only W3RUE, Belle Vernon, Penna., and W8EDS, Salem, Ohio, were worked, although the band was "wide open." No other activity was aparent. *Where was everybody?* W8JLQ has tentative skeds with W8HCC and W8RTL at 8:00 P.M. EST nightly.

Vic, W5HPT, Bedford, Texas: Vic has finally received his 20 element "J" beam and is putting it to good use. He holds almost constant checks

with W5AJG, Dallas. During the month of March, he heard W5RCI, Marks, Miss., (5-7); K5SDM on phone from Houston; K5JHG Atlanta, Texas; and W5ML in Oil City, La. Vic also says that he is still very interested in Amateur TV and is looking for someone to QSO with. *Isn't there anyone else interested in ATV in Texas?*

Bob, WØHGF, Cedar Rapids, Iowa: Bob reports 220 mc activity in his area includes WØTCF, WØOFY, and KØKOU. All are on a.m. except WØOFY, who is on s.s.b. Bob's rig consists of a 5763-5763-6360-6360 lineup. However, he plans to have 200 or 300 watts on soon.

Notes

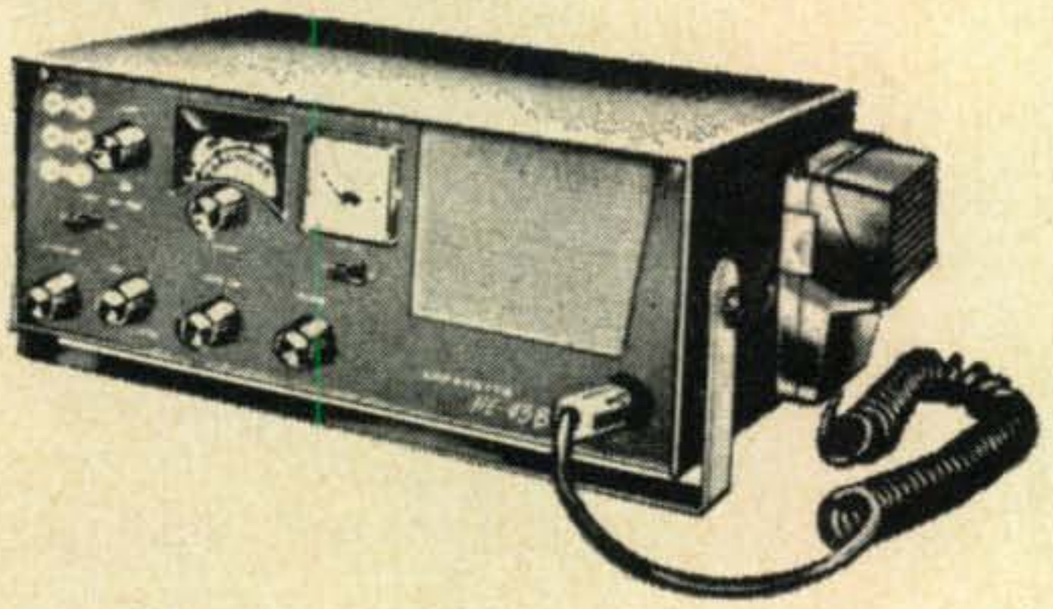
Dave, K9CNN, sends word of the Chicago Microwave Club. The club meets the first Thursday of each month at 8:30 P.M. at Kosciuszko Park, 2732 N. Avers. Walt, K1RTS, is on 220 mc from Conn. with a Mark II transmitter, ARR-2 receiver and a 5 element beam and is looking for contacts. He says his big problem (besides trying to find someone to contact) is WNDT, Channel 13 in New York.

Vic, W9JFP, is on 432 from Milo, Wisc., with a KW and 54 element beam and is looking for contacts Saturday, Wednesday, and Sunday. K9DOE is also on 432 mc with a similar setup from Forest Lake, Ill.

73, ALLEN, K2UYH

New Amateur Products

Lafayette HE-45B



LAFAYETTE Radio Electronics of Syosset, New York, recently announced their latest product in a growing line of transceivers, the HE-45B.

Superceding the HE-45 and HE-45A, the new unit consists of a three stage transmitter running approximately 14 watts input to a 2E26 and a sensitive superheterodyne receiver with 1 μ sensitivity covering 50.0 to 54.0 mc. A series gate noise limiting circuit is employed here also. New modulation and power transformers have been installed, resulting in more power and almost 100% modulation. The transceivers is self powered with its built-in 12 v.d.c. and/or 117 v.a.c. supplies and is push-to-talk with a rugged ceramic microphone, offering the optimum in mobile communications. Price: $119.95. ■

Home-Built Receiver [*from page 27*]

should be enough.) Set the BC-221 to 3.5 mc and check to see that a signal output is obtained from the receiver.

8. Set the BC-221 to 3.6, 3.7, 3.8, and 3.9 mc and tune one of the four 4.5 mc i.f. circuits to each of these frequencies. It does not appear to matter much in what order they are tuned to which frequency but keep in mind the frequency selected for the primary of the input i.f.

9. Set the BC-221 to 3.75 mc and tune the antenna tuning circuit for maximum signal.

10. All of the above tuning adjustments can be made satisfactorily by ear. They can also be made by turning up the a.g.c. delay and tuning for maximum signal on the S meter. (*Caution:* With the a.g.c. at maximum, the meter will rise to a maximum and then hang. If care is not taken, the tuning will not be maximized.) Keep the a.g.c. at ¼ open.

11. With the receiver bandswitch on the 40 meter band, set the receiver dial on the frequency chosen in step 8 for tuning the primary of the input 4.5 mc i.f. transformer. Set the BC-221 on the forty meter frequency indicated on the receiver dial so as to produce a signal output and tune the primary of the input i.f. for maximum signal. Return to 3.75 mc with the receiver and the BC-221 and retune the 80 meter antenna tuning circuit for maximum signal.

12. Switch to the 15 meter band, tune the oscillator tank, and check for proper oscillator operation by listening for the beat on the BC-221. Then peak the input circuit in the band center.

13. A check should be made of the half-lattice filter by coupling the BC-221 to the 12AT7 conversion detector as in step 5 above and

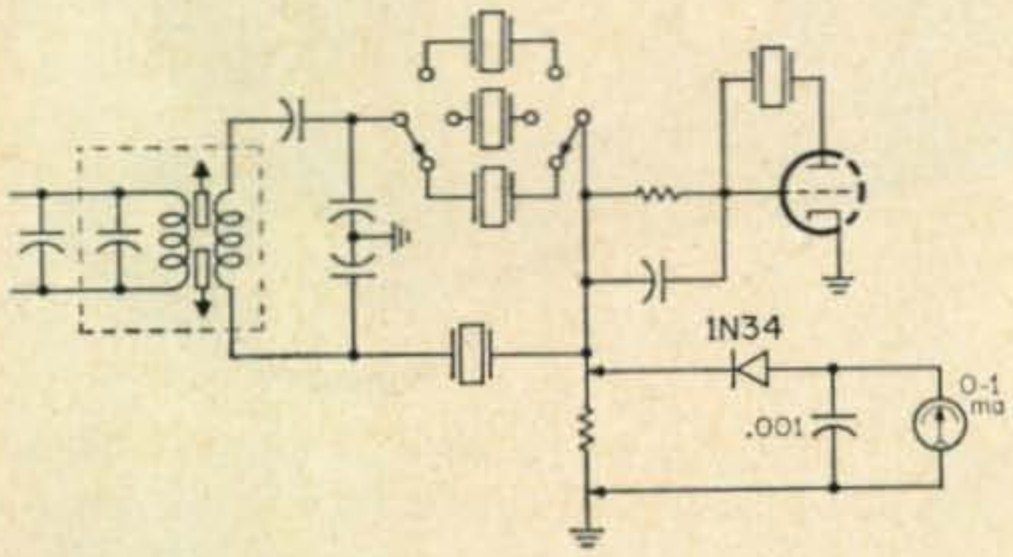


Fig. 5—Temporary circuit for determining the half lattice filter response as described in the text.

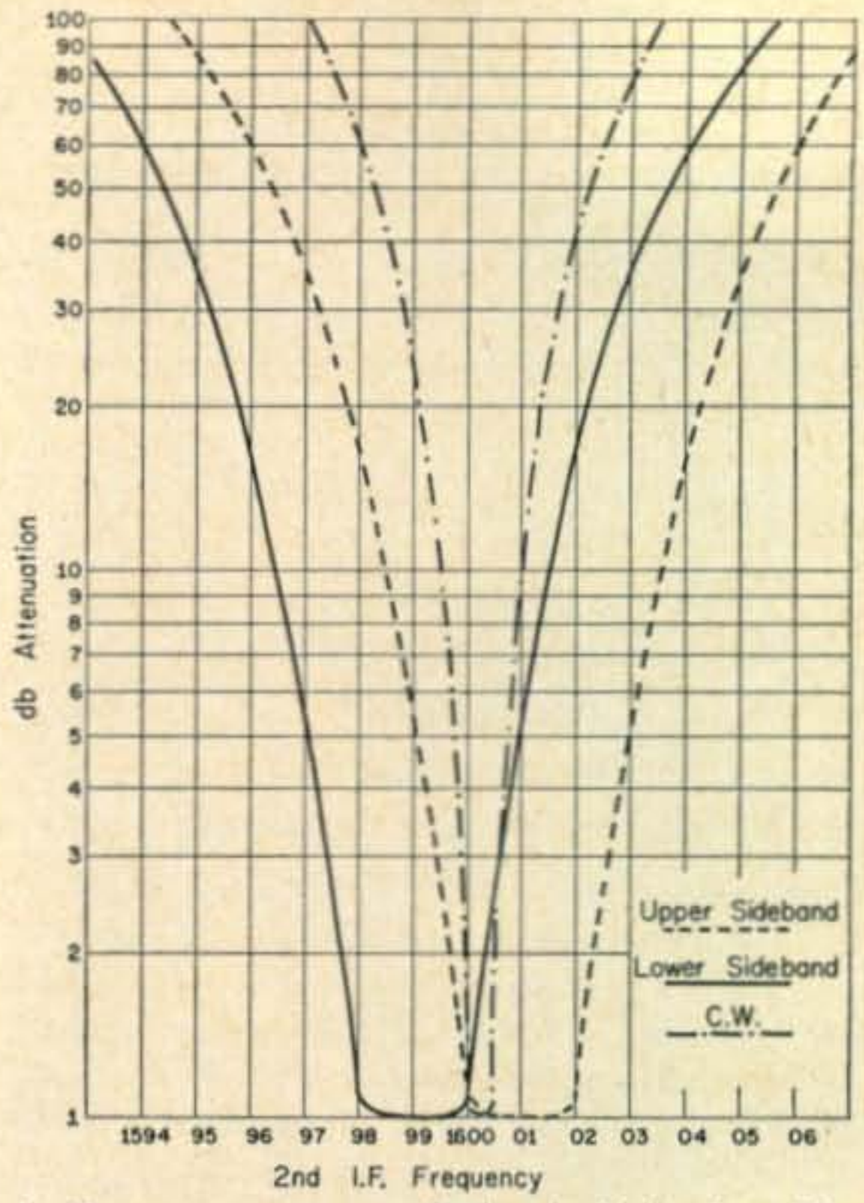


Fig. 6—Response curves of the half lattice filter for C.W., LOWER SIDEBAND and UPPER SIDEBAND.

temporarily soldering a 1N34 (or any other similar detector crystal) to the signal side of the 68K load resistor for the half-lattice filter, as shown in fig. 5. For each position of the half-lattice filter switch, a series of current measurements should be taken at 500 c.p.s. intervals from 1597 kc to 1603 kc. A typical plot of outputs as measured on the original receiver is shown in fig. 6. If the plots obtained do not approximate those shown, then the performance of the receiver will not be optimum. The crystal frequencies and the circuit should be carefully checked and the bandpass characteristics of the filter rechecked until the shapes of the curves are near those shown.

Conclusions

Although I have tried to be very detailed in describing the circuits in this receiver that I had to spend time on, I did this for the benefit of those who have never embarked on a receiver project before. I am in hopes that those who have built receivers will recognize the promise of the quartz crystal detector as a tool for s.s.b., f.s.k. and c.w. and I am also in hopes that variations of this technique will soon appear in *CQ* which will make the homebuilt receiver even easier to build and better performing. ■

C.W. Results [*from page 50*]

UA1KUA	117,600	525	53	94
UA6KTB	112,365	461	41	124
UA3KWB	41,202	256	32	77
UA3KUA	24,450	215	19	56
UA6KAF	18,078	170	17	52
UA3KHA	17,756	219	28	44
UA3KFA	15,980	160	26	42
UA3KTK	11,205	209	11	34
UA1KAY	8112	132	17	35
UA3RZO	7880	121	8	32
UA4KPL	6966	130	15	39
UA3KYA	4182	48	15	26
UA4KCE	3267	55	13	20
UA3KOB	3072	86	7	25
UA6KVB	861	21	8	13
UA1KDY	288	14	6	10
Latvia				
UQ2KAM	2350	75	7	18
Ukraine				
UB5KED	**259,440**	**734**	**61**	**174**
UB5KAI	100,536	506	42	135
UB5KAK	32,509	473	16	43
UB5KKE	21,165	192	22	60
White Russia				
UC2KAR	**258,000**	**921**	**56**	**144**
UC2KGD	10,620	163	16	43

Our thanks to the following stations for sending us their logs for checking purposes: CR7LU; G3IRM; GI3PKY; HK3HY; KG6ALD; KL7RZ; OH5OD; OK1ADP, AEH, AEM, ARN, IJ, KIX, KRM, TJ, UQ; OK2BCZ, BDT, BMS, KNP, KOS; OK3CAW, CCA, KEF; OX3AI; OZ7-KV; PAØMAR, PLM; SM5ASX, BEI, BFJ, BHW, CWC; SM7CKJ/6; SP9-AHL, AJA; UL7KNG; UT5CU; VQ2MS; W1MD, MV, RWU; W2GT, WZ; W6ERS, OJW; K6OHJ; W9-TCU; VE6VO; ZL3IS; ZS2E; UA9-23285; LA6CF/M.

The YL International SSB'ers Inc., will remain unaffiliated but will cooperate with all other similar organizations with mutual purposes. Major goals are to help build better international friendship and good will both through fraternal associations and support of worthy humanity ventures.

Already in planning stage are a sequence of international conventions with one scheduled for Europe in the not too distant future.

In the YL SSB'ers you will find something revolutionary in hamdom circles. In the past, by outworn custom, YLs had choice of being a member of what was predominantly an OM's club, or, they 'segregated' themselves to strictly YL clubs and YL affairs. The YL SSB'ers shatters this illogical approach; while it is and shall remain a YL organization, it invites OM membership with emphasis on DXers and others who subscribe to the SSB'ers 'purposes'. Reaction has been startling: fantastic . . . unique . . . new . . . healthy. . . exciting . . . creative . . . natural . . . above norm . . . and the general consensus has been complete acceptance that YLs are entitled to prominent leadership voice in world-wide hamdom affairs. A new die has been cast. Here in the YL International SSB'ers Inc., YL leadership will prevail but OMs are given opportunity to both participate in SSB'ers' affairs and importantly, directly support YL sponsored endeavors. *Old Man's note:* high time we started thinking of YL leadership within our national and international Leagues and organizations.

The YL International SSB'ers Inc., sponsor an award for working members. These rules have been recently changed as follows: DX stations work 10 W/K members plus 5 DX members; W/K stations work 10 DX members plus 5 W/K members. All contacts after February 9, 1963. Available to s.w.l.s. Seal endorsement for each 10 additional members on basis above general ratio. Award free to DXers and members. U.S., Canadian stations and s.w.l.s. send 75¢ or 7 IRC to Custodian, V. Mayree Tallman, K4ICA, 428 S.W. 28th Road, Miami 36, Florida. For member list and rules for breaking into weekly SSB'ers world-wide net, send s.a.s.e. to K4ICA.

The new Metropolitan Nashville Award sponsored by the Radio Amateur Transmitting Society, RATS, for working stations in the new Metropolitan Nashville effective April 1, 1963. At latest count there were over 700 amateurs in the area of award's coverage.

The Sunday Noon Naggers Net Award for working members. Within 100 air miles radius of Canton, Ohio, work 15 members; outside 100 miles work 5. Contacts must be after March 26, 1961. Net contacts do not count. While called a net, the group has club status and is affiliated with the Canton ARC. At present the club has 50 members. No charge for the certificate, just send list to Custodian, Chuck Keeton, K8OBW, 6720 Ridge Ave., East Sparta, Ohio.

The SSB'ers will publish their own news letter. YLs the world over are invited to join the SSB'ers. Contact K4ICA, permanent secretary-treasurer for information.

What's Cooking Department

Pot's loaded with choice goodies. In talk stage are county awards for Oregon, Wyoming, Iowa, Mississippi, Arkansas . . . and by July issue we expect to break the Washington County Award at Governor level sponsorship.

Quite amusing when 'friendly competitive' writers attempt to scoop the Old Man on the 'things' he has brewing in the WCD pot . . .! Keeps us on our toes though, and not complaining . . . just amused.

More amused at certain 'opposition' inane attempts to belittle awards and those who seek them. Truly, folks must possess a mighty low IQ not to understand that awards programs provide tremendous public relations 'facility' by which amateur radio's stature is enhanced within our community and society. These Colorado Canary yodlers are incapable of grasping that awards as such, whatever the phase of our human society, are 'proof' of man's personal achievements and/or attainments. If one passes an examination of any kind he expects and gets written 'proof' thereof in some tangible form. The same is true of ARRL appointments, code speed awards or even the class of license we hold; it is likewise true of contests and competitive awards we might seek. Only the more stupid among us or the incompetent, are prone to view awards as 'wall paper'. To the more intelligent, awards and contest programs offer more interesting motivation and incentive toward personal achievement participation. On that note of admonishment to the *Equus*-three-letter dolts, the Old Man will get back to his chore of helping others help others make hamming more exciting and satisfying through programs of mass participation which directly 'sells' hamdom's stature within our society.

The Old Man, K6BX

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Announcements [*from page 16*]

In the same issue, "A Compact 2-Meter Transceiver," page 65, a 47K ½ watt resistor should be connected from pin 10 of the 6D10 to the B-plus line.

Ed Marriner's "Hetrociter" for April, page 21 indicated that RFC_2 and RFC_3 is a Miller 72F125AP. The part no. is ok but the inductance value is wrong. It should be 12 μh, *not* 12 mh. Sorry for the errors.

Radio Classics [*from page 40*]

is 10 times the common logarithm of the noise figure. Thus the n.f. of my receiver before modification was 200 or 23 db. After modification[3], the n.f. was 4 or 6 db.

Noise figure is more important as frequency is increased, for man-made noise and interference decreases and the noise of the receiver is the main competition the signal faces. Tilton[4] pointed out that tubes have capacitance, and that the generator output deteriorated with increased frequency. The way to cancel this effect was to parallel the tube output with a parallel-resonant circuit. This allows a simple noise generator to operate 50, 144, and 220 mc (fig. 2).

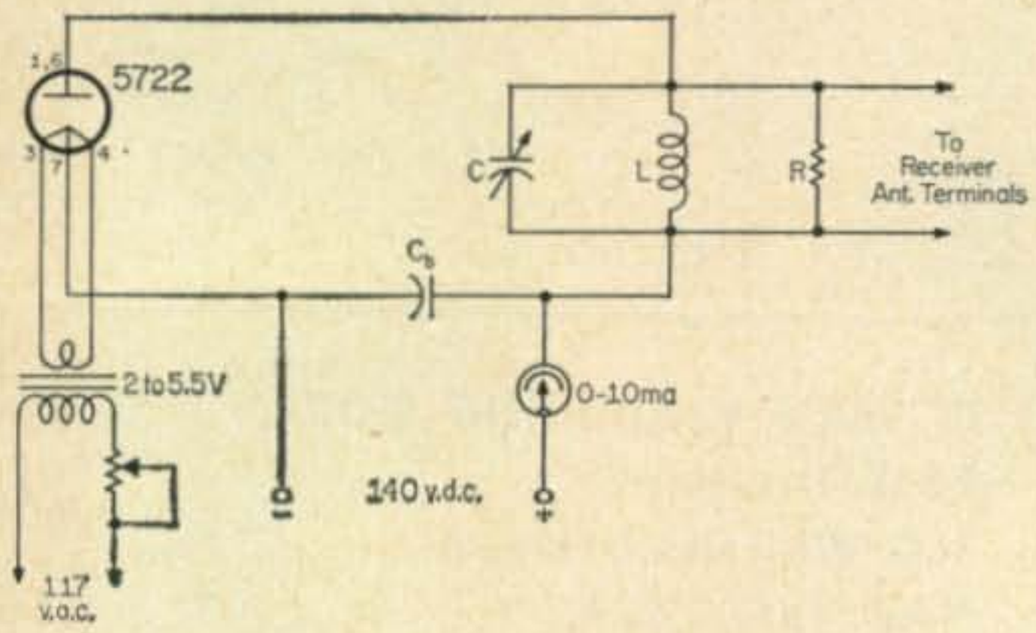


Fig. 2—Diode noise generator specially suited for v.h.f. work. Tuned circuit *L-C* cancels the effect of tube capacitance by parallel resonance at the operating frequency. Bypass C_b should have low reactance compared to *R* at the operating frequency. Erie mica button capacitors are recommended. Short solid-ribbon leads should be used.

While the 15E and the 801A (VT-25 or VT-25A surplus) work fine through 10 meters, the Sylvania 5722 is specially designed to operate as a good noise generator at higher frequencies. Remember that the *heater* temperature should be varied with plate voltage kept high and nearly constant, and that decreasing plate current will show you when you have made a receiver improvement.

Recent work with parametric amplifiers has reduced noise below the "ideal." Noise was formerly figured on the basis of 293°K, which is about room temperature. Amplification without resistance, however, does not produce noise, and so the modern way to specify noise is in terms of degrees Kelvin. It is now possible to obtain noise figures of 90°K (1/3 of the previous ideal) with circuits operating at room temperature. ■

[3] Santangelo, J., "Second Guessing The Experts on the HQ-129X," *CQ*, Apr. '52, p. 24.
[4] Tilton, E. P., "Noise Generator Technique for the VHF Man," *QST*, Aug. '49, p. 20.

DX [*from page 54*]

10; **JG,** University College Hospital–Mona, Kings. 7; **LR,** Constabulary Station Mandeville; **LT,** c/o Jam. Tele. Co. Ltd., Mont. Bay; **MJ,** "Seaview," Oracabessa; **RA,** Jam. Red Cross, 76 Arnold Rd., Kings. 5; **RD,** c/o Jam. Tele. Co. Ltd., P.O.B. 21, Kings. 5; **RS,** 2 Lismore Ave., Kings. 5; **VI,** 13 Hamilton Dr., Kings. 10; **WF,** St. Margaret's Bay, P.O.B. 11, Portland; **XG,** 6 Liguanea Ave., Kings. 6.

9G1EO	via VE4OX.	
9Q5AB	via W2HMJ.	
9Q5RK	via LX Bureau.	73, Urb, W2DEC

Space [*from page 55*]

international body responsible for the coordination of rocket and satellite projects on a worldwide basis. The U.S. National Academy of Sciences participates in the work of COSPAR on the behalf of the United States.

These broadcasts, called SPACEWARN, are intended mainly for tracking stations and scientists in Central and South America. The broadcasts, however, can be received in many other areas of the world, especially if a good communication receiver is used.

SPACEWARN broadcasts are in the English language, and should be of interest to anyone wanting latest launching and orbital information. The following schedule for SPACEWARN broadcasts is expected to be in effect from May 5 through August 31, 1963. QSL cards verifying reception of SPACEWARN broadcasts can be obtained from SPACEWARN, IBS/EF, U.S.I.A., Washington 25, D.C. Listeners in the USA should send a stamped self-addressed envelope for the QSL card.

Frequency (kc)	Transmitter Location
15215	Greenville, N.C.
11830	Greenville, N.C.
9750	Greenville, N.C.
6105	Greenville, N.C.
11790	Betheny, Ohio
9650	Betheny, Ohio

FLASH

Continuous c.w. signals from the beacon transmitter aboard the EXPLORER 17 satellite are being received loud and clear on 136.560 mc. Launched on April 2, EXPLORER 17 is loaded with scientific equipment for making extensive measurements of the earth's atmosphere. A second transmitter, operating on 136.317 mc, is being used as a ground-controlled telemetry channel.

EXPLORER 17's orbit is at an inclination of 57.6 degrees with the equator, and takes 96.4 minutes to complete. 73, George, W3ASK

Propagation [*from page 56*]

levels and fewer hours of darkness in the northern hemisphere are both expected to result in poorer DX conditions on 40, 80 and 160 meters during June and the summer months. Forty

[*Continued on page 90*]

such a newspaper has one main purpose for existing: to develop more interest in the club and its activities so that its meetings will be better attended. A club with only a few members attending meetings has little reason for existence. Therefore, the club newspaper must inspire members to attend the gatherings of the clan. If, on the other hand, the paper provides an excuse for members not to attend meetings because they see no reason to follow up the announcements in the bulletins, then it serves an adverse purpose and has no place in the club's activities.

To do a good job for a club, the organization's bulletin must be concerned above all with the activities of the different members in the group. Since this is a different approach than the purpose of the commercial magazine or newspaper, this makes the club newspaper a highly specialized publication. Its closest kin is the factory magazine or lodge bulletin. Because of the characteristics that make such club papers different from the printed matter sold on newsstands and in book stores, some special considerations are necessary to make a club newspaper successful.

Club newspapers or magazines are extremely personal publications in contrast to the commercial jobs that provide reading matter for the general public. To be more specific, the club paper must deal directly and personally with each and every member of the club, in name as well as in activities. Whereas the commercial publication writes *to* Joe Ham, the club paper must write *about* Joe. Unless Joe has designed a new piece of gear or has accomplished something of nation-wide importance, he has little chance of seeing his name in a commercial radio magazine. On the other hand, just because he is a paid up member of the club, Joe has every reason to expect to see his name in the club newspaper sooner or later.

This fact, that the club newspaper tells Joe and his fellow club members about himself, makes the club magazine a completely different publication from the one he buys through the mails or on the newsstand. The editor of the club paper and his staff members must always keep in mind that there are very few individuals in this world who are not interested, first of all, in themselves. News about the other fellow is not nearly so exciting as news about yourself. Since the radio club is a closely-knit, personal organization, its newspaper must follow this format and be as intimate and personal about club members' ham activities as possible. A club newspaper must confine itself to news about the club members including, eventually, every club member.

It is interesting to watch the results of using club members' names in the club paper. A large percentage of those whose names appear in an issue of the paper will show up at the next meeting of the club. Eventually, those whose names are not used will ask why they aren't mentioned. And they will be quite pleased and show improved meeting attendance after something is published about them.

During the past year photographs were made of various member's shacks and published in one issue of a paper the writer edits. Done by the off-set process, this wasn't too expensive. After the first series was published we realized that succeeding series would have to be done because members asked, "When are you coming to my house for a picture?" To repeat, nothing is as important as the member's own name and his own activities. Publicize him, and don't concentrate on a few of the leaders. Spread the publicity over the entire membership during the year. After all, the entire membership makes the club successful, not just the outstanding work of a few leaders. The strongest club is the one with the greatest number of active members. This can be promoted by a good club paper, by seeing to it that as many members as possible are mentioned in the paper during the year.

Coverage

No club newspaper has any business trying to copy the commercial magazines devoted to amateur and commercial radio. Leave the publication of new gadgets, schematics, research in radio, and construction articles to the big commercial jobs. In the first place, the club paper isn't large enough to do such a job satisfactorily, and secondly, the club newspaper staff hasn't the facilities to test out and study a design before publishing the drawing. An editor who goes in for this in a club bulletin is using space that takes away what every club member is looking for: his own name.

Staffing

The ham who agrees to publish a club newspaper will need help. He will need a staff of reporters to cover the news that comes from members engaged in the many divisions of a ham radio club: The DXers, the v.h.f. enthusiasts, the Novices, the Technicians, the c.w. gang, the s.s.b. specialists, the Civil Defense leaders, the General class boys, the YLs and XYLs, not to mention any two-letter or extra class members.

This staff is easy to come by. The mere fact that a ham has been appointed to an editorial staff makes him pleased, but it doesn't insure his turning in news. First of all he must be taught what is news. The very thing that interests him about his fellow members' activities in radio may not be reported to the editor as newsworthy because, "Well, George just did that! Is that news?" Tom's new certificate, Bill's visit to a distant ham last summer, Joe's contact in Asia last week, and many other achievements in the club are passed by. They don't sound like the weird and wonderful news stories that appear in the city daily. They're

[*Continued on page 91*]

meters is forecast to open to many areas of the world from shortly before sunset, and to remain open through the hours of darkness and the sunrise period. While 40 meters is expected to be the best band for DX during the hours of darkness, signals are likely to be weaker and the band noisier than during the winter months. Some 80 meter openings are forecast to DX areas during June. Openings should occur during the hours of darkness and the sunrise period, but signals are also expected to be weaker and noisier than during the winter months. Few 160 meter DX openings are predicted for June, but some may occur during the hours of darkness and at sunrise.

V.H.F. Ionospheric Openings

There is an increasing amount of scientific evidence which indicates that sporadic-*E* propagation occurs more frequently during periods of low solar activity than at any other time in the sunspot cycle.[1,2] If this is the case, sporadic-*E* short-skip openings on the v.h.f. bands should occur even more frequently during June and the summer months of 1963, than the record number which took place during the same period last year.

Almost daily sporadic-*E* openings can be expected on 10 meters during June, with the skip distance ranging between approximately 500 and 1300 miles. Frequent 6 meter openings should take place between distances of approximately 750 and 1300 miles, and some openings at a maximum distance of 1300 miles may also be possible on 2 meters. During periods of intense sporadic-*E* ionization, "two-hop" openings, up to distances of approximately 2400 miles, may take place on 10 and 6 meters.

No major meteor showers are expected to occur during June, and very little auroral activity is expected during the month. Check the "Last Minute Forecast" appearing at the beginning of this column, since some auroral activity may occur during periods predicted to be "below normal" or "disturbed."

Sunspot Activity

The Swiss Federal Solar Observatory reports a monthly average sunspot number of 17 for March 1963. This results in a 12-month running smoothed sunspot number of 33 centered on September 1962. A smoothed sunspot number of 24 is predicted for June 1963, as the solar cycle continues to decline slowly.

Flash

Use "Australia" predictions appearing in this month's DX Propagation Charts to find the best times and bands for working the DX-Pedition of the month, VR4CB, Solomon Islands.

73, George, W3ASK

[1] Monroe, M. and D., "50 Mc Propagation Effects; Mid-Point Report On A Six-Year DX Study," p. 37, *CQ*, June, 1962.

[2] Jacobs, G., "Some Notes On Sporadic-E Propagation," p. 60, *CQ*, June, 1962.

Club Bulletins [*from page 89*]

merely the activities of friends.

But these daily activities of "your friends" are just the items that will help make a club paper a success. They take to themselves a sparkle and luster when they appear in print. These staff members need to learn that never a month goes by but that someone in the club has done something with his rig that is worth telling to other members.

But even after the editor has taught the staff members what is news, so far as the club is concerned, the next problem is to get the members to send the data to the editor. This sounds simple and easy. But the editor who tries to get such news will soon learn. "Didn't I send that to you? I thought I did," is the reply more often given than the news item the editor needed to help fill out his pages. People today are too busy. We won't argue whether or not they are busy at worthwhile activities. The fact remains that everyone has so many demands on his time that he will shuck off any duty that he can afford to overlook. Turning in news items for the club paper will come under this classification. He can't be fired for missing the story and no one will cause him to feel shame for having failed, so he has little reason for making a mighty effort to write or see the editor.

The writer has tried various means to get news, even to sending mimeographed announcements that the news items are due at his office, enclosing stamped and addressed envelopes to mail the news items to him. Many of these stamped and addressed envelopes are still in members' homes. Of course, most of the staff will respond, but only under guidance. The editor will have to suggest what type of news to look for. Sources of news one might expect staff members to check are many times not reported. For instance: who are the new Novices, the new Technicians, who made a General ticket since last month, who won a new certificate, who worked on Field Day, which members are sick, who's moved away, what ham has recently moved into the club area, etc.? Suggestions such as these will usually result in reporting of news about club members and future club members.

Even the most obvious system—a net operation on a certain frequency at the scheduled time and date—won't be highly successful. This should be understood by anyone who has tried to operate a net. "You bet," they'll tell you, "we'll be on," but where are they when the time comes?

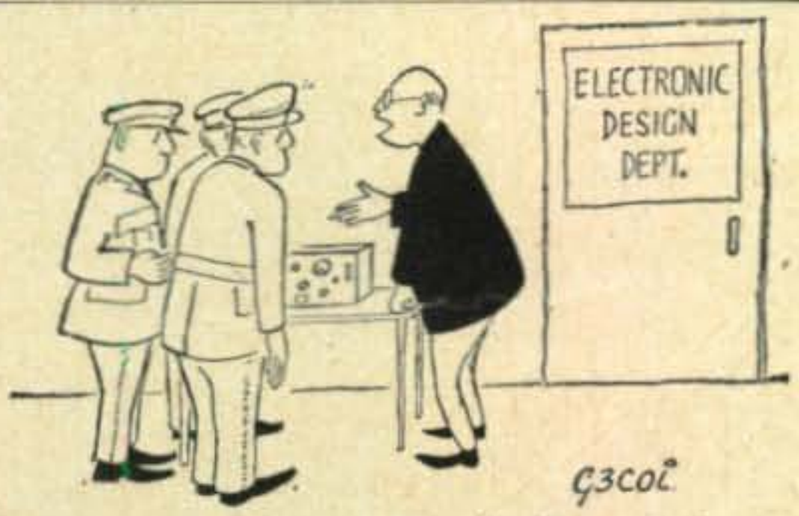
Finally, the editor discovers which of his staff can be depended on for more news items than the other reporters. These two or three reporters will, as a general rule, come up with the necessary amount of information that will fill out the pages of the paper.

Editors and their staff would do well to copy one thing from the commercial papers and magazines. Readers like to become accustomed to certain features in their newspapers and periodicals. Most newspaper readers have definite habits of reading. Men usually turn first to the sports pages. And there is a commotion if the make-up of the paper is changed and the sports pages aren't where they usually are found! Once in awhile a newspaper will change a long-run feature from its habitual location to a new setting. Readers have even been known to write in and complain about such a change.

In our club bulletin, the first page is regularly devoted to the program that will constitute the next month's meeting. This enables the member to decide whether he will attend that particular meeting, and often is the persuasion needed to bring him there. On the second page is the list of the entire staff of reporters by name, call letters and street addresses. This is important. The member who has a news item will not report it to a staff member if he can't find out where the staff member lives or where to get in touch with him. This takes up some space in a small paper, but it has a two-fold advantage: it lets the members know to whom they may report news and it gives publicity (the only pay for club reporters) to those who spend time working on the club paper.

Finally, keep plugging away at the names, addresses and call letters of the Novices and their progress through the stages of Technician and General class. The future of the club depends on the development of membership lists and these may come only from the Novices and Technicians. Many a club has deteriorated because old-timers insisted on keeping control in their own hands and holding off the new and younger members.

Publication of a club paper gets to be a chore, month after month. It can become a boresome task if the members are not interested in it and if it doesn't tell news about them. Even the reporters lose interest when news items wane. However, it becomes interesting in proportion to the amount of news concerning club members that it carries. It is up to the editor and reporters to keep the paper lively and interesting. This in turn will make the club active and interesting, too. And that is, after all, the ultimate goal of a club paper —an alert amateur radio club. ■



". . . Gentlemen, not only will this unit be optimum for space communications but it will have a high value on the surplus market when you're through with it!"

UHF [*from page 59*]

Anthony Mallard, K3KOH, 2151 E. Monmoth Street, Phila. 34, Pa., is looking for a circuit to construct a t.r.f. type v.h.f. receiver for 6, 2 and 1¼ meters. He would like it to be completely transistorized and is looking for information on the subject.

Tower Hines, WA6LBM/AL6LBM has informed us of some interesting information for you surplus hounds, on how he converted a TRC-8 from f.m. to a.m. and lowered its frequency to the 220 mc band by using an empty ½ lb. coffee can. Tower says, "I recently converted the TRC-8 transmitter to a.m. (from f.m.) and lowered its frequency to 220 mc with the use of an empty ½ pound coffee can. The T-30, as the singular component of the TRC-8, uses a large, closed cylinder with an expanding, spaced inner sleeve to produce capacitive reactance for the tuned circuits of the oscillator grids, plates, and the final grids. (Three separate inductive coupling loops one from each of these circuits are mounted on the cylinder.) The adjustable portion of the inner sleeve slides on the inner surface of the fixed sleeve, therefore its surface is further from the outer cylinder. The coffee can fit perfect, snug against the wall (inner) of the outer cylinder and about ¼ inch short of the beginning of the fixed, inner sleeve, so shorting would not occur. The coffee can lowered the frequency 8 mc, without loss of stability. (I also added regulated screen voltage for the oscillator). The TX tuned from 230 to 250 mc on the dial and approximately 2 mc lower to the stop. The latter can be loosened and full range of the ¾ meter band can be tuned without further adjustment. I tried everything else without success and resorted to the coffee can in desperation." Thank you for this interesting information and I am sure it will help out many people in a similar situation.

I'll close the column this month by advising you of the First Annual Southern California v.h.f. Jamboree sponsored by the Microwave Society of Long Beach. It will be held at the Lafayette Hotel in Long Beach from June 14th to 16th. It appears to be a roaring success and they expect to draw attendance from all parts of the United States. The Jamboree will feature many electronic exhibits, special events, talks and demonstrations including a tour through the modern Antenna Labs of Douglas Aircraft and a complete OSCAR tracking station. For the family there will be tours to Disneyland, Marineland, and Knotts Berry Farm. The Jamboree is limited to strictly v.h.f. and up and preregistration including banquet before May 15th is $5.50 per person, or $6.00 at the door. Preregistration for general admission only is $2.00 or $2.50 at the door.

For more information, drop a line to the Microwave Society of Long Beach, Inc., P.O. Box 3303, Long Beach 3, California.

That passivates our junction for another month, see you in 30.

73, De Don, W6TNS

Sideband [*from page 63*]

12th Annual Sideband Dinner

New York, the month of March, and the sidebanders from all over the country make up a winning combination each year and this year was no exception. The 12th Annual Sideband Hamfest and Dinner, held at the Statler Hilton Hotel in New York City on March 26, attracted many of the top sidebanders of the country from the fields of operating, manufacturing, and administration. We just wish we could list all the wonderful people who were there but there's just no room for 1,000 names.

It was most interesting to see the preponderance of transceivers presented this year. Hallicrafters, Sonar, Swan, Heath, WRL, Collins, National, and SBE spotlighted their dual purpose rigs while Hammarlund and B&W emphasized their newest in fixed station equipment.

Following their successful luncheon of last year, The Hallicrafters Company again played host at a noon-time repast, this year in conjunction with the ARRL. About 80 top names in amateur radio were in attendance including executives of the League, of manufacturing companies, of the FCC, *CQ* and *QST*, top DXers and the visiting contingent from Puerto Rico. It was a remarkable get-together of "Who's Who" in ham radio and a wonderful time was had by all.

The dinner also had its share of celebrities, including our favorite Master of Ceremonies, Bill Leonard, W2SKE, who, as usual, set just the right note for the evening. The steak dinner was delicious; the prizes were plentiful, including two main door prizes donated by Hammarlund and Hallicrafters, and—you guessed it—again a wonderful time was had by all. See you in New York next year?

73, Irv and Dot

Ham Clinic [*from page 64*]

Antenna Current Downward—"I have a home-built plate modulated transmitter and note that when I modulate it, the antenna current (as indicated on an antenna ammeter) goes down. What is the cause of this?"

Not enough excitation, poor bias regulation, insufficient bias or a possible overload of the modulator. Also, you may be using a power supply with insufficient dynamic range, *i.e.*, insufficient current supply capability on modulation peaks.

S.S.B. Power Supply With Silicons—"I require a power supply that will give me 700 to 800 volts at around 225 ma, 45 to 50 volts bias and 200 to 225 volts for the screen. I want to use silicon rectifiers. Can you help?"

Yes. In *CQ* for October 1962, page 34 is a power supply that meets all your requirements and then some! You can use as much or as little of this supply as you feel necessary and careful selection of transformers and dropping resistors

Random Thoughts . . .
From the Boys in the Back Room

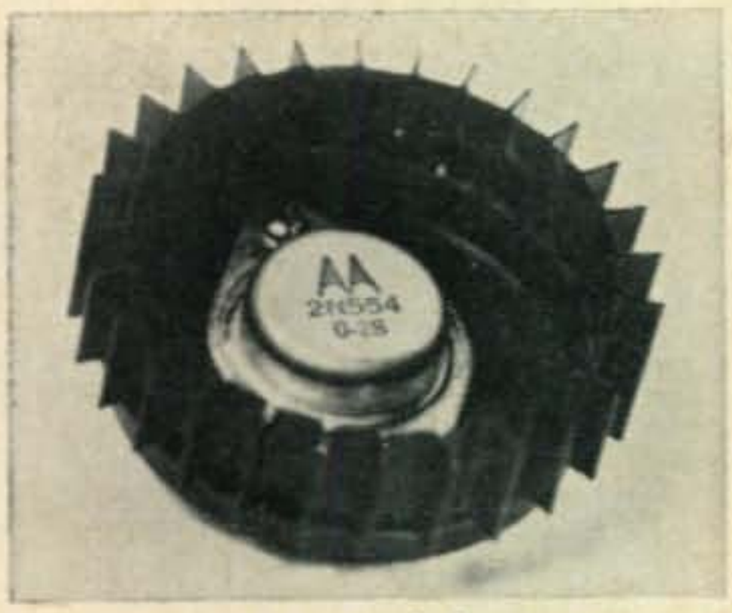
THE manufacturers who advertise in *CQ* represent the life blood of the Amateur Radio Fraternity. Whether it be parts for a construction project or a complete factory assembled station, when you want it, you want it in a hurry, and you want it to be right.

CQ's advertisers stand behind their products and service. They've learned from years of experience that a happy customer is a repeat-business customer. They also have the foresight to reinvest profits into research toward developing new and better products, and into advertising to make you, the amateur public aware that these products are available. In most instances, the products advertised in *CQ* are sent to the *CQ* lab for test and evaluation. This is further evidence that the manufacturer is proud of his wares and eager that they may be put to the most stringent tests.

If an item is advertised in *CQ*, it's a virtual guarantee that the manufacturer's specs are accurate and honest. And if the product is reviewed in *CQ's* editorial pages, then it's been through our testing labs and been carefully scrutinized. Beware of the manufacturer who hasn't the confidence to advertise his equipment or submit it for examination. In the long run, you'll get far more value for your dollar buying advertised products—and far more satisfaction.

will give you the voltages you need.

New Heat Dissipator for Semiconductors—The Cool-Fin Electronics Corp. of 1717 N. Potrero Ave., South El Monte, California has announced a new heat dissipating device for semiconductors. These units are ideal for use with power transistors in transistorized power supplies. Designated the CFQ 200 series, more info can be obtained on them from the address given.



Cool-Fin Electronics heat sink for power transistors.

RSGB Amateur Radio Handbook—"Does the British ham society have a radio handbook of their own? If so, where and for how much can I obtain one?"

Yes, the Radio Society of Great Britain does publish a handbook. It sells for $5.50 postpaid, contains 544 pages and 22 chapters. It is indeed a fine book, and HAM CLINIC recommends it. Address your order to: RSGB, New Ruskin House, 28 Little Russell St., London W-1, England. There are a number of items in this book presented in a very different way and not found in all radio handbooks. We are glad to help out the RSGB by mentioning it.

A.F. Choke Value—"What happens if I use a 5 instead of a 10 henry choke (in a power supply) rated at half the current."

You'll have magnetic saturation, a reduction of inductance and of course inferior filtering action.

Thirty

Writing the HAM CLINIC column for *CQ* is not the major part of our effort, for answering the hundreds of letters received each month (especially during the Winter) takes up the largest portion of our spare time.

Many letters are now being received directly at our home QTH in Switzerland (4 Lutzelmatt Str., Luzern) and are being answered within three days after receipt. Those sent to CQ must be forwarded to us and take up to a month or longer. If you are willing to take the trouble to obtain International Reply Coupons at the Post Office and send them along to us directly, you can bet we feel more than obligated to answer you quickly. However, we try to give the same service to readers writing us at *CQ* in New York.

We are now settled enough to work on a few construction projects and should have something interesting before too long for you.

Until the next issue then, our very best to you, our faithful readers. Chuck

Pacemaker [*from page 39*]

sure the metal doesn't ground the studs on the balanced modulator coil. Switch the meter to the grid position and remove the 5R4GY. Fire the rig up and, following the instructions in the manual, peak the trimmers and slugs for maximum grid current. The drive is about adequate on 10 meters so it may be wiser to peak for maximum around your favorite frequencies. The cogniscenti will understand that stagger tuning the coils on each band (up to 20 meters only) will eliminate the need for retuning the exciter knob after QSY.

Replace the 5R4GY and neutralize by the procedure in the manual. In my rig the capacitor C_{166} ended up almost fully meshed; if you find more capacity is required a 4.7 mmf 3 kv capacitor or a wire gimmick should be used.

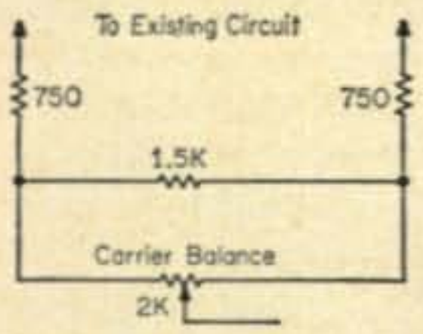


Fig. 1—The 2K CARRIER BALANCE pots R_{26} and R_{31} are disconnected from the existing circuit and rewired as shown above. This vernier circuit permits more exact adjustment.

The Balanced Modulators

In order to make nulling the carrier easier the balanced modulator controls were both modified (see fig. 1). Slosh the controls out with a good cleaner to insure smooth operation. If you want to remove the controls beware of another nut between the panel and chassis. As you slowly pull the control out, keep a pencil against the shaft end so the nut doesn't fall. This modification gives at least a 3:1 vernier which makes nulling less critical. Remove the CARRIER INSERT control R_{67} and examine the carbon track. If it looks good, clean the control out and remount it. While the iron is hot replace R_{86} off the CARRIER INSERT pot, with a 2.2 meg 1 watt to reduce carrier variations when operating a.m.

If, when working s.s.b., you notice that your carrier suppression jumps erratically its a good bet that one or both of the ECC81 balanced modulator tubes is microphonic. While operating, observe which control has to be adjusted to reduce the carrier again. The tube connected to that control is the culprit. I had to try four new ECC81s to find two that were stable enough! A quick check on new tubes is to fire the rig up on a dummy load and null the carrier out (either sideband position). Couple a receiver so you get an S meter reading of about 3 or 4. Tap the balanced modulator tubes lightly. If the S meter goes up appreciably that tube is unsuitable.

While you're at it, find a good ECC81 for the phase inverter, V_4. I cannot emphasize too strongly the need for two really choice tubes in

[*Continued on page 103*]

RTTY [from page 68]

A National 2-Meter RTTY Channel

In the March '63 RTTY Column we proposed that 146.70 mc be established as the "national" RTTY channel for 2 meters, to replace the 147.96 lost because the FCC put the c.w. portion, petitioned for by the ARRL, up at the high end of 2. Many interesting comments have been received:

ARRL: In March '63 *QST*, ARRL says that they would like to see us back on 147.96 (*which would exclude the Novice and the Technician*) and that "regional determinations seem adequate."

New Jersey (Southern): This group has operated many years on 146.70 a.m., working largely through the Philadelphia/Camden areas as far south as Washington. Their reasons for selecting 146.70 follow in general those given in the RTTY Column.

California (Southern): RTTY, Inc., reports many nets, (Novice, Technician, and General) all in operation separately in the Los Angeles and San Diego areas.

Virginia: The Lynchburg group is in accord with the recommendation of 146.70, with the additional recommendation of theirs for f.m. operation.

Chicago: The South Side, including Cook and Dage Counties, has been on 146.70 f.m. for some time with the nearby Indiana (Gary) group. The CATS in Chicago proper are now changing over from 147.70 to 146.70 f.m. to achieve greater coordination.

Wisconsin (Milwaukee): This group has been on 146.94 f.m. since 1958. They suggest an f.m. frequency between 146.70 and 147.00.

Minnesota: This group has been working a.m. on random frequencies. They can see the advantage of an established channel and will go along with 146.70.

Indiana: Operation is already on 146.70 f.m. with about 20 stations in Lake and Porter Counties. This frequency was chosen because of its closeness to 146.94 and to avoid other channels already in use by other groups.

Oregon (Portland): Limited operation has been on 147.70 but they can see the advantages of an established channel, so they will move down.

No one has actually raised an objection to 146.70. Fundamentally, many of us want to again see a "national" frequency established and publicized to (1) utilize frequencies more efficiently in the high density areas, such as Los Angeles and New York; and (2) increase the possibility of contact in the low density areas, such as the Midwest. Also, we feel that we should not exclude the Novice and Technician groups by establishing an RTTY frequency that they cannot use.

We therefore recommend 146.70 for a.f.s.k. RTTY as the "national" 2 meter frequency along with the already well-established 6 meter frequency of 52.6 Mc. 73, Byron, W2JTP

sound like beautiful music. It is also a challenge to those who like keen competition."

As possibly the best known YL operating on c.w., Kay has created thousands of international friendships and created a tremendous amount of good will. We are all proud of you, Kay, and grateful for the fine example you are setting of amateur radio at its best.

CHC Convention

K2UKQ, Kay, first gal in the world to earn CHC-200 Top Honors Award, will probably receive her Arne Trossman Top Honors Plaque at the CHC convention, to be held in conjunction with the National and FHC conventions at Cleveland Oct. 4-6. Also to be presented at the CHC convention is a lovely trophy for the high scoring CHC'er YL in the CHC/HTH annual QSO Party to be held May 31-June 3. K8MZT, Shirley, is chairman for the YL affairs and KØRGU, Tillie, "queen" of the CHC'ers, is planning a colorful pageant. . . . Clif, K6BX, guiding star of the CHC'ers, requests samples of all awards and certificates for master display at CHC, FHC and ARRL National Convention at Cleveland.

The CHC "Hunt the YL Hunters" certificate is off the press (for pix see K6BX dept, May *CQ*). Rules in this column Oct. '62 *CQ*. KØRGU, Tillie is custodian.

Congratulations . . .

To WA4BMC, "Mike" for making BPL 11 times; she is a member of CHC YL Chap., is NCS on SETN 365 days a year, acting net mgr., checks into five phone traffic nets a day and working toward 35 wpm c.w. . . . Congrats, again, to W4UF, Dot, who has been elected the "sweetheart" of the Flying Hams Club. Dot has DXCC, over 100 certificates, is a member of QCWA. . . . Congrats to VE3DKY, Jeanne Robinson, for earning WAZ #1758 — only the 18th YL to achieve this award. . . . Congrats also to the KH6 YL Club in their successful efforts to establish a Ham station (KH6EOQ) at Tripler General Hospital, especially to KH6's AFN, AFC and AFL, who did the planning. KH6EOQ is being used by servicemen at the Honolulu hospital for MARS and morale.

Here and There

A newly organized club is known as the YL International SSB'ers, Inc. Any YL can join; membership is $1 per year which includes monthly newsletter. Officers and certificate rules were listed in K6BX's column, April *CQ*. Certificate custodian is K4ICA. The SSB'ers meet every Tues. and Thurs., 14.333 kc, 1800 GMT (1300 EST).

The 20 m YL s.s.b. net has changed freq. to 14,288 kc—Wed. at 1900 GMT, K6KCI & WA4-FJF NCS.

33, W5RZJ

Ham Shop

Rates for the Ham Shop are 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.

QSLs?? WPE's?? CB's?? Biggest variety samples 20¢ (refunded). Sackers, W8DED, Holland, Michigan.

QSLs Samples 25¢ Rubber stamps; name, call, address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSL's SWL's $2.95 per 100. Beautiful; highest quality; 5 color rainbows; Kromekote stock. Seeing is believing! Samples 10¢ refundable. J. Harms, 905 Fernald, Edgewater, Florida.

QSLs—$2.00 per 100 postpaid U.S. only. Glossy, red and green. Free sample. Hobby Print Shop, Umatilla, Fla.

QSL's SWL's, CB samples 15¢, Nicholas & Son, Printery. P.O. Box 11184, Phoenix 17, Arizona.

QSLs SWLs that are different, colored, embossed card stock and "Kromekote." Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QSL Kromekote 3-color . . . order 200 get 25 each of 8 different styles . . . many styles. Samples 10¢. Progress Printing. Box 1154, Biloxi, Miss.

QSLs four colors glossy stock, forty designs—send $5 for 200 and get surprise of your life. 48 hour service. Satisfaction guaranteed. Constantine Press, Blandensburg, Md.

GLOSSY 3-color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service 7 Fairfield Rd., Somerset, N. J.

QSLs—SWLs samples 10¢. Malgo Press. Box 375 M.O., Toledo 1, Ohio.

QSL Cards in 3 colors $2.50 per 100. Free samples and catalogue. Garth Printing, Box 51Q, Jutland, New Jersey.

QSL cards: 2 color, glossy; 100 for $2.50. Samples, Dime, Ramsbottom Printing, Box 237F, Kirksville, Missouri.

QSLs Samples, dime. Print Shop, Corwith, Iowa.

QSLs CBL's—Finest quality—extra fast service on stock or custom designed multicolor cards. Samples and catalogue 25¢ (refundable). Dunnahoo, 516 Prospect, Fairview, Mass.

RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box 7507 Kansas City 16, Mo.

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.

QSL's—100—$2.50. Samples. Dime. AMEE's Printery—W9FXQ—Box 138, Oak Lawn Illinois.

QSL Cards Brownie, W3CJI—3110 Lehigh, Allentown, Pa., Catalog with samples 25¢.

QSL's 100 $2.50. Samples free. Amee's Printery, W9FXQ. Box 13, Oak Lawn, Illinois.

SELL 75A-4, serial 5446, speaker, 2 filters, $575, absolutely like new; stereo Fisher am-fm 101-R tuner, $100; stereo amp-preamp, Bell 3030, $95 and TEC transistorized stereo amp, $95; 2-6550 tubes each $4; 2E26 tube RCA never used, $2; E-V 600 D mike, as is, working, $5; mobile, power supply with relays, etc. ready to go, 6 volts in, about 400 volts, 350 ma. out, $25; Johnson 275 watt matchbox, $30; VFO-matic for transceive operation with 74A receivers, $90. All in excellent or like new condition. F.O.B. Lamb, 1219 Yardley Rd., Morrisville, Pa.

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.

WANTED Army Sets or Parts. GRC, PRC, FRR/URR, TCC, SB, SCR Send Listings. Quick Cash. Anker Electronics, 1617 So. Main St., Box 26, Wilkes Barre, Pa.

TOROIDS Uncased 88 mh like new. Dollar each. Five $4.00 p.p. DePaul, 309 South Ashton, Millbrae, Calif.

METERS All ranges. Reasonable prices. Write your needs, all inquiries answered. W1VYQ, 19 Chesterfield Rd., Northboro, Mass.

Pacemaker [*from page 97*]

the balanced modulators. It is well worth your while to spend several nights on the air selecting them. Just slide the chassis back in the cabinet for on-the-air operation and, if the need to change a tube arises, simply sliding the chassis out about 5 inches will give enough room to change the tube. Make sure you turn to OFF; STANDBY still leaves B plus on in the set.

Power Transformer Considerations

After studying the power transformer in an Invader (it's the same physical size as the one in the Pacemaker) it was decided that if it could handle two 6146s in one it could in both. Thus the final was modified and the existing power supply used for several months, except that the 5U4G was replaced by silicons.

I finally decided to replace the remaining 5R4G and 6X4 with silicons even though the power transformer seemed to handle the added load. The savings in filament power alone amounts to 25 watts not to mention a desirable reduction in internal heat. The savings of 25 watts should equal the average power used by the extra 6146.

Looking through the ads in the back of this book it was found that silicon rectifiers could be purchased very reasonably. Enough material has been written previously regarding mounting and precautions to be observed when using these units so we won't go into that again. A look at the photo will show two methods used in this rig.

The 5U4G should have a p.i.v. rating of 1200 volts in each leg; the 5R4GY a p.i.v. of 2400 volts and the 6X4 around 800 volts. If you choose to mount the rectifiers on an old tube base check to see where the cathode leads go. The circuit shows the filter chokes wired to pin #2 of the sockets but a look showed they were actually connected to pin #8! I wired two silicons under the socket for V_{18} and the tube now in the socket is an 0B2 which feeds bias to a linear.

Thanks to the choke input, no trouble has been experienced even though no balancing resistors are used and the p.i.v. rating is close to the limit of the silicons.

At first no surge resistor was used but I discovered the surge damaged the on-off switch, so a globar resistor (Workman #051) was wired between the center tap of the power transformer and ground. The wiring was brought up through the chassis to the globar mounted on L_{31}.

After the rig has operated satisfactorily for several days you can complete the audio balance and phase shift adjustments. You can be sure now that when you set the adjustments they will stay put! My rig has operated in this manner for about 8 months now and no troubles have been experienced even though both B supplies are running about 10% higher than before. I consider the time and money spent on these modifications worth while and, except when chasing DX or under poor conditions, the exciter is used barefoot. This amounts to about 85% of operating hours. ■

220mc. Information Frequency, Equipment, Schedules. Postage Returned W9DJ.

STILL LOOKING for old wireless gear before 1925. Will pay good money or trade and particularly want certain spark equipment, a C.R.L. Paragon with amplifigon or matching tube panel, De-Forest Type O radiotelephone with tubes, catalogs, government call books and other books. File of QST's is almost complete but need a few issues of 1916, 1917, 1919 and 1923. If you are lucky, enough to own any copies I need, I will pay real money for them. I want them that badly. Also need quenched sections number SE1001 for SE1075 ship transmitter. In writing please give complete information plus price or specify what you need. W5VA/W5AI, T. Frank Smith, P.O. Box 840, Corpus Christi, Texas.

FOR SALE: Complete instructions including 28 page booklet and 22" x 36" schematic for converting the ART-13 transmitter to a.m. and s.s.b. Satisfaction guaranteed. $2.50 Sam Appleton, 501 N. Maxwell St., Tulia, Texas.

COMMUNICATION Teletype unusual surplus bargains, Free flyer. MDC-923 W. Schiller, Phila. 40, Pa.

CONVERT any television to sensitive, big-screen oscilloscope. Only minor changes required. Plan $1.95. Relco Industries, Box 10563, Houston 18, Texas.

MULTIPLEX Adapter—Circuit board set of 5 coils, sockets and complete instructions $15.00. D. L. Stoner, Box 7388Q, Alta Loma, California.

READY CASH for your AN/GRC, PRC, TRC, TCC, ARC, all Military communications Equip't. Also test gear: TS-; AN/UPM, URM, etc. We Pay Freight. Call K2BBC collect at TR 8-5222 or Write Space Electronics Co., 218 W. Tremont Ave., Bronx 53, New York.

ATTENTION! Swap equipment, components with other hams! Many interesting offers in Equipment Exchange. Sample copy free! Write: Brand, Sycamore, Ill.

LOOKING? Shopping? Trading? Trying to save money? Write Bob Graham for Special Deals on new and guaranteed reconditioned used gear. Cash or Budget. See us at the Swampscott Hamfest. Graham Radio, Dept. B., Reading, Mass. Tel: 944-4000.

TRADE-ins accepted on purchases of demos and brand new Ham, CB, Marine and Hi-Fi equipment. We are one of the largest retailers in the country and carry complete lines of new equipment of almost all manufacturers in stock. Time payments —up to 24 months—arranged. We will also buy your used equipment for high cash prices. Many specials available. Call Bob at Crown Electronics, 64 Cortland Street, N. Y. 7, N. Y. Worth 4-0790 for real money saving deals, whether you have something to trade-in or not.

WANTED Radio correspondence course, also back issues of Electronic World and Popular Electronics. Thomas Condon, 321 Moreland St., S.I. 6, New York City.

MODEL 19 teletype machine for sale. This machine is complete and is in very good condition. Sorry, will not ship but will crate. Contact Larry, K9BJM, Hoopeston, Ill.

SELL KWM-2 purchased Dec. 62, Ser. 13642 $940; A.c. pwr. supply $90; VFO-matic for 75 A receivers, $80; Johnson Matchbox-275 watts, $30; all guaranteed perfect, F.O.B. Lamb, 1219 Yardley Road, Morrisville, Pa.

SELL Collins 75A-4, #2163, with speaker $440, Hallicrafters HT-32A, #230705, $400 with manuals and in good condition. Both for $815, or best offer. No trades. Rule, W4ZUK, 2817 North Atlantic Boulevard, Ft. Lauderdale, Florida.

WANTED High power rf tubes for a final, also want several 4-400's 810's, 833's. Please price them low. Sam Kofsky, W2YSF, 201 Eastern Parkway, Bklyn, 38, N.Y.

KWS—1+75A4 $1200 for both. Gonset Communicator IV 2 meters $200 or best offer over. All A-1 condition. Will ship. W5VPN 1300 Walter N.E., Albuquerque, New Mexico.

ENGLAND. Established radio and TV company would distribute ham gear throughout England and Europe, arranging demonstrations and storage, etc., money transfers arranged. Excellent references. Contact S.G. Spiegler, G3RIA, Spiegler Ltd., 898 Garratt Lane, London, S.W. 17, England.

FOR SALE 1-Viking Kilowatt, complete with right hand desk, $800; 1-Viking Ranger, $150; 1-Viking Pacemaker, $200; 1-70 Rohn Tower Model 25, $70; 1-Mosley 40 meter beam, $50; 1-SX-101 Receiver, $200, with speaker; 1-SX-88, with speaker, $100; 1-Globe King 500C, $400. All gear my personal ham shak and guaranteed by K5YUA, Melvin Rogers, 301 N. Canal, Carlsbad, New Mexico.

416B TUBES Good—Used—Unboxed. Guaranteed. $10 each. K6SQT, Box 2194 Pine Grove, California.

SELL HT-33 Excellent Condition $300. or best offer and will deliver 100 miles. Donald Farrell—WA2WEE, Chittenango, N.Y.

FOR SALE R-388/URR receiver $250; Viking invader (new) $500; TT-55/mgc teletype $100; Magnecorder tape recorder $100; TV50 Genometer $25. Simpson 480 Genescope $100; 4X250 B tube $10; used Vidicon tube 6198—$25; used Motorola 2-way radio & BC-1031C Panoramic adapter. Harry L. Parker, P.O. Box 303 Georgetown, So. Car.

WANT 220 432 gear. W9DJ.

more expensive to use miniature components. The majority of components are on a small piece of Vector board, and the rest on the 3"×4"×6" aluminum chassis. Two Keystone #182 battery clips are mounted on the back of the unit for the penlight cells. A second 12 volt battery, B_1 in fig. 9, is used only for bias and the current drain is so small that it permits the use of any miniature hearing aid type unit. The front panel was dressed up with a sheet of Contact.

Component substitutions can be made provided the unit being substituted is close in characteristics. The types specified are quality components and for longevity, should be used.

Adjustment

The adjustment of the unit is as simple as building it. Connect a mechanical keyer to J_1; it must be the two-circuit type. Methods of adapting bugs and straight keys for this application have been covered elsewhere and will not be repeated here. To begin the adjustment connect an ohmmeter across the normally open relay contacts. Close the dash circuit (CR_2 cathode to ground), adjust the speed for a moderate value, and then adjust the weight control for a 75% scale deflection (this is 25% up from zero ohms on any ohmmeter range but reading on a linear scale). This corresponds to a 3 to 1 mark to space ratio for dashes. Mark this position on the panel. If the potentiometer is wired correctly, clockwise rotation will give a higher percent deflection. If not, reverse the connections to the pot. As the speed is now varied, little variation of the percent deflection will be observed.

Repeat the above procedure with the dot circuit, but adjust the meter deflection to 50%, giving a 1 to 1 mark to space ratio.

The reason for keeping the speed controls separate was twofold. First, it was not felt that one would like being restricted to specific dash and dot rates, which would be the case if the speed pots were ganged. However, if separate controls are not desired the pots may be ganged. Secondly, ganging the pots causes a slight tracking error, and once the panel is calibrated with most used speeds, it does not require much effort to change both dash and dot speeds.

Timing capacitor values provide a broad range of speeds. Should the Tee-Key be too fast, or too slow, change C_2, C_3, C_6, and C_7 to larger or smaller values, respectively. Do not change the timing potentiometers, since too high a value of base resistance will not allow the transistors to saturate, causing excessive heating. Variations from standard values often produces nicer sounding tones.

Careful component selection will result in a total cost from $20 to $25, a far cry from the commercially available units. The Tee-Key is a Saturday's afternoon of work that will give a lifetime of neat "brass pounding". ■

DON'T miss a single issue of the Ham Trader, Magazine devoted to buying and selling Ham equipment. Don't pay for ad unless item is sold. Send for free sample. Write the Ham Trader, Box 174 Dept. C, Franklin Square, N.Y., or call 516-FL 2-1913 Sat.

FOR SALE 1957 Motorola Communications Center—1 B44AAB-1 Base Station; 1 DS-9645 Antenna; 1 DS-9632 Transmission Line Kit (115' #740); 1 FSC-2(a)1 Remote Console; 1 TU-151 Microphone; 4 T44AAV-1 Mobile units; 3 P-92 Accessory Groups; 1 F-94 Accessory Groups; 3 TU-433 6 volt speakers; 1 TU-433 12 volt speakers; Original cost of equipment—$4,802.50. Will sell for $1,000. A. M. Westerman, 18841 John R. Street, Detroit 3, Michigan.

QUESTION Want to design a QSL or CBL Card? Cost—25¢ for a sampler instruction kit. $1.50, $2.50, $4.50 per 100 for reproducing design on the card stock of your choice. A new idea! Offered by: Samco, Box 203 Wynantskill, N.Y.

WORLD's largest stock of premium quality reconditioned equipment! Terms! Trials! AF-67 $89.95; GSB-100 $329.00; HT-37 $375.00, Cheyenne $89.95; DX-100 $169.00; DX-40 $49.95; Apache $219.00; Challenger $79.95; Viking II $169.00; Valiant $299.95; Geloso G-209 $149.00; G-66 $89.95; SX-101 $239.00; Commanche $89.95; NC-109 $119.95; RME-6900 $249.00. Leo, WØGFQ, Box 919, Council Bluffs, Iowa.

FOR SALE Hammarlund HQ-100 with matching S-100 speaker and Johnson 6&2 meter converter. A-1 condition $200 or make offer. Terry L. Jimp, 702 Maplewood, Willard, Ohio.

SELL power converter, Cornell Dubilier model 110SH40, 600 watt vibrator converter 110 volt d.c. to 60 cycle a.c. Little used $65. D.O. Romain, 124 Romain Ave., Pompton Lakes, N.J.

SELL SX 101A $250; HC-10 s.s.b. converter $75; Transtenna T-R switch Model 102, outboard $50; all like new and F.O.B. . . . Lamb, 1219 Yardley Rd., Morrisville, Penna.

SELL Collins 75A-4, #2163 with speaker $415; Hallicrafters HT-32A #230705 $375, with manuals and in good condition. KWM-2 with a.c. power supply $790. No trades. Rule W4ZUK, 2817 North Atlantic Boulevard, Ft. Lauderdale, Florida.

WANTED Johnson Kilowatt matchbox. State condition and lowest price to John S. McCracken, K8XYM, 51-22nd Street, Wellsburg, W. Va.

FOR SALE or trade, model 15 teletype, K5DNH, 200 Charles Drive, Lafayette, La.

HEATH DX-20 for sale. Good operating condition $17.50. Bill Keane, K2KXW, 171 Laurel Ave., Arlington, New Jersey.

CANADIANS KWM-1 with noise blanker. Just aligned and checked by Collins. D.c. supply, a.c. supply, mobile mount, 20 meter Hustler $800. Hallicrafters HT-33 Kilowatt not used since completely overhauled by Hallicrafters, $700. F. Gaspard, 143 Smith St., Winnipeg.

WALKIE-TALKIES 75 meter phone, complete matched sets, BC-611, MAB, $55. BC-745 pogo sticks, $55. Absolutely perfect BC-221-C new, with original case, calibration manual, unopened instruction books, etc. $75. Perfect LM-5 $50. Sylvania gun-type geiger counter $25. Master Mobile remote antenna tuner, 12v, $15. Tom Perera K2DCY, 410 Riverside Drive, NY 25, N.Y.

WANTED DX-40. Also selling DX-20 for $30. WV6ZBZ, 149 Oregon Rd., Ureka, Calif.

HRO-60 one owner guaranteed perfect, recently aligned, coils for 500 kc thru 30 mc $349. Don Parrott, Box 277, Idaho Springs, Colorado.

WANTED old radios manufactured before 1925, especially Grebe, Murad, Paragon and Zenith. J. Worcester, R.D. 1, Frankfort, N.Y.

HEATH mobile/fixed ssb HR-20, HX-20, HP-10, HP-20, factory aligned and checked, mike, $297; Cheyenne with xtal socket, ac power, $100; Gonset G-66 with speaker 12/110 power supply $120; matched pair BC-611 $40; All FB shape. ART-12 with cal book all tubes, as is $30. Prefer pickup. W8VXL Box 218 Delton, Michigan. Tel: MA 3-6631 eve.

75A-4 w/1.5 & 3.1 kc filters, ser. 2662, new condition, no modification. Best offer over $450. Reason: bought 51J. Will ship. W9DXV, Box 87, Webster, Wis.

COLLINS KW-1 transmitter sold new for $3800. This is the Rolls Royce of am 1 kw transmitters and is in mint condition. Make offer to W2QJT, 630 Highland Road, Ithaca, N.Y.

WANTED two old style navy double-decker hand key knobs. W1BB.

YL General License, seeks position, New York City or vicinity where technical background plus office skills can be applied. Write, YL, G.P.O., Box 952, New York 1, N.Y.

FOR SALE HQ 110C like new with Ameco Pre-Amp. $170. Heath Shawnee 6 meter transceiver 6 mo. old. A real jewel $200. Russell Stull, 1400 Helma Av., Hamilton, Ohio. K8YYH.

HRO-60 complete with A, B, C, D, E, F, AA and AC coils, nbfm, calibrator, selecto-ject. Perfect for DX, cw, am, ssb. Make best offer to W2QJT.

CLEANING OUT shack New 4E27 tubes, pair for $6; three 6146s for $5; Bliley 100kc crystal $3; Coaxial relay $6; bargain. List free. KØMVR, 424 Twentieth St., N.E., Cedar Rapids, Iowa.

SELL OUT Almost new HQ-110C, $179; DX-20, $29.95; modulator for DX-20 $5.00; Heath VF-1 vfo, $17; power supply for vfo—$7; QF-1 Q-multiplier $8.50; Brand New BC-522 $22.50. Bill Boyd, 128 Blackburn, Elk City, Okla.

It takes a banker to know a good buy

. . . Collins

S S B EQUIPMENT . . .

and it takes Terry, W9DIA

to come up with a LOW LOW 5% INTEREST RATE

"Hi! I'm Lowell McNeil, W9PTN, president of the West Racine Bank in Racine, Wisconsin. As a banker, I can assure you that Collins radio equipment is an excellent investment. It has quality, performance and top trade-in value. These are the things we bankers look for. Many banks offer special finance rates on Collins equipment, just as Terry is offering here. I have KWM-1 at the office and a complete Collins station at home. I've been 'all-Collins' for many years."

LOW AS 10% DOWN PAYMENT — TAKE 1-2-3 YEARS TO PAY!

	Amateur Net	(1 yr.) (10% Down)	(2 yrs.) (20% Down)	(3 yrs.) (30% Down)
30L-1 Linear Amplifier	$ 520.00	$ 40.95	$ 19.06	$ 11.62
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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SCHAUB-LORENZ T30 automatic am, fm, sw, lw, West-German transistor radio, $110. Schultz, 49-15 Skillman Ave., Woodside 77, N.Y.

ROTO-BRAKE Hy-Gain Model RBX-1 for sale, complete factory reconditioned, $80. W5LDH, 29 Snipe St., New Orleans 24, La.

WANTED Jones Micro-Match 261/262, K1IIK.

COMPLETE mobile rig. Heath Cheyenne with mike, $75. 12vdc, $40 and 110vac, $25, solid state power supplies. Gonset Super 12, $70. Gonset noise clipper, $10. Johnson vswr coupler and indicator, $30. Master Mobile base mount, bumper mount and heavy duty chrome plated spring, $20. Spare tubes for Cheyenne, $10. Complete rig only $225. All in top condition with manuals. D. E. Judevine, 3060 Frankford Ave., Philadelphia.

HAM FAMILY going hi fi. Two high powered xmitters, three top quality receivers plus many accessories (antennas, rotators, etc.) also mobile station. Send for list. WA2LIM, 146-31 60 Ave., Flushing 55, N.Y.

WANTED Heath Twoer with mobile power supply. Must be in A-1 cond. Karl Schneider, 5023 Florinda Av., Temple City, Calif.

FOR SALE National NC-109 Receiver, excellent condition, used sparingly, $110. Tom Wilson, 105 Orchard St., Northfield, Minn.

KWM-2 with late vox, 516F-2 ac supply. Like new with cables, manual and factory cartons. Both for $795 firm. Closing down station so no trades please. Save $120 plus over a dealer. W7PGA/6, 1139 Doon Court, Connyvale, Cal. Tel: 244-9267.

TRAVEL ABROAD Cheaper, more fun through the N.A. Ham-Hop Association. Summer travellers note: 2-month minimum needed to arrange "hops" . . . W8SZE, 3075 Scarborough Road, Cleveland 18, Ohio.

FOR SALE Reconditioned, excellent teletype 60 wpm sunc. M15 w/keyboard $90. W/auto-carriage-return-line-feed $150; M19 w/table & TD $240; M19 keyboard $55; M14 typing reperforators w/keyboard $125; w/o keyboard high or low base $75; with line count switch and/or distributor (requires external tape head) $15 each, extra. FPR5H $45; 9 channel TD $150; tri-channel TD $90; (AN/TG C cover CQ January 63) ANTGC set (tri channel TD + 2 typing-reperf.) $175; Automatic Electric auto-tape relay equip. AN/GGC-2 75 wpm available, 60 wpm. Excellent cond. Dual channel $325. Single channel with tape in storage $245. Repairs and reconditioning. M14, M15, M19. Frank Holloway, Jr. 513 N. Pinehurst Ave., Salisbury, Md.

POLYCOMM PC "6ac" 6 meter transceiver in excellent condition, $190. Need cash for college. Kellersman, Stonybrook Road, Darien, Conn.

GONSET Super six converter, 80 thru 10m. First $22 takes it. W3JJU, John Hollar, RD 1, Mt. Bethel, Pa.

MOBILE transistor power supply kits and transformers 120 & 200 watt kits $33.95 p.p. Dual supply kits $43.95. Additional information for stamp. C. F. Grice, 13114 Indian Creek, Houston 24, Texas.

FREE bargain bulletin! Write: "Brand Bulletin", Sycamore, Ill.

CALL LETTER plaques. Complete plexiglass design. Finest raised black letters on white background, crystal clear base. 2⅝" x 10". Desk or wall models, $3.95 each. Halo mast model, $4.95 complete. W8WHG, Richard Wilcox. 43 Pelton, Coldwater, Mich.

ALUMINUM for every ham need. Write to Dick's, 62 Cherry Avenue, Tiffin, Ohio, for list of tubing, angle, channel, castings, plain and perforated sheet, and complete beam kits.

CONVERT any car radio to home use. Instructions $1.00. Custom Design. P.O. Box 63, Roslyn, Pa.

PRINTED CIRCUIT boards for many do it yourself projects. Board for Silver Sentry vfo, $2.85; 6BE6 Product Detector, $1.15; 100 kc Oscillator, $1.00; Speech Amplifier, $2.50; Many more available. Send for free catalog. P/M Electronics, Box 6288, Seattle 88, Washington.

COLLINS 75A-2A, one filter $269.00; 32V Transmitter $169; Johnson Thunderbolt Amplifier $289; Ranger $169; Hallicrafters SX-100 $165; 88 mh toroids $3 for six postpaid. Alltronics-Howard Co., Box 19, Boston 1, Mass. Richmond 2-0048.

LIGHTWEIGHT but sturdy "Space Guns" added to your present tri-band or 20 meter beam's driven element, provided it is fed directly with co-ax and does not employ any type of match such as the Gamma, etc., gives you a rotateable dipole on 40 meters with a figure 8 pattern. Four band operation on one feed line. Simple tuning and installation instructions included. Immediate delivery. Net $39.95 per pair, f.o.b. Nettles Manufacturing Co., P.O., Box 614, Denver, Colorado, USA.

HIGHLY-EFFECTIVE home study review for FCC Commercial Phone Exams. Free literature! Wallace Cook, Box 10634, Jackson 9, Mississippi.

NEED MONEY? Get that new rig now—no need to do without! Borrow money to buy it quickly, confidentially, as thousands are doing, from National Loans by mail. Easily arranged, repay in small monthly amounts. Borrow $100 to $600 without co-signers or collateral. For our quick 73, write—tell us how much you need. National Loans, Dept. Q, 101 S. Tejon, Colorado Springs, Colo.

WANTED Commercial, military, all types, ARC, ARN, ARM, BC, GRC, PRC, TRC, URR, URM, TS, 618S, 17L, 51R, 51J, Others . . . RITCO Box 156 Annandale, Va.

HAMS Convert any television to sensitive, big-screen oscilloscope. Simple changes. No electronics experience necessary. Illustrated plans, $2.00. Relcoa, Box 10563, Houston 18, Texas.

KWM-2 excellent condition ac & dc supplies, mount 995, prefer pickup. E. MacFaul, 822 The Circle, Lewiston, N.Y.

HAMMARLUND HQ-145 receiver $180. Heath MT-1 Cheyenne transmitter $70. Both in excellent condition. Ed, WA2OWC, 1623 Riverview Terrace, W. Belmar, New Jersey.

MUST SELL Mohawk rcvr $22; Apache xmtr $200; SB-10 $65; or all three for $465. Excellent condition. Used less than 20 hours. Will deliver within 200 mi. W9FME, 53142 Twyckenham, South Bend 17, Indiana.

SELL HQ-145C with calibrator $195 cash. K2ZSY, 3013 Valentine, Bronx, N.Y.C., Tel: SE-3-6152.

COMPLETE ssb, cw, am station, new, never been used. SX-100 Hallicrafter, Pacemaker—latest factory modifications, Hy-Gain tribander triaxial gamma matched antenna. Stal mic. power rotator—Selsyn indicator. All coax. & equip. to put it on the air. $400. Net worth $1000. Kranzer, 1057 Indiana Ave., Venice, Cal.

SELL Mobile power supply—Multi-Elmac PSR 612 for PMR-7 or similar receiver $15; Dynamoter; suitable for mobile transmitter power supply. Input 6v, d.c.; output 450 v @ 100 ma $10. Risch W2CMQ, 2301 Kings Highway, Brooklyn 27, N.Y.

FOR SALE Valiant. Best offer. Will deliver radius of 250 miles. K3MHK, 338 Grandview Ave., Chambersburg, Pa.

SALE 75A-4 serial 3334, $530; Johnson Pacemaker $230, both like new; grounded-grid linear, Pair 811's $100; Two-bay Emcor rack, writing top, $40; $810 for station; 100 mh encapsulated torrids, two for $1; G4ZU beam, rotor, 30 foot crank up tower, $45; 522, clean, $12; Dynamotors 12v input 1000 volt out, $5. Wanted—scope with dc amps similar to Heath model OP-1; transistor tester 1M-30; space control R-C equipment. FOB Bellflower; W6JGM, Dalton A. Davis, 9489 Muroc St., Bellflower, California.

LOOKING—Shopping—Trading—Trying to save money? Write Bob Graham for special deals on new and reconditioned used gear. Cash or budget. Graham Radio, Dept. B, Reading, Massachusetts, Tel: 944-4000.

FOR SALE G-76 plus crystal calibrator and dc supply in A-1 condition $375. 10 meter International Crystal converter and Ameco noise limiter both for $20. Jack Resnick, K2QPP 63-07 71 Street, Middle Village 79, N.Y. TW 4-8980.

SSB-cw-am transmitter, built-in vfo, power supply, TR switch, 120 watts pep identical to ssb transmitter January QST. Constructed by Servotronic Instrument Company of Houston. $250 satisfaction guaranteed. HQ-140X excellent $120, HQ-100 late model $110, HQ-110-C immaculate condition $160, Viking Challenger f/w late model $90, Globe 755 vfo $25, Johnson TR $15, 7 band vertical $12, triband vertical $6, 110v antenna relay $3, Lysco ATU $4, four-record German language course $8. WØPRM, 202½ South 10th, Independence, Kansas.

COLLEGE bound, need cash, will sacrifice 75A-4, excellent condition—$350. K4MLJ, Bill White, 1010 Carson St., Greenville, Tenn.

SELL 4D32 tube $7.40 meter ground plane, 4 radials, coax fitting, $25. Local deal preferred. W2EQS.

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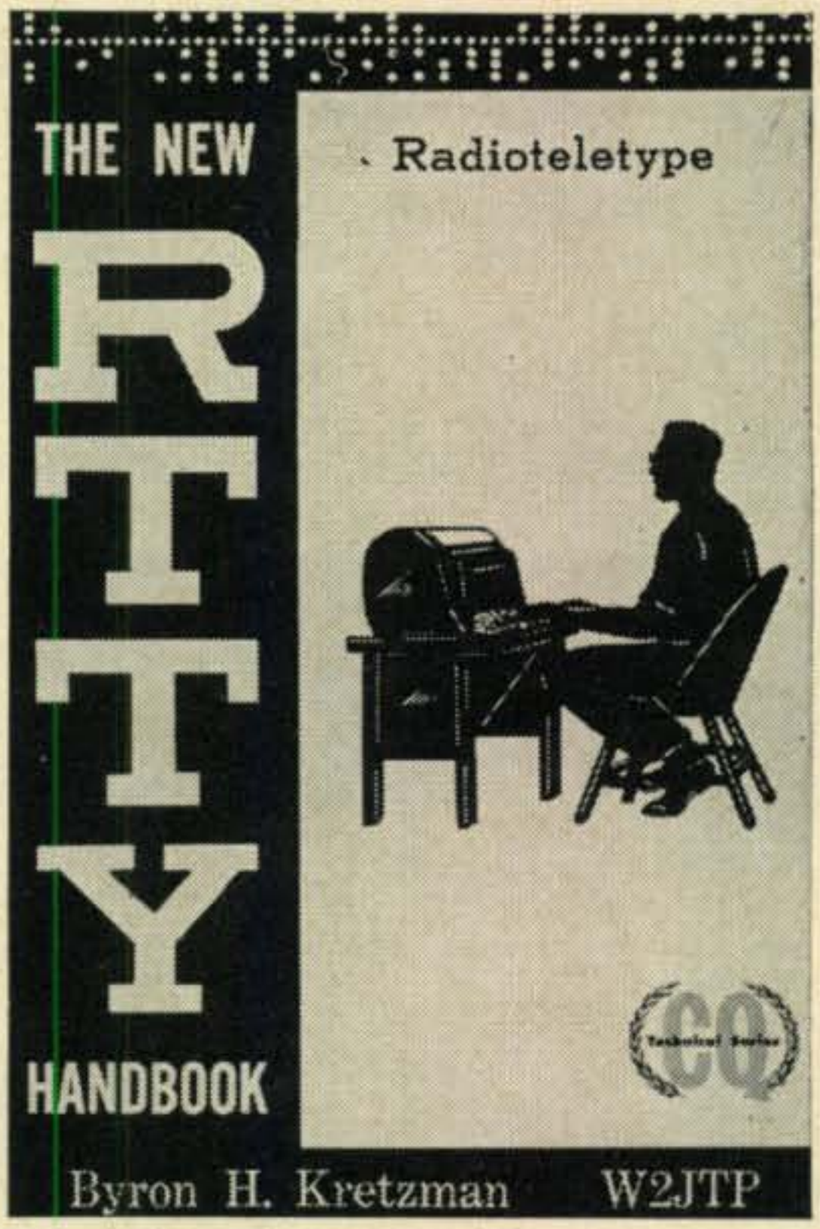

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Packed with features to put out a solid signal that really punches thru QRM! 150 watts CW/peak AM input on 80 thru 10 meters, 100 watts on 6 meters. Highlights: Highly stable VFO has illuminated dial and planetary drive; socket for optional switch-selected crystal operation; efficient controlled-carrier screen modulation; adjustable pi-network matches 40 to 600 ohm antennas; buffer stage isolates oscillator from final; parallel 6146's in output stage; silicon diodes for reliable high-voltage and low heat; voltage regulator in B+; single knob bandswitching; TVI suppressed with all leads in and out of case by-passed for RF; switched meter reads buffer, final grid and final plate currents and relative power output; mode switch provides for VFO spotting and tuning without placing a signal on-the-air; clean chirpless keying—no high voltage at key terminals; plus a host of other fine features. With all parts, tubes, plugs, wire, solder and step-by-step instructions and handsome gray satin metal case, 8½ x 17 x 10½". Less mike, key, crystals. For 110-125 v. 60 cycle AC. 28 lbs.

83 YU 403 FJ. T-150 Transmitter Kit, only..... **$119.95**

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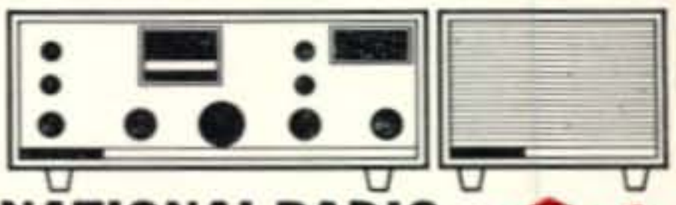
It's got guts!

It takes more than handsome, functional styling to make a great transceiver . . . In plain language, it takes guts. The rugged good looks of the NCX-3 were styled by Industrial Designer Gregory Fossella to complement the performance and features engineered into the NCX-3 by National's Advanced Development Team. Take a good close look at the photo below. 18 tubes and 6 diodes add up to the one SSB/CW/AM transceiver in the $300-$400 price range that gives you the features you want and need — with the conservatively rated parts, handsome layout and wiring workmanship that you expect from National. The NCX-3 wasn't designed with the intention of providing marginal "condensed communications" — It has a lot of parts. But notice that components run at right angles for easy circuit tracing and service . . . that it isn't necessary to unsolder three layers of wiring to get at one component . . . that even the resistor color codes all run in a parallel direction!

It's no wonder that the NCX-3 is backed by National's One Year Guarantee, or that the NCX-3, by actual dealer count, outsells all other transceivers. It's no wonder, because the NCX-3 at $369 is the only transceiver in its price range with built-in important features required for fixed station as well as for mobile applications: • Complete coverage (with overlap) of the 80, 40 and 20 meter phone and CW bands • Built-in grid-block break-in keying • Built-in Vox, as well as push-to-talk • Built-in RF-derived SSB/CW AGC without annoying pops or thumps • Built-in S-Meter and PA current meter • Built-in AM detector for fully compatible AM operation • Conservatively rated Pi-network final amplifier runs black at full 200 watts PEP • Mobile mount included in the price!

A lot of sideband transceivers have been advertised recently . . . nevertheless, we suggest you take the time to compare all of them with the NCX-3 — we know of no better way to satisfy yourself that you'll be happy with your choice — that you've chosen a rig that does what you want it to do. As a first step, write us today (enclose 50¢ for handling and postage) for a copy of the NCX-3 Instruction Manual. In the meantime, ask your National Dealer to give you an actual demonstration of the NCX-3 Tri-Band Transceiver.



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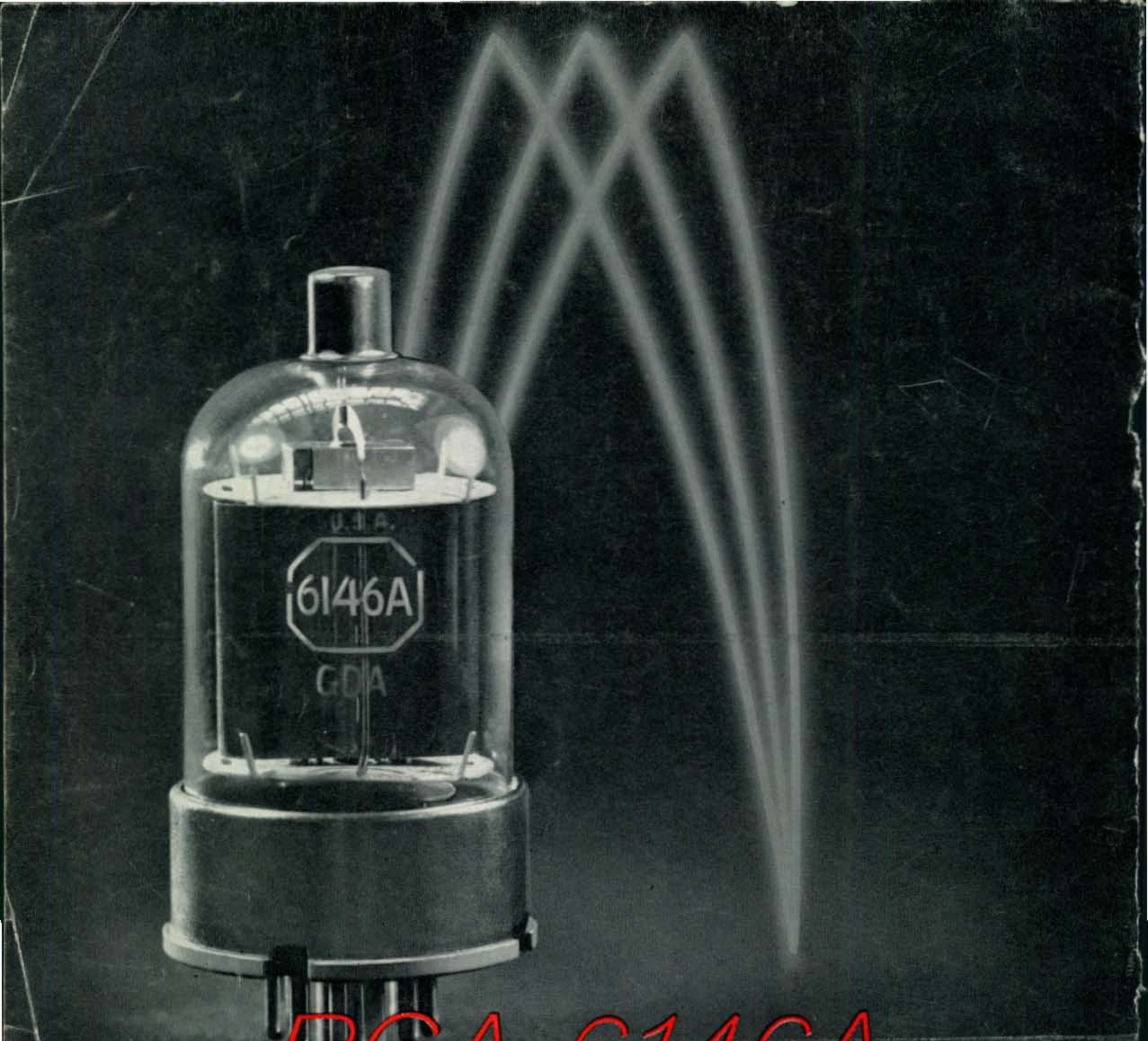

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This small, sturdily-built tube provides the same high efficiency and power output capabilities as its prototypes—35 watts CW (ICAS) at 175 Mc.; 70 watts CW (ICAS) at 60 Mc. RCA-6146A, as well as the entire 6146 family, is available from RCA Industrial Tube Distributors everywhere. For technical information, write: Section F-15-M, Commercial Engineering.

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