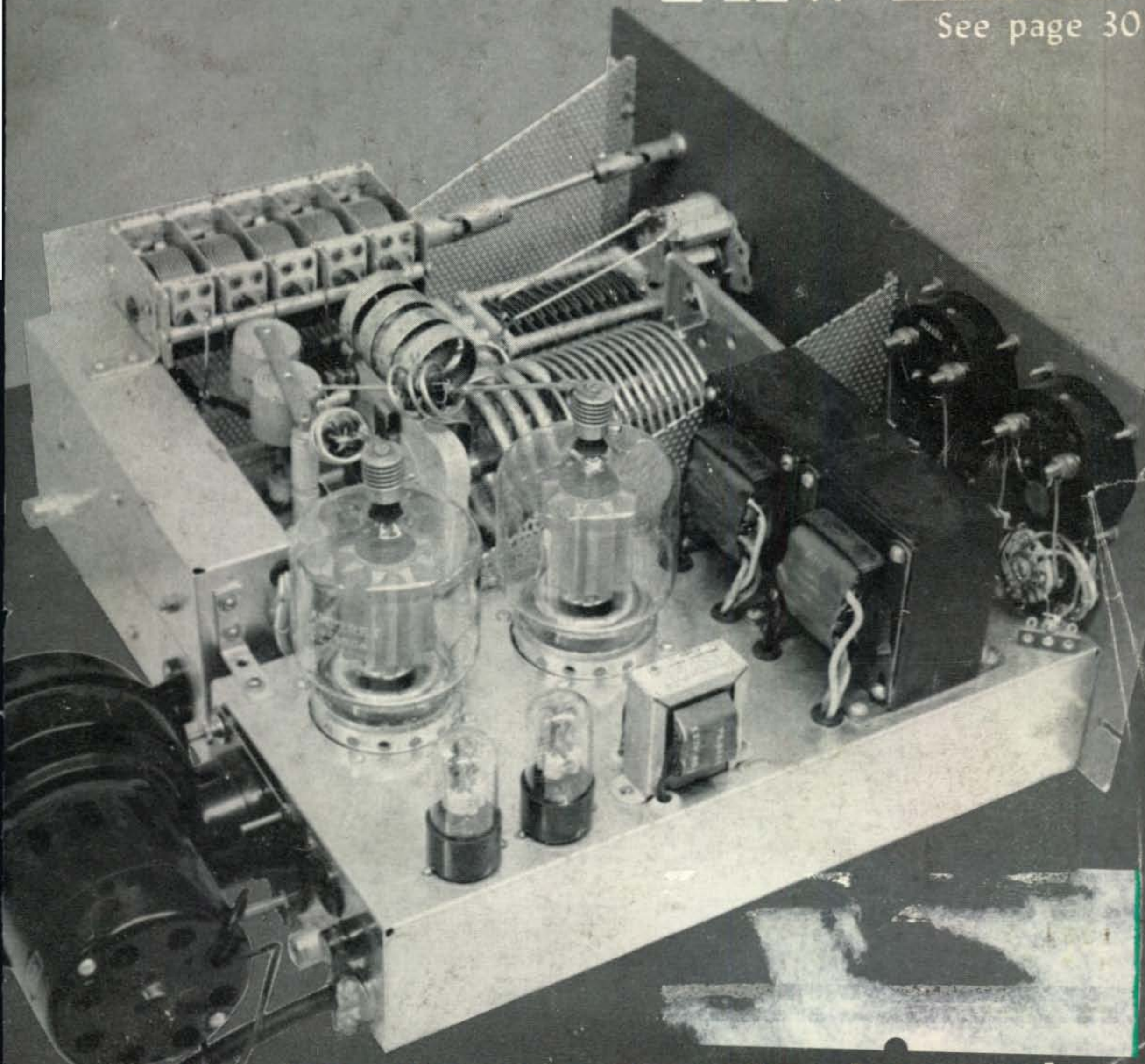
October 1963
50¢

CQ

A Table-Top 2 Kw Linear

See page 30

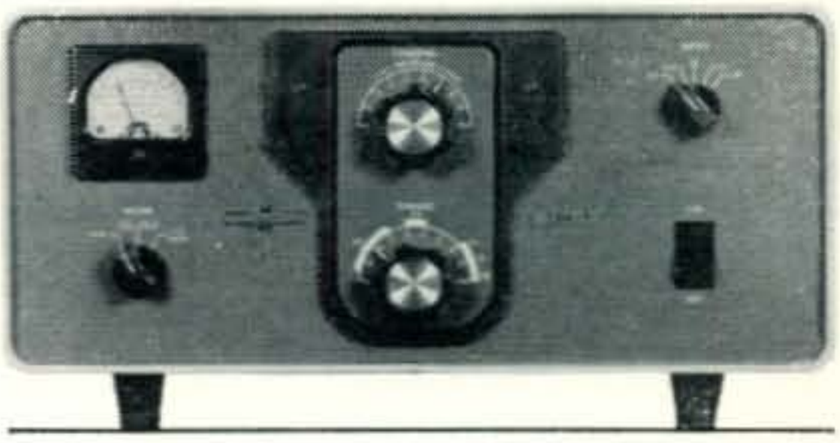


The Radio Amateur's Journal

talk about

TALK POWER

No other comparable equipment gives you more talk power than the compact, portable Collins 30L-1 Linear with exclusive automatic load control. The 30L-1 provides a conservatively rated 1,000 watts PEP input on SSB (500 watts average dc) and 1,000 watts average on CW. It is designed to be driven by the KWM-1, KWM-2, 32S-3 or most other 70-100 watt CW/SSB exciters. When used with the KWM-2, you can have a kilowatt station in two suitcases. But more talk power is just one of the 30L-1 features. You'll also find solid state rectifiers which help reduce heat. There's a self-contained power supply with safety interlocks. An automatic antenna transfer, a high/low power capability, and an RF inverse feedback. Get the facts on more talk power and all the other features offered you in the Collins 30L-1 Linear. For free copy of Collins amateur catalog, see your distributor today. ☐



COLLINS

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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

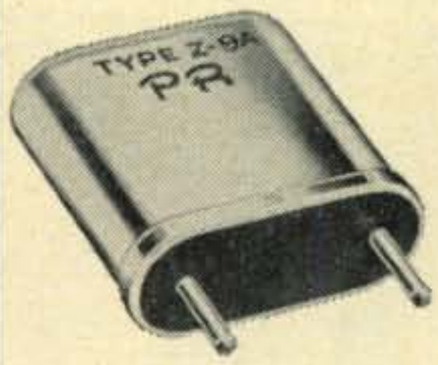
Fundamental, PR Type Z-2

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

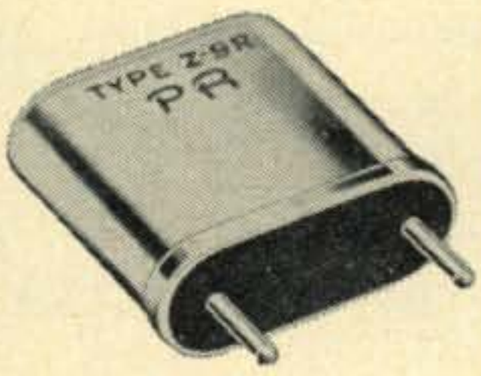
Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 Mc., ± 15 Kc.; .050" pins.

. . . . . **$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.)

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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 1, on page 110

one good thing leads to another...

A single word, rather than any single feature, accounts for the enthusiastic acceptance we've experienced with the SX-117. The word is *"Versatility."*

No other receiver in its class lets you work so much territory so well —wherever your present or future interests may lie.

For instance: You get all important coverage from 3.0 Mc. through 30 Mc. (five crystals provided) plus four positions from 85 kc.—3 Mc. for use with HA-10 low freq. tuner.

You get *three-step variable selectivity*, including a transmitter-type V.F.O. that can be *locked on frequency* . . . less than *1 μv* sensitivity . . . extreme electrical and mechanical *stability* . . . up to *50 db.* attenuation to unwanted heterodyne in the pass band.

Looking ahead, you'll find interesting the oscillator output jacks for transceive operation with Hallicrafters' HT-44 matching transmitter.

The SX-117 costs $379.95. The HA-10 adds just $24.95 (less low freq. crystals).

SX-117 **triple-conversion receiver by** ***hallicrafters***

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

Export: Hallicrafters, International Dept., Commercial Div. **Canada:** Gould Sales Co., Montreal, P.Q.

CQ

The Radio Amateur's Journal

Vol. 19, No. 10 October 1963

OFFICES

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Telephone, 201 JUdson 2-4460

CQ—(Title registered U. S. Post Office) is published monthly by Cowan Publishing Corp. Second class postage paid at New York, N. Y. and at Garden City, New York. Subscription Rates: U.S.A. and Possessions, APO, FPO, Canada and Mexico: one year $5.00; two years $9.00; three years $13.00. Pan-American and foreign, one year $6.00; two years $11.00; three years $16.00. Printed in the U.S.A. Postmaster: send Form 3579 to *CQ* 300 W. 43rd St., N.Y., N.Y., 10036.

Table of Contents

Departments

ZERO BIAS

ARE newly licensed amateurs totally unprepared to meet today's challenge of operating a radio station? Are they completely unprepared to apply practical operating technique to a situation requiring both academic as well as practical skills?

Just what is it that makes one operator appear better than another? When given a dozen or so amateurs, all licensed an equal number of years and all having similar code speeds, why will one or two always outshine the others? Why has more anxiety recently been voiced on the operating characteristics found on the bands?

We think it has a great deal to do with the improper pre-training period prior to the amateur receiving his license as well as a complete lack of self-training following the General exam.

It is a known fact that a great many amateurs buy and/or build *nothing* until they are sure that their ticket hangs securely on the wall. Many prospective hams therefore never have the ability or desire to "listen in" before exam time. Some General class licensees, embarrassed to make the effort through the Novice ranks are completely flabbergasted by the QRM. "My code records were never like this!" cries the unbelieving brass-pounder.

Whether your choice of mode be phone or c.w. there's certainly more to operating than knowing the Q-code or memorizing a page or two from the operating section of a handbook.

The trouble probably lies with the well meaning club, which as an effort to stimulate membership and attendance, offers code practice classes, with little or no thought to practical on-the-air operation. Few clubs go beyond the code-oscillator/hand-key type lesson. Clubs lucky enough to meet at a place having a working station invariably use the rig for a local ragchew after the meeting adjourns rather than for practical instruction for the beginner.

The old timer too, has lost much of this status as one who takes newcomers under his wing. Years ago it was almost unwritten law that an experienced amateur be required to "show the ropes" to an s.w.l. Today, it has become "Let George do it."

Many times a prospective amateur will accidentally fall into the clutches of one who is as inexperienced as himself. Naturally, the results are disheartening and indeed time consuming, considering the relearning period involved.

Many newly licensed amateurs and some old ones too are quick to mistakenly evaluate the "Roger-Roger-Over-and-Out" operator as one to emulate. If his operations seem professional and it goes uncorrected, what's a poor fellow to think?

The true DX operator and the traffic handler seem to be the overall standouts in operating technique. In the DXers case the infamous "Black List" (which should probably be used more often) keeps the operator aware that any misconduct on the air will not be tolerated. Is it only logical, when a DX station calls "CQ W4 ONLY" he's not besieged by all ten call areas?

Although the traffic handler is not confronted with a "Black List," his skill remains high in the knowledge that traffic must pass quickly and accurately. Long drawn out messages and queries from other net members only lead to embarrassing repeats and delays. You've probably heard: "This message goes to Mrs. Helen Jones—that's a married lady—M-Mary R-Roger S-Sugar. . . ." It happens, but we're happy to say, infrequently.

We're not naive enough to think that every amateur can be a contest winner or a top traffic handler. We feel, however, that there has been too much emphasis placed on passing the code and written examination, with little emphasis on what happens after.

Unlike years past, when amateurs were almost always connected with the electronics industry, today's amateurs come from all walks of life. Whether the ham be a tinkerer, who hasn't made a contact in months, or a fellow who is on the air nightly, amateurs owe it to themselves, and to those aspiring to become amateurs, to practice self discipline, consider the other fellow, give advice freely to those who ask for it and above all not be reluctant to tell a fellow when he's making an obvious mistake.

THIS COULD BE YOUR LUCKY DAY-ENTER...GIANT "I WISH..."

Just complete this statement in 25 words or less:

Over $35,000 in prizes-

Easy to enter, easy to win!

1 Nothing to buy! Just visit your Hallicrafters distributor listed below and secure an entry blank. (We won't mind if you look over his featured Hallicrafters display while you're there!)

Fill in entry blank, and complete sentence, "I WISH . . . everyone would use VHF for short range contacts

2 because . . ." **DO NOT** MAIL ENTRY TO HALLICRAFTERS. Turn in or mail to distributor. He will select local winner on basis of originality and sincerity of statement, and award HA-2 or HA-6 local prize.

3 Local winners become eligible for GRAND NATIONAL PRIZE. Hallicrafters will select winner. All decisions final. Entries become Hallicrafters property; winners' names and statements may be published.

one of OVER 60 HA-2 or HA-6 TRANSVERTERS WITH POWER SUPPLY ...OR THIS FABULOUS, DELUXE HALLICRAFTERS **SSB**/AM/CW STATION!

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"I WISH...everyone would use VHF for short range contacts because..."

your opinion may win-

GRAND PRIZE

HT-44 transmitter (slaves with SX-117 for transceive operation) . . . HT-45 "Loudenboomer" amplifier . . . SX-117 triple conversion receiver . . . R-47 speaker . . . HA-10 low freq. converter . . . HA-1 "T.O." keyer . . . HA-8 Splatter Guard . . . P-150 AC and P-45 AC power supplies.

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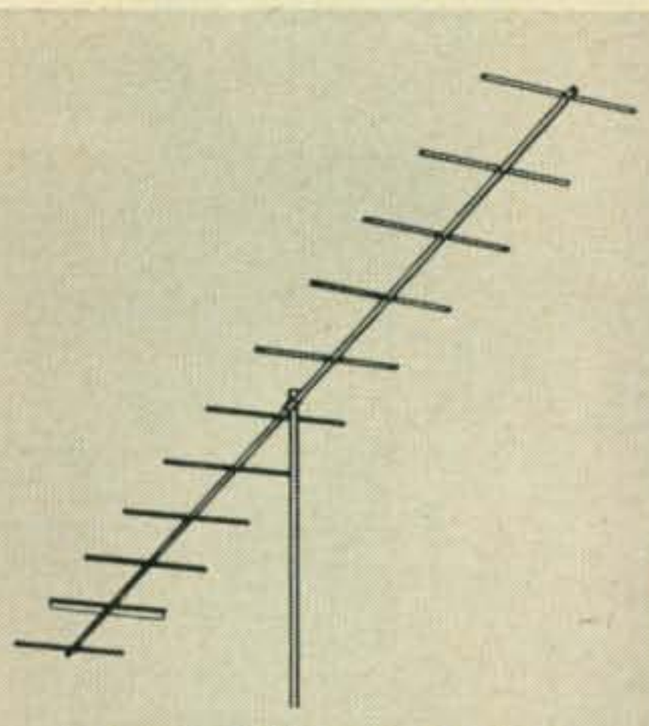
Everything's GO on VHF!

with hy-gain's all new complete line of BASE STATION AND MOBILE ANTENNAS



OPTIMUM SPACED BEAMS FOR 6 OR 2 METERS

STACKED JAYPOLES FOR 2 METERS

GAIN MOBILE WHIPS FOR 6 OR 2 METERS

AND THAT AIN'T ALL...there are OVER 40 MODELS including LOG PERIODICS for 6 and 2 meters... 3-ELEMENT OPTIMUM SPACED BEAMS that will deliver more gain than 5-element medium or short spaced beams...GAIN STACKED HALOS for 6 or 2 meters featuring a new peak in mechanical superiority with new center mount which delivers unparalleled impedance control and true omni-directional performance...Extremely compact omni-directional GAIN GROUND PLANES...Duoband 6 and 2 meter UNITY GAIN GROUND PLANES...Single band and Duoband MOBILE WHIPS AND HALOS...EVERY SIGNIFICANT ANTENNA CONFIGURATION KNOWN TO THE ART...All of superior mechanical and electrical quality. They're all illustrated and fully described in Hy-Gain's new VHF catalog. A top performance antenna for every possible application...a price to fit every pocketbook. Prices range from as low as **$3.95.**

Send for your FREE copy of Hy-Gain's full line catalog on VHF antennas TODAY...you absolutely can't afford to buy an antenna until you've looked at Hy-Gain!

I want a FREE complete line catalog on Hy-Gain's all new VHF antenna line

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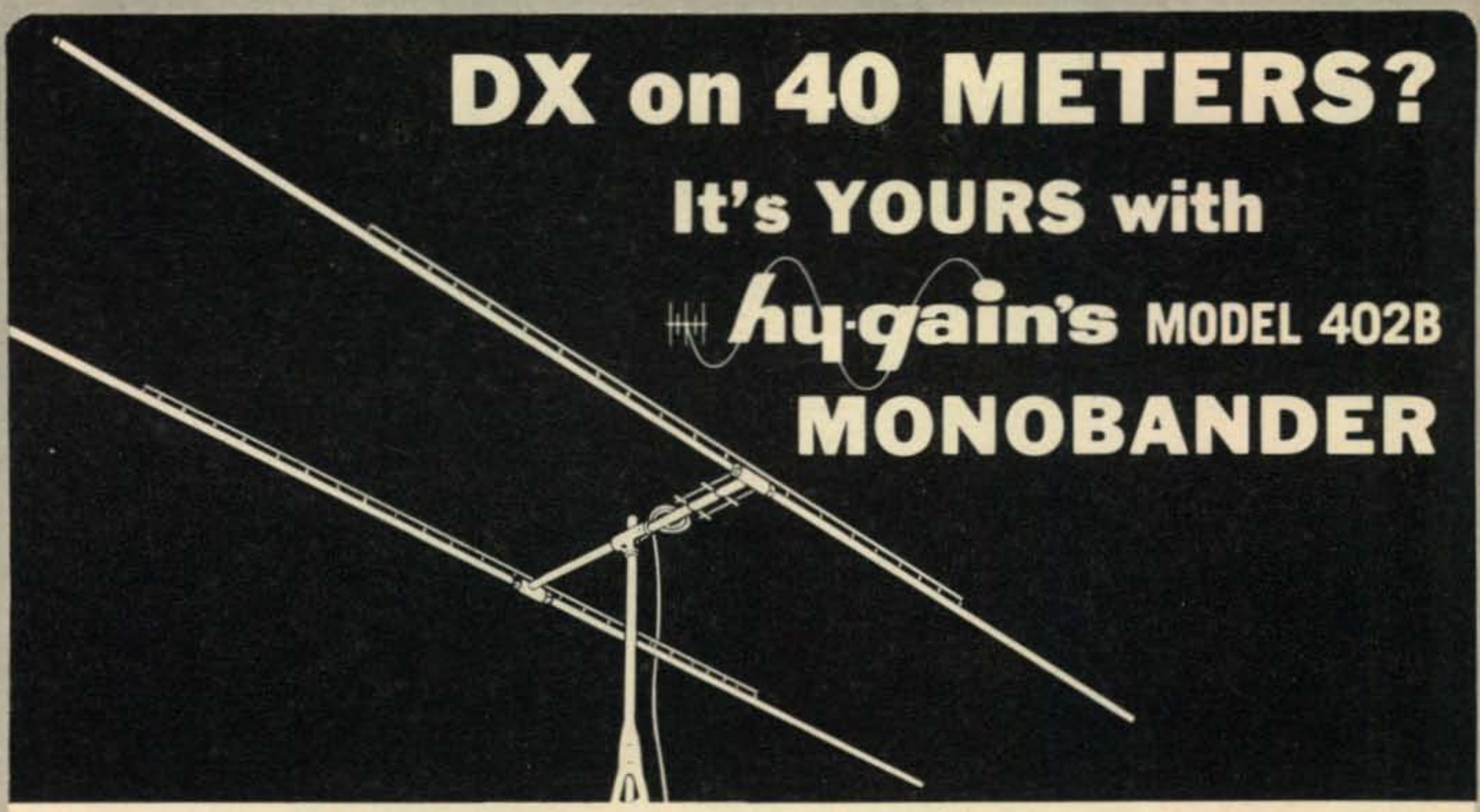
CITY_____ STATE_____

hy-gain ANTENNA PRODUCTS CORPORATION
8425 NE Highway 6 Lincoln, Nebraska

For further information, check number 8, on page 110

DX on 40 METERS?

It's YOURS with hy-gain's MODEL 402B MONOBANDER



It's true... with Hy-Gain's Model 402B, you can work signals on 40 meters that you never knew existed. And, you can work 'em 24 hours a day – 365 days of the year.

Hy-Gain's 402B gives maximum obtainable forward gain and attenuation of unwanted signals off the sides and back for an antenna of this type.

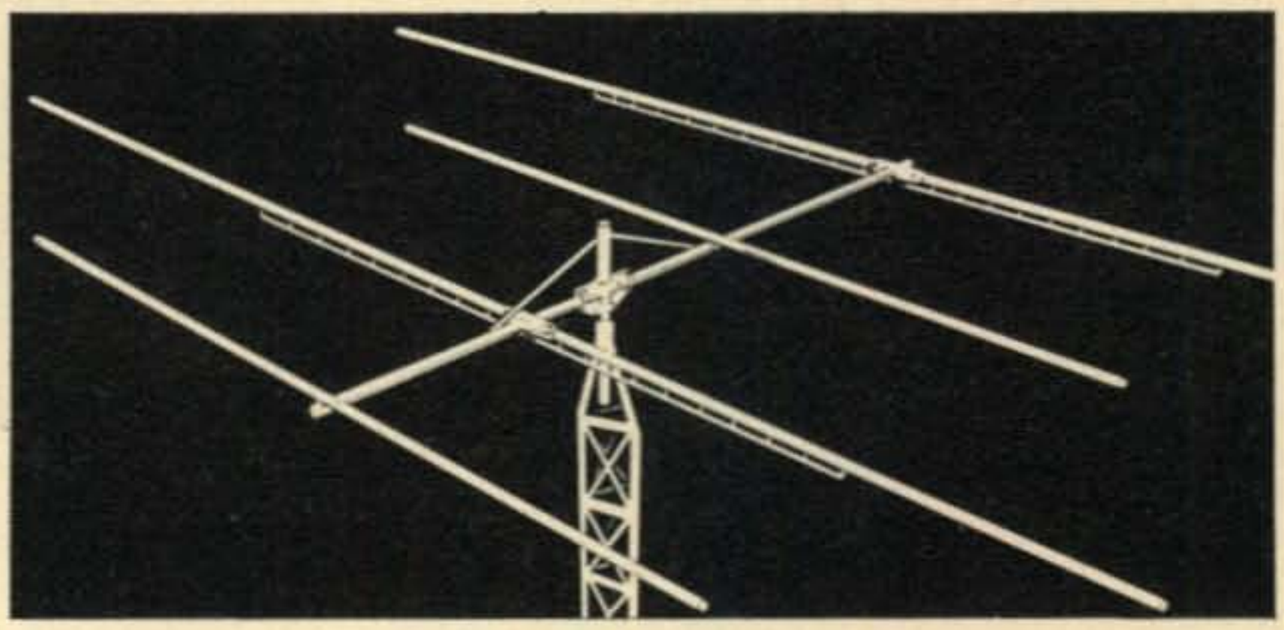
How can the 402B deliver such amazing performance? Well, there are several reasons but probably the most important surrounds Hy-Gain's perfected linear loading which extends parallel along the elements and delivers maximum possible performance from a shortened antenna. Linear loading, another Hy-Gain innovation, eliminates the need for lossey center loading coils.

The 402B feeds with 52 ohm coax. Elements are 43 ft. long. The 2-inch boom is 16 ft. long. The 402B is constructed of seamless, taper-swaged aluminum tubing offering very low wind resistance. Insulators are of high impact, fiberglas impregnated plastic. All steel parts iridite treated to MIL specs. Since it weighs only 37 lbs., the 402B can easily be stacked with any tri-bander or 20 meter beam with a scant 10 ft. separation required. A sensational buy at only **$99.75** Ham Net.

New Maximum Performance on 20 and 40 Meters

hy-gain's

Model DB-24 DUOBANDER



Here's an antenna that will give you the unparalleled performance of Hy-Gain's 402B on 40 meters *PLUS* full-sized 3-element performance on 20 meters – Hy-Gain's DB-24. Unique linear stub decoupling reduces the overall length of the DB-24 to ⅔ full size for 40 meters and makes possible 2-band operation without traps. Three full-sized elements on 20 meters deliver 8.1db forward gain; 20 to 30db gain in F/B ratio. Two 40-meter elements same as on Model 402B. Fed with 52 ohm coax, the DB-24 easily handles maximum legal power. Insulators are of high impact, fiberglas impregnated plastic and all steel parts are iridite treated to MIL specs. Longest element is 43 ft.; shipping weight, 64 lbs. The DB-24 is the ultimate in 20 and 40 meter antennas. Priced at **$169.50.**

See them today at your favorite Hy-Gain Distributors or write for the name of the Hy-Gain Distributor nearest you.

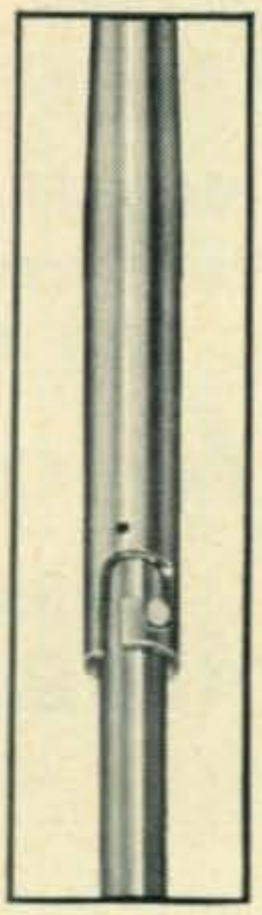
Hy-Gain Antenna Products Corporation 8426 N.E. Highway 6, Lincoln, Nebr.

For further information, check number 10, on page 110

Choose the NEW MOBILE TOPPERS by hy-gain

featuring...

■ TOP LOADED DESIGN – Delivers superior performance* ■ PRECISION ADJUSTMENT TO EXACT FREQUENCY – Easily made on telescoping tip of Topper Capsule ■ NOISELESS QUICK-DISCONNECT – For changing bands in seconds... convenient for low garaging (No tools required) ■ POWER HANDLING OF 100 Watts AM; 300 Watts PEP ■ SLEEK, SLIM PROFILE – Reduces wind resistance at high speeds for greater frequency stabilization ■ WEATHERABILITY – Loading coil is totally encapsulated in durable Fiberglas Topper Capsule ■ VERSATILITY – 5 ft. Topper Capsules for 10, 15, 20, 40 and 75 meters... all equipped with male "Quick-Disconnect" ■ RUGGED 36" POLISHED STEEL MAST – Fits any standard body or bumper mount... equipped with female "Quick-Disconnect"



POPULARLY PRICED

TL-10 Topper Capsule for 10 Meters.....	$ 5.95
TL-15 Topper Capsule for 15 Meters.....	$ 6.95
TL-20 Topper Capsule for 20 Meters.....	$ 7.95
TL-40 Topper Capsule for 40 Meters.....	$ 9.95
TL-75 Topper Capsule for 75 Meters.....	$11.95
Universal TM-36 Mast Section (Use with Topper Capsule ONLY).....	$ 7.95

*It is acknowledged that to attain maximum efficiency from installing a loading coil in an antenna, the loading coil must be installed at or near the top of the antenna. By loading the top of the antenna, the efficient current section of the antenna may then be left at natural length. Top loading also raises the feed point impedance from which a superior transfer of energy results, because of the small diameter of the loading coil, top loaded antennas offer the additional advantage of superior mechanical reliability.

See the New Hy-Gain Mobile Toppers at your Favorite Hy-Gain Distributors or Write for Complete Engineering Report to:

HY-GAIN ANTENNA PRODUCTS CORPORATION

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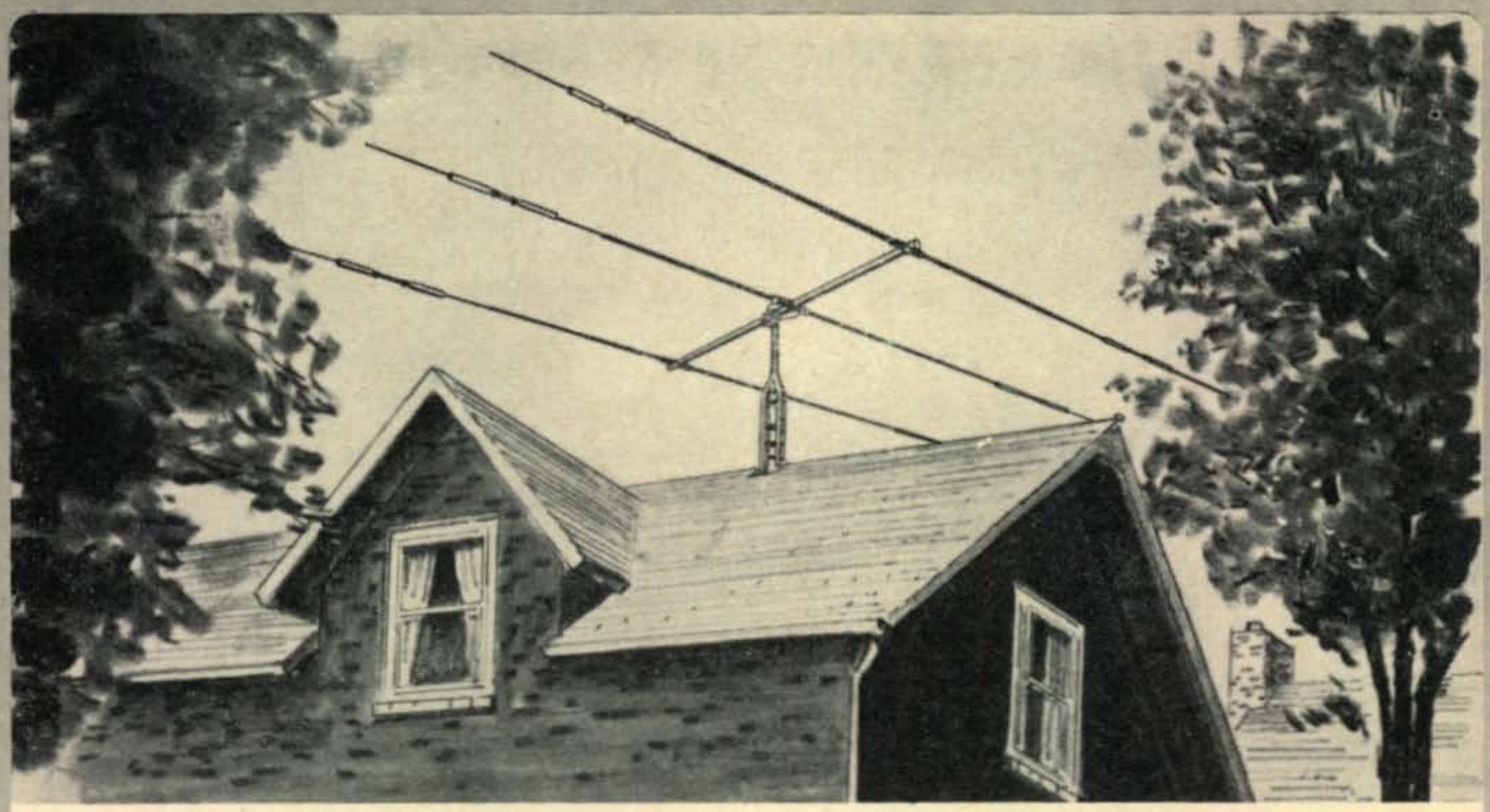


Announcing **hy-gain's new 3-element**

THUNDERBIRD JUNIOR

for maximum performance in limited space

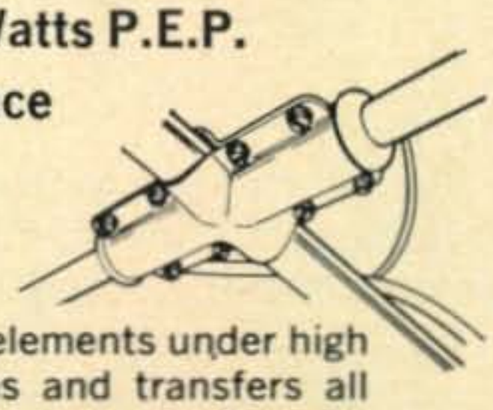
- **Up to 8db Forward Gain**
- **25db Front-to-Back Ratio**
- **Takes up to 300 Watts AM; 600 Watts P.E.P.**
- **SWR Less than 1.5:1 at Resonance**

Now...a famous Hy-Gain Thunderbird Tribander for the Ham with severe space limitations who wants top performance on 10, 15 and 20 meters... Hy-Gain's all new Model TH-3Jr.

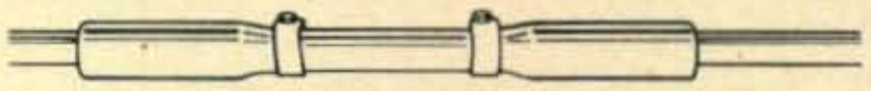
Constructed of durable, lightweight taper-swaged aluminum tubing, the TH-3Jr offers very low wind resistance and can be easily rotated with a heavy duty TV rotator. Weighing only 28 pounds, it's ideal for rooftop or lightweight tower installations. Features include famous Hy-Gain Slim Line Junior Traps; hardware that is iridite treated to MIL specs; and, molded high-impact cycolac plastic insulators.

The TH-3Jr has a 12-foot boom with the longest element being 26 feet. It has a turning radius of 14'9". Easily installed, the TH-3Jr can also be quickly disassembled making it ideal for high performance portable use.

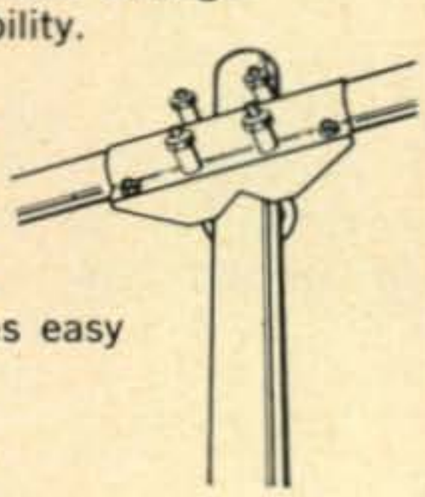
It's a real buy at **$69.50** Ham Net.



Injection molded plastic sleeve effectively insulates elements under high power conditions and transfers all mechanical stress to die-formed heavy aluminum bracket.



Unique new lightweight high reliability trap utilizes high impact styron coil form for frequency stability... is completely enclosed in die-formed aluminum for mechanical strength and lifetime weatherability.



Rugged die-formed, all aluminum boom to mast bracket clamps securely to any mast diameter of 1¼ to 1⅝ inches O.D. Facilitates easy one-man installation.

Get yours today from your favorite Hy-Gain Distributor or write for the name of the distributor nearest you.

HY-GAIN ANTENNA PRODUCTS CORPORATION
8428 N.E. Highway 6, Lincoln, Nebraska

For further information, check number 11, on page 110

NOW ARRIVING ON TRACK SIX!

Clegg's VENUS 6 TRANSCEIVER

A COMPLETE SSB STATION FOR 6 METERS

Yes, the long awaited VENUS 6 SSB TRANSCEIVER is now being delivered to your distributors. We take this opportunity to thank the hundreds of hams who have waited so long and patiently for their orders to be filled.

As the result of the acquisition of Clegg Laboratories by Squires-Sanders, Inc. (see page 13) the design and production of more and better new Clegg products will move forward rapidly. Excellent financing and a completely ham oriented program have resulted in vastly improved test, quality control and manufacturing facilities and, as the VENUS 6, the first in this new line of products makes its bow, its superior design and construction features will be readily apparent.

The VENUS 6, a high quality compact attractively styled SSB RECEIVER and TRANSMITTER, puts you on 50 Mc single sideband without all the fuss, bother and expense associated with adapting low frequency SSB exciters, relays and linear amplifiers, Its 20 tubes and 4 semiconductors provide performance equivalent to 35 tubes.

The VENUS employs all the latest circuit techniques including crystal lattice filter, balanced beam tube modulator, low noise NUVISTOR front end and the newly conceived RECEIVER OFFSET tuning.

Packaging is sturdy, attractive and, most important . . . designed for maximum operating convenience. The same dial assembly that has drawn thousands of raves from ZEUS and INTERCEPTOR owners has been further refined for use in the VENUS. Accurate 1 KC per division performance, so desirable for SSB, is further supplemented with a precision electrical vernier. An effective IF noise limiter with adjustable threshold provides excellent rejection of impulse noise on SSB, AM or CW.

See your Distributor or write for information.

Clegg LABORATORIES
Division of Squires-Sanders, Inc.

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

For further information, check number 12, on page 110

Clegg Laboratories, well known for high-performance VHF equipment — the Zeus transmitter, Interceptor receiver, Thor 6 and 99'er 6 meter transceivers — has recently become a division of Squires-Sanders, Inc. Amateurs interested in VHF will find that this means a vastly better Clegg — as the result of excellent technical support and financial backing, plus association with a company whose entire interests center upon superior amateur communications equipment.

Squires-Sanders recent technical innovations, which have resulted in a truly remarkable line of HF amateur equipment, give this announcement even greater significance to the amateur fraternity. The combined product lines will thus include equipment of the highest quality for *both VHF and HF* — produced by a company whose principals have both a strong professional and technical background and a deep interest in amateur radio.

D. F. SANDERS, President

A founder and president of Stavid Engineering, Inc. and subsequently president of Lockheed Electronics Company. Squires-Sanders Directors include ALDEN R. LOOSLI, General Manager, Fibres Division, American Cyanamid; RANDOLPH B. MARSTON, Associate of Laurance S. Rockefeller; and JAMES W. WALKER, Vice President of Brady Security and Realty Corp.

WILLIAM K. SQUIRES, W2PUL, Vice President

Former Chief Scientist for Lockheed Electronics Company and previously with the Rand Corporation, president of Telemeter Magnetics (now a division of Ampex), and supervisor of advanced development for the Radio and Television Division of Sylvania Electric Products.

EDWARD T. CLEGG, W2LOY, Clegg Laboratories Division

A founder and president of Clegg Laboratories since 1951. Formerly vice president of Transistor Devices, Inc., of which Clegg Laboratories was a division. Responsible for many original developments in VHF communications equipment, including all Clegg amateur products. Extensive prior background in military communications and countermeasures.

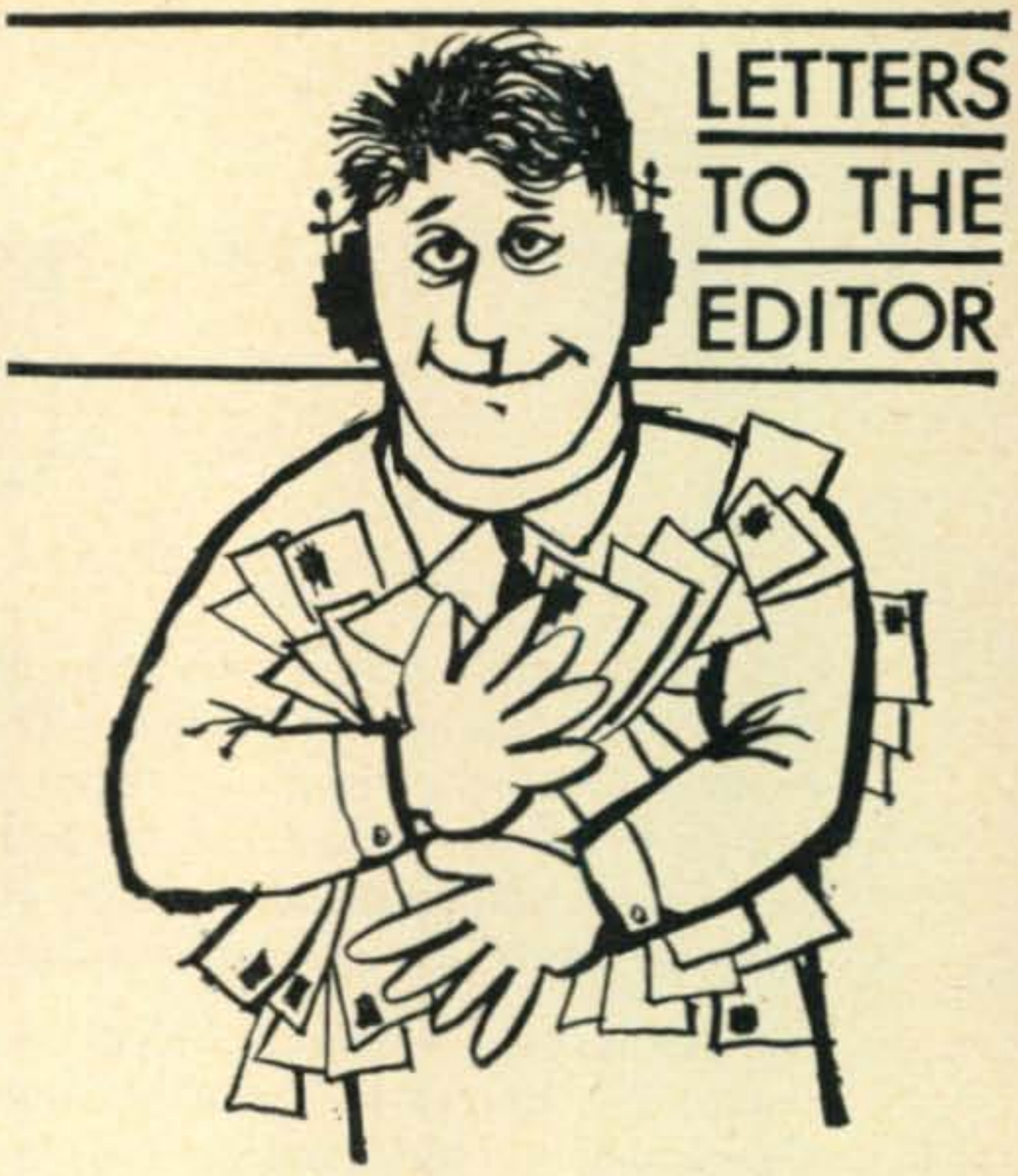
SS-1-R is the designation for the first *Squires-Sanders* product — a 3.5 to 30 MC, amateur band, AM/SSB/CW receiver having performance characteristics superior to previously available equipment. The SS-1-R will feature unparalleled freedom from overload and cross modulation* plus excellent sensitivity, selectivity and image rejection. Digital read-out of frequency, automatic all-band calibration with WWV and a motor driven tuning mechanism are just some of the unusual refinements. A pre-IF noise silencer accessory that literally eliminates the majority of impulse noise will complement the receiver.

The SS-1-R and the Silencer are already "on the air" in field testing. They will be available at your favorite dealer soon.

*See "A New Approach to Receiver Front End Design", W. K. Squires, QST, September 1963

Squires - Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N. J.



Unity Needed

Editor, *CQ:*

Relative to the content of Zero Bias in the August issue, I think you are following a wise and proper course, and one in the best interest of amateur radio, by refusing to be a party to splitting the ranks for the sake of coddling a vociferous group, many of whom seemingly refuse to attempt to understand the reasons for past and present developments.

If I sense the current situation correctly, it behooves us all to remind ourselves that we have been given certain privileges by FCC (in the face of very strong competition from commercial and other sources) and, with these privileges, certain responsibilities to conduct ourselves and to develop the art in the public interest; and further, that, unless we as a group soon begin to demonstrate more convincingly that we are performing a service —giving as well as receiving—our privileges will be further restricted. At this time, few things could accelerate such restrictive action by FCC than a division in amateur ranks. Remember the old adage, "Divide and Conquer." So, let's not dwell on what may possibly have been mistakes in the past—let's be sure we do the right thing in the future.

Karl G. Krech, W3BS
1012 Wilde Avenue
Drexel Hill, Pa.

Editor, *CQ:*

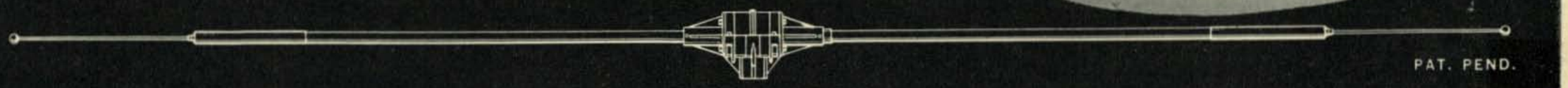
At the risk of boring you with repetitious comment, I cannot refrain from telling you what a wonderful job you're doing with your editorials! Your calm, factual approach to what could be a controversial issue should be a guideline for all editors to follow. You have assuredly added to the respect accorded you and your magazine. Amateur radio needs unity now as never before. If it is to survive the next International Conference, it will need to prove again its usefulness and potentialities and to present a unified front to all those other services that need and desire our operating frequencies.

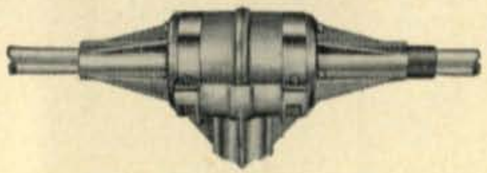
Carl C. Drumeller, W5EHC
5824 N.W. 58th Street
Oklahoma City 22, Okla.

FIRST and ONLY.. remotely tuned ROTATABLE DIPOLE!

DESIGNED SPECIALLY FOR 40 AND 75 METERS IN LIMITED ANTENNA SPACE

NEW-TRONICS CLIFF-DWELLER™





Housing for motors and gear trains with mounting yoke

Resonance and band switching control

ELECTRICAL FEATURES

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

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

MECHANICAL FEATURES

- Approx. lengths
  - 28′-6″ — 26′ 7.0-7.3 mc
  - 30′-6″ — 26′ 3.5-4.0 mc
  - 31′-4″ — 26′ Two-Bander
- Self supporting, accepts 1¼″ threaded pipe for mounting in standard rotators
- Maximum turning radius approx. 15′-8″
- Sturdy aluminum die cast housing for motors and gear trains which drive end sections of dipole
- Heat treated aircraft type, 1¼″ heavy wall aluminum tubing
- Completely waterproofed resonators and housings

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

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

NEW-TRONICS CORPORATION

3455 VEGA AVENUE • CLEVELAND 13, OHIO

For further information, check number 15, on page 110

Novice Point of View

Editor, *CQ:*

As a Novice I do not have too much of a say in the ARRL "incentive license movement." But, as a licensed amateur I will say that I feel that it would be a great deterrent to amateur radio, and people starting out in ham radio.

If the holders of a higher class of license wanted more privileges, give them the higher frequencies (144 mc up) to them alone. Those higher frequencies are supposed to have great promise, so give them to amateurs who could utilize them to the fullest extent.

Jim Brookman, WN4PXP
612 Ellison Avenue
New Smyrna Beach, Florida

More Swans of Abbotsbury

Editor, *CQ:*

After reading the superbly written article by E. M. Wagner in the August *CQ* I wish to say bravo! He so beautifully points out what I have been thinking for a long time. I have often thought about writing an article on that very subject myself, but I am not so skilled in rhetoric as Mr. Wagner so I probably could have never come up with such a good job.

I wish there were some way that the article could be reprinted in vast quantities and distributed to everyone who has anything to do at all with amateur radio. Of course it would have little effect on those whose interest in amateur radio is chiefly commercial, since the more 'plug-in appliance' hams we have, the more money they have in their pockets.

One thing though, I read the article and never could understand why some of your staff were reluctant to see it in print, as you stated in the introductory heading of the article. In fact, after reading this article, how could anyone not agree with it wholeheartedly if he is intelligent and really interested in amateur radio? Everyone should realize that amateur radio still possesses the inherent ability to attract newcomers of its own accord.

Donald Cheser, K4KYV
RFD 1
Woodlawn, Tenn.

Editor, *CQ:*

I wish to congratulate the author, Mr. Wagner, for writing, and you for publishing the above article in *CQ*. I agree with the author that amateur radio is rapidly approaching a crisis. Also that active encouragement for people to adopt amateur radio as a hobby should be discontinued. However, I seriously question how effective this would be in reducing the number of new swans. I hope that many more amateurs will express their opinions on this provocative article.

J. J. Dobry, M.D., VE6DR
604-608 Bamlett Building
Calgary, Alberta, Canada

Editor, *CQ:*

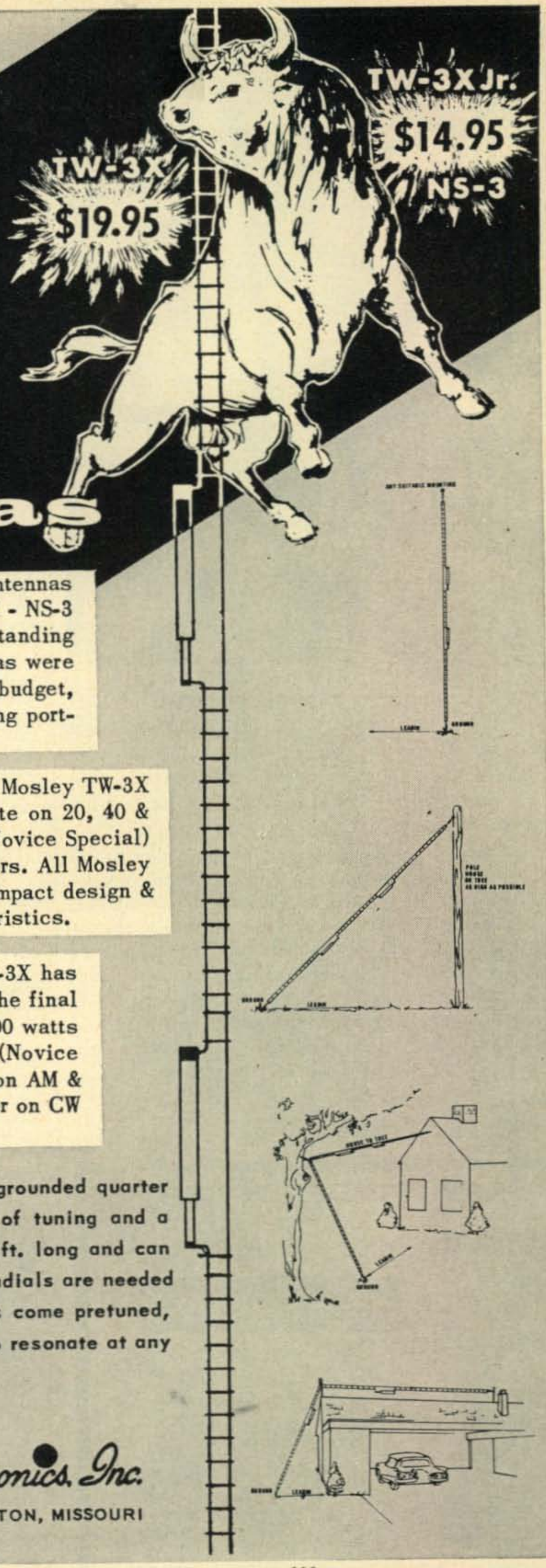
I read the article in August *CQ* entitled "The Swans of Abbotsbury" with very much interest. It is understandable why some of your staff were reluctant to publish this article. I do admire your courage because I can see that perhaps some of your advertisers may prefer to discourage this sort of thing.

Over a period of twenty years I have seen much publicity to entice new blood into amateur radio. The trend has been to make the dollar the ticket to the airways rather than genuine interest and proficiency of the technical art. Those amateurs that are willing to improve their proficiency and contribute something besides QRM are the only ones that are worthy of receiving the benefits of the best hobby in the world. I certainly believe that amateur radio continually needs to have new blood, but I am with G3BID—why advertise for QRM? Let's be more selective in both our advertising and the requirements for amateur privileges.

R. G. McCuistion, W5LMI
P. O. Box 4943
Midland, Texas

For further information, check number 16, on page 110

NEW Mosley EL TORO antennas



- **THREE MODELS** - Mosley El Toro antennas are available in three models, TW-3X - NS-3 and TW-3X Jr., designed to give outstanding performance. These versatile antennas were developed for the ham with a limited budget, limited space and the traveler working portable.

- **THREE BAND OPERATION** - Mosley TW-3X and TW-3X Jr. antennas operate on 20, 40 & 75/80 meters. Mosley NS-3 (Novice Special) operates on 15, 40 & 80 meters. All Mosley antennas feature pretuned, compact design & excellent broad band characteristics.

- **TWO POWER RATINGS** - Mosley TW-3X has an AM rating of 1000 watts input to the final amplifier and a CW/SSB rating of 2000 watts P.E.P. Mosley TW-3X Jr. and NS-3 (Novice Special) have ratings of 300 watts on AM & 1000 watts input to the final amplifier on CW and SSB.

Mosley El Toro antennas are trap type grounded quarter wave antennas using a unique method of tuning and a single 52 ohm coax line. Antenna is 58 ft. long and can be mounted to fit most any location. No radials are needed when mounted at ground level. Antennas come pretuned, in kit form and can be easily adjusted to resonate at any portion of the rated bands.

Mosley Electronics, Inc.

4610 N. LINDBERGH BLVD., BRIDGETON, MISSOURI

63044

For further information, check number 17, on page 110

Don't Forget 160

Editor, *CQ:*

Re: August Zero Bias, you forgot(?) to mention class B & C privileges on the 1750-2000 kc 160 meter band. The omission sadly distorts the content. 160 was "the band" for most class B & C hams on phone. I am in favor of incentive licensing.

S. P. (Ted) Wilds, W4GVD
P. O. Box 323
Aiken, S. C.

Jealousy?

Editor, *CQ:*

Please stop publishing articles about ten year old girls who have General (and Conditional) licenses (July *CQ*, p. 71). Each such article sets me back six weeks in my study for my General!

Warren S. Kirkland, WN6BUT
523rd A.F. Band
March AFB, Calif.

Inter-Class Friction

Editor, *CQ:*

Re: Letter of K1UZV, page 10, August issue.

Got a kick out of this letter. It is a very good example of what creates friction between the amateurs. The Tech grade 'lids' are tested by the so-called 'elite' class amateurs.

It has been my experience that much more courtesy and friendliness has been shown on bands where lower grades are operating. Perhaps this is why there is such a rapid growth among their ranks.

If it will be remembered, the biggest difference between the Tech. and Class A (General) amateur license is the code test, theory being approximately the same. Some Tech's have lots of electronic experience and have had more experience with TVI than some of your so-called elite Class A amateurs.

Anytime someone calls a class of licensed hams lids, it seems to me this is just trying to cause friction. I wonder what it takes for an operator to set himself up so high above everyone else?

Herman Entz, K7PAG
1314 Second Street
Kirkland, Washington

P.S. I'm a General Class Licensee who doesn't feel 'elite'.

When Hams Were Hams

Editor, *CQ:*

Before I blast off I would like to say that I have been an amateur radio operator for years and years, even back in the beginning of ham radio, in the spark gap days, the days of rotary spark gaps, stationary spark gaps, ear-phones, cats whiskers, and finally, the Audion tube and the Neutrodyne receiver. These were crude receivers but they were the best in those days. It took a good operator to tune in a station and usually two or three dials and the adjustment of the regeneration control. We had no Will-O-The-Wisp, Extra class. Advanced class, General class, Conditionals or Novice class boys. We were just plain old amateurs, no one seemed to want to esteem himself above another fellow amateur. If you needed help you could always feel free to ask another ham for it. Today that all seems different, it is dog eat dog.

In my school days, each term we had in our class, a smart Alex, a know it all. Today we have the same thing in ham radio. Some of them are just a smidgen better on code or perhaps on some theory and they get the big head. They never have had to build their own equipment. They rely wholly upon the manufacturing companies. Some of them can't even solder a joint! Yet they claim that they are the real amateurs!

Real amateurs are the ones that made ham radio, they dug it out of the wilderness. They had the knowledge, the inventive experience, to test and to try, and to err. The real amateurs were weeded out from the boys, the book worms. It was build, build, and that is where we were made amateurs, because we were not bigots who had to rely on what the real amateurs had already discovered.

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

"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

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.

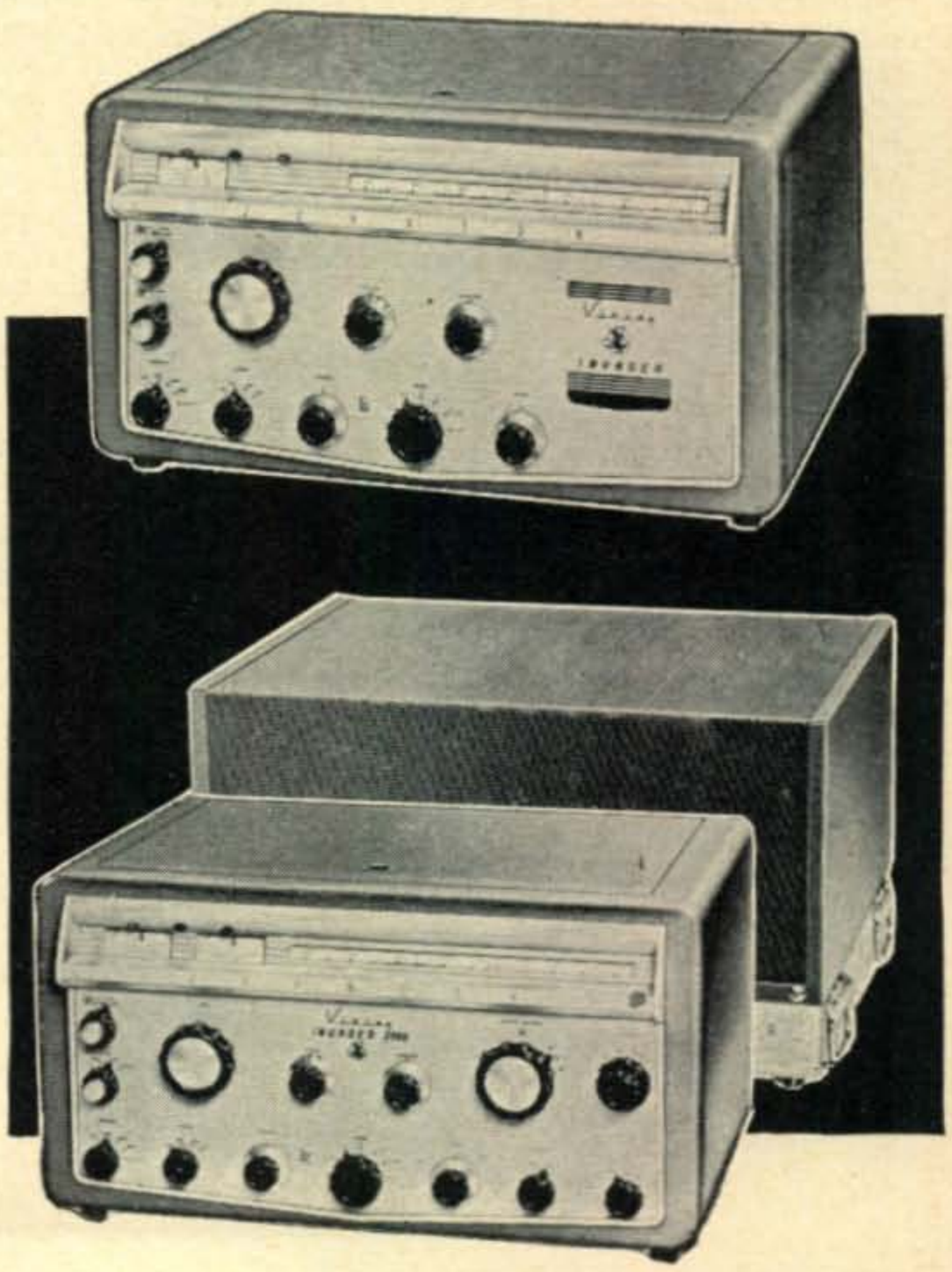
Cat. No. 240-302-2 Wired, tested.....Net $619.50

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



E. F. JOHNSON COMPANY
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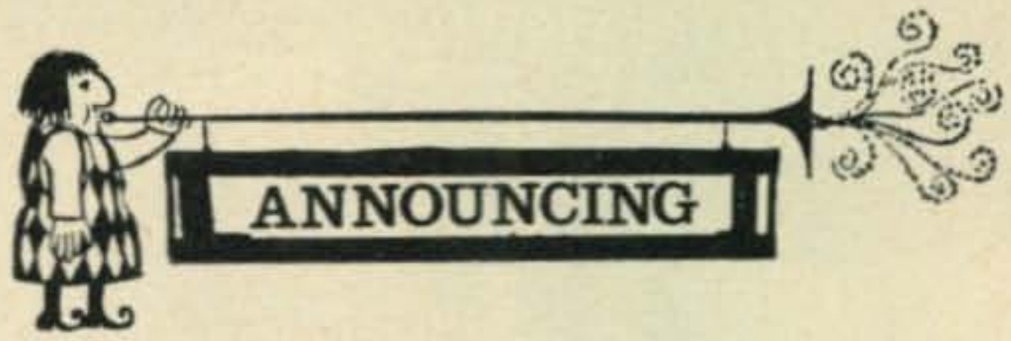
®

For further information, check number 31, on page 110

I am for making all Advanced, Extra, Conditional and Novice class licensees build their own equipment and operate it before he is permitted to have a permanent license that he can renew. Ham radio used to be *in*ventive, now it is *pre*ventive. No hams, no amateurs—all manufactures and Citizen banders, every Tom, Dick and Harry with a license, working DX and carrying on a lot of hogwash.

U. D. Bryant, K4QJJ, ex-3UV, W3FRH
404 Sycamore Street
Corbin, Kentucky



Amateur Radio on Display at the 1963 National Electronics Conference

The Chicago Area Radio Club Council will present a complete operating amateur radio single sideband, and radio teleprinter station at the 1963 National Electronics Conference to be held October 28 thru 30 at the Chicago Lakefront Exhibition Hall, McCormick Place. The station will be set up and operated by radio amateurs of the Chicago area from the Ladies Amateur Radio Klub, (LARK) and the Illiana Teleprinter Society (ITS).

An added feature of the amateur radio display will be the first time showing of a device to transform punched printer tape into embossed Braille material for the blind. This is the invention of Mr. Ray Morrison W9GRW, an active teleprinter enthusiast. Mr. Morrison has been at work on this device for several years, and will also give a talk and demonstration of the new machine during the annual "Chi-RTTY" meeting on Sunday, October 27 at McCormick Place. This meeting is sponsored by the Chicago Area Teleprinter Society (CATS), a group of radio amateurs interested in communications via teleprinters.

The display will be under the direction of Eve Cudia, K9EMS of the LARKS and Bill Soich, W9HXW of the ITS.

QCWA Dinner-Meeting

The 16th annual Dinner/Meeting of the Quarter Century Wireless Association will be held Friday, Oct. 25 at the Hotel Shelburne in New York City. The Dinner/Meeting will begin at 6 P.M. with cocktails. Mr. Ivan Loucks, W3GD of the FCC will be guest speaker. Dinner reservations may be made by writing QCWA President W2FX, 155 Bay View Road, Plandome Manor, N. Y.

Correction

"A 10 Meter Mobile Converter," page 23, Aug. *CQ* should show *one* section of switch S_1 in the opposite position. Several readers were kind enough to point this out.

start right stay right with HEATHKIT

Here's the low cost, high quality set-up you need to begin your new hobby of Amateur Radio . . .

HR-10 RECEIVER

• Covers 80 through 10 meters • Tunes SSB, AM & CW signals • Prebuilt, prealigned tuning assembly • RF stage for extra sensitivity • Lattice-type crystal filter for high selectivity

An ideal novice receiver! Easy to build with preassembled, aligned tuning unit, and precut, cabled wiring harness! Versatile controls, large slide-rule dial, built-in "S" meter for easy tuning, built-in BFO for SSB & CW reception and a host of other high performance features to delight any amateur radio fan! Features amateur band coverage only for maximum accuracy and stability. Provision for plug-in 100 kc crystal calibrator. 7-tube superheterodyne circuit. A perfect style & performance mate to the DX-60 Phone & CW Transmitter!

Kit HR-10...20 lbs....$8 mo... **$79.95**

Kit HRA-10-1, Plug-in 100 kc crystal calibrator. 1 lb..... **$8.95**

HG-10 VFO

• 80 through 2 meters coverage • Plugs into DX-60 for general class operation • A tremendous savings over crystals for similar coverage

This high quality Heathkit VFO requires only plug-in connection to the DX-60 Transmitter to tune any frequency, any band for complete amateur coverage. Beautifully designed throughout for years of top-notch performance & high stability. 12 lbs.

Kit HG-10 $5 mo.... **$34.95**

DX-60 TRANSMITTER

• 90-watts phone or CW on 80 through 10 meters • Neutralized 6146 final amplifier • Built-in low pass filter • Operates at reduced power for novice operation

An exceptionally fine transmitter for the novice! Provides CW operation at the novice power limit and AM operation later as a general class license holder. Clean, rugged construction, high quality components, and easy to follow instructions make assembly an easy, fun-filled task. Controlled-carrier modulator and power supply are built-in. Single-knob bandswitching and Pi-network (coaxial) output provide for complete operating convenience. Panel meter monitors final grid or plate current for easy tuning. Less crystals.

Kit DX-60...24 lbs.... $8 mo..... **$79.95**

WANT CW ONLY? . . . USE THE HX-11

Specially designed for CW work! Efficient circuitry provides 50-watt plate power input for outstanding amateur communications. Covers 80 through 10 meters. Features built-in low pass filter, neutralized final amplifier, switched antenna relay power, pi-network output coupling and panel meter. Husky built-in power supply. Single knob bandswitching.

Kit HX-11...18 lbs....$5 mo..... **$43.50**

FREE 1964 CATALOG

Fully illustrates over 250 different Heathkits at money-saving do-it-yourself prices. Choose from a complete line of "mobile" or "fixed" station amateur gear and accessories at savings of 50% or more!

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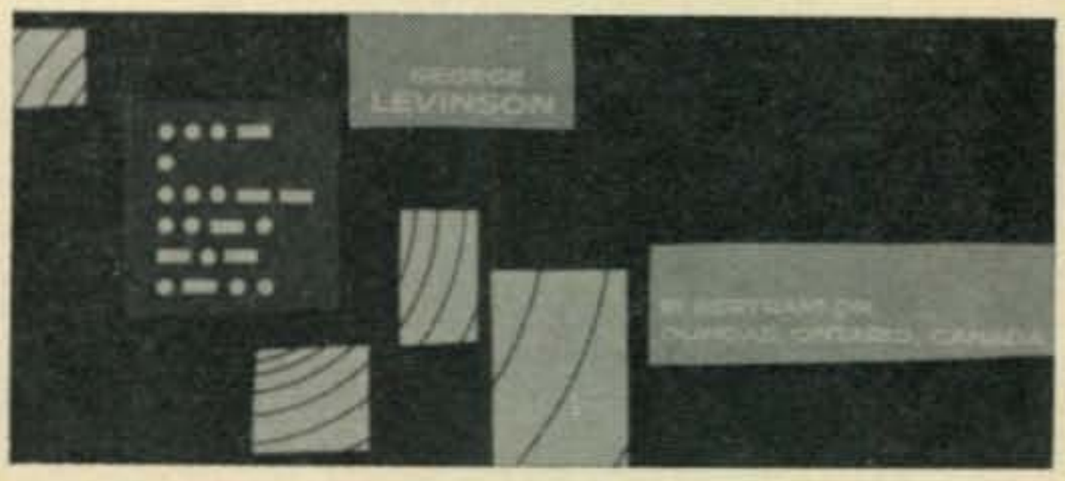
For further information, check number 21, on page 110

QSL contest



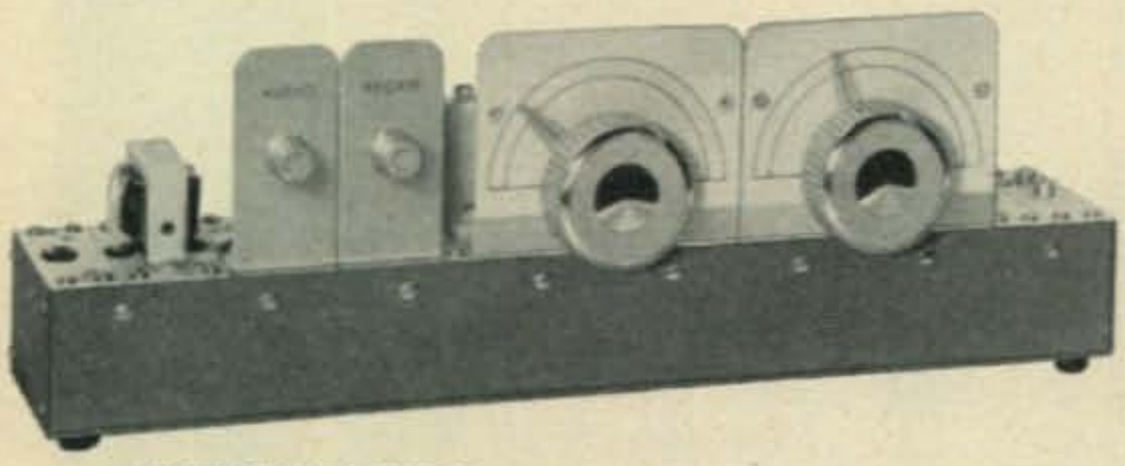
WINNER this month is VE3FKL who uses the "code" scheme in a colorful 3½" by 8" card. George used a buff colored card printed in red, green, white and two shades of blue to produce a striking effect. Runners up are headed by an s.w.l., Martin Rustige, DL9286 whose card features "Stuttgart at night." OX3JV, DJ5MX and K4BYN fill out the runners-up department.

Runners Up

EXPERIMENTER, SWL or RADIO AMATEUR

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

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



RECEIVER KITS

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

Receiver kit includes 4" speaker and power supply.

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

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

TRANSMITTER KIT

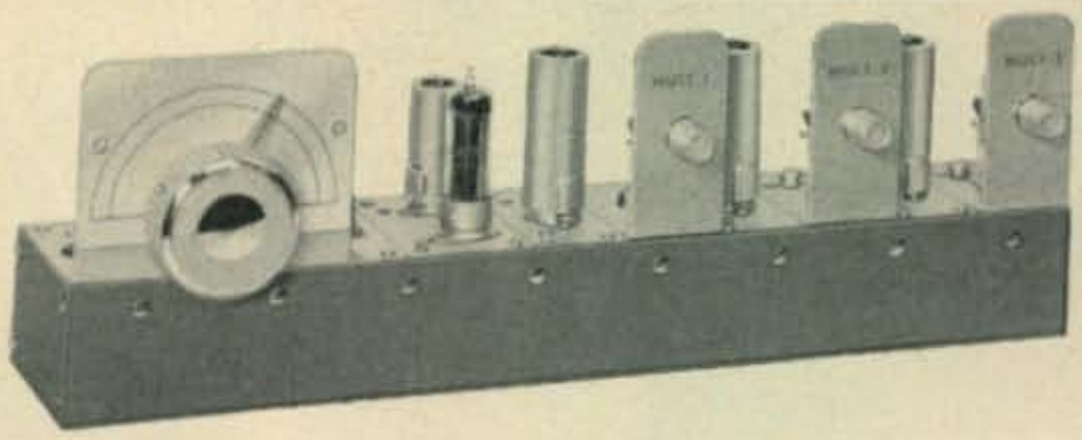
A compact package delivering a plate input of 50 watts for CW operation on 80 or 40 meters. 12BY7 crystal oscillator—6DQ6 power amplifier. Pi-network final. When used with AOR-44 receiver, transmitter operates from receiver power supply. Meter and TR switch.

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

POWER SUPPLY KITS

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

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



VFO KITS

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

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

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For further information, check number 24, on page 110

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OCTOBER 1963

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For further information, check number 25, on page 110

For further information, check number 26, on page 110

an announcement of significance to all amateur radio operators

The Heath Company takes pleasure in introducing on the following pages, the first of a complete series of fully integrated SSB amateur radio equipment that will set new standards for value, quality, style, and performance. To be designated the Heathkit SB Series, these products represent a major step forward in amateur radio SSB equipment. Now, the best in SSB design features are combined with Heathkit's leadership in electronic kit techniques to bring maximum performance and operating convenience to amateurs at modest prices.

What design features are essential or desirable for the best SSB performance? Some of the more important ones are high mechanical and electrical frequency stability achieved only by employing crystal-controlled heterodyne circuitry with low frequency variable frequency oscillators, optimum receiver selectivity and minimum transmitted signal bandwidth obtainable by means of the excellent shape factors exhibited only by crystal or mechanical filters, linear tuning with 1 kc dial calibration, smooth anti-backlash dial, automatic level control, small size, and light weight. The SB Series has all these plus the several improved and unique features listed below.

To provide even better performance plus maximum ease of assembly, these new Heathkit SSB products also feature linear dials providing 500 kc frequency coverage per bandswitch position while maintaining 1 kc calibration marks spaced approximately ⅛" apart, a high frequency bandpass IF (8.4—8.9 mc) for improved image rejection and suppression of spurious responses, preassembled and prealigned LMO (linear master oscillator), circuit boards and wiring harnesses, plus specially tooled cabinet, knobs, dial mechanism, and LMO components. When the transmitter and receiver are operated in the transceive mode, in addition to the usual practice of employing a common VFO and high frequency oscillator, the receiver BFO is used as the transmitter carrier oscillator to prevent even minute frequency changes between transmit and receive due to crystal tolerances. This attention to detail is typical of the careful, thorough engineering behind the Heath SB Series.

Only Heathkit experience and know-how can provide the engineering and manual skills necessary to bring such quality and performance to kit-form SSB equipment. Despite this background, Heath engineers spent over two years in the design of the equipment, and the developing and specifying of the critical components (such as the LMO, crystal filters, and dial mechanism). Only the most capable manufacturers have been selected to supply the special components and, as always, only the highest quality parts are employed throughout.

Carefully read the features and specifications of the SB-300 SSB Receiver described on the next two pages. The entire SB Series will exhibit all these fine performance characteristics using the same basic critical components in equipment covering all amateur interests.

HEATH COMPANY

Benton Harbor, Michigan

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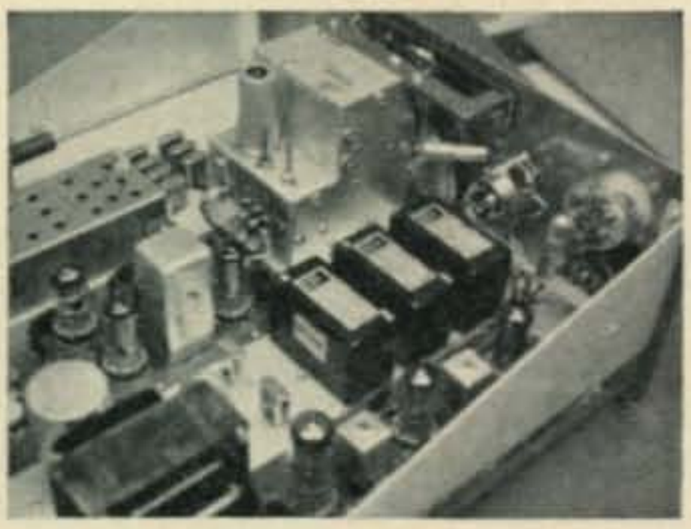
SB-300

SSB RECEIVER

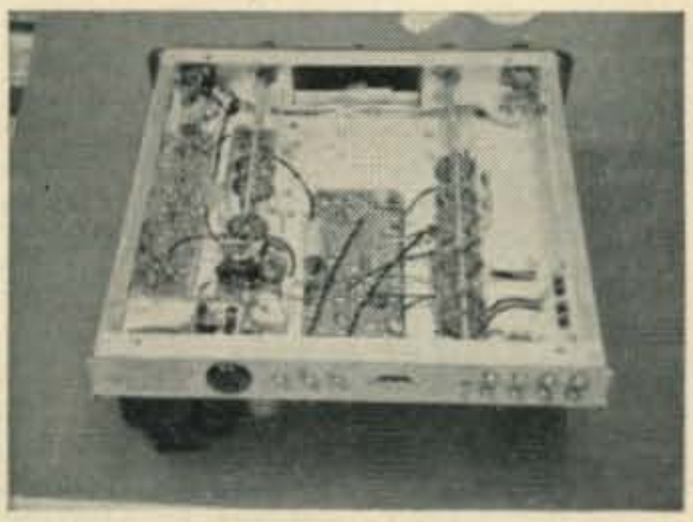
$264.95

deluxe features for finest performance



Precision-built Linear Master Oscillator (LMO) is completely assembled and calibrated, ready to install; specially designed dial assures accurate readout and smooth frequency control.

Prebuilt, hermetically-sealed 2.1 kc crystal band-pass filter for SSB provides the excellent nominal shape-factor of 2:1 (60/6 db). Optional AM and CW filters shown installed.



Two heavy-duty 3/32" circuit boards and pre-cut, cabled wiring harness maintain a clean, uncluttered layout for fast, easy assembly, years of faithful performance.

All adjustments are conveniently made from the top of the chassis; chassis screening clearly identifies coil and tube locations, etc. Entire top of ventilated cabinet opens for easy access.

SB-300 features

- Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters
- Crystal-controlled front-end for same tuning rate on all bands
- 1 kc dial calibrations — 100 kc per dial revolution provides band spread equal to 10 feet per megacycle — tuning knob to dial ratio approx. 4:1
- Provision for transceive operation with matching SB-400 Transmitter (available soon)
- Prebuilt linear master oscillator (LMO), wiring harness and two heavy-duty circuit boards for fast, easy assembly
- Professional styling and features throughout for finest HF and VHF amateur band communications

Experienced amateurs will especially appreciate the careful attention to detail behind the design of the SB-300. Its many features include a crystal controlled front-end that provides the same tuning rate on all bands, a prebuilt Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations, built-in crystal calibrator and 2.1 kc crystal-lattice bandpass filter, a smooth, non-backlash vernier dial drive mechanism, and a beautifully styled cabinet and panel. Cabinet top opens completely for easy access to top chassis components. Optional AM and CW filters are low-cost and easily installed, their steep-sided bandpass eliminates, not merely attenuates, adjacent interfering signals for exceptional reception.

Circuit features include a high frequency I.F. for maximum I.F. and image rejection, audio inverse feedback, fast-slow-off AGC control, stability of 100 cps after warmup, and a host of other deluxe features that assure finest communications results. Order your SB-300 now for 60% savings over comparable factory-built receivers! A matching Transmitter, 1 KW Linear Amplifier, and an All-Band SSB Transceiver will be available soon!

Kit SB-300....17 lbs.....no money dn., $25 mo..... **$264.95**
SBA-300-1 CW Crystal Filter (400 cps)....1 lb..... **$ 19.95**
SBA-300-2 AM Crystal Filter (3.75 kc)....1 lb..... **$ 19.95**

Check the superb specifications below and see what a tremendous dollar value the SB-300 represents!

Frequency Range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 8.25, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected: LSB, USB, CW, AM. **Selectivity:** SSB: 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). AM: 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). CW: 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response:** SSB: 350 to 2450 cps nominal at 6 db. AM: 200 to 3500 cps nominal at 6 db. CW: 800 to 1200 cps nominal at 6 db. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500 ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 First mixer; (1) 6AB4 Heterodyne oscillator; (1) 6AU6 LM osc.; (1) 6AU6 second mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product detector, BFO, BFO amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14-7/8" W x 6-5/8" H x 13-3/8" D.

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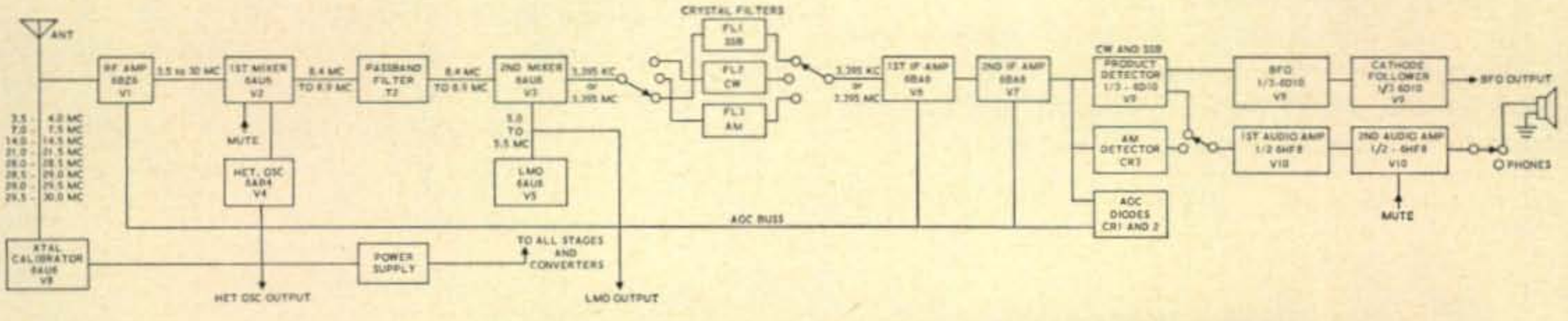

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For further information, check number 29, on page 110

A 2 KW P.E.P. Linear Amplifier

BY M. D. SMITH*, WA4DXP

Here is a linear amplifier that is basic in design. Using swamped grid input, it requires 100 to 150 watts of drive and loafs along at 1 kw input. This table top linear is flexibly metered and has a series of safety controls to prevent accidental damage (to linear or operator).

THE following linear amplifier for 80-10 meter operation was designed over a period of seven months. During this time, numerous other circuits were investigated to determine their most outstanding features. The features from past amplifiers, new ideas, and standard amplifier practice were combined in a linear that would satisfy the following basic requirements:

1. The amplifier had to deliver 2 kw p.e.p. as well as 1 kw c.w. and almost 1 kw a.m.
2. The unit must be rugged, simple in basic design and easy to build.
3. It had to be easy to put into operation, that is, very little adjustment after construction such as neutralization.
4. Designed along commercial broadcast lines in preserving components and insuring foolproof operation.
5. Finally, it had to be compact and neat for desk-top operation.

The completed unit meets the above requirements in that it is one of the most stable, easily adjusted, and rugged linears available. It compares favorably with others costing three to four times as much.

It uses a pair of Amperex 4-400A tetrodes in swamped grid which requires no input tuning. The amplifier will require an exciter that is in the 100 to 150 watt power range.

In actual operation, the linearity, checked with a Heath HO-10 monitor scope, is excellent. With both of the 4-400A's in operation, it's actually hard to hold it down to 1,000 watts c.w.

*Smith Broadcasting, POB 7372-A, Birmingham 13, Alabama.

Circuit Details

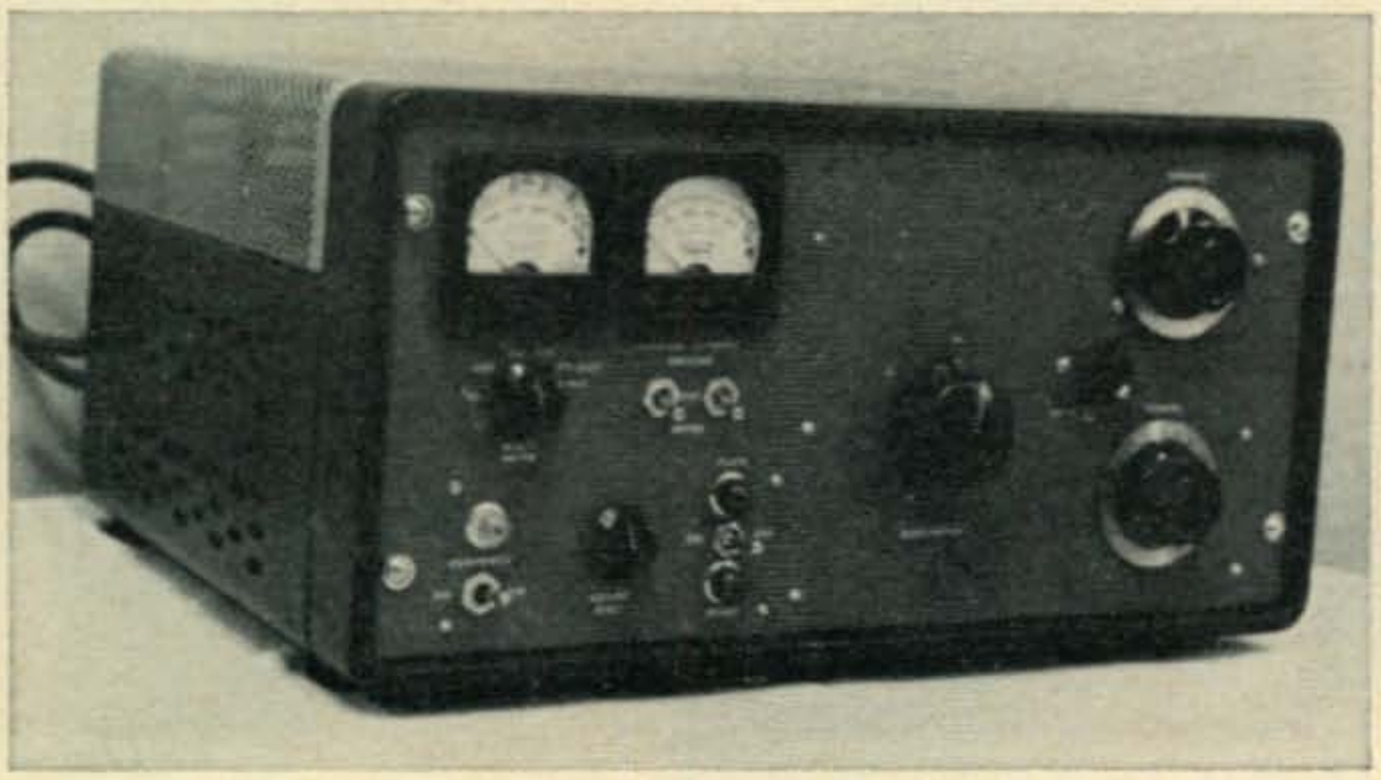
Amplifier—The heart of the linear is the pair of 4-400A tubes. The heavily swamped grid combined with ample parasitic chokes makes this linear one that just won't "take off" with the first application of r.f. Many commercial broadcast transmitters use a pair of 4-400A's with nearly 2,000 watts of d.c. input.

Input Circuit—The advantage of the swamped grid is that it is easy to build, requires no tuning on any band and allows tuning of the exciter at full output using the non-reactive resistor as a dummy load. The voltage developed from the current in the 100 ohm resistor is coupled through the 0.001 mica transmitting capacitor to the grids of the 4-400A's as shown in fig. 1.

Output Circuit—The output is coupled through two 500 mmf, 30 kv "TV Doorknob" capacitors to the B&W Model 850A Pi-Network inductor. The tuning capacitor is a dual section (100 mmf per section) with the second section placed in the circuit manually for 80 meter operation by switch S_1. The 1500 mmf loading capacitor can be any type. (The author used a surplus broadcast variable available from Fair Radio.[1] It bears the part number 3D9400 and costs $1.95. This is a five section job and each section is rated 20-402 mmf.)

A standard relative power output circuit is included in the main schematic, but it can be omitted if desired. Note that the 10 mh safety choke is *not* a part of the relative output circuit. The safety choke lowers the voltage on the tuning capacitor plates and provides a d.c. discharge

[1]2133 Elida Road, Lima, Ohio.



Front view of the 2 kw p.e.p. table top linear complete in its cabinet. The output tuning controls are on the right side of the linear. The left knob is the bandswitch, the upper dial, loading and the lower dial, plate tuning. The switch, S_1, between the two dials adds the second section to the plate capacitor to enable tuning 80 meters.

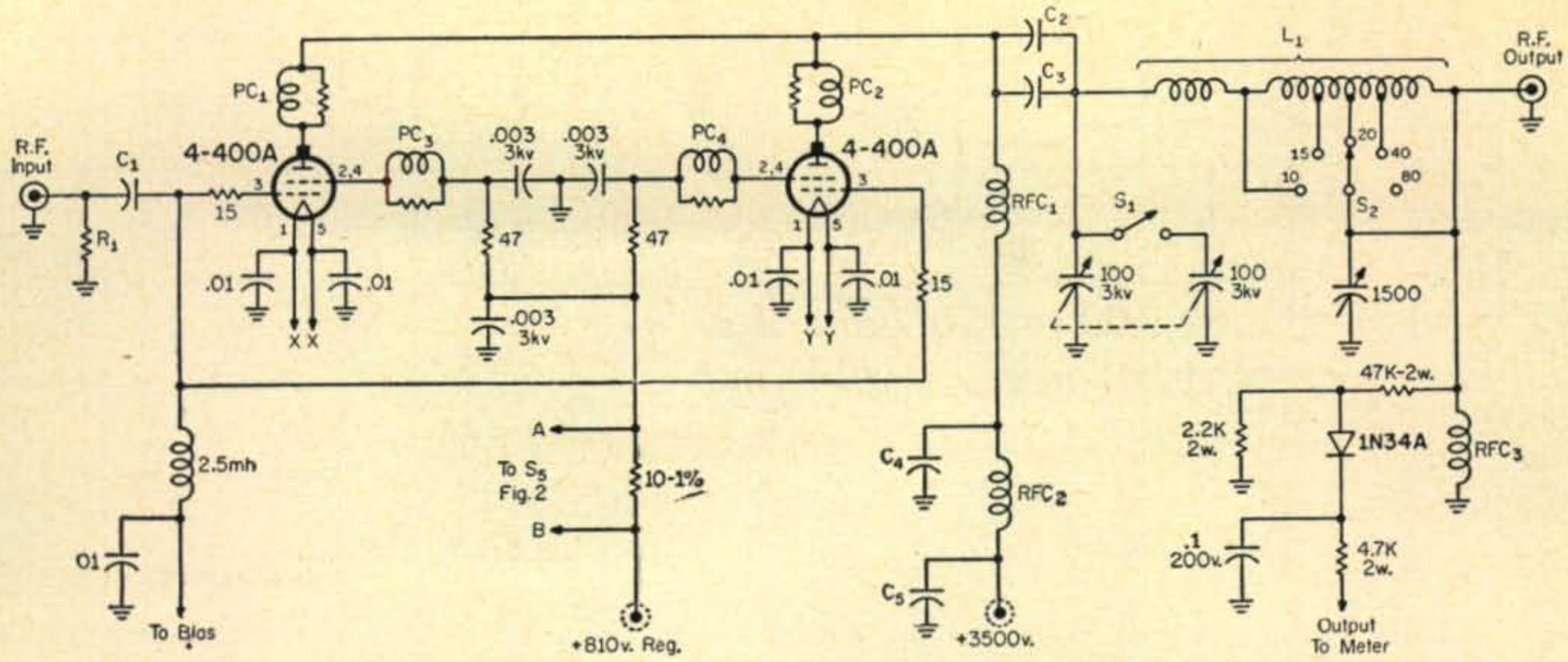


Fig. 1—Circuit of the 2 kw p.e.p. linear amplifier. All capacitors are disc ceramic unless otherwise noted and all resistors are 2 watts unless otherwise indicated.

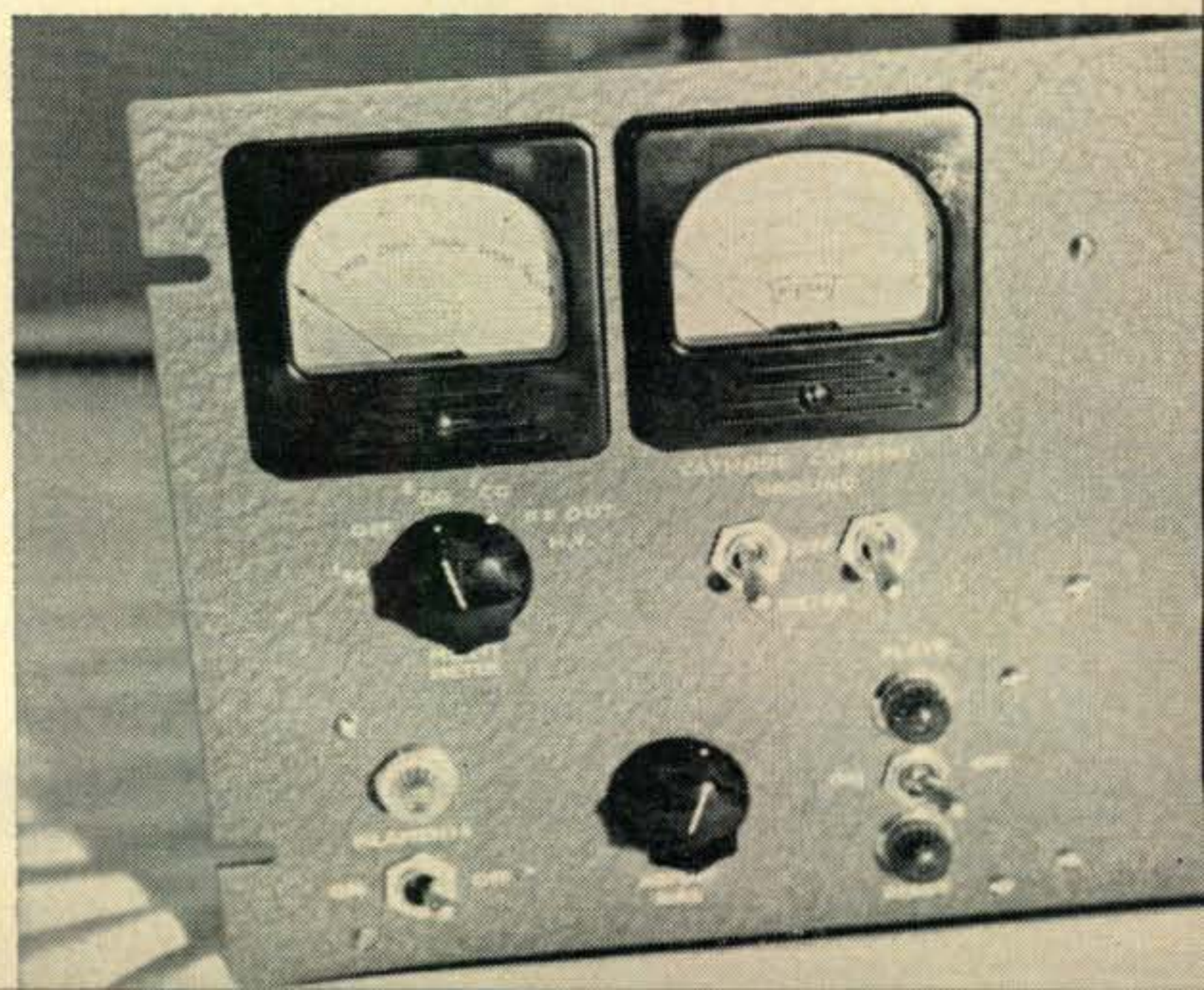
C_1—.001 mf 1 kv transmitting type mica.
C_2, C_3—500 mmf, 30 kv TV type capacitors.
C_4, C_5—500 mmf, 20 kv TV type capacitors.
L_1—B&W 850A Pi-network.
PC_1, PC_2—3t #14 busbar, 1½" dia wound around four 220 ohm 2 watt resistors in parallel.
PC_3, PC_4—3t #18 wound tight and spaced evenly on a 47 ohm 2 watt resistor.
R_1—100 ohm 100 watt non-inductive resistor.
RFC_1—145 mh, 800 ma. National R-175A or equiv.
RFC_2—Ohmite Z-50.
RFC_3—10 mh, 1 amp. r.f. choke.
S_1—S.p.s.t. ceramic rotary mounted on 1" standoffs.
S_2—Part of L_1 assy.

path should one of the coupling capacitors short.

Control And Metering Circuits—So far, the linear is more or less standard. It is simple in basic design and construction. However, the control circuits are one of the most outstanding features of the linear and are applicable to many other amplifiers. As shown in fig. 2 two Amperite thermal delay relays are used in the safety system. These relays have heat sensitive contacts which either open or close after the heater has been on for a pre-set time. The 115NO15 operates on 115 volts a.c., has normally open contacts and closes after fifteen seconds. When the filament switch, S_1, is first closed, the filament power light and blower come on. A small amount of current passes through the Globar resistors R_1 and R_2. At first the tubes will not even show a glow (a far cry from the surge of current normally observed without the series resistors), then as the Globar thermistors heat, their resistance goes down and the voltage on the filaments of the 4-400A's slowly rises until it reaches a steady state of about 4 volts (10 seconds). After fifteen seconds, the thermal delay relay closes and allows full voltage on the filaments. By preventing this harmful cold surge current, the filament life of the tubes should at least be doubled.

The other thermal delay relay is a 115NO180. It has a delay of three minutes. This is the plate delay relay. Even if the plate switch S_2 is thrown, nothing will happen until three minutes have elapsed. This gives all tubes ample time to warm up before the high voltage is turned on. A "ready" light will come on after the allotted time, showing that the relay has closed and that high voltage may be applied. The other pilot light is the plate indicator showing that high voltage is on. If one should care not to wait three minutes to apply high voltage, a relay with a shorter delay time can be used; just unplug one relay and plug in the other.

The bias supply is a bridge network of silicon rectifiers. The BIAS ADJ. control (located on the front panel) determines the bias voltage on the grids when the terminals of TB_1 are *shorted*. If they are open, the full bias voltage (250-300 volts) is put on the grids, thus cutting them off. The terminal will normally go to a relay which



Front panel view of the metering and control circuit for the 2 kw p.e.p. linear amplifier. The left meter, calibrated from 0-5 kv, is used for the multimeter and is controlled by the switch below it. The right hand meter is for cathode current and switches S_3 and S_4 are below it. The filament toggle switch S_1 and PL_1 are in the lower left corner. The center knob is the BIAS ADJUST control and the plate toggle is between PL_2 and PL_3 on the right.

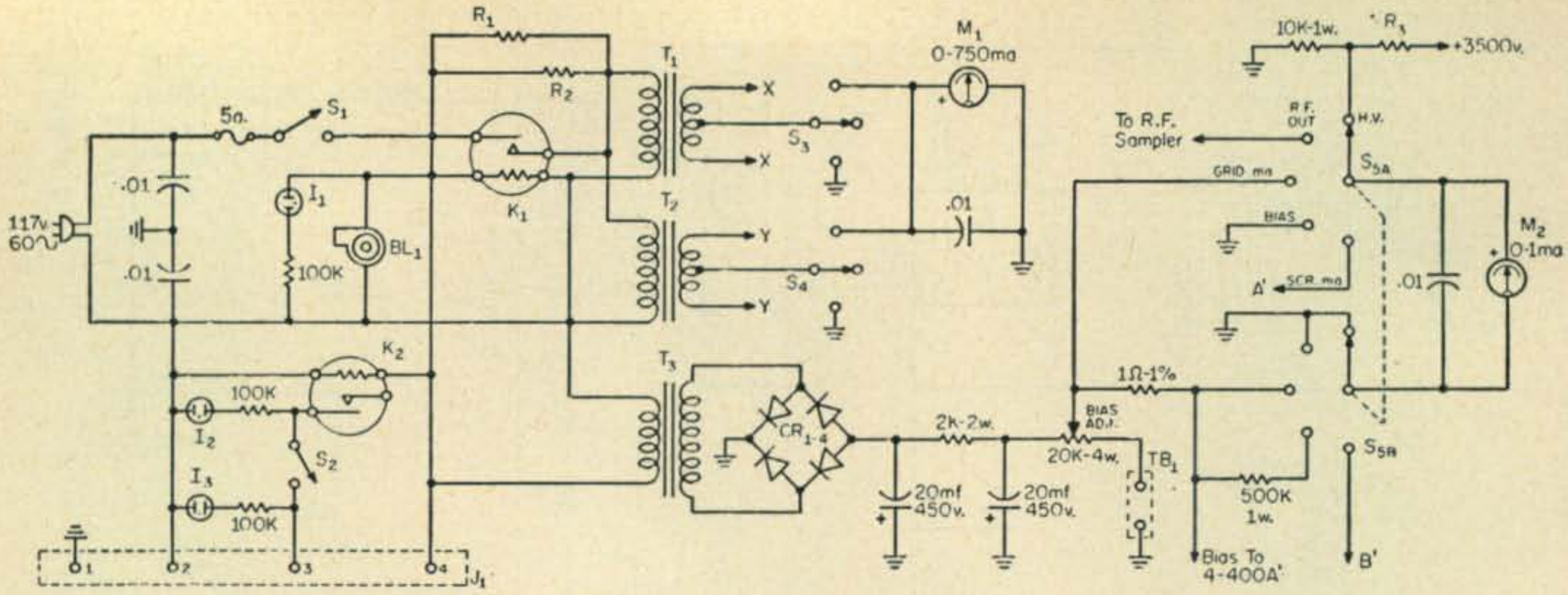


Fig. 2—Control circuit and bias supply for the 4-400A linear. This circuitry is incorporated in the amplifier chassis with power supply control connections being made via J_1.

B_1—100 c.f.m. blower. Dayton #2C781 or equiv.
CR_1, CR_2, CR_3, CR_4—Silicon Rectifiers, 1N1096.
I_1, I_2, I_3—NE-51 Neon bulbs and Dialco Neon Panel assemblies.
K_1—Thermal Time Delay relay. Amperite 115NO15.
K_2—Thermal Time Delay relay. Amperite 115NO180.
R_1, R_2—G-C Globars. Type 25-910.
R_3—Five 1M 2w. resistors in series.
S_3, S_4—S.p.d.t. toggle, center off position.
S_5—D.p. 6 position non-shorting rotary switch.
T_1, T_2—5v, 15 amp filament transformer. Triad F11U or equiv.
T_3—250v, 25 ma. Stancor PS-8416 or equiv.

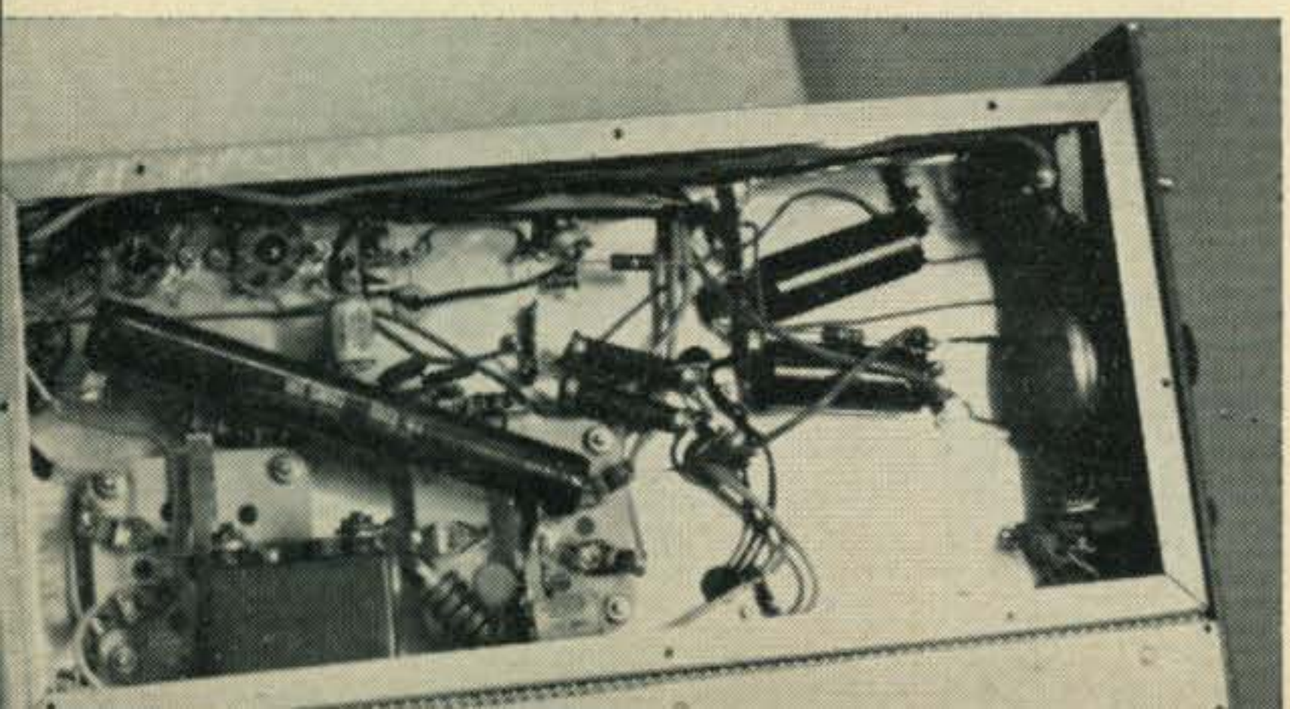
will break the connection for receive and short the terminals for transmit. (Note: I chose to place a 10K pot across the terminals of TB_1 and adjusted it during receive operation so that the finals drew about 50 mils of current for regulation purposes. This is not necessary with a well regulated supply, but the voltage rose from 3500 to 4200 thus exceeding the 2 kv each or 4 kv total rating of the filter capacitors.)

The plate current meter is located in the cathode circuit. It measures both plate and screen current, but since screen current is comparatively small, it will read plate current for all practical purposes. Two filament transformers are used, so it is possible to meter either one or both of the tubes. The toggle switches S_3 and S_4 have "center-off" positions and it is possible to cut one of the tubes out of the circuit completely by breaking the cathode ground connection. This is ideal for running reduced power.

Power Supply—This is a very conventional circuit and only brief description is necessary. The transformer is rated at 3500-0-3500 volts at 400 ma, but will easily deliver quite a bit more for amateur use. It has two inputs that may be paralleled for 115 volt operation or series for 230 volt operation.

Both filament and plate power are operated by 115 v.a.c. power relays and provision can easily be made for manual operation.

Bottom view of the input section of the linear amplifier with the bottom plate removed. The 100 ohm non-inductive resistor and the 1 kv mica capacitor may be seen over the 4-400A sockets.



Mechanical Layout

The amplifier is built on an 8¾" grey wrinkle standard rack panel, a chassis 7×15×3 inches, another 2½×9½×5 inches and a 15×17 inch bottom plate. The bottom plate is cut into two pieces . . . one 15"×7" and another 15"×10" which is used as the foundation for the bandswitch and tuning components. The small chassis is bolted, on its end, to the main chassis and bottom plate. The r.f. output connector and the h.v. connector are located on this small chassis. The relative power output circuit is located inside the small chassis.

The B&W coil is mounted directly on the bottom plate, but the lower tuning capacitor is mounted on one inch insulators to allow the shaft to come through the front panel at the proper height. The loading capacitor is bolted to the side of the aluminum angle bracket and also bolted to the small back chassis with a piece of angle iron. An off-set ball joint drive is used to permit proper alignment of the shaft when it comes through the front panel.

The 4-400A tube sockets had to be sub-mounted ¼" to allow clearance for the cabinet top. The tubes can be sub-mounted at any depth, so long as the air holes at the base of the tubes are not covered up.

The blower, a 100 c.f.m. size (although a 60 c.f.m. could be used equally as well), is mounted on the back of the main chassis. It must be removed to put the linear in the cabinet, and then installed from the back by means of wing nuts. The top and bottom of the blower mounting flange had to be trimmed to allow flush mounting with the top and bottom of the main chassis.

Testing And Operation

As mentioned earlier, testing is extremely simple. The filaments were turned on to check the

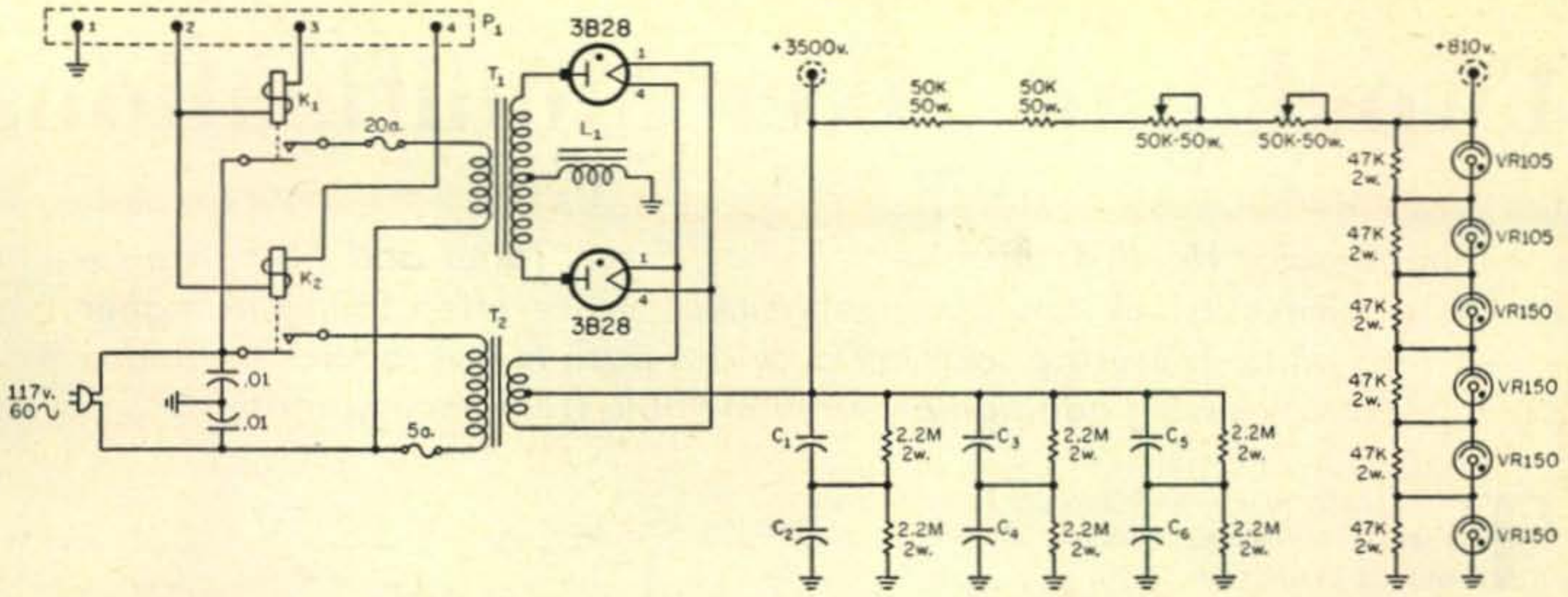


Fig. 3—Plate and screen supply for the 2kw linear. All control functions are handled from the amplifier chassis via P_1.

C_1, C_2, C_3, C_4, C_5, C_6—4 mf 2 kv oil filled. Available from Fair Radio.

K_1, K_2——D.p.s.t. 115 v.a.c. relay. Potter Brumfield #PR7AY.

L_1—10 h, 500 ma. Available from Fair Radio.

T_1—3500-0-3500 v.a.c. at 500 ma. Osborne #8924. Osborne Trans. Co., 3834 Mitchell Ave., Detroit 7, Mich.

T_2—2.5v, 10 amps, filament transformer. Triad F5U or equiv.

filament-saver circuit. At first there was no glow, but ten seconds later they were at almost full brightness, and when the delay relay closed, there was a final bright glow as the filament reached the full five volts.

Three minutes later the "ready" light came on showing that the plate switch could be closed. Both the cathode current switches were placed in the center OFF position to prevent any current from being drawn when h.v. was put on the plates. The bias voltage was set for maximum, about 310 volts and the plate switch was then closed. The multi-meter indicated 4200 volts on the plates. First one, then the other cathode switch was placed in the METER position and, as was expected, since the bias was at cutoff, no current flowed. As the bias was lowered (TB_1 was shorted) the static plate current began to climb until it reached the rated static current of 180 mils (90 mils each). At this point the tubes were showing a dull red glow which is normal.

Previously the HT-32B was loaded into the linear and it was now possible to inject a small amount of r.f. for tuning. Another method would be to set the bias control for cutoff, add r.f., then back down on the bias until 200 mils were being drawn. Now, with the multi-meter in the R.F. OUT position, it is easy to find resonance and load for maximum r.f. output.

Throughout the entire procedure, nothing unusual happened and ten minutes after the filament switch was thrown, the linear was putting a solid 1,000 watts c.w. on the 40 meter band. There wasn't any trouble with harmonics or parasitics on *any* band at any time.

The input impedance is approximately 100 ohms, a slight mismatch for 50 ohm transmitters. It would be best to use RG-11/U for connections from exciter to transmitter. It will be best to use as short a lead as possible, although, as much as six feet seems to work fine.

The cost of parts for the linear was about $175, excluding the cost of the 4-400A's which sell new for $48.00 each. The cost of the power supply is far lower than commercial units . . . about $150.00. The total cost of the linear is far below many other commercial linear amplifiers and it features broadcast quality and ruggedness found only in the most expensive linears on the market today.

If you have been running "barefoot" for a while and you aren't satisfied with the thorns of QRM and the bruises of QSB, then try on some shoes . . . "Shoes—Size 2 kw." ■

A three quarter rear view of the 2 kw p.e.p. linear amplifier shows the layout of the input chassis in the foreground. The two plug-in time delay relays are in the lower left corner. Alongside them is T_3, the bias supply power transformer. The two transformers near the front panel are T_1 and T_2, filament transformers for the 4-400As. The output tuning section is built on the bottom plate and the rear chassis, mounted on its side, contains the relative output circuit, the r.f. output connector and the high voltage connector The parasitic chokes may be seen connected to the plate r.f. choke which also mounts the two TV type coupling capacitors.

Twoer and Sixer Modifications

BY TOM BECKETT*, W5IUU

The popular Heath Transceivers, Twoer, Sixer, Tener and CB-1, are inexpensive but lack operating refinements more often found in higher priced units. The use of a relay provides push-to-talk operation and a rotary switch addition provides multiple frequency operation.

THE Heath Sixers and Twoers have proven themselves to be effective for fixed and mobile operation. Their popularity is due in no small part to the moderate cost as well as excellent performance. There are, however, several changes that would increase operating efficiency. First in importance, I feel, is push-to-talk operation and second is to be able to change frequency (over a narrow bandwidth, of course) by switching crystals. All this can be done without sacrificing any existing functions or impairing the operation in any way.

Push-to-Talk Modification

For this conversion it is necessary to replace the front panel T-R switch with a 4 pole double throw relay. A method of energizing the relay coil for all modes of operation had to be found and was really very simple. A relay with a 10K coil, requiring an energizing current of 5.25 milliamperes, is placed in series with a 20K 5 watt resistor and wired across the B plus 250 volt line. As shown in fig. 1, the relay circuit is complete only when the microphone press-to-talk switch is depressed.

The relay is mounted behind the front panel just above the T-R switch by means of an L shaped bracket. With the relay used, the bracket mounting holes had to be drilled just above the

*3868 Potomac, Dallas 5, Texas.

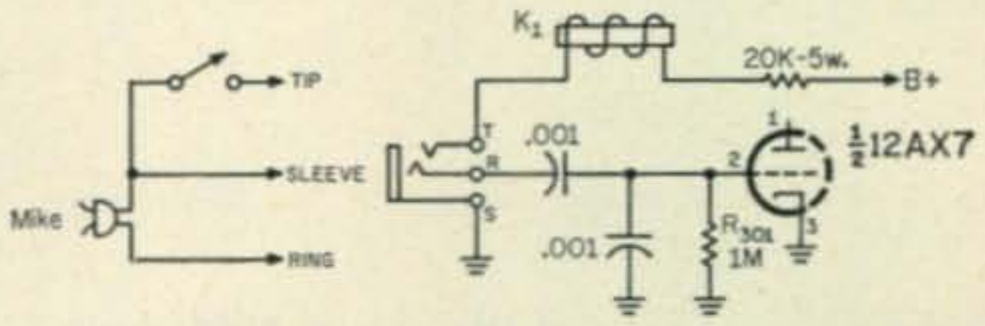


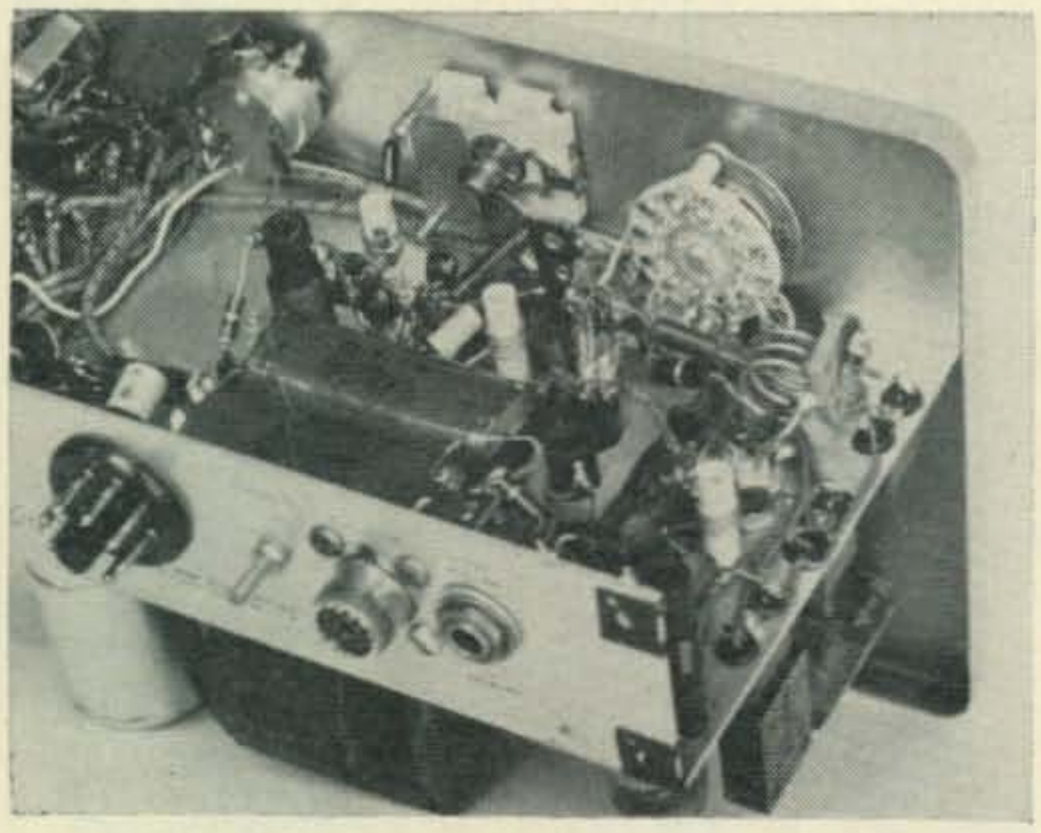
Fig. 1—Wiring for the relay coil and microphone for push-to-talk operation in the Heath transceivers HW-19, HW-29, HW29A and CB-1. The relay is a Potter Brumfield GB-17D with a 10K coil.

Heathkit plastic emblem.

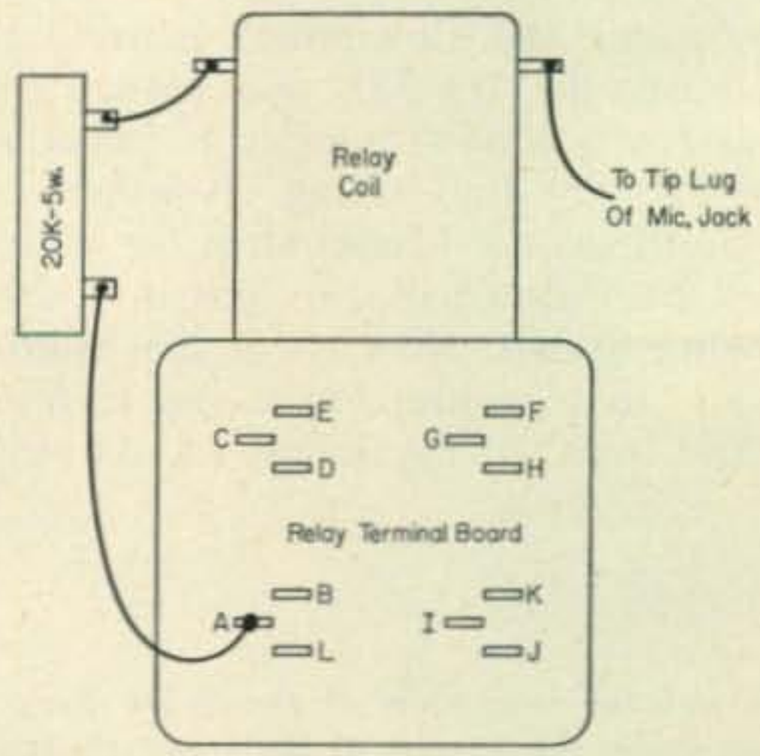
When the relay is mounted it becomes a simple matter to transfer the wires from the T-R switch, section by section, to the relay contact terminals. How this is done is shown in fig. 2.

When a wire is removed from the switch it must be rerouted up through the hole in the chassis just alongside the switch. If the wire is not long enough to reach the relay terminal designated, it should be followed back to its point of origin and a new and longer wire soldered in and run to the relay. This will prevent an unsightly mess of splices bound to cause trouble later.

In some instances the switch lug is used for a terminal point, that is, there is more than one wire tied to it. For a neat job it is best to reroute the wires so they junction at some other point



Bottom view of the modified Heath Twoer showing the new crystal selector switch on the right of the front panel. Care must be taken to clear the components when drilling the holes for the new crystal sockets. The vertical terminal strip just behind the switch is for the antenna circuit junctions.



Model	A	B	C	D	E	F	G	H	I	J	K	L
Twoer HW-30	3	2	6	4	5	8	9	7	12	10	11	—
Sixer HW-29A	9	8	6	4	5	2	3	1	12	10	11	—
Sixer HW-29	3	2	6	4	5	8	9	7	12	10	11	1
Tener HW-19	3	2	6	4	5	8	9	7	12	10	11	1
CB-1	3	2	6	4	5	8	9	7	12	10	11	1

Fig. 2—Correlation of relay and switch wiring for the various Heathkit transceiver models is shown in the drawing and chart above.

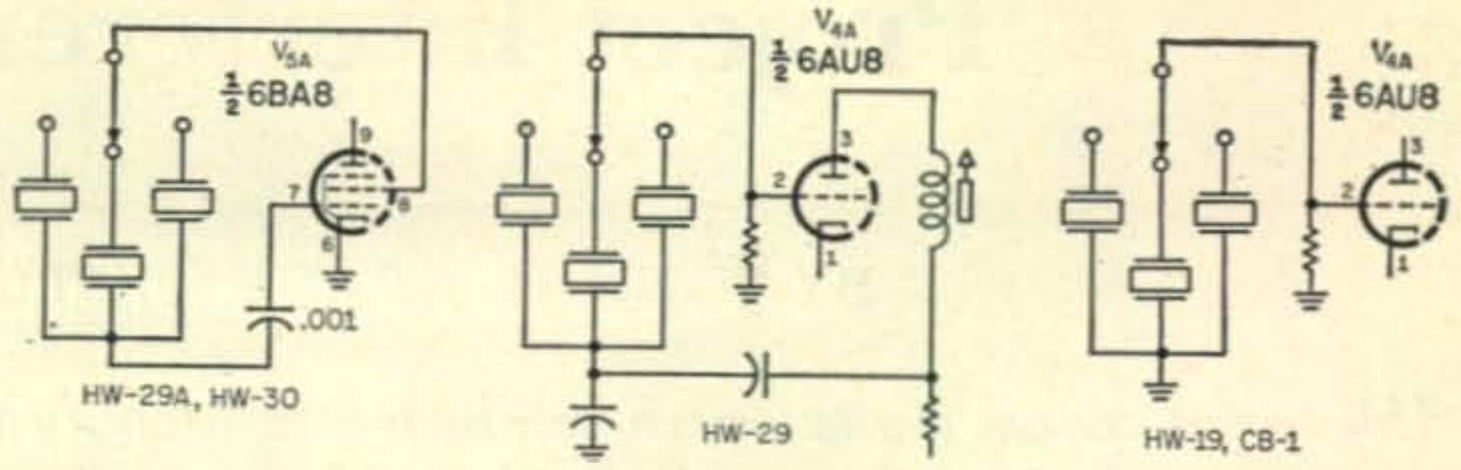


Fig. 3—Wiring changes for crystal switching in the various Heath models, is shown above.

and run a single wire through the hole to the relay. If you lack experience and are nervous about rerouting wires it is possible to lift the connections off the switch lugs, add a length of wire and run it to the relay. Just be sure to splice carefully and tape well.

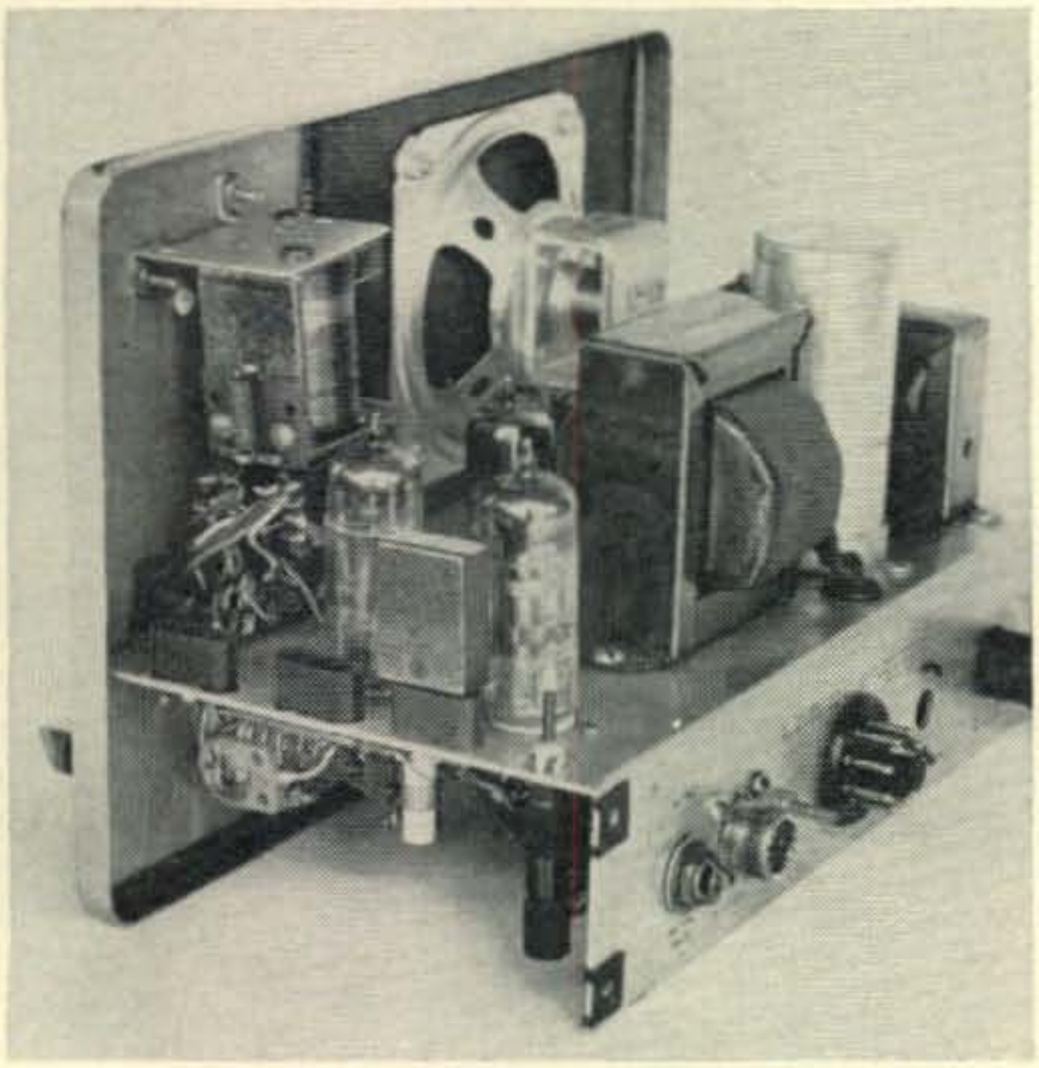
When extending the relay section that switches the antenna, the precaution of using coaxial cable is recommended. The three lengths cannot fit in the hole along with the other wires so a ⅜" hole is drilled between V_3 and V_4. It is located about 2¼" from the right edge and 3" from the rear of the chassis.

A four lug vertical tie strip is mounted on the same screw supporting the 3 lug tie strip near the old T-R switch. It is used as a junction for the coax cables and any blocking capacitors that may be found in the model being converted. (The Twoer has 2 blocking capacitors, one model Sixer has one and another Sixer has none.)

The p.t.t. conversion is applicable to other similar Heathkit units as listed in the chart in fig. 2. The chart shows the variations in switch to relay connections for each unit.

In those models that use shielded wire for connections F, G and H, a single 3 conductor shielded wire should be used to extend the wires and care should be taken to dress the shield away from the relay terminal board.

Also, the B plus voltage for the relay coil is picked up at relay lug A as shown in fig. 2. This is valid only in the HW-29A and the HW-30. For the other units the 20K resistor lead must be brought below the chassis to the 225 volt line. This may be found at the junction of the 330 ohm 2 watt and 10K 1 watt filter resistors. If this change is not made there will not be adequate current to pull the relay in.



Rear panels view of the modified Heath Twoer shows the push-to-talk relay mounted on the front panel. The two additional crystal sockets may be seen along the edge of the chassis.

Microphone Modification

Remove the screw-on type microphone connector and replace it with a Mallory #702B jack which is a 3 circuit open affair. Wire it as shown in fig. 1. It is important to use the order shown for tip, ring and sleeve. If the order is changed, the insertion of the mike jack can accidentally bring the crystal or ceramic element in contact with the B plus.

Crystal Switching

There is sufficient room to add two more crystal sockets in line with the existing crystal and the front panel. The switch to select the crystals can be placed in the old T-R switch location. A Centralab #2001 one pole 2-12 position rotary switch was used. It was set for a three position stop. The simple circuits are shown in fig. 3. The old T-R switch knob is used for the crystal switch so the outward appearance of the unit does not change at all.

The span, in frequency, between the highest and lowest crystal will vary and depends to a great degree upon the bandwidth of the antenna. This will have to be determined experimentally. Since the selector switch will accommodate more crystals you need only find room for them on the chassis and stay within the bandwidth to have more flexibility, frequency wise. ■

"... and I would also appreciate a QSL. My call is ..."

Project Interference

Part 1

BY JOHN H. GRADY*, K4TUA

This series covers the research conducted to identify the principal sources of excessive interference on the amateur spectrum. In addition, the series provides a workable plan of action called "Operation Quality Cleanup," to achieve more effective and efficient operation on the amateur bands with a significant reduction of interference. Part I deals with some of the causes of interference and an analysis of the useable portions of the amateur spectrum. Part II will deal with the quality of signals and the effect of signal quality on bandwidth. Part III describes, in detail, a campaign to improve conditions on the bands.

THIS paper was developed to supply answers to the questions: What can we do **about** interference in the amateur bands? And, how can we secure more effective and efficient operating in our spectrum?

The object of the study was to create an improved program of amateur compatability—one which would provide a means for more harmonious operation in the amateur bands through the use of good quality signals, good operating techniques and prevention of interference with other amateurs on the band.

A good example of the interference problem can readily be observed by tuning across the 40-meter band. One will hear, superimposed on foreign broadcasts, a cacaphony of distorted, garbled whistles, squeals, and other background noise that represents what may be collectively labeled "interference."

At present, the interference level on the active amateur bands has nearly reached the saturated or intolerable stage, and unless immediate action is taken to reduce the amount of interference, we will not be able to keep up with the demands of an increasing amateur population.

There are four basic types of interference (noise): galactic, solar, atmospheric and man made. To insure that we are on common ground, radio interference may be defined as any objectionable, radiated or conducted electrical disturbance which interferes with the operation or reliability of communications. This article will be concerned *only* with man-made types of interference.

Amateur Spectrum Compression

The FCC-assigned amateur spectrum for all modes of transmission on each of the 80, 40, 20, 15 and 10-meter bands is shown in Table I.

It has already been established by Jacobs and Leinwoll[1] that "the present sunspot cycle is declining, and will continue to decline for the next four years. This decline will be responsible for steadily poorer conditions on 20, 15, 10 and 6-meters, but increasingly improved conditions on 40, 80, and 160."

These facts can be readily confirmed by tuning across the bands and noting that only spasmodic openings occur on 10 and 15 meters, 65.1% of available amateur h.f. spectrum.

If, during the next three years, conditions on 20 deteriorate to those presently found on 10 and 15, then by 1965 or before, all active amateurs will be forced to leave 20 meter (10.6% of h.f. spectrum) and operate on 40 and 80 (24.3% of h.f. spectrum).

With infrequent openings on 10 and 15 meters, the present active amateur spectrum has been compressed from 100% (80 through 10) to 34.8% (20, 40, and 80) with the probability of shrinking to 24.2% of the available h.f. spectrum (40 and 80).

Based on our present amateur population the continuing rise in band activity (each succeeding year establishing new all-time-high band activity records), has already resulted in an overloaded per-channel density. The degree of interference has nearly reached an insufferable stage.

If the interference has nearly reached the saturation stage today, think what it will be like when our population doubles!

Table I—H. F. Amateur Spectrum

Band	*Frequency* (mc)	*Bandwidth* (kc)	*Bandwidth* %
80	3.5-4.0	500	15.10
40	7.0-7.3	300	9.20
20	14.0-14.35	350	10.60
15	21.0-21.45	450	13.60
10	28.0-29.7	1700	51.50
	Total	3,300	100.00

Table I: The amateur spectrum illustrating the number of kilocycles available for h.f. communications and the percentage of spectrum allotted to each band. The 160 meter band was not included in this survey.

*404 North Briarcliff Road, Warner Robins, Georgia.

[1]Jacobs, F. & Leinwoll, S., "The Sunspot Story; Cycle 19 The Declining Years," (Part I) *CQ*, April '61, p. 27.

Table II—A.M. Bandwith Observations

Bandwidth (kc)	40m. Observ.	%	20m. Observ.	%	15m. Observ.	%	All Band Total	%
6	9	3	24	4	3	3	36	3.6
7	24	8	54	9	8	8	86	8.6
8	30	10	66	11	11	11	107	10.7
9	45	15	84	14	15	15	144	14.4
10	96	32	180	30	31	31	307	30.7
11	36	12	78	13	12	12	126	12.6
12	24	8	42	7	8	8	74	7.4
13	15	5	36	6	5	5	56	5.6
14	12	4	18	3	4	4	34	3.4
15	6	2	12	2	3	3	21	2.1
15+	3	1	6	1	0	0	9	0.9
TOTAL	300	100%	600	100%	100	100%	1000	100%

Table II: A.m. bandwidth observations made on 40, 20 and 15 meters with percent or total observations tabulated in the last column. Note the similarity from band to band.

Interference Reduction Plans

In preliminary studies of our interference problem, you have probably discovered literature on the elimination of interference published during the past five years. Contained therein are a variety of approaches, points of view, and philosophies which present a bewildering hodgepodge of ideas.

Several approaches have been recommended: One group advocates that pressure be applied on the authorities to expand the amateur spectrum and thereby lessen interference; another group contends that lowering the amateur r.f. power limits would reduce interference. It should be obvious that neither procedures would correct the basic problem.

Analyzing the first recommendation, we find that the Geneva Radio Conference in 1959 made provisions for continuance of every amateur assignment established by the Atlantic City Radio Convention in 1947. Based on the pressure exerted by commercial interests for expansion of their spectrum, we have no assurance that W/K amateurs will be so fortunate at the next Radio Conference, probably in 1964 or 1965, much less get *more* spectrum space.

Analyzing the second recommendation, while there are numerous conditions generating interference on the amateur bands, an important one is heterodyne action, and it should be readily seen that a reduction in output power will not remove the heterodyne.

Tune across the bands any night and you will hear statements pertaining to interference such as: "Sorry, but missed everything but your name during your last transmission because of the QRM"; "Local station splattering all over our frequency that time and covered you us completely"; "Please give me a repeat," or "Thought we could make a go of it but guess we had better cut it off now," *etc.*

Causes of Interference

A study was made and the following sources of interference were found on the amateur bands: on-channel interference; adjacent-channel interference; Excessive signal bandwidth; failure of a station in contact with another to accurately zero-beat the other, thus occupying more spectrum space than required; on-the-air tuneup rather than the use of a dummy load; failure to listen on frequency before tuning up and transmitting; frequency instability; sideband splatter, *i.e.*, signals lying outside the intelligence bandwidth; spurious radiations; presence of carrier on s.s.b.; noise and hum on carrier; inefficient phone patch causing over-modulation and broad signals; local and short-haul contacts using high power, which could easily take place on the v.h.f.s; chirps; clicks; Russian and Russian satellite jamming stations; power lines and consumer appliance (not covered in this article); foreign commercial stations; and last, foreign broadcast stations.

The widespread presence of excessive signal bandwidths and distortion products, resulting in serious interference, was noted during this study. As a result, it was decided to conduct additional research to determine whether the excessive interference found on the s.s.b. and a.m. portions of 40, 20, and 15 was primarily due to either excessive bandwidth of the transmitted signal or from general distortion products on the signal.

Bandwidth/Distortion Study

The following equipment was used during this study: Telrex 5 element 20 m. beam on 95 foot tower; Hy-Gain Thunderbird TH-4, 20, 15 and 10 m. beam on 50 foot tower; Hy-Gain 14AVS vertical, 40, 20, 15, 10 m.; 15, 40, 80 m. doublets, and a Collins 75S-3 receiver.

It was believed that a sample size of 1,000 observations with 30% on 40, 60% on 20, and 10% on 10 would be satisfactory on s.s.b. and a.m.

Table III—SSB Bandwidth Observations

Bandwidth (kc)	40m. Observ.	%	20m. Observ.	%	15m. Observ.	%	All Band Total	%
3	9	3	12	2	3	3	24	2.4
4	75	25	138	23	24	24	237	23.7
5	93	31	174	29	30	30	297	29.7
6	60	20	126	21	22	22	208	20.8
7	42	14	108	18	15	15	165	16.5
8	12	4	24	4	3	3	39	3.9
9	6	2	12	2	2	2	20	2.0
10	3	1	6	1	1	1	10	1.0
TOTAL	300	100%	600	100%	100	100%	1000	100%

Table III: S.s.b. bandwidth observations. Only 40, 20, and 15 meters were used in this study. The last column indicates the percentage of observations of each bandwidth.

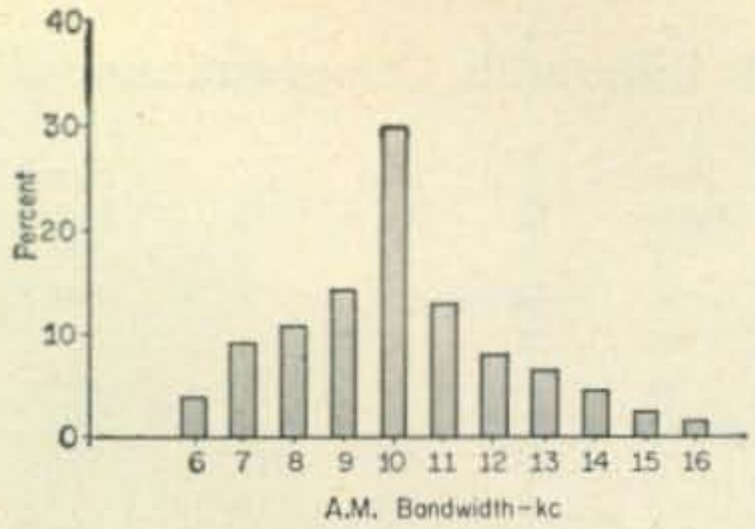


Fig. 1—Bar graph showing percentage of a.m. signals of various bandwidths (from 1000 observations).

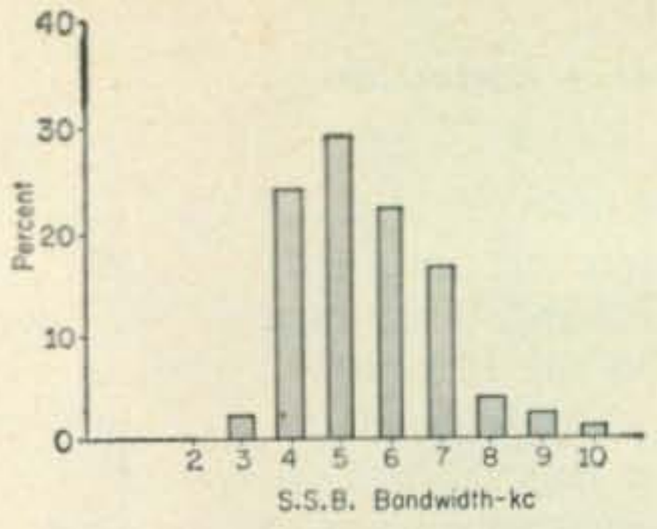


Fig. 2—Graph showing percentage of s.s.b. signals of various bandwidths (from 1000 observations).

The duration of the nightly tests and beam directions were as follows:

Time (GMT)	*Bearing*
2300-0030	East Coast
0030-0200	Midwest
0200-0300	West Coast

The recognized procedures for determining the bandwidth of the wanted and unwanted sideband of the transmitted signal were given by Scherer[2] as follows: "Unwanted sideband: Set the receiver sideband selector for the wanted sideband, and tune in the signal to the basic frequency. Then change the sideband selector for the unwanted sideband, and tune the receiver to the furthest point out on the unwanted side at which signal modulation may be found. The difference between the original signal frequency and that at which the receiver is now tuned will be the bandwith on the unwanted sideband (minus any error which may be due to receiver selectivity deficiencies).

"Wanted sideband: Set the receiver sideband selector for the wanted sideband, and tune in the signal to the basic frequency. Tune the receiver to the furthest point out on the wanted side at which signal modulation may be found. The difference between the original signal frequency and that at which the receiver is now tuned will be the bandwidth of the wanted sideband.

[2]Scherer, W. M., "What About Sideband-Suppression and Bandwidth Reports?," *CQ*, May '60, p. 42.

"A report may be given to the total bandwidth (lower plus upper), or it may be given for each sideband separately." Also, "when any observations are being made, care must be taken so as not to mistake adjacent channel signals from other stations for those of the transmitter being checked."

Before requesting a bandwidth check, assurance was given that the receiving station's receiver had a one kc readout and the aforementioned approved bandwidth procedure was used.

Bandwidth Findings

A total of 1,000 observations were made on 40, 20, and 15 to determine the bandwidth of a.m. signals. Bandwidths ranged from 6 to over 15 kc. A summary of the findings is as follows: 68.4%, 8 to 11 kc in width; 96.4%, over 6 kc wide; 3.6%, 6 kc wide. (Table II).

A total of 1,000 observations, to determine the bandwidth of s.s.b. signals, were made on 40, 20 and 15 m. Bandwidths ranged from 3 to 10 kc. A summary of the findings is as follows: 82.7%, 4 to 6 kc; 2.4%, 3 kc; 14.9%, over 6 kc; 97.6%, over 3 kc. (Table III).

Part II of this analysis, to be presented next month, will discuss the quality of a.m. and s.s.b. signals observed and will attempt to set a standard by which their signals may be judged.

[*To Be Continued*]

New Amateur Products

Amplidyne VHF Equipment

THREE new pieces of v.h.f. equipment have been announced by Amplidyne Labs of Kings Park, N. Y. They include a 50, 144 and 220 mc bandswitching, crystal controlled converter, a 50 and 144 mc transmitter, and an adapter using the transmitter's modulator, power supply, metering circuits and some 55 mc output to allow 220 mc operation.

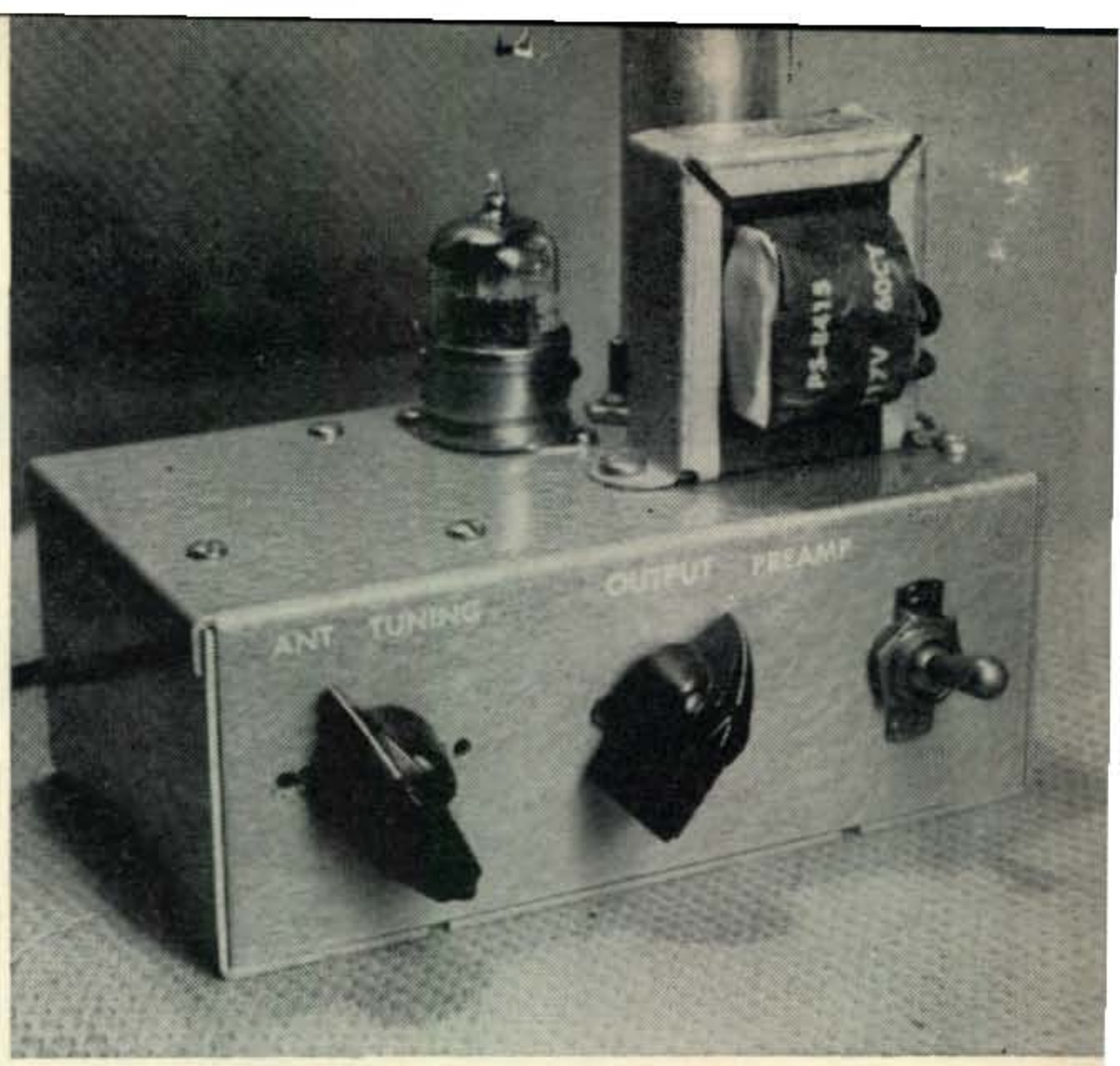
The Model 126 converter employs the same grounded-grid circuitry used in the single band 50 mc converter (*CQ*, March '63, page 42). Two Nuvistors as r.f. amplifiers provide noise figures of 2.5 db on 50 mc, 3.0 db on 144 mc and 4.0 db on 220 mc. The converter is priced at $94.50.

The Model 621 50 and 144 mc transmitter runs 60 watts input to an 8150 Compactron and is plate modulated. Separate output connectors are provided for 6 and 2. Built-in push-to-talk, a dummy load, full metering, crystal switching and antenna relay, among other things, are featured. Provision is made to connect the Model 221 220 mc adapter. The transmitter is priced at $229.50.

The Model 221 220 mc adapter consists of a 6CL6 doubler (from a 55 mc signal), 6360 doubler (to 220 mc), and a 6360 amplifier running 18 watts. Power, modulation and 55mc excitation are supplied by the Model 621 transmitter. The Model 221 sells for $72.50.

For further information circle A on page 110.

Three quarter view of the cascode pre-amplifier for 15 and 20 meters showing control and component locations.



This cascode pre-amplifier covers the 15 and 20 meter bands and uses a 6386 for stable, oscillation-free performance.

A Cascode Pre-Amp for 14 and 21 Mc.

BY E. H. MARRINER*, W6BLZ

On the higher frequency amateur bands it is desirable to use a pre-amplifier with your receiver to improve the signal to noise ratio and increase sensitivity. Frequencies lower than 10 mc are disturbed by atmospheric noise and there is generally no reason to use a pre-amplifier. Nothing is disturbed in your present receiver and the amplifier is simply connected at the receiver antenna terminals.

The circuit uses a 6386 twin triode, recently designed for remote cut-off cascode-amplifier applications. This nine-pin miniature tube is characterized by its high gain, low noise and low higher-order harmonic distortion. When used in a pre-selector circuit it operates without self oscillation and minimum of adjustment.

*528 Colima Street, La Jolla, California.

Theory of Operation

A signal coupled into L_1 and transferred to L_2, the antenna coil to drive the grid of the 6386 tube. The first half of the tube drives the cathode

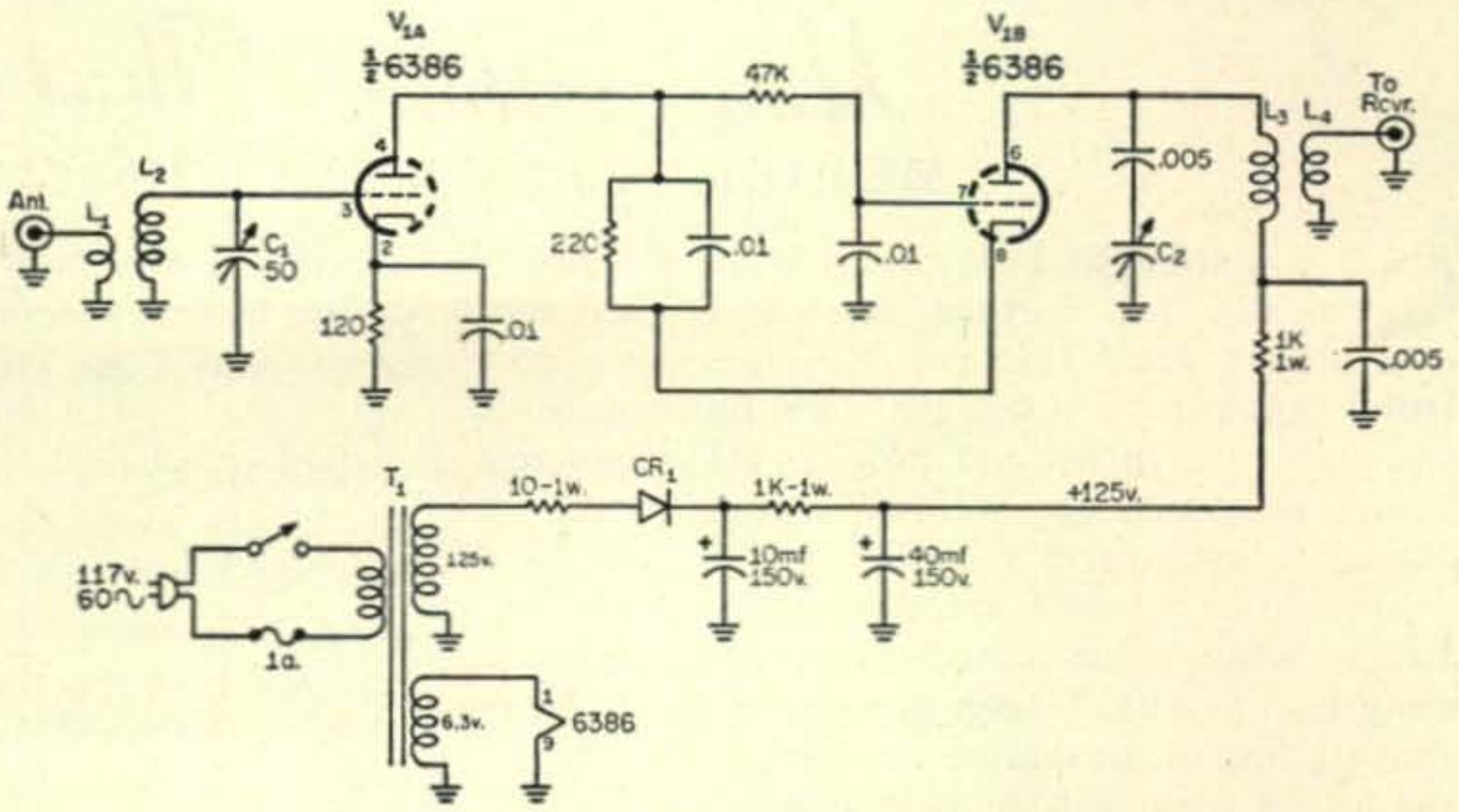
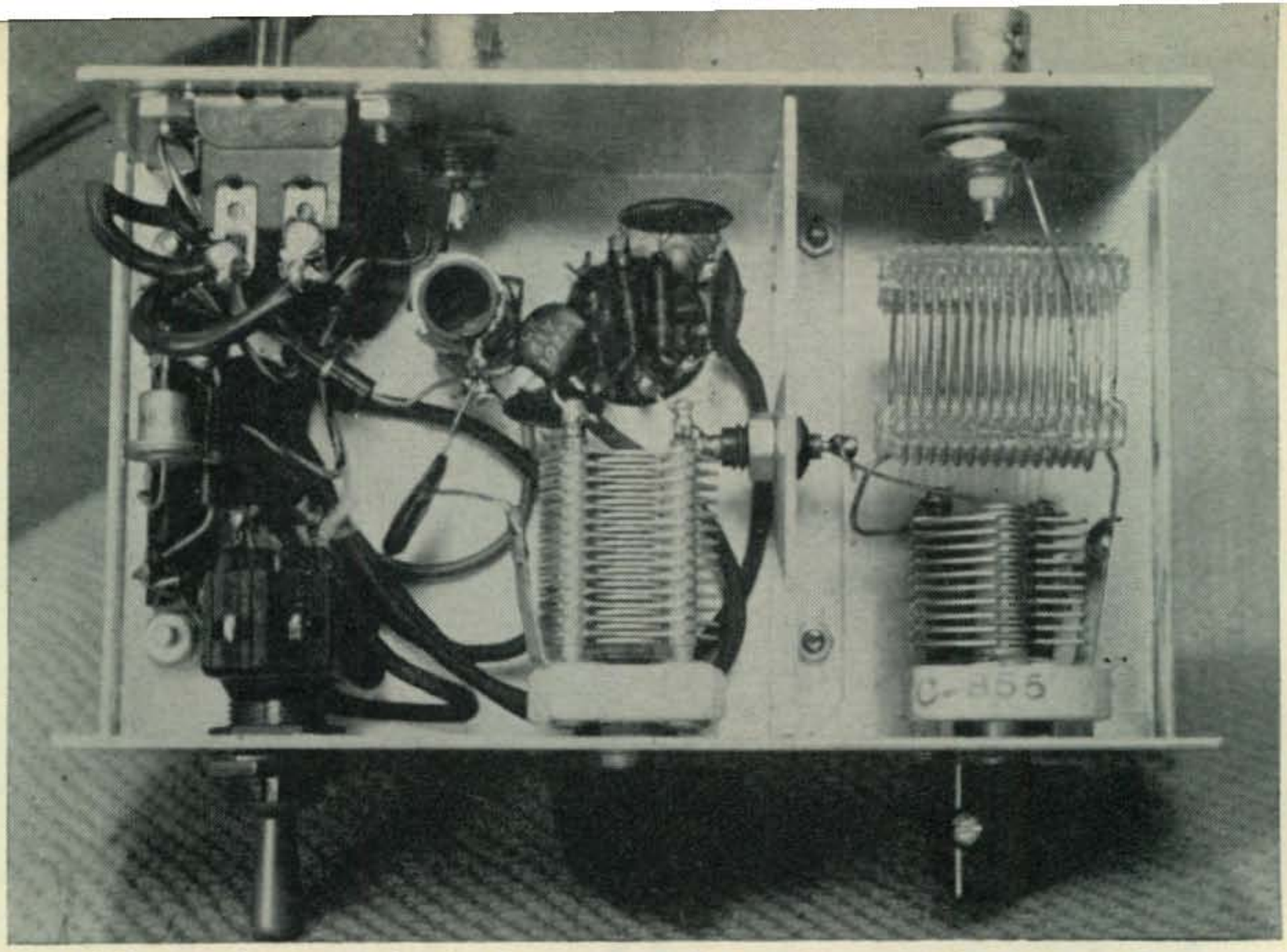


Fig. 1—Circuit of a cascode pre-amplifier for the 15 and 20 meter bands. All capacitors with values greater than one are in mmf and less than one in mf unless otherwise noted. All resistors are half watt unless otherwise noted.

C_1—50 mmf APC type variable.
C_2—100 mmf APC type variable.
CR_1—400 p.i.v. diode at 50 ma. International SD-94 or equiv.
L_1—4t hookup wire on cold end of L_2.
L_2—16t Air Dux #816.
L_3—6.8 μh. Miller #21A686RBI, or 14t of #26 wire on ⅜" slug tuned coil.
L_4—2t. hookup wire for 50 ohm output. 4t. for 300 ohms.
T_1—125v. at 15 ma, 6.3v. at .6 a. Stancor PS-8415 or equiv.



Bottom view of the cascode pre-amp showing the power supply components on the right and the antenna input components on the left. The shield prevents coupling between the input and output circuits. The input jack is on the left and the output is on the right near L_3.

of the output section which has the grid grounded for a.c. by capacitor C_3. The change in voltage between the grid and the cathode of V_{1b} is then further amplified. The output signal is taken from L_4 and coupled into the receiver antenna input terminals.

Cascode circuits can use either self bias or fixed bias. This circuit uses the self bias method which more nearly equalizes the tube currents. Either circuit uses the same number of parts and is a matter of personal preference.

Construction

The pre-selector is built in an LMB Co. 5¼" × 3" × 2⅛" chassis, #136. No critical arrangement was used in the layout; the shield separating the antenna coil from the tube being used simply to keep the input signal from coupling across the tuned circuits.

Testing

Once the pre-selector is wired, adjust capacitors C_1 and C_2 for maximum signal on whatever frequency you are using in the 14 mc or 21 mc band.

If you desire to tap the antenna on L_2 instead of using L_1, the proper tap can be found by moving the lead until maximum signal is produced. The antenna can then be soldered directly in place. About 4 turns from ground should do it for a 50 ohm antenna. Inductor L_4 is coupled to the receiver through a short piece of coax and if the receiver has an antenna trimmer it should be peaked. ■

How About That?

MURIEL GORMAN*, XYL VE3CMG

So you thought I'd exhausted all the possibilities for further derogatory remarks didn't you? Just goes to show you how wrong you can be doesn't it? XY-Lamentations was just a warm up and now that I've got my second wind and my writing arm limbered up again I'm just a rarin' to go![1]

Sometimes when I am downstairs doing the laundry while some scintillating-type dialogue is going on upstairs, I keep one ear tuned to hear what's going on in the outside world. One day it was a call from a ham who is a farmer in his spare time. He informed us how green the grass was (know any other shades)? how the hens were laying eggs well (he expected golf balls maybe?) how many sheep he had, and ended by saying he had recently had to shoot fifteen male cows. Now I ask you, isn't that shooting a lotta bull?

Sometimes it's a call to a pal who lives about ten blocks away and goes as follows: "Er, the weather here isn't so good today, it's snowing quite hard here—" It's different out his way maybe? Perhaps the poor guy is near sighted or he's been down in his shack so long he doesn't know what time of the year it is!

It goes on and on until the sma' wee hours but they never seem to get tired. I retired one night just before midnight after wearying of the old story "up-in-five-minutes-Hon" routine, and didn't wake up until about 5:00 A.M. next morn-

[*Continued on page 86*]

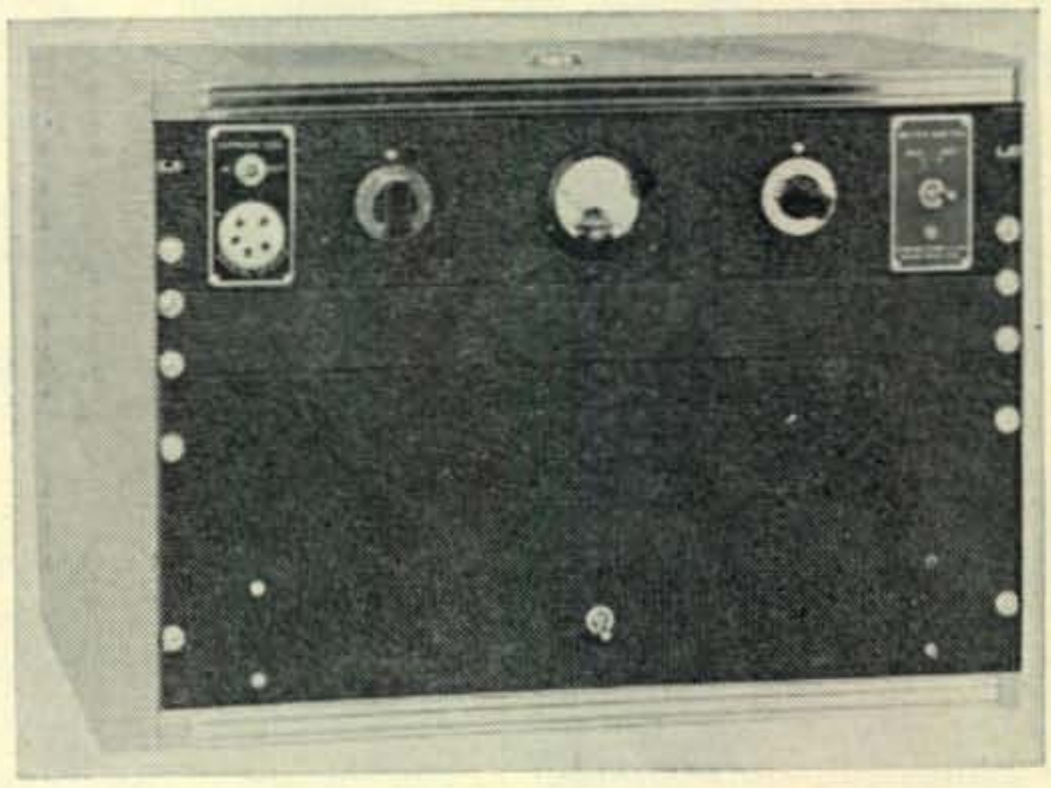
*9620—137A St., North Surrey, British Columbia.
[1]Gorman, M., "XY-Lamentations," *CQ*, November 1960, page 48.

Modifying The Millen 90800 Exciter

BY DAVID T. GEISER*, WA2ANU

The Millen 90800 has been seen selling for as little as $5.00 on some distributors shelves. Without additional shielding and the complete elimination of TVI there isn't much that can beat the dollar-per-watt value of this one-night project.

THE MILLEN 90800 Exciter (now superseded by the modern Millen 90801) was an excellent example of all that was best and worst in amateur transmitters before the second world war and the advent of television. There are hundreds of these transmitter/exciters that still exist, but no sensible ham would operate them within 100 miles of a television receiver. They generate an effective signal but terrible TVI when operated at or above 7 mc. This modification was made specially to show a group of beginners that carefully designed changes made shielding unnecessary even in a "deep-fringe" TV area. The particular modification described was aimed at 40 meters, but the principles are well known and apply generally.



The Millen 90800 exciter with its associated power supply.

The Challenge

The folks in the beginners class were puzzled about how a clean transmitter could be made without shielding, and I figured the best way to explain was to show them. I kept my eyes open for one of the old Millen exciters figuring that if I could cure it, any rig could be cured. For those who are not familiar with it, a 6L6 crystal oscillator (tri-tet) drives an 807 final. The oscillator is capable of delivering 15 or 20 watts, but the final needs only ¼ watt and retaliates by creating massive amounts of TVI. As there is no shielding and the bypasses are not particularly good, the TVI radiates. Operation on 7 mc results in damaging TVI each 7 mc throughout the TV spectrum. This means every other channel is hit badly. Filters in the transmitter feedline are no good, for the lack of shielding allows the TVI to pass around the outside of the filter.

The Oscillator

The first step is to strip the oscillator of all wiring. The existing oscillator produces much TVI and is past saving. The oscillator is rebuilt with the circuit of "The Simplest and Cheapest Rig."[1] The oscillator tuning capacitor is removed, and the paint under its mounting feet is scraped clean. A bracket is made from flashing copper to fit between the capacitor mounting feet and the chassis extending to the capacitor rotor connection. A half-inch wide copper strap is run from pin 3 of the oscillator tube to the stator of the oscillator tuning capacitor. These

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

[1]Geiser, D.T., "The Simplest and Cheapest Rig," *CQ*, Aug., 1963, p. 24.

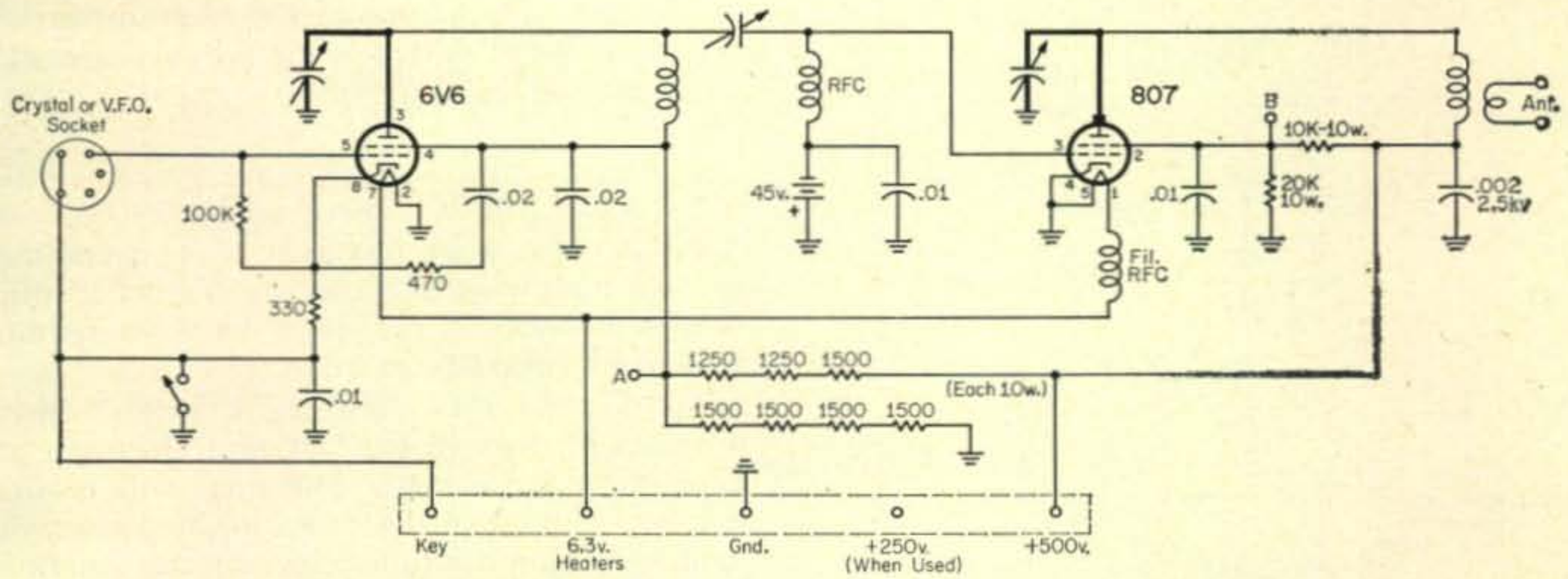
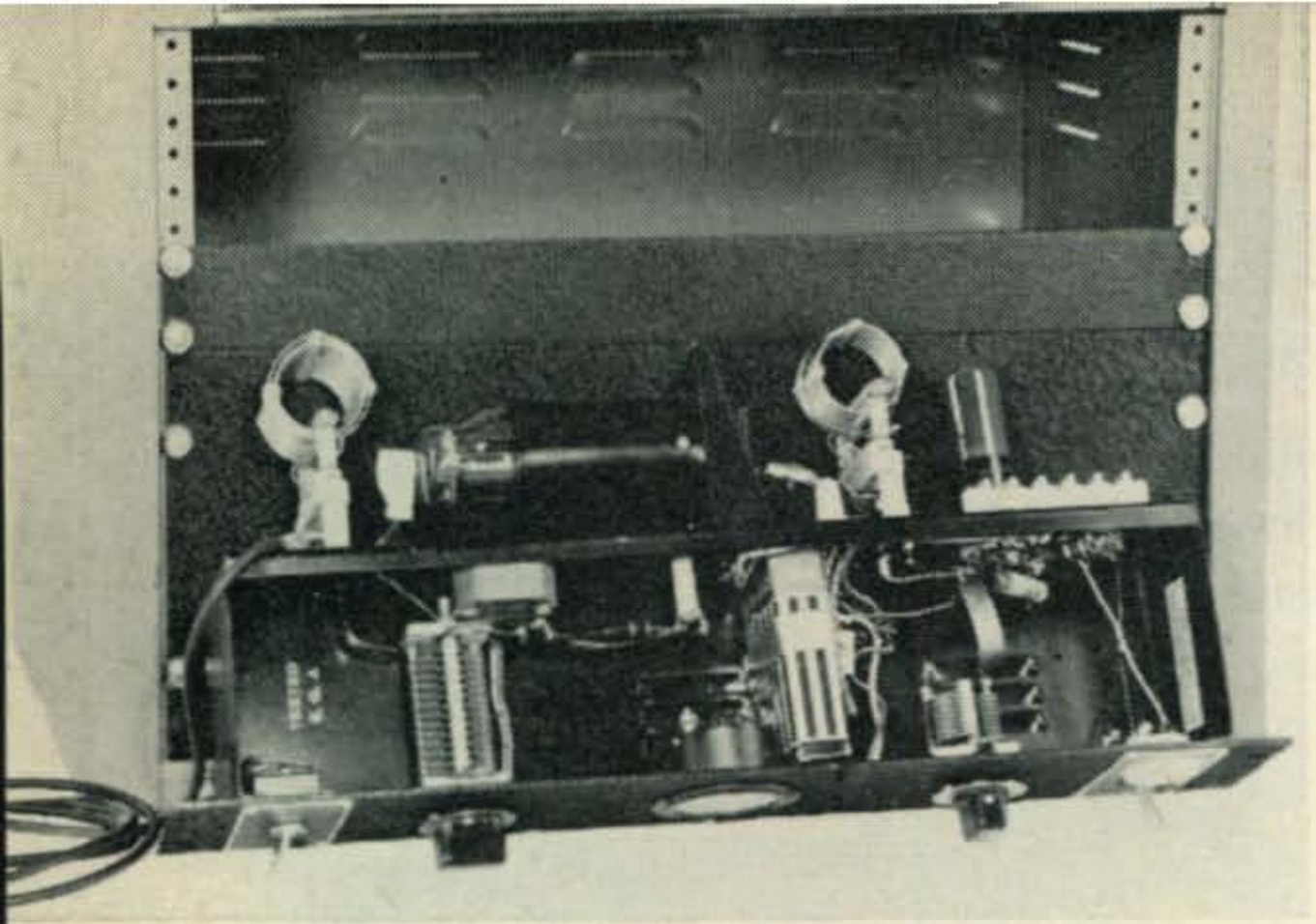


Fig. 1—Circuit of the modified Millen 90800 exciter/transmitter capable of 40 watts input. Points A and B may be fed from 250 volts directly eliminating the nine 10 watt voltage-divider resistors. Heavy lines in the plate leads indicate copper strapping.



Interior view of the Millen 90800 exciter shows the extent of the modifications. The oscillator circuit is rewired, copper strap replaces wire from the tuning capacitors to the tubes and a 45 volt battery is added to bias the 807 for class AB operation.

heavy straps are always a good idea, though they may not always be necessary. Throw away the bypass capacitors that came with the rig. While you're doing this, you'd just as well take out the heavy bleeder resistor and replace it with a new voltage divider network to feed the oscillator plate. This new divider keeps the oscillator voltage from rising too high under key-up conditions.

All keying is done in the oscillator—it has clean keying without clicks or chirps and the modified final does not mess it up.

The existing 40 meter oscillator coil may be used if turns are removed until the oscillator tuning capacitor, when 90% meshed, just resonates at the bottom end of 40 meters.

The Final

Once the bleeder resistor is disposed of, the modification of the final is easy. The bypasses come out; the final plate circuit is treated just like the oscillator (except that the plate of the 807 is the cap instead of pin 3), and the grid-leak resistor is removed. A 45-volt B-battery is installed with a strap to hold it down—it doesn't have to be too accessible, for it will last at least a year of heavy operating. With the trimmed-down final plate coil, the link makes a pretty good match to 50 ohms.

What we have now is a class AB final amplifier. It creates fewer harmonics than a class B or C final, doesn't need as much driving power, doesn't alter the keying waveform, and still puts out a solid 24 watts with 40 watts input from a 500-volt power supply.

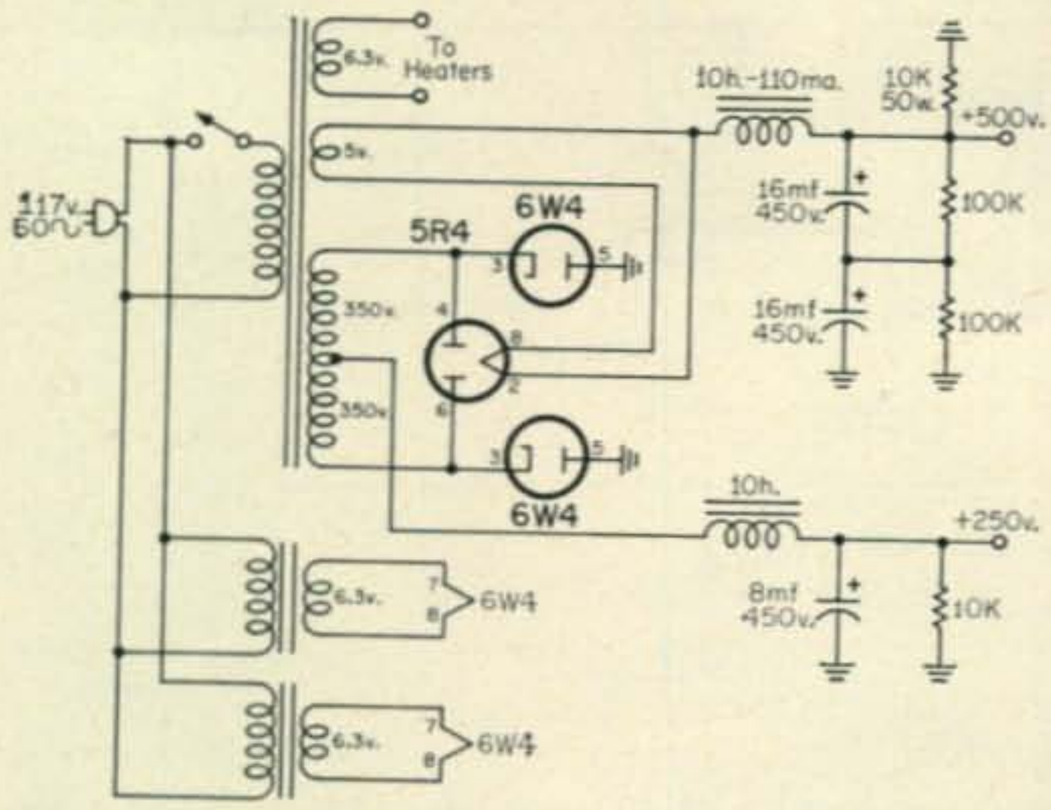


Fig. 2—Power supply for the modified Millen exciter showing two voltage outputs. See text.

The final tank with its 50 mmf tuning capacitor has very low Q, but if harmonics aren't being generated, high-Q (10 or more) *just isn't necessary*. The low-Q means that the maximum-output and plate-current dip points of the final tuning capacitor will shift with loading.

Tuning

Turn the meter switch to the "6L6" position. Dip the oscillator plate current with the left-hand tuning knob. Tighten the mica trimmer that couples the oscillator plate to the final grid until TVI just begins to appear on channel 2 or other harmonically related TV channels. Loosen the trimmer screw until the TVI disappears. This means that the grid drive no longer causes grid current flow. Switch the meter to "807" and dip the loaded final. It is best to do this whole procedure with a dummy load.

If TVI appears, make extremely small tuning adjustments. It should disappear very close to the points of maximum final output and best keying. Accurate tuning will effect a 40 db reduction in TVI producing harmonics, and it is impossible to determine this point without watching a TV receiver.

Connect the actual load to the final and retune. For best results, the actual load should be very close to 50 ohms. As the plate current dip may not coincide with maximum power output, use a field strength meter near the antenna to determine the maximum output setting. Remember that r.f. voltmeters and s.w.r. bridges can cause TVI, so disconnect them before making the final fine adjustment for TVI elimination. This procedure works well on all rigs and is generally recommended.

General Comment

The specified parts have been carefully chosen in this design for the sole purpose of TVI elimination while retaining reasonable output. Many 40 meter operators will not consider this power reasonable—I can't argue. The first answer I received to a CQ with this rig was from a ZD6, and the average QSO from a good location is 600 miles.

Parts substitution should not be made without good reason, though there are many combinations that will work just as well. This comment is a warning only to those who expect identical results and should not be a deterrent to those who like a little adventure in their lives.

Many will criticize the use of an 807 operating straight through without neutralization, particularly in class AB[1]. The final will oscillate if tuned well off of the operating frequency, but loading and careful tuning prevent this condition. The cathode grounding and bypassing with disk ceramic capacitors with shortest possible leads

[*Continued on page 104*]

The RSGB Golden Jubilee

Direct from London, a report of the festivities marking the 50th anniversary of the Radio Society of Great Britain.

WHENEVER one goes to London, treading those same streets that have been built on and lived on continually for more than 2,000 years, one is always aware that he is in the presence of history. This was never more so than the week of July 1, when an event occurred which was unique in the saga of world amateur radio—the Golden Jubilee of the Radio Society of Great Britain.

It was on July 5, 1913, in the London home of Rene Klein, KXJ, 2HT and, later, G8NK, that a historic meeting took place which was to give birth to the "Wireless Society of London." And now, fifty years later, radio amateurs from all over the world gathered in a cool, damp, crowded London to pay respects to an organization which is recognized and respected wherever the miracle of amateur radio continues to enchant, to intrigue, to stimulate and to inspire mankind.

The elaborate arrangements for the RSGB Jubilee Celebrations took the form of a 5-day convention under the able management of G2FUX, Frank Fletcher. Arrival in London found it busting out all over with foreign tourists. They take their tourists casually here, looking on them as part of the scenery, together with the huge red buses, the wonderful policemen, the acrobatic cabs, the umbrellas, the sooty splendor of the buildings and the calm acceptance that any moment something wonderful is going to happen, like the troop of Household Cavalry clattering along the Mall, a-glittering and a-jangling, or the dramatic emergence of yet another perfect Roman mosaic pavement in the deep-dug foundations of a building under erection.

The first two days, while visitors were still arriving in London, there were trips to places of interest to the amateur—the Radio Research Station at Slough, the BBC Television Center and the headquarters of the Mullard Organization. Arrangements had been made for the wives to be taken on guided tours of London at the same time. It seems that, although the response to this offer was very limited, those who did go had themselves quite a ball, inspecting such historic monuments as the Summer Sales! The charming, if startling, results of these shopping orgies be-

Some of the notables at the luncheon prior to the RSGB Golden Jubilee banquet. L. to r.: G2WZ, Douglas Wedderspoon; K9EBE, Trav Marshall of Hallicrafters; G3VW, Bob Newland; G3KD, Phil Thorogood; G3HPH, Leo Gwilt.

A visitor from the US, Mary Sturky, K7BGS (left) and an unidentified friend take some time off from their receptionist duties to enjoy some US-style refreshment.

came evident at the first of the formal receptions —the famous London Members' Luncheon Club on July 3, where the Ladies' hats are a traditional and spectacular feature of the scene.

This is a marvelous thing, this Luncheon Club, 13 years old now and possibly one of the best social institutions in world of amateur radio. About 100 guests met for a typically English lunch and this was for some a first introduction to genuine British beer, which is dark brown, sweetish, always tepid and has to be tasted to be believed, although it kicks back like an ornery jackass.

That same evening there was an Official Reception at the London Planetarium. Here we had the first opportunity for a long ragchew with scores of British amateurs. It was amusing to note that the old homebrew-versus-commercial controversy was just getting into its stride in Britain, but that the pattern of argument is just the same as at home.

Radio amateurs are the same the world over, exponents of all the same opinions that one would expect to meet at Swampscott—only the accents were different. There was the v.h.f. fiend, the guy who thinks a.m. should be abolished by law tomorrow morning (if not sooner), the other one who *knows* that s.s.b. is a lot of bumsteerage and that it will never amount to anything, the oldtimer who has never spoken into a mike in all his forty years of operating.

There was exposure to the exhausting and attractive attentions of a most vociferous lobby

The elegant Connaught Rooms, scene of the RSGB 50th Anniversary Jubilee banquet, July 4, 1963.

called the Amateur Radio Mobile Society, who were responsible for the very first break-through in the reciprocity deadlock when, in April, their Belgian and Dutch members obtained permission for temporary mobile licenses, ON5 and PA9, to be granted to foreign amateurs for the Verviers Rally. One of this group was G3BID, Edgar Wagner, who has the distinction of being one of the two only holders of the Mobile Century Award. Edgar pointed out that "ARMS" is a truly international organization, although it is administered from London, where expenses are comparatively low, and that it is doing some impressive work through its monthly journal, *Mobile News.*

Reciprocity is a great deal in the air over here and opinions are heard, both official and unofficial, that at last something is bound to give in this direction. The problem is particularly pressing and embarrassing in Britain where they calculate there must be some hundreds of licensed U.S. amateurs resident, who are hogtied by lack of reciprical licensing.

On July 4 some 60 people were taken by private launch from Westminster Bridge along the Thames to Hampton Court. This is a delightful way to travel and was for centuries the only way to traverse London, for the ancient river was the main transport artery until well into the Victorian era. On board GB3RS/Mobile operated the new KW Project 2000 s.s.b. transceiver.

At Hampton Court some slick organization by the local radio club divided us into small groups, each with its own well-informed guide, who took us round the Palace. Built by Cardinal Wolsey, Henry VIII's minister, in 1515, Hampton Court was claimed by the monarch when Wolsey incurred the Royal Displeasure, although he was a lucky fellow, for it was at least in his own bed and not on the block that the Cardinal died!

Visitors to the RSGB Golden Jubilee came from the most remote corners of the earth as evidenced by this trio. L. to r.: ZS6AZD, Graham Duplessis; W3AYD, Mike Solomon; W3MVB, Jerry Scarno.

When the British go in for glamour, pomp and circumstance, no nation can compete with them. Friday, July 5, saw the climax of the week, with a banquet for more than 400 people at the Connaught Rooms.

Nobody who was there will ever forget that night, which was celebrated with the dignity that the occasion deserved, yet which retained so many charming and homely touches. The evening started with a zing, from the preliminary cocktail party given by KW Electronics Ltd. Then the banqueters queued up (what a country this is for queues!) to be presented formally to Norman Caws, G3BVG, President of the Radio Society of Great Britain. A British red-coated Toastmaster, an impressive figure with a superb English accent called names and callsigns with faultless precision and the guests stepped forward to shake the President's hand.

The surprising good coffee was poured and the guests were handed a glass of a formidable liqueur which was introduced into Scotland by Bonnie Prince Charlie in 1745—how they really *live* their history! It is a tradition of formal British protocol that, until the toast to the Queen has been drunk, nobody smokes at a formal table. The American custom of smoking between courses is *out.*

Of course such an occasion as this must inevitably be heavy with speeches but those at the R.S.G.B. Jubilee Dinner were so practised, so witty and so interesting that it was a privilege to listen. The toast to the Radio Society of Great Britain was proposed by a most distinguished guest, announced by that Toastmaster in sonorous, proud and rolling glory: "Pray silence for the Lord Brabazen of Tara, one of Her Majesty's Privy Councillors, Knight Grand Cross of the Most Excellent Order of the British Empire, holder of the Military Cross."

Lord Brabazen turned out to be a youngster of nearly 80, who still rides the Cresta Run with

[*Continued on page 105*]

Reviewing The Radio Classics

Extra Wide-Band Antennas

BY DAVID T. GEISER*, WA2ANU

Number 9 of a Series

ANTENNAS are common to both the ham and the public—they simply pick up signals. But when an engineer explains that an antenna will pick up one signal well and others poorly, questions arise.

The amateur finds an easy answer to the question—the antenna is resonant. Only when person after person without technical background asks him "why", does the amateur wonder whether resonance is the entire answer. Resonance is not the whole answer; the final answer has yet to be written. Here is an area for exploration.

Space

Space is a particular form of transmission line connecting a transmitter and a receiver. It has many similarities to television twin and coaxial cable for transmitters. Let us look at these:

Twin-lead and coaxial cable are intended to be uniform from an r.f. source to a load. Each transmission line has a "design" inductance and capacitance per unit length since all conductors exhibit inductance and all conductors with a voltage difference between them exhibit capacitance.

When men design transmission lines, they work with the permeability and dielectric constants of their materials so that in terms of unit length the characteristic impedance R equals $(L/C)^{1/2}$.

When a load of impedance R is connected to this transmission line, there are no reflections of power from the load (unity s.w.r.). There are practical limitations to manufacture, but the electrical characteristics of space are the same everywhere. Space, too, has a dielectric constant and permeability giving it a certain impedance, 377 ohms per square. This is somewhat hard to understand at first, but it is this same value regardless of what unit is used; 377 ohms per square centimeter, inch, foot, or mile. Whenever we build a device that matches this impedance, we have an antenna.

The dipole is one such device—it matches space at its half-wave resonant frequency. At a *few* certain distances above ground, the antenna appears to have a resistance of 72 ohms, but its apparent resistance varies with height. As the antenna approaches ground, its apparent resistance approaches zero. At the frequency of resonance, the antenna, when looking like a pure resistance, does "match space." Thus, if we wish, we can look at an antenna as if it is a transformer matching a low impedance such as 36 ohms (¼ wave) or 72 ohms (½ wave) to the impedance of free space. It is normal to wish that this transformer action would cover a greater part of the frequency spectrum, and that is what the authors of these classics did.

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

The Background

Since the early days of radio, the cage and fan antennas had been known to be less critical of tuning than those made with a single wire; they had broader bandwidth. This is only another way of saying that they had a better match over a broader frequency range. Yet there didn't seem to be a good antenna that would give a good match over the 10:1 frequency range of many amateur transmitters.

Various amateurs and manufacturers attempted to fill the need with trap antennas, cut and loaded to do a fair job of radiating a signal on several ham bands. There was always an unsatisfied few, for many hams were also interested in non-ham frequencies such as for MARS and CAP. The military was definitely unsatisfied, for they were interested in all frequencies from the broadcast band up.

The Discone

The first true space-matching antenna that this author knows of was publicly described in 1946,[1] the discone. The antenna derives its name from its two elements, one shaped like a disc, the other like a cone. The two are so proportioned that there is a gradual change of impedance from the transmission line to the impedance of free space, at which point the radio energy fully enters space and is transmitted. It is a true wide-band transformer, for it will work at any frequency in an 8:1 to 10:1 range with an s.w.r. of 2:1 or less.

[1]A. G. Kandoian, "Three New Antenna Types and their Application," *Proceedings of the I. R. E.*, v. 34, p. 70W, Feb. 1946, also *Electrical Communication*, v. 23, p. 27, Mar. 1946.

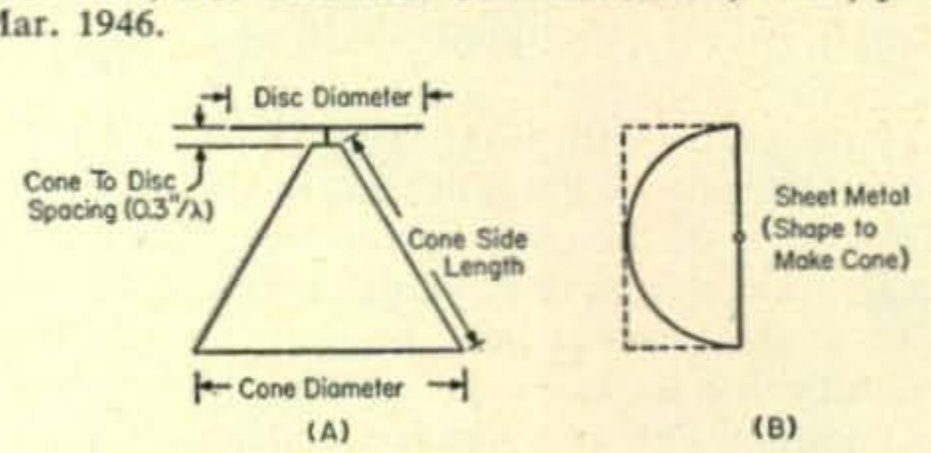


Fig. 1—(A) The discone antenna is named for its two primary elements: the disc and the cone, which together form a broadband antenna usable over a 10:1 frequency range. (B) The cone for a v.h.f. discone may easily be cut from a single rectangle of sheetmetal as described in the text.

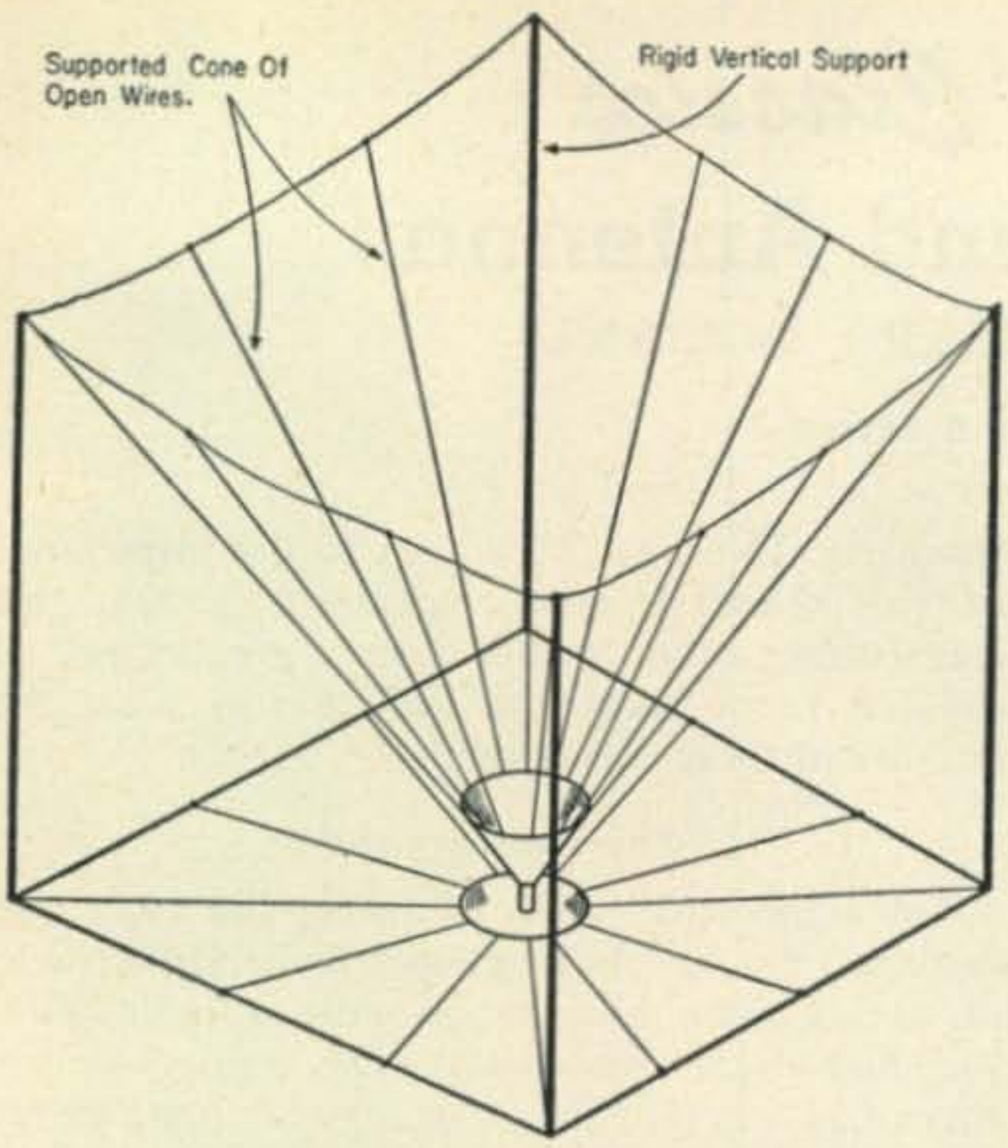


Fig. 2—A low frequency version of the discone may be inverted as shown and may be constructed of wires rather than sheetmetal.

Its radiation pattern is like a ¼ wave vertical antenna.[2]

The design of the antenna (fig. 1) is mathematically simple. For a 50-ohm feed the following proportions are used:

CONE SIDE LENGTH: ¼ wave at lowest freq. plus 10%.
CONE DIAMETER: same.
DISC DIAMETER: ⅔ cone side length.
CONE TO DISC SPACING: 0.3 inch/meter wavelength at lowest freq.

One of the easiest ways to make such an antenna for two meters and higher frequencies is to make it out of sheet metal. To do this with the given dimensions, procure a sheet of metal twice the side-length long by the side-length wide, and scribe a half circle on it. This will make a 60° cone when the curved edge is formed into a circle. A strip riveted or soldered to make a seam will hold the cone in shape. If you wish, metal legs or brackets may be attached to the open end of the cone for attachment to an automobile or roof.

The point of the cone (if formed from sheet metal) should be sawed off to permit mounting of a coax connector within the cone. If the disc is small, it may be directly soldered to the center pin of the connector.

Many hams will want to make a lower-frequency version of the antenna. In this case, only a foot or so of the cone should be made of sheet metal, the remainder being wires continuing down at the same angle. The sheet metal will be structure that looks "pure" at v.h.f. and the wires are good enough at lower frequencies if 12 to 20 are used. Also, the sheet metal cone tip offers a good cover for the husky hardware needed to support the large disc. The l.f. disc need not be

[2]J. M. Boyer, "Discone—40 to 500 Mc Skywire," *CQ*, July 1949. M. Seybold, "The Low-Frequency Discone," *CQ*, July 1950.

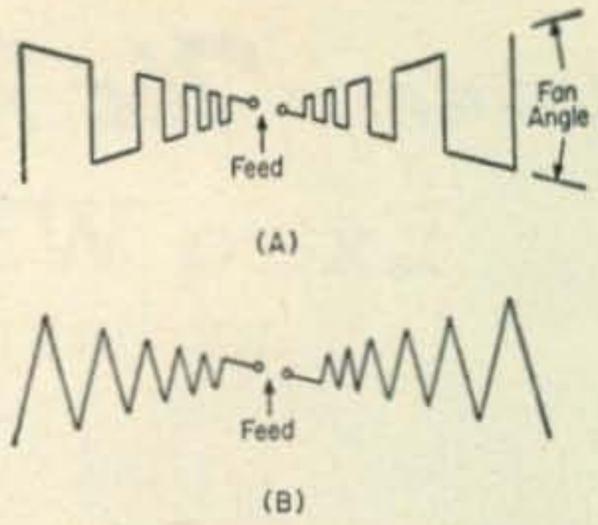


Fig. 3—Two versions of the log periodic antenna prior to "folding." Radiation is into and away from the page.

solid for more than a foot or so, aluminum angle making good radials that look sufficiently like a disc. It is important, however, to have plenty of strong insulation to support the disc away from the cone.

The discone may be turned upside-down, with the disc slightly above ground level and the open end of the cone up (fig. 2). This has an advantage with 3-30 mc discones, or even higher frequencies, for the supporting poles around the cone perimeter are less than a ¼ wave high and have only to support the weight of conically descending wires. There is no awkward disc to balance.

The discone is a decent vertical antenna that does not require tuning, it is omnidirectional, and may be stacked or put in a parabolic reflector for higher gain.[3] It does, however, have the major disadvantage that it is not capable of directional characteristics as is a rotary beam without considerable awkwardness. This is the primary reason for the invention of the log-periodic antenna.

The Log-Periodic Antenna

Apparently, about 1957 it was realized that antennas that made solid angles in space could possess extremely wide bandwidths. Thus, antennas like the discone could be extended infinitely without real change in characteristics. However, refinement of the theory seemed to indicate that for best bandwidth, the two elements of the antenna should have the same shape but have corresponding irregularities extending in opposite directions. An example of such an antenna is shown in each fig. 3(A) and (B).[4] Antennas of these shapes in the positions shown would

[*Continued on page 83*]

[3]Kandoian, *et al*, "High Gain With Discone Antennas, *Electrical Communication*, v. 25, p. 139, June 1948.
[4]DuHamel and Isbell, "Broadband Logarithmically Periodic Antenna Structures," *1957 I. R. E. Convention Record*, Part I, p. 119.

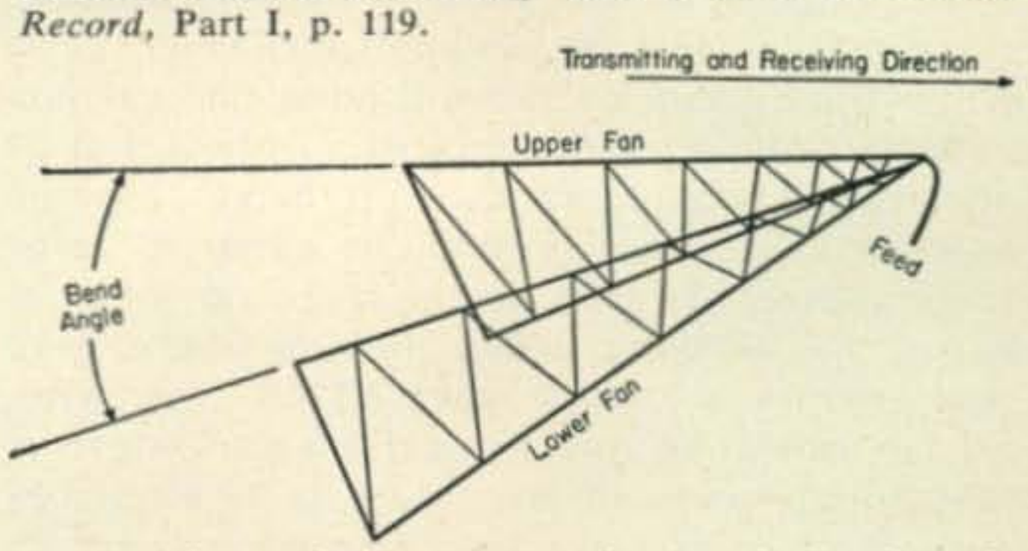


Fig. 4—A log periodic antenna showing the bend angle and the transmitting and receiving direction.

Results of The

7th Annual CQ S.S.B. DX Contest

BY IRV and DOROTHY STRAUBER*, K2HEA/K2MGE

"IF AT first, you don't succeed, try, try again" was never more aptly demonstrated than by the performances of Dr. Harry Schöenherr, DL3LL, during the past three s.s.b. contests. Making his first appearance as a sideband contestant in the 1961 event, Harry took top honors for Germany; in 1962, he was second highest scorer in the world, and in 1963, Harry is *the champion!* Now there's tenacity for you! Harry's winning station consists of an HT-32A with a 500 watt p.e.p. grounded-grid linear, 75A-4 receiver, 20 meter cubical quad up 80 feet, and a half-wave dipole for 3.8 mc. Referring to this as "*the* contest of the year," Harry is our "Man of the Year" and deserves the congratulations of all for his wonderful performance. We are proud that he is this year's winner of the K2HEA/K2MGE Trophy for the highest scoring station in the world, using more than one band.

Hard on Harry's heels, with a remarkable score on 14 mc was Capt. Don Miller, HL9KH, a first-time participant in the s.s.b. contest but an operator who is known and admired throughout the world. As you will note, Don's single band score was phenomenal, particularly in view of the fact that he was using a "barefoot" exciter; again the HT-32, "rewired to the 32B"; *two* 75A-4 receivers, and *two* 14 mc beams in phase, rotated! Don's contest operation makes him the winner of the W1ONK Trophy, given to the highest scoring station using single band outside of the USA.

Adding yet another trophy to his collection is Bob Stankus, W2VCZ, who beat out some very tough competition to become the highest scoring U.S.A. station *and* the second highest in the entire world. That's some operating! Bob will receive the W2SKE Trophy, given to the top multi-band station in the USA. Keep your eye on Bob next year, he should come up with that extra bit of "Oomph" that will help him over the top!

Our fourth trophy winner is Pedro Pereira G., TI2PI, who got the most out of his 32V-2/51SB to rack up 107,118 points which is quite a score for a low power station. Pedro emerged as the highest scoring non-USA multi-band station using under 175 watts p.e.p. He is a newcomer to sideband contests but we bet you'll be hearing much more of him in the future! He will receive the new KØJBK-WØNFA Trophy, donated by Charlene and Chester Franz.

Going down the listing of the highest scoring multi-band stations in the world, it was very interesting to discover that not one, but two of the well-known Russian DXers placed third and fourth in this category. This is the first year that any of the numerous USSR contestants have appeared in the top listing and we are pleased to see that it was Vlad and Leo who made it.

Last, but far from least, considering the tremendous competition he faced, was Rush Drake, K3UDX, who has long been known to the contest fraternity as a formidable but fair rival. Rush especially flew in from his Seattle home to activate his second station in Washington, D.C. for the s.s.b. contest and it sure paid off for him!

This is Matias Garcia Pupo, EA4GZ, better known to his sideband friends as Maty. He has become one of Spain's most ardent sidebander and contest operators.

Four newcomers to the top listing of single band operators made this year's contest unique. Sig Persson, SM5BLA, won second place in Sweden last year; Larry Lee, TF2WHB (now K4MQD), made this his s.s.b. contest debut; Matias Garcia Pupo, EA4GZ, was Spain's top scorer in the 1962 contest; and Victor, UA1MU, distinguished himself among a large number of other USSR single band operators.

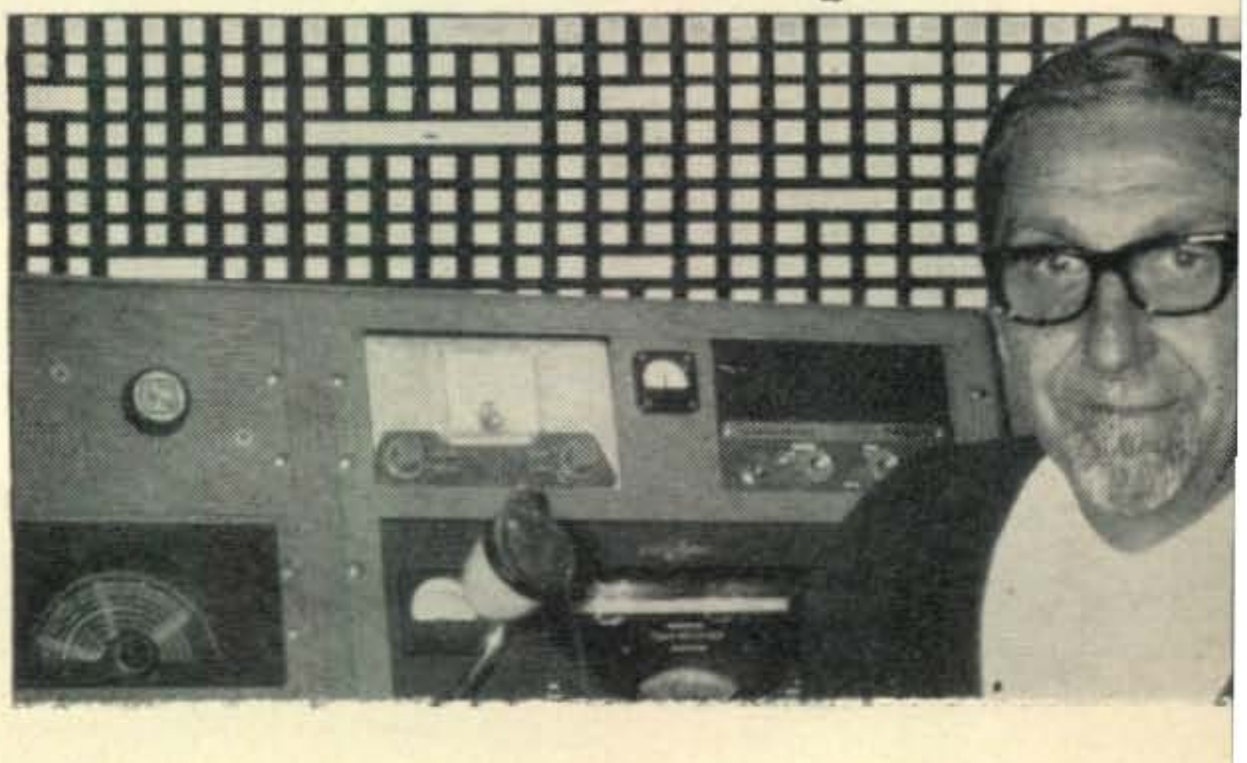
Although Ami Shami, 4X4DK, noted that 80 was open only during sunset hours, he managed to work all the stations he heard and wound up as highest scorer on the 3.5 mc band, continuing the fine tradition he set as last year's Champion in the Sixth Annual S.S.B. Contest.

A particularly noteworthy score was turned in by "Ye Olde Forty Meter Master," Bob Sommerfelt, K2GXI, who "slept the afternoon hours away" and missed none of the activity on 7 mc. It's not easy to stick only to one band, especially when conditions do not make for constant activity and it was encouraging to see the various scores which were submitted. This goes for Jack Kecherson, KP4BMA, too, who managed to concentrate on 21 mc long enough to turn in a very fine score.

To our dismay, we were unable to find any USA station using less than 175 watts whose score would qualify it for the Mickey Unger W8YIN Memorial Trophy. Therefore, regretfully, this award will not be made this year.

As explained later, a new category was instituted during the compilation of results—the Multi-Operator group. The boys of the Royal Air Force, using the special call GB3RAF, did a spectacular job of racking up contacts on all bands while USSR operators at club station UA1KBW, did themselves proud with their operation on 20 meters only.

Although the Seventh *CQ* S.S.B. Contest may be just a pleasant memory to most of you, to us it is an event



Dr. Harry Schönherr, DL3LL, of Ludwigsburg, Germany, is the Champion in the 7th Annual CQ SSB Contest. Using only two bands, Harry amassed a record-breaking score.

*SIDEBAND Editors, *CQ*.

SM5BLA occupies the No. 2 spot in the single band category. As might be expected, 14 mc was the most popular band during the contest and this is where Sig piled up his big score.

One of the best known sidebanders in the world is Sjoerd (George) Heeringa, PJ2AA, who was the highest scoring contestant in South America.

that is still providing much food for thought. The printer's error in scoring, the let-down in conditions, the emergence of many multi-operator stations caused us to make several changes as the results were being compiled and analyzed. The requirement for making at least 100 contacts had to be dropped in view of the poor conditions; we regret that many stations did not submit their logs because their contacts fell short of the 100 indicated.

We also decided that, in fairness to the single operator, a new category should be set up for stations having more than one operator and that these multi-operator stations should be grouped separately. Obviously, the rule regarding multi-operator stations was not clear; it has always been our intention that there be no more than one operator at a station.

At one time, the s.s.b. contest was so simple—merely work as many stations and as many prefixes as you could and that was that! But it has come to the point where the tremendous number of participants has caused a much more complex situation to develop. Although we have been trying not to let the situation get out of hand, each year brings its own share of problems. This year, when we separated multi-band and single band operation for the first time, we were surprised to see that, in many cases, single band operators came up with higher scores than multi-band operators! We also had to re-score many logs due to the mix-up in points. How we regretted having to lower many totals but all logs had to be figured on the same basis.

We have again had many interesting comments from contest participants regarding rules and operating. We expect to get to work immediately, drawing up rules for next year's contest and publicizing them earlier so that more stations will be familiar with the requirements when the big weekend arrives next March. For now, let us thank one and all for your interest, your enthusiasm and your support. We hope to retain all three over the coming years of sideband contests.

Top Ten

DL3LL	334,110	SM5BLA	193,280
HL9KH	313,728	UA3CR	186,048
GB3RAF	232,140	UA1KBW	177,282
W2VCZ	223,080	K3UDX	167,162
UA2AW	217,288	UB5WF	161,768

Number groups after call letters denote the following: Band (A-all), Final Score, Number of points accumulated, and number of different prefixes worked. Asterisk (*) denotes power used under 175 watts p.e.p. **Bold face** listings indicate certificate winners.

SINGLE OPERATOR
North America
United States

W1ONK	**A**	**140,616**	**868**	**162**
W1AOL	**21**	**3783**	**97**	**39**
W1ZFV	**14**	**87,024**	**592**	**147**
K1RTB	"	46,010	430	107
W1ORV	"	41,952	437	96
W1UOP	"	38,388	457	84
W1PLJ	"	504	36	14
W1MRQ/M	"	405	27	15
W2VCZ	**A**	**223,080**	**1144**	**195**
K2IEG	"	153,990	870	177
W2GKZ	"	4788	126	38
K2HFX	**14**	**81,900**	**650**	**126**
WA2SFP	"	61,017	473	129
WA2RNM	"	47,190	429	110
K2MGE	"	16,344	227	72
W2QKJ	"	11,394	189	52
K2GXI	**7**	**14,632**	**236**	**62**
K3UDX	**A**	**167,162**	**1007**	**166**
W3CJI	"	41,128	388	106
W3JTC	**14**	**44,928**	**416**	**108**
WA4DCP	**14**	**16,863**	**219**	**77**
W4RLS	14	15,015	195	77
W4OM	**"**	**14,526**	**269**	**54**
W4HA	"	9240	140	66
W4BVV	**7**	**6820**	**124**	**55**
K5MDX	**A**	**84,152**	**628**	**134**
WA5ALI	"	8640	135	64
W5AJY	**3.5**	**616**	**44**	**14**
K6EVR	**A**	**83,790**	**665**	**126**
W6YMV	"	22,140	270	82
WA6IPY	**21**	**1875**	**75**	**25**
K6RWO	**14**	**43,575**	**415**	**105**
K6EXO	"	5670	126	45
K6HZU/6	"	4484	102	42
W6UED	"	4292	116	37
K6AHV	**7**	**7656**	**132**	**50**
K7JCJ	**A**	**5400**	**90**	**60**
W7QPK	**14**	**9450**	**150**	**63**
W8WT	**A**	**15,549**	**213**	**73**
W8CLR	**14**	**36,358**	**343**	**106**
W8BKO	"	31,296	326	96
K9EAB	**A**	**61,404**	**476**	**129**
WA9ENB	"	22,517	253	89
W9OKM	**14**	**20,590**	**290**	**71**
K9VVF	"	5280	96	55
K9ZJV	"	840	35	24
KØIFL	**14**	**11,222**	**181**	**62**
WØNFA	"	9208	176	58

Bahamas

VP7CC*	**14**	**12,096**	**224**	**54**

Bermuda

W5JDX/VP9*	**14**	**35,964**	**444**	**81**

Canada

VE1CS*	**14**	**17,152**	**256**	**67**
VE2AMW*	"	**18,720**	**240**	**78**
VE2WY	"	14,740	220	67
VE3PV	**A**	**13,600**	**170**	**80**
VE3BJO	**14**	**17,472**	**224**	**78**

[*Continued on page 92*]

The Hdqs. Station of the Royal Air Force ARS, using the special call of GB3RAF, topped all other multi-operator stations by a considerable margin. But then look at the group who participated! l. to r., back row: G3ROB, G5UG, F/Lt. Griffiths, secretary of the RAFARS, (seated) G2BVN, and GW3IEQ, ex-VS9APH, VS9KPH. Kneeling: G3GJQ, ex-AP2R and VS9K, N. Griffiths, Jr., and G3HRY.

The KØJBK-WØNFA trophy is being made available for the first time to the highest scoring non-U.S.A. station using under 175 watts p.e.p. A contest newcomer, T12PI, will have his name engraved on this award which we hope will be an inspiration to him in future contests.

The B&W Model 6100 Transmitter. It is nicely styled with controls conveniently grouped. The three frequency-synthesizer dials are on the black panel in the center. Below these is the door behind which are located the VOX, ALC and CARRIER BALANCE controls. The large knob at the left of the door is the band-selector. The mic and key jacks are at the right with the various function controls.

CQ Reviews:

The B&W Model 6100 Transmitter

It is not often that something radically new is introduced on the amateur equipment market, but Barker & Williamson, Inc., have done just that with their outstanding Model 6100 Transmitter which features a frequency synthesizer, a modern development heretofore used only in commercial and military equipment (a few homebuilt affairs have appeared, but these have been few and far between). This arrangement is an entirely crystal controlled device used in place of a v.f.o. for variable frequency control. It insures better stability than ordinarily experienced with free-running oscillators and it facilitates instant frequency changes with an exceptionally high degree of reset accuracy to any frequency within its range. A more detailed description will be given later.

Besides the frequency synthesizer, the Model 6100 has about everything else one might desire in a piece of equipment of this type. First of all, it is an s.s.b., a.m. and c.w. transmitter capable of at least 100 watts peak output on all bands 80 through 10 meters and on many MARS frequencies. It has numerous fine features as will be seen during the ensuing description.

Circuitry

A block diagram is shown in fig. 1. The microphone signal is applied to a two-stage a.f. amplifier consisting of two triode sections of V_1 which is one of the latest type tubes, a 6C10 triple-triode Compactron. The third triode in V_1 is an a.f. cathode follower which feeds a shunt-connected dual-diode balanced modulator no. 1.

A crystal-controlled carrier signal of 3.2 mc, obtained from V_4, also is applied to the balanced modulator where it is balanced out. The result is a double-sideband suppressed carrier signal at 3.2 mc which is fed into a 3.2 mc upper-sideband crystal lattice filter having a bandwidth of 3 kc. This produces a single-sideband signal at 3.2 mc which is amplified by V_5.

Sideband Switching

A second balanced modulator, using 4 diodes, comes next. Here the signal is mixed with a crystal-controlled oscillator signal of either 6 or

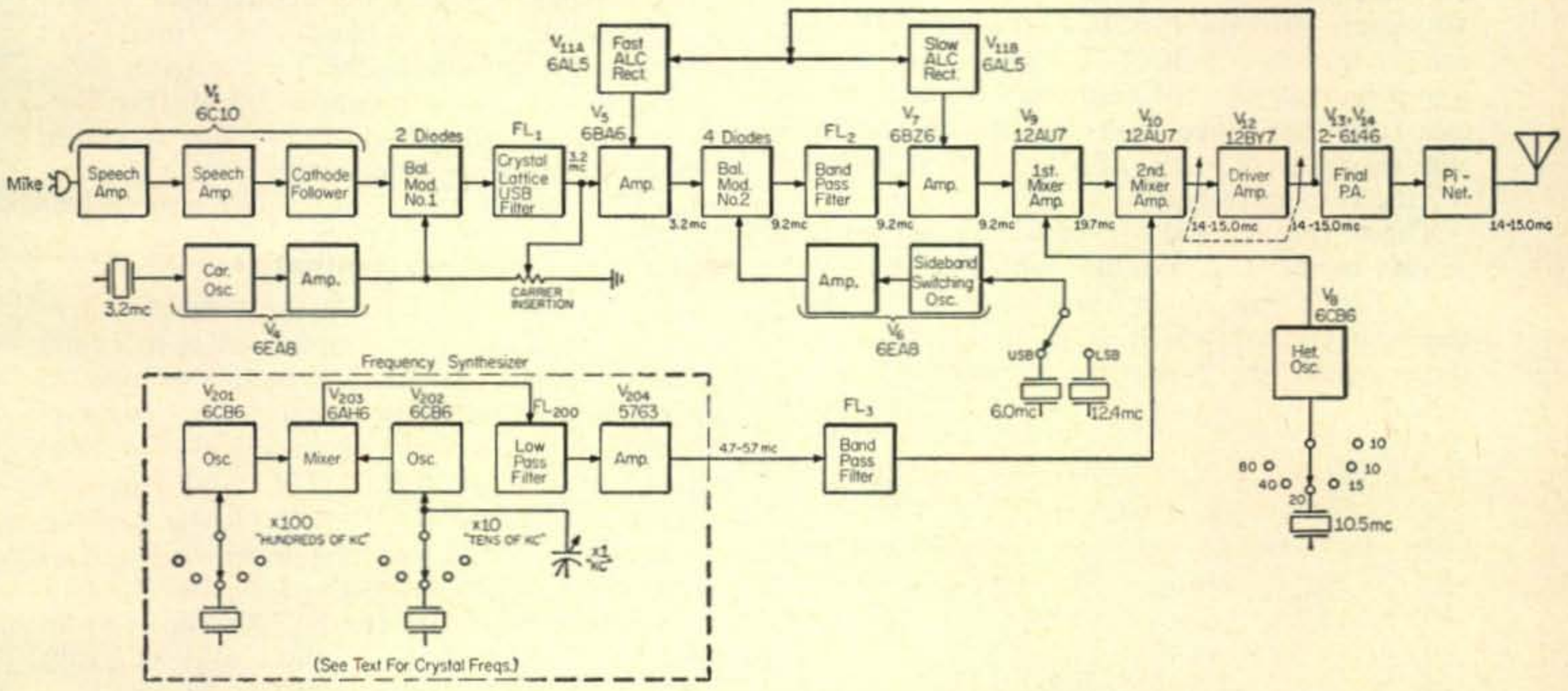
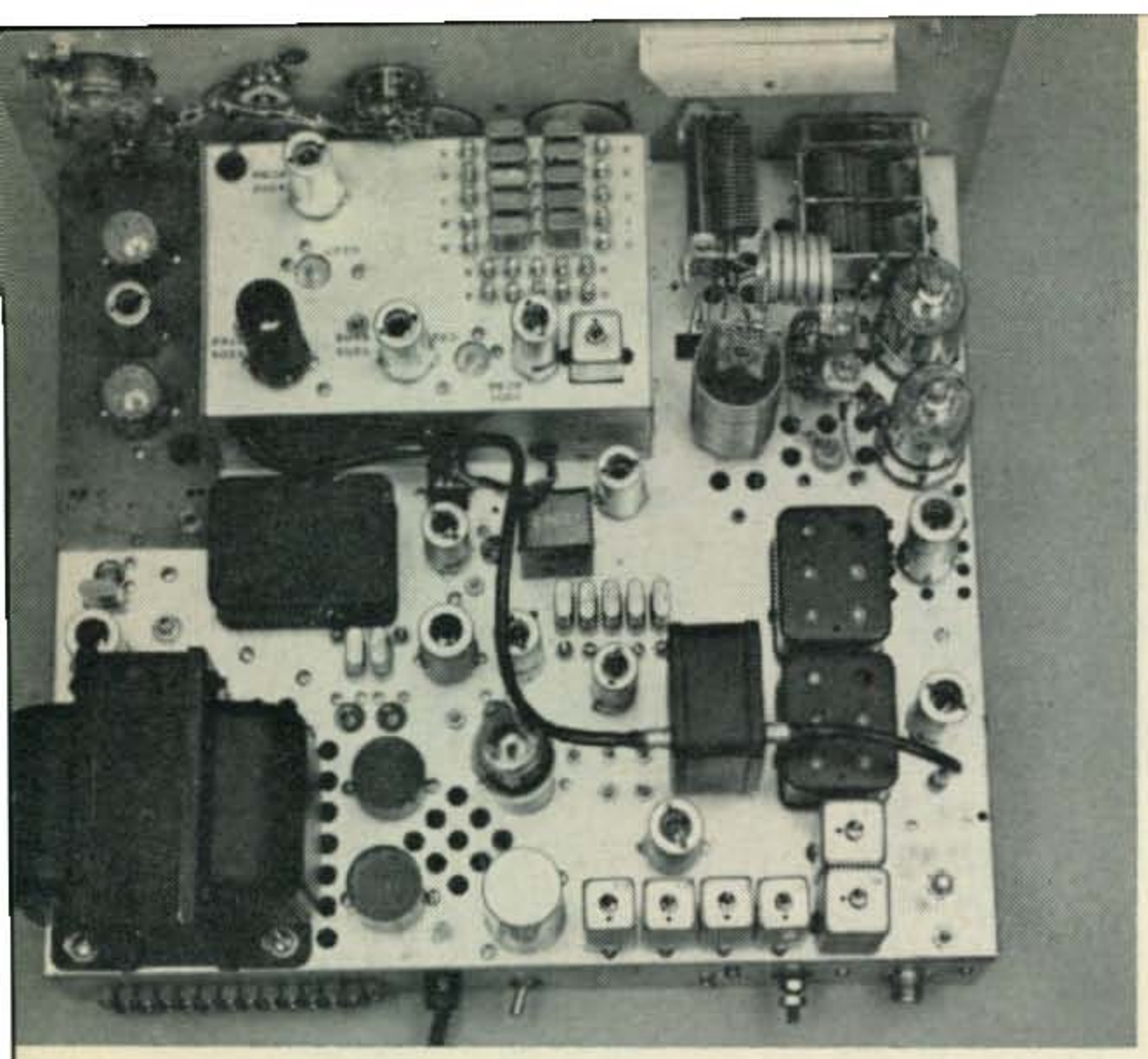


Fig. 1—Block diagram of the B&W 6100 transmitter. Vox circuits are not shown for simplicity. Heterodyne oscillator V_8 shows output for 20 meters only. Crystal frequencies used for other bands are shown in the text.



Top chassis view of the B&W Model 6100 Transmitter. The heart of it, a frequency synthesizer is a separate plug-in module seen next to the panel. The ten 100 kc step crystals, surrounded with their associated trimmers, are on top of the unit. The other crystals are inside of the module. A perforated metal cage, which is normally secured to the bracket on the panel, has been removed to obtain a view of the p.a. at the upper right. Note the silver-plated ribbon-type 10-meter high efficiency tank coil to the left of the 6146's. The vox and speech amplifier stages are at the left of the synthesizer. At the lower left is a husky power transformer, between which and the synthesizer is the sideband filter. The output cable from the synthesizer is connected to bandpass filter FL_3

12.4 mc, derived from V_6, to produce either an upper or lower sideband signal at a frequency of 9.2 mc.

Switching sidebands at this point has two advantages. One is that only one frequency has to be shifted, rather than two as needed with some systems. The other is that the 3.2 mc carrier can be fixed at the best side of the filter where its skirt can be made steeper for a given cost, thus providing a high degree of unwanted-sideband suppression and better low-frequency a.f. response for producing a more pleasant-sounding voice signal.

The output of the balanced modulator no. 2 is passed through a 9.2 mc band-pass filter which eliminates the possibility of spurious responses, notably the 3rd harmonic of the 3.2 mc s.s.b. signal. A second amplifier, V_7, is then used prior to feeding the signal to the first mixer/amplifier V_9. For 80-meter use this stage operates as a straight-through amplifier on 9.2 mc. For the other bands it combines signals from crystal-controlled oscillator V_8, of 3.5 mc for 40 meters, 10.5 mc for 20, 17.5 mc for 15, 24.5 mc for the lower half of 10 and 25.5 mc for the upper half of 10. The resulting output frequencies from this stage then are: 9.2 mc and the sum-mixtures 12.7, 19.7, 26.7, 33.7 and 34.7 mc for the respective bands.

These frequencies are now applied to the second mixer, V_{10}, together with frequencies in the 4.7 to 5.7 mc range from the frequency synthesizer. Output which is produced from this stage covers the respective amateur bands as follows:

Band	*Signal from V_9 (mc)*		*Signal from Synthesizer (mc)*		*Mixer output (mc)*
80	9.2	minus	5.7-4.7	=	3.5- 4.5
40	12.7	minus	5.7-4.7	=	7.5- 8.0
20	19.7	minus	5.7-4.7	=	14.0-15.0
15	26.7	minus	5.7-4.7	=	21.0-22.0
10	33.7	minus	5.7-4.7	=	28.0-29.0
10	34.7	minus	5.7-4.7	=	29.0-30.0

Driver and Final

A 12BY7 driver/amplifier, V_{12}, which uses high-Q circuits gang-tuned together with those of the preceding mixer, pushes a pair of 6146's, V_{13} & V_{14}, to a p.e.p. input of 180 watts. The 6146's are a specially selected type to ensure high output, good linearity and long life. The output circuit consists of a variable pi-network for matching to resistive loads of from 30 to 100 ohms. Particular attention has been paid to this circuit to maintain proper tube-load impedance and high efficiency, as is evidenced by the fact that uniform output is obtained on all bands with no drop-off at the higher frequencies. An r.f. choke across the output terminals provides a d.c. path directly to ground in the event the d.c. blocking capacitor should break down, thereby eliminating a potential shock hazard.

Capacitance-bridge type neutralization is used in the final. The 12BY7 is likewise neutralized. An interesting feature, in this respect, is that a separate neutralizing capacitor for each band is selected with the bandswitch. Stabilization of a 12BY7 usually is quite critical, but this arrangement handles it nicely by maintaining proper neutralization on each band which might not otherwise be obtained due to changing stray reactances as the tube is bandswitched. "Neutralizing" jumpers are provided in both stages to disable their B-plus supply lines during neutralizing adjustments.

Frequency Synthesizer

Now let us take a look at the frequency synthesizer which is not as complicated as its exotic name suggests. The basic principle is one of hetrodyning a fixed crystal against another crystal whose frequency can be varied over a small range. Referring to fig. 1, V_{201} and V_{202} are separate crystal oscillators, each having a switch to select any one of ten crystals which for V_{201} are fixed at 100 kc intervals from 24.7 to 25.7 mc. Those for V_{202} are spaced 10 kc apart from 20.01 to 20.1 mc. Each of these may be "rubbered," or shifted downward 10 kc by means of a variable capacitor. The output of the oscillators is combined in a mixer, V_{203}, to produce

difference-frequencies anywhere from 4.7 to 5.7 mc, depending on the crystal combinations and the variable shift of the 20 mc crystals. Temperature-matched crystals are used to maintain a constant difference-frequency at the mixer output as the equipment temperature varies. The output of the mixer is fed through a three-section low-pass filter, FL_{200}, to eliminate spurious responses, and is then amplified by V_{204} before being applied to the transmitter mixer, V_{10}, through a band-pass filter, FL_3.

A.M. Operation

When a.m. is used, a 3.2 mc carrier from V_4 is reinserted after the sideband filter by means of a variable carrier-level control, thus producing a single-sideband a.m. signal. The control is equipped with a warning light which goes on when carrier is inserted. In the event carrier is inadvertently left on when s.s.b. operation is contemplated, the light brings this situation to the operator's attention. The a.m. carrier input is 45 watts with 180 watts p.e.p.

C.W. Operation

For c.w., carrier is inserted with the carrier-level control for a d.c. input of 180 watts to the final. Grid-bias keying is used on the 2nd mixer and the driver stage. Break-in operation is possible. Key jack is located on the panel.

VOX

Two tubes, a 6C10 Compactron and a 6AL5, make voice-control operation possible with a conventional vox circuit. This includes an anti-trip circuit which prevents loudspeaker signals from actuating the transmitter. All controls for the vox system are accessible from the front panel. Push-to-talk operation also is available.

A.L.C.

The automatic-level control (a.l.c.) system in the Model 6100 is quite unique. An a.l.c. dual-diode detector, V_{11}, is connected to the grid of the final amplifier and conducts only when the r.f. drive exceeds a preset a.l.c. bias potential determined by the a.l.c. threshold control. The detector diodes are connected to separate loads, each of which has a different time constant. Bias potential developed at the slower one (1.5 sec. constant) is applied to V_7 where the gain is held between words, while bias from the faster one (0.03 sec.) is applied to V_5 where the gain follows the rapid variations of each syllable. Thus excellent a.l.c. linearity is maintained and the overall gain is smoothly controlled to limit excitation at the 6146 grids to the pre-set value. The a.l.c. takes hold *before* overloading of the final tubes commences and thus prevents flat topping and resulting distortion.

An innovation with this a.l.c. system is that it allows the final output to be limited to any desired value between 10 and 100 watts, thereby furnishing a convenient means for reducing power during local rag chews, or for use with a linear requiring low drive and to prevent overdriving the linear. The a.l.c. threshold control is accessible for screw-driver adjustment from the front panel and the degree of a.l.c. compression is indicated in db on the panel meter.

Frequency Spotting

A CALIBRATE position is provided to enable the operator to "zero-in" on a received signal without putting a signal on the air with the transmitter. A panel control allows the calibrating level to be adjusted to prevent overloading the receiver and to provide the optimum level for the best beat.

Metering

Besides indicating a.l.c. compression, the panel meter may be switched to read relative output power. This is useful for tune-up to maximum output, for nulling out the carrier and for output monitoring. A sensitivity control is included to set the meter reading to any desired reference point. The meter also may be switched to read total cathode current of the final. There are three separate meter scales, one for each function.

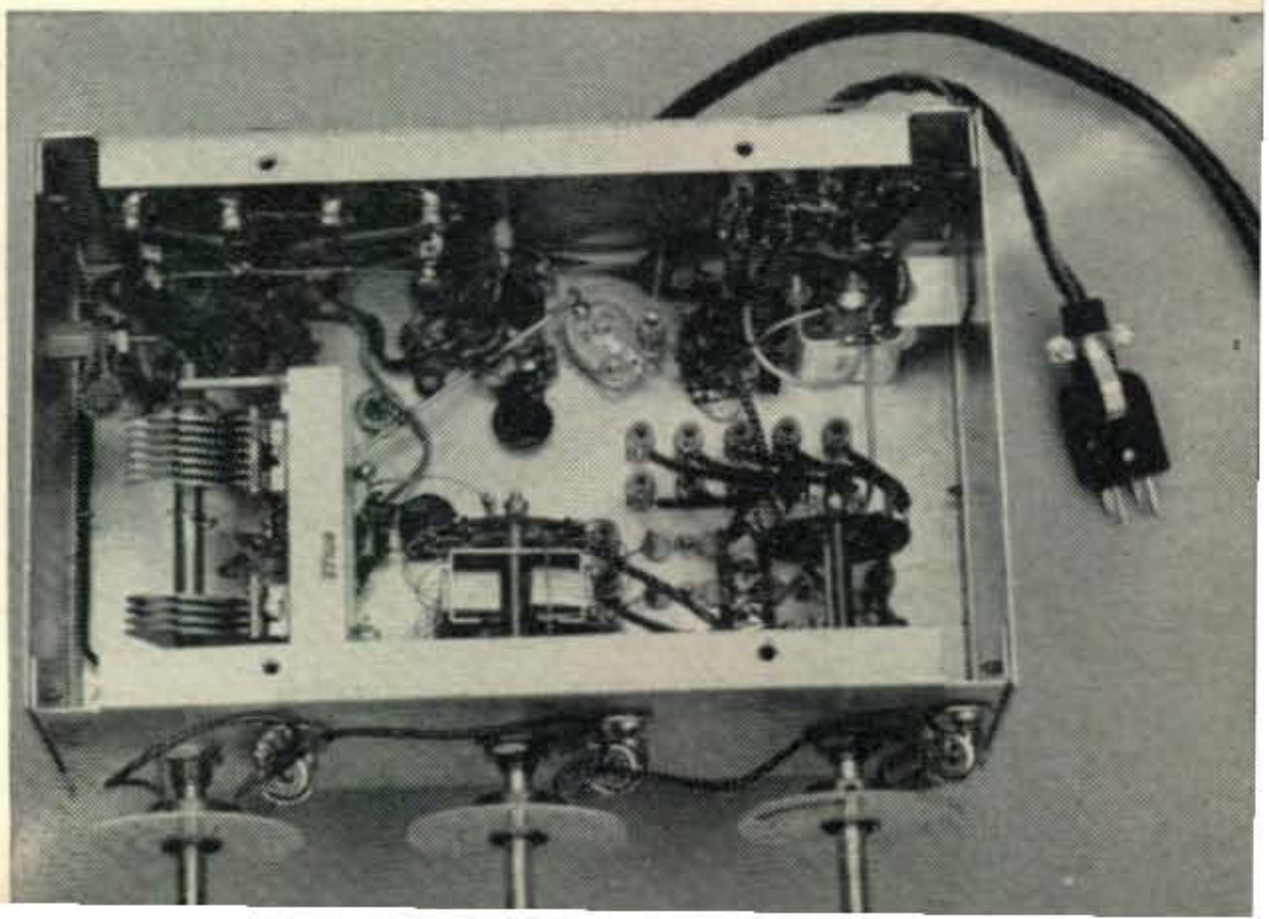
Phone Patch

The Model 6100 is equipped with a separate low-impedance phone-patch input which is available at a terminal strip on the rear apron. High-impedance patch may be used through the microphone input. Vox may be used with either input.

Auxiliary Terminals

Other rear terminals provide up to —100 volts for receiver disabling, anti-trip circuit to receiver output, external push-to-talk control

[*Continued on page 84*]



Underside view of the frequency-synthesizer module for the Model 6100. It is easily taken out without necessitating removal of the dials, nor is the calibration altered. At the left is the variable capacitor for "rubbering" each 20 mc crystal over a continuous range of 10 kc. Its dial (×1) is calibrated in one-half kc steps. The ×10 switch is at the center with the ten 20 mc crystals mounted on it. At the right is the ×1000 switch behind which are some of the piston-type trimmers for its 25 mc crystals.

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

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

CW-PHONE WAZ

1824	UA3AN	Vladimir Makarov
1825	K6BWX	R. H. Maddux, M.D.
1826	VS4RS	Ron. L. Skelton
1827	W3GJY	John F. Wojtkiewicz
1828	W9ZB	Robert F. Wilson
1829	JA2AIR	Kazuo Nagata
1830	W6JKJ	Stan Kuhl
1831	OH5TK	Antero Kahra
1832	W1RAN	Ned Raub

TWO-WAY SSB WAZ

169	OH2HN	Altti Unkuri
170	W3NKM	Stanley S. Springer
171	WØTJ	W. M. Atkins
172	UA3DR	Leonid Sharapow

CW WPX

457	SP2HL	Jan Knull
458	KØIAD	Gary Alexander
459	W2LJX	Jim Ortloff
460	OH2VZ	Pertti Kantanen
461	K2UYG	William Schneider, Jr.
462	W3HNI	Charles W. Casselberry
463	G8KU	P. B. Briscombe
464	KP4BEA	Robert B. Roach
465	VK9XK	S. Russ Coleston
466	W9ZB	Robert F. Wilson
467	DL1TA	Dr. Karl-Heinz Birr
468	ZE3JO	Malcolm Geddes
469	VK7SM	Sam G. Moore
470	VK3AXK	S. Russ Coleston

PHONE WPX

95	G3GHE	Charles M. Nairn

SSB WPX

140	W3BVL	William T. Heller
141	G3WW	R. F. G. Thurlow

In response to our request for a picture of a DX Hog for the completion of the DX menagerie, Bob, W9NN, was kind enough to send in this picture. W9RIL is shown apprehending "DX Hog" W9NN in the woods of Northern Wisconsin.

DURING the recent Malmö, Sweden, conference of the IARU Region I, a proposal brought forward by the Dutch delegation was discussed. This proposal was to limit the use of amateur bands for contests, which are not of an international character, like the WSEM contests of the USSR. The proposal also was discussed with Ernst Krenkel, RAEM, who represented the USSR Radio Club at the Conference. During the past WSEM contest, open only for the U-countries, it was very nice to see that they were only occupying the lower 50 kc of the band, thus leaving space for all others that could not take part in this contest. We wish to thank RAEM and his friends and believe that this is an example of what can be reached at an IARU conference. We should look at some of our *exclusively* U. S. contests in the same light.

BY1 China: Rumor has it that Leo, UA3CR, will DXpedition to BY1PK for some s.s.b. operation. *(Tnx JDXRC)* This sounds too good to be true. It reminds me of the most frustrating QSO I've ever heard. BY1PK worked BY9SX (that's Manchuria, man) in English and signing off with "cheerio."

CR8 Portuguese Timor: Seco, CR8AC, has resumed activity around 14040/50 kc at 1100 to 1200 GMT. *(Tnx WGDXC)*

DU5 Leyte Island: The Philippine Amateur Radio Association will activate this rare prefix as DU5DM on October 19 and 20 in commem-

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.

*Box 35, Hazlet, New Jersey.

This photo was taken during the 3rd annual Lake Placid DX Conference on July 14th, 1963. Standing l. to r. W4CKB; HK3EY (Pres. of HK League); K4OBM; Danny Weil, VP2VB; W4DQS; HK1QQ; K4GRD; WA4DDG; Kneeling l. to r. W4BJ; W4LVV; W4QVJ; Naomi Weil; K4WIS; W4BWR. *(Tnx W4CKB).*

oration of Douglas McArthur.

FC Corsica: "Why is it that you didn't get ur QSL from F9UC/FC? Here is the answer. As joint participants in the Hammarlund DXpedition to Corsica, we had the pleasure of visiting Jean, F9UC/FC's shack. There we learned that Jean's home had been destroyed in a storm a few years ago and most of his equipment, logs and cards were destroyed.

"Although the DXpedition rigs had to be kept on the air without interruption, we took time out to search the shack and came up with an old station log which does not show too precise indications of emission type, date, time, freq., etc.

"A batch of QSLs were found in a cardboard box and the ones with s.a.s.e. were answered by the guy who was off duty. Those were mailed July 11, 1963. All other QSLs, about 2,000, without s.a.s.e., will be taken home to DL9PF and answered by a special QSL to be printed shortly. All QSOs still legible in the old log will also be QSLed. These amount to a few thousand 14 mc a.m. QSOs only. The DXCC Manager of ARRL Hq, will be asked to please credit those which, unfortunately, show only the year and the call sign of the station worked. These QSLs will be sent by the Bureau shortly.

"Jack, HB9TL, will handle future QSLs for Pierre, F9RY/FC.

"In the future, DL9PF will act as QSL manager for Jean, F9UC/FC, who promised to send his logs periodically to Walter. F9UC/FC will be on all bands c.w. a.m. s.s.b. from now on." Signed Harry, DL7AH/9Q5AD/LX3AH and Walter, DL9PF/PX1PF/LX3PF.

The above letter speaks for itself.

At the W4CKB orange grove they specialize in raising oranges and antennas. As you can see, they also pick their pickers. Danny Weil, VP2VB, gets some orange juice on its way. *(Tnx W4CKB).*

HS Thailand: Frank, W4LCY, is licensed as HS1P. Frank is with the "Global Ionospheric Research Association" and will oblige with W/K QSOs when and if they become legal. QSL via W4CKB. *(Tnx W4CKB)*

MP4 Trucial Oman: MP4TAD has been active on 14 mc s.s.b.—14300 kc is preferred.

PYØ Trinidade Island: PY1BCR has returned to the Island and is operating as PY1BCR/Ø. 14085 preferred. No civilians are allowed on the Island so the DXpedition plans were scraped. *(Tnx Florida DX Report)*

TL8 Central African Republic: Gus, exFQ8AF/TR2AP is now in TL8-land awaiting his ticket. Gus promises TL8 QSO in quantity. *(Tnx VERON)*

TU2 Ivory Coast: Very active on 14 mc s.s.b. now is "Smitthy" (Frank R. Smith, W8HMI) as TU2AU. He will stay in Abidjan for about two years and will operate s.s.b. on all bands. On 40, he is using a two-element beam. QSLs go via U. S. Embassy, Abidjan. *(Tnx VERON)*

VP8 Falkland Islands: Dave, VP8HJ, has been active on both c.w. and s.s.b. *(Tnx VERON)*

VP8 South Orkneys: Peter, VP8GQ remains active on all bands, c.w. and s.s.b. Peter will operate on 160 meters again this year. *(Tnx VERON)*

VS9P Perram Island: Rumor has VS9PSU active from Perram Island which is a possession of Aden located off the coast of the Malagasy Republic. 15 meter a.m. phone, so the reports say. *(Tnx LIDXC)*

VU2 India: Dady, VU2MD, is one of the better known Indian hams and I thought his story, which appeared in the Northern California *Bulletin* would be of interest.

"I became interested in ham radio way back in 1927 and have been active ever since except for the break during the war years. I am essentially a brass pounder and enjoy key bashing. I am a great believer in the use of low power and efficient antenna system and for years have worked with rigs of 50 watts and less. Up to 1958, all my QSOs were on c.w. and occasionally a.m.; but, since I heard so much about s.s.b., I acquired a CE-20A Exciter and a 458 v.f.o., just to 'keep up with the Jones.' Hi . . . The antenna is a G5RV multiband dipole. (It is not possible to have a quad or a beam in my apartment flat.)

This is the Aruba Ariba award, sponsored by the Aruba A.R.C. See text for requirements.

and the receivers are AR-88 and SX-28. My standby c.w. rig runs an 813 in the final. I am quite proud of my QRP rigs, as I have managed to collect over 75 awards from 30 countries on all six continents. I have worked Gus W4BPD from every spot on the African continent he has touched so far and he has given me quite a few countries. I am, however, still looking out for Idaho, North Dakota and Utah for my WAS, so please tell your friends in these states to look for me on 14050 kc any time after 1530 GMT. The conditions are not good enough for s.s.b. QSOs except during occasional openings."

Where else but California would they print a story about a fellow running 50 watts input to an 813?

ZD7 St. Helena: G3PEU showed up right on schedule as ZD7BW. He will QSL upon his return home about the end of the year.

ZS2MI Marion Island: Jack, ZS1OU, reports via the West Gulf *Bulletin* that Ray, ZS2MI, has a very difficult time with reception due to constant rain, static, etc. Jack mentions that he has received many letters requesting schedules and it is impossible to answer or comply with them. He has induced Ray to spend more time on the air during week days and says he will be on 14058 kc each week day from 1030 to 1145 GMT. He will also be on the low end of 7 mc from 0500 to 0600 GMT week days and on weekends 14058 kc 1300 GMT or earlier with W4ECI acting as MC. ZS2MI's T8C note is easily recognizable.

9X5 Burundi: The new prefix for Burundi is 9X5. Ruwandi will continue to use 9U5.

160 Meters

In spite of the usual decline in 160 meter activity during the summer months when static is a problem, outdoor activities call, and nighttime is shorter, there has been some DX activity on 160.

South Africa—ZS2FM, Mike has continued his tests during ZS winter (W/VE summer) faithfully being on 1901.5 kc every Sunday morning from 0400-0530 GMT. He worked W6ML late in spring and W1BB July 14, 0422-0521 GMT, peaking 569 at 0500. He checks band conditions from our 1950 Loran sigs, also WCC on 2036 kc, a 24 hour commercial station. Much credit is due Mike for arousing interest in 160 in ZS-land. Latest addition is a near neighbor ZE3JO, Mal, who expects to be active this season with a Ranger/HRO.

South Pacific—K1KSH/KG6, Gary, is now operating on 160 from the South Pacific. First conquest was Alex, W6ML, ex-W6KIP, whom he QSOd July 7, 1998 kc, 1225-1248 GMT peaking 339. W6ML peaked 579; this after two other unsuccessful skeds. Needless to say, both he and Alex are very happy. W6ML's signals were heard during all schedules very reliably. Gary's signals from Globe Scout and "Jury-Rig" antenna at best possible height weren't as good. He will be in the South Pacific for several months expecting to excite 160 DXers by also operating from several other rare prefixes. Keep an ear open for him this coming season; also any time now Saturday or Sunday mornings 0830-1000 GMT on 1998. He will listen both high and low ends of band.

Northwards/Baffin Island—VE2UQ, Gordon had the opportunity and flew there for a week this summer. He decided to test 160 DX from the Land of the Midnight Sun even though anticipated QSOs where difficult, if not impossible, due to the fact that this time of year it was twilight only—no darkness from 0400-0500 GMT. Light enough at midnight to read a newspaper in the open. 100 miles south of his QTH a short period of darkness existed from 0403-0515 GMT. Using a Ranger and 260-foot end fed LW antenna, Gordon operated faithfully every day. Many W/VEs participated in these tests. On July 17 he QSOd VE1ZZ coming in there peaking 449 and giving Jack a 549 report for his first QSO. Then, on July 18th, also QSOd W1BB for 45 minutes. VE2UQ/8's signals varied from zero to 539 peaks, which proves that QSOs are possible from beyond the Arctic circle. It is wondered if it may not have been the very fact of the Midnight Sun and periods of twilight that made it possible at all. Usually Arctic QSOs on 160 are considered practically impossible. It is known that 160 meter signals peak at sunrise and sunset and maybe this "continuous" sunset-sunrise did the trick. Much credit to Jack for opening up the North to 160 DX and to more knowledge of conditions there on 160. Congratulations. *(Tnx to W1BB for above 160 meter news)*

Corn Islands Kaput

For some time an effort has been quietly underway to secure an American call for operations in the Corn Islands. (Alias, Islas de Mistoriosa, April Florida DX *Report*)

The Corn Islands are located off the coast of Nicaragua in the Caribbean and have been described as a "lush paradise." On U. S. Navy Hydrographic Office charts the Corns are designated as "Leased by the United States." Research into their status showed a treaty between the U. S. and Nicaragua; the Bryan-Chamorro Treaty of 1914, wherein, for $3,000,000 cash, the U. S. was granted perpetual rights to build a canal across Nicaragua and also a 99-year lease on the Greater and Lesser Corn Islands.

Article II of the Treaty states: "It being expressly agreed that the territory hereby leased and the naval base which may be maintained

[*Continued on page 88*]

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during October, 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 (October 3, 8 and 30), 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)* Oct. 3, 8, 30	*Normal Days (WWV rating 5-6)* Oct. 1-2, 4-5, 7, 9-10, 12, 17-19, 21, 24-29, 31	*Below Normal Days (WWV rating 4)* Oct. 11, 15-16, 20, 23	*Disturbed Days (WWV rating less than 4)* Oct. 6, 13-14, 22
(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.

It looks like Normal propagation conditions for the Contest Period Oct. 26-27.

CQ DX Contest Special

The 1963 *CQ* World Wide DX Contest will be held on the following dates:

Phone Section: October 26-27

CW Section: November 23-24

Continuing the practice of the past twelve years, this month's PROPAGATION column contains DX Propagation Charts prepared for use during the 1963 Contest periods. For those readers interested in statistics, previous predictions appearing in this column for the twenty-four Contest periods held during the past twelve years have achieved a high degree of accuracy 18 times, a fair degree of accuracy 4 times, and missed the mark only twice.

*11307 Clara St., Silver Spring, Md.

Sunspot Cycle

The Swiss Federal Solar Observatory reports monthly mean sunspot numbers of 37 for June and 19 for July, 1963. This results in smoothed sunspot numbers of 30 centered on Dec. '62 and 29 centered on Jan. '63. The sunspot cycle continues to decline at a slow rate. A smoothed sunspot level of 31 was recorded during last year's Contest, and a level of 18 is predicted for the 1963 Contest.

General Forecast

10 Meters: The 10 Meter predictions appearing in the Charts apply mainly to the October 25-27 Contest period, and for the entire month of November. Conditions are expected to be somewhat poorer during the earlier part of October, with openings averaging one numerical rating *lower* than the values shown in the Charts. During the Contest periods a few openings may occur to Africa and South America during the daylight hours, and some openings may also be possible to Australia and the Pacific area during the late afternoon and early evening hours. If propagation conditions are on the high side of "normal" during the Contest periods, openings on 10 meters may be a pleasant surprise to those who can stick it out. If conditions are "below normal" or "disturbed", chances are that the band will be a complete washout.

15 Meters: Although DX openings are expected to be somewhat less frequent than last year, 15 meters should be a good DX band during most of the daylight hours. The band is forecast to open to almost every corner of the world sometime during the period from shortly after dawn through the early evening hours. Signals from Europe and the north and east should peak shortly before noon, while signals from the Far East and the south and west should peak during the afternoon and early evening hours. When conditions are on the high side of "normal", 15 meters may be the best band for DX during the daylight hours; when conditions are "below normal" or "disturbed," openings may be spotty and of short duration.

20 Meters: As during the past few years, 20 meters is again expected to be the "backbone" band during the Contest periods. Good DX openings are expected to many areas of the world

from sunrise through the early evening hours. Conditions are predicted to peak shortly after sunrise and again during the late afternoon and early evening hours. During these peak periods, 20 meters is likely to be the best band for DX. with openings possible to almost all areas of the world, and with signal levels often exceptionally strong. During periods of "below normal" or "disturbed" conditions, 20 meter openings may become spotty and of shorter duration, but in general, the band is expected to hold up in fairly good shape during all but "blackout" conditions.

40 Meters: The band is expected to open for DX during the early evening hours, and remain open to one area of the world or another until shortly after sunrise. During the hours of darkness, 40 meters should be the optimum band for DX openings. Signal levels often are expected to be exceptionally strong on DX openings during periods of "normal" or "above normal" propagation conditions, while the band is likely to be spotty during periods of "below normal" or "disturbed" conditions.

80 Meters: Conditions generally improve on this band as the solar cycle approaches minimum values. Some fairly good 80 meter DX openings are forecast to several areas of the world during the nighttime hours, with signal levels likely to be strong during periods of "normal" or "above normal" or "disturbed" conditions.

160 Meters: The few contest participants who concentrated on 160 meters last year were pleasantly rewarded for their efforts. Conditions on this band also improve as the number of sunspots decreases, and DX openings on this band are expected to be somewhat more numerous than last year. Openings to some areas of the world should be possible during the nighttime hours and the pre-dawn period. Because of low power limitations imposed in this band in many areas of the world, signals will usually be weak and noisy, especially on phone. Openings on 160 meters, while better than last year, will be considerably poorer than the nighttime openings expected on 40 and 80 meters.

CQ WW DX Contest Special
OCTOBER & NOVEMBER, 1963
Time Zone: EST (24-Hour Time)
Eastern USA To:

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

South-east Asia	08-10(1) 10-13(2) 13-17(1) 17-19(2) 19-21(1)	06-07(1) 07-09(2) 09-14(1) 21-23(1)	05-08(1) 17-19(1)	*NIL*
Far East	16-19(1)* 15-16(1) 16-10(2) 19-20(1)	06-07(1) 07-09(2) 09-11(1) 16-19(1) 19-21(2) 21-22(1)	03-09(1)	04-07(1)
Pacific Islands & New Zealand	12-19(1)* 07-10(1) 10-13(2) 13-16(1) 16-18(3) 18-20(2) 20-22(1)	17-19(1) 19-20(2) 20-22(3) 22-00(2) 00-06(1) 06-09(2) 09-14(1)	23-01(1) 01-06(3) 06-07(2) 07-09(1)	00-03(1) 03-06(2) 06-07(1) 03-07(1)†
Aus-tralia	14-17(1)* 07-08(1) 08-10(2) 10-14(1) 14-18(2) 18-21(1)	00-07(1) 07-09(3) 09-11(2) 11-17(1) 20-22(1) 22-00(2)	03-04(1) 04-07(2) 07-09(1)	04-05(1) 05-07(2) 07-08(1) 05-07(1)†
South America	07-09(1)* 09-14(2)* 14-17(1)* 06-08(1) 08-10(3) 10-14(2) 14-16(4) 16-18(2) 18-20(1)	14-17(2) 17-19(4) 19-00(3) 00-02(2) 02-05(1) 05-07(2) 07-14(1)	18-19(1) 19-20(2) 20-03(3) 03-06(1)	19-20(1) 20-22(2) 22-00(1) 00-02(2) 02-06(1) 00-04(1)†
Mc-Murdo Sound, Ant-arctica	06-07(1) 07-09(2) 09-11(1) 16-18(1)	18-20(1) 20-00(2) 00-06(1) 06-08(2) 08-11(1)	23-07(1)	*NIL*

Time Zone: PST (24-Hour Time)

WESTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	06-07(1) 07-10(2) 10-12(1)	05-06(1) 06-08(2) 08-10(1) 10-12(2) 12-14(1) 21-23(1)	19-00(1)	19-23(1)
Eastern Europe & Euro-pean USSR	07-10(1)	06-07(1) 07-09(2) 09-14(1) 21-23(1)	21-00(1)	*NIL*
Southern Europe & North Africa	06-07(1) 07-10(2) 10-13(1)	06-09(1) 09-12(2) 12-14(1) 21-23(1)	18-23(1)	18-22(1) 18-20(1)†
Eastern Mediter-ranean & Arabia	07-10(1)	06-07(1) 07-09(2) 09-12(1)	18-22(1)	*NIL*
Central & South Africa	07-09(1)* 09-11(2)* 11-13(1)* 06-10(1) 10-12(2) 12-14(3) 14-15(2) 15-16(1)	10-13(1) 13-15(2) 15-17(3) 17-19(2) 19-23(1)	16-17(1) 17-19(2) 19-21(1)	17-19(1) 17-19(1)†
Central Asia	17-19(1)	07-09(1) 17-21(1)	06-09(1)	*NIL*
South-east Asia	09-11(1)* 15-18(1)* 08-09(1) 09-12(2) 12-15(1) 15-17(2) 17-20(1)	07-08(1) 08-10(2) 10-14(1) 18-23(1)	03-05(1) 05-07(2) 07-09(1)	05-07(1)
Far East	14-16(1)* 12-14(1) 14-17(3) 17-18(2) 18-20(1)	07-12(1) 12-14(2) 14-16(1) 16-18(3) 18-20(2) 20-22(1)	22-00(1) 00-02(2) 02-06(3) 06-08(2) 08-09(1)	23-01(1) 01-05(2) 05-07(1) 01-06(1)†
Pacific Islands & New Zealand	09-11(1)* 11-17(2)* 17-19(1)* 08-09(1) 09-12(3) 12-16(2)	06-08(1) 08-10(3) 10-12(2) 12-17(1) 17-19(2) 19-21(4)	21-22(1) 22-05(3) 05-07(2) 07-09(1)	22-00(1) 00-05(2) 05-07(1) 02-06(1)†
Pacific Islands (cont.)	16-19(4) 19-20(2) 20-22(1)	21-23(3) 23-00(2) 00-03(1)		
Aus-tralia	12-19(1)* 07-08(1) 08-13(2) 13-16(1) 16-19(2) 19-21(1)	06-08(1) 08-10(3) 10-12(2) 12-20(1) 20-22(2) 22-03(1)	01-03(1) 03-06(3) 06-09(1)	03-04(1) 04-06(2) 06-08(1) 04-07(1)†
South America	07-08(1)* 08-13(2)* 13-16(1)* 05-07(1) 07-12(2) 12-14(3) 14-16(4) 16-17(2) 17-19(1)	14-16(2) 16-18(4) 18-20(3) 20-00(2) 00-05(1) 05-07(2) 07-14(1)	18-19(1) 19-01(3) 01-05(1)	19-22(1) 22-01(2) 01-04(1) 23-02(1)†
Mc-Murdo Sound, Ant-arctica	06-07(1) 07-09(2) 09-11(1) 16-18(1)	16-18(1) 18-20(2) 20-22(3) 22-02(2) 02-06(1) 06-08(2) 08-11(1)	23-06(1)	*NIL*

Propagation Charts

The numerical ratings appearing in parenthesis following each predicted time of band opening in the Charts, indicate the *total* number of days during each month (October & November) that the opening is expected to occur. The rating (1) means that the opening should occur on less than 7 days; (2) the opening should occur between 8 and 13 days; (3) between 14 and 22 days, and (4) on more than 22 days.

To determine the *specific* day that an opening is most likely to take place, refer next to the "Last Minute Forecast" which appears at the beginning of this column. This forecast is inserted in the column just as *CQ* goes to press and is based on the latest available propagation data. The forecast attempts to predict specific days upon which openings shown in the Propagation Charts are most likely to occur, and the expected signals, noise and fading levels. For example, an opening rated (2) in the Propagation Charts is likely to take place with moderately strong signals and little fading or noise on days shown in the "Last Minute Forecast" as "above normal;" openings are expected to fluctuate between weak and strong, with moderate fading and noise on days predicted to be "normal;" and generally weak signals, with considerable fading and noise can be expected on days shown as "below normal." Openings rated (2) in the forecast are not expected to take place during "disturbed" conditions.

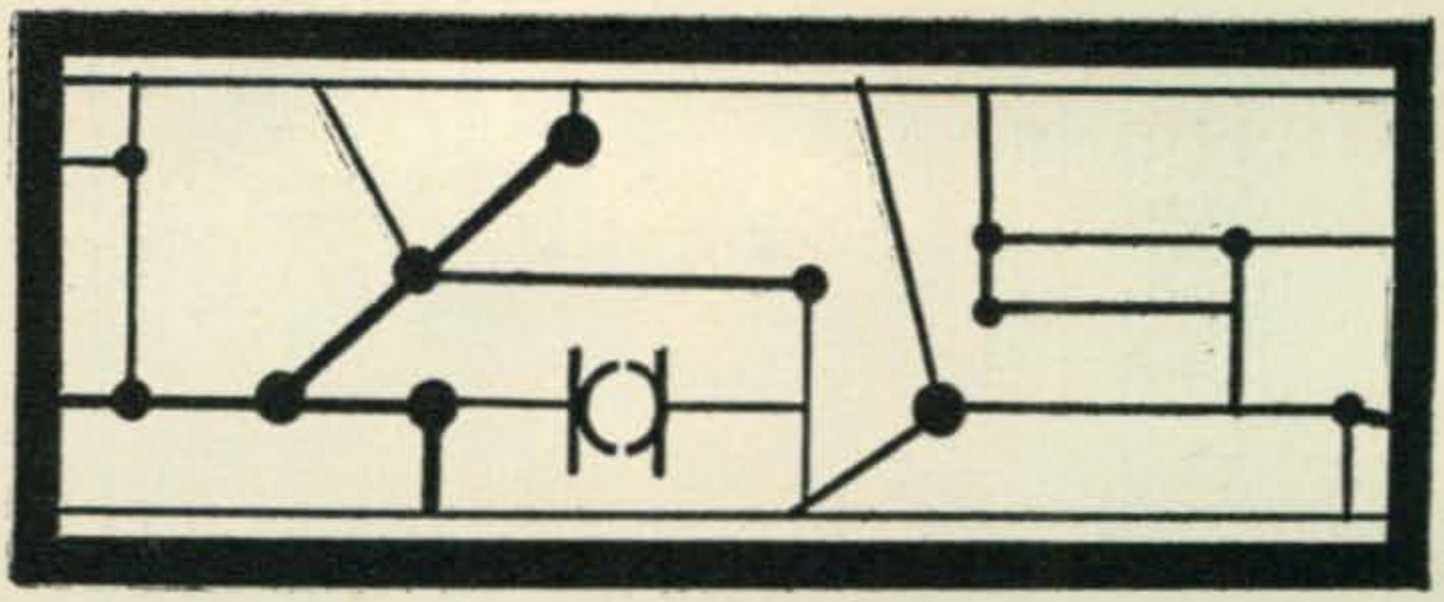
The sequence to follow in using the Propagation data appearing in this column is:

1. Check the appropriate Propagation Chart (Eastern, Central or Western USA, depending on your QTH) for the predicted times of opening for the particular band or circuit that you are interested in;
2. Check the numerical rating appearing in the parenthesis following the predicted band opening against the quality figures appearing in the "Last Minute Forecast" for October 26 and 27, in order to determine likely signal, noise and fading levels for the predicted opening. (Check the "Last Minute Forecast" which will appear in next month's column for tht November 23-24 Contest period).

This month's special Charts are based upon the following *effective radiated powers* at an-

[*Continued on page 96*]

NOVICE



WALTER G. BURDINE*, W8ZCV

A FEW days ago I was asked to give a test to a man that was blind. This naturally presented quite a problem as I had been around the blind very little and had no idea of their methods of writing and reading. I wrote the FCC for the instructions and right back came a set of examinations and a letter telling me how to proceed with the test. I know a lot of you are unfamiliar with the methods of testing the handicapped and I think you might be as interested as I was. The contents of the letter are as follows:

Instructions for Blind Applicants for Amateur Radio Licenses General Class

"APPOINTMENT: Because blind applicants require special attention and cannot take the code tests or written examinations in the manner indicated below while others are in the room, it is required that prior appointment be made. At the Detroit office, where amateurs are examined on Wednesday and Friday mornings, it is usually required that the blind applicants appear by appointment at 1:00 P.M. on one of these days. At examination centers away from the field office, appointment can be made for 1:30 P.M., a half hour before the scheduled General Class examination.

"ASSISTANT: The examiner will not be available to read the questions to the applicant, especially at field examinations. It is therefore required that the applicant be accompanied by a person, preferably a nonamateur, who can read the questions and record the selected answers.

"CODE TESTS: Blind applicants have copied the code test in many ways. In most cases the applicant dictates the words or letters to the examiner who records them as dictated. A few applicants have been able to use a standard typewriter. If this method is used, the applicant must bring his own typewriter. Some applicants use a Braille typewriter and read back the copy to the examiner. Only a few have copied the code test with a Braille slate and if this method is used it is recommended that two or three slates be brought to clamp to the paper before the test starts, to avoid delays in shifting the slate position. Sending tests are conducted in the usual manner except that dictated material is sent.

"WRITTEN TESTS: The person accompanying the applicant reads the questions to him, one at a time, and reads the five multiple-choice answers. The applicant decides which is the correct answer and indicates the correct answer to his assistant who records it on the IBM sheet.

Novice, Technician, and Conditional

"Examinations by mail for Novice, Technician and Conditional classes can be conducted by voluntary examiners in a manner similar to the above. Examiners are cautioned against aiding the applicant through the use of their own knowledge of the theory and regulations.

Physical Handicaps other than Blindness

"Persons who have physical handicaps other than blindness, which prevent copying the code, or recording the written tests may also be examined by appointment. Tests will be conducted in a manner which appears best suited for the particular individual."

That is the text of the letter sent to me by the Detroit field office and I presume the same is done at all examining centers. I will add that every precaution should be taken to prevent any help to the applicant when giving the test and possibly making the applicant feel that he cheated while taking the test. Don't forget that the applicant would like to stand on his own two feet so to speak, he doesn't want help or

[*Continued on page 99*]

Hosie Edwards, K8VER and Vernon Harris, WA8CCS at the controls of the DESC field day six meter station. The shack is a surplus truck cab. It was hot in there! I know, I used one too!

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

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

A high-level international radio conference on space communications will begin in Geneva, Switzerland on October 7th. Being held under the auspices of the International Telecommunication Union, the conference is scheduled to remain in session for a five-week period. The conference, the first of its kind to be held in the field of space communications, is expected to be one of the most important held in the nearly 100-year history of the ITU.

The main purpose of the conference will be to allocate radio spectrum for space activities and radio astronomy. It will be the first conference in the general area of space to be held on such a broad international level, and hundreds of scientists, engineers and government officials from a large number of the 120 member nations of the ITU are expected to attend.

The official name of the conference is the "Extraordinary Administrative Radio Conference to Allocate Frequency Bands for Space Radiocommunication Purposes." The results of the conference, from the standpoint of the International Radio Regulations, which it is authorized to revise, are expected to have far-reaching effects on the practical utilization of space during the next ten or fifteen years. The Radio Regulations is the basic ITU document governing the worldwide operation of radio.

This past summer, the Federal Communications Commission released to the public the U.S. frequency proposals that will be considered at the space conference. These include the proposed allocation of a total of approximately 3,000 mc of the radio spectrum to meet the expected frequency requirements of future operational satellite systems, and for space research and exploration. The U.S. proposes allocations for communication, meteorological and precision navigational satellite systems, as well as for experimental earth satellites, space probes intended for scientific exploration of the moon, various planets, and the solar system, and for manned space-flight. Also included in the U.S. proposals are frequency allocations for such supporting communication functions as telecommand, telemetering and tracking, as well as radio astronomy. The proposals also contain a recommendation concerning direct broadcasting satellites.

Except for narrow bands for space research between 10,003—10,005 kc, 19,990—20,010 kc and 39,986—40,002 kc all of the frequency bands proposed by the U.S. are in the v.h.f., u.h.f., and s.h.f. range up to 33,500 *megacycles*, or 33.5 *gigacycles*. In order to keep dislocation in the radio spectrum to a minimum, almost all of the U.S. proposed allocations are to be shared with existing terrestrial radio systems, although some exclusive bands are being requested for space research, telecommand and telemetry where absolute freedom from interference is necessary.

The Geneva space conference has aroused considerable interest, not only in technical circles, but also in the United Nations. The UN

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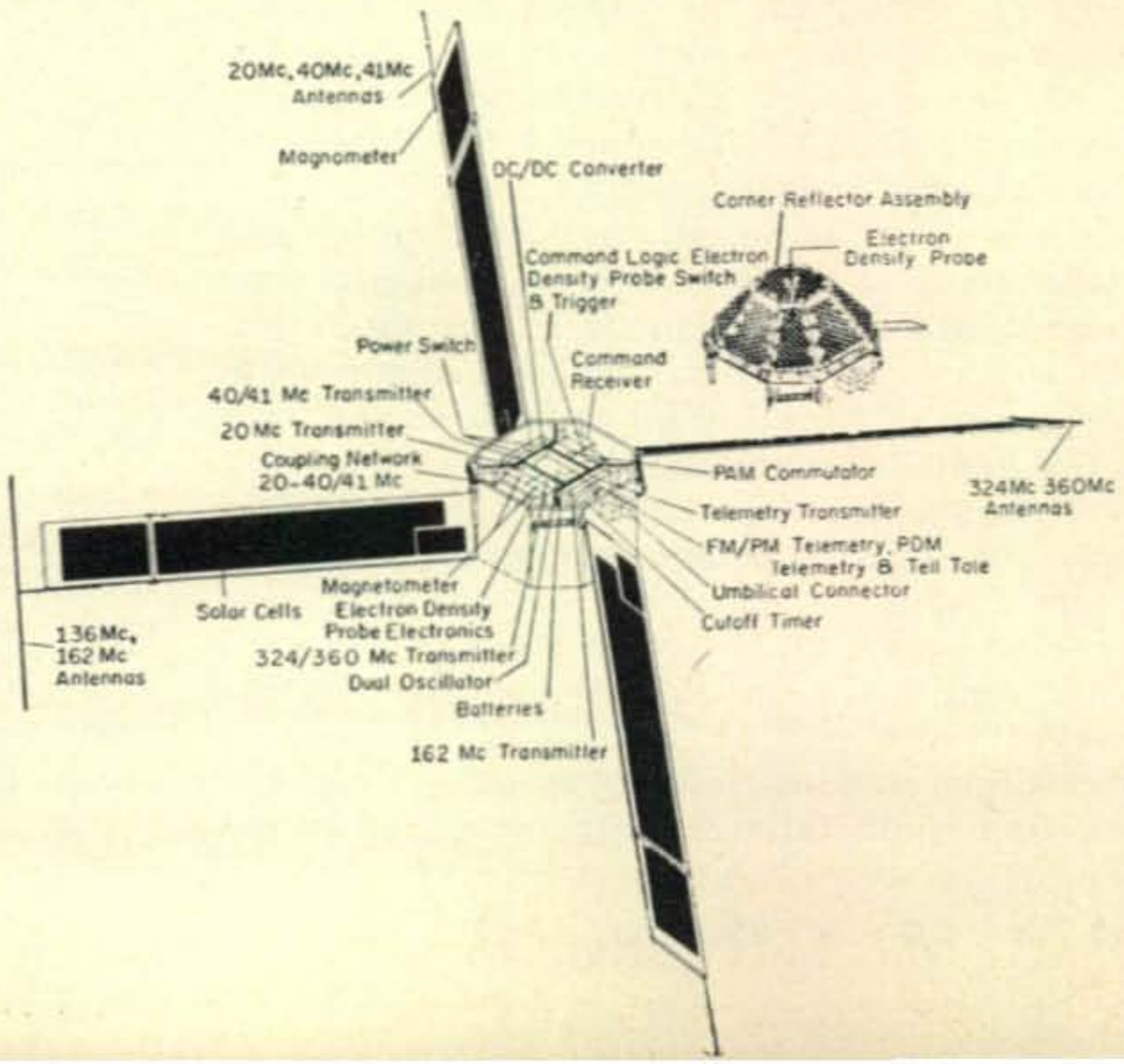


Fig. 1—Cutaway view of S-66 Ionospheric Beacon Satellite which NASA planned to launch during late September. The satellite will radiate signals on seven frequencies for ionospheric investigation. The relatively simple receiving equipment necessary for measuring signal strength, Doppler shift and Faraday rotation make this program a natural for amateur radio participation. *(Official NASA Photo).*

General Assembly last December recommended that the conference consider those aspects of space communication in which international cooperation will be required. More recently the UN Economic and Social Council stressed the importance of the conference with reference to peaceful uses of outer space and urged all member-nations to participate.

None of the U.S. frequency proposals deal with bands allocated to radio amateurs. Amateur radio is an *experimental* service, and space communication projects planned by radio amateurs, such as OSCAR, will take place in bands already allocated to amateur radio on a world-wide basis. For these reasons, it seems unlikely that radio amateur frequency bands will come up for much discussion at the conference. The results of the conference, however, will be of considerable interest to "space-listeners," since the frequency bands that will be used on all future satellites and space probes will be decided in Geneva during the next few weeks. These results will be reported in this column as soon as they are known.

S-66 Ionosphere Satellite

If all goes according to plan, by the time this appears in print, America's S-66 research satellite should be probing the secrets of the ionosphere. Scheduled to be launched during late September from the Pacific Missile Range (Point Arguello, California), S-66 will be to long-distant communications what the TIROS satellite is to weather. Surveying the ionosphere on a global basis, S-66 is expected to send back to earth data for predicting radio propagation conditions and for charting the ionosphere and radio storms in much the same manner that data from TIROS satellites are used for world-wide weather forecasting. As radio amateurs know from first-hand experience, the ionosphere is subject to as rapid, and sometimes as dramatic, changes as the weather.

The ionosphere is a region of electrically charged gases beginning about 35 miles above the surface of the earth and extending hundreds of miles into space. The electrification in this region is responsible for bending high frequency radio signals back to earth over great distances.

The ionosphere is believed to be produced by ultraviolet and X-rays emitted from the sun. The degree of electrification varies hourly, daily, seasonally, geographically and over an 11-year cycle related to sunspots. Often violent electronic storms, believed to originate on the sun, cause the ionosphere to "break-up", or disappear in some areas of the world for periods ranging from a few hours to several days. During such storms, high frequency radio communication becomes very difficult to maintain, or may black out entirely.

During the past 40 years the nature of the ionosphere has been studied extensively by the use of radio pulsing techniques. Ionospheric measuring stations, located at more than 100 different points throughout the world, probe the ionosphere with sweep-frequency radio pulses every hour, or more frequently. With the advent of the space age, sounding rockets and such satellites as EXPLORER VIII, ARIEL I, and ALOUETTE have studied the ionosphere in greater detail. Although much is known presently about the ionosphere, it seems, in fact, that new puzzles sprout for each one that is solved. S-66, or the Ionospheric Beacon Satellite, as it is officially called, represents a new and more advanced assault upon the complexities of the ionosphere on a global basis. The satellite's primary objective will be to conduct measurements which will allow scientists to plot the form and structure of the ionosphere more accurately than previously possible. It is expected that the results obtained from the S-66 project will lead to a better understanding of the relationship that exists between solar activity, the ionosphere, and long distant radio communications.

S-66 Orbit and Frequencies

NASA will attempt to place S-66 into a near circular polar orbit, inclined 80 degrees to the equator, at an altitude of about 600 miles. In such an orbit, the earth will rotate under the satellite thus permitting S-66 to view each area of the earth's ionosphere every 24 hours. The satellite is expected to have a period of 105 minutes and a radio life of about three years.

The satellite will radiate signals on the following *seven* frequencies. Passing through the ionosphere, these signals will provide ground observers with a means for measuring and comparing Doppler shifts and Faraday rotations. From such measurements, scientists will be able to deduce the structure and form of the ionosphere with great accuracy.

Freq. (mc)	*Power* (Watts)	*Purpose*
20.005	0.25	Continuous radiation of c.w. beacon for ionospheric measurements.
40.010	0.25	" " "
41.010	0.25	" " "
136.170	0.40	Continuous radiation of c.w. tracking beacon and realtime pulsed telemetry.
162.000	0.10	Continuous radiation of Doppler transmitter.
324.000	0.10	" " "
360.090	0.10	Continuous radiation of c.w. beacon for ionospheric measurements.

All signals radiated by the spacecraft are commanded on-off by ground control.

The S-66 spacecraft is octagonal-shaped and weighs about 120 pounds. Four blades covered with solar cells convert the sun's energy into electricity to recharge the satellite's nickel-cadmium batteries. Two 5-foot whip antennas and two dipole antennas extend from the opposite blades. The whip antenna for the satellite's command receiver extends from the bottom of the satellite. For more details of S-66's appearance see fig. 1.

S-66 Participation

Widespread participation in the S-66 project is anticipated since the satellite's polar orbit will

[*Continued on page 100*]

the USA-CA PROGRAM

CLIF EVANS*, K6BX

SIXTEEN USA-CA-500 and one USA-CA-1000 awards were mailed to July winners as shown below.

USA-CA HONOR ROLL

500

WØPLN 242	HK3LX 247	WA6GWM 253
K2BFU 243	K5LWL 248	K6PQY 254
W5CME 244	K6YVV 249	WA6CRN 255
W8HWX 245	K6CJF 250	HK3RQ 256
OK3EA 246	K9ZXG 251	HK7ZT 257
	K3BTT 252	

1000

W6YC 10	VE3BKL 12	K5UYF 13
WØMCX 11		W1GKJ 14

Of the sixteen USA-CA-500 awards, there were two endorsements for all phone, eight for all c.w., and six for mixed operations.

We goofed: . . . back in May issue we listed W6YC correctly as USA-CA-1000 10; we later erroneously listed W1GKJ as 10; our apologies to W1GKJ to whom we assign 14 as only corrective solution to our goof.

Seeing OK3EA on list above reminds us he just came in following Helmut, DL1QT, for CHC-200 Top Honors, and both become eligible for the Arne Trossman CHC-200 Top Honors Plaque. Harry, OK3EA, 31, doctor, pediatrician, was a s.w.l. from 1948-54, and club station operator 1950-54, getting his ticket in 1954. Yes, he's single and says his hobbies still are hunting for DX and awards.

Japan YLs Seek More Contacts

Word from Emiko Ito, JA1CFS, says Japanese YLs are highly active on 3.5 and 7 mc. She suggests that U.S. hams try calling "CQ JA/YL" especially on 7 mc. She is Custodian for the work 10 JA YLs award, YL-10, and reports sixteen have been issued to date in following sequence: WA6IVM, W6ETR, W8IEC, K4GLA, UA6LF, OH2BAD, W9KA, W1YPH, W6FGJ, HM1AP, OH6AA, HA5AM, HA5FQ, W8NAN, K6EIE and SP6FZ.

USA-CA Program and Rules

Many folks just getting introduced to the USA-CA Program or just awakening into realization of its many outlets of hamdom participation, write asking why we don't print the full details of the program more often. Appreciate the interest; however, space only permits such publication along with complete Honor Roll once a year and we have picked November as the month.

Full information covering the USA-CA Program may be obtained from K6BX for s.a.s.e. What we send are pages from the *Directory of Certificates and Awards*, and feel free to ask for literature on other *CQ* awards too.

Speaking of USA-CA Rules, we still get considerable correspondence asking how to figure out county credit for independent cities. This amazes us because the rules plainly state that you may claim any *one* county adjacent to an independent city, and such concrete words are not subject to interpretation.

The question has been raised if aeronautical-mobile contacts count for USA-CA. Absolutely . . . same as for mobile so long as the QSL card names either the county flown over at time of contact or names city or town flown over. Don't tell me some of you folks are planning aeronautical-mobile county expeditions?

Several letters have been received lately asking if Maritime Mobile contacts with ships, vessels or boats tied up at docks count for the county in which berthed. Yes . . . and let's take it even further; USA-CA recognizes the fact of international law that a ship within the 3-mile limit

Four famous DXers get mugged at the EXIT door during recent N.Z.A.R.T. Convention held "Down Under." Left to right are: ZL2AFZ, ZL2GX, ZL1APM and ZL1TB. The "Old Dominion Award" for working state of Virginia counties. See text for qualifications.

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

Can't always go by the name; here is the "Junk Hunters" certificate for working members; Ohio stations work eight and stations outside Ohio work four members. All contacts must be QSLed. No charge. Send log data and s.a.s.e. to W8IJW, Sect'y, Junk Hunters Club, 1293 Chelton Dr., Kent, Ohio. Even though you may already be just a junk hunter, when you win this certificate you become one of "the" Junk Hunters. Bonafide "Junk Hunters" are K6BX (we worked 18 of those listed) K8BRW, CEN, EUX, KKG, KTG, OPL, QLT, RSC, RUD, SEZ, VMY, YYK, ZCC, ZEV, ZGZ, ZSY; W8AJW, CHA, EFB, EPM, FKU, IJW, JZZ; WA8AYL, BBG, CAX, CYX, DRX, DKM, EEP, EMW, FRK, FZF, GBW, GED, GGP.

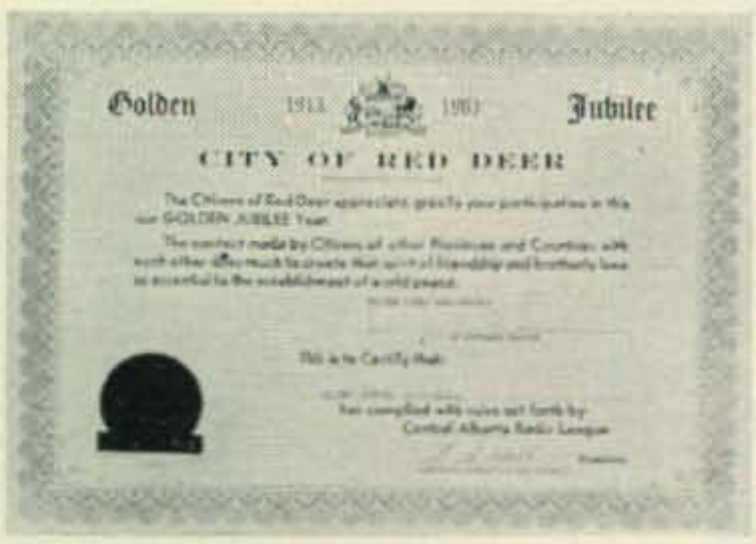
is also in territorial waters of an adjacent county.

New Bargain P.O.D. Nr. 26

As you know, we recommend the Post Office Department's Directory Nr. 26 as best source of information to determine the county QTH of any designated contact. Also, as you know, the Post Office Department has recently come out with a new ZIP number code for *all* post offices. Well . . . the P.O.D. in implementing the new program has come up with a tremendous new July, 1963 issue of P.O.D. Nr. 26, a giant size 8½ × 11" book of 572 pages weighing two pounds for the regular price of $2.50.

Besides the county identity data, this new Directory contains a wealth of cross-indexed information which should be in the library of all amateurs and s.w.l.s. Here's what it contains: (A) A list of postal delivery zone offices. (B) A list of all post offices, branch post offices, and stations arranged alphabetically by states. (C) An alphabetical list of all post offices (cities and towns) branch post offices and named stations. (D) A list of the number of post offices by classes, in each state and territory as of July 1, 1963. (E) A list of post offices by states and counties. (F) A list of Army posts, camps, and stations and Air Force bases, fields and installations. (G) A list of post offices that have been discontinued or had their names changed during the past two years. (H) A list of ZIP (Zone Improvement Plan) Code numbers.

To get this outstanding book value, send $2.50 to the Supt. of Documents, Gov't. Printing Office, Washington, D.C. 20402, and ask for the Directory of Post Offices, catalog No. P. 1.10/4:963, July, 1963 issue. New, revised issues are available each July.



It's not too late to win the City of Red Deer Golden Jubilee Award (1963) for contacting Central Alberta Radio League members; British Columbia, Alberta and Saskatachewan work 10 members; rest of Canada, N.W.T., and U.S.A. work 5; DX, including KH6 work 3; locals work 15. C.A.R.L. Club station VE6QE counts as 2 contacts. Send copy of complete log data with verification by one other licensed amateur to E. S. Hall, VE6PZ, 5406-38 St., Red Deer, Alta., Canada. No charge.

P.O.D. 26 Good Will Program

As you know, the USA-CA Program conducts a double-barreled good-will program to assist our DX friends identify the county of contact when U.S. hams have failed to provide such information on QSL cards. One phase of the good will action is for U.S. hams to send expired and replaced P.O.D. 26 books to DXers who have indicated desire for such gifts, and second phase is the listing in this column those amateurs to whom DXers may write (send s.a.s.e.) asking help in identifying U.S. counties.

The "Old Dominion Award" for working state of Virginia counties. See text for qualifications.

Some time back we explained that each July all U.S. Post Offices are provided numbers of P.O.D. 26 depending on size of P.O. and branches served. As a normal action, the P.O. then destroys the expired copies; however, many Post Masters, when appropriately informed of the Amateur Radio P.O.D. 26 Good Will Program, are glad to make these expired copies available to responsible amateurs and clubs for purpose of sending to DXers.

Several folks have written that their Post Masters have refused to cooperate saying they had no authority to release the books. In this connection all we can say is that such decision and action is a proper responsibility of each Post Master and a matter of his interpretation of the purpose for which the books are to be used. We suggest that Post Masters not be approached by individuals as such, but rather by organized clubs. The fact remains that for every Post Master who feels he hasn't the authority to release these expired books to the Good Will Program, a dozen others cooperate. As example, in one major Texas community the Alamo YLs and the San Antonio Radio Club obtained forty expired copies of P.O.D. 26 which are now on

[*Continued on page 102*]

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

September	28-29	MARC VE/W
October	5-6	Oceania Phone
October	12-13	Oceania C.W.
October	12-14	ARRL CD C.W.
October	19-21	ARRL CD Phone
October	19-20	RSGB 7 Mc Phone
October	23-24	YL/AP C.W.
October	26-27	*CQ* WW DX Phone
November	2-3	RSGB 7 Mc C.W.
November	6-7	YL/AP Phone
November	9-11	ARRL SS
November	16-18	ARRL SS
November	16-17	RSGB 21/28 Phone
November	23-24	*CQ* WW DX C.W.
December	7-8	OK DX C.W.
December	14-16	Virginia Party

MARC VE/W

Starts: 1800 EST Saturday, September 28
Ends: 2400 EST Sunday, September 29

This is strictly a Canadian/U.S. party, a fine little contest as long as the supply of VEs hold out. The W/Ks usually run out of VE contacts the second day of the contest and activity bogs down. If the boys across the border would stir up a little more activity it would be a lot more interesting.

Rules are same as in previous years except for a slight change in the multiplier; VEØ is now considered as a separate multiplier. Better check rules in last month's CALENDAR.

This year your logs go to: Gordon H. Webster, VE2BB, 1550 Erin Place, Dorval, Quebec, Canada.

Oceania DX

Phone

Starts: 1000 GMT Saturday, October 5
Ends: 1000 GMT Sunday, October 6

C.W.

Starts: 1000 GMT Saturday, October 12
Ends: 1000 GMT Sunday, October 13

This is a joint activity by the two national amateur organizations of Australia and New Zealand, the WIA and NZART. It's the old VK/ZL contest with an expanded format for the second year.

It's the world working VK/ZL and Oceania stations on all bands. The contest is in three sections; (A) phone; (B) c.w.; and (C) *Receiving*, both c.w. and phone.

The following scoring rules apply to all stations other than VK/ZLs.

1. The usual five and six figure serial number, RS/RST report plus three figures which may begin with any number between 001 and 100 for the first contact, and increase by one for each successive contact. (A good gimmick, keeps the competition guessing).

2. For Oceania stations, each contact with a VK/ZL counts 2 points; stations in the rest of the world, 1 point.

3. For the rest of the world, each contact with a VK/ZL counts 2 points; with Oceania stations other than VK/ZL, 1 point. One contact per band with the same station is permitted.

4. The multiplier is determined by the sum of VK/ZL call areas worked on each band.

5. Logs should show in this order: date, time, in GMT, station worked, band, serial number sent and received, QSO points. Underline each new VK/ZL call area worked on all bands and use a separate log for each band.

6. Also a summary sheet to show: your call, name and address in BLOCK letters, total score by showing total points for all bands and sum of VK/ZL call areas worked on all bands. (This is not clear to me; is the final score the sum of QSO points and different VK/ZL call areas, or are the QSO points multiplied by the VK/ZL call areas? Usual procedure would indicate that the latter is correct.)

Details of your equipment and other comments are also desirable. Last but not least, sign the usual declaration that all rules and regulations have been observed.

7. Certificates will be awarded to each country and call areas in W/K, JA, SM, UA on the following basis; (a) Top scorer on all bands; (b) Top scorers on individual bands. The minimum contact requirements to be determined by prevailing conditions and activity.

There is also a listener's section for s.w.l. members. Logging is the same as indicated for transmitting stations. Log must show not only the call of the station heard but the call of the station he is working and the serial number sent by the station heard.

Overseas listeners may only log VK and ZL stations.

*14 Sherwood Road, Stamford, Conn. 06905

Your logs must be in the hands of the WIA, Federal Contest Committee, Box 638J, G.P.O., Brisbane, Australia, no later than January 19, 1964.

R.S.G.B. 7 Mc

Phone

Starts: 0001 GMT Saturday, October 19
Ends: 2359 GMT Sunday, October 20

C.W.

Starts: 0001 GMT Saturday, November 2
Ends: 2359 GMT Sunday, November 3

It's the world working the British Isles in this one. Submit your log for all your contest operation on 7 mc but select any continuous 24 hour period for scoring.

1. Contacts must be made in that portion of the 7 mc band for which the entrant is licensed. In the phone section, operation below 7050 kc is prohibited. And only one contact per station of course.

2. The usual five and six figure serial numbers, RS/RST report plus a progressive contact number starting with 001.

3. Each contact with a British Isles station counts 5 points. An additional 50 bonus points can be claimed for the first contact with each country-numeral prefix. *i.e.*, G2, G3, GB, GC3, etc., 37 in all. A further 50 bonus points can also be claimed for every ten stations worked in each call-sign series.

4. Your final score therefore will be the sum of QSO points and bonus points; no multiplier.

5. Log sheets should be columned and show in this order: date, time, in GMT, station worked, serial number sent and received, blank column, bonus points and points claimed.

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

7. Certificates will be awarded to the leading station in each overseas country and following call areas; UA, VE, VK, W/K, ZL and ZS.

There is also a listeners' section and rules and logging are the same as shown for the transmitting stations. Logs should show the station heard as well as the call of the station being worked and the serial number sent. Each British Isles country-numeral prefix heard is worth 20 points but the 50 bonus points for each ten station heard in each call-sign series is the same as for transmitting stations. Overseas s.w.l. of course only log British Isles stations.

Deadline for mailing is November 25, 1963 and your logs go to R.S.G.B. Contest Committee, New Ruskin House, Little Russell Street, London, W.C. 1, England.

YLRL Party

C.W.

Starts: 1700 GMT Wednesday, October 23
Ends: 2300 GMT Thursday, October 24

1963 CQ World Wide DX Contest

Phone

Starts: 0000 GMT Saturday, October 26.
7:00 P.M. EST Friday, October 25.
4:00 P.M. PST Friday, October 25.

Ends: 2400 GMT Sunday, October 27.
7:00 P.M. EST Sunday, October 27.
4:00 P.M. PST Sunday, October 27.

C.W.

Starts: 0000 GMT Saturday, November 23.
7:00 P.M. EST Friday, November 22.
4:00 P.M. PST Friday, November 22.

Ends: 2400 GMT Sunday, November 24.
7:00 P.M. EST Sunday, November 24.
4:00 P.M. PST Sunday, November 24.

Phone

Starts: 1700 GMT Wednesday, November 6
Ends: 2300 GMT Thursday, November 7

This is strictly a YL Party and being run in the middle of the week, while the OM is away from home. So when you fellows come home after a hard day at the office and find no supper on the table you'll know the reason why. On second thought maybe you had better eat out that night.

Check Louisa's column on page 68 for the details.

Ed. Note

Seems we just put last year's contest to bed and here we have another one on our hands.

The work of the harassed Committee would be greatly reduced if you fellows were a little more careful with your log keeping.

Unscored logs are no longer acceptable and will be used only as check logs.

Keeping an accurate log is as much an obligation as working the DX. It's the contestant's responsibility to check his log for duplicate contacts and country/zone multipliers. Hereafter a high percentage of duplicates will be deemed sufficient cause for disqualification.

A few minutes work by each entry will add up to countless hours of savings for the poor overworked Committee.

It is not necessary to recopy your log. A good clean carbon of the original is acceptable, as long as it has been corrected and duplicates and etc. have been crossed out. As a matter of fact we would rather receive a log in its original form; makes it easier to check the other guy's duplicates.

There is still time to get log forms from *CQ*. A large addressed envelope with sufficient postage, please! Air Mail if they are needed for the phone contest.

Was just notified by the Potomac Valley Radio Club that they will donate the Trophy for the highest c.w. score on a single band. Thanks fellows. Wanna bet that one of their members wins it.

Good luck, see you in the pile-ups.

73 for now, Frank, W1WY

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

THE day will surely come when a.m. will *only* be heard on u.h.f. and v.h.f., for s.s.b. and c.w. will be the predominant modes on the h.f. bands. This is understandable when it is realized that a properly performing s.s.b. rig puts out a signal which occupies only one-half the frequency spectrum space that an a.m. signal does.

The answer to the QRM problem in the phone portion of the hambands is not entirely the use of s.s.b. However, if all hams use only the power required for a QSO (local or DX) and s.s.b., you can bet that operating will be more enjoyable for everyone.

But we will continue to have our "die-hard" a.m.'ers who with their kw's will use 6 instead of 3 kc of frequency spectrum and contribute to the ear-splitting bedlam we now have.

Use only the power needed for a solid QSO, and if you are not already using s.s.b., plan on it, you will sooner or later . . . more than likely sooner!

SSB Signal Analysis

Some of us who are partial to SSB are not always lily white when it comes to putting out a proper signal. Some of the s.s.b. signals heard on the hambands are truly atrocious! Full of distortion, bad sideband and carrier suppression, *etc.*, these bad signals are, in some cases, worse than those delivered by an overmodulated a.m. rig!

The analysis of s.s.b. signals in the usual ham station consists of a receiver check for carrier and unwanted sideband suppression and distortion. These checks are not quantitative but rather qualitative in scope. They are all right as far as they go, but the ham who wants to put out the best signal that he can realizes that other in-station checks and rig adjustments are necessary.

Two-Tone Tests

The newcomer to s.s.b. hears that the best test he can make to determine the performance of his rig is the "two-tone" test. For this he needs an oscilloscope connected to the rig's final, either one or two a.f. oscillators and a vacuum tube voltmeter.

To check his filter type rig he merely feeds the two a.f. signals of equal amplitude into the speech amplifier, couples the transmitter to a good dummy load, adjusts the scope to obtain an envelope pattern, then looks for peak flattening caused by excessive drive or insufficient antenna coupling or poor driver stage regulation. He also checks for improper cross-over between envelope segments usually caused by too much final bias. He uses the v.t.v.m. to make sure that the outputs of his two a.f. oscillators are equal, or he can use it to check power output by measuring the voltage across the dummy load.

If he has only one a.f. oscillator he can inject carrier into his filter rig and obtain the same results. If a phasing rig is used he can put the set on a.m. leave the carrier balanced out and feed the a.f. oscillator into the speech amplifier.

Spectrum Analyzers

The two-tone test is fine to check linearity of the final stage of an s.s.b. transmitter, but meas-

[*Continued on page 82*]

A modern spectrum analyzer which covers from 1.5 to 64 mc. At top is panadaptor display. At bottom are tone generators and power output jacks and manual sweep control. *(Photo courtesy TMC, N. Y.)*

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

RTTY

BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

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

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

NARROW shift radioteletype is coming into widespread use these days, in particular on 80 and 20 meters. Stations actively experimenting with n.f.s.k. are: W2JAV, W3TUZ, W4MGT, W5HCS, K6IBE, K8DKC, WØDKN, among others. In last month's RTTY Column we ran down some of the reasons for using narrow shift. We also described in detail the W2JAV transistorized narrow shift terminal unit.

The W2JAV n.f.s.k. TU is of the discriminator-audio-type, centered on 2125 cycles. For the more or less amateur standard of 170 cycle shift, *mark* is 2040 cycles and *space* is 2210 cycles. As we said last month, you just don't run your receiver directly into this TU. The limiters would act as harmonic generators, giving false responses from sub-multiples of frequencies within the basic 300 cycle band-pass. The solution, of course, is to use a band-pass input filter centered on 2125 cycles.

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

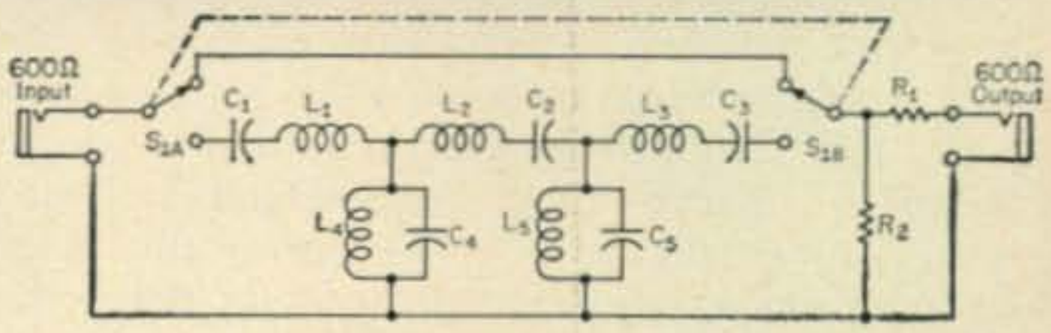


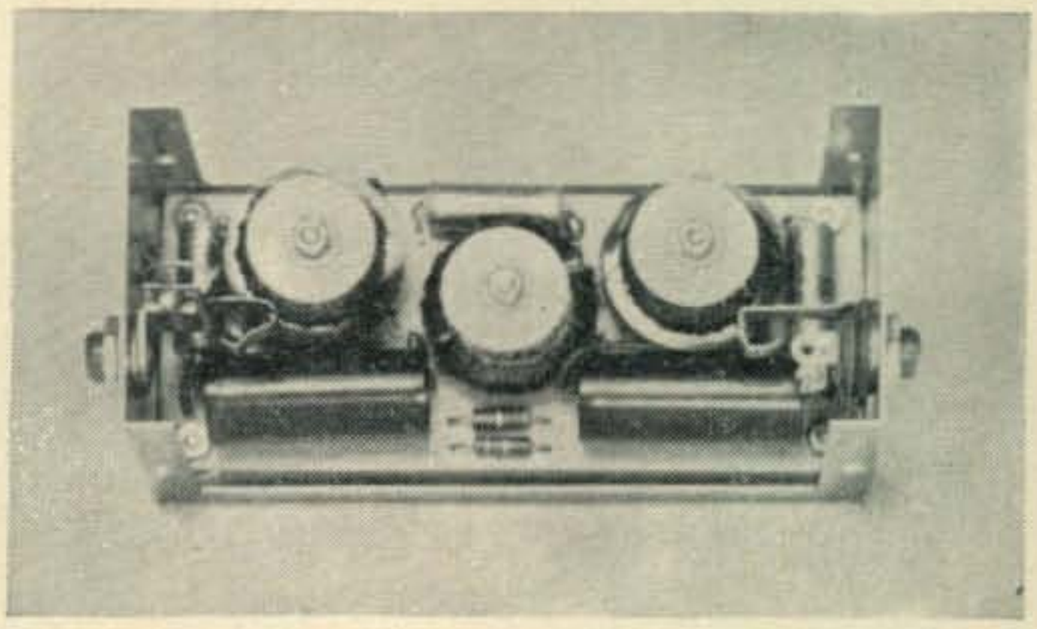
Fig. 1—Band-pass input filter schematic diagram.

C_1, C_2, C_3—0.068 mf 100 volt.
C_4, C_5—1.0 mf 100 volt.
L_1, L_2, L_3—88 mh telephone loading coil.
L_4, L_5—5.5 mh toroidal coil.
R_1—240 ohm ½ watt 5%.
R_2—1200 ohm ½ watt 5%.
S_1—Double pole double throw slide switch.

A Band-pass Input Filter for Narrow Shift

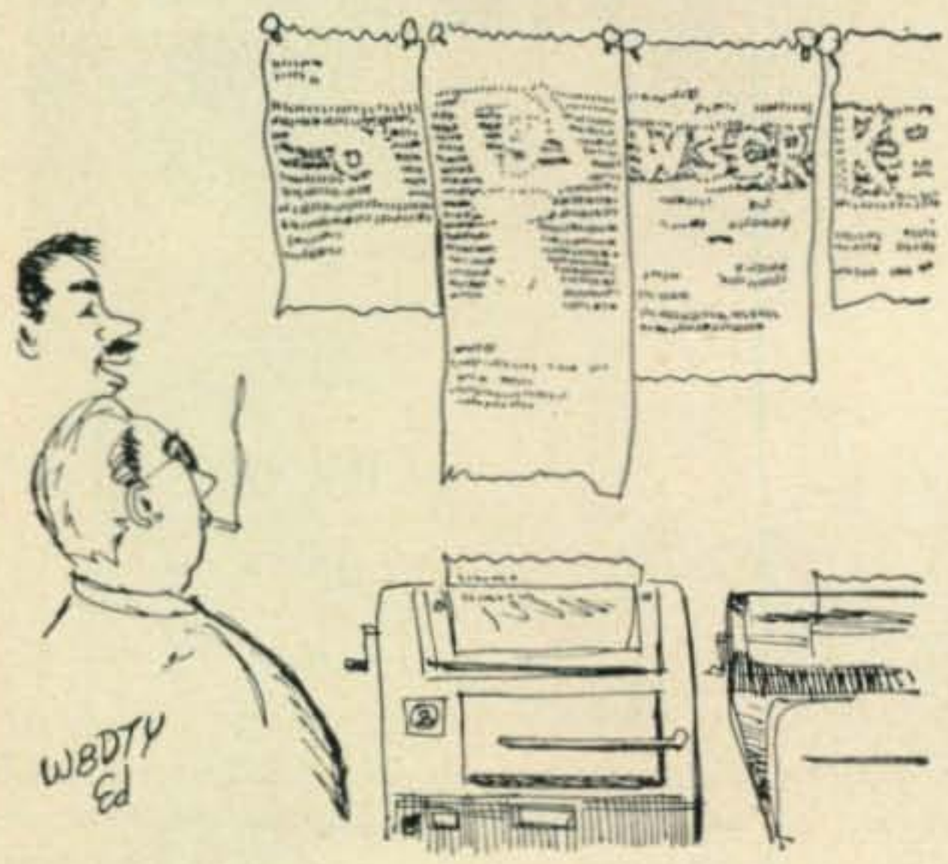
A band-pass input filter for narrow shift is not quite as easy to design as one for the standard 850 cycle shift. (*The New RTTY Handbook*, page 165) The big problem is to get the ½-frequency response down as far as possible. Naturally, such a filter is bound to be a bit more complex. Secondly, it is realized that most amateur RTTY stations do not have a ready supply of custom-wound toroidal coils. Therefore such a filter should use components obtainable by the ham easily and at low cost.

Figure 1 is the schematic diagram of a narrow shift input filter designed by W2JAV. Its components are readily available. The capacitors are standard values which can be bought over the



W2JAV Band-pass Input Filter for Narrow Shift.

RTTY The Hard Way...No. 24



"QSLs sure have changed!"

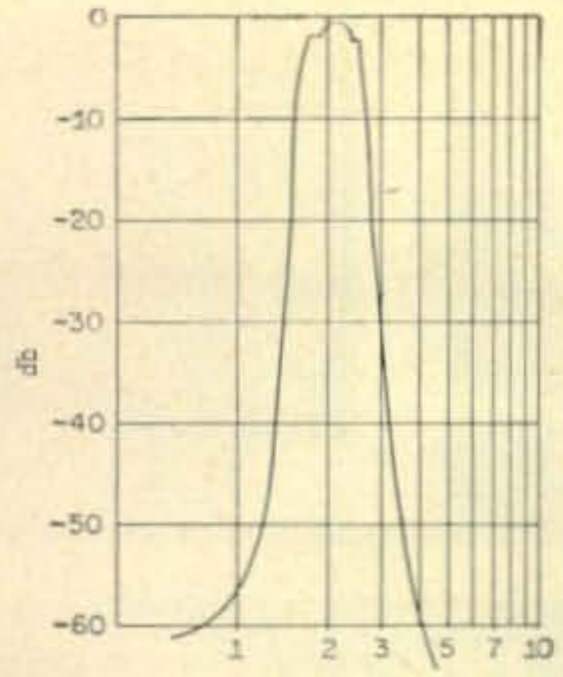


Fig. 2—Frequency response curve for input filter.

counter. Three of the five toroidal coils are the usual 88 mh telephone loading coils, mail-ordered from KCM Products, Box 88, Milwaukee 13, Wisconsin, for $1 each, postpaid.

The 5.5 mh toroidal coils are unusual, but *9 mh* coils are available from Cortlandt Electronics, Inc., 88 Cortlandt Street, New York 7, N.Y. for $1 each, postpaid. These are quickly adjusted to 5.5 mh by unwinding about 48 inches of wire; a 5-minute job.

Performance

Figure 2 shows the frequency response curve of the W2JAV narrow shift band-pass input filter. The band-pass is 800 cycles, insertion loss 1.5 db (plus 3.5 db for the pad), and the 60 db down points are 800 cycles and 3900 cycles. Phil would like to emphasize that this minimal complex design is not finalized. He is not too happy with its response, especially at the top, and the ½-frequency response is not attenuated as far as he would like. So, at some future time we can expect an improved filter design from Phil.

By the way, if you have any questions on the narrow shift TU described last month, or on the filter described above, Phil would appreciate it if you would write to your RTTY Editor instead of directly to him. And, if you are looking for n.f.s.k. signals to copy, try GBY on 20,266 kc, GGS on 7430 kc, and "Whitehall" on about 7.6 mc.

Narrow Shift A.F.S.K.

The transistorized a.f.s.k. oscillator of W2JAV, described in the RTTY Column (*CQ*, March and May '62) can be modified for narrow shift by simply changing the values of the tuning capacitors. About 0.01 mf is added to the *space* channel to put it on 2210 cycles and about 0.025 mf is added to the *mark* channel to put it on 2040 cycles. While little use has been made (so far) of narrow a.f.s.k. on v.h.f., the W2JAV transistorized oscillator is extremely useful as a test device, as described last month, and for internal local audio loop purposes such as detailed in Chapter 5.2 of *The New RTTY Handbook*.

On The Bauds

K1OYB/WB2DQF reports considerable interest in the Portland, Maine, area, with TU's under construction by K1RSA, K1MTJ, K1RQE, and K1OYB. Marty also reports that machines are in short supply at reasonable prices up there, although many are being hoarded in garages, attics, and cellars. Old timer W1EFF of Gray, Maine, is still firing the younger generation with his demonstrations of RTTY.

K2YGL of New Hyde Park, N.Y., is on 80. W2ZKV of Elmhurst, N.Y. has several Model 26's for sale at $60 each. W3KNK of Harrisburg, Pa., has a batch of Model 26 spare parts for sale. W3MHD of Pittsburgh, Pa., had a lightning storm cause a short and fire in his v.f.o.

WA4OCY, ex-W3DTH, is now in Huntsville, Alabama, and has been re-appointed OBS in the Alabama Section. ARRL bulletins will be sent Thursday at 0200 GMT (Wednesday evening) on 146.70 a.m. and on 52.60 f.m. from Van's mountain-top location. W4BLD of Waynesboro, Va., reports that his v.h.f. repeater station is operable on 52.60 f.m. RTTY as well as 52.525 f.m. phone.

NCARTS demonstrated RTTY at the Greater Bay Area Hamfest (San Francisco) in September. K6DPQ of San Pablo, Calif., is building the W2JTP Fork Standard. W6NTK of Oakhurst, Calif., reports chatting with YV1EM of Venezuela while W6CQK visited down there. W7MEU of Seattle, Wash., has a Model 15 for sale at $75. K8WTE of Alliance, Ohio, finally got his Model 15 "brown foxing." W9QKE reports the formation of the Illiana Teleprinter Society, covering the south side of Chicago and northwest Indiana. W9HXW is President. Meetings are held the 2nd Tuesday of each month at Avalon Park, 1215 E. 83rd Street, Chicago. WØEGA of Sioux City, Iowa, is looking for a "MITE" printer, like described in the May '61 RTTY Column. [*ha—so am I, Bill!*]

YV5VW of Caracas, Venezuela, was heard on 20. HZ1AB, XV1EM, DL5LM, and GM3GNR were all worked by K8DKC.

Comments

Most of you are aware of all the comments being made on the bands and in amateur radio publications about incentive licensing, proper band utilization, using minimum power, *etc.* Well, we have been noticing frequently "cross-town" QSO's on the h.f. bands in areas far distant from New York, using needlessly hundreds of excess watts. This obviously does not go unnoticed, and certainly does not endear those stations with the rest of the RTTY gang.

As recommended by the May 3, 1963 Resolution of the Board of Directors of the ARRL, we are urged . . . "4. To expand the use of v.h.f. for local contacts wherever possible, with the ultimate aim of conducting all short-distance communication in this portion of the spectrum." Retired police and taxi f.m. transmitter-receiver sets are now available in large quantities to amateurs at low prices (around $20 to $60). Why not latch on to these and use *them* for cross-town QSO's on 6 or 2 meters? See page 74 of August '63 *CQ* and page 36 of the July '63 *CQ* for further information. 73, Byron, W2JTP

YL

LOUISA B. SANDO*, W5RZJ

CONGRATULATIONS to the Don Price family of Chicago, all six of whom share their ham radio hobby! It began in '58 when Don received the call K9PDT. In July '59 YF Diane became K9TRP, and two weeks later Donita, Gerry and Jim became Novices with the calls KN9TVN, TVO and TVP. Donita dropped the N when she passed General on her 16th birthday, Sept. 14, 1960. Jim and Gerry came up with Generals in the spring of '63, at the same time Alan became WN9IAN.

The home station consists of an HT-32, SX-117 and Johnson Viking Thunderbolt linear, with cubical quad for 10, 15 & 20. With so many hams in the family one wonders how they all get a chance at the rig. Diane has daytime hours five days a week, the rest share weekends and evenings, with Alan having his own rig on 40 & 80. Don and Donita also share a mobile rig going to and from work. Both work for Hallicrafters, Don as an engineer in quality control and Donita as a stenographer. She, by the way, was chosen Hallicrafters "Space Maid" for 1963.

Don and Diane are active in CD work. K9TRP likes DX (DXCC on phone) and certificate hunting (has nearly 50, is CHC #634 and member of CHC Chaps. 4 & 17). She is a past president of LARK and is secretary for Chicago Area Radio Club Council. Donita's main interest has been working the Armed Services bases all over the world. Don does all the building/servicing. Both Donita and Jim have been playing the Hammond organ for about six years, but other family hobbies have fallen by the wayside in preference for ham radio.

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

The all-ham Price family of Chicago. L. to r., standing: Alan, age 13, WN9IAN; Don, K9PDT; Diane, K9TRP; Jim 16, K9TVP; Gerry 15, K9TVO; seated: Donita 19, K9TVN.

Powder Puff Derby radio net crew at Bakersfield, Calif. takeoff, l. to r., standing: W6QGX, Harryette, chairman; WB6AST, Isabell; seated: K6RLR, Jane, and WA6WFZ, Susan, jr. YL of W6QGX.

24th YLRL Anniversary Party

Here it comes again—the most popular contest among the YLs — YLRL's Anniversary Party. Get the dates down on your calendar: C.W.—Oct. 23-24; Phone—Nov. 6-7. Rules in the accompanying box. About the only change is an addition clarifying what constitutes low power on s.s.b.

17th AWTAR

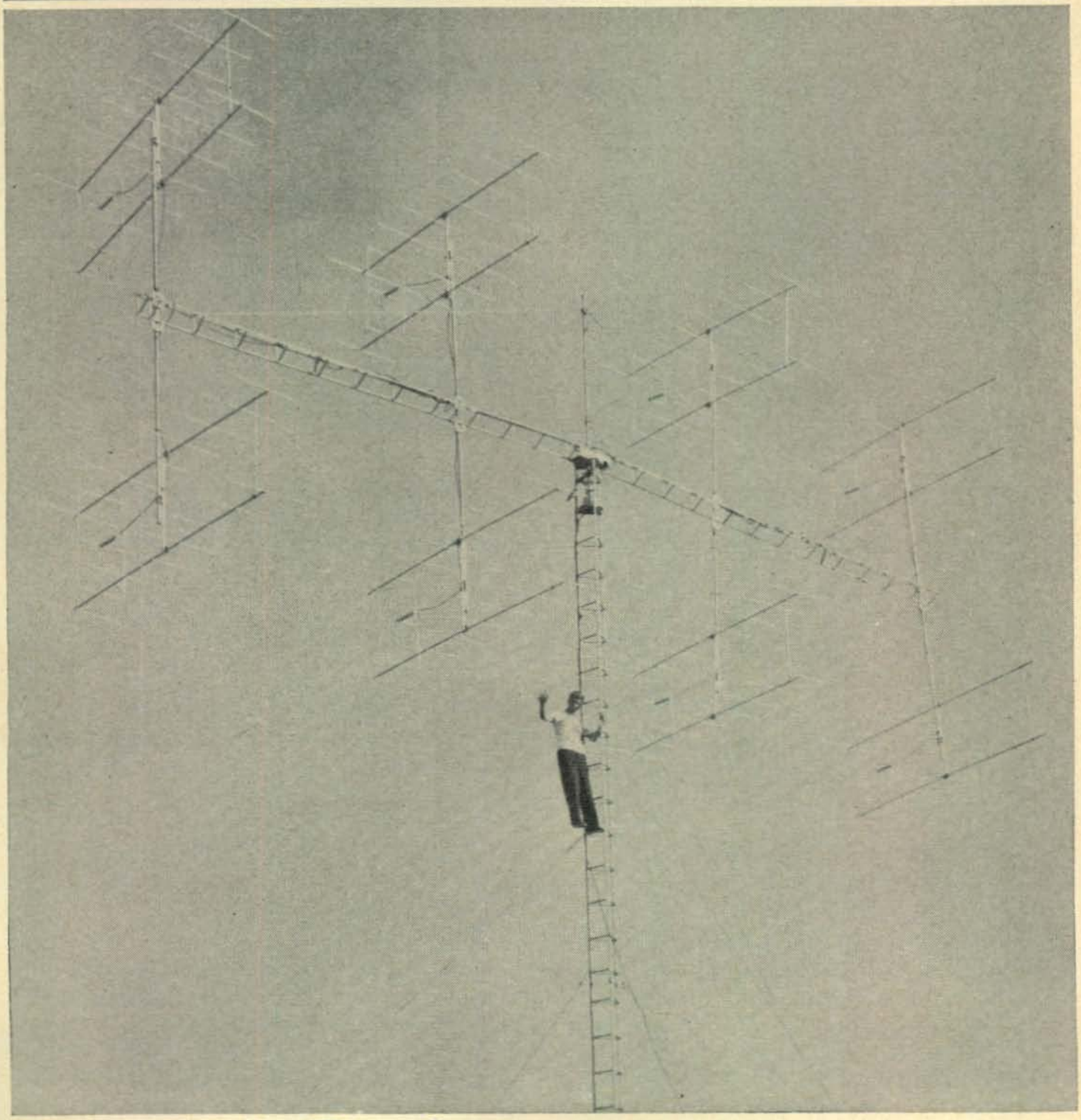
The 17th AWTAR took off from Bakersfield, Calif. on July 13 with these YLs handling the communications net: W6QGX, Harryette, chairman; WB6AST, Isabell; K6RLR, Jane; WA6WFZ, Susan. WB6AST worked through the week preceding the Derby handling communications between the airport and hotel where the contestants stayed, and helped log the cross-country net. K6RLR, a newly licensed private pilot, flew from Chico in her Cessna 140 to assist with the net. WA6WFZ helped especially on the 2-meter net from the field for take-off times. K6KCI, Irma, assisted with 20-meter skeds.

[*Continued on page 105*]

VHF AMATEUR

Vol. 5, No. 10—October, 1963

BOB BROWN, K2ZSQ, Editor



In This Issue

Departments

Features

Cover Photo: VHF Sideband Editor Bob Heil, K9EID, at his 2 meter 128 element Gain, Inc., "J" beam installation.

Address all correspondence to: Bob Brown, K2ZSQ, Editor, *The VHF Amateur*, 300 W. 43rd St., New York, N.Y. 10036.

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For further information, check number 30, on page 110

Editorial . . .

Poor Relations

IT MAY WELL BE JUST a matter of locale, but lately it seems as if we amateurs in the New York City metropolitan area have been getting a lot of just plain "bad press." As in most sections of the country, this region is served by a great many newspapers, both daily and weekly, which more or less convey the temperment of the moment in black and white to millions of residents. During the past summer months, however, amateur radio and the VHF enthusiast especially have been the whipping boy of many ill-informed journalists. Public relations is an integral part of our hobby, and its maintenance requires skill, understanding, patience and just a bit of old-fashioned diplomacy to be kept in smooth running order.

What do we care what John Q. Public thinks? Plenty. *Amateur radio exists because of the service it renders.* But to read the recent newspaper accounts reaching this office, you wouldn't have the first idea how we ever got licensed. Its really no wonder the average American citizen sometimes feels perplexed when the ham comes on the scene—a sort of mixture of skepticism and wonderment. You certainly can't blame him, though. Most of what he knows about the radio amateur is what he reads in the papers. And it is that skepticism mentioned earlier that we're concerned with at the moment. Amateurs (three papers specifically noted *6 meter* amateurs) seem today to be better known for their arrogance and TVI generation than for their knowledge and services. Cases cited in print are admittedly a bit dramatic and perhaps highly exaggerated, but they certainly get their point across: the 50 mc operator causes TVI.

I recently wandered into a radio-TV repair shop in Linden, New Jersey, with a few 2 meter friends. We wanted to purchase two tubes to replenish those lost in the results of a not too successful attempt to get on 220 mc. While I was waiting to be attended to, a stack of literature caught my eye. Being one of those odd individuals who reads everything he gets his hands on, I picked one sheet and proceeded to get the shock of my life. This was a professionally reprinted article that originally appeared in a well-known Newark, New Jersey, newspaper concerning TVI. It must have taken three-quarters of a page in the paper when it ran. The writer of this masterpiece apparently didn't get a byline, but the printed word spoke for itself. Here was an article citing individual cases of amateur-caused TVI! At least a dozen examples were presented in a rather sarcastic tone of the "scientific American amateur radio operators who come blaring through television sets from Netcong to Hoboken in total disregard of the viewer." The writer went on to explain about the high power levels amateurs are allowed to employ and then made a juicy comparison by pointing out that the newly formed Citizens Radio Service with its 5 watt power limitation seems to accomplish just as much without bringing about TVI. When the proprietor finally got around to waiting on me, I asked him where he got these article reprints. I was told they were furnished free of charge to all the local shops by the friendly neighborhood Citizens Band Club. And he had others to show me, ones he had clipped out of the newspapers for display purposes. This kind of public relations we can well do without. And this is only one example.

6 Meter Influence

In an area so densely populated as this one, cases of 6 meter TVI (generally front-end overload of Channel 2) have never been uncommon, but neither has the amateur's gentlemanly attitude toward the matter. There probably isn't one 6 meter operator in the country who hasn't experienced at least one case of TVI. But this has never been a stumbling block to the serious enthusiast because he has taken upon himself to clear it up in a friendly manner.

Unfortunately, however, the many thousands of cases of good neighborly relationships never make the *Daily Bugle*. What does hit the papers is staggering. "I'll bet we're giving them the devil on Channel 2 tonight," and "You'll just have to ignore them, Hank, if you want to enjoy six," made page two in a mass circulation daily this summer. "Let them call the FCC for all the good it'll do them," reached into a Connecticut weekly. An entire county (says the reporter) heard "CQ Channel 2 Gunsmoke fans" one Saturday night. Need we go on?

As unbelievable as they may sound, these messages appeared in black and white not long ago for the edification of the city dweller and suburbanite alike. "News" they call it and news it must be. Far from the "local radio amateur makes good" stories of yesteryear, eh? Regardless of their frequency, each and every one of these reports strikes another blow into the amateur radio we know today. And there's bound to be *some* truth in them however biased they may appear to be.

Little wonder our low frequency brothers scoff occasionally when someone suggests they try VHF. Look what they've got waiting for them! The 6 meter operator may be just a small part of the entire amateur picture in this country, but he has certainly made his mark in one way or another. And his impact is felt by every ham who can read a newspaper. I've heard many old timers tell me that they feel the average 6 or 2 meter operator isn't far removed from a CB'er. But we know better . . . or do we? Are you proud of conditions as they stand today? Would you like your neighbors to hear some of the things we hear on six?

Perhaps what is lacking here is realization.

[*Continued on page 79*]

Letters to the Editor

Mail your letters to: Bob Brown, K2ZSQ, Editor, The VHF Amateur, *300 W. 43rd St., New York, N.Y.*

5¾ Meters

Hi Bob:

The VHF Amateur is missing the boat if all of us do not pull together. You do not know, nor can anyone not associated with commercial two-way radio, what danger the upper half of six meters is in right now. How about a campaign to "Use it before we lose it?" This portion, often called the 5¾ meter f.m. band, is the only band where we can utilize obsolescent commercial gear, and the cost is miniscule compared to that of complex s.s.b. and other glorified modes of operation.

I'm interested in corresponding with those interested in forming a 5¾ meter net with two frequencies of operation, 53.820 and 53.964 mc. Those who lack a used receiver can utilize an existing standard 88 mc f.m. set with little or no conversion, or a Dumont RA-103 TV which covers Channel 1 (6 meters) through 220 mc. Even today's TV's can be detuned sufficiently to cover six meter f.m. The f.m. dollar buys more by about 700% today.

So let's see a new leaf in VHF—perhaps an added column—eventually encompassing 5¾ meter f.m. operations!

Gene Mick, W3ZWR
515 Buxmont
Philadelphia, Pa. 19116

We, too, would like to hear from fellows interested in this little-known aspect of VHF'ing! If enough interest is generated, we'll do our part by presenting modification articles.—ED.

C.W. VHF Contest

Dear Bob:

A c.w. VHF contest? Marvelous! Some of us here have been stirring up activity by working c.w. on six meters. Just talked to some other hams—You have their support, too.

Carol Hoke, WA4LRP
Conover, North Carolina

Carol, so far we've only received three cards favoring the c.w. contest. We're going to need more response than that if this is to get off the ground! More comments invited.—ED.

Transceiver

K2ZSQ:

I would like to see a construction article about a simple, inexpensive 6 meter transceiver in *The VHF Amateur*. How about it, OM?

Richard Polson, WB6EBO
Fresno, California

So would we, Dick! Prospective authors please note: we pay cash plus a subscription for articles published. Write today.—ED.

Citizens Band

Dear Bob:

As one listens to CB during times of skip, it will be realized the extent of its separation over and above its original concept. The monster has reached such proportions that corrective measures are difficult, but remedial procedures of a beneficial nature seem possible.

It's not necessary to go into the details concerning the situation about which you, as Editor, must be fully aware. Therefore, in a small and singular manner, one might follow a procedure similar to one which has just terminated in a satisfactory way.

The case: About two years ago the 15-year-old son of a local business man through his father's influence, name, etc., secured a CB license and, of course, purchased equipment. His operations were considered reasonable, if not wholly unnecessary.

My influence, somewhat as an experiment, encouraged

[*Continued on page 79*]

Santo Domingo on Six!

HAROLD LUND, VP7CX
RCA San Salvador AAFB
P.O. Box 4187
Patrick AFB, Florida

MANY TIMES DURING RECENT MONTHS I have been asked why there isn't more six meter activity in the Caribbean area. With the exceptions of FG7XT, VP5BB, a few Cuban stations, and many Puerto Rican stations, there has not been much activity to speak of. Some of the openings to this area have been exceptionally good and the lack of activity was the only reason that new countries haven't been added to many logbooks this year.

When I discovered that my vacation time was piling up and would have to be taken soon or lost, I decided to try to give some of the fellows a new country on six.

During a 15 meter QSO with Max, HI8MMN, I learned that it was possible for an American citizen to be issued a license in the Dominican Republic. As Santo Domingo has long been a vacation favorite of my co-workers on the Atlantic Missile Range, the decision of where to go was not hard to make.

Ed Clegg, W2LOY, offered to make available a new Clegg Thor 6 transceiver for the trip. This proved to be an excellent choice of equipment as the maximum power allowed on six meters in the Dominican Republic is 50 watts. A three element portable beam was selected as a compromise between size and efficiency. This also turned out to be quite adequate for the trip.

I left San Salvador by military aircraft on Friday, June 21, 1963. I spent that night in San Juan, Puerto Rico. While in San Juan, I called Felix, KP4CK, and asked him to have the San Juan gang watch for me. About noon I caught an airliner to Santo Domingo and arrived there about 3 PM. As it was a weekend, I was forced to leave the equipment with Customs and wait until Monday before applying for a license. I took advantage of this opportunity to enjoy some delicious food and see some of the many interesting sights around Santo Domingo.

Sunday evening I visited Dave Packard,

Here's a shot of HI8MMN, son of the Director General of Telecommunications in the Dominican Republic, operating HI8XHL in July. Rig was a Clegg Thor 6 transceiver.

View from the antenna site atop the Hotel Embajador looking toward the north. Though not clearly visible in this photograph, a high mountain range lies just beyond Santo Domingo.

HI8XAA, who is with the American Embassy. Another of the local American hams, Howard Shoemake, HI8XHS, also stopped in during the evening. We had a very nice visit in Dave's beautiful (but all l.f. band) ham shack.

Early Monday morning I went to the office of the Director General of Telecommunications. Señor Nanita, who is HI8MN, personally handled the application and also made arrangements to have the equipment released by customs. By that evening, I had permission to operate as HI8XHL.

Before leaving San Salvador, I had been offered the use of an apartment in Santo Domingo. One of my co-workers maintains this apartment for his vacations. Upon arrival in Santo Domingo, I set the station up there, but soon discovered that ignition noise was extremely high from a nearby thoroughfare. The line voltage regulation was also very poor and shortly after dark would drop so much the receiver would go dead.

On Tuesday morning I was at the rig bright and early. I wasn't disappointed. The band opened into the W4 call area and the rat race was on. One of the first stations worked was W5SFW.

On Wednesday and Thursday, the band was again open, mostly into the W4 call area. However, it was becoming more and more evident that the line noise was causing many QSOs to be missed. On Friday I moved into the Hotel Embajador on the outskirts of Santo Domingo. I was able to get a room on the seventh floor and arrangements were easily made to put the antenna on the roof. The hotel engineer is the president of the local radio club and he and the hotel staff were all very helpful and cooperative. The band was dead after moving and the only QSOs that day were with local stations.

Saturday, Sunday, and Monday the band was

[*Continued on page 81*]

Another VHF Amateur Exclusive:

Easy Way To 220

MICHAEL W. McKAY, W2GRS
277 Crest Drive
Tarrytown, New York

THE INTENT OF THIS ARTICLE is to describe a quick and simple surplus conversion to get you on the 220 mc band with results quite respectable out to 30 miles or so and dependent only on your antenna beyond that range. Based on alteration of the SCR-522 transmitter, it will be obvious that the scheme to be described is equally useful in the VHF ARC-5 series. Since there are probably several thousand of these venerable clunkers outstanding today in the hands of amateurs across the country, it is the writer's hope that perhaps this discussion will result in more use of a fine, though neglected band.

How It All Started

For many years a 522 transmitter had been used on the 2 meter band here with very good results. (There is a rumor prevalent among the locals that the location here was checked for altitude with an aircraft altimeter prior to purchase.) The exceptional performance of this simple gear was attributed to: 1) a 10 element, well matched array and 2) a clear line-of-sight to the horizon about 35 miles away in the direction of Philadelphia. Once in a while speculation of what life was like upstairs on UHF did occur, but being lazy, nothing was done about trying the higher bands. Then one fine day a brother ham informed me that he was selling out, going to Florida, etc. Running down a neatly typed six page list, I found a well known commercially wired 220 mc was being disposed of at 3% of ham net. Protesting the unfairness of this outrageous price, I was lucky to get away with only the converter, a 5 element yagi, and a set of tubes for the unit, and it was but a few nights later when the first 220 mc QSO was received. As I recall it was between Larry, W2NTY, and Mike, K2QWE, two fine operators and real regulars who have done much for the band in this area. I need not add that an intolerable itch developed to talk to the 10 or 12 stations in northern New Jersey and Long Island that were now received regularly in this period of nocturnal eavesdropping. But the question was how.

The Solution—Back To Fundamentals

Back issues of *CQ* were moved to the office and thoroughly searched for several days. However, the available construction articles all involved tubes not on hand or were just more bother than it appeared to be worth. The problem really solved itself one day when the filter on an old receiver dried out and all that was heard was full wave ripple, i.e. 120 cps hum. But it was double the input frequency. Could it be applied to rf? Sure, although here the scheme is called push-push doubling. At this point let it be seriously suggested that the reader dig out his *ARRL Handbook* and read up on this subject. It is all there. Really nothing new or different is being set forth here save possibly how to make this work on VHF.

So there you have it: apply push-push doubling to the final amplifier (the twin tetrode 832) and get on the 220 mc band in a hurry. Now this means that final must be excited at 110 mc. But, remembering that the 522 originally tuned 100 mc to 156 mc, this is fine. All that need be done is to supply a 6 mc crystal and tune the rig to 110 mc indicated on all dials save the last which is not used. Where to get a 6 mc rock? Well, a unit at 6112 kc was purchased from U.S. Crystals, Inc., La Brea Ave., Los Angeles, Calif. It happened I got mine while on a business trip to that area. However, any of the crystal companies advertised in *CQ* should be able to supply crystals in this range, either new or surplus. Naturally the latter are considerably cheaper. Caution: check and find out where the activity is in your neighborhood. Around New York and New Jeresey everyone seems to operate in the bottom 200 kc of the band, while in Philadelphia a common channel of 221.4 mc is used.

For those who must tinker let it be said that the 522 works like a charm delivering power on 110 mc. The one here, which barely lights a 15 watt bulb in normal fashion on 144 mc, really lit up on 110 mc because of the greater drive available.

Another caution note. If you have just rushed out and purchased a new surplus 522 transmitter *do not* alter the tuning range of any of the 4 tank circuits. Most conversions electrically bandspread these controls. If, as is done here, it is desired to occasionally use the rig on 144 mc (with an 8 mc crystal) then the full tuning range of these circuits must be retained.

Now We Have To Do Some Work

Push-push doubling involves driving the pants off the final 832 at 110 mc, strapping the plates together, and tying them to a tuned circuit resonant at 220 mc. This is where some invention was required. First, the paralleled plates double the 832 output capacity, so don't even bother with a conventional parallel tuned circuit. There just isn't any coil left to work with. But another expedient is available which is the series tuned tank. This worked and is the secret of success in this conversion.

One approach to understanding this scheme (neglecting the load for the moment) is to view the tuning capacitor, C_T, as being in series with the tube output capacity, C_o. This series combination then is adjusted to resonate with the in-

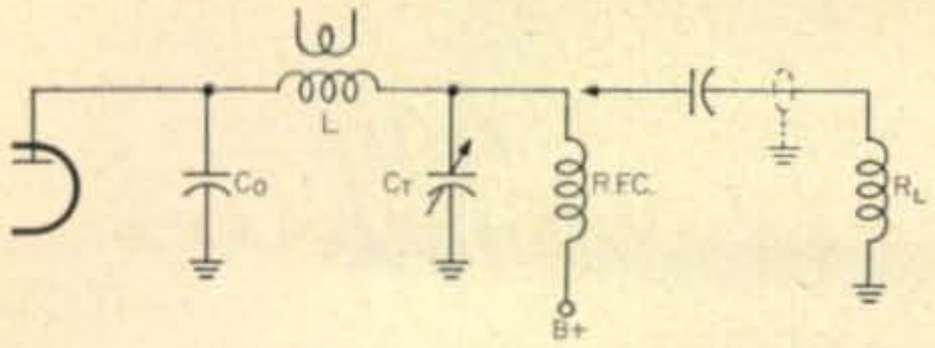


Fig. 1—Diagram of an accepted series tuned circuit suggested by the author. See text for discussion.

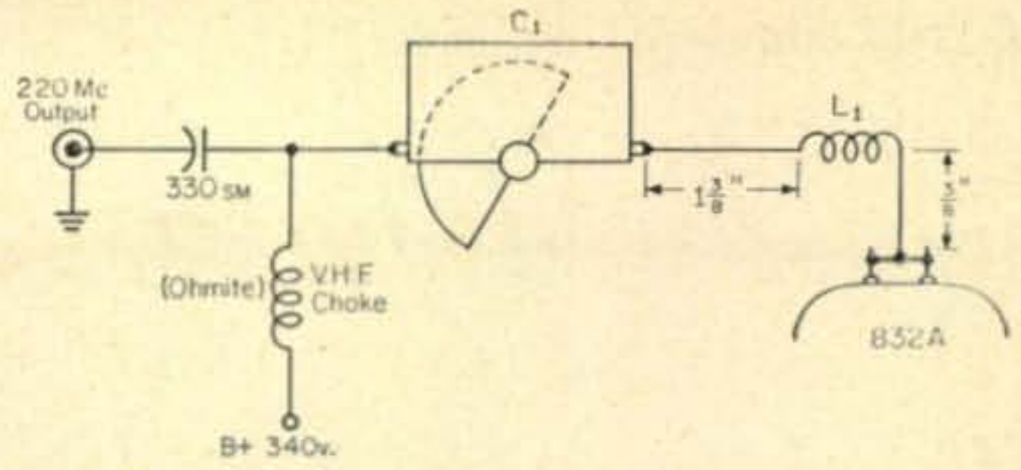


Fig. 2—Actual series tuned circuit applied by the author to his SCR-522 for operation on 220 mc. C_1 is a Cardwell capacitor cut down to a three plate variable with one rotor and two stator plates. Stator plate-to-plate spacing is 1/16". Diameter of rotor plate, 1½". Rotor is grounded. L_1 is 2 turns of tinned #18 wire ⅜" dia., spaced 1".

ductance L at the desired frequency which is 220 mc here. Since C_O in series with C_T is smaller than either capacitance alone, the result is a coil which, though small, is big enough to work even at 220 mc.

To couple a load to this arrangement, a link arrangement was tried much as shown. This was not particularly successful probably due to the stray capacity introduced by the link. Anyway this was abandoned. The similarity of the series circuit to the "Pi" network was noted and the load applied directly across the tuning capacitor. A blocking capacitor of course is required to avoid shorting out the B-plus in the grounded antenna system. The load at this station is a fairly well matched 75 ohm coaxial line (v.s.w.r. is under 1.5 to 1). It was connected exactly as shown and right off the bat 5 watts were developed at the output. This was later increased to about 8 watts.

Varying the L/C ratio seems to optimize the loading as would be expected. However, the coil dimensions indicated resulted in reasonable output so that little fiddling was done afterward. The writer prefers to operate.

In the diagram are coil dimensions, etc. which worked here with three different 832 tubes. The connection T bar to the 832 plate leads was made out of the pins from an old octal socket and a piece of wire. It should be noted that soft tinned #18 wire was used for the coil and T bar. It was not silver plated though this refinement might help.

Looking at the final amplifier plate compartment of the 522, remove the end cover plate and discard it. Detach the existing tank circuit plate leads and tie down to the butterfly capacitor so they are out of the way (remember that you may want to go on 2 meters sometime). Use electrical tape for this. Mount the new 3 plate tuning capacitor on the top of the compartment, midway between the 832 and the existing butterfly tank period. Wire in the coil, choke, and blocking capacitor to a coax fitting and the transmitter is complete.

One more operation is required and you will be on the air. The problem is simply that the push-push arrangement will in practice usually have 110 mc drive power in the output due to residual unbalance in the final amplifier. Therefore insert a T fitting in the output coax line and tie in an open ended stub which is cut to be ¼ wavelength at 110 mc. Don't forget line phase velocity factor in cutting this stub. Since it is desired to short the output at 110 mc, the stub must be open on the far end. At 220 mc the stub is effectively out of the circuit and has no effect on the desired band. Considered as a filter, the stub blocks the odd harmonics of 110 mc, i.e. 330 mc, 550 mc, etc., and passes the even orders, i.e. 220 mc, 440 mc, 660 mc, etc. Do not operate without this stub in the line. In areas where UHF TV is in use proper selection of the transmitter crystal will usually move any remaining harmonic problem out from under the TV signal.

For tuneup a Heathkit v.s.w.r. bridge is left in the line as an output indicator at all times. Insert a 6 mc crystal (6112 kc used here) and tune for max. indication on a 0-1 ma meter connected to the 522 meter pins. This procedure applies to meter switch positions 1, 2, and 5. This tunes the transmitter up to the final grids. To tune the final use the v.s.w.r. bridge. Now go back and maximize the output on the bridge by trimming the low frequency stages again. You are now set to operate.

Results are most gratifying considering the effort involved. Local range contacts are easy and beyond the horizon work is a function of your antenna. Though far from DX, this rig easily reaches down beyond Somerville, N. J., from this location (about 25 miles north of New York City.)

In conclusion the conversion outlined will get you on 220 mc with the least fuss. Although it is a cheap way and maybe a little dirty, it works. Try it, and come on a good band. ■

New Transmitting Transistors for 6 and 2!

RCA HAS RECENTLY ANNOUNCED PRODUCTION of two new VHF power transistors ideally suited to amateur VHF work, for possible use in low power transmitters, mobile units for 2 meters, etc. Two new silicon n-p-n triple diffused planar transistors, the 2N2876 and the 2N2631, are rated at 3 watts minimum *output* at 150 mc, up to 10 watts at 50 mc! The 2N2876 and 2N2631 have high voltage ratings (80 volts max. V_{CBO}, 60 volts max. V_{CEO}) are 100% tested to assure freedom from second breakdown in class A operation at maximum ratings. —WA2NDM ■

A VHF Amateur Exclusive:

The "Phaser" for Two Meters

JOHN A. FREDRICKS, K7GGJ
314 South 13th Avenue
Yakima, Washington

The author presents an easy-to-construct phase modulator that can be connected to any a.m. transmitter to achieve the same basic advantages found in frequency modulation. When the operator wishes to return to a.m., he simply turns down the gain control on the phase modulator!

MANY VHF HAMS HAVE AT ONE time or another wanted to try their hand at VHF p.m. operation. If you are one of these fellows, then take a look at this. First I would like to point out that this particular rig is not complete in itself as a transmitter, but is rather an adapter that can be added to any 2 meter rig to permit p.m. operation without impairing other modes of operation.

Now let's get on to the diagram, as can be seen in fig. 1. The crystal oscillator is nothing out of the ordinary. It is, in fact, a modified Pierce-type of oscillator. The triode half of the 6U8 is used as the phase modulator and deviation is set by capacitor *CN*. Maximum deviation will be attained at maximum capacity. No attempt to multiply in frequency should be made in either the xtal oscillator or in the phase modulator, as frequency "swing" at the resultant output frequency will be down. Frequency multiplication should take place only after the phase modulator stage.

I don't believe that much has to be said about the audio section except that deviation is also controlled by the audio gain control and you may not have to build the stage at all. You may be able to steal the audio from the speech preamp stage in the a.m. section of your rig. The reason that I built up the audio stage was so that I could go from p.m. to another mode of operation merely by turning down the gain control in the phase modulator unit.

In my 2 meter unit I simply removed the old crystal oscillator and built the p.m. unit in to the rig and now I utilize the PM osc for all modes of operation. I would also like to point out that I did not include coil specs because there will be some who will want to put this adapter on 3 mc, 6 mc, & 8 mc to multiply to 2 meters, and I also feel that anyone who constructs VHF gear has the technical ability to come up with the appropriate coils.

The resistor divider network in the control grid of the triode half of the 6U8 is called an audio correction network and performs the following function: When a phase modulator is employed, the equivalent carrier frequency "swing" is in proportion to the amplitude of the audio signal. Rises in the audio signal frequency cause further undesired phase shift in the carrier. The unwanted rise in phase shift is removed by the use of an RC network to lower the amplitude of the audio signal in proportion to the frequency increase.

In this particular circuit a deviation of ± 7 kc was attainable with the trimmer *CN* at full capacity, and the audio gain control "wide-open". I have had this adapter on for about three months with very good reports so get out the soldering iron and good luck on 2 meter p.m.! ■

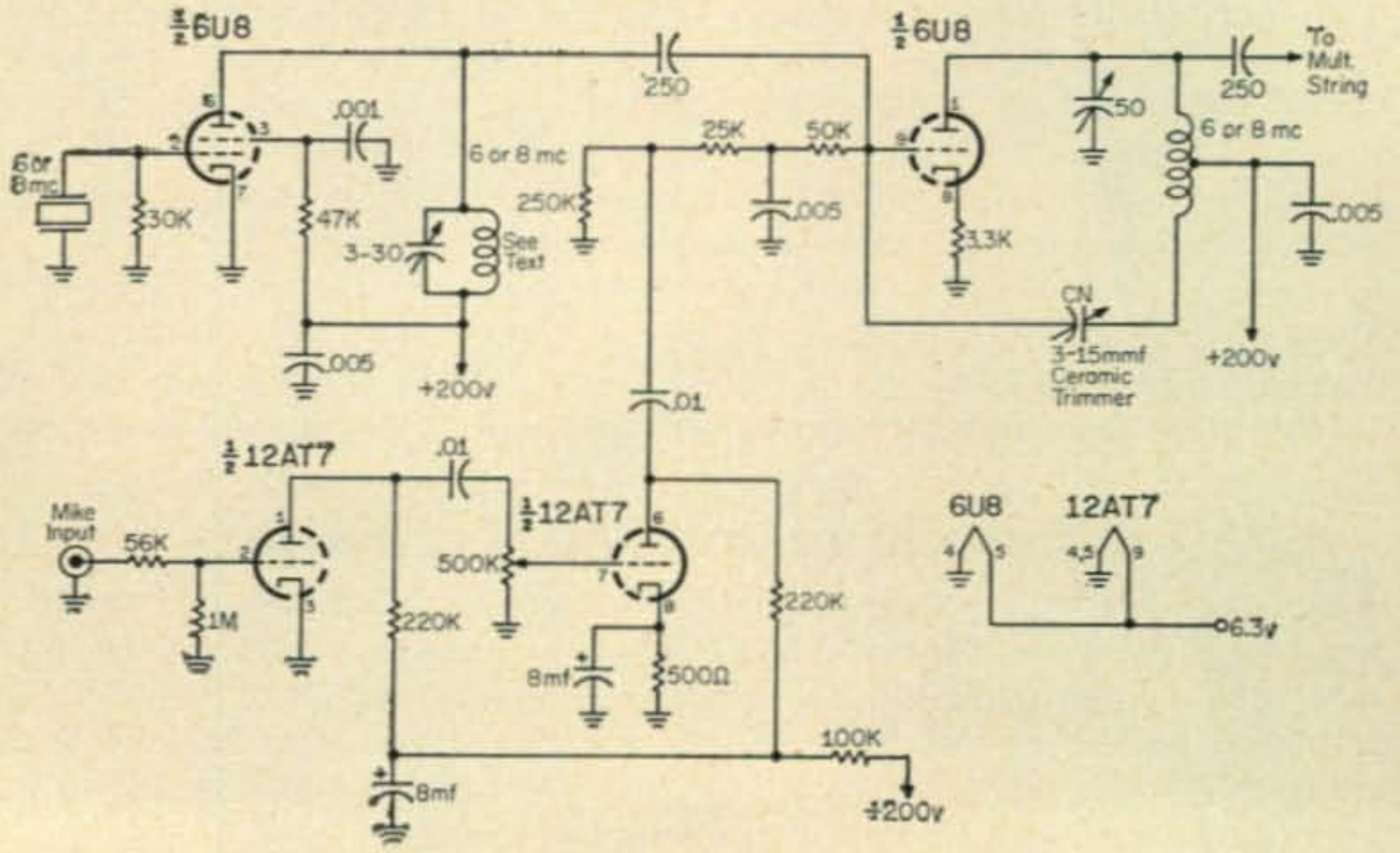


Fig. 1—Schematic of the phase modulator as constructed by the author for 2 meter operation. Coil specs are not included, as you may want to use this unit for other bands (see text). All resistors are ½ watt.

DX REPORT

an exclusive feature of The VHF Amateur

BOB BROWN, K2ZSQ*

Tuning Two

K1RTS SEZ WE OUGHT TO SEPARATE our six and two meter coverage each month because "it's very confusing, you know." So this month we have. And while we're at it we'll mention that Walt's got up a new 13 el. long-john and is hoping for the best. Are there any active 2 meter ops in Maine? If so, Walt wants a sked.

WA2DRK works K8KEQ/3 every day for a nice 145.07 mc 220 miler. Average sigs S6-7.

W1QQ is back on the air after 14 years absence and is working well into upstate New York and Canada. John wants more stations to tune 145.44 mc for him.

K9EID sez, "Been holding skeds with K7HKD and WØENC on 2 meters. HKD has 64 el. "J" antenna and really makes it to Marissa. Several good transmissions from ENC. My new 128 elements really perform!" Write Bob for skeds.

WB2CLN spends his 2 meter time working stuff like K1WVE, K1NPE, K1FRU, K1NNA, K1MIY, K1MDZ, K1WHS, W1HAD and W1BXM (187 miles). All this with just a Twoer transmitter!

KN1ETM writes that he hears W1COP but no QSOs yet. "I don't think he tunes to my 145.335 mc frequency." Bob also wants skeds, but forgot to include his QTH.

Al, WA6YOB, fills us in on the 2 meter Grizzley Peak repeater. Input freq: 146.2, output: 146.8 mc. All f.m. (will convey a.m. if you're right on freq.). Repeater runs automatically 100 watts to a vertical system. Coverage is from Sacramento to San Jose and from the West Coast to the Sierra foothills. Write Al for more details.

K1PLR was mobile on the Merrit Parkway in Connecticut but still managed a 58 goodie with K1CLL/1 in Worcester, Mass. for a nice 150 miles! "Have not been too active on ham bands lately due to YLs," adds Harry.

WA2MBT has petitioned the FCC to extend Technician coverage of two meters to 144—148 mc. Will keep you posted on developments here.

Scanning Six

VP7CX writes with loads of news from San Salvador on 50 mc. Harold reports contacts with FP8CB, VE4GI, VE4FO, FP8CG and WØGNS (state #37) during the July 13-14 weekend. Contacts with HI8XAG, K5IQL, KØWLB (states #38-39) have also been made. He adds that in spite of what gets into print these days he has 15 Kentucky QSLs so far this year. K2SQM/VE1 and VE3CUA were snagged on July 28th. FG7XT and VP5BB have also been active.

According to Harold's latest letter, PJ3AO and K4UTE will be in Anguilla and Tortola this October. They're hoping to be on six. VP7NX is very interested in getting on 50 mc. VP5BB is now on 50.060 mc thanks to xtal from 7CX. Harold also proposes a possible "adoption" system for clubs interested in sponsoring a VHF station in a rare country by contributing gear. More on this later.

K7OCG in Phoenix is mighty proud of his recent 2100 mile QSO with the boys at WA2VLR in N.J. John adds that July was a great DX month for him.

KL7AUG was worked by forty Seattle and Portland area stations during a 5½ hour session on July 30-31. Signals ran S9-plus much of the time according to W7DYD who was one of the lucky ones. KL7AUG has been snooping on six for four years and reported this opening as the best ever. Thanks, Herb, for the news!

W8KNC/Ø in Belle Fourche, S.D., sent us a lengthy letter covering July from his end. Let's suffice it to say many boys worked their first South Dakota then! K2MGZ was one mentioned. Ira operates out of Black Hills National Park at Custer Peak, 6800′ plus! Twenty-six states worked just in July.

WA4JYN is quite proud of his QSO with K3WVX (Fla. to Md.) that lasted 2 hours and 10 minutes during the solar eclipse on July 20.

WA4HXZ/4 is having a DX ball in his first weeks on six. Skip galore for Henry.

K4NEH is pleased with his July 20 skip DX which included VP9WB. Vernon sez WA4BDR is active from Kentucky.

WA9FIH has been busy working WA6AKM, K6GRJ/6, W8KNC/Ø, WAØBBI/Ø, K7EMO and VE4AE.

WB2HHT is now WA4PJT in Virginia. Steve is on 50.19 and 145.278 mc ("2 meters is pretty dead here"). Look for him.

WA2GWM floods us once again with a barrage of news contributing to his record of 794 different stations on 6 meters in 15 months. This takes into account 32 states plus VE1, VO1, CO3 and FP8. Frank needs one more Memphis "cotton picker" for their award and some skeds with Maine, Texas and Oklahoma.

WØGXJ in Cedar Rapids reports much July DX including W6ABN/6 for a nice 1000 miler.

K4LFN/6 is on 50.1 and 51.0 mc s.s.b. with 50 watts from Guadelupe, California. Skeds appreciated here also.

KØFPC writes, "Around here we are regarded as 'nuts' because we use push-to-talk and break-in in the manner of the low frequency sidebanders (which some of us are). We also operate c.w. on 50 mc and some of us even build our own equipment. Aren't we weird?" *Not to my way of thinking. Bob. Sad commentary, eh? K2ZSQ.*

WA8EWT picked up Idaho (K7YON),

[*Continued on page 79*]

*Editor, *The VHF Amateur*, 300 West 43rd St., New York, N.Y. 10036.

UHF ROUNDUP

an exclusive feature of The VHF Amateur

ALLEN KATZ, K2UYH*

IT TAKES JUST ABOUT TWO months from the time this column is put together till the time it is printed. Bob and I have tried to make this fact known, but at times it seems like a well-guarded secret. Especially when a fellow is disturbed because an important bit of news he sent in does not appear in the very next edition. Bob is doing all he can to limit this necessary delay. Most readers are probably already receiving Bob's most recent effort, the *VHF News Bulletin.* Besides these side effects sometimes suffered by our (heaven praise 'em) contributors[1] who really make this column possible, the time delay does not go unnoticed by us. It is kind of like eating an upside down cake right side up.

Columnist K2UYH observing unusual effects of his newly installed synchronous detection system. (Photo courtesy Universal Artists).

How to Hear Signals Under Noise

Here is what Bill Ashby, K2TKN, probably the most advanced amateur in this field, has to say about his system. "At present I am using the following method with *excellent* results. Any oscillator in the receiver is sine-wave wobbled by applying a stable reference audio signal (200 cycles) through a variable phase shifter to a varactor diode across the oscillator, giving a ± 1 kc swing. The output of the receiver is fed to a limiter-discriminator that is saturated with receiver noise. Any coherent signal, even though buried in the noise, shows up at the output of the discriminator as audio. Tuning the receiver across a signal shifts the phase, but there is a very strong output of the correct phase when the signal is centered on the discriminator crossover.

"The audio output is fed to the sync detector through a low *Q* filter centered on the stable audio oscillator frequency. Attempts at high *Q* here lead to trouble. The sync detector comes in many forms, but always turns out to be a balanced modulator. If the signal being fed in is exactly the same frequency and phase as the reference oscillator, the output of the detector contains the difference and the sum frequencies. The difference is d.c. in this case while the sum is 400 cycles if the stable oscillator is 200 cycles. The sum frequencies may be selected by an extremely sharp audio filter and used directly into an audio amplifier, but this approach doesn't buy any noise figure improvement, just a sharp audio filter. The other output, the difference (d.c.), is very usable. I have used it to directly power a transistor audio oscillator, trigger a number of various Schmitt triggers, and operate a sensitive relay amplifier. By adding capacity across the output, long time constant integration is easy to come by. I have used as much as 10 minutes of time constant at this point, but a low pass filter with a cutoff just below the stable oscillator frequency will work well, but you get no integration adder.

"The phase shifter mentioned is of extreme importance, for the d.c. output of the sync detector swings positively or negatively depending on the phase of the received signal and this must be peaked up to the proper polarity on a weak signal for optimum results." *Thanks, Bill!*

Alan Goodacre, VE3BZS, Apt. 324, 219 Bell St., Ottowa, Ontario, Canada, is very interested in corresponding with other amateurs interested in weak signal detection. Alan, too, has built a synchronous detection system that sounds quite interesting. More next month.

General News

WA4GHK is becoming quite an enthusiastic UHF'er. Jim operates out of Palm Bay, Florida, on 220.067 mc and regularly works W4VTJ (120 miles away). W4EMB (180 miles) was worked recently. Jim is looking forward to some skeds. Write to him at 896 Port Malabar Blvd. in Palm Bay today! "There are no locals here on 220 mc. Have to work DX to work anyone!"

From what W5HPT tells us, LeRoy, W5AJG, continues to be the leading force in UHF in the area. He's on every morning, doing a real bang-up job on 6 through 432. More from Vic next month.

K1RTS in Waterbury, Conn., sez all he's hearing on 220 mc is radar peaking to the southwest (S7-8). No QSOs yet. Skeds wanted! QTH: 38 Wildwood Avenue.

W9OVL, the Hoosier from Hammond, has really been drawing in the 220 mc DX. His June list (what are we talking . . . June in October?) includes K9DNG, K9OYD, K9WSZ, WA9FLV, W9RPF and W9SKN. Ben is running 125 watts on 1¼ meters. Month of July brought him the

*48 Cumberland Avenue, Verona, New Jersey.

[1]If you are not a contributor, you can quickly become one by sending a self-addressed stamped envelope to me for your UHF Reporting Forms.

same crew, but with sometimes better sigs.

W6IEY is on 432 mc from La Mesa and tells us that W6BLK, W6AUB, W6ETZ, WA6FJF and W6CMQ are also active. Dick uses a TDZ tripler cavity driven by a 2 meter SCR-522.

WA4GHK is on 432.216 mc, but no contacts yet. *Where is everybody?* Write for skeds as per QTH above. Jim uses a 2C39 Centimeg rig.

K5SDM in Houston caught W5HPT in Bedford, Texas, back on June 21st on 432. Also active down that way are W5AJG, W5SWV, W5YND, K5JHG, W5LYY and K5TUP. W5HPT sez he's still got his amateur TV, but no one to look at.

W2NTY conducted a demonstration at the August East Coast VHF Society's Hamfest. There he was in the mobile, laden down with an APX-6, an APR-5A (mod.) and a 446A cavity, a.m. modulated, working K2QWE, W2DZA and W2ZDE on 1296 mc. Then to 2410 mc for another go at K2QWE. Unfortunately I missed this due to the European excursion, but K2ZSQ got quite an eyefull!

Oh, yes. And here once again is WA4GHK telling us about his hearing radar on 1300 mc 20 miles away with just a 3" whip antenna. "Can hear the radar continuously throughout the 360° rotation of its antenna, but there is no mistaking the main lobe when it passes over this QTH about once every 30 seconds!"

Okay, boys, that about wraps it up this month. How about some more photographs and letters from you UHF'ers?

73, ALLEN, K2UYH

Letters to the Editor [*from page 72*]

the boy to go for a Novice. He did this after a few months of CB work when it is assumed the "ham infection" took place.

Recently he began working on code, picked up theory from magazines and books, tried his hand at small homebrew stuff and now has taken his Technician test. Meanwhile he acquired a 6 meter transceiver and beam. Thus in two years another ham is born to the fraternity. This is what was referred to in a previous paragraph as "remedial." The value is multifold:

1. Persons desiring the affiliation found in over-the-air contacts which have been heretofore questionable may find security.

2. The fact that they have a legal operation but know in their heart that they are using it contrary to the laws brings a moral effect into being.

3. To many young fellows who operate CB in a really non-legal manner, there is the ever-present "culprit" status which is not ethically good in the training of a good citizen.

Conclusion: Let every ham find a "CB ham" and follow the same procedure outlined above, introducing him to amateur radio. If there arises the question of crowding the 50-54 mc band with a few thousand more Technicians, then consider the reason for this class of license—experimental—and find means of utilizing the entire spectrum without TVI, etc.

Randy Blodgett, KV4CQ/WA2DEW
St. Thomas, Virgin Islands

Comments are invited on this controversial subject. —ED.

DX Report [*from page 77*]

VP7CX and CO5CN during July. Good sigs, too.

W6IEY has been making use of the skip snagging Arizona, South Dakota, Utah and Wyoming.

K1PLR wants skeds anytime to upstate New York (area of Corning-Ithaca). Write: 48 Crane Rd. N., Stamford, Conn.

WA4IRX's busy working Quebec (VE2BEW) and usual skip stateside. Al wants sked to Kentucky ground wave mornings between 6-7 and evenings between 9-10 CST. Write: 1609 Dearing Rd., Memphis. *Al's got 42 States confirmed so far during 1963!*

Down Nashville way W4IMX is mighty happy with his 2461 miler to K7DTS in Washington as well as VE4GI, K7MKW (Idaho), W1LKH (R.I.), K3WVJ (Del.), W1KZS/1 (Vt.). States standing now rides at 43 worked, but still waiting on Oregon and Mississippi to confirm. Bill's getting on two meters soon.

K9PVS is desperately looking for Michigan, Wisconsin, Illinois and West Virginia. Please write him for skeds. K9PVS is interested in getting SWL reports from 50 mc monitoring stations. Charlie's also interested in going f.m.

73, BOB, K2ZSQ

Editorial [*from page 71*]

Realization that every time we throw that switch it's like talking into a public address system. The low frequency gang doesn't need to be told this. They work thousands of miles every day. In this respect, though, the VHF bands aren't that much different. We, too, are being heard. Only our SWLs sometimes come in the form of television viewers. Bear in mind that no matter

how clean you feel your situation is, there may be someone, perhaps blocks away, who is intercepting your signals. Audio rectification into tape recorders, stereo equipment, etc., is not at all uncommon. The important thing for us to remember is that ham radio is not a private intercom system. We are broadcasting.

The issue at hand is not one of how to cure TVI. We all know pretty much what to do when the situation is brought to our attention. What we are talking about is operating technique. You might call it "protection" in this case. It is the neighbor who doesn't telephone to complain about TVI that is our source of concern, for he most likely will continue to move in his own circles (which may include newspapers) never once meeting you. He should *not* be ignored for his negligence in not contacting you, but rather he should always be remembered for he'll be there for quite a spell. Conversation about TVI for its own sake need not be aired for the world to hear. TVI is a personal affair which should be handled individually with the utmost diplomacy and tact. To express this to a neighbor in person and then say things inferring just the opposite on the air is only going to defeat your purpose.

I would very much like to hear from you with your feelings on the matter. Perhaps all of the favorable CB publicity in the papers has just incited me a bit. In any case I sincerely hope that the cases mentioned here are but isolated situations and are heavily outweighed by more de-

serving reports of the true amateur. Regardless, however, it's food for thought.

Bob Brown, K2ZSQ, EDITOR

Santo Domingo [*from page 73*]

not in very good shape. Only Bert and Chuck, at HI8XAG, and a few W4 stations were worked. Things at this point did not look too encouraging. To date, only about 75 stations had been worked in the 4-5-8-9-Ø call areas. There had been no openings to the East Coast of the U.S. and it looked as though many of my friends up there were going to be disappointed.

On Tuesday the band opened early into the W4 call area. After working a few 4s, suddenly W1QXX broke through followed by W1BU. About this time the band went wild. About 125 stations worked during this opening, mostly in the 1, 2, and 3 call areas. The band stayed open until early evening with W3BWU being heard after the band had pretty well gone out.

Wednesday morning the band was again open to Florida and a few other states in the W4 area. I had a few QSOs with them and a final QSO with HI8XAG and regretfully turned off the switch. I spent the afternoon saying goodby to the many friends I had made in Santo Domingo and then took a taxi to the airport. I took a jet flight to San Juan, spent the night there, and caught a military flight the following morning from San Juan to San Salvador.

Considering the adverse conditions I operated under the first few days, I feel the trip was quite successful. In addition to giving me a much-needed vacation, I was able to give about 200 stations a new country on six. I heard California on two different days, but was not able to work any 6s. VE3CVX was heard with a good signal, but I couldn't raise him. YV5AGM was worked during one of the openings and KP4BJO was heard quite regularly on ground wave. While I was in Santo Domingo, several of the local stations became interested in six meter operation and about ten of them had six meter gear under construction when I left. Already active are HI8XAG and HI8RO. HI8ORC was also worked by several stations during the July 2 opening.

Six meters is a fascinating band. With the many types of propagation available, it's ideal for the rag-chewer, the DXer, or the experimenter. Many rare countries are represented on six making it a good band for the certificate hunter during the summer months especially. This year from my QTH in the Bahamas I have worked 39 states, VE1-2-3-4, FG7, FP8, HI8, and KP4. I'm sure many more countries could have been worked if there had been activity. I'll be on six the next time it's open. Will you? ■

uring the linearity and the various distortion products, hum, sideband and carrier suppression quantitatively can only be done accurately with a spectrum analyzer (SA).

So far, no manufacturer has produced an SA priced low enough for ham use. The SA used by commercial and military stations cost from $4000 to $15,000—a little high for the average ham!

Basically, however, the SA is not an overly complicated instrument. What makes the cost so high is the calibration accuracy, frequency range, precision oscillators and so on.

The SA enables the visual analysis of a s.s.b. signal by measuring each of its components. Both desirable and undesirable components are shown on a cathode ray tube whose face is calibrated horizontally for frequency (sweep width factor) and vertically (left), from 0 to 40 db and linearity (right) from 0 to 1. Range switches are generally incorporated to extend the log scale from 40db to 60db.

In fig. 1, a typical spectrum analyzer is block diagrammed. This SA is the Model PTE-3A manufactured by The Technical Materiel Corporation of Mamaroneck, N. Y. It can be seen that the unit consists of a panoramic analyzer, master oscillator. mixing stages and two tone a.f. and r.f. generators.

You will note that the a.f. oscillators have outputs of 935 and 2805 c.p.s., while the r.f. oscillators have outputs of 1999 and 2001 kc. The two audio tones have been selected to produce the most revealing distortion pattern of a transmitter or exciter. The predominant distortion products, which are of an odd order, *i.e.*, 3, 5, 7, and adjacent to the carrier down to the 9th order, are displayed on the CRT screen. The two r.f. tones are used to check out the SA for proper operation by noting whether or not the two pips produced on the CRT screen are exactly 2 kc apart.

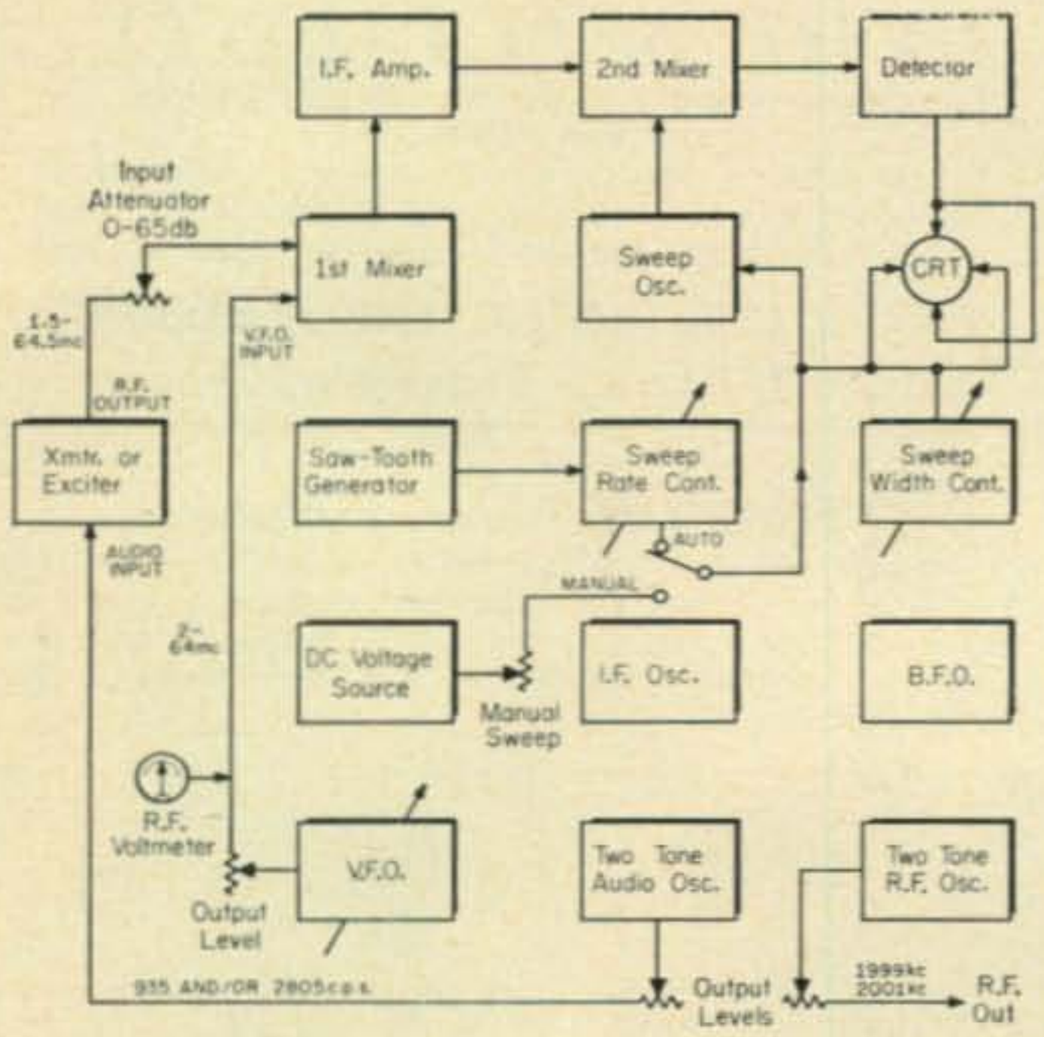


Fig. 1—Block diagram of the TMC r.f. spectrum analyzer.

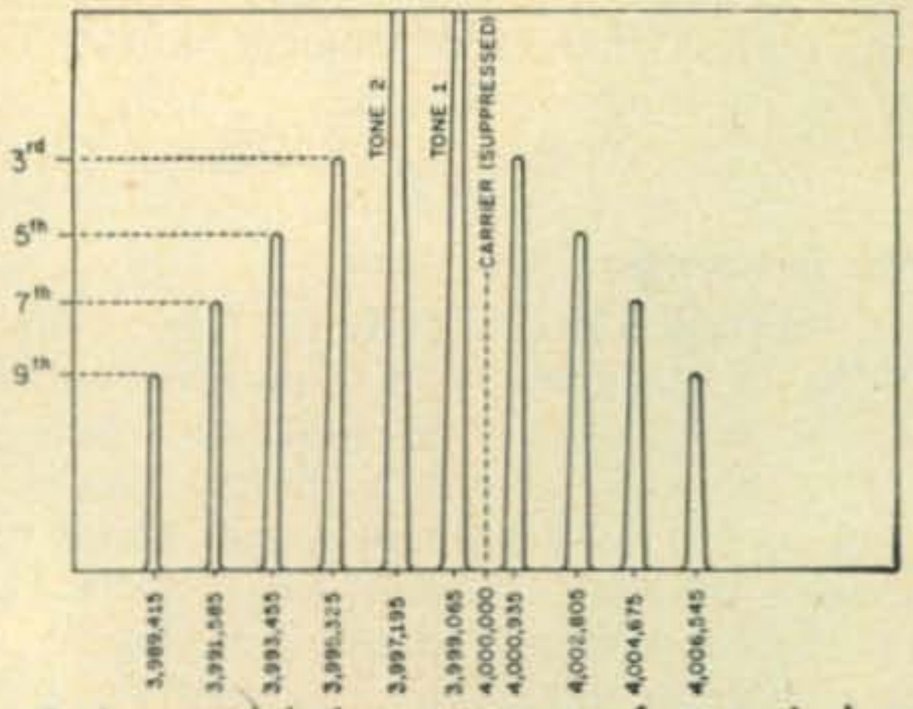


Fig. 2—Intermodulation spectrum of a typical s.s.b. signal (l.s.b.) showing the relative amplitudes of odd-order intermodulation products. This display is typical of spectrum analyzer displays.

Figure 2 shows the intermodulation (IM) spectrum of a lower sideband signal as it would appear on the SA with the upper sideband suppressed. The suppressed carrier is 4 mc with two-tone modulation, $F_1 = 935$ c.p.s. and $F_2 = 2805$ c.p.s. Appearing on the screen are the two lower sideband frequencies produced by the tones and the IM products adjacent to the carrier. Amplitudes of the IM products are considerably smaller than the two l.s.b. frequency amplitudes. In a properly adjusted transmitter, third order products should be at least 40db down from the carrier amplitude. The relative amplitudes shown in fig. 2 do not represent actual conditions but illustrate the fact that there is a general decline progressing from 3rd order to 9th order products. The figure is for the purpose of illustrating the horizontal locations of the products in relation to carrier and the two lower sideband frequencies.

Figure 3 shows the various screen display representations on a spectrum analyzer.

Noise appears as periodic transients on the SA screen. Hum appears as pips at the frequency or multiples of the line frequency. For example, in a 60 c.p.s. hum source, hum will appear at 60, 120 and 180 c.p.s. distances from the carrier frequency.

Questions

Because of the numerous figures in this month's column, we cannot run any of the

[*Continued on page 104*]

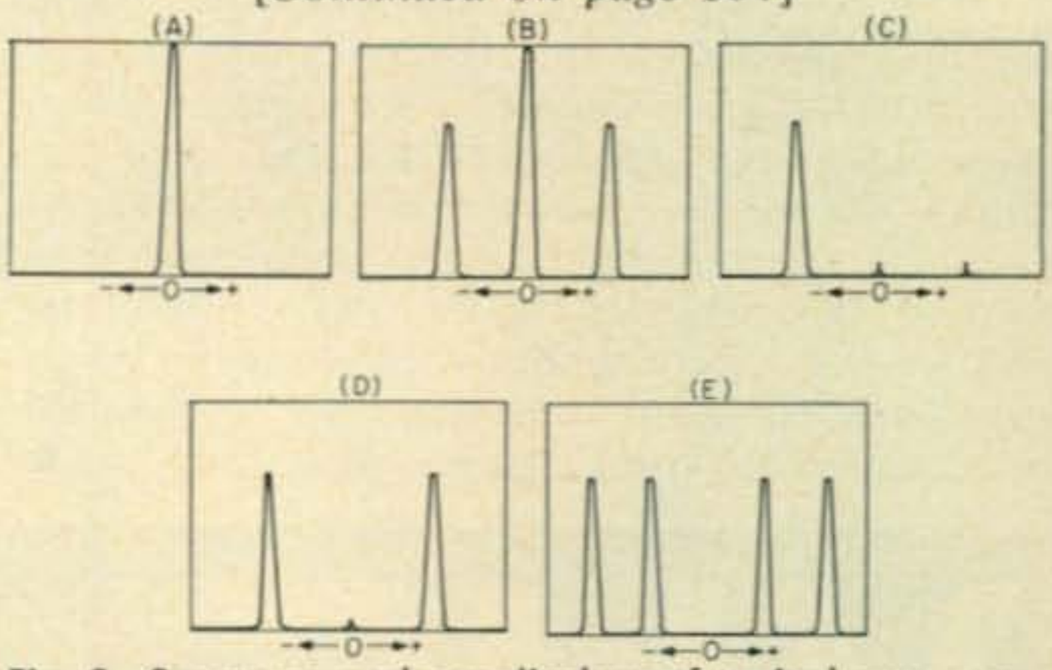


Fig. 3—Spectrum analyzer displays of typical c.w., a.m., s.s.b. and d.s.b. signals. A—Carrier alone (c.w.). B—Carrier with single tone modulation (a.m.). C—Single sideband (one-tone modulation). D—Double sideband (one-tone modulation). E—Double sideband (two-tone modulation).

radiate a horizontally polarized signal. Ideally, the elements would become progressively thicker as they were further from the center of the array. If all angles in such an array converge to the center point, the ideal feed-point impedance is about 190 ohms. These arrays are bidirectional, into and out of the page.

If the array suffers a sharp bend at the center (fig. 4), the signal strength in the direction of the center-point is increased and that toward the larger elements is decreased.[5] It is not particularly difficult to get 30:1 power ratios (15 db) in the front-to-back directions.

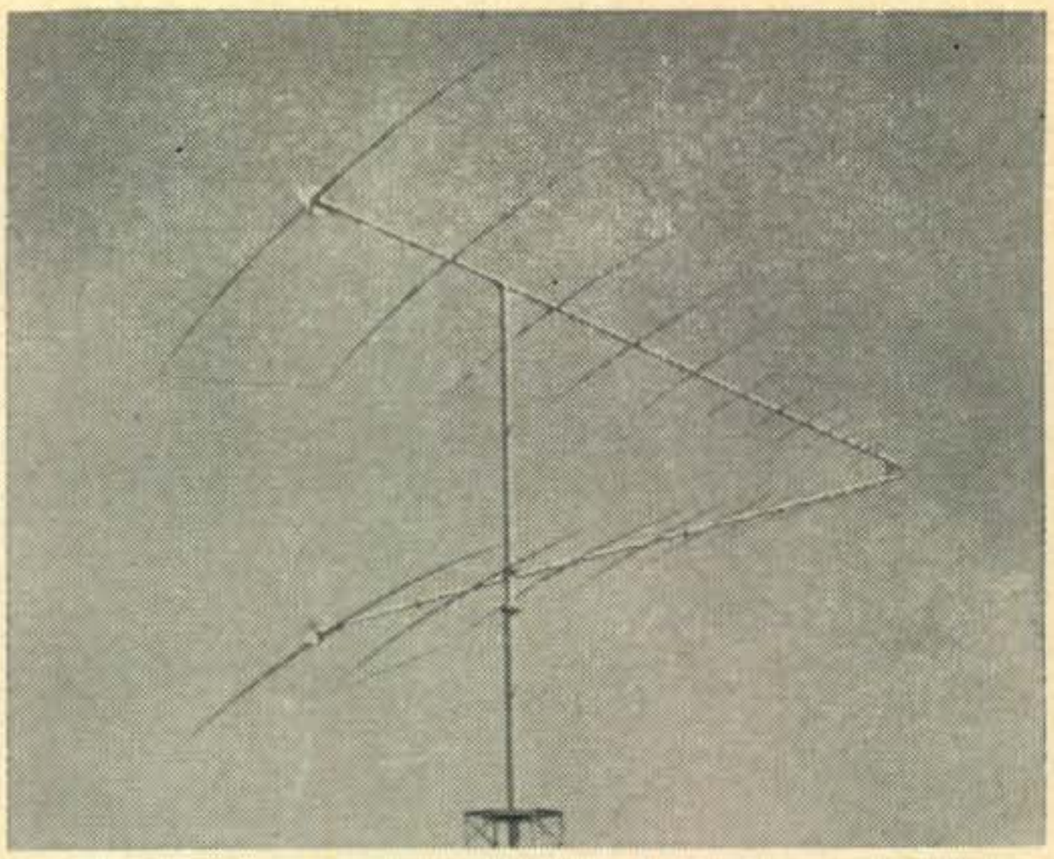
Forward gain of 6 to 10 db is not hard to get if fan angles and bend angles less than 60° are used. A minimum of 30° each seems to be a good practical limit, though fan angles as low as 15° have been reported. Reducing these angles increases both the gain and the front-to-back ratio.

The name log periodic comes from the idea that the elements show a slight but continuous change electrically with frequency. As the frequency continues to change, the characteristics will repeat themselves over and over. As these "repeating" frequency characteristics occur at fixed multiples of the previous frequency, the element lengths have a constant logarithmic (or "log") spacing, hence the name "log periodic."

A designer does not have to be able to "work" logarithms or trigonometry to lay out a log periodic antenna.[6] The procedure is: lay out the fan angle on a piece of paper with one inch standing for a couple of feet. Draw a line bisecting the fan angle. Draw a line ¼ wavelength long at the design or lowest frequency at right angles to the bisector to just touch one side of the fan angle (fig. 5). This determines all other dimensions of the fan. The design frequency for fans like those of fig. 3(A) is the lowest operating frequency, but for (B) should be about 82% of the lowest operating frequency. The place where the ¼ wavelength line touches the angle is the end of the outermost element.

Now a fraction must be chosen that will determine the number of elements needed and the variation of s.w.r. with frequency. The fraction will best be between 0.8 and 0.95. As the fraction increases, the number of elements goes up and s.w.r. changes become less. Let's assume 0.8 is picked. We then pick a spot on the other side of the fan angle 0.8 of the first distance from the corner angle. This is where the next crossing element begins. Then go back to the first side of the fan angle, and measure from the apex 0.8 of the last distance or 0.64 of the original (0.8 × 0.8). We continue this effort, zig-zagging back and forth with elements until the end of one is less than ¼ wave from the bisector at the highest operating frequency. Count the number of lines that represent elements to see how many you need. Measure the lines to see the element lengths. Remember, this is for one fan, and two are needed. Should you wonder how you are going to hold those elements in place, the bisector is at ground potential and makes a very logical boom.

Feedpoint impedance will probably be over 100 ohms, so high impedance coax may be desirable—at least 72 ohms, unless a balun is used. Twin-lead (150 ohms) would seem about ideal from an impedance standpoint. A common form of feed is to poke coax cable through part of the lower boom, with the shield connected to the lower set of elements and the center conductor connected to the upper.



Commercial version of a log periodic antenna. *(Photo courtesy Collins Radio Co.).*

After construction of the two fans, lay the upper over the lower to check for differences (there should be none), and then lift and rotate one fan so that the open sides of its elements are over the closed sides of the other fan (fig. 6). Install hardware to give the desired bend angle, add feedline connections, and raise into position.

Watch out for harmonics—the log-periodic will happily radiate them with the same gain it gives your desired signal. ■

[5]DuHamel and Ore, "Logarithmically Periodic Antenna Designs," *1958 I. R. E. Convention Record,* Part I, p. 139.

[6]C. T. Milner, "Log Periodic Antennas," *QST*, Nov, 1959, p. 11. G. J. Monser, "Design for an All-Purpose TV-FM Antenna," *Electronics World,* Nov. 1962, p. 36.

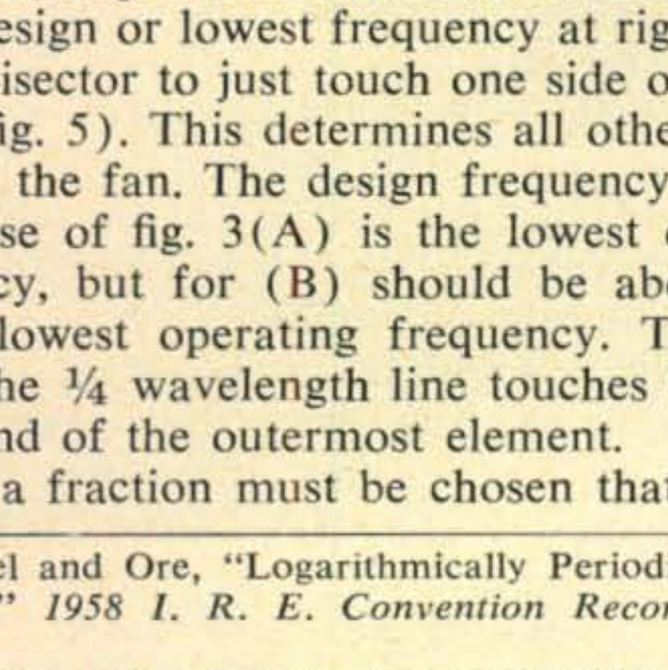


Fig. 5—Typical design layout for one fan of a log periodic antenna.

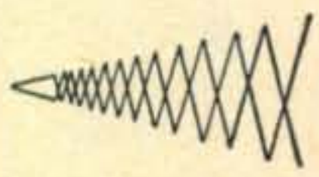


Fig. 6—Two identical fans are reversed and mounted one above the other to form the antenna shown in fig. 4.

B&W 6100 [*from page 51*]

and relay contacts which provide a normally-closed ground contact for use with a receiver's standby circuit. Other relay contacts provide a d.p.d.t. arrangement, normally closed on one side.

Power Supply

Three power supplies operate from a common secondary on the power transformer. All told, thirteen silicon rectifiers are employed. Their use saves space, provides good regulation and eliminates about 50 watts of heat which might otherwise be generated. Each one is shunted with a separate .001 mf capacitor for surge protection. The supplies furnish +750 volts for the final, +300 volts for the low-power stages and −100 volts for bias needs. A rear-apron switch is used to accommodate high or low power-line potentials.

Panel Controls

Panel controls include FINAL TUNE and LOADING, METER SWITCH, METER SENSITIVITY, DRIVER TUNE, BANDSWITCH, CARRIER LEVEL, EMISSION switch for L.S.B, USB, AM/TUNE or CW and OPERATION switch for OFF, STANDBY, MANUAL, CALIBRATE, VOX and PTT. Also included is a small hinged door behind which are recessed the following controls: METER ZERO, ANTI-TRIP, VOX SENSITIVITY, VOX DELAY, CALIBRATE LEVEL, CARRIER BALANCE and ALC THRESHOLD. This arrangement makes the controls readily available, yet protects them from accidental misadjustment. There are three dials for the frequency synthesizer.

Operation and Performance

The Model 6100 is set to frequency by means of the frequency-synthesizer dials and the band-selector switch. The first synthesizer dial varies the frequency in 100 kc steps, the second in 10 kc steps and the third tunes continuously throughout a 10 kc range which is calibrated in one-half kc increments and is readable to less than 200 cycles. The third dial has an adjustable hair-line fiducial for aligning any band against a calibrator. The frequency read-out is obtained from the sum of the dial settings and the position of the band selector.

When the frequency is tuned to zero-beat with another signal, the operation is somewhat different than one is accustomed to when a conventional v.f.o. is used. Instead of having one dial to twist to cover an entire band, there are three dials to turn before the beat can be located. This is not as involved as it may at first appear. If the receiver is well calibrated, chances are that after the ×100 and ×10 synthesizer dials are set accordingly, rotation of only the ×1 dial (this has a slight overlap at each end) will rapidly locate the beat. If the receiver is only approximately calibrated, it most likely will be close enough to indicate the 100 kc segment of a band concerned, for which the ×100 dial can be set and the ×10 one then switched step-by-step from 0 to 10 at the same time the ×1 dial is being rotated over its full range until the signal is heard. A little practice in this regard will enable the operator to quickly tune to frequency without difficulty.

Tune-up procedure is quite conventional. With the operate switch set for manual, carrier is inserted and the DRIVER TUNE, FINAL TUNING and LOADING are all adjusted for maximum output as indicated on the meter. The operation and emission controls are then set for the desired function.

The manufacturer's specifications for frequency stability are: Less than 100 cycles drift during first 15 minutes from normal room temperature. During any hour thereafter it is less than ±25 c.p.s. Results with the unit indicated performance within bounds. P.e.p. output is conservatively rated as 100 watts. It was found possible to actually obtain 115 watts on all bands (with a power-line potential of 117 volts) with good linearity.

Distortion products are rated 40 db below peak (140 watts input) with voice input and a.l.c. in use. Carrier suppression, sideband suppression and spurious-mixture signals, at least 50 db down.

The a.f. response (350 to 3300 c.p.s. at 3 db points) was found to produce a most natural and intelligible sounding signal. On-the-air checks all reported outstanding a.f. quality. The a.l.c. works like a charm. Use of 3 to 5 db of compression effectively raises the average power level with no sign of flat topping or other distortion. Pumping action, as found with some systems, was not exhibited.

The vox functions very smoothly and there is no annoying audible clatter from the vox relay. With c.w., the keying characteristics are really beautiful and break-in operation is good.

The transmitter is solidly built using high-quality components of more than adequate power rating. A continuous carrier output of 120 watts was fed into a dummy load for over an hour with no sign of excessive heating of components nor did the power output drop off. Our only criticism of the unit is that an antenna-changeover system was not included.

The Model 6100 is mounted in a tilted-up table-top cabinet with dimensions of 18⅜" × 9½" × 16" and it weighs 60 lbs. It is nicely laid out in a neat design having a silver-colored panel with black trim and black knobs with silver colored skirts. The price tag of $875 is higher than the general run of gear, but it is well justified for equipment of this quality and with such outstanding features. The Model 6100 Transmitter is manufactured by Barker & Williamson, Inc., Bristol, Pa.—*W2AEF*

For further information, check number 37, on page 110

How About That? [*from page 40*]

ing. The other half of the bed was smooth, cold and empty! Except for our four-year old who was breathing with her mouth open again there wasn't another sound in the house. I thought, "My gosh, he's touched two wrong wires together or something and is probably lying on the floor stiff as a dipole antenna! I threw on my dressing gown and hurried downstairs with fast beating heart fearing the worst! There sat the master of the house with a beautific smile on his face oblivious to time or anything other than whatever was coming through those ear-phones firmly clamped on his head! I was at once relieved and then mad as a hornet and could have almost cheerfully have applied the electrodes to his chair and plugged him into the nearest socket!

Sometimes when he appear to be settled in the shack for the duration (of our marriage that is) I palm myself off on some unfortunate neighbor for an hour or two. As soon as the door closes behind me he's upstairs as if by some prearranged signal and informs me fondly when I come home he just can't settle when I'm not in the house and has, "been up in the living room all evening." After this loving remark he happily disappears for an all-night session with the sound waves! There's a sadistic streak in 'em all!

His "Junk" as I tenderly choose to call it is not always confined to his shack either. On occasion I have found his shirts, etc.: stacked in a wobbly pyramid on a bedroom chair where they have been placed for an indefinite period to make room for some large, lumpy objects he simply *has* to have near him. If I remonstrate he hollers, "Well, where else shall I put them?"

Once I gave out an ultimatum, "Either some of that stuff leaves the house or I do!" Did my darling hesitate in his choice? Not for a minute, bless him! However, I knew I would miss the children too much so I decided to stay!

I know even normal-type husbands are known to be fond of comfortable old clothes—but really! On those long awaited special outings with my beloved, after spending hours making the most of what I've got (and believe me that's not easy), as I glance at my escort of the evening I can't help but mention that a sweatshirt and sneakers don't quite fit the occasion!

Of course things were very different on the day he had to go to the "big city" to pass his final test. Normally I can't pry him out of bed unless I set fire to the covers (this works but it's very hard on the sheets, but that morning he leaped out like an athlete in training, was shaved, showered and away, shining and suave as an advertisement in a Sears Roebuck catalogue!

If we stay with a friend during the summer vacation at her lake cottage, guess where he spends all his time? Out in a dusty, cobwebby old garage with his mobile rig.

Even the families' three teen-aged daughters doth protest also. There they are all ready and

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waiting for their dates and their boy friends get sidetracked en-route to the house, drawn like hypnotised lambs by those mysterious DA-DIT-DIT-DAS and bleep-bleeps that distract the ear. And as night falls and the romantic moon shines over the cow sheds, with wistful voices raised in mournful lament we wail, "Come back little Sheepa!"

Ah well, They say 'tis better to laugh than cry so I'll follow that advice to the bitter end and will leave 'em laughing—even when the men in white coats come to take me away! Seven threes Skiddoo! ■

DX [*from page 54*]

under the grant aforesaid shall be subject exclusively to the laws and sovereign authority of the United States during the terms of such lease. . . ."

From this the possibilities of operation as a new KS4 country seemed very real. A close reading of the FCC regulations showed that a letter of authorization from the Nicaraguan authorities would be in order so the proper people were contacted and a letter with permission to operate arrived, but designated the call as YNØCI, which would not have counted as a new country.

Meanwhile, back home, the FCC asked the State Dept. if the USA had any jurisdiction over the islands. Unfortunately, while concurring that the research was correct, the State Dept. ruled that as the U. S. had never exercised this treaty they would not care to "rock the boat" by granting an American amateur license. They would have no objection to operating as W4XXX/YNØ but no operation which would imply American territory could be permitted. Therefore, only YNØCI is operable and this would be of interest to prefix hunters.

Much time and effort went into this one. Thanks to W9EVI who pushed it for several years, and to W3PS who handled the legal end; and also to the wide circle of DXers who kept a close lip on the proceedings even though enthusiastic over the prospect of a new one in the Caribbean.

Aruba Award

REQUIREMENTS: Available to all amateurs who work three (3) members of the Aruba Amateur Radio Club after January 1, 1963. Contacts can be any combination of bands or modes. Only one type of award will be issued. No endorsements available. Members must have QSL cards of applicant. COST: $1.00 or ten IRCs. APPLICATION: Do *not* send QSL cards. Send list showing complete log data and signed by two licensed amateurs or one official of a recognized amateur radio club, verifying that QSL cards are held by applicant. Send list with money or IRCs to: Awards Manager, A.A.R.C., P.O. Box 273, San Nicolas, Aruba, Netherlands Antilles. MEMBERS: PJ2AE, AF, AL, AQ, AW, AZ; PJ3AC, AF, AJ, AL, AM, AN, AO, AP, AQ, AR, AS, AT.

[*Continued on page 92*]

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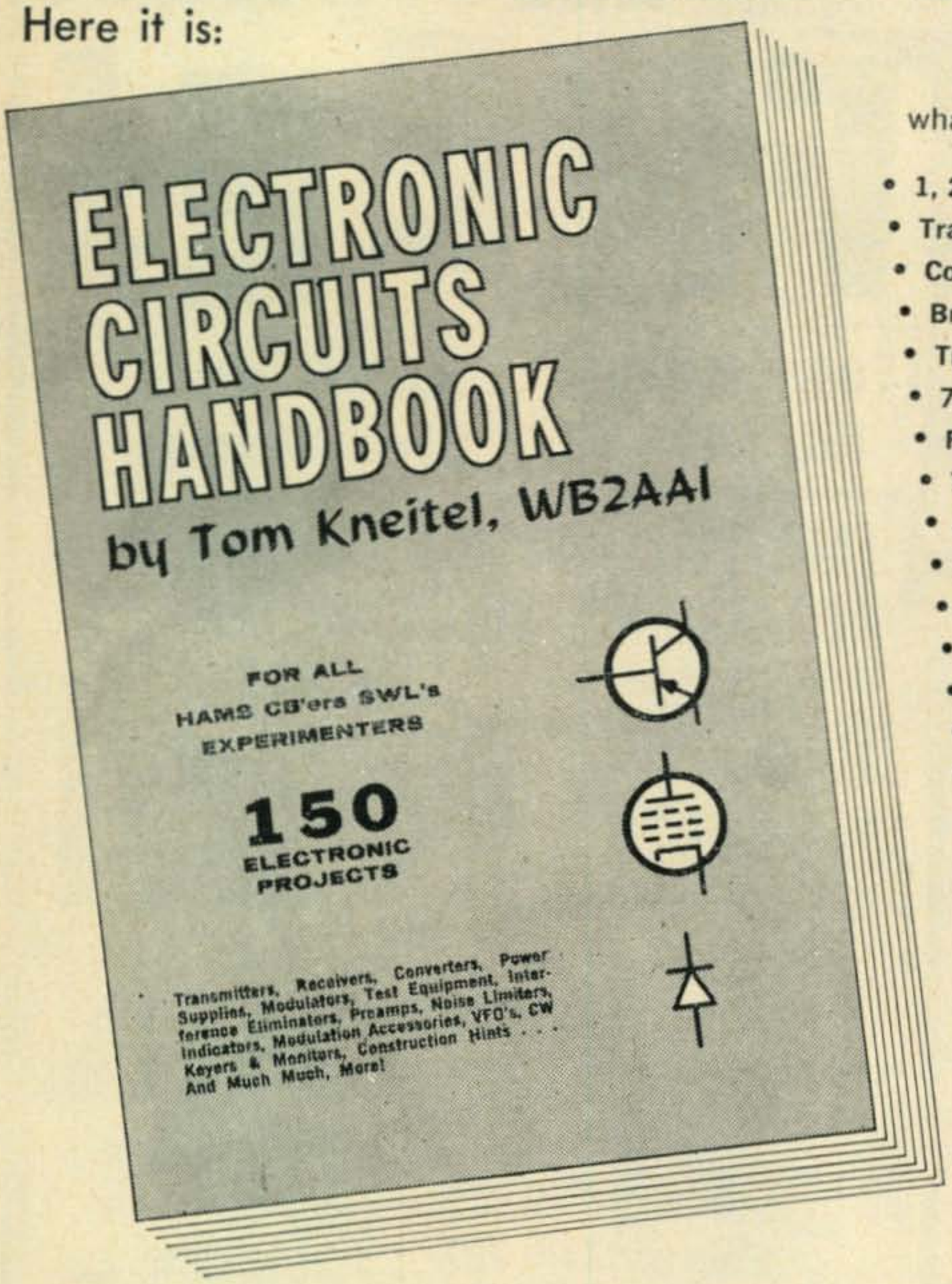

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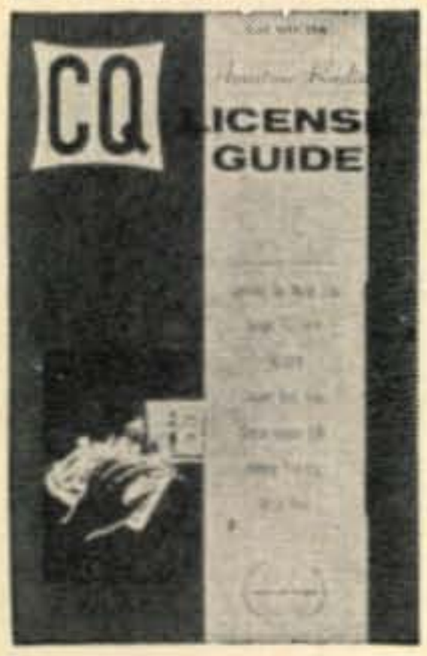

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DX [*from page 88*]

KH6DKA

I'm sorry to report that KH6DKA has become a silent key. Bill was killed in a plane crash. An old timer, Bill also held W6DKA and W7DKA.

W6TI

W6TI, The Horace R. Greer Memorial station of the Northern California DX Club broadcast DX Bulletins at 0600 GMT Saturdays and 1600 GMT and 1830 GMT on Sundays.

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Sideband Contest [*from page* 42]

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VE4XO	"	**52,880**	**452**	**117**
VE6TF	"	**43,878**	**426**	**103**
VE6AAV	"	12,160	190	64
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K4JDC/VO1*	"	**46,400**	**464**	**100**
Canal Zone				
KZ5LC	14	**32,712**	**348**	**94**
Costa Rica				
TI2PI*	A	**107,118**	**1082**	**99**
Guatemala				
TG9SC	14	**48,400**	**512**	**95**
Haiti				
HH2J	14	**17,596**	**332**	**53**
Mexico				
XE1SN	14	**47,616**	**744**	**64**
Puerto Rico				
KP4BMA	21	**27,168**	**566**	**48**
KP4BFA	14	**37,248**	**582**	**64**

Africa

Angola				
CR6CA	14	**5600**	**160**	**35**
Congo				
9Q5RK*	14	**1380**	**60**	**23**
Egypt				
VE3FFW/SU	A	**8716**	**136**	**67**
Lybia				
5A1TW	A	**121,304**	**804**	**126**
Morocco				
CN8IU*	14	**88,616**	**836**	**106**
Mozambique				
CR7CI*	14	**2176**	**68**	**32**
Somalia				
6O1WF	14	**12,200**	**200**	**61**
South Africa				
ZS6VX*	14	**21,576**	**248**	**87**
Sudan				
ST2AR*	14	**19,908**	**316**	**63**
Swaziland				
ZS7R	14	**7098**	**182**	**39**

Asia

Israel				
4X4DK	3.5	**19,008**	**352**	**54**
Japan				
JA3IW*	14	**13,452**	**228**	**59**
JA1ADN*	"	12,400	200	62
JA6AV*	"	3525	75	47
JA1ANG*	"	3102	94	33
JA1NJ	7	**7296**	**228**	**32**
Korea				
HL9KH	14	**313,728**	**1634**	**192**
Maldives				
VS9MB	14	**60,138**	**514**	**117**
Okinawa				
KR6BP	14	**13,680**	**228**	**60**
U.S.S.R.				
Asiatic				
UW9CC	14	**56,180**	**530**	**106**
UAØEH	"	53,010	570	93
UA9KCE*	"	23,700	300	79
UAØEK	"	19,276	316	61
UAØSK	"	19,240	260	74
Azerbaijan				
UD6BR	14	12,272	208	59
Georgia				
UF6FB*	A	**77,268**	**564**	**137**
Kazakh				
UL7JA	A	**45,780**	**420**	**109**
UI8AG	14	**33,856**	**358**	**92**

Europe

Aland Island				
OH5TM/Ø*	A	**12,200**	**200**	**61**
OH2TJ/Ø*	"	**10,044**	**186**	**54**
OH2TH/Ø*	"	9720	180	54
Austria				
OE1RZ	A	**103,660**	**730**	**142**
Belgium				
ON4AD	A	**72,136**	**568**	**127**
Czechoslovakia				
OK3CDR*	A	**30,272**	**344**	**88**
OK2XA	"	22,680	280	81
OK1ADP*	"	22,346	262	83
OK1KW*	"	10,530	234	45
OK1JX	14	**13,224**	**232**	**57**
OK1MP	"	10,812	204	53
OK3DG	"	2880	96	30
OK1VE	3.5	**3626**	**98**	**37**
OK1AWJ	"	3028	92	34
Denmark				
OZ5JT*	A	**58,740**	**660**	**89**

"BECAUSE WE'RE STILL NOT THE LARGEST COLLINS DEALER WE HAVE TO GIVE YOU A BETTER DEAL AND MORE PERSONALIZED SERVICE"

Before You Buy Collins With or Without a Trade-In Get Our Deal!

- Guaranteed Personal Service— all our male and some of our female employees are licensed active hams
- Sales and Service Personnel Collins Factory-Trained
- Full 36 months to Pay
- $5 or Your Trade is Your Down Payment
- Large Stocks Assure Immediate Shipment

DOC, W 9 H J S, manager of our Chicago store and STEVE, W 9 E A N, manager of our Milwaukee store hold daily 6 and 2 meter SSB Q S O's 90 miles apart using Collins 62S-1 SSB converters.

Working Collins displays in all our three stores. Shown here is the complete Collins station at our Chicago store.

CHICAGO HAM WINS 75S3

Here is Howard S. Wayman, W9GVA, 6760 N. Ionia Ave., Chicago, Illinois, accepting the 75S3 Receiver he won at the Big Open House held recently at Chicago Store.

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Steve W9EAN

MILWAUKEE 8, WIS.

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Tuesday, Wednesday & Thursday, 9 A.M. to 5:30 P.M.
Saturday, 9 A.M. to 3 P.M.

Doc W9HJS

CHICAGO 31, ILL.

6450 Milwaukee Ave. • Phone: Ro. 3-1030

Hours: Monday, Wednesday & Thurs., 12 P.M. to 9 P.M.
Tuesday & Friday, 12 P.M. to 5:30 P.M.
Saturday, 9 A.M. to 3 P.M.

Phil W9DVM/4

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Terry: I want to buy _____

I have to trade _____ (what's your deal?)

STAY ON THE AIR PLAN
Not only will I give you a terrific trade-in allowance, but you can keep your equipment until you receive your shipment.

Ship Me: _____

I enclose $_____ and will pay balance

☐ C.O.D. ☐ 1 Year ☐ 2 Years ☐ 3 Years (10% deposit)

If ordering on terms, please list following information on separate sheet and enclose with this order: Name, address, age, married? children? Employed by? Salary? How long? Own or Rent Home? To whom renting? or buying from? Wife employed? Own car?—who buying from? Three to five credit references. The more information you give, the faster we can approve your credit.

EVEN IF YOU'RE NOT ORDERING TODAY, SEND ABOVE INFORMATION FOR ATTRACTIVE CREDIT CARD

NAME _____

ADDRESS _____

CITY _____ STATE _____

☐ Check for latest reconditioned bulletin.

For further information, check number 42, on page 110

OZ4RT*	....	"	16,498	226	73
OZ5KG	....	**14**	**71,912**	**712**	**101**
OZ7FG	....	"	69,720	664	105
OZ8RH	....	**3.5**	**11,682**	**198**	**59**
		England			
G4CP	.....	**A**	**160,556**	**979**	**164**
G3NFV*	....	"	42,946	394	109
G2ABB	....	"	22,960	280	82
G3NMH*	..	**14**	**46,200**	**462**	**100**
G3KZQ	....	"	41,160	490	84
G3MEA	....	"	35,192	332	106
G3OIZ	.....	"	12,862	218	59
G3NWV	....	"	3774	102	37
G3PEU	....	**3.5**	**14,006**	**298**	**47**
		Finland			
OH2AA	....	**A**	**43,466**	**422**	**103**
OH2PM/1		"	43,424	472	92
OH2ER	....	**14**	**38,522**	**374**	**103**
OH2RZ	....	"	34,740	386	90
		France			
F3II	.....	**A**	**3072**	**128**	**24**
F7BI*	.....	**14**	**65,076**	**748**	**87**
		Germany			
DL3LL	.....	**A**	**334,110**	**1806**	**185**
DL2DM	....	"	66,878	562	119
DJ2UU	....	"	23,688	376	63
DL9PU*	....	"	23,184	276	84
DL7EN*	....	"	12,276	186	66
DL9EM	....	"	7668	142	54
DJ1ZG	.....	**14**	**98,298**	**762**	**129**
DL5AO	....	"	92,800	928	100
DJØGT	.....	"	57,200	572	100
DL1KN	....	"	11,160	248	45
DJ5LA	.....	"	3774	102	37
DL6JJ	.....	"	2700	58	30
		Hungary			
HA9OZ	.....	**14**	**20,160**	**280**	**72**
		Iceland			
TF2WHB*	..	**14**	**159,444**	**1236**	**129**
		Ireland			
EI8P	.....	**14**	**93,000**	**744**	**125**
		Italy			
I1CWN*	....	**A**	**64,896**	**624**	**104**
I1DFD*	....	**14**	**68,112**	**774**	**88**
IT1TAI	....	"	58,240	560	104
		Jan Mayen			
LA8SE/P	..	**14**	**7752**	**152**	**51**
		Luxembourg			
LX1DE	.....	**14**	**17,228**	**292**	**59**
		Netherlands			
PAØHBO	....	**14**	**53,016**	**564**	**94**
		Northern Ireland			
GI6TK*	....	**A**	**22,278**	**282**	**79**
		Norway			
LA5HE	.....	**A**	**24,650**	**290**	**85**
LA5LG	.....	"	11,264	176	64
LA1NG	.....	**14**	**22,176**	**308**	**72**
LA8WF	.....	"	15,904	224	71
		Poland			
SP9FR	.....	**A**	**87,098**	**1053**	**107**
SP5HS	.....	**14**	**27,924**	**358**	**78**
		Roumania			
YO3ZA	.....	**14**	**28,044**	**342**	**82**
		Scotland			
GM3JDR*	..	**14**	**44,200**	**442**	**100**
GM3CIX*	..	"	37,400	440	85
		Spain			
EA7ID	.....	**A**	**46,750**	**550**	**85**
EA4GZ*	....	**14**	**128,188**	**878**	**146**
		Sweden			
SL6BH*	....	**A**	**34,182**	**422**	**81**
SM5CBI	....	"	25,730	310	83
SM5BLA	....	**14**	**193,280**	**1208**	**160**
SM6SA	....	"	114,048	1152	99
SM5BOU	..	"	56,784	624	91
SM7AIA*	..	"	23,142	406	57
SM7ACB*		"	12,288	192	64
		Switzerland			
HB9UD	.....	**A**	**14,910**	**213**	**70**
HB9ZY*	....	**14**	**82,944**	**648**	**128**
		U.S.S.R.			
		European			
UA3CR	.....	**A**	**186,048**	**1216**	**153**
UA3FG	.....	"	129,750	1038	125
UA3DR	.....	A	43,460	410	106
UA1MU	....	**14**	**122,104**	**892**	**137**
UW3UF*	..	"	121,160	932	130
UA4IF	.....	"	43,264	416	104
UA6FD	.....	"	24,568	296	83
UA3FT	.....	"	19,856	272	73
UA1OE*	....	"	15,912	234	68
UA3SE	.....	"	13,888	224	62
UA3FU	.....	"	8424	156	54
UA3DB	.....	"	4446	114	39
UA4HP	.....	"	4376	128	42
UA1PQ*	....	"	1395	45	31
		Esthonia			
UR2KAT*	..	**A**	**40,480**	**460**	**88**
UR2AT*	....	"	35,260	410	86
		Kaliningrad			
UA2AW	....	**A**	**217,288**	**1384**	**157**
		Latvia			
UQ2FX*	....	**A**	**23,738**	**286**	**83**
UQ2AZ	.....	"	17,554	262	67
UQ2AS	.....	"	14,840	212	70
		Ukraine			
UB5WF	....	**A**	**161,768**	**1108**	**146**
UB5FJ	.....	"	121,433	956	127
UB5KKA	..	"	58,140	510	114
UB5EF	.....	14	8160	170	48

Oceania

		Australia			
VK6RU*	....	**A**	**9800**	**140**	**70**
VK5QR	.....	**14**	**8732**	**148**	**59**
VK2APK	....	"	**7304**	**166**	**44**
VK2EL	.....	"	2408	86	28
		Christmas Island			
VR3O	.....	**14**	**108,658**	**898**	**121**
		Guam			
KG6AJB	....	**14**	**62,678**	**518**	**121**
		Hawaii			
KH6BLX		**A**	**57,120**	**816**	**70**
KH6EKO		**14**	**44,872**	**568**	**79**
KH6FBJ		"	41,080	520	79
KH6EDW		"	9200	200	46
		Marshall Islands			
KX6AE		**14**	**29,946**	**322**	**93**
		New Zealand			
ZL1AIX		**A**	**145,520**	**1258**	**121**
ZL1AAS		**14**	**30,132**	**372**	**81**

South America

		Brazil			
PY2QT	.....	**A**	**138,656**	**1238**	**112**
		British Guiana			
VP3HAG	....	**A**	**19,470**	**354**	**55**
		Colombia			
HK4EB	.....	**A**	**53,784**	**498**	**108**
		Netherlands Antilles			
PJ2AA	.....	**A**	**152,218**	**1258**	**121**
PJ2CG	.....	**14**	**29,568**	**704**	**42**
		Surinam			
PZ1AX	.....	**14**	**42,000**	**400**	**105**
		Venezuela			
YV5AHG	...	**21**	**7326**	**222**	**33**
YV5AMH		**14**	**31,682**	**434**	**73**
YV5BPG*	..	"	8640	160	54

Multi-Operator

GB3RAF	**A**	**232,140**	**1460**	**159**
G2BVN, 3DAH, GJQ, ROB, 5UG, GW3IEQ				
UP2KNP	**A**	**36,960**	**440**	**84**
UP2OK, NK, NLT				
DLØKW	**A**	**33,375**	**375**	**89**
DJ8EG, 5BT				
UQ2KCC	**A**	**20,944**	**272**	**77**
Club station				
GD6UW*	**A**	**12,322**	**202**	**61**
G3PIT, PWT, RSE, NUH				
UA1KBW	**14**	**177,282**	**1206**	**147**
Club station				
I1DFH*	**14**	**112,644**	**894**	**126**
WA4HIW, WB2FXC, G3IZQ, K8CXQ				
SVØWY	**14**	**106,240**	**830**	**128**
W5TMA, WA8GAG, KØALL				
UD6KAR	**14**	**60,960**	**508**	**120**
Club station				
UA3KYA	**14**	**28,730**	**338**	**85**
Club station				
LK1KSZ	**14**	**19,560**	**326**	**60**
LZ1KSZ, 1DZ				

We sincerely appreciate the time and trouble taken by the following fifty stations who submitted check logs: W2ODA, WB2AKW, W4EEO, K4NXD, W5EDX, W6BAF, WA6WPG, W7UXP/KH6, W8GDQ, W9VSO, G3JKY, GI4RY, GB2SM, HA2AHT, JA1CPM, FSL, 4AQR, 9UU; KG6ALD, KP4BJD, LA6CF/MM, U; OH1SH, 2QI, 2XA; OK1UT, 3KJF; PAØFCM, PJ5CH, SM2BYN, 3AF, 5AM, AZU, CZQ, IC, KV, RC; UA3AET, 9BZ, ØLA; UC2KAB, UG6AW, UM8KAB, VK2AQJ, RA; VK3HL, YV5AKP, ZS4LX, RH; 4U1ITU.

$550.00

300 WATTS P.E.P.

DRAKE TR-3

SIDEBAND TRANSCEIVER

The TR-3 is another Drake design bringing the radio amateur "more performance at less cost, through engineering."

The TR-3 is engineered for optimum performance on upper or lower sideband, with AM and CW included for the "ham" who likes variation, or who desires to contact stations limited to these modes.

Compact and lightweight, it is ideal for limited space, for mobile, for vacations, and for portable excursions. With 300 watts P.E.P. input it will give a good account "barefoot" and will drive high power "ham" linears. The accessory RV-3 Receiving VFO solves the problem of working DX and stations operating on frequencies other than your transmitting frequency.

TR-3 ACCESSORIES

REMOTE RECEIVING VFO
Model RV-3 ..... $99.95
Used with the TR-3 to permit reception on frequencies other than your transmitting frequency.

MATCHING SPEAKER
Model MS-3 ..... $19.95
Contains a 5 x 7 inch heavy magnet speaker and connecting cable. Styled to match TR-3 Transceiver.

POWER SUPPLIES
AC Power Supply
Model AC-3 $79.95
Designed to supply all voltage and current requirements for the TR-3.

10% DOWN

$55.00 ($550.00)

TR-3 SIDEBAND TRANSCEIVER

ORDER NOW FROM HAMATEUR HEADQUARTERS

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- ☐ Place my order for IMMEDIATE DELIVERY of the NEW TR-3 SIDEBAND TRANSCEIVER.
- ☐ Remote Receiving
- ☐ Matching Speaker
- ☐ Power Supplies

Enclosed find $_____

☐ Please send more details & literature.

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Name_____ Call Letters_____

Address_____

City_____ Zone___ State_____

For further information, check number 44, on page 110

Prop. [*from page 55*]
tenna angles less than 20 degrees, as compared to a free space dipole reference antenna. Effective radiated power, or e.r.p., is equivalent to the power fed into the antenna, multiplied by the *power gain* of the antenna.

800 watts double-sideband a.m.
400 watts single-sideband a.m.
200 watts c.w.

To use the Charts for other values of e.r.p., *raise* the quality figures shown in the "Last Minute Forecast" by one letter for each *increase* of 10 db in e.r.p., and *lower* the figures by one letter for each 10 db *decrease* in e.r.p. For example, a c.w. effective radiated power of 2,000 watts would raise a circuit quality rating from C (a fair opening) to B (a good opening), *etc.*

All times shown in the Charts are Local Standard, using the 24-hour time system. In this system midnight is shown as 00, while 01 is 1 A.M., 02 is 2 A.M., *etc.* Noontime is shown as 12, while 13 is 1 P.M., 14 is 2 P.M., *etc.* 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 derived from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

Contest Guide

The following are examples of how the Propagation information contained in this column can serve as a useful guide for piling up points during the Contest periods. From data appearing in the Charts, the following operational schedule can be devised which shows the optimum times for working various areas of the world on the 20 meter band. A Central USA QTH is selected for the example.

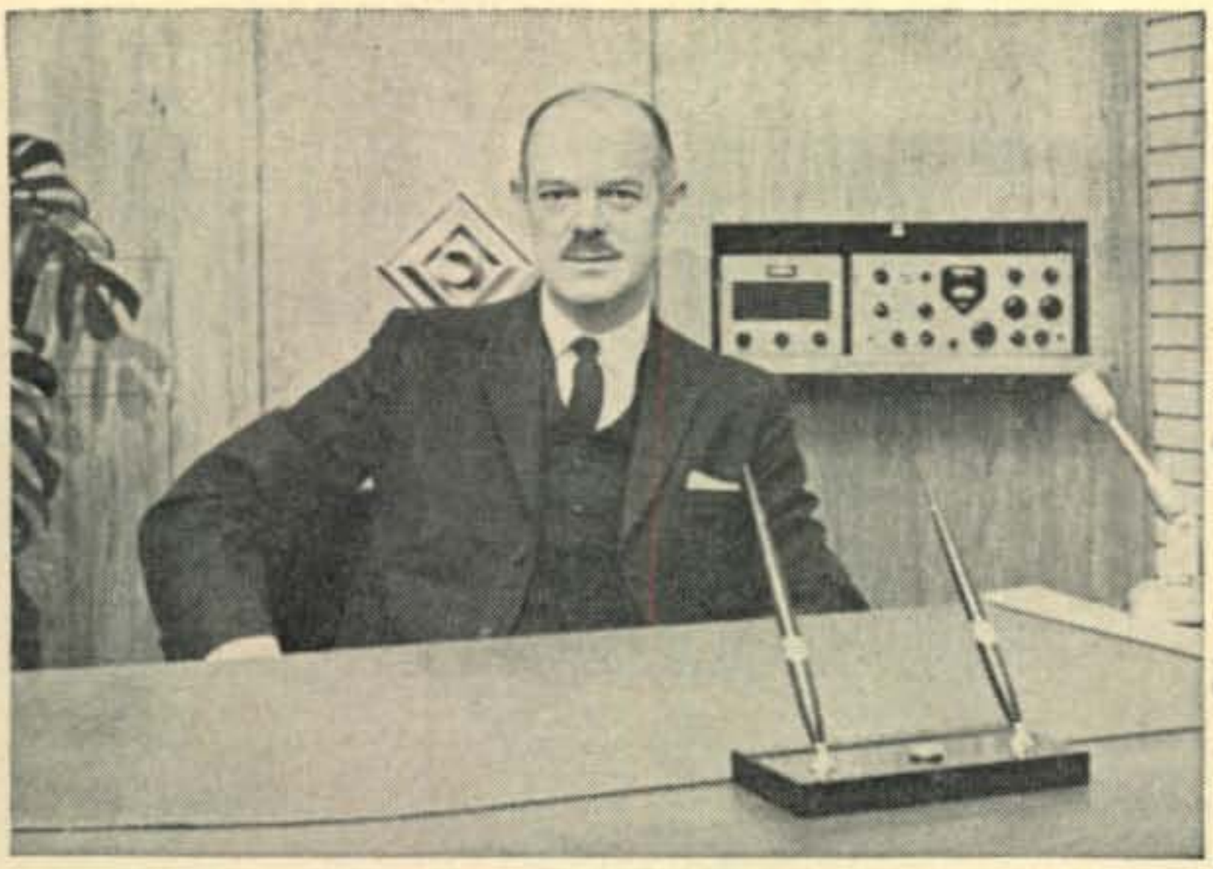
20 meter Work-Plan for Central USA QTH

Time (CST or MST)	*Areas to Which Openings are Optimum*
00—06	Nothing optimum, a good time to sleep.
06—09	Southern Europe, North Africa, Central and Southeast Asia, Far East, Pacific Islands, New Zealand, Australia, South America, Antarctica.
09—12	Western, Central, Eastern and Southern Europe, Eastern Mediterranean and Arabia, North Africa, Australia.
12—15	Western, Central and Southern Europe, North Africa.
15—18	Central and South Africa, South America.
18—21	Central and South Africa, Central Asia, Far East, Pacific Islands, New Zealand, South America.
21—00	Southeast Asia, Pacific Islands, New Zealand, Australia, South America, Antarctica.

The following is a typical *multi-band* operational schedule. It has been devised from the Propagation Charts for an Eastern USA QTH. The schedule shows the time and bands when propagation conditions are expected to be optimum to various parts of the world.

Multi-Band Work Plan for Eastern QTH

Time (EST)	*Best Band*	*Areas Open*
00—03		Nothing optimum, a good time to sleep.



"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."

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% CARRYING CHARGE

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
312B-5 PTO Console	350.00	27.56	12.83	7.82
399C-1 PTO Speaker	164.00	12.91	6.01	3.66

THIS LOW 5% FINANCE RATE APPLIES ONLY TO NEW COLLINS EQUIPMENT PURCHASED WITHOUT TRADE IN

Only Terry Offers Low 5% CARRYING CHARGE

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ORLANDO, FLORIDA
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Shopping Center
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AMATEUR ELECTRONIC SUPPLY Dept. C
3832 W. Lisbon Ave., Milwaukee 8, Wisconsin

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I enclose ..... I will pay the balance

☐ 1 Year (10% Down) ☐ 2 years (20% Down) ☐ 3 years (30% Down)

This special low 5% interest rate subject to withdrawal without notice.

Name .....

Address .....

City ..... Zone ..... State .....

☐ Send latest reconditioned equipment bulletin.

For further information, check number 46, on page 110

03—06	40	Central & Southeast Asia, Far East, Pacific Islands, New Zealand, Australia, South America, Antarctica.
06—09	20	Europe, North Africa, Central Asia, Southeast Asia, Far East, Pacific Islands, New Zealand, Australia, South America, Antarctica.
09—12	15	Europe, Africa, Eastern Mediterranean and Arabia, South America.
12—15	15	Europe, Africa, South America.
15—18	20	Europe, Africa, South Amerca.
18—21	20	Central & South Africa, Central and Southeast Asia, Far East, Pacific Islands, New Zealand, South America, Antarctica.
21—00	40	Europe, Africa, South America.

Similar type operating schedules can be devised for other operating conditions and other QTHs.

WWV Transmission

Check WWV and WWVH propagation transmissions for latest information on propagation conditions during the Contest periods. WWV broadcasts propagation information on 2.5, 5, 10, 15, 20 and 25 mc at 19½ and 49½ minutes past each hour. WWVH broadcasts similar information on 5, 10 and 15 mc at 9 and 39 minutes past each hour. The WWV forecasts are for north-Atlantic circuits, while north-Pacific forecasts are given on WWVH.

The WWV and WWVH propagation forecasts consist of a letter-number combination transmitted in slow Morse Code. The letter "N" indicates that conditions at the time of broadcast are normal; the letter "U" that conditions are presently unsettled or erratic, and the letter "W" that conditions are disturbed and a radio storm is in progress. The number indicates the average quality of propagation conditions forecast for the next few hours, as follows: 1—useless, 2—very poor, 3—poor, 4—poor-to-fair, 5—fair, 6—fair-to-good, 7—good, 8—very good, 9—excellent.

CW Section Forecast

The Propagation Charts appearing in this month's column are valid for *both* the phone and c.w. sections of the Contest. Be sure to retain the Charts for use during the c.w. section. Next month's column will contain Short-Skip Propagation Charts for November and December.

Propagation—Sunspot Research

The FCC has granted approval for a propagation research program to be conducted by K6HME and W6MGI during the period August 16 through November 16, 1963. The experiment will investigate the actual propagation characteristics of 10 meters as the sunspot cycle approaches its minimum phase. A beacon transmitter will be operated 24 hours daily on 28.6 mc modulated by a 600 cycle tone interspersed with the message "Beacon QSL K6HME Post Office Box 20121 San Diego, Calif." All radio amateurs hearing the beacon signal should send time of observation and signal reports to K6HME. More on this project next month.

73, George, W3ASK

Novice [*from page 58*]

pity, just a hobby. How about teaching some handicapped person enough code and theory to pass his amateur exam for Christmas and help him get going, it might be his best Christmas ever.

It Still Keeps Going

This morning I made my contact of the day. Nothing unusual about that, as I have been making a v.h.f. contact every day for 3059 days, except I called CQ and Pat, W8TN came back for his first contact with a Heath Shawnee, followed by QSOs with three YL-OM teams: W9HLS, then WA9AXT/WN9FOK, Ralph and Lucille; K9EEE, Dot and OM (didn't have his call); W8UX/WN8HWL, Bill and Marion. Then that feller that always makes you smile inside, ole Bob, K8VOT finished a very fine couple of hours ragchewing. That is the first time I ever worked three YL-OM teams in succession and the first time for two 2-letter calls at one setting.

The local amateur fraternity used to tell me there was no activity on two meters. If so, how did I make all those contacts for 3059 days? Incidently my first six meter contact was with the first station I heard on six, Phil, W5SFW, Amarillo, Texas. I believe we could relieve some of that congestion on the lower bands by shifting some of the local ragchews to the 144 or 220 mc bands. We would have less QRM on the low bands and more occupancy of the high bands. Had some of you squawkers ever thought of doing more work in improving your equipment and operating higher in the amateur spectrum and doing less squawking about the other fellow. How about some of you fellows that live where there is no channel 2 moving up in the six meter band? You can still tune the low end for us here in channel 2 land and we'll listen for you if you are there. Why *not* use 147 to 148?

Help Wanted

If you have a little spare time to help some one get his ham ticket you might consider a letter to one of those aspirants in the column. Maybe the future ham has a tape recorder or phonograph and you could tape some lessons for him.

Those needing help are:

John Knolke, R.R. 1, Norwalk, Iowa, 50211, needs help with code and theory.

Joseph M. Cassano, 515 Brighton Street, Bethlehem, Pennsylvania, needs help with code and theory.

Bruce D. Epple, Hq and Hq Co. Troop Command USASCS, Fort Monmouth, New Jersey, need help with the theory.

Jay Szerencsy, 737 Vermont Street, Brooklyn 7, New York, would like to locate a local club giving code and theory lessons for the amateur license.

George J. Masciarelli, P. O. Box 297. Clinton, Massachusetts would like to obtain diagrams for the TCS-11, TCS-12 and TCS-15 surplus units.

Dave White, P. O. Box 45, Grafton, West Virginia would like to know of any amateur nets around Grafton.

Howie Axelrod, 183 Holmesdale Avenue, Albany 8, New York could use some help for the test.

Joe Sims, 1224 Forestdale Blvd, Birmingham 14, Alabama is an Explorer Scout and 16 years old. He could use some help.

Gayle Byrd, 11 yrs. old, P. O. Box 275, Mango, Florida says that her brother wrote NOVICE and I put his name in Help Wanted. The local hams as well as VK4NS are helping her brother, so she would now like help getting *her* license. Please fellows and gals, let's help this lady in distress.

I could use some letters and more pictures. This column is for both Novices and Technicians. Good luck and plenty of good signals reports.

73, Walt, W8ZCV

Space [*from page 60*]

take it over almost all of the earth's surface, and its signals can be received and measured with relatively simple equipment at modest cost.

In the United States, S-66 receiving stations have been set-up at the University of Illinois, Pennsylvania State University, Stanford University, the Central Radio Propagation Laboratory of the National Bureau of Standards and NASA's Goddard Space Flight Center. To date, more than 40 scientists in nearly two dozen countries have also volunteered to take part in the program, making this the largest cooperative group ever to take part in a NASA space sattelite experiment. (Amateur radio's Project OSCAR is still the largest cooperative space effort ever undertaken, with more than 1,000 amateur observers from 30 countries reporting observations and measurements of the beacon signals radiated by the OSCAR I and OSCAR II satellites.)

Although coordinated amateur participation in the S-66 program had not been fully arranged at the time this column was being written (late August), it is a natural for amateurs. Simple measurements in the variation of the satellite's signals may reveal areas of patchiness in the ionosphere, while somewhat more sophisticated measurements of Doppler shifts and Faraday rotations can be used for determining the electron density of the ionosphere. The 20.005 mc signal can be received on most amateur receivers, and the read-out equipment necessary to measure Doppler shifts and other signal characteristics is no more complicated than was required for observing and tracking the OSCAR beacons. The information on Project OSCAR measurements contained in this column for Oct., '61 (pages 77-79) can be used as a guide for making similar measurements of S-66's signals.[1]

NASA plans to provide orbital information for S-66 to all participants in the program. Check W1AW and the Project OSCAR communication network since plans are underway to have this data relayed to radio amateurs through these facilities. Volunteer participants can receive additional information about the S-66 program from:

Dr. Erwin Schmerling
S-66 Project
Office of Space Sciences
NASA Headquarters, FOB-6
Washington 25, D.C.

Although not an amateur satellite, S-66 provides the opportunity for radio amateurs to participate again in a space program of vital interest to radio communications.

73, George, W3ASK

[1]Walters, Wells, Hillesland, "Project OSCAR Measurements and Tracking", *QST*, July '61, p. 59.
Norgaard, "Eyeball and Eardrum Doppler Tracking", *QST*, April '62, p. 44. (Feedback, *QST*, June '62, p. 80).
Hilton, "Make Your Own Orbital Predictions from Doppler Measurements", *QST*, Mar. '62, p. 23.

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For further information, check number 50, on page 110

USA-CA [*from page 62*]

their way to that many DXers (names provided by K6BX).

Members of the USA-CA Good Will Club to whom any DXer may feel free to write seeking U.S. county identity are:

K1BUR, KSG, LDK, MEM, OOF, PMJ, QCJ, THG, UAA, UAB; W1DMD, EIO, GKJ, LFX, YPH; K2GTF, PFC, TCS, UFT, VGR, ZKU; W2EMU, ETS, JMF, JQU, KAT; WA2DHF, EFN, KQG, LKW, NFN, ONO, TCW, WLN; K3CNN, DFU, HNP, HZY, JGJ, MNW, NAS, PQO; W3NCF, OUA; K4CDY, DWU, JIG, LWL, MPE, NUW, OAF, VRI, ZRA; WA4AQV, AYX, BMC, CMV, IEW; W4EJP, FNQ, UF, VWW, WHE, WMQ; K5AXK, BQS, BTM, HHO, JBC, MEH, SBN, SNH, USE, UTH, UYF, VXP, WNL; WA5AJK; W5AWT, BUK, EHY, NXF, KPO, VSQ, VZU; K6JBP; W6DIX, MDK, OJW, YC; WA6AJF, ATY, DWH, ECF, FCR, MWG, OZL, PDE, PQI; K7CHA, IMP, JRE, LDK, LTV, LUH, MRX, NHV, OXB, SQD; W7KOI, NNF, RZY; K8BBH, IQB, ITH, IUZ, MMO, TAH; W8CSK, KPL, WUT; WA8AWH; WN8DOF; K9DWG, EGQ, HXX, QGR, TZH, YND, ZQW, ZXG; W9BPG, CLH, GFF, IRH, QQG, QWM, UX; WA9AYD; KØBQI, DEQ, HEU, PFF, RGU, ITO, PLN, VBQ; WAØAQN, ARO, CR6CA, DL1QT, G2FFO, G5GH, G8PL, F9BB, F9MS, OK3EA, VE3EUH, VE6AJC, VP9AK, ZL1TB, and s.w.l.s.: Andy Rugg, 16 Lake Breeze, Point Claire, Que., Canada; Norman Atrip, 406 W. Broad St., Smithville, Tenn.; Steve Cline, Tazewell, Va.; Terry Drott, P.O. Box 161, Smithville, Tenn.; Richard Polson, 4671 No. Orchard, Fresno 26, Calif.; Cliff Hoobler, 8134 Baird Ave., Resida, Calif.; Richard Hadon, Bellville, Wisc.; Lavoyd Kuney, 7618 Beaverland, Detroit 39, Mich.; Gary Perlstein, YMCA, 10th Forson St., St. Joseph, Mo.; Robert Vansteenburgh, Rte 1, Chase, Kansas; Bob Savoy, 7801 Hasbrook St., Phila. 4, Pa.; Dick Little, 4140 Winfield Ave., Ft. Worth, Texas; Pete Wood, 5620 S.W. 185th Ave., Aloha, Ore.; Roger Williams, Rte 2, Box 78-B, Snohomish, Wash.; WPE4CT, 405 North Main St., Lancaster, S.C.; Rob Sanden, RR1, Ogden, Iowa.

Old Dominion Award

The Roanoke Valley Amateur Radio Club sponsor The Old Dominion Award for contacting Virginia counties with requirements based on your QTH. Offered in three classes:

Class	E. of Miss. River (VE1, 2 & 3) *(Counties)*	W. of Miss. River (VE4, 5, 6, 7 & 8) *(Counties)*	DX (KH6, KL7 & /MM) *(Counties)*
1	96	96	96
2	75	60	50
3	50	35	25

Class three is basic award to which seals are added for classes two and one. Independent cities may count for any *one* county sharing common borders. Send alphabetical certified list, full log data and 50¢ or 5 IRC to Custodian, K4WVT, 1902 Bridle Lane, S.W., Roanoke, Va. Endorsements made for all one band or mode or mixed.

QCWA QSO Party Results

Here are highlights of results of QCWA's 1963 annual QSO Party: 182 logs received represented all U.S. Districts, HC1, F7, VE3, KL7 and KP4. We will list only the top 25 contestants: First figure shows QCWA member contacts and second figure shows contacts with non-members of QCWA: 1. W4FNQ 196/256; 2. HC1DC 179/314; 3. W6ZPX 147/167; 4. W5UX 128/163; 5. W6NWI 115/168; 5. *(tie for 5th place)* W5KC 115/144; 7. K6GIL 114/132; 8. W5DWO 113/136; 9 W1DIT 109/36; 10. W2ZM 108/112; 11. W3AHX 105/125; 11. *(tie for 11th place)* W7AYO 105/112; 13. W7LQ 86/92; 14. W8OQV 80/100; 14. *(tie for 14th place)* W1GKJ

80/95; 16. W8KSR 77/94; 16. *(tie for 16th place)* W6YC 77/90; 18. W6JWD 73/93; 19. W8NXN 68/79; 20. W9VZP 66/86; 20. *(tie for 20th place)* KL7MF 66/74; 22. W6GW 64/70; 23. W7POU 61/64; 24. W6FZX 59/63; 25 WØCTW 57/61;

It is understood the Los Angeles Area QCWA Chapter will sponsor the 1964 QCWA Party and that this live-wire organization will seek more participation for the next event.

QCWA, now with over 3,550 members and growing steadily; has its standing awards program for working members in designated numbers in stated numbers of states and countries. For full information about QCWA Awards Rules and membership list corrected quarterly, send s.a.s.e. to K6BX.

See you in November when the Christmas commercial rush starts even before you have time to say your Thanksgiving.

Old Man, K6BX

Millen 90800 [*from page 42*]

does much to eliminate feedback.

If desired, the oscillator circuit and the amplifier screen may be fed with +250 volts and the amplifier plate with +500 volts from a dual voltage power supply like that shown in fig. 2. This was done in the photographed unit to eliminate the bank of bleeder resistors. There is no change in operation.

This modification was performed while in the employ of Sprague Electric Company of North Adams, Mass. Their permission to publish this article is gratefully acknowledged. ■

Ham Clinic [*from page 82*]

thousands of questions we have on file. We request that if you want a rapid reply to your questions that you send your airmail letter to us at 4 Lutzelmatt Strasse, Luzern, Switzerland. Enclose two International Reply Coupons (for airmail return) or the equivalent (in stamps or coin) of 30¢. If you can wait for a reply, direct your letters to me in care of *CQ*. Your cooperation will be appreciated. Next month, the column will be *all* questions.

Thirty

Those of you writing to us complaining that the *Q*-multiplier described on page 60 of the April *CQ* and the diode checker on page 58 of the July issue will not work, bear with us! Our corrections were not caught in time for publication and were misplaced for subsequent issue publication. On the *Q*-multiplier, reading the diagram from left to right, the first capacitor should be .001 mf, the 100 should be in mmf. the one below it should be .002 mf and the extreme right capacitor should be 1-3 mmf. In the diode checker, the bottom end of the pot should go to ground; and the anode of the diode should go to the horizontal input of the scope. The *cathode* of the diode should go to ground.

Again, thank you for reading HAM CLINIC we enjoy bringing it to you. 73 and 75 Chuck

Golden Jubilee [*from page 44*]

expertise! An urbane and humorous speaker, he referred to the earliest experiments in radio, which were described in the *Times* of the day as "a philosophical curiosity." He spoke of the splendid work put into research by radio amateurs and of their invaluable contribution to the science of communication . . . ". . . and what a good thing it would be," said my lord, "to have international control of the world by people like you, who are decent and solid citizens."

In response to the toast "The Guests," proposed by G6CL, John Clarricoats, General Secretary of RSGB, presentations were made to the Society by PAØDD, W. Dalmijn, President of VERON, and VE3CJ, Noel Eaton, Canadian Director of ARRL and the Leagues official representative at the Jubilee. Gifts were also presented by Swiss, German and Norwegian representatives.

Greetings were read, a veritable DXCC, from the British Commonwealth, from Germany, France, Belgium, Eire, from Finland and Greece, fraternal greetings from the USSR, from South Africa and Sweden; then from organizations like Hallicrafters, which spoke of the part amateur radio plays in the effort to achieve peace on earth and goodwill to all men, from the Editor of *CQ*, offering congratulations and wishes for continuing success in the future, from Herbert Hoover Jr., W6ZH and President of IARU—so the wondrous procession of honors and citations unrolled with affection, with dignity and with respect.

Of course there was nostalgia—but they were entitled to nostalgia. There was continual reference to those who had been with us fifty years ago, but who were not with us to celebrate this milestone. Maybe ghosts walked, but they were triumphant, happy ghosts, just breaking in for a final QSO, ghosts who had given to the world a hobby so fine and a science so boundless.

The British are reputed to be over-concerned with their old traditions, with what has gone by. Yet the atmosphere in London this first week of July, 1963, was one of challenge, as well as of past achievement, of a serene looking-back, with true jubilation, yet of a confident and lively looking-forward, to carry the fine tradition of the G call right on into the Space Age. ■

YL [*from page 68*]

Harryette adds there was much interest in the net with a gallery of 20 or more spectators at most times observing and listening to where their relatives or friends were flying. Contestant's RONs were posted and anything special was announced over the p.a. system at the airport. Gear consisted of a KWM-2 and 30L-1 linear lent by Collins Radio and a Gonset courtesy of Scott Radio.

The AWTAR terminated at Atlantic City, N.J. on July 17. W3GTC, Carolyn, was over-all radio net chairman for the sixth consecutive year.

24th YLRL Anniversary Party

Time: CW—Start—October 23, 1963, 1200 EST (1700 GMT)
End—October 24, 1963, 1800 EST (2300 GMT)
Phone—Start—November 6, 1963, 1200 EST (1700 GMT)
End— November 7, 1963, 1800 EST (2300 GMT)

Eligibility: All licensed YL and XYL operators throughout the world are invited to participate. *YLRL members only* are eligible for the cup awards; non-members will receive certificates. *Only YLRL members* are eligible for the Corcoran Award. Contacts with OMs will not count.

Operation: All bands may be used. Cross-band operation is not permitted. Only one contact with each station will be counted in each contest.

Procedure: Call "CQYL"

Exchange: Station worked, QSO number, RS or RST, ARRL Section or country. Entries in log should also show the time, band, date, transmitter and power. (Please know your own ARRL Section. ARRL Section list available for SASE to K1IZT.)

Scoring: a) C.w. and phone sections will be scored as separate contest. Submit *separate logs* for each contest.
b) Multiply number of contacts by total number of ARRL Sections and countries worked.
c) AM contestants running 150 watts input or less at all times may multiply the results of (b) by 1.25 (low-power multiplier).
d) SSB contestants running 300 watts P.E.P. or less at all times may multiply the results of (b) by 1.25 (low-power multiplier).

Awards: Highest c.w. score—gold cup (YLRL member). Highest phone score—gold cup (YLRL member). Highest phone log and c.w. log in each *district* and country will receive a certificate. Highest *combined* phone and c.w. score, YLRL member only, will receive Corcoran Award.

Logs: Copies of all logs must show claimed score, be *signed* by the *operator* and postmarked no later than Nov. 23, 1963 and received no later than Dec. 6, 1963, or they will be disqualified. Send only a copy of your log—no logs will be returned. Send copies of logs to Blanche Randles, K1IZT, 62 Linda Ave., Framingham, Mass.

Here and There

Correction in YL-OM Contest scores listed in July *CQ*: Top district score on c.w. among the OMs in the first district was W1HOZ (instead of W1HOX). Sorry, Dave.

K4's RHL and RNS report a new YL club at Fort Meyers, Fla., which has chosen the name of "Kilo-ettes." Current officers are: Pres., WA4JVH, Donna; V.P., WN4IUU, Pat; rec. secy, Alice Justham; corres. secy, K4NXZ, June; treas., Mary Lou Propp.

Another new YL net/club started out as the Northwest YL Net, and now has chosen the name "Minow Net" (for the first letters of states in 7th call area). Officers are: Pres., K7RAM, Bobbie; V.P./historian, K7KSF, Phyl; secy, K7RBE, Velda; P/C, K7PVG, Frieda. They plan one official meeting a year during a picnic in May, and are working on a certificate. The net meets Fridays on 3830, in summer at 1600 GMT and in winter at 1700 GMT. All YLs are invited to check in.

33, W5RZJ

Ham Shop

Rates for the Ham Shop of 5¢ per word for advertising which in our opinion, is non-commercial in nature. A charge of 25¢ per word is made to all commercial advertisers or organizations. Since we do not bill for Ham Shop advertising, full remittance **must** accompany all orders.

Closing date is the 15th of the 2nd month preceding date of publication. Your copy should be typewritten, double spaced on one side of the page only.

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

QSL's? CB's? WPE's? Largest variety, samples 20¢ (refunded). Callbooks: (fall) American $5, Foreign $3. Sackers, W8DED, Holland, Michigan.

QSL's-SWL's or what have you. You name it and we will do it for you as you wish. Expert art work at nominal cost, enough said? R. McGee, 6258-103rd St., Jacksonville, Fla. 32210.

QSL's SWL's CB Samples 10¢. Nicholas & Son Printery, P.O. Box 11184 Phoenix 17, Arizona.

QSL's new designs. Free catalogue. Longbrook, Box 393-Q, Quakertown, New Jersey.

1964 QSL-size calendars, 100—$7.00. Samples 25¢ Morgan, W8NLW, 443 Euclid, Akron, Ohio.

PICTURE of yourself, home, equipment, etc., on QSL cards, made from your photograph. 250—$7.50 or 500—$10.00 postpaid. Samples free. Write to Picture Cards, 129 Copeland, LaCrosse, Wis.

QSLs SWLs XYL-OMs (Sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fantabulous. DX-attracting. Protopay, snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSLs free samples. Fast service. Bolles, 7701 Tisdale, Austin, Texas.

QUESTION Want to design a QSL card? Sampler Instruction Kit 25¢. Wow! what cards you can create. $1.50 and up 100. Samco, Box 203, Wyantskill, N. Y. 12198.

QSL's—100—$2.50. Samples. Dime. AMEE's Printery—W9FXQ—Box 138, Oak Lawn, Illinois.

RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box, 7507 Kansas City 16, Mo.

QSL's 3-color glossy. 100 $4.50. Rutgers Vari-typing Service. Free Samples, Thomas Street, Riegel Ridge, Milford, N. J.

CALL CARDS Badges, decals, goodies, illustrated literature with samples 25¢. Errol Engraving Att: K1VRO, Westfield, Mass.

FINE QSL's . . . Dime . . .Filmcrafters. Martins Ferry, Ohio.

BUY SURPLUS direct from U.S. Government. Transmitters, receivers, teletype, microwave, test equipment, misc. Where and how to buy. Depot directory & Procedures—$1.00—Ramco, Box 356, No. Hollywood, Calif.

KITS WIRED write Lindy Smith, Rt. 1, 29th Street, Haines City, Florida.

CONVERT inexpensive BC-659 to CB with avc, crystal filter, squelch bias, Pi coupling. Conversion kit $20.60 F.O.B. Citrus Heights.—plans only, $2.00. Jay's CB Service, P.O. Box 173, Citrus Heights, California.

SELL Gonset G-66B, 3 way supply, complete with all band center loaded Master Mobile Whip $140, Viking Ranger, old but mint, no modifications $140. All manuals with gear. K1IGF, 83 Lovers Lane, Niantic, Conn. PE 9-2222.

FOR SALE B&W 5100 xmitter, w&w 51SB sideband generator, and NC-300 receiver. Make an offer. David Sheats, 4755 Arapahoe, Boulder, Colo.

SELLING Entire station of the late K2ADE for the lump sum of $550.00. Consisting of factory wired Valiant, SX-101A, three element Mosley beam, phone patch Zmatch, etc. Must pick up. Marge Cohen, Box 692, Liberty, N.Y. Phone 2716.

STEAM ENGINE driven ac/dc generators, burn wood, coal, etc., 500 watts. Kits $34.50 up; catalog $1.00 refundable, Richcraft Engineering, Sterling, Virginia.

COLLINS KWS-1 #959. Looks new, guaranteed perfect. Includes antenna relay, instruction manuals, spare tubes. Will ship. Best offer above $725 or trade for KWM-2. Will accept NCX-3, SR-150 as part payment. Al Weiss, W6UGA, 2370 Knob Hill, Riverside, California, OV 3-3149.

EVERYBODY Buy! Sell! Swap! Transmitters, receivers, components offered—wanted—in "Equipment Exchange." Interesting sample free! Write: Brand, Publisher, Sycamore, Illinois.

For further information, check number 54, on page 110

SELL SX-101A—$260; HC-10 ssb converter—$75; kw Linear SSB-1000F Eldico—$350; Transtenna T-R switch, outboard model—$50. all like new. Lamb, 1219 Yardley Rd., Morrisville, Penna.

WANTED old radios manufactured before 1925, especially Grebe, Murad, Paragon and Zenith. J. Worcester, R.D. 1, Frankfort, N.Y.

HIGHLY-EFFECTIVE home study review for FCC Commercial Phone Exams. Free literature! Wallace Cook, Box 10634, Jackson 9, Mississippi.

ELECTRONICS, radar, unusual surplus bargains, free flyer. MDC—923 W. Schiller, Phila. 40, Pa.

WIND DRIVEN ac/dc generator system, kits, $19.00 up: catalog $1.00 refundaable; Richcraft Engineering, Sterling, Virginia.

FOR SALE immaculate HT-37 with Shure controlled reluctance desk microphone, grip to talk switch $235; HQ-170C, with 24 hour clock $230. Both in factory cartons. Scarcely used, look and work like brand new. Johnson 250-39 TR switch $12.50. Speed-X chrome plated bug $1.50. Jensen studio-type reflex enclosure with GE wide range speaker $20. K5YJR, 9627 Shadydale Lane, Dallas, Texas 75218.

COMPLETE station Drake 2A—$220, Central 20A—$169, vfo—$20, Heath Q-multiplier—$9, crystal calibrator—$7, crystal mike $5, console with many built-ins. Make offer for whole works. N. Dlugatch, WA6NSF, 3954 Ursula, Los Angeles 8, California, AXminster 2-5187.

W1REP selling HT-32A plus SX-111 $500 takes both. Each in original cartons have seen very little use and in like-new condition. Prefer local deal.

TELEVISION camera start your closed circuit system or amateur station with basic transistor unit. Write Video Systems, 300 West Peachtree N.W., Atlanta 8, Georgia.

WANTED commercial, military, all types, ARC, ARN, ARM, GRC. PRC, URR, URM, TS, 618S, 171, 51R, 51X, APN, others . . . Ritco, P.O. Box 156, Annandale, Va.

A-1 reconditioned equipment. On approval. Trades. Terms. Hallicrafters S-85, $79.00; SX-99 $89.00; SX-110, $119.00; HQ-110, $149.00; HQ-170, $229.00; Collins 75S-1, 75A-4; 32S-1, National, Gonset, Elmac, Heath, Johnson, RME and many others. Write us for lists. Henry Radio Company, Butler, Missouri.

BARGAINS! Read The Ham Trader. Free copy or 25¢ for current issue. Box 153Q, Franklin Square, New York 11010.

PRINTED circuit boards. Hams, experimenters. Silver Sentry vfo, $2.85; Converter, March CQ, $1.50. Free catalog P/M Electronics, Box 6288, Seattle, Washington 98188.

GALAXY sales have brought about several hundred additional trade-ins—KWM-1 $359; Champ 300A $229; King 500C $439; GSB-100 $259; HX-50 $299; 1 Apache $189; Valiant $259; Pacemaker $169; 75A-3 $279; 75A-4 $389; SX-111 $169; SX-101A $249; HRO-50T $159; HRO-60T $259, and many more. Write for free lists. Leo, WØGFQ, Box 919, Council Bluffs, Iowa.

CENTRAL ELECTRONICS 100-V—transmitter—6 bands—10-11-15-20-40 and 75 meters, built-in vox and scope, s.s.b.—am—pm—dsb, etc. Like new $595. National NC-303 receiver with built-in Ameco nuvistor 6—2 and 1¼ meter converters—perfect $325. Lettine Model 262 plate modulated six and two meter transmitter, built in antenna-switch and relay. A-1 $160. Heath-impedance bridge, wired-perfect $70. Heath Q-meter, wired, perfect $55. Sal Francione, W2IDC, 146-07 Jamaica Avenue, Jamaica 35, New York.

COLLINS 75A-4 Serial No. 786—real clean. Will take best offer over $325. P. J. Giacoma, 615 No. 9th St., St. Louis 1, Mo.

DX-60 am-cw transmitter for sale. Complete with matching vfo and antenna relay. Brand new. Any reasonable offer. K3SJZ, 4620 W. Barlind Dr., Pittsburgh 27, Penna, Tel. 881-1262.

WILL PAY any reasonable price for first class copies of CQ for May and December 1945 and January 1946. Want old regional, local or club ham publications, call books. A. R. Marcy, W4ID, 461-3rd Ave., Sea Park, Eau Gallie, Florida.

SELL Waterman S-11A Pocket Scope $45.00 LM-14 frequency meter with calibration and instruction manual and power supply, $45.00 Drake Hy-Patch $20.00. Jim Manship, K4ET, Rt 3. Box 246-D, Greensboro, N.C.

GONSET G-50 transceiver $200; Hallicrafters S-120 receiver $40. Both like new, perfect. Locascio, 8420 51st Avenue, Elmhurst, New York.

SALE Globe King 500-C $290, Hallicrafter S-40A $50; Eldico TR-75A $20, Heath A-76 watt amp. $15, transistor code osc Mon. $12, CDR TR-2 $20; Same Vol 1-20 & Binders $12 each. Precise 7" vtvm $35, B&K 1075 TV-analyst $50, Precise Mod-300 8" scope $50, Precision E-400 sweep gen. $65, ARC-5 2 mtr. recv. $10, 32-el. Cush-Craft 2 meter colinear $40, Minolta camera w/flash, $20, Kodak 828 pony w/flash $20, Heath color bar gen $40; Simpson capacometer $45, Keystone 8 mm Turret with light meter & lenses $60, 6146's new $4.25, B&K 360-vom $40, Lampkin 105-B w/harm. gen, and attenuator $180. George Magera, W4YLT, Mullins, S.C.

WANTED KWS-1 preferably without power supply; KW-1; Johnson Desk Kilowatt, Ray, W2LNP, 134 Wheatley Road, Glen Head, N.Y. Phone: 516-626-1384.

SP-600 JX-14 Ser. No. 7748 Excellent condition. Original unmodified, with manuals. Best offer over $200. Write Pres (W5YEN) Young, 109 North Burke, Long Beach, Miss.

SACRIFICE New HT-37. (won in contest). Never plugged in. In carton as received from factory. $365, postpaid. George Hansen, 216 Lobos, Pacific Grove, California.

CENTRAL ELECTRONICS 200-V. Mint condition. No scratches. Will ship in original crate. With manual. W4MZV, 616 Lakeview Drive, Raleigh, North Carolina.

SELL R-274/SP-600-JX-1 Hammarlund receiver. $400. K5OBA, 1122 E. Elm, Stillwater, Okla.

FOR SALE Moving and need cash. Selling complete ham rig which is in excellent condx and includes the following: Heath Warrior kilowatt linear amplifier. Globe Scout xmtr/driver, with speech preamp and clipper. Hallicrafters HA-5 vfo. SX-99 receiver with homebrew preselector and Heath Q-mult. Hy-Gain TH-3 beam plus 10 foot tower and AR-22 rotator. WRL Ham desk with slope back. Plus accessories, i.e., Conelrad monitor, 65 feet RG-8/U, Dow Key w/dpdt, mic, etc. Many items not even one year old. $495. Garrett S. Friedman, 1920 E. 24 St., Brooklyn 29, N.Y. Phone ES 6-0219.

SHAWNEE 6 meter transceiver for sale. Less than 3 months old and in perfect condition. Must sell for personal reasons. $180. Bill, WA6GCP, 15929 Dalmation, LaMirada, California. Phone: 714 LA 1-3379.

MUST SELL Landlord won't allow antennas. Modified Tower, 6 mo. old with Heath 12 volt vibrator power supply, Halo, coax, crystals, and mike $55, Harvey Wells R9-A receiver, speaker, and 40 meter dipole. Also modified Sonar SRT-120 Transmitter with vfo. Will sacrifice. WN2HQV, Joseph Klinitski, 106-09 Glenwood Rd., Brooklyn 36, N.Y. Tel: NI 9-9207.

WANTED S-meter for Knight R-100 Receiver. One ma. movement. Robert Falls, 220 Jandell Road, Lorton, Va.

SELL Knight T-150 $90. Homebrew swr meter $10. Approx. 150 assorted CQ & QST 1953 to date. Best offer. Ray Robertson, WA2JRE, 37 Ogden Place, Morristown, N.J.

TECH. PUBLICATIONS Need space. will sell Proceedings IRE and Electrical Engineering, about 1935 through 1960. Also other radio magazines. William C. Reichard, Netcong, New Jersey.

VALIANT II 225 dollars. all inquiries answered. will ship. K3VTZ, 5805 Conway Road, Bethesda, Maryland.

FOR SALE Gonset GSB-100 ssb transmitter $290. I have not had it on the air. Apache mint condition $200. Hammarlund HQ-170C wih Hammarlund i.f. noise silencer $270. All items guaranteed new or like new. Ernst A. McCall, 10004 E. 34 Street, Independence, Mo.

40 FOOT Ez-Way tower with wonder post; CDR rotator; 5 el 6 meter beam and all ac $150. WA2MLL, 516 TU 8-1189.

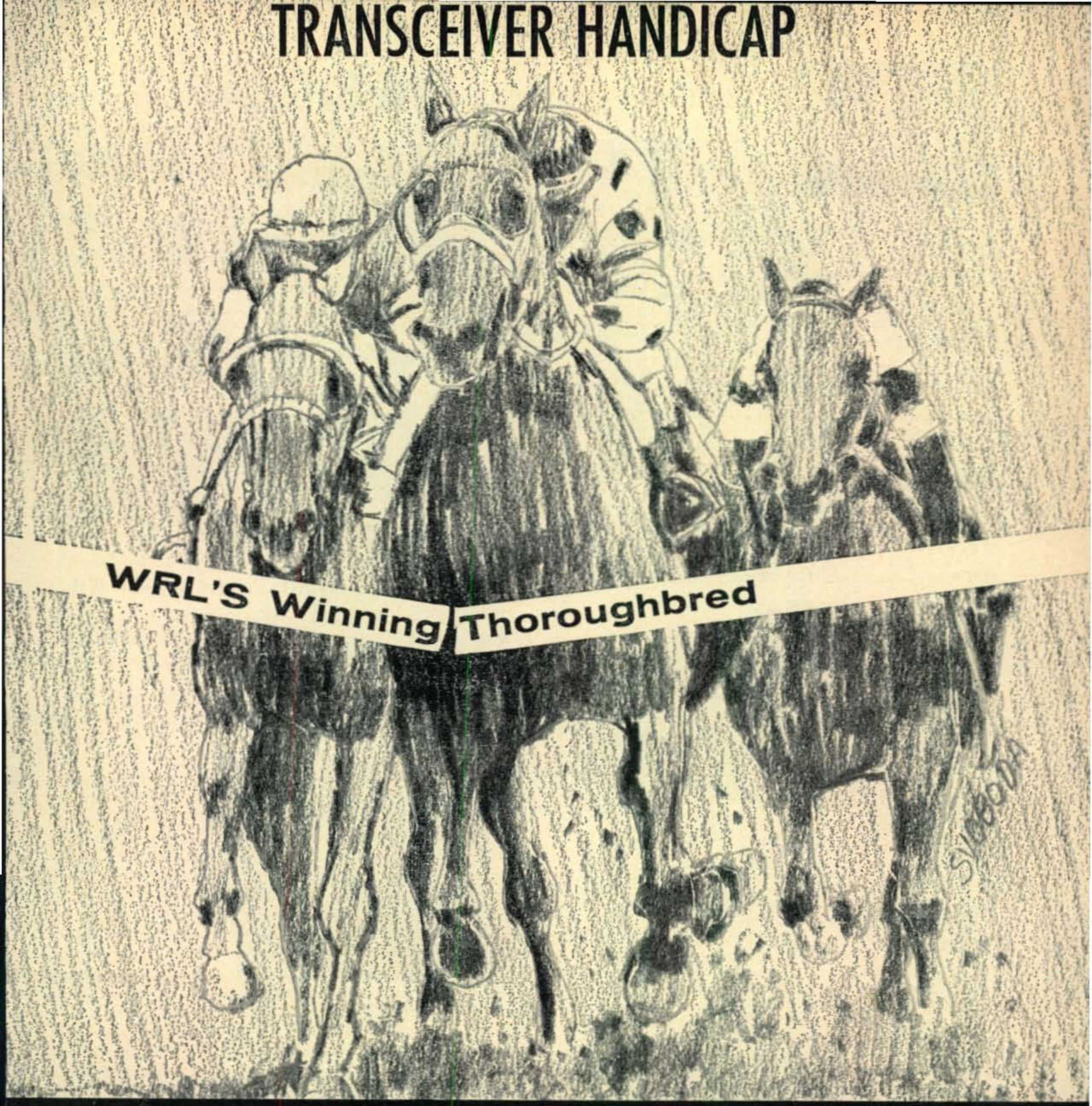
For further information, check number 57, on page 110

For further information, check number 58, on page 110

For further information, check number 14, on page 110

advertisers index

TRANSCEIVER HANDICAP



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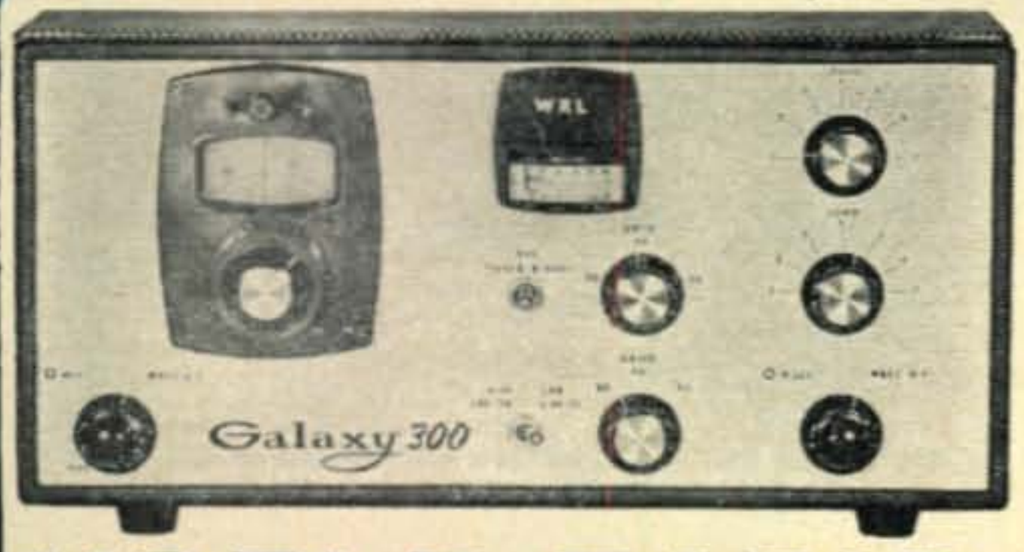

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83 Y 546FS. As above, but factory-assembled $22.95

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fussbudget

Stan Taylor is Manager of National's Quality Control Division . . . and a fussbudget by profession. He and his staff make certain that when you buy a National product you can be confident that every component part, every stage of assembly, every aspect of performance, was checked, re-checked, and approved before the equipment was allowed to leave the factory. Stan has only one quota — 100% test and inspection — and only one criterion in "borderline" cases — "Will the customer be satisfied that his new rig meets National's advertised specifications for performance and workmanship in every respect?"

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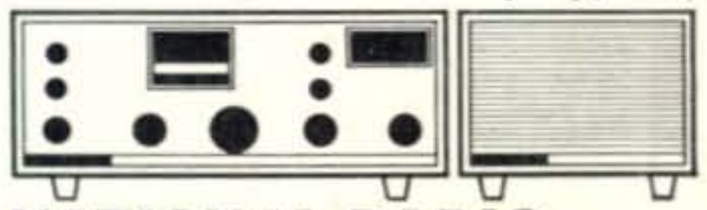
Only a demonstration can give you a true picture of the performance of a National rig . . . but for your preliminary reference, we'd like you to accept a free copy of our complete catalog (and NCX-3 Instruction Manuals are also available at $1 ea.). Just send your name and address to: National Radio Company, Inc., 37 Washington Street, Melrose, Massachusetts 02176.



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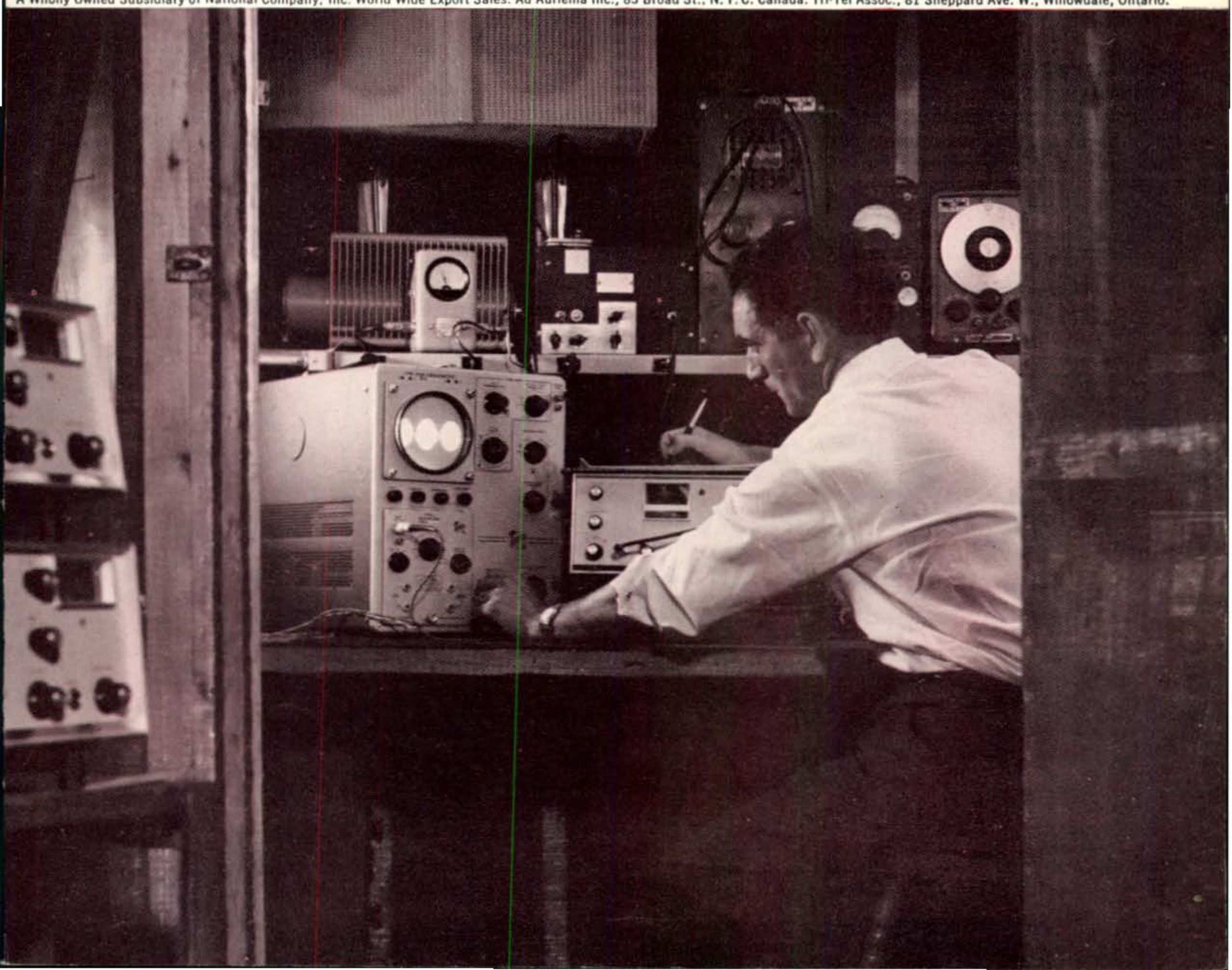

RCA HAM TIPS

A PUBLICATION OF THE RCA ELECTRON TUBE DIVISION

VOL. 23, NO. 1 ©1963, RADIO CORPORATION OF AMERICA WINTER, 1962-63

A MOBILE 50-WATT TRANSMITTER FOR THE SIX- AND TWO-METER BANDS

Part I

By M. R. Adams, WA2ELL, and P. B. Boivin, K2SKK

RCA Electron Tube Division, Harrison, N. J.

A continual increase in the number of technician-class operators is creating new peaks of activity on the six- and two-meter bands. This trend, of course, is most pronounced in metropolitan areas and is evidenced by the quantity and variety of commercial equipment now available for these bands. With the rising popularity of VHF mobile operation, many hams have been seeking new designs to help them achieve higher levels of operating convenience and economy. The use of both six and two meters by Civilian-Defense "RACES" units also makes operation on these bands attractive for emergency use. In a two-part article which [illegible] concluded in the Spring issue, the authors report on a compact, 50-watt amateur [illegible] mounted under an auto dashboard and has a

RCA HAM TIPS

A PUBLICATION OF THE RCA ELECTRON TUBE DIVISION

VOL. 23, NO. 2 ©1963, RADIO CORPORATION OF AMERICA SPRING, 1963

A MOBILE 50-WATT TRANSMITTER FOR THE SIX- AND TWO-METER BANDS

Part II

By M. R. Adams, WA2ELL, and P. B. Boivin, K2SKK

RCA Electron Tube Division, Harrison, N. J.

The Winter, 1962-1963, issue of HAM TIPS presented the first installment of a two-part article on a compact, mobile-type 50-watt amateur bandswitching transmitter designed for coverage of the six- and two-meter bands and employing RCA "quick-heating" tube types 4604 and 7905 for added power economy. In that issue, the authors covered such considerations as circuit description, variable-frequency oscillator, multipliers, driver, final amplifier, modulators, metering, transmitter power requirements, and auxiliary antenna and receiver switching. The article is now concluded with a discussion of chassis construction and layout, bandswitching details, capacitor-mounting details, VFO design, driver shielding and construction details, final-amplifier layout, modulator details, VFO calibration and alignment, alignment procedure for multipliers and driver, and general conclusions and installation tips.

Front view of WA2ELL's and K2SKK's mobile 50-watt transmitter. Unit measures approximately 12 inches in width, 5 inches in height, and 10 inches in depth.

Chassis Construction and Layout

Templates for the chassis layout are shown in Figures 3, 4, and 5. The main chassis is made of 20-gauge sheet brass to facilitate ground connections. The socket straddle shield for V4 is fabricated from 24-gauge copper. Aluminum angle stock (1½-inch by 1½-inch) is cut and drilled to tie together the front panel, main chassis, and modulator. Two more pieces of aluminum angle, ⅜-inch by ⅜-inch, are attached to the top and bottom edges of the front panel to hold the cover. This type of construction results in a finished unit which can be dash-mounted and requires minimum space in the front seat of the vehicle. The use of a perforated sheet-steel cover, which is mounted in two halves, provides easy