September 1964
50¢

CQ

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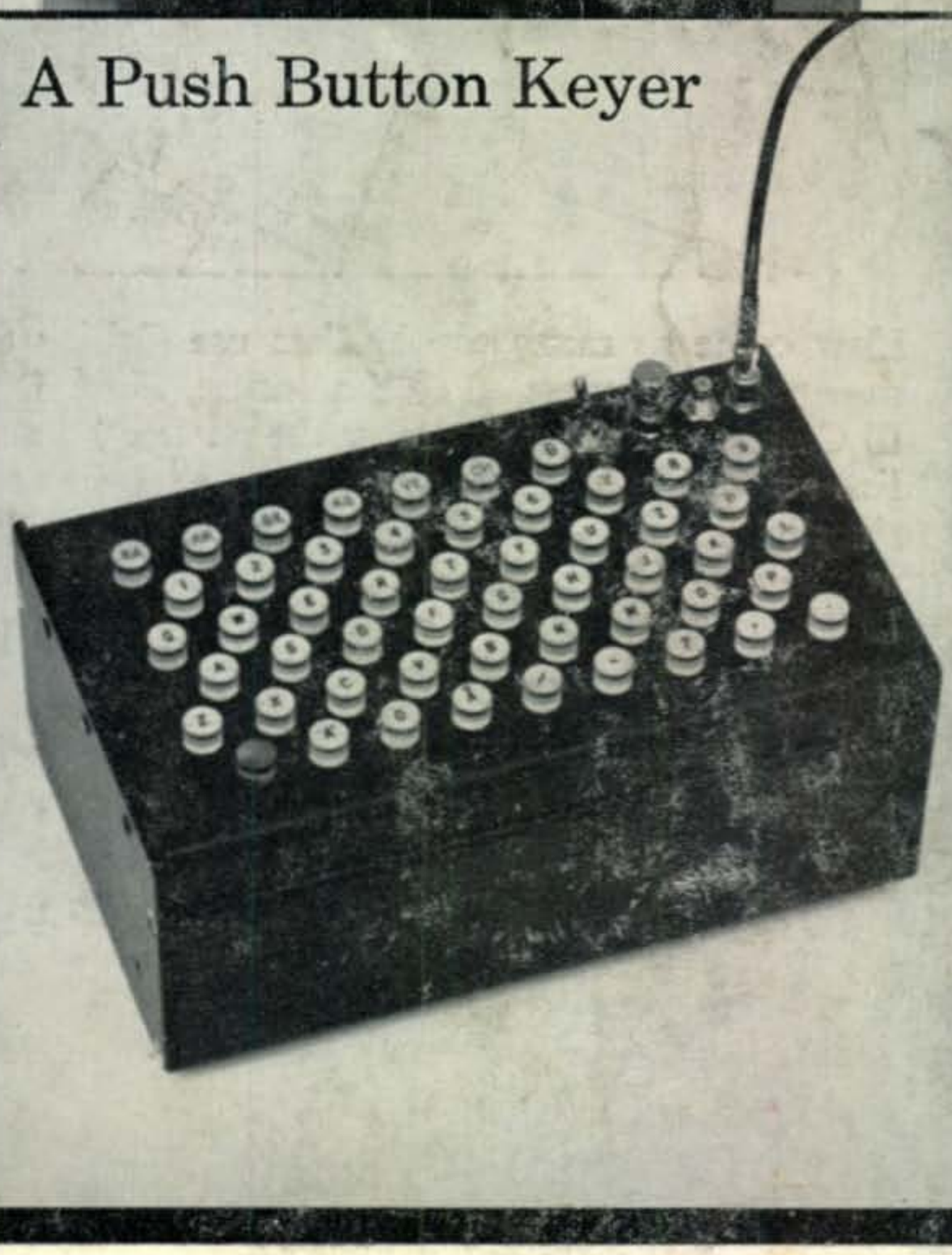
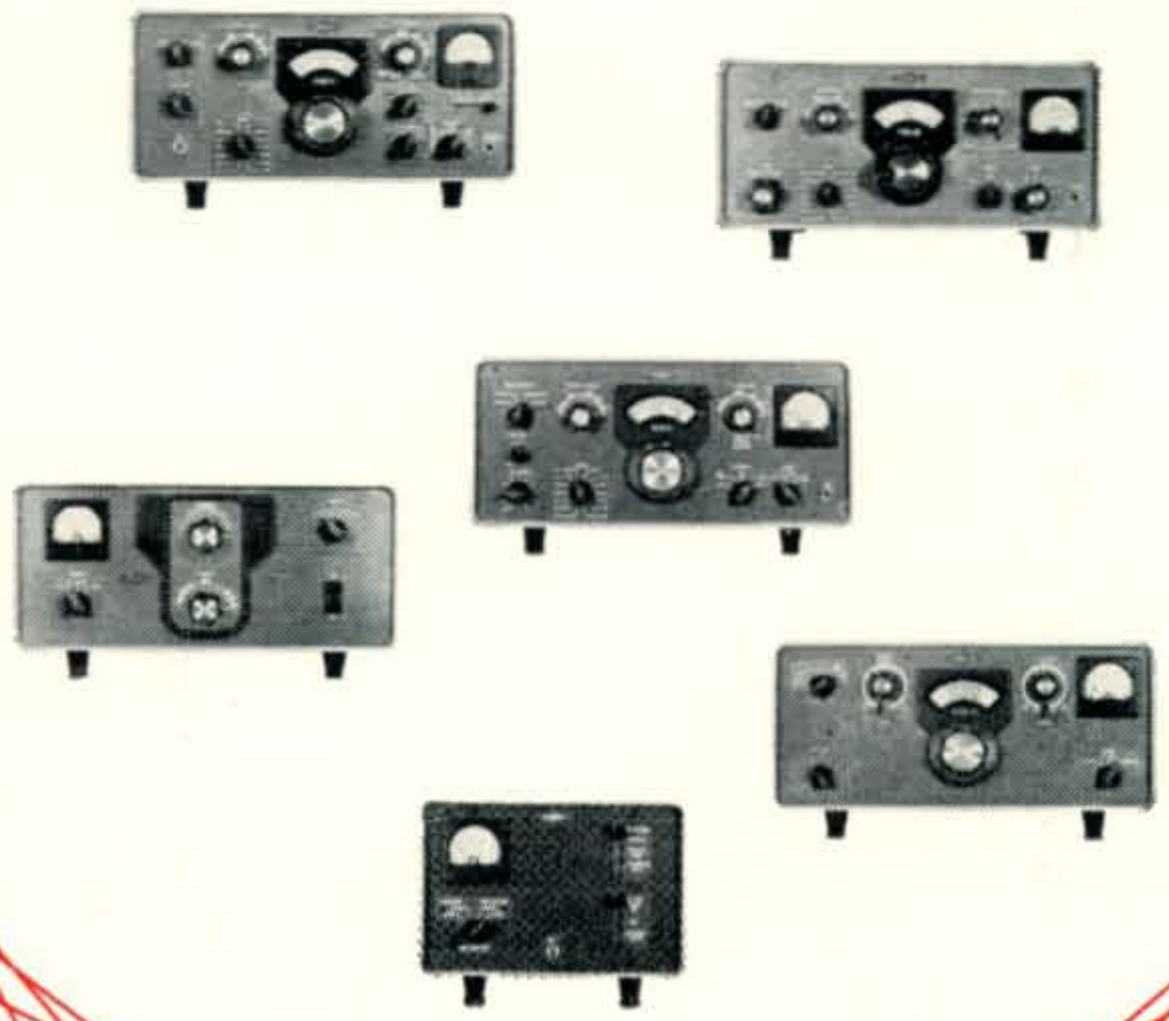
A Push Button Keyer



The Radio Amateur's Journal

Winner's Circle



How come so many top DX'ers use Collins S/Line equipment? To say nothing of all those sweepstake winners, RTTY winners, Field Day winners, traffic men, top amateurs everywhere. ☐ Collins users already know the answer because they're the winners we're talking about. ☐ Collins equipment offers more features than any other. Complete station compatibility; light weight; simplicity and styling; frequency stability; frequency calibration; more QSO's per kilocycle; mechanical filters; dual or single PTO control; automatic load control; negative R-F feedback. ☐ Today, some of these once-exclusive features have been incorporated as standard in all amateur rigs. But Collins is still the only equipment which offers *all* these features — and is still unexcelled in any of them. ☐ Join the winner's circle. A demonstration of S/Line equipment at your Collins distributor's can be very convincing. And don't forget to check those resale values. You'll be surprised to find out how little it costs to own the finest.

For further information, check number 3, on page 110

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Unconditional Guarantee is proof of the maker's absolute confidence in his product... and PR Crystals have been UNCONDITIONALLY GUARANTEED SINCE 1934. You're not taking the slightest chance when you put PRs in your rig, for you'll have the finest radio frequency control that money can buy! PR Crystals are made to PERFORM...under good conditions and bad. They have that extra measure of stability and dependability BUILT-IN, that guarantees years of outstanding performance. Get PRs today from your jobber.

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Frequency Ranges in Kcs.: 1750 to 2000 (160M); 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
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Official assigned frequencies in the range. Calibrated to .005%. 1600 to 10000 Kc. ..**$3.45** Net

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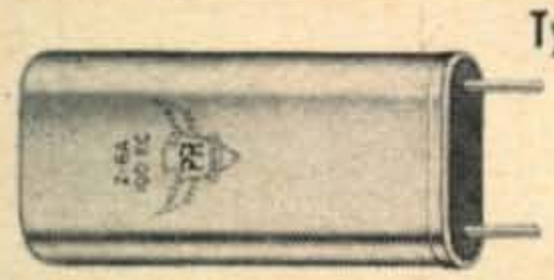
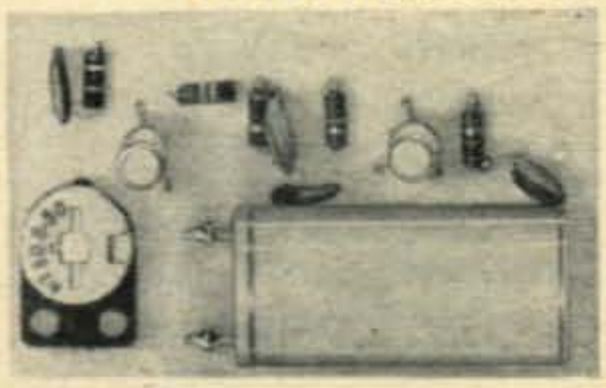
Suitable for converters, experimental etc. Same holder dimensions as Type Z-2. 1600 to 12000 Kc., (Fund.) ± 5 Kc. **$3.45** Net
12001 to 25000 Kc. (3rd Overtone) ± 10 Kc. .....**$4.45** Net

Type Z-6A, Frequency Standard



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

PR-100 Transistorized Oscillator



With PR-100 you can check harmonics at 100 Kc. intervals through 54 Mc. A precision oscillator, fully wired, ready to install. Includes a Z-6A Crystal. Power requirements: 12V DC @ 14 Ma. Oscillator output connects to receiver antenna, high side. Base is 1-7/8 x 2-13/16 inches. Negligible mounting space required. Weighs 2 ounces. .....**$12.95** Net

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

For further information, check number 1, on page 110

may we put in a plug for the transceive capability of the SX-117?

Before buying your next receiver, consider this fact: *The SX-117 alone* provides the built-in capability of transceive operation with the HT-44 transmitter, at the flick of a switch.

We hardly need list the circumstances under which such versatility is highly desirable, if not essential, to most amateurs.

This is just one of many good, solid reasons why the SX-117 is the most popular amateur receiver we've ever engineered.

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.

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.

CQ

The Radio Amateur's Journal

Vol. 20, No. 9 Sept., 1964

OFFICES

14 Vanderventer Avenue
Port Washington, L.I., N.Y. 11050
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Departments

INTERNATIONAL FREQUENCY METERS

designed for servicing!

Equip your lab or service bench with the finest . . .

Discover new operating convenience.

FM-5000 FREQUENCY METER 25 MC to 470 MC

The FM-5000 is a beat frequency measuring device incorporating a transistor counter circuit, low RF output for receiver checking, transmitter keying circuit, audio oscillator, self contained batteries, plug-in oscillators with heating circuits covering frequencies from 100 kc to 60 mc. Stability: ± .00025% +85° to +95°F, ± .0005% +50° to +100°F, ± .001% +32° to +120°F. A separate oscillator (FO-2410) housing 24 crystals and a heater circuit is available. Dimensions: FM-5000, 10" x 8" x 7½".

FM-5000 with batteries, accessories and complete instruction manual, less oscillators, and crystals. Shipping weight: 18 lbs. Cat. No. 620-103 . . . . . $375.00
Plug-in oscillators with crystal $16.00 to $50.00

C-12B FREQUENCY METER For Citizens Band Servicing

This extremely portable secondary frequency standard is a self contained unit for servicing radio transmitters and receivers used in the 27 mc Citizens Band. The meter is capable of holding 24 crystals and comes with 23 crystals installed. The 23 crystals cover Channel 1 through 23. The frequency stability of the C-12B is ± .0025% 32° to 125°F, .0015% 50° to 100°F. Other features include a transistorized frequency counter circuit, AM percentage modulation checker and power output meter.

C-12B complete with PK (pick-off) box, dummy load and connecting cable, crystals and batteries. Shipping weight: 9 lbs. Cat. No. 620-101 . . . . . $300.00

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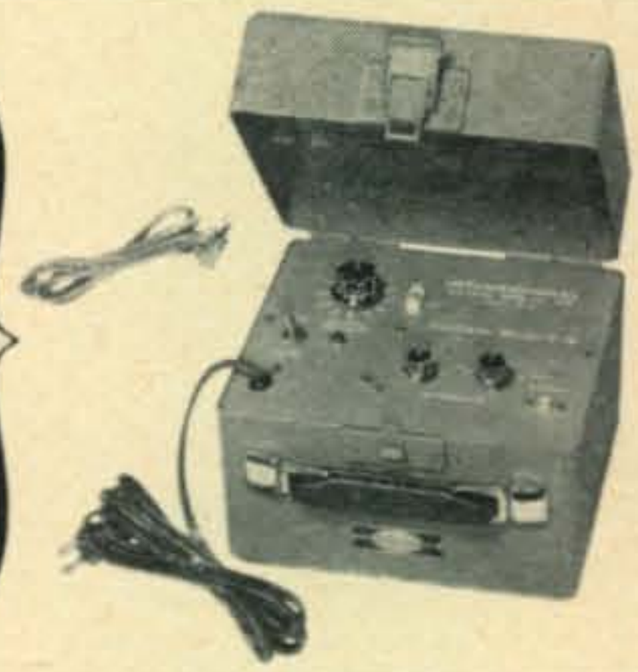
The International C-12 alignment oscillator provides a standard for alignment of IF and RF circuits 200 kc to 60 mc. It makes the 12 most used frequencies instantly available through 12 crystal positions 200 kc to 15,000 kc. Special oscillators are available for use at the higher frequencies to 60 mc. Maximum output .6 volt. Power requirements: 115 vac.

C-12 complete, but less crystals. Shipping weight: 9 lbs. Cat. No. 620-100 . . $69.50



C-12M FREQUENCY METER For Marine Band Servicing

The International C-12M is a portable secondary standard for servicing radio transmitters and receivers used in the 2 mc to 15 mc range. The meter has sockets for 24 crystals. The frequency stability is ± .0025% 32° to 125°F, ± .0015% 50° to 100°F. The C-12M has a built-in transistorized frequency counter circuit, AM percentage modulation checker and modulation carrier and relative percentage field strength.

C-12M complete with PK (pick-off) box and connecting cable, batteries, but less crystals. Shipping weight: 9 lbs. Cat. No. 620-104 . . . . . $235.00
Crystals for C-12M (specify frequency) $5.00 ea.

KEEPING YOU ON FREQUENCY IS OUR BUSINESS...

Write today for our FREE 1964 CATALOG

INTERNATIONAL
CRYSTAL MFG. CO., INC.

18 NORTH LEE OKLAHOMA CITY, OKLAHOMA

For further information, check number 4, on page 110

Happy Anniversary A.R.R.L.!

1964 marks the 50th anniversary of the founding of the American Radio Relay League. Eitel-McCullough, Inc. (30 years young in 1964) salutes the A.R.R.L. on the occasion of attaining the half-century mark in noteworthy achievements and leadership in amateur radio.

The vision and direction provided by the American Radio Relay League has strengthened and fostered the spirit of amateur radio at home and abroad. Continued mature leadership in the best interest of the Radio Amateur Service by the A.R.R.L. will insure that this unique avocation will prosper and grow during the coming years. All radio amateurs of good will salute the American Radio Relay League and join us at Eimac in wishing "Happy Anniversary A.R.R.L.!"

W1KKP
W1NZX
K1PRD
K2MTQ
W2UXY
W3YQM
W4TO
K4AIM
W5CGR
W5EYZ
W5FPV
W5SKL
K5QZC
W6ADK
K6AFH
WA6ANY
K6BAJ
WA6BAN
W6BAX
K6BCM
W6BDN
W6BHI
W6BMU
W6BZ
W6CEO
W6CDT
W6CHE
WA6CNL
W6DJI
WA6DPN
W6DVB
W6EXX
W6FBR
W6FJN
W6FKS
K6GJF
W6HB
W6IOH
W6IVZ
W6JBC
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WA6JTZ
W6KEV
W6WWD
W6KM
W6LOZ
K6MIT
W6MJG
W6MUC
W6SC
W6AY
W6MWT
W6NBD
W6NGP
WA6NWR
WA6NXB
K6OAZ
W6ODT
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W6PHS
WA6PMX
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K6VRQ
W6VW
W6OS
W1FEA
W6VYH
K6VQO
K6YEM
K6YKD
W6YSX
W6ZIU
W6ZLB
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K7BYQ
K7BZA
K7CQP
K7ELO
K7LFZ
K7OUM
W7SLC
W8QDI
W9IEU
W9RHV
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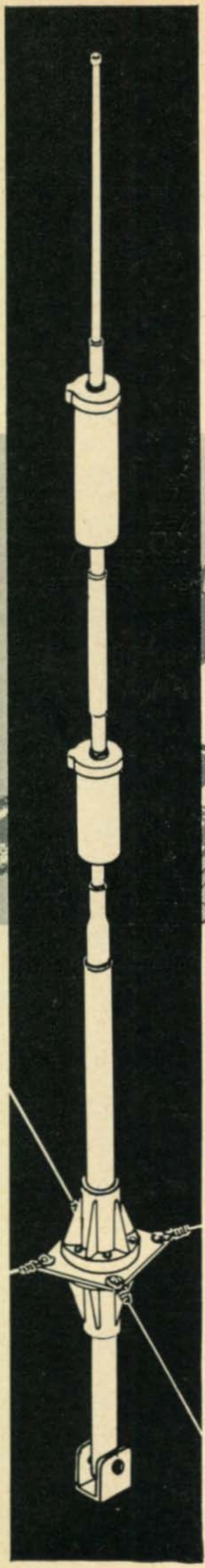
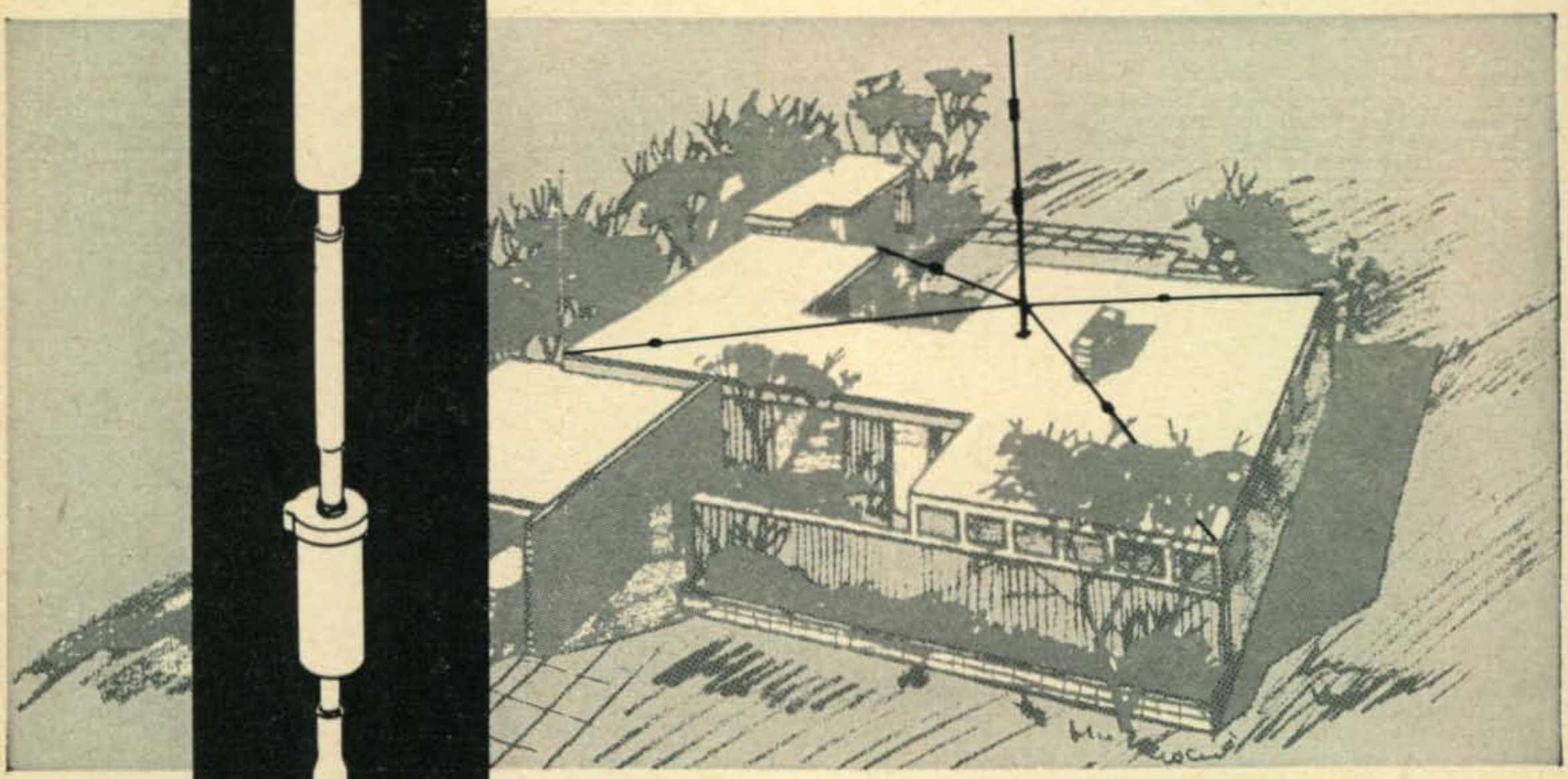


What's New in Verticals?



Setting the pace in 10, 15, 20 and 40 meters is Mosley's new RV-4 vertical antennas. These outstanding performance giving antennas can now be mounted on any roof as well as on the ground. They operate as a quarter wave vertical antenna on all four bands. The RV-4 features the Mosley slim line Trap-Master traps that have earned user acclaim through daily use in tens of thousands of installations throughout the world. These antennas have automatic band switching for 10 thru 40 meters. The RV-4 antennas are self-supporting and completely factory pre-tuned to maintain low SWR over entire range. The RV-4RK kit for roof mounting includes radial wire mast and hinged mounting. No radials required for ground mounting if a good ground connection can be provided within a few inches of the antenna base. Maximum power rating 750 watts on AM phone, 1000 watts CW and 2000 watts P. E. P. on SSB, input to final amplifier, Uses single 52 ohm coax line. Antenna height 20' 8-5/8" above insulator, with roof mount 25' 2-5/8" Weight of antenna 10 lbs., with roof mount 14½ lbs.

(In request of further information write for literature code # (8)

Mosley *Electronics, Inc.* 4610 N. Lindbergh Blvd. Bridgeton, Mo. 63044

For further information, check number 6, on page 110

ZERO BIAS

THE field of public relations is probably one of the most important to amateur radio, and yet it is undoubtedly one of the least popular. Amateurs, like most other avid hobbyists, tend to get deeply involved with their own enchanted little world of receivers and keyers and antennas with little regard to the image they project to their fellow citizens. But it is just this image that may mean the difference between a pleasant, amicable agreement and a tooth and nail court battle should a neighborhood problem crop up.

In years past (say the 1930's) amateurs were often looked upon in the same light as amateur astronomers, rocket experimentors or the airplane enthusiast down the street: with a condescending attitude and perhaps (secretly, of course) a little awe. He was a fellow who didn't create much of a nuisance and kept pretty much to his coils and tubes and stuff. No TVI, of course, and just an occasional case of phone BCI. From the public's point of view, it didn't take too much in the way of public service to justify our existence; an occasional hurricane, flood or such, and its inherent publicity was enough.

Of course times have changed. Two-way communications is no longer the mysterious phenomena it was to the layman, what with Citizens Band radio, two-way commercial radio, radiotelephones and so on. In these days of almost universal use of electronic devices, the likelihood of interference by an amateur with another service is frighteningly great. Who among us has never had at least a handful of interference complaints of various types? Very few, indeed.

The vast expansion of commercial communications sytems has, to many eyes, reduced the need for the amateur service as an emergency facility. In all but the severest natural disasters, commercial systems are able to provide at least *some* communications. And (again from the public's point of view) it is difficult for us to justify our occasional TVI or Hi-Fi-I with natural disasters, thankfully, so few and far between.

How then do we convince our public that we are a necessary and vital part of community life? We must do it through a carefully planned public relations program. Make your presence known to your community. Have a few neighbors in while you demonstrate message handling, phone patching and other small but routine public services you perform. It might be a good opportunity, too, to show them how your own TV set is entirely free of TVI. It is, isn't it? Might very well save a squabble or two later on. It's much easier to build good public relations before trouble erupts than to correct bad public relations after.

Is your club offering a local award or assisting the local sports car club at a rally? Don't keep it to yourselves. You'd be surprised at how receptive the local newspapers are to this type of news. It makes good reading and good publicity.

Planning a new array? Instead of breaking the news to the neighbors with a "here it is—like it or not" attitude, maybe a little "soft soap" beforehand will help them view it more kindly.

In short, a friendly and outgoing approach to existing or potential community problems will do more to perpetuate the fine hobby of amateur radio than all the court battles in the world. What's your attitude been lately?

A Visit To Alliance

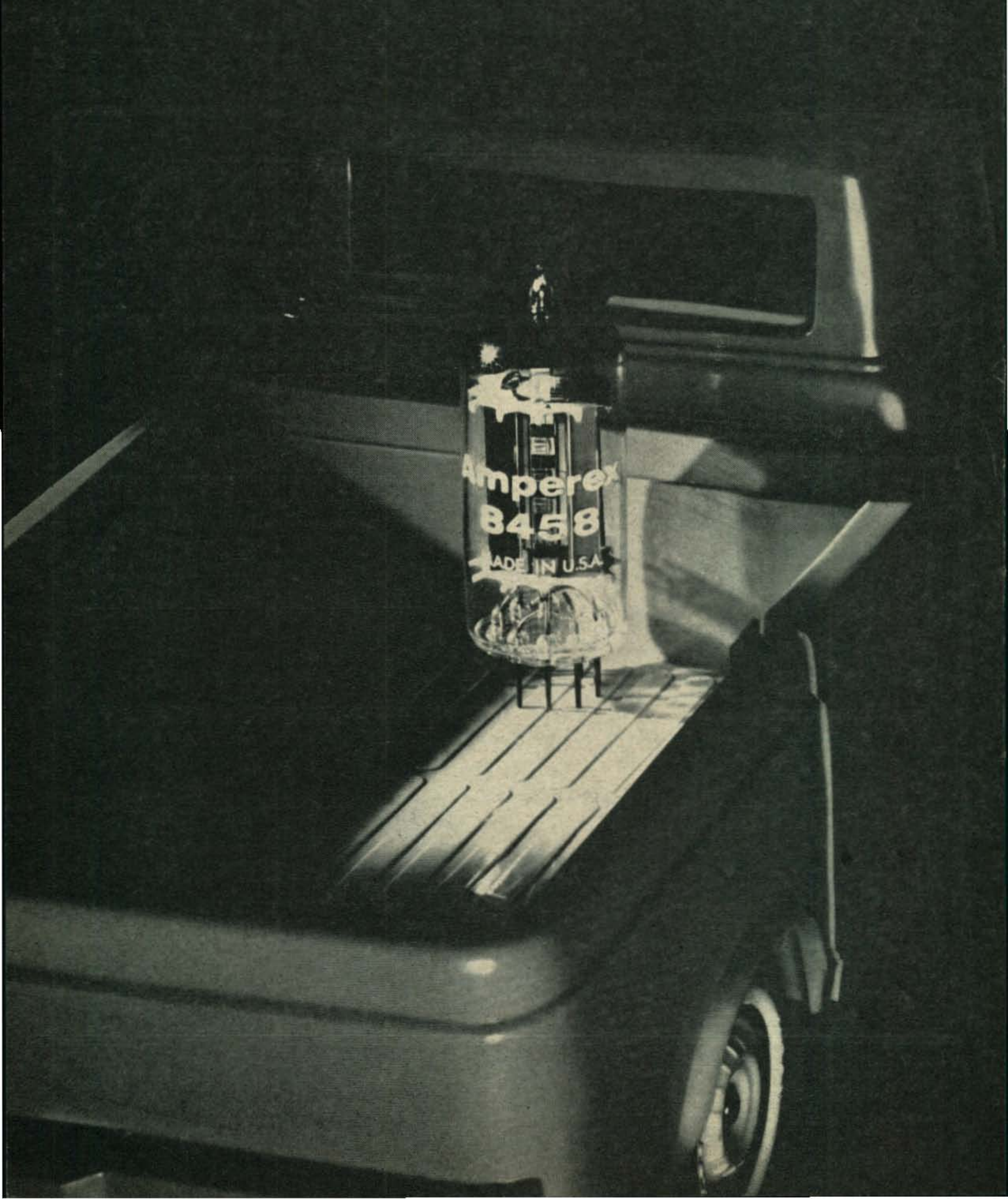
Back in June, we received a surprise phone call from the boys at the Alliance Company, a long familiar name in TV rotators. Seems we were being invited to an all-expenses-paid symposium on antenna rotators! So on a hot and muggy July 1 in rotten old New York, we (WB2AAI and myself) hopped a plane bound for Alliance, Ohio, the home of the TV rotor.

Three hours, one Caravelle and one 1937 vintage DC-3 later we were met at Canton-Akron airport by George Gemberling and Jack Bennet of Alliance who gave us the news that we were about to return to college. And so we did, to Mount Union College, the next day. Noontime found Tom and I shaking our heads in wonder that something as "simple" as an antenna rotator could involve so much engineering. Five o'clock found us amazed at the comparative durability of several different rotators used by hams.

The engineering department had cooked up

[*Continued on page 90*]

...and for twice the power from Mobile Communications Equipment, without radical design changes, there's the new Amperex 8458



If the world renowned Amperex 6360 is—as virtually all designers of mobile communications equipment agree—a truly great tube, its new derivative, the Amperex 8458 is an even greater one! For in addition to the great performance, great low-profile convenience, and great reliability of the earlier twin tetrode, the new 8458 can be counted on to deliver 30 watts of useful power at 175 Mc from less than 1.2 watts of drive power.

To drive the 8458, Amperex has developed a second new twin tetrode, the 8457, a 13.5 volt heater version of the 6360. It is ideally suited for use as a cascaded doubler-multiplier, driving the 8458 as a straight-through amplifier in the 150-175 Mc band. This combination of new Amperex tubes provides extremely stable power output under low voltage conditions, since more than sufficient drive is available. Because the profile heights of these two new tubes are identical with the older 6360, modification of existing circuit designs can be made with resulting improved power and performance.

Both tubes incorporate a 13.5 volt center-tapped heater; are internally neutralized and have indirectly heated oxide-coated cathodes.

8458
SIGNIFICANT CHARACTERISTICS
CLASS C RF AMPLIFIER AT 175 Mc

	CCS	ICAS
DC Plate Voltage	400	450 volts
DC Grid No. 2 Voltage	155	200 volts
DC Grid No. 1 Voltage	–59	–50 volts
DC Plate Current	85	110 ma
Useful Power Output	20	30 watts
Drive Power	1.0	1.2 watts

Both the 8457 and 8458 are immediately available in production quantities from stock. For complete data on these and other Amperex tubes for mobile communications applications, write: Amperex Electronic Corp., Tube Division, Hicksville, L. I., New York 11802.

Amperex®

IN CANADA: PHILIPS ELECTRON DEVICES LTD., TORONTO 17, ONT.

For further information, check number 9, on page 110

Facts Don't Matter?

Editor, *CQ:*

I regret that this, my first letter to any publication should have to be written on such a sad note as the event of the verbal war now being waged in ham circles. Several years ago I became interested in v.h.f. operation; so have not learned of this until recently when I heard another ham really lacing into the ARRL on six meters. I was flabbergasted! I know that the officials of ARRL are only human and do make mistakes from time to time. But to be so completely un-reasonable as to carry on like this kid did is utterly beyond me. When I challenged him on the air to supply actual facts, he informed me that he couldn't recall them off hand and "Besides, it don't matter." I think that it matters very much. All hams should be aware by now that without ARRL's past and present representation we would not exist as an internationally recognized radio service. So I feel compelled to state my feelings on this matter. If those who wish to tear amateur radio apart will only continue to get mis-informed and un-informed fellow hams to comment and harangue on the air, they will surely win. Please fellows, if you want to get into the act, make sure that your information is correct before you make jackasses of all hams in general.

Stuart M. Zuckerman, K4AEJ
160 Howard Street, S.E.
Atlanta, Georgia 30317

Our Readers Grow Weary

Editor, *CQ:*

For many years I have been a reader of *CQ* and have especially enjoyed "Letters to the Editor."

However, I find myself growing weary of a solid column devoted to the escapades of *73 Magazine, et al.*

I hope the column returns to its former status very soon.

Raymond H. Leeson, WA2FRR
16 Fitch Avenue
Auburn, New York

It will Ray, just as soon as the flood of mail concerning this distasteful subject subsides.—K2MGA

Amateur Radio Tomorrow

Editor, *CQ:*

I wish to thank *CQ* and William Orr for presenting "Amateur Radio Tomorrow," in July '64, *CQ*. I found it extremely interesting; I was glad to see all of the facts printed clearly for a change (not as in *QST* or *73*). I have been an s.w.l. for over two years and I am now studying for my Novice ticket. I have read *CQ*

For further information, check number 10, on page 110

Thinking about going to SSB?

. . . if you own a Viking "Valiant", "Valiant II" or "Five Hundred" . . . here's a deal for you!

LOW PRICE OFFER EXTENDED . . . DUE TO POPULAR DEMAND!

If you own a Viking "Valiant", "Valiant II" or "Five Hundred" – then here's your chance to go to Single Sideband at a tremendous saving! All authorized Johnson Amateur Equipment Distributors have $100 certificates, which when validated by him, may be applied against the purchase price of a new Viking "SSB Adapter".

Save $100 by going to SSB now!

SAVE $100.00 NOW!

Certificates are available only through your authorized Johnson Amateur Equipment Distributor. See him soon and save $100.00 by going to SSB now!

SSB ADAPTER – Popular, filter-type SSB generator – bandswitching 80 through 10 meters – more than 50 db sideband suppression. Features built-in multiplier requiring VFO input only – design and front panel controls make operating practically foolproof! Superb audio fidelity and balanced audio response. 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**

(WITH CERTIFICATE: $269.50)

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

For further information, check number 11, on page 110

for almost two years also, and enjoy ZERO BIAS, USA-CA, HAM CLINIC, NOVICE, and v.h.f.-u.h.f. articles. Of particular interest to me were representation of s.w.l. in USA-CA; May '64 ZERO BIAS; June '64 DDRR Antenna; and July '64 "Amateur Radio Tomorrow."

I approve of *CQ*'s incentive licensing proposal except for maximum power. I think that on 160-10 meters, the Advanced Class licensee should be allowed 1,000 watts maximum, and the General-Conditional licensee should be allowed 500 watts maximum; on 6 meters and up, the Advanced Class licensee should be allowed 2,000 watts maximum, and the General-Conditional-Technician licensee should be allowed 1,000 watts maximum.

W. Lynn Bailes, III (age 16)
3033 Maywood Road. SW
Roanoke, Virginia 24014

Editor, *CQ:*

The article by William I. Orr in your July issue was really worth printing. Amateur Radio Tomorrow answered my questions about frequency allocations. One interesting point I noticed in the article was that Mr. Orr considers amateur radio a service. I am in disagreement with this, as is the ARRL. Section five of the Amateurs Code states "Radio is his hobby." Although amateur radio does perform many valuable services, I feel it is a hobby since most of the time the bands are used for the amateurs own enjoyment.

Jon D. Nagy, WB2GFY
245 Adelaide Avenue
Highland Park, New Jersey

Our Warning Is Well Heeded

Editor, *CQ:*

Your warning (July '64, ZERO BIAS) has been received here. I'm truly amazed. I always thought that you guys washed your mouths with soap when you said "ARRL."

Well, I'm learning.

Dick Harrington, WA6SCJ
412 Second Street
Orland, California

Editor, *CQ:*

Many times in the past I have been ready to write a letter in reference to an editorial, and after reading July's ZERO BIAS I feel that now I must, so here goes.

I've only been an amateur for about a year and a half and did not think myself qualified to express an opinion. I am sure that I will be called an alarmist by some of my friends, but in the light of this I must agree wholeheartedly with your outlook as expressed in July's ZERO BIAS.

The subject of the editorial is something I have been harping on for better than a year; it is typified in many articles and even in the advertising content of many well known equipment manufacturers. It seems that there is a growing feeling of futility among the amateurs as to the longevity of ham radio as we know it at the present, a great lack of security seems to be prevalent among those who would prefer to believe the "Wayne Greens" and the like. The story of Wayne Green's activities has only come to my attention since the first of this year and I must admit that I was rather appalled. Such activities on the part of an amateur seem to be rather ridiculous in light of basic concepts behind being a radio amateur. It seems that all his activities are strictly for personal gain, and for the degrading of the principles for which we all cherish.

The underLIEing factions concerned with the eventual ruin of amateur radio seem to be pointing out to all of the uninformed masses that if we do not cast aside our ARRL affiliation that we are doomed by such things as "Incentive Licensing, I.T.U. Conferences and the like." This is irresponsible thinking and complete lack of understanding of basic need for this type of organization and authority.

It appears to this reader that interest in ham radio as an art and a hobby for the betterment of those involved throughout the world has deteriorated to the point that most are becoming "switchboard operators." I digress from the well worn phrase "appliance operator," because even these must recognize what the equipment is, and the work it was intended to perform. . . .

Your editorial has pointed up to me that I cannot actively support the ARRL by merely belonging and paying my dues. Either we get together and support the League or perhaps the portent of doom being sold

from 2 to 160 meters

relax...
for the BEST
in HF and VHF
listening

HAMMARLUND'S NEW HQ-170A-VHF

the only* receiver capturing all popular Ham Bands.

The exciting HQ-170A-VHF is the **first** and only Ham Band receiver that gives you **everything** you want. Separate NuVistor front ends (0.3μV for 10 db S/N) for both 6 and 2 meters completely eliminates the need for add-on converters or jury-rigged adaptations. Built-in 6 and 2 meter operation employs **matched circuitry** for outstanding performance.

Here is an SSB receiver that combines basic operating excellence with all of the extra features you want to make it a versatile, "fun-to-work-with" unit. Full coverage from 2 to 160 meters, excellent electrical and mechanical stability, expanded vernier tuning and a host of truly incomparable HQ-170A features makes this receiver the new **First Choice** for the amateur fraternity.

The HQ-170A-VHF is the most versatile, and most **complete** amateur band receiver now available on the market—one neat package contains all the flexibility you need—superlative AM, CW and SSB reception on **All** popular amateur bands.

Coming soon—Matching transmit accessories for the Fabulous HX-50.

*Except for the Hammarlund HQ-110A-VHF

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MANUFACTURING COMPANY
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53 West 23rd Street, New York 10, New York

I'm intererested. Please send HQ-170A-VHF info to:

Name_____

Address_____

City_____ Zone_____ State_____

For further information, check number 13, on page 110

to amateurs of today will eventually come true. I certainly will do my part in the future to allay any such eventuality. We as amateurs need the League just as badly as they need us.

I think a quote by an amateur made to me will outline the type of thinking that is prevalent among this strong but small band of "Greenies." While visiting a local ham appliance dealer, an amateur who professes to having been an amateur for twenty three years and a holder of an Extra class license stated that "If I hadda go back ta usin c.w. I'd quit amachoor radio." Now what the hell kind of ham is this! He comes in contact with many young and aspiring hams who would no doubt believe that his advice or comments are to be taken as law, I can't help but feel this fellow does not deserve the privilege he has.

To summarize I wish to thank *CQ* for opening mine and many other eyes with your forward type of editorial, and to congratulate you on a very fine stand. You may use this letter to help fill your overflowing waste basket or maybe even print it.

John Lansing, WB6ARP
10591 Telfair
Pacoima, California

Lasers

Editor, *CQ:*

I really enjoyed the article on Lasers in the August issue of *CQ*. I am extremely interested in the subject and I would like to know of any construction information on Lasers. Also, I would like to know of any place where I might obtain materials for building a Laser.

Joe Craig, WA4IPE
Box 62
Hollywood, Fla.

Part II in this issue gives more information on Lasers. Mr. Leinwoll may be able to supply some sources of construction data.—K2MGA

On Zero Bias

Editor, *CQ:*

Congratulations and well done on your May and June editorials!

It is sickening to realize that we have someone in the amateur ranks so out of step with our principles and traditions that you felt the need to devote part of your magazine to helping expose him, but he has become so obnoxious that the things in those editorials needed to be said.

Incidentally, I am in favor of RM-499, and I am sending *73 Magazine* a copy of this letter since they haven't included me in any of their "polls."

Roy Hejhall, K7QWR
8713 East Oak St.
Scottsdale, Arizona 85257

Editor, *CQ:*

In reference to your June ZERO BIAS you surely have changed your position from previous editorials. However, no one has changed as much as I have in so little time. I used to think how amateur radio was falling apart. When the ARRL presented RM-499, I was positive that doom would soon overtake us. However, one does not always see both sides of the argument. No one man can or should have the power to decide the fate of amateur radio. It takes a team, a league if you will, to settle the arguments. And so, *CQ* and amateurs, respect towards the ARRL means respect towards amateur radio.

I apologize for any comments that I may have made, detrimental to the league during the onset of RM-499.

Stephen Sauer, WA9ASZ
6102 Grandview Drive
Indianapolis, Indiana 46208

Editor, *CQ*·

I just finished reading the editorial in the July *CQ*. I think it is excellent and very much to the point.

I have developed a great respect for *CQ* and the staff for the way you have handled your end of the very difficult position we find ourselves in due to the tactics of the group mentioned in your July editorial.

I must admit I lost respect for *CQ* during Wayne Green's reign. I am very pleased to see that things have changed and that you have this behind you.

Bill Eitel, W6UF
Pres., Eitel McCullough, Inc.
301 Industrial Way
San Carlos, Calif.

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hy-Q Traps

...a totally new dimension in multi-band antenna performance

YEARS IN THE MAKING There's no guesswork involved where Hy-Gain's all new Hy-Q Traps are concerned. They are the product of countless hours of research – months of field testing – weeks of exhaustive and severe environmental torture. Now, on new higher performance Hy-Gain multi-band trap antennas...separate traps for each band, featuring...large diameter coils that develop an exceptionally favorable L/C ratio and very high Q performance – air dielectric capacitor – mechanically superior solid aluminum housings...the most advanced and unquestionably the finest parallel resonant traps ever offered to the Amateur.

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8430 N.E. Highway 6 – Lincoln, Nebraska

For further information, check number 15, on page 110

Editor, *CQ*:

May I offer my congratulations on the editorial in the July issue. I have been a League member for over 30 years and hold several of their Communications Dept. appointments, and while I realize that nothing on this earth is perfect, I believe the ARRL is sincere in their efforts to perpetuate this wonderful hobby of ours. Editorials such as yours certainly help to strengthen your position among the more responsible, serious amateurs.

George A. Jesse, W9IQW
930 Second St.
Port Edwards, Wisconsin

Editor, *CQ*:

For the past three months, your editorial page alone has been worth the price of the magazine. Congratulations!

The July editorial proved again that *CQ* is aware of the danger from the "John Birchers" of amateur radio; the lunatic fringe that would go to any extreme to destroy the ARRL.

However, would it not be proper to ask why *CQ* does not set its own house in order? One of the leaders of this crusade to villify the ARRL is one of your own contributing editors, K6BX. Granted, for the last few months he no longer uses the pages of *CQ* to spread his venom, but, over the air and through the many publications (?) he issues, he continues to be the leading source of these unfounded and misleading rumors. Over the air, after one of his many tirades against the ARRL, he never fails to mention the fact that he is an editor of *CQ*.

The management of a publication such as *CQ* can ill afford to have as one of its editors an individual whose thinking and stated aims are at such variance with their own.

Lee Roy Scott, W5KHL/W3PGB
335 Burwood Lane
San Antonio, Texas

Regarding Clif's opinions, I can only say that they do not *reflect our own. Clif is employed by* CQ *only in the capacity of USA-CA. Custodian, a job he handles in an admirable manner. We believe that our house* is *in order and that Clif has as much right to express his thoughts as any of* CQ's *hundreds of authors. However, this does not alter the fact that we are making a sincere effort to convince Clif that his thinking is way off base.*—K2MGA

The "Goldwater Bill"

Editor, *CQ*:

When I read the paragraph headed "Reciprocal Privileges" in your August ZERO BIAS I concluded that either you or W4VZO is guilty of downright *Bias*. How could any fair-minded amateur write about "Public Law 88-313" otherwise known as the "Goldwater Bill," without mentioning Senator Goldwater, K7UGA. You made sure to mention President Johnson by name for signing the bill which is only a perfunctory action on his part, yet fail to mention Senator Goldwater by name who actually fathered the bill and did all the leg work in guiding it from its inception.

It is shocking to find this sort of thing in an amateur's journal and a good example of why you have been accused of poor and, in this case, biased journalism.

Ed J. Sheehy, K2YFM
50 Brookside
Allendale, New Jersey

Your comments, apparently, fail to take into consideration the fact that, all politics aside, Lyndon B. Johnson is *our President and he* is *responsible for the final approval of the Bill. Although Senator Goldwater was instrumental to the passage of the bill, the fact remains that he was one of* thirteen *sponsoring Senators.*—K2MGA

Stamp Collectors, Our Apologies

Editor, *CQ*:

"When you are no longer able to do anything useful—take up amateur radio."

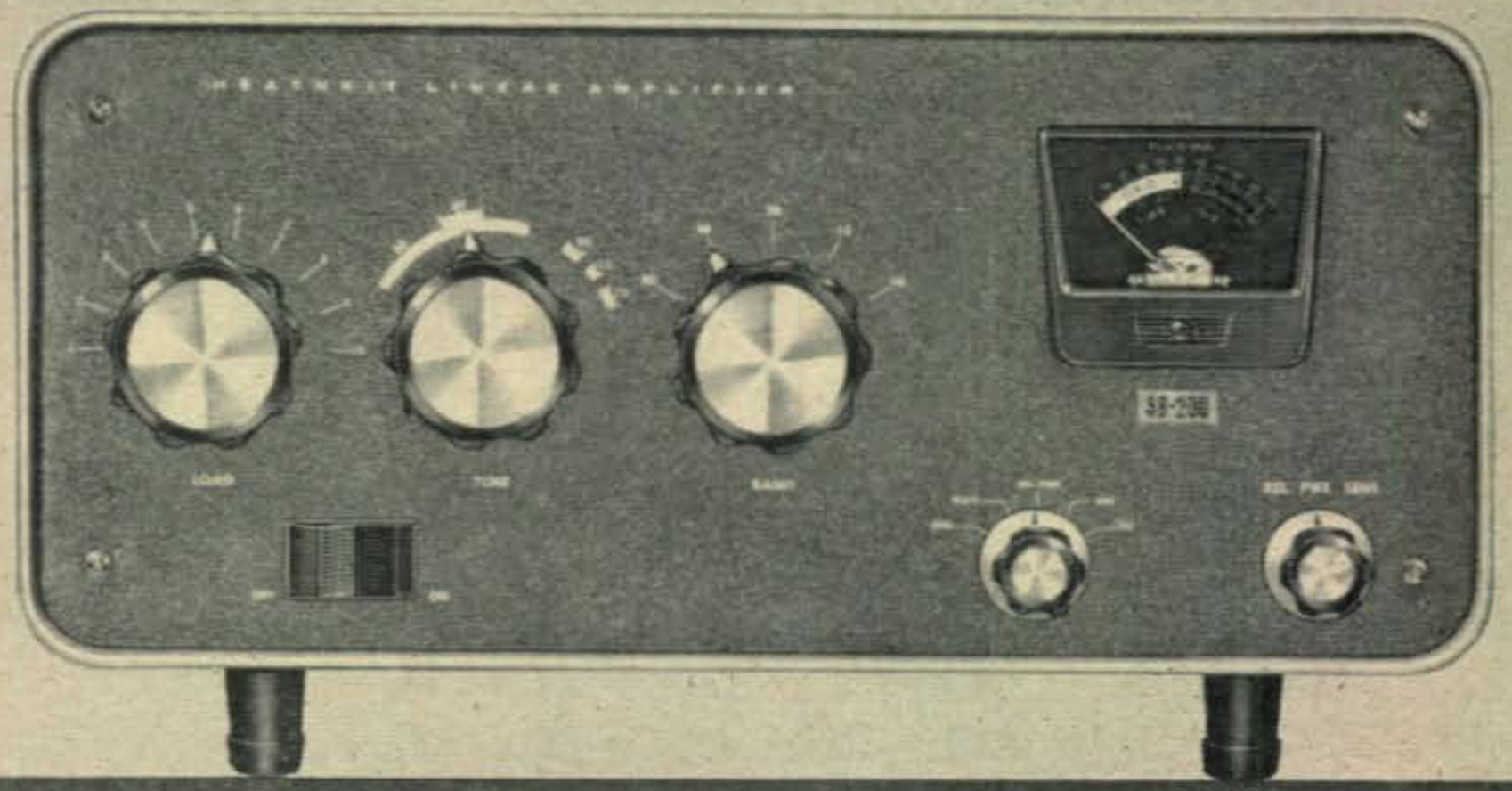
I wonder if such a statement would be appreciated by the individuals who persist in recommending philately to frustrated hams?

Why do we have to belittle another activity to stress a point. It looks like a case of ignorance and stupidity. Being ignorant of the fact that philately, like amateur radio, has progressed in the past few decades; stupid for expressing opinions based on feelings instead of facts.

[*Continued on page 104*]

#3 IN THE HEATHKIT® SSB SERIES

SB-200 LINEAR AMPLIFIER AT ONLY $200.00



• 1200 watts PEP SSB—1000 watts CW • 80 through 10 meter band coverage • Built-in SWR meter—antenna relay solid-state power supply • Automatic Load Control (ALC) • Shielded, fan-cooled amplifier compartment • Pre-tuned cathode input circuit • Circuit breaker protection—no fuses • 120/240 volt operation

Handsomely styled to match the Heathkit SB-300 Receiver and SB-400 Transmitter, the new SB-200 is a completely self-contained desk-top KW Linear that provides globe-circling SSB power at tremendous savings!

Many Advanced-Design Features! Incorporated in the SB-200 is a pre-tuned cathode input circuit for maximum efficiency and low distortion . . . ALC output for automatic exciter control . . . a rugged, well-rated solid-state power supply, protected by circuit-breakers (No fuses to replace or worry about) . . . two heavy duty 572B/T-160-L final amplifiers, fan-cooled for maximum life . . . complete shielding for maximum TVI protection and stability . . . plus a built-in SWR meter and antenna relay for full operating convenience. Antenna is automatically transferred to the exciter when the Linear is switched "off".

Quality Built Throughout! A heavy-gauge one-piece aluminum chassis, partitioned for extra strength and isolation of circuits . . . use of high quality well-rated components . . . and clean circuit layout all contribute to assure extra years of dependable, trouble-free performance.

Complete Operating Versatility! Compact and lightweight the SB-200 is an ideal companion for the SB-400 Transmitter, the soon to be released SB-100 Transceiver and nearly all other popular SSB & CW exciters in use today! Power supply operates on either 120 or 240 volt power sources for use anywhere. When you go "high power" choose the SB-200 for extra value, performance and dependability!

Kit SB-200, 38 lbs., $20 dn., $17 mo. $200.00

SB-200 SPECIFICATIONS—Band coverage: 80, 40, 20, 15 & 10 meters. **Maximum power input:** 1200 watts P.E.P. SSB, 1000 watts CW. **Driving power required:** 70 to 100 watts, depending upon frequency. **Duty cycle:** SSB, continous voice modulation; CW, 50% (key down time not to exceed 5 min.). **Third order distortion:** 30 db or better at 1000 watts P.E.P. **Output impedance:** 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. **Input impedance:** 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. **Meter functions:** 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. **Front panel controls:** Load; Tune; Band; Relative Power Sensitivity; Meter switch, Grid-Plate-Rel, Power-SWR-HV; and Power Switch, on/off. **Tube complement:** Two 572-B/T-160L (in parallel). **Power requirements:** 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.) **Cabinet size:** 14⅞" W x 6⅝" H x 13⅜" D. **Net weight:** 35 lbs.

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Name_____
(Please Print)
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City_____ State_____ Zip_____
Prices & specifications subject to change without notice. AM-148R

For further information, check number 17. on page 110

Henderson, Kentucky

Henderson Amateur Radio Club's first annual Hamfest will be held at Henderson, Kentucky, on September 27. The first prize is a NCX-3 Transceiver with an a.c. power supply and Speaker. Tickets are available for $1 each. The Hamfest will be held at Park Field just north of Atkinson Park, where there is plenty of parking. Food will be available on the grounds. Registration will begin at 9 A.M. For further information contact Owen L. Kanipe, WA4KZI, Box 83, Henderson, Kentucky.

Walla Walla, Wash.

The Walla Walla Valley Radio Amateur Club, W7DF, will hold their 18th annual all-family picnic and hamfest on Sept. 19th and 20th at Jefferson Park. On Saturday night, Sept. 19th from 6 to 11 P.M. there will be a film depicting ham activity in times of disaster. Sunday's activities will include swap shop, games, displays and potluck lunch. Registration from 10 A.M. to noon is free. Also scheduled is the annual meeting of the Minows. Contact Pat Stewart, W7GVC, 1404 Ruth Avenue, Walla Walla for brochure.

Uniontown, Pa.

The Uniontown Amateur Radio Club is having their 15th Annual Gabfest on the Club Grounds, old Pittsburgh Rd., on Sat. afternoon and evening, Sept. 19. Refreshments will be available. Stag affair. Registration is $2.00.

Peoria, Illinois

On Sunday, Sept. 20, the Peoria Area Amateur Club will hold its Hamfest at Exposition Gardens, two miles west of Jct. 88 and Northmore Rd. at State Police Headquarters. There will be lunches, free swap section, contests and cartoons. Registration is $1.00 and $1.50 in advance. For Pre-registration and further information, write to Ferril Lytle, W9DHE, 419 Stonegate Rd., Peoria, Ill.

Mays Landing, New Jersey

SCARA's First Annual Hamfest will be held on Sunday, Sept. 20, at Lake Lenape Park, Mays Landing, N. J. There will be free rides for the children, picnic and camping areas, swimming and many other attractions. Registration time is 9 A.M. and the fee is $2.00. For advance tickets and further details, contact Charles Bengal, W2TUR, 815 Seaside Avenue, Absecon, N. J.

Neuvo Laredo, Mexico

The Radio Experimentors Club of Nuevo Laredo are holding an international get-together from Sept. 18 to 20. All Hams wishing to come are invited. Entertainment will include the Annual Mexican Fair and a Bull Fight. Registration fee is $8.00. Please contact Manual Flores, 1314 Iturbide St., Laredo, Texas for further information.

Sacramento, Calif.

In celebration of the Golden Anniversary of organized Amateur Radio, there will be a 1964 Pacific Division ARRL convention from Sept. 25 to 27. It will be sponsored by all the Radio Clubs in the Sacramento area. Special exhibits, technical talks, Wouff Hong, transmitter hunts, luncheons and fashion shows will be among the many events planned. Pre-registration deadline is midnight, Monday, Sept. 14. The cost of registration and banquet is $8.50 and the Ladies Luncheon $3.00. For further information and banquet reservations, write to: 1964 Pacific Division Convention Committee, P. O. Box 214155, Sacramento, California 95821.

NEWS

B & W OFFERS AMAZING Model 6100 TRANSMITTER FACTORY DIRECT!

NEW LOW PRICE!

NOW ONLY $495.00 NO TRADES

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Here's why B & W's Model 6100 has been called the "Most Amazing Transmitter of Our Time"!

- The Barker & Williamson Model 6100 Transmitter has been engineered and built to give the discriminating operator the ultimate in SSB, CW and AM communications.
- The 6100 uses the B & W crystal controlled frequency synthesizer, producing an order of stability which up to this time has been available only in costly military and commercial communication systems.
- The crystal lattice filter method of sideband generation is employed. Superior sideband suppression results.
- Solid state rectifiers are used.
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Complete Radio Communication Systems and Equipment

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See us at The National ARRL Convention

For further information, check number 19, on page 110

Winnipeg, Manitoba, Canada

The Manitoba Association of Amateur Radio Clubs is sponsoring the "Mid Continent Hamfest" on Sept. 5th anl 6th at the Riviera Park on Highway 75. The usual swap and shop plus demonstrations and activities for young and old will make this Hamfest very worthwhile.

Entertainment for the XYL and plenty of prizes. Saturday night dance and Sunday banquet. For registration information and hotel accommodations write to Russ Down, VE4DE, Box 475, Winnipeg, Canada.

Malaga, New Jersey

The South Jersey Radio Association will sponsor its annual gala Hamfest on Sept. 13, at the Molia Farms, Malaga, N. J. Advance registration for non-club members is $2.00 with Sept. 6 as the deadline. General admission at the gate will be $3.00. Day's activities will include 2 and 6 meter hunt, swap and shop, pony rides, games, and swimming for the children, OM's and XYL's. All are invited . . . call Joe Duffin, W2ORA, 247/257 King's Highway, West Haddonfield, N. J. Phone 428-5759.

Findlay, Ohio

The Findlay Ohio Hamfest will be held at Riverside Park, Sept. 13th. Everybody is invited. Entertainment for the whole family. Bazaar for the women and playgrounds for the children. Bring your picnic baskets, or snacks available at the park. Talk in on 75-6-2 meters. 2 meter transmitter hunt. Tickets are available from Dennis Quick, K8LEU, 834 Summit Street, Findlay and Clark E. Foltz, W8UN, 122 W. Hobart, Findlay.

Anthology of Amateurs

WA9CHG would appreciate it if readers would send him lists of famous amateurs known to them. He collects letters from famous hams (like K7UGA, W4CF, and W6ZH). Write Len at 221 E. Valletts, in Elmhurst, Illinois.

Saddle Brook, N. J.

The East Coast VHF Society will again entertain its members and their many friends at its 6th Annual Hamfest and Old Style Picnic to be held on Sat., August 29th at Saddle Brook Park, Saddle Brook, N. J., starting at 10 A.M. Games, contests, prizes, displays, and many other interesting events for all age groups. Radio facilities will operate on 2, 6, and 10 meters to provide assistance in readily locating the park. Registration and parking are free. Food and soft drinks will be available.

Reno, Nevada

The Nevada Amateur Radio Assoc. (NARA) is sponsoring the Nevada Centennial Hamfest on August 22 and 23 at historical Bowers Mansion located 20 miles south of Reno on Route 395. Registration is $2.00. For further information write NARA, P. O. Box 2534, Reno, Nevada.

Stockholm, Sweden

Stockholm's Radio Amateurs are holding their field days on Sept. 4, 5, and 6th. A contact during this period is valid for 5 points for the WSRA diploma. For further information write to S. Larson, EL8B, (new address) Sandelsgatan 25, Stockholm No, Sweden.

Granite City, Illinois

The annual St. Louis area Hamboree will be held Sunday, Sept. 27, at the Egyptian Radio Club grounds, just across the Mississippi River from North St. Louis. There will be prizes, hidden transmitter hunts, code speed contests, and other events. All proceds from this affair will go to their area disaster communications fund to be used in emergencies. For further information, contact Harold Jensen, W9DJG, 3519 California, Alton, Illinois.

Correction

Many inquiries have been received about the values of the relays incorporated in KH6CU's article, "Toots" in May, *CQ*. The relays are: K_1-10,000 ohm plate circuit relay (P&B LM-5 s.p.s.t. or LM-11 d.p.d.t.); K_2-1000 ohm Keying relay (Sigma 41F-1000-S/SL); K_3-Antenna relay.

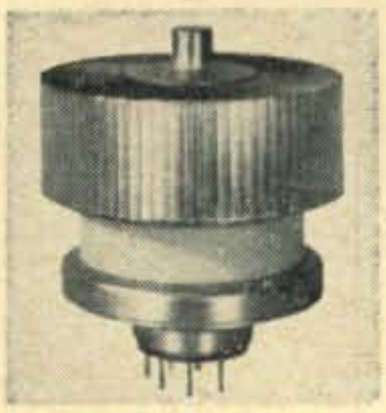
PATTERN FOR PERFORMANCE

Here is a straightforward approach to the problem of preventing electrons from returning to the screen region of a transmitting tube. When channeled into beams like those below, electrons reach the anode, where they do their useful work. Penta's exclusive, patented vane-type suppressor grid does the trick.

The characteristics of Penta tubes employing this electrode geometry approach those of the theoretically perfect beam tube. Plate current is practically independent of plate voltage. Kinks and wiggles are absent. Plate voltage can swing well below screen voltage without appreciable loss of current.

The result is outstanding linearity, efficiency, stability. For example, Penta's PL-8295A—the ceramic version of the famous PL-8295/172—delivers 1000 watts of Class AB_1 useful output at only 2000 plate volts . . . more than 1500 watts at maximum Class AB_1 ratings. Introduced in 1955, Penta tubes with vane-type suppressor grids are in important equipment the world over, and their use in high-quality linear amplifiers is growing daily.

You, too, can enjoy the advantages of this years-ahead design by specifying the PL-177A, PL-175A, PL-8295/172, or PL-8295A, for 100-watt to 1.5-kilowatt power output applications. Detailed, factual data sheets are available for the asking. Ask also for your copy of Penta's latest Summary Catalogue, which describes all Penta products, with prices.



PL-8295A 1000W beam ceramic pentode. High-output Class AB_1 linear amplifier.

PL-175A 400W beam pentode. Popular Class AB_1 linear amplifier.

PL-177A 75W beam pentode. To 175mc. Highly efficient at plate voltages as low as 600v.

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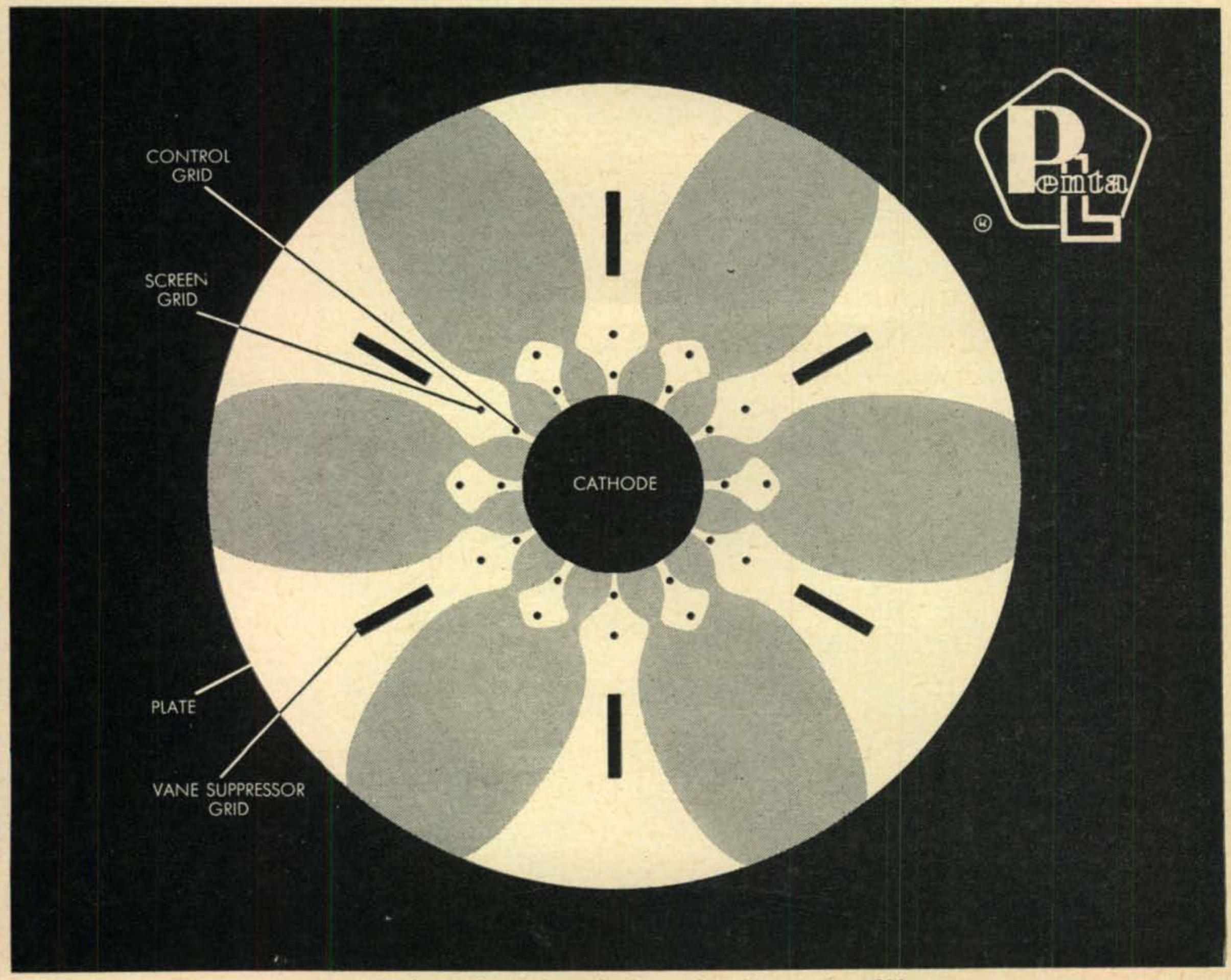

For further information, check number 21, on page 110

CALLING ALL HAM DEALERS

Get Aboard The CQ Election Special

We're campaigning on a platform of more business for *you!*

Yes, the *CQ* Election Special is all set to roll on the advertising campaign trail. *CQ's* November Election Special is ready to carry your sales message to your customers as no other sales promotion can. And that's not just a "campaign promise" either—because *CQ* reaches *more active hams* than any other publication and sells more copies on the newsstands than *all others combined!*

What's our Election Special deal? We're offering ham dealers a special one inch "business card" ad at the very special rate of $25 . . . a saving of *25%* over regular rates. And if you sell to the CB market, you'll want to get your ad into *S-9*, The Citizens Band Journal, too, at the combination rate of $40 for both.

What lower cost way is there to tell your customers that *you're* interested in *their* business and that *you* are eager to serve *them?* There is none!

And it couldn't be easier—just fill out the coupon below and mail with your check. Don't try to write a book in 1" but be sure to put in your store hours, call letters, etc. We'll take care of all the rest.

Don't wait . . . do it *NOW!*

Staple Your Check Here

Yes, I want to get on the CQ Election Special. Please insert the following ad in ☐ CQ ☐ S-9 ☐ Both

Just give us a sketch of what you want.

Please note our low price prohibits cuts or logos.

My check for $..... is attached. (See rates above).

NAME.....

COMPANY.....

ADDRESS.....

CITY..... STATE..... ZIP.....

the Big BOOST for Sideband Signals.....
barefoot or with a linear!

The Clegg SS BOOSTER makes a barefoot VENUS sound like a "kilowatt".....and with an APOLLO 700 linear amplifier added.....WOW.....! Up to 20 db increase in average power results from this latest Squires-Sanders development (see Sideband Speech Clipping, QST, July 1964, page 11). The SS BOOSTER has other advantages, too.....it provides power level control.....it protects against "flat topping". Single panel control provides adjustment from no boost to approximately 26 db.

On-the-air test with the Clegg VENUS six meter transceiver produced the following results: 1) Until properly informed, many stations regularly worked previously (without the SS BOOSTER) were convinced a "linear" had been added. 2) Stations that previously could not be worked consistently reported solid and consistent copy when the SS BOOSTER was used. 3) Average reported signal improvement in weak-signal-path "A-B" tests indicated a gain with the SS BOOSTER equivalent to 6 to 12 db. 4) Over any weak-signal path, intelligibility was always better with the SS BOOSTER than without.

Several models of the SS BOOSTER will ultimately be available, the first of which is for use with the VENUS (as the Clegg SS BOOSTER illustrated above). Tests are currently being conducted on the application of this unit to other equipment such as the MARAUDER. Other versions include an SS BOOSTER built into the SS-1T (matching transmitter for the SS-1R receiver) and a model for use with sideband transmitters utilizing mechanical filters. The potential for application to existing equipment is broad on two conditions: 1) The SS BOOSTER must contain a filter matching that in the sideband exciter, and 2) The transmitter final amplifier (and a linear as well) must be capable of the increased average power input. With the SS BOOSTER in full BOOST, average power will approach peak power, thus tubes and power supply must be capable of operating continuously at (the equivalent of) full CW input.

Installation of the SS BOOSTER requires minor internal modifications. In the case of the Clegg SS BOOSTER for use with existing Clegg VENUS transceivers, complete instructions and an installation kit are included with the Clegg SS BOOSTER. Owners desiring factory installation will be accommodated at a nominal charge.

AMATEUR NET:

Clegg SS BOOSTER (for VENUS) $97.50. Other models priced according to specific filter required.

Squires-Sanders, Inc.

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

For further information, check number 23, on page 110

VERSATILE, CONVENIENT NEW SSB MICROPHONE FROM TURNER

The Turner Model 454X crystal is designed especially for convenience in the hamshack. Choice of PTT on standard model or VOX. Lever-lock holds mike live with PTT wiring. Response: 300-3000 cps. Level: —48db. Price . . . just $15.90, amateur net. For more information, write:

MODEL 454X

THE TURNER MICROPHONE COMPANY
925 17th Street N.E.
Cedar Rapids, Iowa

In Canada: Tri-Tel Associates, Ltd., 81 Sheppard Avenue West, Willowdale, Ontario
Export: Ad Auriema, Inc., 85 Broad Street, New York 4, N.Y.

For further information, check number 22, on page 110

One Control tunes this rig . . . from VFO thru final

Special gang-tuned circuits in Li'l Lulu let you QSY instantly — there's no buffer tuning and final dipping needed when the frequency is changed. And the rig is really TVI proof! By keeping the VFO grid circuit in the 25 mc range, TVI is eliminated. Price: $225 thru your dealer.

Check these features:

• 117 vac, 12 vdc integral power supply • Class A high level modulation • Carbon, dynamic, or crystal mic input • Push-to-talk, or use panel switch • Built-in cw keying filter • VFO spotting switch • VFO control • 12DQ7 final.

WHIPPANY LABORATORIES, INC.
1275 Bloomfield Ave., West Caldwell, N. J.

Li'l Lulu

COMPLETE 50 MC TRANSMITTER

For further information, check number 24, on page 110

SBE powerful, peak performance pair

SB-33/SB1-LA . . . diminutive duo . . . four-band (80-40-20-15) SSB transceiver/exciter and high power linear amplifier. Bright, state-of-the-art version of a full thumping kilowatt . . . entirely self contained, **including all power supplies** . . . in two tiny cabinets! The only "extras" needed are microphone . . . antenna . . . two lineal feet of mounting space . . . and a strong desire for a clean-cut big signal. And when you look at the photograph above, (the 664 dynamic **does** look big in comparison to the linear amplifier behind it) consider that the SB-33 transceiver on the right also includes **an outstanding receiver** capable of solid-copy reception of the DX that is bound to be stirred up by the KW signal from your powerful pair.

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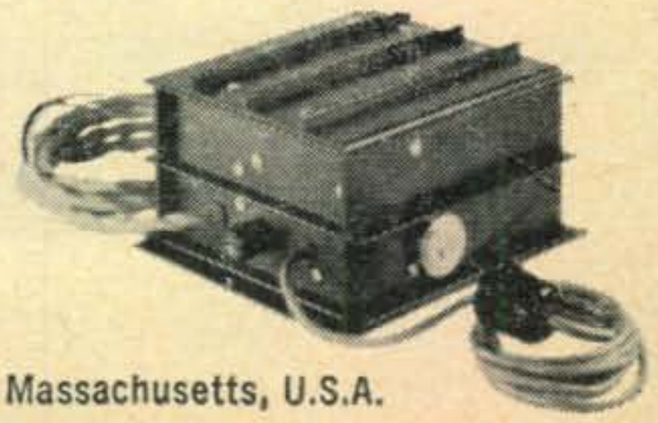

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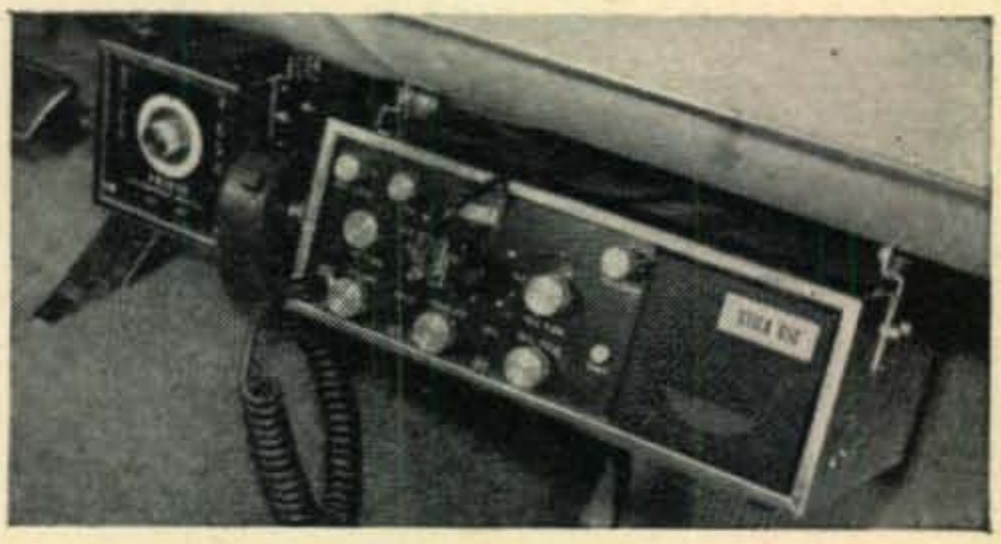

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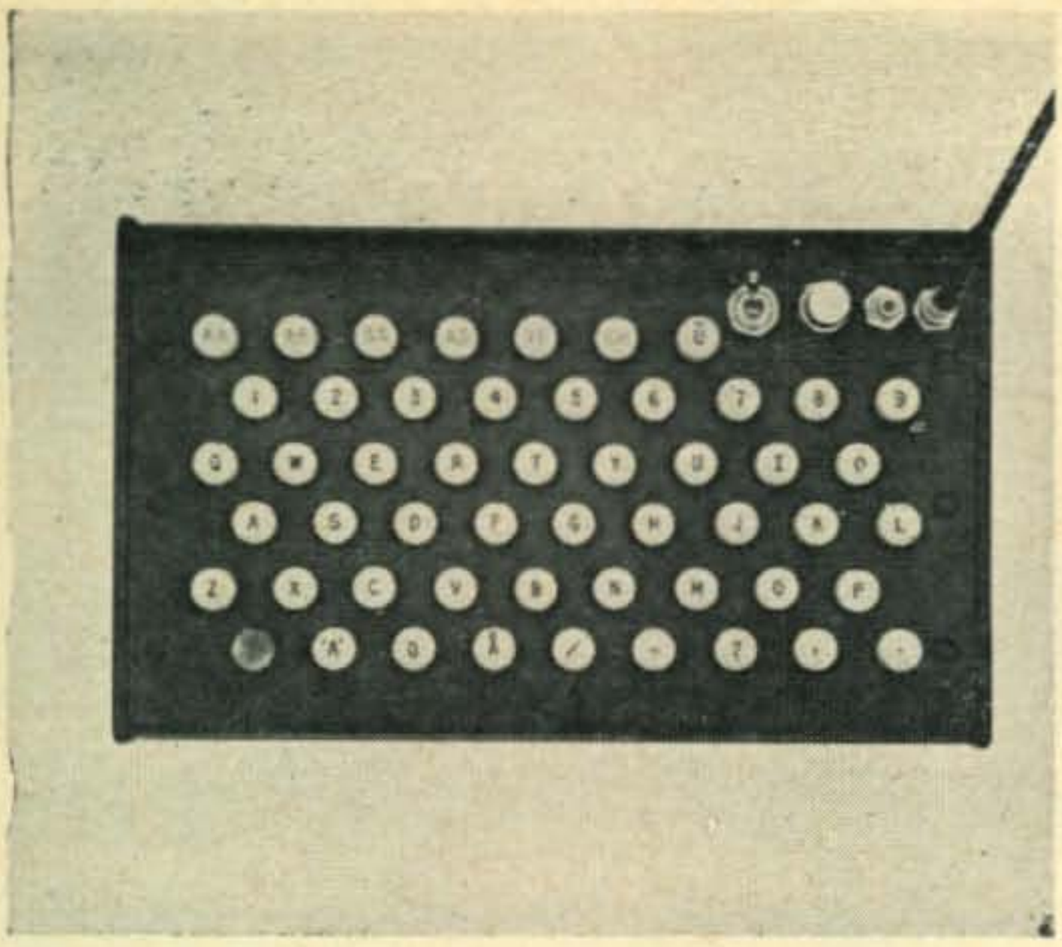


The unique push-button operated keyer described below is a transistorized unit contained in a 5½" × 3½" × 2½" case. It uses 15 transistors and 20 diodes. Embodying computer principles and a small magnetic core shift register, the heart of this unit is constructed of tiny magnetic cores. The total cost of this unit is $130.

BY H. GRANBERG*, OH2ZE

A Push-Button Keyer

THE idea for this keyer was initiated several years ago, when I was building my fourth electronic keyer. However, at that time my knowledge about digital circuitry was somewhat limited. I tried to figure out different ways to make a push-button operated code generator. The best solution I came up with was a group of monostable multivibrators, multigang pots for the speed and space controls, a few dozen diode gates, several power supplies, *etc*. The number of transistors added up to 40 or 50 and about 150 diodes were needed for the gates. The semiconductors were still so expensive that the project was out of the question.

Then I became familiar with the magnetic core shift register and realized that it would be much easier and less expensive way to create such a device. The cost, especially, would be much lower than the transistor shift register or any other systems, I could think of. The cost of some transistors today is less than 50 cents. Actually, there would not be too much difference in cost of the shift register itself, but a large number of diodes which the matrix would require could be eliminated. Also the total current drain would be reduced by a factor of 3 or 4, since the cores do not require d.c. power to switch, nor do they have a standing current drain like a flip-flop.

Finally, I got a system roughly outlined, and a breadboard version was first made. The conversion of the shift register output to Morse code, in a less complicated way, gave the most trouble, unless I wanted to use two shift registers instead of one. A bistable multivibrator with an odd triggering method was the simplest solution and seemed rather reliable for this purpose. Due to battery operation, the total current drain had to be limited, and most parts of the circuitry are far from optimized. In normal use we hardly have to worry about the temperature stability. If the battery voltage is reduced to 10 volts, the operation is still maintained but the speed will go down about 20%.

At least 41 pushbuttons are needed to cover the most necessary characters. Almost 50 characters are then available in the set windings, and it is simply a matter of adding the pushbuttons. I decided to include some foreign letters in the selection and also characters like *AR*, *VE*, etc. To make the line complete, I also added the windings for *AS*, *VA* and *KA*.

The pushbuttons do not have to be necessarily the snap-action type. I happened to have some microswitches on hand and wanted to make use of them. A separate button for each had to be turned out of plexiglass. Several models of medium quality pushbutton switches are commercially available for less than 20 cents apiece.

The Magnetic Core Shift Register

The cores are made of square loop magnetic material. It is usually in the form of thin tape to decrease the switching time and increase the high frequency performance. Also ferrite is used for very high speed applications. A core with the windings is a bistable element alone. It does not have d.c. states as a flip-flop, but a pulse is induced into the windings every time the magnetic state is switched from the negative saturation to positive or *vice versa*. We may express the negative saturation as state "1", and the positive saturation as state "0". If a core is set to "1", the polarity of the input current must be reversed to switch it back to "0".

In a shift register, several windings are employed to achieve the switching, so that a same polarity pulse can always be fed into one winding. In this circuit, windings *a*, *c* and *d* can be

*813 E. Marlette Ave., Phoenix, Arizona 85014.

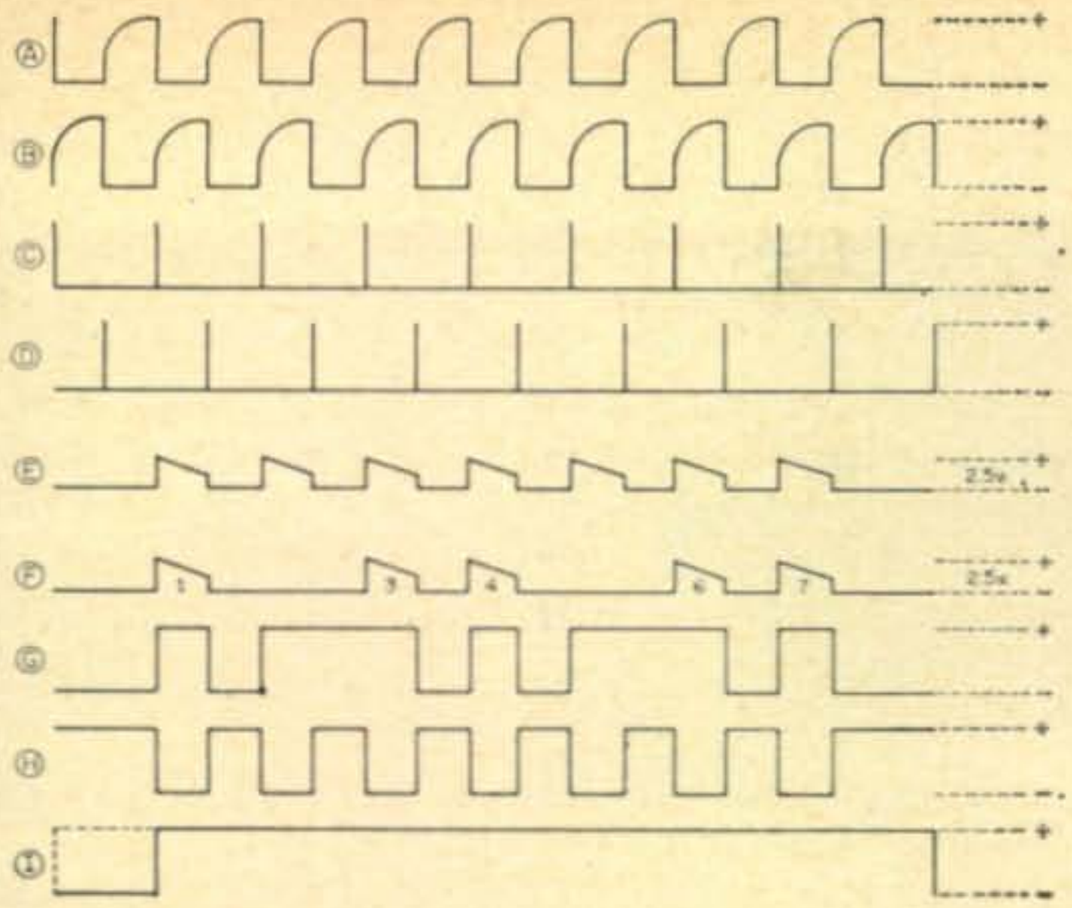


Fig. 1—Typical waveforms found in the keyer are shown above. The letters to the left indicate where the corresponding waveform appears in fig. 2. The amplitudes are equal to the supply voltage minus the diode drop where not indicated.

considered as inputs, whereas *b* is an output. The number of turns for this purpose is not critical since we are not interested in high speed operation.

Depending on the core size and the material, a certain amount of energy is required to switch. It can be measured in ampere turns. The more turns the winding has, the less current is needed. Usually the result is a compromise, since large number of turns increases the capacitance and resistance, thus lowering the speed. Sometimes, as in this case, the inner diameter of the core makes its own limitations. On the other hand, a very fine wire is hard to handle and breaks easily. The output winding has to produce enough voltage to overcome the drops in the two diodes (CR_1-CR_2) and still be able to switch the next core. In addition, there are other losses in the circuit. Especially at slow shifting rates the storage capacitor (C_1) has time to discharge between the shift and switching pulses. The leakage mainly occurs in diode CR_1, transistor Q_5 and indirectly through all the other diodes

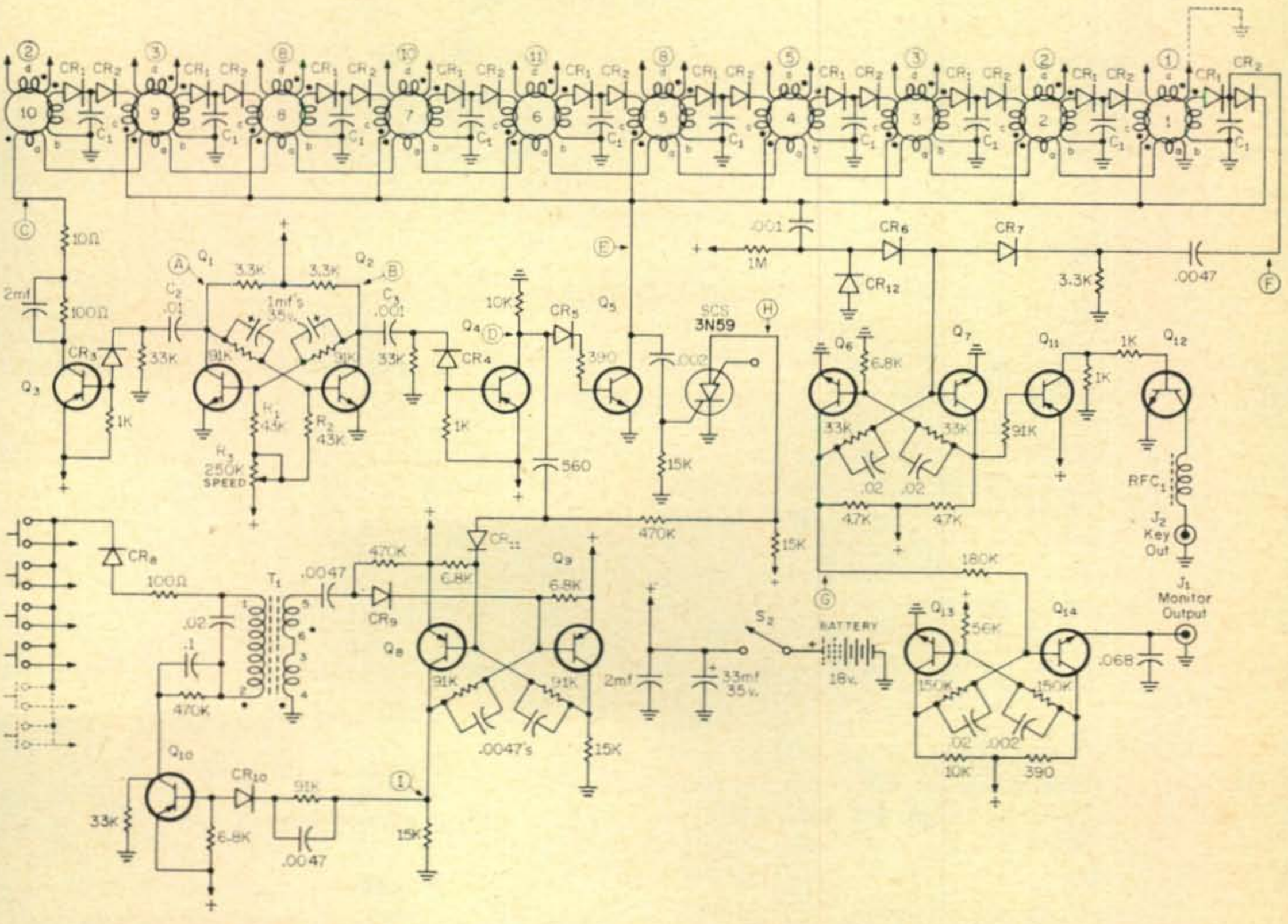
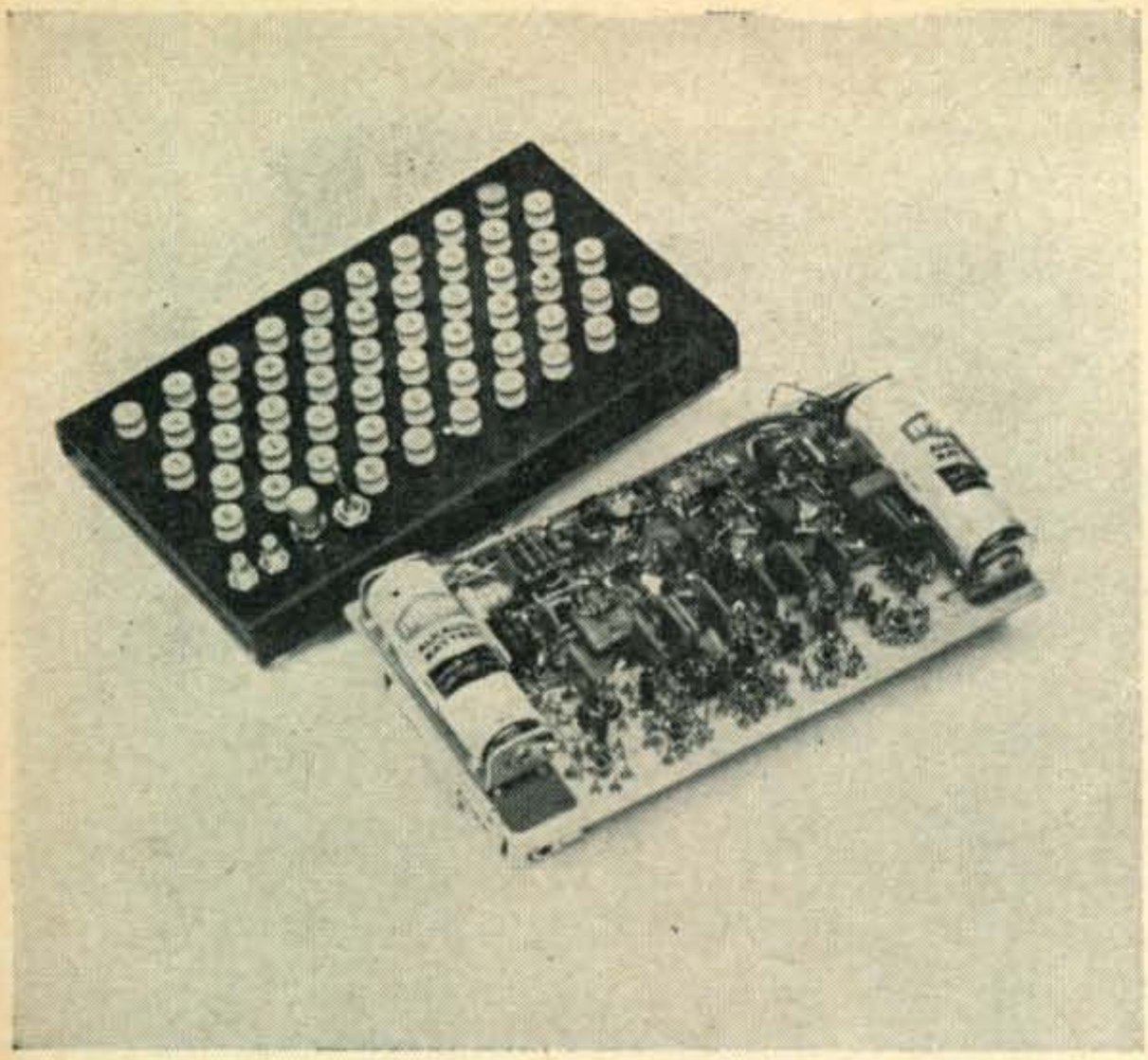


Fig. 2—Circuit of the pushbutton operated keyer. The circled numbers above the magnetic core shift register indicate the number of set windings (d) for each core. The interconnection of these windings is shown in fig. 3 The circled letters locate the waveforms shown in fig. 1. All resistors are ¼ watt except for the SPEED pot, which may be 1/10 watt, and all capacitors are in mf.

C_1—0.1 mf ceramic.
CR_1 through CR_{11}—1N295, 1N461 or 1N645 (silicon).
CR_{12}—1N191, 1N192 or HD2569 (germanium).
Q_1, Q_2, Q_5, Q_6, Q_7 Q_{13}, Q_{14}—2N697, 2N696, 2N1252.
Q_3—2N1131, 2N1132.
Q_4—2N861, 2N1131.
Q_8, Q_9, Q_{10}, Q_{11}—2N396, 2N404.
Q_{12}—2N498, 2N657.
T_1—Pulse transformer. Technitrol 11KHA, 11LHA or equivalent. 0.5-1.5 mh.
Memory Cores—#80528, Magnetics Inc., Butler, Pa.
Battery—4 Eveready #523's in series or equivalent.

Core Windings

a—6t #32 E.
b—18t #38 E.
c—12t #42 E.
d—10t #42 E.



Bottom view of the circuit board shows the memory cores along the front edge. The four 4½ volt batteries are placed at the outboard ends.

in the register. Germanium diodes in this application are less suitable due to their high reverse leakage current. The leakage causes the stored voltage in the capacitors to look to some extent as fig. 1E, instead of having an ideal flat top.

Operation

The shift register, shown in fig. 2, operates in the following manner: The astable multivibrator (Q_1, Q_2), which provides the shift and switching pulses, is running continuously. The outputs from both collectors are differentiated by C_2 and C_3. The negative going pulses are then selected by CR_3 and CR_4. These pulses, having a 180 degree phase difference, are used to turn on Q_3 and Q_4 respectively. The shift pulses from the core driver (Q_3) are fed to the series connected shift windings. The current during each pulse is in the order of 500 ma. The shift current simultaneously resets all cores to "0". If a core was previously set to "1" through one of the set windings or by the output of a preceding core, an output pulse will appear which will charge C_1 and again set the next core. Here the shifting happens from left to right. However, the serial read-out goes oppositely as the cores are numbered. Suppose we set core #1 through a set winding (d). It will stay in "1" till the next shift pulse comes along. Then the positive pulse from winding b charges C_1. This voltage (minus CR_2 drop) appears also at the collector of Q_5. At this moment Q_5 is "off". Soon the circuit will be momentarily closed by a switching pulse and C_1 will be discharged through CR_2. The operation gives the first code pulse in point F as shown in the corresponding waveform figure. It represents directly character E in the output.

To form, for example, an A, we have to set cores 1 and 3. The generation of the first pulse is similar to above. Core 3 also behaves the same way, except that when Q_5 is turned on, C_1 discharges through winding c of core #2 setting it automatically to "1". After this, core 3 stays in "0", and with the next shift pulse, core 2 will be reset also. The same then happens again between 2 and 1, and core 1 will be set a second time. With the following pulse in Q_5 the process is finished. The result is two output pulses since core 2 was not previously set. The time interval is equal to three pulse widths or one dash in the code. Conversion of the output pulses to Morse code will be explained later. The purpose of this shift register is to produce a maximum number of ten squarewave pulses, of which any one can be omitted.

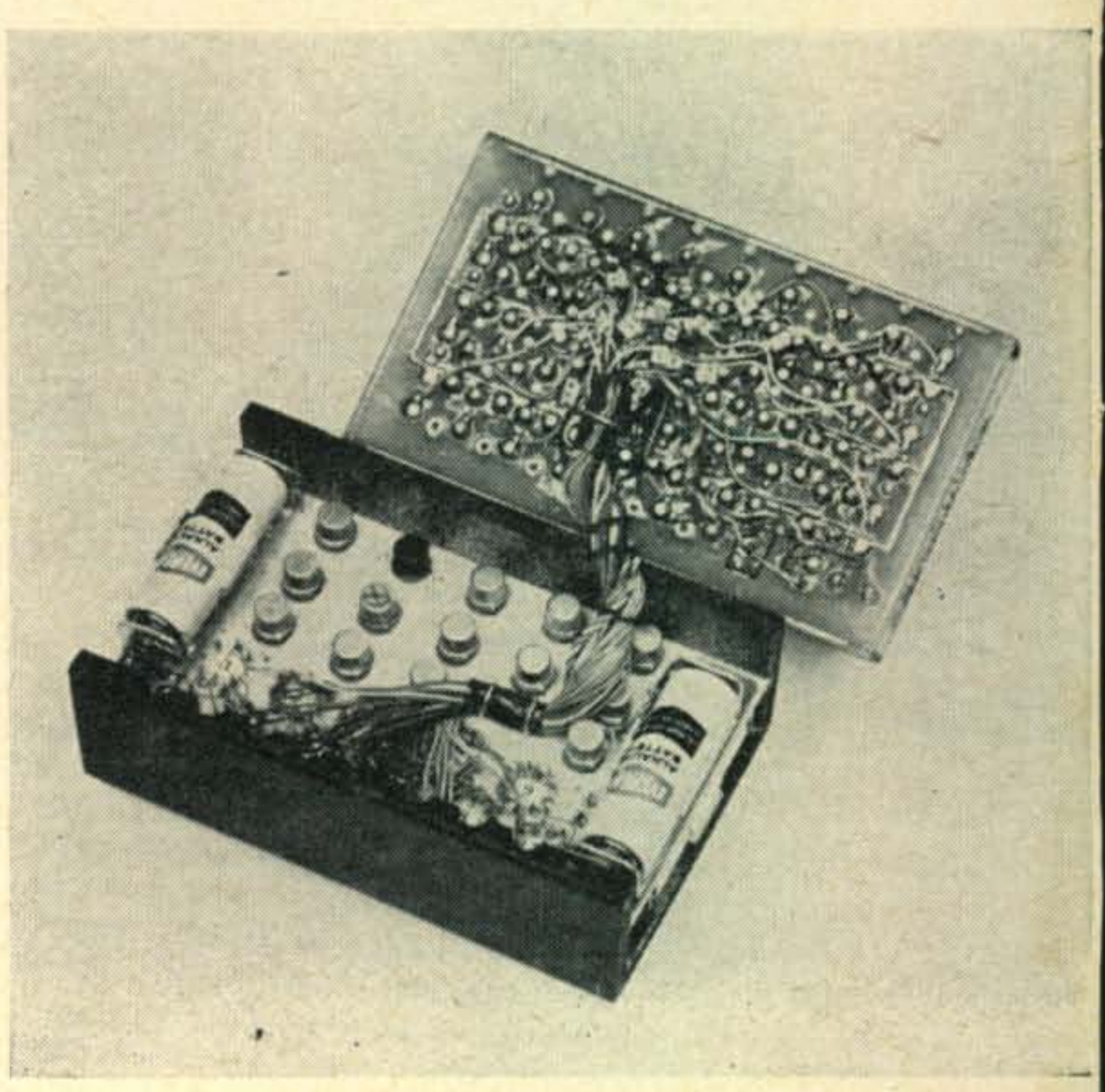
Core Windings

The circled numbers in the circuit diagram indicate how many set windings (d) are needed in each core. The numerous windings may be easier to work on, if the correct number of wires are twisted together and then wound all at the same time. Correct polarities are extremely important. It is advisable to mark all leads during the winding process. For clarity and mounting purposes it is also good to have a terminal post for each lead. The exact connections of the set windings are presented in fig. 3.

Formation Of The Morse Characters

The parallel read-out of the shift register appears at point E. These pulses are always evenly spaced and their number is the same as that of the last pre-set core. The serial read-out pulses at point F are spaced accordingly to the prepared pattern. (See fig. 3.) Examination of figs. 1E and F shows that, if we use the leading edge of the parallel read-out pulse to set a flip-flop, (Q_6-Q_7) and the trailing edge of the serial read-out to reset it, the output at the collectors then will directly represent the Morse code. The combination in fig. 1F thus gives an AR.

A positive signal from Q_6 collector is used to



Top view of the circuit board and bottom view of the switch plate. The cable connects the switches to the memory circuit tie points.

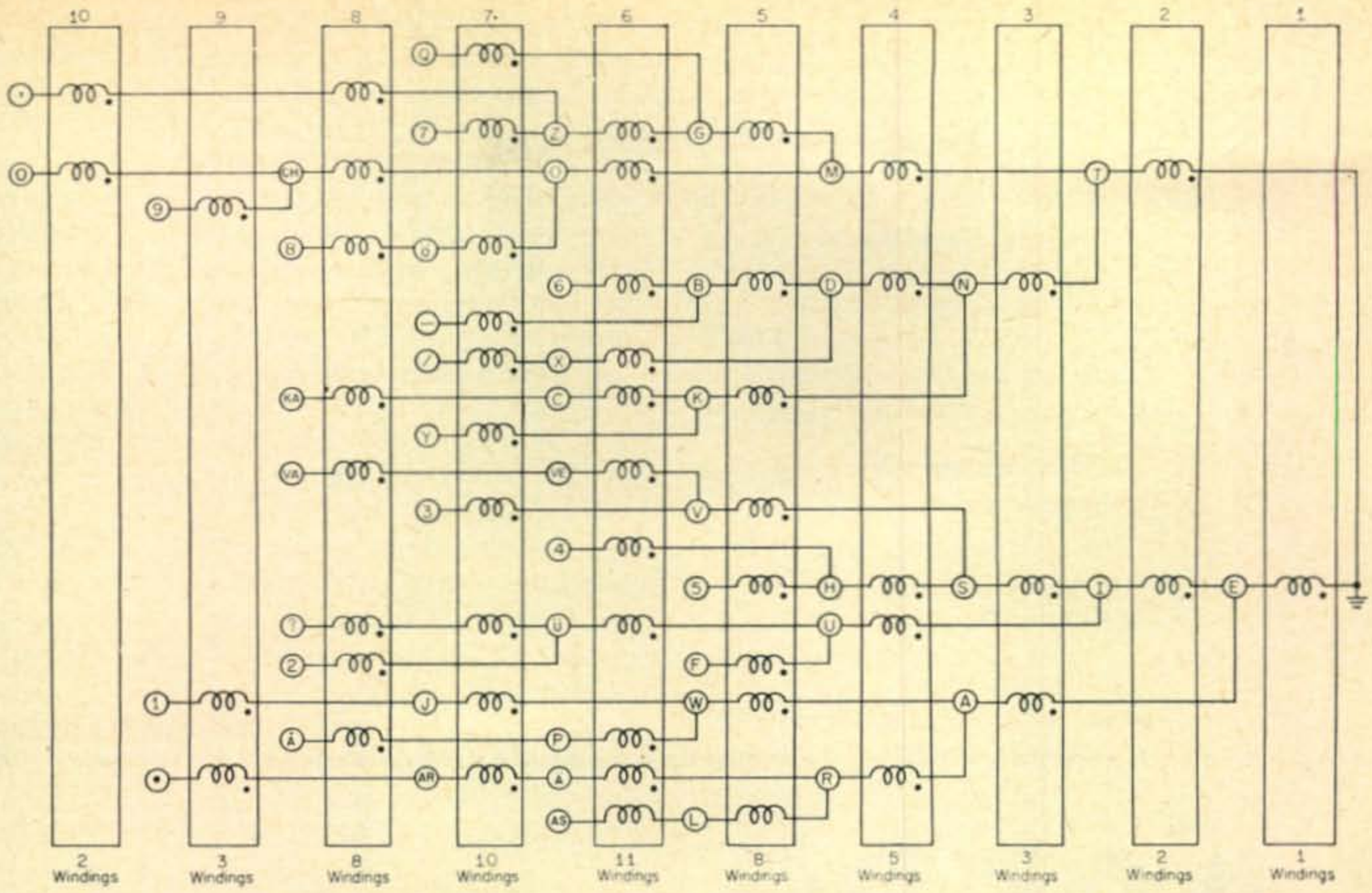


Fig. 3—Interconnection diagram of the shift register set windings are shown above. The circles are the push-button terminals for the characters indicated. The dots on each winding indicate the same ends (start or finish).

activate the free-running multivibrator Q_{13}-Q_{14}, which generates an audio tone of about 800 cycles for monitoring purposes. An npn type for the keying transistor was chosen, since the selection of high voltage types in that group is somewhat larger than with pnp types. It also allows the common emitter configuration in the negative ground system simply. A driver is used to insure the saturation of Q_{12}, where fairly high currents may be switched. Due to inversion occurring in Q_{11}, which is normally "open", its input also has to come from an inverted source. Transistor Q_7 serves this purpose conveniently, and furthermore permits the flip-flop to be more symmetrically loaded. The r.f. choke in the keying output is not necessary but may be helpful to prevent r.f. feedback with operation of a transmitter.

The Automatic Repeater Circuit

The bistable multivibrator Q_8-Q_9 with its associated circuitry serves three functions:

1) If a button is pressed twice or another button is pressed momentarily during one character read-out, the shift register will not re-load.

2) If a button is held down for the length of one character and one space, it will automatically re-load the register, and a second character will be formed. This will go on till the button is released.

3) It forms constant spaces between each character (equal to three dots) if the typing speed is kept nearly constant. For the proper space, a second button can be pressed immediately after the first one and held down till the next character is initiated. Or it can be pressed down later at any time during the first character and the following space.

When no button is pressed, the base of Q_8 gets continuous positive pulses from Q_4. Thus Q_8 is in the nonconducting state causing Q_{10} to be turned on. When a button is pressed, the set current can flow through Q_{10}, the primary of T_1, R_{27}, forward biased CR_8 and through the pushbutton and set windings to ground. This also results in a positive pulse to the base of Q_9 setting the flip-flop into a condition where Q_8 is "on". Respectively, Q_{10} is "off", and does not allow re-loading of the register before the condition of the flip-flop has been changed by a reset pulse from Q_4. The gate, CR_{11}, however, will be closed until the shift register is cleared.

The controlled switch (SCS) is a bistable element. It is acting as an amplifier and inverter for the parallel read-out. Neither the parallel nor the serial read-out can be resistively loaded. There is about 10 microseconds delay from point 4 to point 8. This is enough to prevent CR_{11} from opening before the register is empty and the SCS is permanently "off". One full cycle, minus 10 microseconds later, Q_8-Q_9 will be reset resulting an automatic loading of the register in the above described manner, providing that a button is held down at that moment. Two thirds of the space has now been formed. The last one third is achieved when the register is loaded, (proper cores set) and waiting for the next shift pulse.

With the present values of R_1, R_2 and R_3, the speed range is approximately 10-35 w.p.m. The circuit layout is not critical, and has no notice-

[*Continued on page 92*]

THE laser is potentially one of the most revolutionary inventions in many decades. Its possible impact on amateur radio is far-reaching. Last month we presented a brief history leading up to the invention of the first laser. Since that historic occasion, significant progress has been made toward the use of the laser in communications, and several successful experiments using a beam of light to carry both audio and video have already been run. This is the concluding article on the laser and includes a look at the future in terms of the radio amateur.

The Gas Laser

In February of 1961 scientists at Bell Laboratories announced the first achievement of continuous operation of the gaseous optical maser. Although structurally much different from the solid state laser, the basic principles are the same.

LASERS

Part II

BY STANLEY LEINWOLL*

The conclusion of "Lasers"; the amateurs role in this new challenge.

The device used as an active medium a mixture of gases. The cavity consisted of a quartz tube about 80 centimeters long and 1.5 centimeters in diameter.

The first laser used neon and helium gas in proportions of 90 and 10% respectively, at a pressure of 1 to 2 millimeters of mercury. It produced five coherent infrared emissions, the strongest at 11530 angstrom units.

At either end of the quartz tube (See fig. 5) highly reflecting parallel mirrors in metal chambers are used to reflect the stimulated light back into the cavity. Flexible bellows in these chambers would permit external adjustments to the mirrors. At the end of the system were two optically flat windows through which the undistorted laser beam could leave. The entire device was about 1 meter long.

R.F. Pumping Source

A 28 megacycle radio frequency generator fed energy to three electrodes surrounding the tube, creating a discharge inside the tube. Since the output was in the infrared, an image converter was needed to see the beam.

The best maser beams diverge only about one minute of arc—at a distance of two hundred feet a beam would cover a spot less than one inch in diameter. The spectral linewidth of this emission is but a few billionths of an angstrom, or a few cycles per second, representing a linewidth many times less than that of the solid-state optical masers. Thus it represents the purest "color" ever generated.

Since the development of the first gaseous laser many refinements have broadened both the efficiency of the device, the frequencies produced, and the number of gases which were made to "lase". In addition to the helium-neon laser, devices have been developed which produce optical maser action in all the noble gases, helium, argon, neon, krypton, and xenon. Gas lasers using neon-oxygen and argon-oxygen mixtures have also been developed.

Frequency ranges now extend from the infrared to the visible part of the spectrum, at a frequency of 6328 angstrom units.

Gas lasers have been extremely useful in performing precise scientific measurements, due to the purity of the signal produced, and the narrowness of the beam.

The Injection Laser

From the communications standpoint, and where the interests of the amateur are concerned, perhaps the most significant development in the field of lasers occurred in November, 1962, when an entirely new concept in the production of coherent radiation was announced by International Business Machines Corp., GE, and MIT almost simultaneously.

The new device, called an injection laser, employed a semi-conductor diode driven directly by an electric current, rather than by making use of an external energy source, as solid state and gaseous lasers had been doing.

The chief drawback to the use of solid and gaseous lasers for communications was in modulating and demodulating at frequencies in the million megacycle range.

The injection laser is easily modulated simply by varying the input current. Here is how it works:

The injection laser consists of a gallium arsenide semi-conductor diode through which an electric current is passed. When the current flow reaches a certain threshhold level the diode emits coherent light. The diode, shown in fig. 6, consists of an n-type region which contains an excess

*Radio Frequency and Propagation Manager, Radio Free Europe.

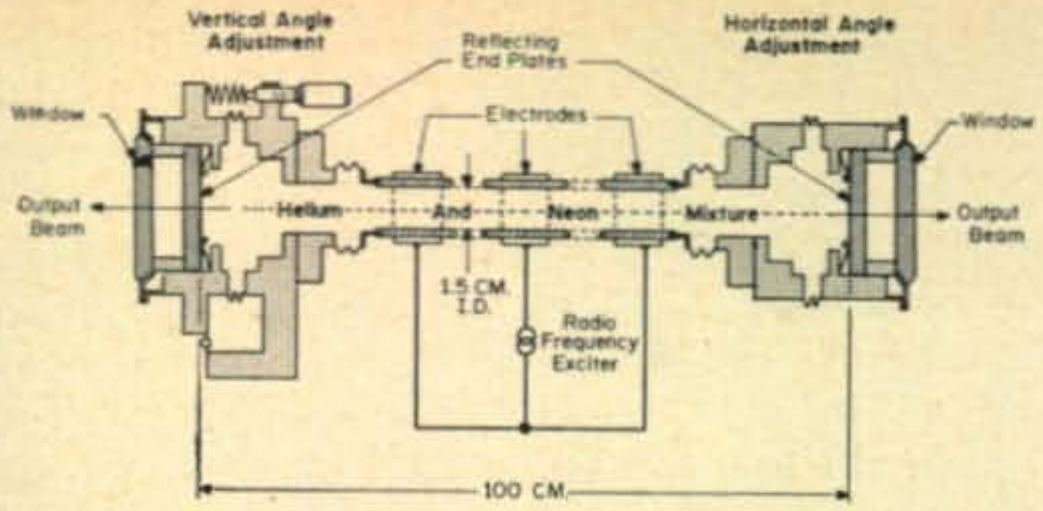


Fig. 5—Construction of a gaseous optical maser built at Bell Laboratories. The r.f. excitation was at 28 mc and the output was in the infrared region.

of electrons. This region is physically joined to a p-type region which contains a deficiency of electrons. A deficiency of electrons is also referred to as a "hole".

Light is produced in a semiconductor by passing a current through it. Electrons from the n-region move across the junction and are injected into the p-region, where they drop into holes. The electrons which move across the junction possess energy when they are in motion, and once they drop into a hole some of this energy is given up in the form of a photon of light.

Materials have been known for some time that emit light when subject to an electric current. These are called electroluminescent. What was not known, however, was that it was possible to produce coherent light by applying a large enough current.

The Gallium Arsenide Semiconductor Diode

Semiconductor diodes are prepared by adding impurities. The Gallium Arsenide injection laser is made by adding impurities in the form of tellurium and zinc, which produce n and p type materials. These are joined, producing a single crystal, one side of which contains the n type material, the other the p-type.

On application of current, electrons move across the junction into holes. The process is called recombination, and results, as we have said, in the emission of a photon. This is shown in fig. 7. These junctions, incidentally, have other unusual properties, and are the basis of most

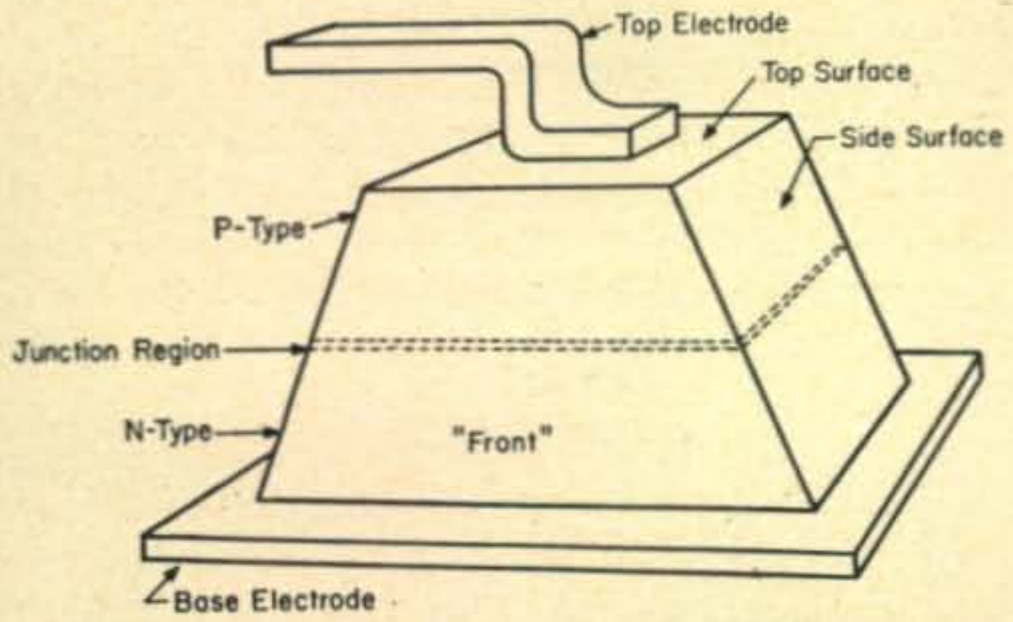


Fig. 6—Construction of the General Electric Gallium Arsenide diode laser. The front and back surfaces are highly polished and perfectly parallel. The junction region is only about 1/10,000 of an inch thick and coherent light is emitted perpendicular to the front and back surfaces along the junction.

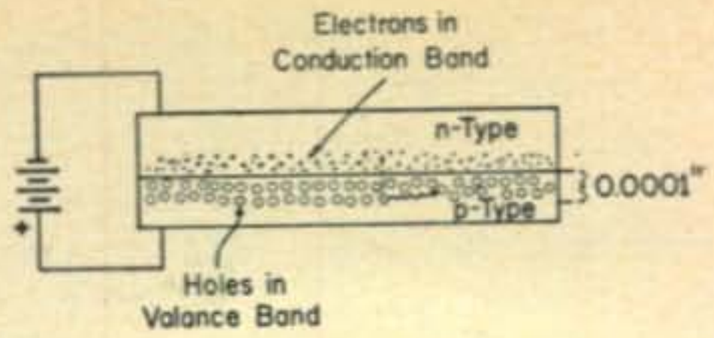


Fig. 7—Diagram above shows how, on application of forward bias, electrons are injected into the p-region. When an electron drops into a hole, a photon is released.

other semiconductor devices such as transistors and semiconductor rectifiers.

Production of Coherent Light

If the forward bias that is applied to the semiconductor is great enough, a large number of electrons and holes will concentrate in a very narrow region, called the active region, about 1/10,000th of an inch wide on the p-side of the junction.

In the active region large numbers of photons are emitted. These, in turn, stimulate the emission of more photons by accelerating the recombination of injected electrons with holes. Each time a photon stimulates the emission of a second photon, the emission occurs *in phase* with the first, and *in the same direction*. It is for this reason that the resultant light is coherent as shown in fig. 8.

Since the thickness of the active region is so small, emitted radiation propagates most strongly in the plane of the junction. Figure 9 shows the highly directional emission obtainable from an injection laser 0.1 × 0.1 × 1.25 mm made by the IBM Corporation.

Waves travelling along the long axis remain in the junction region longer than any others. The rear face can be polished, as it is with the ruby laser, to obtain unidirectional action, as shown in the figure.

The side faces of the laser are usually sawed or etched to permit passage of radiation in this direction with a minimum of internal reflection.

Current Levels

Early injection laser models operated at extremely high current densities, of the order of 10,000 amperes per square centimeter. These models produced their light in pulses and could not operate continuously.

Subsequently c.w. injection lasers were developed to operate at much lower current densities, of the order of 100A/cm^2.

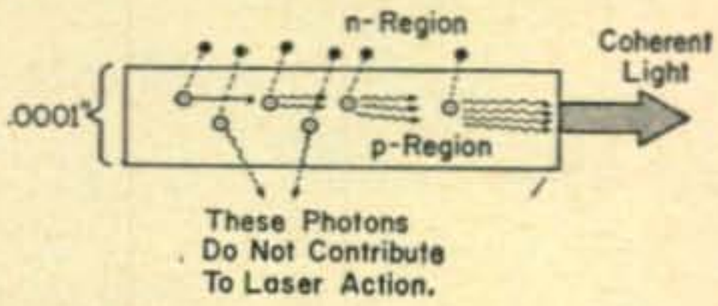


Fig. 8—Emission of a photon when an electron drops into a hole can stimulate recombination of other electrons and holes. When this occurs, parallel to the plane of the junction, stimulated emission grows in intensity. Chain reaction continues until a pulse of coherent light is emitted.

Recently developed injection lasers put out more than 1 watt for 5 watts input. This efficiency, of approximately 20% compares with about 0.1% efficiency for ruby lasers.

Although injection lasers can be operated at room temperatures, such operation must be of the pulse-type, and even then the pulses must lie spaced in time such that overheating does not occur. Such overheating can easily damage the crystal.

Generally, injection lasers are operated at liquid helium, hydrogen, and nitrogen temperatures, ranging from 271° to 196° below zero Centigrade. These temperatures prevent excessive heating and enable the devices to be operated continuously.

Other Semiconducting Materials

Since the end of 1962 researchers have found other semiconductor materials that will lase. These include indium phosphide, indium arsenide, indium antimonide, and a gallium arsenide-gallium phosphide compound.

Development of additional injection laser materials furthers the potential of these devices by broadening their frequency range and thus their potential for use.

Frequency ranges of current injection lasers extend from 7000 angstrom units for the gallium arsenide phosphide compound to 52,000 angstrom units for the most recently announced semiconductor laser, indium antimonide.

The frequency ranges produced by injection lasers run from 60 to 430 *million megacycles per second*. These frequency ranges are in the infra-red portion of the electromagnetic spectrum.

Applications

The most significant advances involving injection lasers have come in the field of communications. Laser light is well suited to communications use because it is emitted in nearly parallel beams, allowing maximum transfer of energy. Since it is coherent, its information carrying capacity is far greater than ordinary light sources.

Thus far, pumped lasers, both solid state, such as the ruby, as well as the gas, have not been satisfactory because problems in modulating the light have not been adequately solved. Modulating the light produced by an injection laser is a relatively simple matter, since the intensity of the light output is a function of the current in the laser once the semiconductor has begun to lase; increasing the current increases the light output.

Since the injection laser can respond to driving current changes in a nanosecond (a billionth of a second) injection laser light can transmit up to one billion "bits" or units of information in one second.

The modulation technique used in the experimental IBM system is called pulse frequency modulation. In this system, the rate at which pulses are emitted from the laser are varied in such a way as to represent voice or other information. The basic elements of the IBM system are shown in fig. 10. The apparatus consists of two basic components: the laser transmitter and its associated modulation circuitry, and the receiver, which consists of a photo-tube and demodulation circuitry. The modulation circuit is shown in fig. 11.

Because it is small, light in weight, and more efficient than optically pumped solid state and gas lasers, the injection laser is ideally suited for a space communications systems, and will be able to fit easily into an earth satellite.

Limitations

The small size of the injection laser, although advantageous, also presents some drawbacks. The region in which lasing action occurs is very small, since electrons, once they have crossed the junction, tend to drop into holes immediately. Since they do not move more than 0.0001 inch before recombination occurs the power of the injection laser is limited.

A second limitation is beam width. Although the injection laser produces highly directional beams, they still diverge significantly more than those produced by other lasers, particularly gas. Beam widths of the order of degrees are often produced by injection lasers compared with a fraction of a degree for the gas laser.

The Future

It is not certain at this point what direction laser research and development will take. Intensive studies are now underway in this country as well as in Europe, and new announcements are being made almost on a daily basis.

The consensus among most scientists and engineers working in the field is that the invention of the laser is one of the most important technological breakthroughs of the century.

For the radio amateur the laser could turn out to be the most revolutionary development in the history of the hobby. It has been said that prior to World War II every important advance in the field of radio communication was the work of amateurs, with the professional scientists and engineers being able only to refine the pioneering efforts of amateurs. With the advent of World

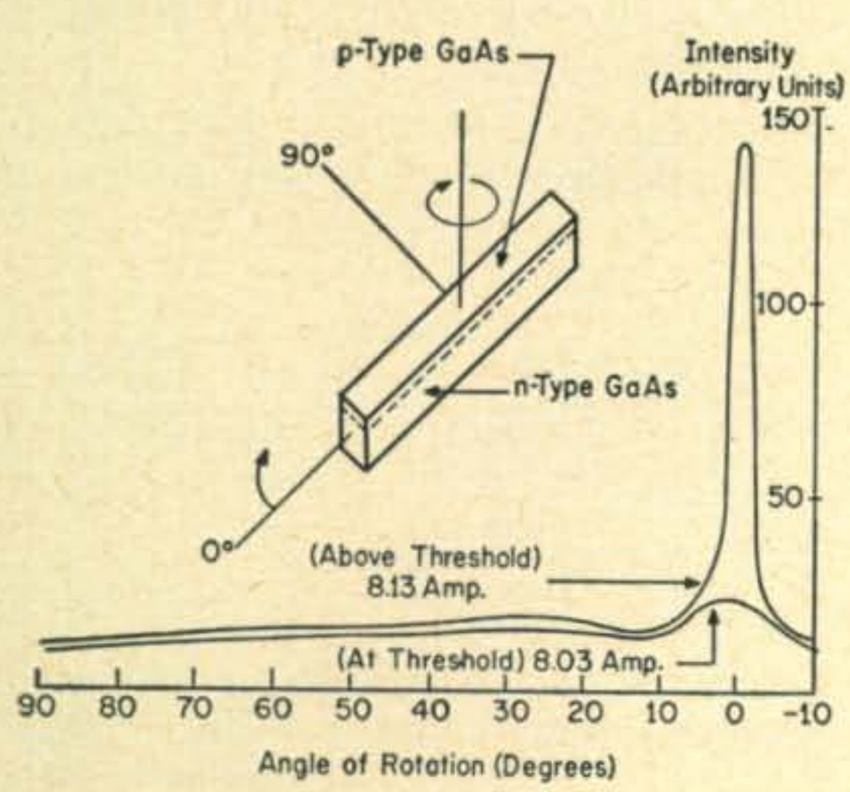


Fig. 9—Directional light amplification obtained by cleavage. IBM scientists obtained uni-directional radiation by polishing the rear plane.

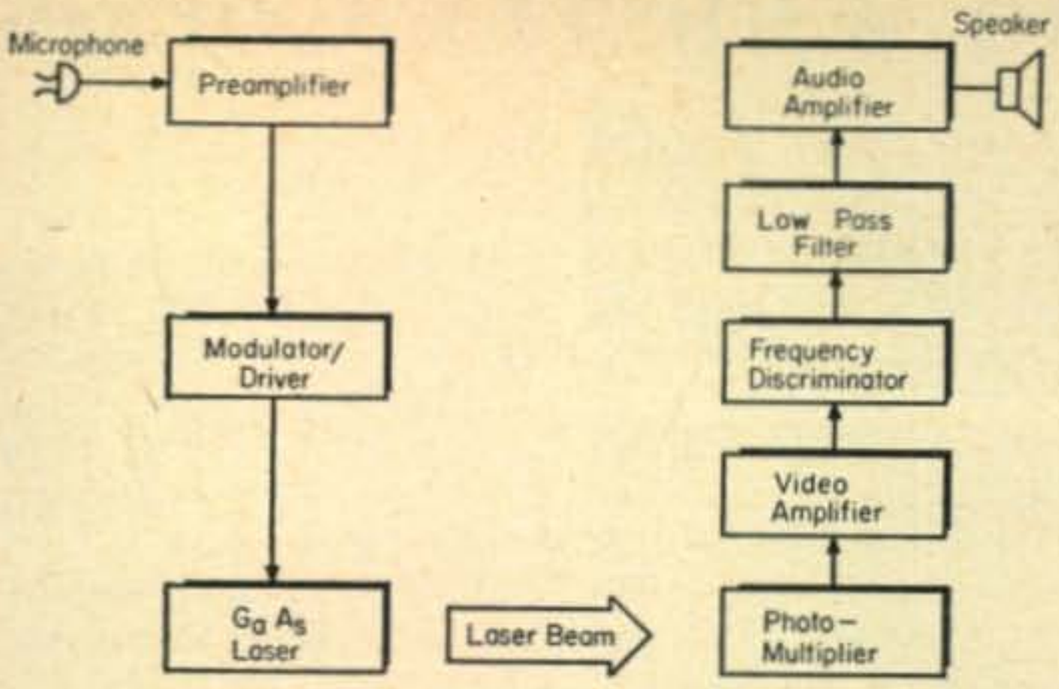


Fig. 10—Block diagram shows the basic circuit elements used in an injection laser communications experiment demonstrated by International Business Machines Corporation. An audio signal from the microphone is sent to the modulator-driver which, in conjunction with the Ga As laser, transforms the audio signal into a series of laser pulses. The audio information, represented by the frequency of this train of laser pulses, is received by the photomultiplier tube. The photo-multiplier tube converts the laser pulses to electrical pulses which are amplified, demodulated and used to power a speaker system.

War II, however, research and development in communications became too expensive and complex for the individual efforts of amateurs working by themselves.

With the coming of the age of the laser and of space communications the amateur is once again in a position to contribute significantly to radio communications research.

Already, laser light beams have been used for transmission of audio and video signals. IBM is in the process of developing a laser space communications networks here on earth using a beam of light as carrier.

We have already seen that the radio amateur is capable of developing, building, and launching an earth satellite. Progress in this field has been remarkable. These are the ingredients of a revolution in the hobby. A synthesis of a program of laser research in conjunction with the present OSCAR program could conceivably result in the development of an amateur laser space communications network.

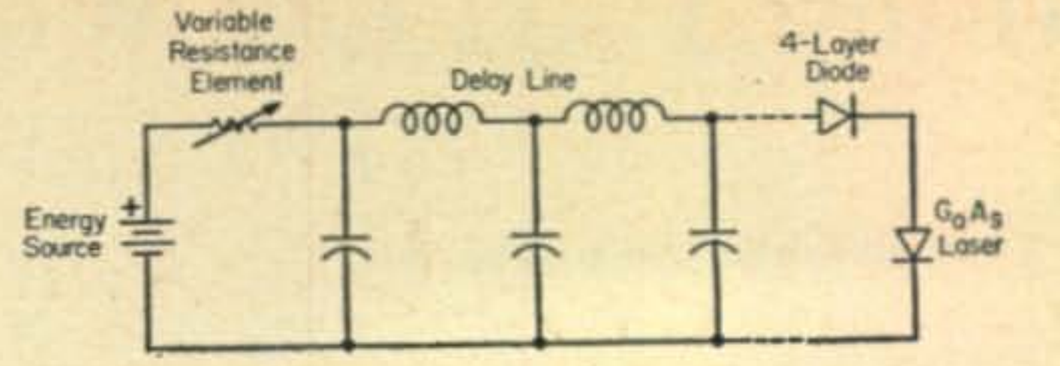


Fig. 11—Diagram shows the modulation circuit used in injection laser communications experiment demonstrated by International Business Machines Corporation. The modulation technique, called pulse-frequency modulation, controls the rate at which the laser emits pulses, thus permitting audio signals to be transmitted over the beam. Output of the laser is controlled directly by impressing electrical pulses from the delay line through the device. When the delay line charges to a preset voltage, the 4-layer diode breaks down, discharging the delay line through the Ga As laser. The frequency at which these electrical pulses are delivered to the laser is controlled by audio signals through the variable resistance element.

Frequencies in the upper microwave, the infrared, and the visible portions of the spectrum are as yet unallocated. Anyone can experiment now without restriction! This is the time to join in and move toward new dimensions in communications! Use by amateurs of the bands in which lasers operate could herald the dawn of a new age in amateur radio!

We can envision a network of three synchronous OSCAR translator satellites capable of receiving and retransmitting all the message traffic of all the world's hams on a single beam of light. We can see hams, equipped with a laser communications system, and their own personal 10 kc channel to work on.

This is the challenge of the future.

I would appreciate hearing from any and all amateurs who are currently engaged in laser research and development. I would also like to hear from any hams who would, at some future date, be interested in participating in laser experiments, or who would like to build a laser of their own. If there is enough interest we can possibly undertake a program of moving forward with the times toward a revolution in amateur radio! ■

Our Own Town, Gee!

Chaplain, Lt. Col., J. D. Andrew, W4EFG/7, points to highway sign indicating direction to Sekiu, (pronounced "CQ") Washington. Sekiu is on highway 9A between Port Angeles and Neah Bay in the extreme NW portion of the State of Washington.

(Photo by M/Sgt. Lassonde)

Rules: 1964 *CQ* World Wide DX Contest

Oct. 24-25, Nov. 28-29, 1964

1. CONTEST PERIOD

PHONE SECTION: 0000 GMT, Saturday, October 24th to 2400 GMT, Sunday, October 25, 1964.
C. W. SECTION: 0000 GMT, Saturday, November 28th to 2400 GMT, Sunday, November 29, 1964.

II. BANDS

Contest activity will be in the 1.8, 3.5, 7.0, 14.0, 21.0, and 28.0 mc amateur bands.

III. TYPE of COMPETITION

1. PHONE SECTION:
   (a) Single Operator.
   (b) Multi-Operator, single transmitter.
   (c) Multi-Operator, multi-transmitter.
2. C.W. SECTION:
   (a) Single Operator.
   (b) Multi-Operator, single transmitter.
   (c) Multi-Operator, multi-transmitter.
3. INTER-CLUB DX Clubs affiliated to a National body.

IV. EQUIPMENT

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

V. SERIAL NUMBERS

1. Phone stations will exchange serial numbers consisting of 4 numerals, the first two being the RS report and the last two their own Zone number.

2. C.w. stations will exchange serial numbers consisting of 5 numerals, the first three being the RST report and the last two their own Zone number.

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

VI. POINTS

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

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

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

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

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

VII. MULTIPLIER

Two types of multipliers will be used.

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

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

VIII. SCORING

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

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

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

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

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

6. *Exception:* Contestants using the 21 *or* 28 mc bands will be required to show a *minimum* of only 8 hours.

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

8. Multi-operator stations will *only* be judged on the basis of an all band score.

IX. ZONES and COUNTRIES

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

X. AWARDS

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

1. To the highest scoring single operator station on each single band in the following areas:
   (a) Each call area of the United States, Canada and Australia.
   (b) All other countries.

2. To the station having the highest all band score (more than one band) in the following areas:
   (a) Each call area of the United States; Canada and Australia.
   (b) All other countries.

3. Awards to multi-operator stations will only be made as in §2 above.

CQ WORLD-WIDE DX CONTEST CQ Page ___ of ___ Pages

Call _____

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

Band	QSOs	Zone Multiplier		Country Multiplier		Points		Band Score	Band
1.8 Mc			+		×		=		1.8 Mc
3.5 Mc			+		×		=		3.5 Mc
7 Mc			+		×		=		7 Mc
14 Mc			+		×		=		14 Mc
21 Mc			+		×		=		21 Mc
28 Mc			+		×		=		28 Mc
TOTAL			+		×		=		All Bands

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

_____ (Signature)

Name _____ Call _____
(USE BLOCK LETTERS)

Street and Number _____

City _____ Country _____

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

Submit logs to: CQ Contest Committee, 14 Vanderventer Avenue, Port Washington, New York

CQ Form 1057 eff. July, 1964

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

CQ WORLD-WIDE DX CONTEST CQ — Page 2 of 4 Pages

CALL W1GTE Log For 14 Mc Band COUNTRY U S A

(Use separate log for each band.) PHONE ☐ CW ☒

DATE / Time GMT	STATION	SERIAL NUMBER Sent	SERIAL NUMBER Received	Fill in only when QSO is mult. Zone No.	Fill in only when QSO is mult. COUNTRY	Points
Nov. 23, 1963						
0003	CE2OO	59905	59913	13	Uruguay	3
07	CX1BI	58905	59913			3
13	LU5AQ	57905	58913		Argentina	3
17	HK1QQ	57905	57909	9	Colombia	3
21	YV5AGD	56905	57909		Venezuela	3
25	KP4CC	56905	56908	8	Puerto Rico	2
29	KP4CK	56905	56908			2
31	VP7NT	55905	56008		Bahamas	2
33	W6RW	55905	55905	3	U S A	0
35	W8JIN	55905	55904	4		0
1320	TF3AB	56905	56940	40	Iceland	3
25	OX3EC	55905	56940		Greenland	2
30	VO2NA	56905	57902	2	Canada	2
40	VE2HV	55905	55905	5		2
Nov. 24						
1200	JA1VX	57905	57925	25	Japan	3
10	HL9KH	58905	57925		Korea	3
15	KL7JDO	56905	56901	1	Alaska	2
25	KH6IJ	56905	57931	31	Hawaii	3
35	VK2GW	55905	56930	30	Australia	3
45	VK6RU	55905	55929	29		3
TOTAL ZONES, COUNTRIES, POINTS THIS SHEET				13	15	47

CQ Form 1056 eff. May, 1962.

CQ WORLD-WIDE DX CONTEST CQ — Page 4 of 5 Pages

CALL OH5BM Log For 14 Mc Band COUNTRY FINLAND

(Use separate log for each band.) PHONE ☒ CW ☐

DATE / Time GMT	STATION	SERIAL NUMBER Sent	SERIAL NUMBER Received	Fill in only when QSO is mult. Zone No.	Fill in only when QSO is mult. COUNTRY	Points
Oct. 26, 1963						
0445	5B4WB	5915	5920	20	Cyprus	3
47	UD6BB	5815	5721	21	Azerbaijan	3
51	UG6KAA	5715	5621		Armenia	3
55	UF6FB	5615	5521		Georgia	3
0500	MP4BBW	5915	5921		Bahrain	3
05	OH2TV	5915	5915	15	Finland	0
07	I1AMU	5915	5915		Italy	1
09	DJ1BZ	5915	5914	14	Germany	1
11	GB2BM	5915	5814		England	1
1700	VE3PV	5615	5504	4	Canada	3
05	W8NGO	5515	5504		U S A	3
10	VO2NA	5615	5502	2		3
15	WB2OCO	5515	5505	5		3
Oct. 27						
0805	KA2JL	5615	5525	25	Japan	3
15	KG1BO	5515	5540	40	Greeland	3
25	TF2WGU	5615	5640		Iceland	1
30	CT2AK	5615	5614		Azores	1
35	CT3AY	5615	5633	33	Madeira Is.	3
TOTAL ZONES, COUNTRIES, POINTS THIS SHEET				10	16	41

CQ Form 1056 eff. May, 1962.

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

XI. SPECIAL AWARDS

In addition, the following special awards will be made:

1. A cup will be awarded to the highest scoring single operator on a single band, phone station in the world. *(Donated by K2IEG)*
2. A cup will be awarded to the highest scoring single operator on a single band, c.w. station in the world. *(Donated by the Potomac Valley Radio Club)*
3. A cup will be awarded to the highest scoring single operator, all band, phone station in the world. *(Donated by W2SKE)*
4. A cup will be awarded to the highest scoring single operator, all band, c.w. station in the world. *(Donated by W9IOP)*
5. A cup will be awarded to the highest scoring multi-operator, single transmitter phone station in the world. *(Donated by W6YY)*
6. A cup will be awarded to the highest scoring multi-operator, single transmitter, c.w. station in the world. *(Donated by W3AOH)*
7. A cup will be awarded to the highest scoring multi-operator, multi-transmitter, phone station in the world. *(Donated by W6AM)*
8. A cup will be awarded to the highest scoring multi-operator, multi-transmitter, c.w. station in the world. *(Donated by K2GL)*
9. A plaque will be awarded to the affiliated DX Club (not a national body) submitting the highest aggregate score of the scores submitted by its members. *(Donated by CQ)*
   (a) For a club to enter, an officer of the club must submit a list of its participating members and their scores.
   (b) This list may include scores of single operator and multi-operator stations; both phone and c.w.
   (c) Stations that are members of a competing club therefore must indicate this fact on their report forms.
10. At the request of the donors, previous winners of a Trophy will again be eligible after a three year period. There are no restrictions to the winning of the *CQ* Plaque.
11. In countries or sections where the returns justify, second and third place certificates will be awarded. Also, such special and/or additional awards will be made as the Contest Committee shall choose.

XII. DISQUALIFICATION

Violation of the rules and regulations pertaining to amateur radio in the country of the contestant, or the rules of this contest, or unsportsmanship conduct, will be deemed sufficient cause for disqualification.

XIII. LOG INSTRUCTIONS

1. In keeping a log, fill in Zone number and Country, only the *FIRST TIME* it is contacted.
2. Use a separate sheet for each band and a tally sheet or report form.
3. Keep all times in *GMT*.
4. All contestants are expected to compute their scores. Logs should be checked for contact duplications and proper point credit before they are submitted.
5. Make sure name and address is clearly noted on each log. PRINT or TYPE.
6. Each contestant must sign a pledge that all rules and regulations have been observed and that the report is a true one. Note sample Contest report form.
7. If official forms are not available, use a duplicate form as indicated. The size is 8½" × 11" with 40 contacts to the page.
8. Copies of the Zone map, log sheets and report forms are available from *CQ*, address listed below. Send a self-addressed envelope large size; include sufficient postage. In the case of overseas stations, IRC coupons are acceptable. Indicate quantity of sheets required.

XIV. DEADLINE

All logs must be postmarked NO LATER than December 1, 1964 for the phone section and January 15, 1965 for the c.w. section. In rare isolated places the deadline will be made more flexible. Send logs directly to:

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

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

Amateur Radio Regulations and "Frequency Conferences"

BY WILLIAM I. ORR*, W6SAI

Just how much spectrum space have we lost in the last 35 years? W6SAI delves into this and other fascinating aspects of "Frequency Conferences."

MY previous article[1] discussed some aspects of the 1959 Administrative Radio Conference of the ITU and its importance to amateur radio. It was pointed out that the underlying problem which confronted the amateur radio service at that epic meeting was the pressure created in the h.f. spectrum on the various services by the desire of many nations to expand the frequency allocations of the International Broadcasting Service. This "frequency squeeze" ultimately endangered the radio amateur allocations, as the amateur radio service occupied a position of relatively low priority in the national need of most countries. By virtue of a a compromise plan entailing frequency coordination, a more effective utilization of the existing broadcast allocations was achieved, and the pressure for changing the high frequency allocations was relieved and the threat to the h.f. amateur bands reduced.

Problems such as this have not been unique to amateur radio, which has had to fight for its life since the days of the early "Frequency Conferences" at the turn of the century. A quick review of some of these early meetings will place some of today's problems in a better perspective.

The International Telegraph Union

Historically, a long sequence of international cooperation has been necessary to create the world-wide network of communication facilities that exists today. The International Telecommunications Union (ITU), including in its membership over 120 countries (administrations), is the existing symbol of this cooperation. International action to regulate communications can be traced back to 1848 when the completion of the first international telegraph lines in Europe created problems of tariff, control, and equipment compatibility. The 1849 Telegraph Treaty signed between Prussia and Austria signalled the first of a series of bilateral agreements between administrations out of which grew the West European Telegraph Union, the 1855 great-grandfather of the present ITU.

The WETU grew in importance and stature until in 1904 it numbered 48 member countries in all continents. At this time it became known as the International Telegraph Union. The scope of activities of the old ITU was gradually widened to include telephone communication, and finally in 1906 a radiotelegraph conference in Berlin laid down preliminary rules relating to the exchange of messages between wireless stations.

World War I brought about a temporary suspension of cooperation in the regulation of international telegraph and telephone services, and during the war the communication services were, in effect, subject to the complete and arbitrary control of each national government. At the end of hostilities, the European nations quickly restored their common communication facilities and in a series of telegraph, telephone and radio conferences gradually laid the groundwork for the first full-fledged conference, at which radio "came of age." This meeting was the Washington Conference of 1927 and was the first conference dealing primarily with communication by radio, as opposed to wire communication.

The National Radio Conference of 1922

Prior to World War I emphasis had been placed upon long waves for long distance point-to-point and maritime radio communication. During the pre-war period in the United States, the Radio Act of 1912 restricted US radio ama-

[1]Orr, W. I., Amateur Radio Tomorrow, CQ, July, 64, p. 49.

*48 Campbell Lane, Menlo Park, Calif.

teurs to wavelengths under 200 meters (above 1500 kc) which were considered useless for commercial purposes. When, in 1923, two-way radio amateur contact was established across the Atlantic ocean on about 100 meters, it was realized that the science of radio had advanced a giant step and that a new spectrum of communication frequencies was at hand. Strictly national wavelength assignments could not cope with international frequency problems. It therefore became the task of the post-war radiotelegraph conferences to bring about an orderly allocation plan for existing and expected requests in the new short wavelengths.

Prior to 1927, amateur radio in the United States had been under the control of the Department of Commerce, operating under rules and regulations derived at a National Radio Conference held in Washington in 1922. From "unlimited" operation under 200 meters, the concept of discrete amateur bands was created, along with assignments for other national communication services in order to prevent chaos on the new "short waves." The United States radio amateur assignments did not agree with amateur radio assignments made by other nations, for there were still no international allocation agreements for any radio services. The informal US radio amateur regulations existing before 1927 were expressed in meters, and corresponded to the following frequency bands:

1500-2000 kc	160 meters
3500-4000 kc	80 meters
7000-8000 kc	40 meters
14000-16000 kc	20 meters
28000-30000 kc	10 meters
56000-64000 kc	5 meters
400-401 mc	¾ meter

In addition, a special sub-band of 170-180 meters was allocated to special licensees. (The first "incentive" license!)

The International Radio Telegraph Conference, Washington, 1927

The Washington Radio Conference of 1927 concerned itself with new rules, procedures and voting rights, particularly those of Dominions, Colonies, Protectorates, Possessions, or Mandated Territories. In addition, problems relating to the growing maritime service in both low and high frequency bands were paramount. Eighty countries were represented, along with sixty-four non-voting private companies and organizations interested in regulation of the Radio Services. The International Amateur Radio Union and the American Radio Relay League both attended this important conference.

The Washington Radio Conference marked an important turning point in the approach to regulation of radio communication. At previous conferences, emphasis had been placed on establishing tariffs, rules for traffic handling and compatible technical standards to provide a workable system of communication. By 1927 it was found necessary to forbid certain practices that could create harmful interference, and to divide up the radio spectrum among the many services that this new science was providing. Restrictions were placed on "spark" transmitters and allocations were created for all the usable frequencies for the radio services then in existence. A table of allocations covering 10 kc to 60,000 kc was created (not without intense controversy) and the various radio services were provided frequency bands for mutual protection and to provide room for future expansion.

It is interesting to note, in passing, that the United States had abstained in the past from joining any international action dealing with provisions it felt would be impossible to apply to private communication companies. It must be remembered that the United States was (and is) one of the few countries wherein communications facilities were not controlled as a government monopoly, and, instead, were in private hands. In view of the separation of regulation and control of communications, the interests of the United States did not necessarily coincide with various facets of international regulations dealing primarily with government controlled communication facilities, particularly with respect to rates, which were a matter of the U.S. private communication companies. As regards to amateur radio, the position of the United States towards privately owned radio stations was, on the whole, more charitable than that of other countries whose communications facilities were under complete government control. The United States position *vis-a-vis* amateur radio at this Conference was to attempt to secure international allocations equal to the privileges afforded radio amateurs in the United States. This proposal was greeted with coolness by many other administrations who tended to lump amateur stations with experimental stations, and who viewed the ability of citizens to communicate via privately owned radio apparatus as dangerous. As a result, the support of the United States Delegation to this Conference, aided by Canada and Italy, the radio amateur service was formalized and achieved recognized stature, with frequency provisions allotted on an international basis. New frequency allocations were agreed upon which, although narrower than the informal US assignments, were much greater than the assignments provided for foreign radio amateurs. On January 1, 1929, the new international amateur bands became:

1715-2000 kc	160 meters
3500-4000 kc	80 meters
7000-7300 kc	40 meters
14000-14400 kc	20 meters
28000-30000 kc	10 meters
56000-60000 kc	5 meters

"Where Have Our Bands Gone?"

In view of the present uproar created by uninformed "allocations experts" over the "loss" of amateur frequencies over the past years, it is

[*Continued on page 96*]

The Heathkit SB-300 receiver. It is professionally styled in a wrap-around cabinet. Under the meter at the left is the a.g.c. switch with a phone jack below it. To the right of the meter is the function switch with the mode switch below. The tuning arrangement in the center has a slide-rule dial with 50 kc points on it and a circular dial with 1 kc increments for each 100 kc. The a.f. gain is at the lower right with the preselector tuning above it.

CQ Reviews:

The Heathkit SB-300 Receiver

BY WILFRED M. SCHERER,* W2AEF

THE production of a kit to build an amateur receiver having performance equal to or better than that of many high-priced factory-built receivers is most unusual—yes, even amazing! Such is the Heathkit SB-300. Besides being a top-notch performer, it also is high quality throughout and is modernly styled with a truly professional appearance.

The SB-300 is an amateur-band-only receiver for use on s.s.b., c.w. and a.m. with full coverage of all bands from 80 through 10 meters. It employs an exceptionally stable v.f.o. which is accurately calibrated in 1 kc increments over a 500 kc range for each band (four 500 kc band segments are used on 10 meters). With s.s.b. either upper or lower sideband may be selected for which a 2.1 kc bandpass crystal filter is automatically switched in. For c.w. a 400 cycle filter is used and the a.m. filter is 3.75 kc wide. The high-frequency r.f. circuits are tuned with a separate preselector control. Slow or fast a.g.c. may be selected. An S-meter is included as is a 100 kc crystal calibrator along with the usual r.f. and a.f. gain controls. Provisions are available to enable the receiver's oscillators to be used to drive a companion unit, the SB-400 transmitter, if transceiver-type of operation should be desired therewith. An accessory power socket is provided for operating separate h.f. converters for which there also is an r.f. input switching arrangement to instantaneously change the receiver input from the normal antenna to the output of either one of two h.f. converters. The B+ is switched to the individual converters at the same time. The arrangement also may be used for switching between different receiving antennas. Appropriate chassis connectors are provided for this purpose. Muting and anti-vox connectors are included too.

*Technical Director, *CQ*.

Specifications and Performance

The operation of the SB-300 makes such a good impression that before going into the circuit and constructional details, it is felt that it's electrical specifications and it's measured performance should be taken up.

The set is so quiet that when it was first operated, it *appeared* to be dead, but what a surprise when it was found what it really could do! Heathkit's specifications for sensitivity are: less than 1 μv for a 15 db signal-to-noise ratio (on s.s.b.). When the initial measurements were made, the performance was so much better than the rating that we had our signal generator recalibrated, just to be sure. Here is what actually was found for sensitivity: 0.25 μv for 25 db s/n on 40 & 20; 20 db s/n on 15 & 80; 15 db s/n on 10. While the full benefit of the excellent signal-to-noise ratio with this high a sensitivity might not be an immediately apparent advantage with today's power-packed bands, it certainly is desirable when the weak ones are to be "dug out from under," especially if the receiving location is a quiet one. Besides this, the overall gain is such that annoying and tiresome background noise is considerably reduced during no-signal conditions.

The V.F.O.

One of the pleasant surprises in the SB-300 is the stability and accuracy of the v.f.o., or linear master oscillator (l.m.o.) as it is called by Heathkit. A contributing factor, in this regard, is that the l.m.o. is supplied completely assembled, wired and aligned.

Frequency Stability

The frequency stability is rated at better than 100 c.p.s. per hour after 20 minutes warmup under normal ambient conditions. It was found to be less than 200 c.p.s. during warmup and less than 50 c.p.s. per hour thereafter.

Line-voltage variations of ±10% resulted in a frequency shift of less than 30 c.p.s. on the three low bands, 50 c.p.s. on 15 and 50 to 100 c.p.s. on the different 10 meter segments, all within the rating of 100 c.p.s.

These excellent results were obtained in spite of the fact that no voltage regulation is employed.

All frequency-stability tests were made on each band, using both upper and lower sideband, so as to include all the crystals in the set.

Slight microphonic effects were noted when the cabinet was tapped quite hard, but they were not evidenced during normal operation.

Dial Accuracy

The 1 kc dial increments are spaced approximately ⅛" apart, resulting in a visual dial accuracy of about 200 c.p.s. The electrical dial accuracy is given as within 400 c.p.s. on all bands after calibration at nearest 100 kc point. Checks were made at every 10 kc point over the whole range after calibrating only at the 300 kc marker. Calibration was within 200 c.p.s. between 0 and 400 kc, and re-calibration was needed at 400 kc for points between 400 and 500 kc to comply with the rating. Backlash is rated at, and was found to be no more than 50 c.p.s.

After setting the l.m.o. frequency shifter (with the dial at the 300 kc point) so that no change of frequency occurred when sidebands were switched, the tracking, in this respect, over the rest of the range was within 30 c.p.s.

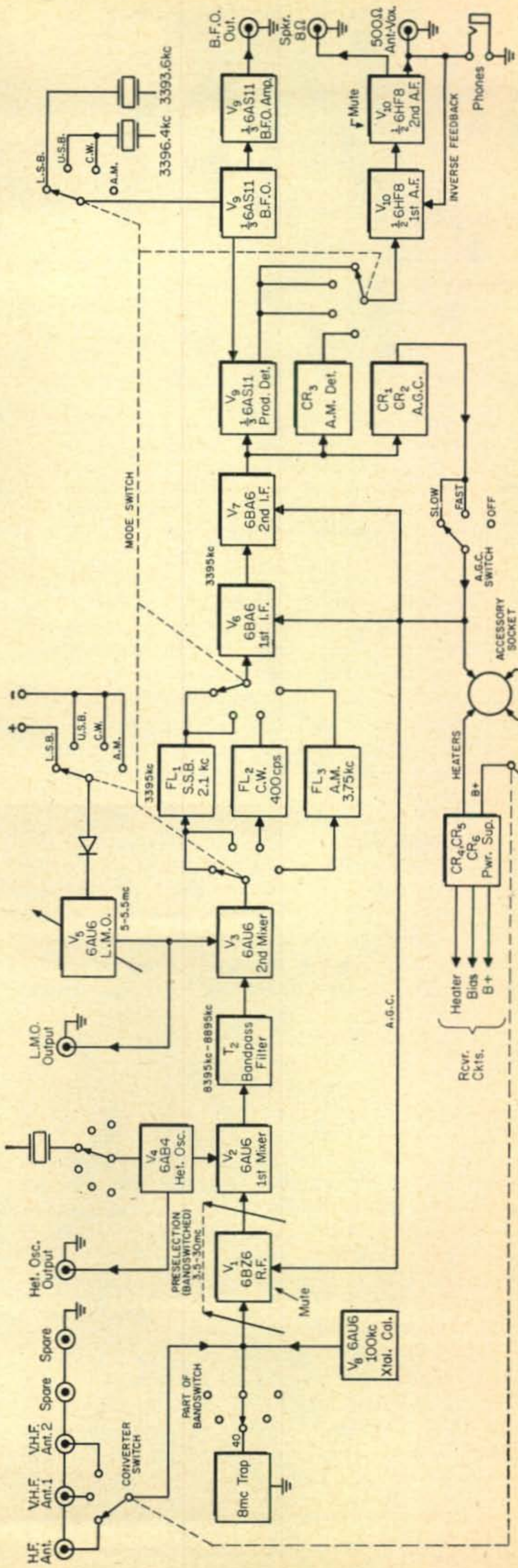
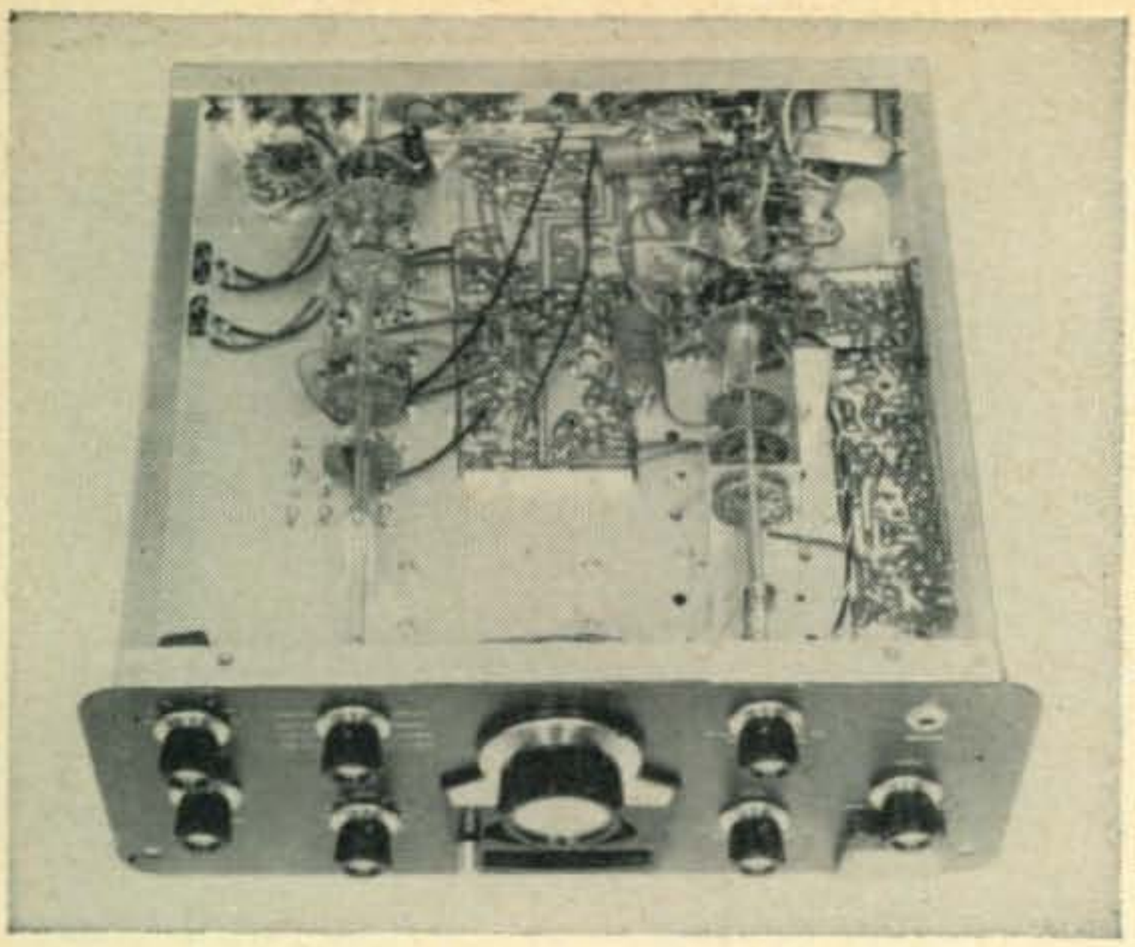


Fig. 1—Block diagram of the SB-300. The lineup is quite simple and requires no explanation, except the following: The gang-tuned preselection circuits are bandswitched, largely contributing to the excellent receiver performance. The crystal frequencies for the heterodyne oscillator are equal to the lowest frequency of each band plus 8895 kc. The output of the 1st mixer goes through a bandpass filter (8395 to 8895 kc) to attenuate frequencies outside this range. When the 40-meter band is used, a series-tuned trap is inserted across the r.f. input to minimize the leakage of signals at the 8 mc i.f. The 3395 kc crystal filters, following the 2nd mixer, are automatically selected when the mode switch is changed for s.s.b., c.w. and a.m. The appropriate type of detector is selected at the same time. L.s.b. or u.s.b. also is selected by this switch. For l.s.b. it applies a positive voltage to a switching diode which then conducts and thus connects additional capacitance to shift the l.m.o. frequency as needed. For u.s.b., c.w. and a.m. a negative voltage cuts off the diode switch. Two diodes in a voltage-doubling circuit provide adequate a.g.c. voltage without requiring an a.g.c. amplifier. A.g.c. also is available at the accessory socket. A switch either turns off the a.g.c. or provides fast or slow release. The r.f. gain, not shown, controls the r.f. and 3395 kc i.f. stages.



Under-chassis view of the SB-300. It is clean with easy accessibility for servicing. Note the small coax leads running from the left of the bandswitch (left). These are the connections for the preselector-tuning capacitor, largely contributing to high image rejection, circuit stability and low noise.

The l.m.o. dial is rotated by a pinch-drive mechanism which provides smooth operation with four turns of the tuning knob required for each 100 kc. A slide-rule scale arrangement indicates the zero-reference points for each 100 kc. The hairline fiducial for the incremental-frequency dial is adjustable in order that proper indexing may be obtained during calibration.

Selectivity

Specifications for selectivity are: s.s.b., 2.1 kc at 6 db down and 5 kc at 60 db down; a.m., 3.75 kc at 6 db and 10 kc at 60 db; c.w., 400 c.p.s. at 6 db and 2.5 kc at 60 db. Just the 2.1 kc filter was checked, as this is the only one normally supplied with the kit. It measured up to specifications. Ripples noted in the passband amounted to no more than 1 db. The filter is one of the most symmetrical ones observed to date, with the result that the a.f. response does not change when sidebands are switched. Unwanted-sideband suppression at 1000 c.p.s. measured —50 db, at 500 c.p.s. it was —40 db! The b.f.o. carrier is so placed in relation to the filter passband that the a.f. quality is most pleasant sounding without the harshness sometimes experienced with h.f. filters. In this respect, the a.f. response with s.s.b. is 350 to 2450 c.p.s. at the 6 db points. The ratings for the optional filters are: a.m. (3.75 kc filter), 200 to 3500 c.p.s.; c.w. (400 c.p.s. filter), 800 to 1200 c.p.s.

For those who do not have the extra filters and who require only occasional reception on the other modes, c.w. may be copied using the upper or lower sideband modes (adjacent-channel QRM may be dodged this way) and a.m. may similarly be read using exalted carrier or the filter connections on the mode switch may be jumped to the a.m. position so the 2.1 kc filter can be used for a.m. also. This arrangement was found to be quite acceptable.

Spurious Responses

Spurious responses found at 21.2 and 28.465 mc were equivalent to a signal input of between 2 and 2.5 μv. The few others that appeared were well below (—6 to —30 db) the rating of 1 μv equivalent, but due to the excellent signal-to-noise ratio of the SB-300, they *sounded* higher.

Image and i.f. signal rejection is given as —50 db. The images which were found were —60 db or more. The i.f. signal rejection (8395-8895 kc) was better than —60 db, except on the 40-meter band where it amounted to —50 db at the lower end, —44 db at the upper end. Later models have a modified input coil which provides better than —60 db rejection on 40. Rejection at the 3395 kc i.f. was better than —80 db on all bands.

A.F. Output Power

The a.f. output power is rated at 1 watt with less than 8% distortion. At 400 c.p.s. it was found a little over 8% (4.5% at ½ watt) and at 1000 c.p.s. it was 4% at 1 watt (2% at ½ watt). R.f. signal input required for ½ watt output was from 1 μv to 4.5 μv, depending on the band used.

Antenna Input Impedance

The antenna input impedance, rated at 50 ohms nominal, varied between 10 and 20 ohms (non-reactive) depending on band.

S-Meter

The r.f. gain varies from band to band, so different input-signal levels are required for a given S-meter reading in each case. Also, the S-meter indications are on the "Scotch" side, requiring the following approximate input levels for S-1 and S-9 readings, respectively, for each band as follows: 80 meters, 5 and 300 μv; 40 m., 4 and 175 μv; 20 m., 7 and 300 μv; 15 m., 10 and 400 μv; 10 m., 20 and 600 μv.

The meter calibrations were found to be such that the standard rating of a 6 db signal change per S-unit indicated approximately 1½ S-unit steps on the meter scale, making it's S-unit readings equivalent to 4 db increments instead. Above S-9, 20 db signal changes indicated about 30 db.

A.G.C.

No specifications are given concerning the a.g.c. figure-of-merit, but for a 60 db increase of r.f. signal input, from 10 to 10,000 μv, the average increase of audio output for all bands was 9 db, or 3 db for each 20 db of signal rise. Due to differences in band gain, 1 to 10 μv input changes raised the a.f. output between 7 and 19 db, according to the band used.

The a.g.c. attack is instantaneous. The fast release is specified for a.m., the slow release for s.s.b. A fast a.g.c. with s.s.b. will produce pumping effects on strong signals with the background noise or QRM rising quickly between words. *Any* fast a.g.c. also results in non-linear audio; whereas, a slow release a.g.c. holds the gain constant for short intervals, resulting in better linearity and cleaner audio with a reduction of

annoying in-between signals. Copying is a lot easier during QRM. The release time for the SB-300 slow a.g.c. showed up to be about 3 seconds with an S-9 signal. For c.w., slow release is specified, but a fast one often helps with weak signals.

Overload and Cross Modulation

Overloading could be detected with signal levels above 5000 μv on most bands. Measurements were not made for cross modulation; however, local kilowatt stations produced no difficulties in this regard.

Special Notes on Later Models

We particularly like the quiet operation, the high sensitivity and excellent signal-to-noise ratio of the SB-300 unit that was checked in the lab; however, since many amateurs psychologically *think* a receiver is dead, unless a lot of background noise is in evidence during no-signal periods, later Model SB-300's are provided with higher i.f. gain *without* deterioration of the signal-to-noise *ratio*. The S-meter also is "livened" up. Thus, lower signal levels will be required for given S-meter readings than reported herein. Also, the a.g.c. action for signals *below* 10 μv will be improved, resulting in lower a.f.-level changes.

Assembly

The manual contains 45 pages of assembly procedures and detailed drawings. These are clear, concise and easy to follow. No particular problems should arise, except possibly those noted later, as long as each step is *carefully* studied and followed. In our case, the time required for assembly was 26 hours, but for those less experienced in this type of work, upwards of twice this time may be needed.

The SB-300 r.f. and i.f. sections each are built on separate printed-circuit boards which are well marked with component identifications. The use of the boards simplifies assembly, saves time and reduces the chances of wiring errors and improper lead dress, as does a color-coded harness which is furnished for power leads and needed interconnections between the various elements, panel controls and connectors. Only one chassis-mounted socket requires individual component installation and wiring.

As previously mentioned, the l.m.o. is already assembled and aligned. Only mounting it, connecting the dial mechanism and power leads is required.

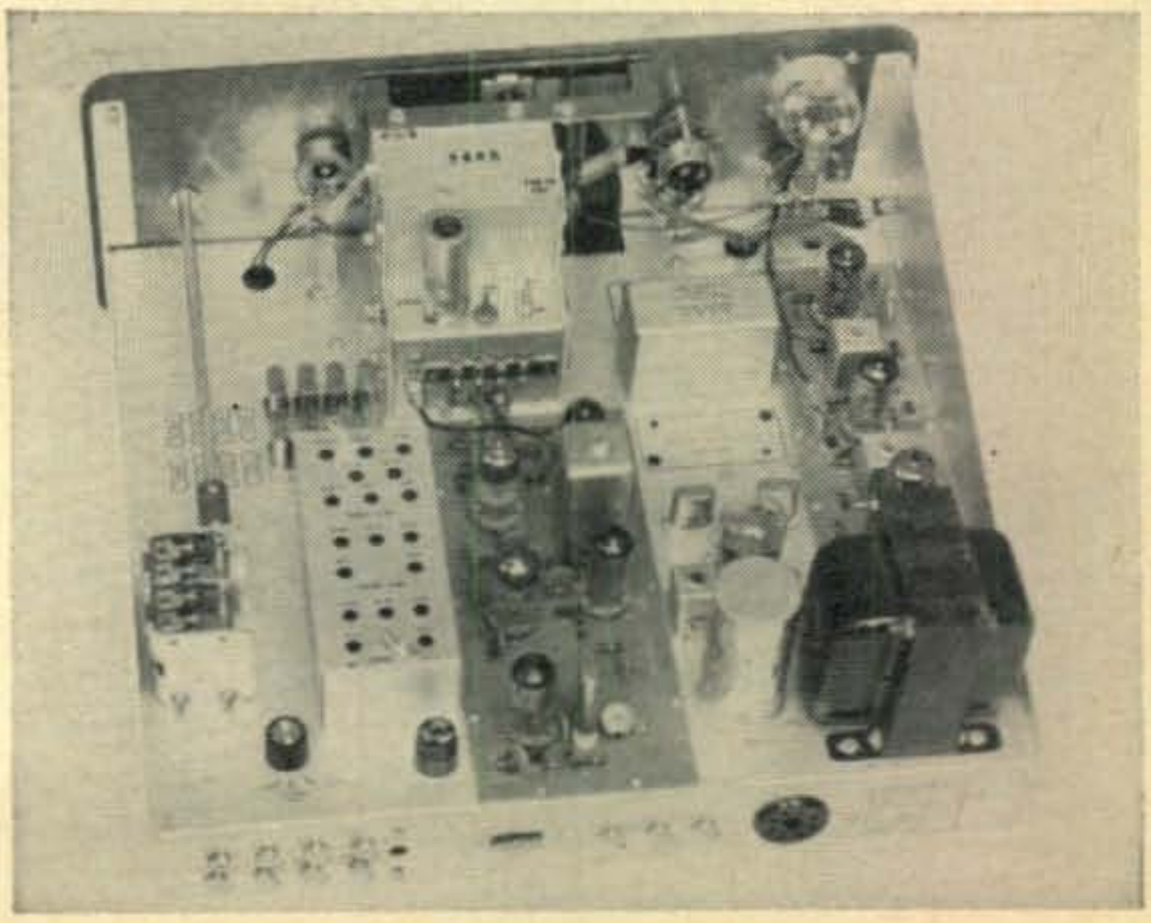
A precaution which was found desirable when the printed-circuit boards were assembled is to be sure that the soldering done at the connections to the ground foils along the sides, does not cause solder to flow outward toward the sides, causing lumps in line with the mounting holes which may ultimately present difficulties in mounting the boards flat against the edges of the chassis cutouts.

When the printed-circuit boards are completed, it will be helpful to examine them closely with a magnifying glass to be certain that connections are well soldered and that no soldered shorts exist between the foil strips. Examination for shorts also may be made by holding the boards up to a bright light.

Other Suggestions

When the harness is to be laid out and fitted in the chassis, it will be helpful to *carefully* consider just where and how the leads from each breakout are to be run, as indicated in the specified pictorial diagram. The harness may then be positioned accordingly, leaving the exact forming dimensions, as indicated in detail 7, until later when the unit is finally buttoned up (detail 16B).

Some difficulty was experienced with the harness at the phone jack. Here the two shielded leads from the breakout were not quite long enough to reach the jack terminals, as indicated at pictorial 16, and if they had been, there would have been too much danger of their ground leads' shorting to the hot-lead terminals on the jack. These difficulties were avoided by opening up the harness so that the leads could be lengthened and be brought up on the opposite side of the jack in such a manner that the insulated inner conductors ran over and past the shield connections.



Top-chassis view of the SB-300. The pre-assembled l.m.o. is at the upper center. The heterodyning crystals are at the left of the l.m.o. with their proper locations identified by labels on the chassis directly under the long shaft for the preselector capacitor on the left side. The i.f. printed-circuit board is along the right side, the r.f. board is at the center. The b.f.o. is between the circuit boards along with the 2.1 kc s.s.b. crystal filter near the panel. Space is provided for the optional filters. The r.f. and h.f. oscillator coils are covered by the can with the holes in the top. The knob in the left foreground is the r.f. input selector at the right of which is a fuse holder. The phono-type jacks on the chassis apron are clearly labelled and next to the round accessory power socket at the right a chart identifies the socket-terminal connections. A cheater-cord type receptacle also may be seen for a detachable a.c. line-power cord.

When the r.f. coils are mounted and wired, carefully recheck each step as it is done. If an error should be made, correcting it later may be extremely difficult, since working space will be limited and the parts almost inaccessible after the entire section is completed. Also, be sure *all* the ground lugs are installed aforehand as indicated in detail 12J.

Referring to page 48, it was found best to make the connections to terminals 1, 2 and 3 of control FB *after* the other work was done in the area to provide better access for installing the components on terminal strip A as indicated in pictorial 16.

When the 100 ohm and 330 ohm 2 watt resistors are installed as indicated on page 29, shove them a bit towards the front of the chassis to allow plenty of space for later installation of the 20 mf electrolytic capacitor shown on page 31.

When the l.m.o. drive arrangement is set up, the pilot-light bracket at the left of the dial should be positioned so that the pointer driver for the slide-rule scale does not hit it. Care also is needed to see that the shield on the pilot-lamp bulb does not touch the terminals of the adjacent function switch.

One final word of caution. In order to minimize the possibility of short circuits when the small coax cables are soldered, their leads should not be taught or strained at the breakout from the braided shield.

A bit of diddling and patience may be needed to get the pointer driver to track properly and to obtain smooth operation of the drive; however, if after completion of the receiver, the drive slips or is too tight, the tension on the pinch-drive pulley can be readjusted from the front of the dial escutcheon after the tuning knob is removed. If the pulley slips out of the dial groove during readjustment, it can, by using a little care, be reinserted. The tuning will become smoother when the moving parts have "worn in" after a few hours operation.

Packaging

The SB-300 is housed in a light gray wrap-around type of perforated-metal case with a hinged cover. The panel has a dark gray-colored semi-crackle finish with white lettering. The knobs are black with polished-aluminum inserts and skirts. The meter and dial scales are illuminated from the rear and have white lettering on a black background, eliminating light-glare. The front mounting feet are made so the unit may be tilted slightly upward or placed in a horizontal position on a table. Dimensions are: 14⅞" w. × 6⅝" h. ×13⅜" d. Weight is 17 lbs. Power required is 50 watts, 120 v.a.c. at 60 c.p.s.

The manual contains a rather complete trouble-shooting chart along with a four-section bottom-view photograph of the chassis with component identification. X-ray views of the printed-circuit boards with parts identification are also shown.

After trying out the SB-300, it was thought that maybe we were lucky enough to have run across a particularly good model, but judging from reports received from owners of other units, the performance reported here apparently is the general rule.

The SB-300 receiver kit is priced at $265.00, complete with all crystals, but less the optional a.m. and c.w. filters; Models SBA-300-1 (3.75 kc) and SBA-300-2 (2.1 kc) respectively. These are priced at $19.95 each. The SBA-300-3 6-meter and SBA-300-4 2-meter converter kits are available at $19.95 each. They may be mounted on the rear of the SB-300 and be permanently connected for additional bandswitched coverage. The manufacturer is The Heath Company, Benton Harbor, Mich. 19023. ■

A Bitter End to the K3IOP Case

In spite of all efforts in his behalf as reported in this magazine earlier this year, it now appears that the K3IOP case is rapidly reaching a close with no decision on policy to be made by the FCC. In brief, Charles A. Seaman, K3IOP, of Elizabeth, Pa., had been originally issued a General Class license, but with the clearly-stipulated condition that this authorization did not include 50 mc privileges even though at least two FCC Commissioners conceded that his operations on that band were "in accordance with the rules." The almost unprecedented uproar created by irate TVI-plagued neighbors made amateur history.

In view of all that has happened since, we were indeed shocked to learn that K3IOP in early July filed a petition asking the FCC to "terminate the proceeding." He said that he has disposed of his six meter gear (which was charged with causing the TVI), and has obtained a low-frequency transmitter which he says is "technically incapable of operating on frequencies above 30 mc." He further adds that as long as he lives in the Elizabeth, Pa., area he "will not acquire" 50-54 mc equipment.

Needless to say, the counsel for the Borough of Elizabeth has *heartily agreed with this action* . . . Another v.h.f. operator down the drain.

—*K2ZSQ*

RTTY From A to Z

BY DURWARD J. TUCKER*, W5VU

Part II

If you have been thinking about RTTY but you haven't gotten around to doing anything about it, then you will want to go back and read Part I also. Covered below is general information on teletypewriter machines as well as specific information on the more common machines.

It must be realized that the teletypewriter is a mechanical device. However, it is a most ingenious device as well as a machine of high precision, not only in design and manufacture but in operation as well. The word "Teletype" has become as synonymous with RTTY as the word "Kleenex" has for tissues. The word "Teletype" is a registered trade mark of the Teletype Corporation of Chicago. This company has dominated this field in America for many, many years. Two other companies in this country are now in the field.

For many years Teletype machines that became obsolete or else too worn for further commercial use were broken up and disposed of as junk. Through the untiring efforts of numerous influential hams, many of them in the employment of the Teletype Corporation and the various Bell Companies, the Teletype machines began to find their way into the hands of the radio amateurs. Not only were the machines made available but they were released at a nominal sum which just about covered the shipping and other handling charges. Amateurs are required to give their word, by signed waiver, that the machines will be put to the service for which they are released (amateur radio) and not to any commercial use. It is hoped that these generous privileges are never abused.

Do not contact your local telephone company or the Teletype Corporation to ask about the availability of a machine. In the first place, all of the companies don't necessarily participate in the plan of making the machines available to the amateurs and furthermore, those that do, of necessity, and from a practical standpoint, must do so through reliable and established organizations.

I believe that in most instances, the Bell machines are distributed to the hams through a local or state RTTY society. It is suggested that you first check with your local amateur radio club to see if there is an RTTY society in your city or state. If you are unable to get the information locally, you should next consult the RTTY column (a regular monthly feature) in your back issues of *CQ*.

A few machines have found their way into the open market. Some of these have been damaged machines that either need repairing or have been repaired. As a rule, such machines cost much more and you don't always know what you are getting. It requires not only special tools, but special skills to work on a teletype machine; therefore, this is not usually done by the average ham. On the other hand, there have been a few hams who have repaired machines by actually fabricating the parts that were missing or needed replacing. As a rule, it is better to consult with a fellow ham who is familiar with the machines.

Other Literature

Only Teletype machines will be covered here for obvious reasons. Almost all of the machines in radio amateur use are Teletype machines and they are still about the only make of machine

Fig. 4—Teletype Model 15 page printer used for both Transmit and Receive functions.

*6906 Kingsbury Drive, Dallas 31, Texas.

Fig. 5—Interior view of the Model 15 page printer.

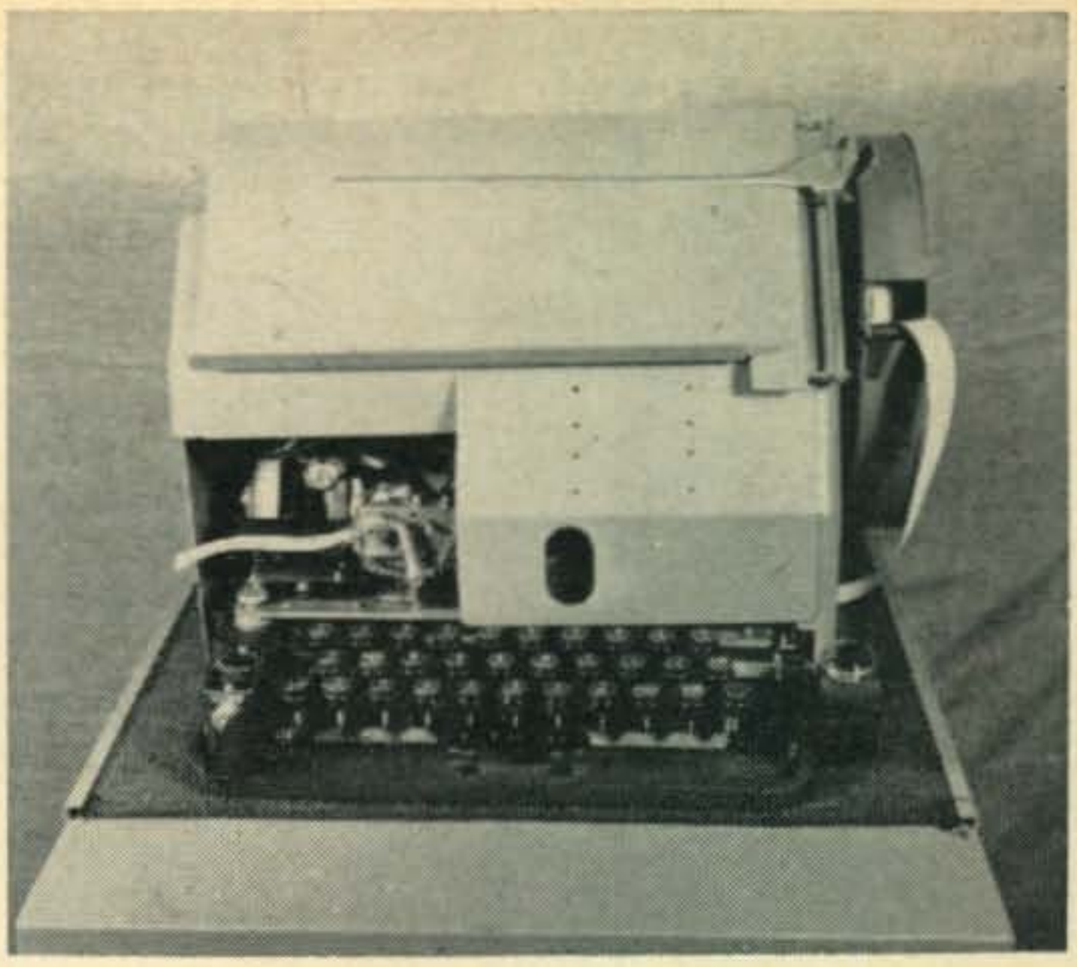


Fig. 6—Teletype Model 14 typing reperforator. This unit performs the same function as a page printer but on a tape rather than a page.

available to American hams. It is beyond the scope of this series to cover other than the more common Teletype machines available for amateur use nor will we go into the minute details of the construction and operation of individual models. Only information covering all machines in a general way will be given. It is recommended that a copy of *The New RTTY Handbook* by Byron H. Kretzman, W2JTP, published by *CQ*, be obtained if further information on individual machines is desired. This handbook covers all of the more common Teletype machines that are more readily obtainable for radio amateur use as well as other types.

Many fine manuals covering this equipment were printed by the government. The manuals are very thorough and complete with photographs of the most minute details of the equipment. The manuals also give complete servicing and maintenance routines as well as step by step procedures (in great detail) for trouble shooting. The manuals are not as plentiful as they used to be but some of them are still occasionally advertised in the radio amateur magazines.

One of the most active RTTY societies is the RTTY Society of Southern California. One of its members, W6AEE, publishes a monthly 16 page *RTTY* magazine that should be helpful to hams already on RTTY as well as the beginner.

Machine Descriptions

There are two general types of Teletype machines. They are the "Page printer" and the "Tape printer." The page printer prints on a sheet about the width of ordinary typewriter paper except the paper comes in rolls about four to five inches in diameter. The paper is also available in a continuous length but folded into a box approximately 9" long by 10" high. When the folded paper is used, the box sits on the floor in back of the machine.

Most of the tape printers in amateur use are of the 11/16" wide tape variety (in rolls about 6" in diameter) such as used by the Model 14 typing reperforator. However, there is narrow tape about ⅜" wide in limited use.

The following discussion covers the most commonly encountered machines. The page printers are used in the Receive and Transmit function. In Receive they type the message out in page form. In Transmit they form the proper code sequences for transmission as the desired keys are hit. The transmitted message may or may not be printed by the machine as the operator chooses.

The Model 12 page printer is quite old. Very few suffering YL's would allow this infernal noisemaker in the house for long. The OM breathed a sigh of relief when the Model 26 became available. However, it too is now rather old and is fading from the amateur RTTY scene. The author would advise all those entering the RTTY field to try for something better than a Model 12 or even a Model 26 if at all possible.

A more recent page printer is the Model 28 (the Cadillac variety) which is not yet generally available for amateur use (just forget about it for a few more years). Another page printer available is the Model 15, part of the Model 19 Tape set which will be discussed shortly. The Model 15 is shown in figs. 4 and 5, and is the unit the amateur should try to obtain.

Model 14 Typing Reperforator

If one can afford another machine besides a Model 15 then the logical one to try to obtain next is the Typing Reperforator, Model 14. It is much like the page printer but works with tape rather than pages. It serves both the receive and transmit functions. The Model 14 Typing Reperforator is shown in figs. 6 and 7.

The Model 14 could be obtained instead of the Model 15 page printer except for the fact that you would be receiving on a tape. Actually, a page printer is more practical. If you had only a tape printer you would always be knee deep in tape.

The Model 14 typing reperforator with key-

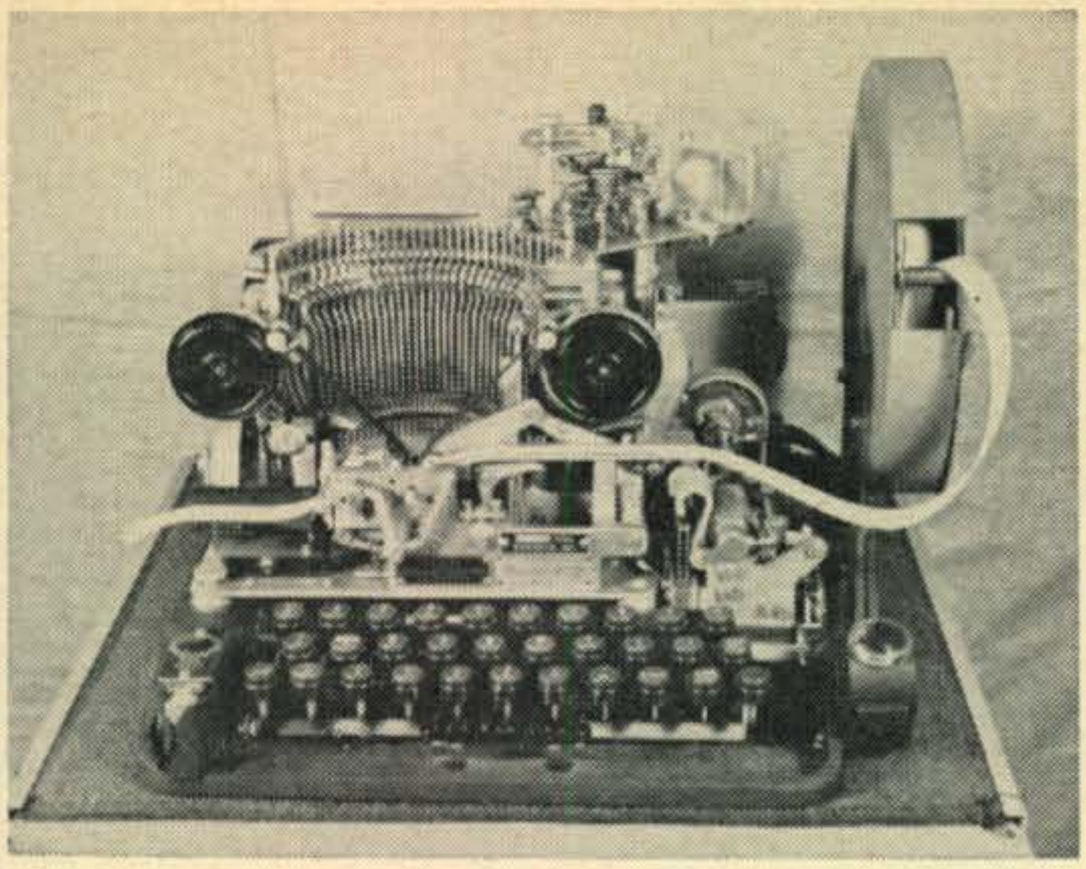


Fig. 7—Interior view of a Model 14 typing reperforator.

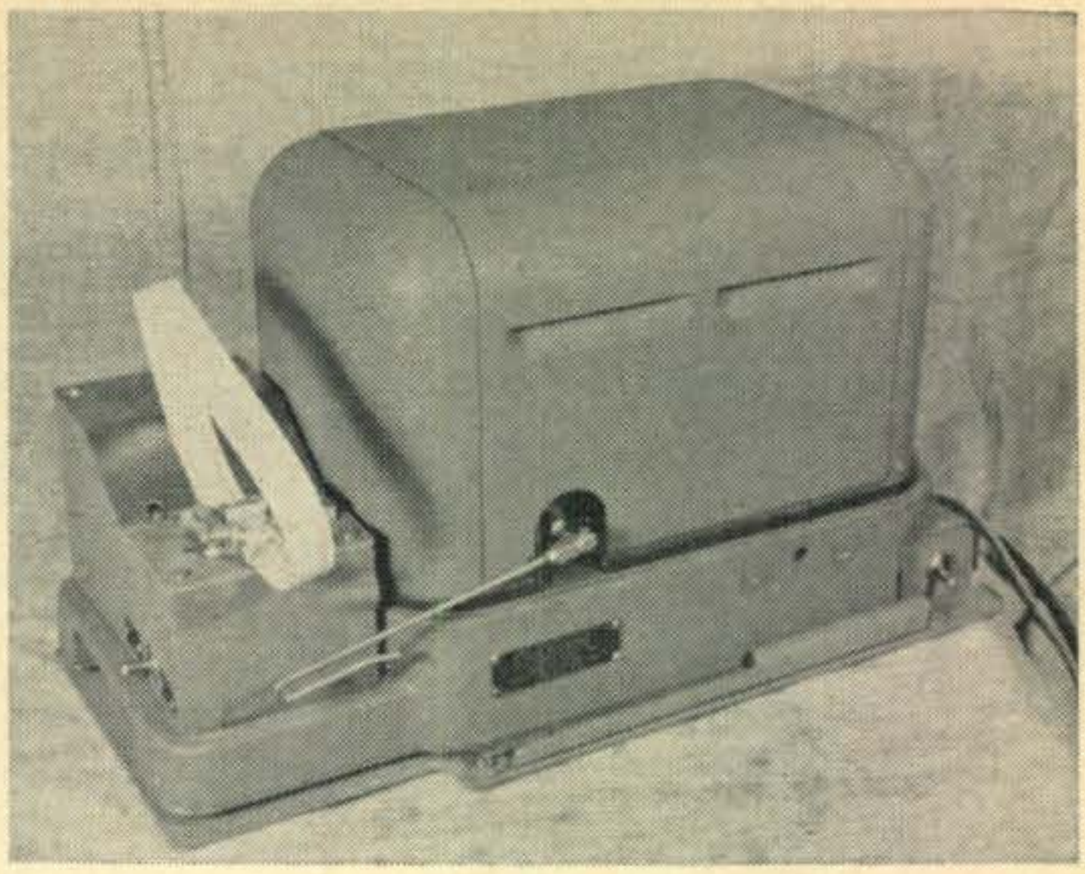


Fig. 8—Teletype transmitter—distributor Model 14 used to transmit pre-punched tapes at speeds up to 60 w.p.m. The closed loop tape repeats the message until the machine shuts down.

board is so called because it punches or perforates the tape, printing the message on the tape at the same time. This function is the same regardless of whether you are sending or receiving on this machine. In other words, you *cannot* turn off the punching function and only print on the tape. It might be noted that there is little or no point in having this particular machine unless you also have a "tape reader" such as the model 14 Transmitter Distributor covered a little later.

The Model 14 Typing Reperforator punches a chadless tape or one in which the chads are not completely severed from the tape. A small part of the leading edge of the chad is left attached to the tape. Note that a chadless tape is one that *retains* all the chads and because the tape is chadless, it is possible to both print and perforate at the same time. This makes it possible for the operator to monitor the tape as shown in figs. 3B and 3D. It also permits quick identification of tapes stored for future use.

Model 15, Plus Perforator Transmitter

The Model 15, Plus Perforator Transmitter is a Model 15 page printer plus a tape perforator and a character counter that tells the operator when to press the LINE FEED key to start a new line at the receiving page printer. This composite set of equipment is designated as a "Model 19 Tape Set" by the Teletype Corporation. More on this in just a moment.

Model 14 Transmitter Distributor

The Model 14 TD receives prepunched tapes of the chadless or chad type. It is used strictly for transmitting purposes. This machine is shown in figs. 8 and 9. The covered view, fig. 8, is shown with a continuous loop tape used to repeat a prepared message. The tapes are transmitted at 60 w.p.m. by the TD machine even though the operator may have originally perforated the tape at a much slower speed. For this reason, the machine is used to transmit CQ's, antenna layouts, station descriptions, discussions, and other routine material as well as contest sequences that can be prepared in advance on a perforated tape. This takes some of the work out of operating as well as speeding up things if you can't type at 60 w.p.m. In fact, you would be amazed at the *work* that some operators go to in this respect to get out of *work!* With a battery of TD's or similar machines that operate from push-button controls, individually or sequentially, an operator can load all of the machines with prerecorded data and carry on a QSO while reclined in his chair. C.w. was never like this! Some don't even have to operate a manual send-receive switch—this is done automatically when sending ceases.

Some operators (who, naturally, have more than one machine) watch the copy coming in on one machine and perforate the answer on tape on another machine at the same time. When the other operator stands by, the perforator tape is fed to him at a steady 60 w.p.m. clip. During this time the now sending operator can twiddle his thumbs, go get a drink of water, or else think up more skulduggery for the next round!

Model 19 Tape Set

Finally, there is the Model 19 Tape Set. Shown in figs 10 and 11, it consists of a Model 15 page printer, a Model 14 Transmitter Distributor, a perforator-counter and a heavy duty power supply.

Examination of fig. 10 shows the Model 15 page printer on the right. In the center is the perforator-counter. The tape feeds through the perforator-counter into the Model 14 Transmitter Distributor. The power supply is located on the shelf below the equipment.

The operator has several options in the operation of the Model 19 tape set. There is a three position switch on the front, just above the right hand side of the keyboard. The three position switch, from top to bottom, is designated: KEYROARD; KBD. & TAPE, and TAPE. It is possible to be receiving RTTY copy that is being printed on the page printer while you, at the same time, are operating the keyboard and perforating a

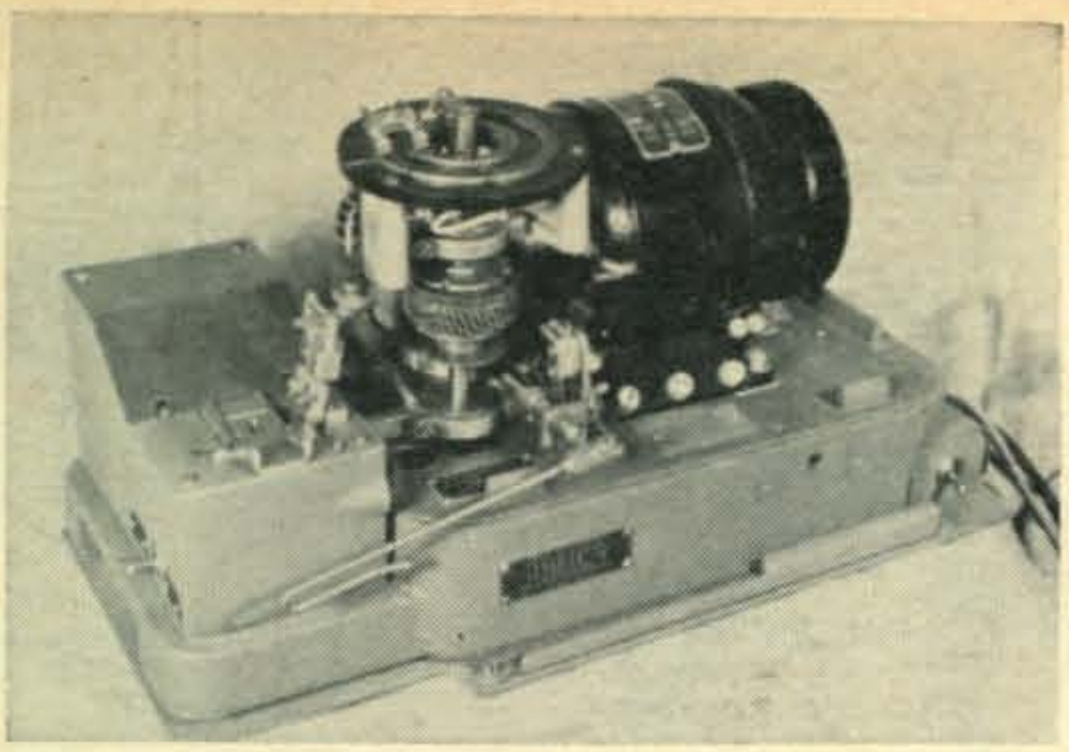


Fig. 9—Interior view of a Model 14 transmitter distributor.

tape, with these two functions being independent of each other. This is with switch in the TAPE position. By placing the function switch in the KBD & TAPE position, it is now possible to write on the keyboard thereby perforating a tape and at the same time the page printer is also printing out the message. Counter does not function in this position and you must watch the page printer to see when you come to the end of a line. Finally, you may throw the function switch to the KEYBOARD position and the machine will function similar to a Model 15 in that the tape punching or perforating mechanism does not function but the keyboard and page printer do function. Writing on the keyboard prints on the page printer.

The counter is to let the operator know when he has punched enough characters on the tape to equal a line on a page printer. A warning light, behind the counter, comes on when 66 characters are hit. He should then punch the CARRIAGE RETURN character and the LINE FEED character to be cut on the tape. Otherwise, when he later transmits the tape, on the TD unit, all amateurs with a page printer would see their machine type to the end of a line at the right hand side of the page and start printing all subsequent characters on top of the last character in the line. In this case, the receiving operator would make a dive for the CARRIAGE RETURN key and LINE FEED key on his own machine; otherwise, he would miss the rest of the message.

It might be well to observe, at this point, that the carriage must return from the end of a line to the start of a new line in the same time that it takes to print one letter or any oher character (O.163 sec.). Furthermore, the paper must be rolled up one line by the line feed operation at the same time. These are pretty fast mechanical operations! If these two operations don't function properly, there is no telling where the next letter will print.

Automatic Carriage & Line Feed Kit

It is possible to obtain an automatic carriage return and line feed kit for a Model 15 page printer. The advantage of this is that the letters do not pile up at the end of the line if the machine fails to receive the carriage return character or if the transmitting operator fails to send it. You can adjust the mechanism for the carriage to return at whatever predetermined point you desire. It is best to set the automatic carriage return so that it takes place a few spaces past the point where the sending operator should have put this function. Of course, you don't ever know for sure if the sending operator has failed to hit the CARRIAGE RETURN and LINE FEED keys or whether he faithfully sent them and your machine failed to receive these two functions. Anyway, the end result is the same and the kit for this automatic feature eliminates this problem.

The kit creates another situation; supose that the sending operator forgets to press the CARRIAGE RETURN key and LINE FEED key at the proper time and this is automatically done by the receiving end machine and then one or two characters later the sending operator suddenly remembers and sends both these functions. Obviously, your machine performs these two functions all over again, starting another line even though it has only printed a character or so on the new line. There is one other point in connection with the use of the automatic line feed and carriage return feature on your machine. These two functions more than often occur during the time that a word is being sent, or more specifically, during the time that one character is being sent. That character is not usually lost but prints on the next line and anywhere from one-third to two-thirds back across the page.

Keyboards

Various keyboard arrangements are encountered, depending on the commercial use or service the machine was put to before it became available for radio amateur use. Old keytops can be pulled off and new ones snapped on in their place. The type slugs may also be changed but they are more difficult to change as they are soldered to the typing arm.[4]

Most hams get the RTTY keyboard arrangement shown in fig. 9. Naturally, the typing arm

[4]RTTY Column, *CQ*, Jan. 1962, page 70.

Fig. 10—Teletype Model 19 tape set. The unit on the right is a Model 15 page printer. The left unit is a Model 14 transmitter distributor. The center unit is a perforator-counter, the function of which is explained *in the text*

Fig. 11—A Model 19 tape set with all covers removed.

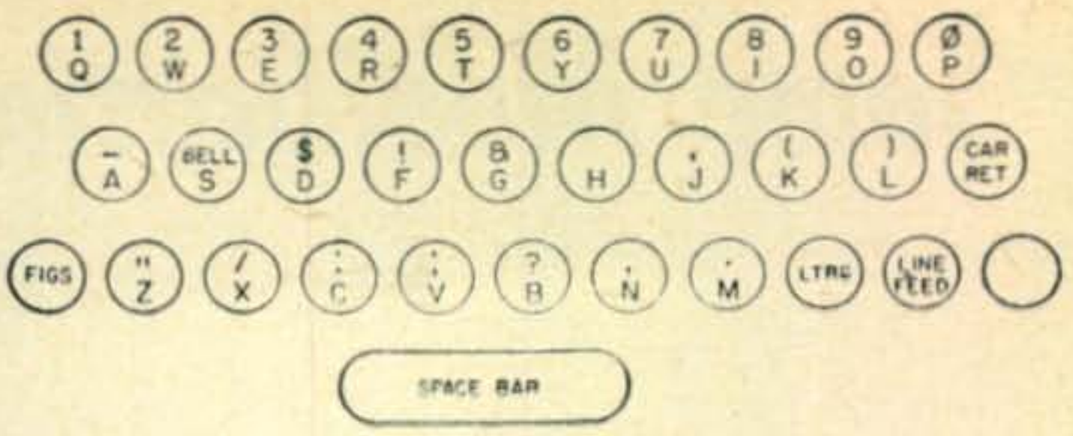


Fig. 12—The most commonly used RTTY keyboard arrangement.

is going to print whatever character slug is soldered to that arm. A certain amount of confusion can result if all hams don't get around to changing not only the key caps but the slugs, as well as the corresponding typing arms so that their keyboard and slugs coincide with the standard keyboard as shown in fig. 12. Both the key caps and slugs are available from a number of amateurs around the country as well as other sources at a very nominal cost. One such source that the author has used is W4NZY.

It will be noted that there are only three rows of keys instead of the customary four rows to be found on a regular typewriter. When changing from sending letters to sending figures, the FIGS key must first be pressed. Likewise, the LTRS key must first be pressed when changing from figures back to letters. Pressing the space bar will also switch most Model 15 machines from figures to letters.

There are certain operating procedures and courtesies to be observed and practiced such as pressing the CARRIAGE FEED and LINE FEED keys twice each to be sure that these two functions are properly carried out by the receiving operator's machine. It is also a good idea to also press the LTRS key at the same time just to be sure that the machine at the receiving end continues to print letters at the start of a new line instead of switching over to printing FIGS as they have been known to do. This is particularly important when conditions are such that perfect copy is not being made.

The next installment will cover Teletype machine basics—how they work.

(To be continued)

LEARN ELECTRONICS THROUGH TV

THIS fall a comprehensive course in basic electronics entitled "Electronics At Work" will be telecast in the New York, Boston, Philadelphia, Pittsburgh and Altoona, Pa. areas. The course, presented in 90 half-hour sessions, has a theme of step by step development of increasingly advanced communication systems. The course is organized into six units of 15 lessons each with the following basic outline:

1. Electrostatics and d.c. circuits principles.
2. Electromagnetism and its application.
3. Power supplies and basic electronic components. (Solid state diodes, transistors included)
4. Vacuum tubes and reactive circuits.
5. Audio communications systems.
6. Television communication systems.

A test run of the course was aired last January in South Carolina for hams over the statewide ETV network. Out of the more than 850 persons completing the course were many radio operators wishing to up-grade their electronics background and skills.

This course is taught by John W. Wentworth, a nationally known electronics expert with Radio Corporation of America.

Supplements to this program are comprehensive *Study Guides* written by Mr. Wentworth and published in six units of 15 lessons each. They present the significant content of each lecture, including line drawings and schematic diagrams,

There are also guides for teachers and those who wish to organize classes in plants etc. The local stations will announce the availability of these publications, or you can write to: Electronics At Work, Box 66, West Columbia, South Carolina.

The following schedules have been announced: Pittsburgh, Sept. 14, on channel 13 (WQED); Philadelphia, Sept. 21, on channel 12, (WHYY); Altoona, Sept. 21, on channel 10, (WFBG), and Boston, Oct. 5, on channel 2, (WGBH). In New York, Channel 13 (WNTD) has scheduled "Electronics at Work" at 12:30 P.M. to 1:00 P.M. on Mondays, Wednesdays and Fridays, beginning Oct. fifth. The programs will be repeated at 11:10 P.M. to 11:40 P.M. the same days. Local broadcast times can be obtained by hams in these viewing areas without difficulty.

Some Modifications for the 75S-1

BY E. E. BALDWIN*, WØRUG

The addition of a Q multiplier, i.f. type noise limiter and a ceramic filter for the a.m. function extends the versatility of the S-line.

THE shortcomings of the S-line are very few indeed but do exist. I keenly felt the lack of a rejection notch in the i.f. passband. I was not pleased with the selectivity on a.m. either.

The lack of a rejection notch in the i.f. passband was the first problem tackled and being lazy by nature, I stopped by the local dealers and bought the Waters Q-Multiplier kit, 337-S1 and installed this as per their instructions. Everything fits on the 'S-2 except for the plate behind the gain controls and on this the crystal switch and band switch assembly gets in the way. However, on the 75S-1 this is not the case and it fits and matches very well. The kit fits nicely and also performs quite well, doing everything the manufacturer claims for it. The instructions are well written and easy to follow.

Filter

As for the i.f. bandwidth, a Clevite 4 kc filter was on hand and appeared made to order for a.m. use. This is a low impedance device about a third of an inch in diameter and about an inch and one half long with a lead out of each end and the case grounded. It will not pass d.c. by the way. Rather than get too involved I removed the two i.f. transformers, T_7 and T_8 connecting the filter in their place as shown in the schematic of fig. 1.

The physical location may be moved around as long as precautions are taken to avoid coupling around the filter. I finally drilled a hole in the shield between the switch decks S_6 and S_7, mounting it there. This unit has a 6 db bandwidth of 4 kc and a bandwidth of 9 kc way down at about 80 db. Despite the mismatch, it worked very well. An excellent alternative would be to use the Collins filters which are designed for this set and will fit existing mounting hardware. Some loss in gain should be expected with any filter, however.

Panoramic Adaptor

While the soldering gun was out, I also placed a 5 mmf silver mica capacitor from the second mixer plate (pin #6, V_{3a}, 6U8A) via miniature

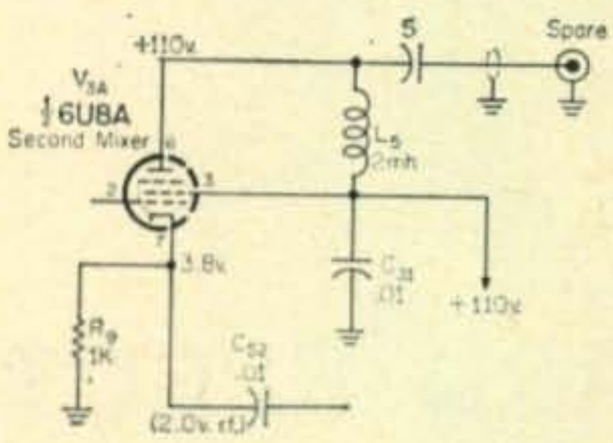


Fig. 2—Simple modification permits attachment of a panadaptor. Use is made of a spare jack on the rear panel as explained in the text.

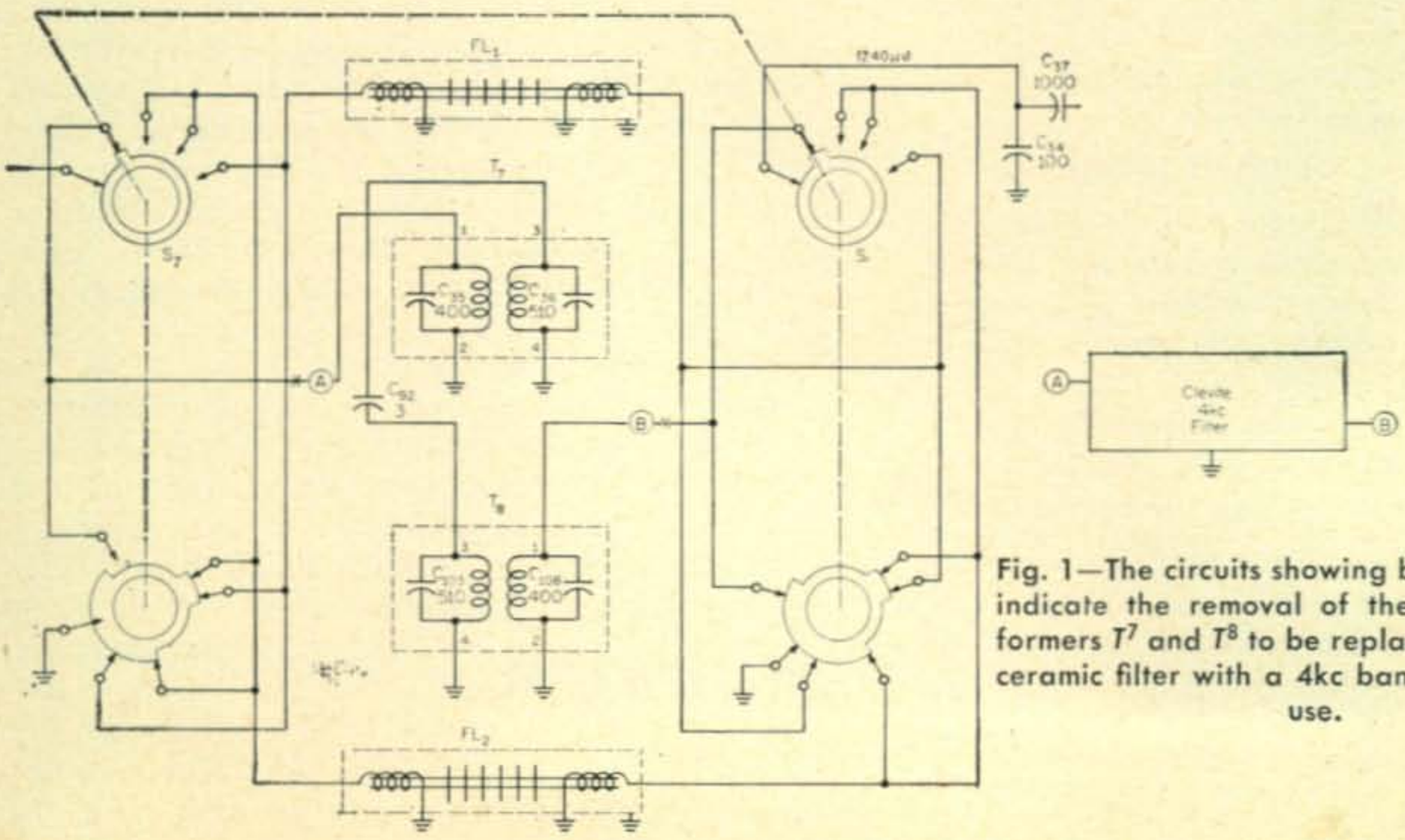


Fig. 1—The circuits showing before and after indicate the removal of the two i.f. transformers T^7 and T^8 to be replaced by a Clevite ceramic filter with a 4kc bandwidth for a.m. use.

*R3, Box 153A, Longmont, Colorado 80501.

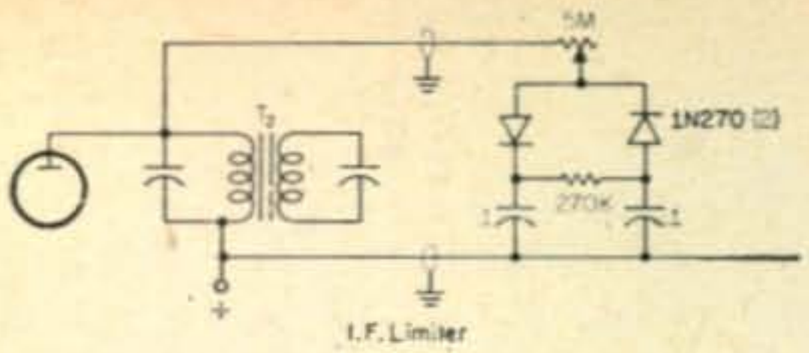


Fig. 3—Circuit of a simple i.f. type limiter for noise reduction.

coaxial cable to the spare jack on the rear of the chassis to make a panadapter jack without serious detuning (shown in fig. 2). Although the level at this point is rather low, most panadapters have enough gain to work quite well. Once we get past this point in the circuit the high selectivity will not allow good panadapter operation.

Of course, someone will want a phono jack but this is already present. The C.W.-SIDETONE jack connects to the hot side of the audio gain control and with the R.F. GAIN control backed off we can use this as a utility audio input.

Noise Limiter

Since I work 160 meters a lot (loran pulses) and 10 meters a bit, a noise blanker would be ideal. However, having used the chassis cutout for the Waters kit, I decided for the time being to keep things simple and use a diode limiter instead. Casting about for ideas, I found several versions of an i.f. limiter that looked good to me so I soldered a pair of 1N270 diodes, a pair of 0.1 capacitors, and a 270K resistor to a one inch terminal board as shown in fig. 3 and mounted this upon the terminal strip to the rear of T_2. Leads to the control were again miniature coaxial cable to keep any stray coupling down to a minimum. The control used was a small 5 megohm, audio taper, but a lower value should work equally well. Also, almost any good diode should work but these were what I had on hand. A mounting hole for the control is already in the chassis between the EMISSION switch and the phone jack, requiring drilling of the panel only (and don't let the drill slip).

A 6 Meter Vertical J Antenna

BY L. F. KINER*, K6VNT

This 6 meter vertical is an extremely simple omni-directional antenna that can help get you on the air quickly. Its advantages, besides simplicity, are low cost, simple matching arrangement and the fact that the base of the radiator may be grounded directly for lightning protection.

MANY newcomers (and oldtimers too) often ask, "What is the best vertical omni-directional antenna to use?" Well we don't claim that the vertical J is the ultimate but it is certainly a good antenna and quite simple to homebrew.

The vertical J antenna derives its name from its resemblance to the letter J. It is an omni-directional antenna consisting of a half-wave radiator with a quarter-wave matching stub directly connected to its lower end. (See figure 1).

The vertical J may be directly fed with 52 ohm coaxial cable. The inner conductor of the coaxial cable is connected 5½" up from the bottom in the center of the radiator element while the coaxial cable braid (shield) is connected 5½" up from the lower end of the matching stub. Many hams have reversed this procedure and claim better results. We've tried it both ways and haven't been able to detect any difference.

The dimension of 5½" is generally accepted as being optimum although a better method of determining this would be to put an s.w.r. bridge in the line and make spot checks from say 4½" to 6½".

A shorting bar is shown at the bottom of the vertical J. This also is optional. We've tried using the shorting bar and leaving it out and couldn't detect any difference.

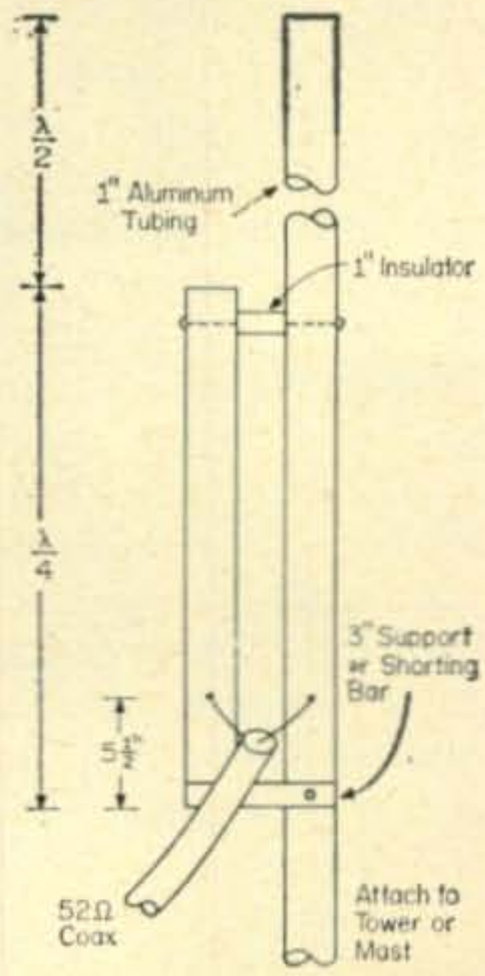


Fig. 1—The vertical J antenna for 6 meters is made from 1" o.d. aluminum tubing and can be fed with 52 ohm coax. For best operation at a center frequency of 50.5 mc the overall length will be 175" while the stub is 58⅜" long.

*17800 Blythe Street, Reseda, California.

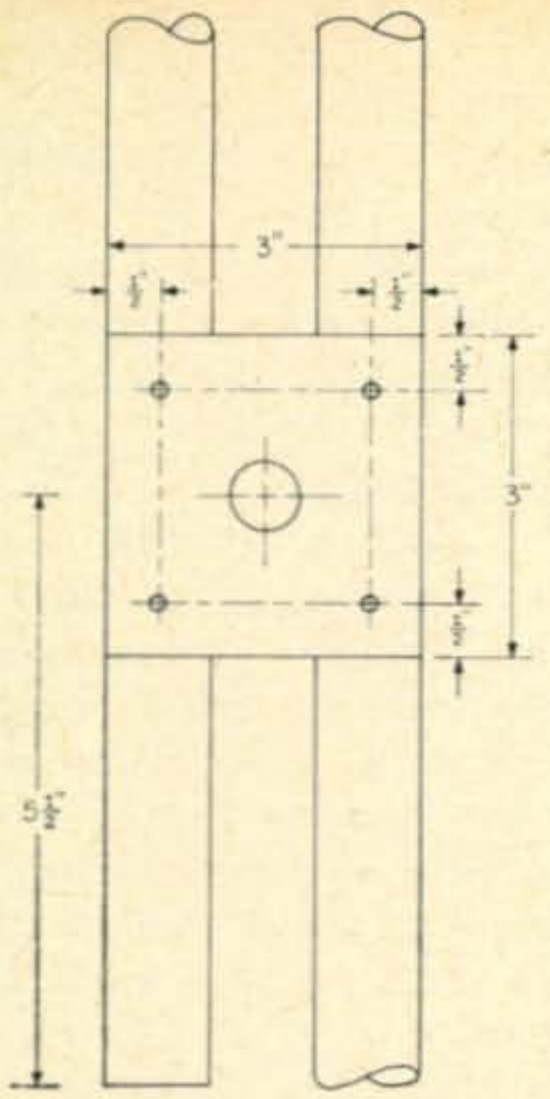


Fig. 2—Dimensions for a mounting block, made from ¼" r.f. insulating material, used to locate a coaxial connector at the feed point and also to help maintain a 2" spacing of elements

Construction

Aluminum tubing is used for the elements and the elements are adjusted so that they are on 2 inch centers. One inch tubing is probably the easiest to use although 1¼" or even ¾" or ½" could be used as long as the 2 inch center is maintained.

The coaxial cable may be connected directly to the elements with screws or you can make up a mounting block for a coaxial connector and take #14 or 12 copper wire and make connections from the elements to the connector. Then your coaxial cable can feed into the connector via conventional mating devices.

The spacer used at the top of the matching stub should be made from a sturdy type of material that is a good r.f. insulator such as Rexolite. The screws too should be non-metallic (but strong) and nylon is recommended. With 1" o.d. tubing the spacer should be 1". Any change in the tubing diameter requires an adjustment in the length of the spacer to maintain the 2" separation between element centers.

[*Continued on page 90*]

Detachable A.C. Line Cords

At one time or another, almost everyone has experienced the nuisance of a dangling a.c. power-line cord when electronic gear is transported, or of having the cord get in the way when equipment is stored and sometimes finding it entangled in other gear when the equipment is removed from a shelf.

An obvious remedy is the installation of a detachable power-line cord; however, it usually happens that many different types of connectors are used in such cases and in the event the line cord becomes lost or misplaced, one with a particular type connector might not be available. Such a situation may be averted by providing for the use of a common-type power cord for *all* equipment. This may be done by utilizing TV cheater cords which are readily available and which are inexpensive enough to have several spares on hand besides those needed for each piece of gear. They are particularly well suited for test instruments with which a detachable cord is most desirable and since they will handle several hundred watts of power, the cheater cords may be used for other equipment as well. An additional convenience is that these line cords may be coiled up in a small enough bundle to be carried in one's pocket.

A typical installation is shown in the photo. A ½" × 1" hole for the cheater receptacle may be cut out in the chassis by drilling two one-half inch holes, side by side, and then filing the rest to fit, by using a one-half inch square chassis punch or by utilizing a metal-nibbling tool.[1]

If the clearance hole in the equipment case is not large enough, a small notch should be filed at each side of the case hole to clear the mounting screws for the receptacle, as shown in the example. If there is not sufficient chassis or internal clearance space for mounting the cheater-cord receptacle near the original line-cord entrance, the receptacle can be mounted at some other convenient location.

Since modifying all our equipment in this fashion, the transportation, installation and operation of the gear has been most convenient. The removal of equipment from a case for servicing also is made easier.—*W2AEF*

[1] "Drilling and Cutting Holes," "Using Chassis Knockout Punches," "Special Tools for Electronics," *CQ*, November 1963.

Typical installation of cheater cord receptacle described in text.

HAM-LETS

Miniver Preevy

BY AMOS ANON

(With apologies to E. H. Robinson)

Miniver Preevy, DX Hound
Chased the rare ones through the seasons
He hardly ever slept at all
And he had reasons.

Miniver loved the days gone by
When bands were clear and DX plenty
He longed for the sound of a ZP4
Calling CQ twenty.

Miniver listened day and night
He scanned the bands from ten to eighty
He called DX with all his might
And longed for Haiti.

Miniver hated high power rigs
He said that he would never own one
But he'd have sold his very soul
To simply loan one.

Miniver Preevy looked at gear
The finest brands, he really sought one
But Miniver was at heart too poor
He never bought one.

Miniver Preevy, child of fate
Would call DX and call and call it
He'd never answer local boys
He did appall it.

Miniver lived and died a ham
A DX ham until the end
He sought the rare ones through the years,
But made no friend.

Miniver Preevy, sad, but true
Never learned the real pleasures
Of the hobby we hold dear
Its many treasures.

Miniver died a lonely man
A DX hound through storm and strife
Miniver died as he had lived
A lonely life.

Miniver still the rare ones calls
From that big rig way upstairs
Miniver calls and calls and calls,
But no one cares.

CQ Reviews:

The Waters Universal Hybrid Couplers, Models 3001 and 3002

BY W. M. SHERER*, W2AEF

VARIOUS types of couplers are used for phone-patch operations; however, the Waters Universal Hybrid Couplers, besides furnishing fool-proof phone-patch operation including complete use of the station v.o.x. system, provide a number of aditional convenient facilities which make it possible to use a tape recorder to record and play back phone-patch conversations, conventional telephone conversations and both sides of QSO's.

To be more explicit, its various functions, which can be instantaneously chosen by means of a selector switch, are described in the order of the different switch positions as follows:

1. RECORD STATION: Automatically connects the radio equipment for use with a separate tape recorder for recording both sides of a QSO. The radio gear operates normally.

2. PLAYBACK TO TRANSMITTER: Permits the tape recordings to be played back over the transmitter with the radio receiver's loudspeaker used for monitoring the playback.

3. OFF: When the Universal Hybrid Coupler is in the OFF position, it is deactivated and disconnected from the telephone line. The station radio equipment and the telephone circuit operate normally and are independent of one another.

4. RECORD LINE: Telephone conversations can be recorded with a tape recorder independently of the radio gear; in fact, the rig may be operated normally without interfering with the telephone recording in progress.

5. PHONE PATCH/RECORD STATION AND LINE:

*Technical Director, *CQ*.

The Waters Universal Hybrid Coupler (Model 3002). The function switch is at the center with the Rcvr Output at lower left and the Xmtr Input at lower right. The Compressor switch is at the upper left, the Compression Level (screw-driver adjust) at upper right. The panel is gray, the case is light gray.

In this position the Waters Coupler acts as a phone patch whereby a party on the telephone line may speak over the radio transmitter. The person on the phone line also may hear the output of the radio receiver, making it possible to carry on a conversation with someone at the other end of the radio circuit. This is further facilitated with the use of the station's v.o.x. which can be operated through the coupler. The station telephone handset also is included in the circuit, serving as a microphone and a headphone to permit the station operator to converse with both parties talking over the phone patch. At the same time, the entire phone-patch conver-

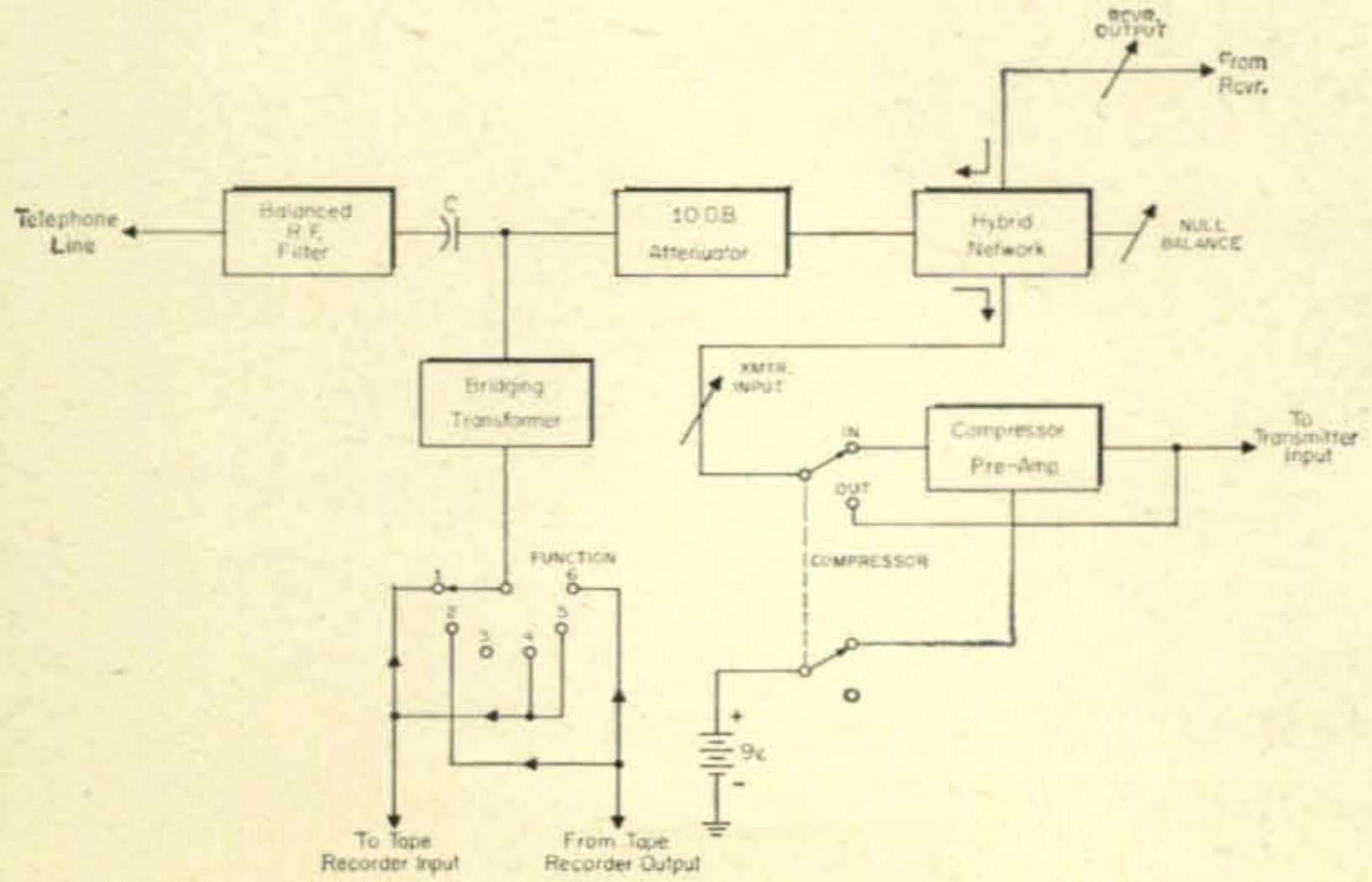


Fig. 1—Block diagram of the Waters Hybrid Coupler. See text for description.

sation may be recorded by a tape machine.

6. PLAYBACK TO LINE: With this position, tape recordings can be played back to a party on the telephone line. At the same time the radio equipment is disconnected from the telephone circuit, enabling normal radio operations to be conducted without interfering with the playback to the line.

Another feature, available only in the Model 3002, is the inclusion of the new Waters Compreamp, a speech pre-amplifier/audio limiter. This assures a high audio level at all times, even with weak telephone speech, for obtaining full modulation and proper operation of the vox, while at the same time it prevents overmodulation which might otherwise occur when the station operator speaks into the telephone mic.

An extra dividend gained with the Model 3002 is that the self-contained Compreamp may be used during normal radio transmissions to provide speech compression for maintaining a high a.f. level (without overmodulation) and effectively increasing the average talk power to get the maximum intelligence through during adverse receiving conditions.

Circuitry

Referring to the block diagram fig. 1, the Universal Hybrid Coupler is connected to the telephone line through a balanced r.f. filter to prevent any r.f., which may be picked up by the line, from entering the audio system of the transmitter and causing r.f. feedback. A large blocking capacitor is used following the filter to prevent the possibility of placing a d.c. load on the line by the bridging transformer or the attenuator. The line is then fed through a 10 db attenuator to a special hybrid network. The attenuator isolates the hybrid from the line in order that a constant impedance over the speech range will be presented to the line.

The hybrid network is a particular two-way coupling arrangement which allows the incoming telephone speech to be passed on to the transmitter and the receiver output to be transferred to the line without allowing the receiver energy to feed into the transmitter and trip the vox. Precise adjustment is obtained with a null-balance control along with level controls for the receiver output and the transmitter input.

When the compressor switch is at OUT, the output from the hybrid network is fed directly to the transmitter input. When the switch is at IN, the compressor (Compreamp) is inserted in the line to the transmitter. The switch applies battery power to the Compreamp which is a two-stage transistorized affair utilizing a pair of special solid-state diodes in a logarithmic circuit to provide compression. Power is not otherwise needed to operate the Waters Couplers.

A bridging transformer is connected ahead of the 10 db isolation attenuator to feed speech from the telephone line or the receiver to a tape recorder via the function switch positions 1, 4 and 5 or to feed the line and the hybrid network from the tape recorder output via the switch positions 2 and 6.

Specifications

Input impedances are as follows: Line—600 ohms; receiver output—4 ohms; mic—hi impedance for crystal or dynamic units; tape recorder speaker—4 ohms. Output impedances are: to tape recorder—½ megohm; to transmitter—50,000 ohms; to receiver speaker—4 ohms.

Specifications for the Compreamp used in the Model 3002 are: input impedance—100,000 ohms; input level—.005 to .02 volts; voltage gain —10 db; output level—.06 volts; output impedance—50,000 ohms. A 9-volt battery is required (Burgess 2U6 or equivalent).

Controls

All controls are located on the front panel, except the null-balance which is on the rear panel along with phono-type jacks for mic input, output to recorder and output to transmitter. Screw-type terminals are provided on a strip for connections to the telephone line, output from a tape recorder, receiver speaker, output from receiver and a ground. The battery is clipped on the rear. Removal of the unit from the case is not required for battery replacement.

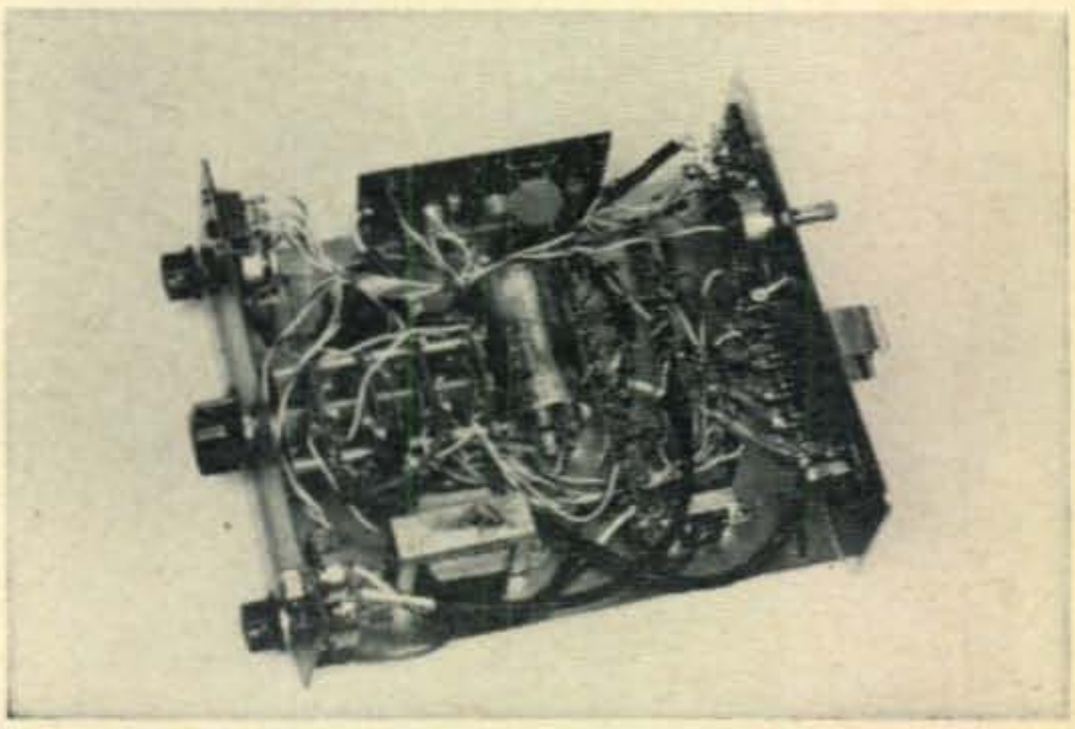
The Waters patented feature of making the panel reversible is included to permit vertical, instead of horizontal, mounting of the unit.[1]

Installation and Operation

Installation is easily made following the specific details given in the manual. No attention need be paid to the polarity of the telephone line. Either vox or push-to-talk installations may be made. Examples of general typical installations are given along with data for use with many of the popular transmitters and transceivers. Notes also are given for use with various type tape recorders.

[*Continued on page 90*]

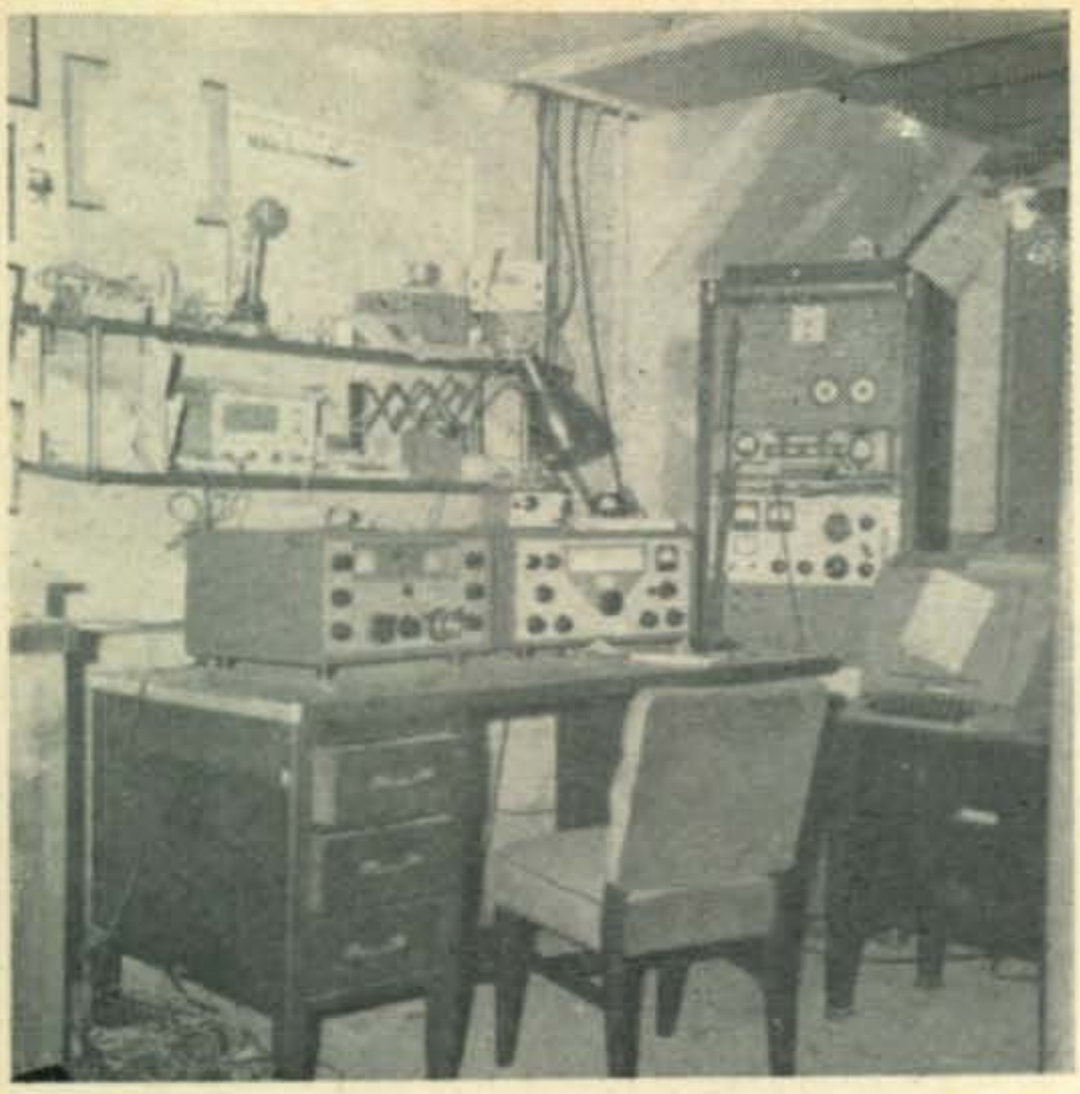
[1] "*CQ* Reviews the Waters Channelator," *CQ*, June 1964.



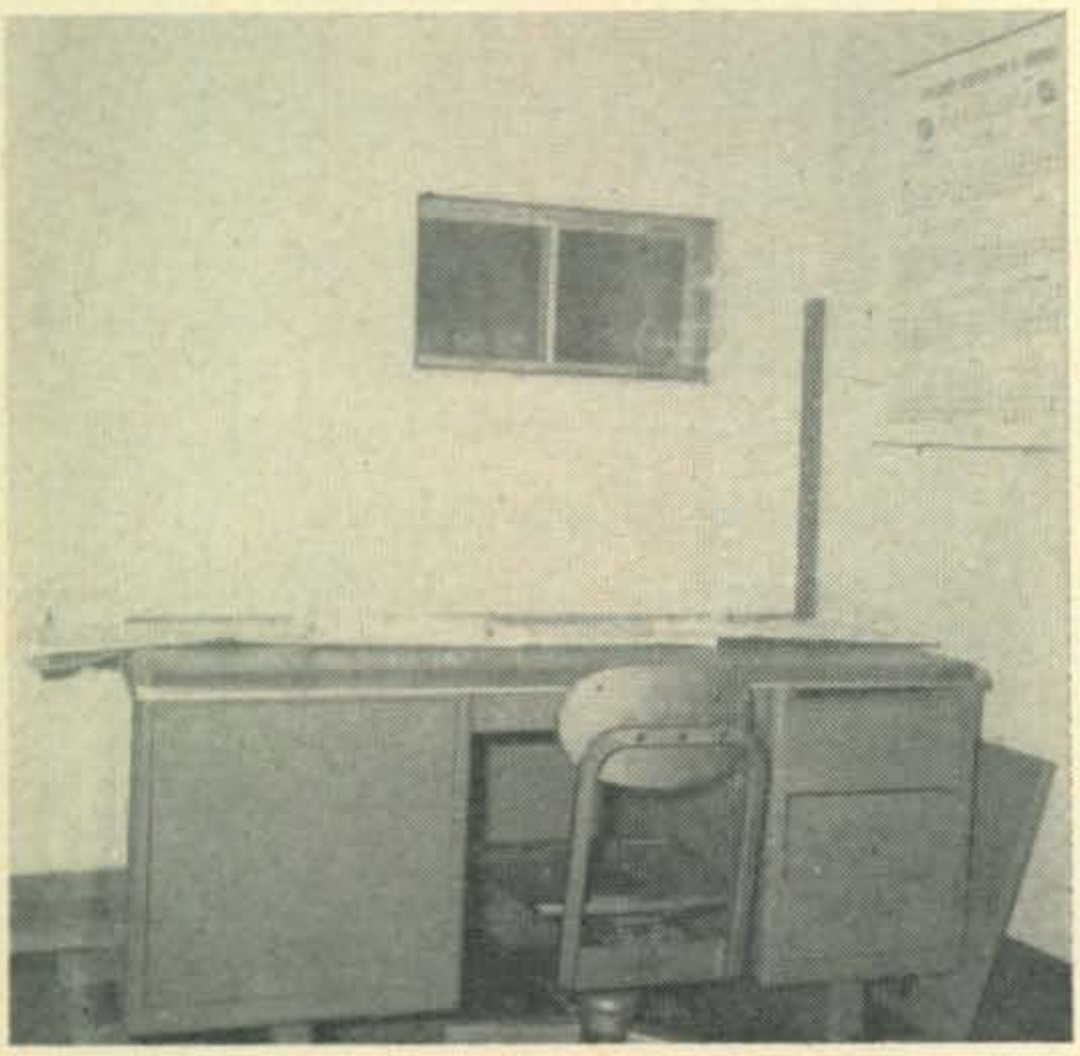
Interior view of the Waters Universal Hybrid Coupler (Model 3002). The wiring and components are readily accessible. The Compreamp (not included in Model 3001) is built on a vertically-mounted printed-circuit board viewed at the top center. The null-balance control shaft and the battery holder may be seen on the rear panel at the right.

A STATION PACKAGE

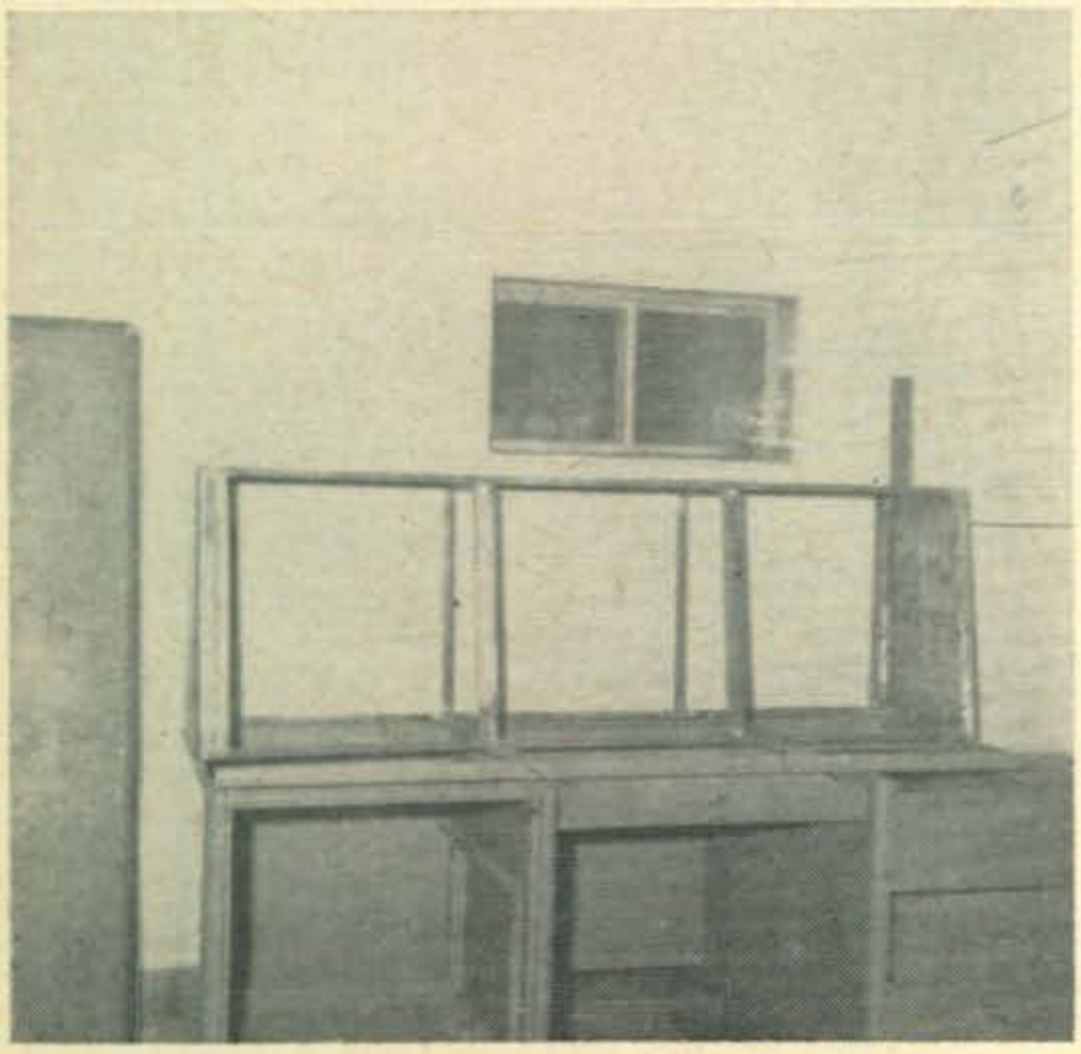
HARRY LOWENSTEIN*, W2HWH



Before—Station was hidden in the darkest corner of the basement.



The desk, cleaned up, before the modification.



The superstructure placed on top of the desk.

THIS past winter the XYL stated flatly, "This cold, dark basement is no place for you in the winter." I really didn't mind the extra sweater and the wool socks and, the cans did keep my ears warm, but the remark did start a train of thought. The shack, in its original form, could not be moved into the recreation room.

Two months later, after liberating a beatup steel desk from The Friendly Junkman, and buying two 24′ lengths of ½″ angle iron ($6.00), the results can be seen in the "after" photo. Of course, en-route, the 18″ holes broken in the recreation room plaster, for the coax and power lines, had to be covered (with prefinished paneling). There was also a paint job. "The room looks so nice now, we ought to re-paint," said the XYL.

Construction

The "super-structure" on top of the desk was clamped together piece by piece then welded (3 hours at $6.00). Wood 1″×2″s can

*12 Maplewood Avenue, Maplewood, New Jersey.

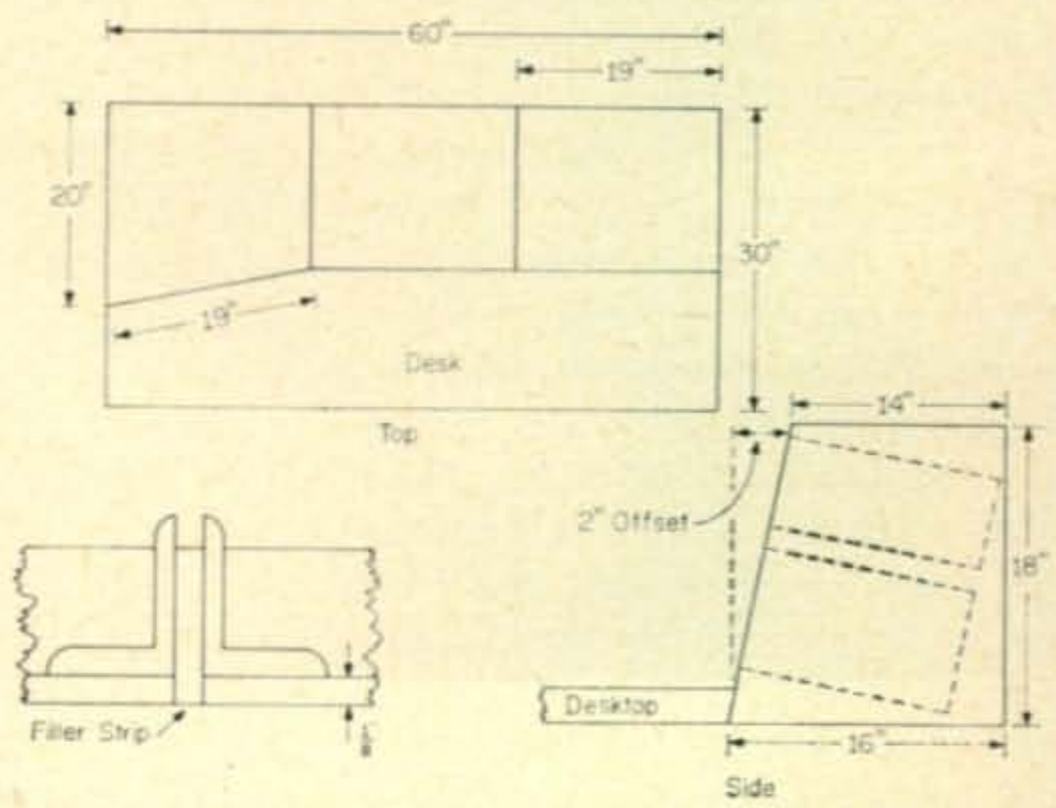
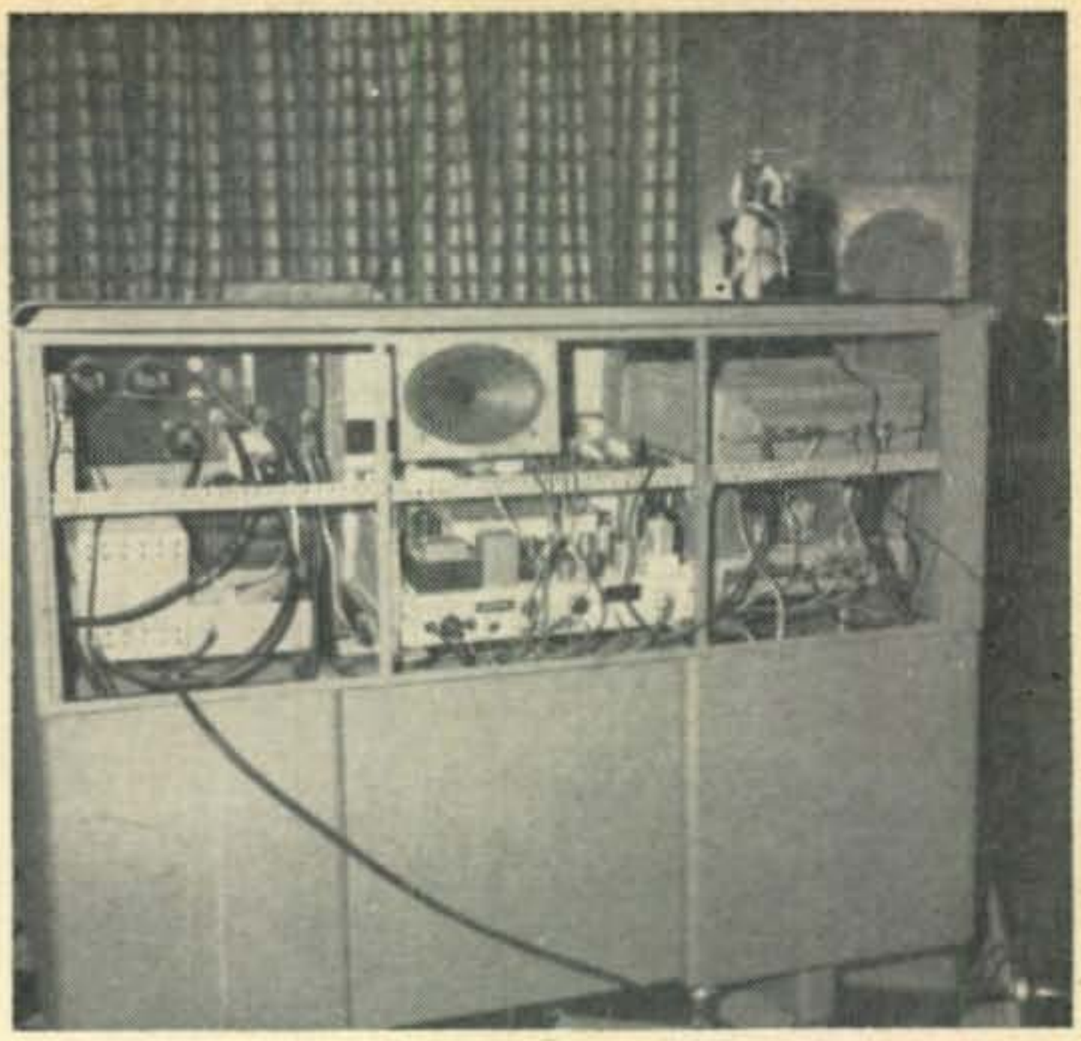


Fig. 1—Top and side views of the superstructure of the console showing the measurements used. Note the detail of the uprights showing how a ⅛″ × ⅝″ filler strip is used in the joint.

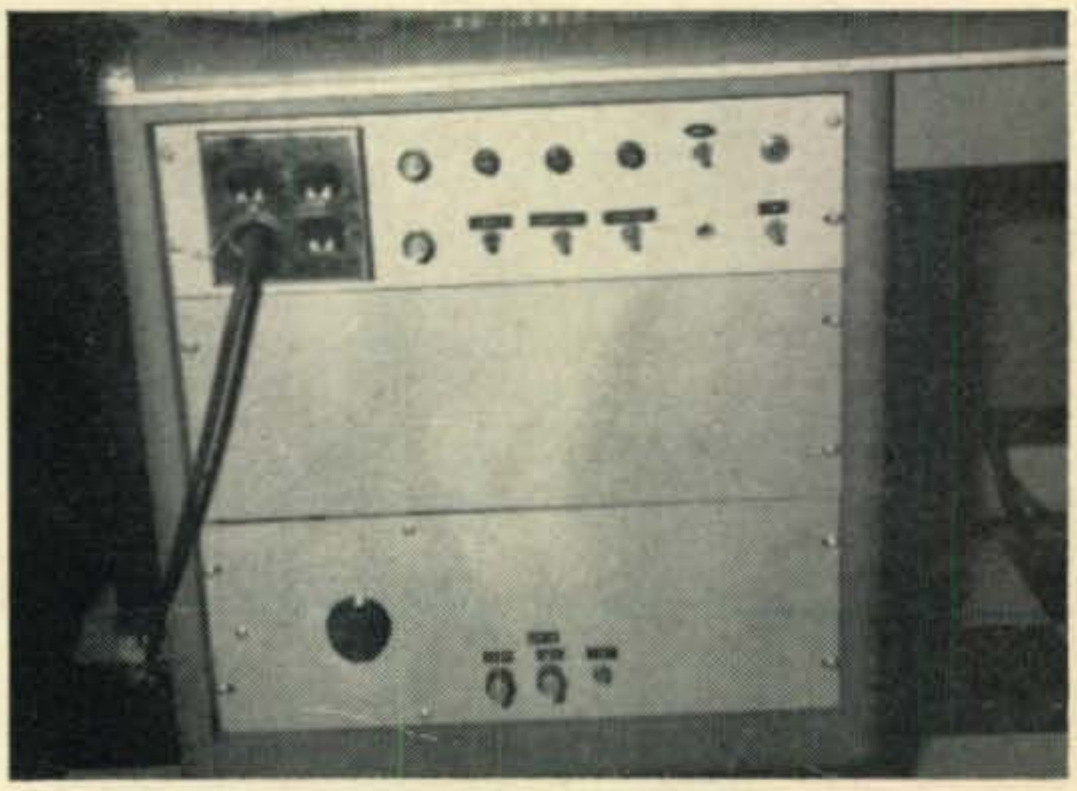
Would you like to move the shack out of the basement, garage, attic or wherever it is you have been exiled to? Repackage your station in console form using a second hand steel desk. The space conservation, elimination of dangling wires and cables and improved appearance will once again permit you to return to the fold.



Rear view of the console showing the hidden wiring. This is one good reason for packaging a station.

be used instead, with the same results plus no drilling and threading for the rack-mounting screws. The old typewriter shelf and the front door covered the ends, with metal left over. After the top of the desk was removed and the "super-structure" bolted to the desk pedestals, the old desk top was cut in half. This was a two hour job by hand, using a power hacksaw blade. The top, linoleum and all, was cut square down the middle, and one piece used as the desk top was trimmed to fit the offset in the superstructure. The other half of the cut top, was reversed and bolted to the top of the "super-structure" to finish the console off. The panel gear was then set in place, unit by unit and holes marked, drilled and tapped for the mounting screws. Everything was then removed and 3 cans of "Spray Gray" finished off the job. The power wiring presented some problem to me and with the help of W2AQG, who does this professionally, a clean, easy to trace, wiring job was done. The dimensions are shown in fig. 1.

These desks are 30" deep and there is, therefore, two sections in depth to use; one for hidden equipment, and one for the "knob-operated" equipment. The back of the old typewriter compartment is used for power supplies and the front is used for panel mounted gear.



The typewriter well has become the power supply section. The top panel contains the fuses and switches for the low voltage supplies and 117 v.a.c. circuits. The bottom panel holds the Variac, Variac fuses and high voltage fuses. There is enough room to hold another 1500 v., 400 ma supply. The outer panel is blank for future equipment.

Results

Space-wise I now have more than I had before, in less floor space, and *no* dangling wires and cables to trip over. The benefits of all the power and control wiring in one enclosure and the extra panel space gained over the old style desk cabinets, and 60" rack, were worth all the effort. Most of us seem to forget that the bottom half of a rack is usually wasted. One thing is certain, there is a lot of space also wasted in desk top cabinets. When you take the "goodies" out of the "little black boxes" there really isn't much *panel* space required. Good luck, and may your station look as good as it sounds. ■

After—The console now occupies an honored spot in the corner of the recreation room.

DX

BY URB LE JEUNE,* W2DEC

THIS will be a very short column, mainly because of the enormous amount of work involved in bringing the WPX and SSB honor rolls up to date. Next month "Here and There" will return with DX news and information.

Field Day on Corregidor

"Old timers of the DX Fraternity are no longer surprised when 'Rundy' turns up from some new and exotic DX spot. This one came as a pleasant surprise even to me. My last DX operation was from TC3ZA from an island off the Turkish coast near Izmir (ancient Smyrna).

"When orders to pack up and leave OD5-Land for DU-Land came thru by telephone on April first, it sounded like an April Fool's joke. It wasn't! So, we packed up the KWM-2 and, after a short sojourn in W6-Land, arrived in Manila on May 10th. The reception by the DU-Land DX-ers was wonderful and the timing was just right for the DUØDM Field Day, an invitation having been extended by the members of the Phlippine Amateur Radio Association.

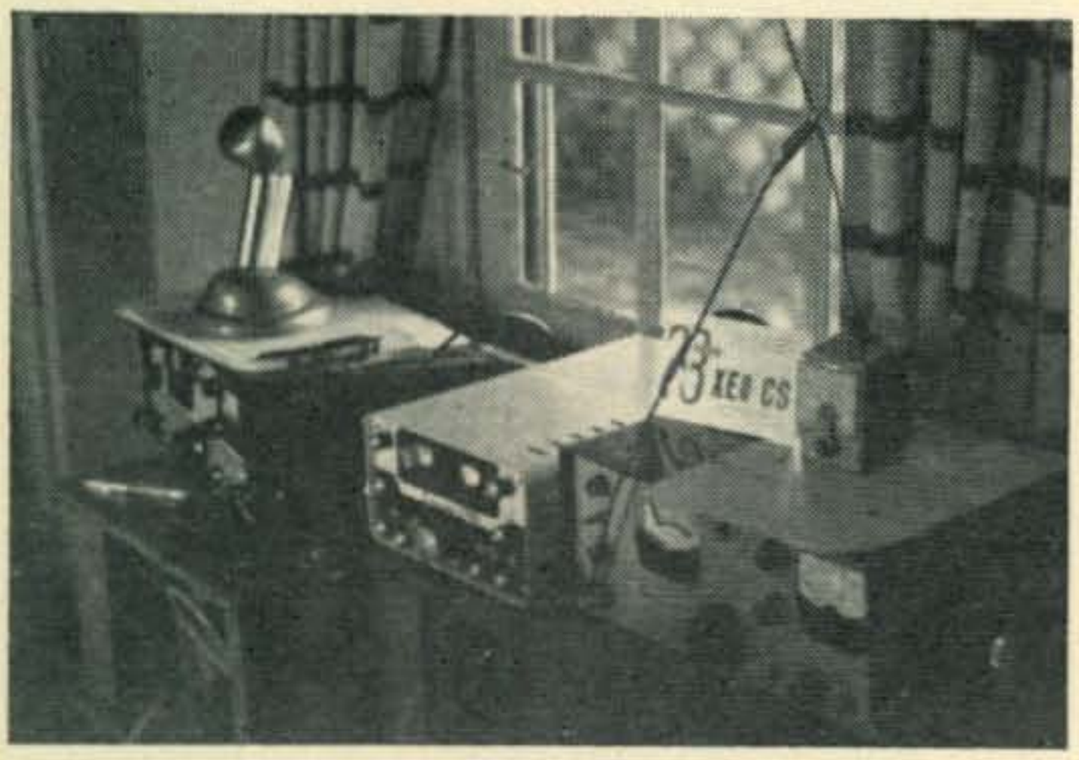
"The operation was well planned in every detail. Thanks to the diligence of the PARA officers assisted by various American Embassy staff. All equipment was tested a few days prior to D-Day and found to be in excellent condition (how wrong can you be!).

"Scotty, W3EFZ, made arrangements with the Philippine Navy for transportation. PARA made arrangements with San Miguel Brewery to supply Cokes and beer gratis. Arrangements were made with the Philippine National Shrine Commission for use of the guest house facilities and an abandoned signal tower on Corregidor.

"At the appointed hour of 0430 GMT May 29th, we started gathering at Philippine Navy Headquarters on Roxas Boulevard (formerly Dewey Boulevard). Everything arrived on schedule and was promptly loaded on the quarter deck of the RPS 61, a fast patrol vessel which took us the 30 odd miles in one hour and 45 minutes. "Seven of us went out on the first trip and started setting up station "A" at the guest house immediately upon arrival. A 20 m. dipole, a 40 m. Ground-plane and a long-wire were erected. DUØDM (sta. "A") was on the air on 20 m. s.s.b. and the first contact was made with KR6KS at 1010 GMT, May 29th.

"Seven more DX-peditioneers came out by Navy LST and by Hydrofoil on Saturday morning. May 30th, and proceeded to set up station "B" at the signal tower in the area known as "Topside" in pre-war days. Antennas included a ground plane and a 3-element beam on 20 m. The first contact from station "B" was with KH6COB at 0829 GMT May 30th.

"Radio propagation conditions were only fair during the entire period. 20 m. c.w. proved to be the best all-around with a few s.s.b. contacts sandwiched in. We had an excellent opening into JA-Land on 21 mc and George, DU1GF, who speaks Japanese, chalked up about 60 contacts on "Ancient Modulation." 40 and 80 proved to be completely disappointing as did 10. Station "B" was dismantled at about 0300 GMT May 31st after chalking up 133 contacts on 20 c.w. Station "A" continued in operation until 2200 GMT May 31st for a total of 60 hours of continuous operation and 323 contacts. The following is a list of first contacts by country: PHONE: DU9FB, JA1ODO, KR8AM, S.S.B.: BV1USC, CR9AI, DU1AP, I1RSE, KH6EPW, KR6KS, VS6AZ, WA6IZQ. C.W.: DJ7CY, DU1RS, G2AGR, GI5UR, HA8KW, HL9KAH, JA1CIO, KH6COB, W7ZQV/KG6, KL7DQC, KR8CD, MP4BEQ, OE1ER, OH2OW, OK3CEA, ON4FU, PAØFLX, SM5AJR, VE3BWY, VK7SM, VK9DR, VS6FI, VS9MB,



The operating position of XEØCS. Mike, K6ICS/XEØICS/XEØCS, sends along the information on obtaining an XE license. A letter from Antonio Pita, Vice President of LMRC is quoted.

"To be quite honest I do not know what the maximum period for temporary permits can be. I assume that since a tourist card is good for six months so should the permit be equally good for the same period.

"There are no set rules for the issuance of said permits. You need only fill in the blank application forms such as the attached and after filling in the required information return this to me [air mail] with your check for Dls. 4.40 ($4.40) which is as you know the fee charged by our authorities.

"My best wishes and happy mobiling through Mexico."

Allow at least two months for application processing. Extra forms will be sent to you upon request to K6ICS, (include s.a.s.e.). Mail application and check to: Liga Mexicana De Radio Experimentadores, A.C., Apartado Postal 907, Mexico D. F., Mexico.

*Box 35, Hazlet, New Jersey 07730.

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

CW-PHONE WAZ

2002	DL1AM	Heinrich Reckewell
2003	SM5EC	Gustaf Ullstrand
2004	WØICQ	Steve Eyer
2005	VE3DEB	Joseph Bebenek
2006	ZE4JS	T. G. M. Baillie
2007	DL1CF	Heinz Hildebrand
2008	HB9LB	Rudolf Zehnder
2009	PY4OD	Talma Dangelo Drummond

ALL-PHONE WAZ

252	W8JIN	James W. Ringland
253	WØCPM	W. J. Mashek

CW WPX

559	OK1AFC	Vlado Domagalsky
560	VK3AHQ	Henry Denver
561	W5VSQ	J. P. Graffagnino
562	DL1BO	Theodor Flick

PHONE WPX

110	K2POA	Arthur B. Johnson

SSB WPX

183	DL1BS	Kuno Huber
184	PAØSNG	G. Mulder
185	G8FC	Headquarters, RAF ARS
186	W1MZB	Frederick J. Coyle
187	DJ8EG	Hellmut Verlaender

TWO-WAY SSB

241	K4HEF	Lucia Littlefield
242	XE1IL	Aitor Iturrioz A.
243	K6SOK	Richard E. Shelton
244	W8JIN	James W. Ringland
245	DL5AO	Richard H. McCaffrey, Jr.
246	ZS6BBP	H. Behrens
247	K6YRA	Allen R. Friedman

300 TWO-WAY SSB

6	WØQVZ	Robert M. Kelley

WPX ENDORSEMENTS

	Mode	*Continents*	*Band*
K2CPR	CW	F	3.5 7 14 21
W4BHG	CW	E	
W4RLS	SSB	F	
W8GMK	CW	E	
W8KPL	CW	A	
W8UMR	CW	E	
	Mixed	N A	
W9UXO	CW	A	
DL1QT	CW	A F	
DL1RK	CW	E	
DL3RK	CW	A F	
DL9KP	CW		14
EP3RO	Phone	E	
G2GM	CW	F	21
ON4FU	CW	E F	
PAØSNG	Phone		14

A-Asia; *E*-Europe; *F*-Africa; *N*-North America; *O*-Oceania; *S*-South America.

VU2GG, YU3KN, W1WPO, W2OBX, W3HTF, K4ISV, W5EPQ, W6VPH, W7HDL, W8KSR, W9SKR, WØUNG.

"When we first set up operation, we discovered that none of our equipment would work! After taking great care to test everything in advance, this was a real shocker. Fortunately, some of us still remember how to change tubes and use a v.o.m. so we got on the air without undue delay although we had to resort to the Gonset G66/G77 at station "A", hence the Ancient Modulation contacts on 21 mc! We finally ended up with a 32-S transmitter and the receiver portion of the KWM-2 plus the Gonset Twins at station "A". Station "B" used a 32-S transmitter and a SB-300 receiver. The two 750 watt Kohler put-puts worked beautifuly except for the one time when station "A" was drowned out by heavy rain.

"The purpose of the Corregidor Field Day is to commemorate the return of General Douglas MacArthur and the return of the famous "Rock" to the people of the Philippines. Hence the special call DUØDM. These letters are also the initials of the present President of the Philippines, H. E. Diosdado Macapagal. Future Corregidor Field Days will be held on the second week-end in February each year since this is more nearly the correct date and the weather and radio conditions are likely to be better. Make a note on your calendar to look for DUØDM February 12-14, 1965.

DUØDM Station "A" operated by Ed, DU1OR, assisted by George, DU1GF and Pid, DU1TI.

DUØDM Station "B" operated by Rundy, W3ZA/6.

WPX HONOR ROLL

CW WPX

W2HMJ	694	W2GT	510	W9WCE	458	WØPGI	420	PAØHBO	453	ZS6IW	350	W3VSU	300	W3OCU	588
W8KPL	664	K9EAB	510	W3BCY	457	W7ABO	419	G3NUG	451			KØRDP	300	W9DWQ	571
W5KC	650	DL3RK	509	W7HDL	457	HB9TT	419	K9EAB	450	**SSB WPX**		VE3BKL	300	W6YY	570
W2EQS	641	W8UMR	506	OE1FF	457	KH6BLX	418	W6YY	448	W4OPM	530	K1SHN	300	W5LGG	565
W2AIW	617	W8RQ	505	F9MS	457	UA4IF	417	W3DJZ	447	G3DO	466	K2POA	300	YU1AG	559
W4OPM	600	W9UZS	505	OK3EA	456	W8GMK	417	G8KS	430	MP4BBW	462	W6USG	299	W4BYU	557
W6KG	596	PAØLOU	505	UC2AR	456	K2PFC	415	VK6RU	421	HB9TL	452	WØCVU	291	K2ZKU	555
W9UXO	582	G3EYN	503	W8KSR	456	VK3XB	415	W3AYD	420	W3NKM	451	GI6TK	278	W3AYD	552
ON4QX	579	ON4FU	503	K4TEA	451	W1DGT	415	F8PI	418	G8KS	450	K5OGP	277	HB9EU	551
DL1QT	573	YU1AG	503	W3PGB	450	W5AWT	412	PZ1AX	413	K9EAB	439	K8ONV	275	WØMCX	529
W2NUT	571	W6YY	502	DL1YA	450	W5DA	412	K2CJN	409	G3AWZ	428	VE3ES	274	W2GT	528
W8LY	570	DL7CS	502	DL9KP	450	WA2DIG	411	DL3TJ	404	W3MAC	425	K2JFV	266	DJ2KS	524
K6CQM	565	K2CPR	501	DL9KP	450	W2PTD	411	OE1FF	404	G3NUG	423	K2MGE	263	G8KS	520
W5OLG	564	W9SFR	501	W8JIN	449	K5LZO	411	W1ORV	404	I1AMU	403	W3AYD	262	OE1FF	519
W2HO	563	W2EMW	500	SP6FZ	447	W4DKP	410	W1UOP	402	W6YMV	372	W4EEU	262	K9AGB	510
K2UKQ	559	W2FXA	500	W3AYD	443	W1CKU	408	W6USG	400	W1ORV	370	DL1PM	257	PAØLOU	510
W5LGG	558	W2MUM	495	W6UNP	442	K4IEX	408	VE3BQP	386	W6RKP	360	G3WW	257	G3HDA	509
W9DWQ	556	W1WLW	494	VK3XB	439	K4JVE	407	SP7HX	385	W2HXG	359	W3DJZ	257	HK3LX	508
W2KIR	555	LA3DB	491	W3BQA	437	W5AFX	407	TG3AD	381	TI2HP	356	XE1CV	256	W4BQY	505
K2ZKU	552	PY4OD	491	LA5HE	437	SM5AJR	406	DL6VM	376	W4RLS	355	G3FKM	255	W3KPD	501
W1EQ	549	OK3DG	488	WA6SBO	435	SP7HX	404	G3FKM	366	W4NJF	351	UR2AR	255	LA5HE	500
KP4CC	542	SM5CCE	488	VE3ES	433	W6ISQ	401	W8UMR	363	PZ1AX	345	W1EQ	253	KP4AOO	500
W1IJB	546	W4BYU	487	G3HIW	433	K6VVA	400	SM3AZI	362	K1IXG	344	K2ZKU	251	ST2AR	489
W9YSX	544	W8PQQ	481	W4CKD	431			DL2UZ	361	VE3BQP	334	K3BNS	250	JA2JW	480
G2GM	538	W4HYW	478	WØAUB	429	**Phone WPX**		SM3EP	361	W4RBZ	332			W4RBZ	477
W9GFF	538	W8IBX	476	W2RA	428	W9WHM	629	CX2CN	359	W2VCZ	320	**Mixed WPX**		W3CGS	475
IT1AGA	536	W5BUK	475	K5LIA	428	CT1PK	610	W1DGJ	358	W1UOP	318	W4OPM	658	W9FVU	474
SM7MS	534	WØMCX	472	OK1MB	428	W8WT	600	W5ERY	358	W2YBO	318	G3DO	638	G3FKM	463
W3GJY	526	K4HPR	470	W5EJT	428	G3DO	598	W6CHY	358	W8PQQ	315	W8WT	631	DL1YA	456
OK1SV	517	W3OCU	466	W3CGS	426	CT1HF	586	W8JIN	356	WA2EOQ	315	W9YSX	622	W1ORV	455
K9AGB	515	K6SXA	464	W1EIO	425	MP4BBW	506	W4RLS	356	G6LX	310	K9EAB	606	VK2DI	454
W6WO	511	SM3TW	463	OE3WB	425	DJ3CP	473	G3GHE	356	K4PUS	305	W8JIN	605	DJ5VQ	452
DJ2KS	511	JA2JW	461	KL7MF	424	W9YSQ	471	PY2CK	354	DJ3CP	304	W3NKM	605	WØZBQ	452
		VE4OX	461	SM5WI	424	PAØSNG	468	5A5TO	353	WA2SFP	300	W8UMR	599	G3NUG	452
		W9WIO	460	W4HVQ	422	W9UZC	462	LA5HE	351	K2TDI	300	DL3RK	593	GI6TK	450

"The next Field Day operation of PARA will be to commemorate General Douglas MacArthur's return to Leyte. Look for DU5DM from Leyte October 19 and 20, 1964.

"Corregidor was lots of fun. I hope if I am still in Manila that I shall be invited to go to Leyte. For those of you who may be visiting Manila and desire to meet some local Hams, I suggest going to the Selecta Restaurant on Roxas Blvd. around 12:30 P.M. for lunch. You will find some of the local gang there almost every day."

All Africa Award

The following is a list of areas in Africa from which QSL cards will qualify to obtain the All Africa Award.

Confirmation must be submitted in respect of all the first nine areas plus at least 25 of the remaining listed countries on the continent of Africa.

A list indicating call-signs, mode of operation and date must be submitted accompanied by the cards with the exception of DX applications as stated below.

In the case of Societies which are members of the IARU, DX application lists will be accepted from members if duly checked and certified by their Awards Manager.

All stations contacted must be land stations and contacts should have been made after November 1945, with a minimum c.w. report of RST 338 and R3 S3 in the case of phone contacts.

The certificate is issued free to members of the S.A.R.L. and at a charge of 50 cents (10 IRC) to non-members.

1—ZS1, 2—ZS2, 3—ZS3, 4—ZS4, 5—ZS5, 6—ZS6, 7—ZS7, SD1, 8—ZS8, 9—ZS9, 10—CN, 5C, CN8, 11—CR5, 12—CR6, 13—CR7, 14—EA9, EAØ, EA8, (Spain, Morocco, Rio de Oro, Ifni, Spanish Guiana, 15—EK. CN2, KT1, 16—EL, 17—ET3, ETE3, 18—FA, 19—FD3, FD8, 20—FE8, TJ8, 21—FF, TU2, TY2, TZ, XT2, 5T5, 5U7, 6W8, 7G1, 22—FL8, FL9, 23—FQ, TL8, TR8, TT8, 24—I5, MD4, MS4, 6O1, 25—ET2, IG, MD3, MI3, MI6, 26—LI, MC1, 5A1-5, MD1, MT1, 27—OQ, OQØ, OQ5, TN8, 9Q5, 9U5, 28—ST, 29—MD5, SU, 30—VQ2, 31—VQ3, 5H3, 32—VQ4, 33—VQ5, 34—VQ6, 6O2, 35—ZD1, 36—XT2, ZD2, 5N2, 37—ZD3, 38—FF8,/GN, ZD4, 5V4, 9G1, 39—ZD6, 40—ZE, 41—FT4, 3V8.

WAAC Award

The WAAC (Worked All Asian Countries) Award is available to all who work and receive QSLs from amateur radio stations according to the following rules:

Work one each JA district, *i.e.*—JA1, JA2, etc. (10 QSOs & QSLs).

Work 20 Asian countries (not including JAs) such as VS1, VS4, VS6, HL, HM, JT1, UAØ, VU, 4S7, BV, KR6, DU, etc.

Mail your request for the Award to: JA1ADN, Fred Noboru Ihara, 408-47 Meishindai, Hodogaya-ku, Yokohama-shi, Kanagawa-ken, Japan.

73, Urb, W2DEC

SSB DX HONOR ROLL

The following amateurs have met the requirements for listing on the Honor Roll in accordance with the rules as stated in the January 1964 *CQ*.

TI2HP	295	K8RTW	274	W1AOL	250
W2ZX	293	K9EAB	273	K8ONV	244
W2BXA	293	W2LV	271	YV5AFF	239
W8PQQ	292	K2MGE	270	W7DLR	238
K4TJL	289	W3MAC	270	W4RLS	236
WØQVZ	288	WA2IZS	269	W6YMV	235
W2TP	282	G3NUG	269	OZ7FG	233
W2FXN	281	W4SSU	263	W2PTM	230
W1LLF	281	G2BVN	263	XE1AE	230
W2VCZ	279	W2RGV	261	W3VSU	228
G8KS	279	G3DO	260	K2JFV	223
W4OPM	278	W6RKP	258	W3FWD	216
W6UOU	277	PJ2AA	258	WA2EOQ	210
HB9TL	275	G2PL	257	W6ZJY	204
I1AMU	275	W6WNE	254	SM5UF	203
DL1IN	275	K6LGF	250		

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

August	29-30	QRP QSO Party
August	29-30	All Asia DX C.W.
August	29-31	West Virginia QSO Party
September	19-21	Pennsylvania QSO Party
September	19-20	S A C C.W.
September	26-27	S A C Phone
September	26-27	MARC VE/W
October	3-4	VK/ZL/Oceania Phone
October	10-11	VK/ZL/Oceania C.W.
October	10-11	VU2/4S7 DX Phone
October	17-18	VU2/4S7 DX C.W.
October	10-11	ARRL CD C.W.
October	17-18	ARRL CD Phone
October	21-22	YL/AP C.W. Party
October	**24-25**	***CQ* WW DX Phone**
Oct. 31-Nov. 1		RSGB 7 mc DX Phone
Oct. 31-Nov. 1		New Hampshire Party
November	4-5	YL/AP Phone Party
November	14-15	ARRL SS Phone
November	21-22	ARRL SS C.W.
November	21-22	RSGB 7 mc DX C.W.
November	**28-29**	***CQ* WW DX C.W.**
December	5-6	OK DX C.W.
December	5-6	RSGB 21/28 mc Phone

QRP QSO Party

Starts: 1800 GMT Saturday, August 29.
Ends: 2400 GMT Sunday, August 30

This is the Second Annual QSO Party run by the QRP Amateur Radio Club. The contest is primarily organized for QRP stations, but other stations may participate providing their contacts are with QRP stations only. (100 watts input or less constitutes QRP.)

Log Data: Date/Time (GMT), QSO Nr., Station worked, his QSO Nr., QRP Nr., State/Country and power input. Non-members use "NM" in place of QRP Nr.

Scoring: QRP stations can work any station, and they score 1 point for each c.w. contact and 1.5 for each phone/SSB contact. QRO and non-members must work QRP stations only and score 1 point per contact regardless of mode used.

Frequencies: 3540, 7040, 14065, 21040 and 29040 on c.w. 3855, 7260, 21300, 28540 and 50350 on a.m./s.s.b.

Awards: A Plaque to the highest scoring QRP member. A certificate to the high scoring member and non-member in each call area and each country outside the USA.

Logs must be postmarked no later than September 20th and go to: Jerry Fiore, K4HPR, 229 Meadowdale Ave., Birmingham, Ala. 35215. Information or application for membership in the QRP A.R.C. goes to: John Huetter, K8DZR, 2146 Chesterland, Lakewood, Ohio 44107.

*14 Sherwood Road, Stamford, Conn. 06905.

All Asia DX

Starts: 1000 GMT Saturday, August 29.
Ends: 1600 GMT Sunday, August 30.

The 5th annual All Asia DX Contest, sponsored by the JARL, is a c.w. activity only.

Rules in detail were covered in last month's CALENDAR.

Logs must be in the hands of the committee no later than Nov. 30th and go to: The JARL Contest Committee, P.O. Box 377, Tokyo, Central Japan.

West Virginia QSO Party

Starts: 2300 GMT Saturday, August 29.
Ends: 0500 GMT Monday, August 31.

Rules and suggested frequencies where you will find the activity were listed in last month's CALENDAR.

Mailing deadline for logs is Oct. 1st and they go to: Contest Chairman, Ross Kirk, K8YBU, 901 Sixth Avenue, St. Albans, West Virginia.

S A C

C.W.—Sept. 19-20 Phone—Sept. 26-27
Starts: 1500 GMT Saturday, Ends: 1800 GMT Sunday in each instance.

The sixth Scandinavian Activity Contest is sponsored by the SSA (Sweden).

It's the world working the Scandinavians and for contest purposes the following prefixes will be considered country multipliers: LA, LA/p, OH, OHØ, OX, OY, OZ and SM/SL.

Complete rules in last month's CALENDAR.

Mailing deadline is Oct. 15th. Logs go to: SSA Contest Manager, Karl O. Friden, SM7ID, Box 2005, Kristianstad 2, Sweden.

Pennsylvania QSO Party

Starts: 2300 GMT Saturday, September 19.
Ends: 0400 GMT Monday, September 21.

The seventh annual Pennsylvania QSO Party sponsored by the Nittany Amateur Radio Club, offers out of state stations an opportunity to earn credits for the USA-CA and Penn. Counties awards.

Log Data: Date/Time in GMT, QSO number, station worked, RS/RST report and county for Penn. stations. Out of state stations will send their state, province or country. Also indicate band and mode used.

Scoring: Penn. stations, one point per QSO, multiplied by the number of states, provinces and countries worked. Out of state stations, one point per QSO, multiplied by the number of

Penn. counties worked. Entries are expected to compute their own scores.

Frequencies: Activity will be found around 3575, 3875, 7075, 7275, 14075, 14275, 21075, 21325. Give 10 meters a try too. The same station can be worked on different bands and modes.

Awards: Certificates will be awarded to the first place station in each ARRL Section and country. Second and third place certificates will also be issued where justification warrants it. The latest issue of the *U.S. Call Book* will be awarded to the highest scoring Penn. station and to the top out of state station. Stations qualifying for the Penn. Counties Award during the contest will receive it free.

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

MARC VE/W

Starts: 1800 EST Saturday, September 26.
Ends: 2400 EST Sunday, September 27.

This popular Canadian/U.S. Party is once again sponsored by the Montreal Amateur Radio Club.

The contest period covers a 30 hour period, however you are only permitted to operate 20 hours. It is essential therefore that ON and OFF times are clearly indicated on your log.

1. Each completed contact counts 2 points. The same station can be worked twice on each band, once on c.w. and once on phone.

2. There are four separate stages in the multiplier for W/K stations. (a) Number of VE sections worked, a maximum of 10, VE1—VE8, VEØ & VO. (b) 6.6, the ratio of US to Canadian sections. (c) 2.5, provisional multiplier based on the ratio of US to Canadian logs received. (d) Power multiplier; 2 if input is less than 30 watts, 1.5 if less than 100 watts. Example: Contact points × VE sections worked, × 6.6, × 2.5 × appropriate power multiplier for final score.

3. Only single operator operation is permitted.

4. Your log should show in this order: On the *receive* side, date and time, contact number, station worked, RS/RST, and ARRL section. On the *send* side, your contact number, and RS/RST. Additional columns showing type of emission, band, sections as they are worked and QSO points should also be included. And don't forget to show ON and OFF times you were on the air.

5. Certificates will be awarded to the highest scoring station in each ARRL section. A traveling Trophy goes to the over-all winner.

You are expected to score your own log and check for duplicate contacts. Also include a summary sheet giving all essential information. Call, name and address, ARRL section, number of operating hours, summary of your score, power used and equipment discription.

Sign the following declaration: "I hereby state that my station was operated in accordance wtih the rules of the contest and governmental regulations and I agree to abide by the decision of the Contest Committee.

Logs should be sent to: Gordon H. Webster, VE2BB, 1550 Erin Place, Dorval, Quebec, Canada.

VK/ZL/Oceania DX

Phone—Oct. 3-4. **C.w.**—Oct. 10-11.
Starts: 1000 GMT Saturday, Ends: 1000 GMT Sunday in each instance.

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

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

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

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

Final Score: Multiply total QSO points by the sum of VK/ZL call areas worked on all bands. The same VK or ZL call area worked on a different band counts as a separate multiplier.

Logs: Must show in this order: Date and Time in GMT, station worked, serial number sent & received. Underline each new VK/ZL call area worked and use a separate log sheet for each band.

Also include a summary sheet with your call, name and address in block letters, details of your equipment, and a summary of your score for each band. Sign a declaration that all rules and regulations have been observed.

Awards: Attractive colored pictorial certificates will be awarded in each country and each call area for W/K, JA, SM and UA. (1) To the top scorer using all Bands. (2) Top scorer on each individual band. (3) Other certificates may be awarded, determined by conditions and activity.

There is also a Listeners section but VK and ZL stations *only* are to be listed. Logs should be set up similar to the procedure indicated in the transmitting section, showing call of the VK/ZL station heard as well as the station he is working.

Logs must be in the hands of the Contest Committee before January 16, 1965 and go to: The N.Z.A.R.T., P.O. Box 489, Wellington, New Zealand.

VU2/4S7 DX

Phone—Oct. 10-11 **C.w.**—Oct. 17-18.
Starts: 0600 GMT Saturday, Ends: 0600 GMT Sunday in each instance.

This is the first DX contest organized by the joint Radio Societies of India and Ceylon.

Phone and c.w. are separate contests, all bands may be used, and only one contact per band is

[*Continued on page 93*]

Propagation

BY GEORGE JACOBS, W3ASK

DURING September, 20 meters is expected to continue to be the best band for DX openings from sunrise until shortly after sunset. An improvement is expected in DX propagation on 15 meters, especially during the late afternoon hours, as fall approaches. A few 10 meter DX openings, to southern or tropical areas, are also forecast for the afternoon hours. Short-skip openings on 10, 15 and 20 meters are expected to decrease considerably during the month, as sporadic-*E* ionization declines.

Static levels begin to decrease during September, and this should result in an improvement in propagation conditions on 40, 80 and 160 meters, especially during the hours of darkness. Forty meters is expected to open to many areas of the world from shortly before sundown, and remain open until shortly after sunrise. To many areas of the world, 40 meters should be the best band for DX propagation conditions during the late evening and early morning hours.

Some fairly good 80 meter DX openings are forecast during the hours of darkness. Some 160 meter DX openings may occur also during this period. (See further discussion on 160 meter propagation conditions later in this column). Excellent short-skip conditions are forecast for 40 and 80 meters during the hours of daylight, and most of the nighttime hours. Good short-skip openings are expected on 160 meters during the hours of darkness.

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

VHF Ionospheric Openings

The number of v.h.f. ionospheric openings generally drops off considerably during September. Sporadic-E short-skip openings occur far less often during September than the summer months, and meteor activity is at a low level. Some v.h.f. ionospheric openings may be possible, however, as a result of a seasonal increase in auroral activity, which usually takes place during late September and the early fall season. Check the "Last Minute Forecast" appearing at the beginning of this column for periods that are most likely to be "below normal" or "disturbed" during the month. Auroral-scatter v.h.f. openings are very likely to occur on these days.

Sunspot Cycle

The Zurich Solar Observatory reports an average sunspot number of 9 for June, 1964. From June 22 to 28, there were no spots on the sun at all! This represents the lowest level of monthly sunspot activity observed since March, 1955. Based on June's observations, the 12-month running smoothed sunspot number, upon which the sunspot cycle is based, dropped to 21. This latest smoothed number is centered on Decem-

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for September

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

How To Use These Charts

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

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

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

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

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

4—This month's Propagation Charts are based upon a transmitter power of 75 watts c.w.; 150 watts s.s.b., or 300 watts d.s.b., into a dipole antenna one quarter-wave above ground on 160, 80 and 40 meters and a half-wave above ground on 20, 15 and 10 meters. For each 10 db increase above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

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

6—These Propagation Charts are valid through October 31, 1964. These Charts are prepared from basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

ber, 1963. A smoothed sunspot number of 12 is forecast for September, 1964. For more information on the behavior of the present sunspot cycle see "A Look At The Remainder Of The Sunspot Cycle," in the March, 1964 issue of *CQ* (pp. 26-27).

Best-Ever 160 Meter Conditions

As a radio wave enters the ionosphere, it collides with gas molecules which are present in this region. As a result of these collisions, the radio wave loses energy, and finally emerges from the ionosphere with decreased signal strength. The loss of energy by the radio wave is called *ionospheric*, or *solar* absorption.

Since the sun is the prime source of energy responsible for sustaining the ionosphere, the degree of ionospheric absorption varies with the position of the sun with respect to a point on earth, and the sunspot cycle. The affect of solar absorption upon a radio wave varies *inversely* as the square of the wave frequency. For example, if the wave frequency is doubled, ionospheric absorption will decrease by a factor of four. The *lower* the frequency, the *greater* the absorption. For this reason, ionospheric absorption is greatest in the 160 meter band, the lowest frequency band allocated to the radio amateur service.

During the daylight hours ionospheric absorption is generally so intense that 160 meter skywave propagation is not possible. During periods of high sunspot activity, nighttime absorption remains strong enough to limit 160 meter skywave propagation to short-skip openings, usually not exceeding a thousand miles, or so. As the solar cycle declines, however, the level of ionospheric absorption decreases. This would indicate that an improvement might be expected in 160 meter propagation conditions, especially during the nighttime hours of the late fall, winter and early spring months when absorption is at a low seasonal level as well. Such an improvement has been observed over the past few years of steadily declining sunspot activity.

Stu Perry, W1BB, reports that 160 meter propagation conditions during the 1963-64 season continued to improve, as they have for each season since the sunspot cycle began to decline during 1958. Stu has worked 76 countries on 160, and he hopes to make DXCC this coming season. Among new 160 meter propagation records established during 1963-64, were the first Europe (G3PU) to West Coast USA opening (W6ML);

[*Continued on page 94*]

CQ Short-Skip Propagation Chart

September-October, 1964

Band Openings Given in Local Standard Time

At Path Mid-Point (24-Hour Time System)

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	09-13 (0-1)	09-13 (1) 13-21 (0-1)	09-21 (1-0)
15	*Nil*	09-21 (0-1)	07-09 (0-1) 09-16 (1-2) 16-21 (1)	07-09 (1) 09-16 (2) 16-18 (1) 18-21 (1-0)
20	*Nil*	07-09 (0-1) 09-12 (0-3) 12-14 (0-2) 14-21 (0-1)	07-09 (1-2) 09-12 (3-4) 12-14 (2-4) 14-17 (1-4) 17-19 (1-3) 19-21 (1-2) 21-07 (0-1)	07-09 (2) 09-11 (4) 11-14 (4-3) 14-17 (4) 17-19 (3) 19-21 (2) 21-07 (1-0)
40	07-09 (0-2) 09-11 (1-3) 11-15 (2-4) 15-17 (2-3) 17-19 (1-2) 19-21 (0-1)	07-09 (2-3) 09-11 (3) 11-15 (4-2) 15-17 (3) 17-19 (2-4) 19-21 (1-4) 21-23 (0-3) 23-02 (0-2) 02-05 (0-1) 05-07 (0-2)	07-09 (3-2) 09-11 (3-1) 11-15 (2-1) 15-17 (3-2) 17-19 (4-3) 19-21 (4) 21-23 (3-4) 23-02 (2) 02-05 (1-2) 05-07 (2-3)	07-09 (2-1) 09-15 (1-0) 15-17 (2-1) 17-19 (3-2) 19-23 (4) 23-02 (2-4) 02-05 (2-3) 05-07 (3-2)
80	06-08 (3-4) 08-21 (4) 21-03 (3-4) 03-06 (2-3)	06-08 (4-2) 08-16 (4-1) 16-18 (4-2) 18-21 (4-3) 21-03 (4)	06-08 (2-1) 08-16 (1-0) 16-18 (2-1) 18-21 (3-2) 21-03 (4)	06-08 (1) 08-16 (0) 16-18 (1) 18-21 (2) 21-03 (4-3)
160	16-18 (1-0) 18-20 (2-1) 20-05 (4) 05-07 (3-2) 07-09 (2-1) 09-11 (1-0)	17-19 (1-0) 19-20 (1) 20-02 (4-3) 02-05 (4-2) 05-07 (2-1) 07-09 (1-0)	19-20 (1-0) 20-22 (3-1) 22-02 (3) 02-05 (2-1) 05-07 (1)	20-22 (1-0) 22-02 (3-2) 02-05 (1) 05-07 (1-0)

Hawaii To:

*Openings Given in Hawaiian Standard Time**

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160‡ Meters*
Eastern USA	07-11 (1) 11-13 (2) 13-15 (1)	05-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-05 (1)	18-20 (1) 20-23 (2) 23-02 (1) 20-00 (1)‡
Central USA	06-07 (1) 07-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	05-06 (1) 06-08 (3) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (4) 16-18 (2) 18-19 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1)	18-20 (1) 20-01 (2) 01-03 (1) 20-01 (1)‡
Western USA	12-15 (1)† 06-07 (1) 07-09 (2) 09-12 (3) 12-14 (2) 14-17 (1)	06-07 (1) 07-10 (4) 10-14 (3) 14-16 (4) 16-18 (2) 18-20 (1)	17-18 (1) 18-19 (2) 19-00 (4) 00-03 (3) 03-06 (2) 06-08 (1)	18-20 (1) 20-22 (2) 22-03 (3) 03-04 (2) 04-06 (1) 20-03 (1)‡ 23-02 (2)‡ 02-04 (1)‡

Alaska To:

Openings Given in GMT§

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Eastern USA	21-23 (1)	18-21 (1) 21-23 (2) 23-01 (1)	08-12 (1)	*Nil*
Central USA	21-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	08-13 (1)	*Nil*
Western USA	20-21 (1) 21-23 (2) 23-01 (1)	17-18 (1) 18-21 (2) 21-01 (3) 01-02 (2) 02-04 (1)	08-11 (1) 11-14 (2) 14-16 (1)	11-14 (1)

*Hawaiian Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST; 2 hours *behind* PST and 10 hours *behind* GMT.

†Indicates possible 10 meter openings.

‡Indicates possible 160 meter openings.

§GMT or Z Time is 5 hours *ahead* of EST; 6 hours *ahead* of CST; 7 hours *ahead* of MST; 8 hours *ahead* of PST and 9 hours *ahead* of Alaskan Standard Time in the zone between Skagway and 141 degrees west longitude, etc.

THE VHF COLUMN

BY BOB BROWN, K2ZSQ
and ALLEN KATZ, K2UYH*

NEW column? No! We have just combined the VHF REPORT and the UHF ROUNDUP into a better column which will be bigger than the two old columns put together.

Why? Because v.h.f. amateurs' interests cannot be split by an imaginary line someplace between the 144 and 220 mc bands. Most outstanding v.h.f. amateurs make use of all the v.h.f. frequencies available. Following a policy of separate columns in some cases meant cutting many letters up like a jig saw puzzle.

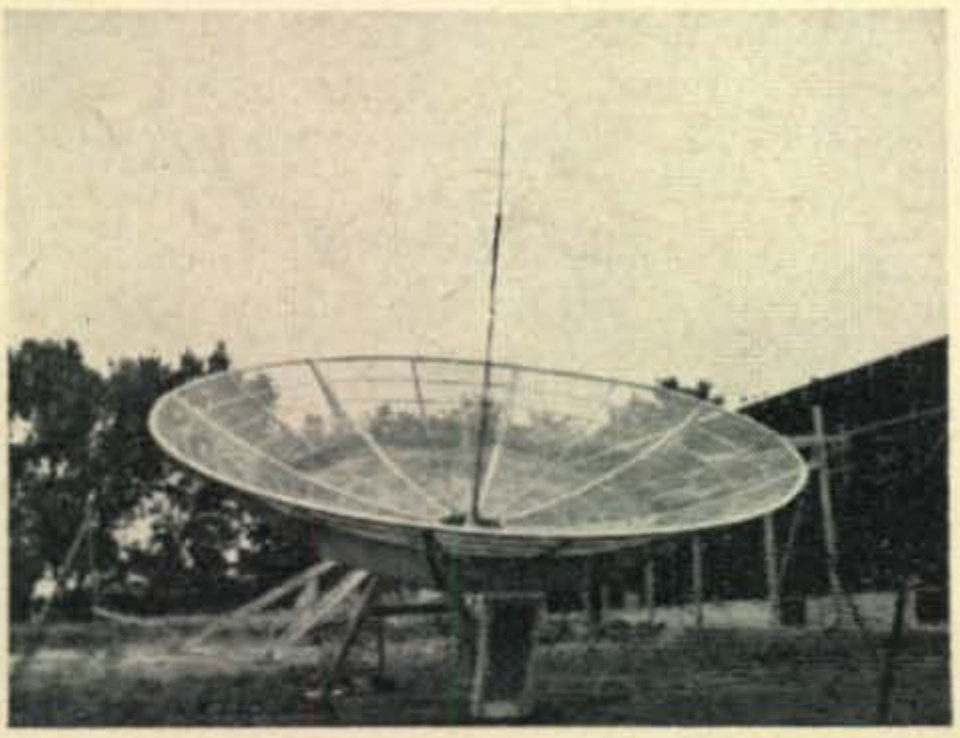
It all began at one of those informal sessions where the topic of discussion might range from the K3IOP case to cork screw antennas. Toni (Bob's XYL) had just fixed up a big pitcher of ice tea when the idea of merging the two columns struck. Things moved along quickly after that. The difference between our two columns was more coloring than frequency . . . the operator vs. the constructor. To combine the two columns would mean covering the whole gamet of v.h.f. activity. The going was not all easy, for we agree on few things other than the importance of the bands above 50 mc. But by the time Toni's sink was overflowing with empty glasses (she makes great ice tea) we had the formula.

Now if we could only get some of our enthusiasm to rub off on you, the reader (for we need your cooperation for this column to go), we would be quite content. A helping hand would be appreciated.

New 432 Mc DX Record

Although we have not gone through the arithmetic yet, it looks like HB9RG of Switzerland and KP4BPZ of Puerto Rico now hold the 432 mc distance record. The contact was made during the moonbounce tests conducted by Gordon, KP4BPZ on the weekend of June 13 and 14, using the 1000 foot dish at Arecibo. Other stations to QSO KP4BPZ on 432 mc include G3LTF, W9GAB and W1BU. On 144 mc the list is even longer with DL3LNG, DJ3EN, DJ8PL, G2HCG, W1BU, K2LNG, W3TIK/3, W3LUL/3, W3TMZ/3, W4HJZ, W4FJP, WB6GZY, and WØIC all making contact.

Many v.h.f. operators have expressed an opinion that this type of communication is not amateur. And it must be admitted that a 1000 foot dish (about 60 db gain on 432 mc) is many times larger than the 28 foot dish at W1BU (about 30 db) about which we have heard so much quibble. And it is true that antennas of this size are not commonly found about the average ham shack. But can anyone deny the shot in the arm this kind of activity gives to u.h.f. operation? Let's give these giants the credit due and hope they keep up their good work.



W9GAB's moonbounce antenna system consisting of a 15 foot homebrew parabolic reflector fed with a dipole and reflector. Transmission line is 15 feet on RG-33U.

A Personal Account—K2UYH

We had to work much of the time KP4BPZ was on the air (darn those broadcast hours). But as soon as we got off our shift, we dashed down to K2TKN's QTH to see how he made out. Bill has had a 20 foot dish laying on the ground for nearly two years now. Lucky for him the weekend of June 13 came right in the middle of his vacation. So come Saturday June 6, with the chance of a moonbounce QSO at stake, Bill was well on the road to completing a polar mount. All would have gone according to schedule had he not been overly anxious and tried to mount the dish alone. Three unsuccessful attempts later Bill found himself plying the trade of arc-welding to an almost ruined dish. He evidently had a good teacher, however, for the next day (this time with the help of a local ham) the dish was in place atop the mount. The final bolts were tightened about 2030 hours GMT. KP4BPZ had at that time been transmitting on 432 for about an hour. Precious time had elapsed, and the Arecibo reflector, being curved in the earth, was fixed. Changes in beam direction could only be obtained by changing the position or phase of the feed. On June 13 KP4BPZ had a total of 168 minutes of moon sight. Bill hurriedly pointed his dish at the moon and placed a two-turn helix antenna where he believed the focal point was situated. There was no time to optimize. He connected the feedline to his converter and there was Gordon coming in 18 to 24 db above the noise level without even touching the dial! Due to lack of time unfortunately Bill did not have his kw final in operation on 432. Determined,

*c/o *CQ*, 14 Vanderventer Avenue, Port Washington, Long Island, N.Y. 11050.

Yuiichi Himi, JA1FXI, and his son are shown firing upon his amateur TV station. Mr. Himi is presdent of the Japan Amateur TV Club.

however, he threw on his 150 watt exciter. But the loss of time and the low power proved his better and no QSO was made.

The next day, back at work again, we received word that KP4BPZ was again coming through—this time on 144 mc. Carl Schiedler, W2AZL, who recently moved and does not have his station yet back together, sunk a pipe in the ground. An eleven element beam and a door hinge were attached to the top of the pipe. Sure enough, KP4BPZ was copyable, even with this simple lashup! Carl even remarked that signals were such that only a 3 kc phone bandwidth was necessary.

With the strength of the signals that KP4BPZ was putting in, we decided to take no chances and throw a six foot dish into the anxiously waiting arms of our polar mount. (We have a 16 foot dish under construction, but it will not be finished for another month.) The equipment at Arecibo was designed for 440 mc. Four thirty two is only 8 mc away. I would not be surprised if KP4BPZ is on 432 again in the near future. If there is any word of such tests, we will be sure to let you know.

From The Mailbag

Bob, W9GAB, reports on his KP4BPZ contact: "The moonbounce experiment by KP4BPZ was a dramatic success here and a very gratifying experience for me and my helpers (W9HGE and W9LST). Our system consisted of a 15 foot homebrew parabolic reflector fed with a dipole and reflector." *(We would like very much to see a diagram of your launch antenna. Did you use a bazooka or slot transformer?)* "The dish was mounted on a polar mount set at a 20 degree angle with the equator." *(We will have to go over the operation of a polar mount one of these months. As can be seen, a polar mount is pretty important to a moonbounce system.)* "Tracking was achieved by use of ropes and a block and tackle. The antenna was set to a calculated position by pointer and dial calibrated in degrees of right assention. Transmission line was 65 feet of RG-35U.

"Cloud cover here was such that visual sighting was not possible during most of June 13 and 14. One attempt was made to see if our theoretical sighting could be improved by wagging the beam back and forth. This only resulted in an inferior signal." *(Good for you, Bob. Those tables do tell the truth.)*

"Signals on 432 were solid and quite strong, but it was felt that the code speed was a bit high (13-15 w.p.m.) for consistent copy." *(We have heard similar thoughts expressed by others. It would have also helped if he plunked his carrier on for several minutes and allowed everyone to adjust their systems for maximum signal strength.)* "Our RST was 469 on 432 mc, while KP4BPZ was peaking 599 with high and rapid QSB. On 144 mc the story was different. Signals were very weak and difficult to copy (5 w.p.m. would have been about right).

"Equipment here consisted of 4CX250F's on both 432 and 144 mc. Power input was approximately 700 watts on 432 and 950 on 144. Receiving gear used was a paramp on 432 (1 db n.f.) and a 3 db converter on 144 into a 75A-2." *(Did you also use the dish on 144?)*

"It is my opinion that at this time moonbounce is well beyond the capabilities of this writer, at least in communications with a similarly equipped station! During the test the only other station heard was W1BU on 432 mc. This is a let down for me, but a good future challange to be licked." *(Don't be so pessimistic, you may have that "challenge" almost licked now. Sam's dish only has 5 db more than yours. Hearing him is nothing to sneeze at!)*

"I am regularly active on 432 mc looking east between 8:00 and 9:00 P.M. CST. Other stations on are WØCTM, running 200 watts on 432.051 from Minnesota and WØIDY, running 250 watts on 432.138 from Cedar Rapids, Iowa." *(FB on your activities, Bob, and many thanks for your very informative letter.)*

Bob, K4KLK, on his 6 meter DX QTH: "Thought I would write and let you know what has been going on six meters in the mountains of North Carolina. I was first on six meters back in 1958 and worked about eighteen different states, but a hitch in the USAF and one year at college disrupted things for a while.

"The equipment here is mostly homebrew: transmitting, 6U8 to 6146 at 45 watts modulated with Class B 616's; receiving, Ameco nuvistor converter into National NC-125 as a 7 mc i.f. strip; antenna is a four element homebrew job 28 feet up.

New VHF Century Club Members

Six Meters

W3MFY 263
W7ZKL 264
WA9FIH 265
W3TFA 266
K5VZA 267
JA3CNU 268
K3VSC 269
WA9ASZ 270
WØFII 271
K5DRF 272

Two Meters

K8ZGV 171
WB2ECR 172
K8TCA 173
DL1GM 174
WB2FXB 175
WB2CCO 176
WN2KDD 177
WA2ZPD 178
WN2CLN 179
WN2CLN 180
WB2GMN 181
WB2FXB 182
WB2FXB 183

"The altitude here is approximately 2000 feet with a clear view north, but mountains on all sides. On ground wave consistent contacts are made into Knoxville, Tennessee over Clingmans Dome (6643 feet), Mount Leconte (6593 feet), and Mount Guyot (6622 feet)!" *(You've got some nice contest locations there!)*

"The May 12 Sporadic-*E* session was far the best I have ever caught. I called one CQ and must have been called by 20 stations. It would be a great help if the v.h.f. boys would follow a few rules of courtesy." *(Yes, six meters can seem just like the low frequencies in an opening. Note these rules, fellows—You just might be a culprit.)*

"1) If v.f.o. controlled, do not zero the frequency. 2) Do not break. 3) Do not ask a rare station to work a friend. Let him take his chances with the rest. 4) No rag chewing. I had to pick out the strongest station and I was plagued with 'Break-Break' and stations calling on the frequency. If the fellows would follow rules like these, a heck of a lot more contacts could be made and everyone would have more fun making them. But very few listen. Come on fellows—let's try more courtesy."

Bill, W9HOV, of Gain, Inc., has some campaign promises. And what he says is worth noting. I sure hope he can keep to his word, and with this beginning we see a possible end to this gain vs. business in regards to specs on commercial beams. Buyer beware!

"I have been corresponding with Loren Parks, K7AAD, who has been testing all kinds of antennas with the help of a professor at the University of Washington. And have they come up with some weird findings! Little trivia like a long yagi made in the east having an honest gain of 4 db, a 13 element job made on the west coast with less than 3 db gain. How did the 'J' make out? Fantastic, but when they are range and lab tested, you'd think twice before scoffing especially when the lab tests have no connection with any antenna company.

"We now have a super long john for 2, 1¼, and ¾ meters. I have all the laboratory information that I need and in due time will publicize this data, but the thing is that we have come up with 100% honest counts on these beams. Although they will sound far greater than the others, we are going to do something unheard of—we are going to print laboratory gains. These beams will only do 13.2 db according to our lab reports, but they are the most under-estimated beams you have ever seen." *(Bill, good luck to you with your policy. And we know it is gong to be rough. Let us see those specs when they're ready.)*

Vic, W5HPT, from Texas: "Not much to report from this station. I have been travelling like crazy and haven't had much time for projects or operating. Band was very good first part of May on 2 meters with Arkansas, Kansas, Louisiana, New Mexico, Ohio, and Oklahoma being worked."

"Later during the month it opened again but I was out on the road as usual. Missed working W4HHK, (Tenn.), on 432 mc. He was putting in a very fine signal they say. He advised that he would be on 432 with his big dish by about June 1, so should start giving r.f. stages a bad time—hi.

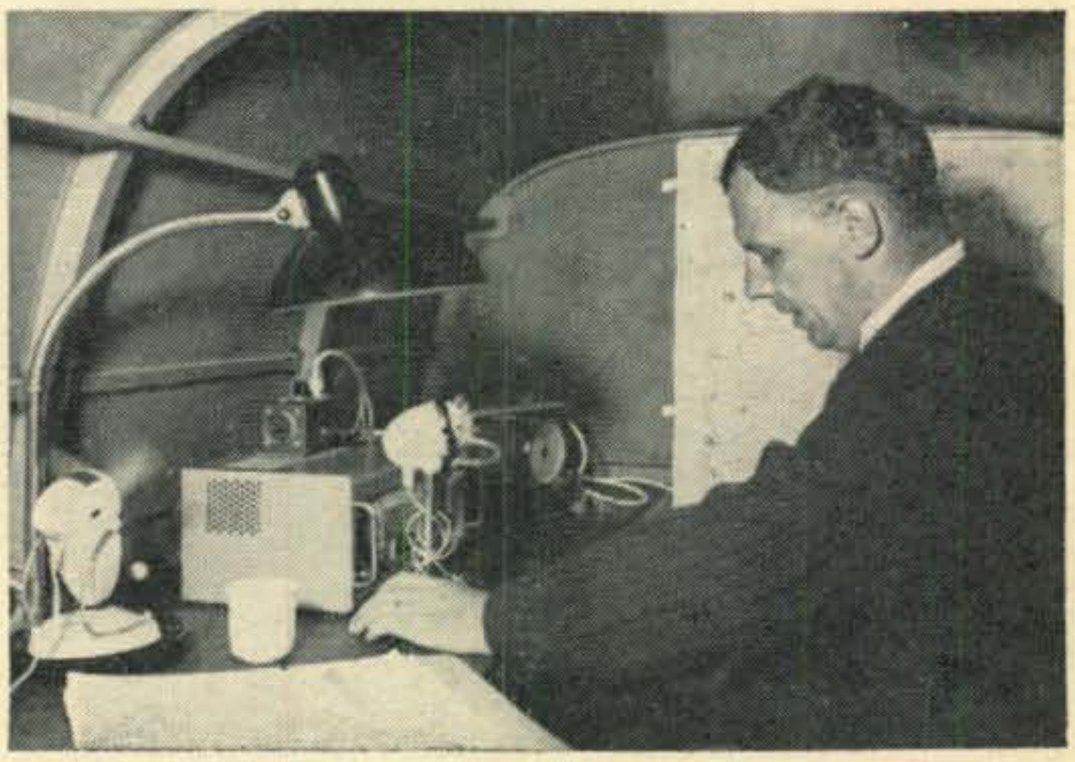
"W5SWV is on 432 s.s.b. now, so the list is growing. Amateur television is on the wain again, however, I am getting the station more business all the time, just in case some activity comes along." *(Yes, Vic, we know how it is, but this time I think the ATV trend is for keeps, although it does take much effort to keep the fires burning.)*

Jim Howard, an s.w.l. from Kansas City, Missouri sends in the following information on amateur TV extracted from *Radio Japan News:*

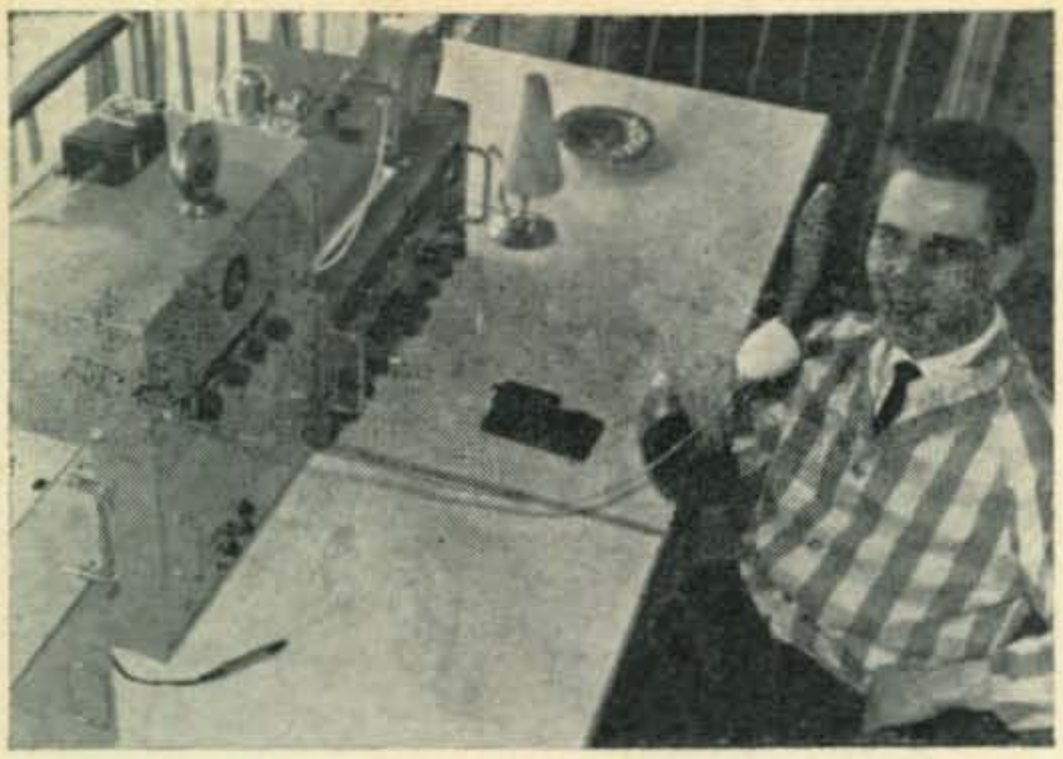
"Yuiichi Himi is on amateur television from Japan under the call JA1FXI. Equipment thus far is low power, although the transmitter is crystal controlled and the antenna is 35 feet up. Coverage now is limited to about one mile, however, plans to up the power should increase range to more than 30 miles. Himi is president of the Japan Amateur Television Club and an engineer at one of Japan's TV stations." *(We will see if more information can be obtained in the future.)*

Greg, K2ALX, on ATV from New York: "Location is in Ozone Park, Queens, New York. Equipment consists of a live Vidicon camera and monoscope for the video. Transmitter is a grid-modulated 4X250B running 200 watts black level. Receiver is a 416B converter into a standard TV receiver. And the antenna is a 32 element collinear on a 60 foot tower. Our audio line is on 147.7 mc. Ted, W2JTI, and I have informal skeds Monday nights at 7:30 P.M. EST. Ted is located in Bay Ridge, Brooklyn, about 10 miles airline. Excellent pictures are received at both ends of path."

Dean, K8RXD, with a question on varactors: I



Here is a shot of DJ8TF fixed portable during a 1963 VHF contest in his VW wagon. Note the "QRA-Locator-Map" at the rear wall. Based on geographical coordinates these QRA locators enable European v.h.f. men to find the smallest village in a few seconds and help tremendously in calculating distances covered. *(Photo by DL3FM).*



One of Europe's foremost VHF enthusiasts, DJ4OB. He is one of the most accomplished advocates of operating skill. In addition to this he and DJ1EH are respected for their combined craftsmanship in constructing excellent homebrew v.h.f. equipment. *(Photo by DL3FM).*

have been active on 144 mc c.w. for about six years now and have always been interested in the u.h.f. bands. I was wondering if in one of your forthcoming articles, you could possibly describe a 432 mc tripler using Varactors." *(See last month's column. However, we will try and get a simpler circuit for you soon, possibly with some photographs of component layout.)* "I have heard that a few fellows were using Varactor triplers to get on 432, but I have never seen or, to be perfectly frank, even heard of a Varactor." *(Well if you really want to become hep on power Varactors we suggest you write to Texas Instrument, P.O. Box 5012, Dallas 22, Texas, and ask for their technical seminar on power Varactors and Varactor multipliers design. Varactors are not just used as multipliers, they are also the active element of the parametric amplifier.)*

VE3BSX with a question on the Lancer: "On page 77 of your April issue of *CQ* you show the schematic diagram of the Lancer 2 meter transmitter. I note that in error you have omitted showing the value of R_3 (between pin 7 of the 12AU7 and ground).

It would be greatly appreciated if you could let me know the value of this resistor, as I plan to build this rig." *(Sorry for the goof. Try 200K for* R_3.*)*

DX Doings

Just about everything under the sun seems to be happening on the bands above 50 mc during the last few months. We have seen new records set on the ¾ and 2 meter bands and an almost unprecedented skip season on the 6 meter band. Well, what is so unusual about what has happened on 6? Certainly not a heck of a lot if we talk in terms of the 11 year sun spot cycle but if we compare this summer's DX with what had been predicted, I think you will admit we have not done badly! At this writing we are still in the midst of an almost unbroken chain of single-hop Sporadic-*E* skip on 6, unusual tropo on 2 and encouraging signs in a moonbounce direction on ultra highs.

It would be impossible for us to attempt a typical "DX Doings" column inasmuch as we find ourselves virtually deluged with reports this month. Perhaps we could hit a few interesting sidelights however found in our current mail. Starting with the immense 6 meter activity resulting from the excellent available propagation (It constantly amazes us how many known stations the openings reveal), we turn to our reliable operator in Maine. K1VUE notes in his report an encouraging amount of two-way sideband contacts recently. He indicates a few: W4CPX (S.C.), K3KEO (Del.), W4LZP (Tenn.), WA9FMH (Ill.), etc. Steve's homebrew transmitter is an effective "cheap and easy" rig employing a 12GN7-6005-(2)1625's push pull d.s.b. combination. He has built the r.f. section on an old ARC-5 transmitter chassis. Power input on a.m., by the way, is 28 watts whereas on double sideband he is realizing 80 watts. Perhaps in the next few months we can release the diagram in this column.

Vince Varnas, K8REG, of Dayton, Ohio sent us a huge stack of 6 meter DX reports. Scanning through them we find a few worthy of note: KP4AAN, KP4AGJ, KP4AKR, KP4BEL, KP4-BEO, KP4BRI, TI2NA, VE4MA, VE7ASI, VP7BG, VP7CC, and VP7DD. Incidentally, nearly all of these were worked using narrow band f.m.! Note too our new states—K8REG only needs Alaska and Hawaii to complete his WAS. We should mention also that K8ZES of Gallion, Ohio has also been doing quite well on 6 although chief concentration is rapidly moving to ¾ meters.

Looking at 2 meters we find Gary Fisher, K9WZB, of New Carlisle, Indiana reaping in the contacts. Scanning over his contributions it appears that his 144 mc range never drops below 240 miles, including the W3's right on through the VE3's. Locally, by the way, we find 2 meter activity on the east coast at a near all-time high and also enjoying good seasonal inversions far too numerous to set forth here.

A few scattered 220 reports: W9OVL in Hammon, Indiana busy working 500 miles on a.m. with S5 reports in virtually all directions. How does he do it? Well perhaps his 10 over 10 up 40 feet fed completely with 300 ohm line *(no baluns)* has something to do with it. In the shack Ben uses a 125 watt rig, and a 416B radar converter to help things on the receiving end. Moving to Jamaica, New York we find W2BAAI looking for schedules. Tom's available frequencies are 220.029 and 220.033. Drop him a line in care of this magazine. Four thirty two seems to be enjoying a rebirth recently if one can believe what he is told these days. In all seriousness, however, our brief observations from New Jersey show this to be true. Phone operators beware—the rage is still c.w. In the Midwest, however, n.b.f.m. operation is growing rapidly. The trend is stlil one of schedule so it is always a good idea to get acquainted with the local gang first.

[*Continued on page 94*]

SPACE COMMUNICATIONS

BY GEORGE JACOBS,* W3ASK

When in Washington be sure to visit the new Smithsonian Museum of History and Technology. The museum, opened earlier this year, is located on Constitution Avenue between 12th and 14th Streets. Of special interest to readers of this column is the Communications Space exhibit, where eight communication satellites, including OSCAR the Amateur Radio satellite, are on display. The other seven satellites included in the exhibit, which will remain on display for about two years, are ECHO, RELAY, SYNCOM, TELSTAR, WEST FORD, SCORE and COURIER.

The exhibit stresses the historical development of the rapidly changing field of space communications, with special emphasis on the variety of techniques that have been attempted. On display are all satellites which have been launched for communication purposes, including six active and two passive systems. All, except ECHO, are fully instrumented back-up or test models of the original satellites.

Besides viewing OSCAR and the other communication satellites, plan to spend a few pleasant hours browsing through the spacious new building where one can see on display Edison's first electric light, Morse's first telegraph, Bell's first telephone and scores of other exhibits containing the original equipment which have made scientific history in this country during the past two centuries.

Puerto Rico—USA—Europe via Moonbounce

Following on the heels of the record-breaking 2 meter W6DNG—OH1NL earth-moon-earth QSO this past April, more moonbounce history was made during May and June of this past year.

On May 20, between 0020 and 0040 GMT, KP4BPZ at Arecibo, Puerto Rico established the first 420 mc two-way amateur radio moonbounce QSO with W1BU at Medfield, Mass. C.w. signals were R4 S6 on both ends. Equipment at W1BU consisted of 150 watts output into a 28-foot parabolic reflector on a polar mount. For receiving, W1BU used a parametric amplifier into a 100-cycle bandwidth receiver. Both stations made contact again on May 21.

At 2020 GMT on June 13, this 420 mc record was broken when KP4BPZ made contact with G3LTF at Galleywood, Essex, England via moonbounce. Signal reports were RST 459 both ways. A further contact took place about an hour later. G3LTF's equipment consisted of 80 watts into a 15-foot dish antenna and an AF 139 transistor preamplifier. Just prior to this, KP4BPZ worked HB9RG[1] near Zurich, Switzerland. This QSO establishes a new DX record for the 420 mc band, with a distance measured unofficially as 4600 miles. During this same period, KP4BPZ also worked W9GAB, W1BU (again), and W1FZJ on a.m.!

On 2 meters, KP4BPZ worked W1BU, K2LMG, G2HCG, WB6GZY, DJ3EN, W3TIK/3, DJ8PL, W4HJZ, W4FJ and WØIC. These moonbounce QSOs were also heard by numerous radio amateurs on both sides of the Atlantic Ocean, many using rather modest receiving equipment. While this array of earth-moon-earth contacts represents a record as far as the number of participating stations, none of the QSOs broke the 5,800 mile DX record set for 2 meters earlier this year as a result of the moonbounce contact between W6DNG and OH1NL.

[1]Swiss newspaper accounts referred to the Swiss station participating in the moon-bounce experiments as HB9RF, but KP4BPZ's log shows the station as HB9RG.

KP4BPZ Antenna

Located at the recently inaugurated Arecibo Ionosphere Observatory in Puerto Rico, KP4-BPZ, while using low power transmitters on 2 meters and 420 mc, did have available for these moonbounce transmissions the Observatory's 1000-foot dish antenna!

Built into a natural hollow in the mountains of northwestern Puerto Rico, this 1000-foot diameter, 150-foot deep dish antenna is used primarily as a radio telescope. Under the direction of scientists from Cornell University, the antenna can be focused on the moon, the planets, the sun, and the very limits of the known universe in order to explore these areas with high power radio and radar beams. The dish makes its possible for the Arecibo radio telescope to scan the universe up to distances twice as far as man has been able to peer previously. It can scan the moon's surface, down to depths of several inches, to determine whether the moon is dusty, rocky, or something in between. The dish itself is made of galvanized steel welded mesh consisting of ½-inch openings. The antenna has a gain of about *60 db* at 420 mc, and generates a beam whose width is less than one-sixth of a degree.

Based on the above facts, one might argue that the use of this huge antenna by KP4BPZ puts these moonbounce QSO outside the sphere of normal amateur radio contacts. On the other hand, it was the use of this antenna by KP4BPZ that made it possible to generate this great amount of earth-moon-earth activity on two continents. The Arecibo antenna sets a reference level for the amount of system gain that is required to maintain useful communications via moonbounce on both 2 meters and 420 mc. While other radio amateurs will not have such

[*Continued on page 88*]

*11307 Clara St[illegible], Silver Spring, Md. 20902.

the USA-CA PROGRAM

BY CLIF EVANS,* K6BX

FOURTEEN county hunters recorded their scores during month of June as we go to press. Nine were for original USA-CA-500 Award for confirmed contacts with 500 different U.S. counties.

USA-CA Honor Roll

500		K6UTO	391	WØKZZ	45
WA2WGS	385	KØRTH	392	W4UF	46
W1FAB	387	W1MFQ	393	W8CYB/2	47
PJ3AO	388	W8CYB/2	394	1500	
K4AUL	389	1000		K4VOF	12
K8VII	390	K5SGK	44		

Of the above nine USA-CA-500 awards, four were for mixed operations; three for all phone and two for all c.w. Of the four USA-CA 1000 and one USA-CA 1500 awards, all were for mixed band/mode operations.

Additional credit endorsements issued during the month were: K5SGK with USA-CA-500 endorsements for all mobile, all 2-way s.s.b. and all 7 mc. WØKZZ with USA-CA-500 endorsements for all mobile, all 2-way s.s.b., all 3.5 mc. and mixed operations.

A growing flood of inquiries asking for USA-CA Program and Rules will partially be met by insertion of the following 'boxed' information in each month's column.

We Get Letters

Karl Nystrom, SM5-2735, s.w.l., "Dear Clif. . . . I am proud to become member SWL-CHC. Here in Sweden many work hard for achievements to join. I read *CQ* every month and especially your USA-CA column. Many SM s.w.l.s. are working hard to achieve this wonderful award. Even with good QSL card returns it will take years but we feel the effort worthwhile. Thanks very, very much for all your interest and help for the s.w.l.s around the world."

Governor Richard J. Hughes of New Jersey is shown here with members of the Nights at the Round Table, signing an Amateur Radio Week Proclamation. Identified (clockwise) are Roy J. Eise, Sr., WA2IGO, "Nights" President; Lloyd Gardiner, K2PSW; Thomas S. Digman, State Director of Civil Defense; Edward Phillips, K2TZC, and Elliott Hall, WA2PII. The Proclamation paid tribute to the 80,000 licensed amateurs who provide communications for Civil Defense, handle traffic and further the technical advancement of radio design, construction and experimentation in all its phases.

K2PFC, "Have camp trailer with 1250 watt generator. Plan to hit hilltops of many 'rare' New York counties using CHC frequencies 7030 and 14065. Would like to hear from all with requests for the 'rarest' ones so we may plan trips this fall and coming spring." (Suggest send s.a.s.e.)

W5VSQ. "Cliff, I'm operating 14300 s.s.b. mobile almost daily and passing through around seven 'rare' counties in S.W. part Louisiana. Circumstances and time permitting, will also work c.w. on CHC frequency of 14075. Operations usually start around 1400 or 1500 GMT." For further info send him s.a.s.e.

Roger, WAØAWZ, ". . . located in Lake County, Minn. and two in family working 3820. 14305. Glad to help any County Hunters seeking Lake County."

Jerry, W2KXL, "Clif, thanks for USA-CA making my QSL sought after by DX stations. Three out of four contacted ask me for name of my county and want to swap QSLs. You weren't just talking when you said the USA-CA has the DX beams of the world now turned toward the U.S.A."

Jim, WAØDSG, "Cliff, add my word along with the many we know you get from other members of the Armed Forces in appreciation that USA-CA has no date, call or QTH restrictions. Many awards programs penalize those of us who in the service of our country are forced to frequency change QTH. We now can join the USA-CA Program and work for something worthwhile."

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

USA-CA Achievement Program & Rules

The basic USA-CA achievement award is issued for confirmed contacts with any 500 different U.S. Counties, and with achievement class seals for each add'l 500, and with a trophy for all 3078 counties. Original applications *must* be in form of a *USA-CA Record Book*. This 108-page book, available *only* from *CQ* at $1.25 each, contains state/county maps of all 50 U.S. states; has counties alphabetically listed by states, and has provisions for required log data. Two *Record Books* are suggested; one for your own master record and file, and the second to be used in application. Supplemental lists may thereafter be used in application for higher class seals. For complete USA-CA Program and Rules, refer to each November issue of CQ Magazine.

Captain W. A. McGuinness, USN, Commander, Submarine Squadron Twelve, Key West, Florida, presents John "Jack" Frye, WA8DFF, Dayton, Ohio, with number one "Radioman Submariner" award for working the Squadron's submarines on amateur radio frequencies. *(Official Navy Photo).*

Michigan Adds Realistic Counties Award

The Muskegon Area Amateur Radio Council announces sponsorship of a realistic Michigan Counties Award, MCA, for confirmed contacts with 23 of Michigan's 83 counties. Endorsement seals for working 53 and all 83. Also special endorsement seals for working 23 Michigan counties with Mobile stations, or working 23 Michigan counties while operating Mobile. No other endorsements available. No limitations as to date, band or mode. USA-CA Rules apply. To get award, send GCR alphabetical by county list showing full log data. W/K stations send handling fee of $1 or 10 IRC; DX stations send 50¢ or 5 IRC to Awards Manager, "Otts" Beyer, K8CIR, 15426 Comstock, Grand Haven, Michigan 49417.

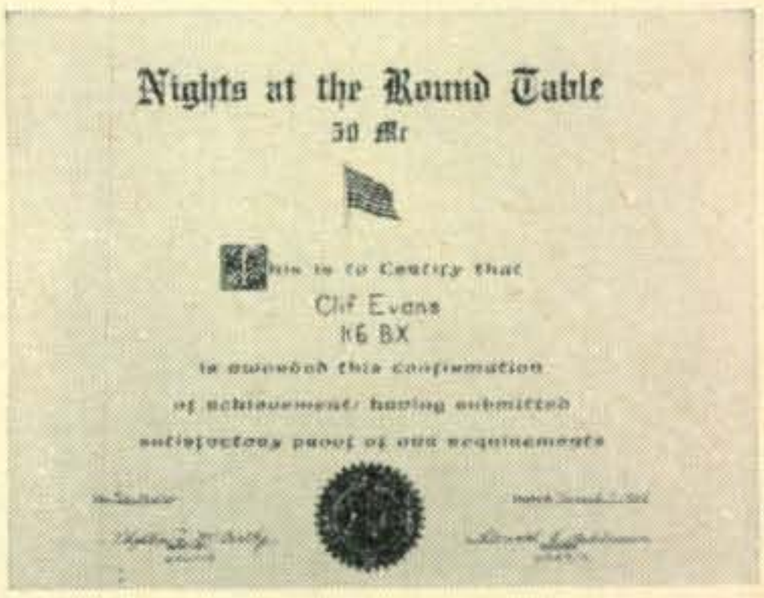
Nights At The Round Table

A distinguished group of New Jersey hams have organized a club called the Nights at the Round Table, with purpose of promoting increased operating skill and bettered public relations through a sponsored awards program. Just recently the group requested and received a New Jersey Amateur Radio Week Proclamation from Governor Richard J. Hughes of New Jersey.

Requirements of the "Nights" award are: Work 12 members if located within 25 air miles of city of Newark, N.J.; if between 25 and 100 air miles distant, work 8; and over 100 miles distant, work 3 members. All contacts after November 1, 1963. No charge. Submit application with QSLs. Roy J. Eise, Sr., WA2IGQ is President.

A Navy "Well Done" To WA8DFF

Submarine Squadron Twelve ARC, Key West, Florida, threw a "Well Done" party for "Jack" Frye, WA8DFF (and his XYL), first amateur to qualify for the "Radioman Submariner" certificate sponsored by the club. (See pic story on award in August 1963 column.)


Nights at the Round Table

30 Mr

This is to Certify that

Clif Evans

K6 BX

is awarded this confirmation

of achievement having submitted

satisfactory proof of our requirements

Pictured here is an award for working members of the "Nights at the Round Table," sponsoring organization.


Royal Naval Amateur Radio Society

Proficiency Award for International Morse Code

Secretary

Here is the Royal Naval Amateur Radio Society "Proficiency Award for International Morse Code." The headquarters station of the RNARS, G3BZU, transmits code proficiency signals on the first Tuesday of each month at 2000 GMT on 3550 kc, at speeds of 20, 25, 30, and 35 w.p.m. for period of three minutes each speed. Send entries with two IRC to RNARS (QRQ) Test, H.M.S. *Mercury*, Leydene, Petersfield, Hants, England. Word received is that a code speed of 40 w.p.m. will be added. The RNARS sponsors the "Mercury Award" for working members of the Society. For info on this award send s.a.s.e. to K6BX.

The Navy V.I.P. treatment extended to the Frye's consisted of two days lodging at the beautiful Howard Johnson Motel in Key West, a dinner banquet attended by all local amateurs and their wives at which Jack was presented his number one certificate and beautiful ship plaques of the two submarines he worked. On second day Jack was taken on tour of the Submarine Tender USS *Bushnell* (AS-15), commanded by Captain Harvey J. Smith Jr., USN, and the submarine USS *Threadfin* (SS 410) commanded by LCDR. William A. Kiehl, USN. He was lunch guest of Commodore McGlinness, USN, Commander Submarine Squadron Twelve. The President of the Key West ARC, Don Hanaford, WA4PJW also presented Jack with the Conch Net Certificate earned for contacts from Jack's home in Ohio. (See Conch award in March, 1962 column.)

Several other events were on the Frye's program; however, the above is evidence that Submarine Squadron Twelve ARC also rates a "Well Done" for outstanding support of amateur radio and the Navy's public relations.

What's Cooking Department

No doubt about it . . . from the flood of letters and newly sponsored awards, many clubs are

[*Continued on page 96*]

YL

LOUISA B. SANDO,* W5RZJ

25th Anniversary Quadrennial YLRL Convention

Columbus, Ohio, June 19-21

1964

In the summer of 1939, responding to a letter from W7FWB (now K4LMB) published in *QST*, 13 YLs under the leadership of W9NBX (now W6UXF) as president, founded the Young Ladies Radio League. Now, 25 years later, YLRL has celebrated its silver anniversary and its growth to nearly a thousand members. Its 25th anniversary was the theme of YLRL's 4th International Convention held June 19-21, 1964 at the Nationwide Inn, Columbus, Ohio, sponsored by the Buckeye Belles.

Never before had so many YLs gathered in one place to exchange "eyelash QSOs" for the conventional kind. Total registration reached 165 licensed YLs, plus 6 guests. Every U.S. call area was represented, with YLs from 25 states, plus Canada and Guatemala. What a heap of writing it took to autograph each other's programs, and what a fine way to get acquainted with everyone!

Throughout Friday and on Sat. A.M. YLs registered with K8UKM, Zip, in the lobby of the Inn, received their I.D. badges and buckeye souvenirs. On display here were the beautiful bed cover, pillow cover and tablecloth assembled by K8ITF, Marge, from the squares embroidered by members of YL clubs and others. Marge received 20 squares from DX lands (used in the tablecloth) and 47 from stateside YLs which she used with several girl-on-the-globe, YLRL diamond and Buckeye Belle squares to complete the bedspread and a pillow cover. Also here were bulletin boards with QSLs, congratulatory messages and copies of early anniversary issues of *YL Harmonics*. Many YLs were soon exchanging "swap souvenirs" made especially for the occasion.

Meanwhile in the hospitality room station W8YL was on the air. Licensed as a special events station, W8YL was in operation for one week with W8NAL, Carmella, as trustee. Operating on 2, 6, 10, 15, 20, 40 and 80, it consisted of a TR-3 and Clegg 99'er, courtesy of Universal Service Co., better known as Gibby's. Special QSLs were issued for W8YL. In the hospitality room also were the gift shop run by W8WTB, Marilyn, and scrapbooks and albums on display.

YL Forum

On Sat. morning the YL Forum and business session, directed by YLRL President K1IZT, Blanche, was held in the Ohio Ballroom. K9ILK, Fran, gave the invocation, followed by YLRL Welcome Song led by W8LGY, Ruth, and K9QGR, Hazel.

For the first time in the history of YLRL all current officers were present at the gathering. Many matters concerning YLRL were discussed, such as the membership drive, why members drop out, financial statement, need for increased dues, possibility of dividing the treasurer's work into that of receiving and disbursing treasurers, *YL Harmonics*, and whether a certified statement could be substituted for actual QSLs for the various YLRL certificates (there was an almost unanimous expression in favor of continuing to require QSLs).

The possibility was discussed of updating our book *CQ YL* by the addition of pages, or entire chapters, and all were in favor. K4LMB suggested YLs present donate $1 toward the printing expense and within minutes she had collected $100—enough to print 4 supplemental pages for the book! When these are available (probably by November) copies will be mailed to each YL attending the convention; others may receive them by request.

For the first time in its history all of the current officers of YLRL were at one gathering. The 1964 officers are, l. to r., K7MRX, secretary; W6QYL, vice president; K1IZT, president; K5YIB, treasurer; K1EKO, editor of *Harmonics*. (W5IWL photo).

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

Presidents of YLRL, l. to r., front row: W1ZEN, 1962; W6UXF (ex-W9NBX), 1941-42; K1IZT, 1964; W7NJS, 1958; W6DXI, 1960. Standing: W8DUV (ex-W4BLR), 1959; W3PVH, 1957; W7HHH, 1952-53; W3CDQ, 1944-45; K4LMB (ex-W7FWB), 1939-40; K5BNQ, 1961; W6CEE, 1954-55. *(W8BTW photo).*

W3CDQ (center) is congratulated by convention chairman K8MZT for holding her amateur license continuously since 1922. At left, K8PXX, president of Buckeye Belles, hostess club for the convention. *(W8BTW photo).*

W6UXF (ex-W9NBX), left, receives from K4LMB (ex-W7FWB) a certificate granting her life membership in YLRL. This was an historic occasion for though they were co-founders and first officers of YLRL and in frequent contact throughout the 25 years of its existence, this was the first time these two YLs had actually met in person! *(W5IWL photo).*

Luncheon Program

At 1:00 P.M. Sat. the YLs again gathered in the Ohio Ballroom for the YLRL Luncheon, MC'ed by convention chairman, K8MZT, Shirley. Each table was decorated with lovely centerpieces created by the Cleveland area YLs, under chairmanship of W8WRJ, Carol, and there were "goodies" for each YL (as there had been at the Forum also).

Several years ago life membership in YLRL was presented to K4LMB (ex-W7FWB) as founder of YLRL. Now Shirley announced life membership in YLRL was awarded to each of the other YLs who had responded to Ethel's letter in *QST* and became the founding group: W6UXF, Enid (ex-W9NBX); W4JCR, Anita (ex-W8TAY); W6NAZ, Lenore (ex-W9CHD); WØUA, Loretta (ex-W9UA); W1GQT, Lida; VE2HI, Ethel; W7GXI, Marjorie; K4UBF, Mary (ex-W8SBB); W6WSV, Carol (ex-W9WWP); W5HYF, Jean, and W6RGX, Genevieve. Each of these founding members also received a lovely ceramic plaque mounted on wood created by W8AWS, Yvette.

Taped Messages

An outstanding event of the convention was the taped messages from original members of YLRL. Their comments had been recorded by W6NAZ, Lenore, and her OM W6MSC, with appropriate background notes and music. Though they were at the convention in person, comments were taped from K4LMB and W6UXF. Enid recalled the winter nights in N. Dakota (as W9NBX) working 80-meter c.w., handling traffic from the Byrd Expedition, and QSOing her future OM, W6ZB. WØUA commented on the years of code practice she and her brother, W9BSP, transmitted and of how when she was licensed 40 years ago there were only about a dozen YLs in the entire country. W4JCR, who was P/C from 1939 through 1945 as W8TAY, and kept YLRL together throughout the WW II years, commented that there was no YLRL treasury back in 1939-40; dues were only 25¢ and they depended on donations to keep *YL Harmonics* going. VE2HI told of how she was teased into getting her license. W7GXI commented that she was the first YL to join the armed services and W1GQT said she had been on c.w. ever since 1933. W6WSV, who was first V.P. (as W9WWP) recognized the increased work and problems for officers with YLRL's tremendous growth. W6NAZ (ex-W9CHD) expressed appreciation to all who have carried on YLRL through the years. "You and yours will continue to bring understanding to all peoples in the world while at the same time you find your own happiness."

This FB tape recording was received with a standing ovation, and it is our feeling that it should be preserved to be played at all future YLRL conventions.

The YLs present who had held licenses for

the greatest number of years were recognized: W3CDQ, Liz, 1922; W8NAL, Carmella, 1934. The 11 past presidents of YLRL in attendance were recognized, as were the current officers, YL editors K1IJV, Jean, and W5RZJ, and W2-OWL, Ruth, continuous membership chairman. Each was presented a handsome name-call plaque for desk or rig. Each of the convention committee members was recognized similarly and then each YL, by district, was called upon and received a name-call pin.

Prize drawing was held again and the Clegg 99'er went to the mother of K1GSF, Peggy.

YL-OM Banquet

Sat. evening the YLs, many of them accompanied by their OMs (who earlier had toured the Center of Science and Industry), gathered again in the Ohio Ballroom for the banquet. K8MZT was our genial MC and immediately gave credit to the OMs by commenting, "Behind every YL there is a good man!" (Well, almost every YL, Shirley.)

K4LMB presented W6UXF with a life membership certificate in YLRL, and K8MZT presented one to Ethel, as founder of YLRL. Similar certificates will be mailed to all founding members. Shirley read a letter from W6WSV, first V.P., and announced that W9RUJ, formerly so active in ham radio, could be addressed at the Geriatrics Hospital, Bartlesville, Okla.

For the first time in YLRL history prize for high score in a YLRL contest could be presented in person. This was made by V.P. and Activities Manager W6QYL, Martha, to KØEPE, Marte, for her high score of 99,090 points earned in the 1964 YL-OM contest.

Unknown to chairman K8MZT a late arriving embroidered square from the Portugal YLs had been made into a pillow by K8ITF, and this was presented to Shirley by W8LGY, Ruth, co-chairman of the convention as a special memento of the event.

Speaker for the banquet was Enid Aldwell, W6UXF, co-founder of YLRL. Enid, who spoke to us on "CQ Happiness," is a staff member of the Parker Foundation of Human Relations, co-author with Dr. Wm. Parker of the book *Man, Animal and Divine*, and is working on another book of her own. Enid explained that no person can stand still, but must grow and change and find himself in relation to other people. We must first be honest with ourselves about our own feelings and then be willing to accept others as they are without wishing to change them. Enid summed it up thus: "Life is a gift; we should live so that we and others around us can move comfortably in our environment. *Today* is the most important day in our lives . . . this moment!"

Now is was time for prizes . . . and thanks to K8PXX, Toni, prize chairman and her committee, there was one for every single YL present. Excitement mounted as the ticket for first the pillow cover of embroidered squares was

Convention co-chairman W8LGY, left, presents chairman K8MZT with the pillow covered with the square embroidered by the Portugal YLs as a special memento of the convention *(W5IWL photo)*.

A "Martha to Martha" award—W6QYL, left, presents to KØEPE the gold cup for top score in YLRL's 1964 YL-OM Contest. *(W5IWL photo)*.

QSL issued for contacts with W8YL, special events station in operation during the week of YLRL's 25th Anniversary Convention.

drawn, won by K8NQD, Helen, then the tablecloth of DX squares, won by WA9ENB, Frankie. Finally came the ticket for the bed cover, and to the delight of all it went to K6KCI, Irma, of Santa Barbara.

Other special prizes were a tablecloth from the Portland Roses, won by W7GGV, Helen, and a bag containing 50 silver dollars from the Colorado YLs, won by W9ILK, Fran. KØEPE, who brought the silver dollars, said the club members had earned the money by holding raffles at meetings throughout the past year.

It was the recommendation of the YLRL officers that the next YLRL convention be held in 1969—to celebrate YLRL's 30th anniversary, and the officers will be open to bids from any YL clubs wishing to sponsor it. From the special gleam in KØEPE's eyes we suspect that Marte and the other Colorado YLs might offer to be our next hostesses. . . .

On Sunday the Buckeye Belles were hostess to the YLs and their families who wished to stay for a noontime brunch in the Ohio Ballroom before heading for home QTH or further vacationing.

To K8MZT, chairman; W8LGY, co-chairman; W8OTK, business manager, and to all their convention committee members, sincere thanks from all for a tremendously successful convention! Enjoying it all were these YLs:

W1's HOY, UKR, YWT, ZEN; K1's EKO, GSF, IIF, IJV, IZT, LCI, LTN, WZY; W2's EEO, OWL; K2OEW; WA2UAB; W3's AVN, CDQ, GTC, PVH, TNP, UTR; K3's HZY, LHH, NLU, TNL; W4's ARC, BAV, BWR, DEF, HLF, TVT, ZDK; K4's EAM, LMB; WA4's FEY, FJF; W5's RZJ, ZPD; K5's BNQ, JFJ, YIB; W6's BDE, CEE, DXI, QGX, QYL, UXF; WA6BJB; W7's GGV, HHH, NJS; K7's BED, MRX.

W8's ATB, OTK, UAP, DUV, WRJ, FHL, EIR, RZN, LGY, NAL, WUT, HAV, HUX, HWX, EFB, VMY, RVP, ETT, WRJ; K8's CEN, MZT, NQD, TVX, WZF, OMC, ZWY, PXX, LMA, ITF, RZH, GWF, YFB, VUR, VJH, VCB, LHF, VMY, MKG, VBO, ZHP, HDO, MQB, OMH, HDG, DPB, ZNC, PAM, QBU, NOI, TWW, RZI, LHX, QEI, UKM, PSZ, DMU, CKI; WA8's ARJ, GPO, CJP, EKQ, DZL, FGX, FSX, ALT, AWS, FGW, CXF, EBS, AHU, JCF, IAQ, IJW, HWL, BBG, WTB, DWL; WN8's ELE, KON.

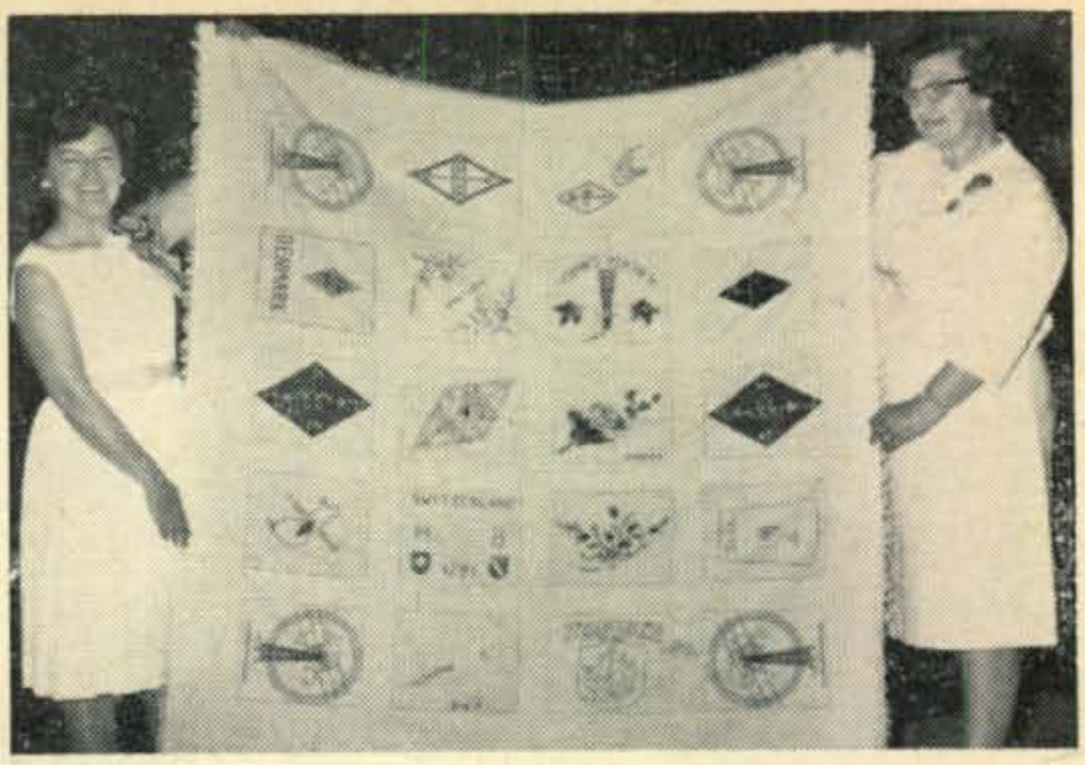
W9's GJB, SJR; K9's HCY, HGY, ILK, IWR, QGR, TCM; WA9's BMI, CNY, DKN, DUV, ENB; WØHJL; KØ's BTV, EPE, GZO, KHR, ORH, RGU, WEN, WGL; WAØ's BGD, BJC; VE3's DGG, DXZ; TG9BC. (Plus W9AYX and K8's DHF and VWW who had registered but at the last minute were unable to attend.)

For your column editor it was an especially enjoyable occasion—not only the convention and the chance to renew so many friendships as well as make new ones, but the opportunity for the W5RZJ family to continue a vacation trip that included Washington, D.C., New York and the World's Fair, three weeks with relatives in Massachusetts, a stop at Niagara Falls and with VE3DTW and VE3TW on the Welland Canal, as well as visits with other friends en route home.

YLRL "Howdy Days"

"Howdy Days," a get-acquainted fun contest for licensed YLs, will be held Tues. through Thurs., Sept. 22-24, 1964. Here are the rules:

STARTS: Tues. Sept. 22, 1964, 1200 EST, ENDS: Thurs. Sept. 24, 1964, 1200 EST.



The tablecloth made of squares embroidered by the DX YLs and put together by K8ITF, was won by WA9ENB (right); KØORH helps hold it. *(W5IWL photo).*

These YLs, gathered around W8YL, made a trek to TV station WBNS for a special program viewed at 2 P.M. Friday. L. to r., K8GWF, whose station was shown in QSO during the TV show; W8LGY, convention co-chairman; WA8ARJ, and TG9BC. Standing, VE3DGG and W7GGV. TG9BC and her OM, TG9BM, have lived in Guatemala for 6 years. She has been licensed for 2 years, is QSL Mgr. for CRAG, the TG radio club of 150 active hams. Corinne likes to make tape recordings describing the arts and crafts in Central America which she circulates via the mail in a round-robin especially to handicapped persons. *(W8BTW photo).*

Pictured at the YL Forum, the three gals who report YL activities for their respective magazines, l. to r., K1EKO, YL Harmonics; W5RZJ, CQ; K1IJV, QST. *(W2EEO photo).*

These YLs pictured at the convention are members of the QCWA. L. to r., W8NAL, K4LMB (ex-W7FWB), and W3CDQ. *(W8BTW photo).*

These YLs are the only ones who have attended each and every one of the four International YLRL Conventions held to date. L. to r., W6CEE, W3PVH; standing: W6QGX (who flew in at the last moment for this one), and W5RZJ. The prior conventions are Santa Monica, 1955; Chicago, 1957; Cambridge, 1960. *(W8BTW photo).*

K8ITF (left) and W8LGY hold the main YL prize, the bed cover designed and put together by K8ITF from squares embroidered by YL club members and others throughout the U.S. Lucky ticket was an absentee one held by K6KCI. *(W5IVL photo).*

1. Score based on licensed YL contacts only. 2. All bands and all modes of emission may be used. 3. Only one contact with each station will be counted. Contacts on nets do not count. 5. No multipliers. 6. Contest opens 1200 EST Tues., Sept. 22, 1964, and closes 1200 EST, Thurs., Sept. 24, 1964. 7. Scoring: 2 points for YLRL member; 1 point for non-YLRL member. 8. Logs not required; submit a list stating date, time, call, name, QTH and whether or not YLRL member. 9. AWARDS: Top score YLRL member—choice of pin, charm or YLRL stationery; top score non-YLRL member—1 year paid membership in YLRL. 10. Score sheets must be received by Oct. 15, 1964; Submit to Martha Edwards, W6QYL, 44303 No. Date Ave., Lancaster, Calif.

25th YLRL Anniversary Party

YLRL's 25th Anniversary Party will be held on the following dates: C.W.—Oct. 21, 22, 1964; Phone—Nov. 4-5, 1964. Reserve these dates on your calendar; rules will be published in the next issue of *CQ*.

33, W5RZJ

Harvey Sampson Dies at 56

THE founder and president of Harvey Radio Company, one of the busiest ham distributors in the east, died recently in New York. Harvey E. Sampson was stricken with a heart attack in his automobile in Syosset, Long Island.

Mr. Sampson opened a small store of his own in midtown New York in 1927 with $1,000 that he had saved by working for four years at various retail radio stores. From this modest beginning, Harvey Radio grew to the point where in 1964, the corporation reported first quarter sales alone near $2 million. His store in New York City is now a mecca for amateur radio and high fidelity enthusiasts.

He was a native of Jamaica in the British West Indies and came to the United States with his parents at the age of 10, to live in Brooklyn, New York. Mr. Sampson resided in Massapequa, Long Island, and is survived by his wife, Betty, and two sons; Harvey Jr., and Paul, both associated with the electronics concern.

NOVICE

WALTER G. BURDINE,* W8ZCV

As the number of amateur radio operators increase, we must out of necessity develop better operating habits to conserve our frequencies for the most efficient use. Our numbers are increasing rapidly. Here in W8-land it took thirty odd years to go through the alphabet the first time, about six years to go through the second time and in about two years we are starting on the N section of the alphabet. Many call areas have completed the WA and WB segments and are now ready for the WC? series. I was the first licensed ham in Waynesville and we now have about twenty hams here, this is indicative of the growth of our hobby. Amateur radio is really growing. Are we keeping up with our operating and technical advancement? Can we improve our signals so that we may have enough space in our frequency spectrum for those signals? Will we need to develop new methods of communications to be able to use our bands efficiently?

Just how many stations will our bands contain? Must we resort to more exotic methods of transmissions than ssb to conserve our space? Can some of our engineering grade amateurs develop some method of pulse-time or pulse-gate modulation for transmission and the companion receiver for ham use. This might be the solution to part of our problems concerning frequency spectrum.

Many years ago I heard a Mr. Knight talk on the subject of pulse transmission and pulse time modulation. He stated that it might be possible for many amateurs to use the same frequency at the same time without interference. He explained that we could run high peak power with a small tube, due to the short duty cycle with pulse transmission, and that we could also modulate the transmitter the same way and build a high power rig with only small tubes. I have often thought of this when hearing the amateur signals on the low frequency bands and at times of openings on the high frequency bands. This would make our equipment more complex, but then, the amateur has always had the ability to simplify and improve any method of transmission adopted by our fraternity. Mr. Knight's problem seemed to be stability of the gate signal, why not use the standard transmitted signal from WWV for all gate frequencies. Almost everyone can receive WWV and their frequency is stable enough for this purpose.

Why bring this up in the Novice column? This column is written for both the novice and the Technician license, but many others read this as is proven by the letters reecived. The class of license held has little significance to the technical abilities of the holder, I know many broadcast operators with technician licenses. I was just planting an acorn to see if we could grow an oak.

Limited Space Antennas

Many letters are received asking how it is possible to operate in residences where it is forbidden to erect an outside antenna. Where there are space problems, permitting the erection of an antenna, how do you operate within the confines of an apartment? How can we operate in a trailer when on vacation, where we do not aim to stay more than a few days and don't want to take the time to erect a permanent type antenna?

I do not intend to try to help you hide an antenna from any landlord that doesn't want amateur operation from his property, but just from those who don't want their property cluttered with wires and towers strewn around the place. Many do not mind the operation if it is done without cluttering the property with antennas. This can be done with some loss of efficiency but if the antenna is correctly installed it may work better than some antennas using plenty of space.

Some of the ideas, picked up on the air, and by reading many of the magazines devoted to the subject, will be shown and discussed here. Read any good antenna handbook for more complete ideas and full information data.

I often wonder why more people don't take the advantage of the fact that the higher frequencies will take less space for antenna installation. Antennas above 144 mc can be installed in a very limited space. There is enough operation on the two meter band in cosmopolitan areas for any operator. This is mostly a limited distance band, possible 30 miles from the station. We have about two hundred two meter stations in the Dayton area. The two meter antenna described in this column sometime ago[1] has been used in many different ways for portable operation. One antenna was built of Reynolds do-it-yourself aluminum and mounted on a photographic tripod with a pan head for rotation and azimuth positioning. The operator used it on the second floor and was able to work many stations with a Gonset. I use one of these mounted on a Lincoln for good coverage of the band with a rebuilt Gonset. I did not build it for remote rotation, but I have plans to remotely rotate the antenna. It is quite tolerant as to directivity when heading to or from the city.

Halo type antenna such as that used on automobiles can also be used in permanent antenna

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

[1]NOVICE, *CQ*, Dec. '62, p. 68.

Last fall at the Cincinnati Hamfest I was asked by Michael Brooks, W2DQM and Allen Erickson of MGM-TV to help locate a young ham to appear on a TV program to be known as Science All-Stars. I had a little trouble talking Michael H. Shatzlein WA9DUF, Knightstown, Indiana into an interview but he won out amongst the others. Mike says it was the biggest thing that ever happened to him. This picture was taken at the Dayton Hamvention by W8HHS, Doug De Maw.

installations. They work very well due to the added height and the fact that they are stationary. Halos are very reasonable in price and installation. This type of antenna can be used on most any frequency from 28 mc up. They work very well for the space used.

Almost any mobile antenna could be used in a permanent installation with better results than in mobile service. Many mobile installations have worked a surprising amount of DX. This could be the answer to that antenna problem.

Other ideas have been used to solve the antenna problem by utilizing available materials at hand. One enterprising amateur in Kansas used a discarded rural telephone wire for an antenna with good results, it was eight miles long. A vertical antenna was built by suspending a wire in the chimney and using a loading coil to make it the right length. A local ham did very well on 40 meters with the eavespouting on his house. He was able to work about as well as he did with his dipole. Attic antennas have been used successfully in many installations. The aluminum roof on a house was finally accepted as the best antenna that another ham could build, he used it on every band from 80 to 10 meters with an antenna tuner. A suitable antenna tuner must be used with any compromise antenna for best results. The first attempt at using a compromise antenna may not work too well, but keep trying and eventually you will be able to work out.

A very small wire might be used to construct a nearly invisible antenna system for use with about 50 watts or less. It is possible to hide the antenna for some band under the ridge of the roof. It can be inductive or capacitive loaded for use on any bands. I had a 20 foot boom with 16 elements on it for two meters in my attic. It does very but I am unable to rotate the house. It surely is inconspicuous. The leads were brought down through the walls and terminated in a wall plug near my desk.

When roofs or eavespouting is used for antennas be sure that they are bonded together or they might cause rectification and radiate many harmonics and spurious frequencies. Galvanized roofs and eavespouting can be soldered while aluminum must be bolted with aluminum bolts or screws.

It is possible to construct and operate an antenna if you use the right frequency and your old "noodle."

An Antenna Tuner

An easy way to suppress the transmission of harmonics is to use an antenna tuner between the transmitter and the antenna. A properly tuned antenna will suppress most of your "pink-slip" signals and also at the same time give you better signals at the other fellow's receiver. The antenna tuner in fig. 1, will work well with any antenna, not just the compromise antennas talked about in this article.

The unit can be built using either ready wound coils or B&W or Air Dux coil stock. The ready wound stock can be bought from any local radio supply house or from the mail order catalogs. If you operate one band only the construction is simplified. If you buy ready made coils buy the coil for a band higher than the one used and select a condenser of about 4 times the band used, in other words get a twenty meter coil and a condenser of about 150 mmf for operation on 40 meters. Loading can be increased by moving the antenna tap toward the ground. The voltage rating should be at least four times the peak voltage for a good safety factor. The tuner will work with a single end fed long wire or any coax fed antenna. Always use a good ground.

As an after thought did you read about the DDRR low profile antenna in the June, 1964 *CQ*. How about hiding that in the attic? If you don't have that copy better get an order in to *CQ* right away before the supply is exhausted, that one idea is worth the price.

Letters

From Alan Raftery, 13, WIA-L5065, 22 Princes Street, Croyden, South Australia comes our first letter of the month. I am very happy to get letters from other countries especially the young ones. The world of tomorrow will soon fall upon their shoulders to carry and rule, they stand a good chance to improve many things in the future.

"Dear Walt: I am 13 years old, and I have been reading your novice column for quite a time with much interest. I am an s.w.l. and I hope to obtain my ticket when I am 16 years old.

"I have a 9 tube S.T.C. receiver that receives 160, 80, 40, 20, 15 and 10 meters. It works quite well. I have received novices on 80, 40 and 15 meters with the usual 578 signals.

"I mainly listen on 20 meters on which I have heard 111 countries with 15 confirmed.

"I would appreciate you mentioning me in your column as I would like to exchange letters with any novices or short-wave listeners. I do not receive many letters and will answer all received.

"Hoping to hear from you soon. 73 es Best DX, Alan.

"P.S. Do you know of a transistorized 6 meter band converter? Incidentally the VK six meter band is now only 52 to 54 mc, *not* 50 to 54 mc as the P.M.G. have allotted channel Ø from 48 to 52 mc."

Thanks, Alan for the letter and be sure to write again. (International Crystal Mfg. Company, 18 N. Lee Street, Oklahoma City, Oklahoma and Vanguard Electronics Labs, 190-48 99th Ave., Hollis, N.Y. (both *CQ* advertisers) have transistorized converters for sale at very reasonable prices. I have not tried them personally but I understand they are good. *CQ* has published diagrams for a few converters and the transistors can be bought very reasonably from Poly Packs Co., East Lynn, Massachusetts. Good luck with the transistor converter.

"Dear Walt: My signal frequents the 80 and 40 meter Novice bands in order to give the newcomers a chance to work an XE call. I'd like to pass along a few hints to some who didn't read the free operating guide that ARRL sends to all new Novices, or who didn't have a copy of the *Radio Amateur's Handbook*.

"(1) In answering any station, give RST, QTH, Address if you need a QSL and name. *IN THAT ORDER.*

"(2) Working DX on any band at any time—keep it short. Band conditions change and there are usually others waiting to contact him. Don't try to be a "DX King" by hogging the band.

"(3) R.R.R. means I read you 300% but all too often it means I missed your name and QTH. One R is all that is needed.

"(4) BK means break and not back. Use it correctly.

"(5) Let the DX station lead in ragchewing, follow his example, he may be trying to work as many stations as possible. It should not be necessary to ask a DX station what country he is in, use your call-book.

"Walt, that about sums it up. One thing is for certain, in this day of prideless, push-button hams with commercial transmitters and dipole antennas, incentive licensing is not the answer.

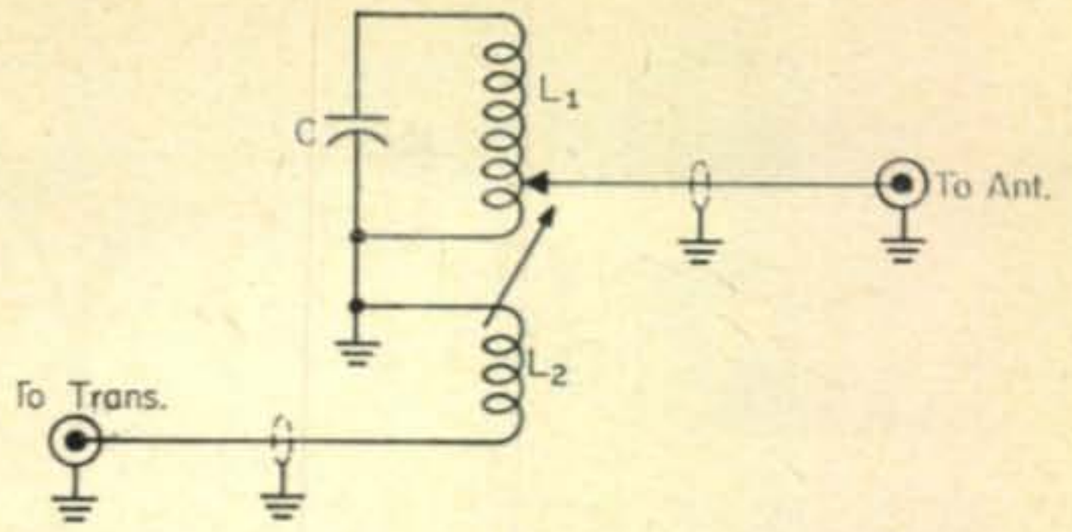


Fig. 1—A simple antenna tuner that will work on all bands. C—is about 4 mmf per meter (example 40 meters —150 mmf). L_1—Should resonate at ½ mesh of the condenser at desired band. The coupling between L_1 and L_2 can be made variable for added convenience.

Pride however might be. The world's biggest problem today is lack of pride, heritage, etc. It's time to start saying "I'm proud to be a good operator and if you think you are a better operator than I am—well buddy you've got to show me."

"Keep up the FB work on the Novice column Walt. You have the responsibility more or less of filling in the gaps left in the Novice's education before their examinations—it's a big responsibility and you're doing a remarkable job. Best DX and 73. Bob Wheaton ex-K8DIH."

"P.S. I'll have to live here for three years before I can become licensed as an XE but my wife is Mexican and can get a license so we will soon be licensed as XE1BOB. We will be looking for you then."

Thanks Bob for the letter and I agree with you one hundred percent.

Help Wanted

Don Carter, Phone 265-7828, 2890 Sand Creek Highway, Adrian, Michigan needs help with code and theory;

Jim Przybyla, R.F.D. #1, Londonderry, New Hampshire needs a local to advise him on equipment and maybe some help with code and theory.

David E. Y. Sarna, 370 Riverside Drive #6B, New York 25, New York, Phone MO 6-2567 would like a little help and some one to give him the test.

Ray Fallen Jr., 14 1082 Woodlawn Drive, Coraopolis, Pennsylvania 15108 blames the novice column for that urge to get a license and says he would like some help with theory.

Thank you for helping all of these fellows and for the help rendered in the past to amateur aspirants.

Well, that just about uses up all my space this month. I hope you didn't get in the poison ivy during field day and that you are just heading into your best DX season on record.

Write your letters to me at home, Waynesville, Ohio.

73. Walt.

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

OUR mail bag frequently is filled with letters asking such questions as, "I just got interested in radioteletype; what frequencies are used by hams?" And, "I just got my converter working; where can I find press stations to copy the news?" And, one of the latest, from a broker-ham: "Broadcast reception is poor out here; how do I set up an RTTY receiving station to copy the stock market reports?" (!) So, "the time has come," the walrus said, "to speak of many things."

First of all let us discuss this business of copying commercials. In case you didn't know it, most Teletype machines are made available to the radio amateur for *experimental* purposes, only. Ok, so you would like to check your set-up on a commercial signal. (Read on; we will tell you how later.) Secondly, most commercial and/or press stations do *not* use emissions which are compatible with those standards stipulated by the FCC in their rules and the amateur standard shift of 850 c.p.s., which is in most general use. They also most likely use baud rates which are different from the 45.45 standard (60 w.p.m.) determined by the machines made available to us. Sure, if the shift is right we can finagle copy of the European 50 baud (67 w.p.m.) by playing with the range finder on the machine, but this is not optimum operation of equipment. Many commercial stations use 75 and 100 w.p.m., too. But *most* significant is the simple fact that most of them do not use single-channel f.s.k.; they are most likely using multiplex (multiple channel transmission) in one form or another; like, narrow shift a.f.s.k. on independent sideband. (There are some such stations who put 16 teleprinter channels on one sideband and voice on the other.)

So, if you are thinking of trying RTTY, plan on it as strictly an amateur radio activity. If you would like to check out a receiving set-up on an f.s.k. signal known to have the right (850 c.p.s.) shift and the right (45.45) baud rate, we suggest that you tune in the Weather Bureau station in Miami on 14,395 kc.[1] The transmit to machines with weather symbols, use aeronautical weather abbreviations, and sometimes use the synoptic code, but don't let that stop you. It quickly becomes obvious whether or not you are getting good copy.

Amateur RTTY Activity

Now, let us take a long look at amateur RTTY activity, band by band. 160 meters, of course, is out. Only A1 and A3 emission is permitted.

80-Meters: Activity here is centered around 3620 kc. On a cold clear winter night many QSO's will be heard from 3605 to 3650 kc. Ordinary contacts are made half across the country, and sometimes from coast to coast. Multipath in the early evening causes errors on short-haul contacts; and, in the summer, particularly in the midwest, the higher noise level reduces activity to a minimum. Most stations on this band use wide (850 c.p.s.) shift.

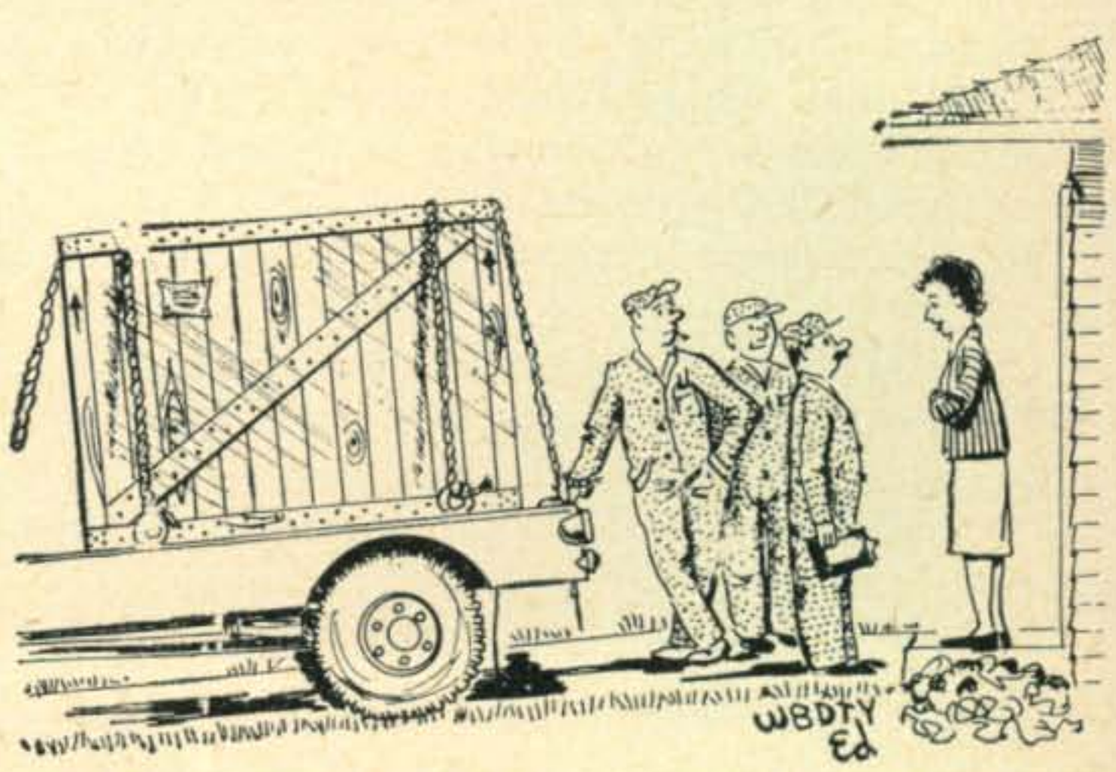
40-Meters: Initially, all activity on this band was centered around 7140 kc, but about a year ago, west coast RTTYers promoted a change in the listed recommended frequency to 7040. The purpose of this was to permit foreign DX stations (who can't use 7140) a better opportunity for U.S. contacts. As the result, 7040 is essentially unused in the east and midwest because of the heavy c.w. activity. Interestingly, east coast activity on 7140 has become almost exclusively narrow (170 c.p.s.) shift. Activity is highest on week ends.

20-Meters: This is the major DX band for RTTYers. Activity is centered around 14,090 kc, with spreading from about 14,075 to 14,100. Some foreign activity exists *above* 14,100, so

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

[1] RTTY Column, *CQ*, Dec. 1960, p. 112.

RTTY The Hard Way...No. 35



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watch for DX under the s.s.b. there. Most stations use 850 c.p.s. shift. Some foreign stations use 50 bauds, but these can be copied by running the range finger down around 20. Many Italians send upside-down, by the way.

15-Meters: Activity on this band is centered around 21,090 kc, and naturally depends upon the vagaries of the band. When open, much DX, like VK and ZL, can easily be worked with low power.

10-Meters: According to the rules, on frequencies 29.0 to 29.7 mc, ". . . radiotelegraph transmissions employing carrier shift or other frequency modulation techniques may be employed." There is almost no RTTY activity on this band except for some localized f.s.k. operation in one city in the midwest.

6-Meters: The recommended operating frequency here is 52.60 mc. Activity is limited in those areas having Channel 2 TV. Both a.m. (A2) and wide-band f.m. (F2) is used with a.f.s.k. as the mode. The standard tones are 2125 c.p.s. *mark* and 2975 c.p.s. *space*. Since 52.525 is the National wide-band f.m. calling frequency for 'phone, RTTY operation with the same rig is a lead pipe cinch — only crystals need be switched. The a.m. stations usually use horizontal beams while the f.m. stations usually use vertically polarized omnidirectional antennas.

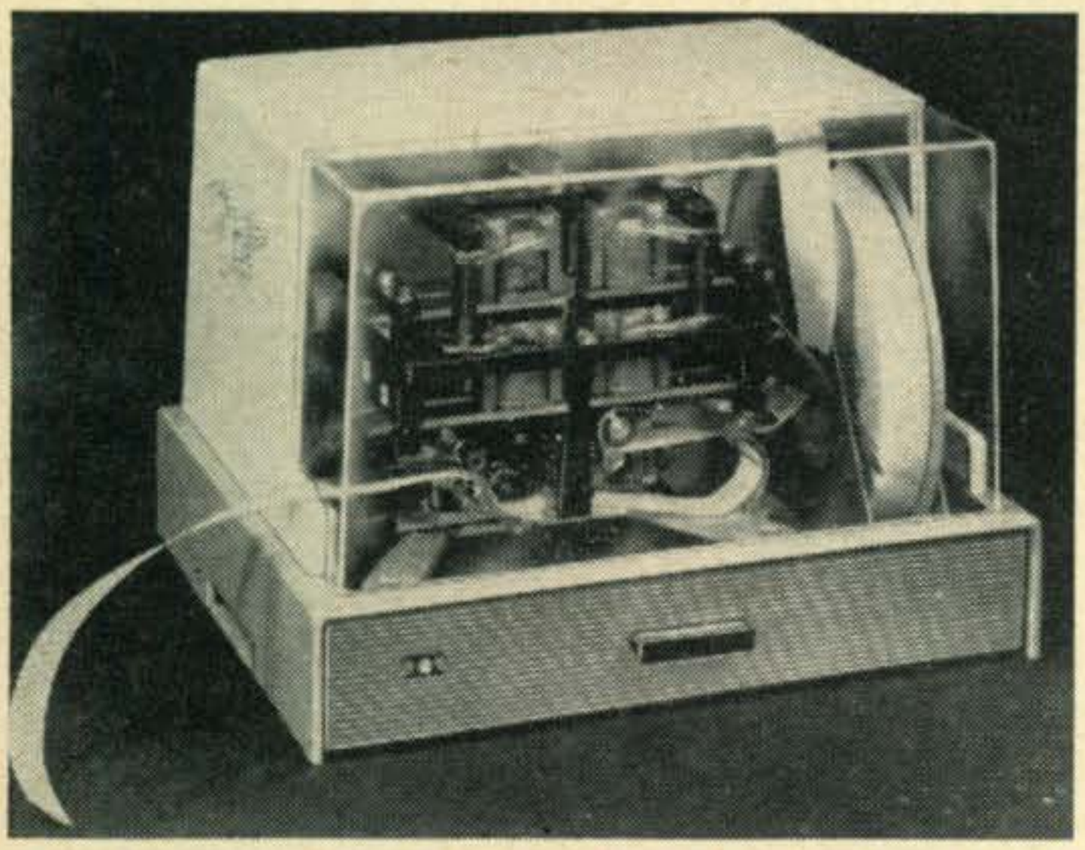
2-Meters: The recommended operating frequency here is 146.70 mc. Activity is most high in metropolitan areas. Both a.m. (2) and wide-band f.m. (F2) is used, with a.f.s.k. and the standard tones. Autostart is the "cool" operation. Since 146.94 is the National wide-band f.m. calling frequency for 'phone, RTTY operation with the same rig is readily possible just by switching crystals. Like on 6-meters, the a.m. stations usually use horizontal beams while the f.m. stations use vertically polarized omnidirectional antennas.

Narrow Shift

In the early days of RTTY only 850 c.p.s. (plus or minus 50) shift was permitted by the FCC. Now, although any shift less than 900 c.p.s. is legal, most general operation still uses 850 c.p.s. Narrow shift is on the up-swing, though. Although there is some experimentation with very narrow values, most "narrow shift" operation is in the order of 150 to 200 c.p.s., with 170 c.p.s. as the target value. (The 170 is a standard commercial value.) The advantages are pretty obvious. Less QRM, better signal-to-noise ratios, etc., accrue when we narrow down receivers as well as transmitters.

Narrow shift operation takes place largely around 7140 kc, as we said above, however, we notice more and more on 20 meters. Copying it we discover that it is the traffic handlers and others working scheduled circuits who are using it. The best example is the good ship Hope, working K8DKC and WØJRQ from Ecuador.

If you want to work narrow shift, the best bet is to build a narrow shift TU, such as the W2JAV transistor job described in the September '63 and June '64 issues of *CQ*. Don't let the printed circuit board scare you off. After much effort (Project Despair II), we obtained a supply of boards *and* connectors. These are available at $2.50 each, postpaid, with connector. Send check or money order, made out to me, to the Huntington QTH at the head of this column. *Do not send cash*. By the way, we cannot export.



Something unlikely to be available for amateur RTTY, but which may eventually make Model 14 and Model 28 tape gear more available, is the Teletype Corporation's DRPE high speed tape punch. This new unit operates at any speed up to 200 characters per second on parallel-wire signals and features a new tuned reed principle for punching tape.

On the Bauds

W1KAY of Westport, Conn., is on 20. W1LN worked /1 from eastern Massachusetts for Field Day. K1ODH of Georgetown, Conn., has a Model 26, a Twin City TU, and an HX-50, and is building a tuning fork standard. K2MWN of Jamaica, Long Lsland, near the J. F. Kennedy Airport, is on 80 meters.

WA4SQU works 20 meters. K4ALA of Goldsboro, N.C., has a TG-7B (military Model 15). WA4GTA of Portsmouth, Va., uses tape on 20. K5QBU of Edgewater Park, Miss., runs 150 watts to a DX-100 on 20 and has a supply of 50 pounds (8 miles) of tape, all red. K5PJB of Comanche, Texas, also works 20.

W6DTN of Studio City, Calif. (also Chief Operator on the Monterey), is looking for a 50 cycle synchronous motor for a Model 15. Bob is also looking for a 500K ohm miniature pot for the W2JAV narrow shift transistor TU. W6DRV of Chatsworth, Calif., is also building the W2JAV narrow shift TU. W7VKO of Phoenix, Ariz., needs 10 for his RTTY-WAS and is trying on 20; with narrow shift, too, sometimes.

W8ZND of Detroit, Mich., is looking for toroids. *(Suggest Toroid Kit, $5 from KCM, Box 88, Milwaukee, Wisconsin. Kit includes toroids, capacitors, and hardware for input filter as well as channel filters.)* K8DKC of Ann Arbor, Mich., has an Electrocom FSC-250 for sale. K9POU of Batavia, Ill., uses tape with a 100-V and a 51J-3 to work DX on 20. W9HXW is President of the Illiana Teleprinter Society. WØKUJ of St. Louis, Mo., has a 14 typing reperforator and is

[*Continued on page 90*]

HAM CLINIC

CHARLES J. SCHAUERS,* W4VZO

Now that Public Law 88-313 (88th Congress—S-920) is operative, let us all hope that our State Department will lose no time in making the necessary bilateral arrangements to permit U.S. hams to operate in selected foreign countries.

Through reciprocal operations, international goodwill shall be enhanced, ham radio technology improved and there will be greater opportunity for hams to contribute to the public welfare.

The next big step is of course to lower tariffs on ham radio equipment in every country permitting amateur operation and especially those which will have bilateral operations agreements with the U.S.

Here is one other thought: we sincerely hope that the customs people of all the nations (including the U.S.) will be advised of PL 88-313 and that red tape will be cut to a minimum for the ham moving his equipment from country to country.

Observation

The American radio amateur cannot be hoodwinked for long. Once he gets "burned" in any deal he is twice as wary. This applies to equipment, clubs, associations etc. Once he is taken dishonestly he rebels (and rightly so).

When he feels someone (or a group) considers him stupid, his feathers ruffle and sometimes he counterattacks emotionally—and this *is* wrong.

Let us all hope that the present "cold war" now existing between some hams and some groups of hams subsides and that dignity will prevail. If we "fight" among ourselves when we have but one goal in mind, i.e., preservation of our hobby, we stand to weaken our cause.

So let us pull together and steer away from those who pretend they have your welfare at heart but actually are out for cheap publicity or the buck.

Tech tips for techs

If you are one of the many who have purchased those little Japanese pocket transistorized tape recorders, remember that by using ½ mil tape you can more than double the playing time of a 2" reel. Also, you can install a plug-receptacle arrangement to feed the recorder with a group of higher powered batteries when you are at home. Of course, on the road you use the regular batteries installed within the recorder case.

Apartment Doublet—By mounting a doublet antenna (cut to the band) on top of an apartment building and following the square (or triangular) contour of the building makes a most neat installation. Regular TV screw type stand-off insulators are used on the corners of the building to raise the antenna high enough for fair performance.

CRT Monitor—Some hams have used the small 1" 1CP1 cathode ray tubes for monitoring transmitter operation. These CRTs are mounted on the front panel of the transmitter. Voltage for operation is obtained from the low voltage portion of the set. However, some hams complain that they have encountered hum traces and have attempted to shield the tube with tin foil—this will not work. If hum is introduced into the tube directly from electromagnetic fields from transformers etc., it is necessary to use a shield such as *Millen's* Nicoloi shield. This is a special CRT shield and is very effective.

Multi-Scale Dial Calibration—Many hams do not know that a regular printing establishment can print your calibration figures (frequencies, bands etc.) on the plastic dial faces of your multi-scale dials. It costs a little more but is worth the effort. All you need do is to furnish a template cut to size with the figures marked on it with a ballpoint pen—the printer will do the rest.

Questions

Electro-Glass Mounting Strips—"Where can I buy electro-glass mounting strips?"

Try Allied Radio Corp.

Transistor Product Detector—"Can you publish my request for a transistor product detector circuit for s.s.b. operation? I've looked through all literature and have found none specifically for s.s.b. operation. I of course want one which will be simple and work effectively."

Take a look at *QST* for November 1963. Any reader offer a better one for publication here?

Commercial Transistor AF Amplifiers—"I'm looking for two pre-packaged af amplifiers having an output of 150 to 300 milliwatts. Where can I buy these?"

Try Lafayette Radio they have exactly what you want.

Transistor Patents—"I am interested in finding out what transistor circuits have been patented in the U.S. What are my best information sources?"

The U.S. Patent Office's official gazette and drawings of patents issued by the U.S. Patent Office (available through the U.S. Govt. Printing Office) will give you the information you seek.

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*c/o *CQ*, 14 Vanderventer Ave., Port Washington, L. I., N. Y.

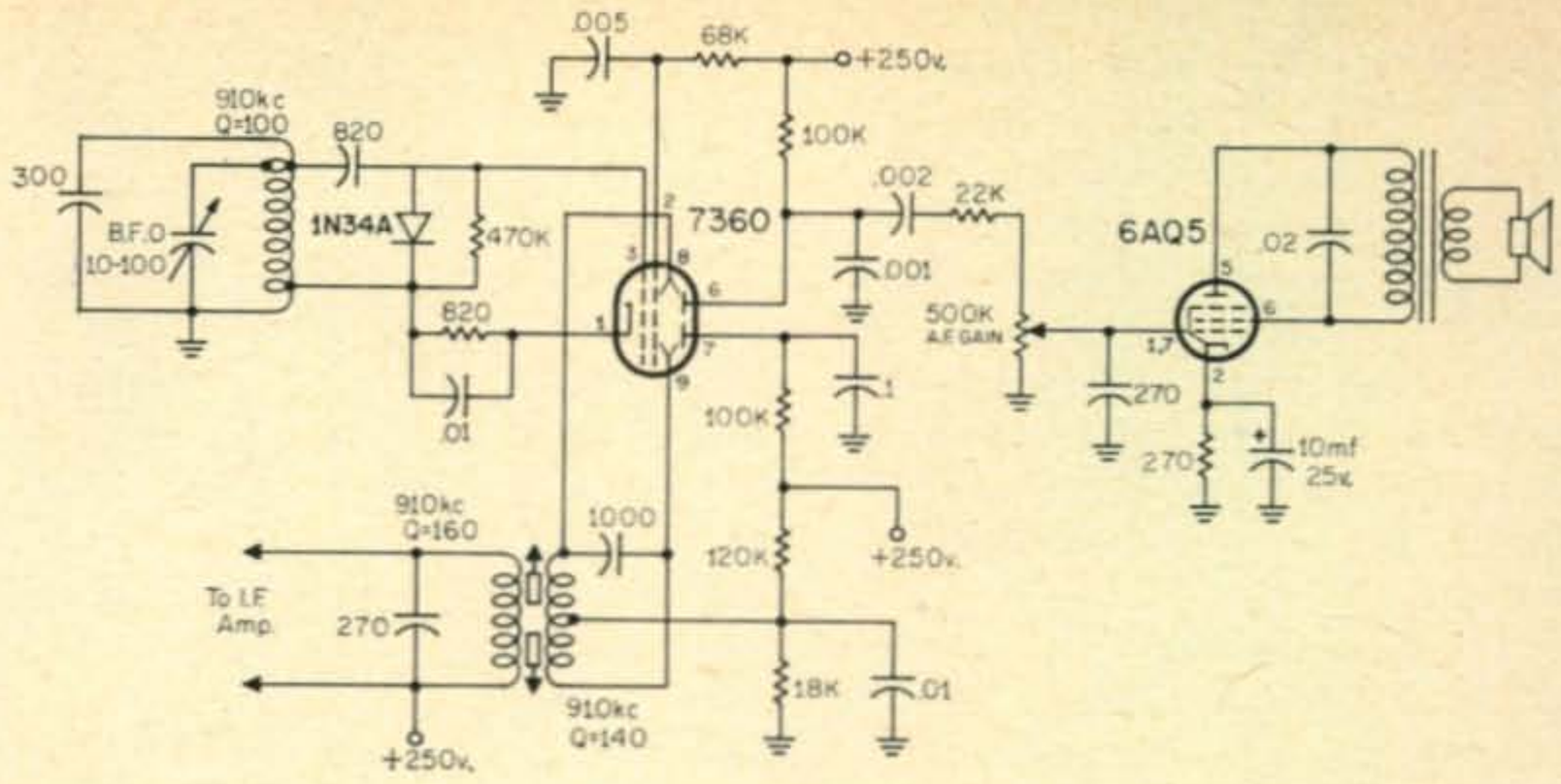

Fig. 1—Product detector using a 7360 beam deflection tube.

However, the magazine *Semiconductor Products and Solid State Technology* (published by *CQ's* Publishers) publishes each month a Patent Review section compiled by Sam Marshall. This is the best presentation of material I have seen on the subject. Also, the magazine publishes a bibliography on semiconductors and solid state technologies. Subscriptions to SP and SST are available for only $6.00 per year in the U.S. ($10.00 overseas).

RCA product detector using a 7360—Thanks to M. B. Knight of the Advanced Product Development Section (Electronic Components and Devices) of RCA, we present the following information to our readers.

Writes Mr. Knight: "In your HAM CLINIC column for June 1964, I noticed the product detector circuit using tube type 6BU8, and I would like to straighten out a point of confusion regarding this tube.

"The 6BU8 is actually a twin pentode and works quite differently than the beam deflection tubes. In fact, the 6BU8 units could be separated into two bottles without changing the electronic behavior; the sharing of heater, cathode, grid No. 1, and grid No. 2 in the actual construction is done solely for reasons of economy. The beam-deflection tubes (7360, 6AR8 and 6JH8) are single electronic structures in which control is by voltage between deflecting electrodes rather than by voltages from each electrode to cathode. Two important implications of this distinction are (1) the beam-deflection tube has inherent features that promote good balance and stability of balance, plus the capability for augmented balance stability by such circuit means as the separate plate load resistors and (2) the beam-deflection tube can be only one modulator or demodulator whereas the 6BU8 can do two modulator jobs at once.

"I suggest therefore, that your circuit is not truly "balanced" using the 6BU8, except that you may obtain some compensation through the common cathode resistor for the second-order effect of the grid No. 3 voltage influencing the cathode current. Because output is taken from only one pentode plate, the operation should be little different in principle from the use of a single pentode (6AS6, 6DT6, 6GX6, 6GY6, 6HZ6) or a pentagrid tube such as the (6BE6, 6BY6, 6CS6 etc.).

"In my opinion, the pentodes and pentagrid tubes have a practical weakness in product detector service in that the grid No. 3 characteristics are often not very linear and the grid No. 3 bias voltage must be carefully chosen for minimum distortion or envelope detection. Furthermore, this 'sweet spot' is subject to drift and may differ from tube to tube. In the beam-deflection tube, not only are the characteristics more linear and symmetrical, but the best operating point is the inherently stable condition of having plate currents about equal; the absolute voltage of the deflecting electrodes from ground is not critical."

This is *one* time we agree 99.9% with someone who has written in to us and given us all some very fine information. For those readers interested in using the RCA 7360 beam-deflection tube as a product detector we reproduce herewith the diagram from an article written by Mr. Knight from the June 1960 *RCA Review*.

We have tried the circuit shown in fig. 1 modified for b.f.o. injection frequency of 455 kc and it worked beautifully. The PD had sufficient output to drive the 6AQ5 directly. We found however, that for best operation that we got better results by replacing the 820 mmf coupling capacitor in the grid of the 7360 with a variable unit of 560 mmf. This enabled us to vary b.f.o. injection levels, at least when operating at 455 kc.

The circuit can be fed with any i.f. signal simply by installing the proper i.f. transformer and b.f.o. circuitry for the correct frequency. One other thing, make sure that the b.f.o. (if you use a separate one) is fed with regulated voltage.

Delayed TVI—"I have been operating for nearly a year with my DX-40 and then suddenly my neighbors tell me that I am interfering with their TV reception. I have checked everything and all looks normal. What do you think?"

If your set operated before without causing TVI then there are a number of things to look for. First of all, have you checked your coax? Some of the cheap stuff does get old fast and has been known to be one cause of TVI. Next, check for a gassy 6146. Recheck your ground con-

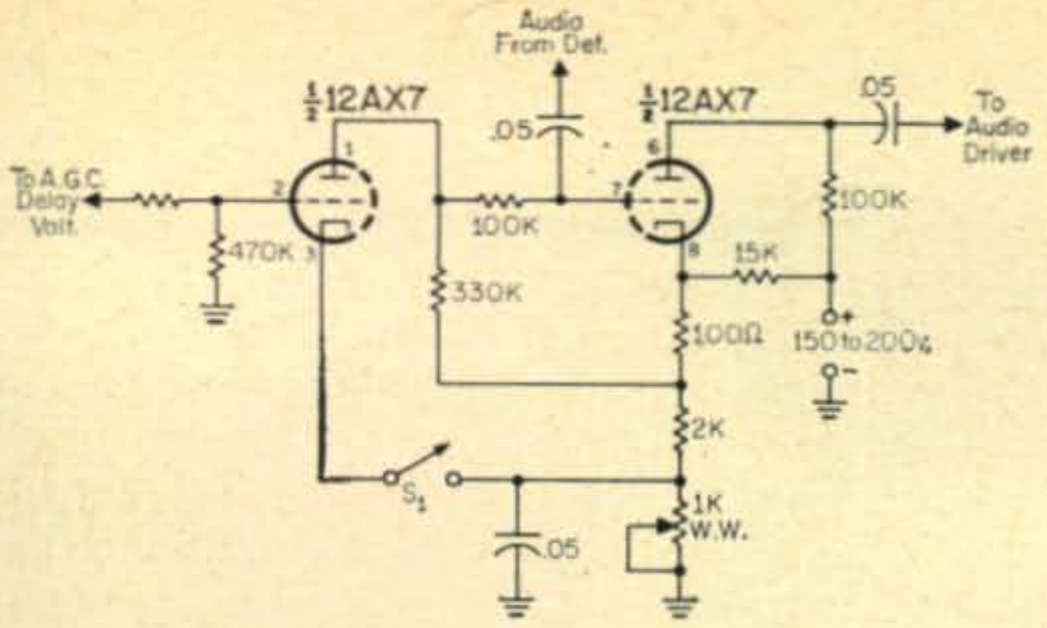

Fig. 2—Effective but simple squelch circuit which can be adapted to any receiver.

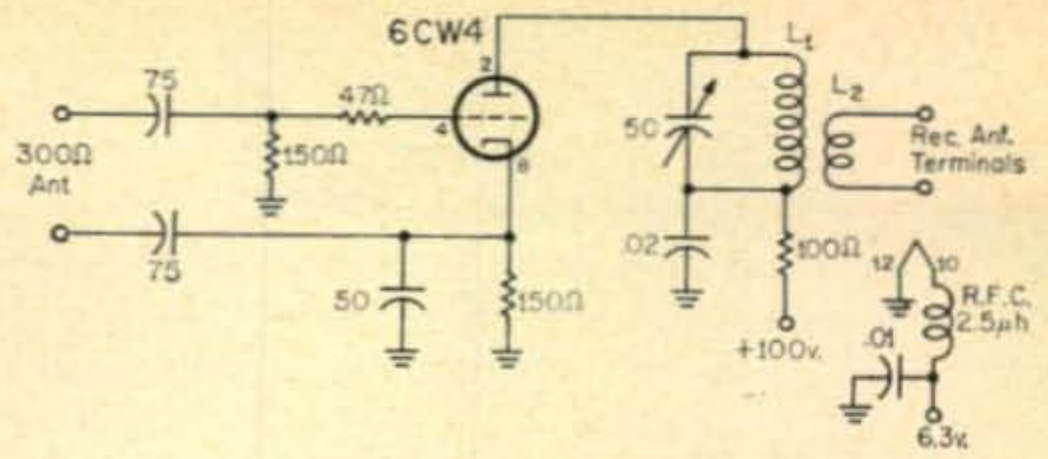

Fig. 3—Very simple pre-amplifier for 6 meters. It should be used with a balanced 300 ohm twin lead feeder. By using the same tuned circuit for output and input, and using a 47K resistor from grid to ground, it will make a very fine amplifier. However, input and output sections must be shielded from each other to prevent oscillation.

nections. Sometimes changing an antenna's position will help alleviate TVI. Check ground connections at the power meter box and at the telephone input terminal . . . visually. Then ask the power and telephone companies to check their ground-points with the equipment they have available for this purpose. Are you overloading your DX40 on tune-up? This could be. Keep your drive as low as possible to the final. Have you had the set out of its cabinet? When you put it back did you *tighten* all screws carefully? Next, check for the radiation of spurious signals (falling in local TVI channels). This can be done with a good grid-dip meter used as a monitor in the diode position. If you do not have a low-pass filter, install one. Anyone else with more suggestions?

Squelch circuit—"Can you give me a practical squelch circuit using one tube and no relays? I have space for only one tube in my receiver. The circuit should fit in between the detector and audio driver stage, and the squelch should be adjustable. Make it simple!"

Using a 12AX7 tube, the circuit shown in fig. 2 could not be much simpler and works very well. The threshold control is the variable 1K resistor in the cathode circuits of the triodes in the 12AX7.

Swiss quad antenna—"Where can I obtain full information on the Swiss quad antenna that I have been hearing about?"

The *RSGB Bulletin* for June 1964 contains full information on the quad by its inventor. This antenna has been getting terrific reports.

Six meter preamplifier—"Please publish the circuit of a simple 6 meter preamplifier to pep up my receiver. The thing should not be complicated and easy to construct. What say?"

See fig. 3. This amplifier uses a nuvistor 6CW4 and will improve the operation of any receiver on 6 meters if the antenna transmission line is 300 ohm ribbon. I have not tried it with coax and it may work as is, without a tuned input circuit.

SB-10 power supply—"I have a second-hand SB-10 and I need a power supply for it. Please print the diagram for one."

See Page 67, March 1961 *CQ* and you'll find the diagram. If you write Heath they may have some diagrams left of the power supply for the SB-10—the same as in the *CQ* issue mentioned.

KWM-1 to 40 Meters—"Now that I have a KWM-1 (second-hand), I'd like to put it on 40 meters. Anything ever appear in *CQ* on this?"

Yes. See August 1962 *CQ* P. 32.

T-23/ARC-5 to 2 meter s.s.b. mixer amplifier—"It seems to me that *CQ* published something on using a T-23/ARC-5 as a two meter s.s.b. mixer and amplifier. What issue?"

November 1962.

Pepping Up The Pacemaker—"Can I add a second 6146 to my Pacemaker transmitter? If so how?"

See June 1963, *CQ*, p. 39 for full pep-up info on the Pacemaker. (note: those who do not subscribe to *CQ* miss a lot of good solid information. For instance, I have 15 letters asking for information on a mobile converter (transistorized) for 40, 20, 15 and 10 meters. If the hams who wrote the letters had subscribed to *CQ* they would have found the information on pages 32-33 of April 1963 *CQ!*)

No Full Diagrams—We continue to receive letters asking us to design a specific circuit or a whole set. We also receive requests for specific diagrams. Sorry readers, the time available does not permit us to answer these requests. We do, when the demand is great, come up with diagrams for publication in the column. Although HAM CLINIC is the only service of its kind in hamdom there are limits! To receive quick replies, make your letters short and confine them to one subject. Long rambling letters take time to read (and to answer) and take time away from someone else. Be sure to include two IRC's for rapid replies—if you can wait, include U.S. postage—and envelope is not necessary.

Thirty

Listen for us on all bands during the months of August and September from the U.S., we'll be glad to talk to you. So until next month then, remember what I said about thanking those responsible for "engineering" the reciprocal law into being.

73-75 and 72. Chuck

antennas available, the mark has now been established, against which amateur radio can now work in order to develop new circuits and new techniques that may make it possible to maintain such communications with more modest equipment in the future. Through the activity generated, radio amateurs, who participated in the KP4BPZ QSOs, demonstrated that they have equipment available for participating in other space communications experiments. In almost all cases, the equipment used for working KP4BPZ will be more than adequate for working 2 meter DX through the OSCAR III satellite, and possibly for conducting satellite-reflection experiments from the ECHO II satellite. These moonbounce experiments also demonstrate that the pioneering scientific spirit of amateur radio is far from dead!

Satellite Television Relay

US, European and Canadian broadcasting officials met in Washington during July with representatives of the newly formed Communications Satellite Corp. The purpose of the meeting was to work out the final arrangements for televising the Olympic games which will be held in Japan this fall, and transmitting the broadcasts to Europe and North America via the SYNCOM III satellite.

It is hoped to use SYNCOM III, the latest in the series of synchronous satellites which will be launched by NASA over the Pacific Ocean in late August, to relay television broadcasts from a newly built earth station terminal near Tokyo to an earth station terminal at Pt. Mugu, California. In the United States, the live Olympic TV broadcasts will be carried on the stations of the National Broadcasting Co. network. If things work out as planned, the programs will also be transmitted by land-line from California to Canada for use by the Canadian Broadcasting Corp. network. At Halifax, Nova Scotia, a jet plane will be standing by to fly video recordings of the programs over the Atlantic Ocean to Europe in about five hours for showing in European countries through the Eurovision network. It is also possible that some television broadcasts of the Olympic games may also be relayed from Tokyo directly to Europe via either RELAY or TELSTAR, if they should be in proper orbits. Neither of these satellites, however, will be in the orbit required for relaying broadcasts to the United States, except for very brief periods.

OSCAR III

As this is being written, OSCAR III is still undergoing ground tests. Everything on the satellite checks out A-O.K. except for the linear amplifier, where transistor failure has developed. It appears that the difficulty has been located, and is now well on the road to being corrected. While a definite launch date cannot be established at the present time, it appears certain that OSCAR III *will not* be launched in less than 90 days time, or not before December of this year.

With the establishment of a launch date for amateur radio's active communication satellite drawing nearer, the long promised comprehensive article on OSCAR III is scheduled to appear in next month's issue of *CQ*. Entitled, "OSCAR III—An Active Communication Satellite For Radio Amateurs," the article will cover all aspects of the project including a description of the satellite's circuitry, how it will work, how to communicate with the satellite, how to track the satellite, other experiments that can be performed with the satellite, etc. If you are planning to take part in the OSCAR III project, don't miss this article in next month's *CQ*. It promises to be the most comprehensive article on OSCAR III that will appear in any single issue of any magazine.

The long period of testing OSCAR III has disclosed that it may require considerably *less* power to work through the satellite than was thought previously. Tests have shown that when the satellite will be in a nearly overhead position, it may be possible to establish 2 meter communications using as little as 100 watts effective radiated power. This can be achieved with a ground installation consisting of 25 watts into a Yagi antenna with 6 db gain. To work the satellite during most of the time that it may be visible will require effective radiated powers on the order of 1,000 watts. More on OSCAR III next month in the special article on this subject.

European Amateur Satellite

Work progresses slowly, but surely on the development of a satellite in the OSCAR series which will be designed and built by European radio amateurs. A meeting of the European Region of the International Amateur Radio Union's Permanent VHF Committee is planned towards the end of 1964 to finalize plans for a European Amateur Radio Satellite. It is hoped that such a satellite might be designed and built during 1965, with a possible launch towards the end of 1965 or early 1966. More news on this project as it develops.

COSMOS 33

The Soviet Union successfully launched their COSMOS 33 satellite on June 23, 1964. Strong telemetry signals have been reported received from this satellite on a frequency of 19.995 mc.

73, George, W3ASK

For further information, check number 33, on page 110

Zero Bias [*from page 7*]

a series of demonstration rigs to test the turning power, windmilling resistance, and physical strength of three popular rotors including, of course, their own.

Tom and I naturally were extremely critical, looking for a bit of "rigging" of the test set-ups when it came to the Alliance product. As skeptical as we were at first, we had to concede that all the demonstrations *were* on the up and up. The tests consisted of stalling torque measurements, override (windmilling) torque, and wind loading strength such as you might observe with a large antenna in a high wind. The Alliance showed about average on stalling torque (200 inch pounds), superior on windmilling (worm gear drive), and a wind loading strength vastly superior to any other on the market. All of which means that that little old-fashioned TV rotor is a darned good item for ham use.

Aside from the mechanical attributes of the Alliance products, we were most impressed by the sincerity and honest enthusiasm the folks at Alliance showed. You've really got to believe in a product to fly five editors halfway across the country to show them you've got something good! They have!

Silent Key

A powerful Corvette and a rainy night combined to rob hamdom of one of its most avid and well-liked v.h.f.ers. Larry Kohlman, K2BVC died on July in a severe auto accident in New Rochelle, New York. He will be sorely missed.

Miscellaneous

Well, *CQ* finally has a station on the air after nearly 21 years without a voice. Things are still rather temporary but within a month or so our antenna installations will take on a more permanent look. The main purpose of the station, however, is not for general operating . . . we just don't have the time . . . instead it is used to test equipment in operating conditions of QRM, etc. Test instruments can tell just so much. The final test is always in the using.

This represents only one more step in our constant effort to bring our readers the most accurate information possible about new equipment. The call being used temporarily is W2AEF/2, our own Bill Scherer's call. We'll let you know just as soon as we receive our own call, but for the time being, look for W2AEF/2.

73, Dick, K2MGA

RTTY [*from page 84*]

building the W2JAV narrow shift TU. WØYPT of Monona, Iowa, uses the W2JAV wide-shift transistor TU and is about to build the narrow shift unit.

FG7XT on Guadeloupe Island uses 100 watts to an HT-32 and tape gear on 20. W8BZB/HC2 on the good ship Hope, solid at W2JTP on 20, uses tape to clear traffic with WØJRQ. ZL1WB runs 150 watts to an 813. VE2HY, VE3WR, and VE3DTY work W1BGW and W2JAV Sunday mornings on the narrow shift net on 7140 kc.

Comments

Why isn't there more RTTY activity from foreign countries? This is a question frequently heard. Well, from personal experience I can tell you one reason. They can't afford it. Oh, you will send them parts to build gears? Ha! On a recent trip to the Near East I talked in person to many hams with exotic calls. They told me the sad tale of custom regulations in their country. One fellow just threw up his hands and said, "Please don't send me anything; I can't pay the duty!" So when you hear RTTY DX, just remember—it wasn't easy for him to get on.

73, Byron, W2JTP

6M Vertical [*from page 52*]

The dimensions given in fig. 1 are for a center frequency of 50.5 mc. If you desire it lower or higher you will need to calculate the dimensions.

Most (or all) of the material needed for a vertical J can be obtained from metal surplus houses at less than $10.00. The radiator or longest element should be a single length of aluminum tubing 17 foot long (or longer is acceptable). Two 10 foot lengths may be joined but be sure to couple them together solidly to avoid buckling. A coupler can be made by also purchasing a 6 foot length of aluminum tubing whose o.d. is the same as i.d. of your radiator element and pounding it into the two radiator lengths and securing with machine screws.

The lower end of the matching stub (if you use the shorting bar) and the radiator are at zero r.f. potential and therefore the radiator may be connected to ground, or directly to a grounded metal mast. This provides a convenient means for protecting the antenna against lightning.

We don't claim it's the best, but it does work and it's easy to build and best of all it doesn't cost much. For the newcomer in a channel 2 area we might mention that verticals are more desirable from a TVI standpoint because of the polarization of TV antennas (they're horizontal you know) although they generally do not provide the gain of a horizontal beam. Try it, we think you'll like it. ■

Waters Patch [*from page 55*]

Adjustment

Adjustments for phone-patch service with vox involves balancing the receiver output and the transmitter input controls with the null-balance adjustment for best anti-trip action, while maintaining adequate speech levels. These steps must be taken with the Compreamp *out* (if the Model 3002 is in use) and may be made while testing with another party on the telephone line and should be done using a receiver-output level of no more than about .1 volt across the 3.2 ohm output terminals. After this, the Compreamp is switched on and its compression level adjusted.

It should be noted that there is interaction between the level-controls and the null-balance, so

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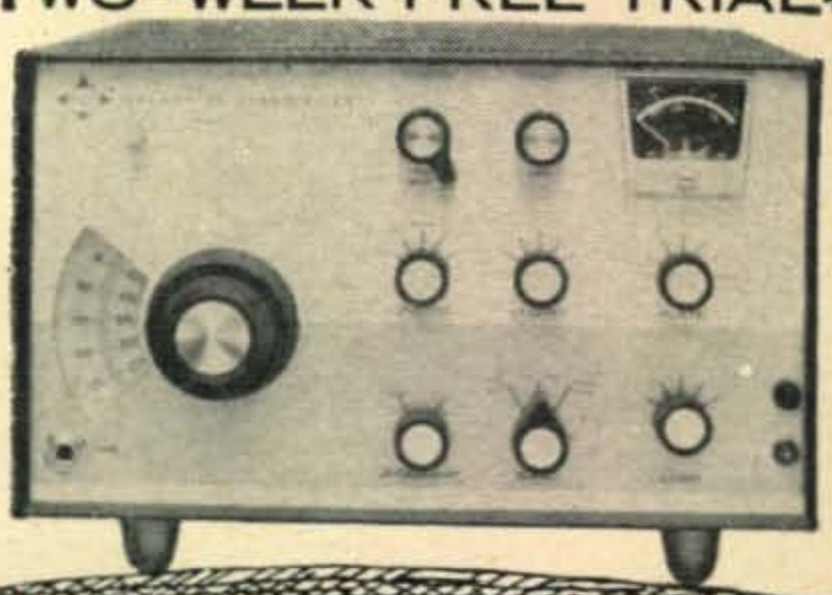

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Name_____ Call_____

Address_____

City_____ State_____

For further information, check number 58, on page 110

they are best left set after the initial settings have been found, assuming nearly the same signal levels are subsequently concerned. The receiver control also is used with RECORD STATION and the transmitter control also is used for PLAYBACK TO TRANSMITTER; however, leaving them set, as just done, should not be of consequence in these other operational modes, since the tape recorder's or the transmitter's gain controls may be used instead.

An interesting sidelight in connection with phone-patch work is that when one attempts to run a phone patch with a weak signal being received from the distant party on the phone line, the trick in getting the distant party to speak up is to *reduce* the receiver a.f. output level. This takes advantage of a bit of human psychology which says that a person will naturally speak up louder if the signal he is getting over his telephone feels weak to him. The normal inclination of the station operator, however, is exactly the opposite; that is, his instincts tell him when the distant party is weak and he will then furnish higher levels to the telephone line. The distant party then accommodates in the reverse direction by further dropping his voice until the whole patch literally falls apart.

Performance

The instruction manual is so replete with data regarding the installation and operation of the Waters Hybrid Couplers that one could hardly go astray. No difficulties were experienced in obtaining proper operation, except in one case where the null balance was critical due to a particularly cranky vox system used at the time.

The Waters Universal Hybrid Couplers are priced as follows: Model 3001 $49.50; Model 3002 $69.95; Model 358 Compreamp Retrofit Kit (for adding Compreamp to existing Model 3001) $19.95. The producer is Waters Manufacturing Inc., Wayland, Mass. ■

Push Button Keyer [*from page 31*]

able effect in its operation. Printed circuits are used only to mount the pushbuttons and connect their common side, which is attached to CR_8.

There is no point in discussing the mechanical details in this article. To be accurate, it would probably take several pages. The intention is merely to present the idea and the circuit description to the c.w. fans. As I understand, similar devices are not readily available in the commercial market. If they were, they would undoubtedly be too expensive for most of us. The roughly calculated price of all components however should not be in excess of $130.00, which is still tolerable to some amateurs.

The overall operation of the circuit is quite satisfactory, though errors occur if two buttons are closed together. It causes an incorrect setting of the memory cores. The pushbuttons should be labeled with the corresponding letters till the operator has become familiar with their positions. ■

permitted with the same station.

The following rules apply to stations outside of India and Ceylon.

Serial Numbers: The conventional exchange, five and six figures, RS/RST report plus a progressive three figure contact number starting with 001 for the first contact.

Scoring: 2 points for each contact on a specific band with VU2/4S7 stations; 1 point for each contact with DX stations other than VU2/4S7.

Final Score: There was no indication of a multiplier in the rules, therefore it is assumed that the final score will be a total of the QSO points from all bands.

Logs: Should show in this order: Date/Time in GMT, station worked, serial number sent and received, and points. Use a different log sheet for each band.

Include a summary sheet with your call, name and address in block letters, equipment discription, and summary of your score by adding total QSO points from all bands. Sign a declaration that rules and regulations have been observed.

Awards: Certificates will be awarded to each country and each call area in W/K, JA, SM, UA, VK and ZL. (1) To the Top scorer using All Bands. (2) Top scorer using one band. (3) Those with minimum contact requirements, to be determined by conditions and activity.

There is also a s.w.l. section. Scoring is the same as for the transmitting section and logs and summary sheets should be similarly set out. Only logging of VU2/4S7 stations have point value.

Logs cannot be postmarked later than November 15th and go to: ARSI Contest Committee, Post Box 534, New Delhi 1, India.

All Asia DX Contest

Continental Winners

All Band

HL9KH	67,424
UB5WF	9,417
VK5NO	7,170
WA6IPY	2,640
5A1TW	1,620
HC1DC	516

Continental Leaders

3.5 mc

OK1AHZ	45
JA7LK	14

7.0 mc

JA1AEA	746
W8KWC/KH6	438
SP5ALG	308
XE1NL	7

14 mc

4X4FU	15,834
OH2BC	3,212
W3MSK	1,880
VK2APK	712
ZS2U	6
OA4CG	5

21 mc

4X4MR	11,280
VK2DI	196
UA6FJ	184
CR6DX	28
K4HPR	15
YV6BS	2

North America

WA6IPY	A	2,640
W6AFI	"	2,338
K6BWX	"	2,295
WA6IVM	"	2,184
K6IEC	"	1,573
WA6AYU	"	1,456
W9IOP	"	1,136
WØDCA	"	984
WA6OJM	"	266
WA6TEV	"	240
W6KHS	"	57
W3MSK	14	1,880
W6VSS	"	1,012
K1NOL	"	882
W6MSM	"	693
K1LBH	"	528
W2WZ	"	522
W7LZF	"	427
W4KXV	"	252
W7DLR	"	240
W7BTH	"	75
W6BIL	"	68
W8LT	"	56
WA6QGW	"	44
K8NMG	"	44
W7VRO	"	14
W5DQD	"	5
W8MCC	"	4
W1PLJ	"	2
WA6SVY	"	1
K4HPR	21	15
KL7COI	14	180
KL7DUZ	"	136
VE2NV	14	136
VO1BD	"	25
XE1NL	7	7

1963 WAEDC Contest

C.W. Results

Continental Leaders

DJ3KR		119,880
UA9DN		80,136
6O1ND		71,332
W2JAE		64,294
HC1DC		32,040
VK5ZP		8,704

North America

W1BPW	C	27,507
K1SDX	C	26,064
K1IJU	B	4,050
W4RXY/1	C	2,156
W1CKA	C	1,904
W1WY	B	1,794
W1JTD	C	944
W1PLJ	C	200
W2JAE	C	64,294
WB2CKS	C	20,900
WA2RUB	A	9,672
K2EAC	C	8,932
K2GDP	C	2,639
W2KVL	C	530
W2QDY	B	456
WA2PDW	B	416
K3JJG	A	25,920
W3KA	C	23,360
W3AHX	B	12,857
W3AFM	C	8,190
W3BYX	C	6,021
W3KTW	C	1,887
W3QLW	C	1,474
W3MCG	C	1,456
K3MNT/3	B	1,005
W3QQL	C	544
W4HTV	C	3,892
WA4EDY	A	1,152
W4KXV	C	32
W5WZQ	C	7,683
WA5CBE	C	1,024
W5KC	B	207
WA6SBO	C	2,121
WA6OHJ	A	915
WA6QAU	C	320
W7ABO	C	322
W8RQ	B	20,124
W8CQN	B	3,768
W8GMK	C	2,709
WA8ENO	C	1,462
K8VIX	C	1,014
K8BCK	C	988
W8IBX	C	108
W9IOP	C	27,945
W9KXK	C	2,500
W9WIO	C	2,014
WØYCR	C	2,380
KØGSV	B	36
VE1ZZ	C	6,132
VE1AE	B	1,008
VE1EK	B	459
VE2BV	C	2,592
VE2IL	A	6
VE3BPJ	B	672
VE8RH	C	7,291
VE8DX	C	5,775
VE3BFC/8	B	2,714
HP1AC	B	290
KP4CC	C	3,776
KP4BJU	C	207
TG9AD	C	432

Phone Results

Continental Leaders

F9RY/FC	33,136
5N2JKO	22,506
VS9AAA	17,040
OX3JV	5,300
PZ1CE	3,720

North America

K1UDP	C	420
W1PLJ	C	15
K2HFX	C	1,900
WB2BGM	C	481
K3BNS	C	882
K3CNN	C	615
K3MNT/3	B	1
K5MDX	C	1,386
W5KC	B	40
WA6OHJ	A	10
K8CFU	C	640
W8BKO	C	555
KL7AQU	C	1,824
VE3BFC/8	B	4,186
WB2CDB/VO1	C	784
OX3JV	B	5,300
TG9SC	C	392
W5JDX/VP9	B	5,040

A—Up to 50 w.
B—Up to 150 w.
C—Over 150 w.

Editors Note

The contest season will be in full swing when you read this column.

Date duplication continues to plague the list, even though there are several open dates in the Calendar. These could have provided clear weekends for most of the involved activities.

The VK/ZLs will once again be bucking the ARRL CD "clatter."

And can you imagine trying to work the RSGB boys thru the ARRL SS "madhouse" on 7 mc? It will be quite a challenge.

The QSO Club announces the Fall 1964 "QSO Field Day" for October 23-24, the same weekend as our WW DX Phone Contest. Lots of luck.

This is an activity in which only school club stations may participate.

It is suggested that interested school clubs contact Ken Johnson, W6VEB, QSO Club, Pasadena City College, 1570 East Colorado Blvd., Pasadena, Calif. 91106.

See page 37 for complete details on our World Wide DX Contest for 1964. No changes from last year but it might be well to review some of the fine points.

73 for now, Frank, W1WY

Propagation [*from page 64*]

the first Europe (GI6TK) to Columbia, South America opening (HK4EB); the first Austria (OE3LI) to USA opening (W1BB/1), and the season's plum, the first opening from Singapore (VS1LP) to Europe (G3GRL), West Coast USA (W6ML) and East Coast USA (W1BB/1).

An indication of the improved propagation conditions on this band can be seen from the report that G3RBP, using *10 watts* and a 275-foot long wire antenna was able to QSO 94 DX stations this past year. W1BB has this to say about 160 meter propagation conditions:

"My conclusion is that given the proper combination of propagation conditions, low QRN level at each end, correct choice of time of day/night, sunrise/sunset, season of the year, and point in the sunspot cycle, (combinations which do exist if you wait long enough for them, and things are lined up to take advantage of them), there are no two places on this earth between which communication cannot be carried out on 160 meters, utilizing the power inputs, types of equipment and antennas available to amateurs."

With the present sunspot cycle approaching its minimum, the ideal combination that W1BB refers to may very well take place beginning this fall, and continue through the spring of 1965. With propagation conditions expected to be ideal for 160 meters during this period, and with 160 meter activity now existing in every state, and in scores of countries on all continents, this coming season may well be the best-ever for this band.

CQ DX Contest Special

The 1964 *CQ* WW DX Contest will be held on the weekends of October 24-25 (phone) and November 28-29 (c.w.). As has been the custom for the past thirteen years, next month's column will be devoted to a special forecast for the contest periods.

73, George, W3ASK

VHF [*from page 68*]

We are presently in a transitional period of column reorganization (at least this month) but will soon have a definite program outlined for the future. In the meantime please continue your reporting through letters and Reader Reporting Forms.

Wrap-Up

We find ourselves with this our first combine column to have plenty to say but not too much space to say it in. Give us a few months (it won't be too bad) to get used to working with each other, decide whose news is more important, what the circuit of the month will be, etc. Will let you know who comes out on top—HI. Meantime, keep us posted on your v.h.f. activities.

73, Allen, K2UYH and Bob, K2ZSQ

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USA-CA [*from page 71*]

getting the 'word' how a realistic awards program opens many doors to bettered hamdom public relations and publicity. We can only apologize if we've not had space to publish data on all awards sent in. We are always looking for high news value action pictures covering achievement awards matter. Much we receive is out-dated to meet 60-day deadlines in this column.

Clif, K6BX

Frequency Conferences [*from page 39*]

interesting to compare the international amateur radio bands of 1929 with those of today. In 1929, amateur radio occupied a total of 3,485 kc between the 160 meter and 10 meter assignments. Today (35 years later) amateur radio occupies a total of 3,350 kc. The net loss of 135 kc is accounted for by the loss of segments of 160 meters, the loss of 50 kc at 20 meters, and the loss of the upper 300 kc at 10 meters, compensated by the gain of 450 kc at 15 meters. Some radio amateurs may find it convenient to use the ARRL as a "scapegoat" for the supposed loss of amateur frequencies during the past decades, but actually the amateur radio service has substantially the same h.f. spectrum space today it had in 1929.

The Madrid Telegraph and Radio Telegraph Conferences of 1932

The most important achievement of the Madrid Conferences was the creation of a single Convention containing general principles more or less common to the telegraph, telephone and radio services. This activity occupied the time and thoughts of the various delegations and was not accomplished without heated discussions and arguments. Additional discussion over "colonial votes" was to take much of the delegates' time. Finally, and most important, the present International Telecommunications Union was created to replace the outmoded Telegraph and Radiotelegraph Unions. A new set of International Radio Regulations based on the 1927 Washington Regulations was drawn up, and a Registration Bureau was created. Its purpose was to register frequencies and establish priority rights on a basis of usage in an attempt to develop allocation techniques which would lessen harmful interference created by the sudden appearance of new broadcasting or fixed service stations on frequencies utilized by other stations.[2]

---

[2]This work is presently carried on by the International Frequency Registration Board (IFRB). Each administration makes its own assignments and notifies them to the IFRB. Over 40,000 notices were received during 1963 from all administrations and about 32,000 of these involved frequencies below 28 mc. Registration, of course, does not apply to the Amateur Radio Service.

The IFRB may return a notification if, after examination, it reports an unfavorable finding. However, the administration may resubmit the registration to the IFRB and, if the allocation has been active for 60 days without causing interference to other stations, the notification is entered in the Master Register.

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Seventy-seven nations were represented at this Conference and, while no changes were made in the 1927 radio amateur regulations, amateur radio emerged from this meeting recognized as a mature communications service and an accepted part of the world-wide communications picture. Again, as before, amateur radio was represented at the Conference by the ARRL and the IARU.

The FCC and IRAC

One result of the Washington and Madrid Conferences was the creation in the United States of the Federal Communications Commission (FCC), replacing and superseding the old Federal Radio Commission. This body was created to meet the new concept of frequency allocation by Services, and the FCC became the domestic mechanism dealing with non-government frequency allocations. At the same time, the Interdepartmental Radio Advisory Committee (IRAC) was established to deal with U.S. Government frequency allocations. These agencies, greatly strengthened, are the regulatory bodies that today deal with allocation and communication problems in the United States.

The International Telecommunications Conference, Cairo, 1938

The first Administrative Radio Conference of the ITU was held in the spring of 1938 in Cairo, Egypt. The use of English as a supplementary language to French was agreed upon at this conference, which occupied itself primarily with problems in finding space in the allocations table for the ever-increasing demands for additional assignments for the mobile, fixed and broadcasting services. New channels for inter-continental air routes were allocated in the 6.5-23.4 mc range, and the US vigorously opposed the proposed expansion of the high frequency broadcasting allocations. In particular, the U.S. objected to the creation of a 21.6 mc broadcast band, and the sharing of the 7.2-7.3 mc portion of the heretofore exclusive radio amateur allocation with international broadcasting in the European region. However, over the opposition of the United States, a portion of an exclusive radio amateur assignment was reallocated on a shared basis with the International Broadcasting Service by a majority vote of members of the ITU.

World War II

The wholesale destruction of international communication facilities and the drastic changes in telecommunication science that occurred during World War II imposed a heavy burden upon the ITU, whose activities had been brought to a standstill during this period. Despite the material losses, the technical progress made in radio (due primarily to radio being the indispensible link between central control authorities and

ships, aircraft and remote facilities) completely altered the communication picture. In addition, the use of short and medium wave broadcast for local and international propaganda grew many fold. The tremendous sea and air traffic across the north Atlantic and the Pacific was responsible for the development of an electronic navigation system (Loran) which permitted mobile stations to establish their position continually, without being disturbed by magnetic phenomena and the aurora borealis.

Because of the continued post-war tensions, these new uses of the radio spectrum did not diminish with cessation of hostilities. New techniques, new equipment and new concepts contributed to an increased use of the complete radio spectrum. In addition, the use of microwave radar systems made it mandatory to expand the allocation table from the Cairo limit of 200 mc up to 30,000 mc.

The Moscow Preparatory Conference, 1946

In the summer of 1946, the "big five" (China, France, the United Kingdom, the USA and the USSR) met in Moscow to compare proposals to be made at the forthcoming Telecommunications Conferences scheduled for 1947. The old Madrid and Cairo regulations were still in effect when hostilities came to an end in 1945 and clearly the march of technical progress had outmoded the regulations formulated at that time.

At this preparatory conference, the US proposed retention of the pre-war radio amateur allocations, with the exception that 300 kc be taken from the high frequency end of the 10 meter band and turned over to the fixed and mobile service. Since the top limit of the partially restored 10 meter band in the USA at this time was only 29.5 mc, and as amateur interest seemed to be concentrated on the lower frequency bands, this frequency reduction was reluctantly accepted by the ARRL. The United States, in partial compensation for this loss, and for the loss of 160 meters to Loran, proposed that a new "15 meter" amateur band of 21,000-21,500 kc be created. In contrast, the USSR proposed sharing the 80, 40 and 20 meter amateur bands with various other services, notably broadcast and fixed. Shortly after the Moscow Conference, the 10 meter assignment in the U.S. was expanded to the present upper limit of 29.7 mc.

The Atlantic City Telecommunications Conference, 1946

This important "Frequency Conference" set the pattern for world-wide, post-war amateur radio. Proposals covering all radio services were advanced by many nations, and the purpose of the Conference was to reconcile these proposals in accord with the communications state-of-the-art arising from the explosive technical advances made during the previous decade. As with the previous conferences, many proposals for additional allocations were made at the expense of

the amateur bands. Tropical broadcasting demands by Asian countries, for example, threatened the 40 meter band, and other services chopped away at the 80 and 20 meter amateur bands. The 15 meter proposal of the United States was trimmed by 50 kc, and various external pressures were applied to the 10 meter band. The growth of communications in other countries contributed to the demand for additional allocations and by the time the conference concluded, the United States found that its allocation proposals had been altered drastically. International Broadcasting had gained a 26% expansion of frequencies, aeronautical mobile had gained 16%, the fixed service had been reduced 3%, the amateur radio service had been reduced 3%, and the maritime mobile service had been reduced 1.5%. Amateur radio had lost the venerable 160 meter band to the navigation aid, Loran; the top 300 kc of the pre-war 10 meter band had been reallocated to the fixed service, and further excursions into the 80 and 40 meter bands on a shared basis in world regions 1 and 3 had been made. The pre-war 114 mc (2½ meter) amateur band had been shifted to 144 mc (2 meters), and the old 5 meter band had now become 50-54 mc.

A hard bargain had been argued and in view of the tremendous expansion of all service allocations, the amateur radio service had fortunately emerged from the Conference relatively intact and in a strong position, due to the firm support of the United States Government, backed by a majority of countries. As in the many previous conferences, the US amateurs were represented by the ARRL and the IARU. ■

Addendum

This review and the preceeding article cover in brief the interplay between the amateur radio service and the International Telecommunications Union over the past decades since World War I. The final article will deal with some of the problems that we can expect amateur radio to be faced with at the next ITU Frequency Conference and some possible courses of action for the amateur radio body to consider during the coming years.

Acknowledgments

Material for the preparation of this article has been derived, in part, from the following publications: *Radio Spectrum Conservation*, a report of the Joint Technical Advisory Committee (IRE-RTMA), McGraw-Hill, 1952, and *The International Telecommunications Union, a study in International Cooperation*, by George A. Codding, Jr., University of Geneva, 1952 (out of print). An account of the 1946 Moscow Conference may be found in the January, 1947 issue of *QST*. A full report of the 1947 Atlantic City Conference may be found in the July-November, 1947 issues of *QST*.

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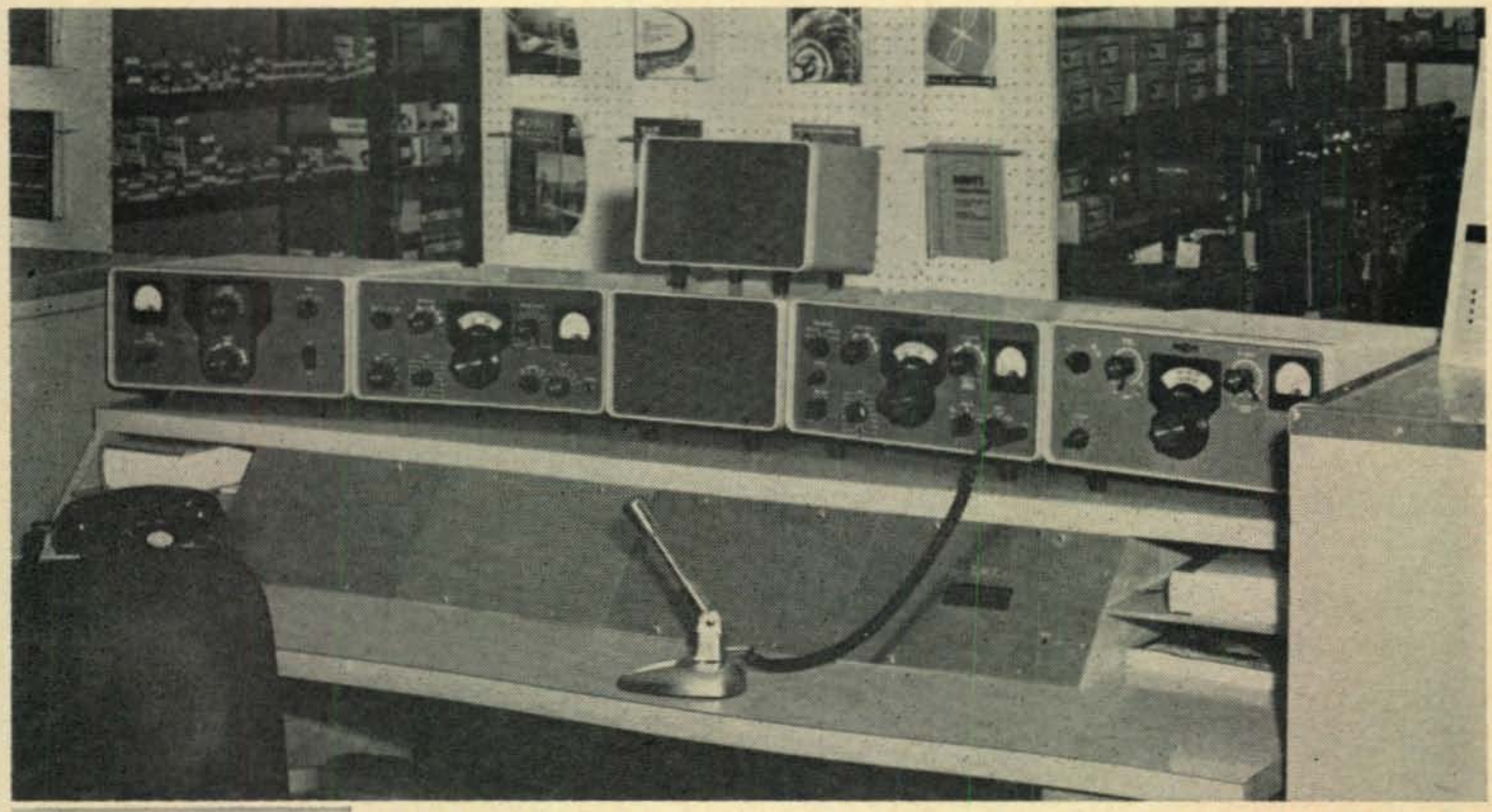

FLORIDA HAMS! Stop in or write me today for a TOP TRADE-IN QUOTE on any new COLLINS equipment. Pay just $5.00 down and take up to 3 years to pay. The OPERATING COLLINS display shown above is waiting to give you a FREE Demonstration. Hams not living in Florida should write our Main store at:

3832 West Lisbon Avenue, Milwaukee, Wisconsin, 53208

73's Phil K4ZKK (Mgr. Fla. Store)

19 AZALEA PARK SHOPPING CENTER

ORLANDO, FLORIDA

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Mon., Wed., Thurs.: Noon to 9 p.m.
Tues. and Fri.: Noon to 5:30 p.m.
Saturdays: 10 a.m. to 4 p.m.

AMATEUR ELECTRONIC SUPPLY

For further information, check number 53, on page 110

Letters [*from page 16*]

We have enough troubles within our own ranks without inviting more from outside.

Vance Murr, W4FWI
649 La Villa Drive
Miami Springs, Fla.

Play it Safe

Editor, *CQ*:

Re: WA4FJF, Ellen, page 80, July '64 *CQ*.

I see two hands there, and wearing headphones yet, while troubleshooting. Under the safety rules isn't Ellen shooting for some trouble that she ain't expecting to find? Like a shot of B plus between the ears.

Oh well, how can you keep one hand in the pocket when you don't have pockets? Still, maybe Ellen could take off the phones and hold them in her hand. Unplugged of course.

Yowie!

L. J. Julien, K9DEY
711 S. Euclid Ave.
Villa Park, Ill.

Incentive Licensing

Editor, *CQ*:

I am enjoying the fracas on RM-499 very much along with the battle or words between *CQ*, *QST*, and *73*. The readers' letters make most interesting reading. It is most gratifying in these days of conformity to know that amateurs have minds of their own and do not mind expressing their opinion.

The main question I have on RM-499 was why the Advanced and Extra Class licensees were left out of the up-grading process. To be sure, those who got their licenses via the "grandfather clause" are not all up to date with solid state, s.s.b. and microwave choke joints. I wonder how many of these built their s.s.b. exciters, since we General and Conditional Licensees have been accused of being "appliance operators." I grant you that I am in agreement with the idea that something needs to be done, but disagree with the method. What with CB and others eyeing our bands, leaving out the Advanced and Extra Class licenses doen't help much in the way of unity and ham spirit.

At the risk of being called a conservative, I propose that the upgrading consist of new examinations for all amateurs. Said exams to cover transistors, other solid-state devices, s.s.b., RTTY, v.h.f., and u.h.f. techniques and theory. In addition, FCC examiner would conduct an oral exam on similar subjects.

The only comment that I would make on the ZERO BIAS editorials on Mr. Green is that the situation is confusing to a subscriber of *73* and *CQ*. If Mr. Green is as some say, why haven't his points been answered or refuted? On the other hand, if all Mr. Green says is untrue, I suppose that no answers to his points are needed. Somehow, I can't believe that both sides are wrong. The truth is there somewhere, but I have not been able to find it, yet. Let us hope that the truth will emerge soon.

Charles Cowell, Jr., K4KLJ
310 Riverside Drive, W.P.
Washington, North Carolina

In the light of current thinking, the technical level of the Extra class seems *to be considered as the "minimum level." Granted, many holders of the Extra or Advance class licenses have not designed and built their own gear, but who can argue that, by and large, they represent a group of more technically proficient hams. It is this proficiency that RM-499 and others hope to promote. A higher technical level may not necessarily* insure *our frequencies and privileges, but can certainly do no harm at the conference table.*

Your suggestions of new exams for all, and oral exams, warrant more than casual inspection, but pity the already overworked FCC.

Regarding Mr. Green's comments about CQ, *its policies, and its publishers, we feel that to dignify his rantings with answers in* CQ *is to bring ourselves down to his editorial level, which we feel is not in the best interests of our tens of thousands of readers. Nor do we intend to print sparsely circulated "private letters" which we dare not print in* CQ. *No—we feel that our readers are able to decide for themselves where the truth lies, and have no need to be* told *what we think they should believe.*—K2MGA

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.

3-D QSL cards stand out everywhere! Cost a little more and show it. Details, samples, 25¢ (refundable). 3-D QSL Co., RR 1 Monson 4, Mass. 01057.

CREATE a QSL card with a "Sampler Instruction Kit" 25¢. Samco, Box 203-C, Wynantskill, N.Y. 12198.

QSL's?? CB's?? WPE's?? SWL's?? Personalized made-to-order one-day service. Samples 25¢. DeLuxe 35¢. (refunded). Sackers, W8DED, Holland, Michigan. (Religious QSL samples 25¢).

NOTICE! Best QSL's for less, Believe us! Free Samples, Liberty Press, 1209 South Chester, Indianapolis, Indiana.

CREATIVE QSL CARDS free, new catalog and samples. Personal attention given. Wilkins Creative Printing. P.O. Box 787-2, Atascadero, California.

QSL's Samples free. Little Print Shop, Box 9363, Austin, Texas.

QSL's . . . $1.90 . . . Dime . . . Filmcrafters . . . Martins Ferry, Ohio

RUBBER STAMPS for QSL Cards. Kits available. Free sample impressions. E & R Stamp Co., 50 Gerald Rd., Rantoul, Illinois.

QSLs At last! Something new in QSL cards! All orginal designs. Send 25¢ for samples. Yarsco Box 307, Yorktown Heights 2, N.Y.

Q-STAMPS Now $1.50! Postage stamp size photographs for QSL's! 50 large or 100 small, $1.50 per gummed-backed, perforated sheet. Free Samples. Q-Stamps, Box 149, Dept. 4A, Gary, Indiana. 46401.

QSL's Samples 25¢. Rubber Stamps; Name, Call, Address, $1.55. Harry Sims, 3227 Missouri Avenue, St. Louis, Mo. 63118.

QSL's—Brownie, W3CJI—3111 Lehigh, Allentown, Pa. Catalog with samples, 25¢.

QSL's 100/$4.00 High gloss, three color. Free samples, quick service. B&R Printing, Box 8711, Orlando, Fla.

QSL's, CB, WPE samples 10¢. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Arizona. 85017.

QSL CARDS Largest selection-Lowest prices. Samples & catalog, 25¢. Refund or 25 extra cards with your first order. Debbeler Printing, 1309-C North 38th Street, Milwaukee, Wis. 53208.

QSL's-SWL's or what have you. You name it and we will do it for you as you wish. Expert art work at nominal cost, enough said? R. McGee, 6258-103rd St., Jacksonville, Fla. 32210.

PICTURE of yourself, home, equipment, etc., on QSL cards, made from your photograph. 250—$7.50 or 500—$10.00 postpaid. Samples free. Write to Picture Cards, 129 Copeland, LaCrosse, Wis.

QSLs SWLs XYL-OMs (Sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fantabulous. DX-attracting. Protopay, snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSLs free samples. Fast service. Bolles, 7701 Tisdale, Austin, Texas.

RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box 7507, Kansas City, MO. 64416.

QSL's 3-color glossy. 100 $4.50. Rutgers Vari-typing Service. Free Samples, Thomas Street, Riegel Ridge, Milford, N.J.

CALL CARDS Badges, decals, goodies, illustrated literature with samples 25¢. Errol Engraving Att: K1VRO, Westfield, Mass.

QSLs Samples, dime. Print Shop, Corwith, Iowa.

1964 QSL catalogue. New Designs. 10¢. Longbrook, Box 393-Q, Quakertown, N.J.

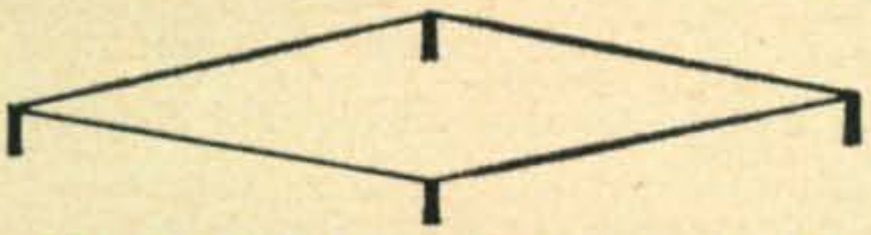
QSL CARDS $2.50 per 100 in three colors. Samples and catalog free. Garth, Box 51C, Jutland, New Jersey.

QSL CARDS. As low as $2.50 per 100. Samples free. Radio Press, Box 24C, Pittstown, New Jersey.

NEW! Unusual QSL's. Free samples. Johnny, P.O. Box 3554, Austin 4, Texas.

For further information, check number 50, on page 110

12 DB GAIN
100 DB F/B



RHOMBIC ANTENNA

You will have a superior signal. This is the same array that is used by American Telephone and Telegraph for their overseas communication.

- Controlled angle of radiation
- 2000 Watts PEP
- 600 Ohms Impedance
- 1.3:1 SWR

Your antenna is made of hard copper wire, insulators and termination resistor. Simple operating instructions are included. Order Now! ! ! Send check or money order.

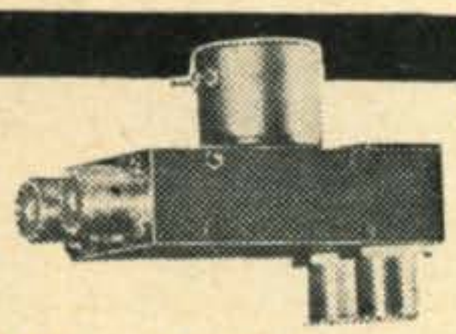
20 Meters	$44.95
15 Meters	$37.95
10 Meters	$29.95

The Hilliard Laboratories
P. O. Box 2614 • Macon, Georgia

For further information, check number 55, on page 110

DOW-KEY

DK2-60B
NEW COAXIAL TRANSFER SWITCH



A DPDT unit internally connected in the de-energized position. Ideal for switching in and out a power amplifier between an exciter and an antenna.

1 kw power rating to 500 mc; VSWR 1.15:1 to 500 mc; Isolation 60 db @ 1 mc; All standard AC and DC coil voltages available.

See your dealer for catalog sheet or write:

DK2-60B with UHF Connectors
$19.00
DK2-60B-2C with UHF connector and DPDT auxiliary contact $20.95
$20.95
(BNC, TNC, N and C slightly higher)

DOW KEY CO., Thief River Falls, Minn.

For further information, check number 56, on page 110

TRANSMITTER BC 223 AX
Brand new complete with all tubes

2,000 kc to 5,250 kc phone CW Marine Crystal or VFO 25 watts **$22.95.** Less tubes, **$17.95.**

Tektronix Oscilliscopes

511AD	$195.00
512	$225.00
513B	$350.00
514AD	$325.00
Ballantine vtvm Model 300	$49.00
HP/vtvm 400C	$75.00
URM25D Sig. Gen. 10kc to 20 mc	$295.00
URM26A Sig. Gen. 4 mc to 408 mc	$225.00
URM26B Sig. Gen. 4 mc to 408 mc	$295.00
TS419 Sig. Gen.	$395.00

COMMUNITY ELECTRONICS INC.
372 Fulton Avenue • Hempstead, L.I. N.Y.
Phone 516 IV 5-0055

For further information, check number 57, on page 110

QSL's 100/$1.00 200/$1.85. Postpaid. Use own rubber stamp. We sell. Sample and catalog 10¢. Directory of Certificates and Awards $2.50. K6BX, Box 385, Bonita, Calif.

WANTED: AN/GRC-3 thru 10, -19, -26, etc., RT-66, -67, -68, -70; R108, R109, R125, T-125, etc. Also receivers: 51J-, SP-600-, R-388, -389, -390, etc., and ARC-27, -34, -55, -6. Test Equipment—Military: TS-, -UPM, -URM, -USM; and commercial: H.P., G.R., Tektronix, etc. we pay freight. Amber Industrial Corp., P.O. Box 2129, Newark 14, New Jersey. Sell confidently. Our

ACCESSORY EQUIPMENT. Many specialties. Free Details. Halco., Box 283, Saxonville, Mass.

PRINTED CIRCUIT BOARDS Hams, Experimenters. Many different projects. Catalog 10¢. P/M Electronics, Box 6288 Seattle, Washington 98188.

HAMS Convert any television to sensitive, big-screen oscilloscope. Simple changes. No electronics experience necessary. Illustrated plans, $2.00. Relcoa, Box 10563, Houston, Texas.

WASHINGTON Amateur Radio News. Free copy. Foundation for Amateur Radio, 2509 32nd St., S.E., Washington, D.C. 20020.

WRITE for free lists of finest reconditioned amateur equipment. Guaranteed. On approval. Time payments. Buy the best for less. Henry Radio Company, Butler, Missouri.

TOP PRICES paid for AN/GRC-3 thru 9, GRC-26, 27 to GRC you name it. AN/URM, UPM, USM, SG-1, 2, 12, 13, any and all mil test sets. GR, HP, Meas. Corp, Boonton, ARC, Tektronix, all commercial sets, AN/ARC-27, 33, 34, 44, 52, 58, 65, etc. R-390, 389, 388, SP-600, BC-610, T-368, We pay shipping. Call, Write, Visit our store. Tech. Systems Corp. 42 W. 15th St., New York 11, N.Y. Call Ed. Charol, CH 2-1949.

ATTENTION HAMS! We buy, sell ham gear. Repair and alignment facilities available. Hold Advanced and First phone. Used gear always reconditioned. Money back guarantee. KitKraft Company, P.O. Box 406—Canal St. Station, New York N.Y. 10013.

COMMUNICATIONS teletype, unusual surplus bargains. Free flyer, MDC, 923 W. Schiller, Phila. 40, Pa.

ANTENNA tuning unit, brand new $3.00 postpaid (cost Navy $85.00). MDC, 923 W. Schiller, Phila., 40, Pa.

REMOTE CONTROL unit, 9 tubes, AN/ARW-26, brand new, complete, $5.00 postpaid (cost Navy $125.00) MDC, 923 W. Schiller, Phila., 40, Pa.

FOR SALE Complete instructions including 28 page booklet and 22″ × 36″ schematic for converting the ART-13 transmitter to a.m. and s.s.b. Satisfaction guaranteed. $2.50. Sam Appleton, 501 No. Maxwell St., Tulia, Texas.

STOP! Don't buy, sell or swap until you see the latest interesting offers in "Equipment Exchange"! 12 big issues $1 sample copy free. Write: Brand, Sycamore, Ill.

ATTENTION RTTY'ers. Typewriter ribbon re-inking device—$3.00 postpaid! WØAJL—Walter E. Nettles, 201 So. Eudora St., Denver, Colorado, 80222.

SAVE Discount Catalog 10¢ Mladenka Sales, Rt. 1, Box 84, Flatonia, Texas.

FREE Electronics parts catalog. Bargains. Save. Power transistor 2N155, $1.00. Western Components, Box 2581, El Cajon, California.

ARE YOU LOOKING for New Ham or CB gear? We have closed one of our stores and have many specials in over-stocked new equipment which might be just what you have been looking for at a price which is exceptionally low. Please inquire specifically your interest and we will quote a surprising stock reduction price. Graham Radio, Dept. BB, Reading, Mass.

12 DB GAIN forward. 100 db front to back ratio. Our rhombic antenna is superior to any other antenna on the market. We challenge you to find an antenna on the market with as much forward gain. We do not guarantee good performace, just the best. Specifications: 2000 watts p.e.p. 600 ohms impedance, swr 1.3 to 1, low Q, easy to match. Complete with high tensil strength copper wire, insulators, and termination resistor. This is the same antenna used by telephone companies for overseas communication. Sold on a fifteen day money back guarantee. Exact frequency must be specified. Order now! 20 Meters $44.95, 15 Meters $37.95, 10 Meters $39.95. The Hilliard Laboratories, Box 2614, Macon, Georgia.

TECHNICAL MANUALS for military surplus electronics. Stamp for list. W3IHD, 4905 Roanne Drive, Washington, D.C. 20021.

BARGAIN LIST, clearing out, transformers, meters, diodes, Variacs, relays, condensers, resistors dials. Ranger, excellent, mike, key, relay, manual, crystals, spare tubes, $110.00; Heath HR-10 Receiver, new, $59.00; Bud cabinet, door, casters, black, 78″, mint, $25.00; Homebrew power supply, panel mount, metered, 2000 vdc @ 375 ma, $45.00; Vibroplex Blue Racer, $10.00; 1 amp. Variac $2.00, 20 amp. $20.00; 3000 vdc, 2 kw power supply parts, write; 4CX250B, $15.00, 4X250B, $10.00, guaranteed. WØLWZ, 1030 So. Dudley, Denver, Colorado, 80226.

PAY CASH for tubes, test equipment, TS, URM, UPM prefixes. Commercial lab test equipment, need klystrons, magnetrons, broadcast & power & industrial tubes, ground equipment, PRC, GRC, etc. For best deal write Bob Sanett, 616 S. Holmby, Los Angeles, Calif. BR 9-1275.

WANTED: Commercial, Military, Alltypes, ARC, ARN, ARM, GRC, PRC, URR, URM, TS, 618S-T, 17L, 51R-X, APN, Others . . . ; RITCO, P.O. Box 156, Annandale, Va.

CRYSTAL BARGAINS. Free list. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

CW INKING RECORDER, BC-1016. Speed variable from 0-400 wpm. Records directly from receiver audio, or from key for making practice tapes. Tapes can be read visually, or run through TG-10 or TG-34 keyers. Brand new in original factory box, including all tubes, two manuals, extra pens, maintenance tools, power cord, etc.; $139.95 FOB Cleveland, Ohio. Telemethods International, 3075 E. 123rd Street, Cleveland, Ohio 44120.

20A **FACTORY WIRED,** vfo in factory cabinet, clean. $135.00 HT-18 VFO Clean. $30.00. BC-375 new. $25.00. Variac, 22½ amps. 120 volts, 60cy. $35.00. R.C.A. aircraft transmitter, AVT49, 3 to 13 mc. 50 w. $35.00. modulation transformer, 600w, universal. $35.00. SW3 and Velvet power supply. Best offer. Teflon sheets, about 101 lbs. $2.00 lb. vacuum variable, 10-150 mmf 23 kv. $25.00. Riders Radio Manuals, 2-20, excellent condition. $100. All prices F.O.B. and firm. S. Diamond, K6PUH, 12559 Baseline, Etiwanda, Calif.

LINE REGULATOR TRANSFER PANEL: Provides emergency operation directly from the unregulated power line if the regulator fails. Any failure below 104 volts, ac or an increase in output voltage above 125 Volts, ac, will cause the equipment load to be switched to the main power line to switch 1 kva loads. 117 volts 50-60 cycles 19 inches wide, 3½ inches high, 7 inches deep. Mfg. Philco Corp. Unit weight 4 lbs., unpacked, with instruction book, new $7.50 each. Atlantic Surplus Sales, 181 Sackett St., Brooklyn, N.Y. 11231.

VIKING RANGER for sale. $115.00. Has just 10 hours since factory overhaul. I am getting married and moving, has to go! Write or call Bob Martin, 145 East Monroe, Villa Park, Illinois.

WØGFQ OFFERS you hundreds of reconditioned equipment bargains. Write for free Blue Book list. Samples: Galaxy 300 with ac p.s. $289.00; Swan 40 $129.00; AF-67 $62.00; HT-37 $299.00; HX-50 $279.00; Invader $329.00; Viking 500 $389.00; Write Leo, Box 919, Council Bluffs, Iowa.

ELIMINATE MOBILE VIBRATOR NOISE. Revolutionary device outmodes noise-creating vibrator. Completely transistorized unit plugs directly into vibrator socket. No moving parts. Same size as vibrator. 12 Volts. Not a kit. Comes completely wired ready to use. For negative ground only. State make and model of transceiver. $11.95 ppd.—$5.00 deposit on all C.O.D. orders. Tel-Trol Systems, 2180 Bronx Park East, Bronx, New York 10462.

ELECTRONIC TUBES—Top brands sold at substantial savings! (Minimum Order $15.00). Authorized GE Distributor. Send for free Buyers' Guide for all your tube requirements. Top Cash pad for your excess inventory (New only—Commercial Quantities). Metropolitan Supply Corp., 443 Park Avenue South, New York, NY. 10016, 212 MU 6-2834.

BARGAINS. Buy, Sell, Trade ham equipment. Subscribe to HEED. 12 issues $1.00. Free sample copy. WA2NHH, 1225 Hillside Place, North Bergen, N.J.

Wanted: Back issues of QST, 1925-Nov, 1924-Feb., 1923-April, May, Oct, Nov. Must be complete and in good condition. Send description & prices. K2EEK c/o CQ.

Sell: 50 mc Gonset III, $150. K2QMM, Tel. 212 SP 6-8069. Local sale (N.Y.C.) only.

Sell: Heath HW-32 and ac supply, $200. Like new. K2QMM, Tel. 212 SP 6-8069.

CHEAP AND EASY SSB! CE-10A and vfo $65 HQ-100 with xtal bfo $85. K9KIC, 2333 Park Riverside, Ill. 447-3999.

WILL TRADE Apache, SB-10, NC-300, speaker, Shure mikes. Want S-line with 30S-1. Will ship. OAPQ P.O. Box 538, Lima, Peru.

RTTY CHANNEL FILTERS. Octal mounted, tuned. Specify frequency. $3.00 each. WA6JGI, 3232 Selby Avenue, Los Angeles, California. 90034.

FOR SALE OR TRADE: SX-27, SX-28, Techtronics 310 scope, Measurements Inc. Model 58 field strength and Noise level meter with ant. kit, used 4CX250B's, new sockets and chimneys, Brush Deviation Test Bridge, Type 1502, Galvanometer model 2310-C, Eico power supply Mod. 1020. Want: SX-101A, or equiv. WB2MEX.

PERSONAL PROPERTY plaques for portable rigs with name and address deep cut engraved and black enamel filled on 1" x 3" solid brass, bronze, silver or gold finished plate, $1.50 each or 2 with same engraving for $2.50. Station call plates on same material 1" x 4" with ½" letters $2.50 each. 1½" x 7" with 1" letters $3.50 each. Custom engraving for custom built rigs, submit sketch for quote. Aladdin Engravers, Box 186, Short Beach, Conn. 16407.

QSLs $2.00 per 100 postpaid. New style glossy 2-colors. Free sample. Hobby Print Shop, Umatilla, Fla. 32784.

HAVE MOVED, must sell: test bench with oscilloscope, signal generator, Variac, audio amplifier, power supply, and ten panel meters in vom. Junk box with thousands of parts: resistors, capacitors, transformers, relays, tubes, meters, etc. DX-40, VF-1, vhf and microwave rigs. QST's, CQ's. Others. K1LKR, 197 Hillside Ave., Neelham Heigrts, Mass.

NEW-TRONICS No. CD40 Rotatable cliff dwellers antenna for sale. Unused. Won at Ham fest. Make offer. W. M. McDonald, 1159 Osgood St., North Andover, Mass.

RTTY GEAR: Model 19 & 14-TD, steel table & W4TJU converter, Extras, all $200. K8BIT.

WANTED: DeForest Audion with screw base, "H" Tube, Oscillion, books, magazines, QSTs before 1926, Boonton "Q" Meter. Send description and prices. W9EWK, 610 Monroe, River Forest, Illinois. 60305.

FOR SALE in N.Y.C. only; RTTY equipment: Kleinschmitt page printer, TU unit with supply, Scope #14 Typing Reperferator, #14 TD All working except TD. Complete $250.00. Call 212 HY 5-3675.

NEED MONEY for college this fall. Must sell entire rig. SR-150 with ac power supply, HA-1 keyer with key, Knight swr bridge. AR-22 Rotor, Bud low pass, TA-33 Jr., B&W antenna switch. All in excellent condition. (Make offer.) WA8ASV, 1211 Milbourne, Flint, Mich.

1931-1932 issues of QST amateur radio magazine for sale, best offer. Write Dan Weisz, 15012 South St., Woodstock, Illinois.

RTTY MODEL 15 A1 shape many late model parts. Synch. motor with kit of most needed spare parts, and rack type "PAT" converter. First $150 takes. Hammarlund HQ-140-X, very good with manual $125. Some 255 relays with sockets $3.00. H.F. Smith ex-WV6FBJ, 6433 Cherry Lane, Rio Linda, California.

FOR SALE or trade. Hallicrafters transceiver SR-150 ac and dc pwr supplies mobile mount make offer. Collins 32S-1, 75S-1 with cw filter 516F-2 pwr supply and 312B-4 control unit gud wrking condx and appearance $795.00. Heathkit frone patch new $20.00. Clegg 99er like new $90.00 certified check or money order. W4VWW, 111 Coleman Court, Greenville, S.C.

FOR SALE: TX-1 Apache. Also 40' self supporting heavy duty tower, phone patch. Local deals on TX-1 and tower. K1MTM. Call 828-4271, 1147 Wash. St., Manton, Mass.

DX-40/VF-1 Excellent $50. Separte $42/13. Want high output plate modulator or parts for one; vhf equipment. Trade? Entman, 5001 Overbrook, Douglaston, N.Y. Phone FA 1-4247.

COMPLETE SETUP. Excellent shape. Worked WAS, WAC, etc. with low antenna. S-53, Adventurer, V-44, P-2 swr meter, QF-1, B&W T-R switch, xtals, key, bug, all connecting cables & connectors, cans, several antennas with polyfoam coax, audio filter, operating rack for equipment, all manuals, dozens of magazines and textbooks (124). I ship. Need for college. $135 too much? WAØAHV, Tom Ginkel, 1016 N. State St., New Ulm, Minnesota, 56073 (Also innumerable tubes and parts)

SWAP POLAROID CAMERA M-80 excellent condition for pair of walkie-talkies of equal value. M. Dalessandro, K3IGO, 1917 Haywood St., Farrell, Pennsylvania.

KWM-2 #11968, PM2 $895.00. A2com dc supply 250-12, $75.00 GSB-101 $150.00, HC-10 ssb converter like new $75.00, F455J05. Collins filter $25.00, Charles Wiley, W4DUY, 3407 Hardee Court, Hampton, Va.

5 WATT 27.065 mc transmitter $9.00. P. Cosseboom, 1309 Hyde St., #3 San Francisco, Calif.

LETS SWAP CLUB. Used electronics, mechanical, misc. items. Send list. stamp. CB equip. needed. Cabon, 1510 S. Dunsmuir, Los Angeles, Calif.

FOR SALE: HT-37 $350, SX-111 $175, Hy-Gain Thunderbird $75, Rotor $15. Or will sell all plus homebrew kilowatt, phone patch, ant. sw. and tubes for $625 Cash. Fred Wipperling 7146 Bradford Ave., Highland, Calif.

WANTED Barker and Williamson signal sideband generator Model 51SB-B and Hammarlund Comet Pro receiver in working condx. State price. All reply answered, SFC Eber Diehl, W7AMM, US Army Element JBUSMC, APO 676, New York, N.Y. 09676.

SELL OR TRADE: Heathkit mode IM-21 vtvm $20; Heathkit model O-10 dc oscilloscope $80; Olson model KB-141 signal generator and tracer $20; Olson model AM-191 tape recorder $45; Hallicrafters model S-72R receiver $45; Crestwood tape recorder serial number 5096 $65; Several transmitters and receivers surplus, tubes new and used: Charles Evens, 314 East Story, Bozeman, Montana.

HT-37 about two years old. Like new. Will ship in original carton. Best offer over $300. F.O.B. WØAGP, 11042 Spring, Omaha, Nebr.

4X250B (Eimac) 2ea, New, sealed in factory cartons, $25 each postpaid. Arnold Monday, Lancaster, Missouri.

DRAKE TR-3 Serial 1326 with ac and dc supplies complete for $625. Vox just modified by Drake to TR-3A configuration. Also Hunter Bandit 2000A Serial 439 with Hunter bias modification $475. Both units mint condition used less than six months. K4ZJF, Milt de Reyna, 4030 Hallmark Drive, Pensacola, Fla.

COLLINS 32S-1, 75S-3, 516F-2 with cables and manuals. $995. Ayres, 325 Washington Ave., Jermyn, Pa.

HIGH SCHOOL, college students . . . learn commercial radio announcing! 2,000 home-town radio stations need part-time disc jockeys, announcers, assistant play-by-play sports announcers! For books, magazines, write: Disk Jockey, Box 620-CQ, Pierre, South Dakota, 57501.

COLLINS 32S-1 xmtr $380. 516F-2 ps $80.00. KWM-1, 516F-1 $375. All like new. WA9KBL. 815-323-2486.

ATTENTION VHF CONTEST OPERATORS. The Mountain Top VHF RC, a world-wide contest club is open for membership. We need chapter presidents, in all 50 states. Small and large stations invited. Send for information and applications. Mountain Top VHF RC, 1424 Clinton Ave., So. Plainfield, New Jersey 07080

COLLINS 75A-4 receiver. Perfect. $500. Cash. 2.1 kc filter. Tom Murphy, 7319 Raton Street, Houston, Texas, 77055, phone OV 2-3032.

PEORIA HAMFEST September 20, Exposition Gardens, Peoria Area Amateur Radio Club. Registration $1.00 until Sept. 11. Write: Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Illinois.

SELL: Link 120 watt fm Base Station. Fine for six meters $60; KWM-2, MM-1 Bandscanner, $1050. Excellent condition never mobile. FOB Dallas. W5EEY, Melton Goodwin, 11421 Fernald Ave., Dallas, Texas, 75218.

IF WA2NHH and K9KIC will send a post card to the CQ offices we will send a free copy of the SSB Handbook by return mail.

WANTED 1945 issues of CQ magazine for CQ collection. Issues must be complete, including covers. Contact the CQ editorial offices concerning price and condition.

SX-100 HALLICRAFTERS receiver, perfect, $150. E. Long, 301 Jackson, Joplin, Missouri 64801.

TOROIDS uncased 88 mh 60¢ each or 5/$2.50. Fasold, WA6VVR, Box 34, Dixon, California.

COLLINS 51J4 or 51J3 wanted. State condition, price. Phone collect P to P. Mike Ercolino W2BDS 201—775—7252.

SELL: NC-300 receiver w/calibrator. Excellent condx. $150. Write Box R, c/o CQ, 14 Vanderventer Ave., Port Washington, L.I., N.Y.

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10 channel xtal controlled 200-400 mc, 115 v. 60 cy. power supply. Navy surplus and made to highest standards. Cost $2,500.00 ea. Used, fair condition.

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D.c. power supply mfg. for Mars or RDZ receiver. Input 115 v.a.c. 50/60 cy. Output 300 v.d.c. at 200 ma well filtered thru two 8 hy 200 ma chokes and two 10 mf capacitors thru a VR-150. 6.3 v.c.t. at 10 amps and 12 v.a.c. at 3 amps. Meas. 5½" × 9" × 17". Complete with tubes. Shpg. wt. 65 lbs. Cat. #S-6262

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Input: 115-230 v. 60 cy. Output: 525 v.d.c. at 335 ma., 6.3 v.a.c. at 8.5 a. New. Cat. #S-7116

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Type PP 6 3/M PN-1A. Input: 115 v.a.c. 60 cy. Output: supplies all necessary power for SCR-522. Condition: Good, used. Cat. #S-7115

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PLATE TRANSFORMER

Pri: 115 v. 60 cy. Sec: 1000-650-0-650-1000V at 750 ma. Cat. #S-7119

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FILAMENT TRANSFORMERS

Pri: 115 or 230 v. 60 cy. Sec: 6.3 v.c.t. at 6.5a. Cat. #S-7119

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cap.	w.v.d.c.	Price	2 for	Cat. #
20,000	MFD 25v.	$1.95	$3.00	S-7120
25,000	" 25v.	2.25	3.50	S-7121
20,000	" 30v.	2.25	3.50	S-7122
40,000	" 10v.	1.95	3.00	S-7123
40,000	" 30v.	2.75	4.50	S-7124
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0-1 MA DC METERS RUGGIDIZED

2½" Round Panel Meters. Cat. #S-7126

Price Only $4.95

R-44 3/ARN-5D RECEIVERS

Cat. #S-7127

Price $2.95

All prices are F.O.B. our warehouse Philadelphia, Pa.

All merchandise accurate as to description to the best of our knowledge.

Your purchase money refunded if not satisfied.

VHF TELESCOPING ANTENNA

Ideal for 2 meter mobile has large suction cup for instant mounting. New mfg. by RCA. Cat. #S-7128

Price $1.50

420 MC TRANSCEIVERS

Mfg. by Link for use in the 450-470 mc commercial band. But it can easily be converted for use in the 420 mc amateur band. These units contain two 6v. or 12v. vibrator-type power supplies (one for receive, one for transmit).

TRANSMITTER: 5894A tripler and final use tuned lines. All preceding stages are slug-tuned.

RECEIVER: Uses 6J4 r.f. Amplifier and 3 tunable cavities diode-mixer. Xtal-controlled oscillator chain with 6AK5 as final-tripler. Output with a tuneable cavity for tank circuit. 1st i.f. freq. 39 mc; 2nd i.f. freq., 5 mc contains 6 i.f. stages; xtal-controlled dual conversion.

The transmitter tripler and final amplifier can be easily removed and used to get on 420 mc by driving with your existing 2 meter transmitter. (req. approx. 2-3 watts of r.f. drive).

The receiver front-end can also be removed for use in a home-brew receiver. This dandy unit also contains 3 plug-in xtal ovens supplied with all tubes, xtals, speaker, mike, control box and cables, and antenna change-over relay. All units are used, but in good condition. This is the best deal we have had in a long time for the v.h.f. amateur. These units are useable "as is," or can be taken apart in sections to use as your imagination and technical skill permits. All parts are useable in some phase of amateur work. Schematic supplied. Cat. #S-7104

Price (f.o.b., Phila., Pa.) $34.95

MORE LINK TRANSMITTER-RECEIVERS

Same specifications as our $34.95 unit except the vibrators, 5894A, cables and mike are missing. Most of the small tubes are included. These units are excellent for stripping and using the tripler-amplifier chassis to get on 420 mc with about 2-3 watts drive on 2 meters. Type 829B tubes may be substituted for the 5894 at reduced output. Cat. #S-7129

Price $9.95

5894A TUBES

Price ..... $7.95 ea. or 2/$15.00

1-TDO TRANSMITTER COMPLETE WITH TUBES

Price $349.00

SILICON TOP HAT RECTIFIERS

400 p.i.v. @ 750 ma.

Price ..... 25¢ ea.; 10/$2.00 or 100/$17.00

SILICON RECTIFIERS: All 10 amp. d.c.

P.I.V.	Price	2 For
100	$1.00	$1.50
200	1.50	2.50
300	2.00	3.00
400	2.50	4.00

VHF COAX CABLE COUPLINGS

Amphenol Type 83-1 J

Price ..... 35¢ ea. or 4/$1.00

AUDIO LOW PASS FILTER

Boost your talk power. Pass band 300-2500 cy. rejects 3200 cy. and above 40 db. removed from new eqpt.

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Terms: Our terms are cash. All trade and cash discounts have already been deducted in our catalog quotations. All prices are net. F.O.B. Phila.

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For further information, check number 34, on page 110

NEW! LAFAYETTE 10-80 METER DUAL-CONVERSION AMATEUR RECEIVER Model HA-350 with MECHANICAL FILTER for HIGH SELECTIVITY

189.50

99-2524WX

In the HA-350, Ultra-Sharp Selectivity is Achieved by Means of a True Mechanical Bandpass Filter in the 455 kc IF Section. The Filter Consists of 3 Sections—an Input Transducer, a Mechanically Resonant Filter, and an Output Transducer.

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For further information, check number 32, on page 110

NEW NCX-5 ALL-BAND TRANSCEIVER FROM NATIONAL — $585

. . . The Finest Money Can Buy
At Half The Cost of Closest Comparable Equipment

The new NCX-5 transceiver is dramatically superior in features and performance to the finest equipment previously available, yet, at only $585, sells for the price of ordinary transceivers.

The NCX-5 was designed as a **total** amateur station for the 80, 40, 20, 15, and 10 meter bands, without compromise for either mobile **or** fixed station operation. Accordingly, the NCX-5 incorporates a linear solid state VFO with essentially **no** warmup drift — NCX-5 stability from turn-on is equal to the best tube type oscillators **after** "warm-up", and is unaffected by large excursions in temperature or voltage input. Dial calibration is by means of a technique previously found in only the most expensive military equipment — a digital counter read-out accurate to one kilocycle on each band with additional counter calibration to **100 cycles.**

To make comparison with existing equipment even more difficult, NCX-5 transmit and receive selectivity is by means of National's new 8-pole crystal lattice filter; superior to filters of **any type** ever manufactured for amateur use. Filter bandwidth is 2.8 Kc. at 6 db with a 6-60 db shape factor of 1.7:1.

Selectable upper or lower sideband is included, together with a new **Transceive Vernier** control to provide up to ± 5 Kc. separation of receiver frequency from the transmitter.

Other important features are □ VFO input for optional VFO console □ VFO console incorporates split-frequency crystal channels as well as tunable VFO functions, with sharp selectivity and sidetone oscillator for CW operation □ Built-in ALC (10 db) with ALC input for NCL-2000 2 KW amplifier □ **Two** R. F. stages in receiver □ New separate AM detector as well as product detector □ Front panel choice of built-in VOX, PTT or new MOX operation □ Easy access hinged cover □ 200 watt input on SSB or CW, 100 watts AM □ **Break-in** grid block CW □ Fast-attack slow decay AGC □ S-meter/plate meter □ May be operated from NCX-A or NCX-D power supplies □ Optional XCU-27 100 Kc. calibrator □ Mobile mount included □ National's One Year Warranty.

Delivery of National's new NCX-5 transceiver will be in September. Call or write your authorized National dealer **today** for trade-in information on your present rig, and make certain you're first in line for delivery!

ADDITIONAL NCX-5 SPECIFICATIONS — Frequency Range: With crystals supplied 3,500 to 4,000 Kc., 7,000 to 7,300 Kc., 14,000 to 14,500 Kc., 21,000 to 21,500 Kc., 28,500 to 29,000 Kc. (Three additional crystals required if coverage of entire 28,000 - 30,000 Kc. band is desired). **Types of Emission:** SSB (selectable upper or lower sideband), AM, CW. **Output Impedance Range:** 40-60 ohms, Pi network. **Frequency Determination:** Double conversion with crystal-controlled high frequency oscillators and tunable second oscillator. **Dial Accuracy:** One kilocycle over entire 500 Kc. tuning range on all bands. **Dial Calibration:** 100 cycles on all bands. **Tuning Ratio:** Identical on all bands; 10 Kc. per 360° rotation of main tuning control. **Frequency Stability:** Not more than 100 cycles variation in any ten-minute period from turn-on including variation in input voltage of ±10%. **Suppression:** Carrier −50db, unwanted sideband −50db, 3rd order distortion products −30db at full output. **Receiver Sensitivity:** 0.5 uv for 10 db S/N in SSB mode. **Audio Output:** Better than 2 watts; 3.2 ohms. **Microphone Input:** High Impedance. **Tube and Semi-Conductor Complement:** 20 tubes, 15 semi-conductors, 41 functions; Parallel 6GJ5's in P.A. **Dimensions:** 6-5/16" H, 13-5/8" W, 11-5/8" D. **Shipping Weight:** 26 pounds. **Power Requirements:** 700 V.D.C. @ 300 Ma., 280 V.D.C. @ 160 Ma., −80 V.D.C. @ 10 Ma., 12.6 V. @ 5 A.

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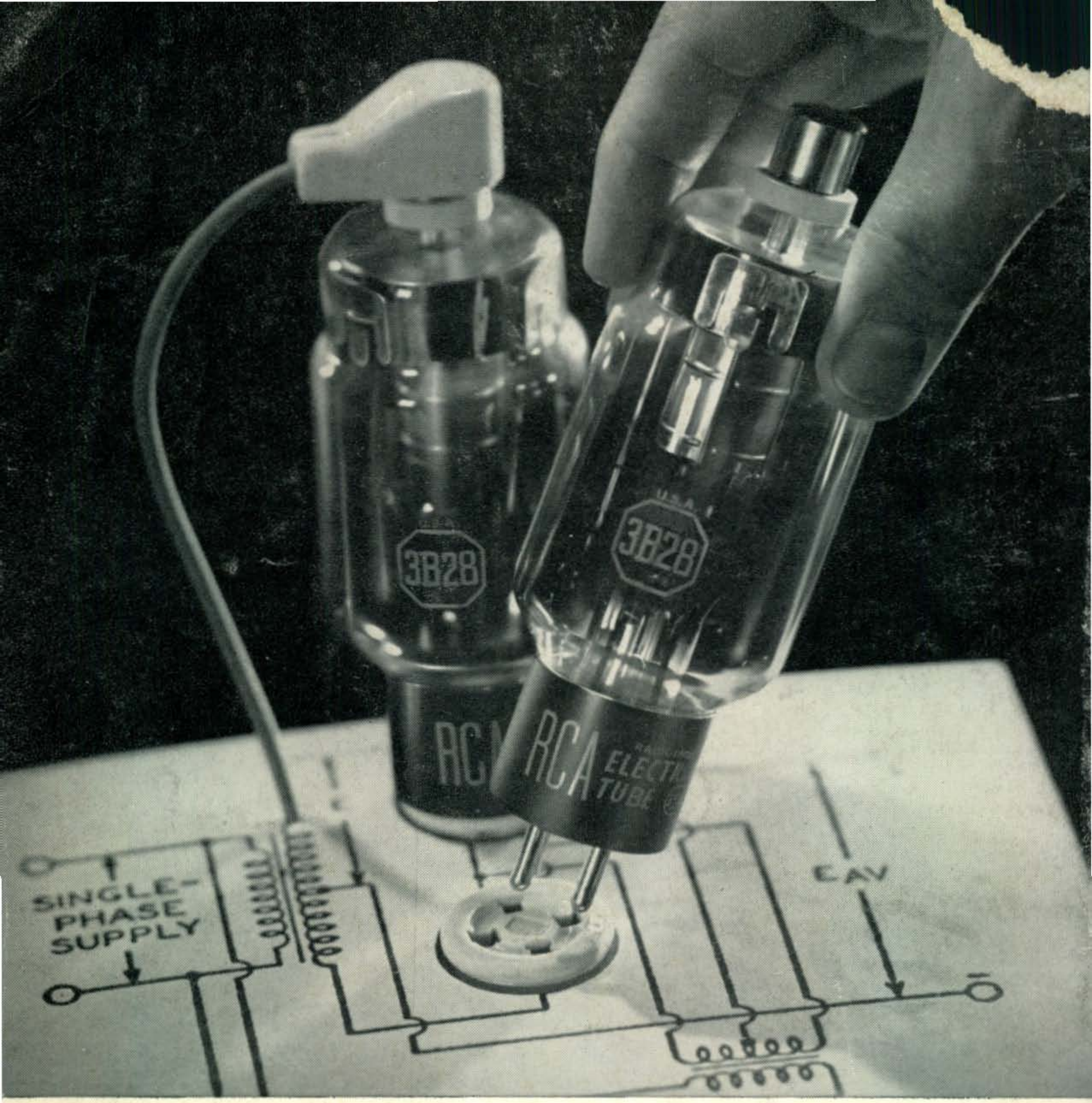
For further information, check number 7, on page 110



Goodbye "ARC-BACK"

Use RCA Xenon Rectifier Tubes

Do your rectifier tubes arc back, blow fuses during QSO's? Does noisy rectifier "hash" get into your receiver? Do you have trouble "firing up" when the shack is cold? If any of these problems are real to you, install RCA Xenon rectifier tubes—and forget them.

These remarkable high-voltage, half-wave rectifiers deliver maximum DC power at temperatures far below those where many power rectifier tubes won't even start. *Yet RCA Xenon rectifier tubes maintain full peak inverse voltage rating at operating temperatures far above those where ordinary rectifier tubes break down.* High overload capability of mercury-vapor types is maintained. DC output is as quiet as vacuum types—no rf filtering or shielding is needed. Tubes can be operated horizontally or vertically. Preconditioning is unnecessary.

Two RCA-3B25's handle up to 1400 watts of DC power. Two RCA-3B28's handle up to 1600 watts.

FACTS ABOUT RCA-3B25 and -3B28

RCA Type	Filament Ratings		Tube Voltage Drop	Operating Conditions, Single-Phase Full-Wave (2 tubes)			
	Volts	Amp.		Peak Inverse Volts	Max. AC Plate-to-Plate Supply Volts	Approx. DC Output Volts to Filter	Max. Out Am
3B25	2.5	5	10	4,500	3,000	1,400	1
3B28	2.5	5	10	10,000	7,000	3,200	0.
				5,000	3,400	1,600	1

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The Most Trusted Nam in Electronics