January 1964
50¢

ICD

CQ

- Voyage to Agalega
- Amateur Radio and the ITU Space Conference

The SB-8 SIDEBAND ADAPTER

See page 24

The Radio Amateur's Journal

This sign tells you you're dealing with a reliable, conscientious businessman, hand-picked as the finest in the land. It also tells you you're buying the finest amateur equipment available.

DEPEND ON IT

ALABAMA
Birmingham — Ack Radio Supply Co.
Huntsville — Electronic Wholesalers, Inc.
Mobile — Specialty Distributing Co.

ALASKA
Anchorage — Yukon Radio Supply, Inc.

ARIZONA
Phoenix — Southwest Electronic Devices
Tucson — Elliott Electronics, Inc.

ARKANSAS
DeWitt — Moory's Wholesale Radio Co.

CALIFORNIA
Anaheim — Henry Radio, Inc.
Burlingame — Amrad Electronics
Long Beach — Scott Radio Supply, Inc.
Los Angeles — Henry Radio Co., Inc.
Radio Products Sales, Inc.
Oakland — Elmar Electronics
Riverside — Mission Ham Supplies
San Diego — Western Radio & TV Supply Co.
San Francisco — Amrad Supply, Inc.
San Jose — Quement Industrial Electronics

COLORADO
Denver — Burstein-Applebee Co. of Colorado

CONNECTICUT
Hartford — Corky's Division, Hatry of Hartford

DISTRICT OF COLUMBIA
Washington — Electronic Wholesalers, Inc.

FLORIDA
Miami — Amateur Radio Center, Inc.
Electronic Wholesalers, Inc.
Orlando — Amateur Electronic Supply
Pensacola — Grice Electronics, Inc.
Tampa — Kinkade Radio Supply, Inc.

GEORGIA
Atlanta — Ack Radio Supply Co.
Specialty Distributing Co., Inc.

HAWAII
Honolulu — Honolulu Electronics

IDAHO
Boise — Robbies Radio and TV, Inc.

ILLINOIS
Chicago — Amateur Electronic Supply
Newark Electronics Corporation
Peoria — Klaus Radio & Electric Company

INDIANA
Fort Wayne — Brown Electronics, Inc.
Indianapolis — Graham Electronics Supply, Inc.
South Bend — Radio Distributing Co., Inc.

IOWA
Council Bluffs — World Radio Laboratories, Inc.
Des Moines — Radio Trade Supply Co.

LOUISIANA
New Orleans — Radio Parts, Inc.

MARYLAND
Wheaton — Uncle George's Radio Ham Shack
Division, Electronics Distributors, Inc.

MASSACHUSETTS
Boston — DeMambro Radio Supply, Inc.
Radio Shack Corp.
Reading — Graham Radio Inc.

MICHIGAN
Ann Arbor — Purchase Radio Supply
Detroit — M. N. Duffy & Co.
Radio Supply & Engineering
Kalamazoo — Warren Radio Company
Muskegon — Electronic Distributors, Inc.

MINNESOTA
Minneapolis — Lew Bonn Company
Electronic Center, Inc.

MISSOURI
Butler — Henry Radio Company
Kansas City — Burstein-Applebee Co.
St. Louis — Walter Ashe Radio Company

NEW HAMPSHIRE
Concord — Evans Radio

NEW JERSEY
Springfield — Federated Purchaser, Inc.

NEW YORK
Albany — Ft. Orange Radio Distributing Co., Inc.
Amsterdam — Adirondack Radio Supply
Buffalo — Genesee Radio & Parts Co., Inc.
Jamaica, Long Island — Harrison Radio Corp.
New York — Harrison Radio Corp.
Harvey Radio, Inc.

NORTH CAROLINA
Asheville — Freck Radio & Supply Co., Inc.
Winston-Salem — Electronic Wholesalers, Inc.

OHIO
Cleveland — Pioneer Electronic Supply Co.
Columbus — Universal Service
Dayton — Custom Electronics, Inc.
Toledo — Selectronic Supplies, Inc.

OKLAHOMA
Tulsa — Radio, Inc.

OREGON
Portland — Portland Radio Supply Co.

PENNSYLVANIA
Philadelphia — Radio Electric Service Co. of Pa.
Pittsburgh — Cameradio Company
Wyncote — "Ham" Buerger

RHODE ISLAND
Providence — W. H. Edwards Company

SOUTH DAKOTA
Watertown — Burghardt Radio Supply

TENNESSEE
Memphis — W. & W. Distributing Company
Nashville — Electra Distributing Company

TEXAS
Abilene — Howard Radio Company
Corpus Christi — Electronic Equipment &
Engineering Co.
Dallas — Amateur Electronics, Inc.
El Paso — McNicol Company, Inc.
Houston — Busacker Electronic Equipment Co., Inc.
Electronic Equipment & Engineering Co.
San Antonio — Radio & Television Parts Co.

WASHINGTON
Lynnwood — Cascade Electronic Supply
Seattle — General Electronics, Inc.
Spokane — Northwest Electronics, Inc.
Tacoma — C & G Radio Electronics Co.

WEST VIRGINIA
Charleston — Mountain Electronics

WISCONSIN
Fon du Lac — Harris Radio Corporation
Madison — Satterfield Electronics, Inc.
Milwaukee — Amateur Electronic Supply

For further information, check number 3, on page 110

EVERY PR CRYSTAL
is UNCONDITIONALLY GUARANTEED

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.

AMATEUR TYPES

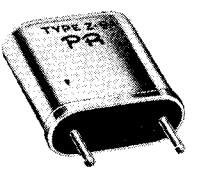
Fundamental, PR Type Z-2

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

AMATEUR TYPES

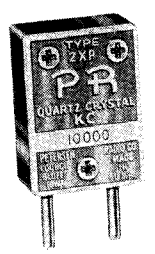
Third Overtone, PR Type Z-9A



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

6 Meters, PR Type Z-9A

Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 Mc., ± 15 Kc.; .050" pins. .....**$4.95** Net



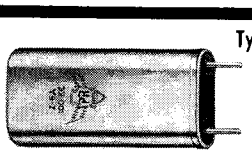
Type Z-1, MARS and CAP

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

Type 2XP

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

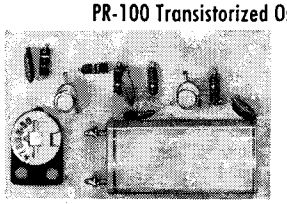
12001 to 25000 Kc. (3rd Overtone) ± 10 Kc. .....**$4.45** Net



Type Z-6A, Frequency Standard

To determine band edge. To keep 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

ORDER FROM YOUR JOBBER

PR Crystals

Since 1934

USE PR AND KNOW WHERE YOU ARE

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

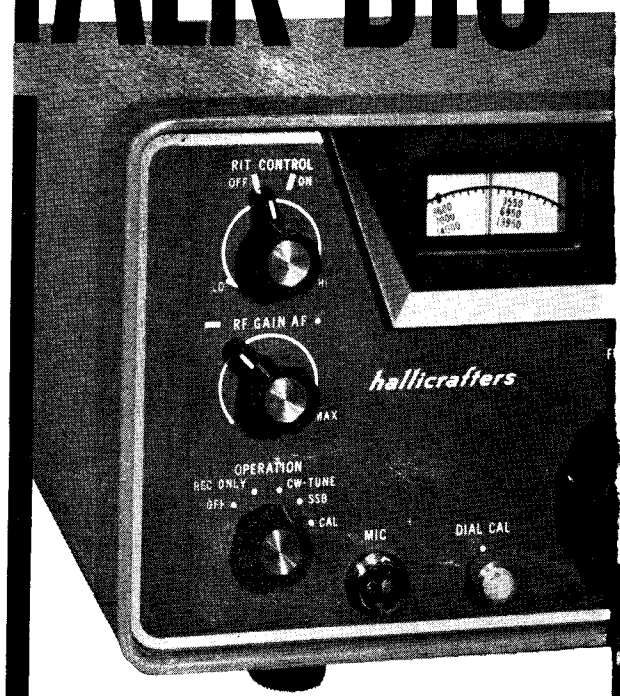
COMMERCIAL CRYSTALS AVAILABLE FROM 100 KC. TO 70 MC. PRICES ON REQUEST.

For further information, check number 1, on page 110

think small*...

TALK BIG

No one but Hallicrafters could shoehorn such sheer, unadulterated **talk power** into so beautifully compact a package as the new SR-160 Tri-band Transceiver. Why Hallicrafters alone? **Eight productive, successful years of SSB and transceiver experience,** leading to such advanced, exclusive techniques as **AALC (Amplified Automatic Level Control)** providing up to 12 db. of effective compression . . . **RIT (Receiver Incremental Tuning)** with ± 3 kc. for superior net and CW operation . . . and a superbly designed **crystal lattice filter** which makes the most of the desirable SSB transmission characteristics. **A built-in changeover relay** permits direct operation with the HT-45 or other linear amplifier. Sensitivity is **less than 1 μv for 20 db.** (yes, 20) S + N/N ratio. The receiver employs a separate AVC amplifier providing a figure of merit of 100 db. These and a dozen other outstanding features make the new SR-160 your best transceiver buy. Write for complete specifications or see your Hallicrafters distributor today.



* *Small size:* *13" x 6½" x 11"*
Small weight: *Only 13¼ lb.*
Small price: *$349.50 less power supplies and mobile mounting kit.*

NEW SR-160

Tri-band SSB/CW Transceiver

by hallicrafters

Fifth & Kostner Aves. Chicago, Ill. 60624

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

For further information, check number 2, on page 110

CQ

The Radio Amateur's Journal

Vol. 20, No. 1 January 1964

Editorial Staff

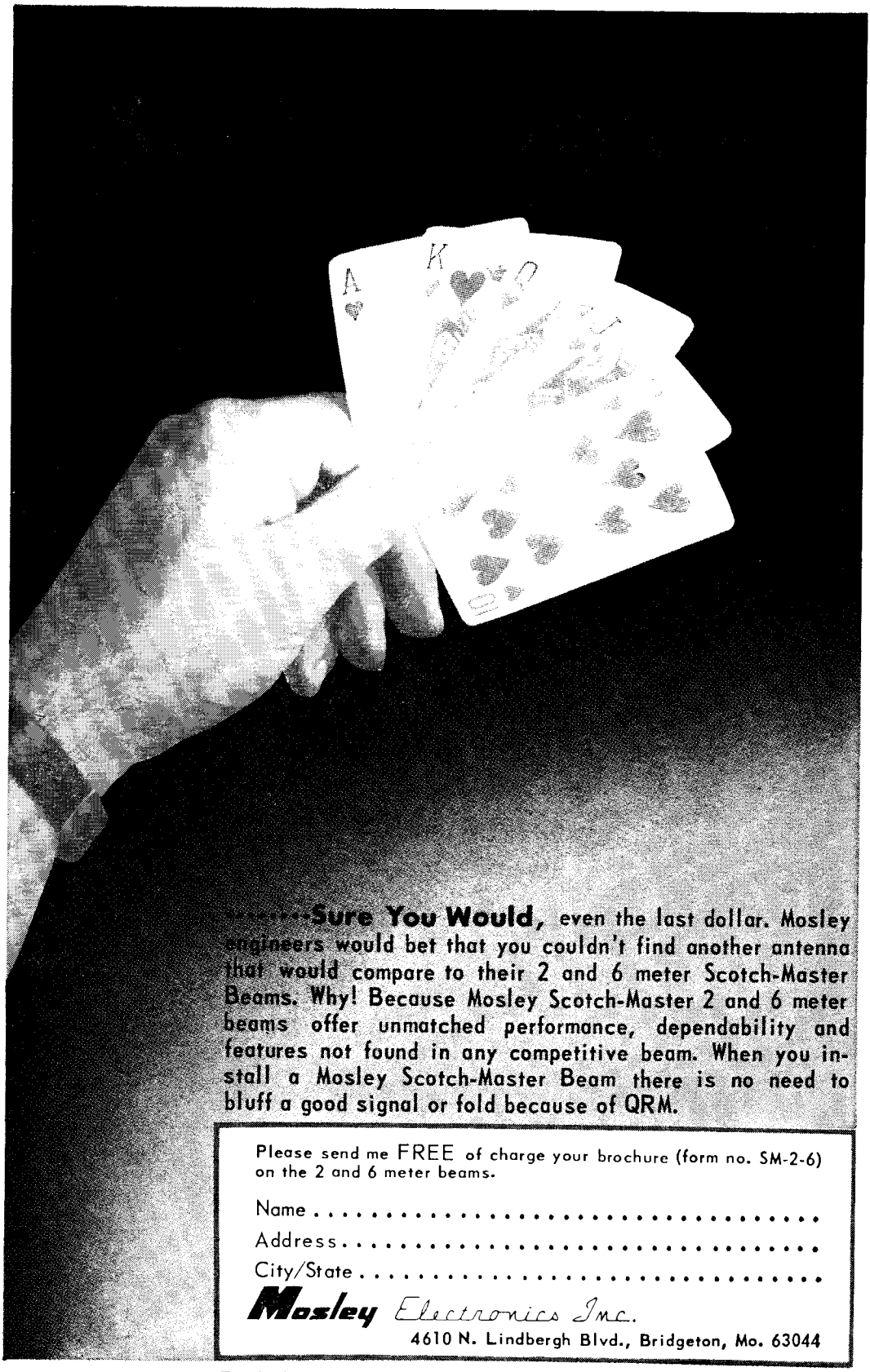
OFFICES
300 West 43rd Street
New York, N. Y. 10036
Telephone, 212 JUdson 2-4460

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

Table of Contents

Departments

For further information, check number 4, on page 110



For further information, check number 6, on page 110

ZERO BIAS

We are indebted to Herbert Hoover, Jr., W6ZH, President of ARRL, for permitting us to reprint his recent speech in this month's ZERO BIAS. *These down-to-earth comments, made at the Atlantic Division Convention on Sept. 1, 1963, we feel are required reading for all those still opposed to incentive licensing.*

ONE of the cherished traditions of Amateur Radio is the Open Forum which takes place at our conventions. Here we discuss our problems in open sessions, and the membership and their elected representatives have a chance to thresh out the policies and programs of the League.

First, I would like to make some observations as a result of my experiences as President of the League during the past year, and then join with you in whatever discussion may follow.

At its annual meeting on May 3, 1963, the ARRL Board, by unanimous vote, adopted a resolution of basic policy which has received wide discussion among radio amateurs—both inside and outside the League. In taking this action, in my opinion, the Board courageously faced up to a situation that has been growing in seriousness for some time. While the reasons for adopting the policy were due primarily to international developments, domestic considerations also entered into the decision.

Amateur Radio, organized as we know it, is soon to celebrate its fiftieth birthday. In this period, it has grown from a few hundred licensees to more than 250,000. The equipment has changed from relatively simple homemade gear to complex receivers and transmitters of sophisticated design and, often, of commercial manufacture. The frequencies available for amateur use have expanded from a small band near 200 meters, ordinarily useful for a few hundred miles, to the present harmonically related bands located throughout the spectrum. Under normal conditions, amateurs can now work each other anywhere in the world, at any time of night or day. As we look back, it has been a most extraordinary development.

Yet, in the process of this growth and progress, there is danger we may have taken some things for granted, without analyzing them very carefully, simply because they have become an accustomed habit. One of these is the continued availability of our high frequency bands from 1.8 to 30 megacycles, without which amateur radio would soon wither away to almost nothing.

We have had our high frequency bands for such a long time many of us have assumed they were ours on a permanent basis. Perhaps we slipped into this attitude because of our having discovered the "short waves" years ago, and therefore assumed at least a goodly portion of them would remain ours for keeps. The bands were ours to enjoy and do with as we pleased—so long as we stayed within bounds and did not use them for commercial purposes. From the standpoint of self-preservation, it seemed as though our only problem was to chase away occasional trespassers —and that, we assumed, was a job the FCC or some similar authority would do for us.

We would have little to worry about if all this were actually true; but unfortunately, as a matter of hard fact, such is not the case.

In practice, there is no such thing as a permanent frequency allocation. By International Treaties going back as far as the Berlin Conference of 1906, the nations of the world decided to avoid chaos in the radio spectrum by a self-imposed system of regulation. Each of them gave up their freedom to carve up the spectrum individually and essentially agreed to abide by the decision of the majority. Whether we as 250,000 licensed amateurs in the United States like it or not, our country has just one vote in an International Radio Conference, and it is no bigger than the vote of any other country, large or small, in the final countdown.

The first International Conference which made allocations of "short waves" was held in Washington in 1927. At the urgent insistence of our amateur representatives, [*Continued on next page*]

led by Hiram Percy Maxim, Amateur Radio was recognized for the first time as a full-fledged Telecommunications Service. This was despite vigorous opposition by many other countries who wished to give Amateur Radio no recognition whatever, or at best, to class it as an experimental hobby. The view of the United States was that amateurs had performed in the "public interest, convenience and necessity"; they were competent in their operations, and their technical contributions were of such far-reaching significance that they were justified in being formally designated as a "Service."

This does not in itself guarantee us any frequency allocations. We will have to fight for them in the future just as hard as we have in the past—and probably a lot harder. But it does make the job easier because we have a recognized status.

In subsequent conferences, the United States continued to maintain its support of the Amateur Service, and, in each instance, it has been joined by enough other countries—Canada in particular—to constitute a majority. However, there have been repeated proposals which, if they had prevailed, would have severely reduced or eliminated our amateur bands. As we shall see, the latter attitude will probably be much stronger in the future than heretofore.

At the next Conference, which may well take place within three to five years, there are expected to be more than 100 nations participating, and each will have an equal vote. Approximately thirty countries have come into being as brand-new nations since the last Conference in 1959, and this will be the first such affair they have attended. Most of them are among the rapidly developing countries of Africa.

There are thirty or forty additional nations which, although older, also have little or no amateur activity. It is significant that many of the proposals to curtail amateur activities in past conferences have been originated by this group. All of the nations, in both of these groups, have radio and communications problems which they feel are far more pressing than providing for an amateur service. It requires only simple arithmetic to realize that the sum of these two groups add up to substantially more than a majority of the whole.

The next Conference, when it occurs, will again be concerned primarily with the High Frequency portion of the spectrum—from 3 to 30 mc. This is the area where the most difficult interference problems must be resolved, and it is here, too, where our most valuable amateur bands are located.

The pressure for more high frequency channels is far greater than ever before. Almost all of the newer nations—and many of the older ones, too—feel they have a vital need for more short-wave broadcasting. They have great pride in their new-found sovereignty and they want to broadcast their virtues, philosophies and aspirations to the rest of the world. They feel a myriad of listeners are eager to hear their story if only a clear channel could be obtained. Unfortunately, all the channels assigned to broadcasting at the 1959 Conference are already overcrowded, and they must squeeze themselves into some other part of the spectrum—at least, they hope, until the next Conference rearranges the allocations to their satisfaction.

The desire for more broadcast channels falls primarily in the band from 7 to 22 mc. In this band, these countries also want more commercial frequencies to keep in touch with the world centers of diplomacy and commerce.

They also have an internal communications problem. Being sparsely settled, telephone and telegraph by land wire seem inordinately expensive, and radio links in the 3 to 7 mc part of the spectrum appear most inviting. Again, if these channels are occupied—as they usually are—then they move into the first vacant spot to be found.

A number of such stations have moved in on us already. What is not fully realized, at least by most amateurs, is that there will again be a concerted move to take over most—if not all—of our amateur bands. And let us not delude ourselves, there are the votes available this time to make it extremely difficult.

When the next Conference takes place, there is little we can do directly, as amateurs. These conferences are between governments, and, while the League and the IARU will have representatives present, we are only a small part of the over-all picture.

The final outcome will be determined by two things, namely (1) the attitude of the smaller countries, whose votes will be decisive, and who feel they are in desperate need of more space in the spectrum; and (2) how vigorously our own Government—and those of other countries where substantial amateur activity has been supported—will defend our frequency allocations.

The attitude of the newer and smaller countries will be largely determined by their own self-interest. They will not be impressed so much by the historic achievements of amateur radio in the past as by what it can do for them in the future.

It will help us in anticipating their reaction if we ask ourselves some straightforward questions. Are we, for instance, in the daily use of our frequencies, creating the kind of image we would like these governments to have about amateur radio? Are we demonstrating our full capability to serve the public interest? Are we trying to improve our technical competence and keep pace with the progress in communications generally? Does amateur radio have a serious side to it, or is it primarily a hobby for entertainment? The answers to these questions and to many more like them will largely determine what happens to amateur radio in the immediate years ahead.

There are serious and well-qualified amateurs in our government, and in vantage points outside,

who are pessimistic about the outcome if the present amateur trends continue. They believe there is a good possibility we will lose all or a good part of our most useful bands; and further sharing with the high-power broadcasting and commercial services, of those parts which might remain, will severely reduce their effectiveness.

The full impact of this situation has become increasingly apparent within the last year. The outcome will depend largely upon what we, as amateurs, can accomplish in getting our own house in order before the next conference begins to shape up.

Whether we like it or not, the rest of the world looks to us to set the standards for amateur operation everywhere. This would be true by sheer weight of numbers, if for no other reason, for we have 250,000 licensees out of the 350,000 world-wide. But in addition, as a result of our high power and big antennas, we put proportionately more loud signals into the ether than even these numbers might indicate. It places upon us a responsibility for performance we cannot escape; and whether it be a foreign amateur who is looking toward us for guidance, or a foreign government looking at our frequencies with envy, it is the *United States* Amateurs who must set the example and provide the leadership. This is a sobering reflection, and the only conclusion is that in the years immediately ahead we must do our utmost to genuinely up-grade the Amateur Service.

This conclusion is also re-inforced if we look at the domestic side of the picture, for if we are to be successful at the next Conference we must have the active and wholehearted support of our own Governmental agencies.

Amateurs have a proud record of making far-reaching and substantial contributions to the technical progress of radio. We have provided an indispensable source of skilled personnel in times of national emergency, and our activities in local disasters have been an invaluable public service. There are many additional amateur activities—more than it is possible to mention here—that have also made very real contributions to the public welfare.

There is still another aspect of amateur radio—the hobby side—that gives a tremendous amount of pleasure, enjoyment and thrill to those who actively engage in it. There is the opportunity to talk with old friends, as well as to make new ones. The challenge of working DX or of participating in a contest appeals to many in our ranks. Then, too—and perhaps above all the other aspects of ham radio—is the common bond of interest that lends substance to the friendships that are formed within the fraternity.

All of us treasure the pleasurable side of amateur radio. But we must never forget that pleasure and entertainment are not the reason we have our amateur bands today. There are other important services that have a very real need for more channels. In our absorption with the many interesting aspects of amateur radio, this is all

For further information, check number 8, on page 110

too easy to forget.

As a practical matter, the purely "fun" side of amateur radio—the so-called hobby side—is one of the extra dividends that comes along from having done a creditable job on the more serious side. There are such a wide variety of constructive activities available that it is often hard to tell where the serious stuff leaves off and the fun begins. This is something each individual has to decide in his own conscience. But the serious side cannot be left for somebody else to do if we expect to keep our ham bands indefinitely.

A good example is the Citizens Band, which has been giving our regulatory authorities so much concern of late. It was originally intended for a multiplicity of business and personal communications, but it has been gradually taken over by literally thousands of individuals who found that chatting over the air could become a most engrossing hobby. Interference from this source has become so great that the original purposes were lost, and the FCC is now considering a drastic revision of the assignments. There is an undeniable moral in this for Amateur Radio.

A high FCC official, once an active amateur himself, said in a public speech recently that the Citizens Band "had all the bad features of amateur radio and none of the good ones." This is worth serious reflection, especially considering the source from which it comes.

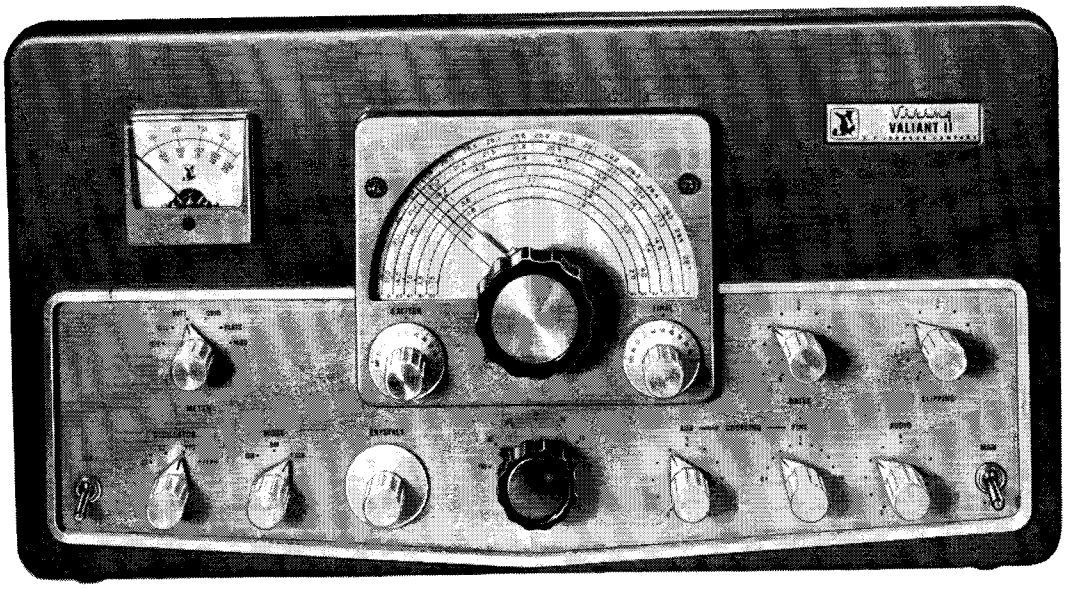
In view of all these circumstances, it is useful to consider again just why we have our present frequencies. The amateur bands were made available to us instead of to other essential services because it was believed to be in the over-all national interest. The purpose was to create a body of technically competent and experienced operators; who would advance with the radio art and, wherever possible, make substantial contributions to its continued progress; and who would be active in promoting the public welfare. These definitions occur all through the legal justification for our domestic existence. In turn, it is basically on these grounds that our Governmental agencies are able to support us at the international level.

During the annual meeting, the directors considered both the international and the domestic situations at length. It was recognized that unless vigorous measures were taken there was a grave possibility we might lose a substantial part of our high frequency bands at the next international conference. Furthermore, the Board concluded this was not a matter that could be counteracted by strenuous arguments alone. Such arguments would have to be accompanied by a genuine upgrading of the amateur service itself if the future could be faced with any degree of confidence.

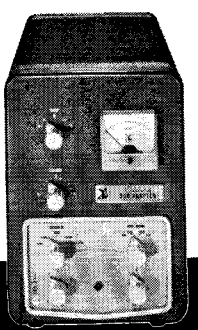
It was also recognized that there was no single solution to the problem, and that any changes which might be recommended in licensing procedures would be only one aspect of a broad program.

It was emphasized that such things as crowded band conditions, poor operating and technical

VALIANT II—Outstanding flexibility and performance—band-switching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Provision for plug-in SSB operation with no internal modification.
Cat. No. 240-105-1 Kit . . . **Net** $375.00 **Cat. No. 240-105-2** Wired, tested . . . **Net** $495.00



VALIANT II SSB ADAPTER



SSB ADAPTER—Filter-type SSB generator—bandswitching 80 through 10 meters—more than 50 db sideband suppression—more than 45 db carrier suppression. Features built-in multiplier requiring VFO input only—design and front panel make operating practically foolproof! Wired, tested.
CAT NO. 240-305-2 . . NET 369.50

If you, like many of today's amateurs, find yourself with your interest fairly equally divided between working AM/CW and SSB, there's a real feeling of frustration with most available equipment. Why? Because most AM rigs require extensive modification to operate SSB—and no SSB rig offers high level AM and Class "C" CW—and the end result is compromise in one mode or the other! Not so with either Viking SSB Adapter/Valiant or SSB Adapter/Valiant II combinations! Now, keep your contacts and work old friends no matter what portion of the band they operate in, and no matter what mode they use!

VALIANT OWNERS—You can make the conversion to SSB operation with a few simple modifications and the Viking "Valiant" SSB Conversion Kit.

Complete Catalog
Send for Amateur Catalog 962 giving detailed information on our complete line of amateur transmitters and accessories.

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

For further information, check number 13, on page 110

procedures and lack of courtesy could not be cured by stiffer licensing requirements or, in most instances, by governmental monitoring. The only recourse for these ills would have to come through the voluntary action of amateurs themselves. The headquarters staff, including the communications, technical and editorial departments, were instructed to do everything possible to publicize and implement the program. Its success would depend upon education through *QST* and other publications—both inside and outside the League—by the cooperation of councils and clubs, and by the on-the-air conduct and diplomacy of conscientious and responsible amateurs everywhere. It was fully recognized that the voluntary aspect of the program was at once the most important and yet perhaps the most difficult to implement.

In arriving at its recommendations for changes in licensing procedures, it was believed a moderate increase in licensing requirements would achieve a necessary upgrading of our level of technical competence. There was no intention or desire to take anything away from anybody, nor was there any idea that only advanced electronics specialists should be able to quality. On the contrary, an examination was envisioned which could be passed by almost any amateur who had had a year of more active experience as a General or Conditional licensee and who would be willing to apply himself to a reasonable amount of study of the material that was readily available in the amateur handbooks. The proposal specifically recommended that no additional code test over and above that already included in the General Class license should be required, and there should be ample time to take an examination after it became available and before its use would be necessary.

It was not the purpose to correct overcrowded band conditions by restricting operation to a selected group. On the contrary, it was believed the maximum useful occupancy of our bands was desirable in order to demonstrate the necessity of our present allocations.

The Executive Committee and the officers were directed to work out the details of the licensing recommendations within the framework of the broad policies which had been laid down. This is now being done and it is expected specific proposals will be made early this fall, after further consultation with the directors has taken place.

It was realized that an over-all program with the ramifications outlined here could not be put into effect over night. Its success could only be measured in terms of years. Nevertheless, it was felt time was running out and a start should be made immediately.

It was also realized there would be opposition to parts of the program by some elements and individuals within the amateur ranks. In view of all the surrounding circumstances, however, the Board believed it had no alternative except to

[*Continued on page 109*]

Read all about the McCoy Golden Guardian Filter on Page 24

For further information, check number 15, on page 110

Tools

Editor, *CQ*:

Congratulations on the exceptionally interesting issue of *CQ* for November 1963. The thirty-three pages on tools and workshop practices is outstanding and should be required reading for all hams. It is particularly impressive when compared with the 1½ page immature and allegedly humorous article on the same subject in the November issue of another ham magazine which also purports to feature "Tool and Workshop Practices." I note with interest in the latter article that the author has never had to replace a broken drill due to the new "chissis" he acquired.

G. L. Countryman, W4JA
75 East Bay St.,
Charleston, S. C. 29401

Editor, *CQ*:

This is just a brief note to congratulate you on the excellent supplement on hand tools which appeared in the November, 1963 issue of *CQ*.

We are certain this material will prove of great value to the radio amateur in pointing out the great variety of hand tools available to make his hobby more worthwhile. Mr. Scherer is to be congratulated on a difficult job well done.

George P. Byrne, Jr., Secty.
Service Tools Institute
53 Park Place
New York 7, N. Y.

Editor, *CQ*:

It was a most worthwhile effort to produce the "Tool & Workshop" article in your November issue. I have been building for five years, but still learned a great deal from this section.

The author has had the exeprience when, on page 57 he says, "It [solder shaken off soldering irons] especially should be kept clear of trouser legs and one's socks."

Keep up the good work.

Bill Hadley, K3SGA
108 Sixth Avenue
Collegeville, Penna.

Ham Clinic

Editor, *CQ*:

I would like to express my interest in, and appreciation of the HAM CLINIC department of *CQ*.

—K9CPT

Editor, *CQ*:

I would like to see HAM CLINIC not only continued but expanded. . . .

—W7IFD

A Correction

Due to a typographical error, the context was changed in a Letter to the Editor by G3BID in the November issue, (p. 12). The last sentence of the second paragraph should read, "Many of our great men had most *un*distinguished acadamic careers."

Protect Your Equipment?

Editor, *CQ*:

Dale and Morey (November, *CQ*) suggest dogs as good burglar insurance.

I suggest extreme caution to this approach! In the first place, the Humane Society would be all over you if you leave a dog unattended while you take off on a vacation.

Furthermore, if the dog gets loose in the heavily populated areas in Nebraska, meaning primarily Lincoln and Omaha, just the fact of being loose lays the owner open to a fine from $5 to $100—Nebraska Statutes 54-608. If a dog does damage, or bites a meter reader, paper boy, milkman, or anyone else on your property legitimately or bites anyone off your property at all, you are open to claims for damages—Nebraska Statutes 54-601. If a loose dog does damage off the owner's property, the owner is further liable to a fine of from the amount of the damage to twice the damage, over the liability to civil recovery—Nebraska Statutes 54-613. . . .

This hardening of attitude toward dogs is nationwide, varying only in degree. It has it's roots in steadily rising numbers of complaints involving bites, property damage, loss of livestock, and general nuisances.

Eugene Austin, WØLZL
1334 N. 20th Street
Lincoln, Nebraska

The author's expert knowledge of dogs comes from material prepared for an article in a local Lincoln newspaper.—*Editor.*

License Fees

Editor, *CQ*:

Concerning the impending application fees, it may become quite obvious that the notion of fees will be rather obnoxious to some of the brethren, and I would like to point out a few facts in the event some of them label the FCC unfair.

Being "amateur" in nature, we are inclined to object to anything that might indicate we are otherwise. Observing it another way, paying for the use of something intangible, such as a portion of the frequency spectrum somehow doesn't harbor a convincing appeal.

However, looking at it from still another viewpoint, the instigation of the application fees is in reality a boon for the amateur service. By its very existence, we as amateurs will no longer be a "parasite" service whereby we were issued licenses, and looked after gratis. To a certain extent, we will now pay our own way . . .

I sincerely believe it will alleviate a certain amount of unfavorable censuring, and may to a certain degree create a stronger position for the amateur service. In a sense, the concept of application fees constitute an excellent example of applied psychology in our favor. No one, but no one desires to abolish a source of added revenue!

Frank A. Phillips, W4LCY/HS
Bangkok, Thailand

SBE AGAIN!
with most for least

....SB1-LA LINEAR AMPLIFIER

Exceptional . . . in its compactness . . . in its high power . . . in its modest price . . . new 1000 watt P.E.P. four-band amplifier (80-40-20-15). **Small** . . . a size match for **SB-33 transceiver** and a companion unit **to make up a pair without equal** as a multi-band mobile combination. But SB1-LA will also work with any SSB transceiver . . . can boost its output to a full KW in fixed or mobile service.

This new linear incorporates every desirable modern feature. Stable, with passive grid input, it offers a 50 ohm resistive load for SSB exciters. Operation is Class AB-1 for low distortion. Output is conventional pi network.

SB1-LA applies the desirable technique of low plate voltage (only 800 volts) and high plate current. This lower plate voltage is far easier on capacitors—diode rectifiers—transformers—insures safer operation under environmental extremes.

All-solid-state, 117V AC heavy-duty power supply is **built in.** (No rectifier tubes).

Tubes used are 6JE6's—six of them, parallel connected. These are standard, low cost types, available anywhere. (See specifications below for other features.)

$279.50

Please send full information on SB1-LA Linear and SB-33 Transceiver.

NAME

NUMBER STREET

CITY ZONE STATE

Bands: 80-40-20-15 meter amateur bands.
Power rating: 1000 watts P.E.P. input. (750 watts 15 meters). 400 watts AM.
Drive requirements: Approx. 75 watts for full rated output.
Input impedance: 50 ohms resistive.
Output impedance: (antenna) 50 ohms, unbal. VSWR 1.5 or less.
Power supply: Built-in all solid-state, 117V AC.
Primary power requirements: 115V AC @ 12A max. at peak output. (DC) **Standby:** 12.6V (nom) @ 7.5A. **Peak:** 12.6V @ 110A.
Tubes: Six, type 6JE6. (parallel connected).
Control circuits: Antenna switching relays (2) built in. Rear terminals for transceiver relay control.
Size-Weight: 5½"H, 11¾"W, 11¾"D. Weight 35 lbs. approx.

SBE SIDEBAND ENGINEERS
317 Roebling Rd. So. San Francisco, Calif. An operation of Webster Manufacturing

For further information, check number 19, on page 110

To Build or Not To Build

Editor, *CQ:*

In answer to a recent letter about today's hams relying on manufacturer's products and doing no building of their own, I would like to state the following:

So often, details, clear to the old timer, are not fully explained, leading Novices to confusion and frustration. Schematics are shown without mention of parts placement, or specifications are incomplete.

I wanted to build a piece of equipment from a recent article. The parts listed a coil thusly: 16T Air Dux #816. How am I to know what Air Dux #816 is? Another coil was simply 2T hookup wire. Two turns of what?

All this discouraged me from building and I will probably buy a commercial version of the article.

I appeal to you more experienced hams, when writing construction (and theory) articles, not to take details for granted and explain things fully.

Robert Entman, WN4RBX
5300 West Grace St.
Richmond 26, Va.

F. M. On Six

Editor, *CQ:*

Regarding your ZERO BIAS for July, 1963; while I have no quarrel with your views or opinions I do with your statement that "operation rarely, if ever, extends beyond the lower two megacycles" (of the six meter band). In Northwestern Kansas and Southwestern Nebraska alone I know of well over 200 obsolete commercial f.m. transmitters and receivers that have been purchased and are either converted or are in the process of conversion for use above 52 mc. A large percentage of these are in use on 53.360 mc.

I placed my set in service on Nov. 11, 1962 and since then 400 contacts have been logged. There are

[*Continued on page 88*]

We wish all our readers a Happy and Prosperous New Year

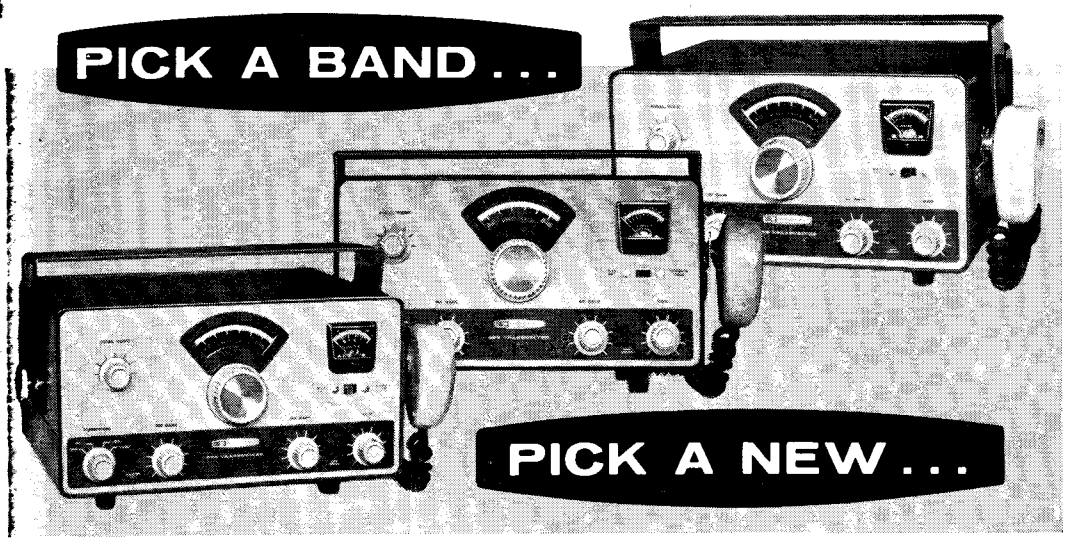
California DXers

The 15th Annual joint conference of the Northern and Southern California DX Clubs will be held on January 11-12 at the Madonna Inn, 100 Madonna Road, San Louis Obispo, California. Registration starts Saturday at noon and price is $9.00 which includes Banquet, breakfast and all activities. The SCDXC is taking registration via Dave Cohen, WA6HGC, 1755 Holly Oak Drive, Monterey Park, California. Prizes and prominent speakers are on the agenda.

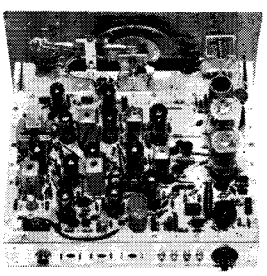
Vacation

Chet Brandon, PJ5CE will accept reservations starting January 15th for a ham vacation at his Coral Cliff Hotel in the Netherlands Antilles. All hams with a valid license will get a chance to operate PJ3CC which is

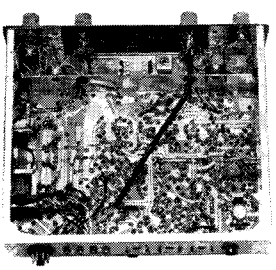
[*Continued on page 88*]



HEATHKIT SINGLE BAND SSB TRANSCEIVER . . .
JUST $119.95 EACH . . . 80, 40 or 20 METERS



80, 40 & 20 METER SSB TRANSCEIVERS—Brand new! More features . . . better performance . . . at one-third the cost of three-band units. Save by buying only the bands you need • True Transceiver for one band, one sideband operation • Crystal filter type SSB generator • Automatic level control • PTT and VOX circuits built-in • Low frequency VFO (1.5—1.7 mc) for greater stability than comparable units • 2 KC dial calibration; 6" of bandspread; vernier tuning • Provision for operation with linear amplifier • Easy assembly with heavy-duty circuit board, rugged steel chassis and wiring harness • Welded and braced one-piece steel chassis & cabinet, gimbal mounting bracket • Accepts Heathkit HRA-10-1 100 KC Crystal Calibrator as plug-in accessory • Uses GH-12 push-to-talk microphone • Operates with new Heathkit HP-13 (DC) or HP-23 (AC) power supplies; also Heathkit HP-10 (DC) or HP-20 (AC) supplies **HW-12, 80 meters; HW-22, 40 meters; HW-32, 20 meters; $119.95 each. HP-23,** AC power supply, **$39.95; HP-13** DC power supply, **$59.95.**



SPECIFICATIONS—RF input: 200 watts PEP. **Sideband generation:** Crystal lattice bandpass filter method. **Stability:** 200 cps per hour after warm-up. **Carrier & unwanted sideband suppression:** 45 db. **Frequency coverage:** HW-12, 3.8-4.0 mc; HW-22, 7.2-7.3 mc; HW-32, 14.2-24.35 mc. **Receiver sensitivity:** 1 uv for 15 db S+ N/N ratio. **Receiver selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32, USB. **Audio output:** 1 watt @ 8 ohms. **Mike input:** Hi-Z. **Panel controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter. Front panel screwdriver adjust for S-meter and VOX delay. **Rear panel controls:** Mike gain, tune level, final bias. **Tube complement:** Fourteen tube heterodyne circuit; (3) 6EA8's mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amp., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12), Het, Osc. and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc. product det.; (1) 6EB8, Audio amp. and output; (2) 6GE5 RF output. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, −125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet dimensions:** 6¼" H x 13" W x 9¾" D.

HEATHKIT® by Daystrom

FREE CATALOG
Send for your free copy today!
Fully illustrates over 250 exciting Heathkits at savings of 50% or more! Choose from the world's largest selection of quality Test, Amateur Radio, Marine, Hi-Fi, Educational and General Hobby kits.

HEATH COMPANY
Benton Harbor, Mich. 49023

12-1-1

Enclosed is $_____, plus postage. Please send model(s)_____.
Please send Free 1964 Heathkit catalog.

Name_____

Address_____

City_____ State_____ Zip_____

AM-132

For further information, check number 21, on page 110

BETTER THAN EVER FOR '64!

Clegg's GREAT NEW

INTERCEPTOR B

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

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

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

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

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

NOW ADD
SUPERB GENERAL COVERAGE
3 THROUGH 30 MC
TO YOUR INTERCEPTOR RECEIVER
(Either B or Earlier Model)

The new Clegg ALLBANDER converter/speaker combination, attractively packaged in a matching cabinet, now extends the tuning range of any INTERCEPTOR receiver to completely cover all frequencies (with the exception 22-27 MC) between 3 and 31 megacycles.

Frequency range and preselector controls provide easy selection and matching of the desired tuning range while the INTERCEPTOR contributes superb selectivity, sensitivity and stability. After adjustment to the desired frequency segment all tuning is accomplished with the INTERCEPTOR'S main tuning dial.

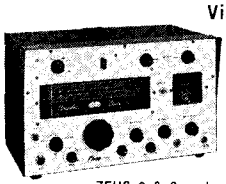
With the ALLBANDER your INTERCEPTOR will not only receive all ham bands between 3-30 MC but also intermediate frequencies where many desirable signals (WWV, Citizens Band, foreign broadcast, etc.) are found.

Operating power is supplied by the INTERCEPTOR.

Clegg ALLBANDER/Speaker—Amateur Net $129.95

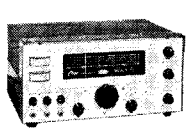
For other Squires-Sanders products see opposite page.

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

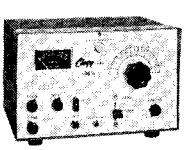


ZEUS 6 & 2 meter transmitter 185 watts AM & CW . . . $695.00 amateur net

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



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



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

See your Distributor or write for information.

Clegg LABORATORIES
Division of Squires-Sanders, Inc.

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

For further information, check number 22, on page 110

The New Standard of Performance

The SS-1R sets a new standard of performance for amateur band communication receivers. A completely new front end design[1] provides superb freedom from cross modulation and overload, while the low noise balanced mixers deliver superior sensitivity — with *no r.f. stage.* Steep-skirted crystal bandpass filters and newly developed high-Q IF circuits provide optimum selectivity with greater than 80 db ultimate attenuation. Extreme linearity, double loop AGC and front end freedom from cross modulation make this selectivity as effective as though it were *at the antenna terminals.* Frequency precision and stability exceed that of most frequency meters; frequency is read directly on a *digital* display.

There are many new operating conveniences not found in other amateur equipment. The unique SS-1R design, plus fixed tuned WWV positions at 10.0 and 15.0 MC (and an auxiliary 5.0 to 5.5 MC band), permits autocalibration of the amateur bands — *with no cursor lines to twiddle.* The manual tuning rate is slow enough for easy and exact sideband tuning — 10 kc. per knob revolution — while pushbutton motor tuning gives fast traverse. An optional noise silencer accessory with spectacular performance[2] is available, as will be a Video Bandscanner. The SS-1R may be operated in transceiver mode with the SS-1T transmitter.

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

SPECIFICATION PROFILE

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

Squires-Sanders, Inc.

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

For further information, check number 23, on page 110

The SB-8 A Filter-Type Sideband Adapter

BY HARTLAND B. SMITH*, W8VVD

Described below is an 8-tube home-brew sideband adapter capable of salvaging many a fine a.m. rig from the scrap heap. It is a bandswitching 80-10 meter unit based on the reasonably priced McCoy "Golden Guardian" 9 mc filter. Construction and alignment are uncomplicated, with cost in the vicinity of $100 for parts.

THERE'S no use denying it, sideband is here to stay. The question is no longer whether to make the change to sideband, it is how to accomplish the transition.

Unfortunately, many hams are saddled with expensive a.m. rigs that have suddenly lost much of their trade-in value. Furthermore, since a large number of us still enjoy working a.m., we're not overly anxious to acquire new gear that won't operate on a.m. at all.

A logical, and relatively low cost, solution to this dilemma is to procure an s.s.b. adapter and hook it into your present a.m. rig. Rather than purchase an adapter, I decided to build one myself. The result is the SB-8 described here.

Costing in the neighborhood of $100.00, its performance compares favorably with that of the most expensive factory-made s.s.b. rigs.

The unit was designed primarily for insertion between the driver and final amplifier of an a.m. rig. However, there is no reason why you can't tack it onto the output of a low-power a.m. or c.w. transmitter and then use a linear amplifier to boost the signal several hundred watts.

The adapter will convert r.f. at the transmitting frequency into a high quality s.s.b. signal at the same frequency. Thus, if you feed a 7.23 mc carrier into it, you'll get 7.23 mc s.s.b. out. Likewise, if you use a 21.407 mc carrier, you'll obtain 21.407 mc sideband.

*467 Park Ave., Birmingham, Michigan.

Circuit Description

The method of accomplishing the conversion from carrier to sideband can be readily understood after a few moments spent in studying the block diagram, fig. 1.

A 6C4, (V_1) acts as a crystal controlled carrier oscillator which may be switched 1500 cycles above-or-below 9 mc. It's output is applied to the grid of the balanced modulator V_2, G.E.'s new 6JH8 sheet-beam tube. As a result of its unique dual-plate design, V_2 effectively suppresses the carrier. Audio from speech amplifier V_3 unbalances V_2 and causes two sidebands, minus carrier, to appear at the plates of the balanced modulator.

The 2.7 kc passband of the McCoy filter, (Z_1), centered at 9 mc, is only wide enough to accommodate one of the two sidebands fed into it. If the carrier oscillator is switched to 8.9985 mc, the upper sideband will go through the filter and appear at the grid of V_4, a 6AU6. On the other hand, if the carrier is at 9.0015 mc, the lower sideband will reach V_4.

The choice of heterodyning frequencies employed here causes sideband inversion to occur on the 15 and 10 meter bands. Thus, Y_1, which produces u.s.b. output on 75, 40 and 20 meters, will give you l.s.b. on 15 and 10 meters. Conversely, if you switch to Y_2, you'll obtain l.s.b. on 75, 40 and 20, or u.s.b. on 15 and 10.

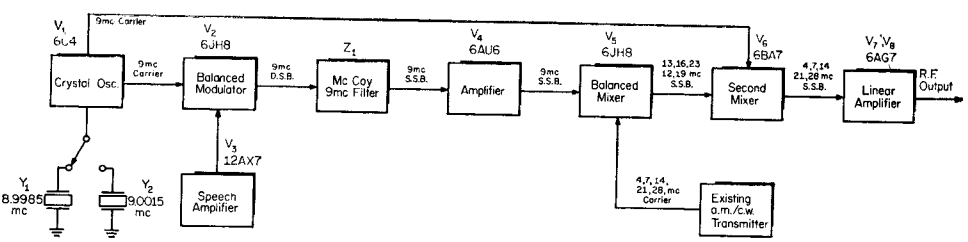
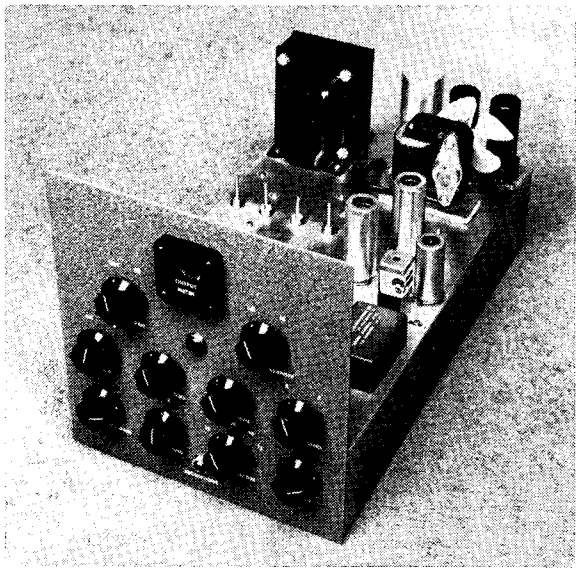


Fig. 1—Block diagram of the filter-type sideband adapter showing mixing and operating frequencies.



The SB-8 is an eight-tube filter-type single sideband generator/mixer which, when used in conjunction with an existing a.m. or c.w. rig, will give s.s.b. output on 80 through 10 meters. Panel controls are, from left to right: top, INPUT PADDER, S_4; METER SENSITIVITY, R_4; middle row: MODE switch, S_3; CARRIER NULL, R_1; CARRIER NULL, R_3; SEND-RECEIVE, S_5; bottom: AUDIO GAIN, R_2; SIDEBAND SELECTOR, S_1; BANDSWITCH, S_2 and PLATE TUNING, C_{11}. Tubes at the center are, l. to r., 6JH8, 6BA7 and 6AU6. A simple shock mounted fan cools the two 6AG7s used as r.f. amplifiers producing approximately 10 watts p.e.p.

A small amount of r.f. from the companion a.m. transmitter is applied to the grid of the balanced first mixer, V_5, another 6JH8. The transmitter carrier is suppressed within this stage and, for all practical purposes, does not appear at the output of V_5. However, the amplified s.s.b. signal coming from V_4 is mixed in V_5 with the transmitter carrier to produce sideband output at a frequency which is either the sum of, or difference between, 9 mc $\pm$ 1500 cycles, and the frequency of the transmitter.

If the transmitter is set at 7.25 mc, for example, a 16.2515 mc s.s.b. signal (7.25 plus 9.0015) will appear on the plates of V_5. This signal is then fed to the injection grid of V_6, a high-gain pentagrid second mixer. The 9.0015 mc energy from V_1, coupled to grid #1 of V_6, beats against the 16.2515 mc s.s.b. signal to produce still another s.s.b. signal at a difference frequency of 7.25 mc. As you can see, we have arrived back at the original transmitter frequency. Instead of a carrier, though, we now have s.s.b., minus carrier.

Two 6AG7 r.f. amplifiers, wired in parallel, amplify this s.s.b. energy sufficiently to drive a transmitting tetrode biased for AB_1 linear operation. Output is more than adequate for two 6146's or an 813.

An interesting characteristic of this unit is that no matter what crystal frequency is employed at V_1, the frequency of the suppressed carrier at the output of the adapter will be *exactly* the same as that of the transmitter carrier fed into V_5. Consequently, any slight drift which may occur in the 6C4 oscillator can have absolutely no effect on the transmitted frequency. This means that the generated s.s.b. signal has exactly the same degree of frequency stability as the a.m. or c.w. transmitter to which it is connected, because whatever we add in V_5, we subtract in V_6 or vice-versa.

Construction

Chassis dimensions are 3" × 15" × 8½". The front panel is 8½" wide and 9" high. Shields, 3" × 7½", cut from sheet aluminum are installed between stages as illustrated in the photographs. The shields are placed 4¼", 7⅝" and 9½" from the chassis front. An 8¼" × 14¾" bottom plate should also be used.

The shield between the input and output terminals of the McCoy filter is especially important, since any unwanted energy that sneaks around the filter will degrade its —55 db attenuation spec.

Trimmer capacitor C_3 comes into use only when S_1 is thrown to the TUNE position. It provides extra capacity to pad the frequency of Y_2 down to exactly 9 mc, right in the middle of the filter's passband. At the same time, another section of S_1 grounds pin 1 of V_2, unbalancing the tube and preventing suppression of the 9 mc signal from V_1. This arrangement allows plenty of carrier to reach the following stages of the adapter and transmitter for tuning purposes. With this arrangement you don't have to whistle in the mike or utilize an audio tone generator when peaking and loading the final.

Do not change the indicated capacitor values associated with T_1 and T_2. If you do, the filter will be improperly terminated and humps will appear in its passband curve. The two unmarked capacitors shown outside the shields of T_1 and T_2 are supplied connected to the transformers and should be rewired as shown.

The bandswitch, S_2 is assembled from a Centralab PA-302 shaft and index assembly, plus four Type-33, 2-pole 5-position phenolic switch sections. Mount S_2 on the front shield and drill holes large enough to accommodate the shaft and support rods in the other two shields through which they must pass.

Ordinary shielded audio wire, the kind with a

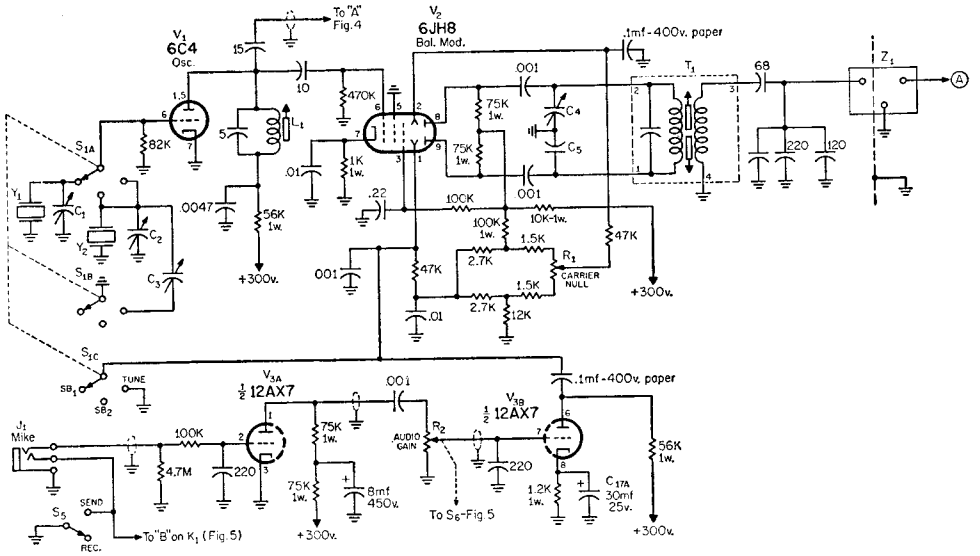


Fig. 2—Diagram of the crystal oscillator, balanced modulator and audio section of the "SB-8." Sideband selector switch, S_1 is labeled SB_1 and SB_2 rather than USB or LSB since sideband inversion occurs on 10 and 15 meters. See text for explanation of unmarked capacitors associated with T_1. Resistors are ½ watt unless otherwise indicated. Decimal value capacitors are disc ceramic and are in mf; others are tubular ceramic and are in mmf unless noted differently.

C_1, C_2—35 mmf air trimmer. Hammarlund APC-Type.
C_3—3-30 mmf mica trimmer. El Menco 461.
C_4—75 mmf air trimmer. Hammarlund APC-75.
C_5—43 mmf tubular ceramic, zero temp. coefficient (NPO).
C_{17A}—See fig. 5.
L_1—See coil table.
R_1—5K pot., linear taper.
R_2—500K pot., audio taper, with switch, (S_6, fig. 5).
S_1—4 pole 3 position rotary switch. Mallory 3243J. (One pole not used.)
S_5—S.p.s.t. rotary switch.
T_1—10.7 mc interstage transformer. Merit FM-254 or equiv. Modify as per text.
Y_1—8.9985 mc. Supplied with Z_1.
Y_2—9.0015 mc. Supplied with Z_1.
Z_1—McCoy 48B1 "Golden Guardian" 9 mc crystal filter. McCoy Electronics Co., Mt. Holly Springs, Penna.

tinned outer braid, is suitable for the long runs associated with the 12AX7 speech amplifier. All other shielded leads shown in the diagrams require RG-59/U or similar coaxial cable.

The slug tuned coils are wound on Superex type C-3 forms. Any Superex dealer who doesn't stock them, can obtain the forms from the factory on special order.[1] With the exceptions of L_1 and L_{17}, each coil consists of two windings, one on top of the other, separated by a layer of plastic electrical tape. Hold the turns in place with *Q*-dope or service cement.

Since paralleled 6AG7s, especially at 10 meters, are apt to suffer from instability, care must be exercised when wiring the output stage. Mount the 6AG7 sockets with pins 4 and 5 nearest the rear of the chassis. Run short, separate ground leads from pins 1, 3 and 5 of each socket to the chassis. Bisect the sockets with a 2" × 3" shield cut from sheet copper or brass. Solder the shield to pin 3 of each socket. Protect the shield with electrical tape wherever it passes close to an ungrounded terminal.

Since they are operated near maximum rating, forced-air cooling of the 6AG7s is recommended. Allied Radio recently introduced a low-cost fan which, because of its size and price, is especially suited for the job. It will operate almost noiselessly if you duplicate the rather unorthodox mounting arrangement utilized here. Fasten the frame of the fan to a 1" × 3" strip of Masonite with epoxy glue. Cut a 1" × 3" × ⅜" slice from a cellulose sponge and cement the sponge between the chassis and the Masonite strip.

Neutralizing gimmick C_n is made by twisting together two pieces of hookup wire. For a start, 3 or 4 twists should be sufficient.

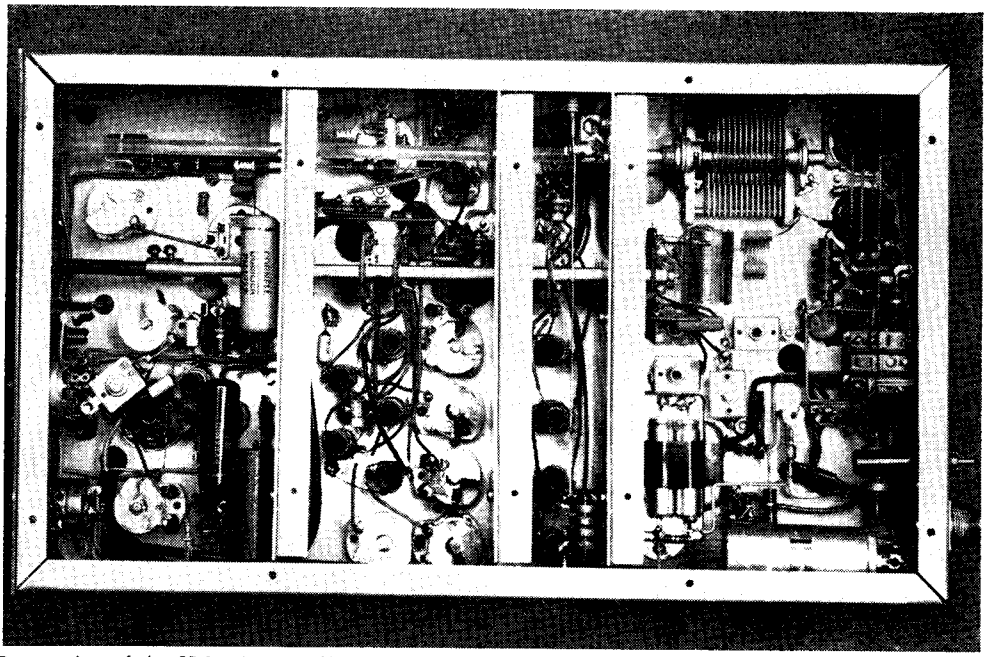
[1]Superex Electronics Corp., 4-6 Radford Place, Yonkers, N.Y.

Front End Alignment

The 9 mc portion of the circuit must be aligned first. Use meter M_1 as a tuning indicator by temporarily hooking it up as shown in fig. 6. Remove the 6AG7s from their sockets to prevent overheating, Advance R_2 only far enough to close S_6. Set S_1 at TUNE, and S_5 in the SEND position.

Tune a nearby receiver to approximately 9 mc and adjust L_1 for strongest oscillation as indicated on the receiver S-meter. Turn up R_1 until you get some indication on meter M_1. Tune T_1, T_2, L_2 and C_4 for maximum needle deflection. You'll undoubtedly have to back off on R_1 as alignment progresses.

Begin with the top slugs all the way up and



Bottom view of the SB-8 using an 8½" × 15" × 3" chassis shows the three interstage shields. The left compartment houses the carrier oscillator, balanced modulator and audio circuitry. In this compartment, mica trimmer, C_3 is mounted above the loctal socket used for crystals Y_1 and Y_2. The second compartment contains the 6AU6 s.s.b. amplifier and the 6JH8 balanced first mixer together with its associated tuned circuits. The 6BA7 and inductors L_8-L_{12} are in the narrow compartment. In the rear compartment one of the four mica-trimmer loading capacitors is partially hidden under the bandswitch.

the bottom slugs all the way down in T_1 and T_2. Handle the slugs with care! They will be seriously damaged if you attempt to adjust them with anything but the proper hex-shaped plastic alignment tool.

Place S_1 in the SB_2 position. Adjust C_2 for maximum meter reading. Set R_4 so the meter reads exactly full scale. Slowly decrease the capacity of C_2 until the meter reads 31% of full scale. Crystal Y_2 is now operating approximately 10 db down the upper slope of the filter.

Put S_1 on SB_1, and tune C_1 for maximum output. Reset R_4 for a full scale meter reading. This time, increase the capacity of C_1 until the meter

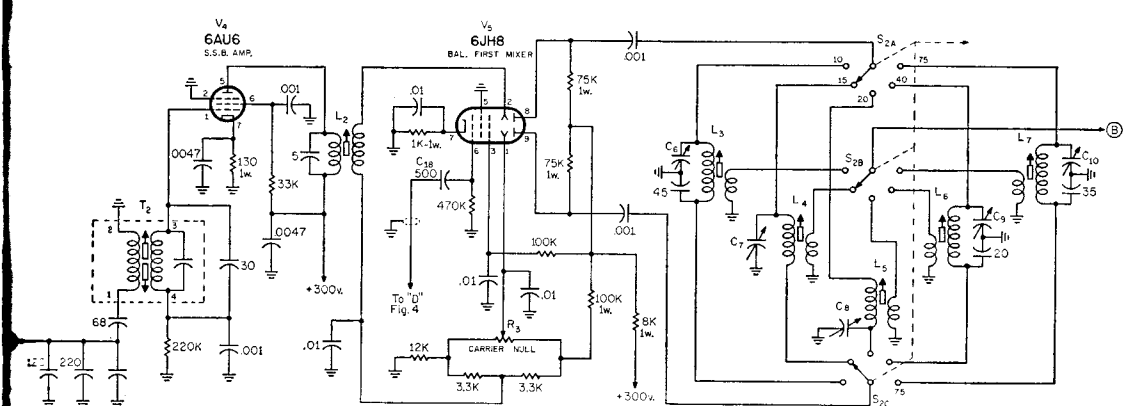


Fig. 3—Diagram of the 9 mc s.s.b. amplifier and the balanced first mixer. The unmarked capacitors associated with T_2 are explained in the text. Bandswitch S_2 is ganged also to switch sections in fig. 4. All resistors are ½ watt unless otherwise indicated. Decimal value capacitors are disc ceramic and are in mf; others are tubular ceramic and are in mmf.

C_6, C_8, C_9, C_{10}—50 mmf air trimmer. Hammarlund APC-50.

C_7—35 mmf air trimmer. Hammarlund APC-35.

L_2-L_7—See coil table.

R_3—5K pot., Linear taper.

S_2—Four Centralab Type 33 2 pole 5 pos. wafers on Centralab PA-302 shaft assy. See text.

T_2—10.7 mc interstage transformer. Merit FM-254 or equiv. Modify as per text.

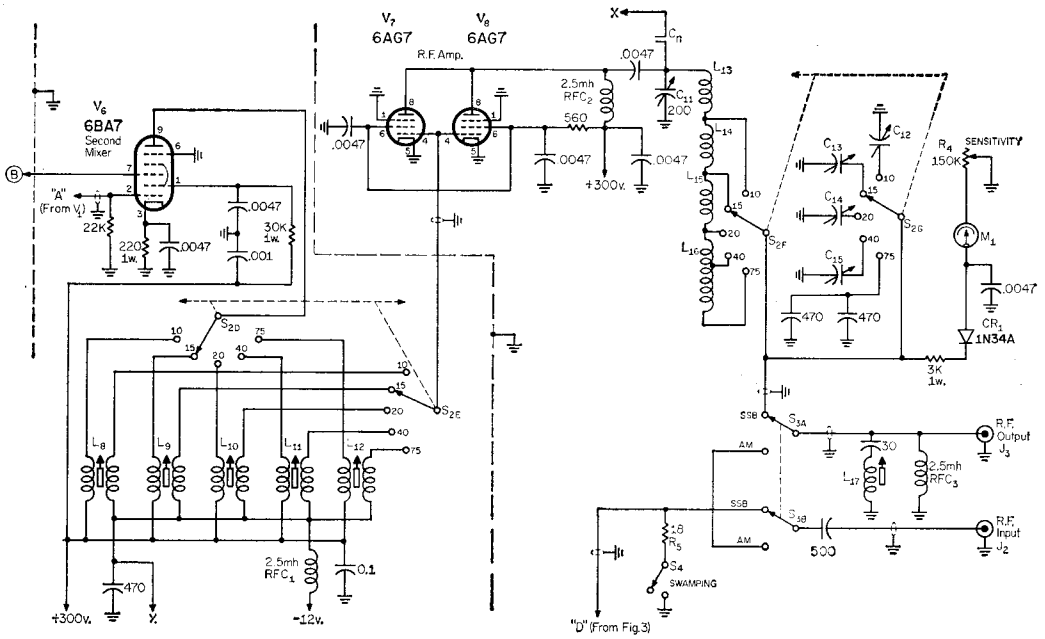


Fig. 4—Second mixer, linear amplifier and a.m.-s.s.b. switching. Meter M_1 is connected as in fig. 6 for initial tune-up. Decimal value capacitors are in mf and are disc ceramics; others are in mmf and are tubular ceramic.

C_{11}—200 mmf variable. Hammarlund MC-200 M.
C_{12}, C_{13}—50-380 mmf mica trimmer. El Menco 465.
C_{14}, C_{15}—110-580 mmf mica trimmer. El Menco 467.
C_n—Neutralizing capacitor. See text and photo.
L_8-L_{12}—See coil table.
L_{13}—5t. B&W 3011 Miniductor.
L_{14}, L_{15}—3t. B&W 3011 Miniductor.
L_{16}—36t. B&W 3012 Miniductor tapped 7t. from L_{15} end.
L_{17}—33t. #30 e. on Superex C-3 form or equivalent.
M_1—0-500 microammeter.
R_4—150K pot. Linear taper.
RFC_1, RFC_2, RFC_3—2.5 mh r.f. choke.
S_2—See fig. 3.
S_3—2 pole 2 pos. rotary switch. Mallory 3222J.
S_4—S.p.s.t. rotary switch.

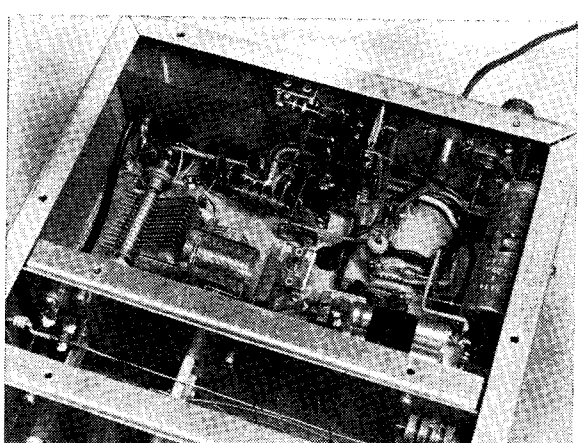
reads 31% of full scale. Set S_1 to TUNE and adjust C_3 for maximum output.

Set R_1 at mid-range. With S_1 at SB_2, adjust C_4 for a meter reading of zero, even with R_4 fully advanced. If you can't achieve a complete null at maximum meter sensitivity, readjust the primary slug of T_1 while varying the capacity of C_4. Some combination of these two adjustments should result in almost complete suppression of the carrier. With S_1 at SB_1, the meter should remain at, or very near, zero.

Throw S_5 to RECEIVE. Plug the mike into J_1 and close its push-to-talk switch. Relay K_1 (fig. 5) should pull in. If it balks or buzzes, reduce the spring tension slightly. Increase R_2 until M_1 begins to move when you speak into the mike. Whistling should cause M_1 to kick over just about as far as when S_1 is in the TUNE position. Front end alignment is now complete.

Mixer Alignment

Remove the temporary wiring associated with



Close-up view of the r.f. amplifier/power supply compartment. Note the copper shield across the 6AG7 sockets at the upper left. The push-to-talk relay and the 9 mc trap inductor L_{17} are mounted on the rear apron. One of the two SO-239 coaxial connectors is visible over the rear edge of the chassis. The neutralizing capacitor C_n is visible at the left in the narrow compartment.

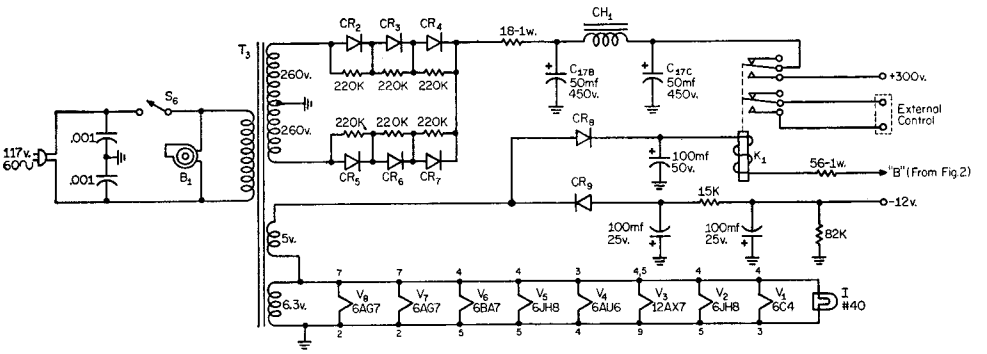


Fig. 5—Power supply and control circuitry for the SB-8. The terminals marked "External Control" may be used to energize an antenna relay, linear amplifier, etc. The —12v. biases the two 6AG7 linear amplifiers.

B_1—Fan. Allied Radio 39A457S.
C_{17}—50-50-30 mf, 450-450-25v.d.c. Three section can-type electrolytic.
CH_1—Filter choke, 2.5 h., 200 ma.
CR_2-CR_7—400 p.i.v. 500 ma silicon diodes.
CR_8—400 p.i.v. 750 ma silicon diode.
CR_9—1N34 diode.
K_1—D.p.d.t. relay. 6.3v.d.c. coil. Potter and Brumfield KA-11D.
S_6—S.p.s.t. switch on control R_2 (fig. 2).
T_1—Power transformer, 520 v.c.t. 90 ma, 6.3 v. 3 a., 5 v. 2 a. Knight (Allied Radio) 61G412.

M_1. Plug the 6AG7s back in their sockets. Connect a 7½ watt bulb across J_3. Feed a 75 meter carrier from your exciter or transmitter driver into J_2. Switch S_1 to TUNE S_3 to SSB, S_2 to 75 meters, and S_5 to send.

Adjust L_2, L_7, L_{12}, C_{10} and C_{11} for maximum output as indicated by M_1 and the brilliance of the bulb. Reduce the drive from the exciter or transmitter to a point just below which the bulb begins to grow dimmer. You may have to switch R_5 across the input lead or reduce the capacity of C_{18} in order to lower the drive sufficiently. Only a whisper of r.f. is required at this point. *Do not overdrive* the grid of V_5.

Set R_3 at mid-range. Switch S_1 *to* SB_2. Tune C_{10} and L_7 for minimum meter indication. This adjustment suppresses the 75 meter carrier feeding into J_2. It is possible that a slight change in the setting of R_1 and R_3 may also be required to produce the deepest null. Turn up R_2 and speak into mike. The bulb should glow brightly, but probably not at full brilliance on speech peaks.

The SB-8 may now be aligned for the higher frequency bands following the procedure outlined in Table I. At 40 meters, a certain amount of residual carrier will appear in M_1 no matter how you adjust C_9 and L_6. This effect is due to the broad band characteristic of L_{11} which allows a small amount of 9 mc energy to reach the final. This unwanted signal can be minimized

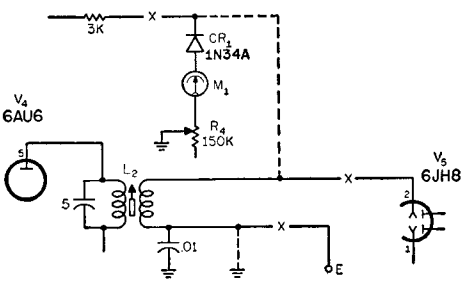


Fig. 6—Temporary meter connections for initial front-end alignment of the filter-type s.s.b. adapter.

Table I — Alignment Chart

Exciter Freq. (Mc)	*Set* S_2 *At*	*Set* S_1 *At*	*Adjust Coils*	*Adjust Capacitors*	M_1 *Meter Reading*	V_5 *Output* (Mc)
3.90	75	TUNE	L_2, L_7, L_{12}	C_{10}, C_{11}	Max.	12.90
		SB_2	L_7	C_{10}	Min.	
7.25	40	TUNE	L_6, L_{11}	C_9, C_{11}, C_{15}	Max.	16.25
		SB_2	L_6, L_{17}	C_9	Min.	
14.30	20	TUNE	L_5, L_{10}	C_8, C_{11}, C_{14}	Max.	23.30
		SB_2	L_5	C_8	Min.	
21.42	15	TUNE	L_4, L_9	C_7, C_{11}, C_{13}	Max.	12.42
		SB_2	L_4	C_7	Min.	
28.65	10	TUNE	L_3, L_8	C_6, C_{11}, C_{12}	Max.	19.65
		SB_2	L_3	C_6	Min.	

Table I—Alignment Chart. Adjustments made with 7½ w. bulb as dummy load. Set AUDIO GAIN, R_2 at minimum, CARRIER NULL controls, R_1 and R_3 at mid-range, MODE switch, S_3 at SSB and S_5 at SEND.

Coil Table

Coil		L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}	L_{12}
Pri.	Turns	28	25	11	22	8	14	23	7*	9	13	30	75
	Wire Size	30	30	18	20	20	28	28	20	20	20	28	30
Sec.	Turns	—	25	11	18	8	14	23	5	9	13	30	60
	Wire Size	—	30	18	20	28	28	28	20	20	20	28	30

All coils close wound on 3/8" dia. slug tuned forms as the Superex C-3 or CTC LS3-B, using enamel wire. Secondaries are wound over primaries and are separated by a single layer of electrical tape.

*Spaced diameter of wire.

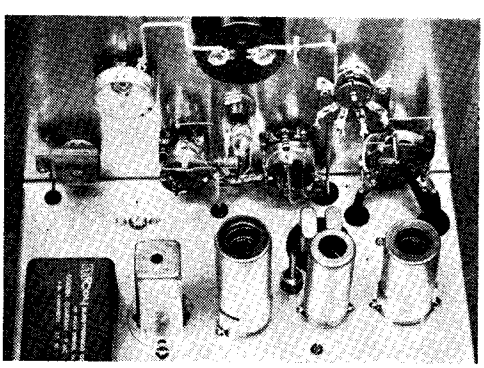
by carefully adjusting the 9 mc trap coil, L_{17} at the output.

Should you be unable to achieve a satisfactory mixer null on a particular band, try reversing the polarity of the mixer plate coil secondary. Due to differences in lead lengths and component arrangements, it may be necessary to alter the fixed capacitor value on some mixer coil primaries. On 15 and 20 meters it may be necessary to move C_7 and C_8 to opposite ends of their respective coils.

Check the 6AG7 stage for neutralization by setting R_1 to give a full scale meter reading with S_1 at TUNE. The needle should fall to zero and remain there when S_1 is switched to either SB_1 or SB_2. If the meter starts to creep up, or if it jumps up as you tune C_{11} from minimum to maximum, the 6AG7's are taking off. Change the capacity of C_6 by either twisting or untwisting it a turn at a time until V_7 and V_8 calm down.

After alignment has been completed hook the SB-8 to your transmitter's final or to a separate linear amplifier. The way this is done will depend on the design of the existing a.m. gear. Two possibilities are shown in fig. 7.

With the arrangement in fig. 7B, besides breaking into the r.f. lead between the driver and final, you'll have to lower the class C bias on the final to AB_1 level. In the case of 6146's, this amounts to 50 volts. A chart of the correct AB_1 bias values for other tubes will be found in the Sideband chapter of the ARRL *Handbook*. Details on driving, tuning and loading a linear are contained in Chapter 6 of the *CQ Sideband Handbook*.



Rear panel view of the eight-tube s.s.b. converter. Mounted from l. to r. are: the McCoy "Golden Guardian" 9 mc crystal lattice filter, transformer, T_1; 6JH8 balanced modulator; 6C4 carrier oscillator and 12AX7 speech amplifier. The front panel measures 8½" w. x 9" h.

Conclusion

Although I wouldn't recommend it as a project for the neophyte, constructing and aligning an SB-8 should pose no serious problems to any ham who has successfully built a receiver converter or who knows his way around the inside of a super-het. If you're looking for a way to generate the best possible sideband signal with the least cash expenditure, I suggest that you seriously consider adding a similar unit to your present a.m. transmitter. ■

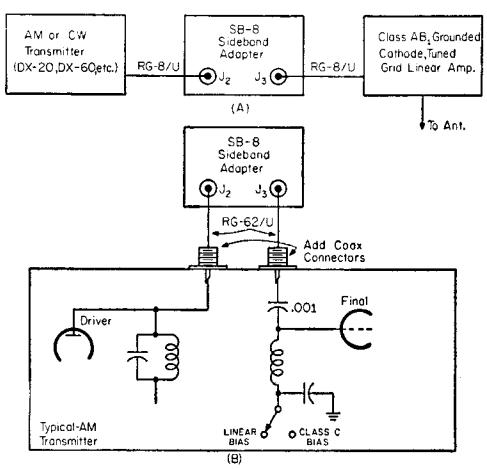
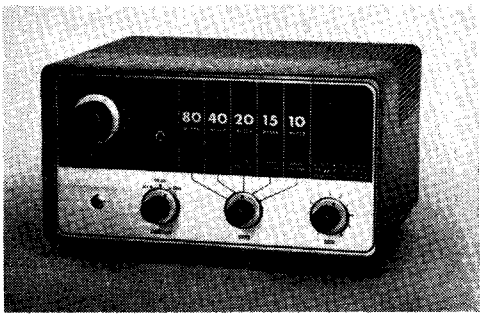


Fig. 7—Two methods of connecting the SB-8 to existing a.m./c.w. gear. In (A), a separate linear amplifier is used in conjunction with the SB-8 and a low-power all-band exciter. (B) shows the change necessary if the existing power amplifier in a transmitter is to be used for a linear amplifier. Sufficient output is not available to drive a grounded grid amplifier.

CQ Reviews:

The Lafayette Model HE-73 Precon

LAFAYETTE Radio Electronics Corporation has come up with a novel innovation for a receiver accessory. This is their Model HE-73 Precon for installation between the antenna and a receiver to serve *either* as an r.f. amplifier/pre-selector on the 10 through 80 meter amateur bands or as a crystal-controlled converter for the 10, 15 and 20 meter bands. It can also be used on the 11 meter Citizen Band. The mode of operation may be chosen with a front panel selector switch. A self-contained a.c. power supply is also included.



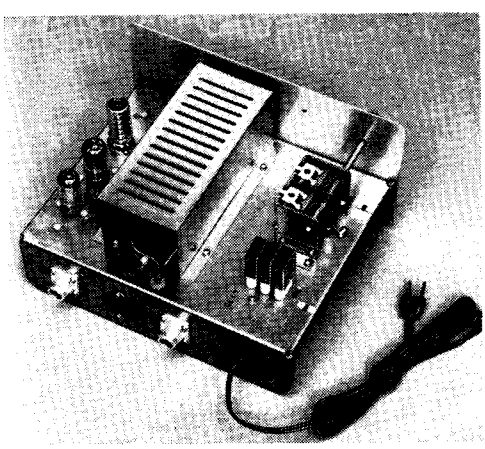
Lafayette Model HE-73 Precon is a neatly styled pre-selector/converter combination. The knob at the upper left is used to peak up the signal. Those at the bottom are the function switch, bandswitch and gain control. A pilot light is at the left.

Pre-Selector

As a pre-selector, the Model HE-73 will provide additional r.f. amplification for a receiver, resulting in increased gain and sensitivity. In many cases it also will better the overall signal-to-noise ratio of the receiving system. Besides this, it will add front-end r.f. selectivity and thereby improve i.f. image rejection. This is an especially desirable feature for single-conversion receivers which use a low-frequency i.f. system. With receivers which do not have an r.f. stage ahead of the first mixer, the use of the HE-73 not only will improve the r.f. selectivity and i.f. image rejection, but will also increase the sensitivity considerably.

Referring to the block diagram, fig. 1A, high gain is obtained by the use of two stages of r.f. amplification, while the desirable selectivity characteristics are obtained with a high-Q r.f. circuit in each stage, both of which are gang-tuned from the front panel to peak up the signal.

A 6BA6 pentode, V_1, is used in the first r.f. stage and the pentode section of a 6BL8, V_{2A}, in the second stage. (The triode section of the 6BL8 is not used during pre-selector operation). This stage is followed by another 6BA6, V_3, which is triode-connected in a cathode-follower circuit to provide a low impedance output. A control in the cathode of the first stage permits adjustment of the gain to prevent overloading of the receiver with strong signals. Bandswitching is employed for optimum performance on each of the amateur bands between 10 and 80 meters.



Top view of the HE-73. The power supply is enclosed within the shield at the center.

Crystal-Controlled Converter

When used as a crystal-controlled converter, the HE-73 will make a sensitive double-conversion system out of a single-conversion receiver for use on the 10, 15 and 20 meter bands. High signal-to-noise ratio with excellent image rejection will be realized and it will make possible a higher degree of frequency stability than usually is experienced on these bands with many receivers. Also, it will extend the frequency range of receivers which have limited coverage.

A block diagram of the converter arrangement is shown in fig. 1B. V_{2A} is now used as a pentode mixer instead of a straight-through r.f. stage, while the triode section of the 6BL8, V_{2B}, is used as a crystal oscillator/doubler. Fundamental type crystals are used with the output of V_{2B} doubling the crystal frequencies of 12.25, 8.75 and 5.25 mc to 24.5, 17.5 and 10.5 mc to provide the mixer with heterodyning frequencies for the 10, 15 and 20 meter bands respectively.

When the converter is used for 10, it's output frequencies fall in the 3.5 to 5.2 mc range over which the receiver must then be tuned. On 15 the tuning range is from 3.5 to 3.95 mc, and on 20 meters it is from 3.5 to 3.85 mc. These ranges are directly marked on the panel of the Precon. The actual received frequency may be determined by adding the frequency indicated on the receiver's dial to the heterodyning frequency for the band in use. For example: A receiver dial reading of 3.8 mc plus the heterodyning frequency of 17.5 mc (for 15 meters) equals 21.3 mc, the frequency to which the system is tuned.

Since the converter is crystal-controlled, the

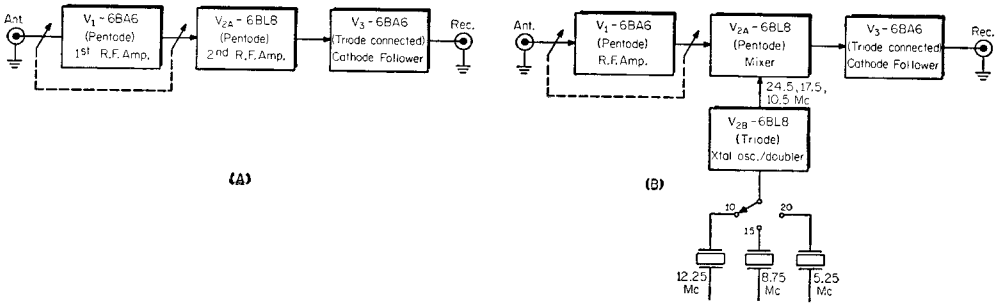


Fig. 1—(A) Block diagram of the HE-73 Precon when used as a pre-selector. (B) Block diagram when used as a converter.

correctness of the frequency, as determined above, will depend on the accuracy of the receiver's dial calibration. Receiver frequency stability usually is greater in the 3.5 mc region than it is at the higher frequencies, so the overall stability of the system, when used on the higher bands, will likewise be better.

Controls

A three-position function switch provides a choice of straight-through operation (antenna connected directly to the receiver, bypassing the Precon), pre-selector, or converter operation. When either of the latter two are used, the self-contained a.c. power supply, using a solid-state rectifier, is switched on at the same time. Power is turned off for straight-through operation (switch at OFF). The input impedance of the unit is approximately 50 ohms with the output designed for feeding into a low impedance.

A bandswitch selects the desired range of operation. Each band is identified on the panel with large numerals together with the converter's output frequencies (the tuning range required for the receiver) on each band.

The gain control is also located on the front panel, as is an antenna-trim control. The latter tunes the two r.f. circuits to insure a high signal-to-noise ratio and to maintain good r.f. selectivity.

SO-239 coax connectors for the input and output circuits are located on the rear apron together with a two-terminal receptacle for connecting to an external control circuit to remotely disable the B-plus circuit of the unit.

Performance

Measurements, as well as listening tests, indicated the Model HE-73 to perform exceptionally well. When used as a pre-selector, the gain was found to be 18 db on 10 and 15 meters, 34 db on 20, 27 db on 40 and 45 db on 80 meters. With a single-conversion receiver having a 455 kc i.f., image rejection on the 10 meter band was improved by almost 25 db.

Used as a converter, the sensitivity averaged better than 0.5 μv for a 15 db signal-to-noise ratio. Noise figure on 10 meters measured near 6 db, equal to or better than the average communications receiver. When operated as a pre-selector, similar results were obtained. Used in conjunction with several manufactured receivers costing over $500, it improved the sensitivity, signal-to-noise ratio and the noise figure. Less cross modulation was also experienced.

With regard to noise, it should be kept in mind that this refers to the inherent noise of the receiving system alone. Man-made noise picked up through the antenna will be amplified to the same extent as will the signal, so the benefits resulting from improved noise ratios will be realized only at quiet locations.

I.f. signal rejection (3.5 to 5.2 mc) was measured at an average of 60 db.

Physical Specifications

The unit is ruggedly and nicely fabricated with easy accessibility of components, should servicing become necessary. It is housed in a medium gray perforated cabinet measuring 10" w. × 6" h. × 8" d. The upper half of the panel is a glossy medium gray, the lower half is semi-matte aluminum. Weight is 9½ pounds; power consumption is approximately 18 watts.

The Model HE-73 Precon will be found a worthwhile accessory for improving receiver performance. It is an imported unit, supplied with a complete operating manual. It carries a price tag of $49.50 and is marketed by Lafayette Radio Electronics Corp., 111 Jericho Turnpike, Syosset, L. I., New York 11791—*W2AEF*

". . . days getting the rig peaked up on . . ."

Squelch Stabilization

BY RONALD L. IVES*

Squelch circuits, also referred to as codan circuits, have been widely used in commercial and amateur work. Sometimes their operation has been somewhat "sticky." Here are some improved circuits, using the latest tube types and zener diodes, that will provide foolproof operation.

THE conventional squelch, also known as a codan, or as an interstation noise suppressor, has been widely used in communications work for almost three decades. When carefully designed and constructed, it is a most valuable aid to effective commercial and amateur communications.

Basically, the squelch is a gated audio amplifier, the control voltage being supplied by the receiver a.v.c. system. Operation of a simple squelch, whose circuit is shown in fig. 1, is as follows:

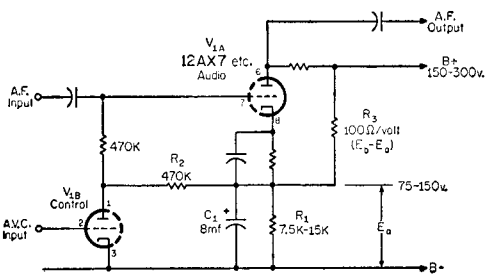


Fig. 1—In this simple squelch circuit V_{1b} is a d.c. amplifier, controlled by the a.v.c. voltage and turns V_{1a} on or off.

When there is no a.v.c. voltage, V_{1b} conducts heavily. Voltage drop across R_2 in the V_{1b} plate circuit biases the grid of V_{1a} very negative with respect to its cathode. In consequence, the tube is cut off, and will not pass an audio signal.

When the receiver a.v.c. voltage rises to the cutoff value of V_{1b}, that tube stops conducting, there is no more voltage drop across R_2, and V_{1a}, no longer cut off, functions as a normal audio amplifier.

The operating point of V_{1b} can be shifted by varying R_1, R_2, or by use of a high resistance potentiometer in the receiver a.v.c. circuit. The value of this, however, must not be too high, or contact potential, generated in V_{1b}, will not only keep the tube nearly cut off at all times, but will also inject negative bias into the receiver a.v.c. system, reducing sensitivity.

Similarly functioning circuits, using a pentode for V_{1b}, and permitting close adjustment of sensitivity, have been described fully elsewhere.[1]

In use, the simple squelch is entirely satisfactory when receiving intermittent strong signals. When no signal is coming in, the speaker is silent. When, however, the signals being received are weak, or are subject to severe fading, the squelch is less satisfactory. Although the control tube (V_{1b}, fig. 1) is a sharp cutoff device, the system is not. As the a.v.c. voltage rises, cutting off the control tube, the plate voltage on that tube is elevated by the voltage drop in R_1 produced by conduction through V_{1a}. This shifts the cutoff point of the control tube, producing a range of a.v.c. voltages in which V_{1a} is neither fully cut off nor fully conducting. This produces severe distortion of audio signals (souring).

If the audio bypass capacitor is too small (C_1, fig. 1), and bleeder current is minimized for reasons of power economy, audio frequencies may get into the control tube, producing very annoying intermittent operation (blopping). Inadequate a.v.c. filtering has much the same effect. Various combinations of these evils are usually found in misbehaving codans.

With the simple squelch, E_a can be made substantially immune to changes in the current through the audio tube by choosing voltage divider resistors (R_1 and R_2, fig. 1) such that bleeder current is from 30 to 50 times tube current. This works well, but imposes an inordinate load on the power supply, and produces a heat disposal problem in many installations.

Until recently, the best answer to the stabilization problem was to regulate E_a by use of a voltage regulator tube, as in fig. 2. This provides excellent regulation of the control tube plate supply voltage, as indicated on a d.c. meter, but is otherwise not very satisfactory. The voltage regulator tube (V_2, fig. 2), injects sputter and

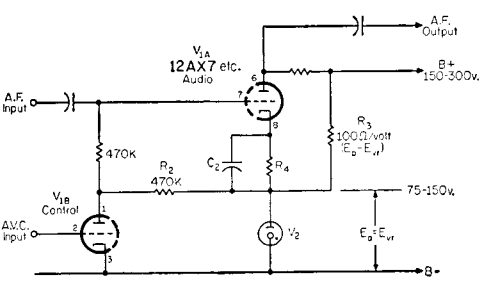


Fig. 2—This circuit is similar to that shown in fig. 1 except that the plate voltage of V_{1b} is stabilized by the vr tube V_2. The limitations of this circuit are described in the text.

*2075 Harvard Street, Palo Alto, California.

[1] Ives, R. L. "Codan Elimination of Intersignal Noise," *QST*, Oct., 1952, p. 36.
Ives, R. L. "Practical Codan Circuits," *Radio-Electronics*, May, 1962, p. 32.

roar into the audio system, and this cannot be eliminated by any simple *R-C* filter.

Most filters which prevent injection of vr tube noise into the audio system also make the vr tube circuit subject to *R-C* oscillation, with interesting, but wholly undesirable, results. About the only sure way of silencing the regulated squelch circuit is to replace the cathode resistor of the audio tube (R_1, fig. 2) with a good choke (10 henries or so), and then to remove C_2 and replace it with a large (8 mf or so) capacitor from cathode to ground.

This is beautifully stable in some instances. In others, the vr circuit goes into oscillation, which may be cured by use of a "Q killer" shunt resistor across the choke, by changing the capacitor (C_2), by changing the vr tube, or by some combination of the above.

Although regulation of the control tube plate supply voltage definitely improves the operation of the squelch, regulation by use of conventional vr tubes is not the answer because of the tendency to oscillation, and construction of a squelch using the circuit of fig. 2, or simple modifications thereof, is not recommended unless the builder has a competent exorcist at his beck and call.

Within the last two years, a new type of voltage regulator—the zener diode, has become commercially available. This device, when used to regulate the control tube plate supply voltage of the codan, performs excellently, introduces no new problem, and permits some reduction in bleeder current with consequent cooler operation. In addition, the zener diode, when used within its current ratings, and *with an adequate heat sink*, is a substantially immortal component, which will probably outlast the equipment in which it is installed. Circuit of a very satisfactory dual triode squelch, with zener diode regulation of the control tube supply voltage, is shown in fig. 3. Plate and cathode circuit constants of the audio tube depend upon the tube chosen, and "handbook" values will be satisfactory. As should be apparent, the operating point of the squelch will also depend upon the tube used.

When close adjustment of the squelch operating point is desired, with a minimum of loading of the receiver a.v.c. system, a pentode—triode unit is slightly more flexible than a dual triode squelch. Use of a combination sharp-cutoff pentode—high-mu triode, such as a 6AW8A, makes

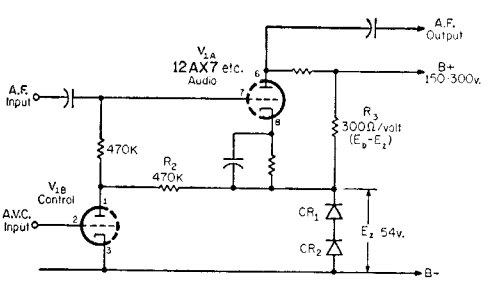


Fig. 3—In this circuit the squelch d.c. amplifier V_{1b} is stabilized by zener diodes CR_1 and CR_2, both International Rectifier 3Z27's.

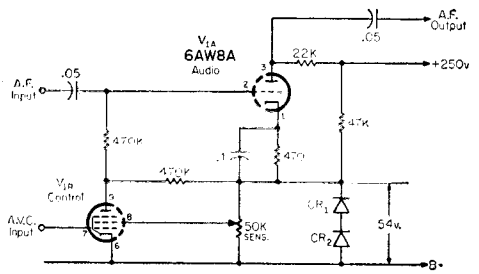


Fig. 4—The use of a pentode d.c. amplifier in the squelch circuit provides greater amplification plus a simple sensitivity control in the screen circuit.

for extremely compact construction. Circuit of a regulated pentode-triode codan comprises fig. 4.

With this circuit, the operating point can be shifted through a considerable range of a.v.c. values by varying the pentode screen voltage. If desired, a switch may be attached to the sensitivity potentiometer to open the plate circuit of the control tube, disabling the squelch where its use is not desired, as for signals that are badly down in the noise.

Customarily, the grid of the squelch control tube is connected directly to the receiver a.v.c. line, an entirely satisfactory procedure provided the total grid to ground resistance is half a megohm or less. When the circuit resistance is higher, contact potential generated by the control tube is injected into the receiver a.v.c. system, reducing the sensitivity, particularly for weak signals for which sensitivity is most needed.

This evil can be effectively cured by inserting a high back resistance diode in the lead from the receiver a.v.c. circuit to the squelch control tube grid, as in fig. 5A. With this arrangement, the control tube is effectively out of the circuit until the a.v.c. line is more negative than the control tube grid. The 4.7 meg resistor from grid to ground provides a grid return for the control tube. Without this resistor, the control tube would cut itself off, operating the squelch independently of the a.v.c. voltage.

[*Continued on page 88*]

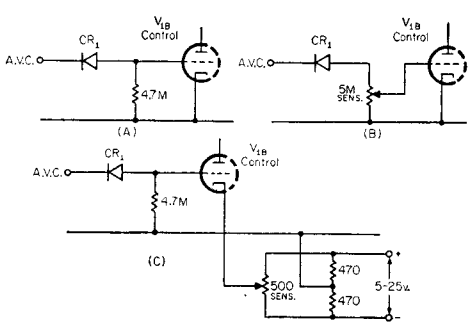


Fig. 5—(A) The insertion of a diode with a high back resistance in series with the a.v.c. line reduces the effect of contact potential developed at the grid of V_{1b}. (B) This circuit places the sensitivity control in the grid circuit of V_{1b}. (C) A d.c. source can be used to vary the squelch sensitivity over a very wide range.

Rheem Califone AR-300 Tape Recorder

THE Rheem Califone AR-300 tape recorder has been designed especially for use by the amateur radio operator. It is a 4-track 2-channel system which includes a number of facilities to provide a high degree of flexibility for individual needs for which it will do the following:

1. Records 4 monaural tracks totalling up to 8 hours of continuous recording time on a single 7-inch reel of tape operated at 3¾ inches per second.
2. Records 4 hours of stereo on the same size reel.
3. Plays pre-recorded 4-track and 2-track stereo tapes.
4. Transfers pre-recorded information from one track to another.
5. Also operates at 7½ inches per second. Wow and flutter is less than 0.2%.
6. Provides two separate audio power channels.
7. Provides two separate pre-amplifiers of 35 db gain for use with microphone to feed the recorder or a transmitter. High or low impedance input is available. Each pre-amp has separate input and output jacks for external use.
8. Provides for taking output from a receiver having 4, 8, 16 or 500 ohm output impedance. An adjustable level control is provided for setting recording level of receiver output without disturbing normal listening level.
9. Allows speaker to be operated from receiver or recorder power amplifier.
10. Provides for erase and demagnetization of tape heads.

Suggested Applications

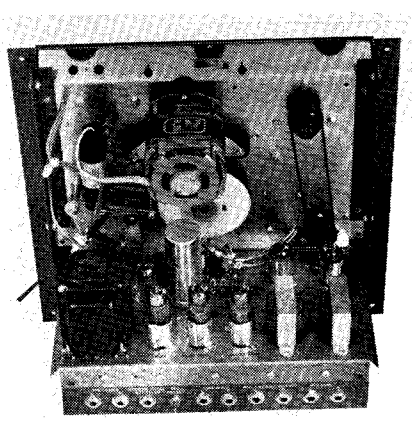
If you are wondering how a tape recorder may be used to advantage in connection with radio amateur activities, here are a number of suggestions:

1. Code-practice tapes may be recorded and played back.
2. Your own code sending may be recorded and later checked for correction or to get an idea how your "fist" sounds.
3. CQ-calling tapes may be made and played back for phone use.
4. Contest operation may be continuously recorded for a log record or other references purposes.
5. Proceedings of club meetings, dinners, conferences or other group gatherings may be recorded with the salient points later transcribed into written records. Recorded tapes may also be used for immediate or later reference for settling questionable or disputed statements.
6. Talks or lectures may be pre-recorded and played back at meetings. Such tapes may also be passed on from club to club.
7. Rare DX contacts may be recorded.
8. "Phone-patch" type of messages may be recorded for later delivery in case the addressed party cannot immediately be reached.
9. ARRL bulletins and other special broadcasts may be recorded for later reference.
10. Proceedings of Civil Defense Drills may be recorded for use as a guide for operating techniques or for ascertaining the need for corrective measures.
11. Correspondence or QSLs may be exchanged by means of recorded tapes.
12. Another station's transmission may be recorded and played back to the sender.
13. Performance of different receivers may be recorded for comparison demonstrations.

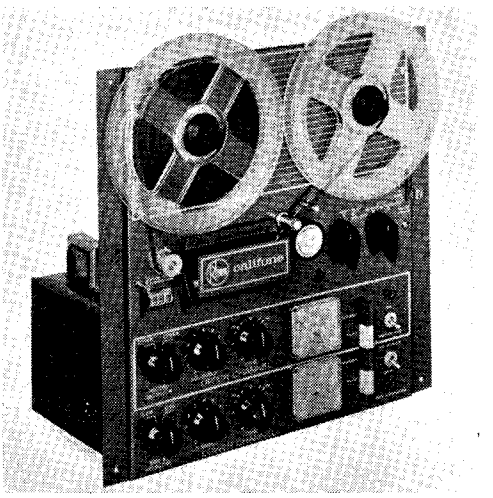
No doubt other uses can be found and, of course, the usual Hi-Fi applications are obvious.

The Rheem Califone AR-300 Tape recorder features simple operation, rugged construction and easy accessibility for servicing. It sells for $259.50 and is produced by Rheem Califone Corp., 5922 Bowcroft St., Los Angeles 16, Cal.

—*W2AEF*



The Rheem Califone AR-300 4-track stereo recorder, a versatile unit designed with the ham in mind.



Rear view of the AR-300 recorder shows the simple and servicable design.

An RTTY Audio Oscillator

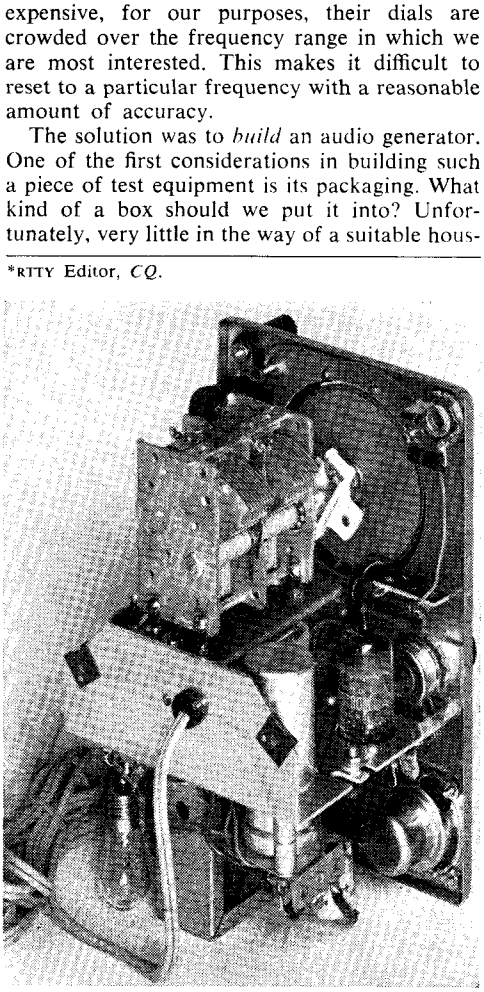
Modifying An Inexpensive Commercial Kit

BY BYRON H. KRETZMAN*, W2JTP

WE had a problem. A good variable frequency audio oscillator was needed. Specifically, we needed something to cover the range from about 800 cycles to 5000 cycles. These are the audio frequencies of prime interest to the RTTYer, and to the v.h.f. (f.m.) operator who is experimenting with tones and filters for remote control purposes. Available kit-type audio oscillators are mostly sine and square wave generators covering wide frequency ranges. Besides being more than necessary, and expensive, for our purposes, their dials are crowded over the frequency range in which we are most interested. This makes it difficult to reset to a particular frequency with a reasonable amount of accuracy.

The solution was to *build* an audio generator. One of the first considerations in building such a piece of test equipment is its packaging. What kind of a box should we put it into? Unfortunately, very little in the way of a suitable housing can be bought over the counter. What we were looking for was something like a v.t.v.m. case. At that point our eyes lit upon a recently procured Heathkit signal tracer. Ah, ha! *That* was the answer! A signal tracer is a very handy piece of equipment when working with filters, tone oscillators, etc. Why not combine the two items into one very compact useful (and inexpensive) unit?

*RTTY Editor, *CQ*.



Rear view of the audio oscillator built into a Heath IT-12 Signal Tracer. The two gang variable is mounted on bakelite to insulate it from ground and an insulated shaft coupler isolates it from the dial. Note the 110 volt candelabra bulb to the left of the power transformer.

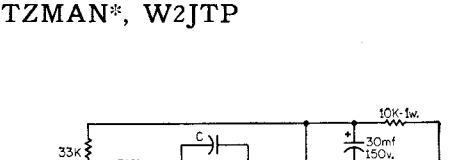


Fig. 1—Circuit of the audio oscillator that can be built into the Heath IT-12 Signal Tracer. Switch S_1 is the NOISE switch, removed from the signal tracer circuit as explained in the text. Capacitor C, about 30 mmf, is adjusted for a fairly constant output over the range.

Modifying the Heathkit IT-12

Looking over the IT-12 Signal Tracer, it immediately became obvious that, to find room for the dual section broadcast-type variable capacitor required for the oscillator, the speaker had to go. The next consideration was the dial. The National Type BMI ($1.10 from Barry Electronics) proved to be exactly the right size. It covers the speaker hole and easily mounts by drilling only three small holes. The dual section tuning capacitor, which must be insulated from the chassis, was mounted on a bakelite plate stood off from the chassis by two metal pillars. The audio output transformer which formerly mounted on the speaker was found to fit nicely under the tuning capacitor.

The tuning eye tube and its bracket was next to go. The hole for the tuning eye turned out to be the right size opening for a 1½-inch square

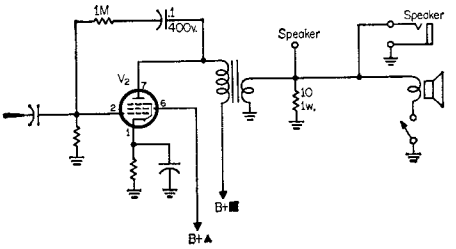


Fig. 2—Modifications made to the signal tracer circuit are shown above. It consists of the addition of feedback.

speaker. So there we mounted a Calrad Type PM-1½ miniature speaker. (Who needs hi-fi?) The flocked speaker grill was cut down to fit. One of the holes in the chassis for the tuning eye bracket provided the center for draw-punching (with a Greenlee No. 730 Socket Punch) a ¾ inch hole for a nine pin socket for the 12AU7 audio oscillator.

Other incidental modifications were to replace the rotary a.c. line switch with a 500 ohm pot (with switch) to control the output of the oscillator, disconnection of the binding posts from the signal tracer output transformer; and, installation of a speaker jack and an input jack for the probe. The red "B+" binding post was connected to the signal tracer input and the red "P" binding post was connected to the audio oscillator output. The black "CT" post was connected to ground.

The panel switch marked NOISE was disconnected from the probe circuit and wired as a B-plus ON-OFF switch for the oscillator. Incidentally, the filter capacitor was dropped below the chassis by a couple of ¾-inch long metal pillars to enable the tuning capacitor rotor plates to clear.

The Oscillator Circuit

Fig. one shows the schematic diagram of the simple feedback bridge-type audio oscillator built into the signal tracer. Capacitor *C* is used to make the output uniform over the full range of the oscillator. If this capacitor is too small, output drops off on the high end, and if too large, output drops off on the low end. We found that 30 mmf kept the output within 0.5 db over the entire range. Open circuit output of the oscillator is +3 dbm.

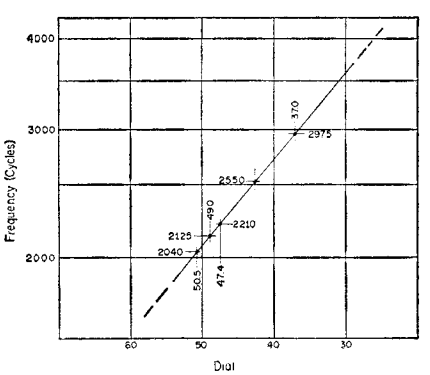


Fig. 3—Shown above is a typical calibration curve for the audio oscillator added to the Heath Signal Tracer. With the dial used the resetability was excellent.

Front view of the combined audio oscillator and signal tracer. A 1½" speaker is now located where the tuning eye formerly was. The National dial covers the old speaker opening.

Figure two shows the minor circuit modifications of the signal tracer itself, made mainly to add feedback.

Calibration

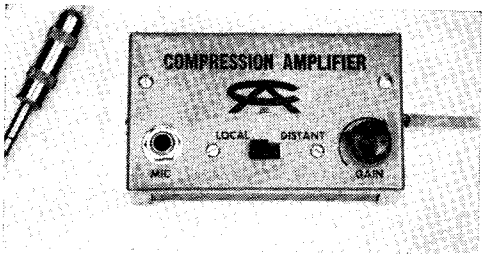
Before beginning calibration, a v.t.v.m. (a.c.) should be connected to the output terminals, and capacitor *C* adjusted so that the output is as constant as possible. Since listening to what you are doing is the purpose of the signal tracer, output from the signal generator is coupled-in by simply connecting a 100K resistor between the two red binding posts. Calibration was done by also coupling-in the output from a 425 cycle tuning fork standard, actually the one described in Chapter 7 of the *New RTTY Handbook*. By adjusting the relative levels of the two oscillators by means of the panel gain controls, it is very easy to *hear* the beat notes between the tunable audio oscillator and harmonics from the fork standard. A calibration point then is recorded every 425 cycles. On the low end of the scale, additional beat notes may be heard from 3-times 212.5 (637.5) and 5-times (1062.5). If an oscilloscope is available it is nice to *see* what you are doing, too. Figure three shows a portion of a typical calibration curve. The exact curve, of course, will depend upon the frequency/rotation characteristics of the tuning capacitor used. A neat trick is to mark the dial through the opening provided in the BMI, at each calibration point. You will be pleased to find out how close you can reset the dial to a specific frequency; usually within just a few cycles.

Total cost, besides the $19.95 for the signal tracer kit, is in the order of $4 to $5. Not bad for a *good* audio generator, huh? ■

CQ Reviews:

The Comtran C-II Audio Compression Amplifier

THE Comtran C-II is an audio compression amplifier which makes it possible to raise the average modulated power of a transmitter without overmodulating it, thereby providing an added degree of signal punch together with an effective increase in voice intelligibility. The unit is a small and compact transistorized device powered by a self-contained inexpensive 9-volt transistor radio battery. Installation simply requires that it be connected between the microphone and the mic input of the transmitter.



The Comtran Model C-II Compression Amplifier is a neat and small self-powered unit. Mic jack is at the left with the output gain control at the right. The LOCAL-DISTANT switch at the center cuts the amplifier in or out of the microphone circuit. The output cable with plug is for insertion into the mic jack of the transmitter.

Circuitry

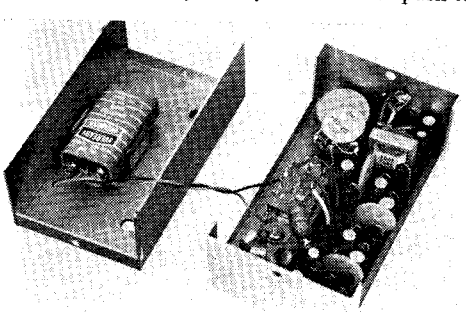
No circuit diagram was supplied with the unit tested for evaluation; however, it is a three-stage affair which rectifies audio from the output stage and feeds it back as d.c. bias for controlling the gain of preceding stages. Thus the output level may be held constant for a given output potential with a wide range of input levels. This not only prevents overmodulation, but also maintains uniform output for many voice levels. It also keeps the average power high at all times and makes the working distance from the microphone less critical.

Other devices which can accomplish similar results employ a clipper, but the inherent distortion of such an arrangement usually is considerably higher than that of a compression amplifier.

Filtering is included which rolls off the frequency response above 3,000 cycles to limit bandwidth and possible distortion which may result in splatter beyond 3 kc from the transmitter frequency.

Installation and Operation

The Comtran C-II output cable is provided with a standard shielded three-way microphone plug which is inserted into the mic jack of the transmitter. The mic input of the unit has a standard three-way mic jack. Normal push-to-talk operation is not altered. Instructions are furnished for modifying the connections for use with other type mic plugs and jacks.



Interior view of the Model C-II. The three transistor stages are mounted on a small printed-circuit board at the right. The other round-ended objects are tiny electrolytic capacitors. A 9-volt transistor-radio battery is held in the cover at the left.

The size of the unit is only 4¼" × 2½" × 1½" and it is provided with two key-hole slots for conveniently mounting it on the rear of a transmitter.

A slide switch on the front of the compression amplifier enables it to be cut in or out of the circuit. With the switch in the LOCAL position, the mic input bypasses the amplifier and is fed directly to the output cable. When the switch is in the DISTANCE position, the compressor is inserted between the microphone and the output cable. At the same time, battery power is applied to the transistors and the compressor is instantly ready for use.

A GAIN control sets the output to the level required for complete modulation of the transmitter. Once this control is set, the modulation will be maintained at the maximum level over a wide variation of voice-level inputs without exceeding the preset degree of modulation. No control is provided for adjusting the degree of compression.

Performance

On-the-air tests, using a.m. and s.s.b., indicated that the C-II Compression Amplifier very effectively produces more solid talk power with improved intelligibility, especially when used during adverse band conditions. It is particularly helpful for mobile work where power is generally limited.

A noticeable attenuation of the low-frequency response also contributes greatly toward this end and some naturalness of the voice is lost, but this is of little consequence considering the other benefits derived.[1]

[*Continued on page 90*]

[1]Scherer, W. M., "Factors in Choosing a Microphone," *CQ*, Jan. 1963, p. 42.

A Four Band Trap Tuned Antenna

BY A. D. SINNING*, WØUYS

This article describes a trap antenna which can easily be constructed by the average ham. The antenna is designed for 75 and 40 meters and operates quite well on 15 and 10 with a low s.w.r. Best of all, it is inexpensive since it requires only several short lengths of thin wall electrical conduit, some #14 enameled wire and a few pieces of plastic tubing.

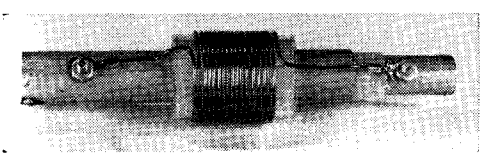
THE average amateur is usually hampered in his operation on the lower bands by the lack of adequate space for antennas. Usually there is room, lengthwise on the lot, for an antenna approximately 100 feet long. Now, unless you are interested in transmitting on approximately 4500 kc this is of very little use to the amateur who wants to get efficient output on 75.

This trap antenna is made with a few lengths of thin wall electrical conduit, some #14 enameled wire and a few pieces of plastic tubing.

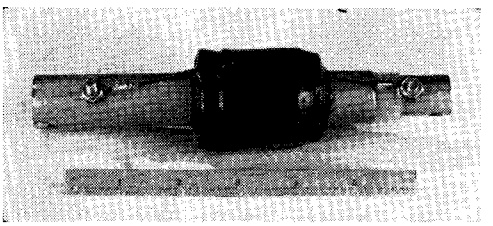
Principles of Operation

The antenna works on the principle that a capacitor and inductor in parallel when tuned to a particular frequency and placed in a line present an almost infinite impedance to radio frequency current at that particular frequency. This is the same principle used in noise suppression on mobile receivers to eliminate generator noise. In other words, a parallel inductor and capacitor "trap" the particular frequency and act electrically as though the line were terminated for this signal. All other frequencies pass through the trap almost as though it were not there. Besides this the inductor acts to effectively shorten the overall length necessary to get efficient operation on the lower bands. This fact can be taken advantage of to build an antenna with an overall length of only 108 feet which will give almost as good performance on 75 as a full ½ wave doublet, as well as being very good on the higher bands. Twenty meters gives a higher s.w.r. but for 10 and 15 the s.w.r. is very low, usually between 1.1:1 and 1.5:1, depending on the placement of the antenna and the proximity of nearby objects.

*6944 11th Avenue South, Minneapolis 23, Minnesota.



One of the two traps used for the antenna is shown above. The two 6" lengths of conduit are mounted on a core of paraffin impregnated dowel. The coil is mounted on a plastic tube that is centered on the conduit by strips of plastic. The coil ends are secured to the ends of each conduit by screws. These screws also keep the length of the interlocked conduit sections fixed by securing them to the dowel centerpiece.



Above is the finished trap after an application of epoxy for weather proofing. The epoxy used and the application method is explained in the text.

Trap Construction Details

Now for the construction details. First get about one foot of ½" thin wall conduit and the same length of ¾" conduit. Cut each into two six inch lengths and remove burrs from all edges. Next get a section of ⅝" wood dowel stock. Cut into two eight inch lengths and boil in paraffin to waterproof it. You will find that this will just slip inside the ½" thin wall. Now cut a strip of polyethylene, such as is used to cover clothes when returned from the cleaners, about 5½" wide and wrap tightly around the ½" thin wall, so as to slip snugly inside the ¾" length. Leave about ¾" sticking over the end of the thin wall. You now have a tubular capacity which can be varied in capacitance by sliding the tubing in or out.

Insert the wooden dowel, which you have prepared by boiling in paraffin, inside the smaller tube and adjust the capacitance to exactly 100 mmf. This can be done by the use of a resistance

[*Continued on page 84*]

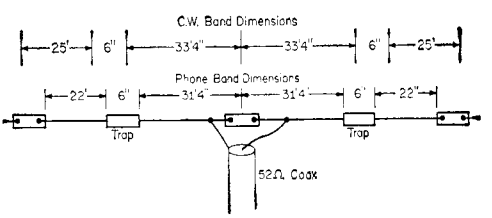
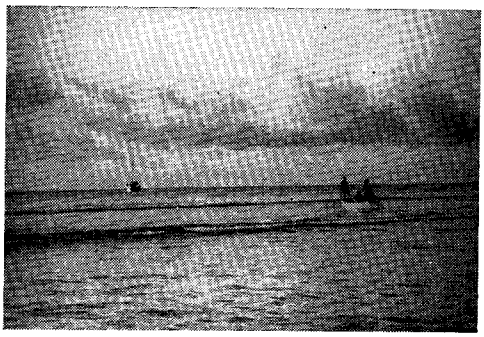


Fig. 1—Trap antenna dimensions for the phone or c.w. portions of the 75, 40, 15 and 10 meter bands are shown above.



A picturesque view of the waters off Agalega. The small boat was used to haul batteries back and forth to the *Marsouin* for charging.

Voyage To Agalega

BY V. C. HARVEY-BRAIN*, VQ9HB/VQ8BFA

IT WAS Thursday evening, May 30, 1963. This was to be the second attempt to reach Agalega. Very late in the season to undertake such a voyage in a rather small vessel; for in the ordinary course of events one could be almost certain of meeting a stiff South East Monsoon before reaching Agalega.

Clear of the Seychelles, nevertheless, I found only a moderate southeast swell, and only a light southerly breeze. Enough swell, however, to upset the ship's black cat who was very soon sick in the middle of my bunk. Enough swell, besides, to spoil my appetite; to dictate a spartan supper of hard tack, baked beans, and coffee.

Hard tack, baked beans, and coffee. The hours passed. The vessel rolled. I snatched uneasy intervals of sleep, while the helmsman steered S.S.E.

Saturday, June 1. 1000 Local time. Even though a stiff S.E. breeze strums through the rigging the vessel rolls no more.

VQ4AQ DE VQ9HB/MM GM GEORGE GLD CUA QTH NOW COETIVY LEAVING FOR AGALEGA PM TODAY VQ9HB/MM DE VQ4AQ GOOD MORNING HARVEY GLAD TO MAKE THIS CONTACT WAS GETTING ANXIOUS YOUR CONTINUED SILENCE YOUR SIGNAL IS 589 HERE IN NAIROBI HARVEY FINE BUSINESS FINE BUSINESS ALSO YOUR QTH ALL THE BOYS GETTING VERY EXCITED THOUSANDS OF HAMS AWAITING YOUR ARRIVAL AT AGALEGA

190 miles to Agalega. Before us now, perhaps, the most difficult part of the voyage. We are entering an area which seems feline to me; treacherous and uncertain; breeding ground of cyclones.

Astern Is Coetivy

The sunset was misty but the sea was calm. And later the moon floated like some huge tranquil pearl in a cloudless but hazy sky. We were pushing on at our best speed. The direct course to Agalega was 177° true but I, taking full advantage of this unexpected calm, had set a course 152° true and so was gaining precious miles to windward. Like this, I hoped to gain an advantageous position from where I might meet anything which the brooding S.E. Monsoon later had to offer.

0700 hours the next day. The scene had changed. The sky was overcast and a strong breeze whined through the rigging. Storm Petrels, considered by sailors as unwelcome visitors for they are said to be the harbingers of strong winds and storms flew about. All plain sail had been set and now, well up to windward of Agalega, we were making fair weather of what might have been a foul breeze.

VQ4AQ DE VQ9HB/MM GE GEORGE GLD CUA UR 5 ES 8 NICE SIG FB WX SO ROUGH HARD TO CONTROL THE KEY TELL THE BOYS AGALEGA NW ABT 33 MILES ES 208 DEGS TRUE HPE ARRIVE TMW IF STILL AFLOAT CHEERIO GEORGE ES 73

0650 hours, Monday, June 3rd. A yell from the masthead. Benoit the boatswain had seen Agalega. "Agalega right ahead."

0900 hours.

VQ4AQ DE VQ9HB/MM GM GEORGE STILL AFLOAT HI UR 5 ES 9 FB ALL EXCITEMENT HERE TELL THE BOYS CAN SEE THE BREAKERS ASHORE AT VQ8BFA

Approaching The Island

Rounding the northern tip of the island one immediately notices a very prominent landmark. A black painted ship's mast complete with crow's nest and rigging. It stands near the end of the iron-pile jetty, and as I was to discover later, is almost 70 feet high. A somewhat melancholy reminder, no doubt, of a disaster which occurred many years ago in the breakers—but, quite naturally, the only thought which crossed my mind at that moment was, what a gift for a ham's antenna!

*Bel Eau, Mahe, Seychelles, Indian Ocean.

I entered the anchorage slowly until I could discern through the crystal clear water the white sand and seaweed on the bottom. Then I let go in 5 fathoms. Even though close up to land, as close as I dare go, the ocean swells passing the protecting horns of the reefs to the north and south of us, meeting in the midst of the anchorage in the form of uneasy mounds of water, caused our small vessel to roll and pitch. I could see at a glance that during bad weather—especially with the wind, anything west of south—our position would become untenable.

Shorewards, all along the edge of the reef the swell broke in a smother of foam on jagged coral. The moment hardly seemed fit for a landing; nevertheless, I hadn't time to lose. The boys were all waiting for VQ8BFA, and moreover the weather might deteriorate at almost any time. I therefore decided to launch the pirogue and proceed ashore.

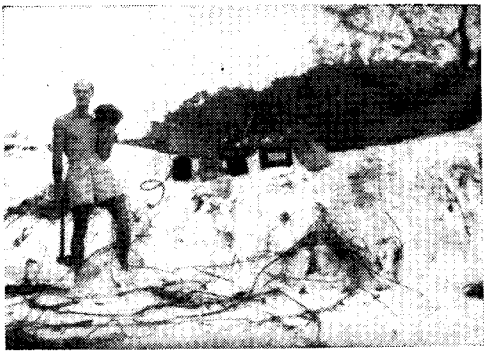
It was half tide. Near the entrance to the channel we found that we had to contend with the fierce current still pouring out from the lagoon. Soon heavy breakers foamed over the coral on both sides of us. We were now struggling in the midst of alarming rip tide. Suddenly a huge hissing breaker reared up astern, and gathering the pirogue on its back, surf-boarded us into the channel at a fierce speed. Then there was an appalling crash; a vast smother of water amidst which the pirogue broached-to. We lay almost on our beam on the back of a huge slanting coral head where, as the wave receded, we were left momentarily high and dry. Realizing in a flash that there was no serious damage; that the next comber might fill us, capsize us, and so perhaps finish us all, we leapt from the boat onto the rock and into the surge, and managed by frantic shoving to slide the pirogue off just in the nick of time before the next breaker arrived.

VQ8BFA had started off somewhat inauspiciously; and this experience was more than enough to convince me that no attempt should be made to land any heavy equipment until the weather moderated. I therefore decided to await more favourable conditions, at the turn of the tide, and even then, only to ferry ashore the small battery rig that day.

Operations Begin

Fortunately there were no more setbacks. And by 1500 hours GMT the rig had been set up ashore in a small shack conveniently placed at the edge of the beach, and kindly put at my disposal by the Administrator.

I suppose that most hams will find the rig rudimentary. The transmitter, an old TCS-12, converted to bring it on to the 20 meter band by the simple process of peaking up the v.f.o. inductance; broad-banding the v.f.o. and buffer-doubler plate inductors; and modifying the p.a. output and antenna-coupling circuits. In this instance a 132 foot long wire was brought down to the shack from the 70 foot ship's mast, already mentioned. This was end fed, being simply clipped on to the p.a. tank. The antenna was orientated in an east-west direction. (Needless to say, no TVI or other similar problems existed). Power was supplied from 12 volt accumulators through conventional dynamotors for both the transmitter and receiver.



Some of the equipment, batteries, etc. on the vine-covered, sandy beach at VQ8BFA.

The big snag about this set-up was that in order to avoid continuous demands on the batteries, the tx could only be left switched on during actual periods of transmission. Hence, when the band was open and speedy operation essential, many precious minutes were lost waiting for the tx heaters to warm up. Again, under these circumstances, the tx could never be worked at its optimum temperature and this of course resulted in considerable frequency drift. (All this was later corrected by separating the heater circuit and running it off a separate battery. The heaters were then left on continuously, and only the B-plus power was cut during receive.) But there remained still one other difficulty; owing to the rough weather, no battery charger had yet been landed. We had to ferry all the batteries onboard the *Marsouin* every morning for re-charging, and back ashore again later in the day. This delay was responsible for the loss of a considerable amount of operating time.

So at 1505 GMT, the day of our arrival at Agalega, I switched on and VQ8BFA was on the air. A thrill of expectation ran right through me, even to my finger tips, as I tapped out the first CQ.

CQ CQ CQ DE VQ8BFA AT AGALEGA

Sixty watts was going into the p.a. and the neon was glowing splendidly. The response was immediate, though not overwhelming. No pile up but plenty of calls. VQ4AQ, VQ4ERR, followed by G8KS, (QSL Manager), all three on s.s.b. VQ4ERR was putting in a terrific signal, but bursting through came HB9KO.

GE DR HANS GLD CUA UR RST 589 AT AGALEGA.

Even in spite of Robbie, who is burning up the shack!

So much to do. Demands on my time onboard the *Marsouin*. Running and maintaining machinery. Charging batteries. Keeping the rig in good operational order. Erecting antennas. Often even cooking my own meals—for the culinary department onboard left much to be desired. All

this was good fun but used up a lot of operating time.

A.M. the 5th of June. Constructed two primative ladders and scaled the roof of the shack. Spent most of the morning up there erecting a Mini-Quad twenty-meter beam. My helpers on the ground, to whom this operation meant less than nothing, consistently sent up parts in the wrong sequence. Nuts and bolts rolled down the steep roof and plunged into the sand some twenty feet beneath.

Having omitted to don a shirt, my back was in the process of being cooked to a cinder. Nevertheless there was always the compensation of a fine view. The sparkling sea where the *Marsouin,* riding to two anchors, bobbed in the swell.

In terms of radio operation a very ineffective afternoon. A thick haze of QRN—a real "pea-souper." Towards evening, however, signal began to rasp out, and by 1715 GMT the veil of static was slowly lifting. One by one, stations started to break out.

VQ8BFA DE W2AGW DE W2JT DE W2JNQ. The beginning of a small unbroken run of Ws. I worked like fury.

VQ8BFA DE W2ZX DE W2HTI DE W1FH.

And then, just before 1830 GMT—they had gone—vanished back into the QRN. Soon, the band was dead.

Midnight and the band was still closed. I set up my camp bed in the shack. My slumbers would have been unbroken but for the scurrying of many rats. Tomorrow I must bring the Black Cat.

Sunday, June 9. Yesterday being fine and calm, we succeeded in landing the heavy 1½ kw generator. So to-day, at 0350 GMT, it was running and the Harvey-Wells T-90 was at last on the air. The Mini-Quad Twenty was beamed on the U.S.A. Another flood of Ws. Reports came in fast and were mostly good.

VQBFA DE K3PCJ VQ8BFA DE W4ECI GM HARVEY UR 579 FB VQ8BFA DE K4ICK DE W2BOK DE W8PQQ —HARVEY UR 579 IN CHARLESTON DE K8YBK

The generator was kicking up so much hash it was almost impossible to copy weak signals. I tried screening it with corrugated iron sheeting—some slight improvement. I doubled the suppressor capacitors, both on the exciter and the a.c. side. I shielded the ignition cable and fixed a 500-ohm suppressor resistor. If anything, the row was worse. I set up a twenty meters folded dipole especially for the receiver at some distance away, but this was still no good. One thing remained—the breaker points capacitor. As this was right inside the works and to get at it meant stripping down the engine, I was reluctant to tackle the job as the generator was on loan.

Synopsis of Prefixes Worked

W, K	332	4X4	6	VK	3
G, GI, GM, GW	46	PA	5	CE	2
DL, DJ, DM	44	JA	5	OH	2
VQ	20	LA	4	PY	2
SM	16	SP	4	YU	2
HB	14	ZE	4	ZB	2
ZS	11	I	3	6O1	2
OE	8	OK	3	UA, UB, UC, HA, F	1 ea.
ON	8	OZ	3		
		VE	3	*Total*	564

Conditions at Agalaga

Every day from about 0300 GMT until 0530 there was nearly always a fine run of Ws. The Europeans were usually found at about 1700 GMT. The VKs, ZLs and the VEs were hardly ever heard at all. I was forced, for reasons already mentioned, to use the TCS-12 much more often than the T-90. But now that the heaters were on a separate circuit the TCS-12 put up an excellent performance. However, at about this time there were complaints; "VQ8BFA is putting in a good workable signal, (provided that one could read Harvey's morse)." The particular complaint was that my dashes were being clipped. George, VQ4AQ, suggested that the antenna relay was the villain, but it wasn't. So I changed over to the T-90. To my consternation I was given the same report. The only items common to both transmitters which could have caused the trouble were, presumably, the key, and perhaps, sloppy operating. I hoped not the latter. I examined the key contacts and found them badly burnt. After grinding them down carefully with an oil stone I did not receive any further complaint. Neither from G8KS, nor even G2DC—Hi.

Every morning the Black Cat, now that he had got the knack of it, jumped into the pirogue and accompanied me ashore. He remained with me all night in the shack. As for the rats—why that Black Cat and the rats—they were all buddies together. He never touched one of them!

A Run of Trouble

Tuesday, 11 June. Arriving on board in the morning with the batteries I discovered that the battery charger was kaput. I changed the coil and re-set the breaker gap. It started but now there was no load on the dynamo. Found a short in the control box. Found a broken brush connection. Repaired both. The engine then started and the meter indicated 15 amps. But then the engine stopped. Now the gear timing had shifted. Dismantled engine and found that the gear key had sheared. Made another key and re-assembled. The engine started at the first pull, but next the coupling spring between engine and dynamo broke. I had no spare. The time was now 1800 and Malbrouk the mechanic, and myself, skipped our lunch. We were tired, we were disgruntled, we were covered with oil and grease. And Malbrouk, looking uneasily over his shoulder muttered, "now I know that the devil is around." VQ8BFA was not on the air that night. VQ8BFA was not on the air the next morning.

Early the next day we ferried the uncharged batteries back ashore. And by using the exciter side of the 1½ kw. a.c. generator I was able to get three of them charged. Then, having little or nothing to do, I borrowed a bicycle and set out to see something of the island.

[*Continued on page 92*]

Amateur Radio and the 1963 ITU Space Communication Conference

BY GEORGE JACOBS*, W3ASK

ONE of the most important radio communication conferences ever held took place in Geneva, Switzerland from October 7 to November 8, 1963. Convened by the International Telecommunication Union[1] (ITU), the conference was attended by more than 400 delegates from 70 countries who were assigned the difficult task of allocating radio frequencies for the rapidly developing communication requirements of space exploration and utilization.

The general results of the conference are discussed in this month's SPACE COMMUNICATIONS column appearing on page 64. This special report will discuss in greater detail the significance of the conference to amateur radio.

The Proposal For Amateur Radio

Documents containing hundreds of proposals made by more than a dozen countries awaited the delegates when the conference opened on October 7. *None of these documents, however, including the proposals of the United States, contained any reference to amateur radio.* On the other hand, certain proposals, although not clear in their intent, appeared to be subject to the interpretation that space activities would be *prohibited* for services which have not been specifically allocated any frequencies for space communcations. The conference began, therefore, with the possibility that amateur-radio activity in space might not be permitted in the future, despite the successes of the OSCAR I and II satellites.

Perhaps as a move to avoid any misinterpretation that might result in prohibiting space activities for the radio amateur service, the United Kingdom delegation submitted the following proposal on October 8:

"In the band 144-146 mc, space stations in the Amateur Service may be used. (Reasons: To permit the use of space communication techniques by Amateurs)."

The British proposal was assigned to the Allocations Committee (Committee 5) for consideration. Committee 5 assigned it to Working Group 5C, which also considered frequency allocations for weather and navigation satellites. The Working Group consisted of delegates from most of the 70 countries attending the conference. Observers from the International Amateur Radio Union (IARU) and other international organizations were also present.

*SPACE COMMUNICATIONS Editor, *CQ*.

[1]The ITU publishes its own monthly magazine entitled *Communications Journal*, English editions are available through subscription via The International Telecommunications Union, Editorial Office, Place des Nations, Geneva, Switzerland.

Amateur Radio Participation

Amateur radio was well represented at the conference, and as events turned out, fortunately so! The IARU is recognized as an international organization by the ITU, and officially attended the conference with the status of observer. The IARU delegation was comprised of the following: John Clarricoats, G6CL; John Huntoon, W1LVQ; Per A. Kinnman, SM5ZD; Robert M. Booth, Jr., W3PS; William I. Orr, W6SAI; Arthur O. Milne, G2MI.

The IARU is an affiliation of 60 national societies of amateur radio operators in as many countries around the world, and claims to represent more than 500,000 radio amateurs. The Union has two major tasks: to do everything possible for preserving the amateur bands, and to form the connecting link between amateurs of all countries in scientific, technical and operational matters.

In addition to IARU representation, there were at least 25 licensed radio amateurs from 13 countries among the 400 delegates attending the conference. While having primary responsibilities to their national delegations in other areas of communications, several came to the assistance of amateur radio "when the chips were down."

Proposal Hotly Debated

The British proposal to permit amateur space communications in the 144-146 mc band came up for discussion for the first time in Working Group 5C on October 10. It received favorable support from some delegations, including the USA, but serious questions were raised by several other delegations as to whether radio amateurs could utilize space communications as a practical matter. The following were among the more persistent questions raised:

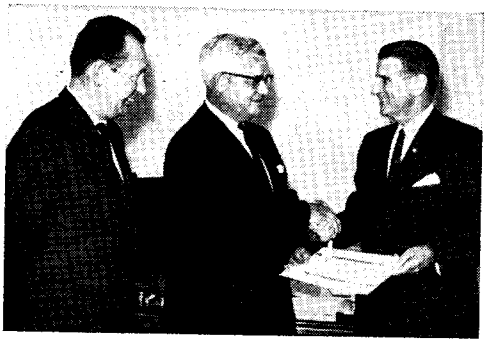
1. Could radio amateurs really build a satellite? Isn't this a too complicated and costly undertaking for them?

2. Who would launch satellites built by radio amateurs in countries that did not have launching facilities?

3. Wouldn't this require ground stations with powers greater than radio amateurs are permitted to have in most countries?

4. How could it be guaranteed that an amateur radio satellite would not interfere with terrestrial communications of radio amateurs who did not care to participate in the space experiment?

The amateur radio discussions continued through October 11, becoming quite heated at times. While several countries continuously came to the support of amateur radio, the op-



The Honorable Oren Harris of Arkansas (right), shown receiving his membership certificate to the International Amateur Radio Club of the ITU. John Gayer, HB9AEQ, president of the club, presents the certificate to Congressman Harris, as Ted Robinson, F8RU, club secretary looks on. Congressman Harris was in Geneva as a member of the U.S. Delegation to the ITU Conference on Space Communications. He is also Chairman of the House Committee on Interstate and Foreign Commerce where S. 920, the reciprocal operating privileges bill recently approved by the Senate has been forwarded for comments and final action by the House of Representatives.

position to the proposed British allocation was such that no headway could be made. It became obvious that the conference required a briefing on the accomplishments of amateur radio in the field of space communications, and plans for the future. The chairman of Working Group 5C called a temporary halt to the discussion and requested that the IARU submit a briefing paper to the conference on this subject. This in itself can be considered as an important milestone for amateur radio in the international field, since it was the first time since the days of Hiram Percy Maxim that the IARU had been invited to participate actively in the deliberations of an international conference!

Fortunately, the IARU delegation came well prepared with reports, articles, photographs, letters, etc. describing in detail the OSCAR amateur radio satellite program. The "night oil" burned brightly in several hotel rooms in Geneva until the wee hours of the morning as the IARU representatives summarized the OSCAR data into an official conference document. The document, bearing the number Doc. 84, and entitled, "OSCAR Space Satellite Program Of The International Amateur Radio Union," was circulated to the conference on October 14.

Coincidentally [?], a model of the OSCAR beacon satellite was in Geneva at the time, and was immediately put on exhibition at the Conference location. This enabled skeptical delegates to see and handle the satellite themselves.

On October 12, the chairman of Working Group 5C appointed an *ad-hoc* group comprising delegates from Canada, the USA, the UK and the USSR to try to break the deadlock. It appears as if the IARU document and the OSCAR exhibit helped accomplish this, since a few days later the *ad-hoc* group proposed the following wording which subsequently was found to be acceptable to the entire Working Group 5C: (The wording appears in Doc. 95 Rev., dated October 25)

"In the bands 144-146 mc, space satellites may be used by the Amateur Service. Such use should be coordinated among national amateur organizations concerned and is subject to the provisions of Article 41." (Article 41 of the Geneva Radio Regulations deals with the Amateur Service).

In addition, the following resolution was also part of the proposal, and was passed by the Working Group:

". . . taking into account the desire of amateurs to use space satellites for amateur communications and in light of any recommendation received from the International Amateur Radio Union, the conference resolves that the CCIR be requested to study and recommend upon the technical principles on the basis of which such use of satellites can be conducted taking into account the use of the band concerned by normal terrestrial amateur radio operations."

During the course of discussion on this proposal, it again became apparent that further information concerning amateur radio had to be supplied to the conference. On October 29, the IARU submitted its second official conference document. This document, number Doc. 107 Rev., describes how amateurs have handled the problem of interference in the amateur bands without requiring regulatory assistance, and answered several additional questions that were raised in previous discussions on the conference floor. The document also called attention to the Union's desire to have a segment of the 10 meter band allocated for radio amateur space activities, and indirectly questioned the need for the CCIR to study amateur radio space requirements. (The CCIR is the technical area of the ITU and is responsible for studying technical questions of an international level in the field of communications).

At a full Committee 5 meeting on November 2, amateur radio was again the subject of long and heated debate. At this meeting, however, a majority of nations approved Document 95 and agreed to delete the resolution to the CCIR. Privately, many delegates stated that they took this action as a result of the information made available by the IARU in Document 107. The Committee did not approve a 10 meter allocation for amateur space communications on the basis that no experiments had as yet been carried out in this band, and there was no evidence that any were being planned for the future.

On November 5, Document 95 moved into the Plenary Assembly of the conference, where delegates from 70 countries convened to discuss it. The Plenary meeting approved Document 95, but shortened it to read as follows:

"In the band 144-146 mc, artificial satellites may be used by the Amateur Service."

The Plenary dropped the original wording, ". . . should be coordinated among national amateur organizations concerned . . . ," since this was already the function of the IARU. The words, ". . . and is subject to the provision of Article 41," were also dropped since this was already implicit in the Radio Regulations. The words, "artificial satellites" replaced the original

Members of the IARU delegation to the ITU Space Communications Conference discussing a serious point with VE3ATU (back to camera) of the Canadian Delegation. L. to r.: W6SAI, G6CL, W3PS, SM5ZD and W1LVQ.

wording, "space satellites" to permit moonbounce and meteor-scatter communications, which depend on *natural* rather than artificial satellites, to continue in other bands.

As an added bonus, the delegate from Australia announced at the Plenary meeting that his country had changed its plans to use the band 144-146 mc for broadcasting, and would make the band available for amateur radio and amateur space communications. The Plenary assembly thus approved the band 144-146 mc for amateur space communications on a *worldwide* basis.

In allocating bands to *other* space services, the conference took the following actions which affect certain amateur bands:

420-450 Mc: A small segment between 449.75 and 450 mc has been allocated to space telecommand on a shared basis with radiolocation and amateur services. The amateur service already shares the entire band on a secondary basis with radiolocation and the new space allocation doesn't appear to change significantly the sharing pattern.

3,300-3,500 Mc: A segment between 3,400 and 3,500 mc has been allocated to communications satellites (satellite-earth) on a shared basis with existing radiolocation and amateur services.

5,650-5,925 Mc: A segment 5,670 to 5,725 mc has been allocated to deep space research on a shared basis with existing radiolocation and amateur services.

The conference came to an end on November 8, 1963 with the following favorable results for amateur radio:

1. The amateur radio service received a worldwide allocation, on an exclusive basis, for space communications in the band 144-146 mc.

2. The amateur service received recognition at the conference; was treated on a par with other communication services; and was a topic of considerable serious discussion.

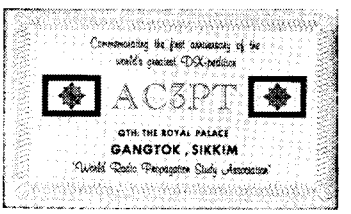
3. The International Amateur Radio Union, acting collectively for *all* the world's radio amateurs, gained stature and recognition at the conference, and played a vital role in swinging the great majority of nations to the side of amateur radio.

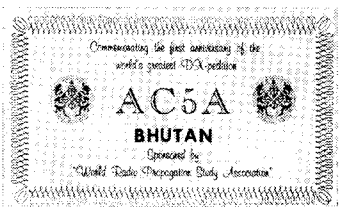
In these days of controversy over the future of amateur radio, it is encouraging to note that nations will still lend support to the *experimental* and *communication* aspects of this service, and that an organization is available to represent these interests on a worldwide, international basis. ■

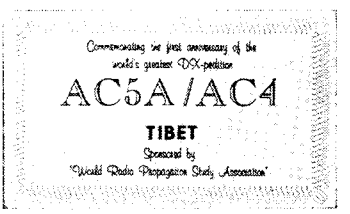
QSL contest

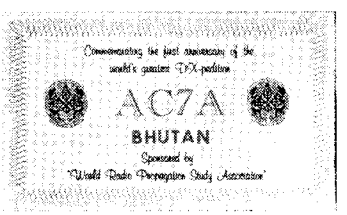
WE'VE sort of combined our monthly "QSL Contest" with *DX Magazine's* "Drooling Corner," since all cards represent a DXpedition and all were operated by one gentleman: namely—Gus M. Browning, W4BPD! All cards are two-color thermograph jobs with the exception of AC3PT which is four and YA1A which uses three colors on front.

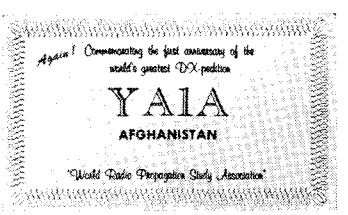
If you happened on one of these calls and you're wondering where to QSL, W4ECI will help via Ack Radio Supply Co., Birmingham 5, Alabama. P.S. Watch for Gus' story on Aldabra in the February issue.

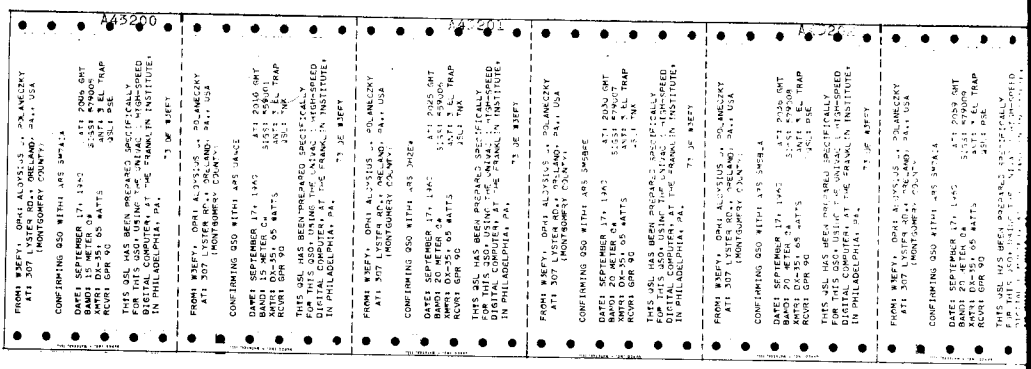












A $1,000,000 High-

Using UNIVAC I For QSL's By The Yard

BY ALOYSIUS J. POLANECZKY*, W3EFY

BEING an "average" ham, we suffer an affliction common to many of our brethren. This affliction usually manifests itself in symptoms displayed at 2215 GMT on weekdays and 1600 GMT on Saturdays. In the terms of mathematical statistics—"A strong correlation exists between the time of symptom manifestation and the time at which the afflictee discovers that the mailman has not delivered any QSL's." The symptoms consist of a few words mumbled under the breath (after all there are six harmonics present) and a slight flush of the face, only infinitesimally indicative of the magnitude of the inner turmoil. It is surprising the amount of distress which can be caused by the non-appearance of a certain piece of cardboard, especially when the expectant recipient is an aspiring certificate collector. (Certain hams in the various counties of the first three call areas, how about coming across?)

The Proposed Remedy

Now, we are magnanimously informed by the experts (those who have more than one out of three cards answered), that one important affector of rate of QSL return is the impact created by the card. "Be original!" "Create an impression!" "Display your personality!" Fine! But how does one do this? Create your own design? By the time we get past our call and QTH our originality is shot. Create an impression? Sure. We're a big gun. Made WAS after only five years of operating. Display your personality? What, admit that we're lazy? Maybe we could print our own using a silk screen? Let's face it, we couldn't draw a straight line if we lived in a one dimensional world.

*Senior Statistician, Computing Center, The Franklin Institute of the State of Pennsylvania, Philadelphia 3, Pa.

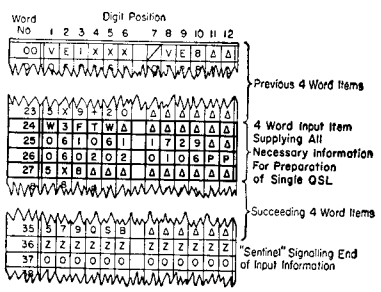


Fig. 2—Input to QSL run. The coded information is shown as it serially appears on the electromagnetic input tape. An explanation of the coded information is given in the text.

The Breakthrough

Then, with the unexpectedness of a JT1 answering our CQ, the solution came to us! Somewhere, the fates that toy with our destiny had dictated that we be employed at the Franklin Institute Computing Center with a $1.5 million dollar Univac I installation at our disposal. Let this loyal slave prepare our cards. "Be original!" Certainly we hadn't seen a card of this nature anywhere. "Create an impression!" If having QSL cards prepared by Univac I, the first "mass" produced high-speed electronic digital computer, didn't have the desired effect, we'd eat the thing, diode by triode. "Display your personality!" If this didn't create proof positive of our laziness nothing else would.

Acquisition Of Grant

Filled with the enthusiasm of the Potomac Valley Radio Club awaiting the opening gun of the annual Sweepstakes, we took the plunge. Our first job was to convince the Director of The

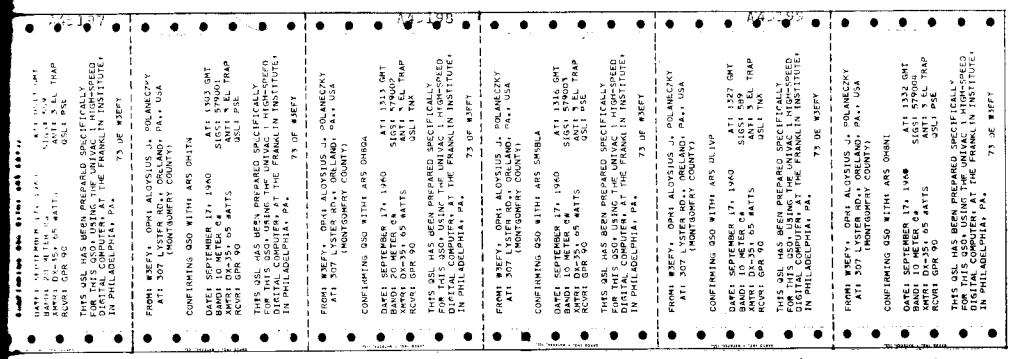


Fig. 1—Sample QSL's.

Speed QSL Printer

Franklin Institute Computing Center, one Larry McGinn, that this was a stroke of good fortune for our organization, and W3EFY should not be charged for machine time (at $120 per hour). The implications were staggering! The name of The Franklin Institute Computing Center would be spread world wide! Outer Mongolia! St. Helena! Coos County, New Hampshire!!!! Our performance would have made Stanislavsky sit up and take notice. For some baffling reason, our audience was unimpressed, and even indicated that perhaps there just might be a stain of selfishness in our motives. (Perish the thought.) But the decision was favorable. Do the programming on our own time, and keep off the machine when a paying customer wants on.

Synthesis Of The Vaccine

If the computer could think for itself, our goal would now have been realized. But for some strange reason all a computer is capable of doing is "executing with blind faith, great reliability and lightning speed every blunder committed by the programmer." Therefore, to successfully utilize a computer on any problem, three areas must be completely and unambiguously defined:

1. What the input to the computer consists of;
2. What is desired as an output;
3. How the transistion from 1 to 2 would be carried out, using paper and pencil, given sufficient time and energy.

Whether we are built backwards, or whether this particular project was best attacked in this fashion, we will not attempt to decide, but we tackled the output problem first. The preparation of a QSL card is strictly an editing problem, making format the primary consideration. There are an almost limitless variety of paper stocks and sizes from which to choose. The fact that there was a large amount of continuous 3 × 5 card stock lying around from a previous job helped define the limits of our output format. Since wastefulness is a capital sin, it was only proper that this excess stock be put to good use. (For the benefit of the Novice, the proper term for this operation is "scrounging.") There it was,

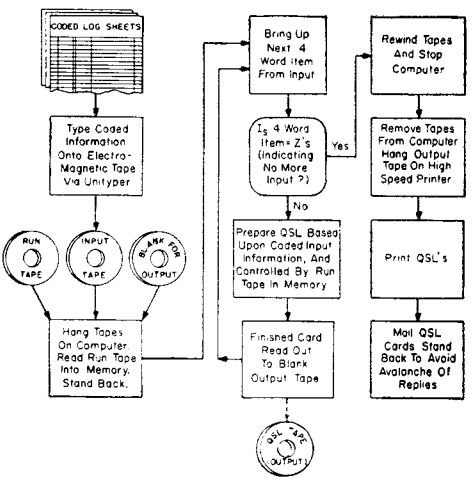


Fig. 3—"Flow Chart" showing total process necessary to prepare QSL's using the Univac I computer.

3 × 5 stock, which, when used on our high speed printer, will accommodate 18 lines of information, each line 50 digits long.

Mustering up every last ounce of originality, we decided that the QSL should contain: our call, name, QTH, county (that should suck in the replies, there must be less than 1,000 hams in our county), date, time (GMT naturally), band, mode, signal report, transmitter, receiver, antenna, request for or acknowledgement of QSL, and call of station worked. (Note the cleverness of this list.) We also decided that there should be displayed on the card an indication that a 1,500 kilobuck organization was tied up preparing the QSL specifically for the recipient. (When nothing else works, try flattery.) Finally we decided to close with the novel, eye-catching and witty phrase "73 DE W3EFY." This format, once rigidly defined (see fig. 1), overcame the first hurdle, and allowed us to proceed to specification of the input.

Certain portions of a QSL are fixed, namely those portions the printer places on the now

Computer operator Herb Chaplin (left) and the author inspect a strip of QSL's just printed out on the High-Speed Printer. Just visible over W3EFY's shoulder is one of the two circuit banks which control the reading of information from tape and its printing onto paper. A Uniservo serves as the input vehicle.

passe, non-computer manufactured cards. This portion need not be specified in the input for each individual QSL card, and could be read into the computer only once for each "run", at the same time the program was read in. Thus, the input need specify only the variable portions of the QSL. Here's where laziness becomes a virtue. We wanted to specify these variable portions in as few digits as possible, thereby feeding to the computer as much information as possible per inch of electromagnetic tape movement (the input and output media for Univac I). The input format finally settled upon is shown in fig. 2.

The input for each QSL consists of a packet or item of four 12 digit "words."

The first of the four words is devoted entirely to the call of the station worked. This allows sufficient space to take care of characters such as WA6SOS/ZD7 with a couple of digits to spare. (The Δ's shown in fig. 2 are spaces and are normally non-printing.)

The first six digits of word 2 are the date, the next four digits are the time and are self-explanatory. The last two digits of the word are allowed to be either spaces or M's. If spaces, our call on the QSL appears as W3EFY, or if M's as W3EFY/M.

The first two digits of word 3 specify the band; e.g., 01 stands for 160M, 02 for 80M, etc. Each succeeding pair in word 3 stands for, respectively, mode, transmitter, receiver, antenna and whether a QSL is being requested or acknowledged (usually the former).

Word 4 is devoted entirely to the signal report, and the 12 digits should be sufficient to contain such extremes as 5X9+20/QSBΔΔ. These four word packets follow each other until all the input is completed. This is succeeded by a word of Z's, termed a sentinel. The sentinel informs the program that the job is finished, and the computer can get back to making money.

The problem of transformation of input to output could now be attacked. On the computer this transformation is controlled by a run tape containing:

1. Coded instructions,
2. The invariant portions of the QSL, and
3. The variable portions of the QSL other than the call of the station worked and the signal report.

Item three consists of words such as January, February, 160, 80, C.W., Phone, S.S.B., TV (dreamer), PSE, TNX, etc. Item 3 above plus the call and signal report are laid into item 2 above as dictated by the coded instructions, item 1. The whole run tape is read into the computer at the beginning of the run, and operation from that point on is completely automatic. (See fig. 3 for a flow chart of the process.)

Writing of the coding itself is the most ego-sustaining portion of programming. Each line of coding as it is written, corrected, modified or deleted is a testimonial to the cleverness of the coder. However, accomplishment must of necessity be its own reward. An explanation of a tricky bit of coding to one's colleagues usually brings a typical reply, "I use that stunt all the time." Rather than belabor the reader with the details of Univac I coding, let it be said that, conceptually, coding is similar to design and construction of ham gear. We are merely designing circuits to control the flow of information. This project resulted in three "debugging" shots on the computer before discovering our coding errors and correcting them.

Immunization Of Patient

Finally success! There it was, QSL's pouring off the computer onto the electromagnetic tape at the rate of three per second. Printed strips of QSL's pouring off the High-Speed Printer at the rate of 33 per minute! The first batch was immediately consigned to the mails and we settled back to await the avalanche of replies.

Relapse

How did we make out? Being an "average" ham, we suffer an affliction common to many of our brethren. This affliction usually manifests itself in symptoms displayed at 2215 GMT on weekdays and 1600 GMT Saturdays. Some guys wouldn't QSL if we *gave* them a Univac I. Pass another platter of diodes, please! They're delicious with horseradish.

Occupational Therapy

In the meantime we plan to continue making our cards on the computer, if you care to have one, give W3 Egg Foo Yung a shout if you hear him on the air. (You may also see one of these cards from KG4BA if you happened to work him with VP9EP at the key. His QSL manager, W3INH, lives nearby, and we ran off a batch for him.)

Acknowledgements

We wish to thank our colleagues at the Franklin Institute Computing Center, who have tolerantly accepted our enthusiasm during our work on this "project." ■

The Coaxial Line Balun

BY CLIFF GILBERT*, K6GAX

Where an unbalanced coaxial transmission line is used to feed balanced systems such as dipoles, dipole-fed multi-element directive arrays, etc., a line balance converter should be used. The author presents a brief summary of the theory and advantages of a coaxial line balance converter. With this simply constructed unit, radiation losses, due to unbalanced line currents, can be markedly attenuated.

THE most efficient method for the transmission of r.f. energy is over nonresonant lines. In a two-wire transmission line each conductor is at high potential with respect to ground, thus creating high currents which flow in opposite directions in each conductor. This high current flow would normally cause the feedline to act as an antenna, but, the conductors are spaced close enough so that any radiation is cancelled.

The situation is different with coaxial feedline, the inner conductor being at high potential with respect to the outer conductor which is grounded. Matching this type of *unbalanced* transmission line to a *balanced* line (or antenna) *cannot* be accomplished simply by connecting to the coax. Assuming equal surge impedances for both lines, currents from the balanced line will flow on the outer conductor of the coax causing radiation. A proper connection can be achieved, however, by using a "line balance converter" or balun.

The purpose of the balun is to increase the impedance of the outer conductor to prevent r.f. from flowing over it. The balun is essentially a quarter-wave line acting as a metallic insulator.

This shorted, quarter-wave line will exhibit standing waves when the open end is resonated. At the shorted end, a voltage node (minimum) and current loop (maximum) occurs and at the open end, a voltage loop and current node occurs. Thus, an extremely high impedance exists at the open terminals and the line acts as a quarter-wave insulator. The vector sum of any unbalanced currents at the antenna terminals will be zero at the shorted end of the stub thus preventing these currents from flowing into the remainder of the line.

Although the balun is limited to a narrow bandwidth, it tends to stabilize the existing impedance values. The explanation of this fact is that the equivalent circuit for a shorted line less than a quarter wave in length is inductive. Should the transmitting frequency be slightly less than resonant, the antenna reactance would be capacitive. The balun would then tend to maintain the existing impedance value by inductively cancelling out the capacitive reactance. Similarly, the equivalent circuit for a shorted line more than a quarter wave in length is capacitive. With a transmitting frequency slightly above resonance, the antenna reactance is inductive. The balun would then tend to maintain the existing impedance value by capacitively cancelling out the inductive reactance.

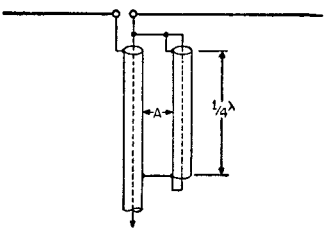


Fig. 1—Balun construction details. The length can be determined from the formula given in the text. The spacing at A should be from ½ to 1 inch and should be held by the use of rigid low loss spacers placed every 6 inches along the length of the balun.

A type of balun pertaining to coaxial lines is the detuning sleeve or bazooka. This, essentially, forms a secondary coaxial system with the sleeve acting as the outer conductor and the outer conductor of the coaxial line as the inner conductor. The balun shown in fig. 1, made with coaxial cable, is easier to construct than a sleeve.

The quarter wavelength can be determined by formula:

$$L_{(\text{feet})} = \frac{234}{f_{(Mc)}}$$

In constructing the line, however, a recommended practical approach is to cut the line several inches longer than the formula indicates and then to resonate the line with a grid-dip oscillator before connection is made to the antenna. The g.d.o. should be coupled to the shorted end while equal small lengths of outer conductor braid are cut from both open ends (leaving sufficient inner conductor for antenna connection) until resonance is determined. The procedure is tedious, but don't rush through it. ■

*19265 Santa Rita Street, Tarzana, Calif.

A Wideband Filter for the 75A-4

BY WALLACE T. THOMPSON*, K8BYT

Here is a filter that broadens the tuning of the 75A-4. With the filter described below you can now copy a.m. on the v.h.f. bands with ease. It is a lot less costly than a broadband 6kc mechanical filter.

THE mechanical filter in the 75A-4 and other Collins receivers provides an ideal passband for s.s.b. signals and most owners of these receivers use them more or less exclusively on s.s.b. and c.w. On occasions, however, it is desirable to have a wider bandpass than 3.1 kc. Such times are the tuning of a.m. signals when such a receiver is used to back up a v.h.f. converter. The stability of many 6 and 2 meter signals being what they are, exhalted carrier reception is annoying and 3.1 kc single sideband diode detected audio has a pronounced fuzziness.

The existence of the 6 kc mechanical filter constitutes recognition of the desirable features of a wider passband. The difficulty is that the price of a mechanical filter is not commensurate with the need.

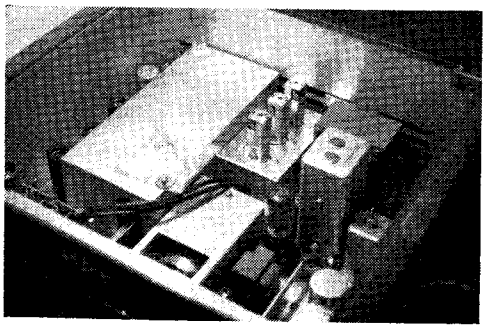
A common trick employed by 75A-4 owners is to prune a few turns from an ordinary 455 kc i.f. transformer and insert it in one of the mechanical filter sockets. The reduction in turns is necessary because of the presence of 100 mmf capacitors across the input and output of the mechanical filter sockets. The filter herein is simply an extension of this approach.

A single i.f. transformer will generally be found to have gain to spare and be as broad as the proverbial barn door when used in this manner. A wideband filter is the desired objective but this is a bit too wide in practice. The poor skirt selectivity allows the passage of nearby signals and greatly increases the likelihood of cross modulation in the i.f. amplifier stages. Thus it is desirable to exchange more of the gain for selectivity and the filter shown in fig. 1 is the result.

The Circuit

This circuit of three cascade i.f. transformers does improve the selectivity somewhat while retaining gain equal to the mechanical filters. The 1 mh r.f. chokes are needed to resonate the previously mentioned 100 mmf capacitors at 455 kc. The 15 mmf coupling capacitors reduce the degree of coupling between each transformer and improve the selectivity. A 15 mmf capacitor has a reactance of 23,000 ohms at 455 kc. Off resonance the i.f. transformer appears as a small impedance and very little of the signal voltage reaches the transformer. Two stages of this light coupling create the additional selectivity observed. The shield sides of the input and output cables are necessarily isolated for d.c. by the 0.005 mf capacitors because the input carries B+ and the output carries a.v.c. when in use in the 75A-4.

*205 Fairway Drive, Columbus 14, Ohio.



View of the filter located in the 75A-4. The Vector socket at the end of the coax plugs into the mechanical filter socket.

Construction

The three i.f. transformers are easily placed on a 3 × 5¼" Minibox, and at the end of 12 inch cables, the filter fits very nicely into an unused space in the 75A-4. Recalling that B plus and a.v.c. voltages come in on the shields of the cables, one should dress the leads carefully to prevent shorting inside the Vector P9D plug. A cardboard insert is desirable. The plug shield

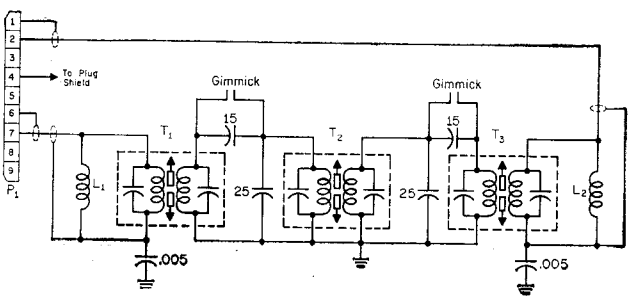


Fig. 1—Circuit of a wideband filter for the 75A-4. The capacitors less than one are in mf, greater than one in mmf and all are ceramic. Inductors L_1 and L_2 are 1 mh r.f. chokes (National R-50), transformer T_1, T_2 and T_3 are 455 kc i.f.s., (Miller 12-C1) and P_1 is a 9 pin plug made by Vector (P9D).

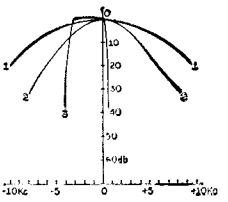
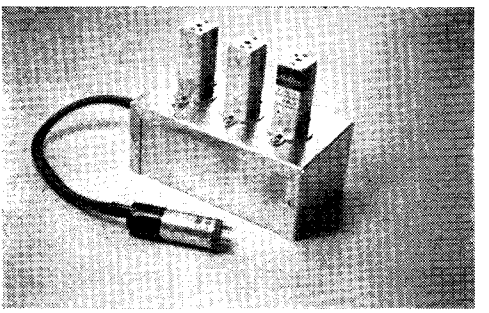


Fig. 2—Response curves of the 75A-4 using the various filters. Curve 1—one i.f. transformer; curve 2—three i.f. transformers; curve 3—mechanical filter.

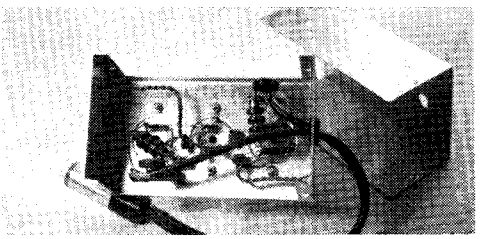
is grounded by connecting a short thin wire to pin number 4 and bending it over the edge where the shield can fits on the base. The input and output coax leads are 13 and 16 inch lengths of RG-58A/U.

The two 15 mmf coupling capacitors are paralleled by twisted wire gimmicks that are used to adjust the gain so that it is equal to that of the mechanical filter.

The transformers may all be peaked at 455 kc or slightly staggered for a flatter passband. The best choice seems to be peaking at 455 kc to narrow the passband. This selectivity curve is shown in fig. 2. Perhaps one might say it is as broad as some fraction of a barn door. In use it is a pleasure to have good quality audio from v.h.f. a.m. signals and other a.m. stations. ■



View of the completed mechanical filter built on a 3 x 5¼ inch Minibox.



Inside view of the filter showing parts placement. Notice the twisted gimmicks used to adjust the gain.

A Plug-In Multi-Crystal Adaptor

THE amateur who operates nets (such as MARS and CAP) and general amateur communications has need for both crystal and v.f.o. operation. Continual plugging-in and unplugging of crystals and v.f.o. is inconvenient and will eventually wear out the socket. The adaptor described selects any of ten crystals and the v.f.o. by the turn of a switch.

Crystal selection is easy—ten of the positions of a 2 pole 11 position switch accomplish this. The mild complication that does arise comes from the need to switch the crystal oscillator to act as an amplifier. In the DSB-100 used at this station, it is necessary to short out an oscillator feedback capacitor when using a v.f.o. While this can be done with a special single-deck switch, it is easier to find, in distributor stock, the two-deck switch shown in fig. 1.

Wiring is easy. Assemble the coax receptacle, ten-crystal socket, and rotary switch to the *inner* channel of the minibox. Wire this section completely, coming out with four long bare leads (to the ground, key, and oscillator grid and cathode in the DSB-100.) When ready to assemble the two halves of the minibox, feed the wires through the pins of the octal plug mounted in the other half of the box. Pull gently on the wires to keep them reasonably straight.

The shaft of the rotary switch was left long so that it could be reached easily in my installation. The parts arrangement is not critical and any practical set up may be used to suit the individual transmitter.—*WA2ANU.*

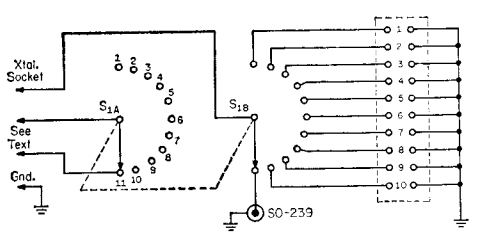
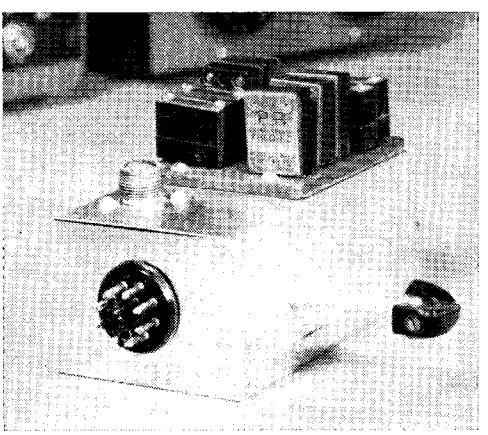


Fig. 1—Circuit of the crystal—v.f.o. selector switch. Position 1-10 selects the desired crystal and position 11 selects the v.f.o. Switch S_{1A} is used to place the crystal oscillator in the amplifier state but is not necessary for all transmitters. The switch is a Mallory 176-C and the crystal socket a Johnson 126-120-1.



View of the finished crystal—v.f.o. adaptor that permits switching of 10 crystals and a v.f.o. input.

15 Meter Coils For The HRO-60

BY GEORGE HRISCHENKO*, VE3DGX

Fifteen meter coil sets for all HRO receivers are practically impossible to obtain and when available are costly. Here are instructions for making up a 15 meter coil set for the HRO-60 using a spare coil set from any HRO model.

IF you missed the boat on the 15 meter bandspread coil for your HRO-60, don't despair. If you can beg, borrow or steal a coil set for any HRO from the HRO Jr. on up, you can wind your own. Try to get a set with two trimmers mounted on each coil board. The set I converted had only one trimmer and made the job of alignment more tedious and involved extra work. Figure 1 shows a pictorial of the finished product.

Preparation of Coil-set

Clean out the coil set carefully leaving all the air trimmers. If there are two air trimmers in the r.f. and oscillator sections in your coil set, remove plates from one of them to bring it down to a 5 to 15 mmf range.

If there are U shaped handles on the coil-set they have to be removed and replaced with a bolt and sleeve arrangement similar to the other HRO-60 coil sets.

Coil Preparation

The coils are prepared from two lengths of Miniductor stock. A length of #3003 is used for the primaries and a length of #3011 makes up the secondary windings. When cutting the coil sections as listed in the chart be sure to allow enough additional turns to peel off connecting leads.

The construction is simple since the primary windings are inserted in the secondary windings and held in place with a few drops of glue placed at strategic points. The coils are self supporting on the four leads.

Assembly

Start with the antenna coil first as it is easiest since it doesn't require a trimmer capacitor. Follow the layout shown in the pictorial of fig. 1 and you should have very little difficulty. After completing the antenna section the two r.f. sections should be tackled. If the coil set used has two air trimmers the layout will have to be slightly different than shown in fig. 1. Fabricate and assemble the coils and wire them in. Now mount the 3-12 mmf NPO ceramic trimmers on stiff wire leads and position them in such a manner so you can reach the adjustment screws through the front of the coil can for alignment purposes.

	ANT.	R.F.	OSC
Pri.	2¼ t	6 t	4 t tapped at 1⅛ t, ¾" diam.
Sec.	5 t	4½ t	
Cap.	50 mmf	68 mmf	68 mmf N150
Trim.	none	3-12 mmf NPO	3-12 mmf NPO

The oscillator section must have a hole cut in the back of the shield can so that the double conversion stage will operate. Check the 20 meter coil set and notice the position of the hole. Place a piece of paper on the rear of the 20 meter oscillator coil and rub your finger over it to get an impression to use as a template. Need I tell you to drill the 15 meter oscillator cover without the coil in it? Install the oscillator coil and the 3-12 mmf NPO ceramic trimmer on stiff wire and position it so that it can be adjusted from the front.

Alignment

After all the coils are reworked and back in their cans, but not mounted on the front plate, push them into their respective compartments. Make sure that the contacts are secure. You may have to shim the front of the cans up with cardboard to insure good contact. Also check to see that the double conversion push rod is not catch-

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

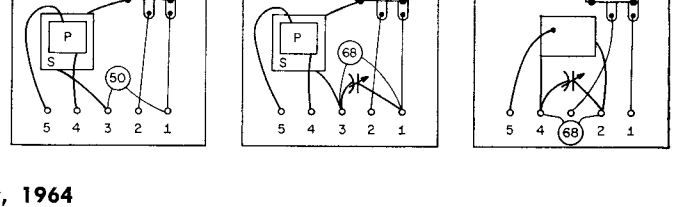
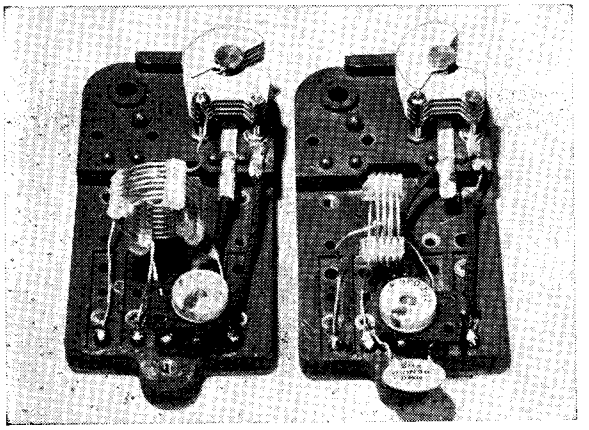


Fig. 1—Pictorial presentation of the 15 meter coil construction. The primaries are cut from #3003 Miniductor and the secondaries from #3011. When mounting the primaries in the secondaries, make sure the windings run in the same direction.



Inside view of coil board. The oscillator coil (AC-4) is on the right. Board on left shows layout suitable for other coils. Note that trimmer C_2 is not essential for AC-1 since it is across ant. trimmer on front panel.

ing on the edge of the hole in the oscillator can.

To begin the alignment I used a signal generator to get as close as possible to the desired frequency. After that I used the transmitter signal and then followed up with the 100 kc calibrator. Start with the oscillator section; the large air trimmer sets the overall range and its final adjustment sets the low end of the dial; the small trimmer adjusts the high end calibration. Make the trimmer adjustments slowly and carefully because the kc's change real fast at 21 mc. With patience I was able to achieve better tracking on 15 meters than 20 meters.

The other coils are adjusted for maximum S meter reading at the ends of the band and present no real adjustment problem.

When the alignment is complete mount all four coils on the frame and check to see that the coil set slides into place with a minimum of pressure. Be especially sure that undue tension is not placed on the finger contacts in the receiver. If you break one off, you have a real job on your hands.

If the coils are sitting too high in the compartments it will be necessary to remove the coil board and place three washers between the inside of each coil shield and the top of the coil board to drop the coils lower into the can. ■

The Superex Model AP-S Headphones

THE Superex Model AP-S headphones have been designed with the radio amateur in mind to provide comfort and lessen fatigue over long periods of use. They are padded with thick high-density poly-foam which gently cushions the ears relieving pressure from the reproducing units and minimizing external noise. Separate adjustable centers give the wearer a custom fit. Those who wear eyeglasses will find them especially comfortable.

The audio-frequency response might be termed hi-fi, inasmuch as it is extremely uniform from below 60 cycles to past 6 kc. For phone work they make pleasant high-quality listening. For c.w. work they lack the harsh resonant characteristics of many type headphones which may or may not be desirable, since resonant peaks often can be used to aid in peaking up c.w. signals and lessening QRM. On the other hand, the smooth response diminishes and tends to dampen the sharpness of noise pulses.

The headset impedance is 600 ohms. The construction of the reproducing units is such that they effectively are miniature loudspeakers; in fact, they may be laid on the table and used as such.

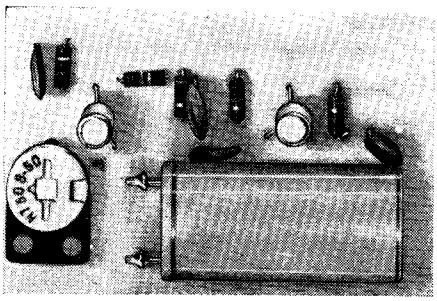
Poly-foam padding and light weight make the AP-S phones comfortable for long-term use.

The Superex Model AP-S Headphones are priced at $24.95 net. They are manufactured by Superex Electronics Corp., Yonkers, N.Y. and are available from most supply houses.

—W2AEF

New Amateur Products

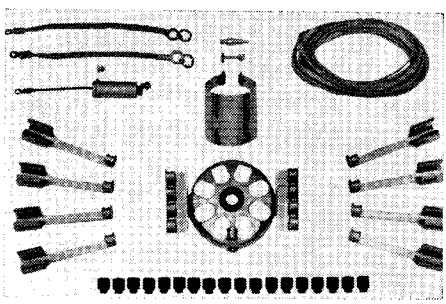
100 Kc Transistorized Oscillator



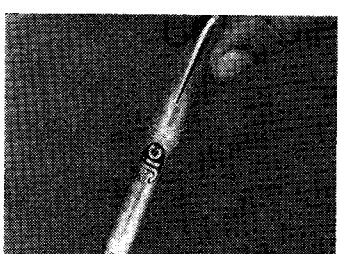
You can keep your receiver, transceiver and exciter right on the button with this new product of Peterson Radio Company, Inc. With the PR-100 you can check harmonics at 100 kc intervals through 54 mc. PR guarantees the oscillator for one year, when installed according to directions. Power requirements: 12 v. @ 14 ma. Output is connected to receiver antenna, high side. A ground connection may be used if required. PR-100 is completely wired, ready to install. It includes a Z-6A 100 kc crystal. Base is 1-7/8" x 2-13/16", and negligible mounting space is required. Weighs only 2 ounces. $12.95 net. Circle A on page 110.

Universal Auto Ignition Shielding Kit

A COMPLETE and extensive ignition shielding kit for most all automobiles has just been released by E. F. Johnson Company. Dubbed "Eliminoise," the new kit may be easily installed on either 6's or 8's, V or in-line engines. Installation requires only the use of ordinary, readily available hand tools, and the components may be easily removed for transfer to another car. Included in the kit: cable straps, coil shield, coil wire bracket, filter capacitor, distributor shield, spark plug shields, shielded spark cable, and cable brackets. All parts are chrome plated. Eliminoise 6 cylinder kit, $29.95, 8 cylinders, $38.50. Circle B on page 110.



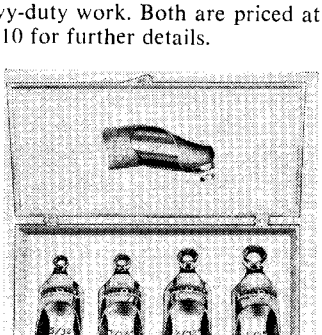
Pocket Type Contact Burnisher

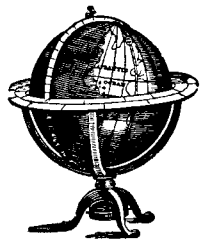


A NEW pocket pen-type burnisher-cleaner is now available from Jonard Industries Corporation, Bronx, New York. The tool is quite handy; has a pocket clip and is rust-proof. The barrel is chrome plated and the chuck is made of aluminum. Adjustment of the blade is possible by varying the depth in chuck. Interchangeable blades are made of hard steel with an abrasive surface coating of aluminum oxide which insures minimum contact wear, for efficient cleaning of contacts and relays. Overall length of tool is 5½". The P-6 pen with 12 blades is available for fine contacts work, while the P-4 with 12 blades is for industrial heavy-duty work. Both are priced at $3.90 each. Circle C on page 110 for further details.

Finger-Tip Wrenches

EVER try to hold a nut with your fingers? This problem has been solved now through use of the new tools shown at the right. Hexagon sizes 5/32", 3/16", 7/32" and ¼" (measured across the flats) are now available in a new line of Finger-Tip wrenches, manufactured by the Touch 'N' Hold Tool Corporation of Pompano Beach, Florida. These tools simply slip on the finger tip like a ring. Nuts are easily picked up from the workbench and held into the tool until the nut is properly located in place. These tiny wrenches are packed in a heavy plastic box and retail for $2.50 per set. Circle D on page 110 for more information.





DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

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

CW-PHONE WAZ

1846	W9HGP	Paul Kent
1847	W6AAO	R. R. Martindale
1848	ON4FU	Jules Delsupehe
1849	W6DAX	Arthur E. Baylor
1850	W6PBI	E. C. Veregge
1851	W5PWW	Charlie Liles
1852	WA6LCK	Gino Robert Campioni
1853	W3WPG	Harold C. Ritchey
1854	JA5FQ	S. Syono
1855	VK2JZ	A. S. Mather
1856	UA6FD	Alex Podmazkov
1857	DJØIK	Bill Nielsen
1858	WA2AEI	John D. Griffiths
1859	W4GF	William S. Grenfell
1860	WØLBB	Harris A. Fromhold
1861	F2NB	Yves Bijault
1862	WA2ELS	William E. Fieldhouse
1863	OH4NS	Heikki Kinnunen
1864	VE7PU	Dick McQuillan
1865	W8WT	Lester A. Jeffery

ALL-PHONE WAZ

207	W6TZD	E. C. Dvorak
208	W9UZC	J. H. Carnett
209	WØJYW	W. A. Peter Wessel

TWO-WAY SSB WAZ

191	SM5UF	Harry Engstrom
192	VE6TP	Gene Krehbiel
193	I1AMU	Alfonso Porretta
194	UA9DT	Vadim V. Kozlov
195	KP4CL	Alicia G. Rodriguez

CW WPX

489	W1ZJJ	Dr. Andrew Peterson
490	WA6HRS	Hillar L. Raamat
491	DL3CM	Jarosch Gerhard
492	KP4AQQ	Osvaldo Garcia
493	DL1IP	Detlef Missfeldt
494	YV5ACP	L. O. Rodriguez P. (Lor)
495	W2GKE	Hal Smith
496	W2ASF	V. L. Spoley
497	UA6FD	Alex Podmazkov
498	W3PVZ	Joseph M. Olnick
499	VE3PV	Peter Victor Travis
500	K2KBI	Charles A. Taylor

Phone WPX

98	W3BNU	Oscar A. Hiskey

SSB WPX

149	K4VOF	Kenneth Wayne
150	SM3AZI	Sture Richtner
151	YV5AST	Alfredo Leon Leon

MIXED WPX

78	JA1BK	Kan Kiyoshi Mizoguchi

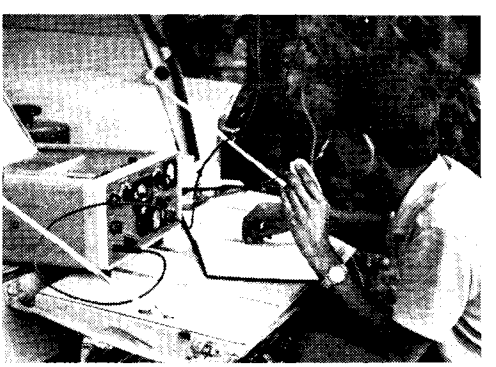
WPX ENDORSEMENTS

	Mode	*Continent*	*Band*
DJ2KS	CW	E	
DL3CM	CW	E	
DL3RK	Mixed	A	
G3HDA	Mixed	E	14
K2KBI	CW		14
K4IEX	CW	E	14
KP4AOO	CW		14
W3PVZ	CW		14
W8KPL	CW	O	
W8RQ	CW		21
W8WT	Phone	S	

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

THE SSB Honor Roll is being listed for the first time this month in the DX column. I am sorry for the delay but there have been problems in transferring records, etc. We have decided to use this opportunity to make a few changes. Effective April 1st, 1964 there will no longer be a certificate issued for 50 countries confirmed on two-way s.s.b. The present state of the art and the great popularity of s.s.b. make this award virtually meaningless. It is possible for a modest station to work this many countries during a contest weekend or even during a week or two of rather casual operation. The first certificate which will be offered for s.s.b. operation will be for 100 countries confirmed on two-way s.s.b. The s.s.b. Honor Roll will begin at 200 countries and remain at that point as long as

*Box 35, Hazlet, New Jersey 07730.



Milos, OK1MP, shown at the operating position of OK5SSB. This exotic prefix was used during an s.s.b. camp meeting where s.s.b. was explained and demonstrated to many OK hams. *(Tnx W2GT)*

WPX HONOR ROLL

CW WPX

W2HMJ	685
W8KPL	648
W5KC	642
W2AIW	617
W2EQS	605
W4OPM	600
W6KG	596
W2NUT	571
W9UXO	566
K6CQM	565
W5OLG	564
ON4QX	556
DL1QT	552
W1EQ	549
W1IJB	546
K2UKQ	546
W9YSX	544
W9GFF	538
SM7MS	534
W2HO	526
G2GM	526
K9AGB	515
IT1AGA	515
KP4CC	515
W6WO	511
DJ2KS	511
W2GT	510
K9EAB	510
DL3RK	509
W8LY	506
W9DWQ	506
W8RQ	505
W9UZS	505
G3EYN	503
YU1AG	503
W5LGG	502
W6YY	502
DL7CS	502
K2CPR	501
W9SFR	501
W2EMW	500
W2FXA	500
K2ZKU	500
W2MUM	495
W3GJY	495
W1WLW	494
LA3DB	491
OK3DG	488
SM5CCE	488
W4BYU	487
W8PQQ	481
W4HYW	478
W8IBX	476
W5BUK	475
WØMCX	472
W3OCU	466
SP6FZ	465
K6SXA	464
W2KIR	463
PY4OD	462
JA2JW	461
W9WIO	460
W9WCE	458
W3BCY	457
W7HDL	457
OE1FF	457
OK3EA	456
UC2AR	456
K4TEA	451
PAØLOU	451
W3PGB	450
DL1YA	450
DL9KP	450
W8JIN	449
W3AYD	443
W6UNP	442
VK3XB	439
W3BQA	437
LA5HE	437
ON4FU	433
VE3ES	433
W8UMR	429
WØAUB	429
W2RA	428
K5LIA	428
OK1MB	428
W3CGS	426
W1EIO	425
OE3WB	425
KL7MF	424
SM5WI	424
WØPGI	420
W7ABO	419
HB9TT	419
G3HIW	418
KH6BLX	418
K2PFC	415
VK3XB	415
W5AWT	412
W5DA	412
WA2DIG	411
W2PTD	411
K5LZO	411
W4DKP	410
W1CKU	408
K4IEX	408
K4JVE	407
W5AFX	407
W4CKD	407
SM5AJR	406
W4YWX	404
GI3OQR	404
KP4AOO	404
VK5RX	404
ZS4MG	404
K2ZRO	403
W9DYG	403
W9IHN	403
VE6VK	403
W2FLD	402
G8PL	402
WA2CBB	401
K9BVR	401
WØVBQ	401
IT1TAI	401
VE3JZ	401
K4HPR	400
SP4JF	400
VE1AE	400
VE4OX	400
VK3KB	400
ZL2GS	400

Phone WPX

W9WHM	605
CT1PK	603
W8WT	589
G3DO	583
CT1HF	527
MP4BBW	506
W9YSQ	471
W9UZC	462
PAØHBO	453
K9EAB	450
W6YY	448
G8KS	430
G3NUG	429
VK6RU	421
W3AYD	420
F8PI	418
PZ1AX	413
K2CJN	409
DL3TJ	404
OE1FF	404
W1UOP	402
W6USG	400
VE3BQP	386
SP7HX	381
TG3AD	381
DL6VM	376
DJ3CP	375
W3DJZ	374
PAØSNG	369
G3FKM	366
W8UMR	363
SM3AZI	362
DL2UZ	361
SM3EP	361
W1DGJ	358
W5ERY	358
W8JIN	356
G3GHE	356
CX2CN	354
PY2CK	354
5A5TO	353
W1ORV	351
LA5HE	351
ZS6IW	350

SSB WPX

W4OPM	481
MP4BBW	462
HB9TL	452
G8KS	450
K9EAB	439
G3AWZ	428
G3DO	424
W3MAC	403
W3NKM	402
G3NUG	394
W2HXG	359
TI2HP	356
W6YMV	354
I1AMU	346
PZ1AX	345
K1IXG	344
VE3BQP	334
W4RLS	322
W2VCZ	320
W1UOP	318
W8PQQ	315
WA2EOQ	315
W1ORV	307
K4PUS	305
DJ3CP	304
WA2SFP	300
K2TDI	300
W3VSU	300
W4NJF	300
KØRDP	300
VE3BKL	300
WØCVU	291
GI6TK	278
VE3ES	274
K2JFV	266
K2MGE	263
W3AYD	262
W4EEU	262
DL1PM	257
XE1CV	256
G3FKM	255
UR2AR	255
K5OGP	254
K1SHN	253
W1EQ	253
W6USG	252

Mixed WPX

W4OPM	658
G3DO	624
W9YSX	622
W8WT	621
K9EAB	606
W8JIN	605
W3OCU	588
W9DWQ	571
W6YY	570
W4BYU	557
W3AYD	552
YU1AG	552
HB9EU	551
WØMCX	529
W2GT	528
DJ2KS	524
G8KS	520
K9AGB	510
W5LGG	509
K2ZKU	508
W4BQY	505
W3KPD	501
W8UMR	500
LA5HE	500
DL3RK	493
JA2JW	480
W3CGS	475
W9FVU	474
G3HDA	469
G3FKM	463
DL1YA	456
WØZBQ	452
PAØLOU	452
GI6TK	450
HK3LX	450

space permits; however, we are making another modification in the rules. Anyone who applies for Honor Roll listing or additional Honor Roll credit *must* submit all QSL cards. Since this is to be a Honor Roll, it is only fair that everyone meet the same standards. There will be a few other small changes made but these will only be details and will not be of any great concern.

I will be most receptive to any suggestions concerning the s.s.b. Honor Roll.

QLM/QHM

During the 9M1MM operation, Gus started using QLM and QHM. The confusion this caused was almost unbelievable and wound up with Gus being called from one end of the band to the other. QLM simply means that the station is tuning from the low end of the band toward the middle or from 14000 to 14050. QHM means tuning from the high end of the band to the middle of the band. There are also QML and QMH signals but these are rarely used and, of course, there is also the old reliable QLF which means now send with your left foot. There must also be a Q-signal for the sideband boys that means "now hold the other nostril closed" but I will be darned if I know what it is.

Here and There

CEØ Easter Island: Reynaldo, CEØAP, active 7025 to 7050 kc 0000 to 0200 GMT, c.w. and a.m. fone with an HT-4, running 500 watts. *(Tnx WGDXC).*

ET3 Ethiopia: ET3GB is active daily on either 7010 kc or 14005 kc or 14270 kc. Operation is centered around 0400 GMT and 2100 GMT. *(Tnx WGDXC).*

KX6 Marshall Islands: KX6BK has QRT'd from Kwajalein. During five months of operation and QRP, Eddie worked 103 countries, including such juicy ones as AC5, CR8, ZS2MI, VS9MB, and VR7A on Jonesburg Island, Hi. QSLs were sent to all contacts but anyone not having received a card should drop Eddie a note at his present QTH, Box 4086, El Paso, Texas. Eddie has resumed operation as K5COU.

LH Bouvet Island: There have been rumors circulating to the effect that the South African authorities will install a weather station on this island. I have checked with LA5HE, and he says this is false information as far as he knows at

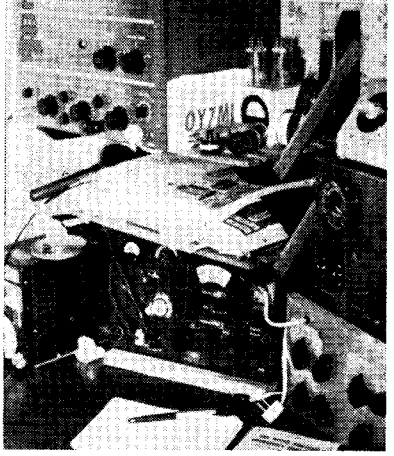
SSB DX HONOR ROLL

W2ZX	288	PZ1AX	261	WA2IZS	240
W8PQQ	288	G8KS	261	W1AOL	238
TI2HP	283	G3FKM	261	PJ2AA	232
PY4TK	279	W5IYU	260	W7DLR	232
K9EAB	279	DL1IN	258	K8NZD	232
K4TJL	279	K2MGE	257	WØCVU	229
W8EAP	278	MP4BBW	256	OZ7FG	228
WØQYZ	278	G3NUG	253	K4AJ	226
K8RTW	276	W6BAF	252	G2PL	225
VQ4ERR	275	WØUUV	251	W4UWC	225
W2FXN	272	K1IXG	250	WA6EYP	222
W6UOU	270	G2BVN	249	WØPGI	221
HB9TL	269	W6WNE	248	WA6HOH	219
WØQVZ	268	W6PXH	247	W3VSU	217
W2TP	267	W8YBZ	246	W4RLS	210
W4OPM	265	W6LGF	244	DJ3CP	207
W6RKP	265	K6ZXW	243	W1ICV	205
W2VCZ	262			OH2NB	204
W3LMA	261			W9SFR	203

WAZ and WPX

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

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



This is where the well known signal of OY7ML starts on its journey. Martin obtained special permission from his Government for limited operation during the 1962/1963 160-meter Transatlantic DX Test. He QSOd a number of Europeans and made the first and only W-contact with W1BB. Credit and congratulations are due Martin for his interest, efforts, perseverance in overcoming many difficulties. The rig uses a 10B and a 6146 final which is not shown. *(Tnx W1BB).*

the present time. LA5HE, as you will remember, was responsible for getting Gus his LH4C call. Gus had been refused a LA license because of no licensing reciprocity but Rag succeeded in getting him a license, hence the LH4 prefix.

SVØ Rhodes: SVØWQ and SVØWF are doing their best to keep this place on the s.s.b. map. *(Tnx WGDXC).*

TL8 Central African Republic: Syd Wagoner of XW8AM and 3V8CA fame is now licensed and extremely active as TL8SW. Operation is taking place on both c.w. and s.s.b. with 14 mc preferred. Syd's stateside QSL manager is W1BPM. *(Tnx WGDXC).*

TU2 Ivory Coast: TU2AU is working the gang in fine style on 20 meters. Don't call him on c.w. when he is operating s.s.b., he doesn't like it. Smitty hopes to DXpedition to 5U7, TZ, TY, XT, and 7G1. *(Tnx Florida DX* Report).

VKØ Heard Island: There is a possibility that Steve, VKØVK, might operate from Heard Island for possibly 24 to 48 hours starting about 2 February. Let's keep our fingers crossed. *(Tnx NEDXC).*

VP8 South Sandwich: South Sandwich Massacre will begin in February if Ken, G3RFH, is successful in his plans to put his 7 mc 40 watter to work for about three weeks. Ken may sign VP8HF/MM on his trip over. It is understood he will be with a party surveying those Volcanic Islands. *(Tnx WGDXC).*

VP8 South Shetland Islands: A new station is active on the islands. Ron, VP8RG, operates c.w. on 14 mc and can be heard between 1900 and 2100 GMT. He asks QSLs via the Irish Radio Transmitting Society. *(Tnx VERON).*

VQ8 Indian Ocean: Harvey Brain, VQ9HB, is scheduled to DXpedition to VQ8C, VQ8R, VQ8B and VQ8AA in the very near future. Another operator will accompany Harvey and s.s.b. as well as c.w. will be used. (See his VQ8BFA escapade in this issue).

VS1S: Bob, VS1LP, is now on vacation in the States but should be returning about the time you read this. Bob still has hopes of putting PK4 on the air.

VS9K Kuria-Muria Island: By the time you read this, the Kuria-Muria expedition will be history. The expedition lived up to all previous expectations and then some. A wonderful job was turned in by VS9HA, VS9HRK, VQ4IN/VS9H and, of course, Gus operating as VS9HAA. Two complete stations were kept in operation 24 hours a day and all bands were used. This island is so rugged that aerial photos had to be taken and a complete study made before the DXpedition could be made. It also included a supporting party of seven men and two tons of supplies. All QSLs will be handled by W4ECI.

XW8 Laos-Phanh: XW8AL, has been very active around 1330 GMT between 14270 and 14280 kc. *(Tnx WGDXC).*

ZK1 Cook Islands: Bill Scarborough, ZK1BS, has now QRTd from activity on the Cook Islands. During the many years he was active he provided the gang with new countries on every mode from c.w. to RTTY and from 10 to 160 meters. His next assignment may very possibly be VP7-land. *(Tnx NCDXC).*

ZS2MI Marion Island: Marion Island still active on Friday and Saturday mornings. Frequencies 14058 at 1100 to 1200 GMT and 7005 at 0500 GMT. *(Tnx NEDXC).*

4S7 Ceylon: Ian, 4S7IW, has been active almost daily on 14125 kc. Usual period of operation is from 1300 to 1330 GMT. *(Tnx WGDXC).*

5H3 Tanganyika: After three years of red tape, Chuck, W3EHG, has succeeded in obtaining a license in Tanganyika. He is operating daily using a KWM-2 with 14 mc preferred. Usual period of operation is between 1900 and 2000 GMT. Chuck will have a kw on very shortly, courtesy of his QSL Manager, W2SNM. *(Tnx W2SNM).*

6O1 Somali Republic: Florida DX Club member,

OH5TK shown operating as OH5TK/OHØ on Åland Island. OH5VD, OH5VF, and OH5TK operated from Åland for two weeks with a 200 watt transmitter and ZL-Special. They had 2,800 QSOs with 80 countries with 1,600 W-QSOs. They lost their s.s.b. equipment in transit, and hope to return next year with new equipment. They are all 17 years old and still in high school! *(Tnx W2GT)*

Bee Walton, K4JLD, of Winter Park, left Oct. 1 for an 18-month stay in the Republic of Somali. While there he will operate s.s.b. and c.w. using a Collins S-line including a 30S-1. His probable call will be 6O1BW. His location will be the Isle de Serpenti, Chisimaio, Republic of Somali. His stateside QSL manager will be WA4FXE, P. O. Box 811, Orlando, Fla. DX QSLs should be addressed c/o Paul Smith Construction Co., P. O. Box 1393, Mombasa, Kenya, East Africa. S.a.s.e., IRCs and Somali stamps are all acceptable. *(Tnx Florida DX* Report).

9Q5 Congo: Glen, K4RJH, is now licensed as 9Q5GE. He prefers 21390 kc s.s.b. starting at 1500 GMT. The rig is a DX-100 with a SB-10 and NC-183D receiver. 20 and 40 will also be used.

9X5 Rwanda: 9X5MV has been very active between 14010 and 14015 kc. 1430 to 1500 GMT is preferred. *(Tnx WGDXC).*

ZD9 Gough Island: At present, ZD9AM is held by Rob Johnson of Gough Island whose home address is P. O. Box 197, Benoni, Tvl, South Africa. The call sign ZD9AM is the call on Gough Island, and Rob Johnson is the ninth person to hold same. Rob will return to South Africa in April, 1964. He will then collect all cards and send his QSL cards in return. If you are awaiting his card, please be patient until April, 1964. *(Tnx ZS1AW).*

ZS8/ZS9 Basutoland/Bechuanaland: Peter Avidon, ZS6BBB, is planning another trip to Basutoland (ZS8) and Bechuanaland (ZS9) just after the first of the New Year. Using the call ZS8Z or ZS6BBB/ZS8, Peter will operate from 1600 GMT on Friday, 3rd January until the morning of Tuesday, 7th January. He will operate from Bechuanaland from 1600 GMT Wednesday, 8th January until the morning of Monday, 13th January under the call ZS9Z or ZS6BBB/ZS9. All QSLs should be sent directly to Peter at P.O.B. 9299, Johannesburg, South Africa. IRCs or s.a.s.e. appreciated. Operating frequencies will be: *20 Meters:* Transmitting, 14,105 to 14,345; Listening, 14,255 to 14,265. *15 Meters:* Transmitting, 21,105 to 21,445; Listening, 21,410 to 21,420. *40 Meters:* Transmitting, 7098, Listening, 7210. *(Tnx LIDXA).*

Certificates

Worked all KA Districts

A new "Worked All KA Districts" Award is being issued by the Far East Amateur Radio League. The requirements are: 3 cards from KA2, and one card from each of the following: KA5, KA7, KA8, and KA9. Apply to FEARL Award Secretary APO #925, c/o P.M. San Francisco.

WXRS Certificate

The WXRS Certificate is issued by the Southern Rio Grande DX Club of Brazil for contacts dated June 14, 1961. This is the date the club was organized. South American stations other than Brazil must work 20 PY-stations; North Americans must work 12; Africa and Europe must work 8 and Asia and Oceania must work 6. Send cards and three IRCs to WXRS c/o The Southern Rio Grande DX Club Box 2180, Porto Alegre, R.S., Brazil.

15 On Top

The Cotswold Radio Contest Club is issuing the "15 On Top" Award. To qualify, it is necessary to contact 15 countries using only the 160 meter band since January 1st, 1960. Applicants should send a log copy of the relevant contacts with a statement signed by a representative of the applicant's National Radio Society.

Stickers will be issued for each additional 5 countries, and an honor roll published quarterly.

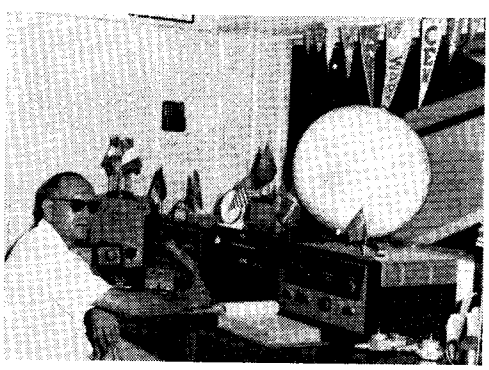
The fee is 3 IRCs, 50 cents or the equivalent. Apply to: Cotswold Radio Contest Club, 250 Gloucester Road, Cheltenham, Glos, England.

QTHs & QSL Managers

The New PJ QSL Bureau is: Aruba Amateur Radio Club, QSL Bureau, Post Office Box 273, San Nicolas, Aruba, Netherlands Antilles.

CEØZI ..... via W4QVJ.
W7BTH would appreciate any help with the present QTH's of CN8FU of 1961 or CN8JF of 1962.
DJØKA ..... Fred Rekich, Postfach 702, 8630 Coburg/Obfr, Germany.
DU5SM ..... via DU1CE.
EP2AU ..... 1 Lt. Foy E. Privette, G4AAS, ARMISH/MAAG Iran, APO 205, N.Y., N.Y.
ET3GB ..... RCA U. S. Aid, APO 319, N.Y., N.Y.
HI8LC ..... Box 88, Santo Domingo, Dom. Rep.
HS1B ..... Box 1038, Bangkok, Thailand.
HS1I ..... via W8JVP.
KJ6BZ ..... June/July 1963, See WA6QVR/KJ6
ex-KL7JDO .... Tony Smakers, 5222 Tavenor Lane, Houston, Texas 77048.
KV4DE ..... H. D. Woertendyke, 42 King St., Christiansted, St. Croix, U. S. Virgin Islands.
KZ5AF ..... via KZ5AZ.
KZ5AZ ..... George R. Spencer, Box 367, Albrook A.F.B., Canal Zone.
LU4FX ..... Box 72, Santa Fe, S. F. Argentina.
MP4QBF ..... Box 73, Doha, Quatar, Arabian Gulf.
PJ5MF ..... via VE6TP.
TA2BK ..... via DJ2PJ.
TI2SS ..... Box 186, San José, Costa Rica.
TIØRC ..... P.O. Box 2412, San José, Costa Rica
TL8SW ..... via W1BPM.
TL8SW ..... Syd Wagoner, B. P. 302, American Embassy, Bangui, Central African Rep.
UR2BU ..... Karl Kallemaa, Vaike-Tahe 14-1, Tartu, Estonia, S. S. R.
VP2KT ..... via W2YTH.
VP2VS ..... via VE6TP.

[*Continued on page 100*]



The ever present Jo, CR6CA, who can be found on the band almost any time it is open to Africa. Jo has one of the strongest signals from the Dark Continent and will be remembered for his operation as CR5MA. *(Tnx W9JJF)*

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during January, 1964. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (January 9 and 12), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be disturbed, etc.

PREDICTED DAY-TO-DAY PROPAGATION CONDITIONS AND CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating higher than 6)* Jan. 9, 12	*Normal Days (WWV rating 5-6)* Jan. 1, 5-8, 10-11, 13, 16-17, 21-27, 29	*Below Normal Days (WWV rating 4)* Jan. 2, 4, 14-15, 18, 20, 28, 30-31	*Disturbed Days (WWV rating less than 4)* Jan. 3, 19
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	D	D

Where:

A—is an excellent opening with strong steady signals.

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

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

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

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

THE following is a thumb-nail picture of h.f. band conditions forecast for January, 1964. For specific times of DX openings refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains *Short-Skip Propagation Charts* for January and February, as well as Charts centered on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for circuits varying in length between distances of 50 and 2300 miles.

10 Meters

Only an occasional DX opening is expected during the daylight hours, mainly to southern and tropical regions. Occasional Sporadic-*E*, meteor-type and auroral short-skip openings may also occur up to distances of approximately 1300 miles.

*11307 Clara Street, Silver Spring, Md. 20902

15 Meters

Although fewer openings are expected to occur this year than during previous periods of higher sunspot activity, generally fair DX propagation conditions to many areas of the world are forecast for the daylight hours. Fairly consistent trans-oceanic openings should take place during the month, with somewhat more frequent openings on north-south circuits. Openings are expected to occur mainly during the hours of daylight, but some may be of rather short duration. Short-skip openings between approximately 1000 and 2300 miles should be possible on most days of the month. Once the sun sets, however, 15 meter signals propagated by the regular layers of the ionosphere are expected to disappear almost entirely.

20 Meters

Fairly good DX openings to many areas of the world are forecast for this band between the sunrise and late afternoon periods. When conditions peak, signal levels may be exceptionally strong. Good short-skip openings, over distances ranging between approximately 750 and 2300 miles, are also expected to take place during the daylight hours on most days during the month. Twenty meters is expected to be the best band for DX during the daylight hours of January.

40 Meters

The band is expected to open for DX during the afternoon hours, and remain open to one part of the world or another until shortly after dawn. During this period, fairly good openings should be possible to many areas of the world, often with exceptionally strong signals. During the daylight hours good short-skip openings should be possible between distances of approximately 100 and 750 miles. During the hours of darkness, the short-skip range should increase to between 1000 and 2300 miles. During the early evening hours, 40 meters is expected to be the best band for DX openings during January.

80 Meters

Ionospheric absorption and static levels are expected to remain at low seasonal values during the month, resulting in fairly good 80 meter openings to many areas of the world during the hours of darkness. During the daylight hours, short-skip openings should be possible between distances of approximately 50 and 350 miles; during the hours of darkness, openings should be possible between distances of approximately 250 and 2300 miles. Exceptionally strong signals are forecast during peak conditions on this band, and 80 meters is expected to be the best band for DX openings during the late evening hours.

160 Meters

A considerable improvement is expected in propagation conditions on this band during January. Fair DX openings are forecast to many areas of the world from a few hours after sundown to shortly before sunrise. Short-skip openings up to 2300 miles should also be possible during the hours of darkness. Because of extremely high solar absorption in this frequency range, even during periods of low sunspot activity, ionospheric propagation

generally is not possible on 160 meters during the daylight hours.

VHF Openings

Some meteor type v.h.f. openings are likely to occur during the *Quadrantids* meteor shower which is expected to take place during the first week of January. Sporadic-*E* and auroral-reflection ionospheric v.h.f. short-skip openings are also likely to occur during periods of disturbed propagation conditions. Check the "Last Minute Forecast" at the beginning of this column for the days that are most likely to be disturbed during January.

Sunspot Cycle

The Swiss Federal Solar Observatory at Zurich reports monthly mean sunspot numbers of 41 for September and 36 for October, 1963. This results in smoothed sunspot numbers of 30 centered on March and 29 centered on April, 1963. The sunspot cycle has remained practically constant from October, 1962 through April, 1963, dropping less than 2 numbers during this seven month period. A smoothed sunspot number of 16 is predicted for January, 1964.

Next month's column will contain a detailed analysis of the present sunspot cycle, including predictions for its remaining months, and for the beginning of the new cycle.

1963 In Review

The past year marked the ninth of the present sunspot cycle, which began during April, 1954, and reached a peak during March, 1958. Sunspot activity continued to decline during 1963, but at a slower rate than during previous years.

The year began with a smoothed sunspot number of 30, and by December, solar activity had decreased to an estimated smoothed sunspot level of 18. Sunspot activity during 1963 was approximately one-third *lower* than the level recorded during 1962, and was the lowest recorded since 1955. Propagation conditions observed on the h.f. amateur radio bands were typical for a period of low solar activity.

DX propagation conditions on the 10, 15 and 20 meters bands were adversely affected by reduced solar activity during the past year. Except for an occasional north-south DX opening during the daylight hours, DX propagation was not possible on 10 meters. Fifteen meter DX openings were also noticeably fewer during 1963 as compared to previous years. Often, when the band did open, it was usually for much shorter periods of time and to fewer areas of the world than during periods of higher solar activity.

DX propagation conditions on 20 meters also became poorer during 1963, but to a lesser degree than on 10 and 15 meters. Despite a considerable reduction in late afternoon and early evening openings, the band, however, did open to many areas of the world during the daylight hours. Twenty meters was the optimum band for DX during 1963 from shortly after sunrise through the late afternoon hours.

While a weaker ionosphere resulted in poorer DX propagation conditions on 10, 15 and 20 meters during the past year, conditions on 40, 80 and 160 meters *improved* considerably. This improvement resulted from a marked decrease in ionospheric absorption associated with a weaker ionosphere and lower solar activity. Signals, both DX and short-skip, were noticeably stronger on 40 meters, and the band opened more frequently for DX, and to more areas of the world than during previous years. In fact, 40 meters was the optimum band for DX during the hours of darkness during the past year. A similar improvement, although not as outstanding as on 40 meters, also was observed on 80 meters.

The most noticeable improvement in propagation conditions during 1963, at least on a relative basis, took place in the 160 meter band. During periods of high solar activity, this band is generally limited to short-skip openings of no more than several hundred miles during the hours of darkness. During the past year, however, the band began to open regularly for DX as early as the first days of September, and continued to open for DX more often, and to more areas of the world than had ever occurred previously.

Considerably fewer ionospheric openings took place on the v.h.f. bands during 1963. This probably results from a marked decrease in auroral displays associated with the reduction in solar activity. On the other hand, Morgan and Dorothy Monroe[1] report a continued increase in the number of Sporadic-*E* short-skip openings which occurred during the spring and summer months of the past year. This adds further evidence to the theory that Sporadic-*E* propagation *increases* as the solar cycle declines.

High frequency, or shortwave, propagation conditions during 1963 were, therefore, generally poorer on 10, 15 and 20 meters, and improved on 40, 80 and 160 meters. There was a greater amount of Sporadic-*E* propagation, but fewer v.h.f. ionospheric openings during the year.

Outlook 1964

The sunspot cycle is expected to continue its decline during 1964, and the year will be marked by a period of low solar activity. This is expected to result in a further decrease in the number of 10, 15 and 20 meter DX openings. Except for an occasional opening during the daylight areas to southern or tropical regions, DX openings on 10 meters are considered to be unlikely during 1964. Somewhat fewer DX openings are expected on 15 meters during the new year, but openings should be possible to many areas of the world during the late fall, winter and early spring months. When 15 meter openings do take place, they will most likely occur during relatively short periods of time from a few hours before noon to a few hours after noon. Not much change is expected in 20 meter propagation conditions during

[1]Monroe, Dorothy and Morgan, K7ALF and K7ALE, "50 Mc Propagation Effects, Mid-Point Report On A Six-Year DX Study," Page 37, June, 1962, *CQ*. A report on 1963 observations will appear shortly in this column.

1964. Although there may be fewer DX openings, the band is still forecast to open to almost all areas of the world between the sunrise period and the early afternoon hours. Twenty meters is expected to be the best band for DX during the hours of daylight, and through the early evening hours of the summer months.

On the other hand, DX conditions are expected to continueto improve on 40, 80 and 160 meters. The improvement on 40 meters is expected to be slight, and for the most part, propagation conditions on this band are expected to be similar to what they were during 1963. Forty meters is expected to remain the best band for DX during the early evening hours of the fall, winter and spring months, and during the hours of darkness in the summer season. A considerable improvement is expected in DX propagation conditions on 80 meters. This improvement has already been noted during the last months of 1963, and it is expected to continue during the new year. DX openings are expected to be more numerous on this band than ever before, and signal levels are forecast to be unusually strong during

[*Continued on page 90*]

CQ Short-Skip Propagation Chart

January-February, 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*	*Nil*	10-15 (0-1)	10-15 (1)
15	*Nil*	10-16 (0-1)	08-10 (0-1) 10-15 (1-2) 15-16 (1) 16-18 (0-1)	06-08 (0-1) 08-10 (1-3) 10-15 (2-3) 15-16 (1-2) 16-18 (1) 18-19 (0-1)
20	*Nil*	08-10 (0-1) 10-14 (0-3) 14-16 (0-2) 16-18 (0-1)	06-07 (0-1) 07-08 (0-2) 08-10 (1-4) 10-14 (3-4) 14-16 (2-3) 16-18 (1) 18-20 (0-1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (3-4) 16-17 (1-4) 17-18 (1-3) 18-19 (1-2) 19-20 (1)
40	08-09 (0-1) 09-10 (1-2) 10-11 (3) 11-15 (3-4) 15-16 (3) 16-18 (1-2) 18-20 (0-1)	07-08 (0-2) 08-09 (1-3) 09-10 (2-4) 10-11 (3-4) 11-15 (4-3) 15-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-16 (4-2) 16-18 (3-4) 18-20 (2-4) 20-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-16 (2) 16-18 (4-3) 18-20 (4) 20-02 (3-4) 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-19 (4) 19-21 (2-3) 21-23 (2) 23-03 (1-2) 03-07 (1)	07-08 (2) 08-10 (4-2) 10-14 (4-0) 14-16 (4-1) 16-18 (4-2) 18-19 (4-3) 19-21 (3-4) 21-23 (2-4) 23-03 (2-3) 03-07 (1-3)	07-08 (2-1) 08-10 (2-0) 10-14 (0) 14-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-23 (4) 23-05 (3) 05-07 (3-2)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-05 (3-2) 05-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3-2) 07-09 (2-1)	17-19 (2-1) 19-21 (4-2) 21-04 (4) 04-05 (4-3) 05-07 (2-1) 07-09 (1-0)	17-18 (1-0) 18-19 (1) 19-21 (2-1) 21-04 (4-3) 04-05 (3-2) 05-06 (1) 06-08 (1-0)	18-20 (1-0) 20-21 (1) 21-01 (3-2) 01-03 (3) 03-04 (3-2) 04-05 (2-1) 05-07 (1-0)

Alaska To:

Openings Given in Alaskan Standard Time‡

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

Hawaii To:

Openings Given in Hawaiian Standard Time¶

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

Forecast Ratings

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

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

On the Short-Skip Propagation 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 longer distance.

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

All times are shown in Local Standard Time, using the 24-hour system. In this system midnight is shown as 00, while 01 is 1 A.M., 02 is 2 A.M., *etc.* Noontime is shown as 12, while 13 is 1 P.M., 14 is 2 P.M., *etc.*

The *CQ* Short-Skip Propagation Charts are based upon a c.w. effective radiated power of 75 watts from a half-wave dipole antenna, a half-wave or higher above ground. The Charts are valid through February 29, 1964. These forecasts are based upon basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

* Possible 10 meter openings from Hawaii.

† Possible 160 meter openings from Hawaii and Alaska.

‡ Alaskan Standard Time (from Skagway to 141 degrees west longitude), is 4 hours *behind* EST; 3 hours *behind* CST; 2 hours *behind* MST; 1 hour *behind* PST and 9 hours *behind* GMT.

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

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

January	4-5	ARRL VHF SS
January	25-26	*CQ* WW 160
January	25-26	R E F C.W.
January	25-27	New Mexico Party
February	8-9	ARRL DX Phone
February	14-16	QCWA Party
February	15-16	B E R U
February	15-17	Vermont Party
February	22-23	ARRL DX C.W.
Feb. 29-Mar. 1		YL/OM Phone
Feb. 29-Mar. 1		R E F Phone
March	7-8	ARRL DX Phone
March	14-15	YL/OM C.W.
March	21-22	ARRL DX C.W.
March	23	Pakistan DX
April	11-12	*CQ* WW DX SSB

CQ World-Wide 160

Starts: 0200 GMT Saturday, January 25
9 P.M. EST Friday, January 24
Ends: 1400 GMT Sunday, January 26
9 A.M. EST Sunday, January 26

No change in rules. Following repeat from last month's CALENDAR.

1. This is a c.w. contest *only*.

2. For W/VE/VO stations; contacts with other W/VE/VO stations, 2 points per QSO. Contacts with other countries, 10 points per QSO.

3. For all other countries; 2 points per QSO with stations in the same country, 5 points per QSO with stations in other countries. Except for contacts with W/VE/VO stations, which will count 10 points.

4. For all stations; a multiplier of one (1) for each state, Canadian province or foreign country worked.

5. Final score: Total points times the total multiplier.

6. Serial number; RST report plus a progressive contact number starting with 001 for the first contact. (W2EQS 579001 NJ).

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

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

Log sheets as well as a copy of the new 160 meter operating regulations are available from *CQ* for a self addressed stamped envelope. (Large size please). Or you can check back to page 84 of the August, 1963 issue of *CQ*.

Your logs should be postmarked no later than February 17th and go to: *CQ*, Att: 160 Contest, 300 West 43rd Street, New York, N.Y. 10036.

*14 Sherwood Road, Stamford, Conn. 06905

R E F C.W.

Starts: 1400 GMT Saturday, January 25
Ends: 2100 GMT Sunday, January 26

Phone

Starts: 1400 GMT Saturday, February 29
Ends: 2100 GMT Sunday, March 1

The schedule for the French Contest has been changed this year and these dates will probably be retained for future contests. Unfortunately the c.w. section coincides with our 160 contest; this is going to cost them some activity as many contest minded operators will be concentrating on the top band.

Rules are practically the same as previous years with one exception. The multiplier will now be determined by the number of French departments worked on each band. (Previously the province was used as a multiplier, a confusing arrangement.)

1. The usual serial numbers, RST or RS report plus a progressive 3 digit QSO number starting with 001.

2. French stations will give their Department in the form of a number after their call for multiplier identification (i.e.: F8TM/78). Stations outside of France proper of course do not use this Department identification, their prefix will identify the DUF country for the multiplier.

3. Each French department or DUF country (excluding F and FC) worked on each band, counts one in your multiplier.

4. Each completed contact counts 3 points.

5. Final score therefore will be the total QSO points times the total multiplier from each band.

6. Certificates to the highest scorer in each country and each W/K and VE call district.

Extracts from your log can be applied for any of the French awards. Log credits however are only valid for a maximum of 2 years. Your awards applications go to F9IL (DUF)—F3ZU (DPF)—F3JI (DDFM) and F3FA (DTA).

Your contest logs go to: Reseau des Emetteurs Francais, BP. 42 01, Paris R.P., France.

CLAIMED SCORES

1963 CQ WW Phone DX Contest

Single Operator

All Band

5A1TW	658,200
K2HLB	324,352
WA2SFP	289,835
YV5BIG	240,352
W4BVV	202,360
JA1FSL	200,304
W3TMZ	194,580
6O1WF	165,049
SL6BH	131,408
PJ5MC	125,952
G5ZT	121,342
YV1GB	81,440
W1ZFV	77,064
SM5AM	74,529
OZ3Y	59,160
W3JTC	59,118
CN8AW	45,217
ST2AR	38,552
KA2BW	26,565

28 Mc

LU1DAB	95,353

21 Mc

W1RIL	59,373
ZS6NM	50,800
W4RLS	30,889

14 Mc

HL9KH	318,960
VP7NS	306,075
G3FXB	270,000
KH6EKO	120,530
K2HFX	118,804

7 Mc

W3PHL	10,980
K6AHV	8,188
W8JIN	4,180

3.5 Mc

GI3CDF	16,092
SM5GZ	8,415

Multi-Operator

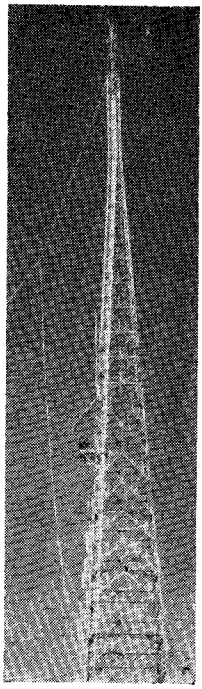
Single Xmtr

WØNFA	389,902
ET3USA	389,844
W8NGO	157,874

Multi-Xmtr

K2GL	956,868
DJ3VM	605,710
9A1AIJ	446,145

Poised for the CQ 160 meter contest at the end of this month, W6YY sends us this shot of his two half-waves in phase. The 450 foot tower is on top of Mount Wilson. That's right, we said 450 feet!!



New Mexico Party

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

Rules for this popular state party appeared in last month's CALENDAR. No mention was made of 160 operation but since New Mexico stations have the advantage of being permitted to operate all four sections of the 160 meter band, they should not pass up a good thing. How about getting into our 160 contest too?

Mailing dateline is February 29th and logs go to: CHC Chapter 1, New Mexico, c/o Willie Petty, W5LEF, 3107 Morningside Drive N.E., Albuqerque, New Mexico 87110.

QCWA Party

Starts: 2200 GMT Friday, February 14
5 P.M. EST Friday, February 14
Ends: 2200 GMT Sunday, February 16
5 P.M. EST Sunday, February 16

This year's party is being sponsored by the Southern California Chapter of the QCWA. Only members are eligible for the QCWA Plaque donated by the National Headquarters. However, CHCers are invited to work QCWA stations for credits toward their own awards.

There is no point scoring or multiplier involved, just see how many QCWA members you can work.

To make it easier for the judging committee, your log should show information in this order: date and time in GMT; contact number; station worked; RST or RS report; QTH; name and QCWA membership number.

The activity will be found on these frequencies: ± 5 kc C.W.; 3540, 3655, 3790, 7005, 7030, 7100, 14100, 21110 & 28110 kc. A.M.; 3810, 3950, 7230, 14240, 21340 & 28690 kc. S.S.B.; (l.s.b.) 3804, 3999, 7204 & 7299 kc, (u.s.b.) 14300, 21410, 21440 & 28690 kc. RTTY (if any) 7105 & 21140 kc.

Your logs should be in the mail before the end of the month and this year they go to: the QCWA chairman: Walter Knight, K6GMA, 13841 McMains St., Garden Grove, Calif.

Vermont Party

Starts: 2300 GMT Saturday, February 15
Ends: 0300 GMT Monday, February 17

The Central Vermont Amateur Radio Club has organized this QSO Party to give all those interested an opportunity to work the comparitively rare state of Vermont for the many state and county awards. EXCHANGE: *Vermont stations;* QSO number, RS/RST report and county. *All others;* QSO number, RS/RST and ARRL section or country. SCORING: *Vermont stations:* 1 point per contact and multiply total by the number of ARRL sections and foreign countries worked. *All others;* 3 points per each Vermont station worked and multiply total by the number of Vermont counties worked.

Contact credit with the same station on different bands will be given, and there are no power restrictions.

AWARDS: (a) Certificates to the highest scoring station in each ARRL section. (There was

[*Continued on page 94*]

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

As the clock in the old town of Geneva struck midnight on November 8, a new era in communications began. At that moment, representatives from the last of the 70 nations attending the Space Communications Conference of the International Telecommunication Union affixed their signatures to the Final Acts of the Conference. The Final Acts contain the results of this five week conference which succeeded in allocating frequencies, for the first time, to the various space communication services. On January 1, 1965, the Final Acts will officially become a part of the International Radio Regulations, the basic document governing the operation of radio throughout the world. The Radio Regulations have the status of an international treaty so far as the United States and most other countries of the world are concerned.

Every space satellite or space vehicle launched, whatever its purpose, is dependent upon communications for its link with the earth. The conference, attended by more than 400 scientists, engineers and government officials from 70 countries, discussed all facets of radiocommunication between earth and space, and between space vehicles. After five weeks of discussion and negotiation, the conference agreed to allocate frequency bands in the crowded radio spectrum to serve space communication requirements for at least the next generation. A total of nearly 6,100 mc have been allocated for the various kinds of space communication services in discrete bands between 10 mc and 35.2 gc (a gc, or gigacycle is equivalent to 1,000 mc). The success of the conference has been hailed by experts as a great step toward the eventual development of communication, weather and navigational satellite systems, as well as permitting expanded space research and exploration, both manned and unmanned.

H.F. and V.H.F. Allocations

The following h.f. and v.h.f. bands allocated by the conference to various space communication services are of special interest to readers of this column since these are the bands that can be received by radio amateurs and space listeners with a minimum of equipment.

*11307 Clara Street, Silver Spring, Md. 20902

10,003-10,005 kc	Space research service on a shared basis.
15,762-15,768 kc	Space research service on a shared basis.
18,030-18,036 kc	Space research service on a shared basis.
19,990-20,010 kc	Space research service on a shared basis.
20,007 kc (± 3 kc)	May be used, in emergency, in the search for, and rescue of, astronauts and space vehicles.
30,005-30,010 kc	Space research and satellite identification, shared.
39,986-40,002 kc	Space research, shared.
136.00-137.00 mc	Space research (telemetering and tracking).
137.00-138.00 mc	Meteorological satellites, space research (telemetering and tracking) and space service.
143.60-143.65 mc	Space research (telemetering and tracking), shared.
144.00-146.00 mc	Radio amateur space activities[1].
148.25 mc (± 15 kc)	Space telecommand, shared.
149.90-150.05 mc	Radionavigation satellites, exclusive.
154.20 mc (± 15 kc)	Space telecommand, shared.
183.10-184.10 mc	Space research, shared.
267.00-273.00 mc	Space (telemetering), shared.

It will be in the above bands that space listeners and radio amateurs will be able to here signals from satellites launched in the future. It is expected that satellites launched by the United States will make greatest use of the bands 136-137 mc and 137-138 mc, while satellites launched by the USSR will make greatest use of the h.f. bands and the band 143.6-143.65 mc, for telemetering and tracking purposes.

U.H.F., S.H.F. and E.H.F. Allocations

The following allocations in the higher regions of the frequency spectrum have also been made:

399.90-400.05 mc	Radionavigation satellites, exclusive.
400.05-401.00 mc	Meteorological satellites (maintenance telemetering), space research (telemetering and tracking), shared.
401.00-402.00 mc	Space (telemetering), shared.
449.75-450.25 mc	Space telecommand, shared.
460.00-470.00 mc	Meteorological satellites, shared.
900.00-960.00 mc	Space research, shared.
1427-1429 mc	Space (telecommand), shared.
1525-1535 mc	Space (telemetering), shared.
1535-1540 mc	Space (telemetering), exclusive.
1660-1670 mc	Meteorological satellites, shared.
1690-1700 mc	Meteorological satellites, shared.
1700-1710 mc	Space research (telemetering and tracking), shared.
1770-1790 mc	Meteorological satellites, shared.
2290-2300 mc	Space research (telemetering and tracking, deep space), shared.

[1]A special report devoted entirely to the results of the conference as far as amateur radio is concerned appears on page xx.

3400-4200 mc	Communications satellites (satellite-earth), shared.
4400-4700 mc	Communications satellites (satellite-earth), shared.
5250-5255 mc	Space research, shared.
5670-5725 mc	Space research (deep space), shared.
5725-5850 mc	Communication satellites (earth-satellite), only in Europe and Africa, shared.
5850-5925 mc	Communication satellites (earth-satellite), only in Europe, Africa and Asia, shared.
5925-6425 mc	Communication satellites (earth-satellite), world-wide, shared.
7250-7300 mc	Communication satellites (satellite-earth), exclusive.
7300-7750 mc	Communication satellites, shared.
7900-7975 mc	Communication satellites (earth-satellite), shared.
7975-8025 mc	Communication satellites (earth-satellite), exclusive.
8025-8400 mc	Communication satellites (earth-satellite), shared.
8400-8500 mc	Space research, shared in Africa, Europe and Asia, exclusive in the western hemisphere.
14.3-14.4 gc	Radionavigation satellites, exclusive.
15.25-15.35 gc	Space research, exclusive.
31-31.3 gc	Space research, shared.
31.8-32.3 gc	Space research, shared.
34.2-35.2 gc	Space research, shared.

International Space Definitions

In addition to the above listed frequency allocations, the conference adopted a number of important definitions, resolutions and recommendations. The following is a partial listing of the definitions agreed to internationally at the conference.

Space service—A radiocommunication service between earth stations and space stations, or between space stations, or between earth stations when the signals are re-transmitted by space stations, or retransmitted by reflection from objects in space, excluding reflection or scattering by the ionosphere or within the earth'satmosphere.

Earth station—A station in the space service located either on the earth's surface, including on board a ship, or on board an aircraft.

Space station—A station in the space service located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the earth's atmosphere.

Space system—Any group of co-operating earth and space stations, providing a given space service and which, in certain cases, may use objects in space for the reflection of the radio-communication signals.

Communication satellite service—A space service between earth stations, when using active or passive satellites for the exchange of communications of the fixed or mobile service, or between an earth station and stations on active satellites for the exchange of communications of the mobile service, with a view to their retransmission to or from stations in the mobile service.

Communication-satellite earth station—An earth station in the communication-satellite service.

Communication-satellite space station—A space station in the communication-satellite service, on an earth satellite.

Active satellite—An earth satellite carrying a station intended to transmit or re-transmit radiocommunication signals.

Passive satellite—An earth satellite intended to transmit radiocommunication signals by reflection.

Satellite system—Any group of co-operating stations providing a given space service and including one or more active or passive satellites.

Space research service—A space service in which spacecraft or other objects in space are used for scientific or technological research purposes.

Broadcasting-satellite service—A space service in which signals transmitted or retransmitted by space stations, or transmitted by reflection from objects in orbit around the earth, are intended for direct reception by the general public.

Radionavigation-satellite service—A service using space stations on earth satellites for the purpose of radionavigation, including, in certain cases, transmission or transmission of supplementary information necessary for the operation of the radio navigation system.

Meteorological-satellite service—A space service in which the results of meteorological observations, made by instruments on earth satellites, are transmitted to earth stations by space stations on these satellites.

Space telemetering—The use of telemetering for the transmission from a space station of results of measurements made in a spacecraft, including those relating to the functioning of the spacecraft.

Maintenance space telemetering—Space telemetering relating exclusively to the electrical and mechanical condition of a spacecraft and its equipment together with the condition of the environment of the spacecraft.

Space telecommand—The use of radiocommunication for the transmission of signals to a space station to initiate, modify or terminate functions of the equipment on a space object, including the space station.

Space tracking—Determination of the orbit, velocity or instantaneous position of an object in space by means of radiodetermination, excluding primary radar, for the purpose of following the movement of the object.

Deep space—Space at distances from the Earth equal to or greater than the distance between the Earth and the Moon.

Orbit—The path in space described by the center of mass of a satellite or other object in space.

Angle of inclination of an orbit—The acute angle (less than 90 degrees) between the plane containing an orbit and the plane of the earth's equator.

Period of an object in space—The time elapsing between two consecutive passages of an object in space through the same point on a closed orbit.

Altitude of the apogee—Altitude above the surface of the Earth of the point on a closed orbit, where a satellite is at its maximum distance from the center of the Earth.

Altitude of the perigee—Altitude above the surface of the Earth of the point on a closed orbit, where a satellite is at its minimum distance from the center of the Earth.

Stationary satellite—A satellite, the circular orbit of which lies in the plane of the earth's equator and which turns about the polar axis of the Earth in the same direction and with the same period as that of the earth's rotation.

Spacecraft—Any type of space vehicle, including earth satellites, deep space probes, whether manned or unmanned.

One of several important amendments to the Radio Regulations adopted by the conference deals with ceasing radio transmissions from satellites. The amendment states that "space stations shall be made capable of ceasing radio emissions by the use of appropriate devices that will ensure definite cessation of emissions (battery life, timing devices, ground control, *etc.*)." The conference also approved technical standards and criteria permitting space services to share most of its frequency allocations with existing terrestrial communication services. This was accomplished by agreeing to limit the signal strength that certain space stations can deliver on the Earth, and by setting up "coordination distances" within which countries must coordinate their space communication activities with terrestrial communication activities in order to ensure that interference will not occur to either communication activity.

The conference adopted a recommendation

[*Continued on page 94*]

the USA-CA PROGRAM

CLIF EVANS*, K6BX

THREE county hunters bagged USA-CA-1000 during November, 1963 together with ten hunters who bagged USA-CA-500 as follows:

USA-CA HONOR ROLL

1000

W8RQ 18	K8CIR 19	KØDEQ 20

500

WA2SAZ 286	K9DWG 289	G6VQ 293
K8KOM 287	K6EIE 290	W6ETR 294
W7ZKL 288	W5LEF 291	KØMLM 295
	K3GEO 292	

Of the above USA-CA-1000 awards, 18 were all c.w. and others were mixed operations. Of the ten USA-CA-500 awards, WA2SAZ was all 6 meters phone; K3GEO was all c.w., and others were mixed operations.

K6BX On Go

Almost didn't get back to Bonita in time to get this column in to *CQ* on last dead-line as we have been on the road back east for over three weeks and just returned home long enough to grab a pair of clean sox and head for the Annual Swap-Fest down Texas way.

Both Sides Of The Coin

The most controversial issue ever facing amateur radio operators in the U.S. was thrown in the hopper when the League petitioned the FCC for a Rule change (RM-499) covering both license categories, restrictions, special privileges and re-allocation of band usage, under the guise of "License Incentive."

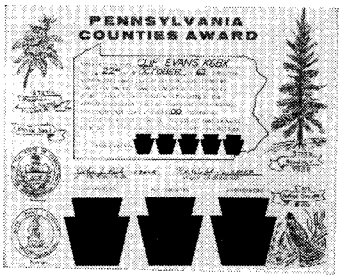
A major reason for the bitter controversy had nothing to do with "License Incentive" but resulted from the drastic approach by ARRL and their failure to honestly state their political motives.

On November 9th, 1963, the writer debated this controversial issue with First Vice President of ARRL, Wayland (Soupy) Groves, W5NW, for three hours before the annual Texas Swap-Fest held at Brownfield, Texas. Folks from all over Texas came to Brownfield seeking answers to the questions which have plagued most every-one. K6BX was invited to Brownfield to speak in opposition to the League's petition.

Here is award sponsored by San Fernando Valley Radio Club, SFVRC, for working members; Los Angeles ARRL Section stations work 10; rest of California and U.S. work 5; all others work 3; contacts after Jan. 1, 1962; no charge but s.a.s.e. for seals appreciated given for repetition of above requirements. No net contacts credited. Send log data only to Awards Chairman, K6UMV, Don Etheredge, 12040 Redbank Street, Sun Valley, Calif., 91352. Members are: WA6ASA, ASA, AWO, AYM, BHC, DCY, DUT, DXZ, EDO, EFI, EOZ, EQE, HAO, HIY, HXE, HXK, IZO, JIO, KLP, KLQ, LDJ, LVT, MBP, NWY, NYQ, ONJ, OPS, OTT, OVV, PFZ, PII, PTG, PMP, PPY, QHQ, QIP, QJN, RBN, RKD, RKL, RMT, SHB, SLG, SQZ, TEI, TEN, TEO, TGH, TOI, TUK, TYZ, UPC, USL, UYV, UZY, VAE, VEB, VEP, WCX, WMX, YCO, YTE, YUY, ZCB, ZIP, ZMF, ZNQ, ZSO, ZWB, ZWS; W6AYY, IN, KBE, KHU, MEP, PJR, OEZ, QJW, QOV, QQA, RXD, SNY, UEI, UEK, UIY, ZGZ; K6BAU, CVA, EBQ, EPS, GPQ, IHU, IUN, JDI, JIM, LDC, LRU, MHR, OAO, OKT, PXD, QAL, RVA, RVB, UBI, UCE, UCG, UHO, UMV, ZTX; WB6ACY, APX, AXS, AYE, GFD; WN6BDD, BYY, CSS, CSZ, DUS, FIP, GEX; WV6QKE, WPA, WUS, ZDZ, ZIW, ZQG; KØPXI; WA4IYJ.

For 45 minutes Soupy attempted to sell RM-499; for 45 minutes K6BX related how, in scores of instances, RM-499 was dangerous to both the national defense interest and the public interest, while at the same time supporting some more realistic incentive licensing approach. Following the two 45 minute talks, those assembled were permitted (unrestricted) to throw questions at either "Soupy" or K6BX and in all cases each had equal opportunity to comment with equal time. Following three hours of democratic debate the temper of those assembled was tested; net result . . . only twelve persons voted to support the League's RM-499 and six of these votes were by ARRL officials. A proposal then was

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



Here is the Pennsylvania Counties Award for working stated numbers of counties which is sponsored by the Nittany Amateur Radio Club, P.O. Box 60, State College, Pa. Class AA for DX stations excluding VE but including KL and KH for working 67 counties; Class A for any stations working 67/60 (last figure for DX); Class B is 60/50; Class C is 45/40 and Class D is 30/25. VE stations work same as U.S. Send GCR list, $1 or 10 IRC for basic award in any class initially and 10¢ or 1 IRC for higher class endorsement seals. Endorsements for AOMB/M. All contacts after January 1, 1960. The Nittany ARC also sponsors the NARC Award for working members after January 1, 1960. Centre County, Penna. stations work 10 members or the club station K3HKK and 7 members; All others work 5 members or the club station plus 3 members. Apply as above. Members are: W3CDR, EJA, IRT, KJM, KXS, LNW, MGP, NEM, NUO, POP, RBC, RNH, SAY, SMV, SLX, TYL, UTI, UVQ, WFZ, WJS, ZUH, ZZO; K3AHY, AKR, BRH, CLX, CXZ, EXE, IOQ, KMP, LUX, LVA, LVO, ONH, ONK, OOU, OXT, PIF, POG, UGR, TMB, UHC, UJM, VGS, VPH.

made that FCC be petitioned for a realistic license incentive program which did not have as its objective that of kicking the Generals and Conditionals off the phone bands; result . . . every person in the hall including the ARRL officials stood up.

As we have stated repeatedly in our own publications, we seek *only* a free press wherein both sides of controversial coins are shown. At Brownfield, both sides of the League's RM-499 *was shown*. Whether the reader is for or against RM-499, and contrary to propaganda otherwise, the Brownfield debate *did* bring out the great majority of answers sought by U.S. hamdom. This debate was taped and this tape is *free!* It is available to any individual ham or club who has the interest in learning the behind-the-scenes facts brought out in debate. To get a copy of this complete debate, send two 1200 foot recording reels to Cliff Payne, W5IKH, 3110 45th St., Lubbock, Texas. Cliff will run the debate on your tape and postpay it back to you free.

As K6BX told the Texas folks, we care less whether folks agree with us or the League, all we ask is that folks listen carefully to both sides. THINK, and come to conclusions based on what is on both sides of the coin. So folks, you owe it to yourself to send for that tape and learn why down Texas way RM-499 was rejected, and why even the state of Texas has submitted a petition to FCC in opposition to the League; such petition stating that RM-499 would destroy the state's capability of running its own Emergency Communication Corps.

World-Wide Public Service Program

The YL-International SSB'ers, Inc., have announced formation of a World-Wide Public Service Program through creation of an Amateur Radio "Communications System Facilities," seven days a week, for the purpose of: a. Handling international emergency traffic; b. Effecting delivery of urgently needed life-saving medication to individuals world-wide; c. Actively promoting international good-will through mass person-to-person contacts both on-the-air and subsequent correspondence and exchanges; d. Effectively promoting incentive for a higher degree of operating proficiency and associated technical competence; e. Promoting effective world-wide public relations through additional media of realistic awards programs and annual QSO parties; f. Co-operation with, and support of other organizations with similar purposes; g. Bringing to the attention of the general public the tremendous contributions through which Amateur Radio serves the public interest, the national interest, peace and good-will amongst the peoples of the earth.

The SSB'ers, now with 1,900 members in over 200 countries, have established a world-wide communications system with communication coordinators in the following twelve world areas: 1. Southeast USA and Central America; 2. Northeast USA and Canada—VE1, 2 & 3; 3. Central USA and Canada—VE4 & 5; 4. Southwest USA and Mid-Pacific; 5. Northwest USA and Canada—VE6, 7 & 8, and Alaska; 6. Europe; 7. Mediterranean and Indian Ocean; 8. North and Central Africa; 9. South Africa; 10. South America; 11. Oceania; 12 Far East.

Communication channels, established in support of the "system", includes the following regular schedules: (Run 4 to 5 hours duration)

MONDAY 1900 GMT, 14,331 kc, SSB'ers "system" originating in Europe, beaming Africa.

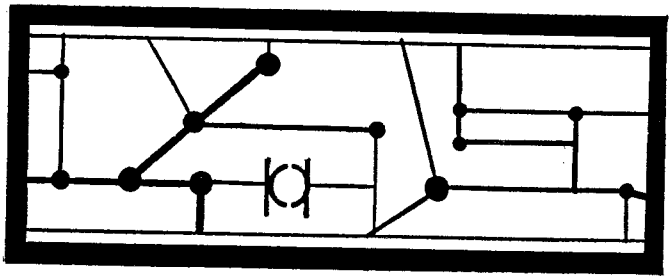
TUESDAY 1800 GMT, 14,331 kc, SSB'ers "system" originating in USA, beaming world.

WEDNESDAY 1800 GMT, 14,331 kc, CHC/FHC[1] beaming world.

[*Continued on page 96*]

Yes, you are 100% right, the above is Worked All Chickenville Award sponsored by The Lanierland VHF-UHF Amateur Society of Northeast Georgia for working two members after January 1, 1962 on 50 mc or higher. No charge, just send list to above Society, P.O. Box 188, Westside P.O., Gainesville, Georgia. From last report, there were many more roosters in Chickenville than v.h.f. hams.

NOVICE



WALTER G. BURDINE*, W8ZCV

THIS issue makes two years that I have been back as your NOVICE editor. I have received letters from 32 countries, all continents and most of the states. Letters come from hams ranging in age from 8 to 76 years and many of these have been followed up by personal visits that I enjoyed very much. I enjoy receiving your letters, pictures, hints and questions. I have answered most of the questions that have been asked, although on some of them I had to do a lot of research to find the answers. Some questions are still unanswered and I apologize for that, but I will get to them later. I always appreciate a stamped self-addressed envelope as this cuts down my cost considerably; this isn't too much to ask is it? I have most all of the magazines that have been published for the amateur radio fraternity and I am still currently receiving *CQ*, *QST*, *Radio-Craft*, *Radio News* and many other sources of information for the ham. Some day I hope to be able to answer questions about any article that has appeared in print in the past. I was lucky to add to my collection of *QSTs* this past summer when I bought about a hundred and twenty-five copies from Kurt Rieder, WA2RKW. These give me a lot of background on the whys and wherefores of present-day amateur radio. You know, it is often said, "To predict the future you would read the past." I will continue to collect the older copies of these magazines as I can afford. My museum of older radios is still growing, too.

Again, thanks for the letters and please keep them coming as they are the heart and soul of our column. I can always use more pictures and ideas.

15 Watt Six Meter Transmitter

After using the little 5763 rig (*CQ*, Nov. '55) for awhile and receiving many comments like, "That thing *looks* too small to put out a good signal," it was decided to come out with a rig with a little more power for use at field events and for emergency use. A description of that rig follows. This unit has been run continuously for 26 hours at three Field Day operations and has served as my main station to help keep my record of continuous daily contacts on v.h.f. for 3155 days. It has been operated portable with a.c. power, dynamotors, vibra-packs and a couple of times it was even operated on a 400 c.p.s. power supply. It is certainly a very versatile rig. A linear amplifier can be used to improve its operation. A transistorized v.f.o. is planned for the future. This transmitter has enough power for working lots of DX and for any local contacts. With proper precautions very little TVI is caused by the rig, due to the use of 50 mc crystals and good grounding.

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

The Transmitter

The transmitter shown in fig. 1 uses a 6U8 tube in a simple slug-tuned oscillator circuit using a 50 mc overtone crystal in the triode section of the tube. The pentode section is used as a buffer-amplifier to drive a 2E26 as a final amplifier. The output is coupled to the antenna through a pi-network to reduce TVI. The output can match almost any type antenna.

The audio output of a crystal microphone is amplified by another 6U8 and transformer-coupled to a pair of 6AQ5s in push-pull as the modulators. The transformer used in my unit was a surplus item from an SCR-522 transmitter. In practice I actually used a pair of 5763 tubes as modulators. Any similar pentode or tetrode power tubes can be used for modulators by making the proper socket connections and operating parameters. It is always better to use larger tubes and run them cool than to overload the smaller tubes. I have never had to change a tube in this transmitter as it is my policy to run them cool.

By wiring the 6U8 filaments in series and using 12AQ5s as modulators and an 6893 tube for the final you can use the car battery (12v.d.c.) as a filament supply. *Do not use a crystal microphone in the car* as the heat inside the car on a warm day will fuse the crystal element in the microphone.

The a.c. power supply can be any supply using conventional circuitry and delivering 6.3 volts at 3 a. and 300 or so volts at 150 or more ma. The a.c. power supply could be built as an integral part of the transmitting if desired with a plug-in arrangement for the emergency power source. For mobile or portable service batteries could be used or a small dynamotor, vibrapack or transistorized power supply used to furnish the necessary high voltage.

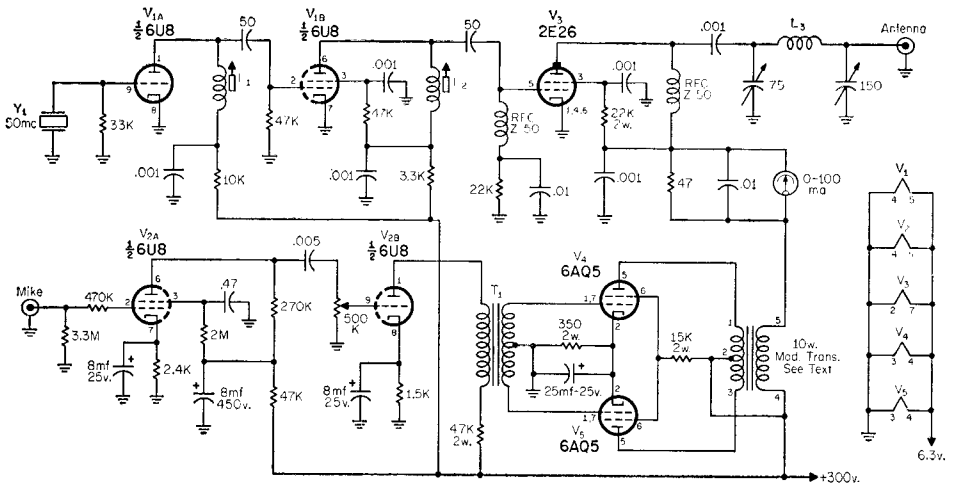


Fig. 1—Schematic diagram of the 15 watt six meter transmitter described in the text. All resistors are ½ watt and all capacitors are in mmf unless otherwise noted

L_3—6-7t. #16 tinned, 1" long, ⅝" dia.
L_3—6 7t. #16 tinned, 1" long, ⅝" dia.
T_1—Stancor A-53C.
Y_1—Fifth overtone 50 mc crystal.

Construction

Construction is simple and should present no problems. I used a 7 × 7 × 2" aluminum chassis with plenty of space for everything. Mount all parts for short leads and neat layout. Keep all bypass capacitor leads short and near the socket. The cathode leads for the 2E26 should be made with a copper strap between pins 1-4-6 and connected by another copper strap to the chassis with as short a lead as possible; this is important —many cases of TVI have been traced to this spot. Disc ceramic capacitors should be used to provide low inductance bypass paths. Coils should be resonated with a grid dip meter and may be wound on any available coil form. The coil data given may not hit the band with the coil forms that you have, but is given as "ball park" data.

Modulator wiring should also be kept short and routed as far as possible from the r.f. wiring to prevent feedback. It is a good idea to use shielded wire for all low level audio wiring.

Use a clean soldering iron and keep all solder joints free of dust and filings. Use enough heat to effect a good bond and be sure that all joints are electrically perfect. Cold solder joints are the cause of many transmitter's not delivering their maximum power output.

I have not had to neutralize any of the transmitters that I have built, but if your transmitter does exhibit spurious oscillations you can employ any of the popular methods of neutralization. I think that one possible reason I've had little trouble of this kind is that I've always taken great pains with my layout, wiring and shielding.

Use your grid dipper to tune the r.f. circuits making sure they are on the right frequency. Just because the crystal says 50.4 mc doesn't mean that that is the only frequency on which it will oscillate; my transmitter tuned up wonderfully and indicated good output but still no one came back to my CQ. I was using a fifth overtone crystal and it was oscillating on the third overtone: 30.276 mc—outside of any amateur band and making me liable for a pink slip. Use your grid-dipper! See you on six meters.

A Letter From Hungary

If you will read the following letter and think about it for a few moments you will get a very good message from it. This letter is my first from Hungary and the 32nd country to write to NOVICE.

"I do not know if you have gotten any letters from Hungary. I read your column in the *CQ* always with great interest. I am a Hungarian s.w.l., and a pupil of the secondary school. I like very much working on the shortwaves, and am very glad to be getting answers to my QSLs. Here in Hungary, the s.w.l.s, too, are 'full members' of the amateur society. Not so, in the U.S.A. —Hi?. I see that in the USA many certificates are issued but we hardly may get them, since your bureaus do not forward the cards of s.w.l.s to the addressees.

"My rig consists of a 7 tube superhet receiver. I listen mostly on the 14 mc band. Today I have 192/92 DXCC countries, and 35/29 zones for WAZ. I like to collect certificates, and I feel that it is deplorable that most of the certificates are not issued for s.w.l.s. In my opinion it is incompatible with the spirit of amateur radio friendship. I would like to get my license, but in this year I must learn much, and I have not enough time to work my station.

"I correspond with s.w.l.s all over the world, and would like to correspond with American radio amateurs, too. So, please give my address to a boy or girl who would like to correspond with a 17 year old Hungarian boy.

"So, 73 and good luck, Walt. I shall read your

[*Continued on page 98*]

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

WITH this issue of *CQ* we celebrate the 7th birthday of HAM CLINIC. Conceived by us to help the ham with his technical and other problems related to ham radio, we have certainly tried very hard to help those who sought our assistance.

Spending many hours in front of our typewriters, Elfriede and I have answered thousands of letters from hams (and others) from nearly every country in the world except Red China.

During the last 72 issues of *CQ* we have covered many subjects for our readers and we have gotten much satisfaction out of knowing that we were, in our own small way, making ham radio just a little more enjoyable by helping others solve their technical problems.

To handle the HAM CLINIC answering service we rely on a well equipped technical library, files containing instruction books, diagrams and service bulletins and the kindness of most equipment manufacturers' service managers. Of course, our 30 years in communications-electronics work helps too.

The encouragement we have received and continue to receive from readers makes up for the long hours we devote to readers' correspondence.

We like letters that are brief and to the point, like this one: "Dear Chuck: recommendation on purchase of SB-10, go or no go?" (Our answer: go.)

Long rambling letters take a lot of time to read and actually accomplish little. The letter that asks the question with sufficient background information so that we can give an intelligent answer is handled quickly.

So as we go into another new year, we thank each and everyone of you who has written to us. *Happy New Year!*

Observation

When one reads the ham publications available today, an analysis of the "letters to the editor" columns sometimes discloses the fact that a few letter writers are often a little too emotional, tend to make snap judgments, often misquote or read into published statements attitudes or ideas which are not always there, and often fail to distinguish between that originally implied and that stated.

Recommended: Before *you* write to the editor to reply to a published letter or proposal by a body official, take two days to cool off, then come back and re-read the material. Pick the salient points which you wish to rebut and then stick to them. Rewrite your copy at least three times, keeping the points given in the paragraph before this one in mind. Be brief and factual; if you are, your letter stands a good chance of being published.

Questions

Identifying Surplus Components—Those readers who have surplus components which they cannot identify are advised to do two things: first, write the manufacturer (if the part carries the manufacturer's name); second, see if it could be in a Federal Stock catalog. The catalog can be seen at any military supply activity office.

Tracing the origin and characteristics of a surplus transformer for one reader took about three hours; this is too much time to devote to any question or request for information.

Receiving Antenna Multicoupler

One item of communications equipment which has not received much space in the amateur radio literature is the receiving antenna multicoupler. The reason for this is no doubt due to the fact that most hams own only one receiver, and with only one receiver a multicoupler is not needed. However, there are now many hams owning two or more receivers and only one all-band antenna; the information that follows is intended for them.

An antenna multicoupler for receiving purposes is nothing more than a device which permits the utilization of one antenna with two or more receivers simultaneously without interaction and loss of gain. Generally, a multicoupler will employ a broadband input amplifier and a number of isolation stages. Each such stage provides a certain amount of amplification and this when added to that obtained from the input amplifier will generally provide quite a bit of gain which would not be realized without the coupler.

Various problems are encountered when designing multicouplers. Some of these are: maintaining uniform gain and receiver isolation throughout a large frequency range; noise generated in tubes and associated circuits; maintaining uniform output of each of the isolation

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

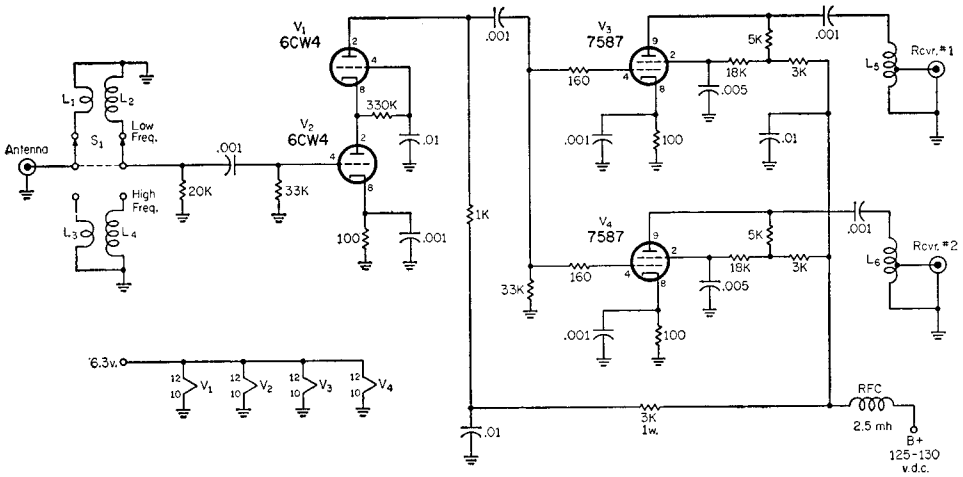


Fig. 1—Experimental receiving antenna multicoupler for 10 through 80 meters. Switch S_1 is set for best performance on the band in use. All resistors are ½ watt unless otherwise specified; all capacitors are in mf and are disc ceramics.

L_1—9 t. B&W #3011 Miniductor. Space 1t. from cold end of L_2.
L_2—40t. B&W #3011 Miniductor.
L_3—3t. B&W #3011 Miniductor. Space 1t. from cold end of L_4.
L_4—8t B&W #3011 Miniductor.
L_5, L_6—12t. B&W #3011 Miniductor. Tap 4t. from cold end.
S_1—2 pole 2 pos. ceramic rotary switch.

amplifiers; attenuation of spurious signals; harmonic distortion; intermodulation, and oscillation.

Commercial manufacturers utilize tubes having fairly high gain and low noise characteristics. Usually, the first stages (amplifiers) are triodes but the succeeding isolation stages are pentodes with the suppressor tied to the cathode to give more stability.

Actually, by substituting tuned circuits for the broadband fixed tuned circuits, it is possible to use the multicoupler as a preselector-amplifier. However, if high gain tubes are used, there is always a possibility (if care is not taken in isolating input and ouput circuits) of oscillation.

Of course, commercially available multicouplers are out of the price reach of the average ham. Furthermore, they are generally designed for up to at least six outputs.

Experimental Antenna Receiving Multicoupler

Having RCA Nuvistors available in my lab, I thought that I would take advantage of their inherent low noise characteristics and put together a double output multicoupler which could be used on the hambands. Figure 1 shows the diagram of the experimental coupler which seems to work remarkably well considering the fact that relatively little effort was made to provide a unit having all of the desirable characteristics of a commercial coupler. Furthermore, components (including the coils) were selected more on the basis of their availability rather than to exactly meet the paper design specifications I drew up.

The unit has been used with two receivers without any interaction between the sets and seems to provide a lot more gain than when the receivers are connected directly (in tandem) to an antenna. The overall gain of both sets was appreciably higher on 7 and 21 mc than it was on the other bands. However, the lower noise and increased gain on 10 meters was well worth the effort putting the coupler together.

Note that the grids of the 7587 isolation amplifiers are in parallel, while their plate circuits are isolated from each other. Perhaps pentodes in these stages would make for better isolation. If you decide to try pentodes, be certain that the suppressor grid is connected to the cathode and that you use all of the isolation resistors shown.

Neutralization was found unnecessary. However, if you run into oscillation, any of the usual neutralization methods normally used in transmitter stages will work.

If additional receivers are used, all you need do is to duplicate the last isolation stage for each extra set. Just make sure that you have the required filament and plate power for the extra tubes available.

You can try tuning the secondary of the antenna input coil assembly for added gain by paralleling it with a variable capacitor of 250 mmf on 3.5 mc to about 50 mmf on 28 mc. Make certain that your inputs and outputs of the coupler are isolated mechanically so that there will be no feedback.

The input of this unit was roughly designed for 72 ohms, but if you wish to change to some other value, the link may be modified accordingly.

If your receivers have different input impedances, you can modify the coils in the outputs of the isolation amplifiers to match each receiver, but this will take a little experimentation.

You can use other coils instead of those sug-

gested, but I found the B&W #3011 Miniductor (16 t.p.i. ¾" dia.) to work okay.

The plate and screen power for the unit should be well filtered, and, if possible, the plate voltage going to the 6CW4's should be regulated for best operation. Switch S_1 is a DPDT ceramic tap switch (two sections). Normal r.f. shielding is employed and the circuit layout did not seem critical.

We hope the information we have given will serve to answer *most* of the questions we have received on multicouplers for receivers. If you build the experimental unit, let us know how you make out. The first reader who sends in a picture of the unit using Nuvistors (along with operational data) will be awarded something worthwhile.

TV Vidicon Tube—"I am planning on constructing a good portable transistorized camera for ham TV use. I'm looking for a vidicon with at least 900 line resolution and which does not require a lot of heater power. Can you assist me?"

I think so. Write Amperex Electronic Corp., Tube Div., 230 Duffy Ave., Hicksville, L.I., N.Y., and ask them for technical specs on their 8483 1" vidicon. This is a real fine tube, is not overly expensive and has, I believe, what you are looking for.

10 Meter Drive Fall-off—Some hams who have purchased v.f.o.s and connected them to their rigs are dismayed to find little drive on 10 meters. Our files are full of letters asking for the solution to the v.f.o. drive problem on 10.

Simply unplugging a crystal and plugging in a v.f.o. does not always work. Here are the reasons. First, the output impedance of the v.f.o. may not be proper for the oscillator circuit used in the rig. Secondly, some hams have the idea that they can drive their rigs on 10 meters with either an 80 or 160 m. v.f.o. output, although they have been using 7 mc crystals for 10 m. operation. And last, but not least, the r.f. output of the v.f.o. may not be great enough for proper 10 m. drive.

Most crystal oscillators (used as a buffer when a v.f.o. is employed) have a high impedance input. If the v.f.o. output is *low* impedance, you run into trouble. Changing from low- to high-Z requires another tuned circuit or a redesign of the oscillator. Generally, if the v.f.o. has low-Z output and the rig oscillator a high-Z input, all one need do is link couple a resonant parallel tuned circuit to the v.f.o., with the tuned circuit going to the oscillator.

Expecting proper 10 m. drive with 80 or 160 m. v.f.o. output leads to a lot of frustration. Sometimes it can be done, but not very often. Stick to the crystal frequency.

Low r.f. output from a v.f.o. is sometimes unavoidable. The best way to obtain the increased drive is to add a buffer-amplifier stage. Increasing voltages to the v.f.o. will not, in most cases, do a bit of good. Sometimes the Z transformation (explained above) will yield the additional r.f. voltage needed.

One other thing: If coax is used to couple the v.f.o. to the rig, be sure it is the correct impedance. If a capacitor is used in series with the coax at the v.f.o. end, disconnect it and try link coupling on the output coil to the rig. This will help if the input of the rig is low impedance.

21 Mc Preamp—"Please give me a reference to a good 21 mc preamplifier circuit."

See June 1956 *CQ*, page 46.

NC-240D Updated—"In what issue of *CQ* did the info on updating the NC-240D appear?"

November 1957.

Gonset Communicator Info—"Any information ever appear in *CQ* on the Gonset Communicator?"

Yes. January 1957 (GC Notes); April 1956 (Selectivity Improvement); and more notes in May 1957. Also March 1959 (soup-up).

KWM-2 and KWM-2A—"I own a KWM-2 which lately exhibits a tendency to 'hang-up' or there is a delay in operation when switching from TRANSMIT to RECEIVE. A buddy of mine also has the KWM-2 and his does not do this. Any advice?"

Yes. The delay in operation is not due to KWM-2 design but can be caused by screen grid emission of the 6146's. Collins has a bulletin out on this. Its number is 6 and dated 1-11-62. If screen grid emission is present (the bulletin will tell you how to determine this), a 1N1490 diode is installed in place of the bus wire connected from terminal E_3 (feedthrough terminal located near the rear apron in the p.a. grid box) to terminal 4 of terminal strip TS_1. The anode of the diode is connected to E_3. The 1N1490 diode has part number 353-1659-00 and is available from Collins for $3.28 along with the bulletin.

Globe Scout Oscillator—"I get drive from my v.f.o. to the 6V6 oscillator in the Globe Scout, but not enough. Any suggestions?"

Yes, read the information given earlier in this column and replace the 6V6 with a 6AG7 or 6CL6. Socket rewiring for the 6AG7 and a new socket and rewiring are necessary for the 6CL6. Parts values need not be changed for the switchover.

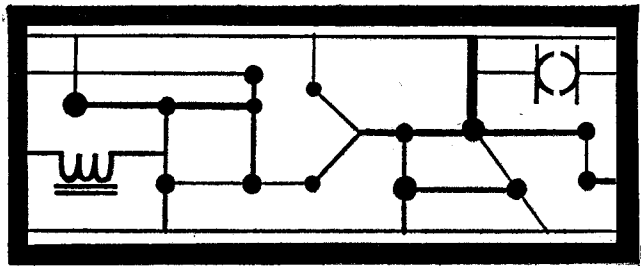
Panadapter for Double Conversion Receivers—"Sure would like to get the necessary information to use my 455 kc panadapter with my receiver having an i.f. of 1650 kc. Can you help?"

First, if you'll get a copy of the June 1960 issue of *CQ* you'll find an article on the subject by K2DHA on page 44. His method will work but not as well as if an extra stage (at the i.f. frequency) is used. The gain with his method on the higher bands is not ideal and the displays show this. I built the unit with another stage and the results were very worthwhile. I did however, broaden out the response so that I had an effective bandwidth of about 150 kc instead of the 100 realized by K2DHA. Normal bandwidth is about 200 kc in most adapters.

Modifying the HQ170—K8ZHZ modified his HQ-170 to improve frequency stability by wiring in a separate 6.3 volt filament transformer (1 a.) to feed the h.f. oscillator and mixer tubes. The tube filaments are on continuously. He also in-

[*Continued on page 102*]

RTTY



BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

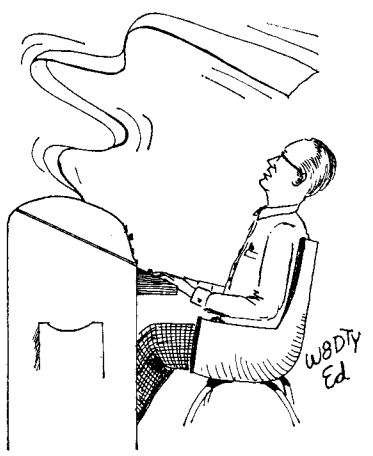
Nets centered on frequencies given; operation usually ± 10 kc on h.f.

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

WE continually receive letters asking how to modify a particular commercial "amateur" s.s.b. transmitter or transceiver so that it may be used on radioteletype. (This we find difficult to understand since we like to build specific equipment for a specific purpose.) We therefore wonder why the manufacturer of these chrome plated jobs didn't build-in RTTY in the first place. Maybe general purpose transmitters are uneconomical to produce for the ham market. But, looking at it from the ham's point of view; if he has a large chunk of hard-earned cash tied up in a commercial job, he wants to get as much "general purpose" use out of it as possible.

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

RTTY The Hard Way...No. 28



"I still don't think Ray sent me the right gears!"

The KWM-2(A) on RTTY

Many of the letters received are in regard to the KWM-2A, a transceiver designed for s.s.b. Simple diode shift results in slightly different frequencies for transmit and receive in the transceive mode of operation. This is awfully inconvenient since it is general practice to zero beat the other fellow.

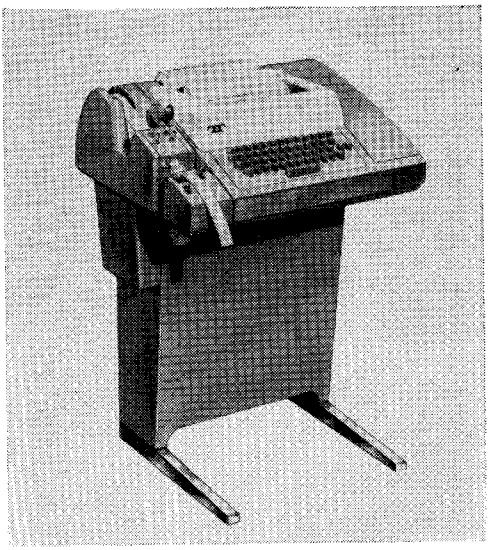
Major Jean Audette, W1BZD/2 at Plattsburgh AFB, N.Y., experimented for about a year and one-half with different techniques until he came up with the idea of using two separate 50K potentiometers for shift control, one for transmit and the other for receive. It was just a short step to add a third pot for narrow shift code identification. To simplify the transmit-receive switching a 110-volt control relay was also added. Jean happens to use a Kleinschmidt TT98 page printer and TT76 TD-reperforator but the circuitry is equally adaptable to any other combinations of Teletype machines. The local loop is set up for 20 ma but there is no reason why it cannot be set up for 60 ma.

Figure 1 is the schematic diagram of the loop and shift control system at W1BZD/2. The SEND-RECEIVE switch on the TT98 was changed to a double-pole-double-throw switch with a center-off position. This allows the KWM-2(A) to operate in the s.s.b. mode with the shift circuit disconnected. The polar relay K_1 happens to be the handy miniature Sigma relay in the TT98 but the WE 255A in another set-up can be used in the same manner. R_1 is the f.s.k. shift adjust, R_2 is the receiver adjust for frequency correlation, and R_3 is the narrow shift adjust for code identification.

All three shift adjust pots can be mounted in the case from a discarded 9-pin sealed Sigma relay. The 9-pin base of this relay is used as a plug to go into the v.f.o. external power socket J_{17} of the KWM-2(A). Pins 2-3 and 6-7 are jumpered. Miniature surplus pots are convenient to use. (Those who use an external v.f.o. with the KWM-2A can modify the KWM-2A by soldering a short piece of wire from pin 5 of socket J_{17} to the spare jack J_{26} at the rear. Then all the pots can be installed in the TU.)

Operation is simple. The 4-pole control relay K_2 is energized when the send-receive switch S_1 is put in the send position. This opens the short across the keyboard, grounds the TU connection,

New economical Model 33ASR Teletype machine has a four-row keyboard and operates on an 8-level code. The similar Model 32ASR has the usual three-row keyboard and 5-level Teletype code. Although these machines will operate at 100 w.p.m., they also will operate at our 60 w.p.m. with the proper gears. Both models are made in simple page-printer versions, too. Manufactured initially for the Bell system, these printers weigh only 35 pounds less floor stand and paper roll.



and keys-on the KWM-2A. With the emission switch on CW, the on-off switch on CAL, set the receiver to a 100 kc point and, observing the shift on a phase-shift 'scope indicator (*RTTY Handbook*, page 149), adjust the f.s.k. adjust pot R_1 for the desired 850 cycle shift. Now, put the send-receive switch S_1 in the REC position and adjust the receiver pot R_2 to obtain 425 cycle shift. The narrow shift identification pot R_3 is adjusted with the send-receive switch in the center or off position. About 20 or 30 cycles shift is sufficient.

For a more accurate setting of the frequency correlation pot, go on the air and ask a station to zero beat *you*, then without touching the receiver tuning, adjust R_3 for correct tones to your TU.

By the way, unless you have a blower on the power amplifier of the KWM-2A, don't load it to more than 150 ma.

On the Bauds

W1KAY of Westport, Conn., uses tape on 80. W1ETF is on 2-meter autostart. W1VIY of Trumbull, Conn., old time 147.96 (now c.w. band) operator is looking for W2JAV circuit boards. WB2CVN, NCS of the East Coast RTTY NET announces that net time is now 1900 hours (EST) on Wednesday nights. K2KAQ of Moonachie, N.Y., is active in Navy MARS with his Model 26. WA2YJD of Great Neck, N.Y. just acquired a Model 26 and is building the Twin City TU *(Jerry is 11 years old!)* W2PEE of Old Brookville, N.Y., converted his W6NRM TU to the two-tone limiterless type.

K3SNQ of Landsdale, Pa., has a surplus regenerative repeater hooked to his simple limiterless and tube-less TU (filters and diodes, only). W4ZLC of Albemarle, N.C., is on 80. W4NZY of Louisville, Ky., is looking for a surplus 0-5/FR exciter. W4MGT of Lexington, Ky., now has a Model 32. WA4OCY of Huntsville, Ala., (formerly NCS) checks into the East Coast net. WA5DEO of Lake Charles, La., is looking for dope on how to f.s.k. his Invader. *(Try John Magnusson at E. F. Johnson, Les!)* W6AEE of Arcadia, Calif., was in the hospital during November for a minor operation.

K8MYF of Columbus, Ohio, uses his KWM-2 on 80 with a long wire. W8CSH at Ohio University has for sale a Model 14 Typing Reperforator for $90. W8RRE of Rochester, Mich., uses an MXD-13 TD on 80. K8DKC of Ann Arbor, Mich., now has a Model 32 on the air. W9YVP reports RTTY booming in the Chicago area with nets on 146.70 and CD on 147.06. The first annual banquet of the Illinois Teleprinters Society (37 members) was held in January. W9ZBY of Exeland, Wis., received a TG-7B via MARS. W9BAV of Savanna, Ill., has an SFO-2 regenerative repeater and is looking for modification or use data. *(Try K8DKC, Jim.)* W9OKF of Park Ridge, Ill., uses tape on 80.

VE6AES of Raymond, Al., is looking for an

[*Continued on page 102*]

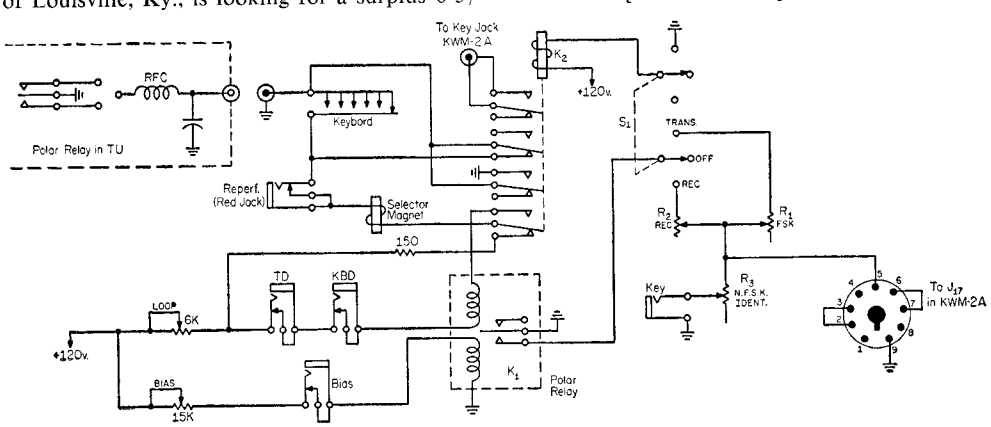


Fig. 1—FSK control system for KWM-2A of W1BZD/2.

YL

LOUISA B. SANDO*, W5RZJ

PEOPLE-TO-PEOPLE. Have you heard about this program? Do you know what it is? Are you taking part in it? People-to-People Executive Director Cookingham recently supplied some background information, from which we quote:

"A young teacher in India learns that not all Americans are wealthy. A Philadelphia intern gains insight from a Philippine brain surgeon. Two eighth-graders on opposite sides of the globe discover a mutual interest in exploring caves.

"These and countless other instances of *friendly communication* between people of different cultures are the objectives of a dynamic growing organization in Kansas City which was started in 1956 by President Dwight D. Eisenhower 'to help people everywhere learn a little more about each other.'

"The organization is called People-to-People, Inc., a non-profit, non-governmental corporation dedicated to *promoting international understanding and friendship through contacts and communication between individuals.*"

Sounds like a "natural" for amateur radio, doesn't it? What other group has such an ideal means of communicating as the hams?

Director Cookingham had three specific suggestions for ways in which amateurs can help: 1—Amateur operators can encourage overseas people to correspond with Americans. 2—Take every possible opportunity to encourage solid friendships between amateurs, and make every effort to have contacts in foreign countries understand United States citizens and our way of life. 3—Encourage amateurs to become members of local People-to-People chapters, and help develop in them meaningful People-to-People contact by means of radio communication.

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

Flyers all, these YLs swapped tales of the wild blue yonder during the Calif. Funfest. L. to r., WA6MFN, WA6ACH, K6JZA, W6QGX.

Famous "Mr. X"—painter, writer, world traveler (also OM of W6NZP)—helps hold painting he donated for the Calif. Funfest. Center, K6BUS, Midge, chairman of the Funfest, and right, WA6ZMG, Mary Janes, winner of this pre-registration prize.

A large order? Well, with any project one has to start somewhere. We all like to collect QSL cards, especially DX ones. Why not try to make personal friendships out of these DX contacts, rather than just grab at QSLs? Start with at least one personal friend in one or more countries—correspond (the *written* word is still powerful); find out about his or her country in detail; swap magazines and photos. (Many YLs are doing just this, especially via YLRL adoptees.)

In addition, help your *non*-ham friends make new friends overseas; get them to correspond. People-to-People sponsors an extensive letter exchange program (for those who cannot make contacts) using a system that helps match correspondents on the basis of common interests. (Those under 14 may participate through the classroom program.)

Look up your local chapter of People-to-People. See if there is a Sister City program operating and, if so, offer to provide communi-

FO8AD, Roland, and "his" two Maxines, left, WA6AOE, and right, W6UHA. Occasion—L.A. YLRC YL-OM Valentine Party

Some past presidents of YLRL gathered at the Calif. Funfest. L. to r., W7NJS (1958), W6DXI (1960), K6OQD (1963), W6CEE ('54-'55), W7HHH ('52-'53).

cation. (They often have no budget and even airmail is expensive to most of these countries.)

If you have jr. ops, talk with their teachers and encourage a classroom to adopt a "cousin" classroom in another country. Classes exchange letters, pictures, tape recordings, art work, botanical specimens, scrapbooks. There also is a University program of P-to-P wherein campus programs provide personal assistance to foreign students and promote international understanding and travel.

For more information write People-to-People, 2401 Grand Ave., Kansas City, Mo. 64108.

YLs in People-to-People

W6NAZ, Lenore Conn, is actively participating in People-to-People. For some time she has been keeping skeds with PY6BM in Salvador, Bahia, Brazil—the Sister City to Los Angeles—and they exchange much general information between their chapter committees. This Fall a group of prominent Salvador citizens visited Los Angeles, staying in private homes, and Lenore assisted with these arrangements. (At the same time, Evelyn, W6NZP, and "Mr. X" made a visit to Salvador.)

Lenore adds that she is even trying to learn Portuguese to put more meaning in her PY QSOs! And she sums up her feeling about the People-to-People program this way: "It is made to order for ham cooperation; the best part is that we can operate on our own. I feel strongly that personal friendships around the world will go a long way in the troubled situation. Time may be running out and we have a wonderful opportunity to prove our good intentions. Now that we all seem to have excellent rigs, I note an aimless air to many QSOs; this is our chance to put our precious frequencies to good use and to make fighting QRM worthwhile . . . I wonder how many other YLs are involved in People-to-People?"

Let's hear from you gals—and happy hunting, not just for QSLs, but for DX friendships!

YLRL 25th Anniversary Convention

January '64. Soon it will be *June, '64*, and long awaited occasion of YLRL's 25th Anniversary Convention (4th International). Date: June 19-21. Place: Nationwide Inn, Columbus, Ohio. Hostess club: Buckeye Belles. Cost: Complete convention ticket, $10. Order yours (and an extra banquet ticket for your OM at $5) from K8UKM, Elizabeth "Zip" Isham, 474 Darbyhurst Rd., Columbus 4, Ohio.

Tentative convention program has been published and includes hospitality room to be open all day Friday, the 19th, with a complete station from 2 through 80, c.w., a.m., s.s.b., and possibly RTTY, plus displays. The YLRL Forum, headed by President K1IZT, is scheduled for 9:30 A.M. Saturday; the luncheon is set for 1 P.M., with the banquet for YLs and OMs, including program and prizes, at 7 P.M.

In addition to the regular convention ticket, the committee is offering an "absentee" ticket for $1. It is available to *any licensed YL* who cannot attend but wishes to have a chance on the embroidered bed cover and receive a memento of the convention. Order from K8UKM, as above.

Here and There

Taking office in Oct. for the Portland Roses: Pres., K7BED, Bettie; V.P.-Treas., W7QKU, Donna; secy, K7BII, Mary; P/C, W7NJS, Beth.

Looking for Floridora YLs for certificate contacts? They'll be on as much as possible during "Floridora Week," Jan. 20-24.

The MINOW net (Fri. 1700 GMT) has changed freq to 3.880.

The Puget Sound YL Coffee Net has announced a certificate for working members: work 7 YLs 15 min. each, 6 meters only. Mail calls, dates and 25¢ to K7QMG, Milly Mowry, 4514 So. Juneau St., Seattle, Wash., 98118, DX contacts, 3 YLs; SWLs, copy both YLs in 7 QSOs, otherwise as above. To make it sound intriguing, Milly says mention your favorite color. The net meets on 50.25 on 1st & 3rd Tuesdays, 1100 PST, NCS rotates.

Purely Personal

Last August the W5RZJ family had the fun of vacationing for a couple of weeks in California, much of the time as guests of WA6AOE,

[*Continued on page 102*]

Vol. 6, No. 1 — Jan., 1964

VHF AMATEUR

BOB BROWN, K2ZSQ

EDITORIAL

SPANNING the continent on two meters has long been the dream of more than a few v.h.f. men. And over the years many thousands of miles have been breached by amateurs with kilowatt finals, parametric amplifiers, low-noise converters, and multiple-element arrays. But for all practical purposes, the two meter amateur band remains the localized ragchew band it has been since WW II. Dependably, its range for the well-equipped seems to be about one hundred miles. Although the band itself and its propagational factors haven't changed much over the years, ham ingenuity has. We predict that not only will two meter men be working across the continent in 1964, but a few may even "hop the pond." This very hour amateurs are working as they did throughout 1963 on developing and launching a satellite capable of relaying signals—your signals—across vast expanses of land and sea.

We are, of course, talking about OSCAR III, amateur radio's first *repeater* satellite, scheduled for launch early this year. Many of you have been reading *CQ*'s SPACE COMMUNICATIONS column and are familiar with the work that has gone into this project. Delay after delay has plagued the committee, but it now appears the satellite will orbit shortly, making amateur radio history before our eyes. A good number of interested hams followed the stories of OSCAR I and II and participated in the reporting of their observations. Unfortunately, however, up till now the program did not receive full cooperation from active two meter men since they could only listen and confirm that the signals existed. With these first two satellites, beacon signals were transmitted in c.w. on 145 mc. And over 1,000 amateurs from 30 countries reported in supplying monitoring data. But real on-the-air participation was impossible. OSCAR III, on the other hand, is unique.

Here's the way it works: the satellite's receiver will "listen" over a 50 kc segment of two meters, centered on 144.1 mc. All signals falling into this segment and being sufficiently strong to be intercepted by the satellite will be picked up and rebroadcast simultaneously on a similar 50 kc segment centered on 145.9 mc. The OSCAR III satellite itself is expected to weigh less than 25 pounds and will probably orbit at an altitude somewhere between 600-1,000 miles. The transmitter will run about one watt output, powered by internal batteries.

By listening in the 145.9 mc area and calling CQ near 144.1, actual QSOs are well within the realm of possibility via the satellite. It should be borne in mind that during OSCAR's passage over your territory, you should specify that you will be listening in the 145.9 mc region to avoid confusion. Due to the great altitude of the receiver, many hundreds of signals will probably be picked up and rebroadcast. A "clear" frequency on your receiver could well be just the opposite coming through OSCAR III.

It is impossible, of course, to predict the life expectancy of this apparatus in space. Most likely it will be functioning for several weeks. This should be time enough for even the most inactive of the two meter gang to fire up and give it a try.

As mentioned earlier, the exact date of the launching is not known, but from all indications it should be just a matter of months now. This project deserves the support and cooperation of all amateurs able to operate in the two meter band. Write today to the Project OSCAR Association, Box 183, Sunnyvale, California, for reporting forms and further data. Over the years it has been found that there are more stations on 144 mc than on any other single v.h.f. band including 50 mc. This is your opportunity to become an active part of amateur radio's largest cooperative space effort. Be prepared.

The K3IOP Case

Those who have been following the recent TVI dilemma (see last month's VHF Editorial) will be interested to learn that Charles A. "Butch" Seaman, K3IOP, has refused to accept his "conditional" General Class license as presented by the FCC. He has been notified by the FCC acknowledging his position and mentioning that a date will soon be set for a hearing in Elizabeth, Pa. This will probably be sometime in January or early February. Meanwhile, his lawyers, Irwin Tryon, W3WFR, and John Elder, W3RSB, have advised him not to go on the air lest the situation get too far out of hand.

We have every hope that little trouble will be encountered at the hearing and that the General license will be awarded without strings. If space permits, we'll cover more of this case next month.

BOB BROWN, K2ZSQ

Using Surplus V.H.F. and U.H.F. Reflectometers

BY LEROY MAY*, W5AJG/AF5AJG

Some reflectometers are now available on the surplus market and through MARS distribution. Made for the Air Force, these units can measure forward and reflected power over a frequency range of 30 to 1000 mc. When calibrated they may also measure power over this frequency range with little error.

SEVERAL types of reflectometer coupler units are now to be found on the surplus market. Some of these units have been distributed through MARS as project assignments to determine their worth in amateur radio work.

The units are small, light weight Micromatch devices which can be built directly into the transmitter to monitor r.f. power output, s.w.r. and possibly act as a modulation monitor. They may also be built as separate independent units for use with various v.h.f. and u.h.f. transmitters. They work on 50, 144, 220, 432 and quite possibly 1296 mc, as the rated range is from 30 to a bit over 1,000 mc. Actually these couplers may be used at lower frequencies than 30 mc for measuring s.w.r. but at these frequencies, they are not accurate for power readings and also show some power inaccuracies at extremely low power levels.

Although the surplus couplers seen in the locality are all alike in construction, they are made by several manufacturers for the Air Force. M. C. Jones Electronic Co. makes the 571.12 and 576.8 and Saratoga Industries makes types LC 997R and 999R.

*9428 Hobart Street, Dallas 18, Texas.

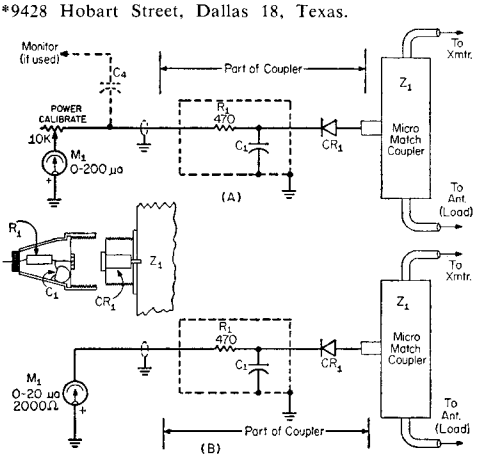
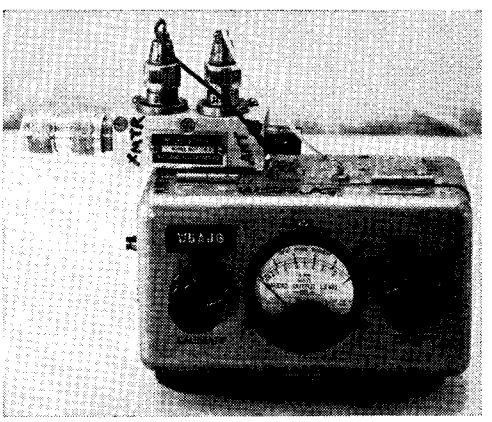


Fig. 1—Circuit (A) for a single coupler is suitable for reading forward powers from 1.2 to 1200 watts. The power range is adjustable with the 10K pot. Circuit (B) uses a 20 microamp meter without a multiplier and is used for very low power only. It is also not suitable for monitoring.



The indicator unit is built into a surplus test-set box and also uses a surplus meter. The Jones Micro Match unit 576.8 is bolted directly to the case and when connected to the transmitter supports the indicator.

The units are built onto a section of the coaxial transmission line but some couplers have coax connectors on each end. They produce no noticeable discontinuity in the line over the entire frequency range and the power handling capability is more than enough for the amateur legal power limit. They are rugged mechanically and will stand a wide variation in temperature and humidity and still produce accurate readings.

Unit Types

These surplus units are found in both single and double coupler types. The single coupler type will respond only to incident power and will produce a full scale deflection on an appropriate meter and multiplier from 1.2 to 1200 watts. The double coupler types are really two single directional couplers built together with one adjusted to respond to incident power and the other to reflected power.

The incident and reflected power pick ups in the coupler are fed to connectors which contain type 1N21 crystals. These rectify the r.f. and the d.c. voltages are fed to the indicator unit which may be placed at any remote point.

Functions

With proper switching an indicator unit can read the incident r.f. power, the reflected r.f.

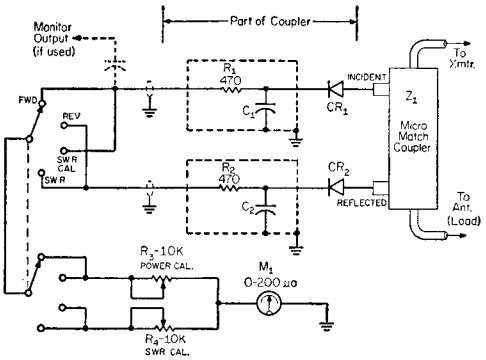
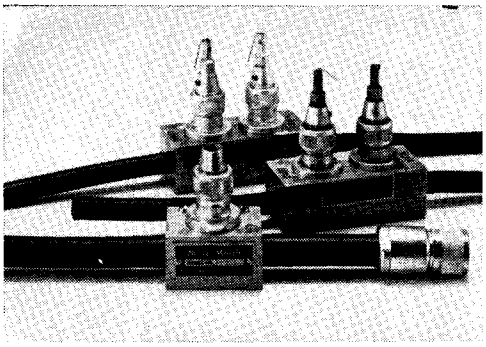


Fig. 2—Schematic of a surplus double coupler and indicator unit which can be calibrated for power readings in the FORWARD position and can be used to read s.w.r. in the CAL. and S.W.R. switch positions.



Several types of surplus couplers, both single and double, are shown above. The crystals are contained in the connectors atop the units. Different couplers can be used with various types of coax and some couplers are supplied with types N and C connectors.

power and the s.w.r. The net power to the load can be determined by the difference in the readings between the incident and reflected powers.

The single couplers can only monitor the incident power to the load which will differ from the net power by about ten per cent for an s.w.r. of up to 2:1.

Indicator Units

Since the indicator units are not available along with the couplers, they have to be constructed. Figures 1A and 1B show the circuits recommended by the manufacturer for the single coupler type. The circuit in fig. 1A employs a 200 microamp meter and is suitable for general purpose work. The circuit in fig. 1B uses a 20 microamp meter without a series resistor and is suitable for low power levels *only*. Note that the 1N21 crystals are housed in the coupler portion of the connector and that the filter network is housed in the connector assembly.

The unit shown in fig. 2 is recommended for double couplers. As shown, it also uses a 200 microampere meter and thus is not suitable for very low power measurements. This circuit, with its switching, is able to measure forward or incident power, reverse or reflected power and s.w.r.

With the selector switch in the FORWARD position the incident power is measured. The circuit operation is simple. The incident r.f. supplied to the connector by the coupler is rectified by CR_1 and filtered by R_1 and C_1. The pure d.c., corresponding to the incident power, is routed through the switch circuit to R_3, a 10K pot and then to the meter. This pot is not a front panel control but a pre-set adjustment and is used to calibrate the meter for power measurements. To accurately calibrate the power reading function in the FORWARD position a calibrated watt-meter load good for the frequency involved will have to be acquired. With the unit in a specific transmitter the pot is generally adjusted for full scale deflection of the meter with full power applied.

When the selector switch is set in the REVERSE position the reflected voltage fed to CR_2, filtered by R_2 and C_2, is also fed to the meter through R_3. Now the *reflected* power may be read since the meter was calibrated full scale for a known power in the FORWARD position. For example, if the full scale reading was produced by 100 watts in the FORWARD position, a quarter scale reading in the reverse position indicates a reflected power of 25 watts. This means that only 75 watts is being delivered to the load.

S.W.R. Function

Actually, with the information obtained in the Forward and Reverse positions we can compute the s.w.r. The forward value plus the reflected value divided by the forward value *minus* the reflected value will equal the s.w.r. From the previous measurements we have:

$$\frac{100 + 25}{100 - 25} = \frac{125}{75} \approx 1.6{:}1 \text{ s.w.r.}$$

A graph may be worked out or taken from a handbook so that the meter readings can be converted to s.w.r. quickly. It would be most convenient, however to calibrate the meter scale directly in s.w.r. just as most commercial meters scales are marked. This would then give you two scales on the meter, power and s.w.r.

The one limitation in this arrangement is that if the scale is calibrated so that s.w.r. is to be read directly from the meter scale when in the REFLECTED position, we must be sure that there was a full scale reading on the FORWARD position. If the setting of R_3 is shifted to provide a full scale forward reading under different conditions, then the power calibration on FORWARD is no longer correct. To allow for this a third position is added to the switch for the S.W.R. FORWARD. Again, we use a 10K pot but it is placed on the front panel and can be adjusted for an exact full scale reading in the FWD position. Now, when we switch to S.W.R., the fourth position, if the meter scale is properly calibrated, we may read s.w.r. directly.

To summarize, the first position, FORWARD, is

[*Continued on page 104*]

an exclusive feature of The VHF Amateur

BY BOB BROWN*, K2ZSQ

MANY of you have written to ask for more discussions on v.h.f. propagation, especially concerning our year-round friend, ground wave. So this month we'll relinquish our place of questionable honor to the other ham-member of the family, Red, K2ZSP, for his views on the subject.

Any discussion of v.h.f. propagation should properly start with tropospheric conditions. Tropospheric propagation is our most common form of v.h.f. phenomena and should be understood before moving to the study of other types. "Tropo" takes place in that part of the earth's atmosphere nearest to us, from earth to a distance of about six miles. All our storms, weather and atmospheric changes as we see them affect this propagation. Thus, it is sometimes called the weather layer.

Tropo could be truthfully called tropospheric bending. The change in direction of a radio wave could be illustrated by comparison with light waves. Let's look back to the time when as youngsters we tried to hit fish in a brook and didn't succeed. We failed not only because of poor aim but also because the fish wasn't where we saw it. The light rays reflected from the fish were bent at the boundary between the water and air, consequently we saw the fish other than at its true location. Lenses and prisms are also examples of bending of light waves. Just as light waves may be reflected or bent, so may v.h.f. radio waves.

The term ground wave is, of course, a misnomer and probably is a carry-over from low frequency work; however, the term has come into general use on v.h.f. to denote an extension of the normal range of transmission and reception over several hundred miles, depending on frequency. Lately however, it seems that this condition has come to be known as "extended ground wave" over the air, compared with "ground wave," which seems to infer normal working radius. So rather than to complicate existing terminology, we'll confine our discussion to extended ground wave. This extended ground wave is a form of tropospheric bending, most prevalent in coastal areas, or areas adjacent to large lakes. Again, the weather element.

Extended ground wave or tropospheric bending is caused by temperature inversion, a sharp difference in moisture content of the upper air masses, or a combination of the two. Remember the example of the bending of light waves at the surface of the water? Here the light waves passed from one substance to a completely different one. At that point a bending of the light waves took place. Something similar happens during tropospheric bending. The two dissimilar substances are, of course, part of the atmosphere. They are different because of temperature differences, moisture differences, or both. The sharper the line of demarcation, the more pronounced the effect. Radio waves transmitted at an angle from the surface of the earth are bent back and thus are received at a greater than normal distance.

Extended ground wave occurs most frequently during the warmer months, but it does happen in the winter. Here's a typical example: In the early morning hours the sun's rays strike the upper atmosphere first. Its temperature rises before the air near the ground warms. These unlike masses cause bending of the v.h.f. signal. A similar condition is true near sunset and sometimes continues for several hours. As the sun sets, the lower atmosphere cools while at higher levels the sun is still shining. Here again we have two unlike masses. A dissimilarity in the moisture contained in each mass further increases the tropospheric bending. It is possible for this bending to be caused by either the temperature or moisture differences individually.

Personal observation has shown that extended ground wave conditions seem to be more prevalent during times of clear weather in the warmer months. Extended ground wave contacts on the v.h.f. in excess of 500 miles have been recorded. More commonly, though, our range is extended over a distance of one hundred to two hundred miles depending on the station equipment and frequency.

You as an active v.h.f. man can enjoy extended ground wave further by arranging your time on the air to conform to times when tropo work is at its best.

144 Mc Reports

Word from Brockton, Massachusetts, has it that KN1ETM has now worked all New England states plus New York with just a Twoer and 2 element beam. A new record? During late August and early September Bob worked W1BXM (Nashua, N.H.), W1CMX (Mt. Greylock, Mass.), W1ECM/1 (Sanford, Me.), K1HNB/1 (Dover, Vt.), K1NAY/1 (Mt. Agemenicus, Me.), W1QVF (Collinsville, Conn.), K1UGZ (Hillsboro, N.H.), K1YCC (Lyndeboro, N.H.), WB2FKJ/2 (White Plains, N.Y.), and W2KTU (E. Marion, New York). K1WHT lets us know that he is soon moving to Monroe, Conn., where elevation is far more favorable. In spite of his 15 ft. above sea level height in Westport, Conn., during September he still managed to latch on to K1NAY/1, W3JZY/3, KN3VEQ, K1IED/4, and K8UOZ/8. The present rig is homebrew, running 100 watts to an 829B, with a 417A converter into an R-383. Antenna is a 16 element Yagi. K1WHT has just completed an automatic c.w. keyer with all keying taped in advance with plans to use it for meteor scatter work from the

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

new QTH. Also in the works is a p.p. 4X250 rig. We understand he will also run it on s.s.b., and on a.m. will have a p.p. parallel modulator with four 813s! At the new QTH he'll be employing two 120 ft. towers—one for six and one for two. Arnold adds, "New equipment includes a URT-9 transmitter that is crystal controlled on 220 and 432 mc with a pair of 4X150As in the final driven by another 4X150A. This is complete with 110 and 220 v.a.c. supply and is the nicest surplus ever for the serious v.h.f.er."

Bernie Welch, WB2CCO, at Plattsburg, New York, is now using a new 16 element "J" beam and is highly impressed with the results. I guess you would be, too, if you'd worked K1CRN (Cumberland, R.I.); K3CFA (Lemont, Pa.); K8AXU (Sistersville, W.Va.), and K8PBA (Ypsilanti, Mich.) all during September! WB2-CCO would appreciate skeds any night—c.w. or a.m.—with any station. Just write. WB2CLN tells us that he, too, caught the September DX from his Flushing, New York, QTH. Stations worked included W1s GYE and NCL, K1s CYW, OOR, SUI, WHS, WHT, WVE, ZZF/1; K3s IPM/3, KUB; W3s LML, OI/3 and WJC/3. All were on a.m.

"I thought I would drop a few lines to let the v.h.f.ers know what was being heard here on September 9th," sez W3LST of Oil City, Pa. Joe's list includes W1s JSM, PYN, RJA, K1CRN; W2s AOC, BLV, HJS, JSM, LMI, LVQ, NCF, SOK, ROA, UTH, WZR, YCO, ZRG; K2s GUG, LOK, UHK (sideband); W4s BUZ, FSO, FJ, HHK, RFR, VHH; K4s EUS, QIF, YYJ, WA4-DKU; W8s ARH, AXR, AXU, BA, BQR, JMX, LCA, MVG, SQY, YIO; K8ZCH; W9s EGH, OII, TGB, WOK; K9GMC; WØs BKV, DQY, KJZ, VE2LA and VE3s AQG and BEK. Joe wants us to mention the lack of auroral c.w. sigs heard above 145.0 mc and adds that many, many more calls could easily have been tacked onto this list had they employed the clix.

And as if that were not enough, Gary Fisher, K9WZB, of New Carlisle, Indiana, sent in his list, too. Gary's DX (worked) takes in K2s KGN, LOK; WA2GHN; W3s CSA, GLC, PGV; K3BLM; W4VCJ; WA4ELH; WØs EOU, GCO, LFE, RVA, RWC; WAØs BUS and FDY, and VE3AIU. K9WZB runs 80 watts on 145.007 mc c.w. (70 watts input on a.m.) into 20 elements up 70 ft. W8AOE and K8VMA are worked regularly on skeds.

50 Mc News

Harold Lund, VP7CX, writes with news from San Salvador, Bahamas: "I was very pleased to work you and the rest of the gang up that way last night (September 14th). This is the first band opening I've had since August 24th. And it couldn't have come at a better time! Band conditions were very poor during the month of August here. The best opening was on August 11 when about 20 stations in the 3-4-5-8-9-Ø call areas were worked. My wife was down visiting during August 20-29, so was not on the air

[*Continued on page 105*]

UHF ROUNDUP

an exclusive feature of The VHF Amateur

BY ALLEN KATZ*, K2UYH

CQ ATV is not the rare sight it once was. Over the past few years the ranks of the video addicts have swelled tremendously. Why then, you ask, is 440 mc not bustling with strangely buzzing 8 mc wide carriers? The answer is not hard to find.

Interest in amateur television has been around for years. There are even some stout fellows who have been *on* for years. However, the vast majority preferred to believe that television was too expensive, too complicated, *etc*. Many of these reasons were quite valid at the time. Anyhow, back in 1957 interest in ham TV started to pick up as it had done in the past along what seems to be a never-ending wave of ups and downs. Some have even tried to relate these spasmodic pulses of activity to the 11 year solar cycle. This time, however, things were different. Possibly it was the advent of commercial TV gear or the flying spot scanner, alias the B&K analysis. No one knows for sure, but TV activity has been climbing ever since. Or should we say *video* activity. I for one tend to associate amateur TV with a whole station, and this is just where the present trend is deficient. Many of the newcomers (experimenting with the most up-to-date amateur emission) have transmitters and receivers which look like they were designed in the dark ages. This fact explains why we receive fine reports from stations like George, W3ZFW, whe recently worked 65 miles plus on 440 ATV and heard talk from other video amateurs who can not work out of their backyards. Some of these fellows have even suggested getting permission to operate with reduced bandpass on two meters. I don't know about your area, but down here even the top two megacycles are darn crowded with local nets, RTTY, and civil defense operation. Can you imagine a few 1 mc TV signals on during a state RACES drill? But what are these fellows trying to buy in the first place? Do they think they can get much further on two meters with a ½ watt of output and no r.f. stage on their converter? All this and greatly reduced resolution too. These fellows are just not giving u.h.f. a chance.

You know, it is not really hard to get a good video signal r.f.-wise on 440 mc. In fact you don't even have to be crystal controlled. With TV's 6 mc bandpass a self-excited oscillator is good enough, provided good engineering practices are followed—both mechanical and electrical. And we do stress the mechanical. No unshielded flimsy 6J6 oscillators are needed, although a 6J6 can be made to work with fine stability if care is taken. Follow the oscillator with a conventional amplifier or buffer. (You know the kw power level is in effect on 440 mc, too.) As for a receiver, most u.h.f. TV converters can be made to tune 440 mc with little effort. Many require only adjustment of the oscillator padder. But don't stop here; put a good pre-amp ahead of it. A lot of fellows are using 416B's or better. I am sure many of you have ideas to add to this. Let's hear from you.

*48 Cumberland Avenue, Verona, New Jersey 07462.

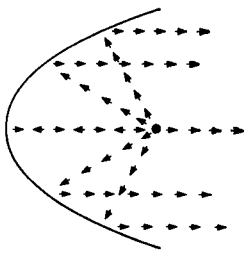


Fig. 1—Reflection of rays from a point source at the focal point of a parabolic reflector.

Parabolic Reflectors

We have received several requests for some elementary parabolic antenna theory. The principle behind the parabolic antenna is really quite simple, and probably familiar to most amateurs; yet there does seem to be a lot of misunderstanding. The usual way of explaining the dish antenna's operation is in terms of light. When a light beam shines on a mirror, it is reflected very much in the same way a radio wave is reflected by a flat metal surface. The angle of incidence is equal to the angle of reflection. The same effect is true for a radio wave. A source of light (a light bulb or a dipole in the case of radio waves) emits light in all directions. Consider what would happen if we put a mirror behind our light bulb bent in such a way that every light ray which hits it would be reflected in the same direction (see fig. 1). A parabolic reflector has just such a surface; when a point source of wave energy is placed at its focal point, parallel rays should theoretically be radiated. This case of infinite gain can, of course, not be met in actual practice. The biggest stumbling block to its attainment is the necessity of a *point source*.

Since all radio waves have a finite wavelength, a point source can never be reached. The divergence of light rays from an auto's headlights (parabolic reflector) is an example of this fact. In the radio spectrum this obstacle becomes even more pronounced. However, we do have a way out. As a parabolic reflector is made larger and larger, the radiating element will look smaller and smaller relative to the reflector, or in other words it will act more and more like a point source.

Using this knowledge and a little common sense, a good gain estimate can be made of the practicality of using a parabolic antenna on any particular band. Take, for instance, a 12 foot

dish; on two meters a half wave dipole (about 3 feet) is one-quarter of the reflector's diameter. Not a very good point source, and the gain equation shows —12 db. We might as well have used a plane reflector of the same size! On 432 mc where a half wave dipole is about one tenth the diameter, a little better approximation is obtained and a gain of 23 db is possible. If we go really high in frequency, values for gain become astronomical. On 10 kmc a 12 foot dish has close to 50 db of gain.

I hope this little refresher in elementary physics clears the air and possible even stirs a little interest in the parabolic antenna. We plan to show in the future that a parabolic antenna is actually not difficult to construct.

Activities

Jim, WA4GHK Palm Bay, Florida, reports his first cross-state 432 mc contact with W4GJO in Sarasota. This was on the 12th of October. The next evening he worked WA4BYR in Englewood over an equally distant path. Jim is now holding nightly skeds with both "west coast" stations on 432.243 mc at 2200 hours EST. Equipment at WA4GHK's end of the path include a Centimeg converter, 13 element yagi and a 2C39 running 27 watts input. Jim says that both WA4BYR and W4GJO are running the same rigs, MA 4062A varactor diode triplers with 15 watts output and homebrew 7077 converters—and notes that the 7077 is a very good tube on 432 mc for those who can obtain them. Agreed, but we are more interested in those varactor diodes. Anyone have information on the MA 4062A?

We have news of 432 s.s.b. activity in the California area from another Jim, K6JC. According to him, K6HCP in San Jose is holding skeds with W6FZA, Porterville, on 432 c.w. and occasional s.s.b. every Sunday and Tuesday night at 2200 PST. Thus far contacts have been made almost every try with signals peaking as high as S3 to 4. A look at the topography will show a very rough 200 mile path between the two points. Jim also mentions that Ken, K6HCP, and Allan, W6FZA, are hoping to beef up their 50 watts output for better s.s.b. two-way work, and that he plans to follow suit. Another Californian, Dick, W6IEY, of La Mesa, is holding schedules to the Los Angeles area with WA6HIT over a 120 mile path. Conditions over this path were very good during the month of August, however September proved disappointing. We have had no word of s.s.b. activity from this group, but rumors indicate that many 432 mc California stations are contemplating its use.

[*Continued on page 104*]

For further information, check number 25, on page 110

For further information, check number 26, on page 110

Trap Antenna [*from page 39*]

capacitance bridge; or, if this is not available, a grid dip meter can be used.

If you use a grid dip meter, a 100 mmf mica capacitor can be connected across the ends of any convenient coil and the resonant point found on the grid dipper. The capacitor is then disconnected and the tubular thinwall capacitor is inserted in its place. By carefully adjusting the capacitance the same setting on the grid dipper can be made to dip. During this operation be sure that you do not have stray hand capacitance or metal in the immediate vicinity. Otherwise the setting will be inaccurate and the trap will be tuned to a wrong frequency.

After the tubular capacitor has been adjusted mark the position and drill a hole for a 10-32 screw exactly one inch from each end. These screws will serve to fix the capacitor to the dowel and also will be used as terminals for each end of the inductor.

To make the inductor get a piece of #14 enameled wire about 12 to 15 feet long. One end should be clamped in a vise and the wire stretched to remove all kinks. Now, using a cylinder of about 1¼" in diameter close wind the entire length of the wire on the cylinder.

When the tension is released the wire will spring out so that it is just under 1½" diameter. A coil form of clear plastic, laminated bakelite, or other insulating material 2" long can be used and 17 turns of the wire are carefully worked over the form, allowing enough on each end to make connection with the 10-32 screws. These are uniformly spaced over exactly 1½" for an inductance of 5 μh. This, in parallel with the 100 mmf capacitor will tune to 7200 kc. For construction details of the trap refer to the accompanying photographs. On each end a small hole is drilled through both the wood and thin wall for the #14 copperweld wire. Both ends of the trap are tinned for a good electrical connection.

Weatherproofing

In order to provide all weather operation the coil should be waterproofed. This can be done in several ways. The coil is spaced equally from the thin wall using strips from a polyethylene squeeze bottle and various materials can be used for waterproofing. Tar from an old transformer worked well, provided that it was not too hot. A mixture of paraffin and beeswax worked well but showed a slight tendency to crack in cold Minnesota winters. Our best results were with an epoxy cement which comes in two tubes and can be purchased in most hardware stores. The Borden Company makes a two component Epoxy Elmers glue as does the Welwood Company. This can be loaded with whiting (calcium carbonate) to increase the amount, lower the cost, and eliminate the running or sagging properties of the glue. For those amateurs employed in electrical manufacturing firms the possibility exists of procuring the raw epoxy resins and hardeners. Shell's Epon 828 and General Mills Versamid 140 in equal proportions worked well.

Antenna Construction

Dimensions of the antenna are as follows: A center insulator is fed on each side with the center and braid, respectively, of a 50 ohm coax cable. Exactly 31 feet 4 inches on each side of the center of the insulator, install the traps with the larger thin wall toward the center to prevent water from collecting around the wooden dowel. The outer sections of the antenna extend beyond each trap 22 feet for a total antenna length of 108 feet. This is shown in fig. 1.

Theoretically the center of a dipole should have an impedance of 72 ohms. However, most hams do not place their antennas high enough to be ¼ wave length above ground, and as a result the impedance is usually lower and 52 ohms gives a better match.

Feeding with RG-8/U coax the best feeder length was found to vary with location but around 70 feet seemed to give the lowest s.w.r. on all bands.

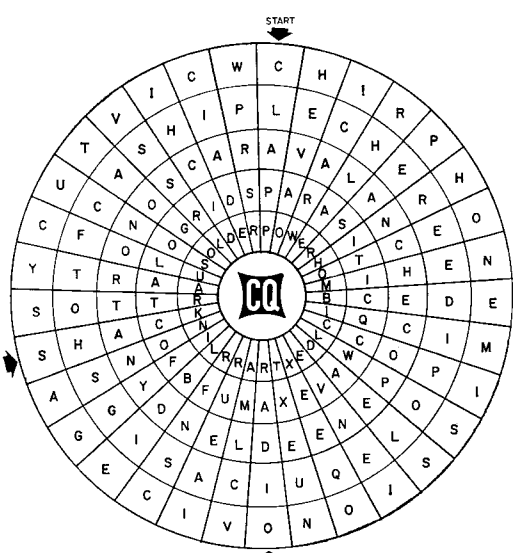
As in all antennas, maximum efficiency is available only at one frequency in each band, and the s.w.r. will increase as the transmitter is tuned farther from the resonant point. It does not change much for about 100 kc on each side of the resonant frequency.

If you are interested in operation in the c.w. portion of the bands the center sections should each be made two feet longer and the end sections should be made three feet longer for a total length of 118 feet. The trap should also be tuned to 105 mmf before winding the inductances. This will give a much lower s.w.r. in the area of the bands you are most interested in.

This antenna offers an interesting and inexpensive building project and will allow the average ham with limited space and budget a chance to improve his transmitting efficiency and operating enjoyment. ■

Solution: Dec. Polargram Puzzle

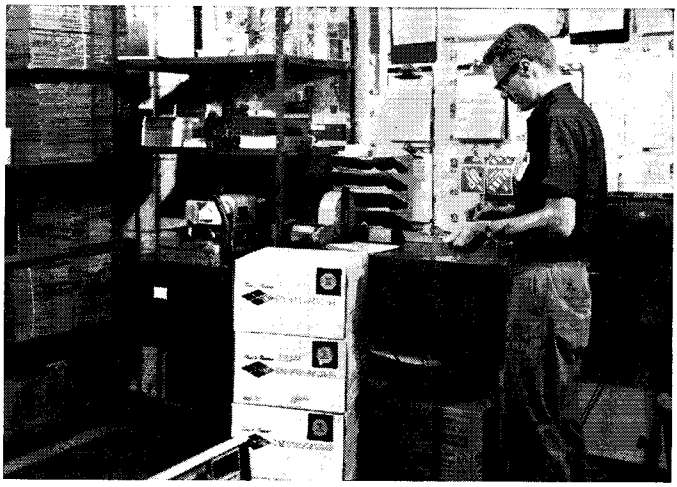
Arrows denote hidden words



TERRY STERMAN
W9DIA

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

$13.17 *a month.*



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

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

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

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

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

	PRICE	3-YRS.
XCU-27 calibr. for NC-140, NC-190, NCX-3, NC-303 and HRO-60	26.60	80¢
NTS-3 spkr for NC-140, NC-190 & NC-270	19.95	62¢
NTS-2 spkr for NC-303	21.95	67¢

Terms Above Apply To Three Year Contract

Minimum Order that can be financed for 1 year is $60; 2 years, $120; 3 years, $180.

BE SURE TO SEND FOR RECONDITIONED BULLETIN • BIG BARGAINS!!!

AMATEUR ELECTRONIC SUPPLY


Steve W9EAN

MILWAUKEE 8, WIS.
3832 West Lisbon Ave. • Phone We. 3-3262
Hours: Monday and Friday, 9 A.M. to 9 P.M.
Tuesday, Wednesday & Thursday, 9 A.M. to 5:30 P.M.
Saturday, 9 A.M. to 3 P.M.


Doc W9HJS

CHICAGO 31, ILL.
6450 Milwaukee Ave. • Phone: Ro. 3-1030
Hours: Monday, Wednesday & Thurs., 12 P.M. to 9 P.M.
Tuesday & Friday, 12 P.M. to 5:30 P.M.
Saturday, 9 A.M. to 3 P.M.


Phil W9DVM/4

ORLANDO, FLA.
23 Azalea Pk. Shop. Ctr. • Phone 277-8231
Hours: Monday, Tues., Thurs. & Friday, 1 P.M. to 9 P.M.
Wednesday, 1 P.M. to 5:30 P.M.
Saturday, 9 A.M. to 5:00 P.M.

IMPORTANT! **Send all Mail Orders and Inquiries To: Terry, W9DIA at our Milwaukee store, c/o Department (C)**

Get Our Quote Today, No Obligation

Terry: I want to buy_____

I have to trade_____(what's your deal?)

STAY ON THE AIR PLAN
Not only will I give you a terrific trade-in allowance, but you can keep your equipment until you receive your shipment.

Ship Me: _____

I enclose $_____ and will pay balance

☐ C.O.D. ☐ 1 Year ☐ 2 Years ☐ 3 Years
(10% deposit)

If ordering on terms, please list following information on separate sheet and enclose with this order: Name, address, age, married? children? Employed by? Salary? How long? Own or Rent Home? To whom renting? or buying from? Wife employed? Own car?—who buying from? Three to five credit references. The more information you give, the faster we can approve your credit.

EVEN IF YOU'RE NOT ORDERING TODAY, SEND ABOVE INFORMATION FOR ATTRACTIVE CREDIT CARD

NAME _____

ADDRESS _____

CITY _____ STATE _____

☐ Check for latest reconditioned bulletin.

For further information, check number 30, on page 110

Letters *[from page 20]*

other hams around that I know are more active than I. Even though we are f.m. we have, on a few occasions, worked a.m. stations in Alabama, Ohio, Indiana and Louisiana. F.m. stations in the state of Washington have also been worked.

I cordially invite you to tune your six-meter receiver up to the upper portion of the band and listen for us. Rarely does an evening go by that some of us aren't on.

Ray Hilborn, KØRXR
Box 404
Colby, Kansas

F. m. on six meters has contributed a great deal in populating the upper end of the band. We hope it will continue.—*Ed.*

Announcements *[from page 20]*

loaded with plenty of gear. The usual swimming, water skiing, fishing, *etc.* is also included. For additional information, rates, *etc.*, write Coral Cliff Hotel, Santa Martha Bay, Curacao, Neth. Ant.

Change In Canadian Form 41-2052

U. S. amateurs contemplating a trip to Canada should be made aware of a procedural change effective April 1, 1964. Applications after this date will be processed through the "Regional Director of Air Services, Dept. of Transport" nearest the area of proposed operation. A list of Regional Directors will be forwarded with Form 41-2052 when application is made.

Lasers

The Jamaica (N.Y.) Amateur UHF club will have a working Laser on demonstration at its meeting of Friday, January 10. The speaker will be WA2JYR. Club QTH is Central Queens YMCA, 89-25 Parsons Blvd., Jamaica, N. Y. W2QPQ is club sect'y and will fill you in on transportation directions.

Philadelphia

The South Philadelphia Amateur Radio Klub (SPARK) will hold a swap and shop/auction on Sunday, January 5, 1964 at the Childs School, 17th & Tasker Sts., Phila., Pa. Admission is 50¢ and all are welcome.

Tropical Hamboree

The fifth annual Tropical Hamboree will be held in Miami, Florida on January 18-19 at the Municipal Auditorium, Bayfront Park. The Dade Radio Club, Inc. is sponsoring the event and will be pleased to send you details. Their QTH is Box 73, Biscayne Annex, Miami, Florida, 33152.

Squelch Stabilization *[from page 34]*

If the fixed grid return of fig. 5A is replaced by a potentiometer, as in fig. 5B, squelch sensitivity can be adjusted from maximum to zero at will.

In extreme cases, seldom encountered in amateur work, where it is desired to vary the squelch sensitivity over a very wide range, a d.c. bias can be applied to the control tube cathode, as in fig. 5C. This requires the addition of a d.c. supply to the system, but permits increasing the squelch sensitivity considerably. With standard tubes, the on-off differential of a squelch so biased can be as small as 0.1 volt!

Numerous other coupling methods and circuits are available for special installations, but a simple squelch, with voltage regulation and diode coupling where needed, gives maximum operating convenience at minimum cost for most amateur and ordinary commercial installations. ■

For further information, check number 29, on page 110

Comtran [*from page 38*]

Listening tests indicated no bothersome distortion; in fact, measurements made at normal voice levels indicated 4% distortion at 400 c.p.s., 1.4% at 1,000 c.p.s. and 0.85% at 2,000 c.p.s. The output level holds closely to within 2 db for a considerable range of input levels; however, the initial impulse of a train of sounds overshoots by about 6 db before the compressor takes hold, an effect often experienced with a.l.c. systems also.

Observations on an r.f. wattmeter and an oscilloscope showed that when the C-II was used, the *average* talk power increased between 50 and 75 percent for a given degree of *peak* modulation.

The Comtran C-II Compression Amplifier sells for $29.95 and is produced by Comtran Associates, Inc., 2847 Cropsey Ave., Brooklyn 14, N.Y.—*W2AEF*

Propagation [*from page 61*]

many openings. Eighty meters is expected to be the optimum band for DX conditions during the hours of darkness of the fall, winter and spring months. A considerable improvement is also expected on 160 meters. This improvement has already been observed and W1BB reports that between September and November of this past year he managed to work such exotic DX on 160 meters as 5N2JKO, K1KSH/KG6, ZS2FM, VE2UQ/VE8 and dozens of Europeans. It is very possible that propagation conditions on 160 meters during the hours of darkness may be better during the new year than they have ever been before!

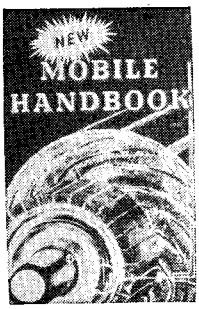
If the radio amateur propagation research of the Monroes proves anything, then a continued increase in Sporadic-*E* short-skip openings can be expected during 1964, especially between late May and early September. Fewer auroral-type openings, however, are expected to occur during the new year, since the sun is going through a quiet period as solar activity continues to decrease.

Shortwave propagation conditions during the coming year, therefore, are expected to be somewhat poorer on 10, 15 and 20 meters, but improved on 40, 80 and 160 meters. Fewer auroral-type ionospheric openings are expected, but record-breaking Sporadic-*E* propagation may take place during the late spring and summer months.

1964 will also be "The International Quiet Sun Year."[2] The IQSY is a follow-up to the International Geophysical Year. The IGY, one of the most successful research programs ever carried out, took place during 1957-58 to coincide with peak solar activity. The IQSY has been planned to coincide with minimum solar activity, which is expected to occur sometime between late 1964 and mid-1965. This new world-wide project, in

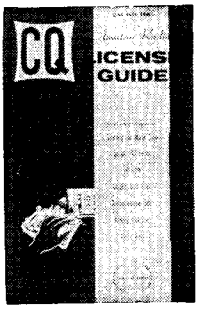
[2]Hearsum, D.R., W8LVZ, "IQSY—The International Quiet Sun Year", p. 39 Sept. 1963, *CQ*.

THE CQ HAM MART



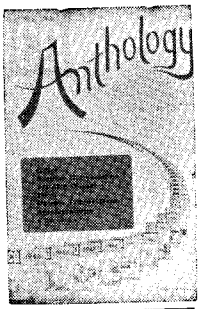
MOBILE HANDBOOK

Anyone who tries to go mobile without getting this book, should think twice before going ahead. *Bill Orr, W6SAI* has put everything you need to know in this book, Build-its by the dozen . . . solutions to ignition problems, keeping the battery charged, noise . . . only *$2.95* postpaid.



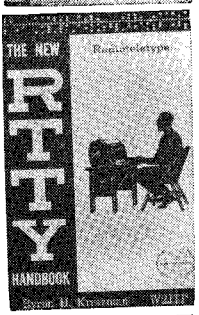
CQ LICENSE GUIDE

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



CQ ANTHOLOGY

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

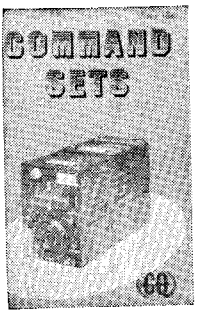


THE NEW RTTY HANDBOOK

A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by *Byron Kretzman, W2JTP*, a well known authority in the field. This book is a must for your library! Only *$3.95.*

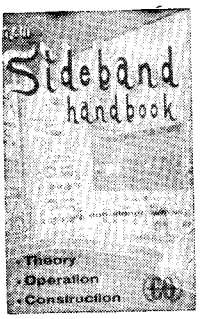
VHF FOR THE RADIO AMATEUR

You can't afford to be without this dynamic new handbook designed with the VHF amateur in mind. Filled from cover to cover with all new and original construction material presented so that you can understand it. Written by *Frank C. Jones W6AJF*, nationally acclaimed for his VHF pioneering. Available now for only *$3.50.*



COMMAND SETS

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



SIDEBAND HANDBOOK

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

COWAN PUBLISHING CORP.
Book Division
300 West 43rd Street
New York 36, N. Y.

ANTENNA ROUNDUP	$ 3.00	☐
ELECTRONIC CIRCUITS HANDBOOK	3.00	☐
UNLIGHTED GLOBE	19.95	☐
ATLAS	15.00	☐
COMMAND SETS	1.50	☐
CODE RECORD	3.50	☐
REGULAR LOG SHEETS (100)	1.00	☐
SSB LOG SHEETS (100)	1.00	☐
HAM'S INTERPRETER	1.50	☐
TVI HANDBOOK	1.75	☐
BINDER—YEAR WANTED	4.00	☐
VHF FOR THE RADIO AMATEUR	3.50	☐
CQ ANTHOLOGY I	2.00	☐
CQ ANTHOLOGY II	3.00	☐
HI-FI BOOK	2.50	☐
SIDEBAND HANDBOOK	3.00	☐
CQ LICENSE GUIDE	2.50	☐
SURPLUS SCHEMATICS HANDBOOK	2.50	☐
DX ZONE MAP	3.00	☐
NEW RTTY HANDBOOK	3.95	☐
DIODE SOURCE BOOK	2.50	☐
USA-CA RECORD BOOK	1.25	☐
"NEW" MOBILE HANDBOOK	2.95	☐

SIRS: My check (money order) for $_____ is enclosed. Please send the following items to:

Name_____

Address_____

City_____ Zone____ State_____

New York City Residents add 4% Sales Tax

which scientists from more than 50 countries are expected to participate, will provide data to complement the research work carried out during the 1957/58 IGY. During the IQSY, many experiments and observations of geophysical phenomena, including the ionosphere, which have not been possible before due to the high level of solar activity will be made. No doubt, propagation observations made by radio amateurs throughout the world will play an important role in the IQSY as they did during the IGY.

160 Meter Tests

W1BB reports the following:

"Reminiscent and symbolic of the original pioneering trans-Atlantic crossings by DeLoy, Schnell, Reinart and Godley in 1921, and held every year since 1932, this yearly operating activity will be held on 60 meters this season on the following *Sunday* mornings from 0500-0730 GMT (Midnight—2:30 A.M., EST), and at other appropriate DX times for other than trans-Atlantic DX:

December 1 and 15
(received too late for publication)
January 5 and 19, 1964
February 2 and 16, 1964

"During these tests *special* efforts will be made by all to establish new records on 160 meters. W/VE stations will call *CQ* DX TEST first five minutes of each hour and then 2nd, 4th, 6th five minute period, etc., listening in between. W/VE stations send reports for TESTS to W1BB. Working DX on 160 meters is challenging and extremely interesting, and there is a real reward in the thrill of working DX on this band. Also don't forget the *CQ* 160 meter c.w. contest scheduled for January 25-26 (see W1WY'S CONTEST CALENDAR in *CQ* for more information."

With conditions on 160 meters expected to be better during this coming year than ever before, participation in this year's 160 meter tests may be extremely worthwhile and rewarding. It is also quite possible that observations made during this year's test periods may prove valuable to IQSY studies.

73, George, W3ASK

Agalega [*from page 42*]

And now Monday, 17 June. 0245 GMT and a tremendous run of Ws. I was glad of this, for the weather is cracking up badly. A large swell was rolling into the anchorage from the s.s.w. and there were heavy breakers growling on the reef. Most of the baggage had already been sent back on board. I was now using the 132 foot long wire (the beam having been dismantled and packed), with the TCS-12. This was almost certainly going to be my last morning.

Forty-two Ws in two hours and twenty minutes. Nothing very impressive about that, but it was the best I could do, for at times there was such a pile up it became a wall of solid screaming QRM. I was constantly frustrated by the kind of DX chaser who continually repeats the DX stations call before signing. Not only does he create much needless QRM, but also by the time he signs, his signal will probably have been blotted out by someone else, or faded out by QSB. Personally, I always give precedence to those who have the initiative to get out into "the clear," and a very bad second place to those who work spot-on my frequency.

Space [*from page 65*]

which pointed out that "the use of satellite transmissions for direct reception by the general public of sound and television broadcasts may be possible in the future" and urged the International Radio Consultative Committee (CCIR) of the ITU to expedite its studies on the technical feasibility of broadcasting from satellites. Experts consider this an important step towards the future possibility of the general public being able to receive radio and television programs in their own homes direct from satellites.

Amateur Radio Allocations

The conference allocated the frequency band 144-146 mc for amateur radio space communication activities. Amateur radio was a topic of considerable discussion at the conference, the results of which are reviewed in a special report entitled "Amateur Radio and the ITU Space Conference" appearing on page 43 of this issue of *CQ*.

73, George, W3ASK

Contest Calendar [*from page 63*]

no mention of countries.) Plus a Trophy to the top scorer outside of Vermont. (b) Gold-trimmed certificates go to the 2nd, 3rd and 4th highest scorers in Vermont; "Top Banana" gets a Trophy. (c) There are special certificates for multi-operator groups. (d) The W-VT (Worked Vermont) certificate will be awarded to stations working 13 out of the 14 counties in Vermont; providing this award has not already been issued to the station.

Suggested frequencies to watch: 3520, 3855, 7050, 7250, 14100, 14250, 21000, 21300, 28100, 28600, 50.250, 50.360, 144 thru 144.5, 145.8 and the Novice frequencies.

Logs postmarked no later than March 31st should be sent to: CVARC c/o Ann L. Chandler. W1AOK, RFD 2. Barre, Vermont.

RESULTS 1963 FRENCH CONTEST

North America	*C.W.*		
K1SDX	1995	W3MSR	36
W1WY	1938	W7QB	27
W1YIS	1350	VE2AFC	264
WA2RUB	264	VO1AW	452
W4HOS	147	XE1PJ	24
W7BTH	48	*Phone*	
		VE2AFC	630

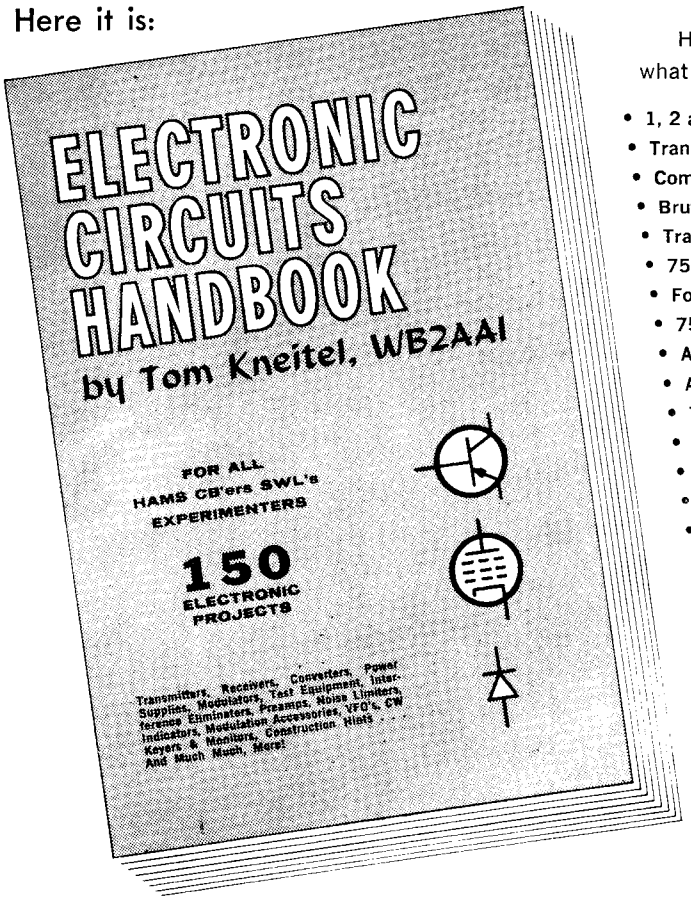
Activity in the 1963 PACC contest was very low and there were only two entries from over here, W4HOS and VE2IL, both on c.w. and both with identical score of 12!

Ed. Note

Say, how about those conditions during our Phone contest; the boys will be talking about that one for a long time. Quote Bill Leonard, W2SKE, one of the operators at the fabulous K2GL, "best conditions I have experienced in a phone contest," and Bill has certainly been in

YOU ASKED FOR IT!

Here it is:



Here's just a sample of what you'll find in its chapters:

- 1, 2 and 3 tube transmitters
- Transmitting tube rejuvenator
- Comprehensive coil winding data
- Brute force power line filters
- Transistorized CW monitor
- 750 watt linear amplifier circuit
- Four good VFO circuits
- 75 Watt Novice "gallon" circuit
- All band preselector circuit
- All-nuvistor preamplifier
- TVI filters of all types
- Transistorized modulator circuits
- Mobile burglar alarm circuit
- Complete sub-miniature ham rig
- Building a free experimentors library
- A kilowatt final amplifier circuit
- Building walkie-talkie projects
- CPO to CW monitor conversion circuits
- Band-pass selectivity filter circuit
- Noise limiter and squelch circuits
- A VFO frequency checker circuit
- Electronic keyer circuit
- Zener diode generator circuit
- One tube receiver circuit

Here is the book we've all been waiting for! Tom Kneitel, WB2AAI, has compiled a book which presents and discusses in detail 150 of the most often needed circuits around the shack. Novices and old-timers alike will find many valuable circuits here ideal for construction projects. Its eleven chapters cover: construction, modulation circuits, transmitters, power supplies, frequency control, CW, receivers/converters, receiver accessories, test gear and indicators, interference eliminators, and experimental circuits.

COWAN PUBLISHING CORP., BOOK DIVISION
300 West 43rd Street
New York 36, N.Y.

Sirs: My check (money order) for $_____ is enclosed. Please send me _____ copies of Electronic Circuits Handbook (cat. #121).

Name_____

Address_____

City_____ Zone_____ State_____

New York City Residents Add 4% Sales Tax

PRICE: $3.00

RUSH YOUR ORDER TODAY

AVAILABLE

NOW!

quite a few of these "brawls." A few of the claimed scores shown elsewhere in this column, will give you an idea of what to expect. All bands were active. Please keep in mind however, these are only claimed scores.

Nice going George, you hit that one right on the nose.

Our "little gem," the 160 contest at the end of the month, also merits your attention. This one keeps growing each year and if we are lucky enough to come up with another week-end like last year's, Man! we've got it made.

See you in the pile-ups, fellows, good luck.

73 for now, Frank, W1WY

USA-CA [*from page 67*]

THURSDAY 1800 GMT, 14,331 kc, SSB'ers "system" originating in USA, beaming world.

FRIDAY 2000 GMT, 14,311, kc, SSB'ers "system" originating in USA, beaming Pacific.

SATURDAY 1800 GMT, 14,331 kc, SSB'ers "system" world-wide roundtable.

SUNDAY 1800 GMT, 14,331 kc, FHC/CHC[1]

The SSB'ers use s.s.b. exclusively for world-wide communications. Primary frequency is 14,331 kc. Alternate frequencies are 3,805, 3,995, 7,205, and 7,295 (l.s.b.); 21,410 and 28,440 kc and 50.20 (u.s.b.).

For further information on this dynamic organization see USA-CA columns of June and September, 1963.

County Identity Clarified

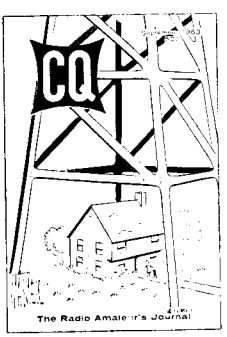
While we feel USA-CA Rules regarding county identity are not subject to interpretation, there has arisen a question of whether the naming of just the county on QSLs for mobile operations suffices. Obviously if the mobile station is within a city, both city and county should be named if for no other reason than common sense. However, for mobile or portable operations not within a city proper and when such QSLs bear the markings /M or /(district), and county is named, then county identity is complete for purposes of USA-CA.

Regardless of printed matter on any QSL card *or* postmark, the statement by the operator that the contact was made from a stated city, or city and county, or county, is the valid QTH of contact for USA-CA purposes. USA-CA is concerned *only* with common sense valid proof of contact with counties and is not concerned with technicalities.

Post Office Reverses Padlock Action

Some months ago we reported that the U.S. Post Office had padlocked the doors of the Continental QSL Club, Dayton, for alleged violation of a postal law dating back before even the Constitution. The crux of the situation was that the

[1]CHC and FHC operate an Emergency Flying Medical Corps (EFMC) to provide transport of medicines to stricken areas or individuals, and which utilizes the YL International SSB'ers World-Wide Communication System during such emergencies. For these purposes headquarters for SSB'ers, FHC and CHC, have combined communication services under the master control of the SSB'ers communication "system."



CQ
300 West 43rd St.
New York 36, N. Y.

Dear OM:

Enclosed please find $_____ for _____ Year(s) Subscription to CQ, The Radio Amateur's Journal.

☐ NEW: Start with _____ issue.
☐ RENEWAL

Name..... **Call**.....

Address.....

City..... Zone.... State.....

Rates: 1 Year....$5 ☐ **2 Years....$9** ☐ **3 Years....$13** ☐

Pan-American and Foreign Add $1.00 Per Year Postage.

P.O. claimed, at that time, that QSL cards were in fact "letters" and more than one could not be placed in an envelope for a single postage fee. Under this P.O. decision then, ARRL's QSL Bureaus also were in violation of interpretation of the postal regulations. The League General Counsel submitted sample evidence of QSL cards to the Post Office Department with claim that the information logged on QSL cards was in fact only confirmation of over-the-air contacts already made and recorded under FCC regulations; therefore were not original letters requiring action on the part of the receiver beyond that already contained in the radio log.

The General Counsel of the Post Office Department in a letter to the League dated September 30, 1963, in analyzing the situation stated;

> "We do not believe the QSL cards are sent for purposes of verification within the meaning of section 9 of the pamphlet, *Restrictions on Transportation of Letters.* As used in section 9, verification is for the purpose of assuring the accuracy of the information. Here, the basic purpose of the QSL card appears to serve as written proof an air contact was, in fact, made. Accordingly, the cards are not considered letters within the meaning of the Private Express Statutes, *provided they contain no matter extraneous to the information exchanged in the air contact.* We do not believe the grouping of the QSL cards in one envelope violates section 25 of the pamphlet because the cards are not letters. Louis J. Doyle, *General Counsel.*"

We suggest you re-read the italicized sentence above and realize extraneous comments on a QSL card changes its category to that of a "letter."

Fifth New Mexico QSO Party

The CHC Chapter #1, New Mexico, announces its 5th New Mexico QSO Party with emphasis on working New Mexico's rare counties in support of the USA-CA, the New Mexico Counties Award and the Amigos De Albuquerque Award. See Contest Calendar this month and complete rules in the December issue, page 58.

What's Cooking Department

Gosh . . . we've run out of space.

Old Man, K6BX

Novice [*from page 69*]

column always with great interest. Please excuse me for the mistakes in this letter, I do not have the best knowledge of the English language. Good Luck, 73, and lots of DX." Kellner Janos, "Jancsi" HA5-Ø55, 21 Eszter u. Budapest II, Hungary.

You will note that this young man, very much interested in radio, still values his education above his hobby. Thank you, Kellner, for the letter and I'm sure that there is a trend developing toward the issuance of certificates to those who spend much time and money collecting the necessary QSLs to get those awards. I hope you

will get lots of letters from the readers of *CQ* and wish you luck in getting your license next year. The best of DX from we amateurs on the other side of the big pond.

Help Wanted

If you are able to aid any of the following, you will help spread the spirit of friendship for amateur radio. Those asking help this month are:

Paul L. Wilkins, 33 Woodbury Forest Drive, Hampton, Virginia, Phone: 826-4087. Paul would like to talk to a local ham who can help him get started off on the right foot.

Tim Weber, 1620 Lakeside Drive, Topeka, Kansas, needs help with code and theory and some help in reading schematics. He is building a Heathkit Mohawk. He saws our column gives him the necessary boost to keep on keeping on. Tim, the August issue of *QST* and about four others following have splendid articles on reading schematics. I'm sure you could start a membership with the August 1963 copy if you requested.

J. C. Rosenberg, P. O. Box 2130, Orcutt, California would like to know of any one that can furnish a diagram for a Breting 14 communications receiver. He is willing to pay any reasonable fee for a book or print.

I would like to take this opportunity to wish all a happy and prosperous New Year. I hope you can work your share of DX and hope that next year you can get your General license. The electric power was finally connected to my shack about twenty minutes ago and so now I will be able to put my rigs on the air and work many more of you. See you on the air!

73, WALT, W8ZCV

DX [*from page 58*]

VP9FK ..... R. B. Appleby, Box 509, Hamilton, Bermuda.
VQ4AA ..... Box 5121, Mombasa, Kenya.
VS9HAA ..... via W4ECI.
VS9HRK ..... via W4ECI.
VQ4IN/VS9H .. via W4ECI.
W4VGL/KG6 .. U.S. Marine Station, Marcus Is. Box D, APO 925 San Francisco, Calif.
WA6QVR/KJ6 .4990 Columbia Pike, Arlington, Va.
XW8AU ..... Box 46, Vientiene, Laos.
YI2WS ..... via SM5CCE.
YS1TA ..... Roberto Trigneros, Box 517, San Salvador, El Salvador.
YV5BTK ..... Box 2285, Caracas, Venezuela.
ex-ZD6HK ..... via W2ELW *or* Box 2187, Lusaka, Northern Rhodesia.
ZD6OL ..... via G3JUL.
ZS7R ..... Box 99, Mbabane, Swaziland.
5A5TH ..... Box 2325, Tripoli, Libya.
5H3JR ..... via W2SNM.
5X5JG ..... J. Marland, c/o Signals Branch, POB 355, Kampala, Uganda.
ex-6O1ND .... Norman Duxbury, 449 Spring Green Rd., Warwick, R. I.
7X2VX ..... via W4UWC.
9A1AIJ ..... via I1AIJ.
9A1CWN ..... via I1CWN.
9A1NU ..... via I1NU.
9A1TAI ..... via IT1TAI.
9Q5AB ..... via W2HAQ.
9Q5CP ..... Box 1268, Leopoldville, Republic of Congo.
9Q5GE ..... via W8WBT.
9U5IB ..... Box 1710 [illegible]nbura, Burundi.

Happy New Year, Urb, W2DEC

Ham Clinic [*from page 72*]

stalled a coax connector for the 6 meter band antenna input. He tapped the coil 1 turn from the bottom for a better match for a beam antenna. This modification allows the 50 mc antenna to remain connected, and still provides a 2 meter converter connection. The original 6 meter coil connection to the antenna terminal strip is, of course, removed. Thank you, K8ZHZ. Incidentally, to further improve the HQ-170, replace the tube rectifier with silicons. This cuts down the internal heat.

Thirty

We have been receiving a number of letters which go somewhat like this: ". . . so because you are in Europe, we would certainly appreciate your telling us all about living conditions, jobs, travel, worthwhile things to buy, *etc.*, over there."

Although we are happy to help fellow hams with *specific* questions we cannot (nor do we have the time) to write long essays on Europe.

Again, do not forget the two IRC's or 25¢ in coin for a *direct* answer from us. We cannot bear the postage bill alone.

Our best to you this month. 73, CHUCK

RTTY [*from page 74*]

instruction book on the 15. VE3CM of Toronto, Ont., on 80 reports low activity in Canada due to lack of availability of machines. VE6HM of Edmonton, Al., found that his "new" Model 15 was not as quiet as his old Model 26.

Comments

Here on the east coast, two very strong foreign commercial or government RTTY stations have appeared at 3608 and 3650 kc. First noticed in November, these stations are using 850 cycle shift and continuous tape transmission; however, their transmission speed is apparently greater than our FCC-decreed 60 w.p.m., so most of us cannot copy them. Our c.w. friends undoubtedly are cussin' us out for this. It is suggested that we pass along the word that these are *not* amateur RTTY stations; and, that amateur RTTYers also must sign in Internal Morse code as well as in the teleprinter code.

73, Byron, W2JTP

YL [*from page 76*]

Maxine, at her cottage on lovely Catalina Island. We were entertained by, or able to visit with, many of the YLs pictured here, including W6UHA, W6QGX, W6CEE, K6BUS and K6OQD. Also K6VAP; K6VFE, Sister Charlotte, at Ventura (a delight after years of friendship going back to the good old 10-meter days when she was W7MUT in Idaho); WB6DQZ and K6KCI, Irma, and her family at "sunny Santa Barbara," and en route home, K6RQE at Barstow.

Just love those W6 gals! 33, W5RZJ

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of October 23, 1962; S. 4369, Title 39, United Statees Code) (1) Date of filing—October 1, 1963. (2) Title of **PUBLICATION: CQ THE RADIO AMATEUR'S JOURNAL.** (3) Frequency of issue—Monthly. (4) Location of known office of publication:—300 West 43rd Street, New York City, County of New York, New York 10036. (5) Location of the headquarters of general business offices of the publishers:—300 West 43rd Street, New York City, County of New York, New York 10036. (6) Names and Addresses of Publisher, Editor and Business Manager:—Publisher—Sanford R. Cowan, 6 Embassy Court, Great Neck, New York; Editor—Arnold Trossman, 1908 Belmont Avenue, Bronx, New York; Business Manager—Richard A. Cowan, 6 Embassy Court, Great Neck, New York. (7) Owner (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given)—Sanford R. Cowan, 6 Embassy Ct., Great Neck, L.I., N.Y. (8) Known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities (if there are none, so state) —NONE. (9) Paragraphs 7 and 8 include, in cases where the stockholder or security holder appears on the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear on the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Names and addresses of individuals who are stockholders of a corporation which itself is a stockholder or holder of bonds, mortgages or other securities of the publishing corporation have been included in paragraphs 7 and 8 when the interests of such individuals are equivalent to 1 percent or more of the total amount of the stock or securities of the publishing corporation. (10) this item must be completed for all publications except those which do not carry advertising other than the publisher's own and which are named in 132.231, 132.232 and 132.233, Postal Manual (4355a, 4355b and 4356 if Title 39, United States Code). (A) (average no. of copies each issue during preceding 12 months) Total No. Copies Printed (net press run) 81,175 (B) Paid Circulation—(1) to term subscribers by mail, carrier delivery or by other means 37,427 (2) sales through agents, news dealers, or otherwise 40,174. (C) Free Distribution (including samples) by mail, carrier delivery, or by other means 3,046. (D) Total No. of copies distributed (sum of lines B1, B2 and C—80,647. (A) (single issue nearest to filing date) Total No. Copies Printed (net press run) 78,500 (B) Paid Circulation —(1) to term subscribers by mail, carrier delivery or by other means 35,378 (2) sales through agents, news dealers, or otherwise 36,438 (C) Free distribution (including samples) by mail, carrier delivery, or by other means 4,246. (D) Total No. of copies distributed (sum of lines B1, B2 and C—76,062).

I certify that the statements made by me above are correct and complete. (signed) Richard A. Cowan, Business Manager.

Reflectometers [*from page 79*]

calibrated to a specific power level using a known source or calibrated meter. The range adjust control is R_3 and it is a back panel control. The second position, REFLECTED, reads the power reflected from the antenna. The difference between the forward and reverse readings is the power being delivered to the load, the antenna. The next two positions function exactly as the first two except the calibration control, R_4, is on the front panel. It is used to adjust the forward reading in the S.W.R. position to full scale in any situation so that the S.W.R. may be read directly from the meter in the fourth position. Adjustment of R_4 does not disturb the power calibration of the first switch position.

The construction presents no electronic problem as lead length and dress are not critical. The leads from the coupler to the indicator should be very short or shielded, preferably both. The Micro Match unit was secured directly to the indicator box.

It will be found that these couplers are *flat* at the frequencies specified. This was verified by the tests made with commercial load resistors and absorption type wattmeters rated up to 1,000 mc. The cost of these surplus couplers ran from $.95 to $2.95 while the commercial prices for identical new units range from $40.00 to $115.00. ■

UHF Roundup [*from page 83*]

Down Texas way Vic, W5HPT, reports a fine 432 mc opening during the month of October in which W5AJG in Dallas worked W4RFR in Nashville, Tenn., for a real nice 600 mile QSO. Unfortunately Vic was out of town on business at the time. On the brighter side W5HPT mentions that he has finally found another Texas station interested in ATV—K5DZM, located in Grapevine with a vidicon camera. I guess we will be hearing of some ATV QSOs from Texas soon.

We received a note from Dave, K7BBO, Spanaway, Wash., to say he lost the parabolic antenna he was working on in a wind storm. Sounds familiar. I guess you have to get used to this sort of thing if you are going to work with home brew parabolic antennas. Anyhow the tragedy has not hampered Dave's spirit and he has already started rebuilding it. Good luck, Dave.

Just a couple bits of news left. K2YVE, well known two meter operator here in the New York area, is now on 220 with an 11 element beam and a "Barry's special" transmitter. Ronald, W8KYD, Parma, Ohio is extremely interested in ATV and would like to hear from other stations working with the emission. Steve, K2PBO, is on 1220 mc with an APX-6 from Rochelle Park, New Jersey. Anyone need another 1220 QSO? Say, if you have any u.h.f. news or technical ideas to contribute to the column, don't keep them to yourself. Let's hear from you! And we do accept pictures.

73, ALLEN, K2UYH

except for the 24th. I've been trying some 144 mc schedules with K4IXC in Miami this weekend, but haven't had any luck. I would like to make some improvements in equipment, but unfortunately it can't be done now. My wife will be coming down as soon as an apartment is available. This will limit my operating time some. Also it will hurt my antenna location quite a bit. I now have a 50 ft. pole right beside the ocean. My wife, by the way, is W9VFP. I'm going to try and get her a call here, but don't know for sure if it will be possible.

"Six has provided many interesting hours for me down here. I'm very anxious to see what it has to offer next year. I'm well into my third six meter logbook since the first opening after I got my ticket, back on November 25, 1962. I'll be looking forward to more of the same next season. Still need those W7 states, Minnesota, KH6 and KL7. I'll be trying this winter to stir up some more activity down this way. I would like to see beacons on some of the islands if possible. It would be interesting to find out more about propagation such as you mentioned some months ago via the north-south path."

From Portsmouth, Va., comes word that K4NEH "went over our head in the *CQ* Summer V.H.F. Contest in August." Vernon had about 65 contacts in four states (Va., N.C., Minn. and Tenn.), coming in with a grand total of 7289 points. Three new stations are now on in the area: WA4PUI, WA4GVT and WA4QBR. K4NEH continues, "Ask VP7CX where those QSL cards are? Still waiting. Also waiting for VE2BEW and VE1AHR. Bob, let's get a gun on those boys in South Carolina. Haven't heard one yet. (The only one I need to complete the South). Now have four stations on in the area on six meter s.s.b.: WA4GMS, WA4JOK, K4FSP and K4VHV." WA4FVD in Monroe County, Florida, wants us to tell you that he's available for skeds anytime. Ron, too, worked a fair share of the September DX. Big antenna plans at WA4FVD—keep your ears peeled.

Jim Hadlock, K7JRE, in Bellevue, Washington, is all in favor of seeing more c.w. activity on 50 mc. Jim has a modulator on his 30 watt transmitter, but "just don't like phone—hi."

Vince Varnas, K8REG, at Dayton, Ohio, manages reliable skeds *via tropo* with WØBBM, Imperial, Missouri, Fridays at 2230 EST on 50.12 mc s.s.b. Skeds are planned with K9EID soon. W8HHS at Traverse City, Michigan, has built a homebrew 22 tube triple conversion receiver for 6 and 2 meters only. Transmitter is a homebrew 829B rig feeding into a Finco A62 through u.h.f. celluline (300 ohm) matched with a Comaire I.M-6N2 matchbox.

Rounding out the 50 mc news this month is K9PVS at Alexandria, Indiana, who reports DX to WA4AAJ (Independence, Ky.), WA8ECQ (Cincinnati, O.), and W8CCI (Hamilton, O.). Schedules would be appreciated here also.

73, Bob, K2ZSQ

Ham Shop

Rates for the Ham Shop are 5¢ per word for advertising which in our opinion, is non-commercial in nature. A charge of 25¢ per word is made to all commercial advertisers or organizations. Since we do not bill for Ham Shop advertising, full remittance **must** accompany all orders.

Closing date is the 10th of the 2nd month preceding date of publication. Your copy should be typewritten, double spaced on one side of the page only.

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

QSL's?? WPE's?? CB's?? Largest variety samples, 25¢. DeLuxe samples 35¢ (refunded). Sackers, W8DED, Holland, Michigan. 49424. (Religious QSL samples 25¢.)

QSL's Samples 25¢. Rubber Stamps; Name, Call, Address, $1.55. Harry Sims, 3227 Missouri Avenue, St. Louis, Mo. 62118.

CREATE a QSL card with a "Sampler Instruction Kit," 25¢. Samco, Box 203-C Wynantskill, N.Y. 12198.

QSL's. Large selection styles including photos. Fast service. Samples, dime. Ray, K7HLR, Route 3, Twin Falls, Idaho.

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.

1964 QSL-size calendars, 100—$7.00. Samples 25¢ Morgan, W8NLW, 443 Euclid, Akron, Ohio.

PICTURE of yourself, home, equipment, etc., on QSL cards, made from your photograph. 250—$7.50 or 500—$10.00 postpaid. Samples free. Write to Picture Cards, 129 Copeland, LaCrosse, Wis.

QSLs SWLs XYL-OMs (Sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fantabulous. DX-attracting. Protopay, snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSLs free samples. Fast service. Bolles, 7701 Tisdale, Austin, Texas.

QSL's . . . Beautiful new designs . . . Dime. Filmcrafters . . . Martins Ferry, Ohio.

QSL's—100—$2.50. Samples. Dime. AMEE's Printery—W9FXQ—Box 138, Oak Lawn, Illinois.

RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box 7507, Kansas City, 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.

NEW QSL PRINTER with new designs. "2-color" $2.25 per 100. 10¢ for samples. Corneilson, 321 Warren, N. Babylon, N. Y.

QSLS Large selection styles, including photos. Fast service. Samples Dime. Ray K7HLR, Route 3, Twin Falls, Idaho.

1964 QSL catalogue. New Designs. 10¢. Longbrook, Box 393-Q, Quakertown, N.J.

QSL CARDS $2.50 per 100 in three colors. Samples and catalog free. Garth, Box 51C, Jutland, New Jersey.

QSL CARDS. As low as $2.50 per 100. Samples free. Radio Press, Box 24C, Pittstown, New Jersey.

FREE Write for copy of latest issue. Hundreds of buy, sell and trading ads. Hams Hobbymart, P.O. Box 38, Rowayton, Conn.

RUSTIC, Call letter plaque, $1.50. KV4DI, St. John, Virgin Islands.

CHRISTIAN HAM FELLOWSHIP (undenominational, non-profit, missionary and fellowship organization) now being organized. Details free. Write Russ Sakkers, W8DED, Box 218, Holland, Michigan.

!!SWAP, SELL, TRADE with other hams!! Special subscription to "Ham Trader" 12 issues $1.00—Box 153C, Franklin Square, N.Y.

SPECTRUM ANALYZERS. Fit your receiver. Brochure. Halco, Box 283, Saxonville, Mass.

CRYSTALS: FT-243's ± 2 KC . . . $1.00—3500 to 8650. Hundley Crystal Co., 2947 North 35th, Kansas City 4, Kansas.

FT-243 CRYSTALS: 3400 to 8700 kc—± 2 KC $1.00 each. Nets $2.00 each. Denver Crystals, 776 South Corona, Denver 9, Colorado.

CLUBS New illustrated literature, badges, decals—All the "goodies." Errol Engraving, Att: K1VRO, Westfield, Mass.

WANTED PL172, AX9909 and PL9295A tubes, no duds—also good rig. Fast cash for a fast deal. Al Claff, Box 7565, Mexico City, Mexico.

TOROIDS 88 mh 60¢ each or 5/$2.50. Fasold/WA6VVR, Box 34, Dixon, California.

TOROID RTTY KIT Mark-Space discriminator and bandpass filters. Includes 4-88 mh and 1-44 mh uncased, like new toroids; information sheet, mounting hardware and six mylar capacitors. $5.00 Postpaid. Toroids: Specify 88 or 44, less capacitors, $1.00 ea. 5/$4.00 Postpaid. KCM Products, Box 88, Milwaukee 13, Wis.

TWIN COAX RG-62/U coaxes in shield jacketed with black vinyl. Fifteen cents per foot. Jack Fath, W3CEV, 1335 Lacebark, Trevose, Penna.

AMMONIUM bifluoride flakes. Used in etching crystals. 1 lb packages $1.00. Add postage to your zone. Quaker Electronics, P.O. Box 215, Hunlock Creek, Pa.

LOWEST CRYSTAL PRICES in world. Thousands of satisfied amateurs. Guaranteed. Send 5¢ stamp for lists of overtone and fundamental frequencies. Quaker Electronics, P.O. Box 215, Hunlock Creek, Penna.

ELECTRONIC keyer. Clean, self-completing characters. $27.75 less monitor. M & M Electronics, 8317 N.W. 34th, Bethany, Okla.

SELL Triplett Model 310 VOM, new, with leather case and book, $20. A1, K2EEK, 75-15 177 St., Flushing, New York.

WANTED Get top dollar for radio, television and special purpose tubes. Tell us what you have. Metropolitan Overseas Supply Corp., 443 Park Avenue South, New York, N.Y. 10016. Telephone: MU 6-2835.

SELL 75A-4 with three filters, speaker/light, KWS-1. Both mint conditon. Local sale only (NYC area). Larry, K2BVC. Phone: 914 TE 4-6018 after 6 P.M.

SELL DX-100, $150., SB-10, $70. Both $200. John Kenny, M-J House, C.I.T., Pasadena, California.

TUBES Top brand tubes at terrific savings. If you need new radio, television or special purpose electron tubes, you'll want our free catalog. Metropolitan, 443 Park Avenue South, New York, N.Y. 10016. MU 6-2835.

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.

HALLICRAFTERS SX-28 with matching 12" speaker, xtal cal. & manual. Excellent condx. Looks like new. $140 plus shipping. Ron McAfee, 212 State Street, Henryetta, Oklahoma.

SELL Electron tubes. Liberal Commissions. Territories available throughout the world. Write in confidence to: Box ET, c/o CQ, 300 West 43rd Street, New York, N.Y. 10036.

HT-32B $500; Clegg Thor 6, $300; bug, $15; best condx, going mobile. Chris, K1RZL, 104 Westcliff Road, Weston, Mass.

SELL Challenger xmtr, 80 thru 6 mtrs, $55. V-44 VFO, $15; QF-1, $7; 8 Novice xtals, 70¢ each. All excell. WAØCVA, 1010 Elm, Burlington, Iowa.

SWAN SW-240 transceiver and a.c. power supply. Perfect condx. Booklet and carton. Must sell. Landlord trouble. $335. Webb, 125 Ocean Avenue, Jersey City, N.J. Phone: HE 3-0803.

WANTED: Commercial, military, all types ARC, ARN, ARM, GRC, PRC, URR, URM, TS, 618S, 17L, 51R, 51X, APN, others . . . Ritco, P.O. Box 156, Annandale, Va.

DISCOUNTS! All reconditioned and guaranteed. Home trial. E-Z terms available. Act now. 21A, $127.20; AF-67, $71.96; 75A-3, $279.20; KWM-1, $314.10; G-76, $224.10; SW-140, $157.50; HX-50, $296.10; Ranger, $143.10; Invader, $395.10; 755A, $35.96; 2A, $170.10; G66B, $79.20; NC-88, $71.10; NC-109, $107.10; SX-101A, $229.50. Leo—WØGFQ, Box 919, Council Bluffs, Iowa.

PRINTED CIRCUIT BOARDS. Hams, experimenters, many different projects. Free catalog. P/M Electronics, Box 6288 Seattle, Washington. 98188.

ATTENTION! Have you seen "Equipment Exchange"? Buy, sell, swap offers galore! Rush card for interesting sample copy. Brand, Sycamore, Illinois.

$1.00 BUYS AMAZING NEW TOOL. 2" curved lucite tip bends light from pocket flash enabling instant inspection of tubes, sockets, resistors, etc. 1001 uses. Complete with battery. Satisfaction guaranteed. Mail to Inspect-Light, Box 212, Glendale, Calif.

CRYSTAL CLEAR BARGAINS in xtals. Free list. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

PRINTED circuit resist, applied with ordinary pen. $1.00. Box 19083, Indianapolis, Indiana.

NEED TUBES REBUILT? 55a's, 212's, 202's, 203's, 204's, other old types. Broken bulbs acceptable. Sam Diaz, Pine Grove Mills, Pa.

ANY REASONABLE OFFER accepted: B&K Dyna-quick tube tester #500; Jackson Tube Tester #49 with adapter; Teletest capacitor tester #CT355; Supreme Multimeter #543; Halldorson metered varivolt transformer; NRI course; Cire math course; Pickett slide rules #4, #1010T; Witmer, 201 Byron, Harrisburg, Penna.

75S-1, immaculate, 500 cycle filter, commercially installed rejection tuning, $395. Paul Zukin, 244 Loring Ave., L.A., 24, Calif., phone 279-1660.

SELL: Lafayette TE-12 VOM, mint condition, $13.00; Heath Q-multiplier inop. $6.50. Signal Corp. Mark II, No. 19 self-contained xmtr, modulator, and 2-8 mc. 2 band, partially converted 80440, receiver, approx. 30 lbs., $20. Power supply for above receiver $3.00. You pay postage. David Allikso, 24834 Donald, Detroit 39, Michigan.

COLLINS F455QS filter, nvr used, $45.00. 15th edition Radio Handbook, $6.00. W9GXR, 315C Ridge Rd., G-28, Wilmette, Illinois.

FOR SALE: Globe Chief 90 like new, only $39.00. WB2FWZ, John Wojcik, 489 East Barber Avenue, Woodbury, N.J.

SELL: 32S-1 with a.c. supply, less than 2 hrs. use, will throw in old Dumont scope . . $530; Eldico SSB 1000F linear . . $300; Eldico SSB 100F exciter . . $400; Transtenna T-R switch, new . . $45; Eldico low pass filter . . $5; Sony CS-300 stereo tape recorder . . $225; Concertone professional recorder, 7½ and 15," five heads, 10" reels . . $500; all f.o.b. . . . Lamb, 1219, Yardley Road, Morrisville, Penna.

SELL GPR-90 general coverage receiver, $250. WAØDZH, 1165 Mitchell, Marion, Iowa.

BEST CASH OFFER takes . . . 4X150A; 4D21; 100Th; 807; 5R4WGY; 6X4W; 6L6WGB; 6AQ5. G.N., 4443 East 3rd Street, Tucson, Arizona.

SELLING ENTIRE SSB STATION. All equipment immaculate and with manuals. Consists of 75A-4 Receiver, Eldico SSB-100F transmitter, matching speaker console with light, drake phone patch, timer, audio test oscillator, control switches, etc., all built in, Harvey Wells Z Match, Homebrew KW Linear using pair 4-400A's, B and W TR switch, and coaxial relays. Must see to appreciate. Prefer you pick up the works for $850.00 KØBXJ, 114 Louise, Topeka, Kansas.

JOHNSON DESK KILOWATT—new side band modification kit—Ranger PTT sequence keying—factory wired—Kilowatt Match Box swr bridge—new tubes—extra spares 4—400A's—810's—872 A's—not surplus—complete cables ready to operate—condition like new—$900.00 cash. Ted Brix—5573 No. Van Ness Blvd, Fresno 5, California.

B&W 5100B 150-watt phone/cw transmitter. New, factory packed. $525 value. First $300 takes it. Dick Hyde, WØQCX, 888 South Lipan, Denver, Colorado 80223.

SELL CQ May 1956, 1957-63 except February 1957, June 1958, 80¢ each; QSTs 1941-1945 all, in binders 75¢ each. QSTs 1957-1963 except Jan 1957 75¢ each. KØPLW, 1005 South Washington, Aberdeen, So. Dakota.

SELL Berkeley 5510-2 counter $475; TS-174/U $90; Measurements 79-B $60; Northern radio VFO, $125; Robert Ireland, Pleasant Valley, N.Y., 12569.

VIKING II, FSK modified VFO, $100. 19 teletype with table, $140; 14 TD, $35. 14 reperf-printer $25; RA-8 supply, $8. TU with scope, $35. Complete, $310. W6PRY, 3670 Jennifer St., San Diego, Cal.

FOR SALE Military Model 19 Teletype, excellent, $250. Also Model 15, $100. Local pickup only, will not ship. S. Foster, 2050 Elmwood Avenue, Rochester, New York, 14620.

KWM-2 with Waters Rejection Tuning SN 10679, $750.00. 516F-2 supply/speaker, $75.00. Less than 1 yr. old in mint condition. H. Martin, Box 1275, Bluefield, W. Va. Tel. 327-9254.

SELL: Viking II, 122-VFO, DB-23 preselector, with high power tubes, complete KWA (80-10). All excellent condition. WA4ELB, Box 839, Maysville, Kentucky.

CENTRAL ELECTRONICS 200V like new. Cost $795. Will sacrifice. WA6TLS, 7549 East Fourth Place, Downey, California.

HAMMARLUND HQ-180 like new. Will sacrifice. WA6TLS, 7549 East Fourth Place, Downey, California.

GONSET G-76 With either AC or DC unit. Cost over $500. Will sacrifice. WA6TLS, 7549 East Fourth Place, Downey, California.

GONSET COMMUNICATOR IV like new, also Gonset VFO. Make offer. WA6TLS, 7549 East Fourth Place, Downey, California.

MU-WESTERN MODEL M1 teletype converters—new factory sealed cartons. Regular amateur net—$110.50. Special price, $89.95. F.O.B. Denver, Colorado. Burstein-Applebee Company—Ham Department—1237 16th Street—Denver, Colorado.

SPACE GUN ANTENNA Add 40M to your present 20-15-10M Beam. One space gun element tip attaches to each end of the present driven element of existing beams, extending the overall length of 14 feet. Works with all beams fed directly or through "Beta" Match from 52 ohm coax line, giving excellent SWR and figure 8 directional pattern on 40. Constructed of high strength aluminum. Regular amateur net—$39.95. Special Price—$39.95 per pair. F.O.B. Denver, Colorado. Burstein-Applebee Company—Ham Department—1237 16th Street—Denver, Colorado.

adopt a broad policy of genuinely trying to upgrade the Amateur Service.

In this connection, I would like to add a further point. The directors of the ARRL are elected individually by the members in each of the League's 16 divisions. They in turn elect a majority of the Executive Committee from among their own members. This is a thoroughly democratic procedure.

Grass roots control of League affairs by the membership is demonstrated by the fact that half of the present Directors of the Board, as well as all of the Director-members of the Executive Committee, the General Manager, the General Counsel and the President have been newly chosen within the last five years.

In the past year that I have been associated with them, I have found the Directors to be without exception a sincere and conscientious group of men, dedicated to the best interests of Amateur Radio. I am proud to serve with them, and I am in full accord with the policies they have adopted to strengthen Amateur Radio.

In conclusion, it is my opinion there are two general courses of action that are open to us.

The first is to drift along, do nothing, and hope for the best. This is the easy way, and the chances are that if we choose it we will get thoroughly clobbered, one of these days, at home as well as abroad.

The second alternative is to face up to the facts and start to do something constructive to preserve Amateur Radio for the future. That is the sole reason behind the Board's recent action, and I think the Directors are to be congratulated for their courage in taking the initiative.

Thank you.

READER SERVICE

CQ Magazine, Dept. RS
300 WEST 43rd STREET
New York 36, N. Y.

Void after Jan. 24, 1964

Please send me more information on your ads in the Jan. 1964 *CQ* keyed as follows:

1	2	3	4	5	6	7	8	9	10	A
11	12	13	14	15	16	17	18	19	20	B
21	22	23	24	25	26	27	28	29	30	C
31	32	33	34	35	36	37	38	39	40	C
41	42	43	44	45	46	47	48	49	50	D
51	52	53	54	55	56	57	58	59	60	E

Total Inquiries ☐

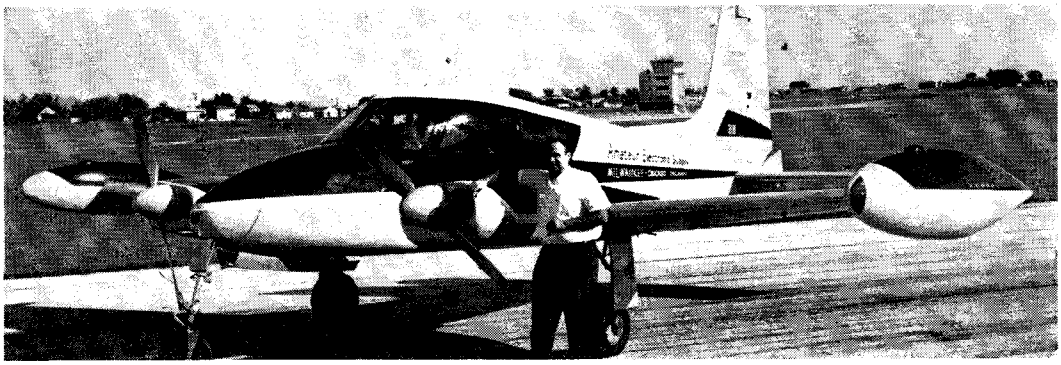
NAME_____
(Please Print)
Type of work (specify)_____
ADDRESS_____
CITY_____
ZONE_____ STATE_____

advertisers index

"Now That You've Had a Chance to Try the Lower Priced Transceivers . . . Get My Terrific Trade-In Quote on the Ultimate . . . the COLLINS KWM-2!"

TERRY STERMAN
W9DIA

We at AES are loudmouths—so we naturally put in the Big Squawkbox. The KWM-2 is not only the best dollar investment, but it makes a darned good arm rest when flying the company plane.



WATCH FOR W9DIA MOBILE FROM HIS AIRPLANE

AMATEUR ELECTRONIC SUPPLY


Steve W9EAN

MILWAUKEE 8, WIS.
3832 West Lisbon Ave. • Phone We. 3-3262
Hours: Monday and Friday, 9 A.M. to 9 P.M.
Tuesday, Wednesday & Thursday, 9 A.M. to 5:30 P.M.
Saturday, 9 A.M. to 3 P.M.


Doc W9HJS

CHICAGO 31, ILL.
6450 Milwaukee Ave. • Phone: Ro. 3-1030
Hours: Monday, Wednesday & Thurs., 12 P.M. to 9 P.M.
Tuesday & Friday, 12 P.M. to 5:30 P.M.
Saturday, 9 A.M. to 3 P.M.


Phil W9DVM/4

ORLANDO, FLA.
23 Azalea Pk. Shop. Ctr. • Phone 277-8231
Hours: Monday, Tues., Thurs. & Friday, 1 P.M. to 9 P.M.
Wednesday, 1 P.M. to 5:30 P.M.
Saturday, 9 A.M. to 5:00 P.M.

IMPORTANT! **Send all Mail Orders and Inquiries To: Terry, W9DIA at our Milwaukee store, c/o Department (C)**
Get Our Quote Today, No Obligation

Terry: I want to buy _____

I have to trade _____ (what's your deal?)

STAY ON THE AIR PLAN
Not only will I give you a terrific trade-in allowance, but you can keep your equipment until you receive your shipment.

Ship Me: _____

I enclose $_____ and will pay balance

☐ C.O.D. ☐ 1 Year ☐ 2 Years ☐ 3 Years
(10% deposit)

If ordering on terms, please list following information on separate sheet and enclose with this order: Name, address, age, married? children? Employed by? Salary? How long? Own or Rent Home? To whom renting? or buying from? Wife employed? Own car?—who buying from? Three to five credit references. The more information you give, the faster we can approve your credit.

EVEN IF YOU'RE NOT ORDERING TODAY, SEND ABOVE INFORMATION FOR ATTRACTIVE CREDIT CARD

NAME _____

ADDRESS _____

CITY _____ STATE _____

☐ Check for latest reconditioned bulletin.

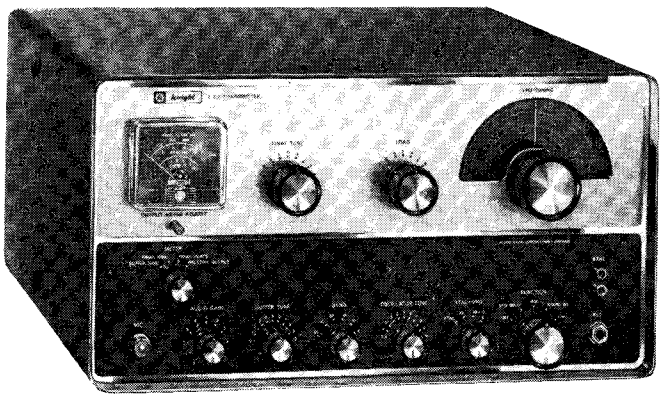
For further information, check number 43, on page 110

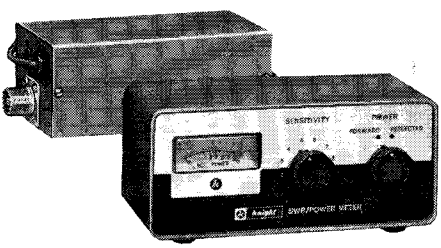
from ALLIED

punch out a clean BIG SIGNAL with this knight-kit® 150-Watt AM-CW Transmitter!

GET TOP WATTS-PER-DOLLAR

- 150 Watts Peak AM/CW Input on 80 Thru 10-Meter Ham Bands
- Controlled-Carrier Modulation for Maximum Audio
- Stable VFO with Planetary Drive, "Spot" Switch
- Clean, Chirpless Keying—No HV Across Key
- Thorough TVI Shielding, Filtering, Bypassing
- Adjustable Pi-Network for 40 to 600-Ohm Antennas





Popular P-2 SWR/Power Meter Kit

ONLY **$15.95**

Now! Get the most from your transmitter and antenna! This easy-to-build "in-line" SWR/power meter measures relative power fed to antenna and standing waves reflected back from it. Lets you make your own matching adjustment between line and driven elements for maximum RF. Features flexible two unit design (coupler and indicator units) with 4-foot shielded connecting cable; has coax connectors; full KW capacity; can be left in line as constant monitor; reads SWR from 1:1 to 20:1; accuracy better than 10%; negligible insertion loss; for unbalanced 50-72 ohm lines, Amateur and CB; range from 1.8 to 432 mc; has sensitivity adjustment; no AC power or batteries required. Coupler, 2 x 5 x 2½"; indicator, 2⅞ x 6¼ x 3". Complete with all parts and instructions. Shpg. wt. 3 lbs. **$15.95**

83 Y 627GA. P-2 Kit, only **$15.95**

83 Y 546GA. As above, but factory-assembled $22.95

T-150A 150-Watt Transmitter Kit

ONLY **$119.95**

$6 monthly on Allied's Credit Fund Plan

Latest version of the rig acclaimed by satisfied owners everywhere. Loaded with features to put out a solid signal that really punches thru the QRM. Controlled-carrier screen modulation for fine audio quality with negligible distortion, plenty of mike gain and top "talking power." Rock-stable VFO, fully calibrated for 6 bands, has illuminated scales, backlash-free planetary drive, and spot switch to let you "zero-in" without putting a signal on the air. 4-stage simultaneous-cathode keying circuit offers clean CW for break-in work—ideal for contests, traffic and DX chasing. Peak AM/CW inputs, 150 watts on 80 thru 10 meters. 20 watts output on 6 meters. Other highlights: Single-knob band-switching, adjustable pi-network for 40 to 600 ohm antennas; VR tube in B+ of VFO oscillator; buffer stage for isolation; standby, remote standby and power takeoff plugs; power supply using 2 silicon diodes in full-wave voltage doubler (saves filament power and eliminates heat); heater/plate voltage takeoff to power auxiliary gear, plus 117 v. for antenna relay; PCIM mike connector; key jack. With all parts, wire, solder instructions and handsome gray satin metal case, 8½ x 17 x 10½". Less mike, key, crystals. For 110-125 v. 60 cycle AC. 35 lbs.

83 YU 409GA. T-150A Transmitter Kit, only..... **$119.95**

PRAISED BY THE LEADING HAM JOURNALS!

satisfaction guaranteed or your money back

EASY TERMS AVAILABLE: Take advantage of the Allied Credit Fund Plan

ORDER TODAY FROM

ALLIED RADIO

ORDER TODAY

ALLIED RADIO
100 N. Western Ave., Chicago 80, Ill.

Ship me the following:

- ☐ T-150A Transmitter Kit 83 YU 409GA
- ☐ P-2 SWR/Power Meter Kit 83 Y 627GA
- ☐ P-2 SWR/Power Meter Assembled 83 Y 546GA

$..... enclosed (check) (money order)

☐ Ship No Money Down on Allied's Credit Fund Plan

Name_____
PLEASE PRINT

Address_____

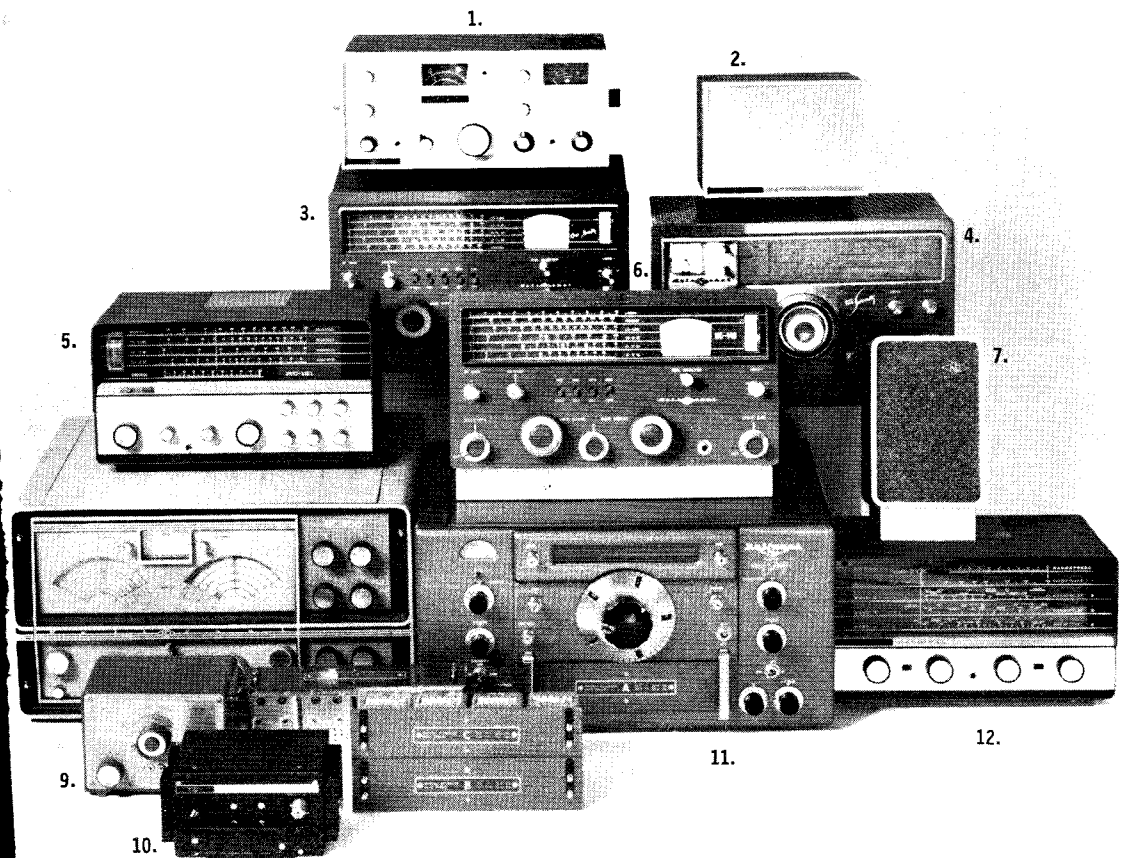
City_____ Zone____ State_____

For further information, check number 17, on page 110

(dis) similar

They don't look alike . . . and they're obviously all intended for widely varying purposes. But in one respect they're as identical as peas in a pod. Every piece of National equipment, from the budget-priced NC-77X to the mighty HRO-60, is built to the same inflexible standard of quality. Each National rig shares the same background of careful and conservative design, meticulous wiring and assembly, and stringent step-by-step inspection. Testing of each unit is conducted as if National's fifty-year reputation hinged on the success or failure of just that one rig (as far as the buyer of that unit is concerned, it does). It all boils down to this: there is a National equipment for practically every application. The models may vary in size, in weight, in appearance, in number or type of features . . . but they all incorporate the same uncompromising quality, and they're all backed up by the same exclusive One Year Guarantee. See all of them now . . . at your National dealer's. And . . . for your own personal reference, send for National's new complete-line catalog . . . packed with full descriptions, photos, and specifications of all National gear. Write to:

NATIONAL RADIO COMPANY, INC.
37 Washington St., Melrose 76, Mass.



1. NCX-3 Tri-Band Transceiver **2.** NCXA AC Supply/Speaker Console **3.** NC-190 General Coverage SSB, AM & CW Receiver **4.** NC-270 Double Conversion Ham Band Receiver **5.** NC-121 General Coverage Receiver **6.** NC-140 General Coverage Receiver **7.** NTS-3 Speaker **8.** NC-400 SSB General Coverage Receiver **9.** VFO-62 Variable Frequency Oscillator **10.** NCXD Transistorized DC Supply **11.** HRO-60 Receiver **12.** NC-77X Four-Band Receiver.

A wholly owned subsidiary of National Company, Inc. World Wide Export Sales: Ad Auriema, Inc., 85 Broad St., N.Y.C.; Canada: Tri-Tel Assoc., 81 Sheppard Ave. W., Willowdale, Ontario.

For further information, check number E. on page 110

Install RCA Industrial Receiving-Type Tubes

FOR TOP "MOBILE" RELIABILITY

RCA tubes for mobile operation are specifically designed to meet the conditions encountered in a "rolling environment"—including low-frequency vibration, road shock, rapid on-off operation, wide temperature variation, and high humidity. Quality, top performance, long life and reliability of RCA tubes for mobile communications equipment are the results of strict quality control and rigorous tests.

Whether for replacement in your present mobile receiver, transceiver, or transmitter—or for new gear in the making—choose RCA—from the wide selection of types for operation from both 3-cell and 6-cell battery systems.

AVAILABLE THROUGH YOUR AUTHORIZED RCA INDUSTRIAL TUBE DISTRIBUTOR

This 44-page book gives you up-to-date technical information on all of the RCA industrial receiving-type tubes, including mobile types. Ask for it today at your authorized RCA distributor: "RCA Industrial Receiving-Type Tubes" (RIT-104C). Or write: Commercial Engineering, Section K-15-Z, RCA Electronic Components and Devices, Harrison, N.J.

RCA

The Most Trusted Name in Electronics