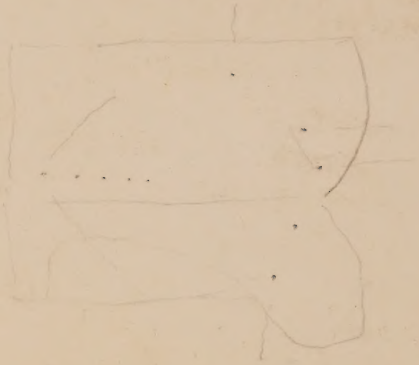
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See page 26.

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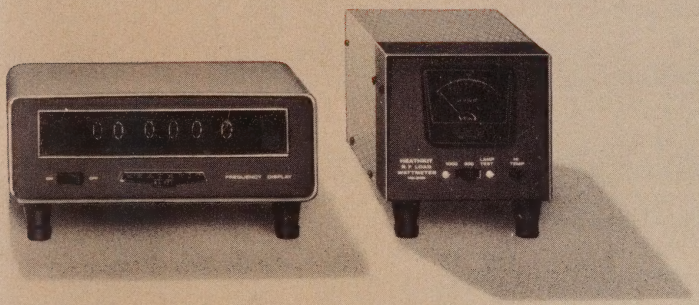
Kit SB-650, 10 lbs. 179.95*

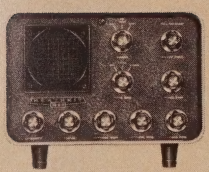
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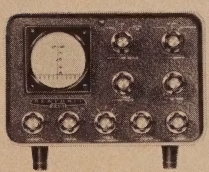
Kit HM-2103, 6 lbs. 59.95*

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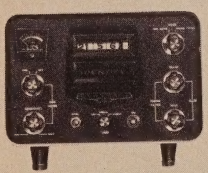




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ZERO BIAS

At the Second 1973 ARRL Board of Directors Meeting held July 19 and 20 in Hartford, a resolution was adopted which will have far-reaching beneficial effects on future developments in amateur radio. On the motion of New England Division ARRL Director, Bob Chapman, W1QV, and with the second of Larry Shima, WØPAN, Dakota Division Director, a resolution was adopted to establish "The ARRL Foundation, Inc."

The objective of the ARRL Foundation is to encourage "innovative programs related to amateur radio [which] will attract substantial financial support from various individuals other than members of the ARRL." The intent, evidently, is to seek donations earmarked specifically for innovative development rather than for the ARRL organization itself.

There are many probing questions which could be raised about this new resolution, and certainly no small amount of criticism could be directed at ARRL for taking this intriguing step, but for the moment, let's explore one of the best prospects.

On the motion of Vic Clark, W4KFC, Roanoke Division, the ARRL Foundation has been directed "toward the securing and disbursing of funds to encourage and assure continuation of amateur radio space activities." Again on the motion of W4KFC, the ARRL General Manager was "authorized to advance funds not exceeding $38,000... for the express purpose of assisting amateur radio organizations engaged in preparation of amateur satellite equipment now scheduled for orbiting during early 1974." That means AMSAT and OSCAR-7. We presume that this "advance" is on a loan-basis to be repaid to ARRL when Foundation funds become available.

What does all this mean to amateur radio? It *could* mean that amateur radio satellite communication is on the verge of an operational breakthrough which will advance amateur satellite communication from the novelty/curiosity/experimental-level to a fully functional, widely accessible radio service. It could in some ways help relieve congestion on the overcrowded lower h.f. amateur bands much as Telstar signaled the end of increasing commercial demands for trans-continental and trans-oceanic radio circuits in the h.f. region. Hopefully, AMSAT will now be relieved of the life or death financial struggles which have sapped so much of its energy for so many years, and be freed to pursue a more vigorous and ambitious amateur radio satellite service. Hopefully, AMSAT, though now more than ever allied with ARRL, will be able to maintain its independent non-political status, and devote its full energy to the development of long-life earth-synchronous communication satellites for amateur use.

We commend the ARRL Board of Directors for their actions, and we sincerely hope that what we are seeing now is but the beginning of a new era of progressive League thinking.

224–225 mHz

As might be expected, the fur is flying in the matter of FCC Docket 19759– The Class E Citizens Band Docket. This recent Notice of Inquiry and Notice of Proposed Rule Making is the most recent step in the quest by certain individuals and organizations to establish a v.h.f. CB service.

It's quite natural for the amateur's first response to be strongly negative towards a proposal which would deprive him of something he now has. We think, however, that pouring all our energy into a flailing effort to beat down the proposed Class E service on 224 mHz could be a self-defeating exercise.

We're not proposing that amateurs complacently accept the loss of 1 mHz of spectrum space. If you have valid reasons that Class E should not occupy 224-225 mHz, make yourself heard through a letter and 14 copies to the FCC.

What we *are* suggesting is that we –meaning amateurs and the ARRL– prepare a fall-back position which we may assume should efforts totally defeat Class E on 224 fail.

This position might well be one of taking an active part in the design of the Class E service: how it might be used, how it might be regulated or policed, what type of equipment requirements could be established, or how "sliders" could be prevented from moving down into the amateur band.

If words alone could alter the course of affairs then Class E could well suffocate under mounds of verbiage. But it seems more likely that some form of Class E lies in the future. It is imperative, therefore, that we give active consideration to how we can turn this probable loss into a substantial gain for amateur radio.

73, Dick, K2MGA

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OUR READERS SAY

Oil on Troubled Waters

Editor, *CQ:*

After reading the diatribe directed at A. Prose Walker by the Editor of *73* Magazine, your own cover story on the ARRL-FCC feud, and knowing the position of *QST* Magazine, I wrote Mr. Walker a letter, hoping to put forward a strong position for the amateur service, but at the same time hoping to pour some oil on troubled waters.

Mr. Walker wrote me a nice two page letter explaining some of the problems, tracing misunderstandings generally to incomplete reporting in *73* Magazine, and also enclosing a copy of his address so reported in *73*. I found both letter and address to be somewhat different than reported, largely through errors of omission rather than direct misrepresentation.

I have circulated the address and letter among members of our own local amateur radio club, and it occurred to me that it might be useful for you to visit with Mr. Walker for similar information for publication. I know the amateur users of the spectrum must watch out for encroaching CB, but I think we will have better luck dealing with FCC and Mr. Walker with a bit more respect and decorum than comes from some quarters. Just a suggestion of mine that I thought I'd pass along.

Harrison Leon Church, W0KXP
Theodore Roosevelt A.R.C.
Dickinson, North Dakota

TTL Test Probe

Editor, *CQ:*

In reference to VE3FEZ's "TTL Test Probe," July *CQ*, two important aspects of TTL Logic are left out of the explanation. The first being that in practice TTL 1 (Positive Logic) is generally 3-5 volts and 0 (TTL Zero) is 0.6 volts or less. These levels are referred to as High (1) or Low (0). Secondly, when a TTL input is allowed to "float" (neither connected to logic 1 or 0) the "chip" sees a High or Logic level 1 and not zero as the example illustrated.

Two notes on the Test Probe circuitry. Add a 1000 ohm resistor in series, between d1 and pin 1 of u1 to prevent circuit loading where maximum fan-out exists. Also, the 1 meg resistor (base of q1) may have to come down in value for lower beta transistors.

Mitch Cohen, WB2IGR
Union, New Jersey

Sliders

Editor, *CQ:*

AWAKE! AWAKE! AWAKE! Unite and strike down the Huns!

Again we are given the opportunity to read the great pearls of wisdom from the great lord. Such hogwash, its enough to make one sick.

I protest most strongly to your idea that I am a criminal or that I might be one of those 'Sliders,' (ucch), because I happen to hold a valid CB license. But most of all, you hold with your logic that because I belong to a group called CB'ers, that I'm a criminal. Hogwash to your logic!

Within one year I plan to hold a VE6 call, and from that you can tell I am Canadian. Now, because I live in Canada and I own equipment, that allows me to listen in on the bands. I'm sure you know what I have to listen to. Yep, you guessed it. Lots of U.S. stuff. When the DX comes in, who do we hear in the non U.S. section? You guessed right again; the Americans calling the DX and trying to get them up in their section.

Now I consider that to be as bad as your 10 meter bandits. Also, how many times have I heard language that must have been recorded at a DI's convention. On many occasions I've listened to various name calling that completely involves Race, Creed, Religion, etc. Other times rude noises, chicken clucking, gargling water, etc.

Now if this is the great amateur group that you types are continuing to put forth, I think I will start my own group, or maybe I'll stay down on the Canadian section and not have to listen to the garbage.

More in the vein of attacking the respectable bastions of Ham radio, I am willing to bet that there are many hundreds of these Hams on 11 meters. As a fact many have told me so. Their reasons I'm not sure, but maybe they are finding something that's missing on the other bands. Maybe we should do the same thing that you recommend; spend an hour or so scanning the 11 meter band for the nasty criminals using our band for their nefarious activities.

The final note before I close this poison pen letter, I'm very disappointed in that you neglected the most obvious. In your lengthy discussion concerning the sale of obsolete amateur equipment, you accuse your fellow amateurs for selling this equipment. Now if you had done your homework, you would have written the truth about CB equipment.

All of the friends that I have talked to on SSB have new equipment; some are CB sets, but most of them are amateur rigs. These rigs, I can name them for you in case you don't know who advertises in your Journal, are as follows: Yaesu Musen (FT - FTDX series), Drake, Swan, Kenwood, etc. These equipment manufacturers make equipment for the most part, (with a crystal purchase), that will tune the 11 meter bank without a lick of work (tuning, trimming, etc.).

Case in point: Swan manufactures a unit called the 1011. Some time ago the amateurs applied pressure to have this stopped. However, it did not stop. Swan changed the name of the unit to Siltronics and it is still coming off the same line, only it's now the improved version of the 1011-B. Wonderful isn't it. Point No. 2: Yaesu Musen - FT101, on the band switch, 11 meters is shown and for the price of the crystal, 11 meters at your fingertips. So if you are attaching blame, put it in the right place.

I would think that your editorial accomplished its objectives -- you filled 1½ columns in your monthly fashion again - 2 Much Garbage Aired.

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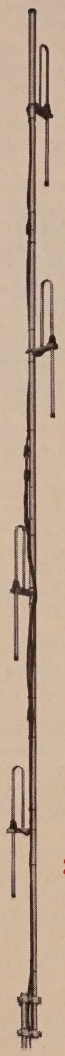
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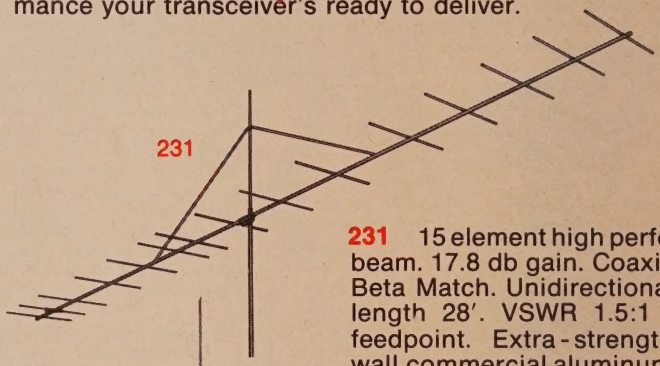
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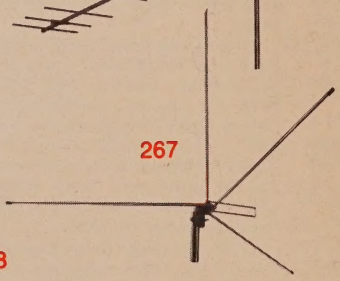
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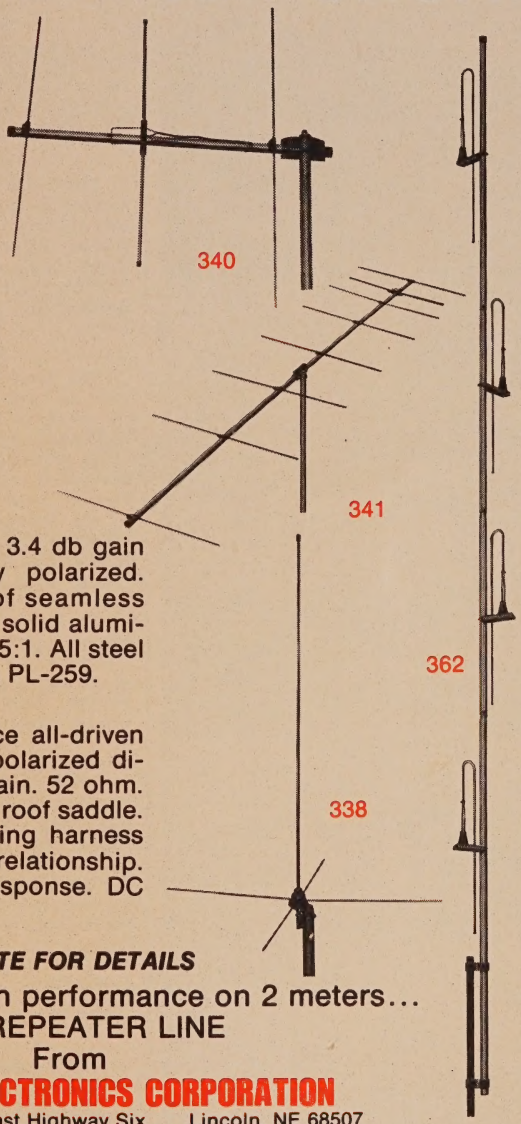
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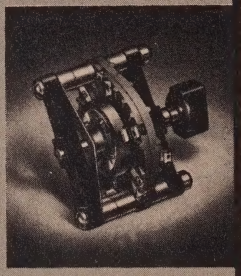
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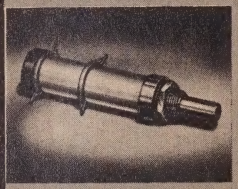
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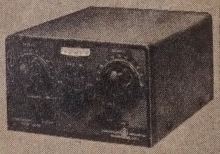
No. 51001
R-F SWITCH
High voltage R-F Switch is designed to handle a KW of r-f power at frequencies to 30 mc. It features high voltage breakdown and a non-arc tracking and arc resistant molded frame. Available in single pole 2 to 6 positions at $14.80; or two pole 2 or 3 positions.



No. 69100
KNOB-TUNABLE CERAMIC COIL FORM
The Millen No. 69100 is a "Designed for Application" ceramic coil form which may be panel mounted and operated by a knob without the knob moving in and out. 25 knob turns for 3.5 to 1 change in inductance. $3.85

No. 90901
MINIATURE MODULE OSCILLOSCOPE
One inch oscilloscope for monitoring modulation. Only 2¾" x 2⅞" x 3⅞" deep. Uses type 1CP1 CRT. Fixed focus. Requires 600 to 950 v.d.c. $40.60. Module power supply available, $39.40





No. 92201
TRANSMATCH JUNIOR
Converts impedance of any 10 to 500 ohm coaxial fed antenna system to 50 ohms. The No. 92201 is a 150 watt single-ended or unbalanced unit intended to match single-ended transmitters to coaxial transmission lines. $115.00. No. 92200 TRANSMATCH is available for use at 1 KW, $169.00

INQUIRE ABOUT OUR COMPLETE LINE OF MINIATURIZED COMPONENTS

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Announcements

Cincinnati, Ohio

Cincinnati Hamfest: The 36th Annual Hamfest will be held Sunday, Sept. 16th at the Stricker's Grove on State Rte. 128, one mile west of Ross (Venice), Ohio. Lots of food, flea market, contests, model aircraft flying. $7.00 covers all. Contact: Jim Wellman, W8HSI, 725 Stout Ave., Wyoming, Ohio. 45215.

Rome, Georgia

The Northwest Georgia Amateur Radio Club and Repeater Association, is having its annual hamfest on Sunday, October 7, 1973 at the Coosa Valley Fair Grounds in Rome, Georgia. Everyone is invited to attend. Gates open at 9:00 a.m.

Hamburg, New York

The 1973 Hamburg International Hamfest will be held on September 15, 1973 at 9:00 AM at the Erie County Fairgrounds in Hamburg. Flea mkt., awards, forums, picnic facil., code contest, etc. Food, Admission $2.50 at gate, $2.00 in advance, For tickets and info: Lin Brownell, WB2HCL, 210 Buffalo St., Hamburg, NY 14075. (716) 649-3106.

Peoria, Illinois

The Peoria Area Amateur Radio Club, Inc. will hold its 16th Annual Hamfest Sunday, September 16, 1973, at Exposition Gardens, located on the northwest edge of Peoria, Ill. Lunch, activities for all. A campsite will open night before. Free coffee and donuts from 9 to 9:30 a.m. Banquet. Swapping parking, contests. Advance registration is $1.50. At the gate, admission is $2.00. For details and Advance Registration, write Chairman, Wendell McWilliams, WBDVJ, Box 1, Rome, IL 61562.

Sharon, Massachusetts

The Sharon Amateur Radio Association (SARA) / will be holding an auction on September 16, 1973 taking place at the Sharon Community Center, Sharon. It will begin at 1:00 p.m. Free refreshments. For info., contact: David Sirkin, WN1OZO, 18 Gorwin Dr., Sharon, MA 02067. Phone: 784-2276.

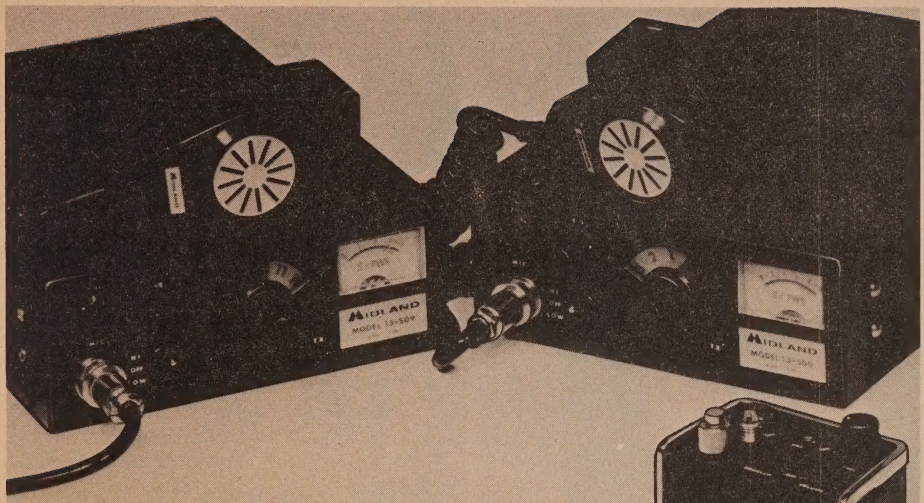
Malaga, New Jersey

South Jersey Radio Association's Hamfest – (their 25th Annual Affair) will be held on Sunday, Sept. 9th, 11 a.m., at the beautiful Molia Farm, Malaga, NJ. Displays of electronic equip., swap shop, games, prizes, swimming. Bring lunch or buy hot dogs, soft drinks. K2AA/2 on the air, begin. 8 a.m., on 3.930 Mhz, 50.3 Mhz, and 145.2 Mhz for mobile talk-in and for SJRA Hamfest info. Contact Bill Brandberg (W2BBN), 322 Lakeview Ave., Haddonfield, NJ 08033 for advance tickets. Adv. Tickets for non-members $2.00, includes family. Latecomers, at gate, $3.00.

Special QSL Card

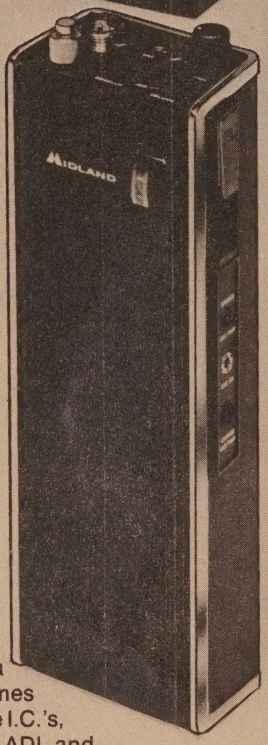
The 100 plus members of the Naval Research Laboratory Radio Club have received special QSL cards to give out commemorating the 50th Anniversary of the NRL. The handsome tri-folded card opens to depict many color photos of the scientific activities of the laboratory.

[Continued on page 78]



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Q AND A

BY CHARLES J. SCHAUERS,* W6QLV



ONE of the big problems facing the amateur today is obtaining components for his construction projects. Many of the big companies who once put out hefty catalogs for ham-electronics experimenters don't do it anymore.

I've tried both in Europe and the USA to obtain certain parts and nearly gave up, but I have found surplus sub-assemblies containing parts not manufactured anymore but which can be used in one's projects!

In the catalogs put out by the larger firms you don't find coils, various variable capacitors, easy-to-use metal boxes for housing small projects etc., so it takes a little digging to come up with what you want. In the larger cities there are still stores that carry "hard to get" parts, but these are becoming fewer and fewer.

Obtaining IC's is no problem, nor are transistors, resistors, fixed capacitors or wire, but try and obtain an odd variable capacitor or transformer (i.f.'s power, etc.) —it is a little difficult.

Anyone have any suggestions?

Transistorized Signal Tracer

"Can you suggest an inexpensive circuit that I can use for signal tracing purposes?"

Sure. See fig. 1. I built this unit into a penlight (flashlight) housing and it works real good. The transistors can be any of the following: for Q_1 you can use a HEP-253, 2N519, 2N426, 2N741A, 2N2929 or equivalent. For Q_2 you can use a HEP-3, 2N1280, 2N2273, 2N974, SK3005 or equivalent.

A 1½ volt mercury cell will power the unit, however an ordinary penlight battery will last a long time.

For more output, run a ground lead to

* c/o *CQ*, 14 Vanderventer Ave., Port Washington, N.Y. 11050

Create a vast improvement in your two meter performance! Get the advantage of 6 db gain transmitting—6 db gain receiving. Both are yours in the Hustler Model G6-144, the antenna designed to establish who is who on two meters.

be "who's who" on two meters with the HUSTLER 6db gain colinear

MODEL G6-144 . . . $42.95

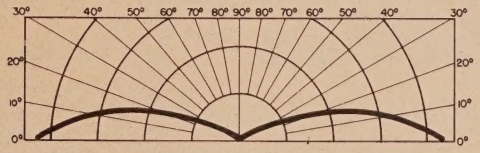
ELECTRICAL:

- 6 db gain over 1/4 wave ground plane
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- SWR at resonance — typically 1.1:1
- 6 MHz bandwidth for 1.5:1 or better SWR
- Power rating—250 watts FM

MECHANICAL:

- Radiator: 133"x 1" — 7/8"-3/8" OD high strength aluminum tubing
- Radials: Four—21" x 3/16" dia. aluminum rod
- SO-239 coax connector
- Wind load—23 lbs. at 100 mph
- Wind survival—100 mph
- Mounting — cast aluminum flange accepts 1" American standard pipe thread
- Shipping Weight: 4.54 lbs.

VERTICAL RADIATION PATTERN



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The G6-144, plus Super Gain two meter mobiles and the "Buck Buster," are available from all distributors who recognize the best!

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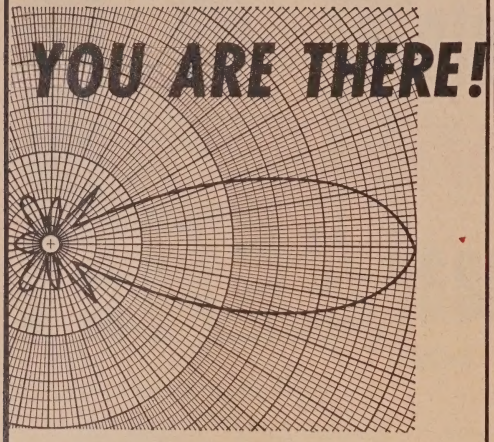
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The design, craftsmanship and technical excellence of Telrex — Communication Antennas.

have made them the standard of comparison throughout the world! Every Telrex antenna model is engineered, precision machined, tuned and matched, then calibrated for easy and correct assembly at your site for repetition of our specifications without 'cut and try' and endless experimentation.

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with a "MATERIAL" difference!

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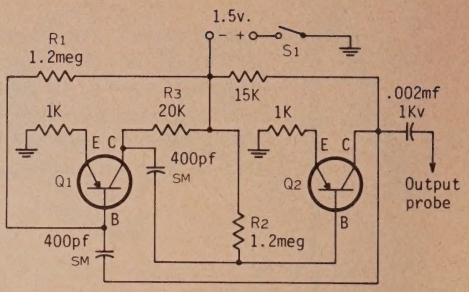


Fig. 1—Simple signal injector. All resistors are ¼ watt. See text for details.

the unit that you are testing.

Adjust the values of R_1 and R_2 *for good* output, adjust R_3 in value (down) for tone.

The output probe is nothing more than about 1" of heavy wire (pointed).

Using the unit, merely touch its probe to the input of any circuit, a note should be heard. It is great for trouble-shooting receivers and hi-fi equipment.

2 Meter Foxhunt Antenna

"I have a portable 2-meter receiver and was wondering what a good antenna would be for 2 meter transmitter location—nothing fancy. What say?"

An ordinary half-wave dipole cut to frequency should work well. Mount the dipole on a tee made of lightweight wood so you can rotate the antenna by hand for maximum signal as read on an S-meter or for a null. Remember that the dipole is bi-directional, though, so keep an eye on the S-meter. Incidentally, if the input to the receiver is not 72 ohms *balanced,* a simple coaxial line should be used with 72 ohm coax feed.

144 mHz Tuner

"With push buttons abounding these days, crystal control, etc., can you give me a circuit (no transistors please!) for a tuner that is simple to make, adjust and use—somehing I can feed into an audio amplifier. It should cover the 2m. band and work on fm."

See fig. 2. I built this little tuner several years ago and it works well. If you will note, it is a super-regenerative detector and it is quite immune to impulse type interference. Its frequency stability is determined largely by how solidly you build it, and its "capture ability" is excellent. Keep all connecting leads *short.*

Savoy

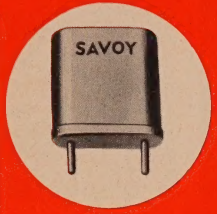
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High efficiency mobile and portable antennas for all amateur bands, CAP, MARS, CB, SECURITY, PUBLIC SERVICE, MARINE, AND GOVERNMENT USE.

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- **Identical size, cost, and appearance**
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MODEL DGA-2M

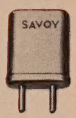
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Quotes on request for amateur or commercial crystals for use in all other equipments.

Specify crystal type, frequency, make of equipment and whether transmit or receive when ordering.



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Complete packaged multi-band antenna systems employing the famous Bassett Sealed Resonators and Balun from which air has been removed and replaced with pure helium at one atmosphere. Operating bands are indicated by model designation.

MODEL DGA-4075	$59.50
MODEL DGA-204075	$79.50
MODEL DGA-2040	$59.50
MODEL DGA-152040	$79.50

BASSETT VACUUM BALUN



The famous sealed helium filled Balun employed with the DGA Series Antenna Systems. Solderless center insulator and easily handles more than full legal power while reducing unwanted coax radiation. Equipped with a special SO-239 type coax connector and available either 1:1 or 4:1.

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5 ELEMENT YAGI
GAIN: 12 db.
Model: MY-144-5

9 ELEMENT YAGI
GAIN: 16 db.
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Matching system incorporates a 200 Ohm folded dipole with a 4 to 1 coaxial balun. Element length is adjustable for critical tuning.

VERTICAL GROUND PLANE...
with special custom features for 150 to 170 MHz.

Gain: 3.4 db. compared to 1/4 wave ground plane. Power Rated: 1 KW AM; 2 KW P.E.P. SSB. Frequency Range: 144 - 148 MHz. with special custom features for 150 - 170 MHz.. VSWR: 1.5/1 or better at resonance.

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Model: DI-2

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Model: DI-2A

For detailed specifications, see your authorized Mosley Dealer or write Dept. 212 . . .

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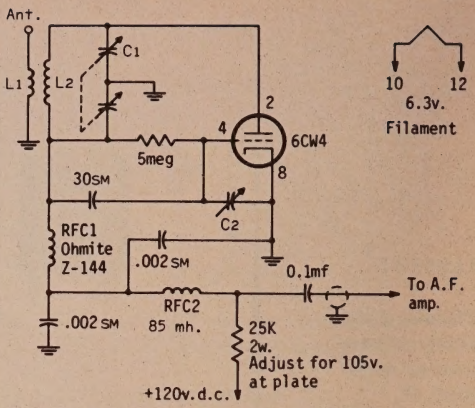


Fig. 2—Schematic of a simple 2-meter super-regenerative detector which can feed a small audio amplifier for general listening on a.m. or f.m. L_1 is 1½ t. #12 enameled wire ¼" dia. L_2 is 4 t. # 16 bare wire ½" dia. Adjust turn spacing to resonate at middle of 2-meter band with C_1 at mid-range. Adjust spacing between L_1 and L_2 for optimum performance. C_1 is a small split-stator 10 pf per section variable capacitor. C_2 is a 5-30 pf compression trimmer. Adjust R_2 for 105 v. at plate of 6CW4. Use a small vernier dial on C_1 as tuning is quite sharp.

Tune the C_1 midway, adjust C_2 and the coupling of L_1 to L_2 for highest noise or loudest 2m. signal. If you wish to use a dipole or multi-element antenna, connect L_1 to the antenna through 72 ohm transmission line.

The tuner will feed into any hi-Z input a.f. amplifier.

Antenna Space Problem

"I recently retired to a 'shuffle board' community for old folks. I've been a ham for over 40 years. Well sir, I'm stymied. 'They' won't let me put up a beam or long wire (although I got permission from a neighbor to erect a pole on his property). Ham radio is my main hobby and without it, I'd go nuts.

"I work all bands and have many friends on 40 and 80 meters in my area that I would like to talk to. What are your suggestions?"

Well OT, join the club! For 10,15 and 20 meters use a vertical For 40 and 80 meters do this: Under the eaves of the house you described you can string a doublet antenna, for 75 meter phone and 40 meter phone operation. Connect the ½ wave elements in parallel and feed 72 ohm coax. You're not out of business yet.

73, Chuck, W6QLV



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Here they are. Your choice of two high quality, fully solid-state, all American made Monobanders. Especially styled and engineered for mobile operation, these handsome units are just 3" high x 8½" wide x 9" deep with a built-in speaker. Completely designed and manufactured by SWAN ELECTRONICS, these new single sideband transceivers feature the very latest practical engineering state-of-the-art developments in amateur radio equipment.

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- Simply connect the Monobander to any 12V DC source and antenna, plug in your mike or key, flip on the power switch and you're on the air!

Select the SWAN MB-40 for 7.0 to 7.3 MHz or the SWAN MB-80 for 3.5 to 4.0 MHz. Whichever you choose, the cost is right-on at $249.95 and your investment is backed by SWAN's warranty and service program that has built a reputation for quality unequalled by any other manufacturer of amateur radio products.

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Name: _____ Radio Call: _____

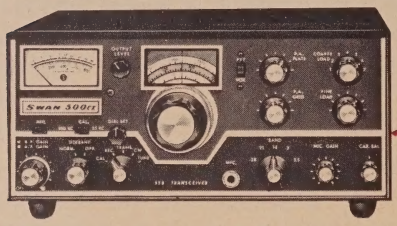
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Here are two single-sideband transceivers that seasoned radio amateur veterans put their trust in, both at home and on the move:



Install a SWAN 500CX and join an elite legion of hams whose experiences have made this the most desired 550 watt P.E.P. transceiver in its class. Enjoy unsurpassed tuning ease, extraordinary signal sensitivity, and transmissions that'll push through noise which would obscure readability in a lesser piece of gear.

500CX, less power supply . . . . $529.95; 117XC, matching AC power supply with speaker . . . . $109.95; 14-117, DC power supply (can be adapted to AC use with $8.00 optional line cord) . . . . $139.95.



Perhaps portability is your need. You can have confidence in the deluxe 270B Cygnet. Compact and lightweight, it has 260 watts P.E.P., a built-in power supply and loudspeaker, plus a solid-state VFO. 12 volt operation is easily adaptable with an optional plug-in DC converter . . . should fit well with vacation plans.

270B, with built-in power supply . . . . $469.95; 14-A, DC converter . . . . $44.95.

Both the 500CX and the 270B cover the five most popular frequency bands — 10, 15, 20, 40 and 80 meters with CW or selectable sideband operation. See SWAN's 1973 catalog for complete specifications.

If you're serious, send us a 10% down payment to your SWAN REVOLVING CREDIT SERVICE account and we'll deliver your choice before another month goes by . . . we don't fool around.

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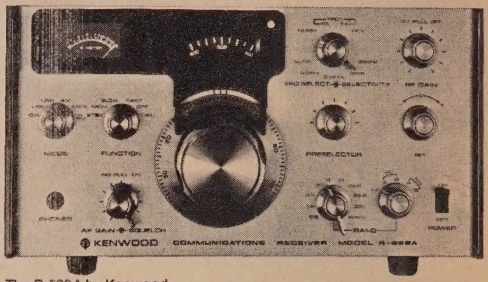
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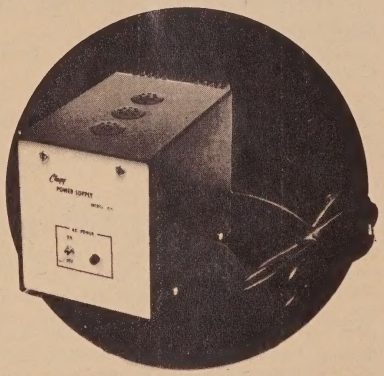
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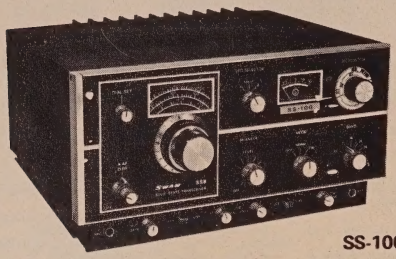
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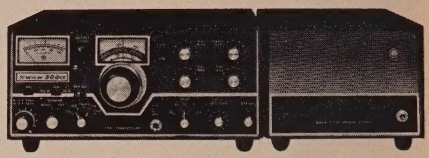
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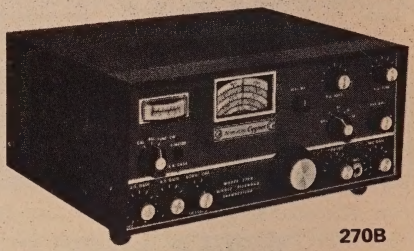
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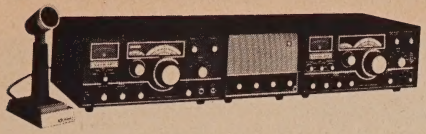


270B

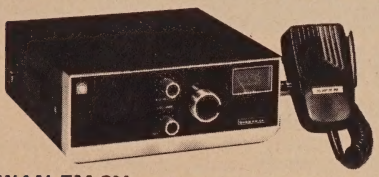
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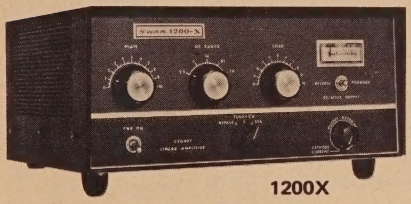


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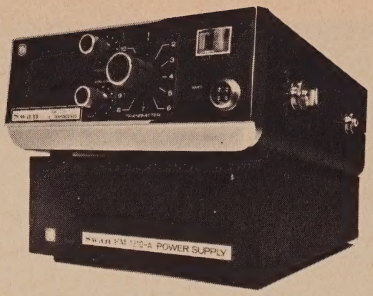
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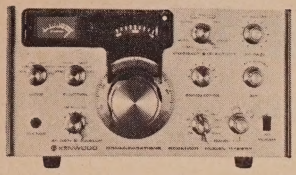
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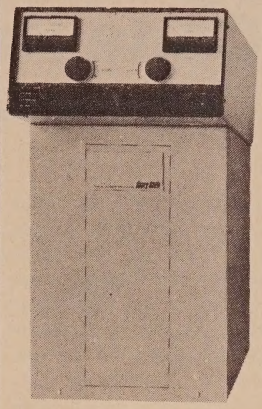
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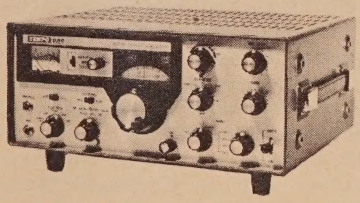
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An Integrated Circuit Morse Code Keyboard

BY ALBERT D. HELFRICK,* K2BLA

THE growing popularity of low cost digital integrated circuits has inspired their use in many communications circuits. The most basic application is to the international Morse code. Several digital Morse code message generators have appeared in amateur literature, along with a handful of keyers, keyboard senders, and a complicated machine to print the code. Here is an all integrated circuit Morse generator using a surplus keyboard, transistor-transistor logic and a unique encoding scheme.

Theory of Operation

In order to understand the mechanism of the keyboard sender, the operation of the individual logic building blocks must be understood. The reader is referred to the literature[1,2] for a discussion of NAND gates, binary counters, flip-flops and shift registers.

In this keyboard sender the Morse character is described by two "data words." The first word will be called "bit count" and the second will be called "dash position." The bit count word is a binary number representing the sum total of dots and dashes in the Morse character. The dash position word, which is the same length as the Morse character, indicated dashes by a "1." For example, the letter C (_ . _ .) has a code 100 1010. The first word is the binary equivalent of 4, or the sum of 2 dots and 2 dashes. The second word indicates that the dashes are sent in the first and third positions. Similarly, the letter G is coded 011 110 and the number 4 is 101 00001.

This method of digitally encoding the Morse characters does not represent the shortest data word length possible. This system has a maximum bit count of nine, that is, three bits for the first word and a maximum of six bits for the second data word (assuming that the Morse sender is required to send only letters, numbers and punctuation). Another system[3] has a bit count of seven. The two additional bits require no extra logic, and this system was chosen to be compatible with an electronic Morse printer designed and built by the author.

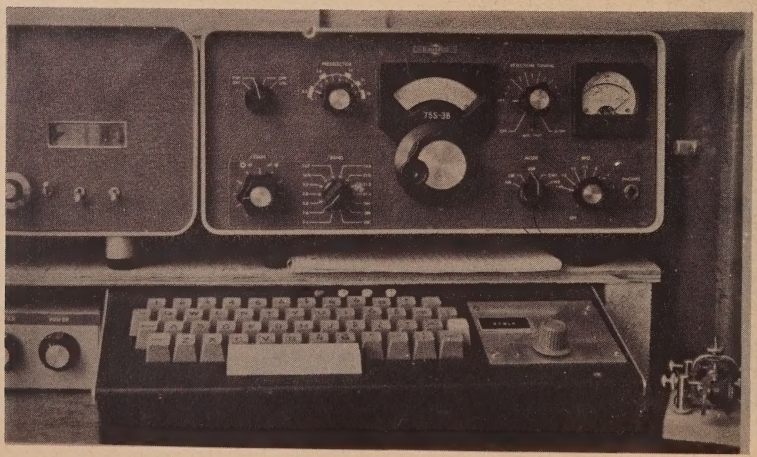
Actual encoding from the keyboard is

*115-B Linn Drive, Verona, N.J. 07044

[1]Malmstadt, Enke. *Digital Electronics for Scientists*, W. A. Benjamin, Inc., 1969.

[2]Texas Instruments. *Designing with TTL Integrated Circuits*, McGraw-Hill, 1971.

[3]Bryant, "Touchcoder II," *QST*, July, 1969.



The low profile of the IC keyboard sender allows it to be handy but not displace important equipment.

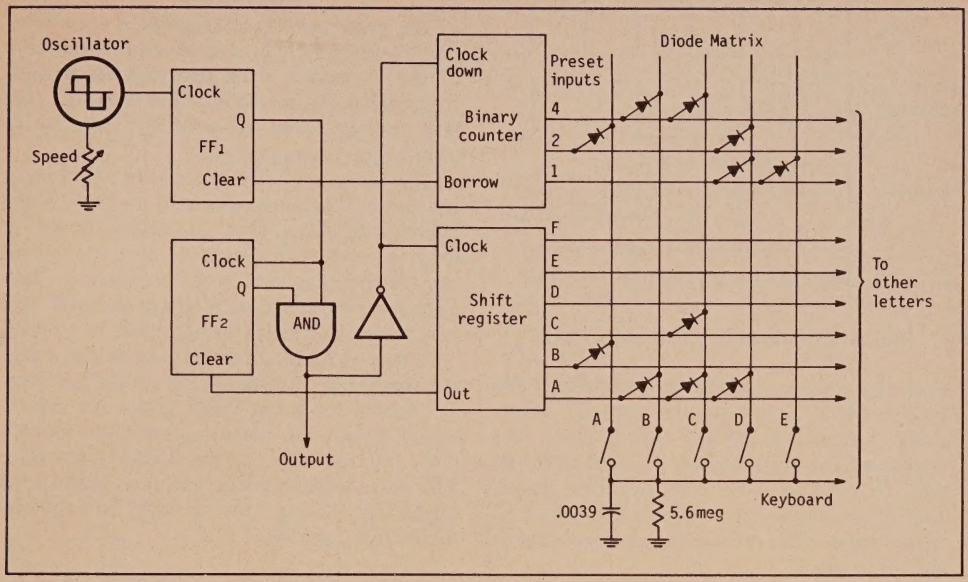


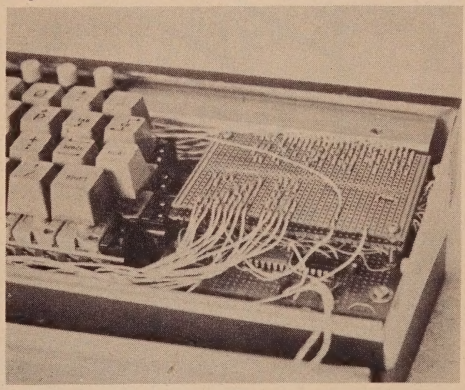
Fig. 1—Simplified schematic of the integrated circuit Morse keyboard with diode matrix shown only for letters A through E. Note that the .0039 mf capacitor and 5.6 meg resistor must be added at the Keyboard and are not shown elsewhere in the schematics.

accomplished by a diode matrix. It was originally planned to use a braided wire encoder to save cost and a prototype sender was constructed using this technique. The method proved unsatisfactory for the unit described since the surplus keyboard was unable to switch the heavy current pulses required.

Figure 1 shows the diode arrangement for the first five letters of the alphabet. Assume the "A" key is closed. This allows current to flow from the binary counter "2" input and the shift register "B" input through the diodes and key switch to charge the capacitor. It only takes a few microseconds for the capacitor to charge to a voltage high enough to stop the current flow. However this is sufficient time to store the data into the counter and shift register. Once the key switch is released the capacitor discharges through the 5.6 megohm resistor which provides a certain amount of key interlocking plus contact bounce suppression.

Sequence of Character Generation

Any key closure presets the up-down binary counter and the "clear" input of FF_1 goes high with the "borrow" output allowing the flip-flop to toggle with the first negative transition of the clock. (See fig. 2.) This initiates the character generation. Consider the letter "R" coded 011 010. The first bit in the shift register is a "0" hence the output of the shift register is low, causing FF_2 to be held low and inoperable. Therefore the second clock pulse returns FF_1 to a low state and sends "dot." The high to low transition of the dot advances



A block of special data entry keys was removed from the surplus Keyboard leaving enough room for the entire electronics package. Only the power supply and relay are mounted inside the rear apron. The diode matrix is bolted to the circuit board for minimum volume.

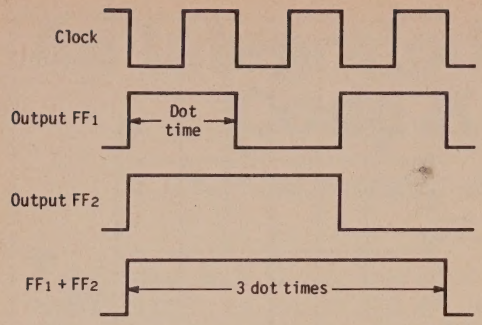


Fig. 2—Waveforms for generating a dash.

both the counter and the shift register. (The bi-directional binary counter actually counts down advancing toward 000.) Now, the output of the shift register is high, allowing FF_2 to operate. The next negative transition of the clock again toggles FF_1 which in turn toggles FF_2, producing the waveforms shown in fig. 2.

The negative transition of the output advances the counter and the shift register. The shift register output is again low, therefore a dot will be sent. Once more the shift register and counter are advanced; however, the counter has been returned to zero. This causes the Borrow output to go low and disables FF_1, completing the character. The machine will remain in this state until the counter is again preset by a keyboard entry.

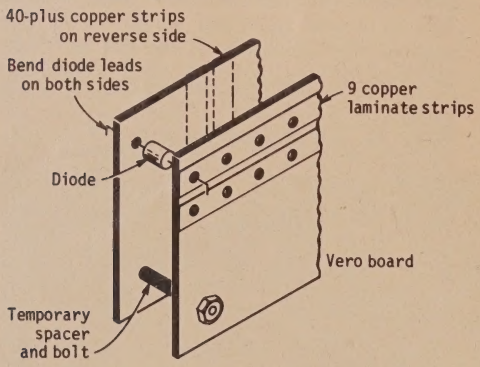


Fig. 3—Construction of the diode matrix. Two pieces of Vero Board is used with copper strips positioned at right angles to each other. As shown in the associated photo, two rows of vertical strips are fabricated on a single board by drilling out the copper strips at their centers. The two corresponding horizontal rows of nine strips on the second board are jumpered together to effect the 40-plus by nine matrix configuration.

Construction

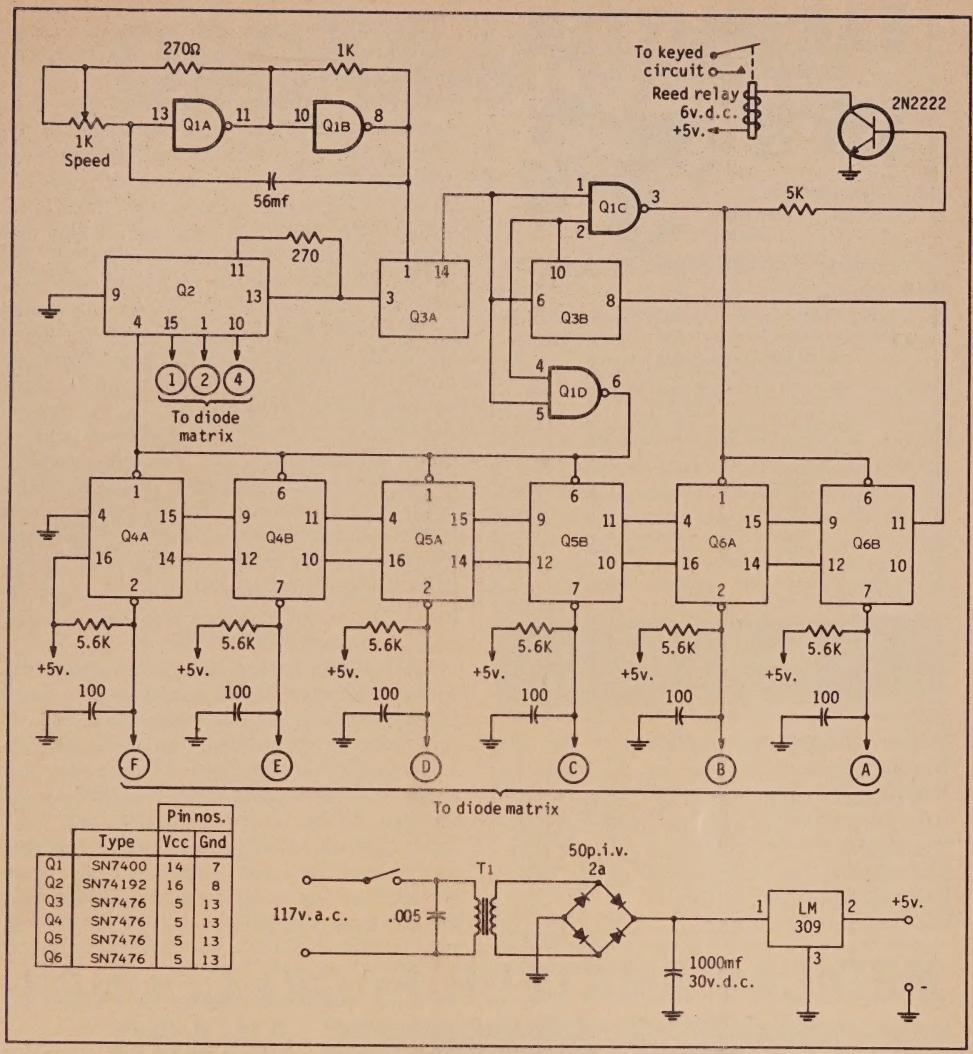
The entire unit is built inside a used computer terminal keyboard. Several of the keys of the keyboard were removed since their functions have no Morse counterpart. This left enough room to assemble the entire electronics package inside.

The integrated circuits are mounted on a pre-drilled copper clad circuit made by Vero Electronics. This type of circuit board is easy to work with and is an absolute necessity for construction of the diode matrix. The copper strips are broken where necessary by careful hand drilling, using 3/16" twist drill.

A successful diode matrix starts with careful shopping. Several surplus supply houses sell diodes for a few cents apiece for silicon signal diodes. Do not use germanium diodes even though their price looks attractive. The reverse leakage current may cause false triggering. I was able to buy 500 silicon diodes for 3¢ each.

	Counter			Shift register					
	4	2	1	A	B	C	D	E	F
.	X	X		X	X			X	X
.	X	X			X		X		X
?	X	X				X	X		
/	X		X	X			X		
A		X			X				
B	X			X					
C	X			X		X			
D		X	X	X					
E			X						
F	X					X			
G		X	X	X	X				
H	X								
I		X							
J	X				X	X	X		
K		X	X	X		X			
L	X				X				
M		X		X	X				
N		X		X					
O		X	X	X	X	X			
P	X				X	X			
Q	X			X	X		X		
R		X	X		X				
S		X	X						
T			X	X					
U		X	X			X			
V	X						X		
W		X	X		X	X			
X	X			X			X		
Y	X			X		X	X		
Z	X			X	X				
0	X		X	X	X	X	X	X	
1	X		X		X	X	X	X	
2	X		X			X	X	X	
3	X		X				X	X	
4	X		X					X	
5	X		X						
6	X		X	X					
7	X		X	X	X				
8	X		X	X	X	X			
9	X		X	X	X	X	X		

Fig. 4—Diode coding chart. An "X" represents a diode.



	Type	Pin nos. Vcc	Gnd
Q1	SN7400	14	7
Q2	SN74192	16	8
Q3	SN7476	5	13
Q4	SN7476	5	13
Q5	SN7476	5	13
Q6	SN7476	5	13

Fig. 5—Schematic of the IC Morse keyboard. Connections to the diode matrix are designated by the circled letters and numbers which correspond to those on the matrix. Transformer T1 is a 12 v. 1.2 a. unit, Radio Shack 273-1505.



The keys are arranged in a standard typewriter format, but unlike the typewriter, several keys have no function (shift, space bar, back space). The knob is the speed adjust.

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CQ Country Chart

A two color, wall-sized country chart is available on poster stock and in large type for only $1.25 per copy postpaid. Address request to: CQ DX Country Chart, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

Careful planning and testing are absolutely necessary, since once the matrix is made it is difficult to repair.

Cut two equal size pieces of the Vero board so that at least nine copper strips run horizontally on one board and forty or more run vertically on the other. Drill two sets of mounting holes and mount the boards together with spacers so they are parallel and about one inch apart. Nine strips on one board will represent the nine data word bits and the forty-odd strips will be connected to the individual keyboard contacts. Push the diode leads through the holes from the center of the two boards and bend the leads so they will not drop out. See fig. 3. Arrange the diodes as shown in figures 4 and 1. When all the diodes are inserted, carefully check your work, and then check it again. Once it is determined that the diode board is correct, remove the spacers and push the boards together. Solder all the leads, being careful not to use excessive heat.

Conclusion

Once the keyboard sender is complete a certain amount of skill is required to send perfect Morse code. Although the keyboard resembles a typewriter, the operation is somewhat different. Only a few hours are required to develop the skill needed to send excellent Morse.

My unit is very light and quick and can send faster than any man can copy. One word of caution is appropriate—don't forget the meaning of QRS! ■

MEDICAL AMATEUR RADIO COUNCIL (MARCO) PRESENTS AWARD

Dr. Earl E. Weston, M.D., W8BXO, Chairman of the Awards Committee for the Medical Amateur Radio Council (MARCO) presents a Certificate of Merit to Walter H. Thain, M.T., W4KKB, a noted cytotechnologist of Miami Court, Florida. The award is in recognition of Walter's activity as Liaison Officer in handling medical traffic and relaying messages and requests for medical assistance particularly from the South American area. The award was presented at the annual meeting of MARCO held in conjunction with the American Medical Association meeting last June in New York. For further information on MARCO and their medical traffic nets write them at: P.O. Box 229, Manchester, Conn. 06040.



OSCAR-Mobiling

BY FRED J. MERRY,* W2GN

AMATEUR *radio history was made on March 22, 1973 when Fred Merry, W2GN, made the first successful QSO through an amateur satellite from a* mobile *station. Since then he has had over 150 mobile contacts, working all USA districts and four countries. He's also OSCAR-Mobiled into Kentucky and Vermont to put these rare states on the air via OSCAR-6 for the first time. Here's his story.* —W3ASK

I WAS installing some 2 meter f.m. gear in my new car recently, when I suddenly realized that all I had to add to have a 100-watt mobile OSCAR-6 ground station were the necessary crystals for the 2 meter up-link, keying facilities for c.w., a ten meter receiver and a ten meter antenna. Giving it a little thought, and using an available h.f. transceiver and ten meter mobile antenna, it took an additional day or two to get the mobile station ready. Once installed I impatiently awaited the next overhead pass of OSCAR-6. What a thrill it was to hear my own c.w. signals coming through the ten meter down-link on the first test of the equipment. I was able to hear them for almost the entire pass, with signal levels varying between S3 and S6. I was so fascinated with my own signals that I forgot about trying to work someone!

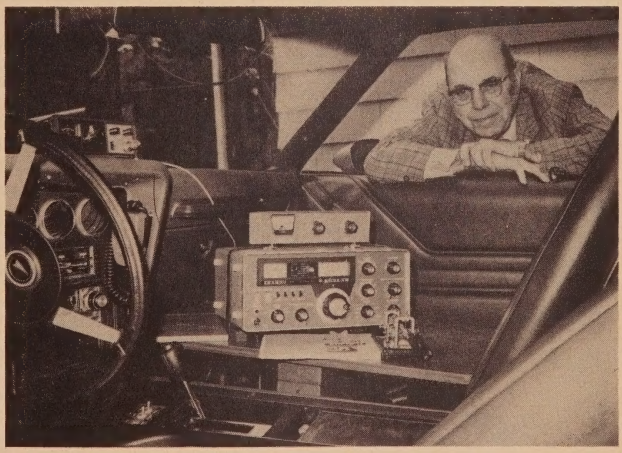
With the set-up shown in fig. 1 I was now in business, and the rest is history. I made what is apparently the first mobile to base station contact through an amateur satellite with Jack Colson, W3TMZ, during orbit number 1983 of OSCAR-6, on March 22, 1973. The contact was made despite some difficulty with a high noise level at my end, even though I thought that I had driven out to a real quiet country location.

I purposely picked a spot high over the city of Albany, N.Y., where the view was clear for miles around. It *was* nice and quiet electrically when I checked it out during the day, but during the evening overhead pass of OSCAR-6 the noise from all those lights in the city increased to a level which almost masked the signals from W3TMZ.

From this I learned a valuable lesson about choosing a location, and the great advantage of a mobile station. If you don't like your present QTH, you can always move to another one with ease!

Now I drive around and look for electrically quiet locations, being sure to check

*35 Highland Dr., East Greenbush, N.Y. 12061



Fred Merry, W2GN looking at the operating position of his mobile OSCAR-6 ground station. Two meter exciter is at upper left, with keying lead draped over dash. Transceiver for ten meter down-link is at lower center, with s.w.r. meter mounted on top. A Vibroplex key, log and notebook complete the station, except for the 100-watt amplifier mounted in the truck and the externally mounted two meter whip transmitting antenna and ten meter receiving antenna.

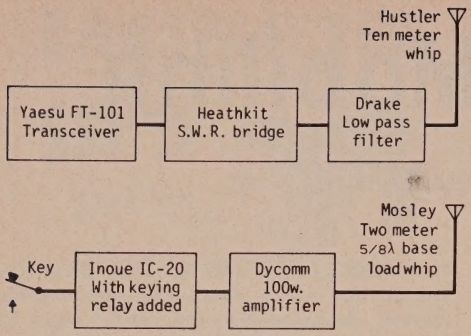


Fig. 1—The equipment used in W2GN's OSCAR-6 mobile ground station. Fred has made over 150 contacts in four countries using this 100-watt mobile station.

them out at the right times. Quiet spots are easy to find in the countryside, off the main highways and free from nearby obstructions, where receiving conditions for OSCAR-6 are usually great when compared to most home locations.

Completely fascinated by the successful contact with W3TMZ, I drove to other nearby spots during later overhead passes. Contacts were made with W5VY on orbit 1990, with W9RGH during orbit 2002, with W9MAL and K1HTV during orbit 2003. During orbit 2008 I worked three stations; K1HTV, W9RGH and W1JSM and during orbit 2015 it was W4PSJ and W7ZC.

With the great excitement inspired by these QSOs, on March 26 I decided to drive over to ARRL Headquarters in Newington, Conn., to demonstrate the mobile OSCAR-6 station. In the Leagues's parking lot, under all of those W1AW antennas, and with Bill Dunkerley, WA2INB and Dave Sumner, K1ZND in the car, we readily made contact on orbit 2028 with W7ZC, K4TI and K6DS, for my first trans-continental mobile OSCAR-6 QSO.

Up to this point I was using a 5/8 wave base-loaded 2 meter whip antenna. I next tried a Squalo mounted a short distance above the car roof. With this antenna I worked KØDDA, W4PSJ and W9JIY. It didn't seem to perform any better than the whip, so I remounted the whip and proceeded to work W7ZC and W8DX. Next I tried a "big wheel" antenna, mounted on a box over the car roof. I worked WØJKF, VE3TW and K4TI with this set-up, but it still didn't seem any better than my original whip, so back went the whip. Of course, these meager tests are not conclusive, and I plan to conduct further tests to determine what type antenna is best for QSOs via the satellite from a mobile station.

The next interesting episode took place on April 2. I briefly summarized the results of my mobile operations on the regular Monday night AMSAT OSCAR-6 net on 3855 kHz.[1] Thinking of what to do next, the idea suddenly struck me. Why not use the mobile station for DXpeditions to states where there was no OSCAR-6 activity. One such state was Vermont, an adjoining state less than an hours ride from my QTH. As luck would have it, I had to make a trip to Bennington, Vermont on April 5. So, while the net was buzzing along I made some quick orbital calculations and I let them know that I would be operating from Bennington during orbits 2152 and 2153.

Unfortunately, I couldn't do anything about scheduling some good weather for the trip, and the morning of the 5th found me in the middle of a severe April snowstorm a couple of miles west of Bennington. But that's no real problem when you're mobile. Turning the equipment on, I worked K1HTV, W3TMZ, VE2BYG and WB2DEI on orbit 2152, for the first OSCAR-6 QSOs from Vermont.

By the next orbit, I made it to Bennington, and operated from Battle Monument Hill. I worked K1HTV, W3LUL, WØJKF, K7BBO, W5VY, W7ZC, W6BGJ, W8DX and WA4JID. What a tremendous kick it was. For the first time in over fifty years as a radio amateur, stations were falling over themselves trying to work *me*.

On April 27th I arrived at the Dayton Hamfest to demonstrate my mobile OSCAR station. Working from the parking lot, with great difficulty because of ignition noise, I managed a half dozen contacts.

There are plenty of Ohio stations working through OSCAR-6, but none in the adjoining state of Kentucky. I decided to OSCAR-Mobile in that direction, just a few hours away.

During five orbits on April 29 and 30, from Florence, Kentucky I managed a total of 38 contacts. It was a real circus for me, and I worked all USA districts, plus a VE2 and a VE6, and my first real DX—OX3DL in Greenland!

[*Continued on page 79*]

[1] See "OSCAR-6 News and Orbital Predictions," appearing in this issue of *CQ* for additional network information.

CQ Reviews: The Miida Model 6354 Mini-Multimeter

BY WILFRED M. SCHERER,* W2AEF

Not so long ago a digital frequency counter by Miida Electronics was described on these pages.[1] Another digital instrument now has been added to their line: the Model 6354 Mini-Multimeter (a DMM).

The Model 6354 provides a maximum readout of four digits up to 1999 with automatic placement of the decimal point for d.c. and a.c. voltages and for resistances.[2] The d.c. voltage ranges are 2, 20, 200 and 1000 v. full-scale; the a.c. ranges are 2, 20, 200 and 350 v. r.m.s. full-scale; resistance ranges are 200 ohms, 2K, 20K, 200K, 2M, 20M, and 200M full-scale. D.c.- and a.c.-current reading are possible using a current-measuring accessory.

A particularly handy and time-saving feature is an auto-ranging system that eliminates manual switching of the ranges. Range selection takes place automatically as needed to provide the greatest resolution or the maximum number of digits in accordance with the input. There also are provisions for holding a specific range for any function or for retaining a given reading when the source under test is removed or changes in value.

Details

Neither a circuit description nor a schematic was supplied with the operating manual, so details in this respect cannot be given; nevertheless, it can be said that besides being a solid-state job using transistors and IC's, the 6354 operates on the dual-slope principle with an analog-to-digital converter the data from which is counted, decoded and displayed by Nixie tubes.

A.c. potentials are converted to d.c. for application to the d.c. measuring setup, while resistances are determined by a particular constant current passed through the unknown resistance, across which the d.c. voltage drop is measured and indicated in terms of resistance.

The auto-ranging system appears to be handled by tiny reed relays that do the range switching in accordance to the applied potential as directed by a sensing arrangement.

Construction

The instrument is manufactured in Japan; nevertheless, Texas Instruments IC's are incorporated in it. The IC's and transistors are soldered directly to the two circuit boards. Of glass epoxy, stacked one above the other and secured by screws along several edges. Interconnections are made through stationary flat circuit-board type connectors at the rear of each board. Servicing the unit under operating conditions thus is not easily conducted without separate associated interconnecting test leads, making it necessary to return the unit to the manufacturer should trouble arise.

The function selectors are interlocking type switches operated by depressing small levers similar to those used for selecting the various voices on an organ. The side of the board at which the switches are installed rests in a groove at the rear of the front

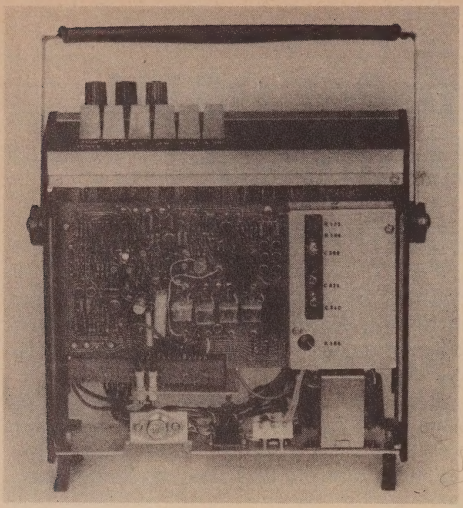


The Miida Model 6354 Mini-Multimeter.

*Technical Consultant, *CQ*.

[1] "*CQ* Reviews: The Miida Digipet-60 Digital Frequency Counter," *CQ*, November 1972, p. 44.

[2] Thus making the DMM what is known as a 3½ digit unit.



Interior View of the Miida DMM. Only one circuit board may be seen; the second one is stacked below it.

panel; however, there is sufficient play in this groove to allow the board to flex somewhat when the switches are operated. This could be a potential cause of eventual trouble. To forestall this possibility, it might be well to install a shim, say of cardboard, between the board and the supporting groove to prevent movement of the board.

The instrument is contained in an easily removed ventilated-metal case at the rear of which are brackets around which the associated cables may be wrapped for storage. These brackets also serve as supporting feet when it is desired to place the unit in an upright position. A bail-type handle also is provided which may be used as a tiltup stand held in various positions quite securely by serrations at the swivels.

Operation

There are three banana-jack input terminals one of which is a black common one that is used in conjunction with a red one for voltage measurements. D.c. potentials are then read by depressing the d.c. lever and a.c. readings are made with the a.c. lever depressed. D.c. polarities are automatically indicated by a **plus** or **minus** sign and the decimal point shifts in accordance with the range that is automatically set up.

Resistance measurements are made using the common input and a third jack, a green one. There are three levers for different groups of resistance ranges. An **ohms** (Ω) paddle handles the 200-ohms range; a KΩ paddle sets up operation for the 2K, 20K and 200K ranges any of which is then automatically selected at this position; an MΩ paddle similarly takes care of the 2M, 20M and 200M ranges. A bit of manual switching is thus required for selecting the desired resistance-range groups.

The input terminals are floating; this is, they are above chassis-ground. Isolation between chassis and the common terminal is such that will withstand 600 v.d.c. continuous. That between the common and high-potential terminal will stand up to 1000 v.d.c. continuous. That between common and ohms input will handle 100 v. a.c. or d.c. for 10 seconds.

An overrange indicator is included,[3] but this usually is not needed due to the auto-ranging system, except during some of the resistance measurements and where the unit has been set for a fixed range. The latter is provided by depressing a **Hold** lever at the time a reading at the required range is indicated. Subsequent application of another potential in this range will indicate (on this one range) the voltage within the normal response time of 0.4 seconds (with d.c.) or 2 seconds (with a.c.) without having to wait for the auto-range switching response of 400 ms per range. This together with the good **on-range** response speeds up operation when a series of measurements are required on one particular range.

At this time the decimal point also is fixed; therefore, the indicated value will have less resolution below 10 percent of the full range than if the next lower range were in use, so the range will have to be changed accordingly where higher resolution at the lower values is desired.

Holding a reading after the source under test has been removed or before its value changes is easily handled by inserting a shorting-plug at the rear of the unit at the time the quantity is displayed. Where this feature often is used, it may be more convenient to remove the short from this plug and rewire a switch to it to enable the shorting-unshorting operations.

Performance

In respect to the other specifications, the

[*Continued on page 78*]

[3] The maximum overrange percentage is 10% of full scale.

A VFO Keying Switch For QRP Operation

BY ALEX M. CLARKE,* K4JYM

THE popularity of QRP operation, documented and aided by the increasing number of simple but effective QRP transmitters and tranceivers available commercially, is one of the really fun things that has happened in ham radio in the past few years, with more and more converts to the weak signal mode appearing every day.

Although the low power/high operating skill aspect is one facet of this ever increasing popularity, the relatively low cost of QRP gear is a definite factor. The low cost aspect is no reason for accepting anything but the highest in operation efficiency, however, particularly since it is so easy to add frills to the QRP station that make it compete favorably in operating ease with the most sophisticated setup.

Figure 1 gives the schematic for a v.f.o. switch which is compatible with the keying of the Ten-Tec rigs and modules, the Heath HW-7, and many of the homebrew projects that have appeared in the ham mags in the past several years.[1] It allows the v.f.o. to be turned off when the key is up, so QSK operation is possible, and can be used to add an outboard v.f.o. to an existing tranceiver circuit. The circuit is similar to one we used earlier in a Ten-Tec module rig.[2] Unfortunately, that circuit turned out to be sensitive not only to the specific transistor used, but also to voltage as well. This wasn't too much of a problem, but did represent a duplication difficulty for the ham not up on the use of switching transistors.

How It Works

Q_2 is the switching transistor, and is on (closed) when its base is biased more negatively than its emitter. Since most transistor v.f.o. circuits draw only 10 ma or so at 12 volts, and in fact will oscillate with a V_{cc} of only 3 or 4 volts, Q_2 must be firmly *off* to keep the v.f.o. from being heard in the receiver, yet must be saturated *on* when the key is down to keep the v.f.o. from chirping or drifting.

Tying the base of Q_2 to the key jack through a sufficiently large resistor to keep Q_2 from leaking a milliampere or so to the v.f.o. results in not enough current to the v.f.o. under key down conditions. The easiest answer, also used in the Ten-Tec AC-7 "vox" switch (where do you think I got the idea, anyhow?) is to tie the base of Q_2 to the collector of Q_1 through a resistor R_3. Now by switching Q_1 in its emitter lead, we can bias Q_1 on fairly hard with the R_1-R_2 biasing network, yet have not only the "open" circuit in the emitter of Q_1, but also the "high resistance" reversed base-collection diode junction of Q_1 to ensure Q_2 doesn't conduct. The 3.3K base resistor for Q_2 keeps the base from drawing more than 4 ma, so a current gain of 4 at Q_2 is sufficient to let 16 ma through to the v.f.o. (chosen since the Ten-Tec VO-1 draws 15 ma or so). The R_1-R_2 biasing resistor network assures us that Q_1 is hard off with the emitter of Q_1 floating on at anything higher than 0.6 volts. Although 2N3638 and 2N3641 transistors, available at Radio Shack and other distrib-

[*Continued on page 79*]

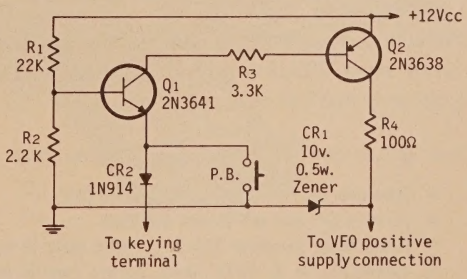


Fig. 1—Circuit of a v.f.o. keying switch for QRP operation. Switch may be used with any of the common solid-state QRP rigs to provide full QSK operation without the "backwave" problems sometimes encountered. All resistors are ½ watt.

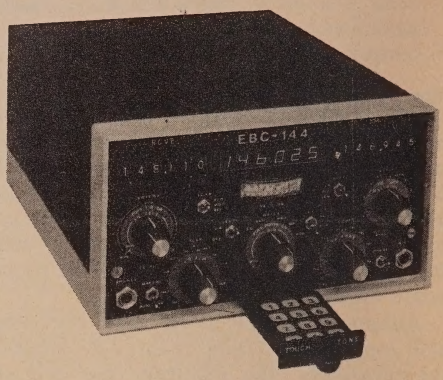
*7707Hollins Road, Richmond, Va. 23229

[1] Demaw, Doug, W1CER, "Once More With QRP," *QST*, Aug. 1970.

[2] Clark, Alex, K4JYM and Strickland, Lance, K4AUN, "Quick and Easy QRP," *CQ*, Jan. 1972.

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1972 CQ WORLD WIDE DX CONTEST: C.W. RESULTS

BY FRANK ANZALONE,* W1WY

We were a bit apprehensive of the outcome of the c.w. section of the 1972 contest. What with the deteriorating conditions on the h.f. bands and the swing to s.s.b.

However we more than held our own; as a matter of fact we had a modest increase over last year's returns, and the 1776 logs received coupled to the 1710 received in the Phone Contest puts us well above any previous record for this or any other contest. So don't sell c.w. short. There's still a lot of activity on the low end of the bands.

Conditions in general were not too bad, depending on where you were located. The forcast had been for below normal for this period, but I would say conditions were fair for at least part of the weekend. A revised updated forcast by W3ASK indicated an improvement, so George did not completely flunk out.

As a whole the accuracy of log keeping was much better than what we found in the phone contest, but we still found it necessary to correct some scores. A few may be surprised to find their scores have been reduced.

*Chairman, *CQ* Contest Committee



No, this is not a multi-operator station, just the family showing an interest in ZE8JN's contest operation. Neil was "Top Banana" in the world on 10 meters by a wide margin.

A few were not so fortunate however and had to be disqualified (see separate list). We just will not accept entries that make no effort at taking out duplicate contacts, or are creating an imaginative multiplier.

Working the same station more than once on the same band is sometimes unavoidable, but we do insist that before a log is submitted all these duplicate contacts must be crossed out and no credit taken. A recopied log should be an exact copy of the original showing all the deletions.

The fact that the number of disqualifications is much lower than that of the phone contest indicates that c.w. is a more accurate mode of transmission than phone.

Some of the new contestants are uncertain in the country breakdown in determining their country multiplier. We use the ARRL DXCC list as the standard for world wide contacs. In addition, however, we also recognize the WAE list for European contacts, which lists a few additional areas that are not on the ARRL list. The WAE country list appeared in the July CONTEST CALENDAR under the WAE contest announcement. This year DM/DT, East Germany will count separately from DL/DJ/DK, West Germany. It is hoped that the ARRL will also give separate country status to East Germany now that the DARC has made the move.

You will notice that we have listed Novice stations separately. There has been an increase in the number of Novice entries and if this interest continues we will continue to give them separate recognition.

In the battle for top club honors the Potomac Valley Radio Club turned the tables on the Frankford Radio Club and recaptured the Number One position and the *CQ* Club Plaque. But is was a close one as you will see by the standings. A breakdown of the scoring showed the FRC had a higher score in the phone section, but the

PLAQUE & TROPHY WINNERS

Single Operator, Single Band

WORLD—North Jersey DX Association. Earl Lucas, W2JT Memorial. Won by Manuel Castelo, CW9BT (21 mHz)

Single Operator, All Band

WORLD—Larry LeKashman, W9IOP Trophy. Won by Ville Hiilesmaa, ZD3Z (OH2MM)
U.S.A.—Frankford Radio Club Trophy. Won by Ronald Sigismonti, W3WJD.
EUROPE—W3AU Operators' Trophy. Won by Algis Kregzde, UP2NK.
CARIB./C.A.—Harold Fox, W3AA Plaque. Won by James Perry, TI2WX.
AFRICA—Gordon Marshall, W6RR Plaque. Won by Mike Sherman, ZS6IW.
ASIA—Japan CQ Magazine Trophy. Won by Peter Rushakov, UM8FM.
OCEANIA—Maui Amateur Radio Club Trophy. Won by P. W. Watson, ZL3GQ.

Multi-Operator, Single Transmitter

WORLD—Dr. Anthony Susen, W3AOH Trophy. Won by Station PJ2VD. (Oprs. PAØLOU, PJ2ARI, PJ2CB, PJ2VD)

Multi-operator, Multi Transmitter

WORLD—Hazard Reeves, K2GL Trophy. Won by Station CW3AA. (Oprs. CX1AAC, CX1BBL, CX2AL, CX3BH, CX4AQ, CX7CO, CX8BBH)

Contest Expedition

WORLD—Dr. Donald Miller, W9WNV Trophy. Dr. Harold Megibow, K2HLB Memorial. Won by Ville Hillesmaa, ZD3Z (OH2MM)

CQ Club Award

Potomac Valley Radio Club

PVRC more than made up the deficit in the c.w. scetion of the contest.

Compiling the club scores was quite a chore. Many clubs were negligent in submitting a list of their participating members and their claimed scores, making it necessary for us to do a lot of researching. In the future a club will only be credited for the list of scores submitted by their Secretary or Contest Manager. We will check the list for accuracy but don't expect us to dig through the logs and give you credit for stations you have not claimed or for members who neglected to indicate their affiliation. *CQ* is making up a new form for club entries and they will be availlable for this year's contest.

Choosing the Contest Expedition winner presented no problem, it was an easy choice. Ville, OH2MM did such an outstanding job from ZD3Z that we just had to award him the Don Miller W9WNV Trophy. We were disappointed, however, in not seeing more expedition stations. Seems the phone men are more expedition minded.

One expedition we were happy to see was the ZF1GS solo on 160 by W4BRB. Gene had been planning for this one for a long time. It must have been a satisfying experience for him in that he established a new world's record on that band. Gene had one gripe however, many W/K8's gave their Zone as 05. Its Zone 04 of course; only West Virginia is in Zone 5.

Bill Frisbie made a flying trip over to Jordan and put JY9FB on 20 for the contest and got back home in time to put EP2FB on 40 for a few contacts before it was over. Under Iran you will note that EP2BQ is still handing 'em out on 160.

ZL3GQ found the action very enjoyable in his first serious attempt. Think Pete will also find it rewarding when he is informed that he is the winner of the Oceania Trophy.

The Carib./C.A. and Africa Plaques donated by W3AA and W6RR respectively are still not generating the activity they merit, especially in the c.w. contest. For instance this year's Carib./C.A. award goes to TI2WX who apologized for his modest score due to his low power of only 75 watts.



The W3AU c.w. crew. Front Row: WA3IAQ, K3EST, WA2DHS, WA1LKX, Back Row: WB2SQN, W3AU, Ed Bissell, the Boss Man himself, W3ZKH, WA3AMH, W3IN, WA3HRV and W3GRM. (The big question: could this crew operating individually equal the score as a multi-multi?)

Single Operator - All Band

Station	QSO's						Zones						Countries					
	1.8	3.5	7	14	21	28	1.8	3.5	7	14	21	28	1.8	3.5	7	14	21	28
ZD3Z		127	355	989	997	1035		13	13	30	25	18		24	30	65	55	60
KH6RS	21	356	652	743	743	475	4	14	26	28	28	21	3	20	36	64	41	26
4M4AGP	30	279	475	548	647	582	8	13	19	30	23	19	12	27	39	66	53	44
W3WJD		138	215	295	323	150		20	28	36	30	20		46	70	88	81	51
K1LPL/3		90	424	290	352	123		13	26	29	27	15		30	67	71	64	43
W1BGD/2		104	216	360	335	150		13	26	32	27	21		39	63	79	61	53
K6AHV	5	93	402	396	262	140	3	18	26	32	25	21	3	26	49	71	52	27
ZL3GQ		42	154	364	406	526		12	18	28	24	23		12	26	56	55	48
ZS6IW		16	78	566	443	200		9	21	32	25	25		14	37	70	56	56
K1NDL		128	267	289	249	146		15	26	33	26	18		39	60	78	59	47

Multi-Operator - Single Transmitter

PJ2VD		295	340	660	706	488		12	18	28	20	20		27		51	51	50
UK5IAZ		207	394	481	651	152		20	25	34	33	28		50	69	96	94	71
K1DIR	13	110	419	334	319	206	6	20	27	33	27	20	9	47	79	84	75	59
LZ1KVV		238	474	425	496	221		14	26	32	26	26		50	65	76	65	59
VE1ASJ	43	267	388	620	314	367	4	16	16	31	23	20	6	35	37	73	51	47
UK3AAO		118	130	553	262	152		16	26	35	28	27		51	58	86	75	75

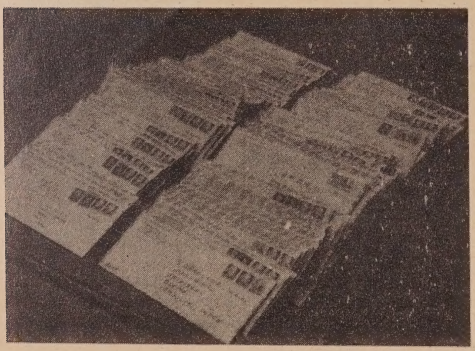
Multi-Operator - Multi-Transmitter

CW3AA	6	85	458	1419	1638	1119	5	9	22	34	32	27	5	10	37	79	79	67
W3AU	37	299	677	884	693	382	9	22	31	38	32	24	18	57	88	107	88	72
W4BVV	18	295	629	740	687	399	7	20	30	37	32	24	8	57	80	111	81	69
W7RM	70	268	824	954	643	261	13	22	31	37	33	21	15	34	68	106	85	38
DJ2BW	223	587	608	1034	680	243	4	13	25	35	29	25	14	55	78	92	85	51
SK6AJ		528	798	731	466	259		13	32	34	28	28		49	78	79	54	68

Band-by-band breakdown of top all-band scores.

Since winners of *CQ* Contest awards are not eligible for the same Trophy for a period of 3 years, this leaves the field wide open and some of you fellows are missing a good thing by not giving it a try. Put in that little extra effort—you may be pleasantly surprised.

Not much in the way of soap box comments, just the run of the mill. "Great contest," "condx surprisingly good," "condx were lousy," "Murphy struck again," "why don't DX stations sign more often?" "Generals should be classed in a separate division," "how about a power multiplier," "where's my certificate for last year's contest?" (strike that last one), etc., etc. Guess c.w. men are not too vocal; anyway I've run out of space.



View of some of the inquiries mailed out to verify results of the 1972 contest.

Following stations have been disqualified because of taking credit for excessive duplicate contacts and other log discrepancies. G3RUX, K6SEN, K8HLR, KV4FZ, SP5ELA, SP9AQY, VK2APK, WA5JMK, WB5DYY, YU1HYE.

Just mentioning the names of the members of the Committee seems so inadequate. These fellows do a terrific job each year. Take my word for it, you have no idea of the work until you have actually been involved. Ask Dave Donnelly, WB2SQN and Dick Norton, W6DGH, the new members on our staff. The rest of us, Fred Capossela, W2IWC, Bob Entwistle, W1MDO, Ralph Nichols, W1CNU, Andy Malashuk, W1GYE, Gene Walsh, K2KUR, Bernie Welch, W8IMZ and Bob Cox, K3EST have known for a long time what we are in for. Some times we get no thanks or appreciation, like K3EST who was not even mentioned in last month's Phone Report. Sorry about that Bob, you can blame me for that goof, and to try and make amends I'll leave out my name. But not Sue Buschlinger who did a tremendous job back at the office.

73 for this one, W1WY

TOP SCORES

SINGLE OPERATOR

ALL BAND

ZD3Z	**3,504,492**	W1BGD/2	1,386,072
KH6RS	2,748,307	K6AHV	1,335,046
4M4AGP	2,578,665	**ZL3GQ**	**1,318,834**
W3WJD	1,527,500	**ZS6IW**	**1,313,070**
K1LPL/3	1,436,435	K1NOL	1,254,729

SINGLE BAND

28 mhz		7 mHz	
ZE8JN	197,397	K6EBB	228,786
YU3TVP	110,074	W5WZQ	189,711
W4KFC	100,631	YU3EY	176,548
ZL1IL	98,580	W2DXL	171,384
K1LWI	82,064	OH2KK	163,512
XW8EV	80,808	UB5LL	150,720

21 mHz		3.5 mHz	
CW9BT	**696,193**	DL7AV	110,424
CX1JM	494,283	W1MX	80,410
KA6AY	284,688	W3MFW	74,976
G3HCT	245,108	UB5CI	74,112
JH1DTC	243,936	YV5AW	65,000
K8WWU	168,945	DJ5PN	64,440

14 mHz		1.8 mHz	
CR6IK	680,088	ZF1GS	11,124
YV4AJ	603,591	GM3WSF	5,280
PZ1AH	457,583	OK1ATP	4,316
LU5HFI	435,768	VE5XU	3,451
PY7AKQ/6	320,824	WA4SGF	2,542
6G1AA	301,143	W1BB	2,088

MULTI-OPERATOR
SINGLE TRANSMITTER

PJ2VD	**2,400,664**	LZ1KVV	1,793,754
UK5IAZ	2,112,240	VE1ASJ	1,749,766
K1DIR	1,985,310	UK3AAO	1,628,474

MULTI-OPERATOR
MULTI TRANSMITTER

CW3AA	**5,679,260**	W7RM	4,229,727
W3AU	5,031,982	DJ2BW	3,527,425
W4BVV	4,476,912	SK6AJ	2,522,341

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

SINGLE OPERATOR
NORTH AMERICA

United States

K1NOL A
1,254,729 1329 118 283

W1YK A 1,235,097 1284 91 242
(Opr. WA1JLD)

W7TML/1		489,048	598	89	198
K1THQ	"	308,256	322	102	236
W1PL	"	274,170	386	76	171
W1GMF	"	158,976	272	63	144
W1CNU	"	86,173	213	42	95
K1YXK	"	85,956	201	56	100
W1IHN	"	74,120	165	55	115
W1RML	"	44,811	142	49	68
W1WY	"	38,038	154	30	61
W1MDO	"	36,424	110	43	73
W1FLM	"	36,045	152	22	59
K1GUD	"	33,744	151	27	49
W1VF	"	31,059	112	43	76
W1AM	"	21,638	83	39	59
W1PLJ	"	16,724	79	25	49
WA1JSD	"	15,265	76	25	46
W1AWE	"	9,052	50	24	38
K1CSJ/1		4,180	37	11	27
K1LWI	**28**	**82,064**	**307**	**24**	**68**
K1HVV	**21**	**118,755**	**477**	**26**	**65**
WA1JUY	**14**	**201,728**	**543**	**35**	**93**
		(Opr. WA1ABV)			
K2LQQ/1		45,050	184	24	61
WA1LAI	"	77	4	3	4
W1MX	**3.5**	**80,410**	**329**	**22**	**64**
		(Opr. WA1CQW)			
WB2CKS/1		14,193	47	17	40
K1OME	"	12,122	199	9	29
W1SWX	"	2,975	30	14	21
W1BB	**1.8**	**2,088**	**33**	**7**	**17**

W1BGD/2
A 1,386,072 1165 119 295

W2GXD
A 1,064,196 895 116 296

K2TQC	"	472,410	566	95	195
K2KUR/2		460,502	610	77	182
K2QIL	"	356,328	501	73	179
W2GGE	"	333,472	420	86	186
W2FVS	"	245,349	369	73	160
W2UI	"	183,293	316	65	144
WB2YIK	"	161,100	243	77	148
K2MFY	"	105,876	242	47	106
K2FL	"	92,129	187	63	118
W2HUG	"	67,667	170	64	93
W2CVW	"	63,218	155	50	96
W2DF	"	49,077	131	44	89
K2VGR	"	20,604	89	41	61
W2CKR	"	14,550	70	28	47
K2GI	"	14,244	127	23	61
WA2AUB	"	10,269	57	25	38
WA2IFE	"	7,697	61	14	29
W2MB	"	3,861	35	14	25
WA2MZH	"	3,680	31	17	29
WB2JAM					
	28	**28,050**	**135**	**21**	**54**
K3MBQ/2		21,231	118	17	46
WA2IFS	"	14,238	80	18	45
W2EUO	"	3,007	34	11	20
W2NIN	**21**	**143,994**	**478**	**31**	**72**
WA2HZR	"	56,252	237	24	58
WA2ZEZ	"	54,824	244	21	56
WA2RQH	"	27,636	192	16	31
K2INP	**14**	**115,830**	**360**	**33**	**77**
W2BJH	"	25,200	121	25	50
WB2PCM	"	558	14	7	11
W2DXL	**7**	**171,384**	**539**	**29**	**82**
WA2UJM					
	3.5	**24,512**	**141**	**17**	**47**
W2AO	"	22,560	132	16	45
W2EQS	**1.8**	**1,809**	**33**	**9**	**18**
W2LWI	"	900	21	6	12

W3WJD
A 1,527,500 1121 134 336

K1LPL/3
1,436,435 1279 110 275

W3GRF		**1,004,226**	**919**	**113**	**270**
K3YUA	"	770,876	697	111	271
W3VT	"	711,713	623	118	285
W3EZT	"	633,598	658	107	227
W3GN	"	568,589	681	94	207
W3NZ	"	564,281	619	100	223
W3CRE	"	554,400	726	86	189
W3DQG	"	553,455	626	93	222
W3OV	"	546,315	635	94	207
K3WUW	"	467,568	538	100	206
W3PZW	"	411,958	500	95	198
W3MFJ	"	387,140	517	78	182
W3NOH	"	368,044	423	93	209
W3KV	"	294,408	386	82	179
K3JH	"	271,551	453	59	142
WA3HMM					
	"	250,908	430	77	129
W3KT	"	230,651	323	95	168
W3QOR	"	201,056	299	80	164
W3FA	"	169,776	282	72	144
W3GID	"	161,000	278	69	131
W3GRS	"	150,144	265	72	132
W3KFQ	"	134,928	322	45	99
W3ZJ	"	125,048	237	74	122
W3ZRS	"	107,734	231	62	104
W3AXW	"	99,552	197	75	108
WA3NNA	"	93,125	223	51	98
W3CGS	"	69,960	153	55	94
W3FTG	"	59,568	150	56	90
K3ZOL	"	58,032	166	44	80
W3AIZ	"	45,968	202	46	90
W3HVM	"	41,019	127	44	69
W3TMZ	"	37,440	112	46	71
K3YVN	"	34,347	114	41	66
W3EVW	"	26,316	96	41	61
W3GHD	"	24,168	80	40	66
W3GL	"	23,256	86	44	58
W3EKT	"	14,750	60	31	44
W3HUS	"	14,356	72	27	41
WA3ENM	"	12,155	65	20	45
W3EKZ	"	10,368	52	25	39
W3CBF	"	7,280	45	20	36
W3ECW	"	5,544	36	24	32
W3ML	"	3,036	27	22	22
WA3PWY	"	1,012	16	10	13
WA3RCD	"	1,000	30	13	12
WA3QDH	"	390	26	9	6
WA3IWX	**28**	**26,534**	**136**	**20**	**49**
K3RDT	"	3,440	31	13	27
W3AFM	**14**	**82,040**	**235**	**37**	**93**
W3KA	"	37,198	182	18	53
WA3EFH	"	23,200	105	25	55
WA3RQB	7	812	24	10	11
W3MFW					
	3.5	**74,976**	**290**	**25**	**63**
W3VEQ	"	16,115	116	19	36
W4NQA	**A**	**793,968**	**784**	**105**	**251**
W4ZCY	**A**	**725,025**	**779**	**112**	**214**
K4BAI	**A**	**614,999**	**644**	**100**	**243**
W4KXV	"	580,232	628	107	221
WA4KJR	"	546,234	637	101	197
K4DBZ	"	432,680	527	89	201
WB4BGY	"	428,706	481	97	209
W4ZSH	"	263,398	373	80	174
K4FW	"	250,410	246	88	167
WB4ZHE	"	246,309	368	92	167
W4BJ	"	233,310	394	79	126
W4DM	"	198,492	342	73	131
K4HWW	"	192,924	326	64	143
K4JM	"	184,140	328	65	133
K0CMF/4		147,917	279	66	121
W4JHK	"	136,040	261	64	126
W4HOS	"	114,160	214	72	123
K4ZA	"	95,877	194	77	124
WB4RUA	"	94,810	189	71	119
K4AUL	"	89,046	209	52	101
W4ZM	"	68,644	183	43	88
W4GF	"	62,580	168	48	92
K4NE	"	45,264	127	50	73
W4DXI	"	43,419	120	47	76
K4LRX	"	41,824	125	45	76
WA4ATJ	"	35,182	128	35	63
K4YJQ	"	35,182	128	35	63
WB4TBO	"	26,299	103	30	61
K4EKJ	"	25,382	119	28	46
K4JYM	"	21,975	102	30	45
K4KA	"	20,806	73	39	64
WB4NRI	"	15,957	71	38	43
W4YHD	"	15,330	82	25	48
K4PR	"	14,824	72	36	45
W4KMS	"	7,875	43	29	34
K4TBN	"	7,564	47	28	33
K6ETM/4		6,710	47	24	31
W4YZC	"	6,552	42	23	33
WA4EPM	"	6,273	44	18	33
K4AUN	"	5,358	50	11	27
K4QD	"	540	11	8	10
W4GXW	"	330	10	7	8
W4KFC	**28**	**100,631**	**343**	**26**	**77**
W4OZF	"	62,250	291	21	54
K4SXD	"	56,856	230	23	69
W4OGG	"	6,576	50	21	28
W4EEO	"	1,798	20	11	20
W4AAV	**21**	**161,862**	**520**	**29**	**77**



As you can see, HI8LC goes in for wall to wall decorations. Make room for a couple more Luis, you have one for phone and one for c.w. coming for the 1972 Contest.

W4WSF	14	157,665	474	33	82	
W4ORT	"	120,950	360	34	84	
W4TMR	"	16,560	80	26	46	
K4II	7	**76,804**	**293**	**25**	**66**	
W4QQN	"	48,024	233	20	49	
K4JD	"	37,720	144	27	65	
W9WKU/4						
	"	16,555	107	16	39	
K4LDR	"	3,255	40	11	20	
K4CYU	3.5	**23,400**	**146**	**18**	**42**	
K4TS	"	12,744	95	14	38	
K4YFQ	"	11,800	87	15	35	
K4EZ	"	7,518	67	12	30	
W4WRY	"	2,464	62	23	34	
WA4SGF	1.8	**2,542**	**39**	**10**	**21**	
W5SBX	A	**676,668**	**743**	**112**	**209**	
W5KGJ	"	558,448	640	105	199	
WA5LES	"	364,738	460	95	186	
WA5ZWC	"	212,741	336	86	143	
W5OSJ	"	183,876	352	79	120	
WA5VCQ	"	136,278	223	79	127	
W5OB	"	118,229	227	75	116	
VE6BU/W5		76,020	202	58	82	
WA5UCT	"	64,468	174	60	82	
W5UO	"	46,986	130	53	70	
W5QBM	"	31,740	125	38	54	
WB5BHN	"	24,738	107	44	49	
W5HIC	"	8,192	46	28	36	
W5SOD	"	2,040	33	15	15	
W5TFG	28	**24,004**	**128**	**22**	**46**	
W5PAQ	"	22,736	125	23	43	
WA5WPB						
	21	**99,372**	**383**	**28**	**63**	
W5NQC	14	7,176	51	22	30	
W5WZQ	7	**189,711**	**608**	**33**	**74**	
WB5DIZ	"	11,925	87	19	34	
WA5STI	"	6,952	64	18	26	
W5RTQ	3.5	**17,214**	**115**	**21**	**36**	
W5LUJ	"	10,829	83	17	32	
K5PFL	"	8,550	68	17	33	
K5ABV	"	8,370	73	18	27	
W5KC	"	1,122	20	10	12	
WA5ZNY	1.8	**234**	**24**	**5**	**8**	
K6AHV						
	A	1,335,046	1298	125	228	
K6SDR						
	A	1,165,180	1,217	124	216	
W6RR						
	A	1,143,080	1,210	116	212	
W6DGH						
	A	1,134,226	1,244	118	199	
WA6DKF						
	"	959,900	1,004	119	212	
W6JPH/6		772,680	987	104	170	
W9LVT/6		676,096	883	105	173	
W6DQX	"	666,368	767	117	187	
K6HIH	"	293,119	643	69	88	
WA6JVD	"	286,632	462	80	136	
K6NA	"	277,632	293	128	230	
WA6GFY	"	264,420	510	75	105	
			(Opr. WA6HRS)			
W6OKK	"	262,195	457	80	125	
K6DC	"	219,452	462	65	101	
WA6IVM	"	213,752	476	64	90	
W6NJU	"	193,140	329	97	125	
K6QW	"	157,170	296	81	114	
K6DR	"	144,480	298	72	96	
K6OC	"	118,269	266	64	89	
W6OVO	"	98,670	239	60	83	
K6WD	"	90,043	246	53	74	
W6KJG	"	83,421	267	53	64	
K6WT	"	78,535	209	61	78	
WA6JQX	"	75,900	202	62	76	
W6DAB	"	73,970	202	50	80	
K6MP	"	70,848	199	54	69	
W6UZX	"	50,715	161	46	69	
W6GBY	"	42,183	134	47	62	
W6CLM	"	37,752	142	50	54	
K6QPH	"	35,400	112	55	63	
K6QM	"	21,888	104	36	40	
WB6EXW	"	16,705	103	31	34	
WB6KOR	"	16,620	103	28	32	
W6KYA	"	13,345	59	42	43	
W6EYY	"	12,342	76	30	31	
W6DPK	"	9,918	60	26	32	
W6JKR	"	6,996	40	31	35	
W6RQZ	"	4,867	50	14	17	
K6TU	"	1,470	19	15	15	
W0HAW/6		858	24	13	13	
W6EJA	"	492	14	6	6	
W6AM	28	**45,234**	**260**	**23**	**40**	
W6HX	"	44,423	254	22	39	
WA6GLD	"	18,630	120	20	34	
K6QZ	21	**113,064**	**464**	**25**	**59**	
W6KFV	"	75,087	366	28	53	
W6RGG/6		69,864	295	26	56	
K6VL	"	57,519	260	26	51	
WB6LJO	"	36,750	180	24	46	
K6YFZ	"	36,539	208	20	41	
W6FVU	"	21,200	193	17	23	
W6HJ	"	13,725	108	18	27	
WA6IQM						
	14	**168,276**	**516**	**34**	**77**	
W6BH	"	165,648	506	33	79	
W6UA	"	129,941	344	38	95	
K6EBB	7	**228,786**	**774**	**31**	**71**	
W6AJJ	"	115,584	472	29	55	
K6CQF/6		105,009	411	30	57	
K6ERT	3.5	**41,241**	**253**	**22**	**37**	
W6MUR	"	24,592	172	19	34	
WB6UDC	"	6,138	74	13	18	
K6PJY	1.8	**225**	**12**	**5**	**5**	
W7IR	A	**638,510**	**671**	**114**	**221**	
W7RS	"	496,470	674	95	152	
W7YTN	"	341,034	548	89	137	
WA7JCB	"	263,648	525	74	102	
W7OF	"	258,984	428	85	133	
W7NP	"	254,736	490	73	110	
W7LZF	"	86,640	261	52	68	
W7YBX	"	55,590	192	46	56	
W7WMY	"	50,336	180	49	55	
W7APN	"	25,612	123	34	42	
K7UWT	"	4,760	51	18	17	
W7SCQ	"	3,094	42	13	13	
WA7TLK	"	1,425	30	9	10	
WA7RUY	"	280	14	4	4	
W7DAZ	28	**19,976**	**165**	**19**	**25**	
W7UBA	"	15,047	128	16	25	
WA7MEO						
	21	**52,488**	**347**	**23**	**31**	
W7AYY	"	40,460	209	23	45	
W6HJP/7		10,880	96	16	24	
W7DV	14	**104,751**	**343**	**32**	**71**	
W7FR	"	86,300	301	31	67	
			(Opr. W7PH)			
W7UMX	"	40,920	225	24	38	
WA7QCN	"	28,635	157	26	43	
WA7NUH	"	18,492	102	25	42	
K7CXZ	"	4,070	40	18	19	
K7RSC	"	3,570	64	9	12	
W7EKM	"	2,032	50	14	16	
W7QK	3.5	**10,537**	**88**	**12**	**29**	
W7JLU	"	10,380	124	12	18	
WA7OET/7	1.8	**146**	**42**	**5**	**4**	
WA8YVR	A	**629,640**	**705**	**102**	**216**	
W8ROF	"	473,896	558	105	191	
W8DSO	"	120,687	288	50	97	
W8BVF	"	25,351	89	39	62	
W8KYD	"	13,419	76	20	43	
W8VSK	28	**51,051**	**195**	**27**	**64**	
WB8EAS	"	7,636	64	15	31	
K8WWU	21	**168,945**	**558**	**30**	**75**	
WA8YOQ	"	105,408	376	27	69	
W8PCS	"	15,741	103	18	35	
W8KFL	14	**83,030**	**251**	**34**	**81**	
W8JGU	"	65,208	198	36	78	
W8UMR	"	17,745	96	20	45	
W8TJQ	"	8,083	45	22	37	
WA8JUN						
	3.5	**15,675**	**106**	**20**	**37**	
W8WVU	"	1,428	34	9	12	
W9LKJ	A	**757,575**	**797**	**108**	**225**	
W9RER	"	706,515	741	106	229	
K9KDI	"	705,888	729	106	236	
WB9BPG	"	568,106	577	108	233	
W9OHH	"	477,400	545	102	208	
W9IRH	"	318,937	451	95	162	
W9SFR	"	279,000	449	77	148	
W9WYB	"	176,052	303	75	129	
W9ZTD	"	148,804	266	79	129	
WA9REC	"	145,054	297	70	112	
W9PJT	"	124,916	282	59	108	
W9RQM	"	110,716	219	66	112	
WB8IDK/9		76,104	180	61	90	
W9DWQ	"	52,924	151	50	81	
K9HLW	"	27,232	106	41	51	
K9DDA	"	16,830	73	40	50	
W9KBZ	"	13,013	67	30	47	
W9JAN	"	6,912	47	23	31	
W9PNE	"	4,032	39	22	26	
W9YYG	28	**36,112**	**173**	**20**	**54**	
W9LKI	"	34,504	160	21	55	
W9MTD	"	25,038	114	22	56	
W9KNI	"	13,041	71	25	44	
WB9FRG	"	9,790	65	18	37	
W9AUM	21	**60,369**	**253**	**25**	**56**	
W9VBV	"	39,285	170	26	55	
W9CRW	"	27,939	144	20	47	
WB9DRE	"	12,528	75	19	39	
WA9WIF	"	1,100	24	10	10	
K9UQN	14	**10,200**	**92**	**16**	**24**	
W9YT	7	**83,928**	**304**	**32**	**72**	
			(Opr. WA9SUU)			
W9KYZ	"	28,835	145	24	49	
K9CUV	3.5	**13,338**	**97**	**17**	**37**	
W9HUZ	"	12,204	87	19	35	
W9URK	"	312	13	6	7	
WAØKDI	A	**108,066**	**232**	**62**	**104**	
WØIUB	"	66,924	241	47	52	
WØGYH	"	56,940	141	57	89	
WØQWS	"	55,944	160	53	73	
WAØYEF	"	49,776	148	52	70	
WØHBH	"	47,724	145	50	73	
WA6UAV/Ø		28,405	115	42	53	
W9LHG/Ø		22,011	104	42	45	
WØNER	"	21,888	100	32	44	
WAØTAS	"	6,231	93	29	38	
WØFDK	"	5,916	51	23	28	
WØFCL	"	72	12	5	4	
WØMHK	28	**3,534**	**38**	**16**	**22**	
WAØVIK	21	**65,044**	**247**	**26**	**66**	
WØODT	"	2,573	32	13	18	
WAØLYM	14	**86,469**	**272**	**33**	**78**	
WBØGIJ	"	79,200	284	32	67	
WØTCX	"	42,560	162	30	65	
WØAIH	7	**9,129**	**64**	**16**	**35**	
WØNFL	1.8	**558**	**17**	**8**	**10**	
WØMS	"	166	30	6	6	
		Alaska				
KL7HIK	A	**566,223**	**1264**	**72**	**105**	
KL7BCH	"	257,397	867	48	71	
KL7GDO	"	233,050	777	51	67	
KL7HNN	"	212,534	667	55	78	
KL7CZ	"	36,093	310	26	27	
KL7MF	"	29,600	200	29	45	
WA8KMJ/KL7						
	21	**49,770**	**572**	**17**	**18**	
KL7EWP	14	**57,375**	**283**	**24**	**51**	
		Barbados				
8P6DR	A	**495,924**	**990**	**72**	**149**	
		Bermuda				
VP9BO	1.8	**1,992**	**83**	**6**	**6**	
		Canada				
VO1AW	A	**397,374**	**797**	**67**	**139**	
VO1HH	3.5	**36,994**	**302**	**12**	**41**	
VE1ABK	21	**3,344**	**83**	**7**	**12**	
VE1AMX	14	52,870	229	24	61	
VE1AE	"	2,560	29	11	21	
VE2AYU	A	**450,468**	**734**	**82**	**176**	
VE3HD	A	**189,686**	**306**	**83**	**155**	
VE3BS	"	51,290	169	39	76	
VE3NE	"	16,400	72	35	45	
VE3BBH	28	**30,194**	**210**	**20**	**42**	
W5QNY/VE3						
	21	**33,912**	**213**	**23**	**49**	
VE3DMC	14	**27,886**	**138**	**21**	**52**	
VE5XC	14	**14,958**	**101**	**21**	**33**	
VE5RA	"	14,632	91	21	38	
VE5XU	1.8	**3,451**	**104**	**8**	**9**	
VA6NQ	A	**34,732**	**233**	**27**	**35**	
VE6MP	14	**148,028**	**637**	**29**	**63**	
VE6APN	"	12,810	141	18	24	
VE6MZ	"	2,590	29	17	18	
VE7WJ						
	A	**1,250,364**	**1715**	**112**	**188**	
VE7IQ	28	3,553	103	9	10	
VE7BEF	14	**34,284**	**256**	**24**	**33**	
		Cayman Is.				
VE8MN	A	**14,858**	**205**	**16**	**18**	
		Costa Rica				
ZF1GS	1.8	**11,124**	**203**	**10**	**17**	
		Costa Rica				
TI2WX	A	**184,808**	**861**	**47**	**57**	
		Dominican Rep.				
HI8LC	21	**48,603**	**399**	**17**	**34**	
HI3JEH	14	**32,355**	**342**	**17**	**28**	
W4YCQ/HI8						
	3.5	**30,280**	**359**	**11**	**29**	
		Greenland				
OX3YY	A	**217,434**	**778**	**55**	**113**	
OX3WQ	14	**103,760**	**516**	**21**	**59**	
		Honduras				
HR1AT	14	**24,219**	**243**	**24**	**45**	
		Mexico				
6G1AA	14	**301,143**	**1206**	**32**	**79**	
XE1FFC	"	16,992	123	9	8	
		Panama				
HP1EE	14	1,048	64	4	4	
		Puerto Rico				
KP4DKX	A	**181,440**	**740**	**35**	**73**	
KP4DJI	"	62,104	546	29	27	
KP4DGE	14	**131,781**	**654**	**30**	**63**	
		St. Pierre				
FPØBG	A	**284,715**	**747**	**60**	**111**	

AFRICA

Angola

CR6IK	14	680,088	1776	34	95

Ethiopia

ET3USE	A	720,790	995	77	168

Gambia

ZD3Z	A	3,504,492	3518	99	234
		(Opr. OH2MM)			

Kerguelen Is.

FB8XX	A	153,285	320	51	114

Mali Republic

TZ2AC	A	106,372	314	43	73
		(Opr. DJ6QT)			

Mauritania

5T5CJ	A	375,011	753	58	111

Mozambique

CR7IZ	A	289,041	571	60	117

Republic of South Africa

ZS6IW					
	A	1,313,070	1303	112	233
ZS6CW	"	57,664	188	40	66
ZS5SG	14	12,680	86	22	30

Rhodesia

ZE1BL	A	475,960	1092	56	90
ZE8JN		28 197,397	816	24	57
ZE2KV		14 243,776	794	33	71
ZE5JJ	7	28,322	208	18	31

Sierra Leone

9L1JT	A	676,600	1141	64	135
9L1GC	"	608,850	1030	61	137

Swaziland

3D6AX	A	183,348	320	78	120

ASIA

Afghanistan

YA1OS	7	20,253	195	12	31

Bahrain

MP4BHM	A	38,592	144	31	65

India

VU2HQ	14	26,605	141	31	54

Iran

EP2FB	7	27	3	1	2
EP2BQ	1.8	1,128	32	3	9

Japan

JA2JW	A				
		1,033,975	1225	110	185
JA2IYJ	A	365,001	714	86	105
JA2PFO	A	217,890	508	68	94
JA8FBM	"	152,220	410	52	77
JA2CEC/1		141,638	357	70	81
JA2TH	"	139,720	354	64	76
JA6CLO	"	139,602	331	72	87
JA1JKG	"	138,853	381	63	80
JA5BJY	"	132,486	334	63	79
JA1CMD	"	125,552	306	66	86
JA3MIO	"	119,925	348	55	68
JA8BI/1		117,438	330	61	77
JA7DLE	"	110,920	353	50	68
JA2ZAP	"	84,096	261	59	69
JA3IQX	"	82,432	227	56	72
JA3FYC	"	66,560	226	50	60
JA1AS	"	64,184	215	52	61
JA1BNW	"	63,036	216	42	60
JA7ARW	"	57,371	206	46	57
JA7CDV	"	50,456	169	50	56
JA6BIF	"	34,854	171	33	41
JA7JW	"	31,248	161	36	36
JA5CEK/3		30,492	131	39	45
JA7AEM	"	30,184	149	37	40
JA7BP	"	28,200	114	48	46
JA5TX	"	21,546	130	29	34
JH1AWN	"	19,459	121	29	32
JH3OSP	"	19,096	127	27	29
JA3BRB	"	18,778	91	38	44
JR1PUO	"	16,445	117	28	27
JA1BSU	"	15,264	114	26	22
JA4DZ	"	12,906	83	27	27
JE1CUA	"	11,475	93	22	23
JA4GPJ	"	9,798	83	22	24
JA3FV	"	9,514	79	19	23
JA6WYS	"	8,528	66	22	30
JA1BZM	"	8,103	87	20	17
JAØKSR	"	6,120	61	20	20
JA7IKH	"	5,617	51	20	21
JA4GXS	"	5,376	66	17	15
JA1BC	"	3,321	44	14	13
JA2BJW	"	4,005	33	22	23
JAØGZ	"	2,781	42	16	11
JA3HBF	"	1,472	28	11	12
JA1EL	"	390	13	5	5
JH3BJN	"	325	16	7	6
JH1PZN	28	37,260	234	24	36
JA2MGE	"	19,872	143	20	34
JA1SR	"	16,698	136	20	26
JH1APZ	"	16,172	117	23	29
JH1DJD	"	10,260	103	18	20
JA1SJV	"	9,798	84	19	27
JH1CXE	"	8,930	90	16	22
JA1AAT	"	527	13	8	9
JH1DTC	21	243,936	876	31	65
JA3JRI	"	94,620	397	26	57
JE1CAY	"	32,768	187	23	41
JAØEZP	"	26,572	184	20	32
JH1OGT	"	18,705	147	18	25
JA1OLT	"	17,672	136	20	27
JA5HAM	"	4,551	46	15	22
JA3EYO	"	3,366	36	16	18
JA2FVF	"	640	14	7	9
JH1JGX	14	176,015	575	32	75
JA2PJC	14	153,736	614	29	59
JH1HVY	"	61,940	305	29	47
JA1NPV	"	37,360	174	29	51
JA2IU	"	20,955	136	24	31
JA1KNZ	"	20,274	130	24	38
JH2CKD	"	17,248	129	20	29
JA2AAU	"	17,224	156	19	27
JA8GR	"	15,456	107	23	33
JA1KTM	"	15,120	109	23	33
JH2BID	"	10,998	88	19	28
JA2GBO	"	8,568	110	13	15
JA2OJ	"	6,396	56	18	23
JA4BTD	"	5,735	64	19	18
JA2EQ	"	3,335	39	13	16
JA5EN	"	2,196	23	16	20
JAØSC	"	1,840	43	13	10
JA4AQR/5		1,820	24	12	14
JA3BCT	"	1,403	32	13	10
JA9ETJ	"	608	16	9	7
JAØBOP	"	480	14	9	7
JA1CWZ	7	136,155	556	30	57
JA1QER	7	51,617	281	25	46
JA2HNP	"	47,385	211	29	52
JA1PPW	"	34,505	196	23	44
JA1OCA	"	32,410	174	23	47
JA1DUH	"	27,360	169	23	37
JH1DVZ	"	25,311	172	21	38
JA2AIR	"	17,280	123	21	33
JA8GSX	"	8,029	82	17	20
JA5DQH	"	4,959	63	15	14
JR1IRN	"	3,420	38	16	20
JR1GBT	"	1,818	43	9	9
JA1PLO	"	1,078	29	7	7
JA2GOT	"	1,050	27	7	7
JH3KTL	"	1,034	35	6	5
JH3FTO	"	282	19	3	3
JA2AAO	3.5	23,808	151	25	37
JA1HGY	"	6,534	88	15	18
JA3AA	1.8	176	14	4	4
JA8FBH	"	42	3	3	3
JAØDAF	"	12	2	2	2
JA6WGE	"	4	2	2	2
KA2NA	A	6,600	68	19	21
KA6AY	21	284,688	920	30	78
KA7MS	14	6,888	82	19	22

Jordan

JY9FB	14	27,342	194	18	31

Laos

XW8EV	28	80,808	440	23	55

TOP U.S.A. SCORES

All Band	W3WJD	1,527,500
28 mHz	W4KFC	100,631
21 mHz	K8WWU	168,945
14 mHz	WA1JUY	201,728
7 mHz	K6EBB	288,786
3.5 mHz	W1MX	80,410
1.8 mHz	WA4SGF	2,542

Multi-Operator

Single Xmtr	K1DIR	1,985,310
Multi Xmtr	W3AU	5,031,982

Singapore

9V1OK	A	32,980	232	48	49

Thailand

HS4AGN	A				
		1,186,150	1488	116	234
HS3AIG	"	83,028	323	63	85

U.S.S.R.

Asiatic

UW9WL	A	595,359	836	65	184
UA9QDX	"	537,372	853	70	166
UA9JH	"	495,756	929	41	147
UA9NN	"	156,208	290	65	143
UV9DX	"	96,656	304	34	78
UA9MR	"	53,284	136	65	108
UA9MY	"	253	11	6	5
UV9CQ	28	34,987	233	18	41
UA9CX	"	34,884	238	15	39
UA9MK	"	34,286	231	19	43
UV9DS	"	8,758	104	8	21
UA9JL	21	37,319	246	21	46
UA9CN	"	16,520	160	8	32
UA9YE	"	15,351	136	13	30
UA9CBM					
	14	100,719	384	29	64
UA9CAL	"	87,040	455	23	45
UW9AT	"	41,396	194	27	52
UA9UAR	"	34,684	266	20	38
UA9LAC	"	32,895	226	16	35
UA9OO	"	28,032	139	29	44
UA9CAA	"	10,620	120	10	20
UA9FAR	"	5,664	47	14	34
UA9MT	"	3,960	39	16	24
UA9UBU	"	2,940	53	12	16
UA9OS	7	29,304	181	22	44
UA9MAX	"	9,372	94	13	25
UW9PJ	"	5,790	70	8	24
UA9OBJ	"	4,192	70	13	19
UA9BZ	3.5	3,726	54	7	20
UWØAF	A	552,780	864	80	169
UKØCAB	"	182,520	778	46	58
UAØLH	"	121,914	553	51	66
UAØYD	"	100,926	322	40	86
UAØMI	"	96,212	385	58	76
UAØAG	"	81,120	299	39	65
UAØDV	"	71,944	314	31	61
UAØLS	"	59,696	399	41	50
UWØUQ	"	57,876	396	39	52
UAØKAN	"	8,280	52	19	21
UAØLJ	"	4,921	65	16	21
UKØJAA	"	3,973	79	13	16
UKØOOO					
	14	94,848	524	20	58
UAØYAE	"	77,934	334	31	62
UAØTD	"	38,170	296	21	34
UAØCAV	"	33,376	314	25	31
UAØCBR	"	30,385	236	23	36
UWØIW	"	28,917	254	18	33
UAØXAD	"	14,541	146	16	21
UAØSA	"	1,710	33	10	10
UWØLI	7	15,930	219	18	27
UAØJAD					
	3.5	10,765	180	17	19
UWØFB	"	6,346	234	10	9

Armenia

UG6EA	A	43,648	277	18	46
UG6JJ	14	96,348	410	27	57
UK6GAE	"	29,858	196	17	35

Azerbaijan

UD6CN	A	287,980	498	65	155
UD6CM	"	161,875	450	32	93
UD6DFY	28	10,395	118	11	22

Georgia

UF6HK	A	189,072	441	43	113
UF6CX	"	17,300	117	15	35
UF6FBX	28	45,172	352	11	35
UF6QAC	14	111,010	470	28	57
UF6FAV	"	51,770	301	21	41
UF6FBC	"	24,520	228	9	31

Kazakh

UL7CT	A	876,842	1176	74	189
UL7TA	28	20,880	139	16	44
UL7NG	14	49,530	294	24	41
UL7JE	7	63,444	420	24	44
UL7NAF	"	55,796	467	14	38
UL7GW	3.5	29,224	265	14	38
UL7JG	"	21,436	196	13	33

Kirghiz

UM8FM	A				
		1,209,780	1588	83	199
UM8DZ	"	2,170	36	16	19

Tadzhik

UJ8JAS	7	41,654	295	16	43
UJ8AH	3.5	4,928	68	8	20
UJ8AW	"	1,040	27	5	11

Turkoman

UH8BO	A	223,676	399	64	135
UH8CJ	28	55,348	287	18	46
UH8CS	3.5	39,312	276	14	40

Uzbek

UI8BL	A	41,276	229	21	47
UI8OJ	14	168,516	680	30	63
UI8AXX	"	2,347	64	7	27
UI8LL	3.5	48,240	392	10	35

EUROPE

Aland Island

OHØNJ	A	28,365	224	24	69

Austria

OE3AX	A	21,252	130	38	54

Azores

CT2BG	A	200,354	533	48	106

Belgium

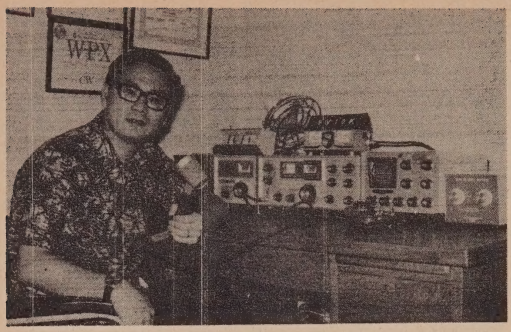
ON4XG	A	247,715	635	60	125
ON5AX	"	74,992	294	35	74
ON5WL	21	3,335	72	11	18

Bulgaria

LZ1KBG	A	235,984	754	56	140
LZ1NJ	"	54,405	398	23	70
LZ2KPL	"	28,810	245	24	62
LZ2LY	28	2,656	38	10	22
LZ1AG	21	53,664	307	28	68
LZ2SA	"	43,494	353	21	45
LZ1AQ	14	49,680	269	26	64
LZ2JF	"	48,888	315	25	59
LZ2GS	"	28,288	289	20	44
LZ2KB	7	56,034	516	20	46
LZ1SS	"	29,670	294	16	53
LZ2JA	"	19,943	328	11	38
LZ1BY	"	156	13	4	9
LZ2ZK	3.5	20,256	347	10	38
LZ2KRZ	"	5,511	156	6	27

Czechoslovakia

OK3EA	A	696,130	1033	102	233
OK1TA	A	300,276	641	75	153
OK1DIM	A	226,600	601	61	145
OK1AHZ	"	123,355	287	68	115
OK2BKL	"	111,875	295	60	119
OK3ZAA	"	109,120	438	47	108
OK1DWA	"	67,584	327	32	100
OK2PEQ	"	62,480	429	28	82
OK2PAW	"	62,100	331	41	94
OK3BT	"	55,245	273	36	91
OK1FAV	"	54,677	328	32	75
OK2BKV	"	52,547	150	49	138
OK1KZ	"	38,295	213	38	73
OK2BJJ	"	37,152	176	37	71
OK2TB	"	36,848	208	29	65
OK1SV	"	36,645	152	37	68
OK2BEC	"	36,000	231	22	74
OK2LN	"	28,224	242	28	70
OK1AWF	"	20,358	191	23	64
OK2BKI	"	17,724	77	36	48
OK1OAT	"	16,744	76	40	52
OK1AOU	"	10,212	128	18	56
OK3TBG	"	7,950	111	15	35
OK1DAV	"	6,527	61	19	42



9V1OK was the only c.w. entry out of Singapore. You're posing for the wrong contest Frank, the key man, the key.

OK3YDP	"	6,394	64	19	27
OK1FJS	"	4,879	61	15	26
OK1DOW	"	4,840	88	16	39
OK1MAA	"	4,756	111	12	29
OK3YCA	"	4,650	80	16	34
OK3CGI	"	4,171	72	12	31
OK2BCI	"	3,128	30	20	20
OK1AHV	"	2,831	49	11	11
OK3CDN	"	2,700	81	9	27
OK2BHD	"	2,450	53	12	23
OK1FAR	"	352	13	9	13
OK1AGQ	28	26,840	169	21	40
OK2PAF	"	17,235	123	21	34
OK3CHK	"	9,200	72	18	28
OK2ABU	"	6,368	75	13	19
OK1AWV	"	5,440	50	18	22
OK1EV	21	91,640	457	27	52
OK3CGC	"	44,660	253	24	53
OK1ARZ	"	37,133	222	24	47
OK1ABP	"	35,624	193	26	47
OK2RO	"	29,784	177	26	47
OK1MMK	"	28,070	162	24	46
OK3UN	"	16,881	149	18	33
OK1AGQ	"	10,754	138	13	25
OK1ATX	"	7,473	65	36	17
OK3TAO	"	2,160	43	9	15
OK1ALW	14	147,516	583	34	80
OK3KAS	"	52,316	397	24	58
OK3BH	"	25,156	210	22	54
OK1AOZ	"	18,252	164	21	33
OK1EP	"	16,740	150	19	43
OK1ATZ	"	16,206	118	24	49
OK3ZMT	"	14,994	135	19	44
OK3CEV	"	12,297	206	13	38
OK2PBG	"	11,562	174	12	36
OK3TAZ	"	10,750	125	13	37
OK1DVK	"	9,168	106	14	34
OK1IAR	"	7,740	67	18	25
OK3TCV	"	6,615	92	12	33
OK2BBQ	"	5,920	104	10	30
OK1VK	"	5,504	65	12	20
OK3TBC	"	4,760	100	12	23
OK3YAX	"	4,320	86	11	25
OK1ADH	"	609	14	10	11
OK2BYW	7	65,280	481	22	63
OK2QX	"	57,646	489	22	60
OK1APJ	"	27,384	315	16	40
OK1KIB	"	6,293	185	6	25
OK1XJ	"	4,991	105	8	23
OK1AES	"	1,794	54	7	16
OK1AEH	"	860	24	8	12
OK3EQ	"	783	24	5	22
OK1AWH	"	558	29	5	13
OK1WC	3.5	48,735	557	13	44
OK1DCW	"	14,016	230	8	40
OK2HI	"	13,500	234	8	37
OK3TCA	"	11,210	294	7	31
OK3TFM	"	11,040	233	8	32
OK1DKR	"	8,853	206	6	33
OK1FIM	"	5,928	120	9	29
OK3YCF	"	4,828	136	7	27
OK1MG	"	3,774	65	9	28
OK3YCL	"	3,360	111	5	23
OK1DAM	"	1,995	113	4	17
OK1DZS	"	1,206	76	4	14
OK1IAL	"	408	25	3	14

OK1ATP					
	1.8	4,316	146	8	18
OL1AOH	"	1,843	84	5	14
OK1MCW	"	1,840	86	5	15
OK1FCW	"	1,392	96	4	12
OL0ANU	"	1,296	79	4	14
OL5AOY	"	705	50	3	12
OK1KPU	"	702	64	3	10
OL5AQC	"	312	27	2	10
OK2PDN	"	310	39	2	8
OK1MIC	"	280	38	2	8
OL9CAW	"	253	28	2	9
OL4APS	"	180	21	2	7
OL1API	"	162	19	2	7
OK1FBW	"	120	16	2	6
OL4APO	"	108	27	2	7
OL8CAG	"	100	12	2	8
OK1AJJ	"	72	11	2	6
OL5APX	"	8	13	2	2
Denmark					
OZ1LO	**A**	**969,450**	**1362**	**103**	**242**
OZ7HT	"	244,800	702	62	130
OZ6PI	"	110,940	395	53	119
OZ5ME	"	63,339	268	42	87
OZ3PO	"	44,896	165	40	82
OZ9OI	"	14,008	137	22	46
OZ2UA	"	12,084	104	21	36
OZ7BF	"	9,211	119	23	38
OZ8SW	"	6,612	86	21	37
OZ5QU	"	2,068	35	17	27
OZ4DX	"	285	13	8	11
OZ7YL	**3.5**	**7,488**	**120**	**8**	**31**
England					
G3LNS	**A**	**983,014**	**1328**	**90**	**217**
G3FXB	"	840,264	1146	88	218
G2DC	"	130,680	333	57	123
G2AJB	"	97,811	352	47	110
G3JKY	"	66,719	303	27	110
G3XTT	"	52,000	266	32	72
G3VDW	"	18,737	256	19	22
G3MWZ	"	16,128	124	28	56
G2BOZ	**28**	**77,256**	**344**	**25**	**62**
G4AMJ	"	31,626	219	20	43
G3CWL	"	3,978	58	12	14
G3HCT	**21**	**245,108**	**848**	**29**	**87**
G5BAU	"	181,204	788	27	62
G3RZI	14	242,198	959	33	76
G3MXJ	"	99,225	430	30	75
G3PVA	"	36,624	316	19	37
G3KDB	**7**	**71,928**	**506**	**24**	**57**
G3RRS	**3.5**	**52,302**	**484**	**16**	**53**
G3ESF	"	27,225	350	9	46
G3ZTQ	**1.8**	**495**	**45**	**3**	**8**
Faroe Islands					
OY4M	**A**	**5,845**	**71**	**13**	**22**
Finland					
OH8RC	**A**	**1,077,050**	**1394**	**98**	**227**
OH1VA	**A**	**357,460**	**831**	**73**	**171**
OH9TH	"	135,876	457	48	108
OH5RZ	"	90,915	367	48	117
OH7NW	"	71,725	300	42	109
OH2AC	"	34,365	144	44	101
OH2YL	"	31,058	151	39	67
OH5YF	"	30,500	129	40	60
OH2LU	"	28,676	181	32	75

OH7RF	"	19,516	93	39	80
OH2VZ	"	17,425	103	33	52
OH7SO	"	10,230	69	28	38
OH70Q	"	7,304	81	16	28
OH5RP	"	6,992	129	13	33
OH5UX	"	6,468	52	25	41
OH5TT	"	5,680	54	18	53
OH2DN	"	4,399	39	21	32
OH6RI	"	4,186	47	16	30
OH1PG	"	3,680	61	13	33
OH5X0	"	2,050	26	24	17
OH50D	"	2,014	31	13	25
OH8SI	"	1,725	32	9	14
OH1JY	"	1,664	47	11	21
OH5TZ	"	1,155	25	14	21
OH2BJY	"	902	25	9	13
OH4SF	"	238	7	7	7
OH2FS	**28**	**13,340**	**104**	**19**	**39**
OH6YU	"	10,899	66	21	42
OH2XM	"	10,744	71	20	48
OH6UW	"	5,232	46	15	33
OH2BMG	"	4,004	34	18	26
OH5PA	"	3,751	43	15	16
OH2LG	"	1,300	21	10	16
OH3XJ	"	1,029	22	7	14
OH3IF/2		322	9	7	7
OH5WH	**21**	**88,981**	**426**	**27**	**74**
OH2BO	"	69,600	375	22	53
OH4SL	"	55,926	349	23	55
OH2ZP	"	49,941	267	29	64
OH5PZ	"	43,016	260	21	54
OH7SP	"	18,944	140	18	46
OH2BCD	"	10,516	118	14	30
OH2JQ	"	5,092	78	12	26
OH1IJ	"	5,032	80	12	25
OH3HS	"	3,306	95	8	21
OH9TD	"	1,586	39	9	17
OH4SO	"	1,482	19	11	15
OH2BNG	"	1,026	40	8	19
OH5VT	**14**	**169,500**	**689**	**32**	**74**
OH8SP	"	25,000	186	13	37
OH2KK	**7**	**163,512**	**684**	**78**	**30**
OH1VR	"	113,740	608	28	66
OH1TN	"	109,275	578	27	66
OH2BMC	"	5,332	95	11	32
OH1XX	3.5	47,600	505	16	54
OH2BCI	"	13,992	218	11	42
France					
F8TQ	**A**	**153,295**	**989**	**49**	**106**
F5IN	"	125,236	550	44	87
F8TM	"	86,360	300	44	92
F8DB	"	82,500	337	43	89
F6API	"	70,513	257	36	71
F9KP	"	48,985	267	30	71
F2XW	"	28,135	152	35	50
F6AAS	"	1,485	32	9	24
F8SF	"	713	23	9	14
FØACS	**3.5**	**45,600**	**520**	**12**	**45**
Germany					
DL8YR	**A**	**360,864**	**801**	**63**	**161**
DJ9MH	**A**	**357,396**	**686**	**71**	**166**
DJ1XP	"	268,836	486	77	181
DJ4UF	"	245,718	571	61	136
DJ4EJ	"	213,686	445	72	170
DJ4ZR	"	212,975	535	60	115
DL1JF	"	201,348	493	65	139
DL1MD	"	194,258	446	71	135
DJ6BW	"	148,296	496	50	98
DJ4HR	"	91,355	314	46	107
DK1DB	"	72,500	274	35	81
DJ1LD	"	67,280	264	50	66
DL6BP	"	63,984	203	47	82
DFØAFZ	"	63,360	200	50	82
DL1YA	"	39,582	192	40	83
DJ2VY	"	19,836	134	31	45
DL1KS	"	12,330	91	25	65
DK5JA	"	10,212	79	28	46
DL1OY	"	4,551	43	17	20
DL3TN	"	1,998	29	16	21
DL6EN	**28**	**78,213**	**318**	**28**	**65**
DK5PR	"	9,504	69	21	33
DL2JO	**21**	**36,600**	**254**	**18**	**42**
DJ3YU	"	29,232	210	19	37
DL1RB	"	28,497	179	23	46
DJ7PT	"	20,768	173	19	40
DL9CE	"	13,832	113	17	35
DL1TH	"	7,221	112	12	17
DJ5QK	"	1,470	36	9	12
DJ7HZ	**14**	**85,410**	**490**	**27**	**63**
DL8CM	"	29,444	207	23	45
DL8FR	**7**	**100,480**	**583**	**23**	**57**
DL7AV	**3.5**	**110,424**	**759**	**23**	**63**
DJ5PN	"	64,440	451	16	56

DL3DA	"	33,524	434	11	47
DL1ES	"	2,616	47	8	16
DJ8WD	**1.8**	**1,162**	**85**	**3**	**11**
DJ4KW	"	564	51	2	10
DM2CYO	**A**	**73,776**	**184**	**64**	**95**
DM2CHM	"	40,326	115	56	87
DM2DQN/A	"	20,748	120	37	54
DM3OML	"	15,334	189	26	56
DM4XKL	"	10,419	121	20	49
DM2CCN	"	6,592	63	19	45
DM2AOL	"	4,240	34	23	30
DM3XUE	"	3,570	33	19	23
DM2DXO	"	1,802	60	8	26
DM3UE	21	2,343	29	14	19
DM2BUN	14	32,560	277	22	52
DM2FBL	"	6,320	108	13	27
DM2ACL	"	1,155	21	10	11
DM4WL	7	1,239	59	4	17
DM4RNL	3.5	7,942	222	6	32
DM2DRO	"	4,472	79	10	33
DM3QML	"	3,567	117	5	24
DM4SOG	"	1,575	83	4	18
Greece					
SVØWH	**A**	**39,934**	**428**	**21**	**61**
SVØWJJ	**28**	**6,160**	**110**	**10**	**18**
Hungary					
HA1YA	**A**	**98,031**	**629**	**30**	**93**
HA7PQ	"	95,948	287	56	110
HA1SB	"	79,079	270	50	93
HA7MC	"	56,160	281	35	85
HA5KBV	"	48,162	144	55	83
HA1KSL	"	19,572	134	34	50
HA2MV	"	18,592	161	23	60
HA1VA	"	12,636	124	21	57
HA9RJ	"	10,736	91	22	39
HA9KOV	"	8,184	101	19	43
HA8VQ	"	6,160	133	10	30
HA3NA	"	2,537	54	14	29
HA9KOZ	"	630	28	7	14
HA3GF	**28**	**24,384**	**146**	**26**	**38**
HA6NN	"	5,776	55	17	21
HA5JI	**21**	**117,130**	**468**	**31**	**75**
HA4XT	**14**	**70,756**	**377**	**31**	**67**
HA7MD	"	8,575	117	14	35
HA1SN	"	6,685	150	8	27
HA5HS	**7**	**56,064**	**501**	**17**	**47**
HA8VX	"	7,917	152	9	30
HA9RB	**3.5**	**11,556**	**331**	**6**	**30**
HA4XK	"	7,168	232	7	25
HA9PP	"	2,581	80	7	22
HA3NS	"	1,197	59	4	17
HA3JNG	"	798	44	4	15
HA7LR	"	441	15	7	13
Iceland					
WA9VYR/TF	**A**	**223,782**	**781**	**46**	**105**
Ireland					
EI5F	**A**	**3,325**	**43**	**16**	**19**
Italy					
I6MAT	**A**	**184,175**	**521**	**54**	**85**
I1CRW/p	"	74,850	273	45	105
				(DL9KP	opr)
I5ZCN	**28**	**49,640**	**302**	**25**	**43**
I2RTI	"	6,256	76	15	19
I4BMJ	**21**	**83,468**	**453**	**24**	**53**
I1SBU	"	24,009	192	19	34
I1EAD	"	1,911	39	10	11
I1MMR	**7**	**51,625**	**536**	**13**	**46**
Luxemborg					
LX9SI	**A**	**42,807**	**538**	**51**	**106**
Malta					
9H1CH	**28**	**73,718**	**414**	**25**	**57**
Netherlands					
PAØVB	**A**	**91,352**	**363**	**47**	**105**
PAØTA	"	59,532	245	46	86
PAØKW	"	40,992	238	37	85
PAØPSK	"	39,185	211	28	57
PAØPHK	"	9,020	96	18	37
PAØDIN	"	4,032	74	24	60
Northern Ireland					
GI3LLQ	**21**	**4,900**	**119**	**10**	**18**
				(GI3XGI	opr)
Norway					
LA9JM	**A**	**139,425**	**349**	**62**	**103**
LA6HL	"	102,487	352	45	76

LA2Q	"	68,040	358	31	79
LA9JD	"	40,198	302	32	69
LA1P	"	12,738	134	17	49
LA6XO	"	9,176	104	23	39
LA5BE	"	1,575	31	10	15
LA9FJ	28	2,378	54	9	20
LA3GK	"	656	39	5	11
LA5KO	"	84	8	3	3
LA8XM	7	6,952	96	12	32
LA6U	"	5,776	107	9	29
LA8RL	3.5	3,808	91	6	26
LA8WG	"	2,727	100	6	21
LA5AP	"	42	7	2	4

Poland

SP8ARU	A	216,960	476	70	156
SP6DMJ	A	159,294	403	59	132
SP2AJO	A	149,974	470	54	133
SP8EM0	"	104,304	448	46	113
SP5AFL	"	79,560	355	47	109
SP9BPF	"	71,188	285	40	108
SP8AWP	"	67,584	327	34	94
SP9CDA	"	61,215	412	35	71
SP1AGE	"	46,354	212	27	59
SP3EKV	"	42,036	375	24	69
SP2JS	"	35,968	200	36	92
SP2EPU	"	35,625	352	16	79
SP9AGS	"	33,063	208	32	71
SP7DTP	"	28,840	159	30	73
SP8HR	"	28,314	170	28	71
SP3ACB	"	27,354	204	25	69
SP2LV	"	26,818	165	30	76
SP9BDQ	"	22,700	125	35	65
SP6UK	"	22,050	183	27	63
SP1AEU	"	21,600	183	28	68
SP9EIJ	"	20,979	143	26	55
SP3FLN	"	15,840	153	22	58
SP6DNZ	"	15,554	170	20	57
SP8ASP	"	11,966	168	18	44
SP9EEE	"	9,108	101	18	51
SP9DN	"	9,063	135	19	38
SP5GMS	"	6,255	133	10	35
SP5ELX	"	5,500	60	17	23
SP2KFQ	"	4,680	86	13	39
SP3AIJ	"	4,312	44	19	30
SP9EMI	"	4,094	85	12	34
SP9AFX	"	3,344	58	17	27
SP8MJ	"	2,976	32	19	29
SP6CZ	"	2,772	47	17	27
SP5ATO	"	2,310	24	17	18
SP3AUZ	"	2,072	42	12	25
SP3DOI	"	312	10	5	7
SP8EST	28	5,040	56	12	18
SP6BFK	"	4,448	52	14	18
SP2FBL	"	3,200	30	16	24
SP9PT	"	1,600	22	9	16
SP9ADU	21	84,378	357	29	69
SP2AVE	21	84,288	471	29	67
SP2DVH	"	71,173	300	30	73
SP9KZ	"	59,594	387	28	55
SP8CUJ	"	56,862	309	53	28
SP9CTW	"	54,188	309	23	53
SP5PIL	"	34,960	203	25	51
SP8ARK	"	19,530	134	22	41
SP8AWL	"	10,187	87	22	39
SP9UH	"	10,152	98	15	32
SP3PL	"	3,219	43	11	18
SP7BRB	"	2,667	55	9	12
SP8EDQ	"	2,072	27	14	14
SP6XA	"	1,536	30	9	15
SP8AQN	14	41,090	373	22	48
SP5DDJ	"	17,385	201	16	41
SP9ZD	"	8,428	91	16	33
SP9EVP	"	6,123	111	11	28
SP6ALL	"	5,664	50	16	43
SP8EVS	"	3,432	82	8	25
SP5CKM	"	2,325	48	9	22
SP7ASZ	"	1,914	48	11	18
SP9ALW	"	1,155	35	6	15
SP9AVZ	"	1,144	49	6	16
SP2FGO	"	864	21	8	8
SP3EJJ	"	558	18	6	12
SP5BB	"	513	26	5	14
SP9FEW	"	96	8	5	7
SP5ARN	7	73,048	421	25	67
SP8FIX	"	23,997	317	14	43
SP9ABU	"	18,850	204	15	50
SP5PZX	"	15,100	268	12	38
SP4FNW	"	5,754	132	8	34
SP6EIY	"	4,726	96	7	27
SP1ETC	"	4,224	127	6	26
SP3DWE	"	2,430	72	6	21
SP8AG	"	2,088	48	6	23
SP9BBH	"	1,800	72	5	20
SP1BLE	"	1,392	58	5	19
SP9EQZ/6		1,360	66	6	14
SP2BMX	"	1,118	31	5	21
SP1CQN/1		360	24	4	11
SP9DH	3.5	26,620	312	13	48
SP9CTY	3.5	22,848	340	11	45
SP9ECH	"	19,943	347	11	38
SP9BNY	"	18,183	234	12	45
SP5GH	"	14,720	138	13	51
SP1DZ	"	8,480	192	6	34
SP2FOV	"	7,805	231	6	35
SP6AZT	"	6,392	185	6	28
SP9EM	"	6,125	169	6	29
SP8CP	"	5,760	144	6	30
SP8SR	"	4,917	145	5	28
SP9DTH	"	3,813	129	5	26
SP1DBD	"	3,360	120	6	22
SP1EWF	"	2,944	77	7	25
SP8DHJ	"	2,886	103	5	21
SP8AIS	"	2,730	101	5	21
SP2KJH	"	2,496	101	5	19
SP5YY	"	2,090	38	8	30
SP9AJM	"	1,508	52	5	21
SP2AHD	"	1,400	55	5	20
SP9FBS	"	893	47	4	15
SP1KNV	"	612	34	4	14
SP2FUA	"	462	35	3	11
SP2FAX	"	228	19	4	8

Portugal

CT1QN	21	23,493	348	11	30

Romania

YO7DL	A	130,684	550	44	104
YO6KAF	"	63,360	319	54	74
YO9APJ	"	33,143	119	51	80
YO2GL	"	31,900	149	40	70
YO7AWC	"	23,010	202	22	56
YO2RA	"	18,392	181	19	69
YO2AVP	"	9,450	65	25	38
YO5AVN/3		8,976	130	13	35
YO9KBU	"	6,344	101	15	37
YO3RT	"	3,744	62	11	24
YO8GF	"	2,883	93	8	23
YO6MZ	"	1,092	29	9	17
YO5NL/3		104	6	5	6
YO2QQ	28	468	19	5	7
YO5BQ	21	9,139	133	12	25
YO8FR	7	12,628	237	10	31
YO2IQ	"	1,708	53	6	22
YO6AZL	"	1,200	36	6	19
YO2AVA	"	266	16	5	9
YO6LV	"	121	11	4	7
YO6AFR	3.5	90	10	3	6

Scotland

GM6RV	A	37,761	197	26	97
GM5AXO	"	5,525	77	12	13
GM5BBJ	21	19,248	236	13	35
GM4BFX	"	2,574	83	6	16
GM3BSQ	14	3,668	98	8	20
GM3WDF	1.8	5,280	206	6	15
GM3YOR/a		490	52	2	8

Sicily

IT9AF	14	151,152	704	32	74

Spain

EA2IA	A	654,024	1293	67	171
EA5BS	"	496,790	1192	55	180
EA2CR	"	10,582	101	14	23
EA2HR	28	480	27	4	8
EA2JJ	7	2,886	108	6	22

Sweden

SM5CMP	A	219,392	482	70	186
SM7ID	A	208,035	524	60	141
SM0BDS	"	148,264	451	52	120
SM5DNI	"	122,472	387	55	134
SM0CGO	"	110,182	374	54	124
SM6CKU	"	70,218	219	64	77
SM4CHM	"	61,440	232	44	84
SM6CRA	"	48,601	226	41	90
SM4AZD	"	42,636	198	41	91
SM7WT	"	38,086	150	49	88
SM5FDD	"	24,804	170	31	47
SM6PF	"	19,902	110	35	58
SM7QY	"	18,974	93	39	67
SM0CCM	"	18,354	118	26	43
SM3DXC	"	10,251	97	21	30
SM5BAX	"	7,602	65	21	21
SMØDUI	"	6,400	82	14	26
SM7TV	"	6,090	57	26	32
SK6AW	"	5,848	58	20	23
SMØIX	"	2,607	45	14	19
SMØFY	28	46,060	187	26	68
SM5BHW	"	34,887	162	26	61
SM5TK	"	12,240	84	21	30
SM2CEW	"	11,605	115	16	39
SM7DMT	"	4,956	47	17	25
SM5ACQ	"	2,926	31	15	23
SM5BVF	"	936	13	11	13
SM6CEN	"	187	7	5	6
SMØDRW					
	21	41,968	223	27	59
SM6CTQ	"	31,160	183	24	52
SM5CEU	"	20,240	161	18	37
SMØKV	"	15,390	139	18	36
SM6FYJ	"	12,361	97	20	27
SM5BNX	"	14,553	137	19	30
SM7BYP	"	3,596	43	14	17
SM5BRS	14	45,675	354	24	51
SM5ESP	14	45,570	290	22	48
SMØFO	"	27,876	237	21	48
SM7ALN	"	27,654	236	20	46
SM2BLY	"	25,742	213	22	39
SM6JY	"	15,714	189	17	37
SMØBVQ	"	8,471	149	14	29
SMØBRF	"	8,052	152	11	22
SM5CVC	"	735	19	7	14
SM7EAN	7	78,192	601	18	54
SM2EKM	"	61,506	473	22	45
SMØTW	"	24,256	257	15	49
SMØCER	"	9,604	132	14	35
SM5AQN	"	8,815	187	11	33
SM3EAP	"	5,764	88	12	32
SM5UQ	"	3,729	101	7	26
SM5CAK	"	378	9	6	8
SM5BPJ					
	3.5	39,960	367	18	56
SM5BZR	"	836	42	5	14

Svalbard

JW4EJ	A	87,000	422	38	78

Switzerland

HB9QA	A	115,488	441	42	102
HB9PQ	"	92,660	300	57	107
HB9UD	"	47,793	256	30	59
HB9DX	21	27,136	168	21	43
HB9ZY	14	90,712	500	29	63
HB9NL	1.8	1,513	54	4	13

Wales

GW3SYL	A	291,346	756	66	143
GW3GHC					
	28	21,987	162	21	42
GW3NJW					
	14	68,484	494	24	54
GW4BCC	7	6,501	189	5	28

Yugoslavia

YU4PH	A	141,866	554	52	126
YU1HPG	"	108,00	349	53	107
YU3TVP	28	110,074	471	26	68
YU1SF	21	14,448	174	15	27
YU1NVT	"	9,460	127	14	29
YU2OB	14	65,384	451	25	63
YU2RKC	"	55,556	347	24	62
YU3EY	7	176,548	881	26	75
YU2CDS	"	44,436	419	20	49
YU1OCV	"	29,951	267	15	46
YU1BCD					
	3.5	59,508	515	21	55

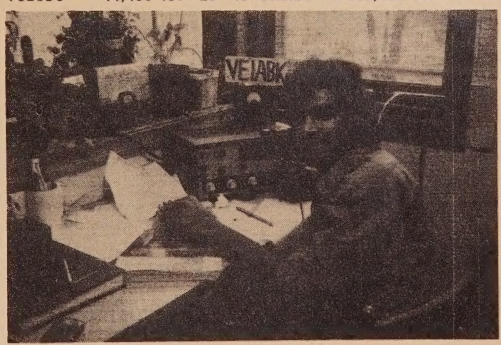
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European

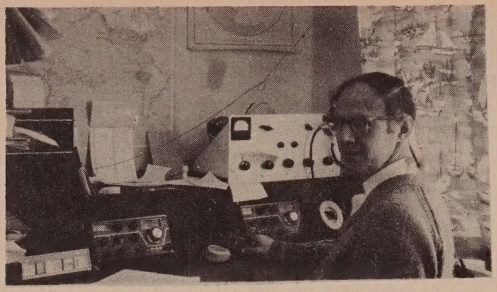
UW3HV	A	832,834	1149	107	280
UA3GM	"	111,618	394	48	114
UA3CA	"	88,140	366	38	92
UA1UD	"	53,436	327	35	87
UA3RO	"	33,180	170	32	73
UV3SB	"	14,656	120	19	45
UA6HP	"	14,007	126	22	65
UV3DN	"	13,570	115	18	41
UW3HY	"	9,882	112	23	38
UA6AJG	"	9,464	121	14	38
UW3WZ	"	6,572	80	18	44
UA3RDI	"	3,990	71	10	28
UV3BV	"	3,354	68	11	32
UA3ACW	"	2,030	53	8	25
UA3XN	"	288	12	7	9
UA4QM	28	32,186	252	21	56
UA4NAG	"	14,151	175	14	39
UA3FT	"	8,533	88	17	36
UA1AJ	"	1,617	23	13	20
UW3UO	21	69,836	506	23	56
UW3EH	"	64,242	373	27	59
UK3DAW	"	47,064	300	25	64
UA3ET	"	34,188	175	24	60
UA1ADM	"	33,051	247	19	50
UA3NP	"	32,032	241	21	53
UA3BK	"	16,960	162	17	38
UA1MV	"	16,860	153	18	42
UW1BT	"	9,176	197	11	26
UW1CX	14	185,592	749	35	79
UA3NG	"	70,932	472	27	65
UA6UO	"	63,500	381	32	68
UA1ZAN	"	55,100	429	18	32
UW6CV	"	48,807	341	21	59
UA4HCM	"	40,964	248	23	53
UW3RE	"	35,342	282	25	57
UZ3RV	"	32,982	311	20	49
UA1TAA	"	32,625	300	25	50
UA4NBI	"	21,452	192	22	40
UA1PAA	"	19,264	160	27	43
UA3TAM	"	15,360	199	18	42
UW6CW	"	15,218	128	21	48
UA3DAO	"	13,617	112	16	35
UA3MAE	"	12,561	114	17	40
UA3IAK	"	9,758	136	12	29
UA3GP	"	9,570	107	16	39
UA4IW	"	9,180	67	23	46
UA3LBF	7	7,172	104	8	36
UA3OBE	"	1,073	43	6	23
UA3QYL					
	3.5	37,200	431	13	49
UK1ABB	"	22,635	455	9	36
UW3YS	"	20,240	275	11	44
UZ3ER	"	6,438	138	7	30
UV3WT	"	1,430	54	5	17

Estonia

UR2MG	A	525,654	1014	79	182



This was the first contest for VE1ABK. Kent apologizes for his modest score on 15, but promises to make a better showing when he gets his code speed up to contest level. Didn't see a contact with KH6IJ in his log, HI!



This year the Maui Radio Club's Oceania Trophy goes to ZL3GQ. To my recollection this is the first time a CQ Contest Trophy has been won by a New Zealand station.

UR2FU	28	2,716	42	11	17
UR2HB	21	9,990	143	12	33
UR2GT	"	6,480	95	12	28
UR2NP	14	34,410	321	18	44
UR2CW	"	2,590	60	9	26
UR2JW	7	39,270	510	16	39
UR2FQ	.35	29,095	527	10	45
UR2CU	"	940	54	3	17
UK2RAH	"	345	24	3	12
		Kaliningrad			
UA2DM	A	160,956	398	60	144
UA2CK	"	87,647	353	41	92
UA2DP	21	9,320	105	14	26
UA2EC	3.5	7,130	97	9	37
UA2DK	"	2,700	96	6	21
		Karelia			
UN1CB	A	9,328	153	16	37
		Latvia			
UQ2CR	A	20,664	201	18	45
UQ2NU	14	2,135	33	14	21
UK2GCG	7	33,872	440	16	42
UQ2OC	"	28,424	285	17	51
UQ2GCN					
	3.5	9,648	262	5	31
UQ2GDM	"	2,975	119	4	21
UQ2GCP	"	2,392	92	5	21
		Lithuania			
UP2NK	A				
		1,106,272	1351	110	272
UP2BAR	"	212,247	765	53	136
UP2OU	"	181,076	515	54	139
UP2NX	"	80,172	340	41	112
UK2BAA	"	74,500	399	34	91
UP2BAS	"	28,160	194	30	80
UP2BAZ	"	8,798	170	11	42
UP2BBF	"	4,368	54	3	16
UP2OQ	28	33,698	168	27	56
UP2AY	21	108,976	438	32	80
UK2BBB	14	195,856	894	34	72
UP2NC	"	37,380	350	17	53
UP2DV	"	29,681	268	20	47
UP2BX	"	18,078	159	19	50
UP2OM	"	1,528	80	7	15
UP2PX	3.5	35,380	541	12	46
UP2BBC	"	15,744	351	7	34
UP2DZ	"	10,500	215	9	33
UK2BBK	"	9,879	246	7	30
		Moldavia			
UO5GS	A	209,330	956	34	87
UO5SA	7	35,376	375	17	49
UO5OBD	"	8,084	151	10	33
UO5OAQ	"	364	25	5	8
UO5AP	3.5	12,691	205	10	39
UO5OAL	"	9,250	223	8	29
		Ukuraine			
UB5WF	A	821,606	1208	96	241
UK5EAQ	"	271,998	851	57	150
UK5MAB	"	129,578	606	41	93
UY5TE	"	86,655	348	44	115
UB5WAB	"	59,200	320	25	75
UY5TH	"	57,276	242	43	105
UB5IB	"	45,577	257	35	84
UB5LR	"	11,310	83	26	52
UB5TR	28	15,196	123	19	39
UB5RS	"	2,890	35	14	20
UB5VY	21	98,703	458	29	70
UT5JF	"	52,332	311	26	58
UT5LH	"	11,900	144	15	35
UK5WBG					
	14	154,934	600	35	83
UT5SM	"	37,683	309	27	52
UB5VAA	"	36,792	301	22	51
UK5WAS	"	30,310	239	21	49
UT5BW	"	28,712	209	22	52
UB5AY	"	27,984	364	14	39
UT5RF	"	22,196	246	17	45
UB5GBD	"	19,544	222	17	39
UK5KFG	"	8,050	162	10	25
UB5LL	7	150,720	782	28	68
UB5IF	"	121,373	704	30	69
UY5SS	"	55,991	469	20	53
UT5BP	"	19,404	248	22	44
UT5SN	"	16,800	207	13	37
UB5ZAL	"	10,000	123	14	36
UB5HI	"	6,192	131	6	30
UB5QBA	"	2,862	70	8	19
UB5QBC	"	1,456	38	7	19
UB5CI	3.5	74,112	501	22	74
UY5EX	"	31,696	435	12	44
UB5MZ	"	31,482	486	11	42
UK5VAA	"	27,666	432	11	42
UB5WL	"	22,950	463	10	35
UB5TQ	"	21,112	336	12	40
UT5BY	"	3,328	89	7	25
UB5HAC	"	2,430	74	6	21
		White Russia			
UC2WAJ	A	39,809	444	17	60
UC2CC	"	23,142	146	36	51
UC2WP	28	15,660	115	20	38
UC2AAD	14	30,954	243	23	54
UC2OAF	"	24,640	207	18	46
UC2AAM					
	3.5	27,480	384	12	48
UC2AAP	"	22,896	383	11	42
UC2WAE	"	9,652	217	7	31

OCEANIA

		Australia			
VK2BKM/2					
	A	946,368	1300	90	158
VK2GW	"	277,344	667	61	83
VK3KX	A	653,020	1078	79	127
VK3XB	"	54,416	246	38	38
VK3JI	14	78,660	308	30	60
VK3APN	7	126,996	559	25	51
VK3RJ	3.5	576	20	9	7
VK4AK	14	1,247	17	14	15
VK6AJ	14	36,984	189	28	41
VK6CT	3.5	9,956	94	16	22
VK6HD	1.8	54	4	3	3
		Gilbert & Ellice Islands			
VR1AA	A	252,287	572	75	86
		Guam			
KG6JBS	A	784,930	1025	100	165
KG6JAR	"	570,725	1053	81	104
		Hawaii			
KH6RS					
	A	2,748,307	2990	121	190
			(Opr. W6MAR)		
KH6IJ	A	1,174,896	1737	97	133
WØDAD/KH6					
		125,358	433	48	54
KH6IAB	14	151,810	607	30	55
K5CIT/KH6		40,527	258	26	30
KH6HQL	7	8,619	171	9	8
KH6GJY	3.5	4,953	132	6	7
KH6CHC	1.8	1,458	54	5	4
		Marshall Islands			
KX6BB					
	A	454,727	1168	61	72
KX6JS	"	24,492	210	21	18
		New Zealand			
ZL3GQ					
	A	1,318,834	1492	105	197
ZM1AMM	"	185,871	396	73	94
ZM3ABC	"	3,402	54	11	10
ZL1IL	28	98,580	630	22	31
ZL1ARV	14	160,590	575	33	68

SOUTH AMERICA

		Antarctica			
UA3YH/M					
	14	129,168	484	31	61
		Argentina			
LU3FG	A	444,960	1050	51	93
LU5HFI	14	435,768	1100	35	99
LU6FA	"	165,680	588	33	62
LU2DKG	7	68,796	373	23	40
LU5EVM	1.8	18	3	3	3
		Bolivia			
CP1EU	7	15,048	141	15	23
		Brasil			
PY2ZBA					
	A	1,225,830	1435	99	191
PY7AKQ/6					
	14	320,824	979	33	86
PY2DPR	"	3,675	37	14	21
PY1ZAL	"	2,730	40	12	14
		Chile			
CE2CR	21	4,494	76	10	11
		Ecuador			
HC3JL	A	150	5	5	5
		Surinam			
PZ1AH	14	457,583	1173	35	96
		Trinidad & Tobago			
9Y4VU	A	1,198,652	1566	81	178
		Uruguay			
CW9BT	21	696,193	2068	31	82
CX1JM	"	494,283	1495	35	76
		Venezuela			
4M4AGP					
	A	2,578,665	2561	112	241
			(Opr. W6OAT)		
YV5BNR					
	21	101,657	576	18	41
YV4AJ	14	603,591	1578	37	92
			(Opr. K4TIG)		
YV5CEP	"	219,000	744	31	69
YV5AW	3.5	65,000	426	15	37
YV5KL	"	20,775	278	8	17

Multi-Operator Single Transmitter

W6DOD		620,300	921	92	137
WA6QGW		154,570	410	51	79
WA7OBL		138,864	376	57	75
K7PBU		5,353	45	27	26
W8SH		632,766	680	109	217
W8UM		516,600	589	99	216
W9EWC		973,161	855	128	271
W9EXE		410,338	370	129	269
WØCVS		667,380	795	108	186
WØAA/Ø		284,688	472	78	138
		Alaska			
KL7AIZ		143,412	757	35	39
		Canada			
VE1ASJ		1,749,766	1999	110	249
VE4JB		318,384	618	75	123
		Cayman Islands			
ZF1VD		653,838	1744	65	112

NORTH AMERICA

		U.S.A.			
K1DIR		1,985,310	1401	133	353
K1ZND		1,564,990	1372	107	288
WA1KZE		951,528	1015	98	230
WA2BLV		1,016,338	894	116	270
W3GM		1,101,492	916	129	294
WA3HGV		727,650	739	106	244
W3DBT		437,376	567	89	183
WA3LHG		378,328	510	84	178
W3YXM		354,105	425	102	203
W3NX		329,430	417	86	192
W3BYX		284,354	376	76	190
K3MBF		281,424	473	68	140
W3GPI		134,769	285	58	109
W4QCW		657,552	683	101	236
K4BEO		639,806	756	96	202
W4JD		486,700	549	93	221
W3ZBW/4		105,560	209	71	101
WB5AOF		485,814	609	93	176
WA3GBU/5					
		406,326	597	88	153
W6NUT		974,928	1117	118	186
WA6EPQ/6					
		886,080	972	112	200
WB6KBK		842,148	999	109	189
WA6NGG		621,988	812	104	158

ASIA

		Israel			
4Z4LI		932,064	1393	65	163
		Japan			
		Club Stations			
JA9YBA		645,120	976	92	147
JA3YBF		293,503	661	71	90
JA1YHA		267,701	588	70	97
JA6YCL		60,970	258	42	49
JA7YAA		47,170	189	41	48
JA5YCS		19,200	126	29	31
JA2YCF		14,456	103	27	25

U.S.S.R.

		Club Stations			
		Asiatic			
UK9AAZ		1,102,960	1137	96	244
UK9FEC		344,872	639	61	131
UK9LAA		317,756	709	40	108
UK9CAN		308,934	647	43	119
UK9XAC		200,901	467	56	111
UK9CCC		158,562	429	36	102
UK9MAA		139,384	344	47	86
UK9HAC		68,187	238	38	81
UK9CBD		31,942	278	25	69
UK9AAC		19,398	132	17	36
UKØFAA		1,066,240	1715	104	176
UKØCAQ		135,087	696	50	61
UKØAAC		72,240	315	33	96
UKØCAA		70,490	522	45	50
UKØCAW		38,430	331	31	39
UKØIAC		30,100	233	30	40
UKØZAA		21,987	293	32	31
UKØCAJ		12,236	270	21	71
UKØKAG		8,155	97	19	16
		Azerbaijan			
UK6DAU		186,516	436	46	111
UK6DAC		159,332	490	36	86
		Kazakh			
UK7GAA		731,766	1135	83	179
UK7TAA		166,871	541	49	94
UK7PAA		60,507	275	34	47
		Uzbek			
UK8AAI		662,354	981	77	176

EUROPE

		Bulgaria			
		Club Stations			
LZ1KVV		1,793,754	1854	124	315
LZ1KDZ		247,065	789	58	123
LZ1KRD		175,720	611	59	130
LZ1KCP		133,446	624	36	102
LZ2KSQ		129,744	553	42	117
LZ1KRB		112,716	657	30	63
LZ1KSD		74,040	445	36	84
LZ2KGO		60,358	423	27	76
LZ1KHB		58,125	445	38	55
LZ1KRA		37,492	332	25	66
		Czechoslovakia			
		Club Stations			
OK3KAG		760,632	1217	97	231
OK1KSO/P					
		479,452	838	86	268
OK1KTL		262,083	616	63	136
OK2KNN		144,876	524	56	140
OK1KZD		104,091	401	46	111
OK1KYS		66,975	233	47	94
OK3KNO		28,514	399	15	38
OK2PDL		23,034	149	32	34
OK1KPZ		16,500	206	17	43
OK1KCF		5,610	66	24	42
OK3KGI		3,990	90	9	29

OK2KMB	3,286	106	10	21
OK2KOO	2,665	59	11	30
OK3KED	2,254	53	17	20
OK1KUT	1,000	56	4	16
England				
G3SSO	1,073,284	1331	102	256
G3PDL	373,041	805	62	167
Finland				
OH1AD	1,179,147	1237	119	220
OH3MG	583,881	946	86	217
OH8OB	457,588	824	81	197
OH3AG	96,525	390	52	113
OH2AC	49,773	262	35	106
France				
F6KAW	1,327,592	1983	94	220
Germany				
DLØWU	1,354,220	1788	104	236
DLØWW	913,824	1273	95	209
DLØJRA	527,793	960	95	192
DLØDX	241,011	630	66	117
DLØRZ	206,800	622	62	138
DM3QO	454,292	84		190
DM5DL/1	44,232	41		75
DM3BE	12,070	22		50
Hungary				
HA8KUC	532,948	1027	91	186
HA5KFA	315,657	770	73	170
HA3KMA	278,512	797	56	150
HA5KKK	270,618	635	72	150
HAØKLE	259,128	741	57	120
HA5KBM	222,812	442	70	142
HA4KYH	204,512	552	65	134
HA5KHE	192,864	622	61	135
HA4KYB	173,760	589	60	121
HA7KLC	171,080	579	59	129
HA8KUX	170,520	510	64	132
HA5KFB	152,706	425	62	124
HA5KKC	146,972	356	73	108
HA8KVG	131,528	448	48	116
HA7KLF	117,552	400	55	103
HA5KKB	110,656	417	51	101
HAØKHW	96,432	384	47	117
HA6KNH	89,187	361	47	90
HA3KGJ	83,520	401	46	98
HA6KVB	81,786	421	43	86
HA5KBC	78,736	341	47	101
HA3KMK	64,860	545	33	32
HA5KFM	62,565	306	34	63
HA4KXG	58,242	369	33	69
HA3KNA	50,128	276	32	72
HA7KLH	20,522	293	14	48
HA7YLI	17,424	368	9	35
HA3YGC	16,807	371	10	39
HA5KKP	11,284	173	12	40
HA1KVM	2,822	44	14	20
Netherlands				
PI1PT	64,294	342	36	86
Norway				
LA9OI	1,052,814	1549	84	210
Poland				
Club Stations				
SP7PBC	136,498	673	34	105
SP2PZH	108,472	443	45	104
SP9KBH	60,388	321	33	91
SP9KRT	52,015	397	36	87
SP8KAF	46,157	393	23	78
SP5PCI	39,646	442	16	70
SP2KFS	18,711	231	21	60
SP6PAV	9,216	314	7	29
SP6PBA	8,174	123	14	47
SP6PAZ	6,300	152	9	36
SP3PTE	5,724	69	20	34
Romania				
YO3KAA	275,835	796	60	153
YO8KAN	63,011	386	34	97
Sweden				
SK5AL	890,496	1219	111	273
SM5AOE	670,475	973	98	227
SM6DJI	134,946	431	54	108
Switzerland				
HB9AHP/P	33,480	220	34	74
Wales				
GW6GW	21,239	193	20	47
GW3UCB/P	3,463	167	4	15
Yugoslavia				
YU1AFQ	873,459	1314	94	239

U.S.S.R.

Club Stations				
European				
UK3AAO	1,628,478	1315	132	345
UK6LEZ	1,194,264	1253	127	329
UK1AAA	1,047,098	1376	111	280
UK3ABO	775,065	1165	94	224
UK4LAA	391,017	830	86	203
UK4WAC	367,188	924	63	159
UK4WAB	324,901	746	79	182
UK4NAA	299,728	830	65	143
UK1AAG	235,330	670	63	139
UK4FAA	226,435	865	51	128
UK1QAA	170,245	560	50	125
UK1ABA	130,312	487	55	127
UK3YAB	123,820	359	51	101
UK3SAB	122,271	467	49	110
UK1OAA	109,242	578	33	93
UK3DAA	104,922	402	51	123
UK3MAA	90,207	389	40	77
UK1ZAM	88,672	319	41	95
UK3AAH	84,240	304	52	128
UK1TAB	81,696	368	46	102
UK4AAI	70,278	462	34	72
UK6AJA	31,790	269	26	59
UK3DCF	14,784	222	14	34
UK3WAA	9,342	105	20	34
UK3RAC	2,314	70	8	18
Estonia				
UK2RAJ	34,080	246	28	68
Kaliningrad				
UK2FAA	1,099,947	1365	110	271
Karelia				
UK1NAA	40,191	375	41	100
Latvia				
UK2GAA	753,246	1252	97	236
UK2GBY	301,526	903	62	152
UK2GCF	116,768	444	53	125
Lithuania				
UK2PAF	1,428,024	1780	117	281
UK2PAA	138,719	591	42	107
UP2BAE	41,080	355	17	48
UK2PAT	21,964	275	20	56
UK2PAG	11,928	165	19	37
Ukraine				
UK5IAZ	2,112,240	1885	140	380
UK5KAA	380,410	909	63	155
UK5JAZ	336,673	925	62	135
UK5EAG	332,278	999	55	151
UK5QAA	315,863	727	36	101
UK5UAL	314,875	715	74	155
UK5TAA	237,575	685	59	156
UK5ICA	125,136	595	38	106
UK5QAC	71,540	293	44	102
UK5EAC	26,122	270	20	54
UK5JAR	4,788	109	8	28
White Russia				
UK2WAF	445,341	931	72	175
UK2OAA	132,060	569	54	85
UK2WWW	93,340	386	48	87
UK2AAP	35,984	291	23	81
UK2AAB	28,342	276	21	53
UK2LAA	18,924	161	25	57

OCEANIA

Australia				
VK4VU	621,712	1094	72	124

SOUTH AMERICA

Netherlands Antilles				
PJ2VD	2,400,664	2489	98	228
PJ9JT	1,258,425	1820	77	158

Multi-Operator Multi-Transmitter ASIA

JA2YEF	1,004,668	1068	115	188
XW8CN	223,360	680	59	101
JA1YXP	172,584	513	71	70
JA6YAP	61,488	198	56	70

EUROPE

DJ2BW	3,527,425	3375	131	505
SK5AJ	2,522,341	2774	135	328
OH1AA	2,399,048	2471	134	345
DLØKF	1,976,842	2669	113	283
SP5PWK	494,562	828	88	190
DLØII	459,832	903	68	161
OE1XRA	301,035	628	76	159
OH6AK	152,070	415	63	122
OH8AB	134,125	398	56	129

NORTH AMERICA

W3AU	5,031,982	2972	156	430
W4BVV	4,476,912	2768	150	406
W7RM	4,229,727	3020	157	346
W3GPE	2,434,803	1744	135	348
W3FRY	2,254,181	1598	139	353
K4CG	1,520,656	1324	123	281
WA3ATX	1,235,075	1111	114	275
W3TV	1,198,530	1086	113	273
K3BW	1,124,200	1018	114	271
W6HQN	739,431	881	108	183
W3SS	579,424	675	96	208
VE3HUM	523,410	948	79	160

(Cont. on p. 82)

CLUB SCORES

United States

Potomac Valley Radio Club	**39,298,881**
Frankford Radio Club	38,341,148
Southern California DX Club	20,218,294
Western Washington DX Club	14,722,412
Northern California Contest Club	13,196,993
Northern California DX Club	11,360,142
Murphy's Marauders (Conn.)	8,422,705
Southeastern DX Club (Ga.)	6,892,217
Richardson Wireless Klub (Tex.)	6,572,750
Northern Illinois DX Assoc.	6,383,065
128 Contest Club (Mass.)	3,390,692
Mad River Radio Club (Ohio)	3,138,475
Golden Triangle DX Club (Fla.)	2,718,372
Oak Park A.R.C. (Mich.)	2,205,310
Florida DX Club	2,013,902
Central Virginia Contest Club	1,880,570
Ohio Valley Amateur Radio Assoc.	1,453,194
Virginia Century Club	1,385,184
Texas DX Society	1,273,465
Prince George Wireless Assoc. (Md.)	1,106,167
Delta DX Association (La.)	1,075,754
Overlook Mountain Radio Club (NY)	695,952
Order of Boiled Owls (NY)	370,225
Larkfield Amateur Radio Club (NY)	59,382
Colonie High School R.C. (NY)	52,854

Canada

Calgary Amateur Radio Assoc.	1,822,747
Toronto DX Association	1,730,583
Winnipeg DX Club	578,351
Edmonton DX Club	187,992

Foreign Clubs

Rhein Ruhr DX Assoc. (Germ.)	22,527,174
Honolulu DX Club	19,125,763
Uruguay DX Club	9,428,129
Saar-Pflaz DX Club (Germ.)	6,931,002
Lampertheim DX Group (Germ.)	5,334,527
Kaunas Polytechnic R.C. (Lith.)	5,305,575
Radio Club Venezualano	4,493,792
Far East DX Assoc. (Japan)	4,324,450
Moscow City Radio Club	3,883,008
Chelyabinsk Radio Club (USSR)	3,813,066
SP DX Club (Poland)	3,035,818
Trier DX-Ring (Germ.)	2,601,157
South German DX Group	2,529,673
Kiel Canal Radio Club (Germ.)	1,976,842
SK5AJ Contest Club (Sweden)	1,320,546
Leningrad DX Club (USSR)	1,314,984
Swiss DX Club	1,206,771
Radio Club Beograd (Yugoslavia)	873,459
International A.R.S. (Laos)	781,687
Radio Club Vitebsk (White Russia)	577,288
Tirnovo Radio Club (Bulgaria)	560,013
DM DX Club (East Germ.)	237,980

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MATH'S NOTES

BY IRWIN MATH,* WA2NDM

WHILE all experimenters use relays at one time or another, many people are not familiar with the various methods that can be employed to increase their usefulness. In an attempt to enable our readers to make better use of these devices, and to take advantage of the huge surplus stock of relays available, we have decided to explain some of the more useful "tricks" that can be accomplished with the basic relay.

As we all know, applying appropriate power to a relay's coil causes its contact to either open or close. This action usually occurs in 5-10 milliseconds at the normal operating voltage. Fig. 1, shows a method for reducing this pull-in time significantly.

In this example, the relay is connected to a source of voltage that is greater than its normal coil voltage. To prevent burnout, a dropping resistor, R_d, is connected in series with the coil. Across the dropping resistor, is a capacitor. Operation is as follows:

When power is initially applied, the capacitor has no charge on it and appears as a short circuit. All of the voltage is therefore momentarily applied to the coil and the relay begins to "slam in". At the same time however, the capacitor begins to charge and shortly, when it is fully charged, and the relay has operated, the coil voltage drops to its normal value. The value of the capacitor determines the increase in speed obtained and should be determined experimentally.

*5 Melville Lane, Great Neck, N.Y. 11023.

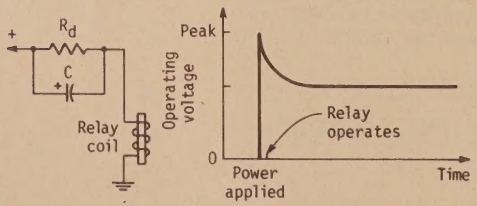


Fig. 1—A method for reducing the pull-in time of a relay.

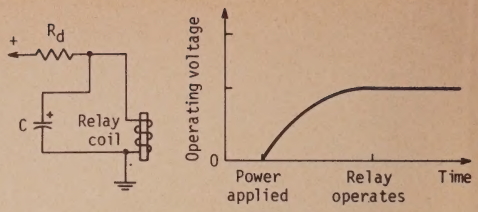


Fig. 2—A method for slowing down the pull-in time.

In fig. 2, we have a method of slowing down the pull-in time. Here we use the same dropping resistor and capacitor, but this time the capacitor shunts the coil. Now, when power is applied, the capacitor must first charge before the relay can operate. Delays of up to several seconds can be obtained with this circuit and sensitive relays. When power is removed in this circuit, the fall out time is lengthened somewhat because the capacitor must then discharge through the coil.

Fig. 3 shows a way to achieve normal pull-in, but delayed dropout of a relay. Here, either a resistor, or diode shunts the relay coil. When voltage is applied (with the polarity shown for the diode circuit) the relay pulls in in the normal manner. When voltage is removed however, the coil develops a back EMF which is shorted by the diode or resistor and the magnetic field produced by the coil decays, slowly delaying the fall out.

Fig. 4 is a useful scheme for employing an ON and an OFF push button to control various circuitry. When the s.p.s.t., normally open ON button is pressed, the relay coil is energized and, as soon as the contacts close, the relay stlf latches. Pressing the s.p.s.t., normally closed OFF button breaks the path and the relay drops out. Additional contacts are used to control the auxiliary circuitry. Note that this circuit will work with either a.c. or d.c. relays.

Fig. 5 is a method for employing an a.c. relay as an overload sensing device. Normally, the relay coil is not activated due to

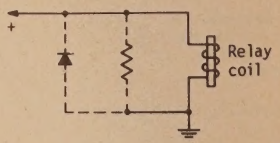


Fig. 3—A diode or resistor shunting the relay coil provides normal pull-in but delayed drop-out. Be sure the p.i.v. of the diode can withstand the back EMF of the coil.

the low load current. When excessive current flows, a full 6 volts will be developed across the secondary of T_1 (a typical filament transformer). This will induce 115 volts into the primary and the relay coil will be activated. Once this happens, the relay latches and removes power from the load. To reset the system, simply press the s.p.s.t. normally closed push button. This breaks the path and resets the circuit. Proper choice of T_1 and the relay should allow current of 1 to 2 amperes to many amperes to trigger the circuit. We used the center-tap of a 6.3 volt 3 amp transformer and one end of the secondary as a sensor winding with the entire primary driving a 48 v. a.c. relay as a fail-safe circuit to indicate when a blower motor failed in a high power system. After two years of 16 hour/day operation, it still works perfectly.

One common problem with relays, especially when using them with semiconductor circuitry, is noise production. This is usually caused by one of two factors: contact arcing and/or back EMF from the relay coil.

Contact arcing occurs when very heavy currents are suddenly interrupted or produced by the extremely rapid rise or fall time of electromechanical contacts especially when switching inductive loads. Fig. 6 shows a simple supression scheme which, if the *R* and *C* values are properly chosen, will drastically reduce such noise. When the contacts open in this example, the capacitor momentarily bypasses the back EMF pulse of the inductive load, thereby effectively eliminating the noise pulse.

The purpose of the resistor is to limit the discharge of the capacitor across the contacts when they again close. A diode may be added as shown to eliminate the degrading effect of the resistor for severe back EMF problems.

To limit back EMF problems from the actual relay coil, the circuit of fig. 3, with a diode will short out any back EMF at the expense of extended drop out time. A resistor may be added in series with this diode

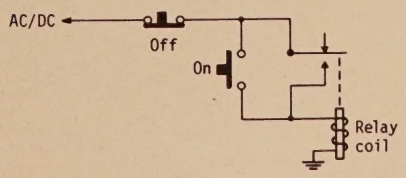


Fig. 4—The On/Off circuit discussed in the text.

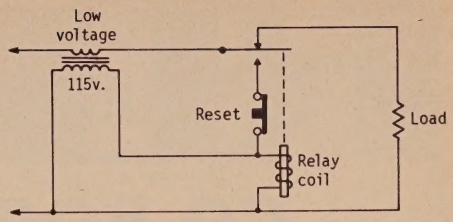


Fig. 5—A method for employing an a.c. relay as an overload sensing device as discussed in the text.

to somewhat lessen the amount of delay produced. Alternately, a capacitor could be tried as a substitute for the diode.

Since just about every surplus dealer handles some relays we will not recommend specific sources at this time. It is advisable to check your catalogs however, as bargains galore are available for these items.

There are several new semiconductors that will be of use to experimenters this month. Texas Instruments, 13500 North Central Expressway, Dallas, Texas, 75222, has a new series of voltage-variable capacitance diodes designed for v.h.f. and u.h.f. applications. The TIV-21, 22 and 23 are 25 volt units with capacitances of 2.5—2.8 pF which is the ballpark value used for u.h.f. work, while the TIV-24 and 25 are designed for lower frequency use and exhibit capacitances of 6.5—7.5 pF. All diodes are silicon and available from TI distributors. Prices in the 100 quantity range are from $1.20 to $1.50 depending on the unit.

Microsemiconductor Corp., 2830 South Fairview Street, Santa Ana, California, 92704, has just announced a new line of rather interesting devices. These are microminiature 3 watt zener diodes, with voltages of from 6.8 volts to 400 volts, in packages smaller than most ¼ watt zeners. Their 1N5063-1N5117 line consists of 70 different voltage devices and individual devices cost 70¢ to $1.40 each in 100 quantity.

[*Continued on page 80*]

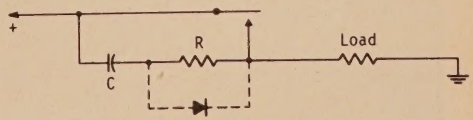
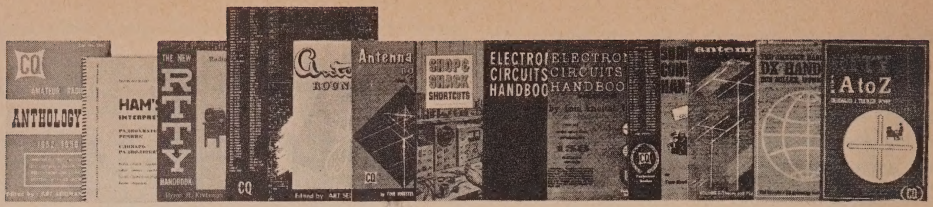


Fig. 6—C approximately equals $I^2/10$ microfarads where I = steady state load current and R is chosen for minimum sparking across the contacts but should not be less than .5 ohms.



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☐ New RTTY Handbook	$3.95	☐ Surplus Conversion Handbook	$3.00
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☐ 103 - Simple Transistor Projects ... $3.45

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Slow Scan TV

BY COPTHORNE MACDONALD,* WA2FLJ

New Directions Roundtable

"...a gathering place for those of us trying to make positive changes in our own lives and in the world around us." That's how I referred to it in the July column. The initial get-acquainted session will be Sunday afternoon, September 16, at 2000 GMT, on about 14253 kHz. Between now and then, think about yourself – where you've been, and where you're heading with your life. Give some thought to the topics you'd like to get into, and helping the rest of us get to know you.

The optimum format may take awhile to evolve, but we'll start with presentations by individuals on various subjects. (For example, in the early weeks we'll have a review of the M.I.T. study of the world problematique: "The Limits to Growth." We'll also have a look at what individuals are doing to harness wind, sun, and water; providing non-exploitive energy sources for personal use.) The presentations will be followed by discussion sessions. If the group is large, or if there are General Class hams who want to get involved, we may split up into smaller groups meeting on and at other frequencies, bands, and times. The "guest of the day" would QSY to join the smaller groups when possible.

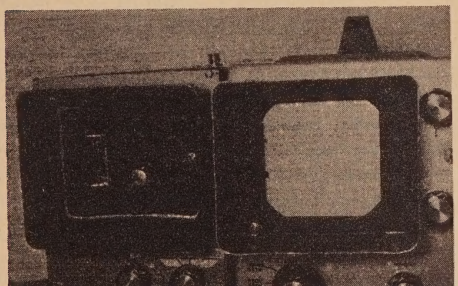
At the very minimum, the NDR will be an avenue for meeting like-minded hams. If we use our imaginations, and if we commit sufficient time and energy to lining up interesting participants and preparing audio/visual materials, it will be much, much more.

* P.O. Box 483, Rochester, Minn. 55901

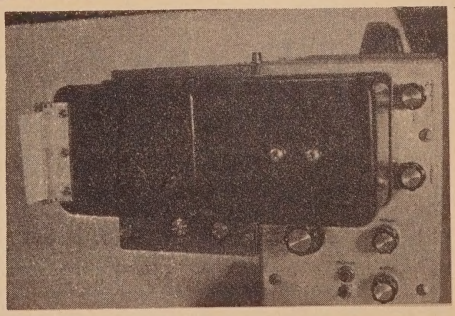
FSS Optics for Scanning Opaque Material

This month we'll continue our study of flying-spot scanner optical techniques and problems. Last month we looked at a special case where the opaque materials being scanned did not have shiny surfaces. In the more usual situation we want to be able to transmit snapshots, or postcards, or material printed on glossy paper. When looking at snapshots by eye we are accustomed to disregarding the specular reflections from the shiny surface. Perhaps we do this because we can move the reflection away from the area of the photo we are viewing by an almost unconscious tilting of the photo or movement of the head. In a flying-spot scanner the position of that photo is fixed, and if there are specular reflections, the viewer cannot get rid of them.

The problem is illustrated in fig. 1. Imagine the object being scanned as acting like a mirror. The rays of light from the lens strike the surface at various angles. The smallest angle occurs at the edges of the scan. If we call this angle a, the ray reflected from the shiny surface will leave that surface at angle a', which is equal to a. If you draw your proposed optical design, full scale, on graph paper it's easy to sketch-in the "safe"



3" monitor with attached flying-spot scanner electronics unit.



The monitor/FSS with optics unit plugged-in.

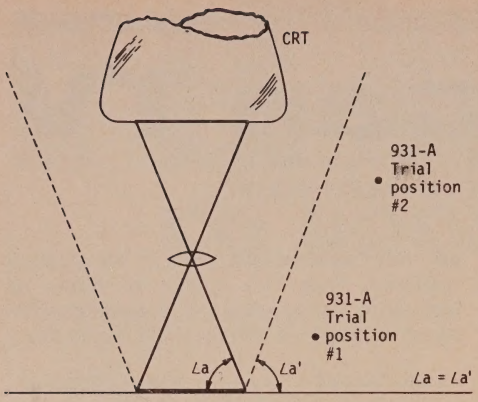


Fig. 1 — A photomultiplier tube located within the shaded area will pick up specular reflections from glossy copy. One outside the dotted lines will not.

and "forbidden" regions. Allow an additional safety factor if you plan to use photos that don't lie perfectly flat.

Uniform Light Gathering

OK, we know how to avoid specular reflections, but putting the photomultiplier tube so far off to the side doesn't seem good. It's not. Fig. 1 shows two trial positions for locating the 931-A. In position No. 1 the farthest scanned point is exactly twice as far from the 931-A as the nearest point. To a first approximation, the light reaching position No. 1 will be inversely proportional to the square of the distance from the spot being scanned.[1] Since the distance ratio is 2:1, the light from the distant point will be down by a factor of 2^2, or 4, from the light received from the near point. If a uniform white card is being scanned, the distant side of the picture will appear a dark grey if the near side is set to produce a "white" video signal. Hardly a satisfactory situation.

One remedy is to increase the distance from the scanned object. The far and near distances for position No. 2 are 5:4 instead of 2:1. This makes the near-to-far light level ratio 1.56:1 instead of 4:1. Very much better.

A second remedy is to place a mirror or white reflecting surface beyond the distant edge of the scanned object as shown in fig. 2. Now the 931-A receives more light than before. Some of the light that otherwise would have been wasted is reflected back to the 931-A. Assuming a perfect mirror, the light from the far side of the object is almost doubled. The light from the near side is not doubled, however, due to the long path length for the reflected ray. Using some math which is not worth going into, the new light level ratio calculates out to be better than 1.1:1 — much better than the original 1.56:1. Note that the mirror extends up into the "forbidden" region. This causes no problems because the specular reflection bounces off the mirror at an angle that never reaches the 931-A. This bounce angle is straightforward to plot, and should be checked. If you use a white surface instead of a mirror to increase the "far side" light getting back to the 931-A, it should be kept out of the "forbidden" region altogether.

The third remedy is rotating the photomultiplier tube. The sensitivity of the 931-A has a directional pattern similar to that of a beam antenna. There is a maximum response in a particular angular direction. About 40 degrees either side of this "best" direction, the effective sensitivity drops to ½ of maximum. The tube can be rotated so that the direction of greatest sensitivity points at the far side of the object being scanned, or at whatever point minimizes the shading.

A fourth remedy is almost more trouble than it is worth: using two 931-A's, one on each side of the picture. The problem here is balancing the outputs of the two tubes and

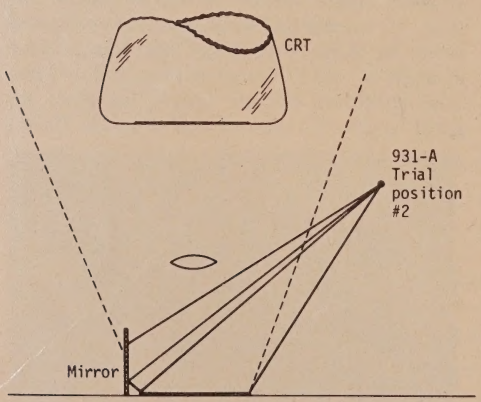


Fig. 2 — Diagram showing direct and reflected light paths to the photomultiplier when a mirror is used on the far side of the scanned object.

[1] Actually, there is also a second law operating. The amount of light radiated from the surface being scanned, at a particular angle to that surface, is proportional to the sine of that angle. In this example, disregarding "Lambert's Law" introduces little error.

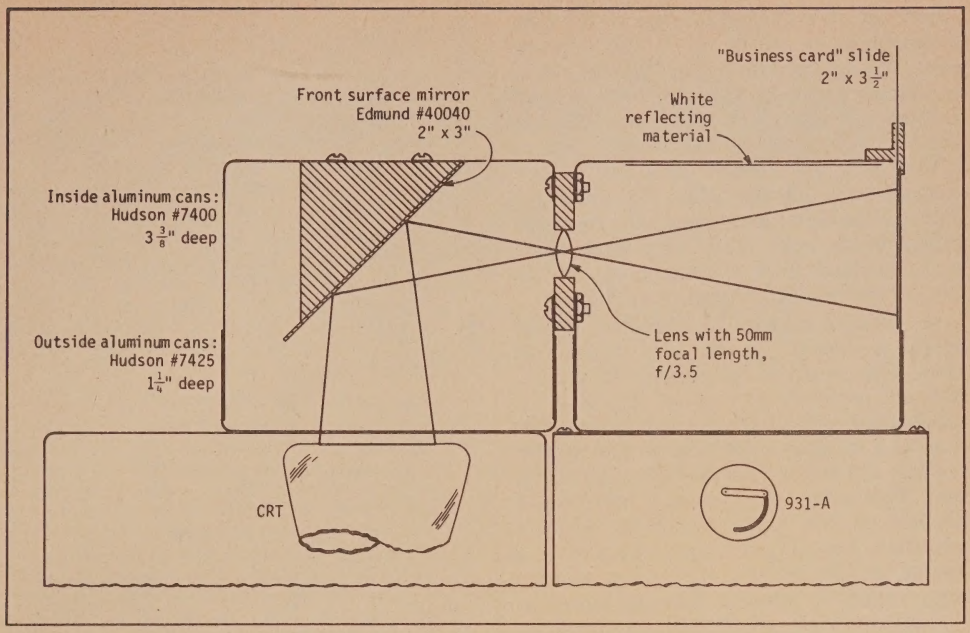


Fig. 3—Mechanical layout of the FSS optics unit in operating position.

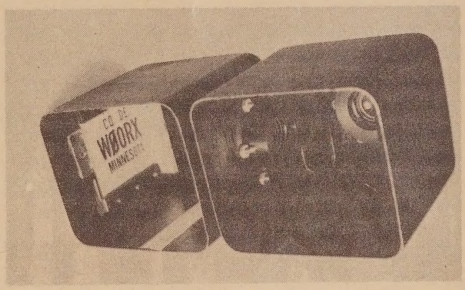
keeping them balanced. By adjusting the overall bleeder voltages it is possible to obtain equal output from the two tubes. Changes in temperature, and line voltage can quickly upset the balance, however, and the tubes are bound to age and fatigue differently.

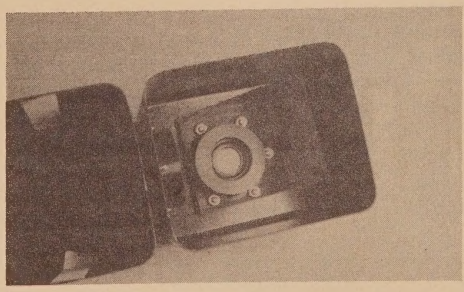
Final adjustments to minimize shading are best made on the completed scanner while scanning a uniform white surface. Monitor the video signal (prior to SCFM modulation) with a d.c. coupled scope synchronized at the 15 Hz line scan rate. The object is to obtain a scope trace of optimal "flatness" left to right, and constant amplitude throughout the frame.

A Compact, Detachable Optical System

A "plug-in" optical system was designed to allow my 3" monitor to do double duty as a flying-spot scanner also. After considering many formats, I finally decided to use standard 2" x 3½" business cards as slides. The cards are inexpensive. A *Flair* or *Pentel* pen has just the right stroke width, and permits making "instant" signs, sketches and diagrams. When rub-on lettering is used to make permanent "slides," the less expensive smaller typefaces can be used. Snapshots can easily be cut up and pasted on the cards to make pictorial slides.

To make a compact unit I decided to "fold" the optics by using a front surface





Two views of the plug-in optics unit showing the front surface mirror, and a "slide" in position.

mirror set at a 45 degree angle to the CRT faceplate, as shown in fig. 3. The distances along the optical axis remain the same as in an unfolded system. (Lens to CRT distance is about 4.3 inches, and lens to slide distance about 3.6 inches.) A CRT raster size of 1 3/4" x 1 3/4" reduces to a 1½" x 1½" scanned area on the slide. To make the optics removable, aluminum cans that nest snugly inside each other were used. These were obtained from Hudson Tool and Die Co., 18 Malvern St., Newark, New Jersey.

A word on mirrors. The ordinary pocket mirror is silvered on the back side of the glass. This protects the metallized surface, but will generally give ghost images in an application such as this. The reason is that there is a reflection not only at the metallic surface, but at the uncoated glass surface as well. This latter reflection may have only 5 or 10% of the brightness of the primary reflection, but since it is displaced from it, a double image can be seen when viewing certain types of material. Edmund Scientific Co. sells mirrors aluminized on the *front* side. This eliminates the double reflection, but care must be taken to keep fingermarks and dirt off. They are difficult to clean.

The exact lens used is no longer available, but the 50 m.m. *f*/3.5 Spiratone enlarging lens mentioned last month should work very well if properly positioned. It is always wise to set up a new optical system in breadboard fashion to accurately check distances before starting to cut metal. (The printed wattage legend on a 100 watt light bulb makes an excellent high contrast image source. It is much easier to use than a CRT for these initial checks.)

Shading was brought to acceptable limits primarily by careful rotation on the 931-A. The shading was then fine tuned by putting white reflecting material on the far side of the slide. (This does not appear in the photos.)

Care must be taken to make the unit light tight if it is to be used in a normally lit room. Caulking compound can be used to seal the corners of sheet metal "mini-boxes." Felt can be glued to one of two mating flat surfaces. Dr. Scholl's *Molefoam* was used to light-seal the slide opening, and the nesting can that the 931-A peeks through.

Vy 73, Cop, WØORX

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Hi,

My name is John (WB2AZT), and I'm the Amateur Products Manager for Venus Scientific. By now, you've probably scanned our ad on the opposite page. If you react as most hams do, you're probably thinking, "That's a nice looking package, but who and what is Venus Scientific?"

That's the purpose of this message--to acquaint you with our company, its products, and its reputation. There's nothing like knowing that a manufacturer is able to back up his product claims.

Basically, Venus Scientific is one of the country's leading manufacturers of electronic high voltage control systems for military and industrial applications. Our H.V. Power supplies were used with television cameras on the Apollo flights that sent TV pictures back from the moon. Some time ago, a group of us within the company who are all active hams, began pressuring our boss Fil Galluppi to let us get into the amateur radio market. After considerable urging and coaxing, including actually dragging him to several hamfests, he too got the bug and gave us a go-ahead.

So here we are with our first of many products we've planned for the amateur market. Our slo-scan monitor is in production, ready for delivery, and frankly, it's something else again. More than just an S.S.T.V. monitor, a flip of the switch converts the unit to the incredible Accu Sync™, an oscilloscope that clearly reads out both incoming and outgoing S.S.T.V. signals. Other features, like our master G10 P.C. Board, make the SS2 flexible and long lasting. The specs on the next page are just a few of the features of the SS2.

Just remember that the ten years we've been in business designing and manufacturing high reliability systems has brought to the ham market the quality product I think we, as hams are entitled to. OK, now you know a little about Venus Scientific. Look for our ads in the months ahead and let us know what you think of our product.

And by the way, in case you're wondering, Yes, we'll announce our companion camera in the next few months.

John M Lotito

John Lotito
WB2AZT

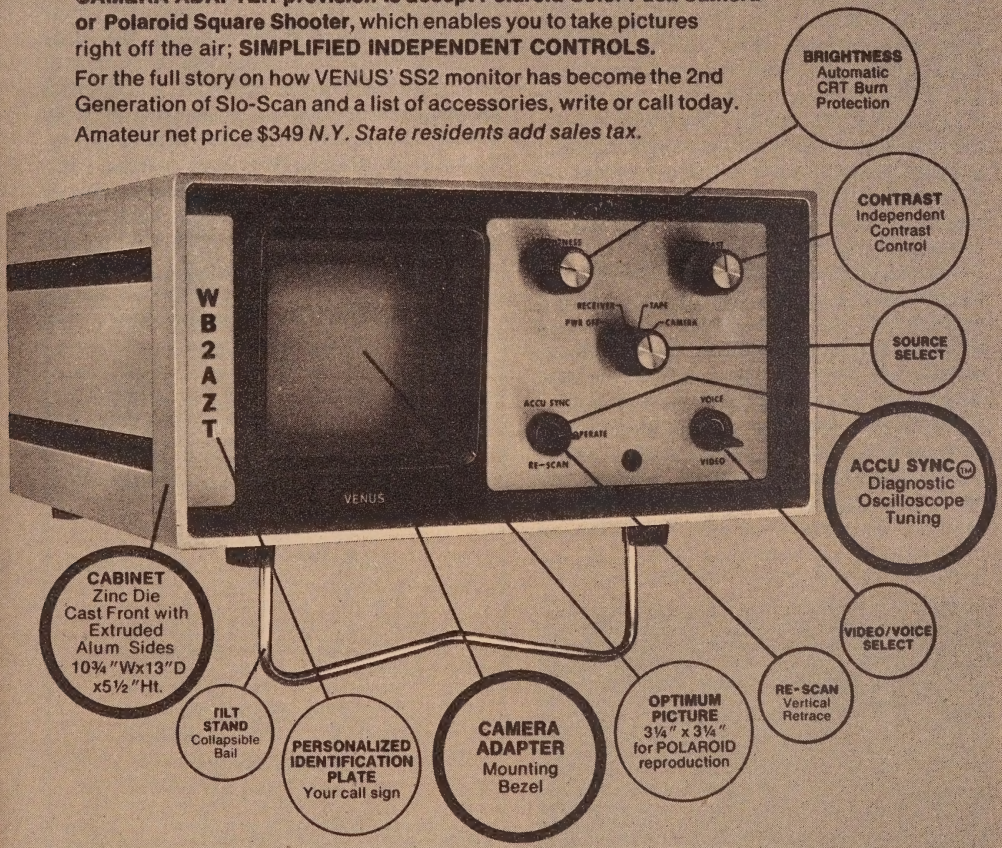
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BY JERRY HAGEN,* WA6GLD

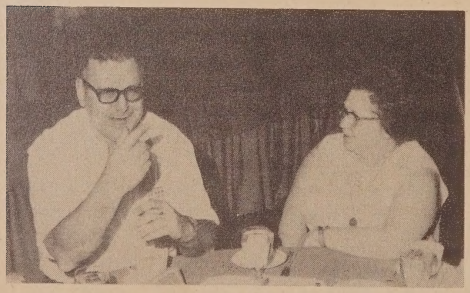
Fresno DX Convention

THE West Coast's biggest DX event was held in April this year and lived up to its reputation as an outstanding affair. The Northern California DX Club was the 1973 host and Chairman K6SSJ attracted a large crowd of DX notables. The Saturday afternoon session began with a Contest Forum chaired by ARRL Contest Committee Member W6DQX with *CQ* Contest Consultant W2IWC also on hand. Next came an antenna comparison of quads, trap tribanders and monoband yagis delivered in humorous style by W1ICP. Long time Contester and DXer KV4FZ presented a fine talk on 160 meter operation and antennas.

The traditional cocktail party made good use of four bars situated on the balcony overlooking the Civic Center. Mild April weather, ample refreshments and a chance to meet old friends made the occasion most memorable. The banquet dinner was topped off by fortune cookies with DX themes such as "you will call CQ on 40 meters and a CR9 will answer." The featured presentation was a film of the Spratly Island DXpedition narrated by Don Riebhoff, HS3DR and Scott Gant, WB4VBY. The trials and tribulations of a DXpedition were well conveyed by the film.

The Sunday DX Breakfast featured an ample buffet, presentation of the W6OA Award to Scott, WB4VBY for the 1S1A effort and a humorous DX Quiz conducted by WA6QGW. There was also a special "mystery presentation." To quote the *West Coast DX Bulletin*—"What you will hear about is the Sunday Breakfast. Tribute was paid to Frank Cuevas, W6AOA, for his long service to the Fresno meeting and DX. Though his birthday was not until June, the crowd sang 'Happy Birthday' to Frank and a huge cake was wheeled in. Frank, always sentimental, was sitting there with tears streaming down his face when the top of

*P.O. Box 1271, Covina, California 91722



Karl, VE8RA describing his Pacific Dxpedition to QSL Manager Ferne, XYL of WA6AHF.



Jim, W6CUF and Don, W6AM in serious discussion!

The WAZ Program

S.S.B. WAZ

1092.....WA1KYW	1099.....VE7TL
1093.....W8MBB	1100.....K4CFB
1094.....XE1J	1101.....UF6CA
1095.....JA4DGG	1102.....UA3AAX
1096.....K8CSG	1104.....UA9KAI
1097.....JA8EAT	1103.....UA4QM
1098.....DJ2AA	

C.W.—Phone WAZ

3550.....LA8NC	3559.....W6UA
3551.....W3GID	3560.....F6KBD
3552.....W9LJL	3561.....F6ALV
3553.....W5UNF/6	3562.....F8OQ
3554.....DM2ATL	3563.....UA3JD
3555.....SP7ASZ	3564.....UA9HM
3556.....SP6BAA	3565.....W1EW
3557.....PY2DBU	3566.....UW1ZJ
3558.....DL7DX	3567.....UW3IO

Phone WAZ

484.....W9HZ

Complete WAZ rules are shown on pages 64-66 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, Florida 33880.

CQ DX Award Honor Roll

The CQ DX Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 273 or more countries for the mode indicated. The ARRL DXCC Country list, LESS DELETED COUNTRIES, is used as the country standard. The total number of current countries on the DXCC as of this listing is 320.

CW

K6EC 315	K6LEB 305	W6ISQ 301	W4BQY 294	WA6MWG 286
W6ID 315	VK3AHQ 304	W4YWX 300	K1SHN 292	DJ7CX 275
W8LY 308	WØAUB 302	ON4QX 299	WA6EPQ 291	
W4IC 305	DL3RK 301	W6NJU 296	WA8DXA 288	

2XSSB

W2TP 319	W6NJU 313	K3GKU 305	ZL1AGO 299	OE1FF 283
I0AMU 318	K6WR 313	WA6AHF 305	G3RWQ 298	WØSFU 283
TI2HP 318	ZS6LW 313	W9QLD 305	YV1KZ 298	HP1JC 282
DL9OH 317	VE3MR 312	K4RTA 304	SM6CKS 297	WA2VEG 282
WA2RAU 317	W3DJZ 312	VE3ACD 304	K1SHN 297	DL6KG 280
W3NKM 317	W9JT 312	F9MS 303	YS1O 297	OE2EGL 278
W9ILW 317	IT9JT 311	K6EC 303	ZL3NS 297	K6GUY 277
G3FKM 316	WA2EOQ 311	KH6BB 303	W0YDB 294	OK1MP 277
K2FL 316	W9DWQ 311	I1ZV 302	I8YRK 292	WAØCPX 276
W6REH 315	I1AA 310	WA2HSX 302	WB2RLK 291	DL1MD 274
W6RKP 315	W4IC 310	WA6MWG 302	XE2YP 291	W8ZOK 274
W3AZD 314	W6YMV 309	WA3IKK 301	YV1LA 291	K9LUI 274
I8KDB 313	XE1AE 309	W6KZS 301	WB6DXU 290	G3WW 273
SM5SB 313	F2MO 308	W6FW 300	K8GQG 288	
W6EL 313	OZ3SK 308	VE3GMT 299	WAØKDI 288	
W6EUF 313	VE2WY 307	K4HJE 299	K1KNQ 284	
W6KTE 313	G3DO 305	W9KRU 299	G3KYF 283	

the cake exploded and out jumped 'Brandy' . . . nude!!! Not even a bandaid!!! The tears dried immediately as Frank leaped up and took her in his arms . . . Son of A Gun!!! What more can be said? Attendance was over 300 with a fine contingent of W7's and VE7's. Distinguished DX visitors included KH6IJ, VS6DR, HC2OM, HC2YL, and VE8RA as well as the speakers previously mentioned. Our thanks to the *West Coast DX Bulletin*, edited by WA6AUD and *World Radio News* published by WB6AUH for the fine Photos of the DX Convention.

The CQ DX Award Program

CW DX	SSB DX
118—W2BP	279—OE1FF
	280—I8HH
	281—WA2VEG
	282—WA8LVH
	283—UK5IIAZ

Endorsements

C.W.: 150-K6VA
S.S.B.: 275-OE1FF, WA2VEG, 250-I8HH, 150-WA8LVH
1.8mHz: W2BP (#1).

Complete rules for the CQ DX Award Program may be obtained by sending a business size, self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, Ca 91722 or to the DX Editor.

Prefix Definition Comment

The following comment regarding the definition of a prefix was received from avid WPXer WA2EAH: "I read the DX COLUMN in March *CQ* and was a bit surprised at some of the rulings on prefixes such as VU25 and UB5Ø. Granted, strictly following WPX Rule 3A they would count for VU2 and UB5. However, considering the number calls of this type in use, I think its time that rule 3A be modified. As soon as WPX credit is eliminated for these special prefixes they lose most of their special status. When WPX hunters realize that HA1ØØ and ZD8Ø are no different from HA1 and ZD8 they will start ignoring them. In fact, the time may come when the ITU has to issue four letter/digit prefixes to different countries. When rule 3A was orig-



Bob, W1QV and ARRL New England Director with Renound contester Nose, KH6IJ.



Who knows whats going on? Scott, WB4VBY of 1S1A, Phil, VS6DR and NCDXC President Iris, W6DOD.

inated it covered every prefix used, but now the rule is conflicting with common sense. I suggest that the restriction on length of a prefix be eliminated completely."

In answer to John's comment it should be stated that Rules for WPX are quite difficult to define because of situations just like those above. The intent of Rule 3A is to keep things "simple" and in accordance with the ITU assignment scheme. The exceptions to this rule have been magnified in recent years with cases like C21 and C31 being issued, the use of 1 series prefixes (as they are not issued, should they count for WPX?) and the two digit numerals as mentioned above. Thus, Rule 3A is not infallable, however it does provide a common definition and is convenient for WPX administration purposes. As the rule is fairly well understood at this time and it is applied to all prefixes, we would prefer *not* to change it at this time. A change might confuse the WPX Manager!!!

Here And There In The World Of DX

Jerry, K8YUW, currently on Diego Garcia Island (Chagos Group) writes that the 6 active hams of the island have formed a club and hope to receive a VQ9 club call. At present the members must apply for permission to operate with their own call portable VQ9. Those at the first meeting included W9JFE, WB6VGI, WA7JLL, WB6GPT, WA9MZU, and K8YUW... HS5AFJ closed down in June after two years of operation resulting in WAZ, 204 countries and over 1500 W/K QSO's...



Joe, HC2OM and XYL Darleen, HC2YL of DXpedition fame.

The WPX Program

2XSSB

752—SV1EN
753—YU1OBA
754—LU9DM
755—UQ2AN
756—CT1ZG

CW

1247—WN7OLT
1248—DJ8IK
1249—OK1FON
1250—OK1DVK
1251—OK1WT
1252—UV3QQ
1253—UY5ZM
1255—UAØPY
1256—UV3AF
1257—UK4WAC
1258—UY5FF
1259—UA3DM
1260—UQ2AN
1261—UB5NA
1262—K6VA
1263—KH6HC
1264—F5DE

Mixed

394—UQ2AN
395—UQ2IL

VPX

55—UA9-165-55
56—PA-1722

WPX Endorsements

S.S.B.: 950-IØAMU, 800-F2MO, 750-WØGYM, 500-K6SSN, 400-G5GH, LU9DM, 350-YU1OBA.
C.W.: 750-K1SHN, 650-SP3DOI, 500-IS1FIC, 450-UY5ZM, 400-VE3BHZ, W9MCJ, SP6BAA, 350-UY5FF, UA3DM, UQ2AN.
Mixeds 900-K1SHN, 700-WA2EAH, K4CIA, 650-F3AT, G5GH, JA4XW, 600-OK3EE, 550-UQ2AN, 500-K6ZDL, W4KFB.
160 Meters: OK1WT
80 Meters: SP6BAA, OK1WT
20 Meters: WA2EAH, OK3EE, G5GH, UQ2IL, UK4WAC
15 Meters: G5GH, DJ8IK
10 Meters: OK3EE, G5GH
Asia: G5GH, W5QBM
Europe: UK4WAC, UQ2IL
North America: WA2EAH, WA4LDM
Oceania: I4ZSQ,W5OBM
South America: WB4KZG, DJ8IK

Complete rules for WPX, WPNX and VPX may be found on pg. 67 of the February, 1972 issue of CQ. Application blanks and reprints of the rules may be obtained by sending a business size self-addressed stamped envelope to Award Manager, P.O. Box 1271, Covina, CA 91722 or to the DX Editor.

Phone patch arrangements with Jordan and Guatemala have been reported by WA1EUO and TG9SK. Of course, amateur radio has good representation in Jordan, but TG9FS and TG9FT provided the spark in Guatemala . . . John, I8KDB reports that the call area prefixes I1 through IØ, IT9 and ISØ must be used by Italian Amateurs. Prior to February 1, 1973 the use of call area designators was optional. Other I prefixes for the island groups and special operation will be retained. IW prefixes will be used for vhf licenses . . . W4GIW and several other Atlanta amateurs are planning to operate from Curaco in the *CQ* WW Contest in the Multi-operator/Single Transmitter category.

DX Achievements

Two firsts in *CQ* Award Programs were made this month. A1, W2BP was the recipiant of the first 1.8 mHz sticker for the *CQ* DX Award with a FB total of 53 countries confirmed on 160 meter c.w. The QSL's incleuded such rarities as EP2BQ, FPØCA, HBØNL, ZB2AY and 4W1AE.

Rick, WN7OLT became the first Novice to be awarded a WPX Award after receiving QSL's from 300 different prefixes on c.w. Rick is the holder of WPNX#21 issued in 1970 and all QSO's were made on 15 meter c.w. Congratulations to Al and Rick!

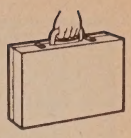
QSL Information

The following stations may be QSLed via W3HNK. (Don't forget an SASE):

CN8BG—Aug 70—May 71
CR4BK—from Jun 71
CR6LF—from Jun 68
CR6KT—from Jul 68
CR7GJ—from May 70
CT1MZ—from Apr 69
CT1ZW—from Mar 71
CT1UE—from Aug 69
CT1TZ—from Nov 68
CT1BT—from Jul 71
CT1UD—from May 69
CT7UA—from Oct 72
EA8GZ—from Mar 73
EL2BI—Mar 69 to Mar 70
EL2CB—Feb 70 to Nov 72
EP2KB—Sep—Nov 68
EP2DX—from May 70
EQ2DX—Sep 72
FG0AFC/FS7—Oct 72
GW3DZJ—from Nov 65
HM1EJ—from May 70
JA6BEE—from Mar 69
JA1IVV—from Oct 65
JY9DX—from Aug 71
KV4EN—from Jun 71
KV4EY—from Jun 67
LX1BW—from Feb 70
OD5CS—from Feb 70
OY5NS—from Sep 72
OY7JD—from Jul 72
OY9LV—from May 69
OX5AP—from Jul 70
OX5AY—from Mar 72
PA0HVM—from 1970
PA0COE—from 1967
PJ8AR—from Oct 70
PY1DBE—from Feb 72
PZ1CF—from Apr 68
SM5BUT—from Jun 68
SM0CER—from Apr 71
SP9BT—from Apr 70
SU1MI—from Feb 72
SV0WEE—71 & 72
SV0WUU—from Jan 72
SV0WXX—Sep 71
TG8DX—Feb 73
TG9DX—Feb 72
TG9KR—from Apr 73
TI2JCC—from Dec 69
UA3FF—from Feb 70
VK9BS—from Jun 69
VP2LAO—Mar 73
VP2VY—Dec 68
VP2VB—Jun 71
VU2VKJ—Feb 73
XP1AA—Jun 70
YA1VKJ—Feb 73
YV5CEY/4—Oct 65
ZE4JS—from Aug 63
ZS3CJ—from Feb 70
ZS3R—from 69
4X4RD—from Apr 65
4X4UH—from Apr 65
5A3TX—64-65
5A5TR—64-65
9C9DX—Oct 70

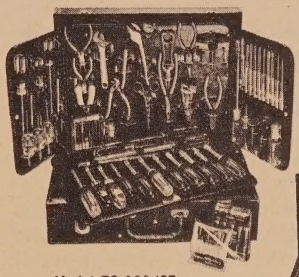
73, Jerry—WA6GLD

NOW, FOR ANY ASSIGNMENT...

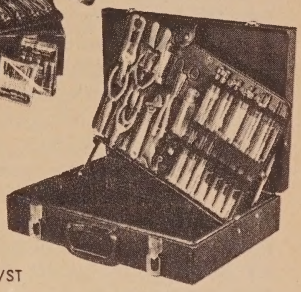


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Propagation

BY GEORGE JACOBS,* W3ASK

THE sunspot cycle continues to decline at a steady pace.

The Swiss Federal Solar Observatory reports a mean monthly sunspot number of 42 for May, 1973. This results in the latest smoothed sunspot number of 59, centered on November, 1972.

A smoothed sunspot number of 38 is forecast for September, 1973.

A marked seasonal change in h.f. radio propagation conditions should take place from about mid-September through mid-October. During this period an *increasing* number of DX openings can be expected on 10 and 15 meters during the daylight hours, while 20 meters will begin to close noticeably earlier than during mid-summer. Improved nighttime DX propagation conditions are also expected on 40, 80 and 160 meters, with considerably *lower* static levels and with these bands remaining open somewhat longer in the northern hemisphere as the hours of darkness increase.

A seasonal improvement is also expected on *long* DX openings between the temperate regions of the northern and southern hemispheres from mid-September through mid-October. This should result in more frequent openings between the USA and such areas as South America, Oceania, South Asia and southern Africa. This improvement should be most noticeable on the 40, 20 and 15 meter bands, but some of these long DX openings may also be possible on 10, 80 and perhaps 160 meters.

Because of the marked changes expected in propagation conditions during September, this month's column contains *both* DX and Short-Skip Propagation Charts. The Short-Skip Charts are valid for the entire months of September and October, while the DX Charts are valid from September 15 through October 15.

*11307 Clara Street, Silver Spring, Md. 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For September, 1973

	Rating & Forecast Quality			
Propagation Index . . . . . (4)		(3)	(2)	(1)
Date *September*				
Above Normal: 14, 16-17, 21, 23-24.	A	A	B	C
Normal: 4-6, 10-13, 15, 20, 22, 25, 28-29.	B	C	D	E
Below Normal: 1-3, 7, 9, 18-19, 26-27, 30.	C	D	E	E
Disturbed: 8.	D	D	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals.

B—Good opening, moderately strong signals with little fading and noise.

C—Fair opening, signals between moderately strong and weak, with some fading and noise.

D—Poor opening, signals weak with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation* index associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (4) will be fair on Sept. 1-3, good on Sept. 4-6, and fair on Sept. 7, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, or subscribe to MAIL-A-PROP, P.O. Box 86, Northport, N.Y. 11768.

During this period DX conditions should be best on 20 meters for an hour or two after sunrise and again during the afternoon and early evening. Fifteen meters should be optimum during most of the daylight hours and 40 meters during most of the hours of darkness and the sunrise period.

For short-skip openings less than 250 miles 80 meters should be optimum during the day, and both 80 and 160 meters during darkness. Between 250 and 1300 miles it should be 40 meters during the day and 80 meters at night. For openings between 750 and 1300 miles 20 meters should be optimum during the day and 40 and 80 meters during the hours of darkness. Between 1300 and 2300 miles, try both 20 and 15 meters during the day and 40 at night.

V.H.F. Ionospheric Openings

Although summertime sporadic-E ionization is expected to fall off considerably during September, an occasional 6-meter short-skip opening may still be possible over distances ranging between 1000 and 1300 miles. While such openings may take place anytime, they are more likely to occur before noon and during the early evening.

Auroral activity should increase during September, and this could produce some 6

and 2 meter auroral-type openings. Such openings last from several minutes to an hour or so, and are usually characterized by weak to moderately strong signals often badly distorted by flutter fading. Check the "Last Minute Forecast" at the beginning of this column for periods that are forecast to be disturbed or below normal, as these are the days on which auroral-type openings are most likely to occur during September.

Conditions for trans-equatorial, or TE-scatter are usually at their best during the spring and fall months. Some fairly good 6 meter TE openings should be possible during September between the southern half of the USA and South America, with an occasional opening also possible from more northern states. The best time for TE openings is between 8 and 11 P.M., local standard time. While most openings will last for an hour or so, some may continue longer. As a rule, signal levels during TE openings are relatively weak, and there may be considerable flutter fading.

No major meteor showers will occur during September, and few, if any meteor-scatter openings are likely on the v.h.f. bands.

DIAL-A-PROP and MAIL-A-PROP

For the very latest in propagation forecasts tailored for the radio amateur dial Area Code 516-883-6223 any time for a 2-to-3 minute telephonic report. But don't be surprised if you encounter a busy signal, especially on Tuesdays when the report is changed.

If you want a hard-copy of the same forecast for convenient daily reference, air-mailed to reach you before Tuesday at a cost considerably less than the average three minute long-distance telephone call then try MAIL-A-PROP.

Both DIAL-A-PROP and MAIL-A-PROP are simple language, day-by-day propagation forecasts for an entire week, Tuesday-to-Tuesday. They describe day-to-day conditions expected on the various amateur bands as *above normal, normal, below normal* or *disturbed.* Band openings are described as *excellent, good, fair* or *poor.* The forecasts contain the latest assessment of solar activity, DX tips band-by-band and by major geographical areas, predictions of ionospheric openings on the v.h.f. bands and special forecasts for *CQ* and ARRL DX Contests.

How To Use The Short-Skip Charts

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts, the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. An * indicates 80 Meter openings. Openings on 160 Meters are likely to occur during those times when 80 Meter openings are shown with a *propagation index* of (2), or higher.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Cart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *standard* time is used at the *path midpoint.* For example, on a circuit between Maine and Florida, the time shown would be EST; on a circuit between NY and Texas, the time would be CST since the path mid-point and use the appropriate stand-the path mid-point, and use the appropriate standard time. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones, *add* 2 hours in the PST zone, 3 hours in MST zone; 4 hours in CST zone; and 5 hours in the EST zone. *Add* 10 hours to convert from SHT to GMT. For example, when it is 12 noon in Honolulu. it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart are given in GMT. To convert to *standard* time in Alaska and other areas of the USA, subtract 10 hours in the Alaskan Standard zone; 9 hours in the Yukon zone; 8 hours in PST zone, 7 hours in MST zone, 6 hours in CST zone, 5 hours in EST zone. For example, at 20 GMT it is 12 Noon in Juneau and 15 or 3 P.M. in NYC.

4. The Short-Skip Chart is based upon a transmited power of 75 watts c.w. or 300 watts p.e.p. on sideband; The Alaska and Hawaii Charts are based upon a transmitter power of 250 watts cw or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10db loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

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73, George, W3ASK

September 15—October 15, 1973

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

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

Time Zones: CST & MST (24-Hour Time)

CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-13 (2) 13-15 (3) 15-18 (2) 18-19 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Northern Europe & European USSR	*Nil*	07-09 (1) 09-11 (2) 11-13 (1)	05-06 (1) 06-08 (2) 08-11 (1) 11-14 (2) 14-16 (1) 22-00 (1)	19-22 (1) 22-00 (2) 00-01 (1) 21-00 (1)*
Eastern Mediterranean & Middle East	09-11 (1(	07-09 (1) 09-12 (2) 12-13 (1)	05-06 (1) 06-08 (2) 08-14 (1) 14-17 (2) 17-19 (1) 22-00 (1)	19-22 (1) 20-22 (1)*
Western & Central Africa	11-15 (1)	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	04-05 (1) 05-07 (2) 07-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
South Africa	09-10 (1)	07-08 (1) 08-11 (2) 11-14 (3) 14-15 (2) 15-16 (1)	05-07 (1) 11-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	19-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
East Africa	*Nil*	08-11 (1) 11-15 (2) 15-17 (1)	12-14 (1) 14-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	20-23 (1)
Central & South Asia	08-10 (1) 17-19 (1)	08-10 (1) 18-21 (1)	06-07 (1) 07-09 (1) 09-11 (1) 17-21 (1)	05-07 (1) 18-20 (1)
Southeast Asia	*Nil*	09-11 (1) 14-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (2) 09-12 (1) 16-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Far East	17-19 (1)	09-11 (1) 14-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-12 (1) 16-18 (1) 18-22 (2) 22-00 (1)	02-04 (1) 04-06 (2) 06-08 (1) 05-07 (1)*

South Pacific & New Zealand	12-14 (1) 14-17 (2) 17-19 (1)	09-12 (2) 12-16 (2) 16-18 (3) 18-20 (2) 20-21 (1)	05-07 (1) 07-09 (3) 09-11 (2) 11-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-02 (1)	23-00 (1) 00-06 (3) 06-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Australasia	13-15 (1) 15-17 (2) 17-18 (1)	08-10 (1) 12-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-12 (2) 12-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Northern & Central South America	10-12 (1) 12-16 (2) 16-18 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (2) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-00 (2) 00-06 (1)	18-19 (1) 19-20 (2) 20-00 (3) 00-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-22 (1)* 22-04 (2)* 04-05 (1)*
Brazil, Argentina, Chile & Uruguay	11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	08-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-06 (1) 06-08 (2)	20-23 (1) 23-03 (2) 03-05 (1) 00-04 (1)*
McMurdo Sound, Antarctica	*Nil*	13-16 (1) 16-18 (2) 18-20 (1)	16-19 (1) 19-23 (2) 23-01 (1) 07-09 (1)	23-06 (1)

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-10 (1)	08-09 (1) 09-11 (2) 11-13 (1)	22-00 (1) 05-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & Northern Europe & European USSR	*Nil*	07-08 (1) 08-10 (2) 10-12 (1)	22-00 (1) 06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (1)	19-23 (1)
Eastern Mediterranean & Middle East	*Nil*	07-08 (1) 08-10 (2) 10-11 (1) 19-21 (1)	21-23 (1) 06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1)	19-22 (1)
West & Central Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 09-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	05-06 (1) 06-08 (2) 08-13 (1) 13-14 (2) 14-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	20-23 (1)
East Africa	*Nil*	09-12 (1) 12-14 (2) 14-15 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-18 (1) 20-22 (1)	19-21 (1)

*Indicates predicted 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2) or higher.

How To Use The DX Propagation Charts

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 call areas in he USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 an 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates 80 Meter openings. Openings on 160 meters are likely to occur during those times when 80 meter openings are shown with a *propagation index* of (2), or higher.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, *add* tho te times shown in the appropriate Chart 8 hours in the PST Zone, 7 in the MST Zone, 6 in the CST Zone and 5 in the EST Zone. For example, 14 in Washington, D.C. is 19 GMT and 20 in Los Angeles is 04 CMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.pe on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute. For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

South Africa	09-12 (1)	07-10 (1) 10-14 (2) 14-15 (1)	04-06 (1) 06-08 (2) 08-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-20 (1) 23-01 (1)	18-21 (1)
Central & South Asia	16-18 (1)	07-10 (1) 15-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-10 (2) 10-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	05-07 (1) 18-20 (1)
Southeast Asia	15-18 (1)	09-11 (1) 14-15 (1) 15-17 (2) 17-19 (1)	05-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 20-22 (1) 22-00 (2) 00-01 (1)	00-02 (1) 02-05 (2) 05-07 (1) 02-05 (1)*
Far East	15-17 (1)	13-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	00-02 (1) 02-07 (2) 07-08 (1) 02-06 (1)*

CQ DX Contest Special
NEXT MONTH

South Pacific & New Zealand	12-14 (1) 14-17 (2) 17-18 (1)	09-13 (1) 13-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (4) 23-01 (3) 01-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	20-21 (1) 21-22 (2) 22-23 (3) 23-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 22-01 (1)* 01-05 (2)* 05-06 (1)*
Austral-asia	13-15 (1) 15-17 (2) 17-19 (1)	07-09 (1) 12-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	16-18 (1) 18-20 (2) 20-00 (3) 00-02 (2) 02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-12 (1)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-09 (1) 01-03 (1)* 03-05 (2)* 05-06 (1)*
Northern & Central South America	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-19 (1)	06-07 (3) 07-09 (4) 09-14 (2) 14-16 (3) 16-20 (4) 20-22 (3) 22-00 (2) 00-04 (1) 04-06 (2)	18-20 (1) 20-01 (3) 01-03 (2) 03-06 (2) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Brazil, Argentina, Chile & Uruguay	10-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-08 (1) 08-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-01 (2) 01-03 (1) 23-02 (1)*
McMurdo Sound, Antarctica	13-16 (1)	12-15 (1) 15-18 (2) 18-19 (1)	07-09 (1) 16-18 (1) 18-19 (2) 19-22 (3) 22-00 (2) 00-02 (1)	00-05 (1)

CQ Short-Skip Propagation Chart

September and October, 1973

Local Standard Time At Path Mid-Point

(24-Hour Time System)

Band (Meters)	*Distance From Transmitter (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	09-13 (0-1)	07-09 (1) 09-13 (1-2) 13-14 (0-2) 14-21 (0-1)	07-09 (1-0) 09-12 (2-0) 12-14 (2-0) 14-18 (1)
15	*Nil*	07-09 (0-1) 09-13 (0-2) 13-21 (0-1)	07-09 (1) 09-11 (2) 11-13 (2-3) 13-16 (1-4) 16-17 (1-3) 17-19 (1-2) 19-21 (1) 21-07 (0-1)	07-08 (1-0) 08-09 (1) 09-11 (2) 11-13 (3-2) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (2-1) 19-20 (1) 20-07 (1-0)
20	11-21 (0-1)	07-09 (0-1) 09-10 (0-2) 10-11 (0-3) 11-15 (1-4) 15-17 (1-3) 17-21 (1-2) 21-07 (0-1)	07-09 (1-2) 09-10 (2-4) 10-11 (3-4) 11-15 (4) 15-17 (3-4) 17-18 (2-4) 18-21 (2-3) 21-23 (1-2) 23-07 (1)	07-08 (2-1) 08-09 (2) 09-13 (4-2) 13-15 (4-3) 15-18 (4) 18-19 (3-4) 19-21 (3) 21-23 (2) 23-00 (1) 00-05 (1-0) 05-07 (1)
40	07-09 (0-2) 09-11 (2-4) 11-15 (3-4) 15-17 (2-3) 17-19 (1-2) 19-07 (0-1)	07-09 (2-3) 09-11 (4-3) 11-15 (4-2) 15-17 (3) 17-19 (2-4) 19-21 (1-4) 21-23 (1-3) 00-02 (1-2) 02-05 (1) 05-07 (1-2)	07-09 (3-2) 09-11 (3-1) 11-15 (2-1) 15-17 (3-2) 17-19 (4-3) 19-21 (4) 21-23 (3-4) 23-02 (2-3) 02-05 (1-2) 05-07 (2-4)	07-09 (2-1) 09-15 (1-0) 15-17 (2-1) 17-19 (3-2) 19-20 (4-3) 20-23 (4) 23-02 (3-4) 02-05 (2-3) 05-07 (4-2)
80	06-08 (3-4) 08-11 (4) 11-18 (4-3) 18-21 (4) 21-03 (3-4) 03-06 (2-3)	06-08 (4-2) 08-11 (4-1) 11-16 (3-1) 16-18 (3-2) 18-20 (4-3) 20-03 (4) 03-05 (3-4) 05-06 (3)	06-08 (2-1) 08-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-21 (4-3) 21-03 (4) 03-05 (4-2) 05-06 (3-2)	06-08 (1) 08-16 (0) 16-18 (1) 18-20 (2) 20-21 (3-2) 21-03 (4-3) 03-05 (2) 05-06 (2-1)
160	16-18 (1-0) 18-20 (2-1) 20-05 (4) 05-07 (3-2) 07-09 (2-1) 09-11 (1-0)	17-19 (1-0) 19-20 (1) 20-02 (4-3) 02-05 (3-2) 05-07 (2-1) 07-09 (1-0)	19-20 (1-0) 20-22 (3-1) 22-02 (3) 02-05 (2-1) 05-07 (1)	20-22 (1-0) 22-02 (3-2) 02-05 (1) 05-07 (1-0)

†See "How To Use Short-Skip Charts" in box at beginning of this column.

HAWAII

Openings Given in Hawaiian Standard Time†

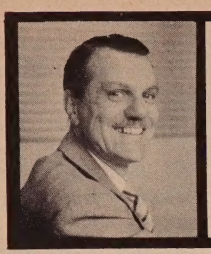
To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	09-12 (1)	07-12 (1) 12-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-16 (3) 16-18 (2) 18-20 (1) 02-04 (1) 04-06 (2) 06-08 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Central USA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

ALASKA

Openings Given in GMT†

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	*Nil*	21-23 (1)	12-14 (1) 18-21 (1) 21-00 (2) 00-02 (1)	08-12 (1)
Cenrtal USA	*Nil*	21-01 (1)	13-15 (1) 19-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-04 (1)	08-14 (1)
Western USA	*Nil*	19-21 (1) 21-00 (2) 00-02 (1)	16-18 (1) 18-22 (2) 22-02 (3) 02-04 (2) 04-06 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.



Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Sept. 8-9	WAEDC Phone Contest
Sept. 8-10	Four Land QSO Party
Sept. 15-16	Space Net VHF Contest
Sept. 15-17	Wash. State QSO Party
Sept. 15-17	Pennsylvania QSO Party
Sept. 15-16	Scandinavian C.W. Contest
Sept. 22-23	Scandinavian Phone Contest
Sept. 19-21	YLRL "Howdy Days"
Sept. 22-23	VE/W Contest
Sept. 29-30	Delta QSO Party
Oct. 6-7	California QSO Party
Oct. 6-7	Missouri QSO Party
Oct. 6-7	New Mexico QSO Party
Oct. 6-7	VK/ZL/Oceania Phone
Oct. 13-14	VK/ZL/Oceania C.W.
Oct. 13-14	RSGB 21/28 mHz Phone
Oct. 17-18	YLRL Anniv. C.W. Party
Oct. 20-21	Boy Scouts Jamboree
Oct. 20-21	WADM C.W. Contest
Oct. 20-21	RSGB 7 mHz C.W. Contest
Oct. 20-22	North Carolina QSO Party
Oct. 27-28	**CQ WW DX Phone Contest**
Nov. 1-2	YLRL Anniv. Phone Party
Nov. 3-4	RSGB 7 mHz Phone Contest
Nov. 2-5	IARS CHC/FHC/HTH Party
Nov. 11	Czechoslovakian Contest
Nov. 10-11	ARRL Phone Sweepstakes
Nov. 17-18	ARRL C.W. Sweepstakes
Nov. 24-25	**CQ WW DX C.W. Contest**
Dec. 8-9	ARRL 160 Contest
Dec. 22-23	Hungarian Contest

Space Net VHF Contest

Starts: 6:00 P.M. Saturday, Sept. 15
Ends: 6:00 P.M. Sunday, Sept. 16
(Local Time)

This is another in the series of Space Net activities commemorating Apollo moon missions. This one is for Apollo 10, when the LM decended to within 9 miles of the moon, the first rehearsal in lunar environment. Rules same as June issue.

Logs and requests for additional information go to: Space Net VHF Contest, Att: A.W. Slapkowski, WB2MTU, Box 909, Sicklerville, N.J. 08081

Washington State QSO Party

Starts: 2000 GMT Saturday, September 15
Ends: 0200 GMT Monday, September 17

The eighth annual QSO Party sponsored by the Boeing Employees' A.R.S. will be held on the final week-end of the Washington State Amateur Radio Week.

All bands and modes may be used and the same station may be worked on each band and mode for QSO points, and again if it is a new multiplier. Wash. stations may work other in-state stations for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Wash. stations; state, province or country for all others.

Scoring: Wash. stations score one point for each QSO, all others 2 points for each Wash. QSO. Multiplier for Wash. is states, provinces and countries worked. Others use total Wash. counties worked. (max. of 39)

Frequencies: C.W.—3560, 7060, 14060, 21060, 28160. Phone—3935, 7260, 14280, 21380, 28660. Novice—3735, 7125, 21150, 28160.

Awards: Certificates to top scorers in each state, province, country and Wash. county. The Worked Five Bears Award is available to anyone working five club members before, during or after the party. The Worked Three Bear Cubs Award for working three Novice members.

Mailing deadline Oct. 15th to: Boeing Employees' A.R.S. Att: Willis Propst, K7RSB, 18415 38th Ave., South, Seattle, Wash. 98188 (Results will be mailed to all entries, no s.a.s.e. required)

Pennsylvania QSO Party

Starts: 2300 GMT Saturday, September 15
Ends: 0200 GMT Monday, September 17

This is the 16th annual party sponsored by the Nittany ARC. The same station may be worked on each band and mode for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Penn. stations, ARRL section for others.

Scoring: *For Penn.*—3 points for out-of-state contacts, 1 point if with other Penn. stations. Multiply total by number of differ-

*14 Sherwood Road, Stamford, Conn. 06905.

ent ARRL sections worked. *Others*—1 point per QSO multiplied by Penn. counties worked. (max. of 67)

Frequencies: Look for c.w. activities on odd GMT hours 72.5 kHz from low end of each c.w. band. Phone on even hours 20 kHz from top of each phone band.

Awards: Section awards to high scorers in the party and Activity certificates for working ARRL sections, Penn. Counties and the NARC Award. Requirements not given, write the NARC.

Mailing deadline October 15th to: Nittany A.R.S., P.O. Box 60, State College, Penn. 16801.

Scandinavian Activity Contest

C.W.—Sept. 15-16 Phone—Sept. 22-23

Starts: 1500 GMT Saturday
Ends: 1800 GMT Sunday

It's the world working the Scandinavians on all bands 3.5 thru 28 mHz. Country prefixes are: LA, JW, JX, OH, OH0, OX, OY, OZ, SK/SL/SM.

Classes: Single Operator and multi-operator, single and multi transmitter. Club stations will be classed as multi-operator. Multi transmitter stations must use separate series of serial numbers for each band.

Exchange: Five and six figures, RS/RST plus a progressive QSO no. starting 001.

Scoring: Each completed QSO counts one point. The multiplier is the sum total of SAC countries worked on each band, as listed above. Maximum of 9 per band. Scoring all band only.

Awards: Certificates to the two top scorers, both phone and c.w., in each country and each USA call area.

Phone and c.w. are separate contests. A summary sheet showing the scoring and other information, your name and address in BLOCK LETTERS, and a signed declaration that all rules and regulations have been observed is requested.

Mailing deadline is October 15th and this year logs go to: Alf Almedal, LA5QK, N-4052, Royneberg, Norway.

"YL Howdy Days"

Starts: 1800 GMT Wednesday, September 19
Ends: 1800 GMT Friday, September 21

This activity is for YL's only. Scores will be based on contacts between licensed women operators only. All bands and modes may be used, but cross-band and net contacts do not count.

Score 2 points for each YLRL member worked and 1 point for each non-member contacted. Only one contact with the same station. There is no multiplier scoring.

The top scoring YLRL member will receive her choice of a YLRL pin, charm, or stationery. The highest scoring non-member receives a one year membership.

Mailing deadline is October 15th and this year logs go to: Eila D. Russell, WA8EBS, 4348 W. 223rd Street, Fairview Park, Ohio 44126.

VE/W Contest

Starts: 2300 GMT Saturday, September 22
Ends: 0200 GMT Monday, September 24

Its the VE/VO's working the W/K's in the "General" portion of the US bands. Phone and c.w. are considered different contests and must be scored separately. There are two classifications, single and multi-operator.

Only 20 hours total operating time may be used in this period. On and off times must be indicated in the log, minimum off period is 15 mins.

Exchange: QSO no., RS(T) and QTH. ARRL section for W/K's; geographical areas for VE/VO's. (Provinces plus Newfld., Lab., Yukon and N.W.T. Total of 13)

Scoring: Each completed QSO counts 2 points. W/K's use sum of VE areas from each band for their multiplier. (max. of 13 each band) VE/VO's will use ARRL sections.

Awards: Certificates to the top scoring stations, both phone and c.w., in each section. (min. of 25 QSOs). Awards to multi-operator stations will only be issued when there are at least 3 entries per section. And two Trophies to the top scoring Canadian and US station.

Summary and check sheets are a must, as is a signed declaration that all rules and regulations have been observed. Also a dupe check sheet for logs with 200 or more contacts.

Log forms and summary sheets are available from the MARC address below, include a s.a.e. and IRC's to cover postage.

Mailing deadline for logs is October 31st to: MARC Contest Committee, P.O. Box 2206, Dorval Station, 780, Quebec, Canada.

Delta QSO Party

Starts: 2000 GMT Saturday, September 29
Ends: 0200 GMT Monday, October 1

This is the 4th annual QSO party sponsored by the Delta Division of the ARRL. Delta stations (Ark., La., Miss., Tenn.) work stations both in and outside their boundaries, others only Delta stations. The same station may be worked on each band and mode, portable and mobile each county change.

Exchange: QSO no., RS(T) and QTH. County and state for Delta, ARRL section for others.

Scoring: For Delta, QSO's times ARRL sections worked. (max. of 75) Others, QSO's times Delta counties worked. (max. of 316) DX stations may be worked for QSO points only.

Frequencies: C.W.—3550, 7050, 14050, 21050, 28050. Phone—3990, 7290, 14290, 21390, 28590. Novice—3775, 7175, 21125, 28125.

Certificate Awards:

A. Achievement: All stations contacting 5 stations in each of the 4 Delta states.

B. Delta: To the 3 highest scoring stations in each of the 4 states.

C. Others: To the highest scoring station in each ARRL section and country.

D. Plaques to the top scorer both in and outside the Delta division. Also to the top scoring portable and mobile station.

Mailing deadline November 5th to: Malcolm P. Keown, W5RUB, 213 Moonmist, Vicksburg, Miss. 39180.

California QSO Party

Two Periods: (GMT)
1800 Sat. Oct. 6 to 0600 Sun. Oct. 7
1500 Sun. Oct. 7 to 0300 Mon. Oct. 8

This is the 8th annual QSO Party sponsored by the North Hills Radio Club. The same station may be worked once per band and mode. Calif. stations may work each other for QSO and section credit.

Exchange: QSO no., RS(T) and QTH. County for Calif., ARRL section or country for others.

Scoring: One point per QSO. Calif. use ARRL sections and DX countries worked for their multiplier. Others use Calif. counties. (max. of 58)

Frequencies: C.W.—3560, 7060, 14060, 21060, 28060. s.s.b.—3880, 3980, 7280, 14280, 21280, 21380, 28580. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the winners in each of the 74 ARRL sections and each DX country. Additional awards where justified.

Include a summary sheet, list counties, sections and DX countries worked. Name and address in BLOCK LETTERS and the usual signed declaration.

Mailing deadline Nov. 7th to: John Minke, W6KYA, 6230 Rio Bonito Drive, Carmichael, Calif. 95608. Include s.a.s.e. for results.

Missouri QSO Party

Starts: 2300 GMT Saturday, October 6
Ends: 2300 GMT Sunday, October 7

This is the Special 10th Anniversary Party sponsored by the St. Louis A.R.C. Special efforts will be made to activate hard to get Mo. counties.

The same station may be worked once on each band and mode, and mobiles from each county change. Mo. stations may work other Mo. stations for QSO and state multiplier.

Exchange: QSO no., RS(T) and QTH. County for Mo., state, province or DX country for others.

Scoring: One point per QSO. Mo. stations multiply total by sum of states, provinces and DX countries worked. Others use Mo. counties for their multiplier. (max. of 115) (KH6 and KL7 count as state only)

Frequencies: C.W.—1815, 3560, 7060, 14060, 21060, 28060. Phone—1815, 3860, 3960, 7260, 14260, 14290, 21290, 21360, 28560. v.h.f.—50.110, 144.090, 144.110, 145.110.

Awards: Certificates to top scorers in each state, province and DX country and the top 10 Missouri entries. The top overall scorer will receive a special commemorative plaque.

Mailing deadline is Dec. 1st to: Warren Bergmann, WØTDR, 842 Tuxedo Blvd., Webster Groves, Missouri 63119. Include s.a.s.e. for results.

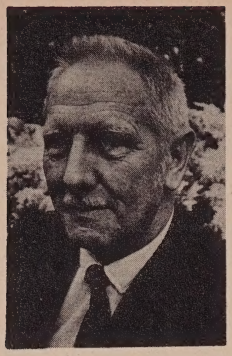
New Mexico QSO Party

Three Periods: (GMT)
2200 Sat. Oct. 6 to 0100 Sun. Oct. 7
0200 to 0600 and 1800 to 2200 Oct. 7

This one is sponsored by the Los Alamos ARC. The same station may be worked only once on each band, but again if there is a county change. Instate contacts are valid for New. Mex.

Exchange: QSO no., RS(T) and QTH. County for New Mex., state, province or

[*Continued on page 77*]



THE awards PROGRAM



BY ED HOPPER,* W2GT

Special Honor Roll
All Counties
#105—James C. Carmody, Jr., W8UOQ, 5-16-73.

THE "Story of The Month" for September, as told by Harry is:

Harry B. Okey, Jr., WDX6ETT
(All Counties #88, 11-22-72)
#1 to S.W.L.!

"Greetings from my short-wave monitoring station, which is located three blocks from the Pacific Ocean, north of San Diego in sunny Southern California.

"To do my monitoring, I use a Hammarlund HQ-170 receiver with a Mosley SWL-7 doublet antenna and a Webcor tape recorder.

"One day in 1948, while tuning around, I heard many amateurs traveling through different states making contacts with other amateurs in their cars (mobile stations) or with fixed stations. I soon became very interested in monitoring these mobile stations as they traveled around their home town, state to state, or from coast to coast.

*P.O. Box 73, Rochelle Park, N.J. 07662



Harry B. Okey, Jr., WDX6ETT. #1 s.w.l. Holder of All Counties Award.

USA-CA HONOR ROLL

3000	1500	500
W8UOQ 126	W8UOQ 225	PY3BXW 946
2500	WA1KMP 226	W8UOQ 947
W8UOQ 158	1000	OK1TA 948
2000	W8UOQ 304	WA1KMP 949
WA5YSC 186	WA1KMP 305	
W8UOQ 187		

"I shortly ran across the 20 meter Independent County Hunters Net, and many mobiles from all over the country would check into this Net and give out different counties. I soon learned there were 3,077 different counties in the U.S. and for working these one could get a very nice USA-Counties Awards Certificate. I also found out that short wave listeners could also apply for this certificate on a heard basis. This sounded like a challenge to me, to see how long it would take me to hear and confirm the different counties in the U.S.A.

"On Saturday, November 18, 1972 I finally logged my last USA county, which was W9SDK/M4 in Georgia on his return trip from Florida to Wisconsin.

"As fast as possible, I finished my application and rushed it to W2GT and I was soon notified that I had earned All Counties #88, dated 11-22-72 and that I was the first short wave listener to receive this All Counties Award and later a plaque through the kind courtesy of the ICH NET!

"I am 48 years old, the youngest of three brothers, unmarried, born in Iowa but graduated from La Jolla High School in 1943 and then went on to attend the University of Berkeley.

"My hobbies include monitoring all the amateur bands, especially the 20 meter Independent County Hunters Net. I also like to collect DX QSLs and I have a fine collection from all types of amateur stations /P, /M, A/M and M/M.

"When I was five years old, I lost my right leg from blood poisoning. This accident did not discourage me from taking part in different sports as I grew older. Each year I would enter the long-distance rough water swimming races which were held at one of our local beaches. I used to roller skate and I like to go bowling, hunting, fishing and fly single-engine aircraft."

"I would like to thank all County Hunters for their kind help and cooperation and for confirming my reports of their signals."

Awards Issued

James Carmody, W8UOQ waited until he had them *all* before sending me the necessary paper work.

Dr. Bill George, WA5YSC keeps busy and made USA-CA-2000, All SSB.

Marge Doucette, WA1KMP won USA-CA-500, 1000 and 1500 endorsed All A-1. (Her OM is Charles, WA1KMQ).

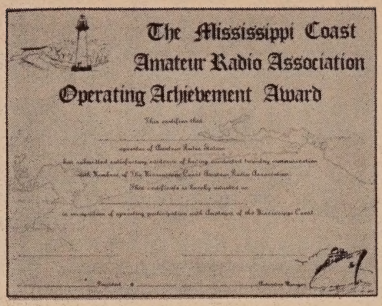
Eduardo Snel, PY3BXW was issued USA-CA-500-#946, endorsed All 2 X SSB. This is #2 Award to Brazil.

Karel Hercik, OK1TA acquired USA-CA-500 #948, Mixed.

Awards

Klondike Gold Rush Anniversary Award: The amateurs of the Yukon have banded together to offer this award during 1973, the 75th Anniversary of The Klondike Gold Rush. To qualify, one must contact three different Yukon amateurs (s.s.b. or c.w.) *or* one Yukon amateur on three different bands between January 1st 1973 and December 31, 1973. Submit log data containing the date, time and frequency of the QSO, *and* the name and location of the Yukon operator. Send this and $1.00 U.S. or Canadian or 6 IRCs to: Andy Duncan, VA8CD, Yukon Amateur Radio Association, Haines Junction, Yukon Territory, Canada. *VA* is a commemorative prefix issued to VE8 Yukon amateurs for Klondike '73. Look for them around 0100 GMT and 0500 GMT on 14205 (break on c.w. and they will gladly QSY), or 3782 from 0400 to 0700 GMT.

Ulster County Award: This attractive award is being issued by the Overlook Mountain Radio Club of Kingston, N.Y. for contacting amateur radio stations in Ulster County, N.Y. No time, mode or band limitations. DX stations (including KH6, KL7) contact any two stations in Ulster



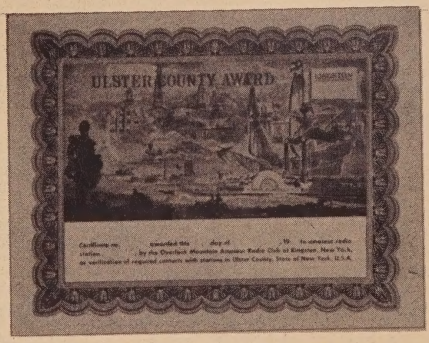
Mississippi Coast ARA Award.

County, N.Y. Continental U.S. stations must contact any three Ulster County stations. Cost: 50 cents to W-K stations, 4 IRCs for DX stations. QSLs not required, but log data must accompany your request for Award. Send to: Ulster County Award Manager, Harold Twiss, WA2RXP, Country Lane, Lake Katrine, N.Y. 12449.

The Mississippi Coast ARA Operating Achievement Award: This Award issued in recognition of the first year of operation of this Amateur Radio Association. All contacts after 1 January 1972 are valid. Amateurs in Miss., Louisiana, and Alabama need contact 5 MCARA members. Amateurs in the remainder of the 10 W-K call areas need contact 2 members. Amateurs in the rest of the world need contact 1 member. Send all QSO data with $1.00 or 5 IRCs to: MCARA, P. O. Box 1785, Gulfport, Mississippi 39501.

Wonderful Wisconsin Week: A certificate signed by the Governor of Wisconsin will be awarded to all who qualify. A special

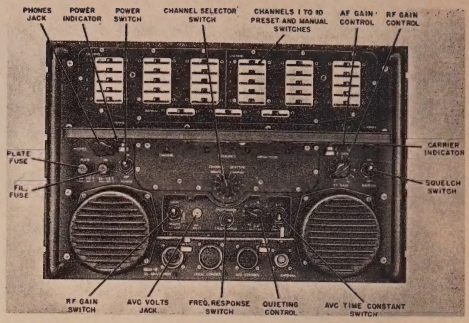
[*Continued on page 75*]



Ulster County (N.Y.) Award.

SURPLUS sidelights

BY GORDON ELIOT WHITE*



Front panel view of the R-278 UHF receiver, used by the Navy in shipboard and shore stations.

MILITARY u.h.f. transceivers are now becoming surplus, and may have some utility for amateurs and sophisticated s.w.l.s who want to eavesdrop on the Air Force, or get on 220 mHz. After a long period of high prices and an export market abroad, the AN/ARC-27 aircraft transceiver is now cheap enough for surplus hounds, and the AN/GRC-27 ground version is also beginning to turn up. This month I will deal in general terms with the R-278B/GR, the receiver portion of the GRC-27, and later I may take up other sections.

The receiver is a standard u.h.f. superhet covering the military aircraft band from 220 mHz to 399.9 mHz in the usual 1,750 channels (100 kHz spacing). This is obsolete, as the aircraft channels are now spaced in 25 kHz increments.

The unit uses 38 crystals in a synthesizer arrangement, with triple conversion. Tuning is automatic, with a motor drive.

The antenna input is 52 ohms, and the set used either directional or omni-directional antennas, the latter the small rod-type discone seen on airport control towers.

The manual on these sets is either *NavShips 92774* or *NavShips 92175*. They were built Circa 1956 by Collins Radio Company. The receiver weighs in at a dainty 115 pounds (less rack) and the whole set tips the scales at 412 pounds. The receiver draws 385 watts — 85 watts more during channel selection.

Although 1,750 channels are available, only ten are pre-set in the controls. Stability is plus or minus 10 kHz. Sensitivity is rated as requiring 6 microvolts 30 percent modulated, to produce 1 watt output at not less than 10 db signal to noise ratio. Selectivity is 85 kHz or greater bandwidth at 6 db;

*1502 Stonewall Rd., Alexandria, Va. 22302

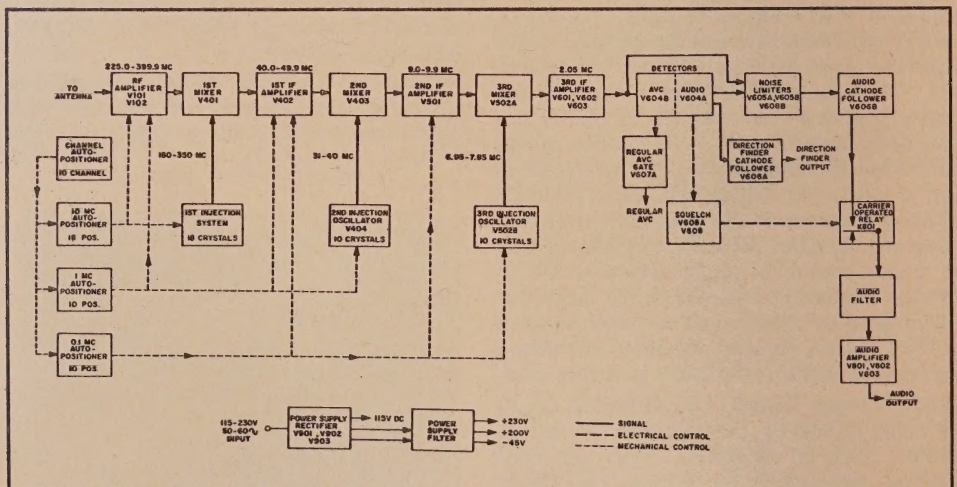
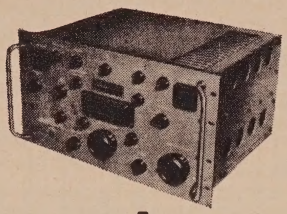


Fig. 1—Block diagram of the R-278 receiver. The set uses 38 crystals in a triple-conversion circuit. The Direction Finder output provides a low-impedance signal, useful for panadaptors and certain other accessories.

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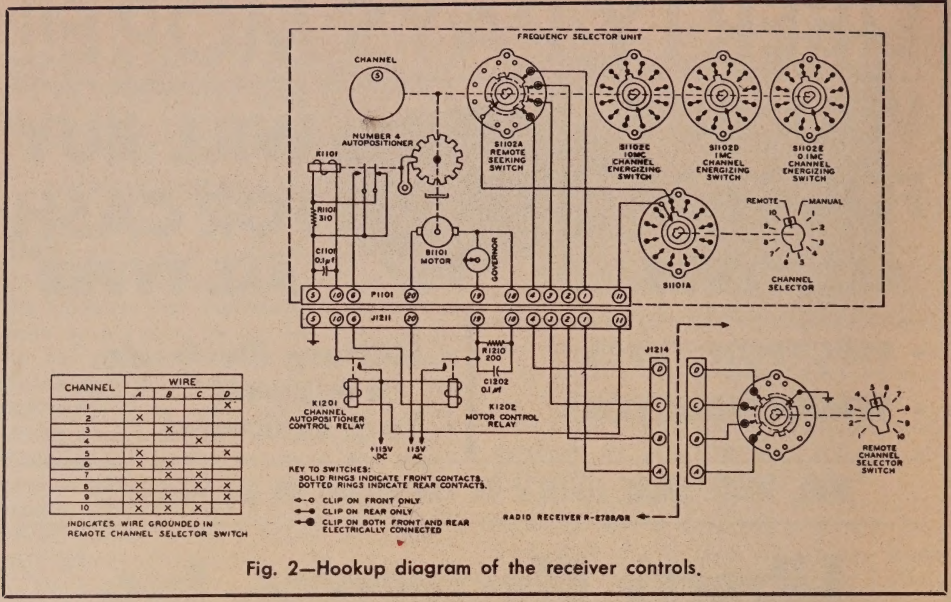
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2	X			
3		X		
4			X	
5	X			X
6	X	X		
7		X	X	
8	X		X	X
9	X	X		X
10	X	X	X	

Fig. 2—Hookup diagram of the receiver controls.

225 kHz at 60 db down. The set will boom out 3 watts into 600 ohm headsets—that ought to blast anyone out of his daydreams.

The receiver alone boasts 30 vacuum tubes of 13 different types.

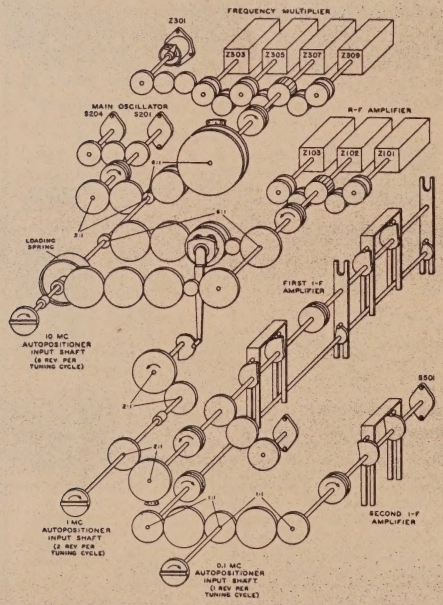


Fig. 3—This drawing gives a general view of the rather complex rack and cam system used by Collins to tune the three sets of variable intermediate frequency transformers.

This is undoubtedly one of the ugliest surplus receivers around, as the photo shows. It has two big blower intakes, the cable plugs, and a raft of channel setting knobs on the front panel. Each pre-set channel is tuned by adjusting a set of knurled discs—one for 10 mHz, 1.0 mHz and 0.1 mHz steps. Thereafter tuning for the pre-selected frequencies is done with the channel selector.

Fig. 1 is a block diagram of the receiver. The crystal scheme is as follows:

First Injection

220-280 mHz, crystal frequencies from 30 mHz to 38.3333, multiplication × 6; 280-400 mHz, crystal frequencies from 26.6667 mHz to 38.8889 mHz, mult. × 9.

Second Injection

0 mHz	31 mHz crystal
1 mHz	32 mHz crystal
2 mHz	33 mHz crystal
3 mHz	34 mHz crystal
4 mHz	35 mHz crystal
5 mHz	36 mHz crystal
6 mHz	37 mHz crystal
7 mHz	38 mHz crystal
8 mHz	39 mHz crystal
9 mHz	40 mHz crystal

Third Injection

.0 mHz	6.95 mHz crystal
.1 mHz	7.05 mHz crystal

.2 mHz	7.15 mHz crystal
.3 mHz	7.25 mHz crystal
.4 mHz	7.35 mHz crystal
.5 mHz	7.45 mHz crystal
.6 mHz	7.55 mHz crystal
.7 mHz	7.65 mHz crystal
.8 mHz	7.75 mHz crystal
.9 mHz	7.85 mHz crystal

The receiver features noise limiters, and a squelch circuit, also a direction finding circuit that is normally not used.

The l.f. tuning system (fig. 2) is typical Collins, with a complex series of permeability-tuned i.f. transformers and geared, cam-driven racks. With cams and pawls and autopositioner input shafts and so on, it is a beautiful scene for the Rube Goldberg types. It works very nicely, but I suggest not trying to make hasty adjustments to that portion of the set.

Since the set has a schematic diagram printed on the side of the chassis, we will not attempt to reproduce it in the small size of a magazine page. Fig. 3 is the control diagram.

The R-278 will work with the AN/ARC-27, the RDZ, TED, TDZ, AN/URR-13, AN/URR-35, AN/ARC-33, etc., which also have 1750 channels spaced 100 kHz apart. (The lowest 25 channels are not counted, as they are not normally used in military communications in this band.) ■

Awards [*from page 71*]

award will be given to the Wisconsin amateur who assists most out-of state operators to qualify. Rules: 1. A Wisconsin applicant submits his QSL and log information of 10 or more contacts made with out of state stations. 2. An out of state applicant submits his QSL and log information of 5 or more contacts with Wisconsin amateurs. 3. A foreign amateur submits his QSL and log information of 2 or more contacts with Wisconsin amateurs (Canada-Alaska-Hawaii included in this section). 4. Only contacts made during Wonderful Wisconsin Week—Sept. 16, through Sept. 22, are valid. There is no charge for the certificate. Mail applicants to: WA9KNH, Robert J. Draeger, P.O. Box 2507, West Allis, Wisconsin 53214. Please apply by Nov. 15, 1973.

Editors Notes

Sad news via Bertha, WA4BMC-Dan

SP-600(*) RECEIVER 0.54-54 MHz continuous, overhauled, aligned, grtd, w/book **$250.00**

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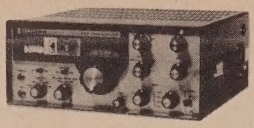
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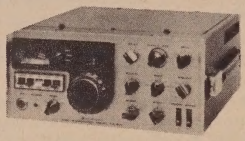
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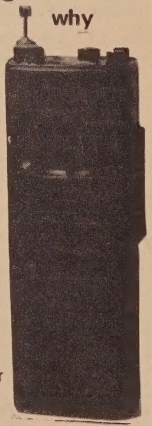
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Earhart, W6UNP, *All Counties* #99, dated 3-28-73, died of a massive heart attack, May 17, 1973. Sincere sympathy from all County Hunters to his family and friends.

Also sorry to hear of the passing of an old friend, Reeve Strock, K4AW. Pre-war as W2GTZ (later W2YW), with another friend, Walt Bostwick, W2GW; we used to chase DX and much to my chagrin when I would call DX, a big percentage of the time when they came back they would answer W2G (and I'd hold my breath) and the next letter would be a W (W2GW) or TZ (W2GTZ)-Hi. The last I knew, Walt was an inactive K6.

Independent Cities of Virginia And The Counties For Which They May Be Used —Only Once!

After much research, checking up-to-date maps, much discussion with County Hunters, in view of all the changes in Virginia, it was agreed that a definite list must be made-under the new setup, 5 Independent Cities do *NOT* touch any Virginia County. Most agree that Independent Cities in a state should *NOT* be used for counties in another state. The following list has been agreed upon and yes, they may be used but ONCE, regardless of the number of QSOs (even with different stations), so if such a city touches two counties, be sure to pick the *ONE* you need.

Alexandria—Arlington *or* Fairfax.
Bedford—Bedford.
Bristol—Washington.
Buena Vista—Rockbrhidge.
Charlottesville—Albemarle.
Chesapeake—Isle of Wight.
Clifton Forge—Alleghany.
Colonial Heights—Chesterfield *or* Prince George.
Covington—Alleghany.
Danville—Pittsylvania.
Emporia—Greensville.
Fairfax—Fairfax.
Lynchburg—Campbell *or* Bedford.
Martinsville—Henry.
Nansemond—Isle of Wight *or* Southampton.
Newport News—York.
Norfolk—Isle of Wight.
Norton—Wise.
Petersburg—Dinwiddle *or* Prince George.
Portsmouth—Isle of Wight.
Radford—Montgomery.
Richmond—Chesterfield *or* Henrico.
Roanoke—Roanoke.
Salem—Roanoke.

Falls Church—Fairfax.
Fort Monroe—York.
Franklin—Southampton.
Fredericksburg—Spotsylvania.
Galax—Carroll *or* Grayson.
Hampton—York.
Harrisonburg—Rockingham.
Hopewell—Prince George.
Lexington—Rockbridge.
South Boston—Halifax.
Staunton—Augusta.
Suffolk—Isle of Wight.
Virginia Beach—Isle of Wight.
Waynesboro—Augusta.
Williamsburg—James City.
Winchester—Frederick.

NOTE—Regarding Washington, D.C.—Montgomery *or* Prince George, Maryland.

I'd like to thank all the County Hunters who were a great help with this list, but YOU know who YOU are so I will not list anyone so as NOT to miss and thus slight anyone, THANKS!

My two main problems are space and 90 day deadline, please try to understand and write and tell me. How was your month?

73, Ed., W2GT.

Contest Calendar [*from page 69*]

country for all others.

Scoring: 1 point per QSO. Multiplier for New Mex. is the sum of states, provinces, countries and NM counties worked. Others use NM counties for their multiplier. (max. of 32)

Frequencies: C.W.—65 kHz up from low edge of band. Phone—Near the edge between General and Advanced. Novice—Middle of each Novice band.

Awards: Appropriate awards will be given to winners in each section.

Mailing deadline November 1st to: Bill Wageman, K5MAT, 35 San Juan, Los Alamos, New Mex. 87544. Include s.a.s.e. for results.

VK/ZL/Oceania DX Contest

Phone: Oct. 6-7 C.W. Oct. 13-14
Starts: 1000 GMT Saturday
Ends: 1000 GMT Sunday

Stations in the rest of the world will consentrate on Oceania, with the emphasis on VK/ZL.

Rules apply to stations other than VK/ZL.

Exchange: Five and six figures, RS/RST plus a progressive QSO no. starting 001.

Scoring: *Oceania stations*: 2 points for VK/ZL contacts, 1 point with rest of world. *Outside Oceania*: 2 points for VK/ZL contacts, 1 point for Oceania contacts other than VK/ZL.

Final Score: Total QSO points multiplied by sum total of VK/ZL call areas worked on all bands. Single band scores are also acceptable.

Logs: Date/time in GMT, station worked, number sent/rec'd, band and QSO points. Underline each new VK/ZL call area worked on each band, use separate log sheet for each band.

A summary sheet showing the scoring, your name and address in BLOCK LETTERS and a signed declaration that rules and regulations have been observed is also requested.

Awards: An attractive colored pictorial certificate goes to the top all band scorer in each country and call areas of W/K, JA and UA. Single bands awards if returns warrant.

There is also a s.w.l. section. Only VK/ZL stations are to be logged, include call of station being worked and serial number sent.

Logs must be in the hands of the committee no later than Jan. 22, 1974. This year they go to: Wireless Institute of Australia, Box N1002 G.P.O. Perth, Western Australia 6001.

CQ World Wide DX Contest

Phone: Oct. 27-28 C.W.: Nov. 24-25
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

Rules are the same as previous years and will be given in details next month. Following is a brief break-down for overseas areas.

1. All bands may be used.
2. Exchange, RS/RST plus *CQ* Zone.
3. QSO point value. (a) 3 points between stations on different continents. (b) 1 point between stations on the same continent but in different countries. (c) Contacts between stations in the same country are permitted for Zone and/or Country multiplier but have no QSO point value.
4. Multiplier is determined by the sum of Zones and Countries worked on each band. (*CQ* Zone and ARRL and DARC lists).
5. Final Score: (a) Single band, Zones

plus Countries multiplied by QSO points. (b) All band, sum of Zones plus sum of Countries from each band multiplied by total QSO points.

6. Three divisions. (a) Single operator, single or all band. (b) Multi-operator, single transmitter. (c) Multi-operator multi transmitter.

7. A multi-operator, single transmitter station, only *one* transmitter and *one* signal within the same time period permitted. Multi transmitter, several transmitters may be active, but only one signal per band is permitted.

8. Use a separate log sheet for each band, 40 contacts to the page. Indicate Zone and Country *only first time* it is worked on each band.

Official rules including list of 25 Trophies will appear in next month's issue. Official log and summary sheets are available from *CQ*. Include a large s.a.s.e. or IRC's to cover postage. *CQ* World Wide DX Contest, 14 Vanderventer Ave., Port Washington, L.I. N.Y. USA 11050.

Editor's Note

Lack of space dictates that this be brief. Its inevitable that there are bound to be conflicts with so many state parties scheduled. A better choice of frequencies however would avoid a lot of the confusion that is bound to happen when three activities are going at the same time on the same frequencies. 73 for now, Frank, W1WY

Announcements *[from page 10]*

E. New Kensington & N.E. Monroeville, Pennsylvania

The Skyview ARC will hold its 11th Annual Swap and Shop on Sunday, Sept. 9th at the Club Grounds, 6 miles East of New Kensington PA, 15 miles N.E. of Monroeville, Pa. Follow direction signs from junction of Routes 366 and 380 to club ground Check-in on 29.0 MHz and 146.94, no fees, parking free, lots of shade and refreshments available. For more info, write c/o Club Station K3MJW, 239 Michigan Ave., Lower Burrell, PA 15068.

Mount Clemens, Michigan

L'Anse Creuse Amateur Radio Club, located in Mount Clemens, Michigan will be holding a Swap-and-Shop September 16th. For information, please contact Richard Arzadon, WA8RXI, Club Pres., at 43642 Gainsley, Sterling Hts., Michigan 48078. Phone: (313) 731-4998.

CQ Reviews Miida [*from page 34*]

6354 has a rated accuracy for d.c. potentials of ±0.1% of reading ±1 digit (at ambient temperature of 23 deg. C. ± 10 deg. C., humidity less than 85%). The maximum obtainable resolution is 1 mv on the 2 v. range; input impedance is 1M on this range and 10M on the other ones. The normal mode rejection is 40 db minimum @ 60 Hz ±1% and the common mode rejection is 60 db minimum with 1K unbalance @ 60 Hz.

The rated accuracy for a.c. potentials is ±0.3% of reading ±0.2% of full scale, except ±0.5% of reading ±0.5% of full scale on the 350 v. range (under the above environment). These ratings for the initial case boil down to ±0.5% at full-scale, ±0.7% of reading at mid-scale and ±1.1% of reading at quarter-scale. For the 350 v. range the respective equivalents are ±1%, ±1.5% and ±2.5%. Maximum resolution is 1 mv r.m.s. on 2 v. range, input impedance is 1M. Frequency response is 45 Hz to 20 kHz.

The accuracy for resistance is given as ±0.5% of reading ±1 digit, except ±1%, ±2% and ±10% of reading ±1 digit on the 2M, 20M and 200M ranges respectively. The impressed current varies in decade steps from 10 ma on the 200-ohms range down to 10 na on the 200M range. Maximum resolution is 0.1 ohms on the 200-ohms range. Response time for resistances is not given, but was found to be within 2 seconds on all ranges (without range change).

Although we do not have the voltage standards needed for checking the accuracy of *all* ranges of the 6354 to within the specified tolerances, from those we do have in this respect and by comparisons with other DMM's of similar ratings, the Miida job lives up to its specifications. Resistance accuracy also was as specified when checked against 0.5% resistors.

The unit operates from a 110/120 v.a.c., 50/60 Hz, source through a detachable line cord at a power consumption of 11 watts. Its size is approximately 2¾" × 8½" × 7⅝" (H.W.D., exclusive of mounting feet and handle) and the weight is about 4.6 lbs.

Current-Measuring Accessories

The current-measuring accessories are six individual precision resistors that are shunted across the voltage-input terminals, the voltage drop across which is then measured according to the current through the particular resistor. The display then shows up in terms of current.

These resistors are available in decade

steps for measuring d.c. currents of 1 a. to 20 na full-scale with accuracies varying from ±0.2% to ±1% of reading ±1 digit (according to the range). The a.c.-current ranges are from 1 a. to 100 na full-scale at a rated accuracy of ±0.8% of reading ±0.2% of full-scale. The price is $2.00 each.

There also are adapters for d.c. potentials up to 36 KV and a.c. potentials to 1000 v. A probe is available too.

The Miida Model 6354 Mini-Multimeter is priced at $289.50, complete with power cable, test leads, ground cord, spare fuse, hold plug and vinyl cover. It is guaranteed to maintain specified accuracies for 6 months after shipment and for 6 months after each calibration. There also is a warranty of 1 year against defects in workmanship and material. Prices and other data on the accessories may be obtained from Miida Electronics, 2 Hammarskjold Plaza, New York, N.Y. 10017. —*W2AEF*

Keying Switch [*from page 35*]

utors, are specified, almost any silicon switching PNP|NPN transistors can be used.

If a "stiff" enough power supply is used, there is no need to regulate the v.f.o. supply voltage. Usually, however, this is not the case, as really "stiff" transistor power supplies begin to get expensive. Battery supplies that are easily carried for portable operation may have sufficient internal resistance to cause some chirp, especially when they have aged slightly (particularly true for lantern batteries). Thus, to minimize the chirp problem, CR_1, a zener diode of 2 or more volts less than the supply voltage, should be used to regulate the v.f.o.

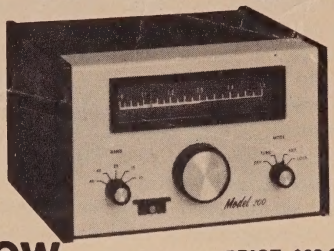
In several recent circuits, such as the one used by Weiss in his QRP transmitter[3], zener regulation is already provided. The zener regulation for these circuits should be retained, eliminating CR_1. The v.f.o. portion may be separated from the untuned buffer, and only the v.f.o. portion keyed, or the entire circuit can be keyed with the v.f.o. switch. The switch will work equally well with all of the transistor v.f.o.'s that have been described.

Zeroing is provided by CR_2 and a push-button or other suitable switch.

[3] Weiss, Adrian, K8EEG, "A Multiband FET VFO QRP Transmitter," *Ham Radio*, July 1972.

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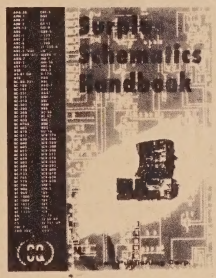
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This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available.

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Adding An Outboard VFO

Both the Heath and the Ten-Tec tranceivers provide a crystal input for their tranceivers. Adding an external v.f.o. to either of these rigs or similar homebrewed rigs[1] amounts to simply capacitively coupling either a homebrew or Ten-Tec module v.f.o. to the pin of the crystal socket which goes to the oscillator/buffer base. The keying line is then directly connected to the tranceiver keying line, by either hooking directly to the key, or adding an appropriate jack to the tranceiver.

An advantage in using an external v.f.o. with a tranceiver is that by adding a T-R switch, such as the simple one described by WA9CXP[4] or the more elaborate one of W4ETO[5], full break/in operation is possible. VOX type semi-break-in can be achieved using a Ten-Tec AC-7 module, or other similar circuit.

Transistor VFO's and the Drake 2NT

Since the v.f.o. promised by Drake in their early brochure for the 2NT has never appeared, and because crystal operation by Novices is a thing of the past (as well as the fact that the 2NT is a dandy c.w. transmitter), the addition of a simple v.f.o. to this transmitter makes a great rig. The transistor v.f.o. is hooked to the crystal socket through a step-up transformer (see Demaw's article on v.f.o.'s[6]), and the keying connection from the v.f.o. switch is hooked to the relay point provided on the 2NT.

(Note that this switch circuit is not suitable for use with either cathode keyed rigs like the Adventurer and the DX-40, or with grid block keying rigs such as the DX-60.)

The v.f.o. switch described is only one of the simple circuits that can be added to QRP gear to increase the "fun quotient." How's *your* imagination? ■

[4] Kanode, Irwin G., WA9CKP, "The Simplest TR Switch," *CQ*, Feb. 1970.

[5] McCoy, Lewis, W1ICP, "Simplified Antenna Switching," *QST*, April 1971.

[6] Demaw, Doug, W1CER, "Some Tips On Solid-State VFO Design," *QST*, May 1970.

Math's Notes [*from page 51*]

Finally, our old friend, Signetics Corporation, 811 East Arques Avenue, Sunnyvale, California, 94086, has a new 14 pin DIP zero crossing detector chip. This device, their SP363A, works from either +5 volts and −12 volts, and will convert low level analog voltages and signals of ± 30 millivolts or more, to TTL compatible outputs. This device should be just the ticket for producing TTL compatible timing pulses from the AC line. Cost for the SP 363A is $2.15 in lots of 1-99.

73, Irv, WA2NDM

OSCAR-Mobiling [*from page 32*]

On May 24 I returned to Vermont for another two day DXpedition. On the 24th I worked six stations from Rutland, and on the 25th another 15 stations from the area around Manchester. Some of these were made from a fantastic location atop Mt. Equinox. On June 11 I again put Vermont on the air, working 13 stations from Bennington.

Then I found another great use for a mobile OSCAR-6 station. The Schenectady (N.Y.) Amateur Radio Association planned to put K2AE/2 on the air for Field Day, June 23 and 24. This year they wanted to include satellite operations, so I drove over to their campsite, and presto—K2AE/2 was in operation via OSCAR-6. We made 11 contacts during Field Day, including the first trans-Atlantic QSO with the mobile equipment when we worked G3IOR during orbit 3146.

To sum up, in three months I've made over 150 contacts with the 100-watt mobile OSCAR-6 ground station, reaching all USA districts and into four countries.

The equipment I am using is shown in fig. 1 and the photo. It is all standard commercial gear, and easily duplicated. If you plan, as I did, to use c.w., an operating platform is needed. I used a piece of plywood hooked under the dash and held down by a seat belt. A word of *caution*, remember that for safety, everything *must* be securely fastened.

The equipment has operated just great, and well beyond my original expectations. I'm getting more of a kick out of amateur radio operating mobile through OSCAR-6 than ever before in the fifty years that I have been in it. I hope that my experience will prompt more mobile work.

Find out for yourself what an exciting feeling it is to operate through OSCAR-6 from a mobile ground station. ■

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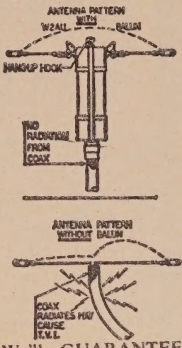
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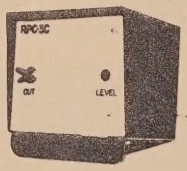
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WN8IOT "	940	20	8	12
WN4YHA "	880	30	10	10
WN4UCC "	800	21	7	9
WN7TMD "	35	4	4	3
WN7SWS 3.5	4	1	1	1

Check logs are always useful in cross-checking other entries. We extend our thanks to the following: C29ED, DJØBE, DK5OS, DK5RY, DL1YB, DL3BC, DM2ADC, DM2BJD, DM2BKH, DM2BML, DM2CGH, DM2CLM, DM2DVH, DM3BGO, DM3CF, DM3USG, DM3XHF, DM3ZMJ, DM4EL, DM4YEL, DM4ZEL, DM5JL, G3WP, GM3PFQ, GM4AQL, GW3OAY, HS4AFX, JA2ITH, K3WNL, K4EAL, K8BYH, K8LJQ, KV4AA, LA8CE, LA8NC, LA8O, OH2BAC, OH6AA, OH6RA, OH6ZH, OK1DPD, OK1JDJ, OK1JST, OK1ND, OK1US, OK2BGR, OK2BOL, OK2PAM, OK3CAU, OK3CES, OK3TMF, OK3ZAR, OL6AQJ, ON4GL, ON4KR, OZ5ME, OZ9QM, PAØNV, PAØWAC, SM5BNX, SM6BZE, SM6CZU, SM,7BBV, SM7TQ, SP1EYI, SP2AVE, SP2DFW, SP3FAH, SP3ZAT, SP5AAX, SP5GBT, SP6KKE, SP6RT, SP7CLB, SP7FAD, SP9FEX, SP9PRO, SP9RU, UA1DA, UA1DX, UA3DCX, UA3DL, UA6AAM, UA6NX, UA6PAA, UA6XAE, UA9ES, UA9SAQ, UA9TS, UA9XN, UAØBAC, UAØOAS, UAØOS, UC2AAN, UK5IAI, UK5LAP, UM8MAC, UP2AW, UP2BAV, UT5HP, UT5HT, UV3DO, UV9EI, UVØBB, UW1AR, UW1OR, UW4CB, UW9PT, UY5EM, VE7AJ, VK4KX, VK6HD, W1AWE, W2EGI, W2LKH, W2NCI, W3CTE, W3EBK, W4JUK, WB8KZD, YO4AJR, YO4AXQ, YO4SI, YO6ADM, YU3NR, ZL2LA, ZS1RA.

Station Operators

Multi-operator Single Transmitter

DLØDX: DK5GK, DK5JG, DJ1ID, DJØZU, DL2TJ, DL6DA. **DLØJRA:** DL7BQ, DL7HN, DL7ON, DL7QU. **DLØRZ:** DK2QN, DL2ZU, DL5GB, DL7RZ. **DLØWU:** DJ4AX, DJ8SW, DK4TP. **DLØWN:** DA1RJ, DK1BN, DK1HO, DK4AN, DK7FC, DK7FN, DK7FO, DJ2ZS, DL2UU, DL3AZ, DL6NK. **DM3BE** & DM3ZBE. **DM3QO** & DM3PQO. **DM5DL/1** & DM5VDL. **F6KAW:** F2QQ, G3TXF, GW3WVG. **G3PDL** & G3VIP. **G3SSO:** G2HDU, G3LCJ, G3MZV, G3PEO, G3SNN, G8KG. **GW3UCB/P:** G3WKH, G3WXS, G3XZK, G4BEG, G8ESI. **GW6GW:** GW3KYA, GW3LAO, GW3MMU, GW3PEA, GW3TUG, GW3XVQ, GW3TKZ. **HA8KUC:** HA8UC, HA8UD, HA8UI, HA8VY, HA8ZA. **JA9YBA:** JA3VEN, JA4WTG, JA9BAU, JA9BEX, JA9EXF, JA9FFN, JH1GUD. **K1DIR** & W1BPW, W1FJJ. **K1ZND** & W1ARR. **K3MBF** & K3LJZ. **K4BEO** & W3BWZ. **K7PBU** & K7PBO, K7UWT. **KL7AIZ:** WB2GJW, WB4LEK, WA7KJA, WN9IQA. **LA9OI** & LA8UL, LA8XM. **OH1AD:** Club. **OH2AC:** OH2BCA, OH2DT, OH3IN.



When you need that extra country multiplier you can usually find OHØNJ from the Aland Islands. Einar tries to give as much time as he can out of his busy schedule.



Winners of the W3AOH multi-op, single transmitter Trophy, PJ2VD. In the back is PA0LOU, a long way from home, PJ2VD's XYL who kept the boys refreshed and well fed, and PJ2VD himself. In front PJ2CB and PJ2ARI. Nice going fellows.

OH3AG: OH3HC, OH3VJ. **OH3MG** & OH3RJ, OH3TQ, OH3XZ. **OH8OB** & OH8OA. OH8RV. **OK3KAG:** OK3CIR, OK3ZAG, OK3ZFM. **PI1PT:** Club. **PJ2VD** & PAØLOU, PJ2ARI, PJ2CB. **PJ9JT:** W1BIH, W1SG, **SK5AL:** SM5BGK, SM5DFM, SM5DKH, SMØDSG, SMØGM. **SM5AOE** & SM6BJI. **SM6DJI** & SM6AYS. **VE1ASJ** & K1MTJ, K1RQE, VE1ACU, VE1DH. **VE4JB** & VE4MF. **VK4VU** & VK4VV. **WA1KZE** & WA1NRV. **WA2BLV** & WA2WLN. **W3BYX** & WA3KRD. **W3DBT** & 4Z4A1. **W3GM** & W3FHR, W3JSX, WA3JYB. **W3GP1** & WA3QIA. **W3NX** & W3DRD. **W3YXM:** K3FQF, KP4DJX, W3FPP, W3FSR, W3GMJ, WA2BNB, WA2ZRG, WA3JVG, WA3MNN, WN3RSK, WN3TAC. **W3ZBW/4** & K9PNT. **WA3GBU/5** & W7WAH, WB5EEM. **WA3HGV** & K3NEZ, WA3KZQ, WA3OVC, WA3RAP. **WA3LHG** & WA3NYU. **W4JD** & WA4HHW. **W4QCW** & K4GFH. **WB5AOF** & WB5ARR. **W6DOD** & W6KG. **W6NUT** & K4TKM. **WA6EPQ/6** & WA6IPY. **WA6NGG** & K6DJY. **WA6QGW** & WA6PMK. **WB6KBK** & WA6PGB, WB6IWS. **WA7OBL** & WA7URW. **W8SH:** WB4JEZ, W8TJQ, WA8VBY, WA8ZAV, WA0KKA. **W8UM:** WA8GGN, WA8MDC, WA8ZFM, WB8JAJ. **W9EWC** & W9AQW, WB8IJI. **W9EXE** & W9ICE. **WØAA/0:** KØORK, WØIYP, WØZHN, WAØWEZ, WBØCNM, WBØFMR. **WAØCVS** & WBØDLE, WBØDJY. **YO3KAA:** YO4HW, YO6EX, YO8DD. **YO8KAN:** CLUB. **YU1AFQ:** YU1NFP, YU1NPZ, YU1NZR, YU1OAU, YUIOAX. **ZF1VD:** K4SHB, W4ZMQ, WB4TAF. **4Z4LI** & 4Z4DZ, **4Z4MI.**

Multi-operator Multi Transmitter

CW3AA: CX1AAC, CX1BBL, CX2AL, CX3BH, CX4AQ, CX7CO, CX8BBH. **DJ2BW** & DA2YW, DC1WF, DL1CF, DJ2HH, DJ4PX, DJ6RX, DK5PD, DL5ZU, DL9OH. **DLØKF:** DL1FL, DL2ZT, DJ4FZ, DJ4SQ, DJ8FRA, DJØVH, DC5OH, DJ7SW, DJ6TN, DJ6TK. **DLØII:** DJ2YE, DJ5PE, DJ5PC, DJ8JP, DJ4TJ. **JA1YXP:** Club. **JA6YAP:** Club. **JA2YEF:** JA2KR, JA2KKA, JA2QOF, JA2NUO, JA2SAA, JA2TCA, JH2FMK, JH2IJS, JA5FUC. **K3BW** & K3JLK, K3TGM, W3HBJ. **K4CG:** WA8RGJ, K6BZL, K4CFB, WB4RDV, WB4FDT, WA3HWN, WB4VWI. **KS6DY** & KS6DH, KS6ER. **OE1XRA:** OE1JBA, OE1ZK. **OH1AA:** OH1NH, OH1NK, OH1RG, OH1SS, OH1SY, OH3ZE, OH1WR. **OH6AK:** OH6NW, OH6RC, OH6RE, OH6LV. **OH8AB:** OH8PK, OH8SS. **OK3CDM:** Club. **SK6AJ:** SM5AD, SM5BNZ, SM5CAK, SM5CBN, SM5CNQ, SM5DJZ, SM5DUS, SM5EXE. **SP5PWK:** SP5AUY, SP5DCY, Henryk. **SP9PBZ:** SP9DH, SP9EVP, SP9GAN. **XW8CN** & XW8FB, XW8BP, XW8CY, XW8EV. **W3AU** & W3IN, W3ZKH, W3GRM, K3EST, WA3AMH, WA3HRV, WA3IAQ, WA2DHS, WA1LKX, WB2SQN. **W3FRY:** K3HTZ, WA3LNM, WA3NQX, W3WPG, K3DZB. **W3GPE** & K3OIO, K3WJV, WA3FFR. **W3SS** & W3CYI, K3SME, WA3SYO, WA3LRN. **W3TV** & W3AOH, W3VW. **WA3ATX** & WA3COJ, WA3MME, W3FHR, WA3GJZ. **W4BVV** & W3BQV, K3NPV, K4GKD, K4VDL, K2UYG, K3GJD, K3OAE. **W6HQN** & W6MAV, WA6UZA, W6VAT. **W7RM** & K6RU, K6UYC, W7YGN, W7EXM, K7HTZ, K7VPF, K7JCA, WA7GWL, WA7OTO, K7JJL. **VE3HUM:** VE3BBH, VE3BVD, VE3CDX, VE3CHZ, VE3DUS, VE3EUP, VE3GUM, VE3KZ.

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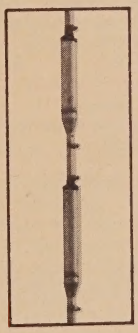
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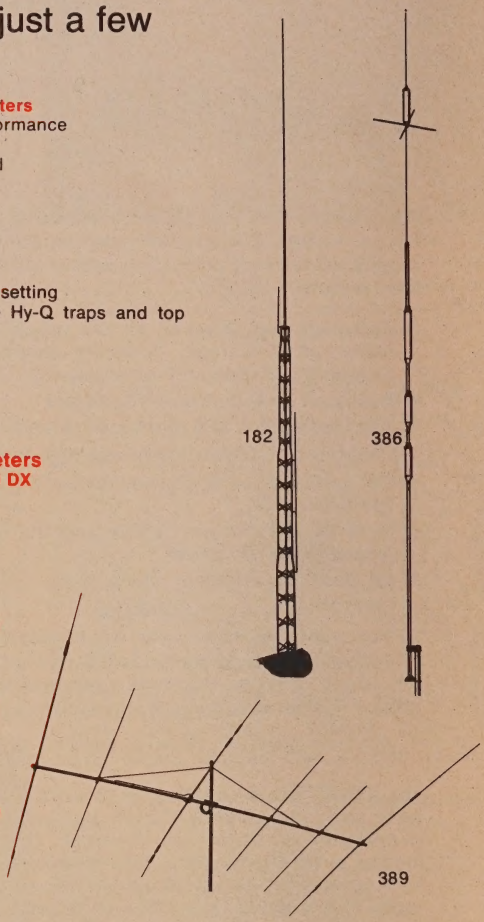
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SELL: Kaar DT-76 Transceiver, Crystalled for six two meter channels, 60—80 watts output, includes mike, control head and trunk-mounting rf section complete. Superb condition. Best reasonable offer. Heath SB-110 6 meter transceiver for SSB, AM or CW, including power supply and speaker, $325 in like-new cond. Raytrack 2kw Pep linear and supply for 6 meters. Best reasonable offer. Heath SB-310 general coverage rcvr, less than 5 hours of air time, $285. Write Dick, WA2LRO at CQ, or call 516/883-6200.

Humidity Sensing Elements, res. varies with humidity change. 3% accuracy. Cost $8.00 ea., six units for $3.75 ppd. New., W4JGO, 643 Diamond Rd., Salem, VA 24153.

WANTED: 100V/200V needing work. SSIR/SSIV in same condx. K8NGV, 26496 W. Six Mile, Detroit, MI 48240.

Worked South America certificate: Work all 13 countries. Send list and $1. HC1TH, 4805 Willowbend Blvd., Houston, TX 77035.

WANT: 6 inch Reflector Telescope. Will trade TV test equip. New Triplett 0-4 RF ammeters $3.00 postpaid. Samkofsky, 4803 Brenda Dr., Orlando, FL 32806.

WANTED: Robot SSTV Camera and Magnum Six for Collins Xmtr. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

FOR SALE: Powerstats - 1 type 136 120 volt 20 amp, like new; 1 similar but uncased, good. Make offers to Ed Block, K5ENL, Grandview, TX 76050.

PRECISION CAPACITORS, Polystryene lab. standard, Western Elect., 0.2631 Mfd., 250 V., 0.1% Box of 10 for $3.75 ppd., W4JGO, 643 Diamond Rd., Salem, VA 24153.

WANTED: Collins mobile pow-sup for KWM2. State price. K4HIC, L. Huguenor, Apt. 4F, 2800 E. Sunrise, Ft. Lauderdale, FL 33304.

Traveling case for SBE-34, Dowkey 110V, 4X5 Foto Enlarger, 16MM camera, Heath SWR, new wheel for Airstrm. trailer, K0TQH, Frentz-Deerwood, MN 56444.

SELL: SX-101 SSB-AM Rcvr. Matching spkr. Exc condx. $100. W6DWU, 13666-H Red Hill, Tustin, CA (near Santa Ana). (714) 832-8307.

FOR SALE: Johnson Viking Mobile (kit) $20.00. B&K 400 w/CR48 adapt crt tstr and Rej. $60. Simpson 351 TV Ant. Compas, $30. All FOB. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy., Jamaica, NY 11432.

BARGAINS: Vibroplex Champion Bug, $18.00, Eico Model 232 VTVM, $10.00, N.R.1 Model "W" VTVM, $10.00, Electro-Voice Model 729 Cardoid Mike, $10.00, Type 8236 tube, $9.00, or trade for 6 6146's. All prices postpaid. James Shank, 21 Terrace Lane, Elizabethtown, PA 17022.

WANTED: SBE 33/34 SWAP for orig. packing KAAR 506, 440mHz, 10W FM xcvr. Cliff, W6-HDO, 6454 Moss Ln., Paradise, CA 95969.

FREE: Research paper on Electronic VIX/CDX. Must for all hams. K6ICS, Dr. Michael K. Gauthier, 9418 Florence Ave., Downey, CA 90240.

SEE you at the ARRL Mid-West Convention on October 5, 6, and 7, at Lincoln NB W0CVU.

Worked South America Certificate: Work all 13 countries. Send list and $1. HC1TH, 4805 Willowbend Blvd., Houston, TX 77035.

CLEGG 99er 6 meter transceiver, excellent condx with Telrex beam, $49. WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, NY 11419.

WANTED TO BUY: Antique radio and gear for my modest collection. Describe and give price and your phone. David M. Bryan, 5313 W. 10th, Topeka, KS 66604.

GALAXY R-530 Receiver, extra filter, manual, original carton. Like new, $525. K8NGV, 26496 W. Six Mile, Detroit, MI 48240.

WANTED: Metal and Mineral "TR" Detector white-compass or Fisher. Must be clean. Give price in 1st letter. Gus Mondrush, W8GIV, 600 Beechmont, Dearborn Hills, MI 48124.

FM RCVR. Nems-Clarke 1502. 50-260mhz. Bandwidth variable 1-300khz. $200.00 or best offer. WA8VFK, 314 So. Western Ave., Springfield, OH 45506.

SELL: 3251/516F2 excellent condition with manual. $400 firm. Sever, 147 South Wise, North Canton, OH 44720.

WANTED: Copy of manual for Boonton Q-Meter Model 160-A. Xerox copy ok. State price. Sparks USNS Washoe County, FPO San Fran 96601.

RFI FILTERS, PI section, 7 amp, 500 v., similar to C.D. type NF, New., $5.95 ea. ppd. W4JGO, 643 Diamond Road, Salem, VA 24153.

WANT: 4X5 Graphic Camera, 616 Kodak "Monitor" Camera. Yashica Mat-124. T.N. Colbert, WA8MLV, 1008 Englewood Dr., Parma, OH 44134.

LINEAR BUILDERS Send SASE for list of HI-Power stuff at Lo-prices. Mace, 8600 Skyline Dr., Hollywood, CA 90046.

TRADE: 1971 Chaparral 440 snowmobile for good 5 band SSB Xcvr. WA0GGU, Rt. 1, Gilbert, MN 55741.

FOR SALE: RME Converter, Preselector DB20: HT18-VFO. Lo-power xmtr, Exciter-5 watts. V-70-D Xmitting tubes. C.L. Meistroff, W4TFA, 7410 Chamberlayne Ave., Richmond, VA 23227.

SELL: Precision lab. std. polystyrene capacitors. Western Elect., 0.2631 Mfd., 250 V., 0.1%, Ten each for $3.75 ppd. W4JGO, 643 Diamond Rd., Salem, VA 24153.

SELL OR SWAP CV-591A/URR SSB Rec. Conv. Units complete, as is, used with manual. Clem-K8HWW, 33727 Brownlea, Sterling Hts., MI 48077.

FOR SALE: Counter dial Millen No. 10030 $6.00 plus postage, book collectors, AC4YN's book, $4.00. W6BLZ, 528 Colima St., La Jolla, CA 92037.

28 KSR Floor Console Cabinets with LESO and wiring. Repairable 28 typing reperforators and transmitter-distributors. D.C. Harrington, 1620 Gardena Ave., Fridley, MN 55432.

COUNTY HUNTERS: WA3LRJ/8 new address is 135 Overhill Rd., Birmingham, MI 48010.

SALE: Ameco CN-144 2 meter converter and power supply, $25.00. B&W Model 51-SB Sideband Generator, $25.00. Central Electronics, 20A and Model 458 VFO, $50.00. All have manuals and shipped Prepaid. James Shank, 21 Terrace Ln., Elizabethtown, PA 17022.

MUST SELL: Swan FM-2X with AC PS and mike. Factory crystals. Mint condition. $225 or best offer. WA3RJM, 1180 Ruxton Rd., York, PA 17403.

FOR SALE: Early KUM1, AC supply, manual. G. Kessler, 6520 Rosemont, Upper Marlboro, MD 20870

TRANSFORMERS REWOUND. Jess Price, W4CLJ, 507 Raehn St., Orlando, FL 32806. Phone: (305) 425-7251.

HALLICRAFTERS HT-37 mint condition, xtras $185.00 or best offer. WN6PXM, 5917 Stoneview, Culver City, CA 90230.

SEND S.A.S.E. for list of ham equipment for sale. WA2WGJ. Sales final. Local pick up preferred. Mr. Charles A. Gentile, 138 Osgood Ave., Staten Island, New York. 10304.

18AVT/WB, 50 ft. RG-8/U, RG-58/U and PI's $50.00, plus shipping. M. Nelson, Jr., 300 Jennings Ave., Lake Worth, FL 33460.

HEATH TWOER with 12 volt power supply. Many modifications installed parts for other desirable mods. Sell for best cash offer. W7BIF, 107 Wyoming, Boulder City, NV 89005.

STATION FOR SALE. Late model clean 75A4 with 500 cy filter, Johnson SSB/AM/CW Pacemaker with mike and TR switch, $595.00. Col E.G. Arnold, 367 Northwest, Vacaville, CA 95688.

HEATH Counter-Scaler, Motorola T43 3 freq. Others. WA5CMC, 2309 Bullington, Wichita Falls, TX 76301.

WANTED: Prop Pitch Rotators. Sell xfmrs 3600-0-3600 at 1 amp with 110/220 pri. $25.00 FOB. Paul Bittner, 814 4th S., Virginia, MN 55792.

WANTED: Control unit for TR-44. Might consider swapping TR-44 rotor head for complete used AR-22. Tom Fitzpatrick, WB4FOT, 1955A Spring Station Dr., Lexington, KY 40505.

SEEKING EMPLOYMENT in Alaska, Yukon, Alberta or B.C. Can any hams suggest opportunities? WA5ETK, "Gene", 817 West 11th, Littlefield, TX 79339. Telephone: (806) 385-4167.

WANTED: HW-7 or PM2A, good condition. WN2LVV, 75 Sycamore Circle, Stony Brook, NY 11790.

TRADE/SELL: Complete Station: GT-550A and ALL accessories. Want R-390A/WRR-2/etc. W6PNC, Lauber, 3128 Vistamont Dr., San Jose, CA. 95118. (408) 266-4326.

CONAR TUBE TESTER. Model 223 with Manual, $30.00, plus shipping. J. Wasiewicz, W2DQC, 229 Sarles Ln., Pleasantville, NY 10570.

HYGAIN DB10-15A Duobander, with balun. Never used, $65.00. Need SB-220 in good condx. Chuck, 431 Monte Vista, Dallas, TX 75223.

FOR SALE: QST 1927 full year with binder, 1926, 9 issues with binder. Both mint. K1MBI, 21 Firestone Ave., Portland, CT 06480.

FISHERMAN: Battery operated transistorized fish caller. Really attracts fish to your line. Batteries and helpful booklet included, $4.00 postpaid. James Shank, 21 Terrace Ln., Elizabethtown, PA 17022.

FOR SALE: B&W Audio Phase Shift Network Model 350. New, original carton. $6.00 postpaid. Worcester, RD 1, Frankfort, NY 13340.

WANT INFO on Signetics Dolby "B" Chip. Can you help? Signetics hasn't been able to. Wm. B. Adams, POB 324, Fishkill, NY 12524.

OSCILLOSCOPE DC/wideband, 5 in. Knight KG-635 w. switch and instructions, excellent condx.. $65.00 you ship. W9TVV, 2028 Oriole Trail, Michigan City, IN 46360.

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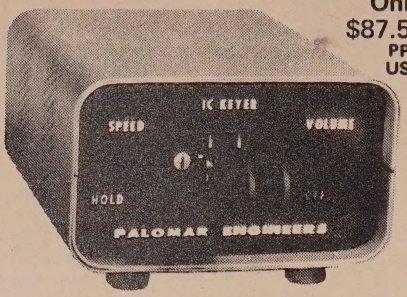
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TEN-TEC PM-3A, mint condx, w/cables, instructions, $40 plus shipping, W7MKW, 205 S.W. 102nd St., Seattle, WA 98146.

WANTED: Fluke 207 VLF receiver. Cash or Swap: whichever desired. P.F. Wilson, W7UNR, 14572 Newport Way, Bellevue, WA 98006.

JOHNSON VIKING II Xmtr w/122 VFO, perfect for novice, $90.00. Pick up only. Auslander, WA2-BJN, 1499 N. Meadow Rd., Merrick, NY 11566.

SELL: 4-CX1000A socket, $15, Cycle Timers—$10, H/P AC4A decades, $4. Freq. Counter, $25. Tuning units for BC610, $10 ea. Trammell, 1507 White Oak Ct., Martinsville, VA 24112.

2MTR FM— SBE-144 Solid State Xceiver, 9 channels xtaled, $225.00 or best offer. WA1MCY, 53 Old Amesbury Line Rd., Haverhill, MA 01830.

SELL: 20-amp variacs, $20.00 each. H/P500B-freq. meter, $50.00. UCS-300, $25.00. 4-1000A, $20.00. Loading Capacitor, $4.00. G.R. Trammell, 1507 White Oak Ct., Martinsville, VA 24112.

WANT: Booster for TR22. What have you available for sale or trade? W2ASI, 15 Kensington Oval, New Rochelle, NY 10805. (914) 633-7077.

HY-GAIN VERTICALS: 2 Model 18-HT "Hy-Tower" Verticals. 1 for $100., the second one for $85. (this one is missing base insulators which can be bought from Hy-Gain). Will not ship. James Shank, 21 Terrace Ln., Elizabethtown, PA 17022.

SR160 Xcvr, Tribander, clean with AC homebrew and DC Halli supplies, cables, mobile mike. Just add antenna for FB SSB-CW rig. $225. WB5BAM, Rt. 1, Box 225C, Breckenridge, TX 76024.

SELL: Heath KW mobile amp. HA-19 and HA-14 $150. FM unconverted 2 freq. U43GGT 12v. as is for $60.00. Lloyd, WA8ZCO, 16245 Beechwood, Birmingham, MI 48009.

SWAN 350, 117C, mike, book, $275. HT-40, mike, book, xtals, $50. W4UYC, 4132 Haverhill Dr. NE, Atlanta, GA 30342.

SALE: FTDX560, Yaesu-mike, spkr., fan. Mint condx, $450. Sale PT101, fan mobile mount, $650, new. Salopek, 2004 North 61st., Phila., PA 19151.

CALL LETTER LICENSE PLATES wanted for collection. Still need 25 states. I'll pay postage. Art Phillips, WA7NXL, 3401 N. Columbus, Apt. 5-O, Tucson, AZ 85712.

NOVICE RIG: Heath HW16, 9 mos. old, aligned, perfect condition, (1)80 (2)40 (1)15 meter crystals, Asking $80.00. Secondly, 14AVQ vertical grounded plane roof antenna with roof mount attach, 50' coax and connections, asking $15.00. Contact: David Smalley, 19561 Stagg St., Reseda, CA 91335 Tel: (213) 886-4780.

WANTED: Waters Filters for 2 & 6 meters; sell/trade VHF/UHF/micro gear, SASE. W4API, Box 4095, Arlington, VA 22204.

WANTED: Drake RV-3, RV-6, Gonset 2 mtr 903A amp & TRC/24 "B" Band xmtr head 100—200 mHz. Paul, WA8JEI, 38251 Elmite, Mt. Clemens, MI 48043.

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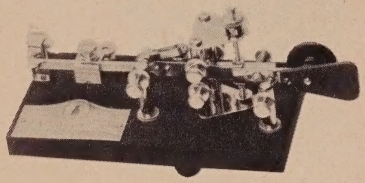
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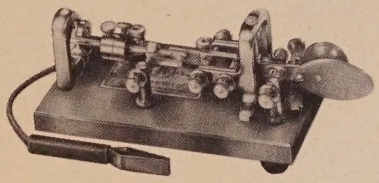
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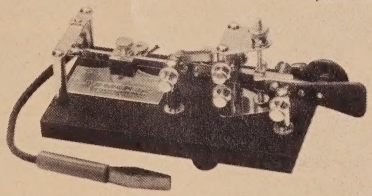
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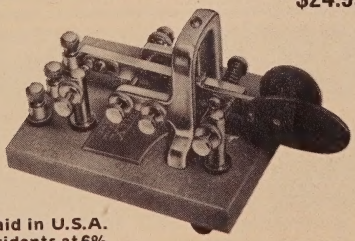
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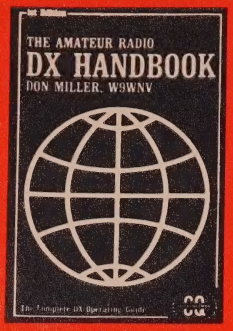


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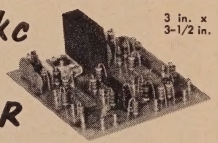
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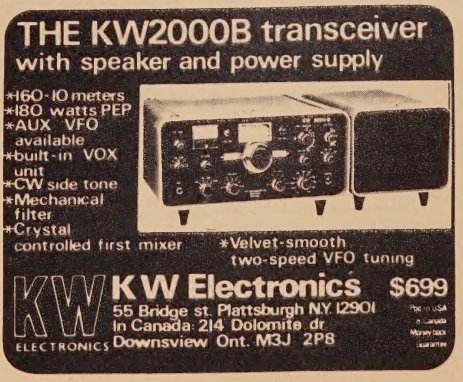
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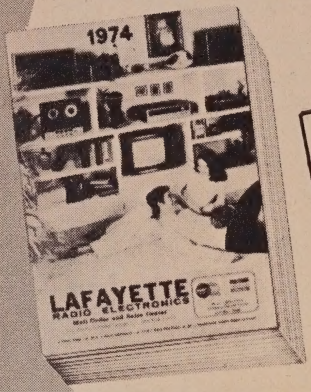






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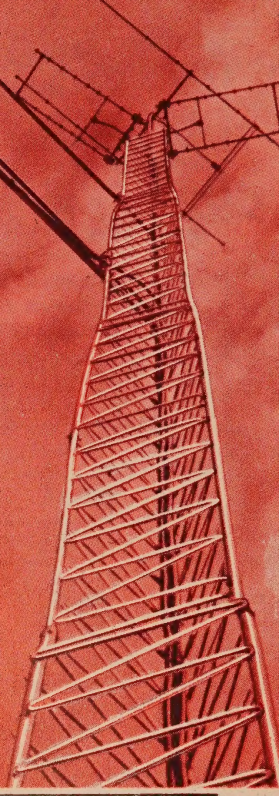
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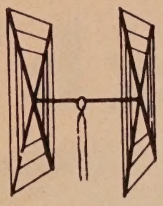
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10/15/20 CUBICAL QUAD SPECIFICATIONS

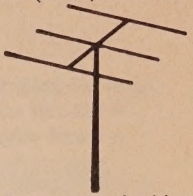
Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.; 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.
Radiating Elements: Steel wire, tempered and plated, .064" diameter.
X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.
Radiator Terminals: Cinch-Jones two-terminal fittings
Feedline (not furnished); 52 ohm coaxial cable

Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$41.00
10-15 CUBICAL QUAD	36.00
15-20 CUBICAL QUAD	38.00
TWENTY METER CUBICAL QUAD	31.00
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(all use single coax feedline)

BEAMS The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.



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3 EL 15	25	12 EL 2	31*
4 EL 15	31*	*20' Boom	
5 EL 15	34*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts! *FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK. OZ4H. and over a thousand other stations!

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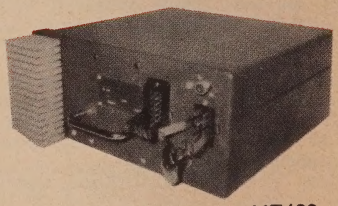
Crystals and tuning, add $50.

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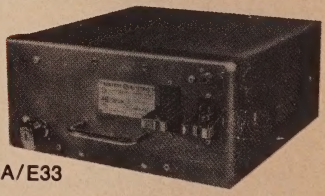
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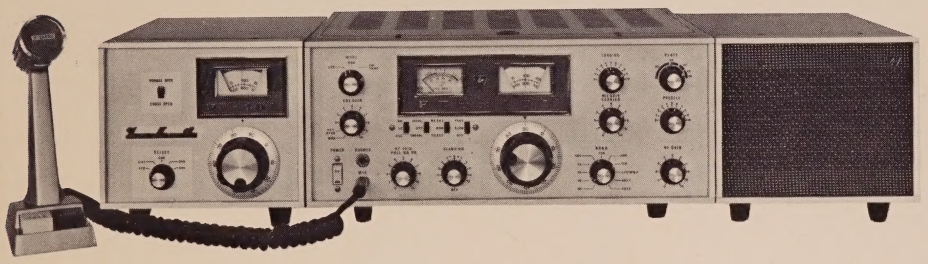
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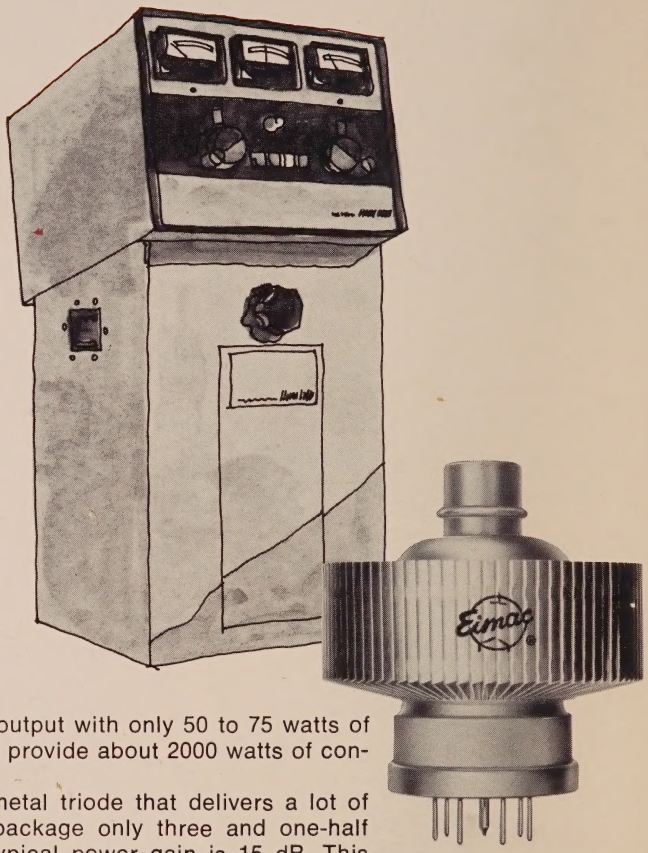
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