CQ

February 1973
$1.00

CQ WPX Contest Results Begin on Page 53.

- Novices: Go VFO For Under $20. See Page 22.



OH3XZ Posts Top 3.8 mHz Score From OHØAM

The Radio Amateur's Journal

8240

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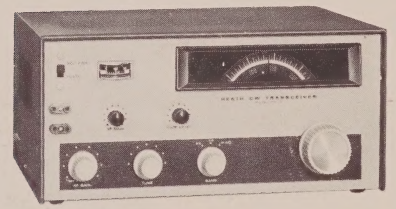
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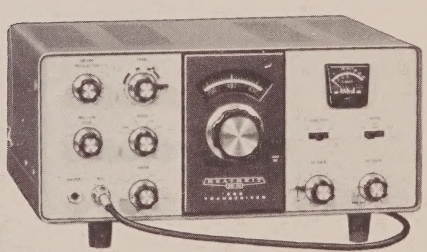
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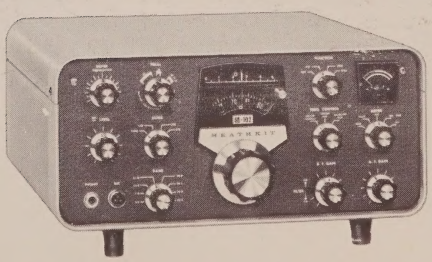
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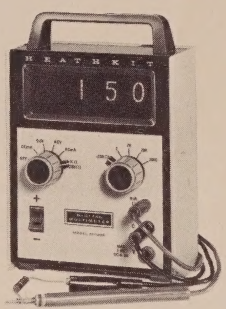
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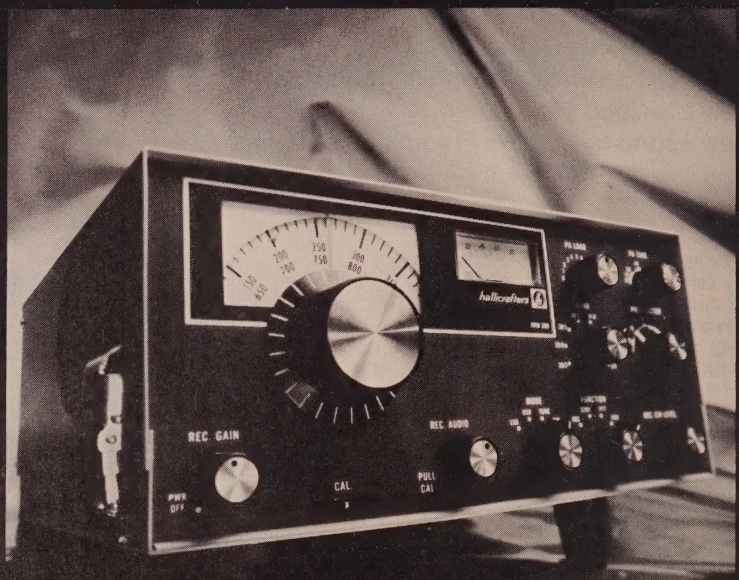
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FEBRUARY, 1973 VOL. 29, NO. 2

CQ

The Radio Amateur's Journal

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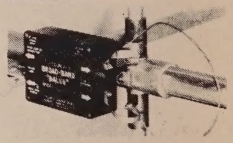
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The year 1972 brought many regulatory actions by FCC – some long-sought and necessary; others, less than welcome, and demanding re-consideration. While not debating the merits of the actions, we feel that the most significant point of the FCC's sudden spurt of activity lies in the fact that amateur radio has begun once again to attract the regulatory interest of FCC.

In the long run, we must welcome this attention to amateur regulatory matters, but one immediate effect should be for amateurs to engage in some re-appraisal of their operating procedures and tactics before FCC does it for them.

Throughout most of amateur radio's history, close supervision by regulatory authorities has been minimal because of the high standards of operating ethics self-imposed by amateurs. The errant amateur has most often been guided in the right direction by other amateurs, and only occasionally by FCC. This tradition of high moral and operating standards has instilled a high degree of trust by FCC in amateur radio. This trust is in danger.

The danger lies in the apparent decline in the ethical standards of a small but growing number of amateurs.

Paragraph 97.113 of the Amateur Radio Rules and Regulations prohibits broadcasting – but we hear broadcasting on the amateur bands. 97.115 prohibits music, but we hear music. 97.119, 97.121, 97.123 and 97.125 prohibit obscenity and profanity, false signals, unidentified communications and malicious interference, and yet not a single day passes during which we don't witness all these violations many times over.

What's happened to obedience to the law? Is it only for the other fellow?

The amateur regulations, by and large, are permissive regulations saying, in effect, "You may do anything with only these few exceptions." And permissive they are. US amateurs enjoy great freedom from restriction with only modest demands made upon them by the law, and yet certain individuals find even these modest demands not to their liking, and simply ignore those regulations which do not suit them.

It is our feeling that if we cannot demonstrate that FCC's trust in us is still warranted, that trust will be withdrawn by imposition of additional restrictive regulation.

Probably the most flagrant abuse of the law is in the area of excessive power. The Rules and Regulations stipulate that the minimum power necessary to maintain the communications desired must be used, and in no case may the final stage plate power input exceed 1000 watts d.c.

Only a few years back, a full kw was the dream of many an amateur, and an unattainable dream at that. Technological advances and greater affluence have made a joke of that dream. The kilowatt amplifier is as much a part of the amateur scene as the transceiver, and with familiarity comes contempt. "Only a kw? " How can you break the East Coast (West Coast) aluminum curtain with only a kw? " The kilowatt linear serves all too often as an exciter for the "big" linear, and by no means are they restricted to 6-land. Several firms make no secret of the availability of 4, 6 or even 10 kilowatt amplifiers – for a price – for a very select and well-heeled clientele. But the galling thing is the growing number of "amateurs" on the air with *50 or more kilowatts* at their fingertips for use "when the going gets tough."

How do you begin to return to sane attitudes towards transmitter power? How can we bring the growing power mania under control before it becomes necessary for FCC to do it for us?

The strongest weapon against a known violator of the 1 kw limit is the contempt of his peers. As long as we continue to grumble to ourselves that W5XXX is grossly illegal, and go right on treating the man as a respected member of the amateur community, there is no hope for discouraging his illegality. But treat him as an outlaw and watch him react.

We're prepared to do our part to that end. We will henceforth bar from *all* future participation in any *CQ* activity any amateur found by FCC to be knowingly using power in excess of the legal limit during any *CQ* contest. In addition, any club's aggregate score which includes that disqualified amateur's score will be automatically rejected without further discussion. The message is clear. Watch out for the other fellow's power as well as your own, for his violation will hurt you, too.

Big brother tactics? Yes, but that's what our self-policing tradition is all about. A slap on the wrist by a big brother is a lot easier to take than FCC dropping the boom on all high power. 73, Dick, K2MGA

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OUR READERS SAY

The Spirit of Ham Radio ... Co-operation

Editor, *CQ:*

Recently, the geography department of Listowel District Secondary School, Listowel, Ontario completed an extensive unit of study on Antarctica in its grade nine regional geography course.

The co-operation and helpfulness expressed in a material way by KC4 operators K2BPP and W8HXR was wonderful! Souvenirs, articles, colored slides, tapes, etc. were forwarded for the use of our students. The National Science Foundation and the National Geographic Society provided excellent maps, photographs, journals, and other audio-visual aids to help in the learning process.

"Radio - Prime Link to Antarctica" was one of a room full of bulletin board displays, research areas, filmstrip and tape recorder areas, etc.

The enclosed picture might be of interest to your readers.



QSLs provide color and are often an interesting and informaitve way of presenting an area in bulletin board fashion.

I realize many of your readers are students, teachers, etc. so this aspect of ham radio may be of interest to them.

Garry V. Hammond, VE3GCO
Atwood, Ontario, Canada

"Self Help" Works

Editor, *CQ:*

Every month ads are listed from High School clubs expounding their need for money and/or equipment. I have recently graduated from Technical H.S. (WA2DYJ) here in Buffalo and I have some info that I think will help these people.

Starting with a fairly small club in a school of 1100 students, we raised so much money in my junior and senior years that we progressed from an Eico 753 and dipole to a Yaesu 560, a Swan triband beam and tower, several Novice stations, a Tempo 2 meter rig, RTTY, and numerous accessories.

How? We simply sold Betty Benson candies during school hours *only*. We were all skeptical to begin with, but our record is pretty convincing! It proves that the easiest way to raise funds is not to place ads and hope, but to sell goods locally (like in your school).

I hope this will hlep some clubs so we'll see less appeals in the ads from now on.

Robin David Becker, WA2NYE
Buffalo, N.Y.

[*Continued on page 94*]

Announcements

International Symposium in Israel

An International Symposium of Radio Amateurs will be held in the Netanya Israel between June 24th and 29th. 1973, sponsored by the Israel Amateur Radio Club to mark the 25th anniversary of amateur radio in Israel. The symposium will cover amateur satellite communication, SSTV, international contest, v.h.f. f.m., third party traffic, and other topics. Featured will be a tour of the new telecommunications satellite station at Emek Haela, near Jerusalem.

El Al Israel Airlines, in cooperation with Eastours Inc., a New York tour operator, have scheduled 17 different group departures from New York, ranging from two weeks to two months, some with stopovers in Europe. Those interested in attending the symposium should contact the organizing committee care of Eastours Inc., 1140 Avenue of the Americas, New York, New York 10036.

Davenport, Iowa

The Davenport RAC will sponsor its 2nd annual Hamfest on Sunday, Feb. 25 in the Danceland Ballroom at 4th & Scott Street in Davenport, Iowa. Plenty of Free Parking, and coffee & doughnuts at 9:00 to 9:30 A.M. Talk-in on 146.94 & 3.975 mHz. Advance registration $1.50; $2.00 at the door. For info write, Ken Caldwell, 1412 14th St., Davenport, Iowa 52804.

Wheaton, Illinois

The Wheaton Community Radio Amateurs will hold their 11th annual Midwinter Swap and Shop on Sunday, Feb 11 at the DuPage County Fairgrounds, Wheaton, Illinois from 8:00 A.M. to 5:00 P.M. $2.00 at the door/$1.50 in advance. Refreshments and unlimited parking. Bring your own tables. Free coffee and donuts 9:00-9:30

[*Continued on page 94*]

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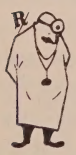
The No. 10031 Dial is a rugged turns counter dial designed for direct crank-handle drive of multi-turn devices such as vacuum variable capacitors, rotary inductors, multi-turn potentiometers, permeability tuned inductors, etc. It has a 0-99 turn digital readout plus a 0-100 vernier scale. The output coupling is a hub for 1/4" diameter shafts. The design includes a built-in dial lock.



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Q AND A

BY CHARLES J. SCHAUERS, W6QLV



ONE of the greatest h.f. transceivers to make the transceiver scene during the earliest period when they become popular, was the Collins KWM-1, and many are still in use. Later, the KWM-2 made its dramatic appearance and it is still going strong.

When Collins' general coverage transceiver the KWM-2A made its debut, it was received with a great deal of enthusiasm.

About the only reason many amateurs did not acquire KWM's was the price tag—but as the used prices began to lower, many amateurs snapped up these sets. There has never been much argument with Collins quality and service.

I have used many different transceivers and I learned to troubleshoot them. The task was made very easy, in many cases, by manufacturers who supplied service information —especially on peculiar problems.

The point of the lead-off this month is that amateurs cannot expect manufacturers to up-date their old equipment with modifications—but many do. It's good business to make modification data available when the modification effort is worth the expense and the work, and I urge all manufacturers to send Q&A such data.

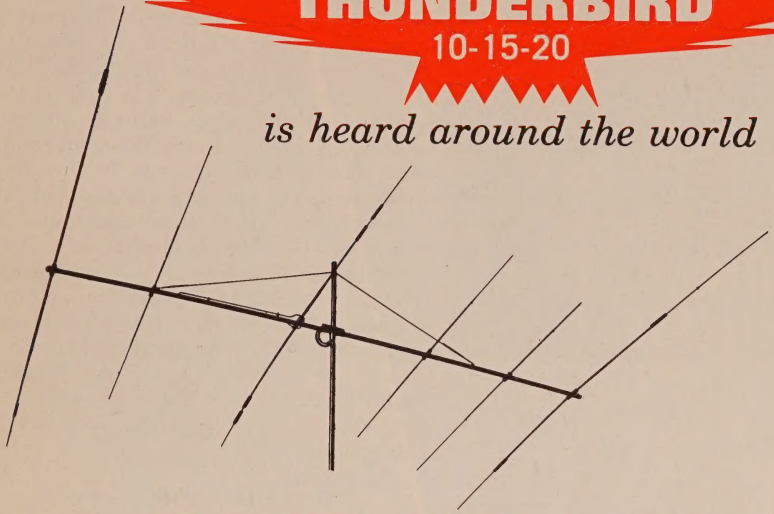
Some modifications are easy and some difficult. All amateurs know that there is no such thing as trouble-free equipment. So when the manufacturer takes time out to prepare service and modification instructions he is helping his customers!

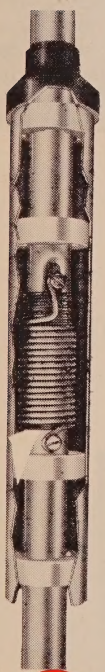
To understand what I mean, read the first question.

Q & A is a free technical assistance program offered by **CQ** to its readers. We ask your cooperation to enable us to assist as many amateurs each month as possible. Always include a self-addressed stamped envelope with your question. Only one question per letter, please. Before writing to ask where a published article appeared, try to find it yourself by consulting the annual indexes of the various amateur magazines. Mail questions to: **CQ** Q & A, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

HY-GAIN'S THUNDERBIRD 10-15-20

is heard around the world





Here's why Thunderbirds outperform all other tri-banders:

* **Thunderbird's "Hy-Q" traps** provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. **And** you can tune the antenna, using charts supplied in the manual, to **substantially** outperform any other antennas made.
* **Thunderbird's superior construction** includes a new, cast aluminum, tilt-head universal boom-to-mast bracket that accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning and provides mast feed-thru for beam stacking.

  Taper swaged, slotted tubing on all elements allows easy adjustment and readjustment. Taper swaged to permit larger diameter tubing where it counts! And less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping metal screws.
* **Thunderbird's exclusive Beta Match** achieves balanced input, optimum matching on all 3 bands and provides DC ground to eliminate precipitation static.

* 25 db front-to-back ratio.
* SWR less than 1.5 to 1 on all bands.
* 24-foot boom...none longer in the industry.
* Extra heavy gauge, machine formed, element to boom brackets, with plastic sleeves used only for insulation. Bracket design allows full mechanical support.
* Interlaced, optimum spaced elements for higher gain and better pattern control.
* 3 active elements on 20 and 15 meters. 4 active elements on 10 meters.

New 6-Element Super Thunderbird
Model 389
Suggested retail price, **$179.95**

Improved 3-Element Thunderbird
Model 388
Suggested retail price, **$144.95**

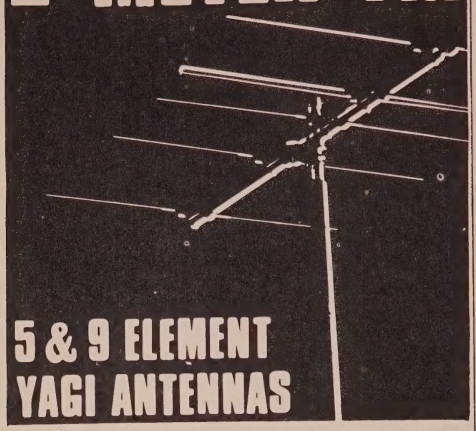
Fabulous 3-Element Thunderbird, Jr.
Model 221
Suggested retail price, **$99.95**

Popular 2-Element Thunderbird
Model 390
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Hi Hobby Industry

Write or call AL McMILLAN—WØJJK for service MASTER-CHARGE & BANK-AMERICARD credit Tues.-Sat.: Noon/5PM (712) 323-0142 telephone, BOX 864 (1530 Ave. "G") Council Bluffs, IA.—51501.

2 METER FM



5 & 9 ELEMENT YAGI ANTENNAS

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

9 ELEMENT YAGI
GAIN: 16 db.
Model: MY-144-9

Matching system incorporates a 200 Ohm folded dipole with a 4 to 1 coaxial balun. Element length is adjustable for critical tuning.

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Model: DI-2

DIPLOMAT SPECIAL
Model: DI-2A

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

Mosley Electronics Inc.
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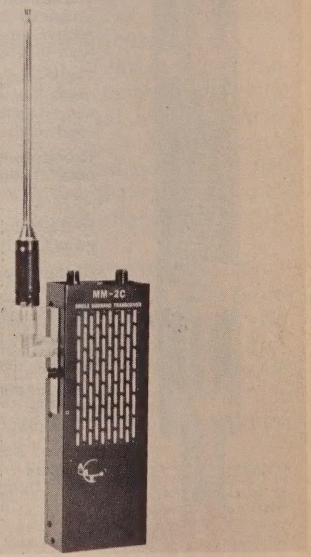
Hand Held SSB Transceiver

"Most hand held transceivers are either for 2 meters or CB use. I'm looking for an s.s.b. hand held model that covers the 40 and 75 meter phone bands. Output should be a few watts. Being a mobile-home owner the set would be used for mobile and portable operation as I travel around. Incidentally, I already use 144 mHz and like it. Any ideas?"

You stated no reasons why you prefer a 40-75 meter transceiver. Perhaps you do not want to go through a repeater or maybe you want some distance coverage. In any event I recommend that you look into the American States model MM-2C hand held transceiver that covers 40 and 75 meters—is s.s.b.—is crystal controlled and can be used with an external antenna. I have heard the results of the set and was amazed. It is all solid-state, small and has low power drain. Nominal output is 4 to 6 watts p.e.p. Write American States Electronics Co. 1074 Wentworth St., Mt. View, Calif. 94040 for more detailed information and pricing.

Drake TR-4 With Linears

"I bought a used Drake TR-4 transceiver and it works fine but now I want to add a linear for more output. Do you suggest a grounded grid or grid driven type linear? With the g.g. I know I need no attenuator between transceiver and linear but with the



The American States MM2C hand held s.s.b. transceiver with a frequency coverage of 1.6 to 10 mHz.



SSB-ers:

increase talk power, cut "splatter"



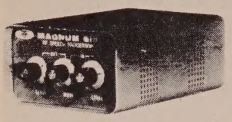
Our *444 base station microphone* not only gives you increased talk power, but cuts "splatter" (and QRM complaints) to an absolute minimum! It has superbly tailored response, with sharp cutoffs below 300 and above 3,000 Hz and a rising response characteristic for maximum intelligibility. The 444's rugged, reliable Controlled Magnetic element has been proved in safety communications, and other tough professional communications applications. It delivers a clean signal to the transmitter at levels as high as crystal units! (And, unlike crystal and ceramic units, the element is totally immune to the effects of temperature and humidity.) The 444 also features an adjustable height stand that makes for comfortable "ragchewing" sessions, an optional-locking bar for push-to-talk or VOX operation, and a practically indestructible Armo-Dur® case. Write:

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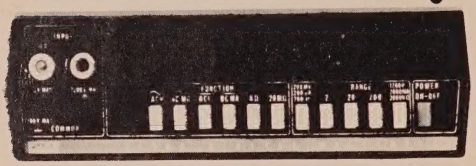


Collins–Heath.....$139.95
Drake T4X/T4XB.$154.95
Drake TR3/TR4....$159.95
Yaesu $139.95
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Get all the details from your nearest Fluke sales office. Dial toll-free 800-426-0361 for address of office nearest you.

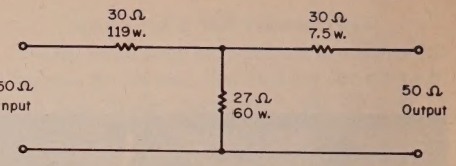


Fig. 1—Attenuator for linears requiring 12 watts of drive.

high impedance grounded cathode deal I do. What do you say?"

Personally, I'm a g.g. man. It's nice to know that the output of your exciter is being added to the output of your final.

Drake suggest two schemes. See figs. 1 and 2. Input and output impedance are 50 ohms. All resistances must be non-inductive. Series parallel combinations of 2 watt carbon resistors can be used to give the resistances and power ratings required. Be careful to adjust the exciter for no flat-topping at the final.

Collins KWM-2 to KWM2-A

"Any instruction relative to converting a KWM-2 to a '2A?"

Yes, thanks to the manager of Central Distribution Center of Collins Radio, Cedar Rapids, Iowa 52406, info is available.

Many sets have already been converted and work well.

To make a general coverage transceiver out of the KWM-2 consult Bulletin No. 9 by obtaining one from the address given above.

This modification is not for the newcomer to do. It must be done at one of Collins' Service Stations, at the factory or by a *competent* technician.

The conversions modification provides crystal positions for 14 additional 200 kHz frequency bands. It takes about two hours to install The modification kit number is 744H-1. The price is not currently available.

To make it simple, write the Collins service agency nearest you or the factory and query for price and shipping instructions. I think the modification is great.

[*Continued on page 92*]

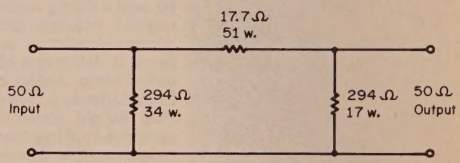
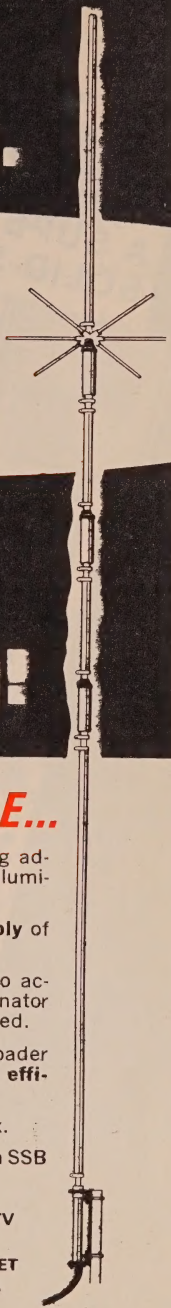


Fig. 2—Attenuator for linears requiring 100 watts of drive.

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- Solid one inch **fiberglass trap forms** for optimum electrical and mechanical stability.
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- Guaranteed to be **easiest assembly** of any multi-band vertical.
- Antenna has ⅜"-24 stud at top to accept RM-75 or RM-75S Hustler resonator for **75 meter operation** when desired.
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A SUPERB NEW SOLID-STATE SSB TRANSCEIVER



KENWOOD'S TS-900

NOW THE PROMISE OF THE TRANSISTOR HAS BEEN FULFILLED. HERE IS THE TRANSCEIVER YOU WILL WANT TO OWN AND CAN AFFORD. FOR YEARS AMATEURS HAVE WAITED FOR THE NEW GENERATION GENERAL PURPOSE SSB TRANSCEIVER. NOW THE WAIT IS OVER. WHATEVER TRANSCEIVER YOU OWN GET READY TO TRADE.

FEATURES: Break-in CW with sidetone provided ★ Built-in 100 KHz and 25 KHz crystal oscillator ★ The receiver incremental tuning control can vary the receive frequency ±2 KHz or more ★ RTTY — Built-in frequency shift circuit for FSK operation. The frequency shift is factory set at 850 Hz ★ Built-in noise blanker designed to reduce impulse type (ignition) noise ★ Built-in VOX circuit with adjustable VOX gain and delay ★ All major electronic circuits are built on modular (plug-in) circuit boards

SPECIFICATIONS: *Frequency range:* 80 meter band — 3.5 to 4.0 MHz; 40 meter band — 7.0 to 7.5 MHz; 20 meter band — 14.0 to 14.5 MHz; 15 meter band — 21.0 to 21.5 MHz; 10 meter band — 28.0 to 28.5 MHz, 28.5 to 29.0 MHz, 29.0 to 29.5 MHz, 29.5 to 30.0 MHz; WWV — 15.0 MHz (receive only) ★ *MODE:* SSB, CW, or FSK ★ *POWER OUTPUT:* 150 watts nominal into 50 ohms for SSB, 125 watts nominal into 50 ohms for CW, 50 watts nominal into 50 ohms for FSK ★ *RF INPUT IMPEDANCE:* 50 ohms ★ *FREQUENCY STABILITY:* Within 100 Hz during any 15 minute period after warmup ★ *CARRIER SUPPRESSION:* Carrier better than 45 db down from output signal ★ *SIDEBAND SUPPRESSION:* Unwanted sideband better than 40 db down from the output signal ★ *HARMONIC RADIATION:* Better than 40 db down from output signal + noise/noise ratio ★ *RECEIVER SENSITIVITY:* 0.5 microvolts for a 10 db signal + noise/noise ratio ★ *RECEIVER SELECTIVITY:* SSB and FSK — 2.2 KHz bandwidth (6 db down), 4.4 KHz bandwidth (60 db down). CW — 0.5 KHz bandwidth (6 db down), 1.5 KHz bandwidth (60 db down) (with optional CW filter installed) ★ *TUBE & SEMICONDUCTOR COMPLEMENT:* 3 tubes (6LQ6 x 2 and 6GK6), 3 IC's, 16 FET's, 57 transistors, 70 diodes ★ SIZE: 12.6″W x 5.5″H x 12.6″D

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PRICES: TS-900 . . . $745.00, PS-900 (AC supply) . . . $195.00 supply) . . . $130.00, VFO (External VFO) . . . $110.00, DS-900 (DC

Also, Kenwood's TS-511S five band SSB & CW transceiver . . . a superb value at $415.00. If you want separate units, Kenwood's R-599 solid state receiver at $349.00 and the T-599 transmitter at $395.00 are the best.

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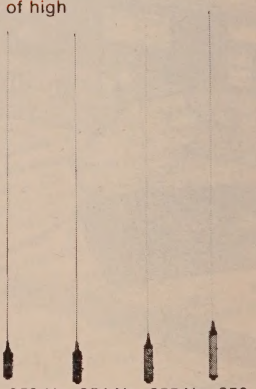
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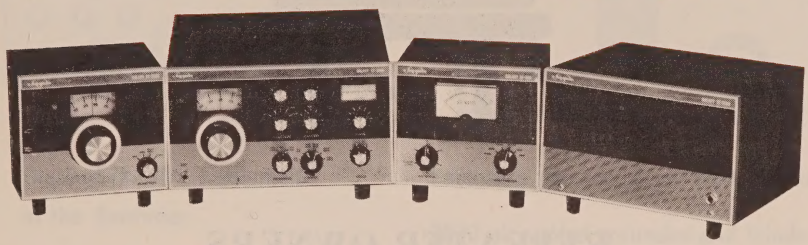
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Harmonic and Spurious Radiation – Carrier suppression in excess of 45 db down, unwanted side bands minus 55 db oscillator feed through and mixer spurious products down 50 db. Second harmonic minus 40 db and third order distortion in excess of minus 45 db.

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Receiver Spurious Response – Image rejection better than 40 db down. Internal spurious below 1 uv equivalent input.

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Automatic Volume Control – Fast attack, slow release on all receiver modes.

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RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

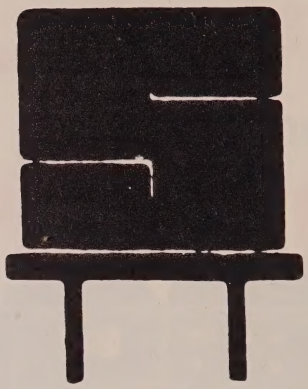
SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95

G-1000 12V D C Mobile power supply with cables. Order No. 802 Ham Net $129.95

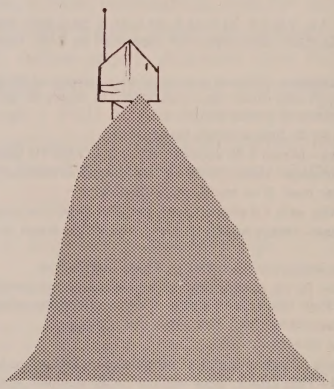
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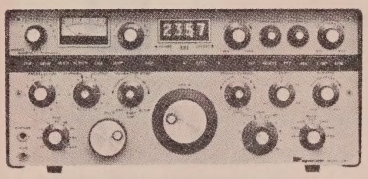


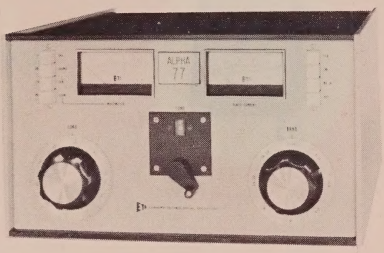
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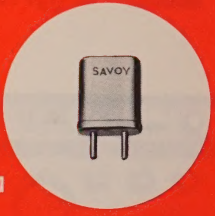
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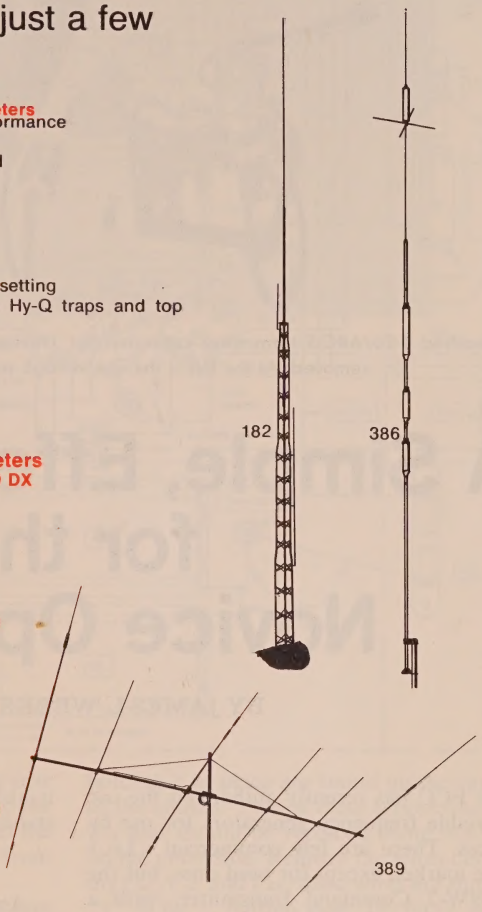
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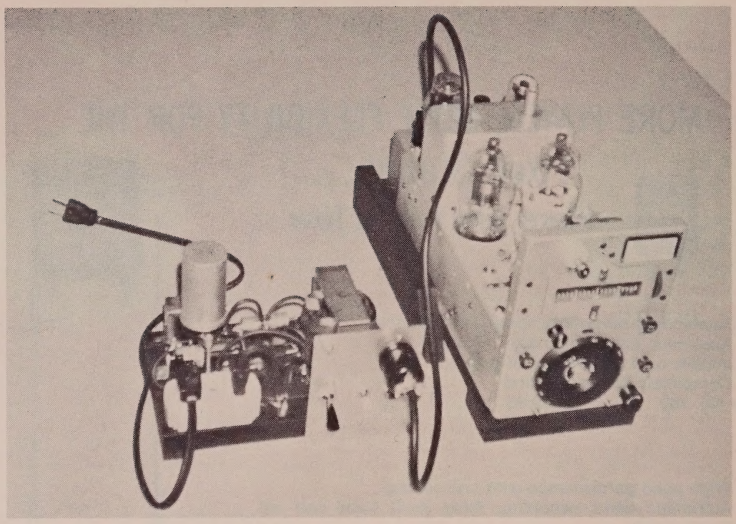


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The modified T-20/ARC-5 transmitter converted for Novice-band v.f.o. use is shown with its shield cover removed. At the left is the low voltage power supply for the unit.

A Simple, Effective VFO for the Novice Operator

BY JAMES L. WEEKS,* W6FNG

THE FCC has recently authorized the use of variable frequency generators for use by Novices. There are few commercial v.f.o.'s on the market, except for used ones, but the old WW-2 Command transmitter, with a minimum of work and cost, makes an excellent v.f.o. for use on existing crystal controlled Novice transmitters. The set to be modified here is the BC-457 (Army) or the T-20/ARC-5 (Navy). These sets are readily available on the surplus market, and modification is very simple. The transmitters are 2-stage affairs having a variable frequency oscillator and an r.f. amplifier. When you are finished with the modifications outlined here, you will have adequate r.f. output from 3.5 to 4.0 mHz and 7.0 to 7.3 mHz along with usable calibration and a high order of stability.

* P.O. Box 307, Wrightwood, Cal. 92397.

Modifying the Transmitter

Assuming that you have acquired the basic Command Transmitter, let's start to work. Each successive step is numbered as follows:

1. Study carefully figs. 1 and 2. They give both a top side and an underneath pictorial-type schematic of major components and associated wiring. All of the basic information you need is here.

2. Take off the outside cover and remove chassis bottom plate. Save all of the machine screws and their associated lock washers. Referring specifically to fig. 2, top view, remove completely L_{52}, the rotary inductor, and all wiring and hardware associated with

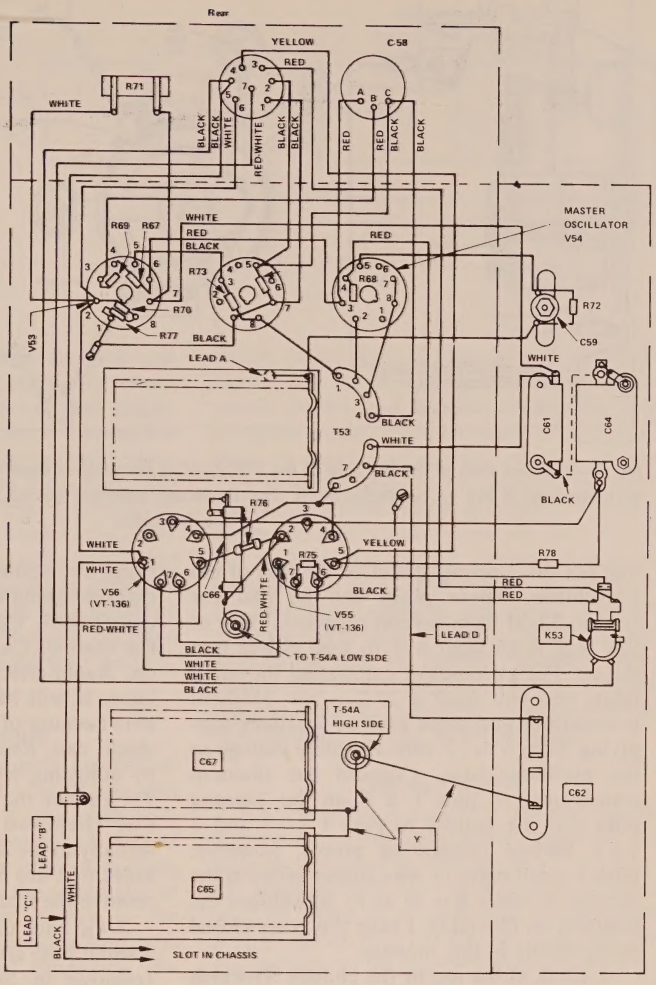


Fig. 1—Pictorial view of the underside of the T-20/ARC-5 transmitter before conversion.

it. Cut away the wire lead shown as "X" which connects L_{52} to T_{54}. Cut lead "B" and lead "C" connected to K_{54} and bend them out of the way, making sure that the exposed ends do not touch the chassis. If you wish, leave K_{54} in place as this keeps some screw holes in the front panel filled. Rotate the small pick-up coil inside of T_{54} so that its turns are at right angles to the turn of T_{54}. On the rear of T_{54}, there is a bracket that connects to the other side of this pick-up coil. Disconnect the wire that goes to ground (the chassis) from this bracket.

3. Before you proceed further, make sure you have a bottle of your wife's (or your mother's) fingernail polish remover and a set of Bristol wrenches; these wrenches are sometimes called Hex-Spline wrenches. The heads of a number of the machine screws which you will have to remove are covered with a red-colored Glyptol varnish which has to be dissolved with the nail polish remover, otherwise you run the risk of stripping the heads of both the machine screws and the Bristol screws.

4. Look underneath the chassis. Completely remove capacitor C_{67}. The five screws holding it in place are found on the top side of the chassis. Two of these screws also hold T_{54} and should be replaced using 6-32 nuts on the underside. Remove the wires connecting C_{65}, C_{67} and C_{62}; these wires are shown as "Y" in fig. 1, bottom view. Do NOT remove lead "D" on C_{62}. C_{65} is left in place, even though it will have no electrical function. It is tied mechanically to the main v.f.o. tuning shaft and gear train, and its removal is a mean chore—just leave it there! Make no other changes in the underneath portion of the chassis at this time.

5. Before going to the next step, you will need to make some arrangement to bring power to the oscillator stage for setting the frequency of the v.f.o. in the 80 meter band. At the time you begin to think about this project, get hold of the 7-prong male plug

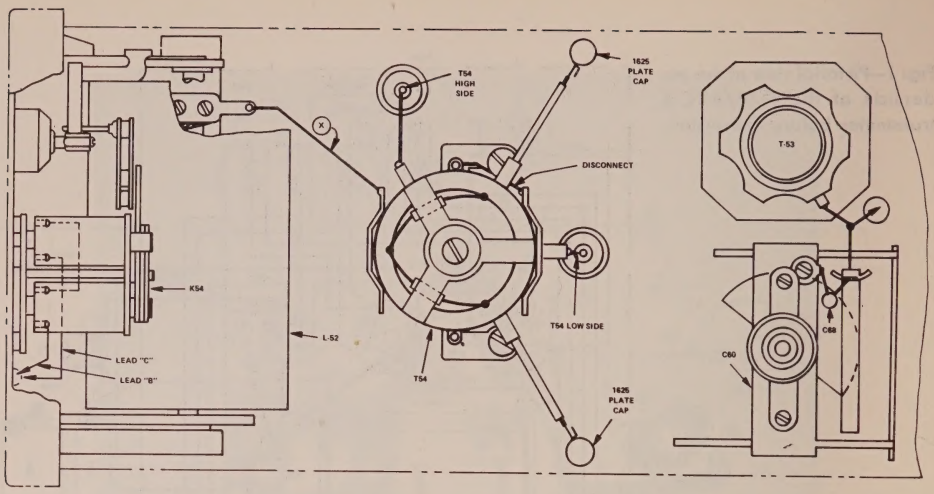


Fig. 2—Pictorial view of the top side of the T-20/ARC-5 transmitter showing the location of major components involved in the v.f.o. modification. The shield can covering the v.f.o. tuned circuit is not shown nor are the tubes.

that fits the 7-prong socket on the rear of the transmitter. These plugs can be had for around $2.00 from several suppliers.[1] Use of this plug is an ideal way to feed power into the set. For purposes of calibrating the oscillator, you will need a 25.2 v. a.c. filament transformer and some kind of a battery supplying from 6 to 12 volts for plate voltage to the oscillator tube. Connect the filament transformer to pins 1 & 6 on the 7-prong plug and the battery to pins 1 (−) and 3 (+). Before connecting power, however, push a small piece of wire solder between the springs of relay K_{53} so as to jam closed the contacts on this relay. Leave this relay closed permanently in this manner.

6. Look at the top of the chassis. Towards the back you will note a large, box-like shield can sitting behind the two r.f. amplifier tubes. Temporarily remove this shield can, which houses the coil T_{53} and capacitor C_{60} both of which are associated with the L/C tuning of the oscillator. Loosen the collar assembly on the shaft of C_{60} and rotate this capacitor (manually) until the plates are fully meshed. Set your receiver, using a crystal calibrator if at all possible, to 3.5 mHz. Set the v.f.o. dial on the front panel, to read 4.0. Connect power to the oscillator per step 5, above. You will be near 3.5 mHz with the oscillator, but look around on each side with your receiver until you find the signal from the oscillator. By moving C_{60}'s rotor plates slightly, you can bring the oscillator to 3.5 mHz with the v.f.o. dial remaining at 4.0. When this has been accomplished, tighten the collar assembly on the shaft of C_{60} and put the shield can back on. Again check the frequency of the oscillator. It will likely have shifted one or two kHz because of the added capacitance of the shield can. Reset the frequency to 3.5 mHz by adjusting with a screwdriver the slug on T_{53} and/or the trimmer capacitor on top of C_{60}. These two adjustments can be made externally to the shield can by two access screwholes that are on top of the shield can. Now remove the filament and plate power.

7. Go back under the chassis. You will note a small hole adjacent to the tuning shaft C_{67} (remove in Step 4, above) Enlarge this hole to accommodate a variable capacitor of at least 340 pf capacitance. In our set we used a Hammarlund MC-340. Connect the stator to the feed-thru connector shown as T_{54A}, High Side, fig. 1. Use a small length of heavy wire for this connection and solder both ends.

8. No further work is required on the underside of the chassis. Put a suitable knob on the shaft of the capacitor you installed in Step 7, and re-install the bottom plate. This new capacitor will tune the final r.f. amplifier to 80 meters with its plates almost full-meshed; under this arrangement, the r.f. amplifier is operating "straight-thru." On 40 meters, the r.f. amplifier operates as a doubler-amplifier, and this capacitor will resonate with the plates about ¾ the way out.

[1]At the end of this article is a list of surplus suppliers who carry Command Sets and accessories.

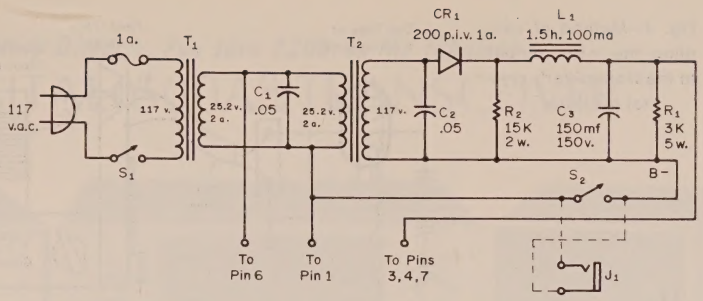


Fig. 3—Schematic of a simple power supply suitable for use with the converted ARC-5 transmitter as a Novice v.f.o. The v.f.o. may be keyed through J_1 as described in the text. T_1 and T_2 are 25.2 v. 2 a. filament transformers connected back to back as shown.

9. Go back to T_{54}, which is the tank coil for the final r.f. amplifier. About ⅓ down from the top of the coil solder a small pigtail of wire which will serve as a connection point. Nearby, mount a fixer ceramic capacitor of .001 to .002 mf rated for at least 200 v.d.c. Connect one end of this capacitor to the pigtail of wire from T_{54}; connect the other end to the feed-thru insulator at the top of the front panel (see fig. 4). The purpose of this fixed capacitor is to block the d.c. potential (around 70 v.d.c.) running through T_{54} from the feed-through insulator into your existing transmitter's grid circuit.

The Power Supply

You will need a power supply capable of delivering 60 to 70 volts d.c. at 25 ma and 25.2 volts a.c. at 1 ampere. At this plate voltage, the v.f.o. will provide around ¾ watt of r.f. drive to the crystal stage of your existing transmitter. Figure 3 shows the schematic of the supply used here (also shown in the photo). Breadboard-type construction was used both for low cost and simplicity. Because there is exposed wiring, which is a potential shock hazard, this writer made a cardboard, box-like cover so that only the front panel, with switches, jack, etc., was exposed. The only aspect of this power supply which might be considered a little out of the ordinary is R_2, which reduces the output from the half-wave rectifier to around 65 volts to the transmitter under load—more plate voltage is unnecessary and undesirable for reasons outlined at the end of this article under Caution. Regulation is around 15%; however, there are no chirps or instability in the transmitted signal, even when the v.f.o. is keyed at high speed.

Coupling to the Transmitter

This v.f.o. is designed to couple into the crystal socket of a crystal controlled transmitter. Some sort of plug will be required. This writer made a plug from a discarded crystal holder and ran two leads (one lead being the shield) from the pins of the holder-plug. In most transmitters, one pin of the crystal socket goes to the grid of the tube; whereas the other pin is grounded. Figure 4 shows the method of connecting the v.f.o. to the existing transmitter. NOTE—it may be necessary to move the tap up or down on T_{54} to provide more or less drive. A simple procedure is to plug in a crystal and tune your transmitter for its normal readings. Then connect the v.f.o. and move the tap down the coil (T_{54}) as far as possible from the top and still maintain normal meter readings.

Tuning the VFO

The oscillator is tuned by the dial on the front panel. This establishes whatever frequency you want to operate on. The v.f.o.'s r.f. amplifier will have to be tuned to resonance on either 80 or 40 meters as outlined in Step 8, above. Plug a 0-100 ma meter into the keying jack on the power supply and tune for greatest dip. Remember, this meter will read both oscillator and amplifier plate currents, but a good dip is present on 80 and a broader, less pronounced dip is present on 40. Within a given Novice band, it usually is not necessary to retune the v.f.o.'s r.f. amplifier when QSY'ing.

Keying

If there is no immediate requirement for break-in operation, the simplest procedure is to turn the v.f.o. on and off by use of toggle switch S_2 on the power supply. Under this arrangement, the v.f.o. runs continuously during transmission, and the transmitter is keyed as before. With the key up, the oscillator (or v.f.o.) feed-thru is barely audible locally and can not be heard 25 miles away.

If you wish to work full break-in, you will

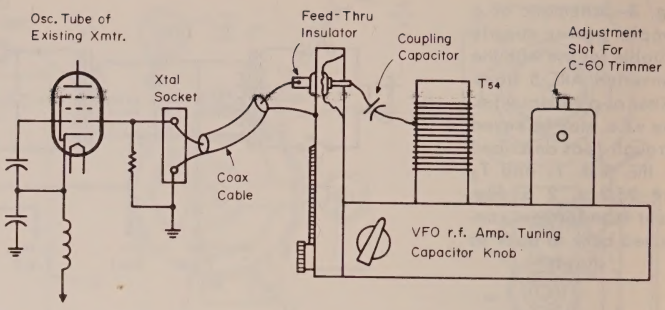


Fig. 4—Method of coupling the v.f.o. output to the transmitter's crystal oscillator.

need a s.p.s.t. relay and a suitable dry-cell battery. These relays sell for around 2 to 3 dollars. Figure 5 shows the necessary circuitry. Be sure to observe correct battery polarity. The diode is required to break the d.c. path for the v.f.o.'s keying circuit back through the battery and the coil of K_1.

Final Caution

After all adjustments have been made, put the outside cover back on the v.f.o. unit. The cover is a good r.f. shield and protects people from getting their fingers burned. Before putting the v.f.o. in operation, have a neighborhood ham listen for you with the new v.f.o. connected. Check for any spurious signals either close to your operating frequency, harmonic frequencies and all over the band. For example, overdriving the crystal stage can cause extraneous signals or harmonics to suddenly develop. Tune up on 80 meters. Do you have a noticeable harmonic on 40 meters? Remember—2 times 3700 to 3750 = 7400 to 7500. Do the same on 40 and then check on 20. Bear in mind, the oscillator of this v.f.o. remains on 80 meters. Half of 7100 to 7150 = 3550 to 3575. Finally, try 21 mHz remembering that ⅓ of 21100 to 21200 = 7033.33 to 7066.66, etc. In our unit we made extensive tests in this connection and had no unwanted signal problems, but your local circumstances may be different. If you do have any difficulties, try the following:

1. Keeping the v.f.o. plate voltage down to around 60 to 70 volts. This is the reason for R_2, fig. 3.

2. Line the vent holes of the v.f.o.'s outside cover with aluminum screen.

3. Keep the r.f. excitation from the v.f.o.'s output to your transmitter as low as possible. Keep the drive to the crystal oscillator at the absolute minimum. Use a shielded connecting lead between the two units as shown in fig. 4. Make sure that your transmitter and v.f.o. cases are connected to a good ground. You might want to replace the feed-thru insulator here with a regular coax-type coupling.

The photo shows the unit and power supply we used here. The outside cover has been removed to give a better view of things. The set was mounted on a home-brew base. On the back of this base is fastened a small aluminum box with a 7-prong male plug mounted on the side of this box. Such a box with plug provides an excellent junction point for the connecting cables, etc.

Command Sets and accessory items are advertised regularly by Fair Radio Sales, Lima, Ohio and G&G Radio Electronics, New York City, N.Y. Columbia Electronic Sales, North Hollywood, Ca. has also advertised these units from time to time. Used units run around $8.00; new ones $12.00. Depending on the condition of your junk box, the power supply will run from $5.00 to $15.00. Good luck! ■

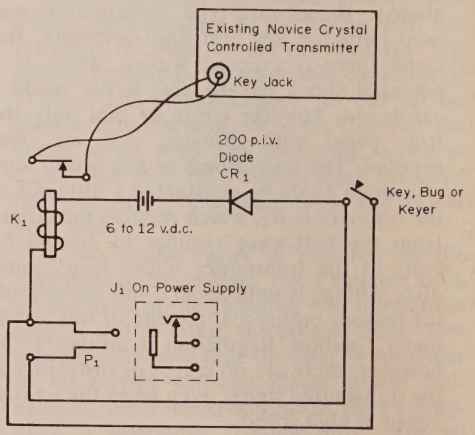
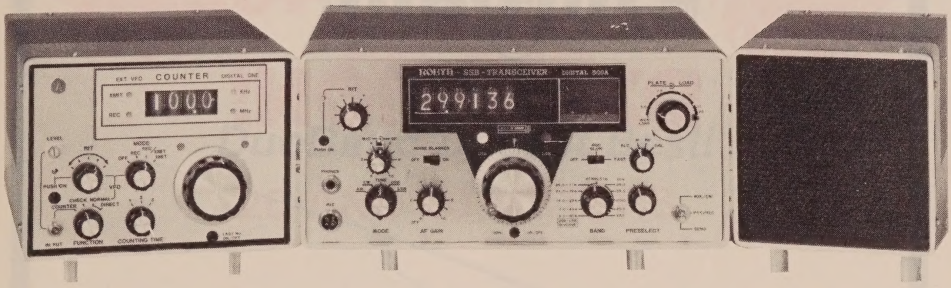


Fig. 5—Keying arrangement for full break-in operation of a Novice rig when used with the ARC-5 v.f.o. K_1 is a normally open s.p.s.t. 6 or 12 v. d.c. relay.

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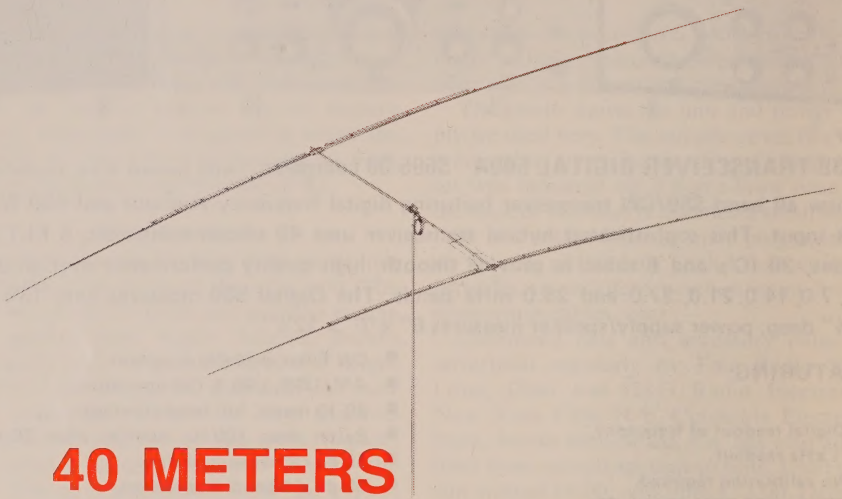
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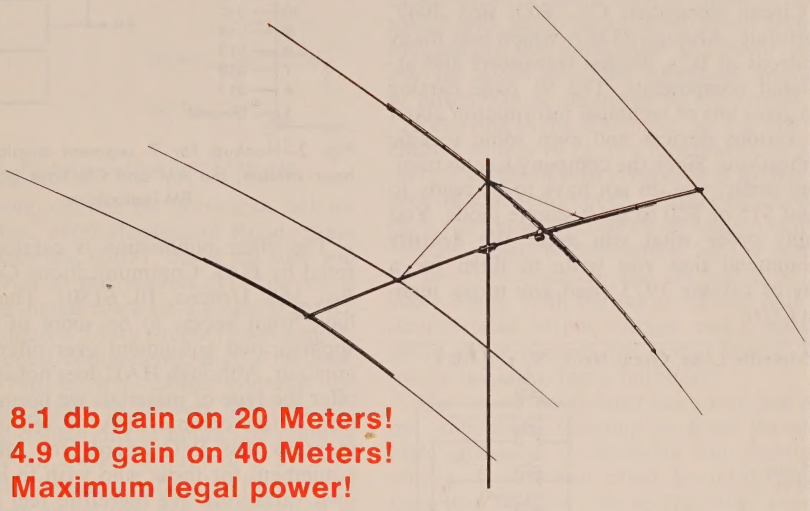
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MATH'S NOTES

BY IRWIN MATH,* WA2NDM

THERE are a couple of new catalogs we have recently received that should be of interest to the solid-state experimenter. One of these is the very professional publication of Circuit Specialists Co., P.O. Box 3047, Scottsdale, Arizona 85257, which lists many hundreds of IC's, diodes, transistors and associated components. The 91 page catalog also gives lots of technical information about the various devices and even some specific applications. Since the company has no minimum order, you do not have to be ready to spend $15 or $20 to get a simple diode. You simply order what you need. We heartily recommend that you write to them for a copy of catalog 1973 (and you might mention *CQ!*).

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

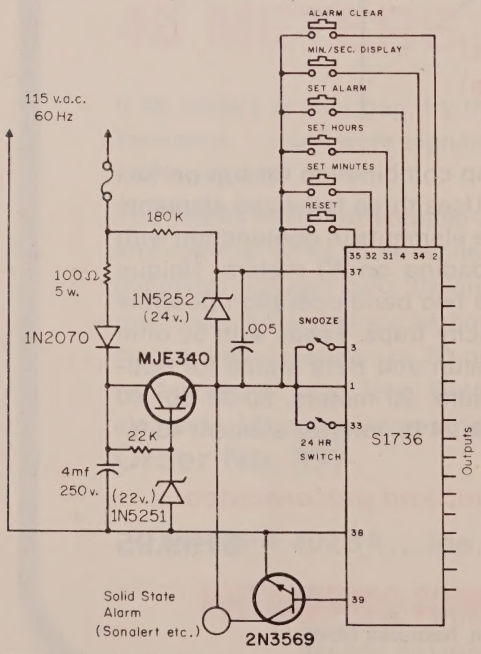


Fig. 1—General purpose digital clock discussed in the text.

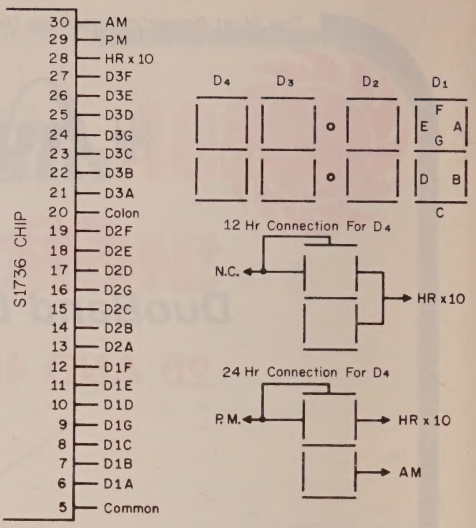


Fig. 2—Hookup for 7 segment display. For 12 hour version, the AM and PM lines go to AM or PM indicators.

The other publication is catalog 872 offered by HAL Communications Corp., P.O. Box 365, Urbana, Ill. 61801. These people have what seems to be some of the most sophisticated equipment ever offered to the amateur. Although HAL does not specifically offer the type of materials we normally mention in this column, they do sell instruction manuals and P/C boards for all of their equipment for those who wish to build their own variations. We therefore feel that some of our readers will be interested in what they have to offer.

The item most interesting to us is HAL's RVD-1002 RTTY Visual Display System. This item is for all practical purposes, a solid-state, no moving parts, receiving teletype machine. Signals are accepted from a typical terminal unit and the entire RTTY message is then displayed on a video monitor or standard TV set. There is no ink, paper or noise in the entire system. Although the RVD-1002 is more expensive than a reconditioned mechanical machine, operating costs are nil and it may be just the ticket for some. A complete manual for the system is available ($10) for those who just want to look.

Other items of interest from HAL are solid-state RTTY keyboards, automatic repeater identifiers, and a fast scan/slow scan TV camera converter.

We have just received detailed information about a new 40 pin modified DIP integrated

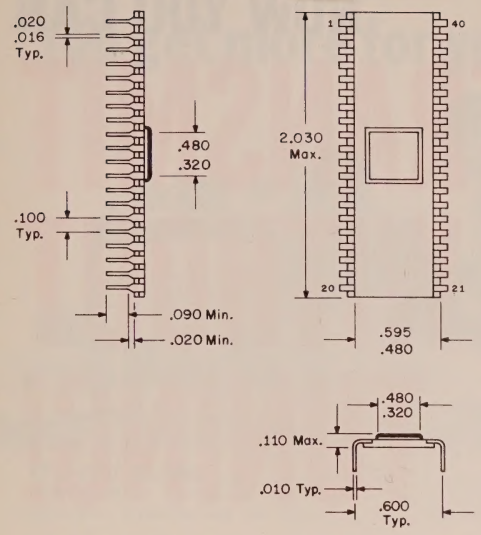


Fig. 3—Package outline for S1736 chip.

circuit being offered by American Micro-Systems, Inc. 3800 Homestead Road, Santa Clara, California, 95051, that I am sure will be of interest to our readers. This device is a complete digital clock on a single chip. All that is required is a very simple power supply, a few external components, and a readout.

The S1736, as it is called, contains the circuitry necessary to convert 60 cycle a.c. power line oscillations to hours and minutes with either an AM-PM display or a 24 hour display. Also included in the chip is provision for an alarm signal that can be produced at any pre-determined time, a power failure inductor that will signify an interruption in timing accuracy and even a "snooze" alarm which provides a repetitive output approximately every 5 minutes when activated. The clock and/or alarm is set by applying a voltage to the appropriate input. When this is done, the digits being set will advance at a rate of one per second until the desired time is reached. At that time, merely releasing the button will "lock" the setting.

The S1736 was designed specifically to drive a four digit seven segment readout of the new low power liquid crystal type, but will also interface nicely with the G.E. Y1938 readouts. American Micro Systems also offers such a liquid crystal readout, their AMI23500/23550.

Cost of both of these devices is rather high in small quantities but do not be discouraged. Clubs or groups (or possibly some of the more enterprising semiconductor dealers) can consolidate orders to take advantage of the quantity discounts available. The S1736 clock chip (shown in fig. 3) is presently $36.50 for 1-24, $22.00 for 25-99 and $14.00 for 100 and up. The companion readout (don't forget the G.E. tubes), the AMI 23500/23550 is $58.50 for 1-24, $18.00 for 25-99, and only $11.93 for 100 and up.

In conclusion this month, I would like to pass on a technique that will be of interest to our many a.m. solid-state experimenters.

A very simple modulator, but one that is quite effective, is shown in fig. 4. It is essentially a standard transistor regulator with one exception. The normal error signal is modulated with audio. Since most power transistors used in this application will easily work into the audio spectrum, significant amounts of power can be produced by the circuit.

Referring to the schematic, we see that the emitter voltage of Q_1 is a function of its base voltage which in turn is controlled by the degree of conduction of Q_2. This conduction of Q_2 is further controlled by its base-to-emitter voltage which is determined by the setting of the potentiometer and the value of the audio input. With the pot set at one half the desired peak output voltage, and a suitable audio signal present, the output voltage will follow the audio input faithfully

This type of modulator has a very low output impedance resulting in good linearity, high gain, and a reasonably well stabilized output. It can also often be implemented from the normal voltage regulator present within the equipment. In addition, although we have not actually tried it, this same scheme should work nicely with many of the voltage regulator chips now being introduced.

73, Irv, WA2NDM

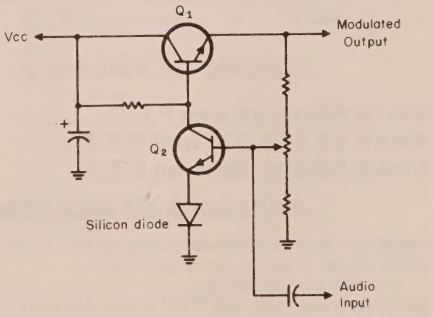
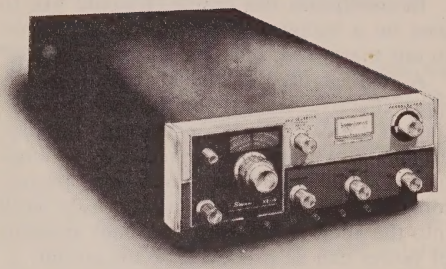


Fig. 4—The series regulator/modulator discussed in the text. A silicon diode is used instead of a Zener in this application to allow a greater output swing.

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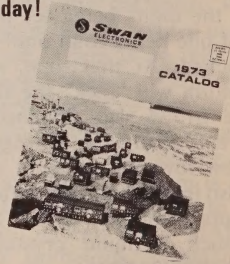
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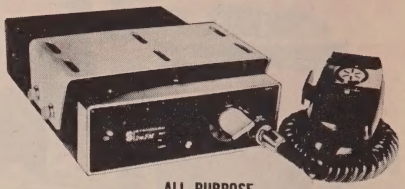
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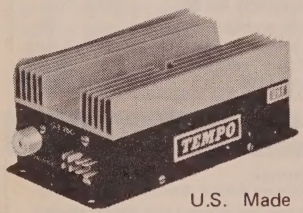
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F. M.

BY GLEN E. ZOOK,* K9STH/5

CAN it be that we're now into the beginning of the third year of the F.M. Column in *CQ*? It doesn't seem that it has been quite so long. Then, on the other hand, when one looks at all that has happened in those two years, it is easy to see how time has flown. In early 1971 there were only a relative few ready-to-go f.m. rigs on the market. Today, there are dozens of rigs by dozens of manufacturers, distributors, and importers. Two years ago one had to build a repeater from scratch using older commercial equipment. Today there are at least two ready to go repeaters, and more are on the way. Two years ago we had no definite rules pertaining to repeaters. Today we have the report and order on 18803. And so it goes. Things are a bit easier for the amateur who wants to get into f.m. The need for converting commercial equipment is not so prevalent as during the early days of f.m. For those amateurs who want to build, numerous circuits have appeared in the amateur magazines and publications about f.m. Even several kit manufacturers have cropped up with f.m. transmitters and receivers. Antennae, once almost non-existant from amateur sources are plentiful, with several previously commercial manufacturers pushing the amateur market. This goes on and on and on.

Those f.m.'ers who have been involved with repeaters and the like for a number of years are beginning to become dis-enchanted with two meters. Why? The challenges are no longer there. With the rise in ready-to-go gear, the need for the experimenter is rapidly diminishing. But, this is only true on two meters. There is still plenty of room and a need for experimentation on 220 mHz, 1296 mHz, and even down on 50 mHz. Sure, 18803 put a bit of restriction on power output (e.r.p.), but above 450 mHz there is still only the 1 kw input rule that we have had to live with for many years. Six meters has been all but deserted for many years. The activity in the low 500 kHz is just not enough to justify the 4 mHz bandwidth. So, we need to get going on six if we want to keep it. The same goes for 220 and 1296. If we don't get going on those frequencies, we can consider our days numbered.

Lets not sit back and bemoan the "Japtracs" and the other ready to go gear for 2 meters. There is still much to be done, and f.m.'ers are the ones to do it.

Five-Two

146.520 mHz is rapidly becoming the "in" direct or simplex frequency on two meters. As the shift from 146.940 mHz simplex in some areas becomes greater, that frequency will be available for repeater operations in the 146.760 mHz areas. Along with this rising interest in simplex activity there have been some interest expressed in formulating a loose organization of 2 meter simplex operators. Such an idea was recently expressed to this columnist by Bill, WA5YIJ, of Oklahoma City, Oklahoma. Anyone interested in the Southwest or Midwest should contact Bill for possible plans along these lines.

Two Meter Band Plans

As most f.m. operators already know, there are presently two major two meter band plans under consideration. The first or "Texas" plan utilizes the 600 kHz input/output spacing and low in/high out throughout the entire 2 mHz allotted to repeaters. See May 1972 *QST* for large quantity of details. The second plan, called the "California" plan is the same as the "Texas" plan except that it calls for high in/low out in the 147-148 mHz range. Both plans have some merit in terms of intermod, equipment frequency spread, and the like. However, the real problems arise in the intermod products generated within the amateur bands due to a high concentration of amateur repeaters. The only practical method of determining the possible products is through the use of a computer. Such a program has been undertaken, and preliminary results seem to favor the "Texas" plan in terms of the total intermod picture (146-148 mHz). However, until this information has undergone several more refinements, the final picture will not be accurately known. Therefore, it is suggested that finalization of 2 meter band plans wait until the final results of these computer programs are known.

* 410 Lawndale Drive, Richardson, Texas 75080

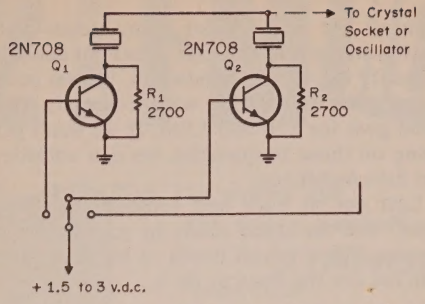


Fig. 1—A crystal switching circuit for oscillators using grounded crystals. A 2N708 or similar high speed switching transistor can be used for Q_1 through Q_n. R_1 through R_n are 2700 ohms, ½ watt.

Technical Talk

The eight frequency deck in the September, 1972, column has generated more interest than any other single item in this column. One item of interest is the source of the variable capacitors. I have seen them advertised in the DX Edition of the *Callbook* (!!) by Barry Electronics. Next, some amateurs with X53GJV units built for the FBI and other agencies may have some problems in that the TU402-C4 uses the ASLX-1 crystal in a circuit the same as that which uses the type RS-1 crystals. Those crystals will not pull onto the correct frequency when operated in a circuit designed for the RO3 crystal. Other than that the decks seem to be working quite well.

For construction projects this month we go to a couple of local club bulletins. The first project is a transistorized multiple crystal switching scheme from the October, 1972, issue of the *Newsletter* of the U.K. FM Group (London), and the second is a NiCad charger from the June, 1971, issue of *Grid Leak* published by Pueblo Ham Club, Inc. (Colorado).

The crystal switching scheme is similar to the familiar diode scheme, but is more positive without the problems encountered with leaky diodes (output on more than one frequency). The desired frequency is selected by applying a 1.5 to 3 volts d.c. at the point indicated. A 2N708 is shown, but almost any high speed switching transistor can be used.

The second project is a NiCad battery charger lifted from the pages of the June, 1971, issue of *Grid Leak* and the original article is a bit too long to reproduce herein, but was an excellent one on the subject of NiCad batteries and how to charge them. Basically, the following criteria were set forth as how to and not to charge NiCad's:

1. Charging is most efficient at a battery temperature of between 40° and 80° F, never to exceed 100° F.

2. Two or more batteries having the same rated voltage regardless of capacity may be charged in parallel on a constant voltage charger, if the charger has the proper current capabilities.

3. Do not connect two or more batteries in series when using the constant amperage method unless the batteries are of the same type and capacity and in the same state of discharge.

4. The charging voltage must be 10% above the rated voltage of the battery.

5. The charging current must never exceed 25% of the rated ampere-hour rating of the battery. 10% is a slower charging rate, but a safer figure. Less than 10% will take too long to charge the battery.

6. The charge efficiency is the ratio of the ampere-hour available on discharge to the ampere hours returned to the battery during charge. This ratio is always less than 1; therefore, excess charge must always be returned to the battery after discharge to restore rated capacity. A figure of 125% may be used depending upon cell type and condition.

The schematic of the charger for NiCad's appears as figure 2. The transformer is a 24 v.a.c. secondary of about 1 amp capacity. The potentiometer is adjusted to provide the 10% above rated voltage (normal full charged terminal voltage of the battery) while making sure that the charging current stays below the 25% of maximum rating. For example, if the battery was a 10 volt 1 amp hour battery, the voltage should be set to 11 volts, and the charging current kept below 250 ma. In the case of most HT batteries this would be about 16 to 16.5 volts and less than 100 ma.

For Newcomers Only

Continuing with our section aimed specifically at the newcomer to f.m., this February column touches upon receiver sensitivity measurements:

Many amateurs are familiar with the terms used in making receiver sensitivity measurements on the 80-10 meter bands, signal to noise ratio (usually expressed 10 db signal + noise to noise). F.m. has its own types of measurement for receiver sensitivity. The most common is the 20 db quieting method. Therein an audio quieting measurement is made at the receiver audio output when a

signal is applied from a calibrated source. To make this measurement, the audio output (noise) from the receiver is measured with a common rectifier a.c. voltmeter and recorded, for example 1.0 volts. Then an on-frequency signal is applied from a signal generator with a calibrated output attenuator (usually in microvolts) and the output voltage reading reduced to 0.1 or 10% of the original value (20 db reduction) or 0.1 volts in the example. This is the 20 db quieting point. The sensitivity in microvolts can then be read directly from the calibrated attenuator. Most equipment operating in the 10 and 6 meter amateur bands have a specification of 0.35 microvolts or less for 20 db quieting; on 2 meters the figure is 0.5 microvolts; and on the 450 mHz band it is 1.0 or less. Of course specific equipment can have specifications which differ from these.

The second method of measuring f.m. receiver performance is the 12 db EIA (Electronics Industries Association) SINAD. Therein a modulated r.f. source must be used along with a distortion analyzer. The modulating frequency is normally 1000 Hz. The signal input is increased with a resulting increase in output until saturation of the limiters. This is then plotted on a graph for reference. As the signal level increases, the noise and distortion decrease. This decreasing in noise and distortion (with 1000 Hz tone nulled on distortion analyzer) is plotted on the same graph. The point at which the difference between the signal + noise + distortion (tone modulation) differs from the noise + distortion curve by 12 db is the 12 db SINAD point. Granted this is a bit oversimplified, but gives an insight into the 12 db SINAD and why it is not normally measured in the field.

Because the 12 db SINAD is difficult to measure under field conditions with a minimum of equipment, the 20 db quieting measurement has become the standard of f.m. performance in most amateur and commercial circles. However, some manufacturers give only the 12 db SINAD measurement in published specifications. This is often due to the fact that the signal in microvolts required to produce a 12 db SINAD is less than that voltage required to produce a 20 db quieting. The most usual comparison between the two rating systems is at 0.5 microvolts for 20 db quieting is normally the same point as 0.35 microvolts 12 db SINAD. Of course the two measurements are not really the same, and

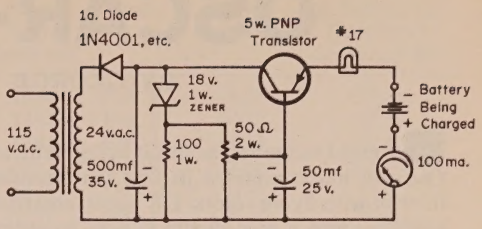


Fig. 2—A NiCad battery charger.

only a rough comparison can be made. However, a receiver with a 0.5 microvolts for 20 db quieting has a better sensitivity than one with 0.5 microvolts for 12 db EIA SINAD. Since the 20 db of quieting method is quite simple to perform in the field, it is a better relative measurement of f.m. receiver performance.

Q & A

Q. How can I keep alternator whine from my transistorized rig?

A. There are at least two possible cures for alternator whine. The first is to connect the f.m. transceiver directly to the battery. The battery acts like a big capacitor and filters out much of the problem. In extreme cases such as some imported automobiles, this lead must be shielded. The second is to put a filter in the line coming to the unit. This normally consists of a filter choke and an electrolytic capacitor. As in normal power supply circuits, such a circuit tends to reduce the ripple produced by the alternator. Such filters are available from distributors of Standard Communications equipment (SR 826 MA, etc.) as a stock item.

Q. Is it best to turn my f.m. rig off when starting the car?

A. Definitely yes. It has been found in certain types of cars that the inductive kick" from the starter solenoid can produce a voltage spike 600 volts or higher, which, in turn, can cause severe damage to transistorized equipment. This also has been a problem with "T Power" (transistorized power supply) tube equipment. Turning off the rig is also necessary if the auto is either started from another battery or if the auto is used to jumper-off another vehicle (its sure cold up North).

Q. One of my neighbors has a scanning receiver and says that I am interfering with the local police and fire frequencies. How-

[*Continued on page 90*]

OSCAR-6 NEWS

BY GEORGE JACOBS,* W3ASK

By mid-December, as this is being written, OSCAR-6 has completed its first two months in orbit with flying colors. DX via an amateur satellite, once a wild dream is now an every day reality . . . well, almost every day. Except for needed rest periods of several days each week, during which its batteries are charged by solar energy, the latest radio amateur communications satellite is functioning well.

Hundreds of radio amateurs in all corners of the world have already piled up thousands of 2-way QSOs through the scatellite's 2 to 10 meter repeater. (Uplink frequency passband is 145.90 to 146.00 mHz; downlink is 29.45 to 29.55 mHz.)

While the level of the 29.45 mHz beacon signal continues to be low when the repeater is in heavy use, the 435.1 mHz beacon transmitter is providing strong telemetry and codestore signals.

At the two-month mark, AMSAT[1] has received reports of communications through the satellite from radio amateurs in almost 40 countries. Among the leading satellite-communicators are DK2ZF of Germany and K7BBO of Tacoma, Washington. DK2ZF reported his 200th satellite QSO on November 27, and included in this total were QSOs with 2 dozen countries in Europe and North America. K7BBO reported his 480th satellite QSO during early December, and he has worked 30 states and 7 foreign countries, including the first reported USA-Japan contact.

New OSCAR Award

ARRL has announced the establishment, beginning with all QSOs made *after December 15, 1972,* of a new award to mark amateur communication achievement via OSCAR-6. It's called the "Satellite DX Achievement Award-1000," and it will be given to each radio amateur accumulating 1000 points for the following satellite contacts:

10 points for each contact with a new station

50 points for each new country

250 points for each new continent

For example, 50 QSOs with different stations in 5 countries on three continents would accumulate the following score:

50 QSOs	$= 50 \times 10 =$	500 points
5 countries	$= 5 \times 50 =$	250 points
3 continents	$= 3 \times 250 =$	750 points
	TOTAL =	1500 points

More than enough for the new 1000 award!

According to ARRL rules, QSLs must confirm 2-way communication via OSCAR-6, contain a date of December 15, 1972 or later, plus usual QSL information. Photocopies of the QSLs are not acceptable. Only one contact per station, regardless of mode. Postage of $1 is required if you wish cards to be returned via registered mail. When you're about ready to apply for the award, request the appropriate form from ARRL Headquarters, 225 Main Street, Newington, Conn. 06111.

OSCAR-6's Latest Operating Schedule and Orbital Data

In order that OSCAR-6 remain operational for as long a period as possible, and hopefully for at least a year, it is necessary to take the repeater out of service for several days each week. This provides the necessary time for the satellite's on board batteries to recharge from the banks of solar cells mounted on OSCAR's outer surfaces.

AMSAT reports the following operational schedule for the late winter and early spring months, assuming no emergency situations develop with the satellite's power supply.

Day (GMT)	*Operational Status of* OSCAR-6
Fridays	ON
Saturdays	ON
Sundays	ON
Mondays through Thursdays	OFF

In terms of EST, the satellite will begin operating at 7 P.M. each *Thursday* and remain in continuous operation until 7 P.M. on *Sundays.*

*Space Communications Editor, *CQ,* 11307 Clara St., Silver Spring, Md. 20902

[1]Radio Amateur Satellite Corp., coordinator for the OSCAR-6 project, P.O. Box 27, Washington, D.C. 20044.

The satellite may be brought into service during periods when it is scheduled to be off in order to conduct certain tests and experiments. When time permits, these special transmission periods will be announced on W1AW Bulletins[2] and on the AMSAT Hotline (Area Code 301-654-1166), and on the AMSAT net.[3]

OSCAR-6's orbit has stabilized to the point where very accurate long-range predictions can now be made. The following Table shows the time of *initial* South-to-North equatorial crossings for planned operational days for February through May, 1973. As will be shown in a later example, this data together with certain fixed orbital parameters make it fairly easy to predict the exact times the satellite will be within range of a particular QTH.

Orbital Prediction Example

Example: What orbits will be in range of an assumed QTH in the center of the USA on Friday evening local time, March 2, 1973.

1. Using a globe or a map projection with minimum distortion, draw a circle 2,300 miles in radius with the assumed QTH at its center. This is called the "range circle." (See fig. 1)

2. Checking Table 1, and remembering that Friday evening local time is Saturday, GMT, March 3, the initial orbit is found to be #1733. This orbit should cross the equator at 76.1 degrees west longitude at 0155 GMT in a south-to-north direction.

3. On the globe or map locate the point of intersection between the equator and 76.1° W. Long. Mark the crossing time 0155 GMT Using a protractor, draw a line through this point, at an angle of 102 degrees with the equator. The satellite's inclination is actually 101.73°, but this is close enough.

4. Note where this line of travel first intersects the range circle. Measure the distance from the equatorial crossing point to this point. In this example, it is about 750 miles. Since the satellite is traveling at about *250 miles a minute,* it will reach the range circle, 3 minutes after crossing the equator or at 0158 GMT. This is the time at which the satellite will first come into range.

5. Next, note where the satellite's line of travel intersects the upper circumference of

[2]For latest Bulletin schedule see *QST,* December, 1972, p. 101.

[3]Each Monday at 7 P.M. EST on 3855 kHz (0000 GMT Tuesday), each Sunday on 14280 kHz at 1800 GMT and 21280 kHz at 1900 GMT.

South-North Orbit No.	*Date*	*Time (GMT)*	*Longitude of Equatorial Crossing (°W)*
1369	Feb. 2	0017	51.8
1382	Feb. 3	0112	65.5
1394	Feb. 4	0012	50.5
1457	Feb. 9	0056	61.6
1470	Feb. 10	0151	75.3
1482	Feb. 11	0051	60.3
1545	Feb. 16	0136	71.5
1557	Feb. 17	0036	56.4
1570	Feb. 18	0131	70.2
1632	Feb. 23	0020	52.6
1645	Feb. 24	0115	66.3
1657	Feb. 25	0015	51.3
1720	Mar. 2	0100	62.4
1733	Mar. 3	0155	76.1
1745	Mar. 4	0055	61.1
1808	Mar. 9	0139	72.2
1820	Mar. 10	0039	57.2
1833	Mar. 11	0134	71.0
1895	Mar. 16	0024	53.3
1908	Mar. 17	0119	67.1
1920	Mar. 18	0019	52.1
1983	Mar. 23	0103	63.2
1995	Mar. 24	0003	48.2
2008	Mar. 25	0058	61.9
2071	Mar. 30	0143	73.1
2083	Mar. 31	0043	58.0
2096	Apr. 1	0137	71.8
2158	Apr. 6	0027	54.1
2171	Apr. 7	0122	67.9
2183	Apr. 8	0022	52.9
2246	Apr. 13	0107	64.0
2258	Apr. 14	0007	49.0
2271	Apr. 15	0101	62.7
2334	Apr. 20	0146	73.9
2346	Apr. 21	0046	58.8
2359	Apr. 22	0141	72.6
2421	Apr. 27	0031	55.0
2434	Apr. 28	0125	68.7
2446	Apr. 29	0025	53.7
2509	May 4	0110	64.8
2521	May 5	0010	49.8
2534	May 6	0105	63.5
2597	May 11	0150	74.7
2609	May 12	0049	59.6
2622	May 13	0144	73.4
2684	May 18	0034	55.8
2697	May 19	0129	69.5
2707	May 20	0029	54.5
2772	May 25	0113	65.6
2784	May 26	0013	50.6
2797	May 27	0108	64.3

Table 1—Data for intial OSCAR-6 orbits, planned operational days, February - May, 1973.

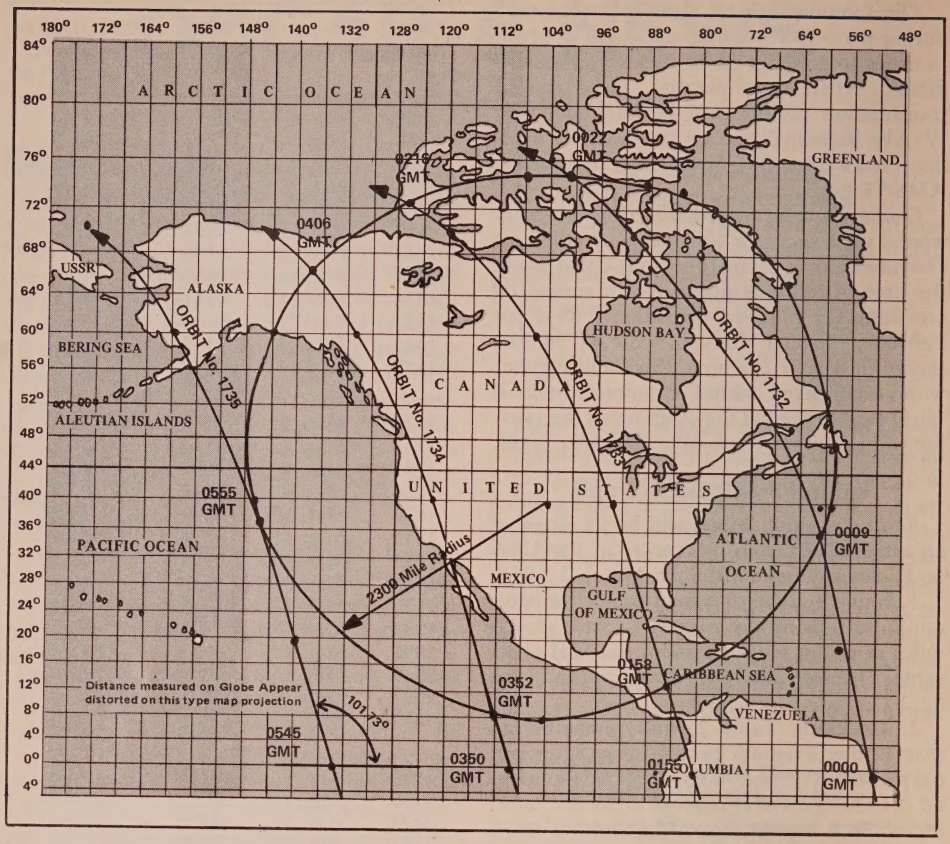


Fig. 1—Plot of oribital paths calculated from intial orbital data for orbit #1733 appearing in Table 1. Communications through the satellite's 2 to 10 meter repeater is possible when the satellite's path passes through the 2300 mile radius range circle drawn around QTH.

the range circle and measure this distance from the lower point of intersection. In this example, the distance is approximately 4500 miles. It will take the satellite 18 minutes to travel this distance, and it should reach the upper point of intersection by 0216 GMT. This is the point at which the satellite should pass out of range.

Orbit No.	*March 3 (GMT)*	*Long. of Equatorial Crossing*	*Time of Signal Aquisition-Loss (GMT)*	
1732	0000	47.35 W	0009	0022
1733*	0155	76.1 W	0158	0216
1734	0350	104.85 W	0352	0406
1735	0545	133.60 W	0555	0556

*Initial orbital data appearing in Table 1.

Table 2—Predicting orbital crossings from initial data given in table 1.

6. Next, determine if the previous pass (orbit #1732) is in range. To find the time and point of equatorial crossing for this orbit *subtract* 115 minutes (the satellite's period) and 28.75 degrees of longitude from the time and point of the initial orbit's crossing (#1733). Orbit #1732, therefore, will cross the equator at 47.35 degrees W. Long., at 0000 GMT. The line of travel is plotted in the same manner as for orbit #1733, and it is seen that it is within range from 0009 to 0022 GMT.

7. Now plot orbit #1734 in the same manner. This orbit will cross the equator 115 minutes *later* than the initial orbit and 28.75 degrees longitude further to the west, or at 0350 GMT at 104.85 degrees. The path of this orbit is plotted and is found to intersect the

[*Continued on page 92*]



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The Three-Quarter Wave, Current-Fed Antenna

BY JACK R. ROTHWELL,* VE7TK

EFFICIENCY, simplicity, and low cost are the three most desirable features of an antenna. Now add the features of versatility, broadband characteristics, and a combination of both low and high angle of radiation and you have the wonders of the three-quarter wave, current-fed antenna.

An immediate advantage of this antenna is that it can be connected directly to your transmitter, because a low impedance of 40 to 60 ohms exists at its feed point. With this arrangement, the use of a low pass filter connected between the transmitter and antenna is recommended.

Marconi type antennas require the use of a good ground or radials, and the ¾ wavelength antenna is no exception to this rule. Do not let this dissuade you from using this antenna, however, for a good water pipe ground will work very well. The writer uses this type of ground, along with several ground rods here and there, in the back yard. Good grounds may be obtained by burying large metalic objects, or by using several ground rods, and then by running a No. 10 aluminum or copper wire underground back to the ham-shack ground bus.

The formula for the ¾ wavelength antenna is:

$$\text{¾ wave in feet} = \frac{702}{\text{Freq. (mHz)}}$$

$$\text{EXAMPLE: } \frac{702}{7.2 \text{ mHz}} = 97.5 \text{ feet } (97' 6'')$$

*P.O. Box 3359, Vancouver 3, B.C., Canada

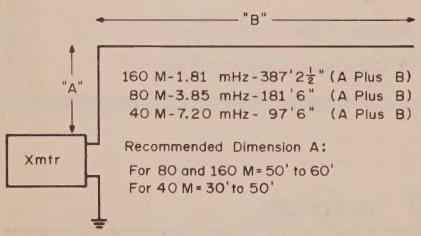


Fig. 1—L-configuration of ¾ wave current-fed antenna having broad-band characteristics.

The antenna may be run partially vertically and horizontally. Refer to fig. 1 which shows a simple inverted *L* configuration. Some frequencies and their dimensions have been selected at random in fig. 1 to illustrate the antenna. You will note that it is recommended that dimension "A" run vertically for 50 to 60 feet on 80 and 160 meters and for 30 to 50 feet on 40 meters. This length is the minimum recommended, for it seems to give the antenna both a good low and high angle of radiation. If it is not possible to obtain these vertical heights, a gradual upwards slope of dimension "A" will still give good results, but it will tend to decrease the high angle of radiation. It should be noted that although the lengths shown in fig. 1 are from the formula, as well as from actual practice, bends, turns, and nearby wires will cause the antenna to resonate higher in frequency. Therefore, allow an extra amount of wire before pruning the antenna to your selected resonant frequency.

Tuning is done in the same manner as with any dipole. The use of a grid dipper, an s.w.r. indicator, and, if possible, an Antennascope or noise bridge will do the job nicely. The use of at least an s.w.r. indicator is required to tune the antenna to the desired frequency. The advantage of tuning the ¾ wave over the dipole is that only one end need be raised and lowered in tuning. It is preferable to keep the transmitter end fixed and to adjust the far end during the process.

When you have completed the tuning of the antenna, you will have a very low s.w.r.—provided, of course, that you are using a good ground. The s.w.r. should be lower than 1.5 to 1 for most of 40 meters, and not much higher at the extremeties of the band. The same broad band characteristics will be found on 80 meters, although you might find an s.w.r. of about 2 to 1 on the extreme frequencies, depending upon where you center the resonant frequency Wide frequency excursions may be made on both bands with very low standing wave ratios.

In fig. 2, you will see that the antenna has

been made into a two bander by using a capacitor of 250 pf to resonate the low band. On the low band, the antenna acts as a ⅜ wavelength series-tuned Marconi, while on the high band it is the ¾ wave current-fed antenna. In this arrangement, the antenna should be cut and tuned for the high band, with the capacitor serving to resonate it on the low band. The writer has used the ⅜ wavelength series tuned Marconi on 160 meters for several years with good success on s.s.b. and c.w.

For the record, the ¾ wave antenna will produce good results on 10-15-20 meters, too. Because of the smaller dimensions, it serves as a vertical with a low angle of radiation and gives a good account of itself for long haul. There is good high-angle radiation, too, that offers very respectable ground-wave coverage. Typical high band dimensions are as follows:

20 Meters - 49'6"
15 Meters - 33'6"
10 Meters - 24'6"

The 15 meter vertical may be used as a ¼ wave for 40 meters

A problem at VE7TK was to remove some of the many sky wires in order to allow birds safe passage in their flight through the yard. A more important problem was to eliminate some of the QRM from the XYL, who believes that our "wireless sets" should be "wireless."

For my part, Carl Mosley's tri-band beam more than adequately handles my high-band requirements. But it occurred to me that a triband for 40-80-160 meters would certainly help clear up some of that overhead wire.

At this point, I was not convinced that the ¾ wavelength antenna would perform as well as a dipole, particularly on 40 meters, so a test was the immediate requirement. Little did I know that the results would be so startling

My longest antenna was the previously mentioned ⅜ wavelength, 160 meter Marconi, 190 feet long. This was tuned to a ¾ wave on 80 meters for the test. This antenna was not too high, varying in height from 20 to 25 feet. It was tested against a diplole 30-feet high. The reports favored the ¾ wave, from 1 to 3 S-units, on both local and distant stations. The locals reported the largest change in signal strength, but every check favored the ¾ wavelength.

On 40 meters, I somehow managed to find space to erect a ¾ wave inverted *L* running

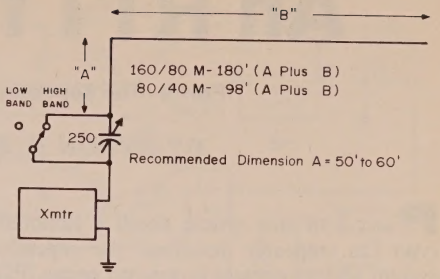


Fig. 2—Antenna modified for two-band operation by addition of variable capacitor.

27 feet vertically and the remaining 70 feet horizontally. In many cases it was 1 to 2 S-units better than the 50-foot high dipole that it was tested against. In other cases there were reports of no noticeable difference, but no check ever favored the dipole over the ¾ wave.

I attribute the success on 80 meters to the excellent high-angle radiation characteristics of the antenna. Some reports on 40 meters would be due to the same reason, while other reports would be due to the directivity of the dipole versus the apparent non directivity of the ¾ wave.

The tests convinced me that the worst I could do with a ¾ wavelength was to break even with the dipole, so down came all my low-band antennas and up went the tri-band in fig. 3 to join my Mosley tri-bander. I now have a good collection of various lengths of used and expensive coax cable that will collect dust in the basement.

[*Continued on page 92*]

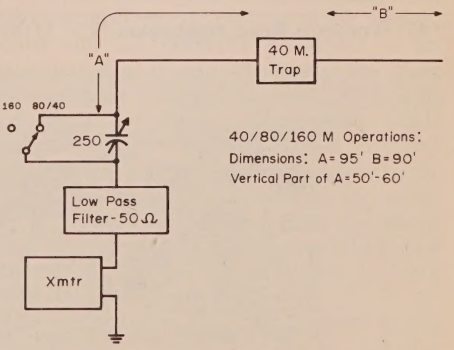


Fig. 3—The additon of a high-Q trap at the appropriate ¾ wave point will allow tri-band operation: ¾ wave on 80 and 40 meters, ⅜ wave on 160 meters. The overall length will have to be adjusted to compensate for the loading effect of the trap.

An RTTY Repeater

Part II—The Repeater Logic and Power Supplies

BY BYRON H. KRETZMAN,* W2JTP

PART I of this article about a radioteletype f.m. repeater described the repeating system and its control in general terms. Part I also described in detail the terminal unit (TU), the unit which demodulates the input RTTY signal and uses it to key an a.f.s.k. oscillator. The repeater is therefore a "regenerative" repeater, repeating *only* an RTTY signal using the standard tones, 2125 Hz for *mark* and 2975 Hz for *space*.

Under the Deck

Figure 6 shows the bottom of the Logic Control Unit (6) with its cover (front panel) off. The TU, described in Part I, is at the left, built upon the Vectorboard. Push-in terminals are used for component connections and mounting. A narrow sub-panel, for the pilot lights and push-buttons, is at the right. Just to the right of the sub-panel is one of the angle brackets into which thumb screws thread to fasten the cover panel shown in fig. 1, Part I. Above and below the sub-panel the filter choke and filter capacitors for the power supplies can be seen, as well as the primary fuse for the power transformer.

Power Supply

Figure 7 is the schematic diagram of the power supply. The inexpensive power transformer[9] T is conservatively rated for the power it is required to deliver. The 175-volt winding is bridge-rectified to provide 200 volts plate voltage for the u.h.f. receiver. The two 6.3 volt windings are paralleled to provide the heater voltage for this receiver. Connections to the u.h.f. receiver are made via the 11-pin socket, SO_1. The 6.3 volts a.c. is also rectified, via diode CR_9 to provide —5.5 volts d.c. to power the 3-minute time-out thermal relay *TTD*, diagrammed in fig. 8.

The 25 volt winding of the power transformer is bridge-rectified to provide a nominal —30 volts unregulated for operation of the logic circuits, and —24 volts regulated (by Zener diode CR_{10}) for the demodulator described in Part I and for the control tone receivers.

A thermistor, R, is connected in series with power transformer T to limit the inrush of current caused by the large number of cold tube heaters in the u.h.f. receiver. This is a Workman Type F.49, available in most parts houses as a TV set replacement. It has a cold resistance of about 90 ohms and a hot resistance of less than 1 ohm. The primary fuse rating of 3/4 ampere should not be exceeded for safety reasons. (Remember, the repeater is unattended.)

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

[9]Available from Edlie Electronics, 2700 Hempstead Turnpike, Levittown, N.Y. 11756

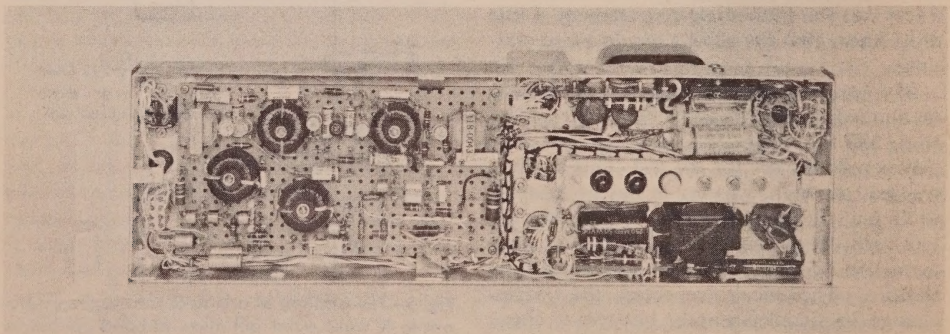
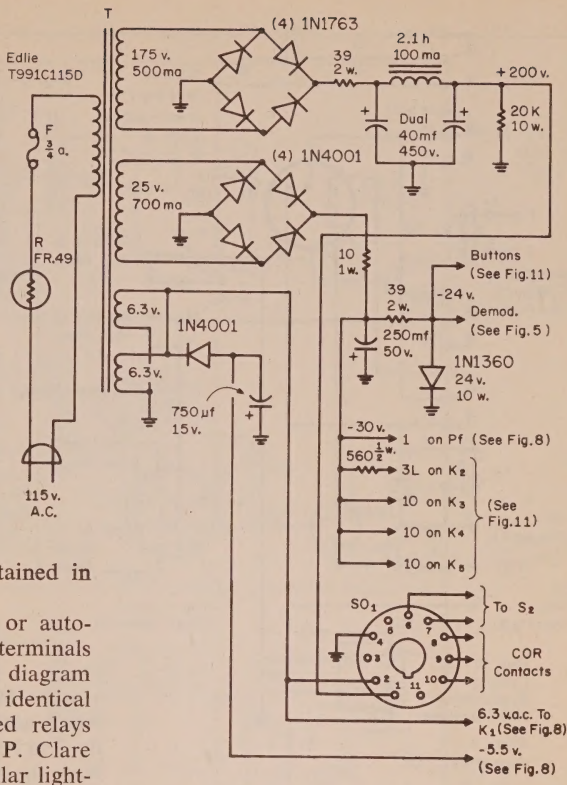


Fig. 6—The logic control unit, with cover off. The demodulator, a.f.s.k. oscillator and ID oscillator are built on the circuit board shown.

Fig. 7—Power supply schematic diagram.



Time-out

Figure 8 is the schematic diagram of the time-out scheme used to open up the press-to-talk (P-T) circuit of the repeater transmitter when a 3-minute transmission period is exceeded Time delay is obtained from an inexpensive standard Amperite 6NO-180 thermal plug-in relay, *TTD*, with a 6-volt heater and normally-open contacts. Relay K_2 is used in conjunction with *TTD* to lock open the P-T circuit, and to open up the heater circuit of *TTD*, as soon as the time period is exceeded. Without K_2 the time period would get shorter with each time-out due to the heat retained in *TTD*.

Relay K_1 is the *mark* detector or autostart relay, and its coil connects to terminals *F* and *G* on figure 5, the schematic diagram of the TU, in Part I. K_1 and K_2 are identical and are surplus hermetically-sealed relays available commercially as the C. P. Clare part number RP7633G4. Any similar light-duty 24-volt relay with 1-ampere contacts can be substituted. Since K_1 is sealed, and its operation cannot be observed, an extra set of contacts is used to light a #47 pilot lamp to indicate operation of the autostart circuit. This lamp is soldered-in on the circuit board of the TU and can be observed, with the chassis cover on, through the plastic bezel in the lower left hand corner of the chassis cover.

A short flexible cable with an octal plug, *Pm*, at the end plugs into an octal socket on the Power Supply (4) for the —80D repeater transmitter and receiver. The voice coil audio output circuit of the 146.70 v.h.f. receiver is picked up on pins 5 and 6 and is connected to one leg of the audio hybrid shown in fig. 3, Part I. This connection is through the contacts of the carrier operated relay (COR) of the u.h.f. receiver so that the audio input to the TU from the u.h.f. receiver has priority over the 146.70 receiver audio.

A 4-pin connector, *Pf*, is wired to the end of a short cable coming out of the logic control unit to provide connection to both the external 28-volt time clock by-pass relay and to the identification (ID) keyer. Pins 2 and 4 are used to connect to the coil of the by-pass relay; and, pins 2 and 3 connect to the contacts actuated by the external code wheel (7).

Logic Control

Figure 9 is a photo of the back of the Logic Control Unit (6). The three solid-state control tone receivers are built upon the Vectorboard and are normally protected by an aluminum dust cover, not shown. The glass enclosed plug-in time delay relay, *TTD* is in the upper left corner. The square black socket, SO_2 for the external by-pass relay and ID keyer connections, is on the upper right edge of the chassis. The cable on the lower left goes out of the picture to plug *Pm* which *plugs* into the —80D power supply (4). The three square cans in the middle are the hermetically sealed logic relays.

Figure 10 is the schematic diagram of the tone receivers. The START tone is 3400 Hz, the STOP tone is 3825 Hz, and the time clock PASS tone is 4250 Hz. Note that, like the standard RTTY tones of 2125 Hz for *mark* and 2975 Hz for *space*, these are all multiples

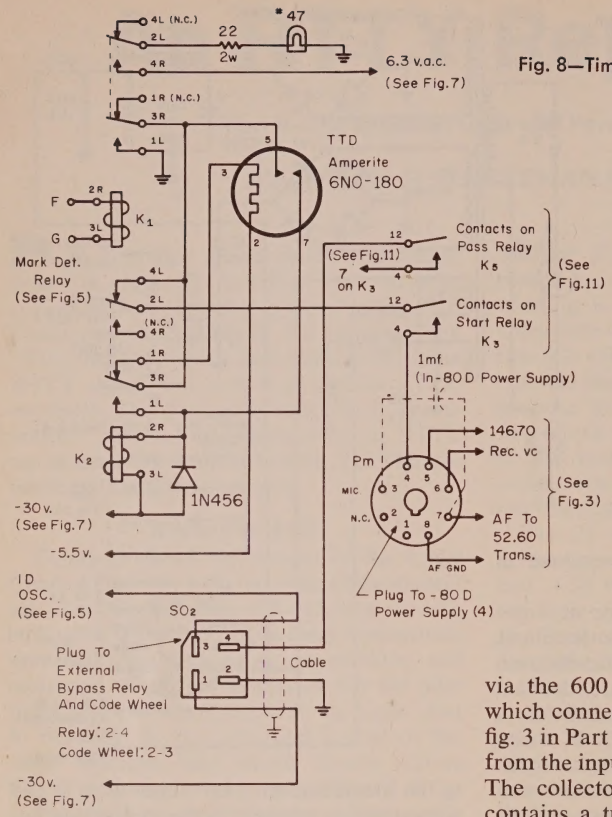


Fig. 8—Time-out control schematic diagram.

of 425 Hz. This makes it convenient to tune up all tone circuits by reference to a 425 Hz tuning fork standard[10] using Lissajous figures on an oscilloscope.

Audio input to the tone receivers comes in via the 600 ohm input terminals *H* and *J* which connect to the audio hybrid. (Refer to fig. 3 in Part I.) Each tone receiver is isolated from the input by its own pre-amplifier stage. The collector circuit of each pre-amplifier contains a tuned circuit, consisting in each case of an 88 mh toroid with a 33-turn secondary winding. One capacitor value across each tuned circuit is underlined in the schematic diagram to indicate that this is only an approximate value. It is this capacitor value which is varied slightly to bring the tuned circuit exactly on-frequency. Like the autostart circuit of the TU, described in Part

[10]Kretzman, B. H., "The New RTTY Handbook," p. 174.

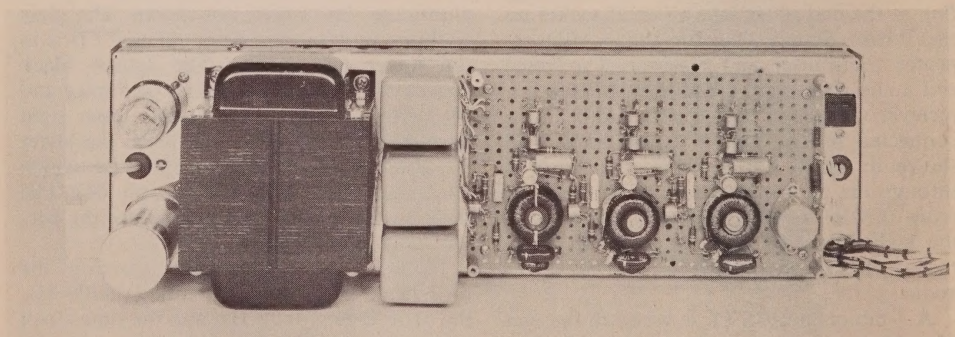


Fig. 9—Logic control unit, rear view. A dust cover, not shown, normally covers the control tone receiver circuit board.

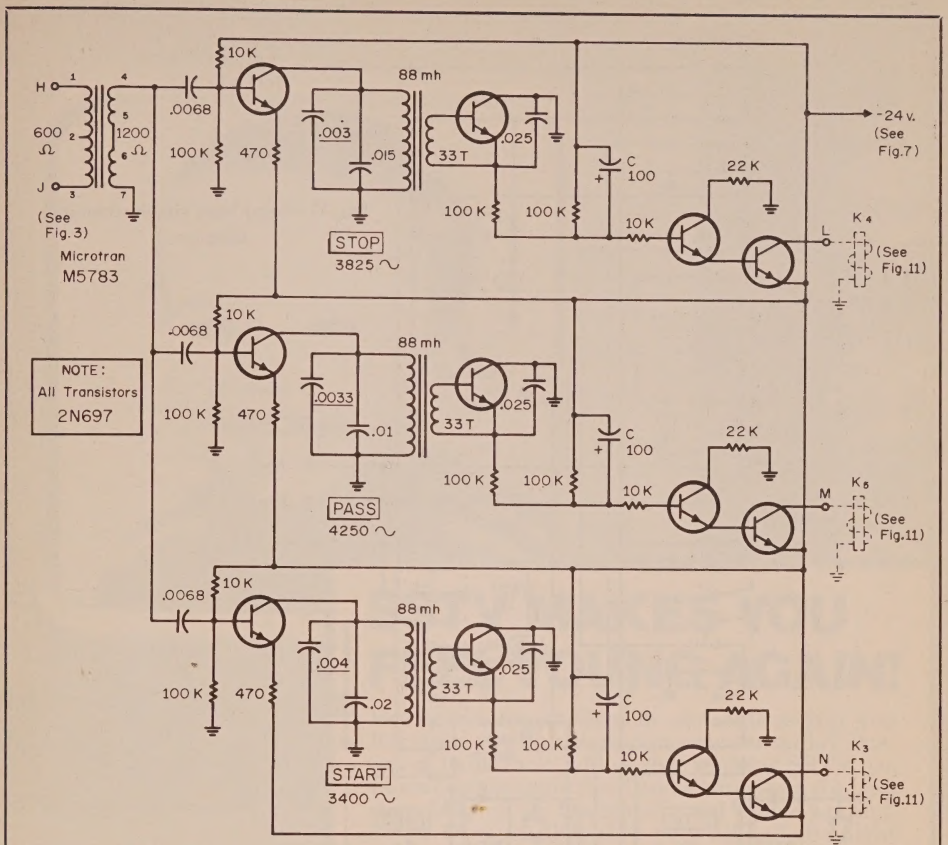


Fig. 10—Control tone receivers schematic diagram. All transistors are 2N697.

I, the time delay built-in is a function of the capacitor *C*. If the capacitor value was exactly 100 mf, the time delay for each function would then be 10 seconds. Incidentally, with the proper signal being received, a d.c. voltage of 1.5 to 2.0 volts, as measured by a v.t.v.m., should appear across this capacitor and the parallel 100K ohm load resistor.

Figure 11 is the schematic diagram of the Relay Logic circuit. Two-winding relays are used, K_3 for START, K_4 for STOP, and K_5 for PASS. These are also surplus hermetically sealed relays, available commercially as C. P. Clare part number RP3716-G168. One winding, used as the "operate" winding, is 300 ohms, while the other winding, used as the "hold" winding, is 1000 ohms. These relays are connected in an electrically latching circuit, using the "hold" winding to latch the contacts in the operate position. The push-buttons, on the sub-panel, are used to actuate these relays for testing and/or local control purposes. Three pilot lights, also in the sub-panel, indicate the status of the control system: Green for START (repeater ready for autostart operation), red for STOP (repeater shut down), and white for PASS (time clock by-passed and repeater ready for operation). Note that, once the PASS function has been initiated, the repeater comes on and this is indicated by the green pilot lamp also being illuminated. To nulify the PASS function it is necessary to issue the STOP instruction, either remotely or locally, and then issue again the START instruction. The repeater will then come back on, ready for autostart operation, *providing* that the associated time clock has closed the a.c. input circuit to the —80D power supply (4).

Speaker Panel

The monitor speaker panel (1) at the top

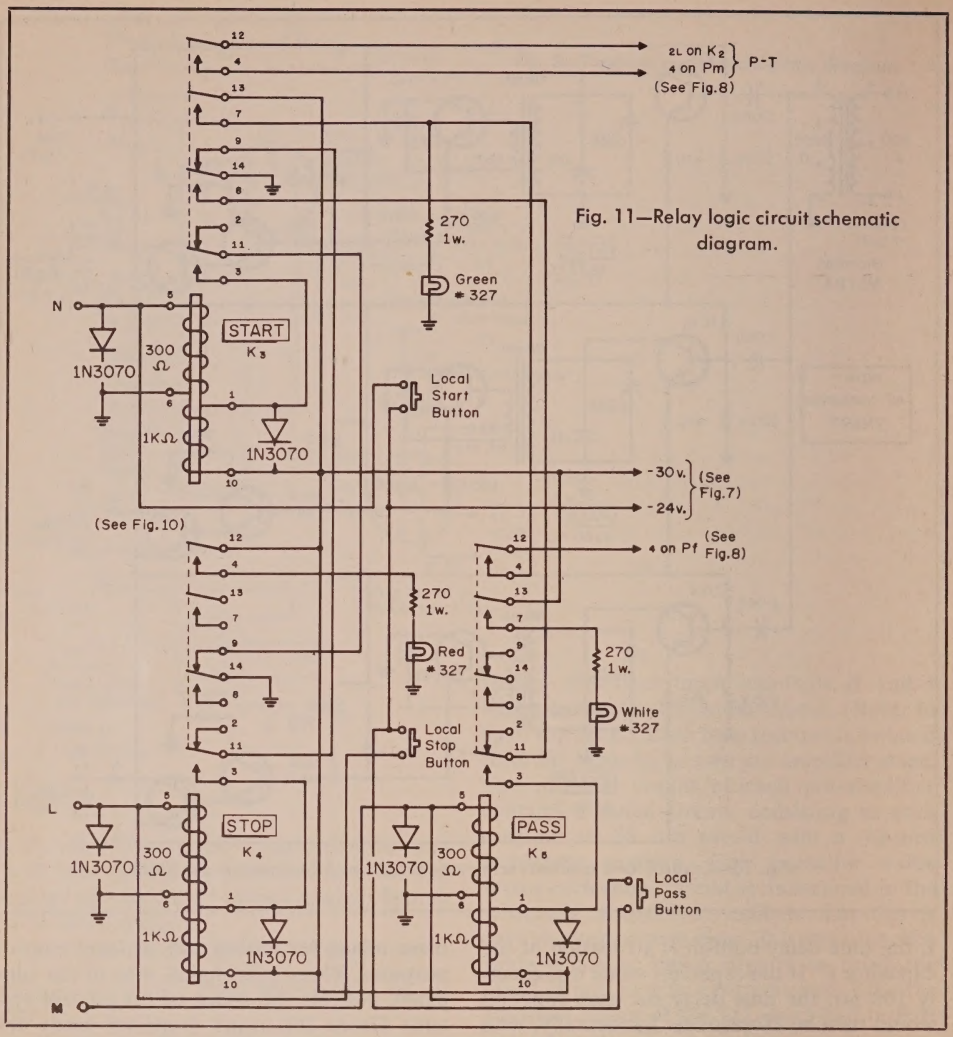


Fig. 11—Relay logic circuit schematic diagram.

of the rack assembly is quite simple. A 2-pole, 3-position, rotary switch is used to switch the voice coil of the monitor speaker between the voice coil circuits of the v.h.f. receiver (146.70) and the u.h.f. receiver (449.88). The center position of the switch is OFF, to silence the speaker when the site is left. The monitor speaker is a PM with an impedance of 45 ohms, a type used frequently in intercoms. The 45 ohm impedance permits bridging the voice coil circuit of either receiver, via the rotary switch, without materially disturbing the audio. The speaker level is not high, but it is sufficient for the purpose.

Figure 3, in Part I, an expanded block diagram of the repeater, shows exactly how the speaker panel is connected. A short cable with a 4-prong plug then plugs into a corresponding socket, SO_2, on the logic control unit chassis. This socket can be seen in the upper right corner of the chassis in the photo, fig. 9.

Part III

Part III, to follow in a subsequent issue, will describe in detail the control station at the other end of the u.h.f. control link. Besides being able to initiate the three control tones, an a.f.s.k. generator is provided to enable activation of the RTTY repeater over the control link, convenient for test purposes or priority traffic. Watch for Part III. ■



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Slow Scan TV

BY COPTHORNE MACDONALD,* W1GNQ/ϕ

SSTV/SSB Band Sharing

A little intelligent planning. That's what a group of us are trying to pull off. The FCC has called on us hams to plan and coordinate the use of the frequencies within our bands, saying that this will result in the best spectrum utilization; better than any further band subdividing by the FCC. SSTV activity is growing and it is to *everyone's* interest to work out a sensible frequency sharing arrangement. Realizing that hams get their information through several channels; the folks at ARRL, Dave Ingram through his column, and I are working together to pool ideas from our readers. The object is to reduce tension in our crowded H.F. bands by working out a "gentlemen's agreement" between DXers, rag chewers, SSTVers, and perhaps even QRPers, on operating frequencies. While the overall QRM level may be no lower, each will QRM'd by his "own kind" which somehow seems less emotionally charged. Check last month's issue of *CQ* for some of my initial thoughts on the matter, and/or check the comments in the other ham magazines. Think about it and then drop me a line with your ideas.

How far could we go with this cooperation idea? Far enough for a 5 watt-or-under QRP frequency in each band? Even if 30% of the time some hard nosed high power guy asserted his "rights" to operate on the frequency, it could be a real aid to QRP stations in making contacts with other QRP stations. Then too, some benevolent 2,000 watt stations might enjoy helping to keep the frequency clear for flea power activities. Lots to think about.

More On Vidicons

Last month we looked at the basic theory of Vidicon operation. This month we'll look at some of the practical problems involved in making the beasties produce good TV pictures. A few years ago most hams built their transmitters but bought their receivers. Transmitters were simple to understand, build, and adjust in those days. Receivers were more complex, and required more equipment than most hams had to get them calibrated, and adjusted for peak performance. A similar situation exists in SSTV today. A Monitor or FSS has circuitry operating at reasonable voltage and current levels, at frequencies at, or around, the audio range. In many cases you can literally "see" problems on the unit's own CRT screen. In the worse-case situation an audio oscillator and medium performance scope will get things right. Not so with vidicon cameras. Vidicon output currents are in the nanoamp range. Video amplifier bandwidths may go out to several mHz. You can't see what the Vidicon electron beam is doing directly, as you can with a CRT, and if one of your sweep circuits fails, your vidicon can be ruined. Spurious signals you have no hope of ever detecting with ordinary instruments can put bars and herringbones into your pictures. In other words, getting a camera to perform properly is a much tougher problem than getting the bugs out of a monitor. Some hams will build cameras just as some built receivers. The ones who have a good understanding of what the problems are, and access to the right test equipment have a good chance of succeeding. Build or buy, you will want to know what's happening and why.

Video Amplification

Vidicon output current is proportional to the scan rate. Scanned at fast scan rates, most Vidicons will deliver 0.2 to 0.3 microamps. A basic definition says that current is the rate of transfer of charge per unit of time. The Vidicon target is capable of storing just so much charge. If we take 8 seconds to move that charge out instead of 1/30 second we would expect the current (charge/unit time) to be only about 1/240 of the output current at fast scan rates. So it is. The output of a slow-scan Vidicon is typically only 1 nanoamp (1/1000 of a microamp) at amateur slow-scan rates.

The Vidicon acts as a near perfect current source, that is, its own internal resistance is

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

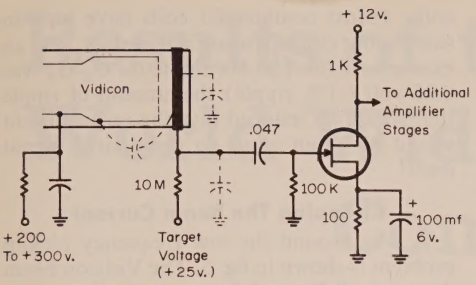


Fig. 1—Typical circuit of Vidicon target and wideband preamp input stage.

very high—about 100 megohms with the lower beam current employed in slow-scan operation. Figure 1 shows a typical target circuit with a wideband preamp FET input stage. Since both the vidicon output, and FET input impedances are very high, the effective target load is the parallel combination of the 100K resistor and capacitance from the target circuit to ground. This capacitance is the total of target-to-mesh, target-to-ground, FET input C, and target wiring to ground capacitances. In a typical case these capacitances will total up to about 30 pf. Not much C; but a problem. At low frequencies we don't know that the *C* is even there. At 50 kHz however, the capacitive reactance of 30 pf is 100K ohms, the same as our target load resistance. At higher frequencies we can forget about the resistor - - - the target load impedance will be simply the reactance of the 30 pf to ground. Figure 2 shows what this means in terms of a preamp input signal voltage in a fast-scan or sampling type camera. In this example, the frequency response

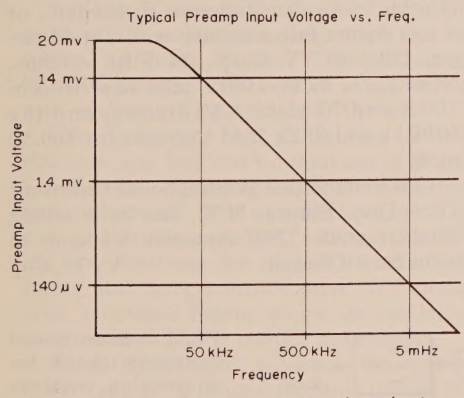


Fig. 2—Video signal input developed at the input to the preamp of fig. 1. Target circuit total C to ground of 30 pf, and p-p Vidicon output current of 0.2 μa are assumed.

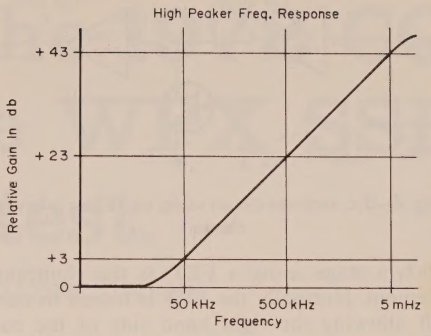


Fig. 3—Frequency response of high peaker necessary to compensate for signal falloff in target circuit.

is not flat even to 50 kHz, let alone the 5mHz or so we'd like. The input signal drops 20 db for every decade higher in frequency we go. What to do? Let's follow the preamp with an amplifier having a gain characteristic that *rises* 20 db per decade. Such a stage is called a high peaker. Figure 3 shows the high peaker response that will give an overall flat camera response out to 5 mHz.

Sounds great. The catch is that even the best input stage produces some noise. Since the high peaker boosts the 5 mHz signals 43 db more than low frequency signals, the preamp noise at 5 mHz is also getting that 43 db boost, and the signal to noise ratio at 5 mHz is about 40 db *lower* than at 50 kHz. Fortunately, the eye is able to tolerate this high frequency noise (which appears as a fine grain "snow") to a much greater extent than low frequency noise which would appear as a line-to-line "streaking." Much effort has gone into a search for techniques to improve the high frequency signal-to-noise ratio, without uncovering any tremendous breakthrough. (A highly mathematical but thorough analysis of the vidicon noise problem can be found in G.M. Glasford's book, *Fundamentals of Television Engineering,* McGraw-Hill, 1955.)

D.C. Restoration

High gain, wideband video amplifiers are normally a.c. coupled which causes problems when it comes time to add blanking and sync pulses to the video signal. This is because the absolute d.c. level of "black," for example, will move up and down as the average scene brightness changes. The usual trick for restoring a fixed d.c. level is passing the signal through a keyed clamp. Figure 4 shows

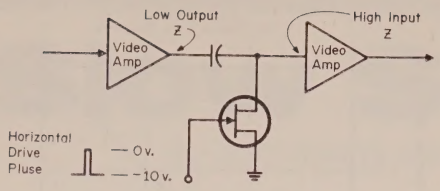


Fig. 4—D.c. restorer circuit using an FET as a keyed clamp.

such a stage using a FET as the clamping element. Normally the FET is biased to cut-off allowing the right hand side of the capacitor to swing freely with the variations applied to the left side. During the horizontal retrace period, however, the FET is switched "on" by the horizontal drive pulse. Since the vidicon beam is "off" during retrace, the video level is a known quantity at this time: zero output current. Once each scan line then, the d.c. level is "reset" to zero.

Slow-Scan Amplification

In theory we could rescale the component values in the fast-scan target circuit for use at slow-scan frequencies. We could increase our target load resistor 240 times to 24 megohms to get the same low frequency voltage into our preamp. In the process the upper 3 db frequency would drop from 50 kHz down to 208 Hz. The high peaker design would be easier since we would only need our 20 db per decade boost from 208 to 1000 Hz or so. The d.c. restoration problem is tougher because the amplifiers must pass 15 Hz with almost no phase shift, rather than 15 kHz with none. Each coupling circuit between stages would need a low frequency 3 db response point at around 0.1 Hz.

I'm sure that a good slow-scan camera could be built along these lines, by taking enough pains. A big problem would be spurious signal pickup in the target circuit. Consider everything that is capacitively coupled to the target: the mest (G_4) electrode with its +250 volts of d.c. and unknown amount of 120 Hz ripple and other crud, the lens and lens mount, possibly the focus and deflection coils. (Most commercial coils have built-in shields, but even these are not perfect.) As an example, if the 120 Hz ripple on G_3-G_4 was 0.25 volt (.1% ripple) the amount of ripple that would be induced into the target circuit would be about equal to the desired signal itself!

Chopping The Beam Current

A way around the low frequency pickup problem is shown in fig. 5. The Vidicon beam current is "chopped," or turned on and off, at a 10 kHz rate. The output current is a series of 10 kHz pulses about twice the amplitude one gets in the continuous beam current mode. (The tube is only really "on" for 4 seconds total out of the 8 required for a scan, hence the higher output.) The 30 pf stray *C* looks like an impedance of 500K at 10kHz, so the p-p video amplitude is about 1 millivolt, if the amplifier itself has an input Z of a megohm or more. From audio practice we know that we can get a good signal-to-noise ratio with a 1 mv input signal in this frequency range. If we use a bandpass filter to pass only the 10 kHz and its sidebands out 1 kHz to either side, we will be throwing away any low frequency hum and deflection pickup problems. After amplifying the 10 kHz we can rectify it, filter out the ripple, and have d.c. restored slow-scan video signal without the necessity of a keyed clamp.

Q & A

Q. Is there a source for inexpensive Vidicons?

A. I would first check your local TV stations and any local closed-circuit TV dealers for "freebie" fast-scan Vidicons. If that fails, or if you want a fast-scan tube with a good target, GBC CCTV Corp., 74 Fifth Avenue, New York, N.Y. 10011 sells new Hitachi 7038 and 7735A 1" Vidicons, and the 20PE11 and 8823 2/3" Vidicons for $69.50 each.

I understand that Westinghouse Electronic Tube Div., Elmira, N.Y., has been selling amateur grade 7290 slow-scan Vidicons to hams for $100 each. Vy 73, Cop

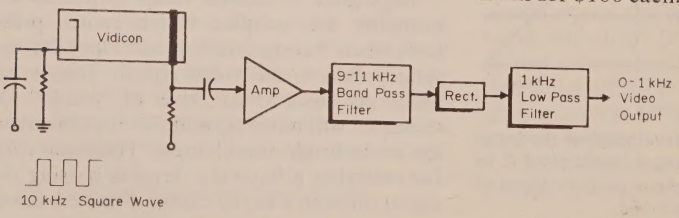


Fig. 5 — Beam current chopping scheme for minimizing spurious pick-up problems in slow-scan cameras.

Results of the 1972 CQ World Wide WPX SSB Contest.

BY FRANK ANZALONE,* W1WY

To say we were a bit disappointed with the results of last year's WPX SSB Contest (March 1972) would be putting it mildly. We just about held our own in the number of logs received, a respectable amount, 653 to be exact, but we had hoped for a much better showing from the fellows stateside.

A big factor in the lack of W/K activity could in part be attributed to the fact that there is too much other contest activity during the weeks preceding our March dates. This we realize and would like to change the time to an April date, but that month is already loaded with long-established European activities.

I will not mention disappointment in the VE returns. It has been pointed out to me that in relation to the number of hams in Canada, the percentage of VE participants is much higher than that in the United States. I concede, it's a true and valid point, but must add, how about the number of awards in relation to the number of entries? That goes for Australia too.

Conditions were not at their best, to quote most of the comments, they might be described as being "lousy." George Jacobs, W3ASK had predicted normal to below normal, evidently we got more of the latter.

This, however, had no bearing on the decrease over last year's output out of Brazil. I'm sure the controlling factor there was that they did not use their unusual assortment of new and exciting prefixes, and that PY1CK did not distribute his special brand of log forms and contest information. We missed your assistance Flavio, please do not let us down in the coming contest next month.

Think I had better put away the "crying towel" and go to more interesting things, but sometimes a little complaining brings results.

A quote from W8WWH's log. "Read your comments in last year's contest report. The least I can do after getting several new countries and prefixes, plus the fun of competition, is to submit a log." Thanks George, sometimes it pays to be considerate, take a look at your score at the top of the W8's.

It wasn't all that bad however, as indicated by some of the scores in the Top listing. We haven't kept records of scores in previous WPX Contests, which would be meaningless anyway, because of the change in scoring on the lower bands, but I am sure some of the scores compare favorably with those of previous years. I am certain about 4X4GV in the Multi Multi category. It's another new record and the Championship remains in Israel.

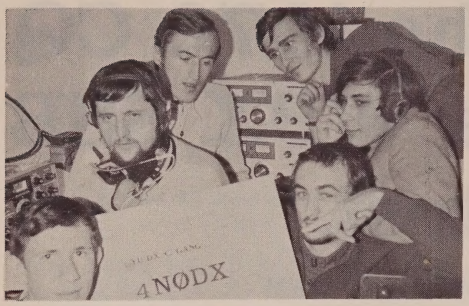
This is the year that PY7APS should have continued his quest for Single Band Champion on 14 mHz. Instead Gerson decided to join the boys at the club station. PY7BDX didn't quite make it either. The contest expedition to the Virgin Islands by W4IZ and his friends, takes home the bacon in the Single Transmitter category.

One of Gerson's countrymen however did make it on 21 mHz and the W3ZKH Single Band Trophy goes to Emilo, PY2DSE.



Jack's score from 9V1QJ would have been much higher if he hadn't blown the final at the start of the contest. Here he's peaking up the FT-101 for maximum output.

* Chairman, Contest Committee.



This is the group that put the exotic call 4NØDX in the Top Six multi-single category. L. to R.—YU1-BCD/Joza, YU3TCB/Mujo, YU3ZV/Drago, YU1-BCD/Popa, YU1BCD/Bane, YU1QBC/Ljube. The other member of the team Miro, YU1SJ was the man behind the lens.

The group at WB6GFJ, who promised even bigger things next year, don't have to wait. Being next in line they are eligible for this year's W9WNV's Multi Multi award.

And without the benefit of a special prefix, XE1IIJ handily won the K4FMA All Band Trophy. Scott usually makes use of one of the special Mexican calls available for contest work.

Up Canada way VE7IG won the Single Band VE6TP award operating portable on 21 mHz from North West Territory. Reg threatened not to operate another single band contest above 20 meters from the NWT due to the unpredictable propagation in that area. Maybe he will have a change of feelings now.

The rest periods which are a trade-mark of the WPX contest are still being received with favor. Occasionally some of the fellows would rather not be restricted.

KH6GMP says, "It was rather frustrating to sit there listening to all that contest activity and I couldn't get in there and operate, due to the mandatory rest periods."

W4SYL thinks the time period of 18 hours is too long, but adds that the XYL thinks they are not long enough.

To Gary I would recommend that he plan his "on the air" time more carefully so that the longer rest periods come up during time of probable less activity.

As for Roger, I would suggest he pay more attention to the little lady at other times so that the contest week-end would be free of family obligations.

Our thinking in making the "off periods" a total of 18 hours, was to allow two sleeping periods, plus time off to grab a snack now and then, and maybe even fulfill your religious obligations during the week-end.

Can't blame you if you're wondering about that high score made by W5QQQ/7, it had me scratching my head too. But its no mystery, Rex did his operating from W7RM's location, but that's still a pretty good score for one guy, no matter how you look at it.

There was no question as to the location of OAN4AGR but that extra letter in the prefix just didn't look right and had us rechecking the log. Under comments it was explained that the N was only an identification for a Novice, same as in the US. Evidently Novices are permitted to operate s.s.b. in Peru.

Working transceive is the accepted procedure on s.s.b. but it has its drawbacks on 40 and 80 in a contest. Those that tried it gave the tuning dial quite a workout and vow that they will have an outboard v.f.o. for the next one. G5AHE and WA8WED came down with a bad case of "wristitis" and had to carry their arm in a sling the next day.

The week-end was not without its share of thrills. WA9UFV worked his long lost friend 6W8AL whom he had not heard in almost 3 years. And W6OKK finally worked his 40th Zone when he raised 3B8CV. But WB9EAQ had the biggest thrill of all, Max became a grandpappy during the contest week-end.

A point of explanation regarding awards. You may wonder why a station at the top of the list in his particular area is not in bold type. The probable answer is that he did not have the required 12 hours of operation. By the same token another station with a much lower score is awarded a certificate because he did show a 12 hour effort, but was handicapped by his location, equipment, band or other factors.

The next one will be coming up in a couple of months, hope you are making plans for a bigger effort this time. We also hope that some of those exotic prefixes used in previous years will again show up. We noted almost a complete lack of anything unusual in this one.

That about winds it up for this year. Once again it was largely a two man team that worked on this one, Bernie Welch, W8IMZ and yours truly. Andy Malashuk, W1GYE pitched in when time was running out on us.

73 for now, Frank, W1WY

[*Scores begin on next page*]

Number groups after call letter denotes: Band, Score, QSO's and Prefixes. Bold listings are certificate winners.

SINGLE OPERATOR

North America

United States

WA4UTP/1				
	A	**7,847**	**75**	**59**
W1PLJ	"	2,772	36	28
W1WY	"	1,690	27	26
K1CSJ/1	**28**	**32,000**	**171**	**100**
K1HVV	**21**	**227,906**	**404**	**212**
W1MDO	"	179,550	360	190
WA1PHF	"	7,314	63	53
W1OKA	**14**	**263,070**	**461**	**222**
K1OME	"	71,898	226	138
W2LEJ	**A**	**89,964**	**232**	**147**
WA2CWX	"	23,636	130	76
K2POA	"	12,789	69	63
K2BQO	**28**	**63,310**	**230**	**130**
VE2MW/W2				
	14	**173,600**	**331**	**200**
W2EIQ	"	8,946	66	62
WA3RBI	**A**	**82,795**	**243**	**145**
WA3GZT	"	14,238	77	63
WA3EOP/3		6,028	58	44
W3FTG	"	3,589	51	37
W3AZD	**28**	**115,200**	**320**	**160**
WA3NQJ	**21**	**109,494**	**269**	**158**
WA3JYB	**7**	**46,920**	**160**	**102**
W3CRE	**3.8**	**7,900**	**72**	**50**
W4SYL	**A**	**532,150**	**671**	**290**
K4OD	"	221,998	381	202
K4ZA	"	87,531	226	163
W4HOS	"	33,277	125	107
W4KMS	"	27,285	132	85
K4GHS	"	16,230	92	70
K4APL	**28**	**87,210**	**239**	**153**
K4QVK	"	60,625	209	125
K4YFQ	"	53,300	197	130
WB4SIJ	"	44,522	183	113
W4WSF	"	11,163	79	61
W4DS	"	4,280	45	40
WB4JBC	**21**	**51,528**	**157**	**114**
WB4TBO	"	2,688	44	32
W4CYC	**14**	**142,317**	**338**	**189**
KØPAQ/4	**"**	**18,920**	**102**	**86**
W4EEO	"	2,324	28	28
K4CYU	**7**	**25,536**	**100**	**84**
W4EZ	"	6,048	72	54
W5ONZ	**A**	**77,220**	**248**	**117**
W5OB	"	31,977	145	99
W5QAM	"	17,577	118	81
WB5CLW	"	13,206	89	62
W5QBM	**28**	**212,538**	**455**	**191**
WA3BZA/5		90,099	280	141
WA5ZNY	"	86,658	362	143
WA5ZWC	"	32,640	155	85
WB5DYY	**21**	**446,561**	**759**	**213**
W5RMC	**14**	**149,352**	**340**	**196**
WA5ALB	"	126,525	330	175
K5PFL	**3.8**	**43,788**	**146**	**89**
W6YRA	**A**	**877,965**	**1477**	**187**
		(Opr. WB6VZI)		
W6BJB	"	241,040	625	131
W6DKQ	"	147,560	371	155
W6KYA	"	61,659	234	93
W6OKK	"	52,448	220	88
W6RQZ	"	6,109	122	41
W6ISQ	"	3,552	34	32
WB6VVO	**28**	**213,590**	**619**	**130**
		(Opr. K6SVL)		
WA6DKF	"	111,036	387	114
WA6JQX	"	10,675	82	61
WB6KMW	"	6,160	67	40
W6GFS	**21**	**644,709**	**1232**	**183**
WA6FIT	"	151,848	506	111
WA6QKU	"	132,699	680	71
WB6GKK	**14**	**170,498**	**413**	**163**
WB6IXC	"	7,661	55	47
K6ERT	**7**	**180,420**	**359**	**97**
W6KFM	"	126,720	309	90
K6SVL	"	76,128	218	78
WB6UDC				
	3.8	**28,274**	**112**	**67**
W5QQQ/7	**A**	**1,741,285**	**1937**	**301**
W7AYY	"	255,850	558	170
W7BJ	"	244,125	659	125
WA7JCB	"	18,408	86	78
W7FCD	"	7,314	67	46
WA7PEZ	**28**	**246,402**	**595**	**117**
K7UWT	21	507	15	13
WA7RRR	**7**	**8,360**	**117**	**55**
W8WWH	**A**	**45,090**	**177**	**135**
WB8EEJ	"	3,505	52	37
WB8AYC	"	2,673	38	33
W8TWA	**28**	**55,833**	**216**	**111**
W8BVF	"	21,508	112	76
W8IMZ/8	"	14,472	105	67
W8KOI	"	495	28	15
WB8EUN	**14**	**90,643**	**247**	**161**
K8QYG	"	3,060	45	36
WA8JUN	**7**	**32,538**	**118**	**87**
W9EWC	**A**	**286,944**	**504**	**224**
WA9NPM	"	104,832	280	156
K9MMH	"	86,702	243	154
W9TLU	"	70,372	169	146
WA9VGY	"	28,710	122	99
W9SFR	"	28,600	182	110
WA9BHH	"	4,796	56	44
WB9DXW	**28**	**39,798**	**177**	**99**
WB9EAQ	"	29,624	136	92
W9LKI	"	19,199	130	73
WB9DRE	"	12,736	87	64
WA9UFV	**21**	**246,202**	**457**	**209**
K6YRA/9	**14**	**125,121**	**303**	**179**
W9ZTD	**7**	**38,038**	**168**	**91**
K9CLO	"	3,120	60	40
WBØFLM	**A**	**8,260**	**83**	**59**
WØFWN	"	7,104	64	37
WAØOML	"	5,850	67	45
WAØYPY	"	5,828	57	47
WØJIG	**28**	**17,402**	**104**	**77**
WA2WMT/Ø				
	21	**90,045**	**325**	**115**
WAØWGO	"	21,156	90	82
WAØEMS	**7**	**23,712**	**149**	**76**
KØHGW	"	368	10	8
KØTPF	**3.8**	**17,152**	**105**	**67**

Alaska

KL7MF	**A**	**38,454**	**192**	**78**

Bermuda

VP9BO	**14**	**355,685**	**645**	**223**

Canada

WA5VRT/VO2				
	A	**23,826**	**152**	**66**
VA2UN	**A**	**1,342,965**	**1730**	**291**
		(Opr. WA2UPC)		
VE2AFC	**3.8**	**5,120**	**37**	**32**
VE3BMV	**A**	**1,083,354**	**1322**	**309**
VE4RP	**A**	**168,354**	**457**	**141**
VE4SD	**14**	**134,113**	**357**	**161**
VE5US	**A**	**895,520**	**1650**	**232**
		(Opr. VE5UF)		
VE6TP	**A**	**243,764**	**623**	**149**
VE6APJ	**28**	**38,927**	**273**	**67**
VE6MC	**14**	**75,350**	**225**	**137**
VE6IN	"	4,800	49	40
VE7AZG	**A**	**41,784**	**207**	**71**
VE7IG/VE8				
	21	**649,516**	**1222**	**206**
VE7IQ	"	11,914	110	46

Greenland

OX5BA	**14**	**115,008**	**526**	**96**
OX3BO	"	3,135	38	33

Guatemala

TG9GF	A	9,955	78	55
TG9GI	21	7,020	70	45
TGØAA	**14**	**28,466**	**125**	**86**

Mexico

XE1IIJ	**A**	**1,941,624**	**3028**	**267**
XE2LLX	"	202,952	755	92
XE1LLS	**14**	**124,850**	**499**	**110**

Panama

HP1AC	**14**	**23,070**	**115**	**82**

Virgin Islands

KV4AM	**28**	**101,750**	**429**	**110**

Africa

Angola

CR6LF	**28**	**1,013,232**	**1136**	**303**
CR6II	"	328,877	608	181

Ascension Island

ZD8CS	**7**	**40,230**	**151**	**45**

Cape Verde Islands

CR4BC	**A**	**1,124,715**	**1251**	**291**
CR4BV	**21**	**32,250**	**130**	**86**

Ethiopia

ET3GK	**A**	**294,600**	**520**	**200**

Mozambique

CR7FR	**28**	**1,011,420**	**1274**	**270**

Somaliland, French

FLØQQ	**14**	**809,744**	**1009**	**272**
		(Opr. F5QQ)		

Southwest Africa

ZS3CJ	**28**	**645,424**	**1044**	**208**

TOP SCORES

SINGLE OPERATOR ALL BANDS

XE1IIJ	**1,941,624**	IT9JT	1,384,848
W5QQQ/7	1,741,285	5K4DF	1,367,520
KS6DH	1,502,160	VA2UN	1,342,965
HC1RF	1,469,925	CT1BH	1,182,564
5H3LV	1,433,688	DU1FH	1,175,388

SINGLE OPERATOR SINGLE BAND

28 mHz		VK2APK	765,810
CR6LF	1,013,232	UW9WR	702,350
CR7FR	1,001,420	PY2CAB	679,014
ZS3CJ	645,424	I3MAU	518,312
5B4IS	511,100	**7 mHz**	
LU2DEK	443,520	K6ERT	180,420
KG6ASP	418,405	G3NLY	177,288
21 mHz		DL8PC	154,560
PY2DSE	**1,188,825**	JA2BAY	76,540
UV3GM	653,130	F6AGM	50,970
VE7IG/VE8	**649,516**	WA3JYB	46,920
W6GFS	644,709	**3.8 mHz**	
UA4CZ	564,096	OHØAM	159,712
G3WJN	396,528	SM6CKU	142,556
14 mHz		SM3EVG	140,800
FLØQQ	809,744	OH1XX	113,600
G3FXB	777,064	UP2ER	75,392
		OK2BIQ	66,820

MULTI-OPERATOR

Single Transmitter

W4IZ/KV4	**2,903,094**	WA3HRV	2,359,816
PY7BDX	2,791,479	4NØDX	2,298,360
14AUM	2,454,096	IP1RBJ	2,032,720

Multi Transmitter

4X4GV	**6,036,175**	SV1GA	934,752
WB6GFJ/6	**1,745,272**	WA3LNM	764,928
W3SS	1,609,285	JA2YEF	642,537

U.S.A. TOP SCORES

Single Operator

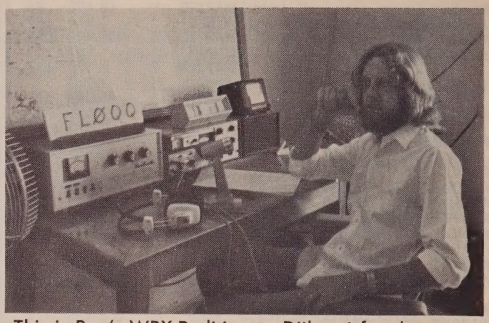
All Band	W5QQQ/7	1,741,285
28 mHz	WA7PEZ	246,402
21 mHz	W6GFS	644,709
14 mHz	W1OKA	263,070
7 mHz	K6ERT	180,420
3.8 mHz	K5PFL	43,788

Multi Operator

Single Xmtr.	WA3HVR	2,359,816
Multi Xmtr.	WB6GFJ/6	1,745,272



The two man team that won the Multi Single award for WB5AAR/5. The portable operation was set-up in a garage for the contest week-end. That's Ralph knocking 'em off while Steve, WB5AOF is doing the logging.



This is Ron's WPX-Pedition to Djibouti for the contest. Using the special call FLØQQ and FL8RC's station, Ron is top man on 14 mHz. (Some of his past expeditions are 3V8AA, GD5APJ and ET3-ZU/A. His home call is F5QQ and his QSL mgr. is F2QQ.)

Tanzania				
5H3LV	**A**	**1,433,688**	**1504**	**328**
5H3MM	**28**	**61,020**	**195**	**108**
Asia				
Afghanistan				
YA10S	A	2,916	34	27
YA1RG	**21**	**23,862**	**122**	**82**
Cyprus				
5B4IS	**28**	**511,100**	**942**	**220**
India				
VU2HQ	**14**	**14,076**	**121**	**68**
Japan				
JA1CG	**A**	**295,117**	**522**	**199**
JA8BMK	"	140,447	309	167
JA7HYS	"	29,054	120	83
JH3GCN	"	23,256	119	72
JA1AAT	"	10,440	76	60
JA0KOH	"	5,658	49	41
JA3LWA	**28**	**241,501**	**497**	**169**
JA1ELY	"	157,170	366	155
JA6BSM	"	136,160	325	148
JA2CXV	"	93,184	280	128
JA3HZT	"	46,350	174	103
JA2MTM	"	44,135	176	91
JA8HWF	"	13,566	99	51
JA3ELU	"	11,550	82	55
JA5FMT	"	6,512	64	44
JA1DFQ	"	5,940	60	36
JA3VOT	"	5,400	51	45
JA9BKW	"	4,896	62	32
JA2CWX	**21**	**382,372**	**622**	**218**
JH3AXC	"	44,376	186	86
JH2EVL	"	39,867	145	97
JA3BUB	"	33,150	147	75
JA9EFN	"	20,254	173	41
JH3FYW	"	6,240	54	40
JA7NRJ	"	780	30	10
JH1EIG	**14**	**238,038**	**436**	**194**
JA2PJC		175,241	363	179
JA7YOJ	"	1,116	22	18
JA6YY	"	765	19	17
JA2BAY	**7**	**76,540**	**175**	**89**
KA2QW	**A**	**566,400**	**1068**	**192**
Lebanon				
OD5BA	**A**	**249,335**	**370**	**235**
OD5FE	**14**	**46,800**	**166**	**100**
Malaysia				
9M2IR	**A**	**15,873**	**167**	**96**
Singapore				
9V1QJ	**A**	**108,416**	**520**	**121**
9V1QD	**28**	**10,760**	**319**	**40**
Thailand				
HS5AFJ	**A**	**499,968**	**1044**	**248**
HS1AFP	**21**	**210,645**	**920**	**155**
U.S.S.R.				
Asiatic				
UA9MR	**A**	**467,820**	**816**	**230**
UA9QDX	"	286,450	523	170
UA9MP	"	268,345	498	205
UK9YAC	"	105,744	489	122
UA9CAA	"	24,490	125	79
UA9FBM	**28**	**146,200**	**490**	**136**
UV9EI	"	42,594	200	93
UA9MDY	"	18,727	191	61
RA9CJC	"	10,780	120	55
UA9WO	**21**	**137,034**	**525**	**138**
UA9TT	"	69,003	194	123
UW9CR	"	58,580	200	116
UW9WR	**14**	**702,350**	**948**	**275**
UA9MT	"	66,998	177	139
UA9WS	"	39,386	165	94
UAØZAR	**A**	**134,809**	**574**	**113**
UAØMI	"	29,465	305	71
RAØABE	**28**	**157,339**	**561**	**169**
Armenia				
UK6GAD	**14**	**19,738**	**106**	**71**
UG6JJ	"	9,360	75	48
Azerbaijan				
UD6HB	**14**	**44,280**	**178**	**90**
Kazakh				
UL7YR	**A**	**60,950**	**220**	**115**
Kirghiz				
UM8MAA	**21**	**116,610**	**463**	**130**
UM8FM	**14**	**128,128**	**352**	**154**
Tadjik				
UJ8JGJ	**A**	**86,698**	**303**	**134**
Europe				
Aland Islands				
OHØNJ	**A**	**7,105**	**64**	**49**
OHØAM	**3.5**	**159,712**	**490**	**161**
		(Opr. OH3XZ)		
Austria				
OE2EGL	**A**	**117,040**	**305**	**154**
Belgium				
ON5MG	**14**	**221,628**	**500**	**219**
Bulgaria				
LZ2KGO	**14**	**2,223**	**55**	**39**
Channel Is. (Guernsey)				
GC3YIZ	**A**	**72,062**	**260**	**137**
Czechoslovakia				
OK1APJ	**A**	**227,415**	**536**	**217**
OK1ADM	"	183,752	343	206
OK1KZ	"	11,550	114	75
OK3EA	"	8,967	70	61
OK1DVK	"	5,454	61	54
OK1AGQ	**28**	**13,664**	**87**	**56**
OK1AHZ	"	11,300	80	50
OK2ABU	"	11,205	90	45
OK1TA	"	7,695	57	45
OK3AS	"	4,440	63	24
OK2BKU	**21**	**249,345**	**666**	**135**
OK1MGW	"	73,649	267	103
OK1MP	"	32,075	145	93
OK1BEG	**14**	**128,248**	**379**	**164**
OK2ALC	"	1,100	27	25
OK2BEF	"	336	16	14
OK2BIQ	**3.5**	**66,820**	**275**	**130**
OK2PEQ	"	27,412	162	89
OK1AHI	"	14,262	108	71
OK2BFX	"	12,784	96	68
OK1JBL	"	6,336	63	44
OK1MWW	"	1,008	24	21
Denmark				
OZ3CE	**A**	**295,100**	**699**	**227**
OZ2LW	"	138,919	366	173
OZ6HS	"	13,937	114	77
OZ3KE	"	7,616	91	56
OZ8KU	"	5,883	70	53
OZ8MG	"	3,382	43	38
OZ3PO	"	2,883	33	31
OZ1XO	"	2,812	57	38
OZ7JZ	"	1,953	32	31
OZ1CZ	**21**	**38,480**	**214**	**65**
OZ6BF	**14**	**8,905**	**109**	**65**
OZ3SK	**7**	**34,532**	**134**	**97**
England				
G2AJB	**A**	**50,061**	**256**	**123**
G4ACQ	"	44,407	210	121
G3YWI	"	37,209	167	79
G4APA	**28**	**35,150**	**168**	**95**
G3TXF	"	31,494	168	87
G3WJN	**21**	**396,528**	**832**	**176**
G3FXB	**14**	**777,064**	**1142**	**274**
G3NSY	"	60,066	266	142
G3NLY	**7**	**177,288**	**313**	**166**
G5AHE	**3.5**	**59,520**	**246**	**124**
G3NOB	"	9,198	75	63
Finland				
OH1LW	**A**	**310,156**	**675**	**209**
OH2LU	"	54,625	259	125
OH2BMG	"	14,536	137	79
OH7SC	"	11,088	88	77
OH3JR	"	8,319	82	59
OH2BFX	"	2,981	52	42
OH2DN	"	1,250	28	25
OH2VZ	"	1,242	28	23
OH1UR	"	60	5	5
OH2BX	**28**	**88,320**	**283**	**120**
OH2XA	"	13,050	86	58
OH5PA	"	546	14	13
OH8SP	**21**	**41,796**	**210**	**108**
OH1ZK	"	6,096	58	48
OH2BCD	"	672	24	12
OH1AD	"	209	11	11
OH5TZ	14	2,240	38	35
OH1XX	**3.5**	**113,600**	**365**	**150**
OH3ZE	"	1,104	24	24
France				
F9MD	**A**	**202,781**	**435**	**199**
F2MO	"	738	21	18
F6BRK	**14**	**9,009**	**102**	**63**
F6AGM	**7**	**50,970**	**144**	**95**
Germany				
DK1FW	**A**	**293,538**	**552**	**241**
DK1YK	"	231,984	492	216
DK4YA	"	82,908	271	147
DL6WE	"	19,045	100	65
DL8PC	**7**	**154,560**	**317**	**168**



At age 14 Dave thinks he qualifies as being the youngest operator in the contest. With few openings to Europe from Texas, WA5ZNY found it tough running up a good multiplier, but he didn't do so bad for his first crack at 10.

DL4JW	**A**	**433,755**	**746**	**243**
DM2ATD	**A**	**955,008**	**1317**	**288**
DM3OML	"	77,004	270	124
DM2YLO	"	33,072	167	106
DM2BTO	"	31,030	158	107
DM2AJH	"	8,784	95	61
DM2DWL	**14**	**39,546**	**197**	**117**

Hungary

HA5CQ	**A**	**148,044**	**408**	**169**

Ireland

EI7CC	**14**	**33,320**	**246**	**119**

Italy

I6FLD	**A**	**1,046,163**	**1439**	**281**
I4ZSQ	"	769,378	1168	281
IP1WXY	"	9,315	92	69
I3MAU	**14**	**518,312**	**890**	**268**

Netherlands

PAØTO	A	714	18	17
PAØLVK	**14**	**20,064**	**134**	**96**

Norway

LA8RL	**A**	**168,504**	**383**	**177**
LA5QK	"	90,398	299	154
LA2GN	"	64,610	232	130
LA9OI	"	57,375	246	135
LA9WK	"	46,435	215	85
LA6U	"	27,467	124	121
LA2TO	"	21,716	241	61
LA8ZM	"	9,126	105	54
LA1NP	"	7,537	130	43
LA8OM	"	4,085	60	43
LA2SI	"	140	8	7
LA3LC	28	816	22	17
LA4LN	**21**	**72,771**	**268**	**127**
LA5KO	**3.5**	**18,480**	**120**	**77**

Poland

SP5XM	**A**	**102,668**	**338**	**159**
SP6AOI	"	97,848	392	151
SP9KR	"	69,678	327	147
SP8AWP	"	20,559	161	89
SP7AWA	"	5,814	64	51
SP8EMO	"	4,554	57	46
SP9AJM	"	1,518	34	33
SP6DXB	"	585	15	13
SP3DOI	**28**	**55,195**	**215**	**95**
SP5BSV	**14**	**107,793**	**398**	**177**
SP5CKM	"	95,681	346	163
SP3BQD	"	44,888	203	124
SP9ADU	"	24,780	141	105
SP5ENA	"	17,430	133	83
SP1BLE	"	11,573	136	71
SP5QU	"	8,905	93	65
SP5BB	"	7,752	94	68
SP9BLF	"	3,588	60	46
SP5DZI	**3.5**	**59,392**	**245**	**128**
SP3BLG	"	37,168	182	101
SP9DH	"	22,098	132	87

Portugal

CT1BH	**A**	**1,182,564**	**1449**	**307**
CT1QN	"	253,602	514	219
CT1ZG	"	39,930	196	121

Romania

YO3AC	28	2,220	37	20
YO6KAL	**14**	**34,684**	**244**	**116**
YO2IS/3	"	10,842	116	78
YO3JU	"	748	18	17

Scotland

GM5AXO	**A**	**66,250**	**240**	**106**

Sicily

IT9JT	**A**	**1,384,848**	**1747**	**326**

Spain

EA3VM	**14**	**28,728**	**239**	**108**

Sweden

SM5CSS	**A**	**747,980**	**1225**	**251**
SM5CAK	"	132,114	280	227
SM5DJZ/7	"	70,664	301	146
SMØCER	"	66,810	229	131
SM5QU	"	25,680	163	107
SMØBDS	"	21,505	132	85
SMØOY	"	17,556	99	76
SM7DER	"	5,250	74	50
SM7BBV	"	3,993	41	33
SM7TV	"	2,686	47	34
SM6BSM	"	826	21	14
SM6AOU	**28**	**37,076**	**151**	**92**
SM5CMP	"	33,345	147	95
SMØCGO	"	560	16	14
SM7AIL	**21**	**9,971**	**82**	**59**
SM7DMN	**14**	**150,154**	**627**	**193**
SM5GA	"	28,700	152	100
SM3EAP	"	16,290	135	90
SM6CKU	**3.5**	**142,556**	**352**	**157**
SM3EVG	"	**140,800**	**443**	**160**
SM4MI	"	13,464	104	68

Switzerland

HB9UD	A	1,080	21	15

Wales

GW4AES	**14**	**30,284**	**247**	**113**

Yugoslavia

YU3EO	**A**	**328,522**	**568**	**277**
YU2RAM	"	44,516	171	124
YU3APR	**28**	**11,948**	**85**	**58**

U.S.S.R.

European

UA4QX	**A**	**705,662**	**1294**	**258**
UA6PG	"	204,792	528	159
UA4SR	"	134,130	511	170
UA3XM	"	108,416	364	154
UA3XP	"	21,210	177	101
UA6WS	"	9,993	99	77
UA3IE	"	8,066	100	74
RA6HEE	**28**	**211,950**	**707**	**157**
RA3ACQ	**28**	**194,951**	**559**	**137**
RA6ADI	"	170,316	555	114
UW3UH	"	68,476	297	106
RA3MAH	"	59,942	271	88
UA3DBG	"	34,432	211	64
UA6HAC	"	20,213	309	41
UA4YAC	"	18,564	134	78
RA1AET	"	10,064	92	42
RA1AKZ	"	3,270	43	30
UA4WAD	"	1,960	44	35
RA3MMY	"	240	10	10
UW3GM	**21**	**653,130**	**1231**	**205**
UA4CZ	**21**	**564,096**	**931**	**226**
UA3OG	"	308,605	874	155
UW1BM	"	257,251	821	173
UA4LG	"	244,536	664	184
UW6LC	"	37,150	200	129
UA1LL	"	7,000	115	40
UW1CX	**14**	**487,416**	**919**	**276**
UW3EH	"	247,380	581	217
UA4AN	"	94,221	334	171
UA4AU	"	52,640	240	140
UA3JD	"	24,880	171	102
UA1NR	"	19,845	149	105
UK3ABO	**3.8**	**51,968**	**237**	**116**
UW3IN	"	39,346	207	103
UA1ALN	"	14,688	123	68
UW3RR	"	7,242	85	51
UA1WAF	"	1,824	60	19
UA3TN	"	1,296	38	24

Estonia

UR2QI	**A**	**48,015**	**304**	**99**
UR2ED	**28**	**8,022**	**72**	**42**
UR2OV	**21**	**9,964**	**100**	**47**
UR2FU	3.8	792	24	18

Kaliningrad

UA2EC	**3.8**	**59,664**	**260**	**113**

Latvia

UQ2DV	**A**	**92,272**	**369**	**158**
UQ2HO	21	3,399	49	33
UQ2CR	**14**	**34,800**	**256**	**120**
UQ2AO	**3.8**	**26,970**	**157**	**87**
UQ2NU	"	15,904	116	71

Lithuania

UP2AY	**21**	**61,642**	**266**	**98**
UP2ER	**3.8**	**75,392**	**295**	**124**
UP2PAD	"	54,288	228	116

Moldavia

UO5OAD	**A**	**44,460**	**230**	**76**
UO5BS	**3.8**	**15,498**	**123**	**63**

Ukraine

UB5CI	**A**	**545,700**	**926**	**300**
UK5MAG	"	182,664	502	177
UB5LU	"	65,296	344	154
RB5EDU	**28**	**208,956**	**599**	**132**
RB5VAS	"	52,248	226	84
UY5HB	"	39,737	217	79
RB5QAO	"	39,232	241	64
UK5OAF	"	24,200	253	100
RB5VAC	"	18,704	121	56
UB5JK	14	6,344	95	52
UK5AO	**3.8**	**29,040**	**153**	**88**

White Russia

UC2XW	3.8	1,656	36	23

Oceania

Australia

VK6CT	**A**	**754,134**	**1024**	**237**
VK4UA	**A**	**48,160**	**235**	**70**
VK4AK	"	19,125	88	75
VK3ACR	**28**	**40,869**	**242**	**57**
VK3XB	"	4,329	41	37
VK3SM	**21**	**54,975**	**269**	**75**
VK2APK	**14**	**765,810**	**1011**	**254**
VK3HE	**14**	**7,594**	**59**	**47**
VK3BBB	"	2,688	33	28

East Caroline Is.

KC6BK	**A**	**831,001**	**1805**	**157**

Gilbert Islands

VR1AA	**A**	**145,297**	**423**	**109**

Guam

KG6JBO	**A**	**289,179**	**978**	**99**
KG6ASP	**28**	**418,405**	**899**	**157**

Hawaii

KH6GMP	**A**	**846,720**	**1764**	**160**

TROPHY WINNERS

WORLD—Single Operator, Single Band. Jack Reichert, W3ZKH Trophy. Won by: **Emilo Jamil Khouri, PY2DSE** (21 mHz)

WORLD — Single Operator, All Band. Don Murray, K4FMA Trophy. Won by: **Scott Redd, XE1IIJ.**

WORLD—Multi-operator, Single Xmtr. Ted Thorpe, ZL2AWJ Memorial, awarded by Don Miller, W9WNV. Won by: **Station W4IZ/KV4.** (Oprs: K4BBF, W4DQD, W4PJD, WA4DWR)

WORLD — Multi-operator, Multi Xmtr. Chuck Swain, K7LMU Memorial, awarded by Don Miller, W9WNV. Won by: **Station WB6GFJ/6.** (Oprs: WB6GFJ, WA6BVY, WA6DIL, W60AT)

CANADA—Single Operator, Single Band. Gene Krehbiel, VE6TP Trophy. Won by: **R. J. Beck, VE7IG/VE8** (21 mHz)

Special CQ Award World Champions

Station 4X4GV. (Oprs: 4X4GV, 4X4DK, 4X4NJ, 4X4OC, 4Z4BG, 4Z4GV, 4Z4JT, 4Z4LF, 4Z4NKX)



Top all bander from Hawaii this year was KH6GMP who is not a new comer to the contest game, Gary having participated in many previous "Brawl."



Maybe this is one of the reasons why the individual entries from Brazil were so much lower this year. Seven of their crack operators went multi, trying for top honors from club station PY7BDX. They didn't quite make it and had to settle for 2nd place. L. to R.—PY7AOJ/Sal, PY7APR/Luiz, PY7-AZQ/Fred, PY7APS/Gerson, PY7AKW/Bart, PY7-DX/Leao. Alex, PY7PO got stuck with the picture taking.

KH6HQL	"	110,014	409	94
WB4RCC/KH6		4,700	55	25

New Zealand

ZL4BO	**14**	**246,708**	**485**	**178**
ZL1TB	"	23,855	129	65

Philippines

DU1FH	**A**	**1,175,388**	**1507**	**246**

Samoa (American)

KS6DH	**A**	**1,502,160**	**2312**	**220**

Western Samoa

5W1AR	**14**	**206,283**	**540**	**133**

Wallis Island

FWØAB	**A**	**460,203**	**1181**	**131**

South America

Argentina

LU5DDM	A	17,150	120	49
LU2DEK	**28**	**443,520**	**909**	**165**
LU6EAM	**14**	**122,920**	**309**	**140**

Brazil

PY7GV	**A**	**356,108**	**464**	**254**
PY7ASQ	"	233,655	426	185
PY2BZD	"	135,406	315	158
PY3APH	"	118,730	266	155
PY4KL	"	116,932	258	164
PY4AKL	"	99,120	259	140
PY4AKR	"	82,320	272	105
PY2FFG	"	34,680	140	85
PY3BDH	"	2,000	36	25
PY1MB	**28**	**300,885**	**538**	**195**
PY7VKZ	"	67,881	205	121
PY2DSE	**21**	**1,188,825**	**1230**	**363**
PY2EGT	"	48,060	187	95
PY2CAB	**14**	**679,014**	**1001**	**238**
PY7ACB	"	141,987	378	141
PY2DBB	"	41,715	152	103
PY1BOL	"	6,345	50	45
PY1HX	"	3,885	42	37
PY8JL	"	3,193	39	31
PY3CGP	**7**	**4,640**	**35**	**29**

Chile

CE8AO	**A**	**242,487**	**472**	**189**
CE3OE	**14**	**135,366**	**307**	**154**

Colombia

5K4DF	**A**	**1,367,520**	**2218**	**222**
HK3LT	"	105,062	270	131
HK1CMX	**14**	**122,430**	**259**	**159**

Ecuador

HC1RF	**A**	**1,469,925**	**1967**	**235**

Peru

OA6CM	14	2,996	43	28
OAN4AGR				
	3.5	**7,548**	**42**	**34**

Uruguay

CX1JM	**21**	**350,325**	**873**	**135**

Venezuela

4M7AV	**A**	**287,684**	**411**	**212**
YV5IZ	"	78,960	253	105

MULTI-OPERATOR

Single Transmitter

United States

WA3HRV		**2,359,816**	**2110**	**388**
W2PV		**2,007,108**	**1840**	**381**
W6HX		**1,708,003**	**2070**	**253**
W4FDA		**1,311,336**	**1350**	**351**
W6HVM		858,486	1385	199
WB5AAR/5		**544,504**	**907**	**232**
WB8IAY		**229,401**	**449**	**213**
WØKQU/0		**177,744**	**659**	**168**
W6VPZ		61,605	242	111
WBØGPE/0		39,087	193	101

North America

W4IZ/KV4		**2,903,094**	**3610**	**333**
VE7ANZ		**1,578,200**	**1851**	**325**
VE6AAD/6		**241,232**	**609**	**149**
WAØLAR/VE4		**60,208**	**248**	**106**

Africa

WA2BVU/3D6				
		1,901,284	**2080**	**308**
FB8XX		**60,120**	**235**	**90**

Asia

KA2DX		**566,082**	**987**	**198**
JH1YDT		**345,912**	**633**	**203**
HMØB		**172,584**	**745**	**141**

Europe

I4AUM		**2,454,096**	**2615**	**348**
4NØDX		**2,298,360**	**2592**	**358**
IP1RBJ		2,032,720	2368	334
DF1WA		**2,013,960**	**2036**	**390**
G3WYX		**1,791,536**	**1936**	**328**
FØZZ		**1,240,624**	**1560**	**308**
SK5AL		**1,177,784**	**1547**	**319**
DA1SU		**1,048,437**	**1131**	**309**
SK6AW		890,960	1308	280
PE2EVO		**801,361**	**1187**	**263**
SK5AA		**687,240**	**1051**	**276**
GC5AYC		**650,962**	**1033**	**271**
HA5KDQ		**579,828**	**1005**	**229**
HA7KLC		401,306	674	326
SK4DM		304,317	638	221
G4AYL/5		241,732	553	223
HA3KNA		147,420	398	234
YU2CBM		143,520	456	160
DK3II		140,352	393	172
SP6PZB		**131,376**	**432**	**184**
SP9KRT		126,158	507	171
OK3KGI		123,539	426	169
HA7KLF		96,368	329	152
SP6KDA		62,816	335	151
SK3AH		58,710	300	114
HA3KMA		47,853	208	117
HA5KFN		18,810	167	95
SKØAC		6,477	61	51

Oceania

VK4VU		**633,372**	**1158**	**188**

South America

PY7BDX		**2,791,479**	**2452**	**393**
PY1HU		275,990	500	193

U.S.S.R.
Club Stations

Asia

UK9OBI		**306,081**	**601**	**213**
UK9XAC		204,836	555	164
UKØSAA		87,414	650	102
UK9HAB		64,524	194	114

Europe

UK6LAZ		**1,754,102**	**1996**	**343**
UK3AAO		1,735,968	2086	321
UK3R		860,700	1405	285
UK3SAB		825,384	1476	289
UK2GAZ		**549,480**	**1003**	**228**
UK2GDZ		373,275	784	225
UK3YAB		274,833	494	261
UK5LAA		**230,340**	**655**	**220**
UK5VAE		181,902	539	213
UK4WAB		**177,072**	**553**	**204**
UK2GAR		67,728	298	136
UK5KAA		58,293	239	127
UK3DAV		36,716	230	137
UK3AAC		35,424	328	108
UK4LAC		24,645	222	89
UK2RAJ		13,266	111	62
UK2AAS		2,318	51	38

MULTI-OPERATOR
Multi Transmitter

4X4GV		**6,036,175**	**4827**	**415**
WB6GFJ/6		**1,745,272**	**2088**	**269**
W3SS		**1,609,285**	**1551**	**365**
SV1GA		**934,752**	**1468**	**312**
WA3LNM		**764,928**	**1001**	**302**
JA2YEF		**642,537**	**771**	**329**
WA1LKX		**458,120**	**748**	**260**
WB9BPG		**416,577**	**631**	**239**
WB6JOD		**122,445**	**391**	**135**
SK1AQ		**109,386**	**312**	**177**

Our thanks to the following stations who submitted their logs for checking purposes. CR7DE, CR7IK, DM2AXC, DM2-AYK, DM2BFK, DM2BUL, DM2-CGL, HA1ZH, JA1VWP, JA4GXS, LA1HI, LA2PC, LA4EI, LA8SJ, OH-1MA, OHIVQ, OH2BEA, OH1NH, OK3CAW, RA3DIJ, SM1CNS, SM-5AQB, SM5BNX, SM7RS, SP1AGE, SP5JB, UA1CK, UA3DAO, UA3QO, UA3VAQ, UA3XAW, UA4NAK, UA-6JAW, UA6JWW, UA9UF, UA9-154306, UB5EM, UF6GW, UK2RAL, UK3DBE, UK3MAA, UK3XAA, UK-5LAP, UK6FAA, UK6GAE, UK9-UAW, UKØAAB, UL7YP, UN1CC, UO5BZ, UQ2OH, UT5IB, UV3AB, UV3DM, UV3FD, UW3DZ, UW4-HW, UW4NH, UW4NP, UW6CV, UW6NQ, UWØFP, UWØIX, VE3-DOC, WA9UEK.

STATION OPERATORS

Multi-Operator Single Transmitter

DA1SU: WA6AXE, WAØTNW. **DF1WA:** DJ6RX, DK2BI, DK-9WB. **DK311** & DL8DC. **FØZZ:** F2QQ, F5HN, F6AZP, F6BHK. **FB8XX:** F6APG, F6BPS. **G3WYX:** G3HTA, G3RUV, G3RUX, G3TJW. **G4AYL/A** & GI3UKS. **GC5AYC:** DJ1GX, DJ4EI, DJ-6AP & XYL. **HA3KMA:** HA3PG & Club. **HA3KNA:** HA3NA, HA3NS, HA3NR. **HA5KDQ:** HA5FM, HA5FN, HA5HO, HA5-KO. **HA5KFN:** HA5LL, HA5-093, HA5-131 **HA7KLF:** HA7LR, HA7LW, HA7MI. **HA7KLC:** Club. **HMØB:** Club. **I4AUM** & I4BER, I4DLS, I4GAD, I4LCK. **IP1RBJ** & IP1MOL, IP1ONT, IP1PTP, IP1RB. **JH1YDT:** Club. **KA2DX:** KA2AD, KA2DD, WA3RHR, WA5IIS, WB6CGM. **OK3KGI:** Club. **PE2EVO:** PAØIB, PAØMJK, PAØMS, PAØRCT, PAØRE, PAØPFW, PAØ-PJS, PAØPWA. **PY1HU** & PY1DEF. **PY7BDX:** PY7AKW, PY7AOJ, PY7APR, PY7APS, PY7AZQ, PY7DX, PY7PO. **SKØAC:** SM5RN, SMØAFT, SMØOY. **SK4DM:** SM4CLR, SM4-3434, SM4-3958, SM4-3964. **SK5AA:** SM5ACQ, SM5EOS, SM5ESP, SM5EUL. **SK3AH:** SM3AJL, SM3COL, SM3FUA. **SK5AL:** K2LZO, SM5BGK, SM5DFM, SM5DKH, SMØDSG, SMØGM. **SK6AW:** SM6CJK, SM6CNX, SM6CVE, **SP6KDA:** Club. **SP6PZB:** SP6FAF, SP6-5057. **SP9KRT:** SP9EIK, SP9-EPF, SP9EUR, SP9ZW, SP9-2236, SP9-1753, SP9-1759. **VE1ANZ** & VE1ACU, VE1ASJ, VE1DH. **VE6AAD/6** & VE6AN, VE6GS, VE6LB. **VK4VU** & VK4VV. **W2PV** & WA1PQA, W2-GUH, WA2EAH, WA2JJN, WA2KTV, WB2VJB, WB2WSH. **WA2BVU/3D6** & ZS6BLK. **WA3HRV** & W3AZD, WA3CGE, WA3IAQ. **W4FDA** & WB4EYX, WB4IAE. **W4IZ/KV4:** K4BBF, W4DQD, W4PJD, WA4DWR. **WB5AAR/5** & WB5AOF. **W6-HVN** & K6CAZ. **W6HX** & WB60LD, WB6VFJ. **W6VPZ:** K6HRT, K6KH, K6YPT, W6CFM, W6LYY, W6YOJ. **WB8IAY** & WA8-UUY. **WØKQU:** WAØTKJ, WAØYMK. **WAØLAR/VE4** & WAØ-MUD, WBØDJY. WBØCPE/Ø: 5 Oprs. **YU2CBM:** Club. **4NØDX:** YU1BCD, YU1NZV, YU1PCF, YU1QBC, YU1SJ, YU3EY.

Multi-Operator Multi Transmitter

JA2YEF: Club. SK1AQ: Club. SV1GA & SV1EN. **WA1LKX** & WA1LKU, WA1LAK. **W3SS:** WA3JLT, WA3LRN, WA3LRO, WA3NNA, WA3OAY. **WA3LNM** & VE3BAW. **WB6GFJ/6** & WA6BVY, WA6DIL, W6OAT. **WB6JOD:** K6QJZ, W6KHS, W6-MSR, WA6OAA, WA6OHO, WA6OSQ, WA6QYB, WA6UAY, WB6MVK, WB6SZY. **WB9BPG** & K9HDP, K9LNX, WB9CEP. **4X4GV** & 4X4DK, 4X4NJ, 4X4OC, 4Z4BG, 4Z4GV, 4Z4JT, 4Z4LF, 4Z4NKX.

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CQ Reviews:

The Leader Model LDM-810 Grid-Dip Meter

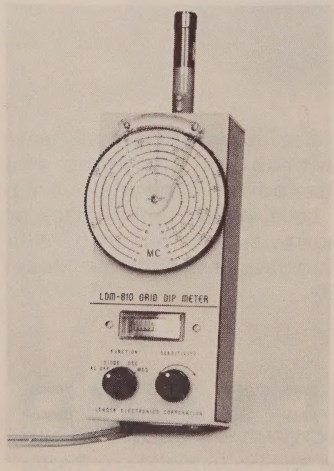
BY WILFRED M. SCHERER,* W2AEF

THE grid-dip oscillator (g.d.o.) is a most useful piece of gear to have on hand when working with r.f. equipment. It is no wonder, then, that a recent survey conducted by *CQ* indicated that the g.d.o. ranks high in popularity among the test instruments owned by radio amateurs. For those not aquainted with this device, its uses will be briefly outlined a bit later.

A new version that has recently entered the market is the Leader Electronics Corporation's Model LDM-810 Grid-Dip Meter. This job employs a Nuvistor with six plug-in inductors with overlapping ranges to provide a frequency coverage of 2-250 mHz.

A special feature of the LDM-810 is a built-in 1 kHz a.f. oscillator for modulating the g.d.o. Other customary features are: oscillate or diode mode of operation, meter sensitivity control, phone jack. In addition, one-hand operation is provided. The instrument functions from either a 100-115 or a 200-230 v.a.c., 50/60 Hz, source using a built-in power supply.

*Technical Advisor, *CQ*.



The Leader Electronics Model LDM-810 Grid-Dip Meter. The function switch is at the lower left, the sensitivity control is at the right.

Details

The LDM-810 employs a 6CW4 in the conventional manner using a Colpitts oscillator circuit as shown at fig. 1. A 500 μa indicating meter operates in a current-balancing circuit, providing the desired sensitivity. Heater and plate potentials are obtained from a power transformer with the B-plus derived from a half-wave silicon-rectifier circuit. Two primary windings at the power transformer may be connected in parallel or in series for the 115 or 230 v. operation respectively. The required change in primary connections is made by a slide switch installed inside the instrument. The a.f. oscillator is a neon-bulb type.

A gear reduction-drive setup at the tuning capacitor allows about 350 degrees rotation of the dial for the full rotation of the variable capacitor, thus providing some bandspreading of the scale. The dial wheel is knurled at the edge where it also extends slightly beyond the perimeters of the case, making possible tuning by the same hand that holds the instrument, and thus permitting the one-hand operation.

The meter is an edgewise-mounted type. The plug-in inductors are identified by letter to coincide with related letters at the various scales on the dial.

The size of the unit is 6¾" L. × 2¾" W. × 2" H. and it weighs 1¾ lbs.

Operation

The function switch has four positions: A.C. OFF; DIODE; OSCILLATE; and MODULATION. These operating functions are primarily used for the following:[1]

[1]For explicit details see: "Using the Grid-Dip Meter," *CQ*. May, June, July 1968, pages 43, 28 & 70 respectively.

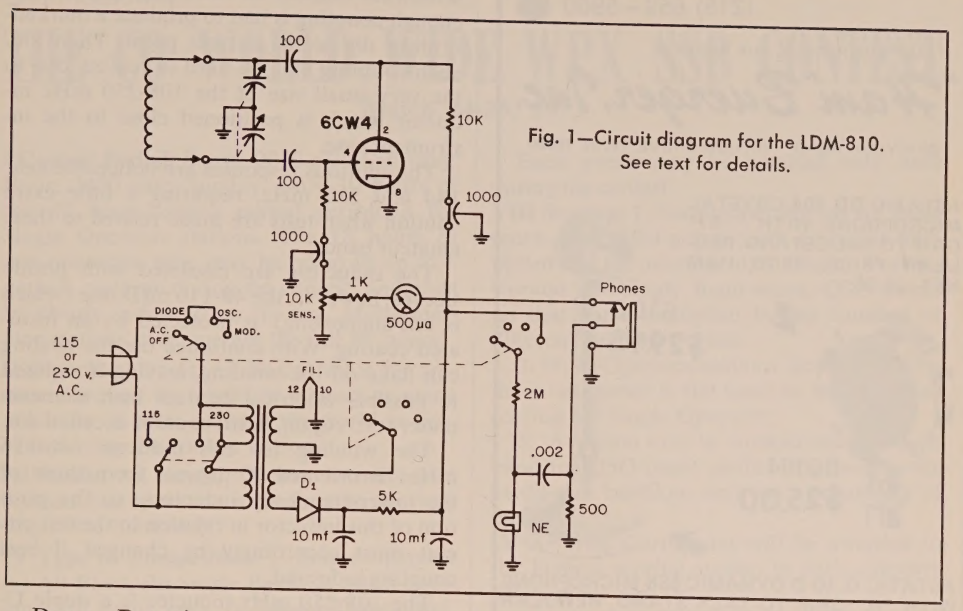


Fig. 1—Circuit diagram for the LDM-810. See text for details.

DIODE: Detecting the presence of r.f. in energized circuits in which case the device functions as an absorption-type wavemeter or frequency meter. Such use is handy for determining if r.f. is produced at a circuit and its frequency, for checking parasitics, harmonics, neutralization, etc.

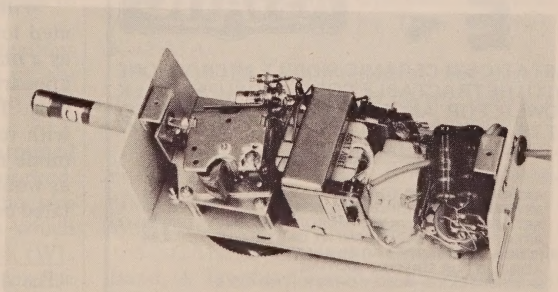
OSCILLATE: Determining the resonant frequency of *de*-energized circuits such as at tuned elements of r.f. gear, at TVI- or signal-rejection traps, filters, antennas, transmission-line sections or stubs, etc; use as an r.f. signal generator for receiver servicing or alignment; use as an r.f. driver for a low-power r.f. bridge such as an Antennascope; checking values of inductance, capacitance and *Q*.

MODULATION: Use as a modulated r.f.-signal generator for easy identification of the signal, especially to facilitate signal tracing on receivers.

Performance

A good attribute of the LDM is that the oscillation response is quite uniform with little overall variation of the meter when the instrument is tuned across any one range when it is not coupled to an external circuit.

Although not quite as good as with a g.d.o. having a more sensitive metering system, pronounced dips were evidenced at the resonant frequency of the circuit under test and with adequate coupling obtainable; however, on the two highest ranges (48-116 and 108-250 mHz) some spurious-response dips or peaks were experienced. These were found to be quite numerous on the top range, making the true resonant frequency of the test circuit



Interior view of the LDM-810. The Nuvistor tube is located in the background alongside the tuning capacitor at the left. A bracket on the power transformer supports the slide switch for changing operation between 115 and 230 v. line potentials.

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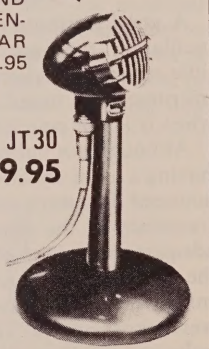
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somewhat difficult to ascertain, unless tight enough coupling is had to produce a markedly deep dip at the correct point. Then too, such coupling may be hard to realize, due to the very small size of the 108-250 mHz inductor which is positioned close to the instrument case.

The spurious responses are noticeable near 144 and 220 mHz, requiring a little extra caution when tests are made related to these amateur bands.

The inductors are insulated with plastic sleeves; however, the 48-116 mHz one (which is self-supporting) is protected by an insulated coating. With continued use the coating can flake off the winding, leaving it exposed to possible electrical contact with elements under test. Again, extra caution is called for.

The winding for this inductor (48-116 mHz) is oriented 90 degrees from those of the lower-frequency inductors, so the position of this inductor in relation to the test circuit must accordingly be changed if best coupling is desired.

The 108-250 mHz inductor is a single U-shaped loop (with a wire bar across its middle) and when it is plugged into the instrument, it is also oriented in a different plane than are the other ones.

Here too this must be taken into account when coupling is made to an external circuit.

The calibration accuracy of the LDM-810 was an average of 1% high at the low end of each range and 2% at the high ends with the correct frequency indicated about 1/8" lower than the dial reading at the hairline (indicating that the calibration might be brought just about on the nose by repositioning the dial on the drive shaft).

Operation in the DIODE mode was satisfactory with sensitivity on a par with other instruments using a 500 μa meter and under the coupling conditions mentioned above.

With the MODULATION mode, the modulated level was quite low as far as a.m. goes; as a matter of fact, no amplitude modulation appears on an oscilloscope r.f.-envelope display. This together with the results obtained with receiver observations indicates that this mode mainly provides frequency modulation as would more apt to be the case with a modulated oscillator.[2]

[*Continued on page 90*]

[2]The deviation increases as the sensitivity control is advanced which thus raises the modulating index.

Announcing

THE CQ WORLD WIDE WPX SSB CONTEST

March 24-25, 1973

I Contest Period: Starts: 0000 GMT Saturday. Ends: 2400 GMT Sunday. Only 30 hours of the 48 hour contest period permitted for Single Operator stations. The 18 hours of non-operating time may be taken in up to 5 periods anytime during the contest, and must be clearly indicated on the log. Multi-operator stations may operate the full 48 hours.

II Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III Bands: All bands, 1.8 thru 28 mHz may be used, but operation is confined to two-way single side band *only*.

IV Type of Competition: 1. Single Operator (a) All Band, (b) Single Band. 2. Multi-operator, All Band, *only*. (a) Single Transmitter, (only one signal permitted), (b) Multi-Transmitter, (one signal per band permitted).

V Exchange: Five figure serial number, RS report plus a progressive three digit contact number starting with 001 for the first contact. (Continue to four digits if past a 1000) Multi-Transmitter stations use separate numbers for each band.

VI Points: 1. Contacts between stations on different continents; count 3 points on the 14, 21 and 28 mHz bands, and 6 points on the 7, 3.5 and 1.8 mHz bands.

2. Contacts between stations in the same continent but not in the same country; count 1 point on 14, 21 and 28 mHz, and 2 points on 7, 3.5 and 1.8 mHz. (Exception: Contacts between different North American countries count 2 points on 14, 21 and 28 mHz, and 4 points on 7, 3.5 and 1.8 mHz. This applies to North American countries *only*.)

3. Contacts are permitted between stations in the same country for the purpose of obtaining a Prefix multiplier, but have no QSO point value.

VII Multiplier: The multiplier is determined by the number of different prefixes worked.

A "prefix" is considered to be the two or three letter/number combinations which forms the first part of an amateur call. (W1, W2, WA2, DL1, DJ, 4X4, 5A1 etc. See WPX rules.)

Each prefix may be counted only *once* during the contest.

VIII Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score, QSO points on that band multiplied by the number of different Prefixes worked.

2. Multi-Operated stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken only *once* regardless of the band.

IX Awards: Certificates will be awarded to the highest scoring station in each category listed under Sec. IV.

1. In every participating country.

2. In each call area of the United States, Canada and Australia.

All scores will be published. However to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single band award *only*. If a log contains more than one band it will be judged as an all band entry, unless specified otherwise. However a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

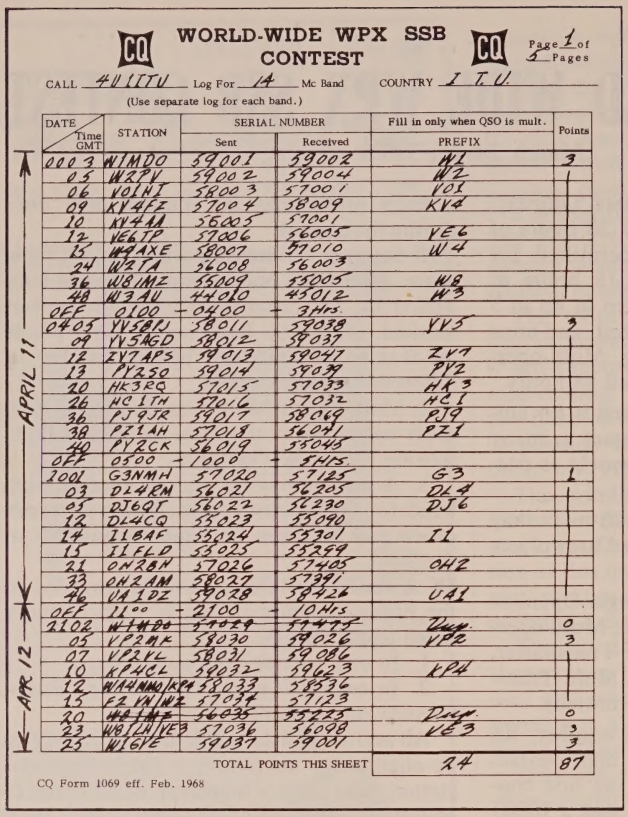
X Special Awards: 1. WORLD—Single Operator, Single Band. A Trophy donated by Jack Reichert, W3ZKH.

2. WORLD—Single Operator, All Band. A Trophy donated by Don Murray, K4FMA.

3. WORLD—Multi-operator, single transmitter. The Ted Thorpe, ZL2AWJ Memorial Award, donated by Don Miller, W9WNV.

4. WORLD—Multi-operator, multi-transmitter. The Chuck Swain, K7LMU. Memorial Award, donated by Don Miller, W9WNV.

5. CANADA—Single Operator, Single Band. A Trophy donated by Gene Krehbiel, VE6TP.



CQ WORLD-WIDE WPX SSB CONTEST CQ Page 1 of 2 Pages

CALL 4U1ITU Log For 14 Mc Band COUNTRY I T U

(Use separate log for each band.)

DATE / Time GMT	STATION	SERIAL NUMBER Sent	SERIAL NUMBER Received	Fill in only when QSO is mult. PREFIX	Points
APRIL 11					
0003	W1MDO	59001	59002	W1	3
05	W2PV	59002	59004	W2	
06	VO1NI	58003	57001	VO1	
09	KV4FZ	57004	58009	KV4	
10	KV4AA	56005	57001		
12	VE6TP	57006	56005	VE6	
15	W4AXE	58007	57010	W4	
24	W2TA	56008	56003		
36	W8IMZ	55009	55005	W8	
48	W3AU	44010	45012	W3	
OFF	0100	- 0400	= 3Hrs.		
0403	VV5BIJ	58011	59038	VV5	3
09	YV5AGD	58012	58037		
12	ZV7APS	59013	59047	ZV7	
13	PY2SO	59014	58039	PY2	
20	HK3RQ	57015	57033	HK3	
26	HC1TH	58016	57032	HC1	
36	PJ9JR	59017	58069	PJ9	
38	PZ1AH	57018	56041	PZ1	
40	PY2CK	56019	55045		
OFF	0500	- 1000	= 5Hrs.		
1001	G3NMH	59020	57125	G3	1
03	DL4RM	56021	56205	DL4	
05	DJ6QT	56022	56230	DJ6	
12	DL4CQ	55023	55090		
14	I1BAF	55024	55301	I1	
15	I1FLD	55025	55299		
21	OH2BH	57026	57405	OH2	
33	OH2AM	58027	57391		
46	UA1DZ	59028	58426	UA1	
OFF	1100	- 2100	= 10Hrs		
2102	W1MDO	59029	59005	Dupe.	0
05	VP2MK	58030	59026	VP2	3
07	VP2VL	58031	59086		
10	KP4CL	59032	59623	KP4	
12	WA4NNO/KP4	58033	58536		
15	FG7XN/FM7	57034	57123		
20	W8IMZ/VE3	56035	55223	Dupe.	0
23	W8IMZ/VE3	57036	56098	VE3	3
25	W1GVE	59037	59001		3
APR 12			TOTAL POINTS THIS SHEET	24	87

CQ Form 1069 eff. Feb. 1968

A sample log sheet already filled out. Official log sheets are available from CQ, see (XII) below.

Also a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant, have been obserevd.

7. Official log and summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available you can make your own by following the attached sample, with 40 contacts to the page.

6. USA—Single Operator, All Band. The Charles "Joe" Hiller, W4OPM Memorial. Donated by Jerry Hagen, WA6GLD.

XI Club Competition: No club award is planned at this time, however one may be given if sufficient interest is shown.

XII Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Use a separate sheet for each band.

3. Prefix multipliers should be entered *only* the FIRST TIME they are contacted.

4. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated.

5. A prefix check list is not only desirable but a *must* for proper contest operation. (It is recommended that you also send it along with your contest log.

6. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition and the contestant's name and mailing address in BLOCK LETTERS.

(Daystrom Limited has made an International Log Form which is available to Canadian amateurs. We will supply them with Summary Sheets. Write to: 1480 Dundas Highway East, Cooksville, Ontario.)

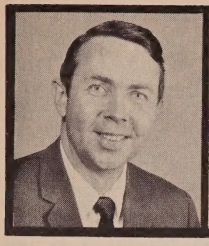
XIII DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct; taking credit for duplicate contacts; incorrect QSO's or incorrect prefixes will be deemed sufficient cause for disqualification.

Disqualification can also result in the disqualified operator(s) being barred from competition in all *CQ* contests for a period of up to three years.

Actions and decisions of the *CQ* Contest Committee are official and final.

XIV Deadline: All entries must be postmarked *no later* than May 1, 1973. In rare isolated areas the deadline will be made more flexible.

Logs go to: *CQ* WPX SSB Contest Committee, 14 Vandeventer Avenue, Port Washington, L.I., N.Y. 11050.



DX

BY JOHN A. ATTAWAY,* K4IIF

THIS writer had planned to operate from Liechtenstein during the *CQ* World Wide DX Phone Contest in October using my own call, HBØXTT. This contestpedition was planned with the help of the Top Tour Ham Club. However, personal tragedy intervened and on Oct. 23 my son and I received a message that my father had died in an accident in Florida on Oct. 21. Naturally we rushed home at once. My sincere thanks to Dr. Erwin Huber, HB9AG, who located us in a remote area in the high mountains on the Swiss-Italian border for delivery of the message, to the Orly Hilton Hotel in Paris who provided rollaway beds in the boardroom when all rooms were taken, and to the staff of National Airlines who smoothed our way through London and Miami and got us home sooner than expected.

De Extra

A Living Countries List? — There's More Than One Way: The two main schools of thought regarding an amateur radio countries list are those on one side who favor a very strict list with changes occurring only when geographic areas completely reorganize under new and/or separate governments, and those on the opposite side who favor a list which is always growing. If the first type of list were used, a person could work all of the countries of the world and his award would be almost as complete as in the case for WAZ. If the second type of list were used, as is the case for DXCC and the *CQ* C.W. and S.S.B. DX Awards, the chase continues indefinitely. The second type of list is sometimes called a "living" countries list.

This column has long advocated a strictly constructed list which closely follows the criteria required by the world community in defining a country, but as a majority of the *CQ* DX Awards Advisory Committee prefer the living list, and we accept the judgement of the Committee in all such matters, we use the ARRL DXCC list. However, with that list now containing well over 300 countries, it is becoming very difficult to keep it growing. The system has fallen back on a struggle to find odd bits of exposed rock and sand somewhere in the middle of an ocean, and designating them as countries. Some examples are Geyser Reef, Mellish Reef, Blenheim Reef, the famous St Peter and St. Paul Rocks, Serrana Bank and Bajo Nuevo. This has led to some controversy and criticism over the years and finally the supply of even rocks and reefs is giving out. Maybe there's yet a better way.

Anyone who has been involved in legal affairs, or who has followed the deliberations of the Supreme Court which frequently culminate in 5-4 decisions, is well aware that any complex set of rules and regulations is subject to widely differing interpretations. In many cases there are several choices which could be made in interpreting a rule, and the rules governing the countries list are no exception. Consequently, an alternate route to a living countries list lies through a re-evaluation of the rules used in the administration of the list. This re-evaluation would logically be done by the ARRL DXCC Advisory Committee.

An example of a simple case which might be subject to reinterpretation involves the Caroline Islands. Geographically speaking, this an an archipelago of some 938 islands stretching across 2000 miles of ocean, and is



The RTTY DXpedition 1972 to Vatican City from left to right: Edwin, HV3SJ; Carl, HB9P; and Willy, HB9HK. Equipment is Swiss made TU Model RT72 and Hal Devices RTTY Video Readout.

* P.O. Box 205, Winter Haven, FL 33880



Bill, ZD7SD, keeps things hopping on 20 meter s.s.b. from St. Helena. Look for him evenings in the lower 50 kHz of the U.S. phone band. *(Tnx Leo, K8PYD.)*

The WPX Program

S.S.B. WPX

717 .....WA4GWN 720 .....WB4SIJ
718 .....ZL1BKE 721 .....I2TPL
719 .....I8YRK

C.W. WPX

1213 .....JA8GR 1215 .....LU9FAN
1214 .....OK2BKI

Mixed WPX

358 .....WB6HDG 361 .....PAØLRK
359 .....JA1ILN 362 .....K6ZDL
360 .....WB4SIJ 363 .....JA3MXR

WPNX

51 .....WN2NYV

WPX Endorsements

S.S.B.: PAØSNG-800, W4IC-750, WA5-LOB-750, W6RKP-700, I8YRK-650, W2LEJ-550, W9GHO-450, SV1GA-450 and WA8TDY-400.
C.W.: PAØSNG-550, KØEKR-550, W4WSF-500, LU9FAN-500, OK3BJ-500, and WA5VDH-400.
Mixed: W4LRN-1250, PAØSNG-950, WA5LOB-750, SM7JV-750, PAØLRK-600, WB6HDG-500, K6ZDL-500, and W5QBM-450.
Europe: W2LEJ, OK2BKI and OK3AS
North America: VE3AAZ

Complete rules for WPX, WPNX and WPX may be found on pg. 67 of the February, 1972 issue. 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.

part of a larger group of islands called Micronesia. For governmental purposes the Caroline Islands are part of the U.N. Trust Territory of the Pacific with the United States as trustee. For amateur radio purposes the Caroline Islands are divided into 2 countries, the Western Caroline Islands and the Eastern Caroline Islands. This division was made long before this writer became a serious DXer and the reasoning behind it is not known to us. Perhaps the original reason is no longer valid.

At the present time, the Trust Territory of the Pacific is divided into 6 administrative districts. Each district has an independent district officer and staff, wth some degree of local government provided by the Micronesian people themselves who advise the 6 district administrators. The 6 districts are Palau, Yap, Truk, Ponape, the Marshall Islands and the Mariana Islands. The Marshalls (KX6) and the Marianas (KG6R,S,T) are already recognized as amateur radio countries. However, Palau, Yap, Truk and Ponape are 4 island groups of the Carolines which make up only 2 countries on the amateur radio list. It would seem that an excellent case could be made for dropping the rather arbitrary Western and Eastern Caroline entities from the list and adding Palau, Yap, Truk and Ponape, to give a net gain of 2 countries.

There are other situations on the list which are subject to similar re-evaluation, and De Extra hopes to explore some of these with you from time to time in future columns.

160 Meter News

As the sunspot cycle declines, DX on the lower frequencies is gradually improving and 160 enthusiasts can look forward to more frequent openings, even into the spring and summer months. For example, Lee, EL2CB, caught a good opening with low QRN last *July 30,* and had S 4-7 contacts with W1, W2, W4, W8, VE3 and others. Lee comments that DX on 160 is like the good old days before 20 meter s.s.b. became so competitive. No jamming, no obscene remarks, in short DXing on 160 is still a gentleman's hobby. Lee is no newcomer either, he has over 300 confirmed.

W1BB reports that his 1000 ft. "Beverage" antenna is back up and that results are super. Signals which are Q 3-4 on his 500 ft. horizontal Vee are a solid Q5 on the "Beverage." QRN is considerably reduced and Stu copies

signals which would be impossible on other antennas.

Congratulations to Charlie, W2EQS, and Ralph, W1HGT, on working all continents (WAC) on 160. The final contact for Charlie was supplied by EP2BQ in Iran, which gives him 83 confirmed countries on 160.

Jim, W6BHY, used his Signal One to put two new countries on 160. The calls were VR1W and KB6DA from the British Phoenix Islands and American Phoenix Islands respectively. If you still need cards for these two, send your s.a.s.e. and QSL to W6CUF. Incidentally, we are told that both of these countries are from the *same shack*. This is one of the oddities of the countries list.

Al, W2BP, made the most comprehensive, island-hopping DXpedition ever devoted to 160 when he made his trip to St. Martin, Montserrat, Dominica, Martinique, St. Lucia, St. Vincent and Grenada last year. He totalled 243 QSO's with 54 different stations using a T4X and R4B.

PY1DVG and EI9J report good activity for their pioneer 160 meter transequatorial tests. See W1BB's 160 meter DX bulletin for full details.

Two New DX Organizations

Two important new DX groups have been formed recently on opposite coasts. On the west end of the spectrum is the Northern California DX Foundation which has incorporated under the laws of the state of California as a charitable foundation. Organizing trustees include some of the most prominent 6-land DXers, with W6BH as President, W6ISQ—Vice President, W6MAV—Secretary, K6KQN—Treasurer and K6DC, W6HVN and WA6AUD as Trustees. WA6AUD is also editor of the popular West Coast DX Bulletin. The Foundation is regarded as a new approach to fostering good will through amateur radio.

Meanwhile back east, a group of DXers in the Washington, D.C. area have founded the National Capital DX Association with 20 charter members, 12 of whom are also members of the Potomac Valley Radio Club. The officers are W3ZNH—President, WA3KSQ—Vice President and W3BWZ—Secretary. This Association has hosted gatherings in Washington for VU2KV, PY2PE/PA, WØEXD/KC4, 5X5NA, K7CBZ (XV5AC) and W1YRC and has plans for future DXpedition sponsorships.

Slow Scan TV Endorsement

The *CQ* DX Awards Advisory Committee has just approved a proposal by Jack, VE3GMT, for a SSTV endorsement sticker in the *CQ* 2XSSB DX Award program. We have selected 50 countries as an initial level of achievement for DXers using this relatively new mode. Stickers should be ready by March 15, and Award Manager WA6GLD will accept applications after that date. Two-way SSTV cards for contacts prior to March 15 *will* be acceptable for the endorsement. Jerry just asks that you hold your applications until he has everything ready to go.



The XV5AC group gave many DXers a new one when permission was granted to operate from Saigon. Left to right are Dave, Chester, Fred and Don. *(Tks Bob Beaudet, W1YRC, QSL Manager for XV5AC.)*

The WAZ Program

S.S.B. WAZ

1037	JA1WPX	1040	VE2AFC
1038	JA2HNP	1041	DK3VD
1039	W8SET	1042	DK3SD

C.W.-Phone WAZ

3443	WB6HDG	3452	W4EAL
3444	OE6MKG	3453	W4ZSH
3445	W9AZP	3454	DL9EY
3446	OZ8WH	3455	DJ2EA
3447	W1MIJ	3456	DJ30B
3448	WA8OSE	3457	OK2AOP
3449	DJ4VP	3458	UK3PG
3450	K2MFY	3459	HB9AMO
3451	WA9UEK	3460	3D6AX

Phone WAZ

479	W7JNC	480	OD5AU

Complete WAZ rules are shown on pgs. 64-66 of the June, 1970 issue of *CQ*. 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, FL 33880.



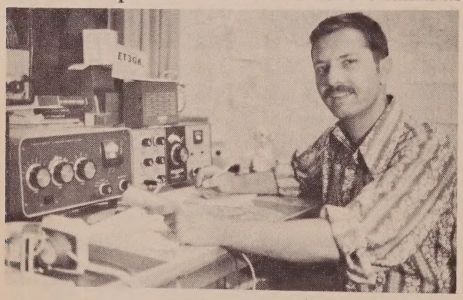
Chuck Purdy, K5LAN/KG6, Station Manager for KG6ALV on Guam.

Some Rare Countries

Bouvet—If you hear 3Y4CG or 3Y4DQ, work them and quick. These are calls reportedly assigned to a Norwegian scientific group going to very, very rare Bouvet Island in January. If you worked VKØAAD within the past 4-6 weeks, you contacted a brief operation from equally rare *Heard Island* by the KC4AAD group. *(Tnx West Coast DX Bulletin.)*

Serrana Bank—The U.S. has apparently relinquished its claim to Serrana Bank and Roncador Cay. A controversy over ownership now seems to be developing between Columbia and Nicaragua. If the YN-claim sticks, these reefs may no longer qualify as separate countries as they seem to be too close to the mainland. However, this is for the ARRL DX Advisory Committee to decide.

Kamaran Island—At presstime, ET3ZU had cancelled his VS9K plans as a consequence of rumored military operations in the area. It was felt that the motives of a stranger busily transmitting radio signals might be difficult to explain to armed forces not familiar with amateur radio.



This smiling face belongs to Bill, ET3GK, who recommends W2PPG's African Net, 2000 hours on 21350 kHz, as a good route for Generals needing contacts with African countries. QSL ET3GK via W2BCU or to Box 472, MAAG, APO New York, N.Y. 09319.

Rare Prefixes

The recent *CQ* World Wide DX Contests produced a big surge in special prefix activity keeping active WPX'ers on the go all weekend. Just south of the border, Bill, XE-1AK, was active as XD1AK and Pete, XE-1IX, was signing XI1IX PLUS 6D1CI by XE1CI, 6D1TX by XE1TX, 6F1J by XR1J, 6G1AA by XE1IIJ, 6I1AZ by XE1AZ and 6J1M by XE1FFC. The Brazilian group was active again with PI1RRS and PW1DVG to name a couple, and the Iranian stations were using the special 9C9 calls instead of the usual EP's. Incidentally, 9C9TW says to QSL via GI3HXV. Down Nicaragua way, YN-1DS operated HTØA with QSLs to be directed to DL3OH, and over across the pond CT1SH was active as CT7SH with cards to go via CT1VE. YX5AJ was Venezuelan Radio Club Station YV5AJ. There were many others but not being able to operate in the contest this year kept us from getting a complete list.

Geoff Watts *DX News Sheet* has a special feature on unusual prefixes Some of those Geoff has logged recently, with times and frequencies, are as follows: *EL4B*, 14317 at 1620 GMT; *FC5*RV, 14187 at 1735; *GD5*BBG, 14281 at 1722; *HG8*KVG, 28550

The CQ DX Award Program

C.W. DX

105 .....SP5HS

S.S.B. DX

236 .....I2TPL	240 .....WØBWJ
237 .....W7CUJ	241 .....W6RKP
238 .....WB4TPU	242 .....KØZFL
239 .....CEØAE	

CQ DX Award Endorsements

C.W.: SP5HS-150
S.S.B.: VE3GMT-300, WB2EZU-150, W3AZD-Low Band and W3AZD-28 mHz.

Complete rules for the CQ DX Award Program may be found on pg. 58 of the January, 1971 issue of *CQ*. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, CA 91722, or to the DX Editor.

WPX HONOR ROLL

The WPX Honor Roll is based on confirmed current prefixes which are submitted by separate application in strict conformance with the *CQ* Master Prefix List. Scores are based on the current prefix total regardless of an operators all-time prefix count.

MIXED

WALRN	1197	DL1MD	866	SM7TV	752
W8LY	932	W4IC	850	K8UDJ	750
VE3GCO	925	YU1AG	837	CT1LN	749
W2NUT	924	W4BQY	818	WA5LOB	749
F9RM	921	W9WHM	811	K2AAC	733
DJ7CX	895	G3DO	810	KØBLT	733
W3PVZ	893	W4CRW	798	WB4KZG	720
ON4QX	886	W3GJY	797	PY4AP	715
WA6MWG	886	W4WSF	789	K2ZRO	708
PAØSNG	882	WØAUB	785	WA6EPQ	689
W8ROC	882	I6SF	780	K6SDR	686
DL1CF	872	W6ISQ	758	W8GMK	683
K1SHN	867	W6TCQ	755	WAØCPX	656

CW

W8LY	928	DJ7CX	730	I6SF	639
W8KPL	910	G2GM	707	W6ISQ	638
DL1QT	844	K1SHN	696	K1LWI	629
W2HO	825	OK2DB	693	W8GMK	628
W2AIW	813	YU1AG	675	K2ZRO	612
VK3AHQ	809	K2AAC	666	VO1AW	605
ON4QX	804	SM5BNX	652	VE4OX	600
WB2FMK	740	W4IC	652	OK2QX	598
W9FD	740				

SSB

W4NJF	1031	W9DWQ	826	I8KDB	790
CT1PK	930	IØAMU	812	WØYDB	784
DL9OH	841	HP1JC	800	DL1MD	774
PAØSNG	758	I1ZV	716	W6RKP	678
WA5LOB	747	W4IC	702	I4ZSQ	669
K2POA	733	K1SHN	697	I8YRK	662
F2MO	730	W3DJZ	694	I4LCK	608
G3DO	719	ZL3NS	685	WB6DXU	604

at 1215; *HH2*JT, 14315 at 1800; *HMØ*B, 14198 at 0950; *JF1*BMG, 14032 at 0810; *JF1*EBC, 21050 at 0200; *JX7*HL, 14292 at 1825; *JY8*DX, 28570 at 1230; *TG7*WT, 14183 at 1850; *TGØ*AA, 21209 at 1348; *VA8RA*, 14189 at 1658; *YOØ*XPO, 14280 at 0640; *5N5*ABG, 14140 at 0621; and *5Z5*NSA, 14260 at 1834. These times are European observations in many cases and may not correspond to times heard in the western hemisphere.

VA6NQ, active during the fall months, commemorated the 50th anniversary of the Calgary Amateur Radio Club. QSLs go to the VE6 Bureau. If you worked WR5OAR and need a card try WA5ZNY.

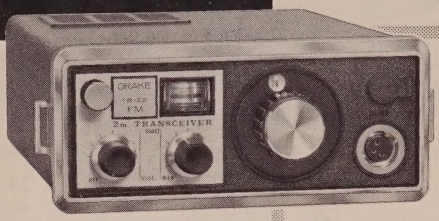
Those Tough Four Zones

Activity from the Siberian areas has picked up considerable in recent months, particu-

[*Continued on page 90*]

DRAKE TR-22

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Over-the-shoulder, mobile, or at home

Completely transistorized, compact, portable. Capacity for 6 channels. Built-in telescoping antenna, and connector for external antenna. Use barefoot or with accessory amplifier. External 12 VDC or internal ni-cad batteries, built-in 120 VAC battery charger.

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GENERAL: • Freq. coverage: 144-148 MHz • 6 channels, 3 supplied • Push-to-talk Xmit • DC Drain: Rcv, 45 mA; Xmit, 450 mA • Size: 5-3/8" x 2-5/16" x 7-1/8", 3-3/4 lbs.

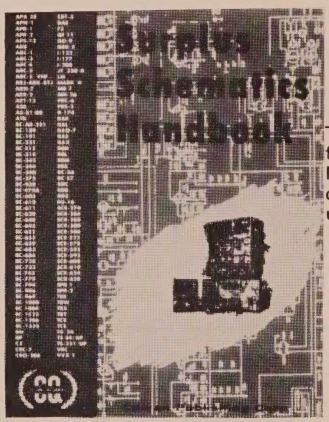
RECEIVER: • Transistorized crystal-controlled superhet • 1st IF: 10.7 MHz, 2nd IF: 455 kHz • Ant. Input Imped: 50 ohms • Sensitivity: 1 μV or less/20 dB S+N/N • Audio Output: 0.7 W • Built-in speaker.

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SURPLUS SCHEMATICS HANDBOOK



Partial list of contents:

ARC1	ART13	BC640	SCR284
ARC33	BC189	BC728	SCR506
ARC5	BC344	RAX	SPR2
ARC7	BC610A	SCR274	TBW

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.

$2.50

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is enclosed. Please send _____ copies of the SURPLUS SCHEMATICS HANDBOOK.

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Address _____

City _____ **State** _____ **Zip** _____



Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Feb.	3-4	Space Net VHF Contest
Feb.	3-4	Ten-Ten Net QSO Party
Feb.	3-4	ARRL DX Phone Contest
Feb.	10-11	QCWA QSO Party
Feb.	10	CCHSRC "Operation's"
Feb.	10-11	VK National Field Day
Feb.	10&18	World SSTV Contest
Feb.	17-18	ARRL DX C.W. Contest
Feb.	17-25	IARC Propagation CW/RTTY
Feb.	24-25	French Phone Contest
Feb.	24-25	YL-OM Phone Contest
Mar.	3-4	ARRL DX Phone Contest
Mar.	10-11	Worldwide VHF Contest
Mar.	10-11	YL-OM C.W. Contest
Mar.	10-11	Israel DX Contest
Mar.	11	WAB HF Phone Contest
Mar.	17-18	ARRL DX C.W. Contest
Mar.	**24-25**	**CQ WW WPX SSB Contest**
Mar.	24-26	BARTG Spring RTTY
Mar.	25	WAB HF C.W. Contest
Mr. 24-Ap. 1		IARC Propagation Phone
Apr.	1	WAB LF Phone Contest
Apr.	8	WAB LF C.W. Contest
Apr.	13-16	County Hunters SSB
Apr.	14-15	Space Net VHF Contest
Apr.	21-22	Bermuda Phone Contest
Apr.	28-29	DARC RTTY Contest
May	5-6	Bermuda C.W. Contest
May	5-6	Helvitia 22 Contest
June	17	WAB VHF Phone Contest

Space Net VHF Contest

Starts: 6:00 P.M. Saturday, February 3
Ends: 6:00 P.M. Sunday, February 4

Mailing deadline for logs is Feb. 28th and they go to: Space Net VHF Contest, Att: WB2MTU, Box 909, Sicklerville, N.J. 08081

ARRL DX Contest

Phone: February 3- 4 and March 3- 4
C.W.: February 17-18 and March 17-18
Starts: 0001 GMT Saturday
Ends: 2359 GMT Sunday

QST has all the information. Logs go to: ARRL Communications Dept., 225 Main Street, Newington, Conn. 06111.

QCWA QSO Party

Starts: 0000 GMT Saturday, February 10
Ends: 2400 GMT Sunday, February 11

Several small modifications were made in the rules after those published in last month's Column were submitted.

Add the following calls to the officers list. K3UIG to K7UGA and KV4AB to W2KW. Also add W2NQR.

Each contact with a member counts one point. A multiplier of 1 is earned for each State, VE province and Mexican member worked. DX countries however are 2 multiplier points. (Alaska and Hawaii are DX) The above is for Continental members. All overseas members however receive a multiplier of 2 for each US state worked. The extra multiplier points for working an officer applies to both continental and foreign members.

Sounds pretty complicated to me. The rest of the rules as published last month should be OK, I hope.

Mail your log to: L. F. Heithecker, W5EJ, 1409 Cooper Drive, Irving, Texas 75060

CCHSRC "Operation's Day"

8:00 A.M. to 8:00 P.M., Sat. Feb. 10

The boys have had special cards printed for this affair. Send your QSL's to: Colonie Central High School Radio Club, WA2DNR, 100 Hackett Avenue, Albany, N.Y. 12205. Details in last month's CALENDAR.

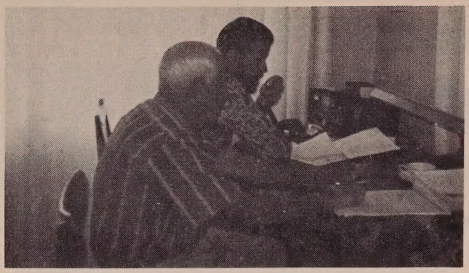
French DX Contest

Starts: 1400 GMT Saturday, February 24
Ends: 2200 GMT Sunday, February 25

This is the Phone section, the C.W. portion was run off last month. All the rules appeared in last month's CALENDAR.

Logs go to the REF Traffic Mgr., Lucien Aubry, F8TM, rue Marceau 53, 91120 Palaiseau, France.

*14 Sherwood Road, Stamford, Conn. 06905



Father and Son act in Afghanistan. Whit, YA1RA (K2GRV) at the mike, and the OM Jeff, YA1GTZ (K2GTZ) at Whit's QTH in Kabul. Jeff visited his son last October and brought the voice of Central Asia into many ham stations throughout the world. QSL's for his operation may be had from K2GTZ's state-side address.

Ten-Ten Net QSO Party

Starts: 0000 GMT Saturday, February 3
Ends: 2400 GMT Sunday, February 4

This activity is limited to members of the Ten-Ten International Net of Southern California which claims to be the world's largest net, on 10 meters?

Exchange: Name, QTH and 10-10 number.

Scoring: One point for each member worked, 1 extra point if it is a DX member, YL/XYL or head of a Chapter.

Awards: There are 1st and 2nd place certificates to winners in each US and VE call areas as well as continental and other DX areas.

Logs go to Grace Dunlap, K5MRU, P.O. Box 445, La Feria, Texas 78559, and must be received by March 15th. Include a s.a.s.e. for results.

VK National Field Day

Starts: 0600 GMT Saturday, February 10
Ends: 0800 GMT Sunday, February 11

This is the John Moyle Memorial Field Day organized by the Wireless Institute of Australia.

It's an inter-continental affair but overseas contacts are encouraged and welcome. Activity will be on all h.f. and v.h.f. bands, and DX contacts should not be difficult on 20, 15 or 10 meter bands if conditions are favorable.

Certificates will be awarded to the two overseas stations contacting the most Australian portable/mobile stations.

Send your reports to: The Wireless Institute of Australia, Att: Peter Brown, VK4PJ, P.O. Box 638, Brisbane, Queensland, 4001, Australia.

French 1972 Contest Results

C.W. U.S.A.

W8VSK	46,200
W1TS	40,158
W5WZQ	39,783
WB2JYM	35,109
W3ARK	33,642
W4BJ	19,992
W8DSO	11,781
W9LKI	5,967
W9KXK	5,508
W3KPI	5,247
W9HE	2,310
W4HOS	420
W3GN	3

No. America

KG4CS	2,772
VE1AE	3,666

Phone U.S.A.

F2YS/W2	76,869
W9TLU	4,644

No. America

VE2AFC	288,219
VE3GCO	14,976
VE8YC	6,588
VE4RP	2,250
VO1AW	1,040

World SSTV Contest

Two Periods:
1500-2200 GMT Saturday, February 10
0700-1400 GMT Sunday, February 18

This is the 3rd annual Slow Scan Television Contest sponsored by *CQ Electronica* magazine of Italy.

All authorized amateur frequencies, 3.5 thru 28 mHz, may be used. (The TVers have their own established spots)

Contacts must be made by SSTV mode only and it is not permitted to use other modes of transmission any time, before, after or during the transmission.

Exchange: Picture and number of contact.

Scoring: Score one point for each complete exchange, and a multiplier of 10 for each continent, and 5 for each country worked. (Use the ARRL country list plus each W/K and VE call areas.) The same station may be contacted only *once* regardless of the band.

Final Score: Total exchange points times the sum of the continent/country multiplier.

Awards: 1st, 2nd and 3rd place winners will receive 12 months, 6 months and 6 months free subscriptions to *CQ Electronica*. There is also a special s.w.l. prize.

Participants are expected to observe fundamental rules of courtesy and operating during the contest exchanges.

Logs must be received by March 20th and go to: Prof. Franco Fanti, via A Dallolio 19, 40139 Bologna, Italy.

IARC Propagation Contest

CW/RTTY: February 17 to 25
Phone: March 24 to April 1
Starts: 0001 GMT Ends: 2400 GMT

There are no rule changes from last year. The dates have been purposely planned to coincide with major contests in order to get a maximum number of reports. Contacts with stations in other activities may be scored by supplying the correct IARC Zone number.

Categories: Single band, all band, mobile

and s.w.l., single operator only.

Exchange: RS/RST plus your CPR Zone.

Scoring: One point per contact, and a multiplier of one for each Zone and IARC country worked, on each band. You may work stations in your own zone but for multiplier credit only, no QSO points.

Final Score: Total QSO points multiplied by the sum of Zones and Countries worked. (If all band, sum from each band.)

The same station may be worked as many times as desired. Contacts lasting more than 6 minutes or a fraction thereof, may be credited as a separate QSO, but each must be logged separately.

Use separate log sheets for each band and mode, and note time in GMT only. Official log sheets, and CPR Zone map and official IARC country list are available from K4ZA. It is not necessary to use the official form, a facsimile with 40 contacts to the page may be used.

Awards: Certificates to the winners in each Zone in each category.

Logs and all inquiries go to: L. M. Rundlett, K4ZA, 2001 Eye Street, N.W., Washington, D.C. 20006.

YL-OM Contest

Phone: Feb. 24-25 C.W.: Mar. 10-11
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

Its the YL's working the OM's in this one. All bands may be used but cross-band or Net contacts do not count.

Exchange: QSO no., RS(T) and your ARRL section or country. (See QST for ARRL section list, usually on page 6)

Scoring: One point per QSO, multiplied by the number of ARRL sections and countries worked. The same station may be worked once only regardless of the band.

There is also a power multiplier of 1.25 for stations running 150 watts or less input. (300 watts p.e.p. if on s.s.b.) Multiply your score by above factor.

Phone and c.w. are separate contest and requires separate logs.

Awards: Certificates to the highest scoring YL and OM in each US and VE call districts and in each country. There are also 4 Trophies for the Top YL and OM in each contest and 2nd and 3rd place certificates for the runner-ups.

Mailing deadline is April 1st to: Eila Russell, WA8EBS, 4348 W. 223rd Street, Fairview Park, Ohio 44126.

Claimed Scores 1972 CQ WW DX Phone Contest

Single Operator All Band

4M4UA	5,409,315
KH6RS	5,331,072
6G1AA	4,069,764
EA4LH	2,744,119
W6RR	2,405,430
G3LNS	2,175,173
KH6IJ	2,027,475
W2PV	1,790,019
WB2SQN	1,560,564
W9MIJ/4	1,214,220
W4ZCY	1,124,214

28 mHz

CX3RP	422,124
K4YYL	355,320
CR7FR	354,000
ZS3CJ	233,369
JA3LWA	232,648
K6SVL	194,812
K8ULU	120,324
K6RU	106,200
K7IDX	68,400
W5QGZ	84,640

21 mHz

G3HCT	629,847
KH6BZF	567,736
EP2TC	565,740
WA1PID	438,200
WB2VYA	254,779
DU1GJM	169,818
W5QNY/VE3	111,398
SP5BSV	102,626

14 mHz

OH2BAD	508,810
VE6MP	379,308
W4WSF	308,783
KH6IAB	277,833
WA6IQM	228,478
K9PPY	201,894
CT7ZW	146,804

7 mHz

HR1RF	399,542
4M1BI	157,320
W3PHL	104,554
JA2BAY	61,572
K6CQF/6	25,300
WB4TPU	13,516

3.5 mHz

CN8HD	55,366
K6ERT	24,192
VE3BBN	23,001
W1GQO	22,330

1.8 mHz

KV4FZ	7,881
DL5KS	114

Multi-Operator Single Trans.

ZP5AQ	2,031,976
DKØAA	1,643,994
K9CUY	1,348,508

Multi-Operator Multi-Trans.

W4GIW/VP7	5,533,328
KS6DH	5,488,856
DLØWW	5,334,537
WB5DTX	3,781,148

World Wide V.H.F. Activity

3:00 P.M. March 10 to 10:00 P.M. March 11 (Your Local Time)

The Itchycoo Park VHF ARS is again sponsoring this contest to activate the v.h.f. bands and allow hams to renew old acquaintances and make new ones.

Use all v.h.f. bands and mobile operation is encouraged. (Satellite contacts are permitted)

Exchange: Your call, county and state or province. (Each county if mobile)

Scoring: Multiply number of contacts, times number of counties, times number of states worked.

Awards: Certificates to each station scoring 100 points on six or 50 points on two meters. And a certificate to the Top station in each state or province. Each band is considered a separate entry but a station may enter one or both bands, a separate log for each band.

Mailing deadline is April 15th to: Itchycoo Park VHF ARS, Att: WA3NUL, P.O. Box 1062, Hagerstown, Maryland 21740.

Worked All Britain Contest

The "WAB" contests are 12 hour affairs from 0900 to 2100 GMT on the dates listed in the Events Box.

The following rules are for over-seas stations other than the British Isles. Contacts made during the contest may be applied for the WAB awards.

Bands: LF — 1.8, 3.5, 7 mHz. HF — 14, 21, 28 mHz. VHF — All above 30 mHz.

Exchange: RS/RST and QSO number. Stations in the UK will also give their county and WAB area number.

Scoring: Each contact is worth 5 points. The same station may be worked on different bands for QSO points but not a multiplier.

The multiplier is determined by the different UK WAB areas worked.

Final Score: Total QSO points times the WAB area multiplier.

Awards: Certificates to the leading stations in each country and each VE, VK and W/K call areas. There are also awards for s.w.l. logging stations in the contest.

Logs go to: Cannock Chase ARS, Att: C. J. Morris, G3ABG, 24 Walhouse Street, Cannock, Staffs., England.

Editor's Notes

Complete rules for this year's WPX SSB Contest appear on page 63. No changes from previous years, rest periods totaling 18 hrs.

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B.A.R.T.G.

U.S.A.			
WA2YVK	127,338	W2DUS	35,280
WA6WGL	92,022	W7CBY	34,224
WB6RXM	89,112	W7TZL	28,006
W3KV	84,976	W4AIS	23,046
K5ARH	83,600	K7BVT	21,352
W2LFL	81,942	W7HFH	11,280
K4VDM	74,320	W4ZLH	10,208
W9AE	69,186	W8KZM	7,160
WA8GVM	68,406	W1BFS	5,026
K8ILL	62,280		
WØMT	57,188	**No. America**	
W7KS	54,320	KZ5LF	132,080
WAØTLT	42,962	KL7GRF	125,280
W5TZB	40,820	VE2AXO	9,760
W7IU	39,850	FM7AJ	9,230
W6AEE	39,208	VE5TO	4,960

D.A.R.C.

U.S.A.			
WB6RXM	23,049	W6AEE	1,560
W3KV	10,879		
K5ARH	8,052	**No. America**	
W5EUN	7,040	KL7GRF	17,232
WA6WGL	6,920	KZ5LF	12,348
W8CQ	4,576	KG4FK	8,056
W2VAQ	1,748	VE4SC	512
		VE5TO	84

S.A.R.T.G.

U.S.A.			
K2PAR	72,630	K8ILL	12,875
K5ARH	59,130	WA6IDQ	12,450
W2LFL	58,500	WB6QFE	6,670
K6WZ	51,570	WØNP	5,100
W3KV	46,655		
WB6IMP	46,060	**No. America**	
W4CQI	40,885	KZ5BH	107,360
W5TZB	39,690	KZ5LF	66,395
W6IZJ	34,960	VO2AF	63,270
W7KS	21,000	KL7GRF	62,320
W5EUN	19,550	XE1YJ	45,540
W8CQ	15,390	VE5TO	9,630
W6AEE	14,725	VE4SC	8,370
		FM7AJ	1,330

1972 RTTY Contest Results

and double QSO points for contacts on 40, 80 and 160 still remain the same. Don't forget, the prefix multiplier is counted only once, not once per band. And please indicate your total number of valid contacts on your summary sheet. And your mailing address should be one that is valid 8 to 10 months after the contest.

Conditions for the recent W W Phone Contest were terrific, just as George Jacobs had predicted. However they were not so good for the c.w. week-end, also just like George had indicated. Personally I didn't think they were quite that bad, so don't know if we should give W3ASK 100% for his 1972 predictions or not.

The list of Phone claimed scores are a cross-section of only a few of the "early bird" logs received, so don't go jumping to any conclusions.

73 for now, Frank, W1WY



Propagation

BY GEORGE JACOBS,* W3ASK

THE Swiss Federal Solar Observatory, the world's official keeper of sunspot records, reports a monthly mean sunspot number of 55 for October, 1972. This results in a running smoothed sunspot number of 74, centered on April, 1972. During the period between August, 1971 and April, 1972 the sunspot cycle *increased* by 9 smoothed numbers, when it should have been on the decline.

While the smoothed sunspot number for April, 1972 is the latest available, there are several indications that this temporary rise in solar activity is at an end, and that the cycle is again declining. A smoothed sunspot number of 48 is forecast for February, 1973.

Declining solar activity, coupled with normal seasonal changes in shortwave propagation conditions, is expected to result in considerably *fewer* 10 meter DX openings during February and the early spring months. While some fairly good openings may still be possible on north-south paths, and on paths between the northern and southern hemispheres, few, if any are forecast on east-west circuits to Europe and the Far East. Whatever 10 meter openings take place during February are most likely to occur during the hours of daylight.

Fifteen meters should be optimum for world-wide DX propagation conditions during most of the daylight hours. Good openings are forecast during February to almost all areas of the world, with generally strong signals and little fading. The band should open shortly after sunrise, and remain open to one area of the world or another through the late afternoon and early evening hours.

Excellent DX propagation conditions are forecast for 20 meters shortly after sunrise and again during the late afternoon and early evening hours. Some openings may occur during other daylight hours as well, and the band may remain open during the hours of darkness to southern and tropical areas.

Fairly good DX propagation conditions are forecast for 40 meters from late afternoon, through the hours of darkness and continuing through the sunrise period. Exceptionally high signal levels are expected during some DX openings on this band during February.

A seasonal increase in static levels usually begins during February, and this is expected to produce somewhat higher noise levels on 80 and 160 meters. Some fairly good DX openings, however, are forecast for 80 meters during the hours of darkness and the sunrise period. An occasional DX opening may also be possible during the same period on 160 meters.

V.H.F. Ionospheric Openings

Auroral displays tend to occur somewhat more frequently during February. This should make possible an increased number of shortskip openings, ranging in distance from a few hundred up to approximately 1300 miles, on both 6 and 2 meters. Such openings, usually characterized by flutter fading, result from the intense regions of ionization that accompany auroral displays. Check the "Last Minute Forecast" at the beginning of this column for those days during February ex-

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For February, 1973

	Rating & Forecast Quality			
Propagation Index	(4)	(3)	(2)	(1)
Date				
Above Normal: 2, 7, 13-14, 21-22, 27	A	A	C	C
Normal: 1, 3, 6, 8, 10-12, 15, 19-20 23, 26, 28	B	C	D	E
Below Normal: 4-5, 9, 18, 25	C	D	E	E
Disturbed: 17, 24	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 (3) will be fair on Feb. 1, and excellent on Feb. 2, etc.

* 11307 Clara Street, Silver Spring, Md. 20902

pected to be disturbed or below normal. These are the days on which auroral propagation is mostly likely to occur.

Trans-equatorial propagation (TE) improves as spring approaches, and some openings may be possible on 6 meters during February, especially between southern regions of the USA and South America. The best time to check for TE propagation is between 8 and 11 P.M., local time.

No significant meteor showers are scheduled for February, so few, if any meteor-type ionospheric openings are likely to occur.

This month's *Propagation Charts* contain band opening predictions for major DX paths for the period February 15 through April 15, 1973. A short-skip propagation forecast for February appeared in last month's column. Instructions for the proper use of these *Charts* appear earlier in this column. ■

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

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

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

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

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 the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 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* to the 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 GMT, etc.

5. The Charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. 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.

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

[*Continued on page 88*]

Amateur FM Comes of Age



TEMPO/CL 220

As new as tomorrow! The Tempo Commercial Line VHF transceivers offer commercial performance at amateur prices. Both units include an audio limiter to assure constant deviation at all times and an instantaneous impulse squelch. Microphone, power cord, mounting bracket and one pair of crystals is included.

- Frequency Range: 220-225 MHz (2 MHz operating range)
- Number of Channels: 12 channel capability for transmit and receive
- RF Power Output: 10 Watts or 3 Watts.
- Audio Output: 2 Watts minimum w/internal speaker (at less than 10% distortion)
- The price: $329.00 w/out power supply

TEMPO/CL 146

- Frequency Range: 146-148 MHz
- Same general specifications as CL 220
- The price: $279.00



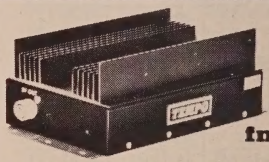
TEMPO/fmp

Truly mobile, the Tempo/fmp 2 meter 3 watt portable gives amateurs 3 watts, or a battery saving ½ watt, FM talk power anyplace at anytime. With a leather carrying case included, this little transceiver will operate in the field, in a car, or at home with an accessory AC power supply. The battery pack is included. The price: $225.00 (Accessory rechargeable battery available: $22.00)



TEMPO/fmv 2

So much for so little! This little 10 Watt VHF FM transceiver offers high quality performance and features usually found only on more expensive units. Features such as AFC on receive and separate switchable Transmit/Receive sections. Includes mounting bracket, heavy duty power cord and provisions for accessory AC power supply. Frequency: 146-148 MHz, 11 channels, 25 KHz channel spacing. 13.8 VDC ±10% operation (standby −100 ma, receive −150 ma, transmit−3.0 amp.) $199.00



TEMPO/TPL high power fm amplifiers

MODEL NUMBER	POWER INPUT	POWER OUTPUT (min)	BAND	PRICE
TPL1002-3	5 to 25W	100-135W	2M	$220.00
TPL1002-3B	1-3W	80W	2M	$235.00
TPL802	5W	80W	2M	$180.00
TPL802B	1 to 3W	80W	2M	$195.00
TPL502	5 to 15W	35-55W	2M	$105.00
TPL502B	1 to 3W	45W	2M	$130.00
TPL252-A2	1W	25W	2M	$ 85.00
TPL445-10	1 to 2.5W	12W	440MHz	$125.00
TPL445-30	4W	30W	440MHz	$215.00
TPL445-30B	1W	30W	440MHz	$235.00

TCP 12A Control Head . . . $32.00



TEMPO/fmh

So much for so little! 2 watt VHF/FM hand held. 6 Channel capability, solid state, 12 VDC, 144-148 MHz (any two MHz), includes 1 pair of crystals, built-in charging terminals for ni-cad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone. $189.00

TEMPO/6N2

The Tempo 6N2 meets the demand for a high power six meter and two meter power amplifier. Using a pair of Eimac 8874 tubes it provides 2000 watts PEP input on SSB and 1000 watts input on CW and FM. Completely self-contained in one small desk mount cabinet with internal solid state power supply, built in blower and RF relative power indicator.

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

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THE awards PROGRAM

BY ED HOPPER,* W2GT

Special Honor Roll
All Counties

#85—Dot Dickenson, K5BTM, 10-24-72.
#86—Arnie C. Bachmann, K9DCJ, 11-1-72.

THE February, "Story of The Month," as related by "Gil" is:

Gilmer V. Barber, W4IZR
(All Counties #84, 8-21-72)

"First of all, I would like to say thanks to all the hams and mobile operators for making it possible for me to attain the magic figure of USA-CA-3079 #84, dated August 21, 1972. This took me nearly ten years to reach this goal, but it has been worth all the time that went into the effort.

"For an old man of 56, having been born a North Carolinian during World War #1, I have resided within forty miles of my original birthplace. I attended Gupton Jones School of Mortuary Science and have followed the profession of Funeral Director and Embalming for the past 38 years. This is one of the reasons for taking so long to attain the magic figure, as my work required most of my time.

"I am married to one of the Mississippi belles by the name of Ginny and she is one of the greatest and has been my partner in crime for all the years of County Hunting. We have a daughter who resides in Dayton, Ohio along with a grandson. They have all been a part of the team as drivers or loggers on the many mobile trips we have made, giving out counties.

"I was licensed during World War II and prior to that time was an avid s.w.l. I acquired the call W4IZR in 1946 and spent several years working for WAS and DXCC. 1962 was the year we stumbled upon the County Hunter Net on 40 meters. The bug bit us and in 1967 we decided to go on s.s.b. and work the Independent County Hunters on 20 and 80. That same year we went mobile and started passing out counties from many states and have enjoyed that phase as much as receiving them.

"I would like to say thanks to K5KDG, Steve, who agreed to get me my last county for 3079, Bradley in Arkansas. Also I would like to use your column to thank all the net controls.

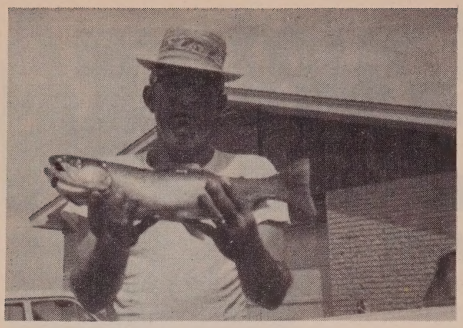


Gil Barber, W4IZR.

USA-CA HONOR ROLL

3000		1500		500	
K9DCJ	107	WB4SLS	198	SP3DOI	915
		W4YWV	199	WA4TZP	916
2500		K9DCJ	200	WB2AIO	917
W8RSW	139	1000		W4YWV	918
K9DCJ	140	W4YWV	281	WB2ZOW	919
2000		WA5YSC	282	W1DOM	920
K9DCJ	164	K9DCJ	283	WA4EPH	921

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



Gil Baker, W5QPX, such a big help to out of states County Hunters and other hams, shown enjoying another hobby.

"Besides radio, we like to surf fish and am a member of Civitan Club and the First Methodist Church of Lexington. I have been associated with many different groups, but I can say—The County Hunters are the greatest. The XYL and I have attended Meetings in Fayetteville, Knoxville, Kansas City and Peoria, and hope that we can make the next one in Fort Wayne. We will continue to work for the program and still be active on the County Hunters Net. Thanks for a swell job you are doing Ed., see you on the Net."

Our records show that Gil applied for USA-CA-500 on September 10, 1963. Then on February 1, 1971 he acquired 1000, 1500 and 2000 endorsed All 14, All SSB, All Mobiles and 2500 endorsed All SSB as well as 3000 endorsed All Phone and then August 21, 1972 he was issued All Counties endorsed All Phone.

Awards Issued

As per the Special Honor Roll, 2 more County Hunters have qualified for All Counties. It would have been nice to issue #88 to Dot Dickenson, K5BTM, but in order to do so and not foul up all the records, she might have had to wait for weeks, months (?), until #s 85, 86 and 87 were issued, so Dot decided to take #85 as of October 24, 1972. Another reminder that starting with #85, a charge of $15.00 will be made to cover about half the cost of the Plaque. Those not wanting to pay the $15.00 can receive a New fully endorsed Award for $1.00.

Arnie Bachmann, K9DCJ, after getting USA-CA-500 back in July 1967, waited until he had them *all* before again writing. He received All Counties #86, endorsed Mixed; 3000 endorsed All Phone; and 2500, 2000, 1500 and 1000 endorsed All SSB.

Frank Koval, W8RSW was issued USA-CA-2500 endorsed All A-1.

Emil Bitterlich, WB4SLS keeps plugging and received USA-CA-1500 endorsed All 14; All SSB; All Mobiles.

Bill Collins, W4YWV gave me a little work checking his USA-CA-1500 All SSB; 1000 and 500 All 14; All SSB; All Mobiles. Wonder if he realizes that no matter what equipment he has, he can always claim he has "Collins" equipment? Hi. . . .

Bill George (M.D.), WA5YSC found time to make it USA-CA-1000 endorsed all SSB.

Leszek Fabjanski, SP3DOI pleased me by sending (via Ken, W2KF) for USA-CA-500. "Les" puts in a FB s.s.b. signal.

Mixed 500 awards were sent to: Sonny Hayes, W1DOM; Charlie Lambert, WA4-EPH; and Mike Garrison, WA4TZP.

Dennis Bookmiller, WB2AIO claimed USA-CA-500 endorsed All 7; All SSB.

Bob Rossi, WB2ZOW made USA-CA-500 endorsed All Mobiles; All A-1.

Awards

U.S. Naval Research Laboratory Certificates/QSLs: This year the Naval Research Laboratory celebrates its 50th Anniversary and as a part of this celebration, plans to honor the amateurs worldwide by providing commemorative QSLs and a certificate for those who work any five of the Laboratory's amateurs or its Club Station, W3NKF. The program of events will start on 1 January 1973 and continue throughout the anniversary year.

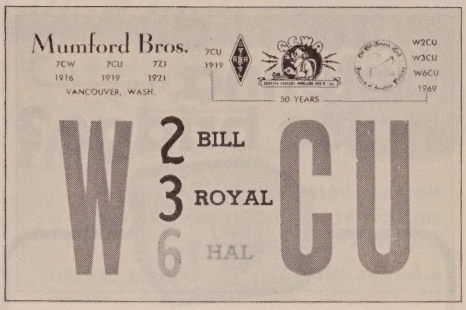
The Naval Research Laboratory owes much to the amateurs world-wide because in the early days these amateurs helped Dr. A. Hoyt Taylor, ex-9YN, Mr. Leo Young, ex-9PC, W3WV and Mr. L. A. Gebhard, ex-8AG, by providing many ranges of contact points for establishing the early understanding of radio propagation by ionospheric reflection. The early paper by Dr. Taylor and Dr. E. O. Hulbert of NRL appeared in the Institute of Radio Engineers Proceedings in 1926. This paper is still a classic reference on radio propagation. In 1925 when the U. S. Fleet sailed to New Zealand and Australia it carried NRL's shortwave equipment with Fred Schnell, 1MD, of the ARRL Headquarters, as the Fleet Radio Officer. Again the Navy communicated with amateurs throughout the world to test its new shortwave communication equipment. In much the same way the amateurs around the world talked

with the U. S. Navy dirigible *Shenandoah* on its fateful transcontinental journey in 1924. In 1928 Admiral Byrd's South Pole Expedition, using radio equipment provided by NRL, was in constant communication with radio amateurs to keep it in contact with the outside world while in the frozen Arctic.

Although activities will last the year, concentrated activity of a contest-like nature will take place 23 June through 15 July. Included will be operation on s.s.b., c.w., RTTY, v.h.f., SSTV, and E. M. E. (Moon Bounce). For more details see CONTEST CALENDAR by Frank Anzalone, W1WY or write for full details to the Coordinators of the different activities: Overall plan, W3BLC; CW, SSB, RTTY, W3MFJ, W3SRA, W3WOX; VHF, W3SFY, W3BDK; SSTV, WA9GVK, WB4YTU; E.M.E., W3KE; Operation NRL stations W3NKF—W3KVC.

WAVE Award: As promised last month, here are the latest rules on the Awards issued by the Nortown Amateur Radio Club, VE3NAR of P. O. Box 356, Adelaide Street Postal Station, Toronto, Ontario, Canada. Yes, I have been receiving letters telling me of their improved service in processing applications. A sworn affidavit, certified by a President or Vice President of a legitimate Amateur Radio organization, or a commissioner for taking affidavits, may be submitted in lieu of QSL cards. For *W*orked *A*ll *VE*, submit QSLs to verify QSOs with 2 different stations on 2 different bands in each of the following 8 sections: Prince Edward Island or Nova Scotia or New Brunswick VE1, Quebec VE2, Ontario VE3, Manitoba VE4, Saskatchewan VE5, Alberta VE6, British Columbia VE7, and Northwest Territories VE8. All contacts must be made from an area within a radius of 150 miles of one point and after January 1, 1939. Submit the 16 QSL cards with $1.00 or 10 IRCs. All cards will be returned, return postage (Canadian or IRCs) must accompany all submissions.

WACAN Award: *W*orked *A*ll *Can*ada Award also sponsored by VE3NAR requires QSL cards to verify QSOs with 2 different stations on 2 different bands in each of the following 12 sections. Prince Edward Island VE1, Nova Scotia VE1, New Brunswick VE1, Quebec VE2, Ontario VE3, Manitoba VE4, Saskatchewan VE5, Alberta VE6. British Columbia VE7, Yukon or Northwest Territories VE8, Labrador VO2, and Newfoundland VO1. All contacts must be made from



Special W2, W3, W6CU QSL.

an area within a radius of 150 miles of one point and after January 1, 1939. VO contacts must be made after March 31, 1949. Submit the 24 QSL cards with $2.00 or 20 IRCs. All cards will be returned, return postage (Canadian or IRCs) must accompany all submissions. Cards submitted for WACAN can be automatically applied towards the WAVE Award (If WAVE Award is desired, please indicate so).

WACAN Award: For holders of WAVE Award, produce QSL cards to verify QSOs with 2 different stations on 2 different bands in the remaining 4 sections. Labrador VO2, Newfoundland VO1 and the two remaining VE1 provinces not submitted for WAVE. Submit the 8 QSL cards, WAVE Award No. and $1.00 or 10 IRCs. All cards will be returned, please submit return postage.

SCA Swedish Communes Award: In 1962 the Swedish Parliament resolved that Sweden would have 272 commune blocs. In order to increase the interest in contacts with Swedish Amateurs, the Club SK5AJ will issue this SCA in 6 different classes starting



Recognition Award for support of KC4DX Navassa Expedition.

what is an antenna noise bridge?



Antenna Noise Bridge (an-'ten-a noiz brij), n. Omega-t's name for a specialized testing device that checks your antenna system for resonant frequency and coaxial impedance.

Obtain maximum efficiency by determining the resonant frequency for any type of antenna with the solid state, self-contained Antenna Noise Bridge...

Two models...TE7-01 for 1-100 MHz range, $29.95...the TE7-02 for 1-300 MHz range, $39.95.

Sold through amateur radio dealers or direct from the factory.

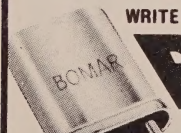
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with 50 confirmed communes on up to 272. Also available for SWLs. In order to keep track of your progress and also needed for your application is the *Record Book* which may be obtained for 3 IRCs from Club SK-5AJ, Awards Manager, Box 46, S-591 01 Mutala 1, Sweden.

Mumford Brother TRIPLE CU QSL: The Mumford Brothers issue this unusual QSL for contacts with the 3. Bill, W2CU; Royal, W3CU; and Hal, W6CU. They have been active since 1916 as 7CW, 1919 7CU, 1921 7ZJ and W2CU was formerly W2DIH. W3-CU was formerly W7AZX and W6CU was formerly W6FAR.

Notes

Had a nice visit to the ARRL Hudson Division Convention at Tarrytown, N.Y. October 21. Met many old and new friends (including my bosses from *CQ*). Sorry I was unable to attend on the 22nd, and thus missed seeing some English and U.S. FOC Friends. Riding to Tarrytown with former New York City residents, Boris, W2IBC and Bob, W2HWB, I was reminiscing about visiting some radio club meetings back in the 1920s (when I was real young). I also remembered visiting W2FZ and being very impressed with his transmitter mounted on a very large panel (probably slate in those days) with many huge meters on it. I had not seen Frank, W2FZ since that time, but in one of the rooms during a lecture I happened to see the back of a certain fellow and at once recognized Frank and had to tell him of our meeting so many years ago. I was happy to see he was honored with a special Plaque at the banquet.

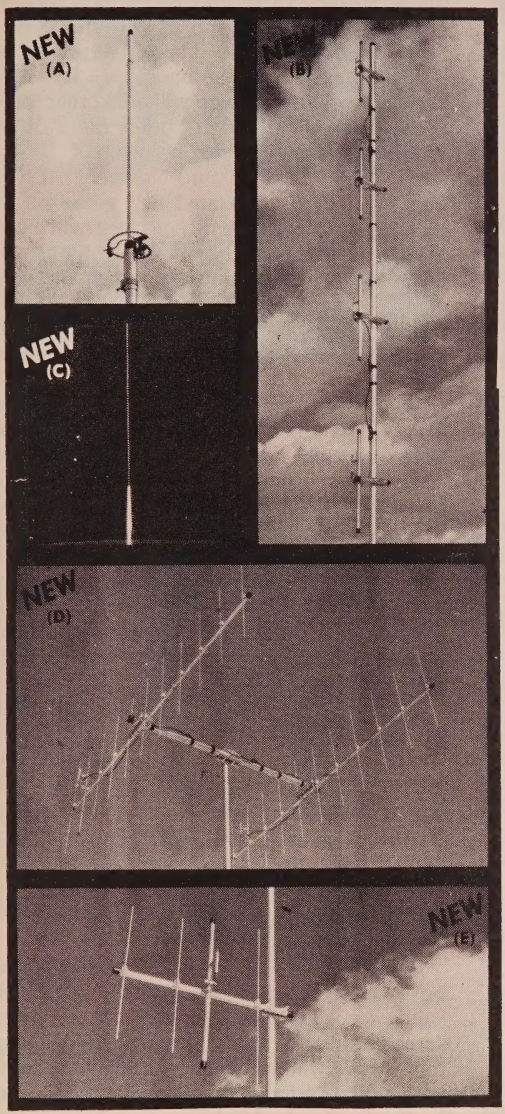
A reminder that the 2nd Annual SSB County Hunters Contest is scheduled for 2200 GMT April 13th to 0500 GMT April 16. See CONTEST CALENDAR by Frank Anzalone, W1WY for full details or send a large s.a.s.e. to WA0ZCQ for log sheets and full rules.

The Mini-convention went very well at Little Rock on 4th November with a total of 22 hams, 9 XYLs and 2 harmonics in attendance.

In one of my weaker moments, I said YES that National Forests could be counted like Independent Cities. I did not realize that they often are hundreds of miles long and no ordinary map shows them and thus they are impossible to properly check—so from now on, forget them. This is in no way any criti-

[*Continued on page 88*]

MORE GREAT BUYS FROM ARROW



Cush Craft

FM 2 METER ANTENNAS

NEW FROM THE WORLD'S LEADING MANUFACTURER OF VHF/UHF COMMUNICATION ANTENNAS

(A) FM RINGO 3.75 db GAIN: The most popular — high performance, half-wave FM antenna. Gives peak gain, and efficiency, instant assembly and installation.

AR-2	100 watts	135-175 MHz		**$12.50**
AR-25	500 watts	135-175 MHz		**17.50**
AR-6	100 watts	50-54 MHz		**18.50**

(B) 4 POLE: A four dipole array with mounting booms and coax harness 52 ohm feed up to 9 db gain.

AFM-4D	1000 watts	146-148 MHz	**$42.50**
AFM-24D	1000 watts	220-225 MHz	**40.50**
AFM-44D	1000 watts	435-450 MHz	**38.50**

(C) FM MOBILE 3 db GAIN: Fiberglass 5/8 wave professional mobile antenna for roof or trunk mount. Superior strength, power handling and performance.

AM-147 146-175 MHz mobile **$26.95**

(D) 11 ELEMENT YAGIS 13.2 db GAIN: The standard of comparison in VHF communications, now cut for 2 meter FM and vertical polarization.

A147-11	1000 watts	146-148 MHz	**$17.95**
A449-11	1000 watts	440-450 MHz	**13.95**

(D) POWER PACK 16 db GAIN: A 22 element, high performance, vertically polarized FM array, complete with all hardware, mounting boom, harness and 2 antennas.

A147-22 1000 watts 146-148 MHz **$49.50**

(E) 4 ELEMENT YAGI 9 db GAIN: A special side mount 4 element FM yagi can be fixed or rotated–good gain and directivity.

A144-4 1000 watts 146-148 MHz **$ 9.95**

(F) FM TWIST 12.4 db GAIN: A Cush Craft exclusive — it's two antennas in one. Horizontal elements cut at 144.5 MHz, vertical elements cut at 147 MHz, two feed lines.

A147-20T 1000 watts 145 & 147 MHz **$39.50**

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FARMINGDALE, L.I., N.Y. 11735 900 Route 110, One Mile South of Republic Aviation
MINEOLA, N.Y. 11501 525 Jericho Turnpike, One Half Block East of Herricks Road
TOTOWA, N.J. 07511 225 Route 46, 201-256-8555
NORWALK, CONN. 06850 18 Isaac Street, Shopping Pl., 203-838-4877

SURPLUS sidelights

BY GORDON ELIOT WHITE*

READERS of this column some three years ago may recall that I took the Pentagon and its Defense Supply Agency to task for the incredible mess that the armed services had made of the surplus disposal system. In February, 1970, I detailed a few of the more flagrant problems in MARS, and the Defense Surplus Sales Agency, along with the military salvage operations.

Well, the military has finally gotten around to doing something about the abuses which have been so rampant for many years in surplus screening and sales. I doubt if an exposé in *CQ* carried a great deal of weight in the decision to shake things up, but I did receive several poison-pen letters from anonymous writers who saw their special deals threatened.

Along the way the General Accounting Office and the McClellan Special Investigating Committee of the Senate got into the act, and I did several lengthy page-one pieces for the newspaper that I work for. All of this pressure apparently did some good, for as this column is published, the Defense Property Disposal Service is taking over all Defense Department surplus operations. If the D.P.D.S. lives up to its own plans, a great deal more usable surplus gear will be made available to the public, and a great deal more usable property will be re-used by the government, at a savings that may reach a billion dollars a year.

As I see it, the crux of the improvement that D.P.D.S. can accomplish is that it is to take over the salvage offices at the 225 military bases here and overseas. D.P.D.S. *intends* to see that the good stuff is no longer broken up and scrapped, or sold as junk. It *intends* to see that the people handling those billions of dollars worth of surplus are guided by the best interests of the government rather than the priorities of the local military command which usually means that salvage is a rung or two below garbage collection.

D.P.D.S. was established last September, but it will probably be June before it can fully take over the entire salvage system. As far as I can now see, it will not greatly shake up the business of bidding on surplus, though it may take the gold out of certain "sweetheart" scrap contracts. There may be some consolidation of salvage operations in a few areas, and changes which will affect their personnel more than it will bother those of us who are interested in buying surplus.

As I write this in mid-November 1972, there is another unrelated flap going on in the surplus business which I hope will have blown over by the time this is published. Since there is great unhappiness at the moment—I have received several dozen agonized phone calls—I want to report what seems to be happening and what I expect to see:

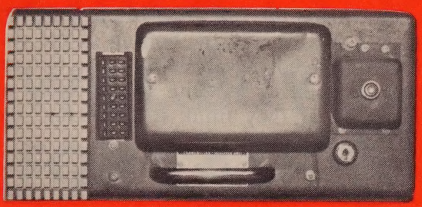
Two weeks ago the Pentagon finally realized that certain munitions items—machine guns, grenades, rockets, and other sorts of ammunition and weaponry, was leaking through the D.S.S.O. sieve. Irish terrorists, Philippine terrorists, and assorted unpleasant types such as hijackers and gun runners were showing up with American military items, up to and including 105 mm howitzers, F-51 fighters, and over-age PT boats. This is undesirable, so an order was sent down to halt the leaks.

In good governmental style, all those 225 salvage operations were told to "demilitarize" (smash, destroy) *everything* on the "munitions list." Since the munitions list is a broad and vague thing, it can be construed to cover test gear, nuts and bolts, tools, etc. etc., if they are "used with" any sort of weapon or munition. Mix that with some bureaucrats already unhappy with the DPDS takeover, and chaos resulted.

It looked for a while as though the surplus business was dead, that nothing would be sold except pulverized metals. This rumor spread at least as fast as any horrendous tale, that is, like wildfire. Congressmen were written to. The Defense Logistics Service Center in Battle Creek, Michigan was besieged. I got phone calls.

However, my spies in the system tell me to avoid panic. After noting that the government would very quickly be up to its navel in shredded metals, I was advised that DPDS had already started to remove the most obvious non-munitions items from the list, and that common sense would be reinstated within a few weeks. I got the same word from contacts at Battle Creek. While I tend to dis-

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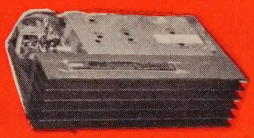
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count most government promises about 90 percent, this is the first time in my memory that both the top and the bottom of the system have agreed. My friends at the bottom moreover, tend to be quite severe critics of the system. If they think it's working, the chances are good that it is.

It is really amazing to see that movement is possible in this vast system. Three years ago Assistant Secretary of Defense Barry Shillito told me in an interview that the system "undoubtedly wastes a few hundred million dollars a year."

"In a system this big," Shillito went on, "that's peanuts."

Well I had chapter and verse on waste I had seen myself, and after an hour Secretary Shillito appeared a little surprised that there was *so much* waste going on.

In the last few years the bad eggs have been chased out of MARS, and if it works, much of the D.S.S.O. waste may follow. Perfection is unlikely, but improvement is possible, with gain for the dealers, for us surplus hounds, and the taxpayer.

As one example: I found that the screening of surplus items by government agencies was simply not working. Done manually, on lengthy mimeographed lists, it was impossible for San Diego, California to avoid buying, say, a million 8-32 nuts which Newport, Rhode Island was selling as salvage. It took too long to look through all that paper. Buying new was vastly simpler.

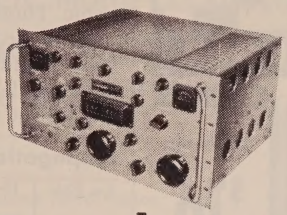
The Pentagon said they were using computers to solve that. Actually they were not—but now they do. Last year they re-used $178 million worth of salvage by manual methods and $433 million with computers. That's a 243 percent improvement since 1970.

I don't think this improved screening will hurt the surplus business very much. Most of the stuff that goes back into the system is in supplies and hardware, maybe a few tubes and other small parts, but it will not affect the obsolete gear that is the vast percentage of usable surplus for the dealers and the public. If you specialize in buying surplus hardware and selling it back to the government at a healthy profit, you may suffer. As one man to another, I sympathize. As a taxpayer I applaud.

To give you an idea of the scope of the surplus business, the government, not including civil agencies, estimates that it disposes of $8.5 billion worth of goods, plus another 500,000 tons of scrap, each year. DPDS will

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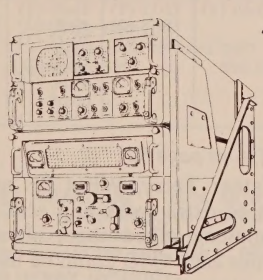
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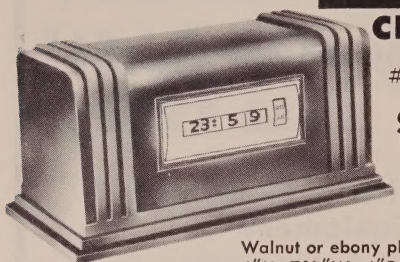
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be headed by an officer of flag or general's rank. It will have 7,000 people in 30 countries. This is big. If it is good we will all benefit. Let us keep our fiingers crossed and avoid panic. Think of those R-390-A receivers that may not be broken up as scrap, of those kilowatt amplifiers waiting to be sold, of those late-model Tektronix 'scopes that are obsolete for the military, but so nice for us.

Propagation [*from page 77*]

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

USA-CA [*from page 82*]

cism of Father Terry, WB6CPE as he did go to a lot of extra work and sent with his QSLs a mimeographed sheet showing for what counties each QSO could be used.

Another item that is developing slowly, certain Awards require the proper post mark on the QSLs, now our postal service is starting to use canceling marks which state only U. S. Postal Service.

Hope you are making the QSOs and getting the QSLs you desire. How was your month? 73, Ed., W2GT. 73, Ed., W2GT.

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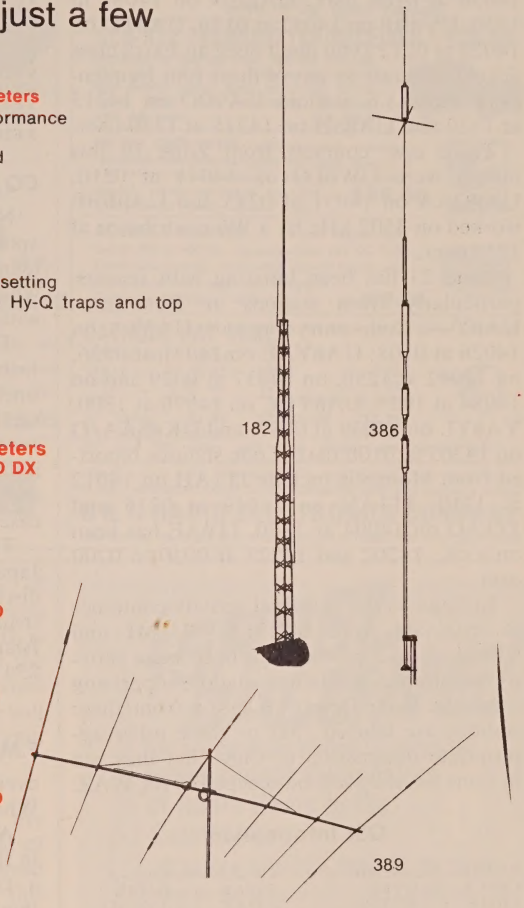
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DX [*from page 69*]

larly on c.w. Anyone still needing Zones 18, 19 and 23 should get down on charley whiskey a few evenings or mornings and wrap the award up in fine style. Some recent reports from Zone 18 include UWØAF on 14030 at 0108 GMT, UAØAN on 14081 at 1330, UVØBB on 14032 at 0136, UAØTD on 14028 at 0212 (you don't need an Extra class ticket to operate on any of those four frequencies) plus s.s.b. stations UA9OO on 14215 at 1320 and UAØSH on 14215 at 1330 GMT.

Three c.w. contacts from Zone 19 this month were UWØLO on 14041 at 0210, UAØQAA on 14031 at 0245 and UAØFBE worked on 3502 kHz by a W6 contributor at 1213 GMT.

Zone 23 has been bursting with reports, particularly from stations in Tana-Tuva, UAØY—. Code entrys include UAØYA on 14026 at 0108; UAØYAE on 14041 at 0026, on 14042 at 1250, on 14037 at 0029 and on 14084 at 1325; UAØYAC on 14070 at 1300; YAØYL on 14039 at 0057; and UKØSAA/O on 14205 at 0100 GMT. Code stations reported from Mongolia include JT1AH on 14012 at 1210; JT1AN on 14049 at 0215 and JT1AO on 14004 at 1330. JTØAE has been on s.s.b., 14202 and 14227 at 0030 to 0200 GMT.

In Zone 34 the principal activity continues to originate from SU1MA, SU1MI and ST2SA. However, there has been some activity mentioned by Israeli stations operating from the Sinai Desert. If QSLs from these stations are labeled /SU or some other appropriate designation to show that they are in Zone 34, they will be acceptable for WAZ.

QSL Information

CN8HD—Via W2GHK
CR6CA—To W2KF
CR7IK—c/o W7VRO
CT2BA—Via K8NGR
DU1GJM—To K8GJM
ET3GK—c/o W5EGH
ET3USA—Via W4NJF
ET3USB—To WB4UKA
FL8DS—Via WB4SPG
FM7WE—c/o K4CFB
FO8BX—Via W6TNQ
FP8DH—To VE6AXU
GC5AGA—c/o K4II
HH2JT—To Julius Tomar, P.O. Box 586, Port-Au-Prince, Haiti
HKØBKX—Via WA6AHF
HS4AC—To W5LUJ
JA3IG — c/o WB4SPG, 11627 Charter Oak Coart, Reston, VA 22070
HP4DJI — To WB4FOT, P.O. Box 102, Hebrun, KY 41706
LU1ZC—Via K4MZU
MI1—To IØBNZ
MP4TDM—c/o K1DRN
MP4TEE—Via G3LQP
ST2SA—To K3RLY
SVØWJJ—c/o WA1HAA, 238 Slater St., Attleboro, MA 02703
SVØWUU—Via WA1HAA
SY1MA—To WA1HAA
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TT8AC—Via DJ1LP
TR8VE—To F6AZI
TU2BB—c/o WB4SPG
TU2CX—Via W4VPD
TU2DQ—c/o WB4SPG
TY8ABB—Via WB4SPG
VK9GN—To K7YDO
VP2GAE—c/o K3NEZ
VR1W—Via W6CUF
VR4BS—To ZL4NH
VU25FBZ—c/o K6TWT
XE2QPE—Via K6QPE
XW8EN—To K3NAS
XT2AE—c/o DJ9KR
XT2AF—Via VE2JH
XX6FL—To CR6LA
YA1RA—c/o K2GTZ
YBØABE—Via K5GUZ
YJ8BL—To W6NJU
YJ8GH—c/o W6ANN
YXSAJ—Via YVSAJ
ZD3X — To OH2NB, Armas Valste, Lansipellontie 12, SF-00390 Helsinki 39, Finland
ZD7BB—Via WAØWKW
ZF1EP—To W4PJG, Dr. Louis Persons, Box 1647, Ft. Myers, FL 33902
ZK1MA—c/o W6KNH
ZL3KK/C—Via ZM4CR
ZS2MI—To ZS6LW
ZS3CJ—c/o W3HNK
3D2AN—Via K6ZIF
3D6AX—To WA5IEV
3X1P—c/o SMØKV
5R8AP—Via DK2SI
5U7AS—To WA8UHL
5U7AX—c/o DJ9KR
5VZYH—Via VE3GHL
5W1AU—To W6KNH
6W8DY—c/o VE4SK
7P8AR—Ulli Dehning, 4 Bay View Ave., Tambers Kluof, Cape Town, South Africa
7X2BK—To W5LUJ
7X7MD—Via IØIJ
9G1HE—To VE3FCL
9G1YA—c/o W5EBH
9G1WW—Via W5EBH
9H1C—To W9SCD
9H5D—c/o G3PRS
9L1GC—Via G3DYY
9L1GW—To K9QZI
9M6HM—c/o K6ZIF
9N1MM—Via W3KVQ/2
9X5VA—To W2PPG
73, John, K4IIF

CQ Reviews Leader GDO [*from page 62*]

Nevertheless, in most cases adequate response on the a.m. receiver may be had for identification of the signal, in addition to which the modulating setup may be useful with f.m. receivers.

The dial scales are easy to read and the instrument handles nicely, especially with onehand operation. It is supplied with a two-section white-polyfoam storage box that has recessed holes for conveniently holding the inductors. Also included is a plug for mating with the miniature phone jack on the g.d.o. case.

The LDM-810 Grid-Dip Meter is made in Japan by Leader Electronics Corp., and is distributed in the U.S.A. through Leader Instruments Corp., 37-27 27th Street, Long Island City, N.Y. 11101. It is priced at $54.95.

—W2AEF

F.M. [*from page 37*]

ever, the authorities don't seem to hear me. What gives?

A. Many monitor receivers lack selectivity in their front ends due to the desire to cover a fairly wide frequency range. Therefore, they are often quite prone to image and intermod problems when used near an amateur f.m. transmitter operating in the two meter band. The cure of the problem in the receiver should be handled by an authorized repair facility for that receiver. Things like peaking the receiver frequency for a small range of frequencies or placing a trap or filter in the antenna line can often help.

18803

Most f.m. groups in the US seem to have mixed emotions about the Report and Order on Docket 18803. Because of certain restrictions, especially the effective radiated power

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and continuous monitoring, a number of petitions (original and 14 copies) have been submitted asking for a re-evaluation. It is rumored that at least 16 were sent from the Dallas-Ft. Worth area along with numerous ones from the East and West Coasts. We will just have to wait and see how things come out.

Finale

As I have said several times before, my mail volume has been very low. Because of this, I am afraid that I have not received some of the letters from readers of this column. Also, items such as magazines, catalogues, also did not arrive. It may be just coincidence, but a couple of days before this column was written I contacted the Post Office about not receiving mail and the next day the missing issues of magazines and several letters showed up! I hope that everything has been cleared up. If I haven't answered your letter, please write again, for it may never have arrived. Please inclose SASE when asking for a reply, for this speeds up things immensely. Also, please address requests to the 410 Lawndale Drive address. Best of luck, and happy fm'ing.

73, Glen, K9STH/5

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Oscar-6 News [*from page 40*]

range circle at 0352 and 0406 GMT.

8. Orbit #1735 is found to cross the equator at 0545 GMT at 133.6° W. Long., and its path just touches the range circle between 0555 and 0556 GMT.

The results of this example are summarized in Table 2 and are shown graphically in fig. 1.

By remembering that each orbit in a south-to-north direction crosses the equator 115 minutes later and 28.75 degrees longitude further west than the previous orbit, equatorial times and points of crossings as well as within range times can be calculated for any orbit, starting with the initial orbital data contained in Table 1.[4] ■

[4]For additional orbital plotting instructions, see "Australis - Oscar-5 - Where it's at"; Danielson, W. and Glick S., *QST*, October 1969, pg. 54. Also "A Simple Approach to OSCAR Communication's Calculations," Brown, C. W., *AMSAT Newsletter*, Sept., 1972, p. 16 and "The Oscalator," Scherer, W. M., *CQ*, Aug. '65, p. 54.

¾ Wave Antenna [*from page 43*]

The new antenna was raised with the first 51 feet in a vertical plane and the remainder in a horizontal plane, with two bends shortly after the trap.

Reception with this antenna seems to be substantially improved over the dipoles, particularly on 80 meters.

Because of the lack of space at this QTH, I was unable to test a ¾ wave 160-meter antenna, which would be about 387 feet long. I feel certain that it would outperform a dipole on this band, based upon the results of my tests on 80 meters.

The ⅜ wave on 160 has given a good account of itself in the past, and I'm now pleased to have it incorporated into the tri-bander.

The tri-bander has given excellent results in all departments, with very low s.w.r., good broad-band operation, and very adequate signal squirting and inhaling.

In constructing any of the antenna systems shown here, use a No. 12 or larger for 2 kw PEP while a No. 14 will be adequate for powers up to 1 kw PEP.

In the tri-bander, I used a Hy-Gain 333-366 trap because I happened to possess two; however, a trap from a Mosley TD-2 would be preferred for high-power operation, as it is rated at 2-kw PEP—compared to the 1-kw PEP for the Hy-Gain on 40 meters.

It is easy to "role your own traps." Complete information will be found on page 492, in the 18th Edition of the Radio Handbook, by Wm. Orr, W6SAI, published by Editors and Engineers. Reference to the ¾ wave antenna is made in the same publication on page 485.

Multi-band operation with the ¾ wave antenna is possible by inserting traps at the appropriate ¾ wavelength points. Some sacrifice in performance could take place, because traps shorten the physical length of an antenna. If such thoughts are contemplated, it is necessary to start the adjustment at the highest band and to work down to the lowest.

Whether you want a single, a dual, a tri, or a multi-bander—as the expression goes—try it . . . you'll like it. ■

Q & A [*from page 12*]

Bias Supply

"I need a bias supply for a rig I am building. It should be capable of up to —100 volts or so. Can you suggest a circuit? It should be adjustable."

See fig. 3. Be sure you use an isolation transformer. A transformerless scheme may give you some trouble.

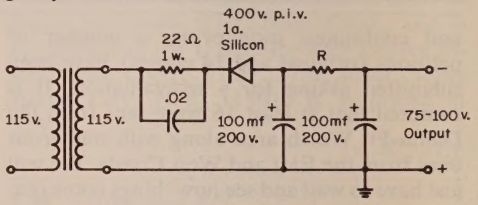


Fig. 3—A bias supply for 75-100 volts. Adjust R for required voltage.

UHF Tube

"I am going to experiment with a friend of mine in the 420-450 mHz band using c.w. and voice. For our final we would like to use a tube instead of transistors (if they'll work anyway). Your suggestion as to the tube we might use and where we can get more information will be appreciated. We'll run around 25 or so watts."

Well, I suggest that you might be able to use Eimac's type 7211, a planar triode. Write Eimac, Division of Varian, 301 Industrial Way, San Carlos, Calif. 94070, for applications info.

Tube Substitution (6GX6)

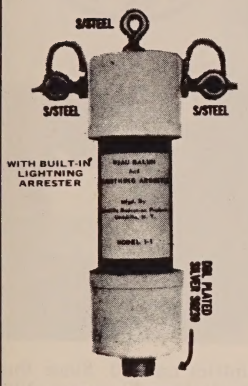
"Please tell me what tube I can use to substitute for a 6GX6?"

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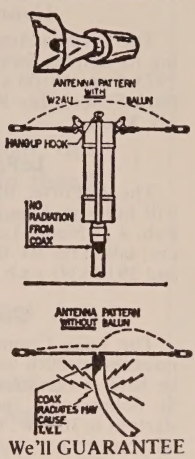
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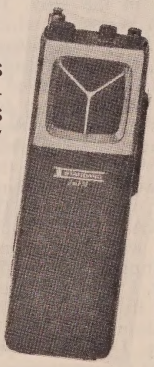
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Announcements [*from page 7*]

A.M. Write WB9AVD,P.O. Box QSL, Wheaton, Illinois 60187 for info. SASE with ticket requests.

Livonia, Michigan

The Livonia Amateur Radio Club is sponsoring its annual Swap n' Shop, Sunday, Feb. 25, 1973 from 10:00 A.M. to 4:00 P.M., at Franklin High School, Jay Rd. and Merriman Rd., Livonia, Mich.

LaPorte, Indiana

The LaPorte, Indiana Amateur Radio Club will hold its Annual Swap-fest and Auction on Feb. 4 at Noon. Location is the Civic Auditorium; talkin on .94; the LaPorte Repeater, .22-.82, and 3910 kHz s.s.b.

Gary, Indiana

The Lake County (Indiana) ARC, Inc. announces its 20th annual Radio Club Banquet to be held at the Scherwood Club, 600 East Joliet St., Schererville, Ind. on Sat., Feb. 10. The affair starts at 6:30 P.M., CST. Awards, music, speeches, all you can eat, entertainment, good fellowship. Tickets $5, available from W9EGQ, 385 Johnson St., Gary, Ind. 46402, or other club members. No tickets sold at door.

Letters [*from page 7*]

QRP 160 Meter WAC

Editor, *CQ:*

I have been a subscriber to *CQ* for many, many years, so it is obvious that I enjoy the magazine. I was especially interested in the article in the Nov. 1972 issue by my friend Adrian Weiss, in which he described his solid state 1.8 mHz rig. However, I was stunned when I read, in the last paragraph of the article that W9PNE had achieved "WAC with 150 watts."

My sole claim to fame is my WAC on 160 meters back in 1968 with 50 watts input. This was the first W9 WAC on 160, and is the only W9 WAC on 160 to this date, as far as I know. I had worked all continents but Asia many years earlier, but it was in 1968 that I had two QSOs with KA9AK to complete the WAC. My transmitter was a Johnson Navigator, rated at 40 watts input. I worked 5 continents with 40 watts; in fact, I worked three continents with 25 watts input. By replacing the 5U4GB rectifier with solid state diodes and by reducing the final bias slightly, I got the input up to 50 watts, which was the maximum legal limit at that time.

So you can see why I felt like I was "shot down" by the reference to 150 watts. I feel that most anyone can work DX on 160 with 150 watts. What is more, when I sent my photo and the information on the 160 WAC to *QST*'s DX Editor at the time, the only reference that QST made to it was "it seems that W9PNE has made WAC." No photo was published, nothing was said about this being the first W9 WAC on 160, and no reference to the 50 watts. Now, you have given me the first definite publicity but got the power all wrong!

You might want to make amends by publishing the enclosed photo of me with my trusty Johnson Navigator. The WAC certificate is propped up on top of the rig.



I now have 63 countries on 160. Since the change in the power regulations, I have run 200 watts input. However, I did work about 50 countries with the Navigator. I also now have WAS on 160. I have 3 countries and over 30 states with five watts input on 160.

Brice Anderson, W9PNE
Lancaster, Ill.

Applauds Contest Committee

Editor, *CQ:*

It is with great appreciation and respect for *CQ*'s Contest Committee, headed by Frank Anzalone, W1WY, that I write to let you know that here is one of many amateurs who applaud the Committee's decision to disqualify those stations who had excessive duplication and just plain false contacts. Just why it took so long for a contest committee to finally do its job, fails me. However, congratulations to *CQ*'s Contest Committee for hopefully setting a new trend toward honest and accurate contest operation.

In direct conjunction with the contest entry problem is the contest style DXpedition operation. As Frank, W1WY, mentioned in the c.w. results, a station may make a second contact to insure being in the DX stations log. This is rapidly becoming the rule rather than the exception in a DXer's operating habit. Why these supposedly excellent DXpedition operators cannot take the time to properly enter each bona fide contact in their logs is excuseable. Apparently, the more famous they are, the worse they become.

Amateur radio is a hobby, gentlemen, only a hobby. If every contest entry, every award application, every award endorsement, etc., has to be scrutinized because of possible falsification, then amateur radio from that aspect, is indeed, not far from the citizens band service.

David J. Church, WA2HZR
N. Syracuse, NY

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Chapter 1—**RTTY Basics.** Chapter 2—**The Teletypewriter.** Chapter 3—**Teletype and Radio Reception.** Chapter 4—**Converter (Terminal Unit) Basics.** Chapter 5—**Polar Relays and Distortion.** Chapter 6—**Special RTTY Circuits.** Chapter 7—**Test Sets.** Chapter 8—**Machine Adjustments.** Chapter 9—**Tape Printers.** Chapter 10—**Kleinschmidt Machines, Tape Readers, Teletype Models 28 and 32.** Chapter 11—**Codes, Data Processing & Advanced Machines.** Chapter 12—**Distortion Producing Test Sets.** Chapter 13—**Regenerative Repeaters and Frequency Shift Monitors.** Chapter 14—**Terminal Units.** Chapter 15—**The RTTY Station.** Chapter 16—**FCC Rules, Operating Procedures.**

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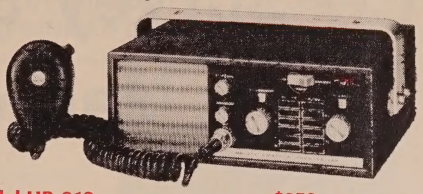
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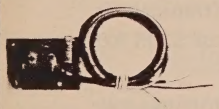


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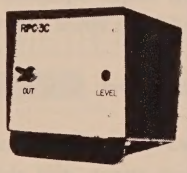
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CQ Survey Shows Ham Market Growth

We're pleased to announce that CQ's marketing staff has just completed a new market survey, and from all outward indications, the amateur radio market has reached its highest peak in the history of the service.

On June 2, 1972, five thousand questionnaires were mailed to randomly selected amateurs. Of these, approximately one hundred seventy were not delivered by the post office because of innacurate addressing, and of the remaining forty eight hundred thirty that did reach addresses, fifteen hundred forty four were completed and returned as of August 3. This is a 32% return, extremely high, and we wish to thank all those amateurs who took the time and effort to aid in this project.

Some of the results were exciting to behold. For example, of the 1,544 amateurs participating, 1,065 spent money during the past year on parts for building and experimenting, and spent a total of $184,493 in this area alone, or an average outlay of almost $180 per person.

The figure for replacement parts was 948 amateurs with a cash outlay of $47,437.

The money spent by hams on equipment was equally impressive. The 1,544 amateurs bought 751 pieces of new major equipment (transceivers, receivers, transmitters and amplifiers) and they spent a total of $295,929 in just twelve months.

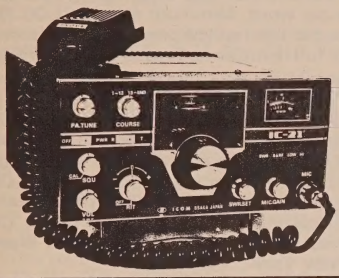
For antennas the figures were also substantial: 666 new antennas purchased at a gross cost of $37,278.

It was fascinating to discover that v.h.f.-f.m. equipment and accessories represent almost 25% of all dollars spent, and about 33% of all units purchased. A similar interesting response was noted on questions pertaining to amateur TV. The survey indicates that approximately 5% of all hams are already experimenting with or operating ham TV, and that an additonal 10% will join the ATV ranks within the next twelve months.

A complete thirty-six-page report has been printed and mailed to all major manufacturers and dealers in the amateur market. If by any chance we've missed someone who can use a copy of the report, just get in touch with the CQ marketing staff and we'll be happy to accomodate. However, we must mention that the supply is limited and must be restricted only to companies or individuals who sell products or services to amateurs.

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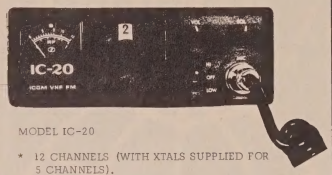
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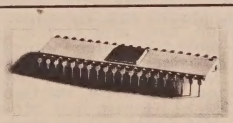
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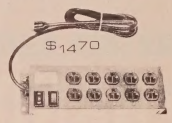
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MODEL 11

Other Models Available

MODEL 12

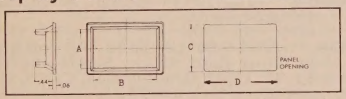
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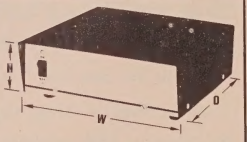




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920-XX	.80	4.00	1.172	4.37	2.45	2.25	2.08
930-XX	1.38	5.00	1.750	5.37	2.75	2.53	2.33
940-XX	.80	5.58	1.172	5.95	2.65	2.43	2.25
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"F"	7½ x 4½ x 10	yes	9.95
"G"	10⅛ x 3⅝ x 9	yes	9.95
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"J"	5 x 3 1/2 x 5 3/4 (Sloping Panel)		7.45
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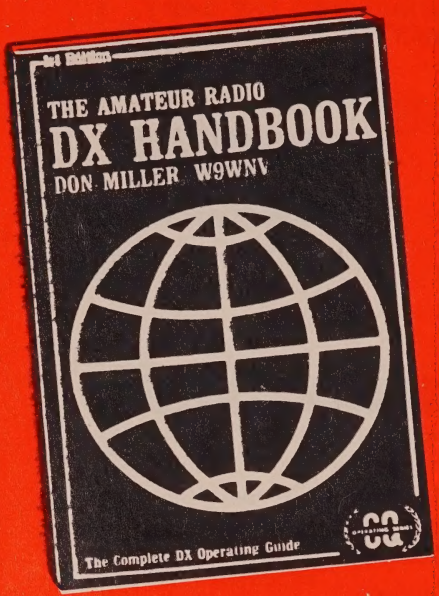
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MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO issues at 10 cents each (plus shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

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Did you know that new supplements to the book, "CQ YL," are now available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone), drop a note with your request to author/publisher, W5RZJ, Louisa Sando, 4417 - 11th St., NW, Albuquerque, NM 87107. Please enclose two 8 cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL," contains 21 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.00 postpaid.

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SWAP: Lafayette HA-144 2 meter transistor transceiver for radio control system. W4YLF, Rt. 1, Columbia, TN. 38401.

SALE: HV XMFRS, CAPACITORS, other parts. Very cheap, SASE for list. W6YKQ, 228 El Prado Ave., San Rafael, Calif. 94903. (415) 479-9498.

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WANTED: Collins Thirty-S-One, Call 609-392-2111, Ext. 600 or 609-695-6430. Jim Zimskind, K2OJL.

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THE HORN SPEAKER, newspaper for the Hobbyist of vintage electronics, Box 12, Kleberg, Texas. 75145.

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WANTED: Junked HT32 for parts. WB2GDK, William Downs, 27 Stevens Dr., Attica, New York. 14011.

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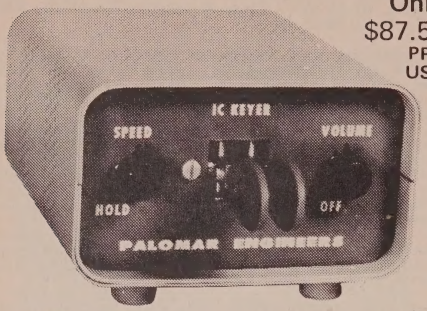
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CQ: Assist in worldwide ham geology birthday— hunt. Send call, name, QTH, B/D to: K4CLA, Rt. 5, Box 111-A, Lexington, SC. 29072.

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HALLICRAFTERS S-94, 30—50 MHz, $25. S38C—.55 — 30 MHz, $15. J. Wasiewicz, W2DQC, 229 Sarles La., Pleasantville, N. Y. 10570.

FOR SALE: Hallicrafters 2000 transceiver inc 2000 power supply. $750. Gallant W4BOJ, 4411 N. Federal, Pompano Bch., FL. 33064.

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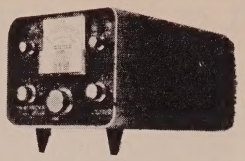
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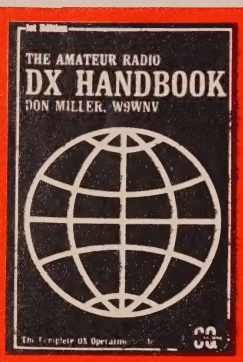
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SELL: Hallicrafters HA-5 VFO, 80-2 meters, perfect, with manual, $40. Waters Compreamp compressor, $10. B&W model 551A coax switch, $4. Stan Dicks, WB8HAT, 19 Curtis St., Athens, OH. 45701.

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WANTED: 455 KC Crystal. HC/U6 holder small pin. Jim Gysan, WNYB, 53 Lothrop St., Beverly, Mass. 01915.

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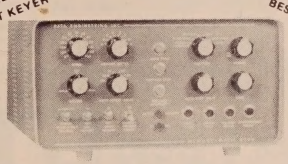
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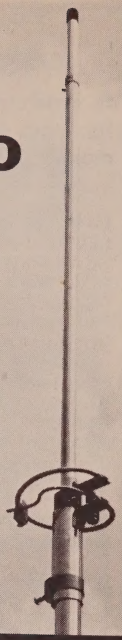
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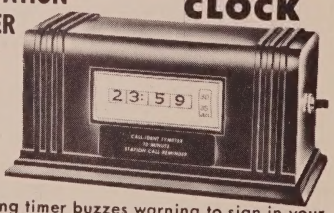
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NATIONAL Tech. Schools course manuals for FCC 1st class phone license course, $25. WB2YEE, 1017 Westmoreland Ave., Syracuse, N. Y. 13210.

FOR SALE, CANADIANS: Johnson Ranger HF transmitter, excellent condition and SB10 SSB adapter if desired— ARC1 VHF 10 channel transportable, professionally built AC power supply, Model 9055 tube tester, Model 315 Eico Signal Generator— Aerovox IC Checker. P. C. Lotzer, 20970 Newlands Dr., Langley, B. C.

FOR SALE: Midland T.V. Camera Model 15.520 $170.00 and shipping. Ross Hansen, WN7TZU, Ross Hansen, 112 S. 1st West, Preston, Idaho. 83263.

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AMECO PCL-P 160-6 meter Nuvistor Cascode Preamplifier for receivers. Built-in power supply. $25, like new. Gerry Skloot, WB2FJX, 158-14 85th St., Howard Beach, NY. 11414. (212) 641-4573.

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FOR SALE: March 1921 QST; 2nd edition Amateur Radio Handbook, Great Britain Radio Society, Radio Supplement to above. Make offers. Douglas, 2254 Pepper Dr., Concord, CA. 94520.

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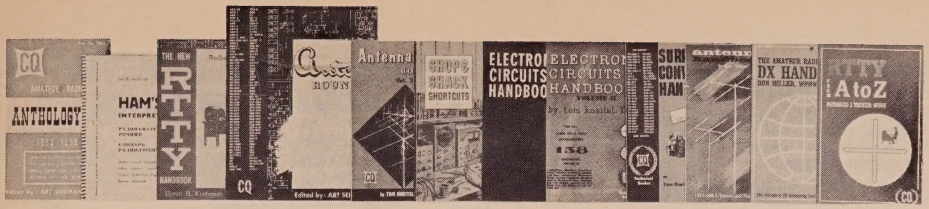
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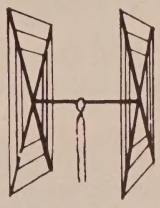
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Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
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(all use single coax feedline)

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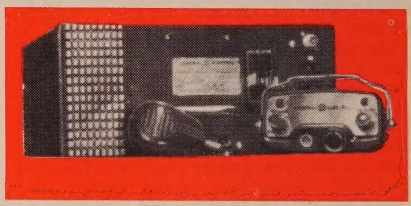
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Accessories available for each above units..... $30.

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Power supply, 60W, less vibrator	—	$25	—	$25	—
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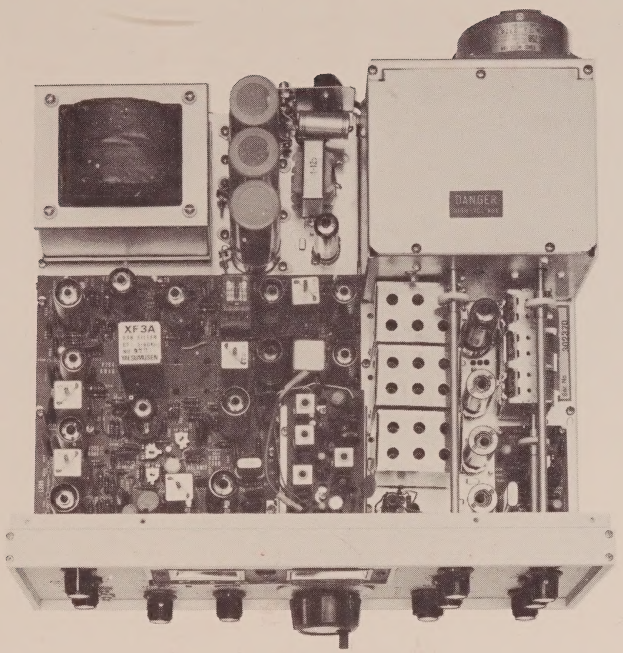
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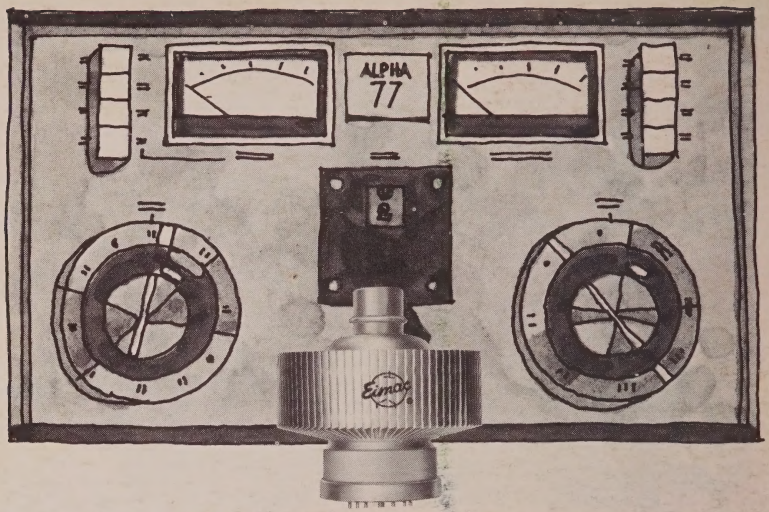
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The no-compromise Alpha 77 is powered by the no-compromise EIMAC 8877.

No corners were cut in designing the rugged Alpha 77 amplifier. Rated for continuous commercial service, it loafs along at the maximum legal amateur power limit.

And, no corners were cut in designing EIMAC's air-cooled 8877 ceramic/metal, high-mu triode, the Alpha 77 power tube. The 8877 is conservatively rated at 1500 watts plate dissipation up to 250 MHz and requires less than 65 watts PEP drive signal for the legal power input limit. This impressive power gain is achieved with 3rd order intermodulation distortion products −38 decibels below one tone of a two equal-tone drive signal.

This compact, rugged, high-mu power triode has a maximum plate voltage rating of 4000 and a maximum plate current rating of one ampere in commercial service. While the 8877 is primarily designed for superlative linear amplifier service demanding low intermodulation distortion, its high efficiency also permits excellent operation as a class C power amplifier, oscillator, or as a plate modulated amplifier. The zero bias characteristic is useful for these services, as plate dissipation is held to a safe level if drive power fails, up to a plate potential of 3 kV.

The Alpha 77 is the ultimate power amplifier for the 70's. That's proven by the choice of the 8877, another example of EIMAC's ability to provide tomorrow's tubes today. For additional information on this tube or other products, contact EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Phone (415) 592-1221. Or contact any of the more than 30 Varian/EIMAC Electron Tube and Device Group Sales Offices throughout the world.

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