CQ

FCC Plans Licensing Shake-Up ... See p. 5

February
1974
$1.00

Radio Communications In Primitive New Guinea

..... p. 27

The Radio Amateur's Journal

08240

Our two hot runners when you put on

Build the Heathkit SB-102 and SB-220 and set new DX track records!

Here's exceptional stability and dial linearity — made possible by an all solid-state linear master oscillator with 1 kHz calibration. The SB-102 stabilizes itself in a fast 10-minutes, drifts less than 100 Hz per hour after initial warm-up. The receiver section delivers an S+N/N ratio of less than 0.35 uV for 10 dB — with front-panel selection of built-in 2.1 kHz SSB crystal filter or optional 400 Hz crystal filter. And there's a dial resettable to 200 Hz; 180 W PEP SSB input, 170 W CW input; switch selection of upper or lower sideband and CW; built-in sidetone for monitoring; built-in 100 kHz crystal calibrator; triple action level control to reduce clipping and distortion; built-in VOX, and complete metering.

The SB-102 is the value leader because you build it yourself to save on initial investment and service. Simple circuit board/wiring harness construction gets it all together. Order your hot runner now — the famous Heathkit SB-102 SSB/CW Transceiver. Combine it with the SB-220 Linear for the ultimate long-distance runner.

Kit SB-102, 24 lbs. **385.00***

Kit SB-600, 8 ohm matching speaker with mounting space for AC supply, 7 lbs. . **19.95***

SBA-301-2, 400 Hz CW crystal filter, 1 lb. **22.95***

Kit HP-23B, AC supply, 19 lbs. **51.95***

Kit HP-13B, DC supply, 8 lbs. **69.95***

SBA-100-1, mobile mount, 6 lbs. **15.95***

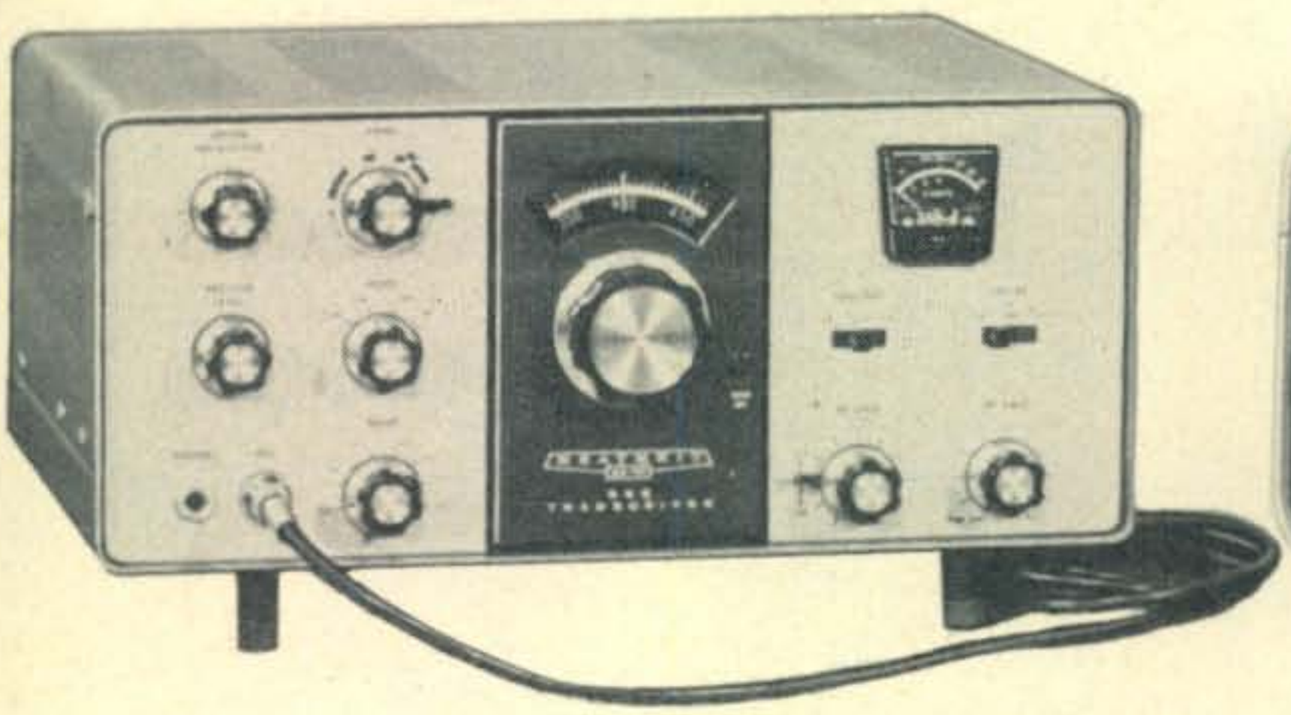
The Heathkit SB-220 is the linear amplifier that the competition tries to measure up to. Two conservatively rated Eimac 3-500Z's in a grounded grid circuit offer up to 2000 W PEP SSB input, or a full 1 kW on both CW and RTTY. The broad-band pretuned pi-input delivers maximum efficiency with low distortion over 80-10 meters. Only 100 watts of driving power is needed to produce full-rated input.

SB-220 features include a built-in solid-state 120/240 V power supply; circuit breaker protection; zener diode regulating operating bias to reduce idling current for cooler running and extended tube life; a large quiet fan; ALC to the driving unit to prevent overdriving; front panel switch selected monitoring of grid current; relative power and high voltage. The SB-220 offers a clean, compact design with the liberal use of internal shielding for extra strength and component isolation. Its green table-top cabinet complements all your SB-series gear.

To tune-up, you simply set the band switch, push the CW-Tune/SSB rocker switch to the CW-Tune position and adjust the Load & Tune controls for maximum relative power. Push the rocker switch to the SSB position and you are ready to set a new DX track record — with 2kw PEP input, or a full gallon on CW and RTTY.

Kit SB-220, 70 lbs **369.95***

get stronger yet, the long-distance shoes



Build the Heathkit HW-101 and SB-200 and run with a 1kw kick!

The HW-101 has improved receiver circuitry and dial drive and added front-panel SSB/CW filter selection. Sensitivity better than 0.35 uV for 10 dB S + N/N. Image and IF rejection better than 50 dB. 36-1 knob to dial ratio in a ball bearing drive mechanism. Thermal stabilized FET VFO with 5 kHz read-out. Built-in 100 kHz crystal calibrated and zero reset button. Front panel crystal filter selection. Optional SBA-301-2 crystal fiter installs in minutes. CW filter offers razor sharp 400 Hz selectivity. Built-in SSB crystal filter delivers 2.1 kHz selectivity at 6 dB down.

Kit HW-101, 23 lbs. **259.95***
Kit HP-23A, AC power supply, 19 lbs. **51.95***
Kit HP-13A, DC power supply, 7 lbs. . .**69.95***
SBA-301-2, 400 Hz crystal filter, 1 lb. . .**22.95***

Brawny partner in the Economy Kilowatt pair, the SB-200 is a completely self-contained, compact desktop rig with built-in solid-state power supply that sets you up with 1200 watts SSB, 1 kW CW with 80 through 10 meter hand coverage. And since it requires only 100 watts PEP drive, it's the ideal mate for the Heathkit HW-101 and almost all other popular transmitters and transceivers. A pair of 572B/T-160-L are used for amplification, fan cooled and shielded for maximum TVI protection. Other noteworthy features include a pre-tuned cathode input circuit for efficiency, low distortion; ALC output for automatic exciter control; circuit breaker protection; built-in SWR meter and antenna relay that automatically switches to the exciter when the linear is off; 120/240 VAC operation.

Kit SB-200, 50 lbs. **229.95***

Visit your nearest Heathkit Electronic Center... or send for FREE Catalog

HEATH ELECTRONIC CENTERS
Units of Schlumberger Products Corp.
ARIZ.: Phoenix; CALIF.: Anaheim, El Cerrito, Los Angeles, Pomona, Redwood City, San Diego (La Mesa), Woodland Hills; COLO.: Denver; CONN.: Hartford (Avon); FLA.: Miami (Hialeah); GA.: Atlanta; ILL.: Chicago, Downers Grove; IND.: Indianapolis; KANSAS: Kansas City (Mission); KY.: Louisville; LA.: New Orleans (Kenner); MD.: Baltimore, Rockville; MASS.: Boston (Wellesley); MICH.: Detroit; MINN.: Minneapolis (Hopkins); MO.: St. Louis; N.J.: Fair Lawn; N.Y.: Buffalo (Amherst), New York City, Jericho; L.I.: Rochester; OHIO: Cincinnati (Woodlawn), Cleveland, Columbus; PA.: Philadelphia, Pittsburgh; R.I.: Providence (Warwick); TEXAS: Dallas, Houston; WASH.: Seattle; WIS.: Milwaukee.

HEATH
Schlumberger

HEATH COMPANY, Dept. 12-2
Benton Harbor, Michigan 49022

☐ Please send FREE Heathkit Catalog.
☐ Enclosed is $_____, plus shipping.
Please send model(s)_____
Name_____
Address_____
City_____ State_____ Zip_____

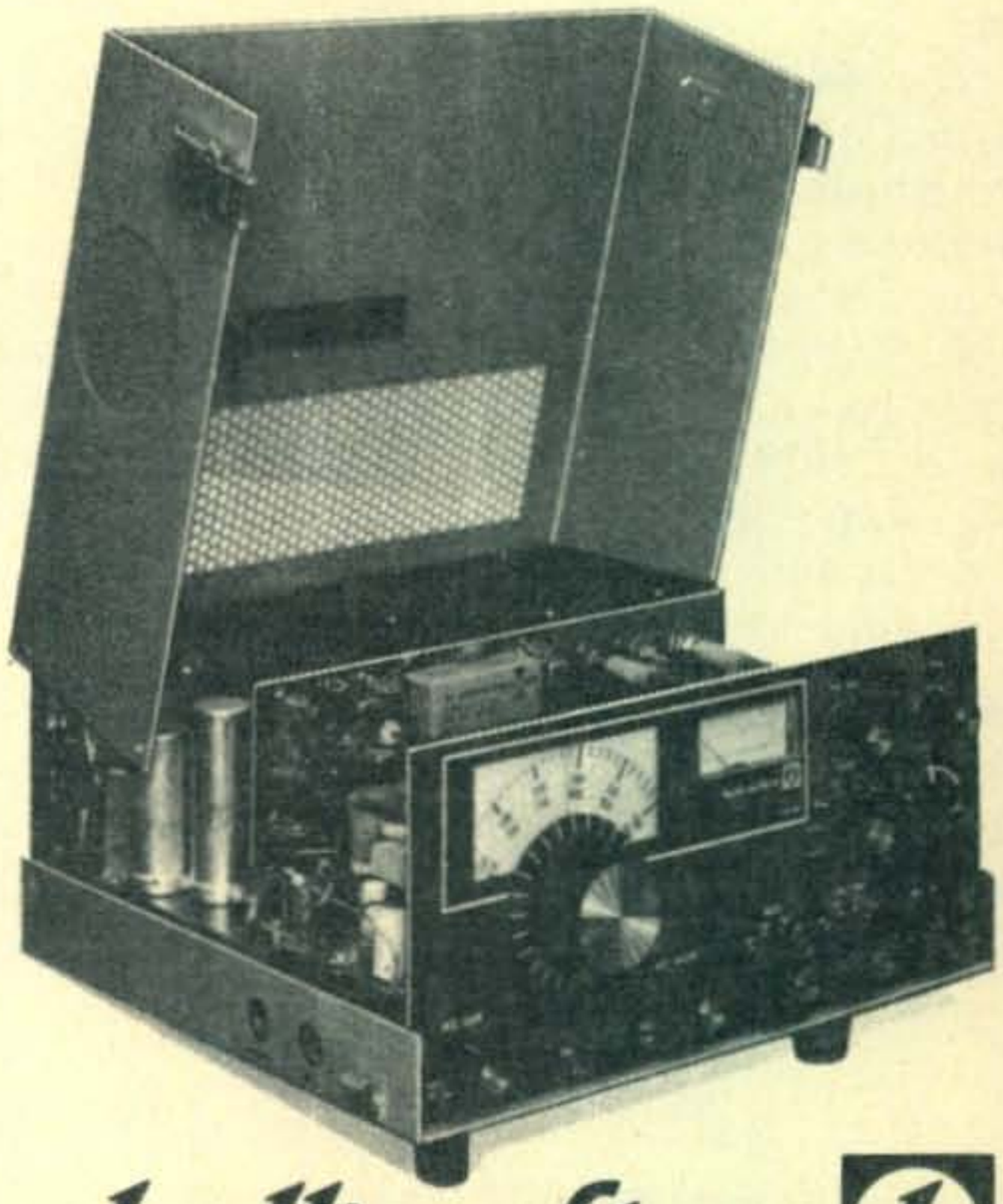
Prices & specifications subject to change without notice.
*Mail order prices; F.O.B. factory. AM-292

Hallicrafters' all-american made FPM-300, Mark II "Safari" SSB/CW transceiver is Q5... from the Mauritania solar eclipse expeditions to a famous raft adventure in the Atlantic.

Proven design in the tradition of the HT-37 and solid-state dependability are combined in this compact transceiver featuring state-of-the-art FET's, hot carrier diodes and bi-polar transistors for peak, reliable performance for only $625.

Some of the high performance specifications are:

- Designed for fixed, portable and mobile use
- Equipped with a self-contained Universal AC and DC power supply system
- Compact dimensions (HWD) 5½ x 12 x 11 inches
- Weight: 25 pounds
- Tuning ranges: 8-600 kHz Bands, 80-10 meters
- Built-in speaker
- Power requirements: 117 V or 234 V 50/60 AC; 13.4 VDC negative ground
- Modes: Selectable Upper or Lower Sideband-CW or RTTY
- Type of service: continuous operation with 2-tone S SB-CW-RTTY (50% duty cycle)
- Power Output: 125 Watts P.E.P. (Nominal) into 50 ohms
- Receiver Sensitivity: Less than 1 uV for 15 db SN Ratio
- Selectivity: 2.0 kHz
- Receiver IM: 60 db below 2 equal 10MV signals
- Receiver Image and IF Rejection: Greater than 60 db.
- Internal Receiver Spurious: Less than equivalent 1 Microvolt Signal
- Transmitter IM: 30 db below P.E.P. (26db below one of two equal tones)
- Adjacent Channel Desensitizing: 3 db with greater than 10,000 MV
- Sideband Suppression: -50 db minimum @ 1 kHz
- AF Power Output: 2 watts
- Stability: 100 Hz after warmup. Max. 100 with 10% line voltage change
- Frequency Readout: Within 1 kHz ± 100 kHz of Cal. Point not more than 3 kHz across entire 500 KC Band
- Break-In CW: Semi-Automatic
- CW Sidetone
- Audio Frequency Response: 500-2500 Hz Nominal
- AALC: 12 db Compression
- AGC Figure of Merit: 60 db minimum
- Crystal Calibrator: Provides 25 kHz Calibration Signals
- Optional Accessories: MR-300 Mobile Installation Kit; HA-60 Blower Fan Kit, works on AC or 12VDC



hallicrafters

See your Hallicrafters distributor today or write or phone:

The Hallicrafters Co., 600 Hicks Road, Rolling Meadows, Ill. 60008 U.S.A.
Phone: 312/259-9600

You should be talking with a Hallicrafters.

FEBRUARY, 1974 VOL. 30, NO. 2

CQ The Radio Amateur's Journal

FEATURES

THE LOW PROFILE QUAD ANTENNA — *John P. Tyskewicz, W1HXU* — 24

RADIO COMMUNICATION IN PRIMITIVE NEW GUINEA — *Milt Mann, W9PRH* — 27

RESULTS OF THE 1973 CQ WORLD WIDE WPX SSB CONTEST — *Bernie Welch, W8IMZ* — 31

CQ REVIEWS: THE TEN-TEC MODEL 315 RECEIVER — *Wilfred M. Scherer, W2AEF* — 35

ANNOUNCING THE CQ WORLD WIDE WPX SSB CONTEST — 38

OSCAR NEWS & ORBITAL DATA — *George Jacobs, W3ASK* — 40

QRP: QRP CONTEST RESULTS — *Adrian Weiss, K8EEG* — 42

SSTV: DESIGNING WITH TRANSISTORS — *Copthorne MacDonald, WØORX* — 44

NOVICE: HOW TO CALL CQ — *Herbert S. Brier, W9EGQ* — 57

MATH'S NOTES: SEMICONDUCTOR NEWS RELEASES — *Irwin Math, WA2NDM* — 66

DEPARTMENTS

Q&A: FREE TECHNICAL ASSISTANCE — *Charles J. Schauers, W6QLV* — 10

DX: AMATEUR RADIO GOODWILL — *Jerry Hagen, WA6GLD* — 50

CONTEST CALENDAR: CLAIMED SCORES 1973 CQ WW DX C.W. CONTEST — *Frank Anzalone, W1WY* — 54

PROPAGATION: DX PREDICTIONS FEB. 15 THROUGH APRIL 15 — *George Jacobs, W3ASK* — 59

AWARDS: STORY OF THE MONTH — J. H. CARNETT, TG9UZ — *A. Edward Hopper, W2GT* — 63

SURPLUS SIDELIGHTS: RTTY EQUIPMENT — *Gordon E. White* — 68

ANNOUNCEMENTS 8
OUR READERS SAY 7
HAM SHOP 84
ZERO BIAS 5

Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200.

CQ (Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second Class postage paid at Port Washington and Phillipsburg, N.J. Subscription Prices: one year, $6.00; two years, $11.00; three years, $15.00. Allow six weeks for change of address. Printed in the United States of America.

Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

The most powerful signals under the sun!

hy-gain

550A
The Total Communication System

The Hy-Gain 550A is the complete amateur system. Designed from the ground up to work together for total performance. Each element is matched to the system, for simple, plug-in expansion of your capabilities.

GT-550A Transceiver The matchless heart of the 550A System. No other transceiver can give you this performance for the price. Operating fixed station or mobile, the GT-550A is guaranteed to have top frequency stability after warm-up. A graph showing stability during final check-out is included with each unit. 25 KHz calibrator and VOX, optional.

Frequency Coverage—3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-29.0 MHz crystals supplied. Other 10 meter coverage optional. Power Output—300 watts PEP (nominal) on SSB, 180 watts on CW and RTTY, into 50 ohm resistive load.

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.

Noise Level—In excess of 40 db below single tone carrier.

Audio Frequency Response—Minus 6 db approximately 300/2400 Hz determined by side band filter.

RF Compression Characteristics—Up to 10 db RF compression without distortion.

Receiver Sensitivity—Better than .5 uv for 10 db S+N/n ratio.

Receiver Selectivity—2.1 KHz with 1.8 shape factor for SSB or 300 Hz sharp selectivity with optional CW filter.

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

Frequency Calibration—Interpolation to 1 KHz in 5 KHz increments.

Frequency Stability—Within 10 Hz during any 30 minute warm-up period, less than 100 Hz in any 15 minute warm-up period, not more than 100 Hz with a plus or minus 10% line voltage variation.

Calibration Accuracy—Interpolation to 1 KHz after calibration.

Back Lash—Not more than 50 Hz.

Output Impedance—Variable 50 ohms nominal capable of matching up to 2-1 SWR (30-100 Ohms).

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

Order No. 855 Ham Net $595.00

RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

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

HY-GAIN ELECTRONICS CORPORATION

Dept. AB, 8601 Northeast Highway Six, Lincoln, NE 68507
402/434-9151 Telex 48-6424

ZERO BIAS

Almost unnoticed in the opening remarks of a recent address by A. Prose Walker, W4BW, Chief of the Amateur and CB Division of FCC, was a hint of a major re-vamping of the amateur licensing structure as it now exists. The event was the SAROC show in Las Vegas, Nevada on January 4. Prose's statement, "I would prefer to discuss some of the new aspects of amateur radio which will be coming along in the next year or so, such as a proposal for re-structuring the amateur license classes and privileges...." was plainly overshadowed by a well-documented discourse on some of the philosophy behind the repeater rules of Docket 18803. But we feel that the future structure of amateur licenses is a subject worthy of closer examination.

We, at *CQ*, have been aware for several months of impending changes in amateur licensing, but have not been at liberty to share our information with our readers until FCC made the first move. The purpose of this editorial is to simply tell you what's likely to come, and give you a little more time in which to develop your own thoughts.

The information that we present here is not necessarily the gospel. Between now and the time a Notice of Proposed Rulemaking is actually released – whenever that may be – manysignificant changes may well be made, but here's what's likely to be proposed.

To begin with, amateur radio will be offered for the first time, a code-free beginner class (probably called Communicator Class) license with operating privileges in the v.h.f. or u.h.f. regions, probably beginning at 220 mHz. Such a license will open the door to thousands of newcomers, who will be offered a chance to join the amateur fraternity on a legal ground-floor level rather than become Citizen's Band anarchists. Hopefully, they won't become amateur radio anarchists.

Next, we expect that holders of the Technician Class License will be authorized to operate c.w. on the Novice bands, and perhaps phone on at least part of 10 meters. A reduction of the General Class code speed requirement from 13 to 10 w.p.m. also seems likely at this time, enabling a somewhat smoother transition from the Technician to General Class License. Mail-order licensing will be shaken up too, we feel, with some new and much more stringent supervision of such examinations required. This might well take the form of examination-by-committee, or examination by an authorized club. Either way the object will be to close off this much-abused pipe-line to a higher grade license by unqualified individuals. The Conditional Class License will continue as the functional equal of the General class, for people legitimately unable to be tested in person at an FCC office.

From where we sit, it looks as though we'll be wrestling with as many as seven different amateur licenses before many more years go by. Each of these licenses will be tailored to a specific purpose, and each will provide a very simple and natural progression to the next higher class license. If our prognosis is correct here's what it's going to look like, from top to bottom:

Amateur Extra-c.w.: 20 w.p.m. code, Extra Theory. All amateur privileges.

Amateur Extra-Phone: 10 w.p.m. code, Extra Theory. All amateur phone privileges, General/Advanced c.w. privileges.

Advanced: 10 w.p.m. code, Advanced Theory. All current Advanced class privileges.

General/Conditional: 10 w.p.m. code, General Theory. All current General Class privileges.

Technician: 5 w.p.m. code, General Theory. All present Technicianprivileges plus those new ones mentioned above.

Novice: 5 w.p.m. code, Novice Theory. All present Novice privileges.

Communicator: No code, Novice Theory. Limited phone privileges above 220 mHz.

As you can see, only one element of an examination need be studied at any one time in order to progress to the next higher license class. Either you'll be studying code or theory, but never both at the same time, and quite obviously you can stop any time you've reached your desired level of operatingprivileges, with the exception of the Communicator and Novice Licenses which will be nonrenewable, (license term for the Communicator still to be determined).

Just when the Commission will complete its preparatory work on this re-shuffling of the license structure is uncertain. Comments filed in advance with the Commission may or may not have a significant effect on the eventual form of the Proposed Rulemaking, but bear in mind that your comments carry as much weight as anyone's at this point, if they're thoughtful and intended to inform and assist rather than vent steam.

73, Dick, K2MGA

NEW DRAKE TR-22C

2 Meter FM Transceiver

New Features

- 12 Channels
- Monolithic crystal filter in IF for superior adjacent-channel selectivity
- Improved microphone

Amateur Net . . . **$229.95**

Including Mike, Over-the-Shoulder Carrying Case, 120 VAC and 12 VDC Cords, 10 ni-cad Batteries, and Speaker/Headphone Plug

SPECIFICATIONS

GENERAL: • **Frequency Coverage:** 144 through 148 MHz. 12 Channels, 2 supplied: (1) Receive: 146.52 MHz, Transmit: 146.52 MHz; (2) Receive: 146.94 MHz, Transmit: 146.34 MHz • **Power Requirements:** 13.0 Volts DC±15% • **Current Drain:** Transmit: 450 mA, Receive: 45mA • **Antenna Impedance:** 50 Ohms • **Dimensions:** 5⅜" x 2⅝" x 7½" (13.6 x 5.8 x 19.1 cm) • **Weight:** 3.75 lbs (1.7 kg)

RECEIVER: • **Sensitivity:** Typically .5 microvolt for 20 dB quieting • **IF Selectivity:** 20 kHz at 6 dB down; ±30 kHz channel rejection greater than 75 dB down. • **First IF:** 10.7 MHz with 2-pole monolithic crystal filter. • **Second IF:** 455 kHz with ceramic filter. • **Intermodulation Response:** At least 60 dB down. • **Modulation Acceptance:** ±7kHz. • **Audio Output:** At least 1 Watt at less than 10% distortion. • **Audio Output Impedance:** 8 Ohms

TRANSMITTER: • **RF Output Power:** 1 Watt minimum • **Frequency Deviation:** Adjustable to ±10 kHz maximum, factory set to 6.0 kHz. • **Multiplication:** 12 Times

ACCESSORIES

- **Model AA-10 Power Amplifier:** Use with TR-22C or any transceiver up to 1.8 watts output. 10 dB power increase. At least 10 watts output at 13.8 VDC. Automatic transmit/receive switching **$49.95**
- **Accessory Crystals** . . . . . each **$7.50**
- **Model MMK-22 Mobile Mount** **$9.95**

At your dealer's

R. L. DRAKE COMPANY DRAKE®

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

Drake manufactures a complete line of Amateur, Commercial, and Marine Communications Equipment. Write for prices and details.

OUR READERS SAY

Book for Blind Hams

Editor, *CQ:*

There is now available for blind hams a Braille publication entitled "DX and the Blind Ham." This is a non-profit publication which will give the blind ham much information which was heretofore available only to those with sight.

The time and effort of many generous people went into the compilation of this publication which consists of 78 pages of Braille. The cost is less than the out-of-pocket expenses incurred by the Peninsula Braille Transcribers Guild of San Mateo, California, whose members transcribed the written material into Braille and bound the pages into book form.

In this volume, "DX and the Blind Ham," there is given international prefixes and locations, compass bearings from three locations in the United States, distances from these locations and other useful information.

Any publicity that you can give this worthy project will certainly be appreciated by those hams who do not have their sight.

The cost of this book is $2.84 which includes handling and postage within the USA. Check or money order should be made payable to "Peninsula Braille Transcribers Guild" and mailed to me.

Roy Phelps, WB6FIS
166 Novato Dr.
Vacaville, CA 95688

New Additions

Editor, *CQ:*

It isn't often that I take the time and effort to write a letter of congratulations and approval, but I find that I must now do so. I have subscribed to *CQ, QST,* and *73* for a few years now, and I have to admit that you have top position -- hands down! While I fully support the League I have allowed my membership to expire due to my disenchantment with *QST.* It has become more and more reports of club activities and less articles and items of ham news interest. I admit that this is personal interest, but after all, that's what sells one magazine to one guy but not to another. As for *73,* while I in no way support Green and his editorial policies (I think he's $†%@*!), good writers and experimenters *do* find their way into the mag from time to time.

As for *CQ,* while I have always found it to be the most interesting and the easiest to read, I have only recently begun to appreciate it fully. Three things contribute to my newfound interest in *CQ,* and none should dilute the effect of the others. For about 4 years now I have been a member of QRP ARC I and a subscriber to the MILLIWATT. I am a proponent of the QRP philosophy (I have a Heath HW-7 for traveling and camping) and I am extremely pleased to see Adrian Weiss's column QRP. I also subscribed to Popular Electronics (I think that was the one!) when Herb Brier was writing the Ham Shack column for them. I enjoyed it very much--but I let it expire when Herb left. I haven't been a novice for several years, but I am always interested in what is going on in that domain. I think we all have a great deal of basics to learn (or remember), and I plan to be a regular reader of Herb's new column NOVICE SHACK. Last, but not least, while I think of myself as an all-around ham, I do enjoy spending most of my free time tinkering with various antennas--and no self-respecting antenna tinkerer would be caught dead without Bill Orr's fine book, *The Radio Handbook.* (It's good for other things, too!) My best wishes to Ade, Herb, and Bill, and especially my congratulations to you for having such outstanding foresight and good judgment in adding these three fine writers to your team. Keep up the good work. Check enclosed for 3 more years.

P.H. Smith, WA4BSI
Gainesville, FL

Customer Service

Editor, *CQ:*

Recently, after seeing an ad in *CQ Magazine,* I ordered a copy of the Surplus Schematics Handbook. As it turned out, the particular schematic which I needed had been listed in the advertisement due to a typographical error and no such schematic existed in the Surplus Schematic Handbook. I immediately returned the Handbook and "demanded" a refund. Within a few days I received not only a refund of the price of the Handbook, but also a personal letter of apology as well as a refund of the return postage on the Handbook.

This letter is to thank you for the response I received after explaining the situation to you. I fully expected a barrage of correspondence prior to receiving my refund, but I was certainly wrong.

Tom Workman, WBØHQO
Denver, CO

Happiness Is . . .

Editor, *CQ:*

I just had to drop you a line telling you how much I enjoyed, "Happiness Is Visiting A Ham."

Such honesty in reporting is refreshing especially in view of Watergate and the gasoline nonsense!

Congratulations to George, WB2AQC.

Jerry Macari, WA2KDB
Flushing, NY

Towering Success

Editor, *CQ:*

I believe the following item may be of interest to your readers.

On October 28, 1973, four years of litigation were terminated when Judge Alexander Kramer of the Suffolk County District Court dismissed two charges against WA2BVU brought by Islip Township for the erection and repair of a 70 foot transmitting tower without a special permit from the Town Council. The attorney for WA2BVU was W2OXR.

Reuben E. Gross,
Atty. at Law
Staten Island, NY

Announcements

Whitewater, Wisconsin

The Tri-County ARC Mid-Winter Swapfest is March 17, 9:00 a.m. to 5:00 p.m. at the National

Guard Armory, Whitewater. $1, advance, $1.50 at the door (additional $1. reserves one display table.) Advance tickets eligible for special prize, talk-in on .94. Refreshments, free parking, everything indoors. For tickets and details, Dan Servais, WA9 AJW, Rt. 4, Box 309, Elkhorn, WI 53121. Tel: (404) 723-2227. S.A.S.E.

Muskegon, Michigan

The Great Lakes ARRL Division Fifth Annual Hamfest will be held March 22-23, 1974 in Muskegon, Michigan. Friday evening at Ramada Inn, Saturday meeting at Muskegon Community College, Saturday evening, more activities at the Ramada Inn. Registration begins at 8:00 a.m., Friday. Parking free for 1500 cars. For tickets, information, reservations, MAARC Box 691, Muskegon, MI 49443. Convention Coordinator Hank Riekels, WA8GVK, (616) 722-1378 days, and (616) 744-1400, nights.

Flushing, New York

The Hall of Science of the City of New York, Inc., in cooperation with the American Radio Relay League, will conduct an amateur radio licensing course. Address: 111th St. & 48th Ave., Flushing Meadow, Corona Park, NY. Course conducted on Saturdays, beginning Feb. 2, 1974, 10 a.m. to noon. Registration fee: $8.00. Write to Hall of Science to register: P.O.B. 1032, Flushing NY 11352, or call: (212) 699-9400.

Arlington Heights, Illinois

The Forest View ARC Hamfest is Sunday, Feb. 3, 1974, at Forest View High School, 2121 S. Goebert Rd., Arlington Hts., from 8 a.m. to 5 p.m. Features include free parking, all indoor facilities, food and refreshment stand, manufacturer's display, and brand new Drake TR-22 for door prize. Bring gear to swap, sell, or auction. Talk-in on 146.94. Adv. registration, $1.50. $2.00 at the door. For advance reservations or info, write: Tony Mazzeffi, WB9GFC, 490 Easy St., Des Plaines, IL 60016.

Cuyahoga Falls, Ohio

The Cuyahoga Falls Radio Club proudly announces its Club Auction to be held Friday, Feb. 22, 1974 at the United Electronics Institute Bldg. Address: 1225 Oplen Ave., Cuyahoga Falls. Hrs: 7 p.m. to 11 p.m. Flyers bearing more details are available from WA8ZGL, Tom Carroll, P.O. Box 106, Cuyahoga Falls, OH 44222.

Detroit, Michigan

Stolen equipment: Regency HR-2A 2-meter xcvr. Serial No. 04-05632. This xcvr is believed to have been stolen from WB8NSU's home QTH on December 12th. Any info, please contact JoAnne E. Moore, WB8NSU, 112 Seward Number 307, Detroit, MI 48202.

St. Joseph, Michigan

Blossomland Amateur Radio Assn. announces "Spring-Thing" 74 Swap-shop and auction on Mar. 16th. Time: 9-5, set up times: 7:30-9. It will be held at St. Joseph High School. Talk-in: W8MAI/8, 22-82, 94 simplex. Tickets are $1 advance. $1.50 at the door. More info from BARA, P.O. Box 175, St. Joseph 49085.

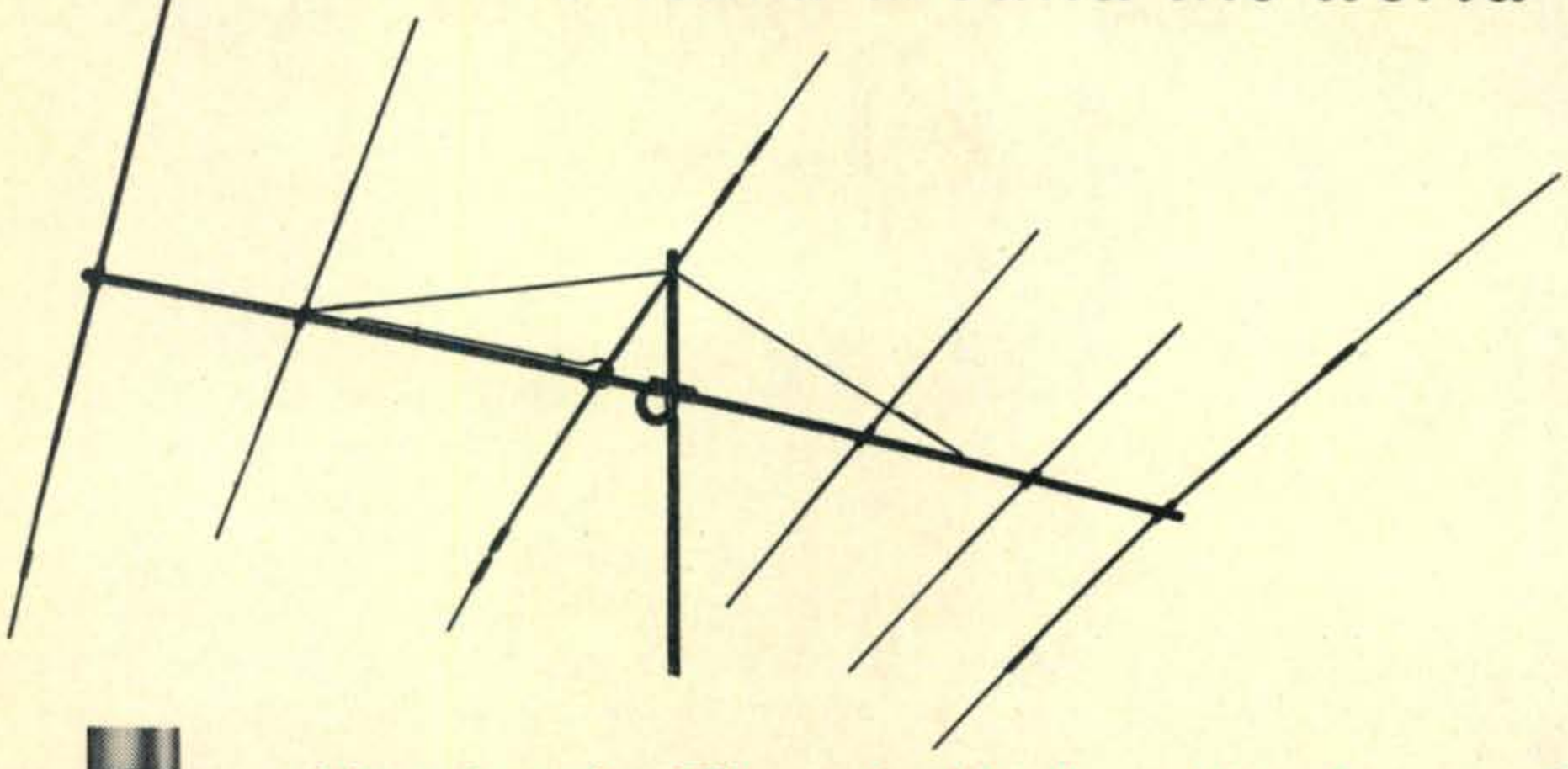
Vero Beach, Florida

The Treasure Coast Hamfest sponsored by the Vero Beach Amateur Radio Club and St. Lucie Repeater Assn., will be held March 9-10, 1974. It will be held at the Vero Beach Community Center. For info, write P.O. Box 3088, Beach Station, Vero Beach, FL 32960.

The voice of

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, **$189.95**

Improved 3-Element Thunderbird
Model 388
Suggested retail price, **$154.95**

Fabulous 3-Element Thunderbird, Jr.
Model 221
Suggested retail price, **$109.95**

Popular 2-Element Thunderbird
Model 390
Suggested retail price, **$99.95**

hy-gain **ELECTRONICS CORPORATION**
Dept. AB, 8601 Northeast Highway Six, Lincoln, NE 68507
402/434-9151 Telex 48-6424

Q AND A

BY CHARLES J. SCHAUERS,*
W6QLV

To the ham with a problem, it is the biggest thing in his life! In his crisis, *his* problem is more important than anyone else's — and this is as it should be if it is to be solved. However, there are those who cannot explain their problem to someone else explicitly enough to elicit the right kind of help—especially by mail. Q&A tries to help these hams but not all questions can be answered; we simply don't know it all.

One of the biggest problems facing hams with old equipment is obtaining the necessary electro-mechanical parts, especially ceramic switches and switch sections. Many of these were manufactured to a manufacturer's specifications and they are *not* a standard item in ready supply. Neither are dial mechanisms.

Some manufacturers carry up to a 7 year supply of spares, but many do not. So when you buy an old used set make sure that all electro-mechanical parts such as relays, switches etc., are available for replacement. No parts lasts firever! Try not to buy a set when you know that the manufacturer is out of business.

Believe it or not, we still receive questions on equipment manufactured as early as 1946! I would like to hear from hams who are still using the old Central Electronics line.

6146 vs 6146W

"I just acquired a foreign made transceiver that uses 6146's in the final. The set works fine, but I understand that if I use the 6146W it would work better. How about this?"

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

1933

Collins started in business to build a better transmitter
—became the leader in amateur radio.

1974

Still the performance leader.

We intend to keep it that way.

Collins Radio Company
Amateur Products
Cedar Rapids, Iowa 52406
Phone 319/395-4507

COLLINS

In Barry Electronics (512 Broadway, N. Y., N. Y. 10012) Green Sheet, you'll find that the 6146 sells for $4.40 and for the 6146W the price is $7.70. Quite a difference. The "W" is a premium tube and can stand a lot of punishment, *i.e.*, higher current for longer periods without going flat. I've used both and recommend the "W".

Solid State Tube Replacements

"Can you recommend a solid state tube replacement for the following tubes? For example: 5U4, 866, 872A and the 816. Where can I obtain the replacements?"

Yes. In order: use the ST-14, ST-7A, ST-10 and the ST-11, all obtainable from International Rectifier, Semiconductor Div. 233 Kansas St., El Segundo, Calif. 90245. The numbers given are their catalog numbers. Full instructions accompany the replacements.

160 Meter Operations

"I'm a relative newcomer to ham radio and I'd like to know why I do not hear more 160 meter operation."

At one time 160 meter operation was very popular but over the years it has because of various restrictions, dropped off. One of the main reasons is being able to install an *efficient* 160 meter antenna in a small amount of space. But 160 is still alive and some of the most modern transceivers cover the band.

Scope Problem

"I have a surplus scope on which I cannot get any vertical pattern positioning. What do I check?"

First check the vertical amplifier tube(s) and components. Next check to see that the leads to the CRT deflection plates are solid. Then check the low voltage power supply. Next, check the vertical positioning control.

Eico 753 Drift

"I bought a used Eico 753 transceiver. It has a terrible frequency drift. Can you please suggest what I must look for to correct the condition?"

Look at the circuit diagram of your set. You will find that the set has a v.f.o. p-c board. On this board are two transistors with other components. C_{33} and C_{34} are precision resistors—one may be defective. Next check CR_7 the 20 volt Zener diode. Check to make

HUSTLER®

the buck passing stops here!

No more buck passing—trading or shopping once you acquire a **Hustler two-meter colinear.** It is the ultimate in mobile antenna performance—electrical and mechanical—the answer to your search **for effective power gain**—transmitting and receiving!

SPECIFICATIONS

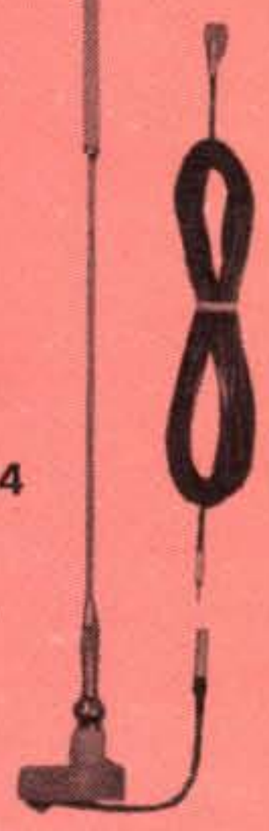
5.2 gain compared to 1/4 wave ground plane
Frequency coverage - 143 to 149 MHz
SWR at resonance - 1.2:1 or better
Bandwidth for 6 MHz - 1.5:1 or better
Power Rating - 200 watts FM
Radiator - 85" consisting of 1/4 wave lower section, phasing transformer and 5/8 wave upper section

CG-144

MODEL CGT-144—Easy—no holes to drill installation with trunk lip mount on side or edge of trunk lid. 180 degree swivel ball for optimized vertical positioning of antenna. Stainless steel radiator. Includes 17' MIL SPEC RG-58/U coax with all connectors attached. Antenna is removable from mount.

PRICE: $37.95

MODEL CG-144—Antenna supplied with 3/8"-24 base to fit all standard mobile ball mounts (mount or cable not included). PRICE: $24.95



CGT-144

AVAILABLE FROM ALL DISTRIBUTORS WHO RECOGNIZE THE BEST!

THE QUICK – QUICK DISCONNECT

MODEL QD-1—For easy press and twist removal of your two meter colinear or Hustler HF mobile, add this assembly between antenna base and mount. It's 100% stainless steel, rugged and precision.

PRICE: $10.95

QD-1

new-tronics corporation
15800 commerce park drive,
brook park, ohio 44142

sure that C_{37} is a 150 volt N470pf. If the parts mentioned check okay then suspect resistors R_{126} and R_{128}. Good luck!

Knight G-696 R.F. Generator

"I have a Knight G-696 r.f. generator which worked fine since 1970 and then suddenly I had trouble controlling the output. I checked the transistors, switches, etc., but yet when I manipulate the output control I have 'rough' spots. Could this be the output control?"

Before you replace the output control (pot) VR_1 (5K), check the 470 ohm resistor in series with it, but I suspect the pot.

TV Tuner Cleaner For Ham Gear

"Can I use TV tuner cleaner in my transceiver safely?"

TV aerosol cleaner is used to clean switch contacts, etc., in electronic equipment but it must be used carefully. If your set is equipped with a fan, also clean the air filter if one is provided. Always use the spray in such a way that the dirt, etc., flushed away does not enter contact areas. It is wise to use a "catch pad" under a part and spray down. The pad can be a lintless rag or facial tissue.

Old Ham Manuals

Q&A receives many requests for old ham equipment manuals and instruction books. Here is a source that may be able to help you get the manual (1945/1965 and older). Write Al McMillan, Hobby Industries, Box 864, Council Bluffs, Iowa 54501. He may also be able to suggest where you can get that "ancient" part you have been looking for. Do not send any money, but query Al first.

Yeasu FTDX-400/500 Mike Gain

"My audio output from mike and patch dropped off, so I replaced the 12AX7 tube, but this did not help. Any suggestions?"

Yes. Check the two capacitors in the cathode circuits of the tube (C_{255} and C_{257}). Check R_{260}, the resistor in series with the first 12AX7 grid. Then check R_{257} and R_{252} feeding the plates with low voltage, these could have changed value. When you have done all of this and not been successful, then check each of the remaining components associated with the preamp, especially the mike gain pot VR_6.

73, Chuck, W6QLV

Savoy

$3.75
Postpaid in U.S.A.

TYPE 900 A

TYPE 901

HIGH ACCURACY CRYSTALS
FOR OVER 30 YEARS

Either type for amateur VHF in Regency, Swan, Standard, Drake, Varitronics, Tempo, Yaesu, Galaxy, Trio, Sonar, Clegg, SBE, Genave.

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

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

BASSETT

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

- **2-6-10-15-20-40-75**
- **Identical size, cost, and appearance**
- **FULLY ADJUSTABLE TO FREQUENCY IN FIELD**
- **Low weight, low drag, high strength fiberglass**
- **Polished chrome brass standard ⅜-24 thread**
- **High gain collinear on 2 meters**

MODEL DGA-2M

$29.50 postpaid in U.S.A.

BASSETT VACUUM TRAP ANTENNA SYSTEM

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

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

BASSETT VACUUM BALUN

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

MODEL DGA-2000-B $12.95
Postpaid in U.S.A.

CONTACT YOUR DISTRIBUTOR OR WRITE FOR DATA

Savoy Electronics, Inc.

P.O. Box 5727 - Fort Lauderdale, Florida - 3331C

Tel: 305-563-1333 or 305-947-9925

never before has one company presented such a broad selection of superb amateur equipment

KENWOOD TS-520

The new TS-520 is the transceiver you have wanted, but could not buy until now. It is a no-compromise, do everything, go everywhere 5 band transceiver for SSB or CW that performs equally well at home, in an automobile, airplane, boat or trailer. The TS-520 features built-in AC power supply, built-in 12 volt DC power supply, built-in VOX with adjustable gain delay and anti-VOX ..

PLUS A HOST OF OTHER IMPORTANT FEATURES AND PROVEN Kenwood reliability. All at a price most amateurs can afford.
The price . . . $599.00

KENWOOD TS-900

. . . the ultimate tranceiver. The promise of the transistor has been fulfilled. Here is the transceiver you will want to own . . . whatever you have now, get ready to trade up. Its important features are far too numerous to list. Its specifications are superb. The TS-900 is unquestionably the best transceiver of its kind ever offered. The price . . . $795.00

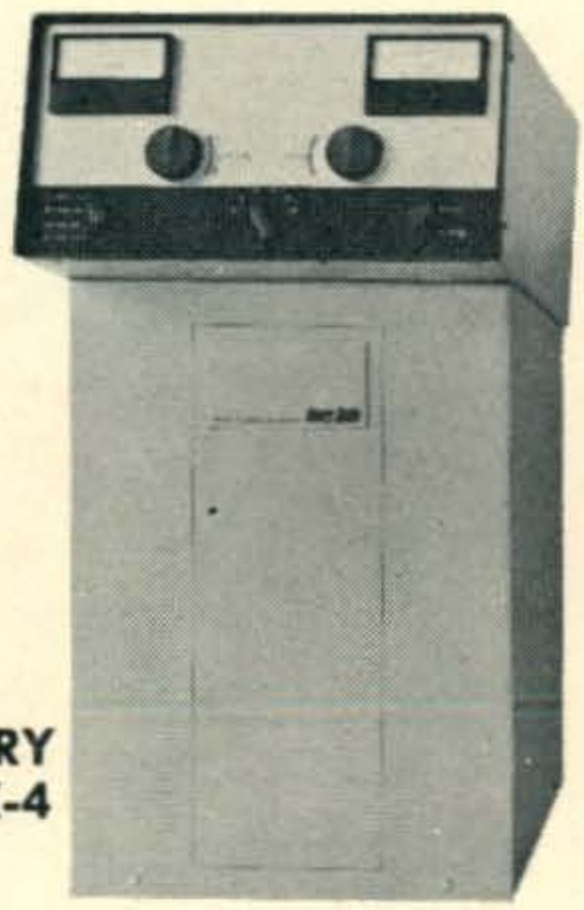
KENWOOD R-599A

The R-599A is the most complete receiver ever offered. It is solid state, superbly reliable, small and light-weight, covers the full amateur band . . . 10 thru 160 meters, CW, LSB, USB, AM, AM.N and FM. Features selectable AGC (slow or fast), built-in calibrator, monitors T-599A frequency to calibrate transmitter, squelch circuit, 1 KHz frequency readout, versatile cross channel operation with the T-599A, stable and accurate VFO, and many, many more. In fact, the R-599A is loaded with features. . . many that are "optional at extra cost" in other receivers. The price . . . $439.00

. . . a winning pair!

HENRY 2K-ULTRA

There has never been an amateur linear amplifier like the new 2K-ULTRA. Small and lightweight, yet rugged and reliable . . . all that the name implies. The ULTRA loafs along at full legal power without even the sound of a blower. Its anode heat is silently and efficiently conducted to a heat sink through the use of a pair of Eimac 8873 tubes. In fact, all of its components are the very best obtainable. The price . . . $845.00.



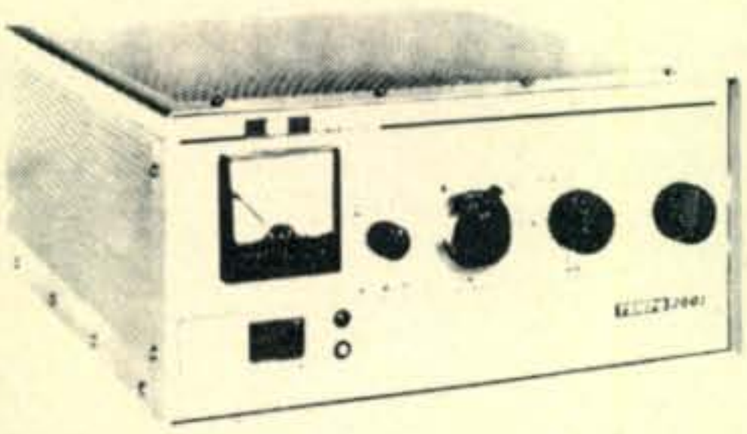
HENRY 2K-4

The 2K-4 linear amplifier offers engineering, construction and features second to none, and at a price that makes it the best amplifier value ever offered to the amateur. Constructed with a ruggedness guaranteed to provide a long life of reliable service, its heavy duty components allow it to loaf along even at full legal power. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console . . . $845.00.

KENWOOD T-599A

The T-599A is mostly solid state . . . only 3 tubes, has built-in power supply, full metering (ALC, Ip, RF output & high voltage), CW-LSB-USB-AM operation, 1 KHz frequency readout, smooth easy VFO action, built-in VOX (with delay, sensitivity and anti-VOX adjustments), built-in semi-automatic CW with sidetone, full amateur band coverage 10 thru 80, versatile cross channel operation with the R-599A. The price . . . $459.00

ONLY HENRY RADIO OFFERS SUCH A BROAD LINE OF TRULY OUTSTANDING EQUIPMENT. EVERY UNIT REPRESENTS THE MOST ADVANCED TECHNOLOGY . . . THE ULTIMATE IN VALUE FOR YOUR INVESTMENT.



TEMPO/2001

Small, but powerful and reliable . . . the 2001 linear amplifier offers a full kilowatt of power for SSB operation in an unbelievably compact package. It uses two Eimac 8874 grounded grid triodes . . . has a built-in solid state power supply, built-in internal blower, a relative RF power indicator, full amateur band coverage from 80-10 meters and is completely wired and ready for operation. The price . . . $545.00

TEMPO/ONE

. . . the best value in SSB transceivers on the market today. Look at the specifications . . . look at the price tag . . . ask any of the thousands of Tempo ONE owners about its reliability, and the reason for its unparalled popularity will be obvious. Features solid state VFO, receiver offset tuning (clarifier), all amateur bands 80 thru 10 meters, SSB upper and lower sideband, CW and AM. The price . . . $349.00

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. $199.00.

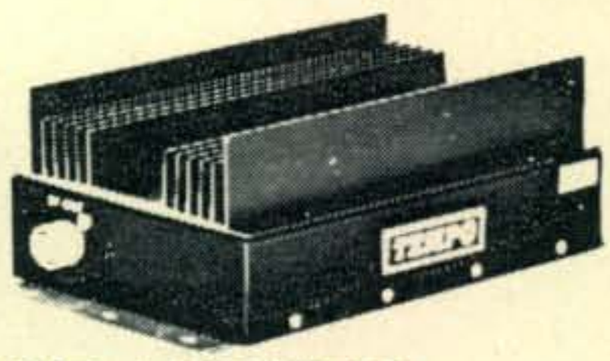
TEMPO/6N2

The Tempo 6N2 amplifier combines most of the fine features of the 2001 for 6 and 2 meter amateur operation. The amplifier uses the same small cabinet, the same modern tubes, the same inherent quality for 2000 watts PEP input on SSB or 1000 watts input on FM or CW. The rig is completely wired in one small package with an internal solid-state power supply, built-in blower, and RF relative power indicator. The price . . . $695.00.

TEMPO/CL-146

The CL-146 offers operation on the 146 MHz amateur band. The price includes a microphone, power cord, mounting bracket and one pair of crystals. A full line of accessories is also available.

• 12 channel capability • 13 watts or a power saving 3 watts • All solid state, 12 VDC - 144 to 148 MHz (any two MHz without retuning) • Supplied with one pair of crystals • RF output meter, S-meter, receiver detector meter • Provisions for external oscillator • Monitor feature • Audio output at front panel • Internal speaker • The price: $299.00.



VHF AMPLIFIERS

Tempo is exclusive distributor for a full line of superb quality solid state 2 meter, amateur VHF FM amplifiers designed for mobile or base station operation. Output ranges from 25 to 130 watts for drive power of 1 to 25 watts. Commercial, type-accepted amplifiers are available also. Please write for prices and specifications.

TEMPO/CL-220

As new as tomorrow! The superb CL-220 embodies the same general specifications as the CL-146, but operates in the frequency range of 220-225 MHz (any three MHz without retuning). At $329.00 it is undoubtedly the best value available today.

Attention Military & Commercial Users: Henry Radio offers a broad line of exceptionally reliable high power linear amplifiers and PGB industrial power generators

HENRY, KENWOOD and TEMPO amateur products are available from dealers throughout the U.S.

Export inquiries invited

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

Prices subject to change without notice.

Wilson Electronics Presents The Finest 2 Meter Handie Talkie With the Hottest Rx Front End on The Market.

2 METER FM TRANSCEIVER MODEL 1402SM

FREQUENCY .....140 - 150 MHZ
(2 MHZ SPREAD)

NUMBER OF CHANNELS 6
Supplied with 146.94 Simplex
146.34/94 - 146.16/76

R.F. Output ..... 2 Watts minimum

Sensitivity .....better than 0.3
MV/20 DB Q.S.

Audio Output .....500 mv

Meter .....Monitors battery voltage
on Tx, S meter on Rx

Weight .....1 lb. 4 ounces
without
battieres

Current drain ..... 15 MA Rx
410 MA Tx

Size 8 7/8" x 1 7/8" x 2 7/8"

Includes Adjustable Whip Ant

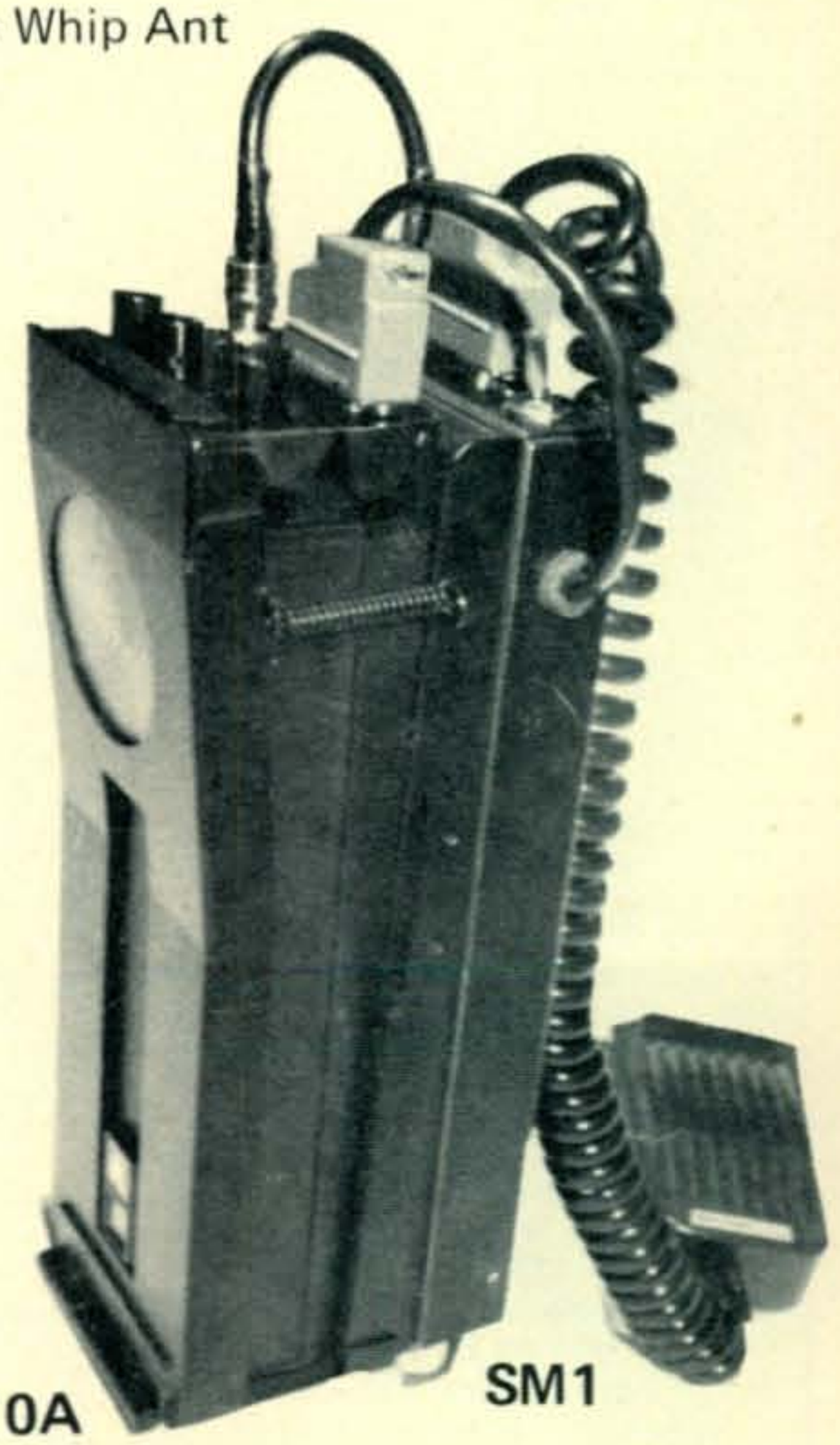
$239.00 Amateur Net Price

MODEL #	ACCESSORIES	
1410A	12 Watt Power Amplifier Also Includes Steel Case For 1402SM - Charges 1402 SM When Pluged into Cigarette Lighter	99.00

LCL LEATHER CASE 12.00
14BC BATTERY CHARGER ...29.95
SM1 SPEAKER MIKE 24.00

WRITE FOR COMPLETE SPEC SHEETS.
SEE YOUR NEAREST DEALER FOR
THE FINEST AMATEUR HANDIE
TALKIE ON THE MARKET

DEALER INQUIRIES INVITED
COMMERCIAL VERSION AVAILABLE



1410A SM1

Wilson Electronics

P.O. Box 794 **Henderson, Nevada 89015**

Telephone (702) 451-5791 451-6650

Assemble this digital clock and calendar in just one evening ...get continuous readout of hour, minute and second, plus month and day.

This new Digital Concepts electronic digital clock and calendar indicates the hours, minutes and seconds . . . or the month and the day . . . or alternates between time and date at 10 second intervals. Glowing orange digital readout (a continuous character .55 inch high) is visible from almost any viewing angle, no matter how light or dark the room.

Operation is totally silent, with accuracy to within seconds a month; life expectancy is an incredible 100,000 hours.

Choice of Display Modes

You can decide to display time only, date only, or a continuous 10-second cycle in in which time alternates with date. You can operate on a 12-hour or 24-hour international time sequence. And you can change all display modes instantly—any time you wish—by flicking simple controls.

Beautiful, and Beautifully Easy to Assemble

The contemporary hand rubbed oiled walnut cabinet is ideal for home, office or place of business. And a very memorable gift. All components of the kit mount on two interlocking printed circuit boards, for easy assembly in one evening, using only a soldering iron and a pair of diagonal cutters. The only wire in the kit is the line cord. Accuracy is assured by one MOS/LSI integrated circuit "chip" and top quality electronic components throughout.

The Digital clock and calendar is also available factory assembled.

Order Now for Immediate Delivery

Send this coupon with your check or money order for fast delivery anywhere in the world. Money back guarantee if not fully satisfied.

---

digital concepts

249 Route 46, Saddle Brook
New Jersey 07662

(201) 845-7101

Enclosed please find my check or money order for $_____, or charge my Mastercharge account number_____, expiration date_____, to cover the following order:

_____ kit(s) of electronics only, **Model CK-100 @ $68.00 each**

_____ cabinet(s), with face and mounting hardware, **Model C-31 @ $18.00 each**

_____ factory assembled calendar/clock(s), **Model EC-102 @ $108.00 each**

Add $3.00 to cover costs of postage and handling. N. J. residents add 5% sales tax.

Name _____

Address _____

City _____

State _____ **Zip** _____

3A

The Ultimate F.M. Transceiver

Here it is, the FMer's dream, a fully synthesized transceiver that'll cover the entire two meter band, PLUS a built-in scanning receiver that'll locate any repeater frequency in your area that's in use.

And get a load of these other features that make the "Dream Machine" the ultimate rig:

- Operates on FM, AM or Modulated CW
- Built-in DC and AC power supplies
- Frequency Range of 143.5 to 148.5 MHz in 5 KHz increments
- Autoscan in 5 KHz steps across entire band, with adjustable speed and frequency limits.
- Synthesizer flexibility that offers choice of 600 KHz up or down, 1 Meg up or down, simplex, frequency split, or any nonstandard split (programmable) all from a single function switch.
- Receiver Sensitivity of 0.35 Mv for 12 db SINAD on FM
- Dual power output of 20 watts or 5 watts across entire band
- Adjacent channel rejection (30 KHz) 100 db minimum
- Image spurious and intermodulation (EIA) 80 db minimum
- 10 pole, 13 KHz crystal filter
- Receiver Superhet, single conversion
- Frequency stability of 0.0005%
- Built-in tone burst and PL encoders and decoders
- Built-in touch tone pad
- Full LED Digital readout
- Built-in S Meter also serves as VSWR bridge, power output meter, battery indicator, deviation indicator and discriminator meter.
- Audio output 4 watts @ 10% THD
- Speaker built-in to left side of cabinet for maximum mobile reception
- Headphone jack for noise-free mobile operation
- Independent selectable priority channel
- Built-in Auto CQ
- Temperature range from -20^{o} to 170^{o} Fahrenheit
- Size: 4" H x 8" W x 10" D Weight: 10 pounds
- One million channels (1000 Rec. x 1000 Trans.)

The EBC-144 "DREAM MACHINE"

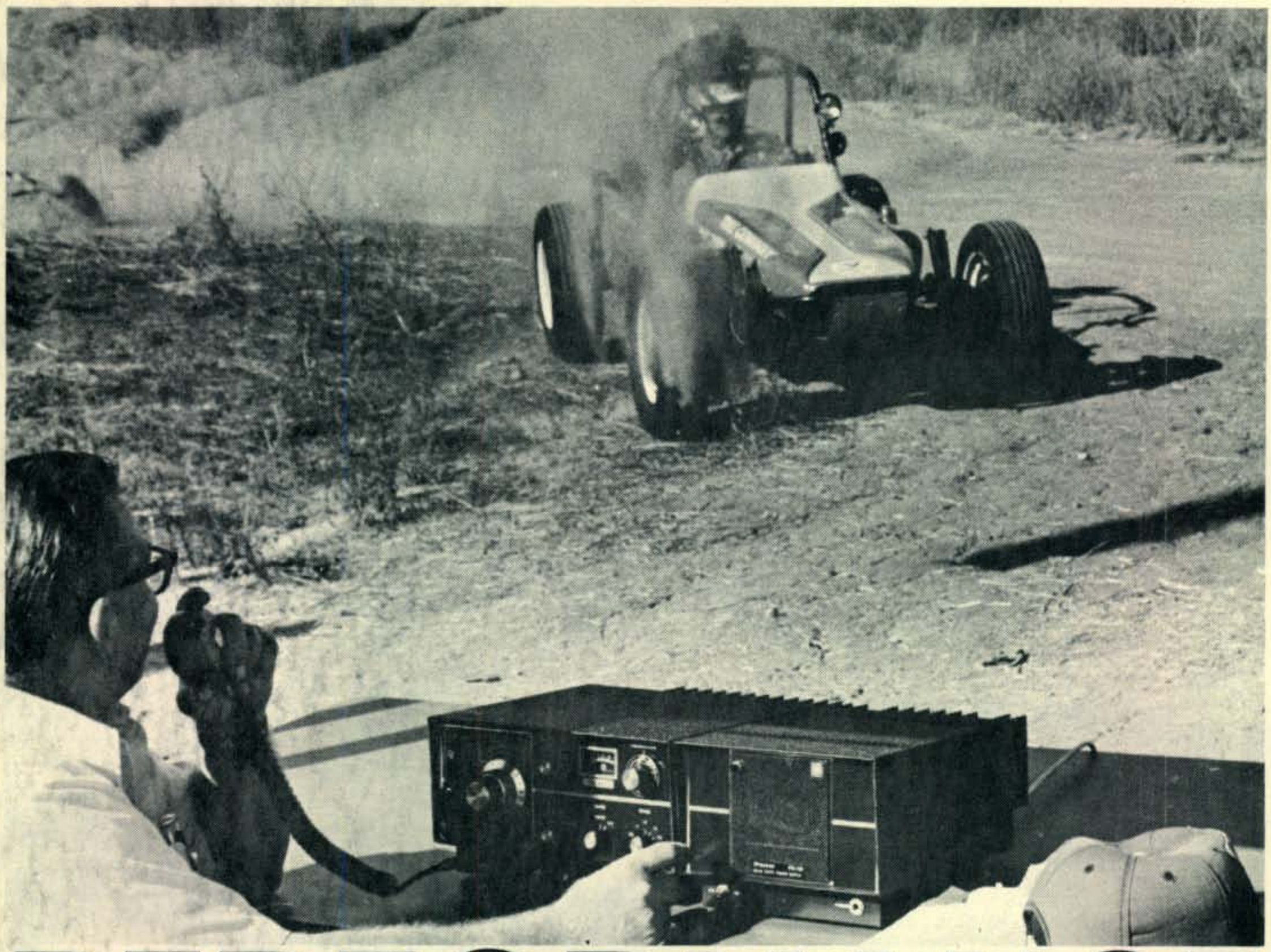
$995.00

A $100 deposit will insure early delivery and guarantee price

AMATEUR PRODUCTS DIVISION

emergency beacon corp.

13K River Street
New Rochelle, N.Y. 10801
(914) 235-9400



PERFORMANCE
WHEN IT COUNTS

SWAN ELECTRONICS Equipment: Major choice of the **Baja Amateur Radio Racing Fellowship** operators who manned the communications network for the 1973 Baja 1000 Off-Road Race from Ensenada to La Paz, B.C., Mexico. More than 50% of the operators used SWAN gear. Among other units, a SWAN SS-200 completely solid-state 5-band transceiver and two FM-2XA 2-meter transceivers were in action at the finish line.

Officials and participants agreed that communications, for the gruelling 875 mile course, was the best in the history of off-road racing. Here are a few of their comments:

Valor Smith (Pit-Crew Chief for the "Baja Bug" class winner) — "We've had nine entries in Mexican races, and this is the finest communications we've ever had."

Ing. Alfredo Arenas (Executive Director of the Baja Sports Committee) — "I think the radio communications were very good. We're very grateful to all the people involved."

Driver Carl Adams (Winner of the "Mini-Pickup" class) — "We got correct answers every time we asked . . . and we went out to win . . . Without communications, it'd be a big guess."

Marilynn Greaves (Official Scorer and Time Keeper) — "Overall communications was exceptionally great . . . In spite of all the dust at the finish line, there was no problem with the SWAN FM-2XA . . . Communications between the radio room and the finish line worked out beautifully."

WHEREVER THE ACTION IS IN AMATEUR RADIO, YOU'LL FIND SWAN ELECTRONICS

SWAN MOBILE TRANSCEIVERS
designed for 12V DC power source

SS-200 (5-Band, 200 watts P.E.P.) **$779**
SS-15 (5-Band, 15 watts P.E.P.) **$579**
FM-2XA (2-meter, 10 watts P.E.P.) **$259**
PS-20 (SS-200 AC Power Supply) **$139**
PS-10 (SS-15 AC Power Supply) **$89**
FM-2XA Snap-Pack (AC Power Supply) **$39.95**

DEALERS THROUGHOUT THE WORLD
or order direct from

SWAN ELECTRONICS
A subsidiary of Cubic Corporation
Home Office: 305 Airport Road • Oceanside, CA 92054
Telephone: (714) 757-7525

THE BEST PRACTICAL DEVELOPMENTS IN AMATEUR RADIO

Everything's FB with Harry Allen ...with one of the many fine headsets from Telex.

No rig operates at its best without the addition of a Telex headphone or headset.

Rugged, comfortable Telex ceramic boom mic headsets in particular, provide the ultimate in convenience and efficiency.

Their boom microphone adjusts to any position you wish, giving you complete hands free movement and mobility.

For non-voice operated transmission, they have a special easy to reach inline push-to-talk switch.

And both Telex boom mic headsets and headphones seal out unwanted room noises and acoustics, concentrating the signal at your ear, so that you hear clearly and without distraction.

From ultra-lightweight headphones to single or dual muff and boom mic headsets, Telex provides you with proven equipment built to the highest standards we know. For information write Telex Communications, Inc., 9600 Aldrich Avenue South, Minneapolis, Minnesota 55420.

PRODUCTS OF SOUND RESEARCH

TELEX®

COMMUNICATIONS INC

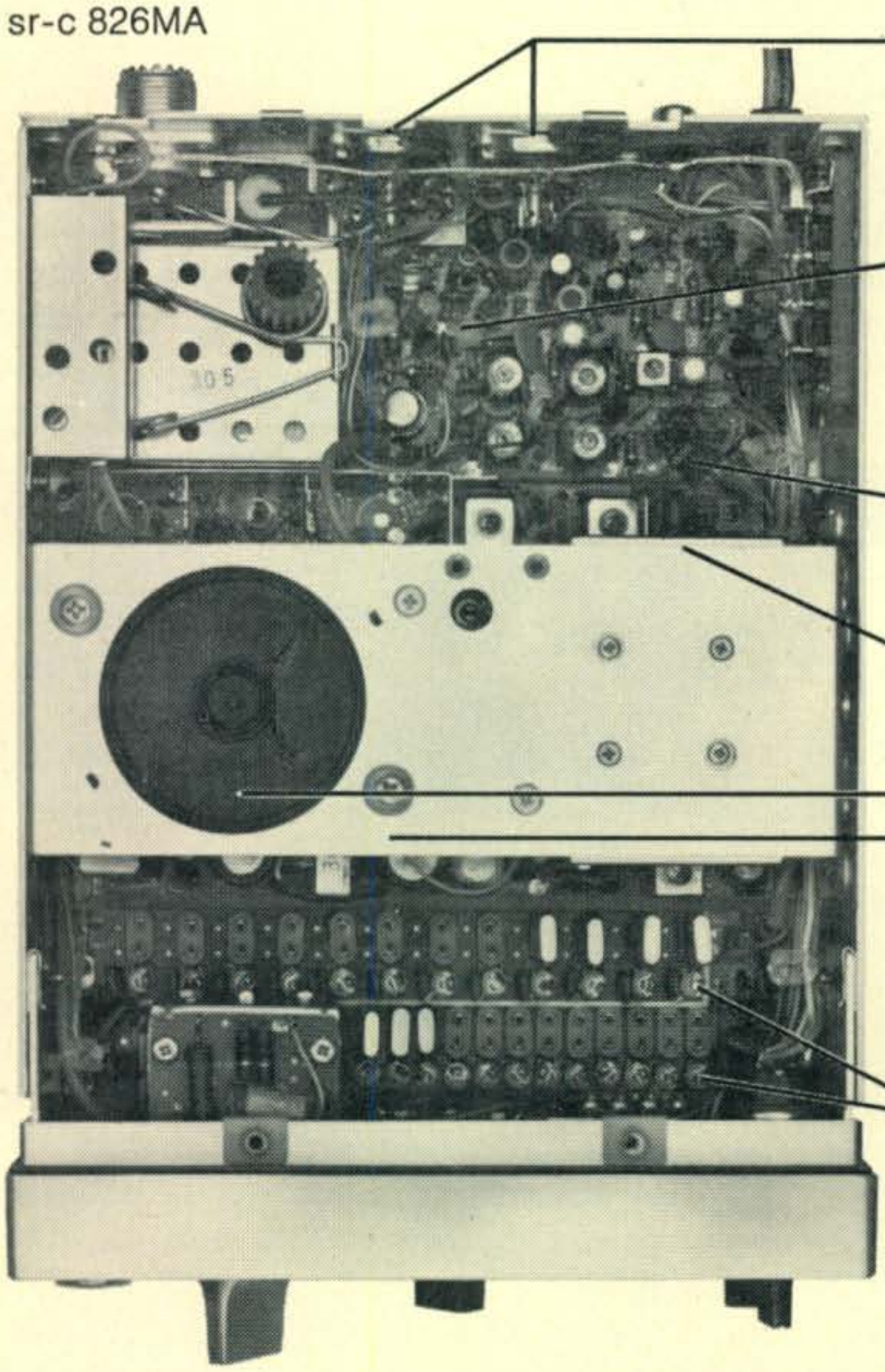
CANADA: Double Diamond Electronics Ltd., Scarborough, Ontario

INTERNATIONAL: Telex Export Dept., 9600 Aldrich Ave.S., Minneapolis, Minn. 55420 U.S.A.

7308

ANATOMY OF A GREAT 2-METER RADIO

sr-c 826MA



Rear panel test jacks for complete Tx and Rx metering and discriminator output for crystal netting; Input for external tone burst and Touchtone®; Provision for external speaker.

Conservative 10 Watt transmitter with an effective IDC circuit to maintain narrow band deviation (±5KHz) for today's repeaters; Automatic current Control and final protection against high VSWR.

Provision for front panel selectable "Private Channel" tone coded squelch (CTCSS) on both receive and transmit.

Triple tuned receiver "Helical Resonators" for maximum intermodulation interference rejection.

Built-in speaker.

The heart of a quality radio—a commercial grade receiver featuring Front-end MOS-FETS and a highly selective 9 section ceramic I.F. filter —necessary for today's active 2 Meter band; Reserve audio for noisy environments.

Individual "Netting" capacitors on both Tx and Rx crystals; 12 channel provision with popular channels 94/94, 34/94, 16/76 and 52/52 included; Easy access to crystal deck through "snap-open" trap door.

Touchtone®—trademark of A.T.&T. Co.

ASTROPOINT = TOTAL PERFORMANCE

STANDARD's "ASTROPOINT" system gives the no compromise performance for the active amateur, unlike the claims made by the "cheapies." Don't be misled by gimmicks or gadgets—it's what's inside that counts. Reliable, solid state circuitry and Glass-Epoxy PC boards used throughout, backed by our 6 month warranty. INSIST ON TOTAL PERFORMANCE—INSIST ON STANDARD.

The 826MA comes complete with microphone, mounting brackets, 4 channels and line filter.

For detailed information on the 826MA, the complete Standard line and the name of your nearest dealer write:

Standard Communications

213/835-3134 • 639 North Marine Avenue, Wilmington, California 90744

The Low Profile Quad Antenna

BY JOHN P. TYSKEWICZ,* W1HXU

QUADS should be heard and not seen. After viewing a real live 20 meter cubical quad for the first time, I could not understand why such an antenna using ¼ λ long elements looks so huge! This first encounter with a full-sized quad was sufficient to postpone my trip to the friendly bamboo pole supplier.

While experimenters have succeeded in reducing the size of yagi antennas with some sacrifice of performance, the quad antenna has not received similar attention.

My approach to reducing quad size was to retain the ¼ λ horizontal portion of the quad element while reducing the dimension of the vertical portion. Conventional thinking indicates that it can't be done, but our experiments prove otherwise. The Low Profile Quad elements described here measure around ⅛ λ in height.

Various approaches to low profile design were tried at 145 mHz under controlled conditons, using a conventional 2-element quad as a reference. Helicoidal, loop, stub, zig-zag and folded vertical sections were tried. With the better sections comparative measurements indicated performance nearly identical to the reference quad. From the mechanical and performance standpoints the 3-wire folded vertical section seemed most suitable for use on the h.f. bands, as well as being adaptable to tri-band use. The trip to the bamboo works was finally made.

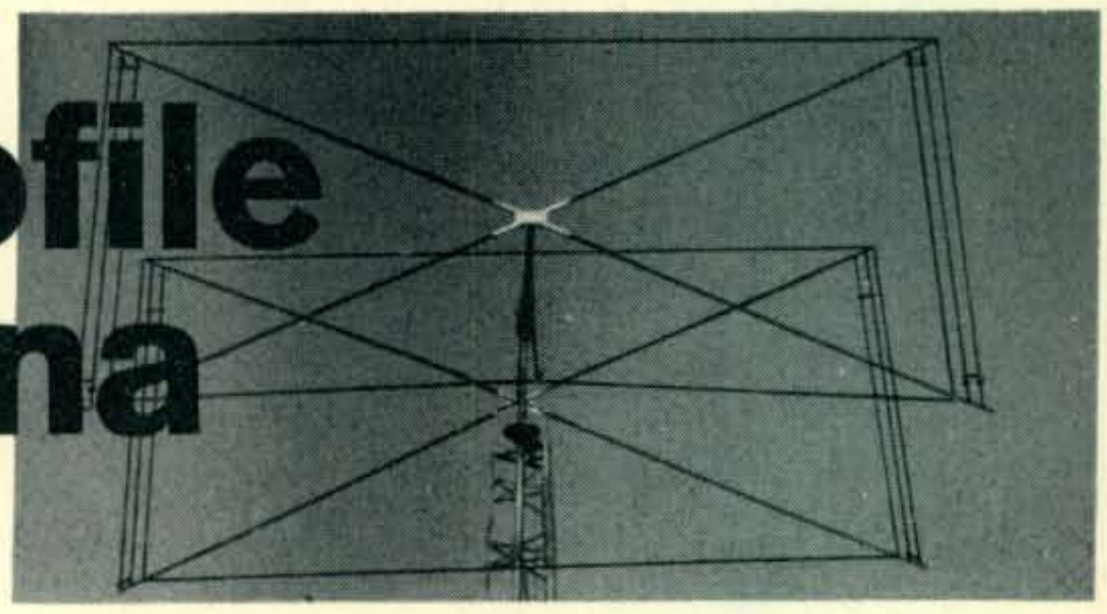
As shown in fig. 1, the 3-wire section is actually comprised of ⅜ λ of wire folded back on itself twice yielding ⅛ λ physical spacing between the two horizontal ¼ λ portions. Why the use of a total driven element wire length of 1¼ λ yields proper resonance is beyond the scope of this author's investigation. Nevertheless, in the configuration shown, it is resonant and it works quite well. Further work with this quad design will no doubt establish the "why" of it. As determined by experiment, the total driven element wire length is calculated from:

$$L \text{ (feet)} = \frac{1192}{f \text{ (mHz)}}$$

The reflector should be about 4% longer. To facilitate tuning, two adjustable shorting bars are used per element, each made of two Fahnestock clips strapped together with copper flashing for a total center-to-center spacing of 3½".

Spider Construction

A well-equipped shop is necessary to duplicate the spiders exactly as shown in fig. 3, but the result will be an extremely durable spider which will make assembly



of the LP quad simple and accurate. Lacking access to such a workshop, however, the builder can improvise with plates, muffler quad hardware. The critical dimension is the 26° angle above and below the horizontal center-line. This 52° spreader angle should be closely adhered to in order to be able to accommodate the ¼ λ horizontal sections across the top and bottom of the quad element.

In the absence of welding equipment, the builder can fabricate the parts by hand and using scrap plywood for a jig, precisely locate the parts using nails. The local welding shop should then be able to tack the parts in place and finish the job with continous welds (c.w.).

A boom length of 8′ was used. Wider spacing might yield better overall performance. Use standard boom-to-mast hardware.

Driven and Reflector Elements

Figure 1 shows the 18 ft. 4 in. × 9 ft. diven element. The bamboo spreaders were spiral wrapped with glossy finish PVC electrical tape, one ¾" × 66′ roll per spreader. At the butt end, black friction tape used to build up a uniform diameter to make a good seat within the angle iron. As the spreader pole diameters will vary, the builder will have

*77 W. Euclid St., Hartford, Conn. 06112

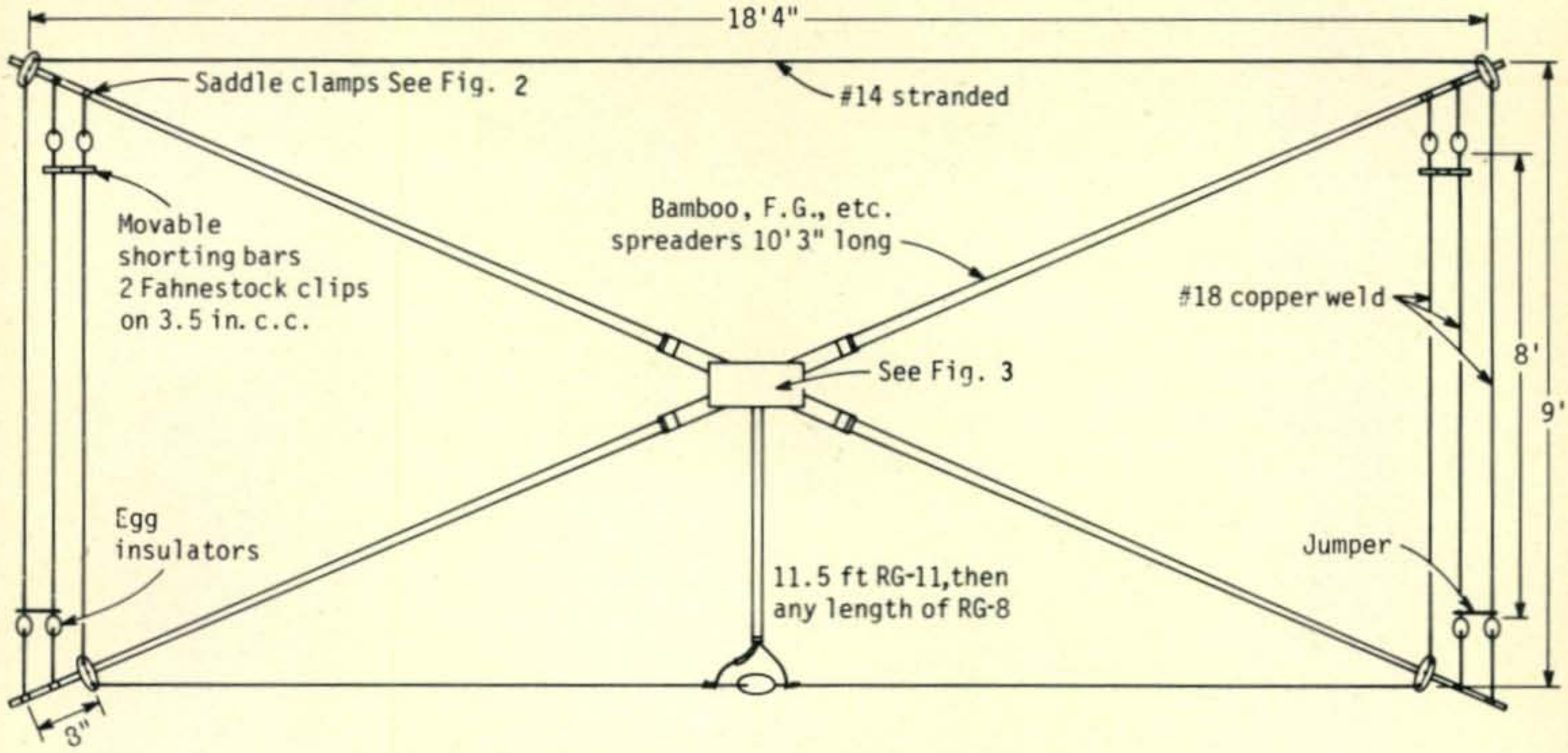


Fig. 1—Driver element construction for the LP Quad.

to form his own spreader and saddle clamps, hence no detailed dimensions. Pass safety wire through the outer cross-arm clamp and hole to prevent accidental clamp slippage.

The spider-spreader assembly is laid flat on the ground and wire stringing begun. Trying to do the job with one continuous piece of wire is quite hopeless. Besides, we are using two different sizes of wire. A guage stick 9 ft. 2 in. long, is butted between the inner side of the saddle clamp at the top spreader and the lower egg insulator wire wrap joint. The #18 copperweld wire is passed around the saddle clamp's lower 10-32 machine screw and fastened. It is then threaded through the egg insulator, drawn firmly and wrapped. Leave several inches of extra wire to make the jumper and connection to the #14 top element wire. Do not rely on the saddle clamps for electrical continuity. With the guage stick in place, the other two parallel #18 wires are then strung. Don't forget to install the movable shorting bar. With a tilt-over tower the shorting bars are more accessable as shown. If necessary the shorting bars and jumpers can be interchanged. Transfer the guage stick to the opposite side and repeat the wire stringing.

Next, the #14 wire horizontal sections are fastened at one end around the other saddle clamp screw, pulled up taut, wire

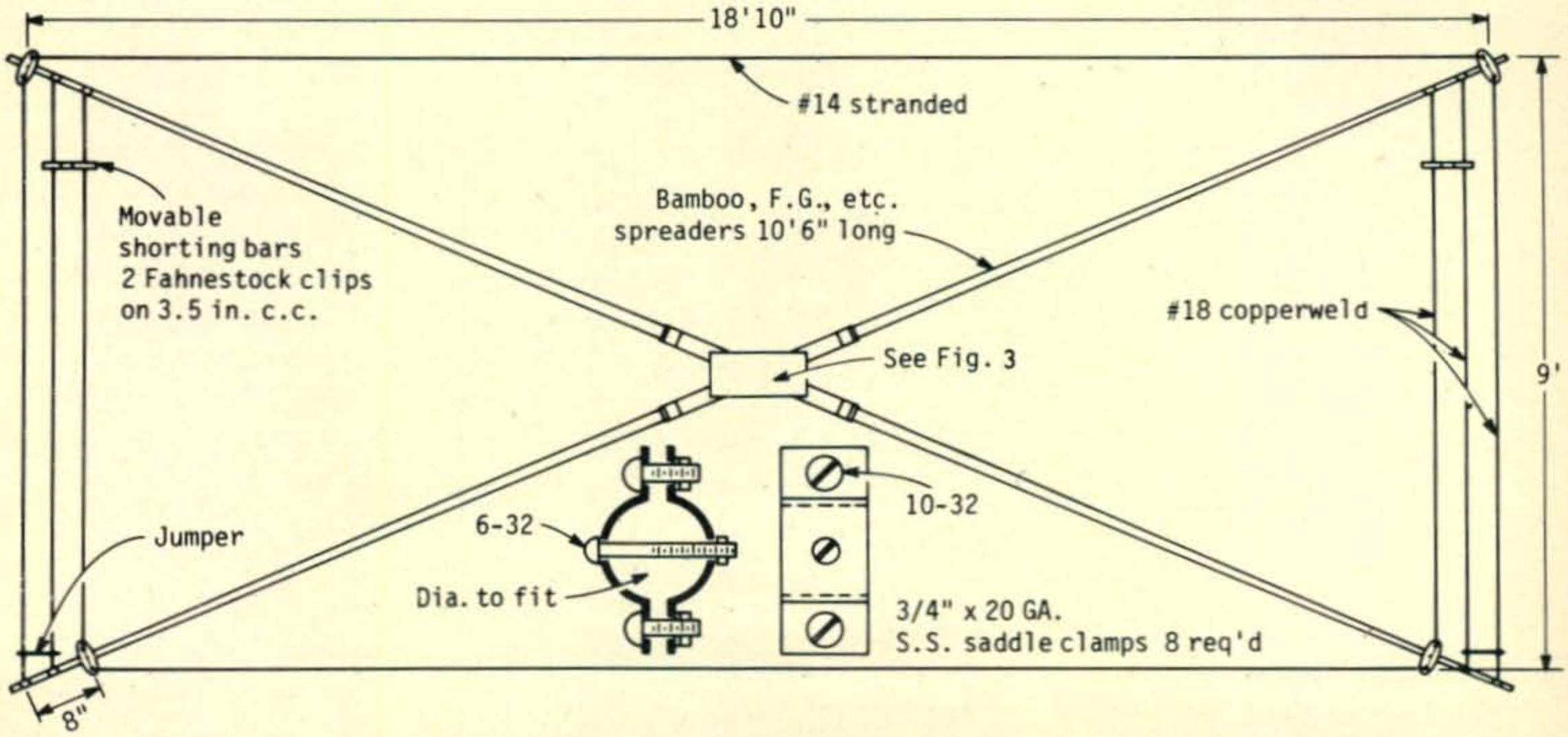


Fig. 2—Construction of LP Quad reflector and saddle clamps.

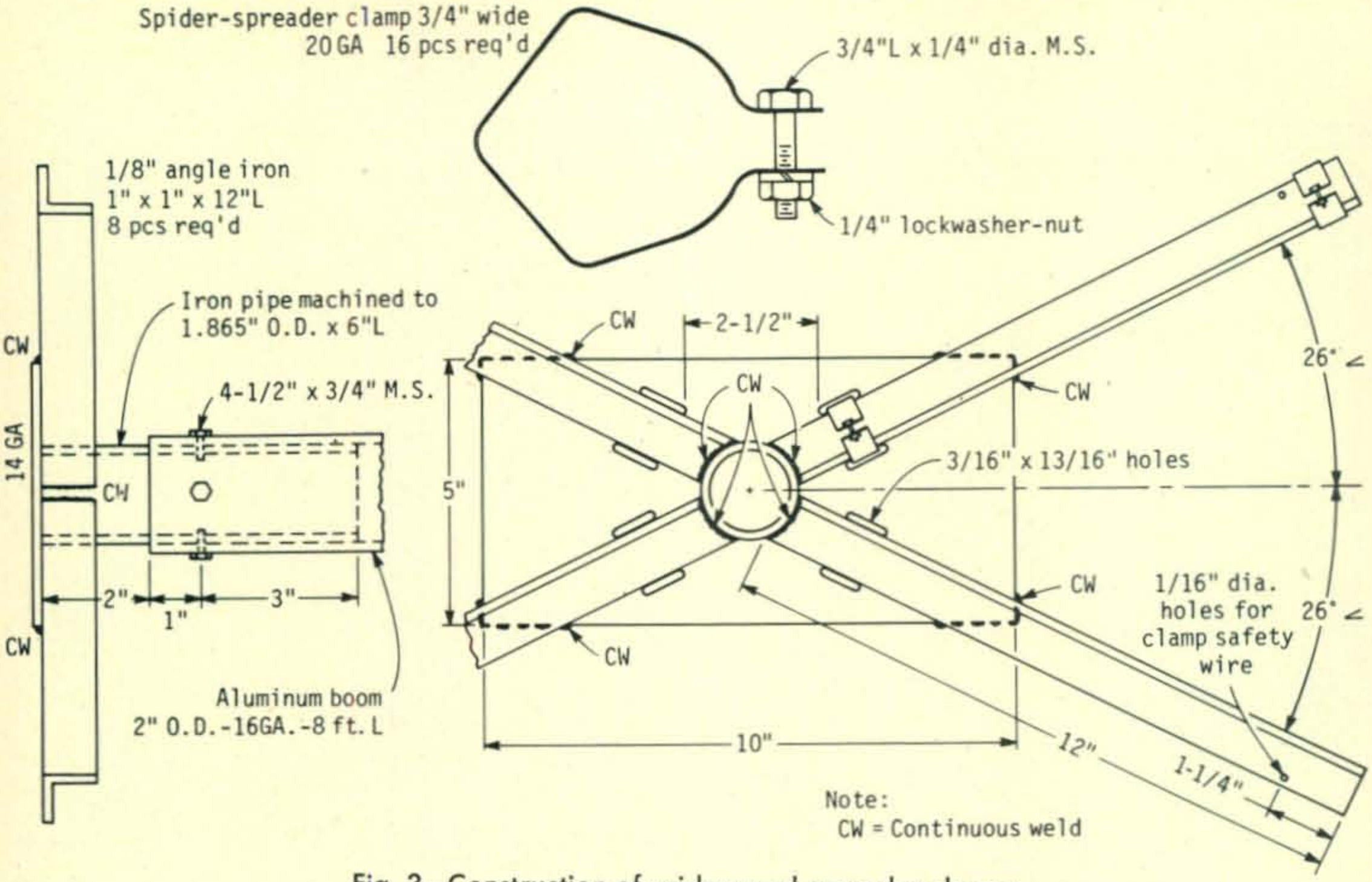


Fig. 3—Construction of spiders and spreader clamps.

wrapped and the pigtails over the saddle clamps soldered.

The 18 ft. 10 in. × 9 ft. reflector element, shown in fig. 3, is assembled in the same manner, minus the egg insulators. The normal power input here at W1HXU is 500 watts d.c. and the bamboo spreader insulation appears to be adequate. However a 2000 w.p.e.p. signal probably could use the egg insulators or at least fiber glass spreaders.

Feeding and Adjustment

The input impedance is made to order for RG-11/U: around 75 ohms. However my underground coax installation uses the more common 50 ohm RG-8/U so it had to do. If operation is confined either to the phone band or c.w. portion, the v.s.w.r. is acceptable when centered in that working portion. By simply inserting a ¼λ matching section of RG-11/U, 11.5 ft. long between the driven element and the 50 ohm feed line one can expect a v.s.w.r. curve as per fig. 4. Of usefull interest is the 50 kHz shift between wet and dry conditions, so tune up for your prevailing WX.

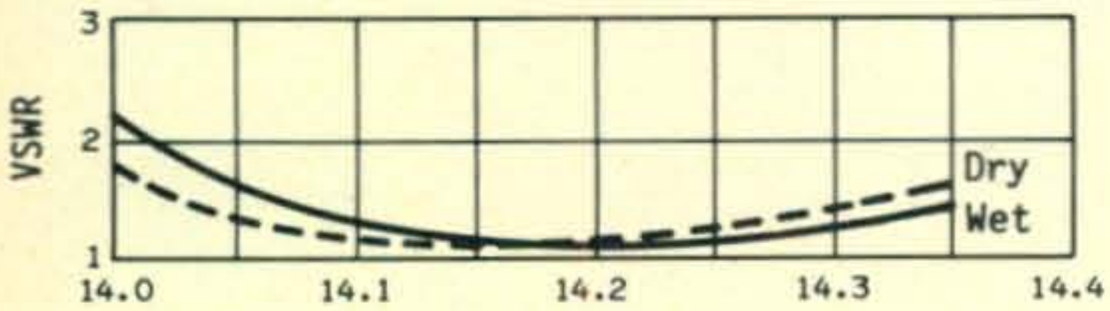


Fig. 4—V.s.w.r. curves of LP Quad.

Initial tuning is made with the shorting bars one foot from the top on both elements. Raise the antenna, apply low power, and take a v.s.w.r. curve. From the frequency of lowest v.s.w.r. on the curve, determine the desired frequency shift. Moving both shorting bars equal increments and in same direction will effect a frequency change of approximately 15 kHz per inch. To lower the frequency move the bars towards the top; to raise the frequency, move bars downward. Adjust the driven element only; raise antenna and repeat the plot of v.w.s.r. until the desired point has been reached.

The reflector is tuned for maximum forward gain or best front-to-back ratio by pointing the beam at a short dipole antenna in the attic 40 ft. from the quad. The transmission line from the dipole terminates in a diode and 0-1 ma meter in the shack. The reflector will tune quite broadly, and some corrective adjustments may be necessary to the driven element as both elements approach optimum resonance. Finally, solder the shorting bars in place. (Thank heaven for tilt-over towers).

A glance through our log book clearly indicates that this Low Profile quad outperforms the previously-used 2-element wide spaced yagi in percentage of contacts and signal reports, and it sure looks real pretty! ■

Radio Communications In Primitive New Guinea

BY MILT MANN,* W9PRH

A RECENT occurrence indicates that most of the world's radio amateurs are extraordinarily mean, cruel, and heartless. Before thinking yourself to be apart from this group, consider the following question: When was the last time you gave a decent meal to the little man inside your receiver who works so hard to make himself heard when you turn up the volume?

Perhaps you're even more thoughtless than some of the primitive cannibals of the Western District of New Guinea. Not long ago a government patrol, returning to check the condition of the first radio receiver that had been left in one remote village, found it was entirely stuffed with rotting food. Local cannibals explained that they had been attempting to feed the little man they heard inside the box!

Happenings like this are common in New Guinea, one of the most primitive regions of the world. Though resident foreigners often joke that their definition of "primitive" is the total lack of television, the truth is that New Guinea's valleys are so deep, its mountains so high, and its bush so impenetrable, that since the beginning of history most tribes who live in its interior have never even seen the people of an adjacent village. Government patrols have touched most areas in recent years, but unknown, stone-age tribes continue to pop up periodically, and some tribes of cannibals and headhunters retain their traditional way of life against the pressure of government opposition.

Communications is one of the most basic . . . and most severe . . . problems of the Territory of Papua and New Guinea. Highway construction is phenomonally difficult. The terrain is rugged and geologically unstable. Only a few intertown roads exist. The best of these, called the Highlands Highway, spans about 350 miles. Averaging over 5,000 feet in altitude, not much more than a single mile of this road is hard-surfaced.

Ships provide good service between coastal ports and up the long Sepik and Fly Rivers. But New Guinea is the world's second largest island. The majority of its population live high in the mountainous interior, generally above the altitudes reached by malaria-carrying mosquitos, and far beyond the range of navigable waterways.

During daylight hours aircraft of every description move large quantities of goods and people between short grass strips, jungle rivers, isolated helicopter pads, corrugated runways left over from World War Two, and the modern airports that adjoin most District Centers.

But aircraft operations are far too expensive to serve as a form of day to day communications for the average citizen. It has taken the penetrating power of radio to provide the first continuous communications link between the people of New Guinea and the unknown world surrounding them.

Many forms of radio communication are used in the Territory. Mission radio networks allow daily meetings between missionaries at

A problem peculiar to New Guinea is one of language. Natives are so isolated that each village has its own language. Over 750 different languages are spoken . . . not dialects, but complete languages.

*P.O. Box 413, Evanston, Ill. 60204

Native woman disc jockey plays the top 100 on the New Guinea "Hit Parade."

remote outposts. Supply boats give advance notice of their impending arrival to villages far upriver. Aircraft can be called from almost anywhere in emergencies. The Weather Bureau gathers up-to-the-minute data for aircraft crews who frequently depart amidst unstable tropical weather. Radio amateurs chat with their friends in the Territory and abroad. And the Australian Broadcasting Company provides world news and entertainment programs primarily for the many Australian expatriates working in the Territory.

The nine stations in the expanding radio network of the Administration's Department of Information and Extension Services (D.I.E.S.), are the most unique and interesting for a variety of reasons.

Other than station managers and a few officials, who are Australian, these nine stations are staffed entirely by natives of Papua and New Guinea. Their formal education varies from nothing up. Yet, they appear to be doing a highly acceptable job.

A station manager explained, "Equipment and operation is as simple as possible to achieve the fastest practical turnover to a totally indigenous staff." The most serious problem he foresaw was the inability of most New Guinea natives to make decisions. "I ask a native disc jockey, 'What will you play tonight?' He replies, 'I'll let you know tomorrow.' "

D.I.E.S. stations are specifically directed to the native listening audience. Within this audience more than 700 languages are spoken. These are not just dialects, but unrelated tongues! To accommodate such diversity, programs of general interest are prepared in studios located near the Territory's capitol of Port Moresby, then broadcast in English early each morning to the nine outlying stations. The staff of each station translates these programs into the languages most important in its own listening area. Some skilled announcers may work with more than half a dozen languages. Radio Daru cleverly arranges for resident students at a nearby high-school to translate items of interest into each of the 27 languages spoken in their home areas within the surrounding Western District.

New Guinea's major language is Melanesian Pidgin, often referred to as Pidgin English. Devised to communicate with early foreign traders who touched New Guinea's shores since centuries ago, it is a conglomeration of English, Malay, German, Chinese, Melanesian, Polynesian, and Portugese words, as well as some from New Guinea's traditional languages. Having its own rules of grammar and sentence structure, it has become an independent language in its own right and may eventually be adopted as the Territory's legal language.

Initially unintelligible to most English speaking people, Pidgin's simple basics and extremely colorful expressions can be readily learned. It is the predominant language broadcast by D.I.E.S. stations in the northern part of the Territory, particularly over the higher powered transmitters of Radio Rabaul, Radio Wewak, and Radio Bougainville. Not only news, but many popular programs, including New Guinea's own musical Hit Parade, are broadcast in Pidgin.

Examples of Pidgin include the slogans used for identification by some D.I.E.S. stations. Radio Mount Hagen, in the densely populated Western Highlands District, is called, "Nek Bolong Tarangau", literally

Missionary uses surplus WW II crank generator to power an ancient BC-1306 transmitter/receiver to maintain daily skeds with other missionaries.

"The Neck that Belongs to the Eagle", or, in other words, "The Voice of the Eagle."

Radio Rabaul's slogan is, "Stesin Bolong Yumi", which if pronounced properly is obviously, "The Station that Belongs to You and Me."

Radio Daru uses the call letters VL8BD and transmits on the frequency of 3305 kHz in the 90 meter short-wave band. Radio Wewak, VL9CD, transmits on 3335 kHz. These are the two stations nearest the Indonesian border which divides the Island of New Guinea in half. A government official related that some years ago, when Australia anticipated potential troubles across this border, the power levels of these two stations were increased from the conventional 250 watts to more than 10,000 watts, presumably for the broadcast of propaganda if it had been deemed desirable. Radio Rabaul, VL-9BR, also runs 10,000 watts because it serves distant residents on a number of widely scattered islands. It is at 3385 kHz. The other stations, all in either the 90 or 120 meter bands, operate at much lower power levels and are not often received outside of the Territory.

Most D.I.E.S. stations operate from 0700 to 1200 GMT, which is late evening local time. A few stations also are on the air from 2000 to 2200 GMT. At 2200 GMT the central station of the Department of Information and Extension Services begins transmissions. On a frequency of 11.880 mHz, it not only provides the local stations with programs to be rebroadcast later in the day, but it also gives advance warning of pending events and otherwise serves in lieu of a telephone line between network control and its stations.

Under its United Nations trusteeship, New Guinea is beginning to emerge into a form

A native New Guinean announcer on Radio Rabaul.

Missionary VK9BN provides essential communications to the outside world via amateur radio from Madang, New Guinea.

of national awareness. Almost every community has its local government council and members are elected from the districts to convene in parliament in Port Moresby. An Australian official observed that, "Political changes are coming about so rapidly that in some cases the man who today serves as president of a government council was in recent memor ythe spear-carrying was leader of his savage tribe." In the course of this transition some unusual laws have been made. For instance, prior to his initial election a candidate for parilament can be interviewed over the radio station that serves his district. But once elected, his voice cannot be heard on the radio for apparent fear that he might take advantage of his political position.

One very bright young member of parliament, Ebia Olewale, pointed out an example of the difficulty this can create: After teaching school for eleven years in Port Moresby, Olewale, who is fluent in at least half-a-dozen languages, returned to his home in the South Fly Electorate of the Western District to enter politics. Though permitted to express his viewpoints over Radio Daru, he also managed to carry his initial campaign to the voters personally. It took two continuous months of canoeing through the swamps and jungle streams of the vast, wet area, but he estimates that he managed to talk with 78% of his 30,000 constituents. now, as an elected official running for reelection, he will be forced to follow the canoe route exclusively as he can no longer be heard over the air.

After thinking briefly of the peace and quiet that such a law might create in America, we asked Olewale how people in his district came to own radio receivers.

He estimated that there were a total of 700 radios in the district. Most were solid-

state receivers imported from Japan or China. Some were bought through local trading stores with money earned from the sale of crocodile skins or wood carvings, which are among the few products of the area. Others, at the request of local government councils, were given by the government to villages without adequate monetary resources.

Government patrols, who sometimes track through the bush for months at a stretch, bring the radios in, present them to a chief, and teach a few people in each village the technique of operating them. Olewale said that one of the most serious problems in his district was the shortage of trading stores, resulting in a large percentage of radios being out of service at any given time due to the difficulty of obtaining batteries. In New Guinea's central mountains where coffee and other commercial crops are grown, and near towns, where salaried jobs can be obtained, many people own personal radios.

New Guinea's Government Administration is concerned with the distribution of radios because within the Territory, radio serves many purposes other than simple entertainment. Before elections, for instance, radio discussions explain the functions of government, potential goals of the election, and the list of candidates. Then, as polling teams walk from village to village across the country, radio announcements give advance notice of their arrival to those who should be prepared to vote on each following day. And proceedings of local government council meetings are frequently broadcast within their own district.

Paul Cox, Manager of Radio Rabaul, related another use: Each station sends recording patrols out to remote areas of its audience. One of their present concerns is to record village story-tellers relating "storis bolong ol tumbuna," literally, stories that belong to all ancestors, or "traditional stories." After playing them back on the air for everyone in the district to hear, they are filed as a permanent cultural record which might otherwise have been lost in New Guinea's rapidly changing societies.

For all the education disseminated by D.I.E.S. stations, musical programming still produces the largest response from the listening audience. Radio Rabaul has received thousands of requests per month for specific tunes, though the total population of its basic listening area is less than 80,000. About 40% of each station's requests are for local tunes. Radio Bougainville fulfilled this demand in typical fashion by recording more than 500 selections in a three month period of visiting villages.

The majority of other requests are for imported country and western songs. In fact, Slim Dusty, who is one of many Australian country and western crooners, has become sort of a hero to New Guinea's radio listening audience. He periodically risks his life in the hands of his fanatic fans by making personal tours of the Territory. Marches and music from other Pacific Islands are also frequently aired.

The people of Papua and New Guinea seem to have developed a rare respect for their radio broadcast services. Listeners write letters to their local station as if they were writing to a helpful big brother. Letters are often intensely personal, yet they are always directed to the station itself . . . and never to any individual working for the station. One letter accused a neighbor of murdering the writer's sister. Another accused a prominent politician of intentionally commiting perjury.

This type of letter is frequently read over the air, all names included. To remain neutral, the stations avoid editorializing such matters, but the accused is always given the opportunity to reply over the air. As a result of the favorable image in which most natives hold D.I.E.S. stations, these airings themselves frequently seem to settle the controversies they have exposed.

Another unique example of this respect was demonstrated when a native announcer arrived at his studio to sign on at the beginning of the daily schedule. He had been out drinking most of the previous night. Though he believed that he was coherent, he decided that it would be unthinkable to risk embarrassing the station. He therefore refused to speak, causing the loss of the first hour of broadcast time.

Loss of respect would be a severe blow to a D.I.E.S. station. Such occurrences are rare. Ten years ago restless natives of Bougainville Island, who are so black that they refer to other Melanesians as "redskins", attacked the local radio station as being a "propaganda machine" during their campaign for separate independence. Station authorities readily agreed that they were committed to showing the views of the Government Administration, but they insisted that they had also presented opposing views in all fairness.

[*Continued on page 79*]

Results of the 1973 CQ World Wide WPX SSB Contest

BY BERNIE WELCH,* W8IMZ

THIS 16th annual event reiterates the fact that s.s.b. and WPX have come a long way since 1957. With practically everyone having s.s.b. capabilities, the contest activity has increased the international popularity of the WPX program. The contest, originally known as the SSB DX Contest, was organized by Bob Adams, W3SW, then *CQ* SSB Column Editor with the help of a crew of world-wide sidewinders (as they were known). There have been some changes in the rules over the years, the main one being the change to WPX for a multiplier in 1959. And if you participated in the first contest, you'll remember the big winner that year was CN8MM operated by Eva and Alex.

The contest was continued by Irv and Dorothy Strauber, K2HEA/K2MGE when they took over the Sideband column in 1961. The column was phased out in 1964 and the Contest Committee picked up the program, made a few modifications and continued the activity up to date.

The general consensus is that (mildly speaking) world-wide propagation conditions were not up to normal during the '73 weekend. It was a definite challenge for many, especially on 28 mHz, and 21 mHz in some areas. Although the average scores are not as high as in some past years, individual perserverance brought home a certificate to a number of unexpected winners. It really doesn't take a giant score to come out on top in this event, which is an excellent reason for always submitting your contest log regardless of the size of the score. The total number of logs received from the USA this year was disappointing.

Prefix competition is the "name of the game" in this one. Although each prefix is equally important, how about those unique goodies like: CQ6, 4M5, CI1, KZØ, TE2, SQ5, XX7, CT7, ZX7, VA6, 4L3, EI1, JD1, PA6, TGØ, and 4J9, to mention a few that added extra excitement to the competition? Also a number of semi-rare DX countries including 4W1, A51, C29, JY6, VQ9, and ZB2 kept the pile-ups in full force.

The Call KZØWPX added a new one to the WPX list. Some of the other KZ5's felt that this gave Jerry an unfair advantage but we don't see it that way. The KZ5 prefix has its own multiplier value, equal to a KZØ. This was a legal call assigned to KZ5JF for the contest period by the Co-ordinator of Civil Radio in the Canal Zone.

The first winner of the new Joe (Mr. WPX) Hiller, W4OPM Memorial Award, donated by Jerry Hagen, WA6GLD, is none other than W2PV operated by Dave Donnelly, WB2SQN, in the all band class.

There is a single band award, also a Memorial for W4OPM. This one donated by the Virginia Century Club of which Joe

*7735 Redbank Ln., Dayton, Ohio 45424

After placing 2nd in the '72 contest, the Brazilian DX Club Station PY7BDX came through with the highest score in this year's contest and picked up the top world honors in the multi-operator, single xmitter category due to the persistant efforts of (L to R standing) PY7AVY, PY7AKW, PY7AUR, PY7AOJ, PY7AZQ; (sitting) PY7AEW, PY7ZAH, PY7APS. How about trying for a special CQ award in the next one?

TROPHY WINNERS

WORLD—Single Operator, Single Band. Jack Reichert, W3ZKH Trophy. Won by: **Victor Manuel Ramos Pereira, CQ6LF** (14 mHz).

WORLD—Single Operator, All Band. Don Murray, K4FMA Trophy. Won by: **Franklyn Brooker, 9Y4VU.**

WORLD—Multi-operator, Single Xmtr. Ted Thorpe, ZL2AWJ Memorial, awarded by Don Miller, W9WNV. Won by: **Station PY7BDX.** (Oprs: PY7AEW, PY7AKW, PY7AOJ, PY7APR, PY7APS, PY7AUR, PY7AZQ, PY7ZAH.)

WORLD — Multi-operator, Multi Xmtr. Chuck Swain, K7LMU Memorial, awarded by Don Miller, W9WNV. Won by: **Station WA3HRV.** (Oprs: K3EST, W3AZD, WA3IAQ.)

CANADA—Single Operator, Single Band. Gene Krehbiel, VE6TP Trophy. Won by: **Alan R. Leith, VE1AL** (14 mHz).

U.S.A.—Single Operator, All Band. Charles "Joe" Hiller, W4OPM Memorial, awarded by Jerry Hagen, WA6GLD. Won by: **Station W2PV.** (Op: David Donnelly, WB2SQN.)

U.S.A.—Single Operator, Single Band (14 mHz). Charles "Joe" Hiller, W4OPM Memorial, awarded by The Virginia Century Club. Won by: **Station W3SS** (Op: Walter Rakitsky, WA3LRO.)

was the founder. W3SS operated by Walter Rakitsky, WA3LRO was the winner.

I wish we had a special award for high scoring Contest Expeditions that go especially for the WPX. Having personally participated in several in the past, I know the planning and work involved as well as the adverse operating conditions that sometimes exist. Anyway, if we had such an award, I feel sure that VP2MYA would have picked up the honor. Another award we don't have is for the neatest, most complete, extra-readable superior log received. Regardless, I feel special mention is in order and do hereby acclaim the log of UK3NAA the best in this category followed closely by the DK4OO entries. Believe me, the Contest Committee really appreciates the extra efforts.

It was interesting to hear the 10/10 Club members exchanging numbers in conjunction with contest contacts on 10 meters. The purpose of this international group of over 8,000 members is to keep 10 meters active and they seem to be doing a pretty good job, and not just during the contest.

Now is the time to request your '74 contest log forms and summary sheets from the *CQ* office. Please send SASE or IRC's. The next one is coming up on the last weekend in March.

To the many stations that expressed their appreciation in receiving their '72 certificates at an early date, I say thank you, not only just for myself, but from my daughter Irene Welch who handled that end of the WPX contest paperwork. We hope to be able to do a repeat job for you '73 winners.

Well, that wraps it up for this year. Thanks to all who helped make this one a success. Hope to work ya in the next one.

73 Bernie, W8IMZ

TOP SCORES

SINGLE OPERATOR ALL BANDS

9Y4VU	**1,198,832**	DU1GJM	882,255
LU5HFI	1,130,268	KS6DH	873,120
TE2CF	1,075,464	**W2PV**	**744,430**
VK4VU	997,338	9H5D	738,990
VQ9R	917,144	EA8CR	737,264
CX1JM	891,660	UD6HB	730,900

SINGLE OPERATOR SINGLE BAND

28 mHz

CR6OZ	98,550
LU2DEK	62,532
PY1MB	60,724
W3AZD	23,016
W4SYL/5	21,060
XW8ES	20,790

21 mHz

XX7IK	472,115
VK9RY	343,826
WB6EJV	282,681
K7RSC	74,520
I3MAU	63,382
W5RTQ	58,420

14 mHz

CQ6LF	**1,138,047**
UA9BB	912,163
DU1JMG	872,025
EA4LH	746,544
W3SS	**685,260**
VK2APK	536,182

7 mHz

DJ2YA	197,616
ZL4BO	187,884
G3ZXX	130,720
JA2BAY	72,354
XE1LLS	72,206
K6JAN	60,342

3.8 mHz

YU3APR	191,860
UI8LAG	187,856
G4AYL/A	119,196
OH1XX	101,916
UW3IN	99,084
UP2ER	92,664

MULTI-OPERATOR

Single Transmitter

PY7BDX	**3,286,287**	4M5BPG	2,598,884
4J9B	2,985,004	4L3Z	1,642,560
VP2MYA	2,792,720	ZX7AAD	1,589,124

Multi Transmitter

WA3HRV	**1,731,750**	YU1JRS	950,300
KA1CQ	1,040,019	SV1GA	555,537

U.S.A. TOP SCORES

Single Operator

All Band W2PV 744,430
28 mHz W3AZD 23,016
21 mHz WB6EJV 282,681
14 mHz W3SS 685,260
7 mHz K6JAN 60,342
3.8 mHz K9CUY 25,840

Multi Operator

Single Xmtr. W1YK 782,400
Multi Xmtr. WA3HRV 1,731,750

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

SINGLE OPERATOR

North America

United States

W1GYE	**A**	**10,488**	**72**	**69**
W1WY	"	1,100	24	22
W1PLJ	"	560	15	14
K1HVV	**21**	**7,540**	**69**	**58**
WA1JMP	**14**	**86,879**	**249**	**163**
WA1NRV	"	56,160	197	117
WA1PHF	"	24	3	3
W2PV	**A**	**744,430**	**873**	**302**
		(Opr. WB2SQN)		
W2GKZ	"	26,730	110	90
WA2EAH	"	15,183	94	63
W2MB	"	8,924	53	46
W2LEJ	"	7,939	59	49
K6SE/2	"	6,996	54	44
K2BQO	**28**	**9,600**	**89**	**60**
WB2IWH	**14**	**2,240**	**37**	**35**
K2DTQ	**7**	**5,170**	**73**	**47**
K3CR	**A**	**25,365**	**133**	**95**
		(Opr. WA3JIH)		
W3YHR	"	12,925	84	55
W3AZD	**28**	**23,016**	**133**	**84**
W3SS	**14**	**685,260**	**758**	**324**
		(Opr. WA3LRO)		
W3GN	"	374,358	589	258
		(Opr. WA1LKX)		
WA3ENM	"	192	8	8
W3CRE	**3.8**	**24,332**	**132**	**72**
K4YFQ	**A**	**225,144**	**395**	**212**
K4KZZ	"	201,960	411	204
K4OD	"	61,570	191	131
W4HOS	"	29,574	136	93
W4WRY	"	19,596	98	71
W4KMS	"	18,225	102	75
WA4YNP	"	4,290	49	39
K4PR	"	504	18	18
WB4WHE/4		9	3	3
WA4DRU	**28**	**9,116**	**73**	**53**
W4WSF	**14**	**413,664**	**562**	**278**
W4EEO	"	2,635	31	31
WA5ZWC	**A**	**88,740**	**278**	**142**
WA5STI	"	53,872	224	112
		(Opr. K9STH)		
WB5HAE	"	12,736	94	64
W5QAM	"	12,276	92	66
W5OB	"	7,987	72	49
W5KZN	"	6,468	68	44
W4SYL/5	**28**	**21,060**	**125**	**78**
W5RTQ	**21**	**58,420**	**217**	**127**
W5BJA	**14**	**104,082**	**363**	**166**
WA5ALB	"	41,082	182	123
W5NOP	"	26,433	117	99
WA5RTG	**7**	**35,526**	**161**	**93**
WA5SDT	"	31,668	147	87
WB5DIZ	"	7,592	60	52
K5PFL	**3.8**	**20,436**	**122**	**78**
W6BJB	**A**	**93,096**	**305**	**108**
K6SDR	"	58,558	320	67
W6KYA	"	41,961	206	71
WA6AHF	"	**39,360**	**182**	**80**
W6OKK	"	26,788	147	74
W6ED	**28**	**15,456**	**97**	**69**
WB6EJV	**21**	**282,681**	**722**	**147**
WA6BVY	"	8,932	107	29
K6SVL	**14**	**228,459**	**638**	**161**
K6JAN	**7**	**60,342**	**215**	**89**
		(Opr. WB6VZI)		
W6BH	"	35,854	119	91
W6APW	"	1,344	17	16
W6PAA	**3.8**	**11,904**	**73**	**62**
W7AYY	**A**	**80,972**	**265**	**124**
K7UWT	"	576	16	16
K7RSC	**21**	**74,520**	**312**	**90**
WA7RRR	**7**	**20,720**	**137**	**74**
K7HTZ	"	12,540	81	55
W7YTN	"	9,000	68	50
W5QQQ/7	**3.8**	**23,968**	**137**	**56**
WA8NYB	**A**	**115,878**	**288**	**186**
WB8EUN	"	65,608	202	139
W8KOD	"	41,650	162	119
W8GIO	"	39,750	140	106
WB8EEJ	"	8,176	68	56
W8CL	"	320	12	10
W8IMZ	**28**	**10,002**	**87**	**66**
WB8EAS	21	860	20	20
K8IDE	**14**	**161,310**	**360**	**190**
W8TWA	**7**	**10,260**	**57**	**54**
WB8FWQ	"	682	42	31
WA9NPM	**A**	**106,639**	**277**	**169**
W9ZTD	"	3,570	42	34
W9IY	**14**	**352,500**	**614**	**250**
W9YRA	"	30,186	148	106
WB9EBO	"	19,402	104	89
WB9EAQ	"	4,218	41	37
K9CUY	**3.8**	**25,840**	**164**	**76**
K0UTX	**A**	**51,094**	**200**	**118**
W0HBH	"	46,846	178	118
WB0FLM	"	10,309	111	61
W0IUB	"	8,788	81	52
WA0EMS	"	3,864	50	42
WA0TKJ	**28**	**5,512**	**62**	**53**
W0FWN	21	12	2	2
K0SGJ	**14**	**50,570**	**206**	**130**
WB0FLT	"	10,220	93	70

Alaska

KL7GDO	**A**	**69,030**	**391**	**59**
KL7AIZ	21	9,900	150	22
KL7EWP	**14**	**10,728**	**107**	**36**

Bermuda

WA1PND/VP9	**A**	**123,760**	**449**	**104**
VP9AD	"	23,501	146	71
VP9GO	**14**	**309,876**	**643**	**196**

Canada

VE1HX	**A**	**117,320**	**381**	**164**
VE1AL	**14**	**325,128**	**582**	**228**
CI1ADV	**A**	**168,610**	**508**	**130**
VE3CBY	**14**	**102,952**	**308**	**136**
VE3BBN	**3.8**	**76,728**	**210**	**92**
VE4RP	**A**	**44,654**	**227**	**83**
VE5RA	**14**	**4,646**	**50**	**46**
VE6SB	**A**	**42,583**	**166**	**97**
VE6MP	"	28,416	165	74
VE6MC	**14**	**16,184**	**123**	**68**
VE7BEF	**14**	**49,685**	**237**	**95**

Canal Zone

KZ0WPX	**A**	**529,064**	**1255**	**164**
		(Opr. KZ5JF)		

Costa Rica

TE2CF	**A**	**1,075,464**	**1848**	**234**
TI2WX	"	75,460	400	77

Dominican Republic

HI8LC	**A**	**56,700**	**226**	**81**

Guatemala

TG0AA	**14**	**271,602**	**800**	**158**

Mexico

XE1HR	**A**	**170,316**	**534**	**114**
XE1LLS	**7**	**72,206**	**214**	**79**

Africa

Angola

CR6CN	**A**	**285,957**	**521**	**189**
CR6OZ	**28**	**98,550**	**264**	**135**
CR6HT	21	2,744	34	28
CQ6LF	**14**	**1,138,047**	**1272**	**309**

Canary Island

EA8CR	**A**	**737,264**	**958**	**236**

Mozambique

CR7IZ	**A**	**536,404**	**610**	**292**
XX7IK	**21**	**472,115**	**687**	**235**
CR7FR	**14**	**321,408**	**524**	**216**

Seychelles Is.

VQ9R	**A**	**917,144**	**1253**	**277**

South Africa

ZS6ZE	**A**	**344,410**	**597**	**202**

Asia

Afghanistan

YA1OS	**A**	**51,555**	**198**	**105**

Bhutan

A51PN	**14**	**16,717**	**142**	**73**

Iran

EP2NH	**21**	**55,692**	**256**	**102**
EP2RB	**14**	**88,320**	**258**	**128**

Japan

JA3AA	**A**	**129,183**	**367**	**149**
JA7AQR	"	20,770	135	67
JA2AIR	"	8,784	83	48
JA7IBJ	"	5,808	51	33
JA1ANA	"	2,262	38	26
JA7ARW	"	1,869	35	21
JA1BUI	"	1,150	34	23
JA6OKB	**28**	**12,400**	**109**	**62**
JA9AG	"	8,904	80	56
JH3GCN	"	3,201	47	33
JH2NWF	"	943	24	23
JA3ELU	"	216	10	9
JA6XFM	"	119	7	7
JA4EBU	"	90	6	5
JA6BSM	**21**	**45,045**	**196**	**105**
JA1ELY	"	32,148	160	94
JA2JAB	"	9,020	82	55
JH2EVL	"	6,512	58	44
JH3FYW	"	2,492	44	28
JA3WKG	"	615	19	15
JH3RGU	"	400	18	10
JH2LUF	"	144	9	8
JH3PHV	"	70	6	5
JA3BUB/3		27	3	3
JA3YJQ	"	3	1	1
JA1KSO	**14**	**181,475**	**438**	**175**
JA2PJC	"	128,501	374	151
JA2HGA	"	16,416	113	72
JA0SC	"	14,204	100	67
JA1AAT	"	6,992	78	46
JA6CM	"	6,026	66	46
JA6YY	"	4,070	55	37
JA1AS	"	2,574	40	33
JH3BJN	"	390	19	13
JA9OT	"	6	3	2
JA2BAY	**7**	**72,354**	**175**	**93**
JA2KFO	"	1,620	28	15
JA7HYS	"	900	16	15
KA7MS	**14**	**7,866**	**75**	**46**

Jordan

JY6FC	A	3,696	38	33

Korea

HM1AJ	**14**	**19,057**	**269**	**59**

Laos

XW8ET	**A**	**9,540**	**117**	**60**
XW8ES	**28**	**20,790**	**409**	**45**

Lebanon

OD5BA	**A**	**490,536**	**689**	**216**
OD5HJ	**14**	**4,294**	**53**	**38**

Thailand

HS4AGZ	**A**	**623,616**	**1350**	**256**

Yemen

4W1AF	**A**	**454,034**	**672**	**226**

U.S.S.R.

Asiatic

UA9YE	**A**	**123,246**	**659**	**123**
UW9EE	"	9,936	80	54
UW9CR	21	595	33	17
UA9BB	**14**	**912,163**	**1174**	**311**
UA9OO	"	109,809	325	147
UA9OS	"	59,000	234	118
UA9MT	"	1,829	31	31
UA9QDX	**7**	**36,234**	**135**	**66**
UW9TZ	3.8	4,424	38	28
UA9UBH	"	3,650	42	25
UA0FBZ	**A**	**190,452**	**1031**	**118**
UA0MI	"	33,184	373	68
UA0CAH	"	29,945	466	53
UK0CAX	"	7,004	159	34
RA0UBG	28	1,005	67	15
UA0AAL	**3.8**	**5,512**	**51**	**26**

Armenia

UG6GAF	**A**	**261,252**	**563**	**164**
UG6JJ	**14**	**66,267**	**216**	**111**

Azerbaijan

UD6HB	**A**	**730,900**	**1012**	**249**

Georgia

UF6HK	**A**	**154,435**	**397**	**151**

DU1JMG relaxing after a successful weekend of contest operating. He scored 3rd highest world-wide on 14 mHz. Wonder if Jose's 204BA Hy-Gain antenna at 127 feet above ground helped any?

VQ9R stirred up plenty of activity during what Carl said was his first contest and real fun. It was interesting to note that many a log comment indicated the VQ9 prefix was a new one for the WPX award.

Kazakh

UL7GAZ	**A**	**340,156**	**789**	**182**
UL7JG	"	95,892	456	131
UL7LAW	"	9,700	70	50
UK7GAA	"	2	2	1
UL7BAB	**14**	**45,551**	**170**	**101**
UL7DAF	**3.8**	**23,400**	**93**	**52**

Tadjik

UJ8JGJ	**14**	**140,778**	**388**	**158**

Turkmen

UH8BO	**A**	**136,485**	**339**	**135**

Uzbek

UI8LAG	**3.8**	**187,856**	**286**	**118**
UI8LAF	"	60,976	161	74
UI8ZAA	"	29,370	104	55

Europe

Belgium

ON5MG	**14**	**151,905**	**419**	**195**

Bulgaria

LZ1QR	**A**	**148,925**	**524**	**185**
LZ2SC	**3.8**	**49,600**	**224**	**100**
LZ2KAD	"	1,456	30	26

Czechoslovakia

OK1AGQ	**A**	**150,300**	**373**	**180**
OK2BBI	"	86,688	299	144
OK1AHV	"	72,352	279	136
OK2BLI	"	71,540	255	140
OK1KZ	"	30,115	181	95
OK1KPU	"	25,317	150	97
OK3TZD	"	16,950	120	75
OK2BEF	"	10,560	84	66
OK3YAX	"	6,996	72	53
OK1TA	"	6,390	53	45
OK2ALC	**21**	**19,926**	**148**	**81**
OK1MP	"	2,175	33	29
OK1AVD	**14**	**24,882**	**193**	**87**
OK1AJN	"	9,006	103	57
OK1DMM	"	220	10	10
OK2KR	7	5,244	58	46
OK2BIQ	**3.8**	**86,028**	**333**	**134**
OK1APJ	"	81,928	324	133
OK1AHI	"	47,936	203	112
OK2PEQ	"	44,440	214	110
OK1AAE	"	31,208	183	83
OK1AVU	"	23,056	157	88
OK1IAE	"	14,874	120	67
OK1MMK	"	8,496	79	59
OK3TOA	"	7,854	88	51
OK1ARH	"	4,472	58	43
OK2BFX	"	2,040	38	30
OK5GY	"	1,248	45	26
OK3CAW	"	336	18	12
OK5PBC	"	131	19	9
OK1KRY	"	126	10	9

Denmark

OZ5EV	**A**	**104,202**	**380**	**156**
OZ5ME	"	20,566	148	91
OZ8KU	"	4,995	63	45
OZ3PO	"	920	22	20
OZ1RH	14	1,250	26	25
OZ3SK	**7**	**15,680**	**98**	**70**

England

G3SEM	**A**	**211,562**	**528**	**206**
G3YBH	"	128,355	341	199
G3HTA	"	126,776	325	184
G2FNK	"	68,980	275	132
G2AJB	"	36,960	194	110
G4AYA	"	12,240	98	68
G3WJN	**21**	**24,564**	**122**	**92**
G3NSY	**14**	**154,500**	**414**	**206**
G4ALG	"	41,088	231	128
G3ZXX	**7**	**130,720**	**424**	**152**
G4ACQ	"	39,592	199	101
G4AYL/A	**3.8**	**119,196**	**401**	**154**
G5AHE	"	31,680	189	90

Finland

OH3YI	**A**	**264,084**	**644**	**236**
OH1LW	"	120,925	469	175
OH2FS	"	25,458	149	87
OH2BMC	"	6,413	68	53
OH7NW	"	5,750	59	46
OH5TT	"	4,140	48	45
OH7OQ	"	756	32	21
OH6ZH	**21**	**836**	**22**	**19**
OH2BMG	"	468	15	13
OH7PB	**14**	**4,410**	**63**	**42**
OH5ZH	"	2,738	46	37
OH2BFX	"	1,025	33	25
OH1PG	"	280	14	14
OH5PA	"	168	9	8
OH1XX	**3.8**	**101,916**	**317**	**149**
OH1JP	"	6,720	70	48
OH2LU	"	126	8	7

France

F9MD	**A**	**161,600**	**368**	**202**
F6AXO	**14**	**2,916**	**52**	**36**

Germany

DK8FZ	**A**	**475,342**	**850**	**266**
DK4OO	"	284,640	529	240
DL9PU	"	17,840	119	80
DJ6TK	"	17,765	108	85
DL1YA	"	8,400	80	56
DL2JO	"	5,566	58	46
DK5OS	"	1,188	36	27
DL8PC	**21**	**36,080**	**147**	**110**
DL8CM	**14**	**90,860**	**302**	**154**
DJ2YA	**7**	**197,616**	**484**	**184**
DK5OL	**3.8**	**1,350**	**30**	**25**
DA2EL	**14**	**204,289**	**472**	**197**
DM2BTO	**A**	**84,529**	**350**	**137**
DM2DEO	"	25,745	150	95
DM2DRN	"	7,381	82	61
DM4XMO	"	630	28	14
DM2DHO	**3.8**	**6,500**	**70**	**50**
DM2COJ	"	5,546	70	47

Gibraltar

ZB2BL	**14**	**3,600**	**51**	**36**

Guernsey (Channel Is.)

GC3YIZ	**3.8**	**13,764**	**110**	**62**

Hungary

HA100CQ	**A**	**89,817**	**322**	**141**
		(Opr. HA5CQ)		
HA6NN	"	80,595	305	135
HA0DI/9	**14**	**10,266**	**100**	**58**

Italy

I3PRK	**A**	**358,001**	**668**	**257**
I2SVA	"	133,875	390	175
I3MAU	**21**	**62,382**	**203**	**134**
I5PLS	**14**	**23,735**	**160**	**101**
I4OAK	"	17,098	146	83
I3BCB	"	9,120	90	60
I8DRX	"	5,280	90	55
I3BYT	**3.8**	**21,900**	**149**	**75**

Malta

9H5D	**A**	**738,990**	**1609**	**306**

Netherlands

PAØTO	**A**	**3,430**	**62**	**49**
PA6KM	**14**	**18,270**	**141**	**90**
		(Opr. PAØHTR)		
PAØLVK	"	6,726	62	57

Norway

LA5QK	**A**	**53,125**	**243**	**125**
LA2AD	"	2,976	84	32
LA1L	**14**	**1,922**	**45**	**31**
		(Opr. LA2TO)		
LA5KO	**7**	**3,996**	**54**	**37**

Poland

SP4CLX	**A**	**134,577**	**376**	**171**
SP6AOI	"	84,102	346	131
SP5XM	"	30,080	165	94
SP7EBM	"	18,012	123	76
SP2BBD	"	15,987	112	73
SP9ABU	"	14,707	110	77
SP5BB	"	12,512	104	68
SP8AWP	"	10,736	91	61
SP5CKM	"	5,258	63	41
SP1EIC	"	2,574	38	33
SP3DOI	"	2,430	32	30
SP1AGE	28	18	3	2
SP5DZI	**14**	**28,800**	**182**	**96**
SP5EMM	"	6,784	80	53
SP9ADU	"	4,386	53	43
SP9EVP	"	4,017	60	39
SP6DYD	"	1,750	29	25
SP5SIP	"	950	20	19
SP8EMO	"	247	16	13
SP8GEY	"	84	6	6
SQ5Z	**7**	**12,560**	**131**	**40**
SP9FLY	"	4,018	50	41
SP1BLE	"	1,488	31	24
SP1II	**3.8**	**16,592**	**111**	**68**
SP6TQ	"	2,040	37	30
SP6FUJ	"	1,768	38	26
SP9DH	"	1,288	26	23
SP3CTC	"	836	20	19
SP9EHP	"	608	21	16
SP9EHW	"	420	15	15
SP6AZ	"	364	17	13

Portugal

CT7ZG	**A**	**97,680**	**419**	**148**
CT1QN	**3.8**	**48,972**	**164**	**106**

Romania

YO3AC	**A**	**168,260**	**452**	**188**
YO2AFB	"	4,386	48	43
YO6DB	"	2,940	55	35
YO3JW	**3.8**	**10,302**	**90**	**51**

Scotland

GM5AXO	**A**	**30,393**	**154**	**99**

Sicily

IT9JT	**A**	**717,885**	**1321**	**301**
IT9FKS	14	188,100	621	225

Spain

EA1FX	**A**	**572,853**	**1125**	**257**
EA4LH	**14**	**746,544**	**1527**	**309**
EA3KO	**3.8**	**73,408**	**254**	**124**

Sweden

SM5DJZ	**A**	**234,123**	**562**	**217**
SM5CSS	"	51,200	220	128
SM7AIL	"	21,510	137	90
SM4CHM	"	12,600	97	70
SM4AZD	"	2,265	28	23
SM2COR	"	2,244	36	32
SM0CGO	"	276	15	12
SM7BBV	"	225	9	9
SM7DMN	**14**	**12,888**	**115**	**72**
SM3VE	"	12,168	120	72
SM4DQE	"	8,643	169	43
SM7TV	"	3,460	65	38
SM5CVC	"	814	27	22
SM7BGF	"	308	12	11

Switzerland

HB9UD	A	704	18	16

Wales

GW4AMV	**14**	**27,000**	**204**	**100**

Yugoslavia

YU2RAM	**A**	**27,930**	**154**	**105**
YU3EJ	**21**	**21,596**	**83**	**67**
YU2OB	**14**	**57,510**	**258**	**135**
YU3TKT	"	800	34	20
YU3APR	**3.8**	**191,860**	**510**	**181**
YU1ODS	"	19,588	111	83

U.S.S.R. European

UA3VAQ	**A**	**92,320**	**292**	**160**
UA3GM	"	63,360	262	128
UA3JD	"	38,054	200	106
UA3HB	"	14,208	105	74
UK2AAB	"	13,068	91	66
UA3XP	"	7,406	68	46
UA3WZ	"	4,128	60	48
UZ3TC	"	4,005	64	45
UA3DAK	**21**	**2,100**	**32**	**30**
UA3DBG	"	1,600	30	25
UW3EH	**14**	**87,318**	**402**	**154**
UA6NF	"	42,640	224	130
UA4AU	"	12,045	101	73
UA4CO	"	8,712	99	72
UV3GW	**7**	**39,690**	**153**	**105**
UV3FD	"	5,194	59	49
UW3IN	**3.8**	**99,084**	**335**	**138**
UW6LC	"	36,800	189	92
UA4UAZ	"	14,336	102	64
UW3RR	"	13,440	107	60
UA6NB	"	12,540	100	57
UW3UH	"	12,420	89	54
UA1ALN	"	9,964	109	53

Estonia

UR2FQ	**14**	**40,320**	**252**	**112**
UR2QD	7	1,998	54	37
UR2RX	**3.8**	**30,744**	**366**	**84**

Kaliningrad

UA2EC	**A**	**63,726**	**219**	**129**

Latvia

UQ2ON	**A**	**72,181**	**281**	**131**
UQ2DV	"	40,248	198	104
UQ2CR	**14**	**3,010**	**69**	**35**
UQ2FK	**3.8**	**35,700**	**180**	**85**
UQ2NU	"	4,602	58	39

Lithuania

UP2OU	**A**	**153,176**	**441**	**164**
UP2PT	**14**	**5,865**	**65**	**51**
UP2ER	**3.8**	**92,664**	**320**	**132**
UP2PBI	"	8,526	84	49

Moldavia

UO5SA	**A**	**204,216**	**523**	**201**
UO5OAB	"	26,712	227	84
UO5RO	"	14,240	160	53
UO5BZ	"	1,170	40	30
UO5OAK	**14**	**8,680**	**177**	**40**
UO5AP	"	2,450	43	35

Ukraine

UB5WE	**A**	**383,265**	**741**	**255**
UY5OO	"	69,414	237	138
UY5DJ	"	3,502	46	34
RB5VAC	28	90	6	6
RB5ZCG	"	60	5	5
UY5HI	**21**	**5,586**	**54**	**42**
UK5IAA	**14**	**277,630**	**761**	**254**
UT5RT	"	272,108	825	236
UK5LAP	"	77,469	362	147
UB5LU	"	12,245	155	79
UB5OD	"	8,357	108	61
UK5ZAA	"	1,943	48	29
UB5ND	**7**	**11,656**	**88**	**62**
UB5EDU	**3.8**	**30,996**	**155**	**82**
UB5ZAL	"	26,520	149	78
UK5IAE	"	6,586	71	37

White Russia

UC2BA	**A**	**73,660**	**267**	**127**
UC2BF	"	3,060	40	34
UC2WP	**14**	**12,688**	**158**	**52**
UC2DN	"	1,736	40	31
UC2DO	**3.8**	**20,868**	**132**	**74**

Oceania

Australia

VK4VU	**A**	**997,338**	**1437**	**226**
VK1AOP	**A**	**50,572**	**197**	**94**
VK4PJ	"	4,872	65	29
VK3SM	**21**	**31,840**	**274**	**40**
VK2APK	**14**	**536,182**	**791**	**236**

Guam

K8CRM/KG6				
	28	**17,754**	**269**	**22**
KG6JAR	**21**	**41,208**	**404**	**34**

[*Cont. on page 80*]

CQ Reviews: The Ten-Tec Model 315 Receiver

BY WILFRED M. SCHERER,* W2AEF

THE Ten-Tec Model 315 is essentially the receiver section of the popular Argonaut Model 505 Solid-State SSB/CW Transceiver.[1] It should be especially attractive to those desiring a full-fledged receiver to go along with their home-built low-power solid-state transmitters. Although it is supplied for operation from a 120 v.a.c. source, it also may be set up for operation from a 12-volt d.c. source which together with the receiver's light weight and relatively small size make it an ideal unit for emergency, vacation, portable, field, bed-side or arm-chair operation. It will also serve well as the regular home-station unit or as a standby receiver.

Perhaps the best way to initially describe what the 315 is all about is to give a rundown of its main features: single conversion with full coverage of the 80-10 meter amateur bands; linear tuning rate with 5 kHz calibrations (20 kHz on 28 mHz) readable to at least 2.5 kHz; MOSFET r.f. stage and mixer; permeability-tuned r.f., preselector and v.f.o.; upper- or low-sideband selection with 9 mHz crystal filter; pulsed 100 kHz crystal calibrator; built-in speaker with up to 1 watt output; headphone/external-speaker jack; S-meter; offset tuning; sidetone-input jack; T/R mute jack; b.f.o. and v.f.o. output jacks for transceive operation with an external transmitter using the same conversion scheme;[2] provisions for incorporation of two position c.w. filter; modular construction with plug-in circuit boards.

Details

A block diagram of the receiver is shown at fig. 1. A number of other details may be found in the reference; nevertheless, some of these will be reviewed here. Dual-gate MOSFET's are used for the r.f. amplifier and mixer. The sideband filter is a four-crystal lattice type with a rated bandwidth of 2.5 kHz and a 6/50-db shape factor of 1.7. A single 9 mHz i.f. stage employs a bipolar transistor, while the product detector is another dual-gate MOSFET. There are three low-level a.f. stages followed by four transistors in a d.c. coupled complimentary output amplifier where both a.c. and d.c. feedback are employed to ensure very low distortion and maintain stability.

The a.g.c. is audio-derived using a separate a.f. amplifier and a voltage doubler. The muting system has two transistors with circuitry that cuts off the a.f. feed during transmit; however, it does not prevent application of the sidetone signal from an external source such as a transmitter or an electronic keyer. In the transmit position the muting disables the frequency-offset tuning of the v.f.o.

The crystal calibrator output is in the form of pulsed signals at a rate of about 3-pulses-per-second. This makes identification easy. In addition, the receiver gain is reduced by about 25 db when the calibrator is in use, minimizing interference from strong on-the-air signals. The calibrator circuitry is shown at fig. 2.

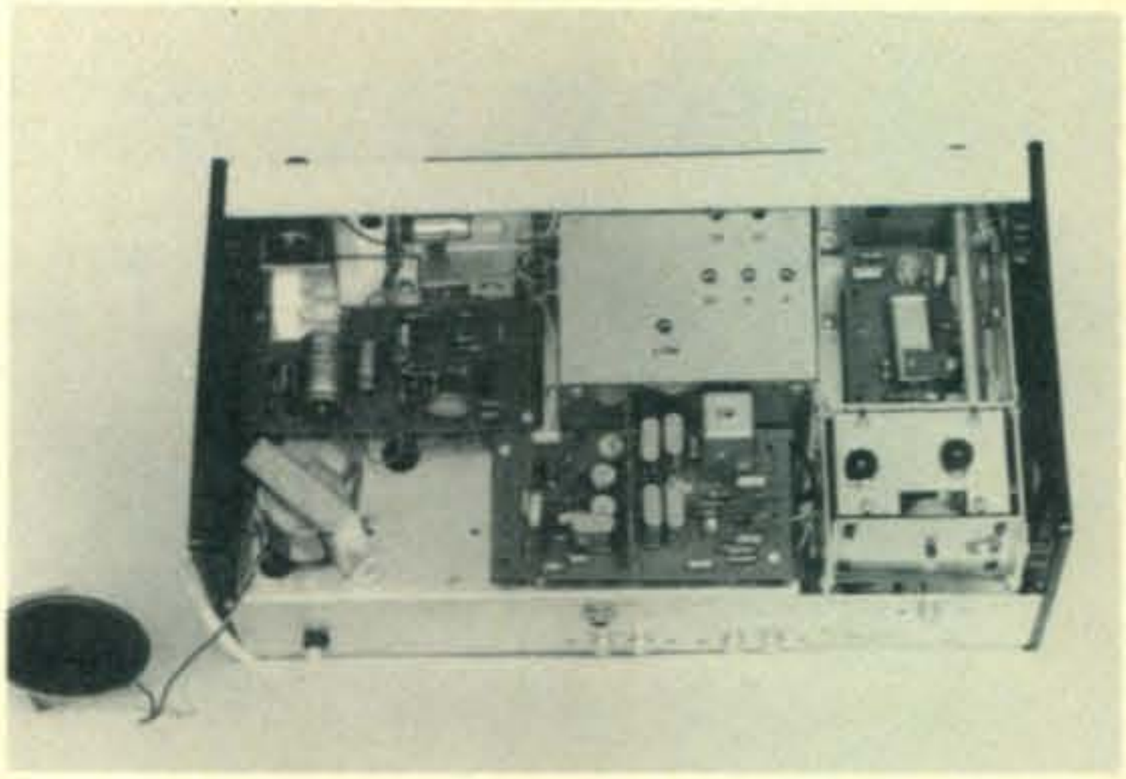
The Ten-Tec Model 315 SSB/CW amateur communications receiver.

---

* Technical Consultant, *CQ*.

[1] "The Second Coming of the Argonaut," *CQ*, November 1971, p. 59.

[2] Since the 315 provides v.f.o. and b.f.o. outputs, a home-built companion transmitter should not be to difficult to dream up. The v.f.o. output at the local oscillator frequency is nominally 50 mv. B.f.o. output at 9 mHz is nominally 80 mv.



Top interior view of the 315 receiver. The v.f.o. section is in the box at upper center. The board at lower center contains the mixer, crystal filter and b.f.o. The Control/Power Supply board is at upper left. At upper right is the crystal calibrator board at the foreground of which is the compartment with the r.f. amplifier and preselector-tuning set-up. The speaker at the left mounts in the top cover.

The b.f.o. employs a single crystal with its frequency placed at the required skirt of the filter that provides "normal" sideband operation (l.s.b. on 80 and 40 meters, u.s.b. on 20, 15 and 10). For "reverse" sideband operation the frequency of the b.f.o. is placed at the opposite skirt of the filter by "tweeking" the crystal by means of a capacitor inserted by a transistor switch. The frequency of the v.f.o. is not likewise shifted, so the receiver must be returned by about 3 kHz when sidebands are changed. When the receiver is used for transceive work with a companion transmitter, provisions are included to shift the b.f.o.-crystal frequency to within the filter passband for c.w. transmissions or tuneup.

The power supply employs silicon rectifiers in a full-wave bridge. Voltage-supply lines of +7 and +12 volts are held constant by individual series regulator transistors controlled by zener reference diodes.

C.W. Filter

The c.w. filter accessory is a module that is inserted in the a.f. section. It consists of critically-coupled double-tuned L/C circuits peaked for a frequency of about 800 Hz with a rated 6 db bandpass of 300 Hz. The skirts may be widened or left narrow by cutting an R/C bridging circuit in or out. A preamplifier is included on the module to make up for insertion loss.

Fig. 1 — Block diagram for the Ten-Tec 315 Receiver.

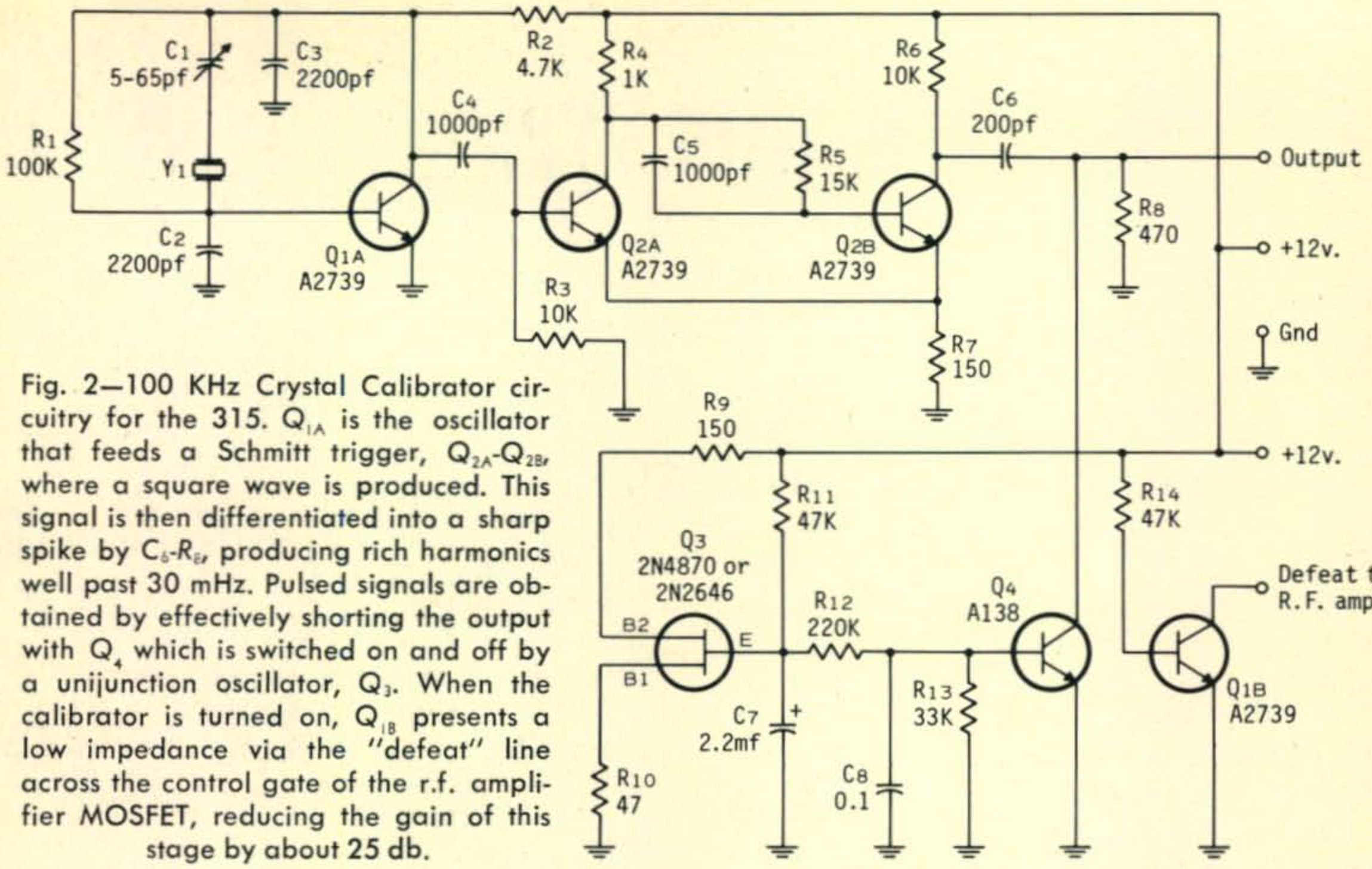


Fig. 2—100 KHz Crystal Calibrator circuitry for the 315. Q_{1A} is the oscillator that feeds a Schmitt trigger, Q_{2A}-Q_{2B}, where a square wave is produced. This signal is then differentiated into a sharp spike by C_6-R_8, producing rich harmonics well past 30 mHz. Pulsed signals are obtained by effectively shorting the output with Q_4 which is switched on and off by a unijunction oscillator, Q_3. When the calibrator is turned on, Q_{1B} presents a low impedance via the "defeat" line across the control gate of the r.f. amplifier MOSFET, reducing the gain of this stage by about 25 db.

V.F.O.

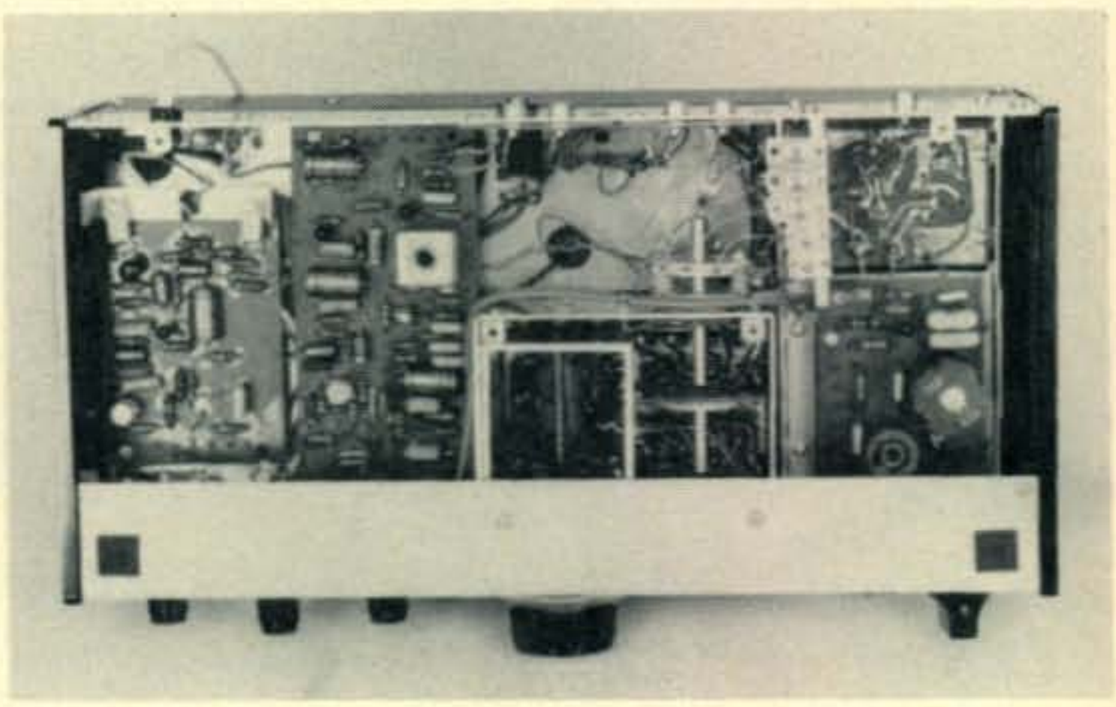
The v.f.o. functions over a number of different segments within the 5-7 mHz spectrum as needed for each band. Except for the 20-meter band, the v.f.o. output frequency is doubled or tripled to provide the mixer-injection signal required for producing the 9 mHz i.f. as described in reference 1.

Construction

Five plug-in circuit boards, installed on an aluminum chassis, make up most of the model 315. These boards incorporate the following sections: Mixer/Sideband Filter/BFO; I.F. Amplifier; A.F. Amplifier; Crystal Calibrator; Control/Power Supply. A wired-in board contains the r.f. amplifier and is installed in an aluminum cubicle along with the preselector permeability-tuning rack. The v.f.o. and frequency multiplier are on another board in a metal box which includes the v.f.o. bandswitch. The v.f.o.'s main-tuning inductor, with its permeability-tuning mechanism, is supported in a 3/16"-thick extruded aluminum frame within the v.f.o. enclosure. This ensures excellent mechanical sturdiness that enhances the v.f.o. stability and operation.

A slide-rule dial indicates the 100-kHz points over a 500-kHz spread, except for the 28-mHz band where the 100-kHz points are on a separate scale spread over the whole band of 28-30 mHz. Tuning is handled by a planetary drive with which about 20 kHz is covered with one revolution of the knob (80 kHz on 28 mHz). A skirt at the tuning knob is calibrated over a 100-kHz spread in 5-kHz increments spaced about 5/16" apart, providing interpolation down to a few kHz. On the 28-mHz band, however, the dial calibrations must be multiplied by four, making each point indicative of a 20-kHz increment instead of 5 kHz. The skirt may be slipped on its shaft for indexing against the calibrator signal. The S-meter is calibrated from S-4 to S-9 +40 db.

[*Continued on page 76*]



Bottom interior view of the 315 Receiver. From left to right are the a.f. amplifier and i.f. boards, the v.f.o. section (in foreground showing the inductor within its extruded-metal support) and the c.w. filter (far right).

Announcing

THE CQ WORLD WIDE WPX SSB CONTEST

March 30-31, 1974

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, VE7DKS.

WORLD-WIDE WPX SSB CONTEST

Page 3 of 13 Pages

CALL HV3SJ Log For 28 Mc Band COUNTRY _____

(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
1344	EI7AA	59078	59221	EI1	1
1402	EA6BS	59079	59081	EA6	1
10	SQ5Z	59080	59042	SQ5	1
30	CR7IZ	59081	58240	CR7	3
41	W1GYE	59082	59101	W1	1
45	W1WY	57083	58079		1
54	K1DWQ	56084	55042	K1	1
1500	W2PV	59085	59147	W2	1
03	W3AZD	59086	57099	W3	1
18	W8IMZ	59087	56078	W8	1
22	K2BQO	57088	56083	K2	1
37	W4SYL/5	59089	58102	W5	1
48	WA8TKJ	56090	56079	WAØ	1
55	W6ED	56091	55100	W6	1
1601	TE2CF	57092	45209	TE6	1
09	W1MDO	58093	59088		1
18	LU2DEK	55094	54212	LU2	1
25	PY1MB	57095	57113	PY1	1
38	4A4AA/1	59096	59372	4A1	1
49	9Z4LO	59097	59372	9Z4	1
1700	PY1MO	44098	54103	PY1	1
OFF	1703 - 1903 - 2 HRS.				
1904	KS6DY	59099	59412	KS6	3
18	SW1AR	59100	59399	SW1	1
21	WB4MIZ/HK3	56101	57099	HK3	1
25	8P6EN	57102	58201	8P6	1
44	CN8HD	59103	59371	CN8	1
58	CQ6LF	59104	59400	CQ6	1
2005	VQ9R	57105	55413	VQ9	1
30	RAØUBG	55106	44101	RAØ	1
OFF	2033 - 0633 - 10 HRS.				
0635	~~K1DWQ~~	~~55107~~	~~56093~~		Dup
49	WA9HYS	56108	56101	WA9	3
0703	OD5BA	58109	59495	OD5	1
13	HM1AJ	57110	57778	HM1	1
22	XW8RS	55111	54801	XW8	1
41	GC3YIZ	59112	59639	GC3	1
57	UD6HB	58113	57807	UD6	3
0809	LX1BW	59114	59449	LX1	1
12	DK4OO	59115	59369	DK4	1
			TOTAL POINTS THIS SHEET		

30 MARCH ↑ ↓ 31 MARCH

CQ Form 1069 eff. Feb. 1968

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

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

7. USA—Single Operator, Single Band. The Charles "Joe" Hiller, W4OPM Memorial. Donated by the Virginia Century Club.

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.

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

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.

(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, 1974. In rare isolated areas the deadline will be made more flexible.

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

OSCAR News & Orbital Data

BY GEORGE JACOBS,* W3ASK

ON October 15, the AMSAT-OSCAR 6 amateur communication satellite successfully completed its first year in space.

After its first 4500 orbits, the satellite's 2-to-10 meter repeater continues to function normally, and it is now expected to remain in operation through most of the new year or longer. The uplink to the satellite is the passband between 145.90 and 146.00 mHz, while the downlink is in the corresponding passband between 29.45 and 29.55 mHz.

Although operating at a power output less than originally intended, the 29.45 mHz beacon signal continues to provide useful telemetry and codestore data.

Oceans and continents have been spanned by the satellite, which makes possible communications over a range as great as 4600 miles. The Radio Amateur Satellite Corp. (AMSAT), manager for the project, reports that 100,000 or more contacts have been made through the satellite's repeater by nearly 2000 stations in at least 72 countries during its first year in space. About 40% of these stations are in the USA, 60% overseas. For countries such as Angola, Austria, Bermuda, Iceland, Ireland, and several others, the AMSAT-OSCAR 6 satellite provided the *first* and so far *only* means for direct communications via a satellite.

While many stations are using directional antennas and e.r.p. on the order of 100 watts or more communications through the satellite has been established with fixed amateur stations using as little as 8 watts and a dipole antenna, and from low power mobile stations in cars, and aboard a ship and an airplane.

In addition to making space communications a reality for radio amateurs on a regular basis throughout the world, data from the satellite has also contributed significantly to increasing scientific knowledge, especially in the field of radio wave propagation. It has also served as a valuable educational tool for budding engineers and scientists in numerous primary and secondary schools, and at colleges and universities where the satellite has been used for first-hand experience with spatial experiments and observations.

AMSAT-OSCAR 6 is proof that radio amateurs are capable of designing, building and operating long-life communication spacecraft that can serve a useful purpose. New communication channels have been opened and scientific knowledge increased in the true spirit and tradition of amateur radio.

Happy Birthday AMSAT-OSCAR 6!

Operating & Orbital Data

The AMSAT-OSCAR 6 satellite continues to orbit the earth every 115 minutes. When travelling in a south-to-north direction, it crosses the equator at an angle of 102° and 28.75° of longitude further to the west on each pass. At the equator and in the low-and-mid latitudes, the satellite should pass "in view" for communications during portions of at least three orbits during the morning and three during the late afternoon and evening, for a total of six. On the more overhead passes, communications should be possible for up to 25 minutes.

On December 1, AMSAT expanded the satellite's operating schedule. It is now ON every *Thursday, Saturday* and *Monday* (GMT days) during the late afternoon and evening *south-to-north* passes, and *Tuesday, Friday* and *Sunday* (GMT days) during the morning *north-to-south* passes. The satellite is normally OFF and *not available for communications on Wednesdays* (GMT).

AMSAT urges that the weekday morning passes, because they fall during school hours, be used by radio amateurs to demonstrate the satellite's potential for educational purposes. If at all possible, arrange to set-up equipment at local schools, or invite groups of interested students to your station, to witness for themselves satellite

*Space Communications Editor, *CQ*, 11307 Clara Street, Silver Spring, MD 20902

communications at work in their community. Remember to invite the local press also, since amateur radio can use the publicity, and send reports of these demonstrations to AMSAT.[1] Check with ARRL for literature and additional suggestions for demonstrating the satellite's educational potential.

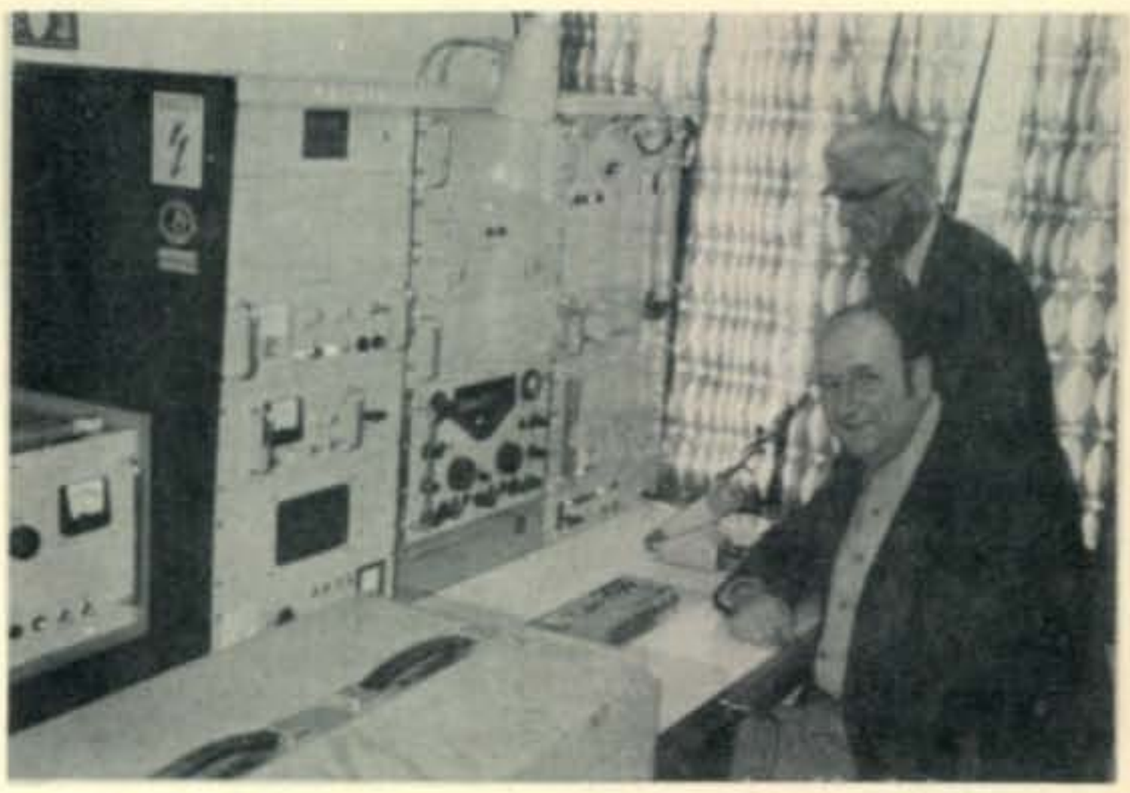
Telemetry data continues to be transmitted daily in c.w. on the beacon frequency of 29.45 mHz between 5 and 15 minutes after the satellite has crossed the equator on its initial, or first orbit of the day (GMT). Codestore data may be transmitted in c.w. on the beacon frequency following the telemetry transmission, and possibly at other times as well. Data copied during the telemetry transmission periods should be sent immediately to AMSAT.[2]

Just prior to the telemetry transmission, as the satellite crosses the equator in a south-to-north direction on its initial orbit, selected stations transmit official bulletins through the repeater, using s.s.b. on a downlink frequency of about 29.49 mHz. These bulletins include reports of special experiments and any changes in the satellite's operating time, as well as updated orbital information. AMSAT urges that during OFF days, the satellite *not be used* for communications while the telemetry and special bulletin transmissions are in progress.

The following table shows the initial, or reference orbit, in a south-to-north direction, for the AMSAT-OSCAR 6 satellite for each day during January, February, March and April, 1974. To produce south-to-north orbital information for other than the referenced orbits, simply keep adding 115 minutes and 28.75° of longitude for each succeeding orbit. South-to-north orbits that cross the equator between approximately 30° and 130° west longitude will permit the satellite to be used for communications over large areas of the USA. These will occur during the late afternoon and evening, local time.

Orbits travelling over the United States in a *north-to-south* direction will cross the equator in the *south-to-north* direction on the opposite side of the world between approximately 210° and 330° west longitude. These passes will occur during the morning hours, local time. The satellite will pass over the USA, crossing the 50th degree of north latitude 41 minutes after

[1,2]AMSAT, P.O. Box 27, Washington, D.C. 20044.



W3ASK (seated) during a recent visit to PA0WLB's impressive radio amateur satellite earth station at Ter Aar, Holland through which hundreds of contacts have been made via the AMSAT-OSCAR 6 satellite. Behind George is Hank Ripet, OSCAR Coordinator for the Netherlands. William, the chief operator, took the picture!

crossing the equator and 176° further to the west; the 40th degree of north latitude 44.4 minutes later and 181° further west and the 30th degree of north latitude 47.7 minutes later and 185° further west. For example, if the satellite crosses the equator in a south-to-north direction at 240° west longitude at 1406 GMT, it will pass over the USA at the intersection of the 40th degree of latitude and the 61st degree of west longitude at 1450.4 GMT.

See "OSCAR-6 News" in Feb. 1973 *CQ*, p.38 for a method to determine the orbits that will be within communication range of a specific QTH.

Reference Orbits

South-North Orbit No.	Date	Equatorial Crossing Time (GMT)	Long. of Equatorial Crossing (°W)
5927	Feb. 1	0002	48.3
5940	2	0057	62.0
5953	3	0152	75.8
5965	4	0052	60.7
5978	5	0147	74.5
5990	6	0047	59.5
6003	7	0142	73.2
6015	8	0042	58.2
6028	9	0137	71.9
6040	10	0037	56.9
6053	11	0132	70.6
6065	12	0032	55.6
6078	13	0127	69.3
6090	14	0027	54.3
6103	15	0121	68.1
6115	16	0021	53.0
6128	17	0116	66.8
6140	18	0016	51.8
6153	19	0111	65.5

[*Continued on page 74*]

QRPp

LOW-LOW POWER OPERATING

BY ADRIAN WEISS,* K8EEG

NEARLY every prospective QRPp operator faces the question: "Will I be able to work out with such low power, given QRM, QRN, and QRO competition?" This question (and the unconscious scepticism it expresses) is a natural one. Our American culture has enthroned Brute Power, whether in the form of a 450 horsepower V-8 engine, a Boeing 747, a Dick Butkas, or a linear amplifier. None of us has escaped the unconscious assumption that it takes brute power (and the more of it, the better) to accomplish anything worth attempting. Hopefully the current energy crisis will awaken Americans to the fact that worthwhile things *can* be done without depending merely upon power.

Remember that this great country wasn't built with two-thousand horsepower earthmovers—just a mule or two, plus a sharp axe and a determined pair of biceps did the job. Well, QRPp operators have, for a long time, critically examined and rejected that "American as apple pie" notion as invalid. Their on-the-air experience has proven time and again that the very low power signal, coupled with skill and determination, can be almost as effective as the high power signal.

A look at the results of the 1973 Annual QRP ARC I QRP Contest should erase some of the scepticism that some of you might have experienced about trying out QRPp and the ability of QRPp to "get through."

The scoring system has a built-in "equalizer" in the form of a set of power multipliers based roughtly on 3 db differences in power levels. Hence, 100 watt operation multiplies by 1.5, 25 watt operation by a 2 multiplier (3 db down), 5 watt operation (another 4 db down) by a 3 multiplier, and 1 watt operation (another 4 db down) by a 4 multiplier. So, scoring is a fairly valid indicator of comparative results. Now to an analysis of this year's results.

If you check the score box, you will note that the top six stations were using under 5 watts output. Further, 18 of the top 25 stations were QRPp. The number of QRPp stations submitting logs (30 out of 53) attests to the growing popularity of this "alternate lifestyle" among amateurs. Admittedly, the low power operator doesn't have the advantage of a power multiplier in day-to-day operation. But the point to be emphasized is that, even if we take away the power multiplier and look only at the raw score in numbers of contacts, the picture hardly changes.

The top three stations, all QRPp, each racked up a greater number of total contacts than any QRO station with the exception of W3RYV, whose total is still under that posted by the top QRPp operator K8BHG. Look at it from another angle. Add the total QSO's reported by the top six QRPp stations, and compare that to the total number of contacts posted by the top six QRO stations, and the QRPp gang still comes out ahead 470-401, with roughly 14.5% more contacts that the QRO gang! This little bit of statistical analysis should make the point quite clear. A good QRPp operator *can* offset a 3-10 db power disadvantage, even in direct competition with QRO stations. Of course, this doesn't mean that the QRO fellows are lids by any means —they just lost the ball game!

Just to ease suspicions that I might be trying to pull the wool over somebody's

*213 Forest Ave., Vermillion, SD 57069.

1973 DL-AG CW Summer QRPp DX Contest Results

Call	Power (Watts)	Score	Call	Power (Watts)	Score
OH2BOR	9	11571	OK1KZ	3	610
DJ4SB	7	6931	HB9QA	3,9	580
DJ1ZB	3	5320	OK1XR	2	516
DJ3IW	2	4872	W7LNG	9	490
OK3BSA	9	3864	DL1NF	6	468
OK1ARD	8	2730	DK2TK/p	3	420
IS0ATZ	8	2420	DK4EX	9	371
DK5MP	8	2108	DT4OEE	9	335
DJ7ST	9	2046	SP9FSD	5	315
I1EFC	9	1620	DM6TAH/A	9	312
G8PG	5,1	1560	DJ2KX	9	310
I5MPN	9	1380	WA6GEN	8	300
WB0DAV	2	1184	OK1UY	2	184
OK1FCA	2	1176	DM2CRJ	8	176
OH2BOI	9	972	IS0BDO	8	168
PA0WX	3	880	SM0GBC/p	2	152
I1MDQ	9	840	DM2AHF	8	136
OK2PAW	6	832	DM2CJF/		
G3DNF	2	814	DT6TAF	9	111
DM6VAH	9	763	DM2AMF/p	8	96
G4BVS	5	752	OH3VJ	1	53
DK3PN/p	3,8	680	DM4JF	8	44

QRP ARC I Annual QRP Contest Results

Call	QSO's	Power	Score	Call	QSO's	Power	Score	Call	QSO's	Power	Score
K8BHG	95	2, 5	27846	W0IYP	32	1	5304	WB5BOT	29	2, 75	1234
K8EEG/0	86	5	23142	WA8CNN	47	70	4620	W3HKS	20	75	1224
K0FRP/6	77	3	20760	VE3BUL	32	5	3519	W2WSS	14	5	1224
VE3KZ	57	.5	19180	WB8NTY	45	90	3399	WN7TUY	30	15	1080
WB4TNB	83	1	17000	WA4LBO	41	4, 9	3342	WN2RXL	22	60	858
WB0DAV	72	3	15264	JE1KZN	30	10	2400	W4QN	13	20	630
W3ARK	76	40	13271	W8GP	28	50	2237	WA6BCN	15	3	576
K2MFY	52	3	12672	W0AV	28	25	2176	W4ZRJ	9	5	576
W3RYV	92	90	12042	WN2EOO	28	15	2016	K1PQV	13	5	546
WA8VPD	49	5	10530	WA4CAO	32	40	1848	W8CSK	14	40	405
WB2LYB	65	25	9176	VE2PJ	28	10	1823	K7LNS	11	20	300
K9VCM	76	90	8910	WA8EDE	27	70	1809	W1ECH/1	9	3	300
K6EIL/2	52	2	7812	WA2EXX	25	90/50	1739	K4GUS	5	5	180
WA3RJS	67	2, 90	7347	WB0GQP	26	70	1620	WN6VZV	10	2	180
W2AXZ	38	3	7050	K9DDA	25	75	1593	W7IBL	12	5, 50	162
WA3SQB	39	3	6840	G3VDW	68	10	1504	KH6EBQ	5	15	99
K1QFD	39	3	6831	W5JLY	14	2	1404	WB8KZD	3	75	36
W4KFB	36	3	6072	W5OP	15	5	1386				

eyes, let me note that previous QRP Contests can be subjected to statistical analysis with the same results. There must be something to the claim that as power goes down, skill must go up!

Every year the length of the list of QRPp stations participating in Field Day increases, and totals are also on the upswing as more operators become more skilled at operating QRPp. Check out the results of the 1973 event in *QST*, November, 1973, page 71, and you'll get the point. Field Day is probably the roughest, toughest stateside contest of them all, and even with the QRM and QRO competition, the QRPp gang does a respectable job. During the 1973 affair, I managed to work 272 stations in about 16 hours, while running QRPp. I never really expected that it could be done, even though I've been in the game for quite a while. Of course, a full-size 8JK up to 50 ft. made a big difference, but that's what QRPp is all about—making that puny signal heard by any means possible short of increasing power.

David vs. Goliath: DX Contests

Four big weekends of tremendous QRPp challenge lay ahead of us—the ARRL DX competition. Now, I know some of you must think I'm nuts for even suggesting that the QRPp operator get into a rough-and-tumble fight with the DX elitists, their California kw's, multi-element beams, and 100 ft. towers. But alas, the Philistines had the same misgivings when David strolled out to lock horns with Goliath. We all know the results of that skirmish!

Actually, there is no need to tremble at the thought of getting caught in a pile-up with a couple of hundred KW's. The amazing thing is, that, many times a QRPp signal, applied at the right frequency, with the right timing, can walk away with a rare DX station right in the middle of the biggest pile-up this side of Malpelo Island. I know, because I've had it happen to me. Listen to the granddaddy of QRPp DX'rs, K4OCE, report his experience during the 1970 *CQ* WW DX Contest:

"It was very unfortunate that I was only able to operate about 7 hours during the contest . . . Anyway, I'm obviously a QRPp nut and I wanted to show some of the DX gang that kw's only cause unnecessary QRM and are absolutely unnecessary on cw. During the 7 hours that I operated, I at no time exceeded ten watts input. I operated on 10, 15, and 20 meters using a four element quad at 38 ft. I worked a total of 45 countries[1] and 21 zones (and forgot to work my own zone!). Between 2348 and 0028, a total of 40 minutes, I worked all continents." Don't let the four element quad frighten you off. During the same contest, W4VNE, running 1 watt output to a 120 ft. random end-fed wire, worked 25 countries and all continents! The efforts of these early DX pioneers are being imitated and matched today, both on s.s.b. and c.w. During the 1973 DX contest, for example, K6GKU made 54 DX contacts while running 2.5 watts s.s.b. I worked 30 countries[2]

[*Continued on page 70*]

[1]The following countries are listed: AX, CE, CX, DL, EL, G, GM, HA, HB, HC, HI, I, JA, JW, KH6, KL7, KV4, KZ5, LA, LU, LZ, OA, OH, ON, PJ, PY, SM, SP, TI, UB5, UP, UA, VE, VQ8, YU, ZE, ZF, ZM, ZS, ZS3, 4Z4, 7Z3, 9Y4.

[2]JA, DK, ZF, G3, KV4, 4M5, 9Y4, LU, ZS, CX, TI, 9Z4, YS1, CR6, CV8, 6Y5, 4C5, HW, VO1, OH, ZD3, KH6, KS6, UP2/CO2, PJ1, OA, PY, CE, KZ5, VE.

Slow Scan TV

BY COPTHORNE MACDONALD,* WØORX

ATA—Amateur Television Association

ON5EX recently sent us a reminder that ATA, formed in 1967 is still going strong and promoting interest in SSTV, UHF-Amateur TV, Fax, and weather satellite reception. It is a non-profit association and publishes an English language magazine, *ATA International*, every three months. A subscription is $5 in US bills (so register the letter) sent to: ATA Treasurer, M. De Meyere, ON4NU, Hullekensstraat 7, 9831 DEURLE, Belgium, Europe. A request to the above address will also get you a free sample copy if you'd like one.

Designing With Transistors

The discrete transistor is a device that will be with us for a long time in spite of the rapid growth of IC's. Most IC's are created in the first place because a particular functional "block" appears in a lot of designer's block diagrams. The cost of designing a new IC is so high that there has to be a mass market for the device. It certainly makes sense to use the IC's that have already hit the market, whenever possible, but there are few projects that can be built without at least a few transistors sprinkled among the DIPs.

Designing with transistors is easy these days, especially at the d.c. and audio frequencies used in slow-scan. Sure, lots of big thick books, full of long equations have been written on the subject, but we can do very nicely by grasping only a few key concepts. The first transistors were low gain germanium units having high leakage. Doing a good design job with these things *did* require a lot of equation juggling. Today we can buy two or three high gain, low leakage, silicon transistors for a dollar. If we restrict ourselves to using only these high gain, low leakage devices, the calculations become greatly simplified.

Figure 1 will be our starting point. Figure 1(A) shows the standard symbol for an NPN transistor with base, emitter, and collector leads marked. Figure 1(B) shows the same NPN transistor, but with Cop's handy "innards" diagram instead of the symbol. This diagram is a useful *model* of how a transistor acts in a circuit. It tells us nothing about the chemistry, and physics, and geometry of the device; but frankly don't need to get into all that to be able to *use* the darned things. Let's start with the two diodes. The transistor really does contain two diode junctions; one between base and collector, and the other between base and emittter. If you take an ohmmeter and check a good transistor you'll find them there. In fact, the standard ohmmeter check to see if a transistor is "probably OK" is to check these diodes for a reasonably low forward resistance and a high back resistance. Then one checks between collector and emitter to make sure that the ohmmeter indicates a high resistance when connected first with one polarity, and then with polarity reversed. The breakdown voltage of these diodes shows up on the transistor data sheet. The base-collector diode is back-biassed during normal transistor operation. BV_{CBO} or sometimes just V_{CBO} is the symbol used to indicate the breakdown voltage of this diode. In the data given for the 2N5828 we see that this voltage is 50 volts. The base-emitter diode is forward biassed in normal operation, so in amplifier circuits its breakdown voltage is not important. It does come into play however in multivibrators and other digital circuits where we intentionally back bias the base-emitter diode to cut the transistor collector current off. BV_{EBO} is the highest safe back bias for this diode. The 2N5828 data shows this as only 5 volts which is typical for silicon transistors. (These diodes actually act like low power 6 or 6.5 volt Zeners having very sharp knees. Try one the next time you need a Zener in

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

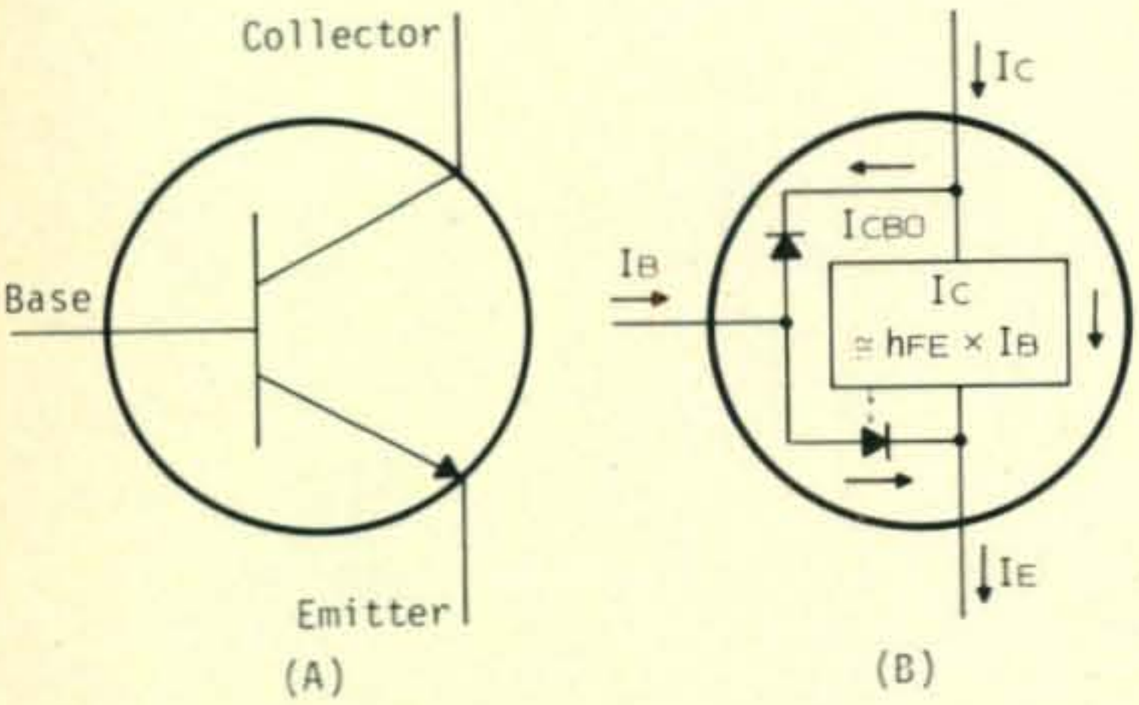


Fig. 1—(A) The symbol for an NPN transistor. (B) is a functional model showing base-collector and base-emitter diodes, and the constant current generator that responds to the current flowing through the base-emitter diode.

this voltage range, but keep the current down to a few mils.)

If the base is shorted to the emitter, the collector-emitter breakdown voltage is the same as BVCBO. If the base is left open, however, or is connected to a high impedance, the maximum collector-emitter voltage should be limited to the rated BVCBO. For the 2N5828 this is 40 volts, only 80% of the BVCBO.

Another diode-connected parameter to keep in the back of our minds is ICBO, the maximum rated leakage of the collector-base diode. This current is added to whatever base current enters through the base lead. Its effect is negligible in 95% of the circuits you'll use, but you might want to take it into account if you are using transistors in circuits having an IB of less than 1 microamp. (Check your calculations to see how much the collector current changes if ICBO *is* added to the external IB.) A transistor is more than a couple of diodes, of course, and that extra something is indicated by the current generator box connected between collector and emitter. In effect, whatever forward bias current we cause to flow in the base-emitter diode gets *multiplied* by the current gain of the transistor (HFE or Beta) and this new *multiplied* current flows in the collector circuit.

Figure 2 shows a simple circuit that causes this action to take place. Here we have grounded the emitter. The base-emitter diode is forward biassed by the current flowing through the 1.1 meg resistor. A forward biassed silicon diode will normally have a voltage drop across it of between 0.5 and 1.0 volts. Let's assume that the voltage is 0.7 volts in this case. IB, the base current, will thus be the voltage across the resistor (11.3 volts) divided by 1.1 megohms, or about 10 microamps. What will the collector current

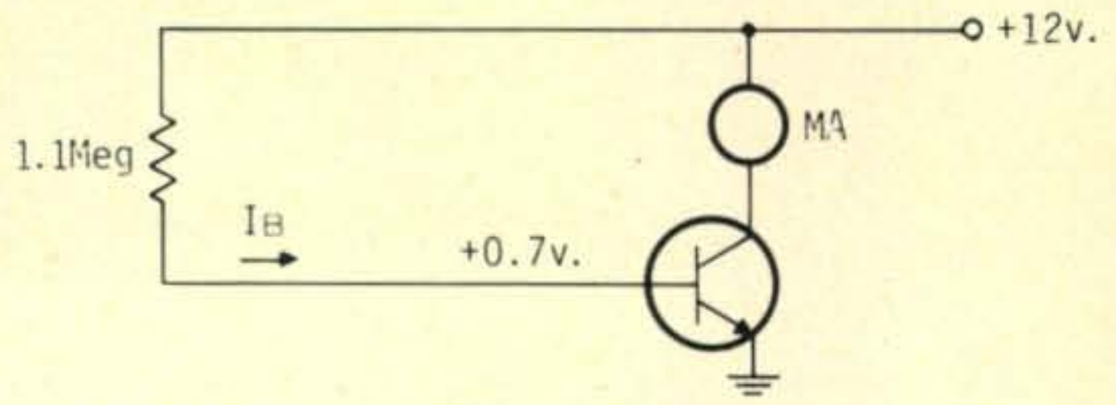


Fig. 2—A simple circuit that causes the action to take place.

be? It depends on the current gain of the transistor. Let us assume that the transistor in question is a 2N5828. The data for that type says that the Beta may be anywhere from 400 to 800. If it happens to be 400, then the collector current will be 10 ua × 400 = 4000 ua, or 4 milliamps. With a unit having a Beta of 800, the collector current would be 8 ua. Since the base current is only a tiny fraction of the collector current, it is also very close to being true that IE = IC.

Designers since the time of Faraday have used the convention that current flows from the (+) terminal of the power supply through the external circuitry and back into the (—) terminal. This was confusing in the days of vacuum tubes because the tubes made us aware that the electrons were actually flowing in the opposite direction. The current fllow arrows in these diagrams follow the plus-to-minus convention, rather than electron flow. Feel free to think either way, but if you dig into any engineeriing books remember that the arrows will show plus-to-minus current flow.

Designing Emitter Followers

The simplest, and one of the most useful transistor circuits is the emitter follower. It is the first "building block" circuit that we'll look at. Emitter followers are voltage amplifiers with a gain of almost 1—typically 0.98 plus. This may not sound too exciting, but at the same time they act as impedance transformers; high Z in and low Z out. The transformation ratio is equal to the transistor HFE, and unlike a wirewound transformer, this one goes down to zero frequency! Slow-scan gear uses a lot of high impedance circuitry: photomultiplier tubes, and 8 second sweep circuits to name a

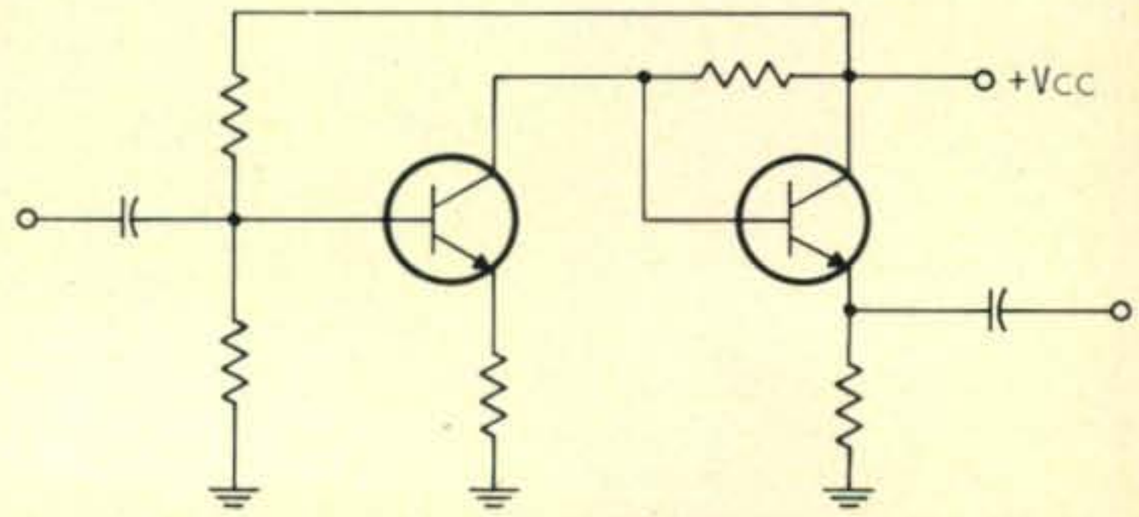
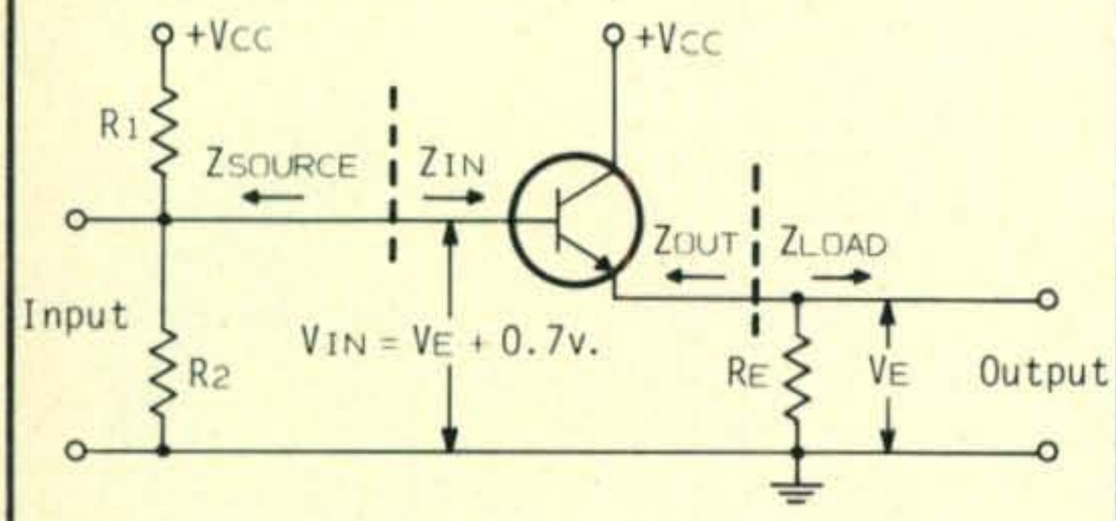


Fig. 3—An emitter follower output stage direct-coupled to the preceding stage.

Basic Data, 2N5828

Polarity: NPN
Collector-base breakdown voltage, BVCBO = 50 volts
Collector-emitter breakdown voltage, BVCEO = 40 volts
Emitter-base breakdown voltage, BVEBO = 5 volts
Maximum collector current, IC = 100 ma.
Maximum total power dissipation @ 25° C = 360 milliwatts
Max. d.c. current gain, hFE = 800 }
Min. d.c. current gain, hFE = 400 } @ IC = 2 ma.
Max. collector cutoff current, ICBO = 0.05 ua.
Min. gain-bandwidth product, fT = 90 mHz
Max. gain-bandwidth product. fT = 350 mHz
Manufacturer: GE
Price: $0.34 each

Emitter Follower Design



1. Decide on emitter d.c. voltage, VE. (See text)
2. Decide on the collector and emitter current. (See text).
3. Select RE: $RE = \frac{VE}{IC}$
4. Select a transistor:
   a) VCEO rating should be appreciably greater than VCC.
   b) Rated power dissipation at 25° C should be well above calculated dissipation, PD:
   $$PD = IC\ (VCC\text{-}VE)$$
   c) Calculate ZIN and ZOUT to make sure that they are satisfactory. (Include source and load Z *external* to the stage in parallel with the resistive loading caused by the bias resistors).
   $$ZIN = ZLOAD \times hFE$$
   $$ZOUT = \frac{ZSOURCE}{hFE}$$
5. Calculate the maximum possible base current:
   $$IB\ MAX = \frac{IC}{hFE\ MIN}$$
6. a) If VIN is provided by the previous stage, is that stage capable of supplying IB MAX?
   b) If the input is to be biassed by an R_1-R_2 type of network, proceed as follows:
      1) The total resistance of $R_1 + R_2$ should be such that the current through the resistors is about ten times the maximum expected IB MAX:
      $$RT = R_1 + R_2$$
      $$RT = \frac{VCC}{10\ IB\ MAX}$$
      2) Once RT has been decided upon, R_2 can be calculated:
      $$R_2 = \frac{VIN}{VCC} \times RT$$
      3) Calculate R_1:
      $$R_1 = RT - R_2$$
7. Check source and load characteristics for the probability of parasitic oscillations, and designs-in suppression measures if they appear necessary. (See text.)

couple. Emitter followers allow the voltages developed in these high Z circuits to be coupled to lower impedance loads. They can be designed not to load down the source that feeds them. Usually one emitter follower will do the trick, especially if a high Beta transistor is used. Occasionally, two or more stages will have to be cascaded. This is done if the necessary impedance transformation ratio is greater than the HFE of one transistor.

A step-by-step design procedure appears in the box. The order given for the steps is not fixed. If your input and output Z requirements are tight, you might start with step 4C), for example. Another possibility is that you only have a few parts on hand and want to come up with the best performance you can. In this case you'd "plug" the values into the appropriate steps and see how the numbers turn out.

Let's amplify some of these steps a bit. Selecting VE in step 1 may be dictated by input or output bias constraints. Figure 3 shows an emitter follower used as an output driver following a transistor gain stage. In this case the VE will be determined by VIN—it will simply be 0.7 volts lower than the collector voltage of the driver transistor. At other times you will want a specific VE and will need to design the input circuitry to give a VIN of VE+ 0.7 volts. When the d.c. bias considerations are not dictated by input or output connections (as is the case with a.c. coupling) it is normal to make VE about half of VCC. This gives the greatest possible output voltage swing without clipping; the peak-to-peak voltage can equal VCC before clipping occurs.

The collector/emitter current decision of step 2 depends largely upon the impedance of the load being driven by the stage, and the necessary peak-to-peak output amplitude. If the stage is capacitively coupled to an external load, find the peak-to-peak current required by that load. To do this, divide the required peak-to-peak voltage across the load by its resistance. If you make the d.c. current through RE equal to this same current value, you will be on the safe side in most cases. The problem here is that while an NPN emitter follower can supply lots of drive current in the positive direction, the drive current in the negative direction is supplied by RE.

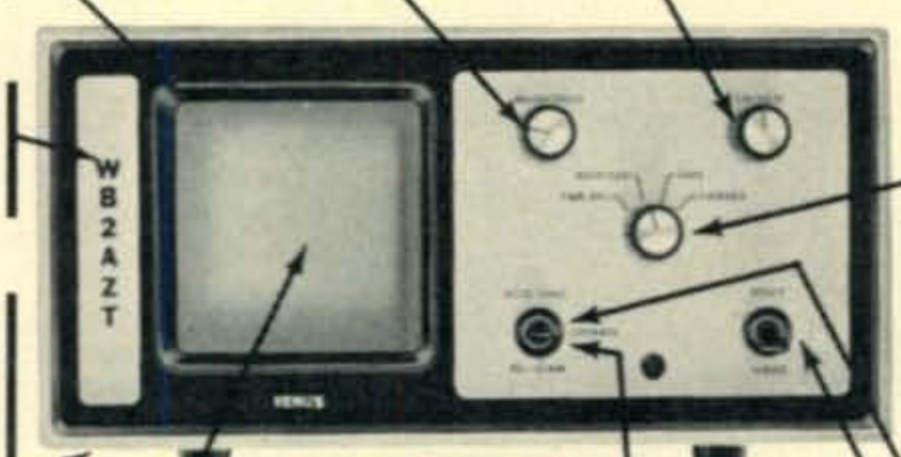
If high input Z is very important, start with step 4 and work backwards through step 3 to step 2. If the application is non-critical, or if you just don't know where to start, arbitrarily select a current of one or two millamps. If something doesn't work out down the line, you can always go back, plug in another value, and try again.

Over-voltage kills transistors instantly. Internal heating is the second enemy. Try to

[*Continued on page 72*]

2nd generation slo-scan system

Venus Slo-Scan TV monitor



CAMERA ADAPTER Mounting Bezel

BRIGHTNESS Automatic CRT Burn Protection

CONTRAST Independent Contrast Control

SOURCE SELECT Rec., Tape, Camera Off & Instant On

PERSONALIZED IDENTIFICATION PLATE Your call sign

CABINET Zinc Die Cast Front with Extruded Alum Sides 10¾"Wx13"D x5½"Ht.

OPTIMUM PICTURE 3¼" x 3⅛" for POLAROID LAND reproduction

TILT STAND Collapsible Bail

RE-SCAN Retrace Vertical

VIDEO/VOICE SELECT

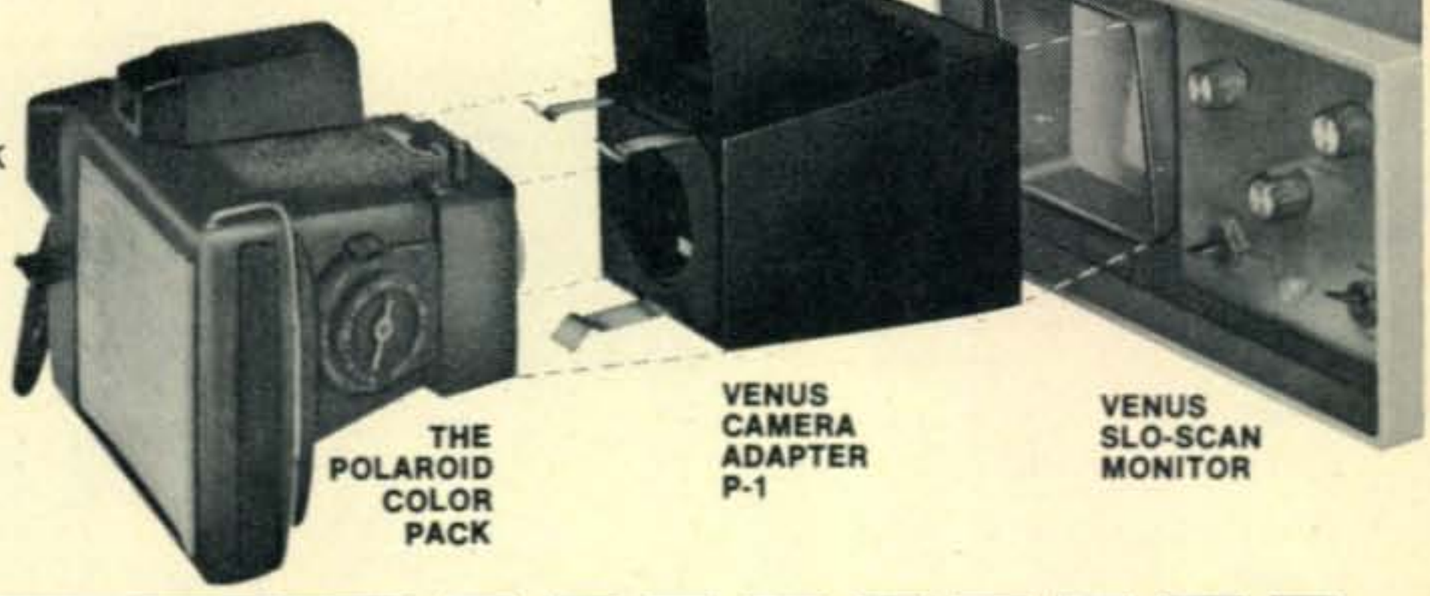
ACCU SYNC© Diagnostic and Tuning Aid

Amat. Net $349.00

Actual unretouched photo taken from the Venus SS2 using a Polaroid Color Pack II Camera mounted on the Venus P-1 Camera Adapter

CAMERA ADAPTER P-1 enables you to take photographs "right-off-the-air" and accepts a Polaroid Color Pack or a Polaroid Square Shooter.

- **Allows photographing in a lit room**
- **Simple-snap mounting for quick and accurate picture taking**
- **Simultaneous hood viewing of picture being taken by camera**
- **Instant QSL via SSTV**
- **Amat. Net $34.50**



THE POLAROID COLOR PACK

VENUS CAMERA ADAPTER P-1

VENUS SLO-SCAN MONITOR

VENUS' SLO-SCAN CAMERA *has arrived!*

VENUS' Slo-Scan Camera will project FAST SCAN VIDEO real-time on any conventional home TV and with a simple flip of a switch converts the FAST SCAN VIDEO to Slo-Scan.

- ***Full, Half and Quarter Frame • Positive Negative Reversal***
- ***RF output for viewing on conventional home TV set.***
- ***Built-in BAR GENERATOR for foolproof means of setting your brightness and contrast controls.***

Write today for detailed information on

☐ ***VENUS SLO-SCAN CAMERA C-1***

I would also like more information on:

☐ **VENUS SLO-SCAN TV MONITOR SS2**
☐ **VENUS CAMERA ADAPTOR P-1**
☐ **VENUS SLO-SCAN ACCESSORIES**

NAME_____ CALL_____

STREET_____

CITY_____ STATE_____ ZIP_____

ORDER DIRECT FROM FACTORY OR AUTHORIZED DISTRIBUTOR AS FOLLOWS:
NEW YORK (Metropolitan Area) **Barry Radio** • **MASS.** (Melford) **A. W. Electronics** • **CALIFORNIA** (Burlingham) **Ham Radio Outlet** • **FLORIDA** (Pensacola) **Goldstein's** • **NEBRASKA** (Omaha) **Radiosmith**

Venus Scientific Inc.

The company that put high voltage on the moon, now brings you expanding amateur radio technology.

399 Smith Street
Farmingdale, N.Y. 11735
Phone 516-293-4100
TWX 510-224-6492

AMATEUR ELECTRONIC SUPPLY USED GEAR

★ 10 Day Free Trial (Lose only Shipping Charges) ★ 30 Day Guarantee ★ Full Credit Within 6 Months on Higher Priced New Equipment ★ EZ Terms–Convenient REVOLVING CHARGE Payment Plan ★ Order Direct from this Ad !

ALLIED
AX-190 Receiver $169
SP-190 Speaker 12

AMECO
CN-50 (14–18) $ 29
CN-144 (10m i.f.) 29
CLB 6m mob. conv. 9
TX-62 VHF Xmtr 69

CENTRAL ELECT.
20A Exciter (table) $ 99
QT-1 Anti-trip 6
MM-2 Analyzer 59

CESCO
CM-52 SWR bridge $ 19

CLEGG/ SQUIRES-SANDERS
22'er 2m Xcvr $129
66'er 6m Xcvr 109
99'er 6m Xcvr 59
Thor 6 (RF only) 79
417 AC sup./mod. 65
418 DC sup./mod. 35
Zeus VHF Xmtr 269
Interceptor Rec. 219
Allbander HF tuner 69
Venus 6m SSB Xmtr 175
SS-1R Receiver 375
SS-1S Noise Silencer (as-is) 15
SS-1V Band Scanner 175
22'er FM series 25 209
FM-27A 2m FM 289
FM-27B 2m FM 319
011 AC sup.-used 59

COLLINS
75A-2 Receiver $269
75A-4 (ser.#1713) 349
75A-4 (ser.#2081) 375
75A-4 (ser.#2146) 375
75A-4 w/VZC modifications (as-is) 250
75S-1 Receiver 325
75S-3 Receiver 449
75S-3B Receiver 595
R-390 Rec (rk.mt.) 595
32S-3 Transmitter 695
30L-1 Linear 395
62S-1 VHF conv. 595
KWM-1 Xcvr 239
516F-1 AC supply 75
516E-1 DC supply 75
KWM-2 Xcvr 595
KWM-2/blanker 695
312B-5 PTO cons. 349
351D-2 Mount 69
516F-2 AC supply 129
MP-1 DC supply 119
PM-2 AC supply 95
CC-2 carrying case 60

COMM. TECHNOLOGY
Magnum 6 RF speech processor (wired for Drake) $ 79

DIGITEC
Z-200A Digital Voltmeter $ 59
Z-200A (rack mount) 49

R. L. DRAKE
2A Receiver $149
2AC Calibrator 9
2B Receiver 179
2BQ Spkr/Q-mult. 29
2BS Speaker 9
2NB noise blanker 15
2NT Transmitter 99
R-4 Receiver 269
R-4A Receiver 289
R-4B Receiver 339
SPR-4 Receiver 395
SC-6 6m conv. 59
CPS-1 supply 12
TR-3 Transceiver 319
AC-3 AC supply 65
DC-3 DC supply 75
RV-3 Remote VFO 59
RV-4 Remote VFO 69
RV-4C Remote VFO 79
TR-4 Transceiver 399
TR-4 w/blanker 469
AC-4 AC supply 75
DC-4 DC supply 89
T-4B Reciter 275
T-4X Transmitter 299
T-4XB Transmitter 375
TC-6 6m Xmt. conv. 169
L-4 Linear 475
TR-22 2m FM Xcvr 149
ML-2 2m FM Xcvr 199
MN-4 Matcher 69
C-4 stn. control 289
5NB noise blanker 49
SCC-4 calibrator 19

DYCOMM
500C 2m Amplifier $ 39
500E 2m Amplifier 49
10-0 100w Amplifier 129

EICO
753 Transceiver $119
751 AC supply 49
752 DC supply 49
717 Keyer 49
720 Transmitter 49
730 Modulator 39

GELOSO
G-208 gen.cov. Rec $89
G-209 Ham Rec. 89

GENAVE
GTX-200 2m FM $189

GLOBE/GALAXY/WRL
Hibander 62 6 & 2m Xmtr (as-is) $ 39
6–2 VFO 34
Galaxy 300 Xcvr 129
G-300 DC supply 39
Galaxy V Xcvr 225
Galaxy V Mk II 249
Galaxy V Mk III 275
GT-550 Xcvr 299
GT-550A Xcvr 349
AC-35 AC supply 65
DC-35 DC supply 65
AC-400 AC supply 75
RV-1 Remote VFO 49
VX-35 VOX 9
VX-35C VOX 15
CAL-35 Calibrator 9
SC-35 Speaker 12
DAC-35 Dlx. console 69
SC-550 Speaker 19
Duo-Bander Xcvr 99
Economy AC supply 39
Ecomony DC supply 39
Rejector 6
Rejector AC supply 4
AC-210 AC supply/ Booster 19
R-530 (new demo) 795

GONSET
Comm II 6m $ 69
Comm IIB 2m 79
Comm IV 6m 119
GC-105 2m Xcvr 119
6m Linear II 69
900A 2m Xcvr 199
901A AC supply 39
910A 6m Xcvr 199
911A AC supply 39
GSB-201 Linear 199

HALLICRAFTERS
SX-62A Receiver $159
SX-71 Receiver 99
SX-100 Receiver 139
SX-101 Mk II Rec. 119
SX-101 Mk III Rec. 139
SX-101A Receiver 169
S-108 Receiver 79
SX-111 Receiver 129
SX-117 Receiver 189
SX-122 Receiver 199
SX-130 Receiver 139
SX-140 Receiver 69
R-46B Speaker 19
R-50 Speaker 12
HT-32 Transmitter 189
HT-32A Transmitter 219
HT-32B Transmitter 279
HT-37 Transmitter 169
HT-40 Transmitter 49
HT-44 Transmitter 159
HT-46 Transmitter 209
HT-45 Linear w/ homebrew supply 175
SR-150 Transceiver 269
SR-160 Transceiver 169
PS-150-120 AC sup. 75
PS-150-12 DC sup. 59
SR-400 Xcvr 475
SR-500 Xcvr 199
P-500A AC supply 75
P-500DC DC supply 85
FPM-300 Xcvr 349
MR-300 mobile mt. 15
SR-2000 Xcvr/AC 875
HA-6 Transverter 89
SR-34 (AC/DC) 199
SR-42 2m Xcvr 79
SR-46 6m Xcvr 69
SR-46A 6m Xcvr 79
HA-26 2-6m VFO 39
HA-1 Keyer 59
HA-5 VFO 49

HAMMARLUND
HQ-100C Receiver $109
HQ-110C Receiver 119
HQ-110A Receiver 139
HQ-110AC Rec. 149
HQ-110A/VHF Rec. 189
HQ-170 Receiver 149
HQ-170C Receiver 159
HQ-170AC Rec. 199
HQ-170A/VHF Rec. 249
HQ-180AX Rec. 359
HQ-215 Receiver 229
S-200 Speaker 15
HX-50A Transmitter 219

HEATHKIT
GR-81 Receiver $ 19
RX-1 Receiver 129
SB-300 Receiver 209
SB-301 Receiver 229
SB-303 Receiver 289
SB-310 SWL Rec. 229
SB-500 2m xmt.conv. 175
SB-600 Speaker 15
HS-24 Speaker 9
DX-35 Transmitter 34
DX-40 Transmitter 39
DX-60 Transmitter 59
DX-60A Xmtr 64
DX-60B Xmtr 69
TX-1 Transmitter 99
HX-10 Transmitter 169
HX-30 6m Xmtr 149
HW-7 QRP CW Xcvr 59
HW-32 20m Xcvr 75
HW-32A 20m Xcvr 85
HW-100 Xcvr 239
HW-101 Xcvr 249
HW-16 Xcvr 89
HW-17A 2m Xcvr 109
HW-17-2 FM adaptor 25
SB-100 Xcvr 299
SB-101 Xcvr 329
SB-102 Xcvr 369
SB-610 signal mon. 69
SB-620 Scanalyzer 119
VF-1 VFO 19
HW-29A (Six'er) 34
HW-30 (Two'er) 39
GP-11 DC supply 9
VHF-1 (Seneca) 6-2 79
HP-10 DC supply 24
HP-20 AC supply 24
HP-23 AC supply 45
HP-23A AC supply 49
HRA-10-1 calibrator 6
HO-10 Monitor 59
SB-650 freq. display 169
HW-202 2m FM Xcvr 169

JOHNSON
Challenger $ 54
Viking II 69
122 VFO 19
Ranger 89
Valiant I 139
Pacemaker 129
Invader 200 219
Invader 2000 475
275w M'box/SWR 79
6N2 VHF Xmtr 89
TR switch 19

KW ELECTRONICS
KW-204 SSB Xmtr $299

KENWOOD
R-599 Receiver $239
T-599 Transmitter 289
TS-511 Xcvr 289
PS-511S AC supply 79
VFO-555 79
TS-900 Xcvr 569
PS-900 AC supply 89

KNIGHT
R-100 Receiver $ 59
T-60 Xmtr 34
T-150 Xmtr 59
TR-106 6m Xcvr 79
V-107 VHF VFO 19
TR-108 2m Xcvr 89

LAFAYETTE
HA-225 Receiver $ 79
HA-250 Receiver 79
HA-800B Receiver 89

MIIDA
Digipet 60 frequency counter $149

NATIONAL
NC-98 Receiver $ 89
NC-155 Receiver 109
NC-183 Receiver 89
NC-270 Receiver 125
NC-300 Receiver 129
HRO-60 Receiver 199
NTS-3 Speaker 12
HRO Speaker 12
XCU-303 Calibrator 15
NCX-3 Xcvr 169
NCX-5 Xcvr 299
NCX-5 Mk II Xcvr 329
NCXA AC supply 75
200 Transceiver 219
AC-200 AC supply 69
NCL-2000 Linear 349
NCX-500 Xcvr 219
AC-500 AC supply 75

P & H
LA-400C Linear $ 69

PALOMAR
Freq. Modulator for Gonset Communicators $ 19

PEARCE-SIMPSON
Gladding 25 2m FM $169

POLYTRONICS
PC-2 2m Xcvr $119
PC-6 6m Xcvr 99
PC-62B 6-2m Xcvr 179

RME
4350A Receiver $109
6900 Receiver 159
VHF-126 converter 75

REACH
ITA 1 (2250Hz) tone encoder $ 25

REGENCY
HR-2 2m FM Xcvr $149
HR-2A 2m FM Xcvr 165
HR-2B 2m FM Xcvr 179
AR-2 Amplifier 89
EC-175 Counter 325

ROBYN
Digital 500 Xcvr w/AC supply $399
Digital 500A Xcvr w/AC supply 449

SBE
SB-34 Transceiver $269
SB2-LA Linear 169
SB2-XC Calibrator 12
SB2-CW Codaptor 29
SB2-MIC Mike 9
SB-144 2m FM Xcvr 149

SIGNAL/ONE
CX-7A Xcvr $995

SINGER
PR-1 Panadaptor $ 79

STANDARD
SR-C826M 2m FM $179
SR-C851T 2m FM 269
SR-CSA Charger 24

SWAN
260 Transceiver $289
400 Transceiver 159
410 VFO 79
VX-1 VOX 12
117B AC supply 65
350 Xcvr (early) 249
350 Xcvr (late) 269
350C Xcvr 299
SW-117C AC supply 65
512 DC supply 69
500 Transceiver 319
500C Transceiver 349
500CX Transceiver 389
117XC AC supply 85
14-117 DC supply 99
14X DC module 39
117X basic AC sup. 65
600R Receiver 325
600S Speaker 15
NB-500 blanker 49
ICAF I.C. audio filt. 19
TV-2 Xmit. conv. 189
TV-2B Xmit. conv. 225
250 6m Xcvr 229
210 VFO 59
500 kc Calibrator 9
NS-1 noise silencer 19
1200W Linear 189
1200X Linear 199
Mark 6 Linear 395
FM-1210 2m FM w/AC supply 225

TEMPO
DC-1A DC supply $ 69
502 2m Amplifier 69

TEN-TEC
Argonaut $199
TX-100 Xmtr 59
RX-10 Receiver 49
405 Linear 109
AC-4 SWR bridge 12
206 Calibrator 15
210 AC supply 19
250 AC supply 39
S-30 Signalizer 29
PM-2A Transceiver 39
PM-2B Transceiver 49
PM-3A Transceiver 54

TOPAZ
C10XDG AC supply for Swan 240 $ 39

TOP BAND SYSTEMS
TBS-2000 Linear $169

UNIMETRICS
Unicom 25 2m FM $189

VARITRONICS
FM-10BM AC supply w/Amp. $ 39
PA-50A 2m FM amp. 49

WATERS
3001 Hybrid coupler $39
361 Codax Keyer 49
337-51A Q-multiplier /notch filter 12

YAESU
FV-400S VFO $ 69
SP-401 Speaker 15
FTdx-400 Xcvr 369
FLdx-400 Xmtr 249
FR-100B Receiver 189
FL-200B Xmtr 189

AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Ave. Milwaukee, Wis. 53216
Phone (414) 442-4200
HOURS: Mon & Fri 9-9; Tues. Wed & Thurs 9-5:30; Sat 9-3

IMPORTANT! – Please Be Sure to send all Mail Orders and Inquiries to our Milwaukee store, whose address is shown above. The following Branch stores are set up to handle Walk-in business only.

17929 Euclid Ave.; Cleveland, Ohio Phone (216) 486–7330
621 Commonwealth Ave.; Orlando, Florida Phone (305) 894–3238

SAVE $50. Genave

Purchase a New GENAVE GTX-200 ($249.95–shown above) or a GTX-2 ($249.95-10 push-button channels) for the Regular price with No Trade and you may take a $50 Credit towards the purchase of other new merchandise of Your Choice. Following are some possible suggestions of other merchandise you might consider:

- **GENAVE PSI-10 AC power supply $79.95**
- **GENAVE HamPak, Portable battery pack with antenna $39.95**
- **GENAVE TE-1 Tone Encoder $79.95**
- **Extra transmit or receive crystals $5 each (146.94MHz included)**
- **ASP, Cushcraft, Gam, Hy-Gain, Larsen Antennas**
- **Bird Ham-Mate 4352 wattmeter $79.00**
- **If you can't think of anything–Phone us or write for our "Condensed listing of Amateur Radio Equipment".**

AMATEUR ELECTRONIC SUPPLY

is the Best Place to purchase your new

DRAKE *gear for the following reasons*

TR-72 2m FM Xcvr, 12vdc, 23 ch.	$299.95
TR-22 Portable 2m FM Xcvr.	219.95
AA-22 Rec./Xmtr. Amplifier	149.95
MMK-22 Mobile Mount	9.95
AA-10 10 watt 2 meter Amplifier	49.95
AC-10 supply for TR-22/AA-10 TR-72	39.95
Extra crystals for TR-22, TR-72 each	5.00
DSR-1 Digitally synthesized Receiver	2195.00
Rack panel adaptor for DSR-1	125.00
2C Receiver	$295.00
2AC Califrator for 2C	18.75
2CS Speaker for 2C	22.00
2CQ Speaker/Q-multiplier for 2C	49.00
2NB Noise Blanker for 2C	26.95
R-4C Receiver	499.95
4NB Noise Blanker	65.00
Filters: 250, 500 cycle; 1.5, 6.0 kHz	50.00
MS-4 Speaker for TR-4C, R-4C, SW-4A	22.00
TR-4C Transceiver for 80-10 Meters	599.95
34PNB Noise Blanker	100.00
RV-4C Remote VFO for TR-4C	110.00
FF-1 Crystal cont. adapt. for TR-4C	46.95
AC-4 AC supply for TR-4C, T-4X	99.95
DC-4 12vdc Supply for TR-4C	125.00
MMK-3 Mobile Mounting kit for TR-4C	6.95
MC-4 Mobile Console for TR-4C	69.00
2NT CW Transmitter	175.00
T-4XC SSB Transmitter	530.00
L-4B Linear Amplifier	825.00
MN-4 Antenna Match Network	99.00
MN-2000 Antenna Match Network	195.00
W-4 RF Wattmeter (2-30 Mc)	61.95
WV-4 RF Wattmeter (20-200 Mc)	73.50
C-4 Station Control Console	395.00
SW-4A AM Shortwave Receiver (tube)	335.00
AL-4 Loop Antenna – BC Band	29.00
AN-5 Short Wave outdoor antenna	8.80
TV-42-LP 100w Low-pass Filter	8.95
TV-1000-LP 1000w Low-pass Filter	18.75
TV-300HP High-pass Filter	6.95
LN-4 Line Filter, 120v, 5 amp.	8.00
Crystals for 2C, R-4C, SW-4A, T-4XC	5.00
Fixed-Frequency Crystals	7.50
729SRD Microphone with plug	19.95
SPR-4 Programable Receiver	579.00
ACCESSORIES FOR SPR-4	
5NB Noise Blanker	$ 65.00
DC-PC DC Power Cord	5.00
TA-4 Transceive adaptor for SPR-4	25.00
SCC-4 Crystal Calibrator	20.00
RY-4 Teletype adaptor	10.00
DIAL Crystal Selector - plain	2.35
CRYSTAL KITS FOR SPR-4	
Aeronautical Overseas – 7 crystals	$ 32.00
Amateur Bands – 6 crystals	27.00
Citizens Band – one crystal	5.00
Marine Bands – 11 crystals	49.00
MARS – 5 crystals	22.00
Teletype Commercial – 4 crystals	18.00
Time & Freq. Std. WWV – 5 crystals	22.00

TR-72

TR-22

Order Today
Direct from this Ad

R-4C

L-4B

your
BANKAMERICARD
welcome

Ray Grenier, K9KHW
Mgr. Mail Order Sales

- **TOP TRADES** for your good clean equipment
- **STAY-ON-THE-AIR PLAN** – Enables you to keep your trade-ins until your new gear arrives – Lose no operating time!
- **PERSONAL SERVICE** from fellow hams who understand your problems.
- **SAME DAY SERVICE** on most Orders and Inquiries from our Centrally Located Modern Facilities
- Top Notch Service Department
- **LARGE COMPLETE STOCK** means Fast Deliveries. United Parcel Service available to most parts of the country. – UPS Blue label (AIR) to the West Coast.
- **GECC Revolving Charge Plan.** Only 10% Down. LOW Monthly Payments – for Examply: $10 a month finances up to $300; $20 up to $610. Write for complete information and credit application.

SAVE up to $100.

If you purchase any of the new Merchandise listed below at the Regular Price and Without a Trade-in, you may take the "Bonus" Credit indicated below toward the purchase of other merchandise (such as power supplies, antennas, towers, microphones, crystals, linears, accessories, etc.)

TR-22 2m FM	$10 Bonus	SPR-4 Receiver	$40 Bonus
TR-72 2m FM	$20 Bonus	TR-4C Xcvr	$50 Bonus
R-4C Receiver	$40 Bonus	C-4 Console	$40 Bonus
T-4XC Xmtr	$40 Bonus	L-4B Linear	$100 Bonus

SIX EZ-WAYS TO PURCHASE
1. CASH
2. C.O.D. (20% DEPOSIT)
3. MASTER CHARGE
4. BANK AMERICARD
5. AMERICAN EXPRESS
6. GECC REVOLVING CHARGE

master charge
THE INTERBANK CARD

AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Ave. Milwaukee, Wis. 53216

Phone (414) 442-4200

HOURS: Mon & Fri 9-9; Tues, Wed & Thurs 9-5:30; Sat 9-3

IMPORTANT! – Please Be Sure to send all Mail Orders and Inquiries to our Milwaukee store, whose address is shown above. The following Branch stores are set up to handle Walk-in business only.

17929 Euclid Avenue; Cleveland Ohio Phone (216) 486–7330
621 Commonwealth Ave.; Orlando, Florida Phone (305) 894–3238

To: AMATEUR ELECTRONIC SUPPLY
4828 W. Fond du Lac Ave. Milwaukee, Wis. 53216

I am interested in the following new equipment:

_____

I have the following to trade: (what's your deal?)

_____

Ship me: _____

I Enclose $_____. I will pay balance (if any):

☐ COD (20% Deposit) ☐ GECC Revolving Charge Plan
☐ Master Charge* ☐ BankAmericard ☐ American Express

Account Number: _____

Expiration DATE _____ *Master Charge Interbank number _____ (4 digits)

Name: _____

Address: _____

City & State: _____

☐ Send used gear list

DX

BY JERRY HAGEN,* WA6GLD

Changing Faces

DUE to heavy business responsibility incurred by John, K4IIF, the DX Department is changing hats. Effective with this issue your Assistant DX Editor will assume DX Editor responsibilities with K4IIF becoming Assistant DX Editor. There will be *NO* change in The Awards Programs. The WPX and *CQ* DX Awards will continue to be handled by WA6GLD while the WAZ Program will remain with K4IIF. During the past six years John, K4IIF, has provided excellent reading as a DX Editor and established the First United States DX Advisory Committee. He provided excellent analysis and commentary on controversial DX issues by airing the opinions of major DX clubs through the *CQ* DX committee. The WPX Award Program was revitalized, the *CQ* DX Awards established and the *CQ* DX Hall of Fame initiated under his leadership. The DX column hopes that the help and interest of DXers will continue to be as good as in the past. We are always glad to receive comments and items of interest to the DX Fraternity for the DX column.

Amateur Radio Goodwill

For the past 11 years the "Colegas Y Amigos" Radio Club of Southern California have been meeting with the Radio Club de Ensenada, B. C., Mexico to promote good will among the border neighbors. This years meeting in was held under the sunny skies and beside the sparkling "Bay Of All Saints" in Ensenada, Baja California. Approximately 30 amateurs from Southern California traveled down the coast where a Saturday morning greeting was given by the Representative of the Ensenada Mayor. Following the greeting, a motorcade proceeded to the "Ensenada Childrens School for Deaf and Mutes" where donations of clothing and food were given for the students. Following the presentation and a tour of the

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

The Southern California group presented many useful supplies to the "Semilla Chiquita" School.

THE WPX PROGRAM

MIXED

408—JA2HGA
409—W5SBX
410—ZL2AH
411—W2FBF
412—W7HKI
413—IØJX
414—SK4DM
415—F9RM

C.W.

1283—OH2DN
1284—OZ8WH
1285—UK3DAA
1286—UK5VAA

SSB

771—JA2HGA
772—JR1TSH
773—LU1BAR/W3
774—HS4AGZ
775—UK5VAA
776—UK9AAN
777—LU8FP

VPX

61—UB5-0795
62—DE-F1Ø/17Ø52

WPNX

64—WN2KUM

Mixed: F9RM—1100, W4CRW—950, I6SF—850, YU1AG, IØJX—800, G5GH—700, W2FLD, W4HHN—650, WA6TAX, WA-9VGY—600, K3SXQ—500, W5SBX, W2-FBF—450
C.W.: DL7MQ—600, G5GH—550, WA3-CSF—450, UK5VAA—400, 350—W5-SBX, UK3DAA, OZ8WH
SSB: K2POA, DL9OH—900, W3YHR—650, WB4SIJ, K2JFE—500, UK9AAN—450, W2SZ, WA2DHF—400, UK5VAA—350
VPX: DE-F1Ø/17052—400, UB5-0795
80 Meters: G2GM, F9RM
40 Meters: F9RM
20 Meters: WB2FMK, F9RM
15 Meters: WA2DHF, F9RM
10 Meters: WA2EAH, F9RM
Africa: SM5-2735, F9RM
Asia: F9RM
Europe: WA4EPM, G5GH, G3OCA, UA9-MP, W5SBX, F9RM
North America: F9RM
Oceania: WA5ZWC, F9RM
South America: WA2EAH, F9RM

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

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

W4LRN	1275	W8ROC	929	YU2DX	855	WA6KDI	790	JA1AG	730
F9RM	1053	ON4QX	916	W4IC	850	W0AUB	785	WA6EPQ	713
VE3GCO	1030	W6TCQ	904	W4BYU	824	K6DSR	789	PA0VB	706
W8LY	986	YU1AG	896	WB4KZG	820	SM7TV	752	W6NJU	706
W2NUT	982	K1SHN	893	W9WHM	811	K2ZRO	751	WA2EAH	700
W3PVZ	970	DL1MD	892	G3DO	810	K8UDJ	750	W9ZTD	700
WA6MWG	962	W4BQY	889	I0JX	803	CT1LN	749	WA0CPX	693
DJ7CX	960	W4WSF	877	K2AAC	783	WA5LOB	749	W8GMK	683
W4CRW	948	I6SF	862	W6ISQ	803	PY4AP	735	WA6JVD	655
PA0SNG	943	W9FD	860	W3GJY	797	K0BLT	733		

CW

W8LY	975	VK3AHQ	809	DJ7CX	730	I6SF	676	K2ZRO	635
W8KPL	955	W9FD	802	K1SHN	715	WA6MWG	674	K1LWI	629
DL1QT	861	WB2FMK	770	YU1AG	709	W6ISQ	666	W8GMK	628
W2HO	825	G2GM	749	K2AAC	686	SM5BNX	652	W3ARK	620
ON4QX	823	K7ABV	745	OK2DB	693	W4IC	652	VE4OX	600
W2AIW	813	W4BYU	744	VO1AW	681	WA6JVD	647	OK2QX	600

SSB

W4NJF	1100	K2POA	883	DL1MD	805	WA5LOB	747	ZL3NS	685
F9RM	1000	HP1JC	851	F2MO	780	K1SHN	737	YU1AG	684
CT1PK	930	I8KDB	839	IT9JT	762	W6RKP	725	I8YRK	662
W9DWQ	917	I0ZV	827	W3DJZ	761	G3DO	719	WB6DXU	656
DL9OH	911	PA0SNG	824	I4ZSQ	753	W6TCQ	709	CR7IK	613
I0AMU	909	W0YDB	819	W4IC	750	OK1MP	702	I4LCK	608

facility, the Radio Club of Ensenada hosted a a cocktail fiesta complete with delicious hors d'oeuvre.

The Radio Club de Ensenada, founded in 1963, has approximately ten members and meets weekly. The Club Call is XE2EBC and the station includes a c.w. rig plus a Swan Transceiver feeding a tri-band yagi or dipole. In May of 1973 the Club members activated the special prefix XF1EBC operating from "All Saints Island" which is located at the entrance to the fine Ensenada harbor. Following the visit to XE2EBC, a luncheon was held at the meeting center and introductions of all amateurs were made. Special honors were accorded to Duke, W6OZD and his XYL for their fine work in organizing the meeting and to Oscar, XE2DDP for his efforts on behalf of the Ensenada Radio Club. DXers W6EIF and WA6GLD were pleased to meet Jose, XE2MX who is a school teacher in Ensenada and an avid DXer. His fine station (shown in photo) feeds a home built 2 element triband quad and a dipole on 40 meters. Jose has worked nearly 150 countries as well as holding several nice DX awards. Of course, application forms for the *CQ* DX awards and WPX were left with XE2MX!

The meeting concluded with a breakfast session on Sunday morning and then the visitors began the scenic trip home.

Reciprocal License Notes

We have been requested to advise US amateurs who may be assigned by the U.S. Forces to Okinawa that operating permission is no longer governed by the U.S. as Okinawa and the Ryukyu Islands have reverted to Japan, Operation privileges may be secured for amateurs

At the Radio Club de Ensenada Clubhouse (l-r) W6EIF, XE2CMM, WA6GLD and XE2EBC members enjoyed the sunshine and fine refreshments.

Seated at the banquet table are (r-l) Duke, W6OZD, Rodolfo, President of the XE2EBC Club and XYL Emma, and Blanca, XE2ID, the only YL member of Radio Club de Ensenada. *(photo by W6EIF)*

This special QSL was for the Radio Club de Ensenada's excursion to "All Saints Island" in May of 1973.

residing in on-base quarters. Applications for Japan and Okinawa should be addressed to SAF/DCO-AMRS, APO San Francisco, Ca. 96525. Bob, W6UUX writes that Foreign Nationals in Japan may operate a club station if properly authorized. Bob hopes formal reciprocal licensing will be authorized in the future.

Pat, FO8BW, writes that reciprocal tickets are issued for French Polynisia; however, applications must be processed 90 days prior to planned operation. Permission and FOØ calls are issued from Papeete and FO8DR can provide information and application forms.

Special Prefix Activity

The PJ1 activity in December was to celebrate the 25th anniversary of VERONA (PJ ARRL!). Special QSL's will be sent to all stations worked and the Curacao Certificate will be issued free of charge (normally $1) for stations working three PJ1's in December 1973. A WPX Bargain! Applications to: VERONA, P.O. Box 383, Curacao, Neth. Antilles.

French amateurs were authorized usage of the HW Prefix between 15 November and 15

The WAZ Program

S.S.B. WAZ

1149.....W2OVC 1150.....K2JMY

C.W.—Phone WAZ

3619.....OK3BH 3622.....WA8TDY
3620.....K1AGB 3623.....OK2QX
3621.....W4WWG 3624.....G3OCA

Phone WAZ

488.....W9VCQ 490.....W4RKN
489.....W6ZYC

Complete rules for the Single Band WAZ program are shown on pgs. 57-58 of the December, 1972 issue. Complete rules for regular WAZ may be found on pages 64-66 of the June, 1970 issue. Application blanks and reprints of both sets of rules may be obtained by sending a self-addressed, stamped envelope to Assistant DX Editor, P.O. Box 205, Winter Haven, FL 33880

Jose, XE2MX, and Mike, WA6ISP, compared their English and Spanish as they are both learning a second language.

December to commemorate the 50th Anniversary of the First Amateur Trans-Atlantic QSO between France and the USA on November 28, 1923.

The *CQ* WW Contests produced their normal share of rare prefixes with A4XFJ, CV1BP, CV3TZ, CV4C, DF8SAR, EL7F, FGØZZ/FSØ, IH9AA (Zone 33!), JH7BBK, KA6JT, XG1J, XI1IX, 4C9AA and 9Z4LO all being active. Good DXpedition activity by KG6SW, VP1-SYL, WB4NXR/VP7, PJ9GIW, FGØAFA/FSØ, VP2M, VP2MDX, PJ8DX/PJ7, XV5AC, plus the prefixes above adding to multiplyers and *CQ* DX Award totals.

160 Meter News

Our 160 meter reporter W1BB reports many first's in Top Band operation such as longest distance for a 1.8 mHz QSO—JA7AO and VP8KF (18,000 km), 1st W7 to Europe (W7-DZO to G3YVU), and activity from Nauru

[*Continued on page 72*]

The CQ DX Award Program

CW DX

128—WA6INK	131—W7GYP
129—DL2WI	132—OK2BKL
130—DK4MF	133—9V1OK

SSB DX

303—WA6INK	307—UW6NQ
304—WB4OXD	308—UV3DU
305—K9UQN	309—UK9AAN
306—WA9LQT	310—WA8TDY

Endorsements

SSB: IØZV, SM6CKS—310, W6FET—275, W8SET, WA6INK—200

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

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Feb.	2-3	ARRL DX Phone Contest
Feb.	9-10	QCWA QSO Party
Feb.	9-10	Worldwide SSTV Contest
Feb.	9-10	Ten Ten Net QSO Party
Feb.	16-17	ARRL DX C.W. Contest
Feb.	16-24	IARC Propagation CW/RTTY
Feb.	23-24	French Phone Contest
Feb.	23-24	YL-OM Phone Contest
Feb.	23-25	Vermont QSO Party
Mar.	2-3	ARRL DX Phone Contest
Mar.	9-10	RSGB BERU C.W. Contest
Mar.	9-10	YL-OM C.W. Contest
Mar.	9-10	Worldwide VHF Activity
Mar.	9 11	Virginia QSO Party
Mar.	16-17	ARRL DX C.W. Contest
Mar.	23-25	BARTG RTTY Contest
Mar.	23-31	IARC Propagation Phone
Mar.	**30-31**	**CQ WW WPX SSB Contest**
Apr.	12-15	County Hunters SSB Contest
Apr.	20-22	Zero District QSO Party
May	11	World Telecomm. C.W. Contest
May	18	World Telecomm. Phone Contest
June	2	Minnesota QSO Party

ARRL DX Contests

Phone: February 2-3 and March 2-3
C.W.: February 16-17 and March 16-17
Starts: 0001 GMT Saturday
Ends: 2359 GMT Sunday

You shouldn't have any problems with this one. Just give your DX contact a signal report and your state or province. They in turn will give you a signal report and three figures indicating their power input.

Last month's *QST* gave you all the details. Your logs go to: ARRL Communications Dept., 225 Main Street, Newington, Conn. 06111

QCWA QSO Party

Starts: 0000 GMT Saturday, February 9
Ends: 2400 GMT Sunday, February 10

Rules have been streamlined and were covered in last month's CALENDAR. This year your logs go to: Ken Hedrick, W9KO, 122 East Slade St., Palatine, Ill. 60067

*14 Sherwood Road, Stamford, Conn. 06905.

Worldwide SSTV Contest

1500-2200 GMT Saturday, February 9
0700-1400 GMT Sunday, February 10

Last month's CALENDAR gave you the details. Logs go to: Prof. Franco Fanti, Via A. Dallolio n. 19, 40139 Bologna, Italy and must be received no later than March 20th.

Ten Ten Net QSO Party

Starts: 0000 GMT Saturday, February 9
Ends: 2400 GMT Sunday, February 10

Action in this one will be on 10 meters and on s.s.b., and for the members of the Ten-Ten International Net. See last month's CALENDAR. Logs go to: Grace Dunlap, K5MRU, Box 445, La Feria, Texas 78559 and must be received by March 15th.

IARC Propagation Contest

CW/RTTY: February 16 to 24
Phone: March 23 to March 31
Starts: 0001 GMT Ends: 2400 GMT

"The Contest with a purpose" has the same rules as last year. The dates have purposely been 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.

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

The same station may be worked as many times as desired, but contacts must last more than 6 minutes or a fraction thereof. Each may be credited as a separate QSO, and must be logged separately.

Use separate log sheets for each band and mode, and note time in GMT only. Official log sheets, CPR zone map and IARC country list are available from K4ZA. It is recommended that you use official forms although it is not required. 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. 23-24 C.W.: Mar. 9-10
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 ARRL section or country. (See *QST* for ARRL section list)

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 final score by the above factor.

Phone and c.w. are separate contests and require separate logs.

Awards: Certificates to the highest scoring YL and OM in each State and VE call district 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.

Logs must be mailed by April 1st and received no later than April 30th. They go to: Christine Haycock, WB2YBA, 361 Roseville Ave., Newark, N.J. 07107

French Contest

Starts: 1400 GMT Saturday, February 23
Ends: 2200 GMT Sunday, February 24

This is the phone section, the c.w. portion took place last month. Rules in details in last month's CALENDAR.

Logs go to: REF Att: Lucien Aubry, F8TM, rue Marceau 53, 91120 Palaiseau, France.

Vermont QSO Party

Starts: 2100 GMT Saturday, February 23
Ends: 0100 GMT Monday, February 25

Sponsored by the Central Vermont ARC this party offers an opportunity to work some of the rare counties in this comparatively rare state. The club plans to activate all areas.

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

Scoring: For VT. 1 point per QSO multiplied by ARRL sections and countries worked. All others get 3 points for each VT. station worked multiplied by the number of VT. counties worked *on each band*.

The same station may be worked on different bands and modes for QSO credit. Mobiles in each new county.

Senator Barry Goldwater, K7UGA/K3, receiving the "Sarnoff Citation" from Fred Link, the President of the Radio Club of America, at the QCWA and Radio Club of America meeting, at the Hotel Plaza, in New York.

Frequencies: 3685, 3909, 3932, 7060, 7265, 7290, 14060, 14295, 14325, 21060, 21375, 28100, 28600, 50260, 50360, 144/144.5, 145.8

Awards: Certificates to highest scorers in each ARRL section and foreign country. Trophies to the Top scorer in Vermont and out-of-state station. Special certificates to the 2nd, 3rd and 4th places in Vermont. The "Worked Vermont" Award will be issued to those working 13 out of the 14 Vermont counties. There is a special certificate for VT multi-operator stations.

Include a s.a.s.e. when you send your log to: Peter Kragh, K2UPD, (W1AYK) 170 Summit Ave. Ramsey, N.J. 07446. Mailing deadline is March 31st.

RSGB BERU Contest

Starts: 1200 GMT Saturday, March 9
Ends: 1200 GMT Sunday, March 10

Eligibility for this one is limited to RSGB residents in the United Kingdom and amateurs licensed to operate within the British Commonwealth or British Mandated Territories.

It is requested that operation be confined to the lower 30 kHz of each band, 3.5 thru 28 mHz on c.w. only. (That little Tea Party back in 1776 makes us ineligible, even if you do hold an extra class license).

Exchange: Just a signal report, no serial number was mentioned.

Scoring: Each completed contact counts 5 points. In addition a bonus of 20 points may be claimed for the first, second and third contacts with each Commonwealth call area. (All British Isles counts as one call area.)

Entries may be single or multi-band, with separate log for each band. The separate band totals to be added and shown on the summary sheet. Multi-band entries are not eligible for

Claimed Scores

1973 CQ WW DX C.W. Contest

The following are a few unofficial claimed scores for the CQ W.W. DX C.W. Contest received at press-time. This listing is not intended to show winning scores, but rather to show typical entries from different areas, so don't be alarmed if you're not listed!

Single Operator
All Band

KH6RS	2,712,388
4C5AA	2,422,251
9Z4AA	2,397,990
LU5HFI	2,017,925
KH6IJ	1,156,240
W1BPW	1,053,008
K6AHV	1.045,156
9L1JT	971,945
K4GSU	962,964
CS6AI	926,640
XU1AA	44,505

28 mHz

CX9BT	238,098
OD5LX	11,692
DL7AA	9,514
K1LWI	7,632
W4WSF	4,796

21 mHz

W4KFC	136,731
K6DSR	106,680
9H1GH	101,640
K4IQR	86,880
AX3KX	84,168

14 mHz

W4AAV	206,010
W9MYD	183,000
WA8MSR	114,017
VE8OO	107,184
K2TQC	103,840
K1HVV	103,059
ZL1ARV	83,776

7 mHz

W5WZQ	134,733
W6ITY	93,316
JA1CWZ	78,056
I1SLB	72,900
W5EQT/0	18,525

3.5 mHz

YV5AW	74,144
OK3CFZ	27,542
K1DIR	22,984
K5PFL	20,237

1.8 mHz

KV4FZ	21,320
PA0HIP	4,100
OK1ATP	2,596

Multi-Operator
Single Transmitter

G3WYX	2,231,455
W3WJD	2,153,424
VS6AW	862,389

Multi-Operator
Multi-Transmitter

W2PV	2,389,504
G3FXB/P	2,350,788
K6EBB	1,139,007
W3GM	1,070,415

single band awards but you may request a single band to be used for competition.

There is also a *s.w.l.* category with scoring same as above. Both stations in a contact may be logged separately for credits.

Awards: Rose Bowl Trophies to the winner and runner-up and to the leading UK station. There is a Bowl for the leading s.w.l. too. Certificates to the leading UK and overseas single band entries on each band, and the UK and continental leaders on all bands.

Logs go to: A. V. Davies, G3MGL, 41 Gainsborough Road, Tilgate, Crawley, Sussex RH10 5LD, England. And must be received before May 13th.

Worldwide VHF Activity

Starts: 3:00 P.M. Saturday, March 9
Ends: 10:00 P.M. Sunday, March 10
(Your Local Time)

This is the 4th annual activity sponsored by the Itchycoo Park VHF ARS. Activity will take place on the 6, 2 and 1¼ meter bands.

Exchange: Call, county and state.

Scoring: Total contacts × counties worked × states worked.

Multi-band operation is encouraged but each band should be scored separately.

Mobile stations may be worked on each county change for QSO and multiplier credit.

Awards: Certificates will be awarded to each station meeting following criteria: 100 points on 50 mHz, 50 points on 144 mHz and 40 points on 220 mHz.

There is a Plaque for the Club or organization having the highest aggregate score, therefore stations should indicate their club affiliation on their logs.

Send your log with a s.a.s.e. to Itchycoo Park VHF ARS, WA3NUL, P.O. Box 1062, Hagerstown, Maryland 21740. Mailing deadline is April 15th.

Virginia QSO Party

Starts: 1800 GMT Saturday, March 9
Ends: 0200 GMT Monday, March 11

This year's party is again sponsored by the Sterling Park ARC. The same station may be worked on each band and mode, Virginians may work other in-state stations.

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

Scoring: One point per QSO. VA. stations multiply total QSO points by sum of states, provinces, countries and VA. counties worked. Out-of-state stations use VA. counties for their multiplier. (max. of 98)

Frequencies: C.W. —60 kHz in from low end of each band. Phone—3930, 7230, 14285, 21375, 28575. (Check phone bands on even hours)

Awards: Certificates to high scorers in each state, province, country and each Virginia county. Special certificate to the Top out-of-state scorer.

Indicate each new multiplier worked. A summary sheet and check list is also requested with your entry.

Logs must be received no later than April 15th and go to: Don Wiles, W4IML, 9801 Lomond Drive, Manassas, VA. 22110

Editor's Notes

Complete rules for this year's WPX SSB Contest appear on page 39. No changes from previous years. Rest periods, double QSO points for contacts on 40, 80 and 160, and counting the multiplier only *once*, (not once per band) are features that have been retained.

Stateside stations are passing up a good thing if they are not getting involved in this one. With the two special W4OPM Memorial Trophies available to USA stations only they do not have to compete on a worldwide basis.

Conditions for the c.w. weekend of the World Wide contest did not compare with the excellent openings we experienced during the phone contest. W3ASK had originally predicted good on Saturday and fair on Sunday, but when he updated the forecast on DIAL-A-PROP he warned of a possible disturbance midway on Sunday. Sure enough signals on 10 and 15 started to fade late Sunday morning and by noon time

[*Continued on page 72*]

NOVICE SHACK

BY HERBERT S. BRIER,* W9EGQ

THE fundamental reason for obtaining an amateur license is to communicate with other amateurs by radio. Two facts emerge when one examines how well different amateurs achieve this goal. One is the wide range of results obtained by different operators using similar equipment. The other is the impressive results obtained by some operators using mediocre equipment. Thus the truism, *A successful amateur station is 10 per cent equipment and 90 per cent operator*. Certainly the world's best operator cannot work another station if his signal is too weak to make the journey. Conversely, the strongest signal on the band will attract a lot of attention in spite of a few operator deficiencies. Between these extremes, however, there is a wide area in which operating skill is all important.

Calling CQ

Paraphrasing amateur operating manuals, such as *A Condensed Manual of Radiotelegraph Operating Procedure and Technique for the Amateur Service*, available from the Aeronautical Center Amateur Radio Club, Inc., Postal Station 18, Oklahoma City, Okla. 73169 for about 50 cents, postpaid: "If W9EGQ desires to communicate with any station within range, he may transmit 'CQ CQ CQ DE W9EGQ W9EGQ W9EGQ K,' repeating the sequence up to three times (a 3×3×3 call. A 5×2×3 sequence is also often recommended.) To answer the CQ, WN9ZZZ would transmit, 'W9EGQ W9EGQ DE WN9ZZZ WN9ZZZ AR,[1] to which W9EGQ would respond, 'WN9ZZZ DE W9EGQ . . .'and the two operators will make alternate transmissions until they have exchanged the desired information." You would not think that there was too much to mess up in such a simple procedure, but read on.

Many amateurs abuse the "CQ" in three ways: They make them too long, then send them poorly, and they use poor judgement when they send them. If you have an audible signal and call on a reasonably clear frequency, you will be quickly heard, if there is anyone around to hear you. But enticing that listener to call you is more of a challenge. Once you have a potential customer, the longer you call, the more likely he is to get tired of listening to you and tune away, or to start calling "CQ" himself. Consequently, a "CQ" lasting longer than two minutes is usually self defeating; two shorter calls with a reasonable listening space between them are likely to be more productive. Worse than calling overlong "CQ's," however, is to mangle your own call letters. Someone tuning across a long "CQ" shortly before the sender runs down has no way of knowing how long he has been braying. But the listener knows instantly whether he can copy what he hears. Because they are so familiar with their own call letters, many amateurs unconsciously speed up and run everything together when sending them, thereby completely destroying the effectiveness of their "CQ's."

"Horrible" Examples

The first "CQ" I heard on the 40-meter Novice band this morning was from a WN3. At least, the operator sent *3* oftener than *2*. I never did decipher the rest of the call letters in the dozen or so times I heard them. He was sending a strong 25 w.p.m., and whatever came after the numeral was a jumble of dots and dashes. A good rule is to call "CQ" at the approximate speed at which you would like to be answered. Assuming the WN3 had been sending readable code, the odds in favor of his getting an answer to such a fast call in a Novice band were not too good. A more-appropriate speed in the Novice bands is eight to 10 w.p.m. Ten w.p.m. is a little fast for some Novices; nevertheless, they can usually decipher call letters at that speed after hearing them a couple of times, if the sending is good.

My next "horrible" example was a WB8, who opened up with a "CQ" on a frequency already occupied by a number of other signals, one of which was a "CQ." When he stood by, another station on the same frequency immediately started calling him. But by the time he had sent the WB8 call letters the first time,

Lou, WN9JVR, has his equipment arranged for convenient operation. You can read more about him in the text.

*385 Johnson St., Gary, Indiana 46402

Dale Newlin, Mike Domazet, Rick Johnson, and Mike Collins, sixth-grade members of the Salk Elementary School Amateur Radio Club, 3001 W. 77th Ave., Merrillville, Ind. 46410, spend a lot of time in the assistant principal's office without being in trouble. The assistant principal is Richard Hardt, WA9SBR, club trustee and instructor. The club station, WB9DDW, is located in his office. The boys already know the code and should soon be joining the 38 licensed amateurs, including three YL's, that the club has already turned out in its six-year existence. *(Photo taken and processed by the Salk Photography Club.)*

the WB8 was back in business again. Getting no reply to the second "CQ" he called again, and again, and again, with all of five seconds between calls before he disappeared. An interesting feature of his performance was that during it, a WN4, a WNØ, a WN9 (twice) and a WN2 called "CQ" on the same frequency. Possibly, not all of these operators could have heard each other, but there is little doubt that some of them could have heard each other, if they had used the more-important halves of their stations—their receivers— more intelligently.

Novice certificate chasers may like to get started with the "Ten American Districts Award." Mail one QSL card (or other proof of contact) from each of the 10 U.S. call areas to the LERC Amateur Radio Club, 2814 Empire Ave., Burbank, Calif. 91504, to obtain it. Each card must contain a signal report and bear a postmark or a QSL bureau stamp or be accompanied by the envelope in which it was mailed. Also include $1.00 to cover "handling" charges.

Normally, a low-power station with a so-so antenna does better calling specific stations than he does calling "CQ," but it is no smarter never to call "CQ" than to call them constantly. You never know what that next call will bring. Bill, WA9MOE, told me last week that, after calling OD5LX, Lebanon, unsuccessfully for months, a weak signal broke into a ragchew he was having with another station. It was OL5LX calling WA9MOE!

Items From Here And There

John V. Smith, 1924 Dolphin Blvd., St. Petersburg, Fla. 33707, responding to our invitation to anyone with ideas or information of interest to Novices to write to the NOVICE SHACK, brings up a matter that has concerned many of us. Normally, the Technician class license is used by mail, as the Novice license is. However, a Novice or other applicant who appears at an FCC examination point for the General class examination and fails the 13-w.p.m. code test but does copy 25 consecutive letters without error is permitted to change his application for a General class license to an application for a Technician class license. He then takes the General class written examination. Upon passing it, the applicant is issued a "non-conditional" Technician class license that can be converted into a General class license by his returning at a later date and passing the 13-w.p.m. code test. The option certainly has its advantages; but, as W4ACG points out, it is not an unmitigated blessing for Novices with some time to go on their tickets with no equipment or desire to operate above 50 mHz, the playground of the Technicians. Current FCC regulations prohibit simultaneous holding both a Novice and a Technician license; so accepting the option brings one's Novice license to an abrupt end. On the other hand, knowing that you have passed the written General test allows you to concentrate on the code before your next trip to mecca. Let's hear your thoughts on the subject.

Amateur licenses in India. In the text accompanying the picture of C. A. Ninan, VU2-CAN (Post Box 15, Poona 1, India) and his wife in the November column, Bill, W6DDB, unintentionally downgraded the VU "General class" license. Dr. Ninan reports that the Grade II Indian license is equivalent to our Novice license, but the Grade I license requires passing a 12-w.p.m. code test and a test on electronics and regulations. Our apologies to the VU's and thanks to Dr. Ninan for correcting us.

Louis Rempe, WN9JVR, 720 North Monroe St., Clinton, Ill. 61727, has enough equipment

[*Continued on page 70*]

Propagation

BY GEORGE JACOBS,* W3ASK

WITH daylight savings time now in use throughout the year, beginning with this month the *CQ* DX Propagation Charts will be given in local daylight time. The Time zones used will now be EDT, CDT, MDT and PDT. Note that the Charts *are not* given in GMT, and *no correction* is required to obtain local time.

The Swiss Federal Solar Observatory, the world's official keeper of sunspot records, reports a monthly mean sunspot number of 22 for November, 1973. This results in a running smoothed sunspot number of 40, centered on May, 1973. A smoothed sunspot number of 26 is forecast for February, 1974, as the present cycle continues to decline slowly towards a minimum.

LAST MINUTE FORECAST

Day-To-Day Conditions Expected For February, 1974

	Rating & Forecast Quality			
Propagation Index . . . . . (4)		(3)	(2)	(1)
Date *February*				
Above Normal: 5-6, 8, 10, 19-20	A	A	B	C
Normal: 1-4, 7, 9, 11, 17-18, 21-22, 25-28	B	C	D	E
Below Normal: 12-13, 16, 23-24	C	D	E	E
Disturbed: 14-15	D	D	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals.

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

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

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

E—No opening expected.

HOW TO USE THIS FORECAST

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

2. With the *propagation index*, use the above table to find the expected signal quality associated with the particular opening for any day of the month. For example, all openings shown in the Charts with *a propagation index* of (4) will be good on Feb. 1-4, excellent on Feb. 5-6, etc.

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

DX Openings

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. The band may occasionally open to Europe and the east from the eastern half of the country between 10 A.M. and 1 P.M. Better conditions should exist towards South America, with fairly regular openings possible between 2 and 4 P.M., and occasionally as early as 10 A.M. The western half of the country is favored for openings toward Oceania and Asia, with some possible between 3 and 7 P.M. When conditions are better than normal some of these openings may extend to the east coast between 3 and 6 P.M.

Fifteen meters looks good for world-wide DX propagation conditions during most of the daylight hours. The band should open first towards Europe, Africa and the east between 10 A.M. and 2 P.M. Openings towards South America should be possible throughout the day, with conditions peaking between 1 and 5 P.M. Openings towards Oceania, the Far East and Asia look best from the western half of the country between 5 and 8 P.M., with some openings extending eastward between 5 and 8 P.M. local DST. The path to Antarctica should peak between 5 and 7 P.M.

On 20 meters, look for a window of fairly good openings in almost all directions for an hour or two after sunrise. The band should peak again towards Europe and the east between Noon and 4 P.M. in the eastern half of the country and between Noon and 2 P.M. in the west. Towards Africa, propagation should be best between 3 and 6 P.M. Best bet for *long path* openings from the western states to Europe and Africa is an hour or two after sunrise. Openings towards the south should peak again during the late afternoon, with the band remaining open as late as 9 P.M. Check until Midnight for openings to deep South America and Antarctica. Evening openings to Oceania, the Far East and Asia should peak between 7 and 9 P.M. in the eastern states and 7 to 11 P.M. in the west.

Fairly good 40 meter openings are forecast to many areas of the world during February. Check between 8 P.M. and 2 A.M. for openings to Europe; between 8 P.M. and Midnight towards Africa; and between 9 P.M. and 4 A.M. for openings towards South America. From the West Coast the band should open to Oceania, the Far East and Asia between 4 and 7 A.M., with openings to Oceania often extending towards the east coast between 5 and 8 A.M. local DST.

Eighty meter openings are forecast to some areas of the world during the hours of darkness. Best bet for Europe is between 9 and 11 P.M. in the western half of the country and from 9 P.M. to 1 A.M. in the east. Conditions are not too good to Africa and the Middle East, but check between 9 P.M. and Midnight for an occasional opening. Best bet for Latin American

*11307 Clara Street, Silver Springs, Md. 20902

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 aeras 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 *daylight saving* time is used, *not* GMT. To convert to GMT, *add* to the times shown in the appropriate Chart 7 hours in the PDT Zone, 6 in the MDT Zone, 5 in the CDT Zone and 4 in EST Zone. For example, 14 in Washington, D.C. is 18 GMT and 20 in Los Angeles is 03 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.

openings is between 9 P.M. and 5 A.M. From western states there is a chance for some good openings to Oceania between 4 and 7 A.M., with possibilities in the eastern states between 4 and 8 A.M., local DST. Conditions to the Far East are expected to be poorer, but with an occasional opening possible from western states between 4 and 7 A.M.

Openings on 160 meters will occur less frequently, but within the same time periods as the openings forecast for 80 meters. A seasonal increase in static levels may be noticeable on 80 and 160 meters during February. On February 9 there is a special TransPacific Test period scheduled for 160 meters between 1330 and 1600 GMT; with a similar Test scheduled for TransAtlantic stations on February 10 between 0500 and 0700 GMT. See page 66 of December 1973 *CQ* for additional information about these 160 meter Test periods.

Short Skip Conditions

On *160 meters,* no significant skip expected during daylight. Up to at least 1300 miles should be possible at night, extending up to a one-hop limit of 2300 miles when conditions are good. On *80 meters,* up to 250 miles during daylight, and between 500 and 2300 miles at night. On *40 meters,* daytime skip should be possible between 250 and 750 miles, extending to between 750 and 2300 miles during the evening to about 10 P.M., and between 1500 and 2300 miles until sunrise. On *20 meters,* daytime skip should range between 750 and 2300 miles to about 4 P.M. Between 4 and 8 P.M. the skip is expected to lengthen to between 1500 and 2300 miles, with the band out by 9 P.M. on most days. On *15 meters,* skip should range between 1300 and 2300 miles during most of the day to about 6 P.M., with the band dead for short-skip after that time. An occasional F-layer short-skip opening may be possible on *10 meters* during the afternoon hours, for distances between approximately 1500 and 2300 miles. Some sporadic-E openings may also be possible on this band, between distances of several hundred to about 1300 miles.

V.h.f. Ionospheric Openings

Best chances for ionospheric openings on the v.h.f. bands may result from auroral activity expected during periods when h.f. conditions are below normal or disturbed. Such openings on 2 and 6 meters, usually characterized by flutter fading and distortion, result from the intense regions of ionization that accompany auroral displays. Auroral-type openings usually range in distance from a few hundred up to approximately 1300 miles. Check the "Last Minute Forecast" at the beginning of this column for those days during February that are expected to be disturbed or below normal.

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, 1974. 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.

MAIL-A-PROP: 95% + Accuracy

During its first six months, the Mail-A-Prop "almost instant" subscriber propagation service has achieved an accuracy in *excess of* 95%, and has hit every major DX Contest held during this period right on the nose.

Written in simple language, this two-page weekly newsletter covers day-by-day the latest propagation data expected for an entire week in advance (Tuesday-to-Tuesday). It contains a description of propagation conditions expected each day in terms of *above normal, normal, below normal* or *disturbed*. Band openings are described as *excellent, good, fair* or *poor*. Best

times for openings each day are given for each h.f. amateur band 10 through 160 meters, to each of the world's Continents.

In addition, Mail-A-Prop contains the latest assessment of solar activity, special DX tips for *CQ* and ARRL DX Contests, a forecast of ionospheric openings on the v.h.f. bands, and general news concerning h.f. propagation.

Mail-A-Prop is sent (by Airmail if necessary) so that it will arrive in Monday's mail, or sooner, in time for *full* use. It is in a convenient written form, and is available for ready reference at any time. It's about the closest thing to a "do-it-yourself" propagation forecaster, and it has received considerable acclaim from its many users.

An annual subscription to Mail-A-Prop, anywhere within North America (including the 50 states, Canada, Mexico and the Caribbean area), is $20 for 52 issues. A semi-annual rate is available for 26 issues at $12.50 and a one-month trial subscription of four issues is available for $2.50. *All rates include postage.*

Subscriptions for Mail-A-Prop should be sent to Mail-A-Prop, P.O. Box 86, Northport, N.Y. 11768. Take the guesswork out of h.f. propagation, use Mail-A-Prop!

73, George, W3ASK

February 15—April 15, 1974

Time Zone: EDT (24-Hour Time)

EASTERN USA TO:

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

Time Zones: CDT & MDT (24-Hour Time)

CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	09-10 (1) 10-14 (2) 14-15 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-17 (2) 17-18 (1)	18-20 (1) 20-23 (2) 23-01 (1) 01-03 (2) 03-04 (1) 20-22 (1)* 22-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	*Nil*	08-12 (1)	08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-16 (1)	20-23 (1) 23-01 (2) 01-03 (1) 23-02 (1)*
Eastern Mediterranean & Middle East	*Nil*	09-12 (1)	08-13 (1) 13-15 (2) 15-18 (1) 23-01 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
West & Central Africa	10-13 (1)	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-21 (1)	19-21 (1) 21-23 (2) 23-02 (1) 22-01 (1)*

*Predicted times of 80 meter openings. Openings on 160 meters are also possible during those times when 80 meter openings are shown with a forecast rating of (2), or better.

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

Time Zone: PDT (24-Hour Time)

WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	09-13 (1)	07-08 (1) 08-11 (2) 11-13 (1) 13-16 (1) 23-01 (1)	20-23 (1) 23-01 (2) 01-02 (1) 21-23 (1)*
Central & Northern Europe & European USSR	*Nil*	08-11 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-13 (2) 13-15 (1) 23-01 (1)	20-22 (1) 22-23 (2) 23-00 (1) 21-23 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	09-12 (1)	08-12 (1) 12-14 (2) 14-16 (1) 23-01 (1)	19-22 (1)
West & Central Africa	10-13 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (2) 15-17 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	19-23 (1) 21-22 (1)*
East Africa	*Nil*	09-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1)	19-21 (1)
South Africa	10-13 (1)	09-11 (1) 11-14 (2) 14-16 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-18 (2) 18-19 (1) 00-02 (1)	19-22 (1) 21-22 (1)*
Central & South Asia	*Nil*	08-10 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 20-22 (1)
Southeast Asia	18-20 (1)	09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	08-09 (1) 09-12 (2) 12-24 (1) 21-22 (1) 22-00 (2) 00-02 (1)	03-05 (1) 05-07 (2) 07-09 (1) 06-08 (1)*
Far East	*Nil*	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	08-09 (1) 09-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 16-18 (2) 18-21 (3) 21-23 (2) 23-01 (1)	01-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-06 (2)* 06-08 (1)*
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-18 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	07-09 (1) 09-12 (2) 12-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-01 (3) 01-03 (2) 03-05 (1)	20-22 (1) 22-23 (2) 23-06 (3) 06-08 (2) 08-09 (1) 23-02 (1)* 02-06 (2)* 06-08 (1)*
Austral-asia	15-18 (1)	10-13 (1) 15-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-12 (2) 12-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-04 (1)	01-03 (1) 03-04 (2) 04-06 (3) 06-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
Northern & Central South America	10-13 (1) 13-15 (2) 15-16 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	07-08 (1) 08-10 (3) 10-16 (2) 16-17 (3) 17-20 (4) 20-21 (3) 21-23 (2) 23-03 (1)	19-21 (1) 21-01 (3) 01-04 (2) 04-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Brazil, Argentina, Chile & Uruguay	11-13 (1) 13-15 (2) 15-17 (1)	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	10-15 (1) 15-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-23 (2) 23-01 (1) 06-08 (1) 08-10 (2)	19-21 (1) 21-02 (2) 02-04 (1) 23-03 (1)*
McMurdo Sound, Antarctica	*Nil*	13-16 (1) 16-19 (2) 19-21 (1)	17-20 (1) 20-23 (2) 23-03 (1) 06-07 (1) 07-09 (2) 09-11 (1)	23-03 (1) 03-05 (2) 05-07 (1)

CQ Country Chart

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

THE awards PROGRAM

Special Honor Roll
All Counties

#109—Ben F. Relf, W5HDK, 10-13-73.
#110—Stephen H. Morris, W1AQE, 10-13-73.
#111—Walter E. Morris, K4ELK, 10-16-73.
#112—Richard L. Brocaw, K5VYT, 11-6-73.

USA-CA HONOR ROLL

3000		1500		500	
W5HDK	133	W5HDK	236	K6JVE/3	974
K5VYT	134	K5VYT	237	W5HDK	975
2500		K9DDA	238	OK2QX	976
W5HDK	165	**1000**		I3BLF	977
K5VYT	166	K6JVE/3	315	DL6UR	978
WA5YSC	167	W5HDK	316	WB0FRM	979
2000		K5VYT	317	K5VYT	980
W5HDK	195	K9DDA	318	K9DDA	981
K5VYT	196			K9DAF	982

THE February "Story of The Month" as told by Jim is:

J. H. CARNETT, TG9UZ
(ALL COUNTIES #59, 6-7-71)

"I was originally licensed in 1933 as W9UZC when my college Physics Professor offered me a job, provided I obtained a license. Although I did very little operating during the next four years, I was quite active with the group from Southern Illinois University in handling emergency traffic during the 1937 Southern Illinois flood.

"After graduating from the University of Illinois as a chemistry major in 1938, I taught high school chemistry, physics and mathematics in Southern Illinois for the next three years. I changed jobs in 1941 and started working in the research laboratory of a petroleum company in New York State, where I became W2OIU.

"In 1949, I moved back to Illinois and was fortunate to get back my original call. In the 1960s, I became very active in working DX and also started county hunting although County Hunting did not exist as an organized activity at that time.

"In 1967, I was transferred to Guatemala and became licensed there as TG9UZ. This was quite an experience as there seemed to be no end to the people who needed a confirmation from TG land. It was also an excellent location to work the States. With my beam pointed North, I could hear any mobile that was operating from any location in the States. Thus, it was probably easier for me to work all counties from that location than from almost any other location in the world.

"I owe tremendous thanks to all the mobilers who went out of their way to give me additional counties. There were so many of these that I don't dare mention calls for fear of slighting someone.

"The XYL is also licensed as WB9IMH (ex TG9KE). A son, W5TDZ, also a County Hunter, lives in Albuquerque, New Mexico.

"After thirty-two years with the same petroleum company, I am now retired as of November 1, 1972, and expect to be quite active from now on".

(As most of you know, only two stations outside the USA have received *All Counties*

Jim Carnett at TG9UZ in 1971.

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

Worked Yellow Thunder Certificate.

Plaques. Roy Needham, ZL1KG was issued #52, 3-3-71 and Jim, TG9UZ got #59, 6-7-71).

Awards Issued

That lucky number three was surpassed this month when *four* hit the All Counties mark!

Ben Relf, W5HDK, who has given out many mobile countiees, waited until he had them ALL *and* found time for the necessary paper work before sending for All Counties and USA-CA-3000 endorsed All SSB; and USA-CA-500, 1000, 1500, 2000, and 2500 endorsed All SSB, All Mobiles.

Steve Morris, W1AQE also qualified for All Counties.

Walt Morris, K4ELK, with fine help from cooperative mobiles acquired All Counties.

Dick Brocaw, K5VYT waited until he had them all and acquired All Counties and USA-CA-3000 endorsed All 20, All SSB. Also USA-CA-500 through USA-CA-2500 endorsed All 20, All SSB, All Mobiles.

Dr. Bill George, WA5YSC is still sticking in there and won USA-CA-2500 endorsed All SSB.

Jim Rounds, K9DDA was issued USA-CA-500, 1000, and 1500 endorsed All A-1.

Les Hamilton, K6JVE/3 qualified for USA-CA-1000 endorsed All SSB, All Mobiles and USA-CA-500 endorsed All 14 SSB Mobiles.

Les Jeffery, W8WT added 3.9 endorsement to his USA-CA-500 & 1000.

Mixed USA-CA-500 Awards went to:
Ing. Jiri Pecek, OK2QX.
Venanzio Mior I3BLF, and
Bob Thorne, K9DAF.

Wilheim Hutt, DL6UR qualified for USA-CA-500 endorsed All A-1.

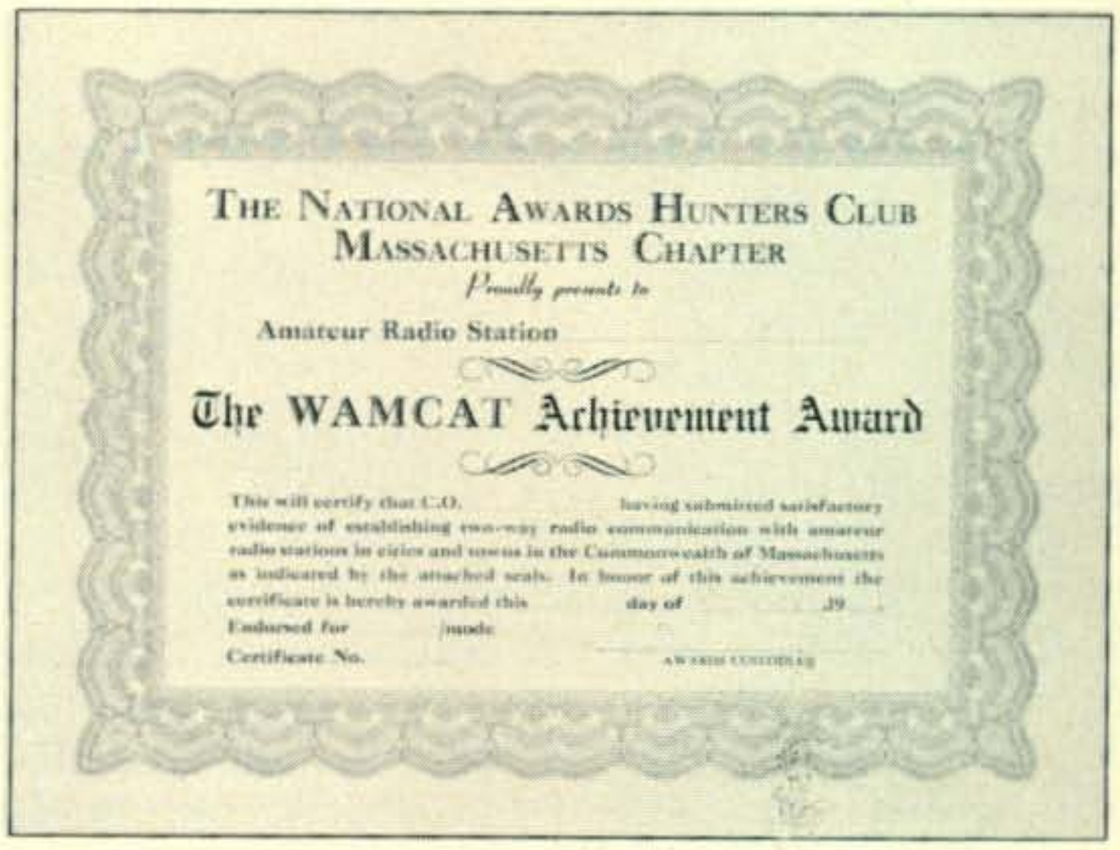
Will Weisert, WBØFRM won USA-CA-500 endorsed All SSB, All Mobiles.

Awards

Worked Yellow Thunder Certificate: This certificate is being made available by the Yellow Thunder Amateur Radio Club, Inc. of central Wisconsin to amateurs throughout the world. To earn this certificate you must work the required number of Yellow Thunder ARC members: Wisconsin stations work 15 or more YTARC members.
Non-Wisconsin stations work 10 or more YT-ARC members.
Non-USA stations work 5 or more YTARC members.

All contacts must be made January 1, 1972 or later. Send a list of the YTARC members worked along with the dates, times, band and mode used. While we encourage exchanging QSL cards, QSL cards are not required for the award. Send list along with $1.00 (USA stations) or 5 IRCs (Non-USA stations) to Yellow Thunder Amateur Radio Club, Inc. C/O Kenneth A. Ebneter, K9GSC, 822 Wauona Trail, Portage, Wisconsin 53901. When your list has been verified with the YTARC members worked, you will receive a numbered certificate along with a copy of Yellow Thunder Smoke Signals, announcing your winning the prized certificate. Endorsement stickers are available for each additional 5 YTARC members worked. Send your list along with s.a.s.e.

Worked All Mass. Cities/Towns Award.



Nishinomiya Leopon Award.

or IRC to K9GSC. A list of YTARC members is available for s.a.s.e. or IRC from K9GSC.

Worked All Mass. Cities & Towns Award (WAMCAT): Issued for confirmed contacts with the 351 Massachusetts Cities and Towns and issued in six classes:

Class DD: For 25 cities & towns in 3 counties. This class to DX and VHF outside the first call area *only*. Higher classes require full contacts.

Class D for 50 cities or towns in 5 counties.
Class C for 100 cities or towns in 8 counties.
Class B for 200 cities or towns in 11 counties.
Class A for 300 cities or towns in 14 counties.
Class AA for all 351 cities & towns.

No date or time limit on contacts. Portables count but *not* mobiles. You may work cities/towns while portable or mobile. The QTH on the QSL will determine the city/town unless the card states otherwise. Contacts with community subdivisions count only for the city/town. (Example—Dorchester is part of Boston, Hyannis is part of Barnstable, etc.). The Awards Custodian will answer any questions on the validity of a location only if the inquiry includes an s.a.s.e. All questions will be determined by the Publication #90 of the Mass. Dept. of Public Works. Submit application with GCR list showing station, date, time, band, mode and Cities/Towns in alphabetical order of Cities & Towns. Fee for basic award is $1.00, seals for higher class cost 10¢, except no charge for higher class seals at time of application for basic award. All awards and seals free to B/P. Awards will be endorsed for band and mode. If application is made for an additional band or mode, fee is 25¢ as an additional certificate will be issued. All awards available to s.w.ls on a "heard" basis. Make checks or Money orders payable to "Mass. Chapter N.A.H.C." (National Awards Hunters Club). IRCs accepted on a ratio of 10 to a dollar. Awards Custodian: George J. Hayes, W1DOM, 29 Belmont St., North Quincy, Mass 02171.

Nishinomiya Leopon Award: The Nishinomiya Amateur Radio Club adopted the colored picture of the leopon, the first and only animal in the world that was born of a leopard father and lion mother. This was in the Hanson Park Zoo in Nishinomiya City, Japan.

Then they sponsored this award with requirements quite difficult and although nearly 250 awards have been issued, none have been issued overseas.

Applicant must collect 22 QSLs to be able to spell Nishinomiya Leopon Award with the last call letters of stations. They must include at least one QSL from Nishinomiya, Japan or its affiliated city, Spokane, Washington (U.S.A.). Letters required may be substituted by a QSL with the leopon picture, regardless of the last call letter of the QSL issued by the Nishino-

[*Continued on page 70*]

MATH'S NOTES

BY IRWIN MATH,* WA2NDM

THIS month, I would like to clean up new semiconductor releases and the like that have accumulated over the past couple of months before they become "old releases."

LSI Computer Systems, 55 Central Avenue, Farmingdale, N.Y., 11735 has introduced a series of time base generators utilizing CMOS technology that will be of interest to our counter builders. They have three devices, the D3600, D60, and D6, which produce square wave outputs of 10 pulses/second, 1 pules/second and 1 pulse/minute respectively. The outputs have a 50% duty cycle and will operate from 60 Hz all the way up to 2mHz. Each unit is packeged in a TO-5 case and has 4 leads. Hookup is shown in figure 1. Cost for any unit is $4.75 in lots of 100 pieces.

Exar Integrated Systems, 750 Palomar Avenue, Sunnyvale, California 94086, has for us a dual 555 type timer which, as shown in figure 2, provides two completely independent 555 timers in one 14 pin DIP package. Any 555 data sheet can be used to find out about the versatility of this chip, and its uses are indeed many. Briefly, the XR-2556, as it is called, is fully compatible with TTL, DTL, and ECL, and works from any 4.5 to 20 volt power supply. Each 555 can supply up to 200 milliamperes to an external load, and can be hooked up to give time delays of from microseconds to an hour. Cost for this gem is only $1.50 for quantities of 100.

For our op-amp fans, Motorola, P.O. Box 20924, Phoenix, Arizona, 85036, offers an 8 pin "mini-dip" operational amplifier called their MC1741SCP1 which is a uA741 pin-for-pin interchangeable device costing only $1.25 each in 100 quantity. Minimum slew rate for this chip is 10 microvolts per microsecond (150 kHz for those who have not read the last three

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

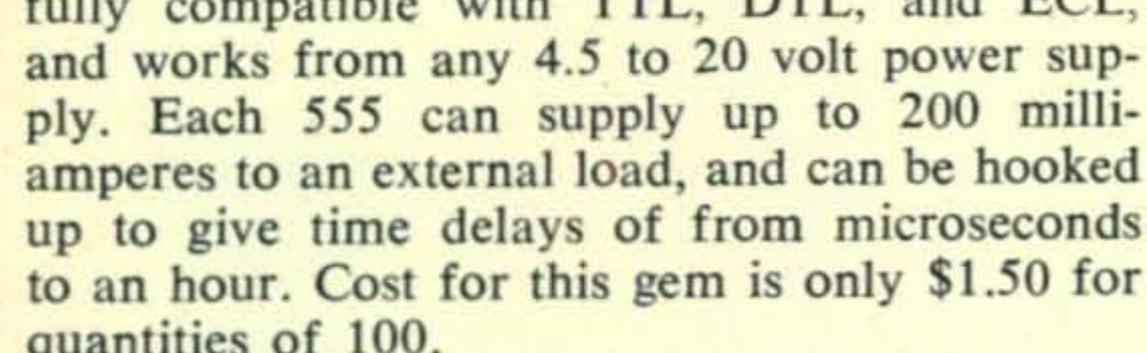


Fig. 1—The hookup of a LSI divider chip.

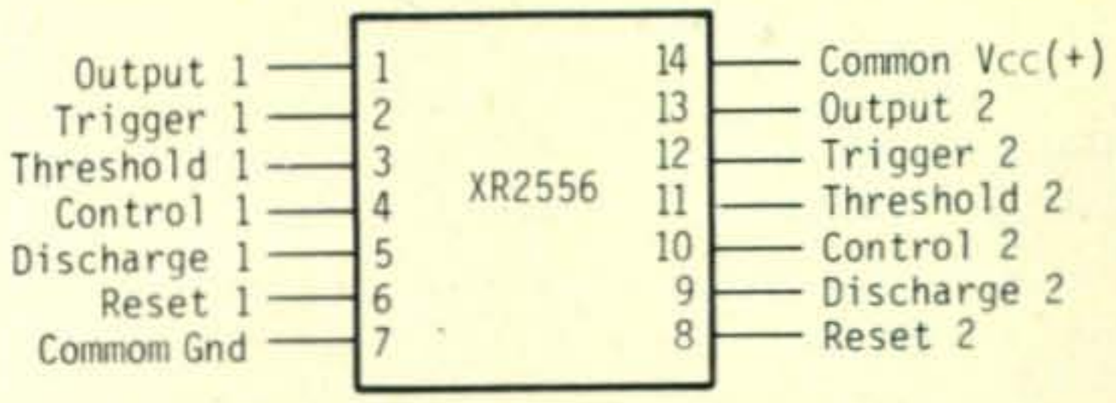


Fig. 2—Exar's new dual 555 timer chip.

MATH'S NOTES) which is 20 times the speed of the standard uA 741. Open loop voltage gain is 100,000 and maximum output current is 10 milliamperes. Write to Motorola for a data sheet if you are interested.

There is a new voltage controlled oscillator (v.c.o.) that has just been introduced by Texas Instruments that seems like a natural for amateur radio experimenters. This device, packaged in a 16 pin dip, consists of two wide range TTL compatible, self-starting, free running multivibrators and output buffer amplifiers as shown in figure 3. An external timing component, capacitor or fundamental crystal, is used to determine the center frequency of operation, while external voltage is fed into the chip to vary the frequency around this center point. Typical center frequency range is from 120 kHz to 85 mHz and typical deviation range is −35% to +75% of center frequency.

Stability is typically .1% for a 10% change in power supply voltage while a change in operating temperature from 0 to 75°C results in only a 50 ppm shift. The device operates from a 5 volt power supply.

This chip, called the SN74S124, should be perfect for signal generators, sweep generators, phase locked loops, f.m. modulators and the like.

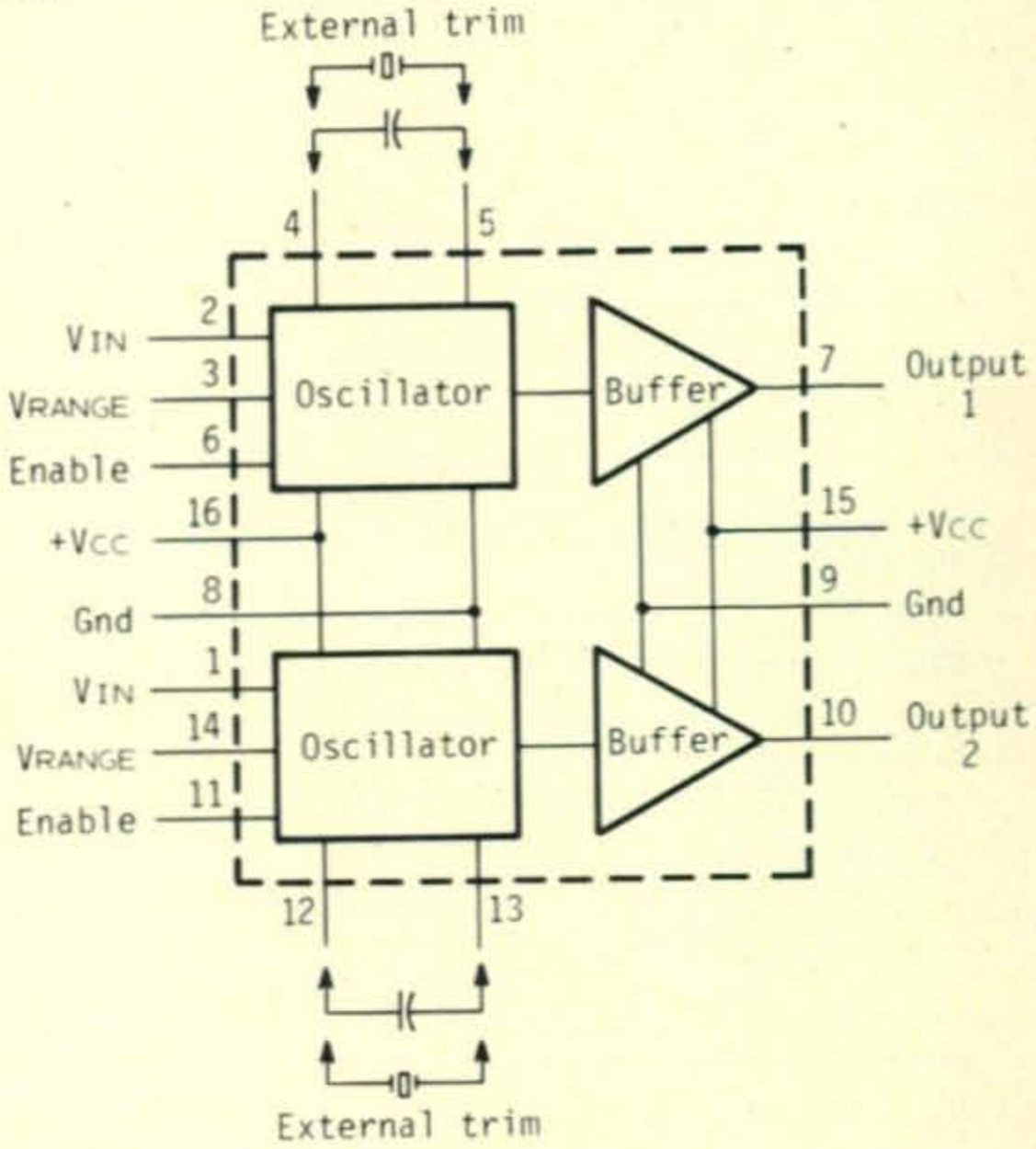


Fig. 3—The SN74S124 just introduced by Texas Instruments.

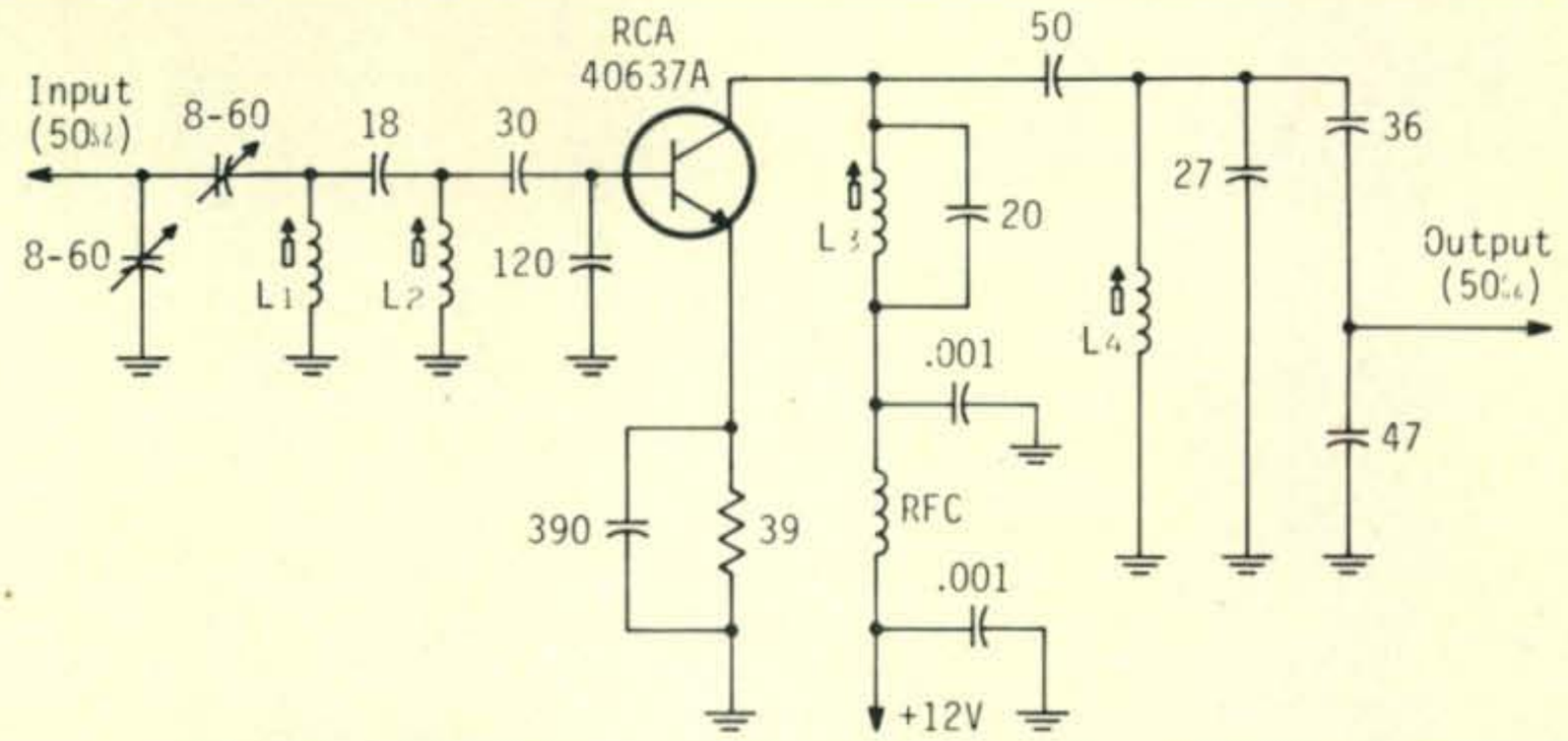


Fig. 4—A doubler as described in the text.

You can get further information from TI at P.O. Box 5012, Dallas, Texas, 75222. Incidentally, cost is about $3 in lots of 100.

A new pin diode designed for v.h.f. and u.h.f. switching such as duplexers, antenna changeover controls, modulators, etc., has been introduced recently by Hewlett Packard, 1501 Page Mill Road, Palo Alto, California, 94304. This device, their HP 5082-3077 operates with low distortion from 100 mHz to 1 gHz (1000 mHz) and exhibits only .3 pF of reverse bias capacity. Since the unit will handle 2.5 watts, it should be useful for small portable equipment and "handy-talkies". Cost in lots of 1-99 is only $2.75 each.

RCA has several new devices, of which we have been informed, that should be of interest.

First of these is their HC4100 which is a 2 to 32 volt, 5 ampere series voltage regulator. Regulation is .2% typical at 5 amperes output. With an external pass transistor, this can be increased to 100 amperes. The HC4100 comes in an 8 lead TO-3 case and is available from stock for $7.35 in 100 quantities.

The 41024 is a TO-39 transistor designed for u.h.f. amplifier service. This NPN device will produce a minimum of 1 watt output at 1 gHz with 5 db of gain and .3 watts output at 1.68 gHz. It is intended for use as a final, driver and pre-driver as well as an oscillator. Cost for the 41024 is $4.80 in quantities of 100.

A similar lower frequency device has also been announced. The 40637A is an NPN TO-18 package that, in a multiplier chain of three doublers such as shown in figure 4, will produce 100 milliwatts of output at 156 mHz from 5 milliwatts of drive at 13 mHz. It should be a natural for 6 and 2 meter f.m. Cost for these, in 100 quantity, is $1.30 each.

That about wraps it up for now. See you next month.

73, Irv, WA2NDM

SURPLUS sidelights

BY GORDON ELIOT WHITE*

SINCE I receive quite a few letters from readers asking questions about RTTY gear, this month I will outline some things in answer to the most commonly-asked queries. I am glad to receive these questions and reader's letters, but I might mention that occasionally I cannot give immediate answers, either because I don't have the information, or because my newspaper job has me busy somewhere else. Also, I appreciate receiving a self-addressed stamped envelope. Several dozen inquiries a month begins to add up in both postage and time. Another thing—it is surprising how many people will forget a return address, and those who give their call may not realize that the *Callbook* is not an infallible reference. It also adds to the time involved in an answer.

One of the more modern RTTY page printers is the Teletype Model 32. This is a lightweight, light-duty machine, sold for about $1,000 in the ASR version with tape punch and reader. They are not found in surplus except from cable companies or Western Union. Few #32 machines come with automatic carriage return/line feed, but Teletype offers a mod kit to accomplish that change. The kit is number 184157, specification S-50413, priced under $2. Installation is fairly complex, requiring disassembly of some of the stunt bar mechanism. For non-overline on the #32 you will need bar #183499. This provides line feed when the machine receives a carriage return character. It is installed at the same time as the 184157 kit.

The #33 machine is an eight-level version of the #32, and is about 98 percent identical to its five-level brother. The #33 is much used in computer time-sharing, but is not practical for conversion to amateur 5-level use unless you build an electronic 5:8 converter which is now possible with integrated circuit chips.

The #32 is generally found with gears for 67 word per minute operation. For amateur use it requires conversion to 60 speed, which can be accomplished with the change of one part, the drive gear-sprocket. This should be changed to part number 181417. Installation is not at all tricky, but it generally requires removal of the motor to allow access to the gear which is made of white nylon and is found on a bracket at the inside end of the motor. The gear costs about $5.

There are no gear shifts for the #32-33 units. You have to get out the screwdriver to change their speeds. Almost all #33 units are found with 100 w.p.m. gears, by the way, as that is the standard speed for ASCII eight-level code.

There are more recent units made by Teletype Corporation, such as the #35, #37, #38, and some other exotic items, all for use with computers and all eight-level machines, period. There may be some electronic five-level units, either heat-printers like the AN/ARC-96 which I described last fall or cathode ray tube display types, but for mechanical teleprinters the game is about over.

There is one five-level impact printer being built which combines impact printing with electronics in a compact little unit which might interest some amateurs. Made by Extel Corporation, of Chicago, it was designed by ex-Teletype employees (thus the name) and although not cheap, it is most attractive.

A solid-state circuit converts the incoming signal into parallel data which is fed to a matrix of subminiature solenoids arranged so as form a letter from a series of dots. The electronics can handle speed changes by varying the internal clock, i.e. an electronic gear shift requiring only plugging in the appropriate crystal.

The Extel is beginning to displace the old Model 15 bangers with the press services, and will eventually take over from the #28. There were a lot of Extels at the 1972 political conventions, tap-tapping away with their distinctive sound. For the energy-conscious, the Extel is a lot more efficient. It has no heavy-current drive motor, only small motors used for advancing the print head and the paper. In fact, the Extel is ideal for remote use where only battery power is available. It can be bought for 12 volt d.c. operation.

None of these have been seen in surplus, as far as I know.

The Model 28 remains, and will remain, I feel, for years, the best bet for amateur RTTY use. It is a very well built mechanical unit, easy to work on, reliable, exceedingly flexible in the options offered, and it is easy to get parts for. There are a dozen dealers who cater to amateur #28 users, stocking used or surplus parts, and Teletype Corp. still makes new parts.

You can get gear shifts, answerback units, various types of readers, tape punches and other accessories. For reference, I have covered the #28 units in this space in May, 1967, p. 90, (tape gear); Jan. 1969, p. 90 (conversion to the modern #35 style cabinet); August, 1971, p. 87 (gear shifts); Feb. 1967, p. 92 (more gear shifts).

You can add auto or/lf to the #28 rather easily, certainly with less risk of having the

*1502 Stonewall Rd., Alexandria, Va. 22302.

printer collapse into a pile of loose parts than on the #32. You can put in stunts like auto-call, reperf turn-on, print-non-print, electrical letters-figs shift, non-overline, letters shift on blank, letters shift on space, etc. with considerable room for imaginative work. It is, in effect, a simple computer which can be programmed to do several functions when instructed. You could, for example, code it to turn on any electrical device when it received the command "turn on" and to stop printing when commanded "stop print." It could ring bells, light lights, turn on the TD, turn it off, even play Jingle Bells if wired up for it.

Of course, in practice, telling the #28 to "turn on" uses up too many characters in its limited (40 character, 200 bit) memory, so we would use "T-O" for turn on—only two characters. If someone wanted to go to the trouble they could build a rudimentary computer out of #28 printers ganged together, in fact there is a #28 "selector" designated LS, with only the stunt box, to do just that in message centers. I can imagine a number of ways this computer capability could be used by amateurs. ■

CQ Country Chart

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

Awards [*from page 65*]

miya ARC station and its club members, and can be substituted the same way by QSLs from Spokane, Washington, U.S.A.

The operating place of a Japanese applicant should be within his prefecture, or within 150 miles for an overseas applicant. QSOs after 1969 are valid. Send application, GCR list and 10 IRCs to: NARC C/O Mr. Taichiro Kimura, JA3GII, 2-20 Kanbara, Nishinomiya, Hyogo-pref. 662 Japan.

Notes

Sad to report that W7SUY, Erwin (Bud) Beckman was involved in an automobile accident while on a County Hunting trip to Montana last October. His mother was fatally injured and Bud suffered a broken shoulder and multiple fractures of one leg.

The Mobile Amateur Radio Awards Club, Inc. sent out a special letter to all members with this and additional data.

May I express my deepest sympathy and that of my readers.

How was your month? 73, Ed., W2GT

Novice Shack [*from page 58*]

to make a choice. The catalog includes a Hallicrafters SX-101 receiver, a Heathkit HW-16, 80, 40, 15-meter Novice transceiver abetted by a Heathkit HG-10 variable frequency oscillator, E. F. Johnson Viking Pacemaker and Adventurer transmitters, and a small antenna farm. The latter sprouts a ground-mounted Hustler 4-BTV vertical with buried radials and an 80-meter loading coil, plus 15-meter dipole, 22 feet high, and another dipole for Navy MARS (Military Affiliate Radio System), where Lou is known as NØBUU. Lou works all the Novice bands and has 45 states and seven foreign countries besides a 15-w.p.m. code certificate to show for his efforts. . . .

Ed. Terpening, W4VCY, 838 Darlington Rd., Tarpon Springs, Fla. 33589, now officially recognizes girls! His long-running amateur radio course is no longer restricted to male students. The current class has two YL members. Classes are held on Saturday, by the way... Reverend Leopold Geissner, Capuchin, YN4LGS, Cristo Rey Pastoral Center, 1031 Douglas Ave., Racine, Wisc. 53402, had passed his Novice code test and was waiting for the written test to arrive when he wrote to welcome the return of the NOVICE SHACK. Leo admits that his technical knowledge is limited, but he is in there trying. His Nicaraguan license expired with 1973 . . . Don Osmund, WN9LWN, 533 Brainerd Ave., Libertyville, Ill. 60048, made a number of excellent suggestions for future NOVICE SHACK columns, for which I thank him. Don started as broadcast-band DX-er. Then the high-school radio club grabbed him. He uses a Heathkit HW-16 transceiver exciting a 15-meter dipole. Operating 15 meters exclusively, he has worked 32 states and six countries. Ten crystals help him to be on or near the right frequency at the right time . . . February 16-17 and March 16-17 are the dates of the c.w. halves of the annual ARRL DX contests. Try your luck on 10 and 15 meters. Assuming no late rule changes, U.S. and Canadian amateurs send a signal report followed by the 3-letter abbreviation of their state or province and receive a signal report followed by three more numbers.

Send your letters, pictures of yourself and equipment, and comments for the NOVICE SHACK to the address at the beginning of the column. 73, Herb, W9EGQ

QRP [*from page 43*]

in about ten hours operation in the c.w. segment. So it can be done! Give it a try.

QRPp Weekly QSO Party

There have been numerous suggestions that we rejuvenate the old *Milliwatt* QRPp Net. Quite a few stations participated while it was in operation during the winter of '70-71. I'll suggest an alternative to the net idea, namely, a weekly QRPp QSO party during which QRPp stations (and QRO alike) can make calls on a selected frequency at a single time. Considering propagation factors, the best combination follows. Session 1: 3540 kHz, Mondays, 2000-2200 CST (Tuesdays, 0200-0400 GMT). Session 2: Saturdays, 14065 kHz, 1300-1500 CST (1800-2100 GMT). The objective of this new approach is to set a time and place where QRPp fellows can be reasonably sure of the opportunity of working other QRPp stations. Likewise, the above frequencies and times can be used every day.

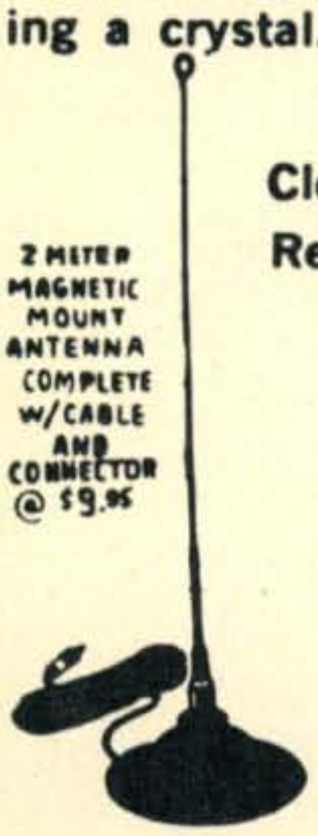
Procedures are informal. Don't be afraid to call CQ QRPp, since it is likely that someone will be listening for your call. If everyone sits and listens, nothing will be accomplished. QRO stations are invited to take part also, and can be a great help in doing the CQ QRPp calling. A note to everyone. Popular rigs such as the PM3A and the HW-7 are set up so that the transmitting frequency is up to 800 Hz away from the receiving frequency. Hence, if you call CQ QRPp, be certain that you tune 1 kHz on both sides of your frequency. This is important.

BARRY presents CLEGG FM-27B

Total 146-148 MHz coverage without buying a crystal. 25w. out, fully synthesized.

$479.95

Clegg FM-27B
Regulated AC power supply
$79.95



BIRD 43 WATTMETER
$100.00
Bird 43 Slugs specify frequency and power

HF	$35.00 each
VHF	$32.00 each

Also 4350 80-10M dual scale 200w/2kw HamMate — $79.00

DRAKE

TR-72 2 meter FM transceiver, 23 channel, 1 & 10 watts, 13.8 VDC $320.00
TR4/C new, $599.95 T-4XC Trans. $530.00
R4C Rec. $499.95
AC-4 Drake A.C. Power Supply ..... $ 99.95

TEN TEC

TRITON II 5 Band All Solid State Transceiver $200.00
W pep R.I.T. works on 12 VDC $606.00
Model 252 115 VAC P/S supplies, 12 VDC for Triton II. $89.00
315 Receiver 10-80m. SSB/AM/CW $229.00
CW FILTER FOR 315 ..... $14.95
AC4 SWR Bridge $ 14.95 KR2 ..... $ 12.95 KR40 ..... $ 89.95

SWR BRIDGE COUPLER, DC-800 MHz
TNC Connectors
(no indicator) full amateur power
$90.00 Value
$10.95

E. F. JOHNSON

151-1-4 Variable Capacitor, 250 pF, medium Xmitting type $5.95 ea.

DX ENGINEERING SPEECH COMPRESSORS

DIRECT PLUG-IN FOR COLLINS 32S $79.50 ppd. U.S.A.
DIRECT PLUG-IN FOR KWM-2 $79.50 ppd. U.S.A.
DIRECT PLUG-IN FOR DRAKE TR3 OR TR4 @ $98.50

MISC.

Collins Radio, 152J-1 Phone Patch & Station Control. Circuitry similar to 312B-4, exlnt condition, with schematic ..... $ 24.95
Complete Maintenance Manual for Signal/One CX-7 & CX-7A ..... $ 25.00

Jackson G80 brass 50:1 anti-backlash dial drive ¼" to ¼". $19.00 value $ 5.50

INOUE IC-22
2 Meter Transceiver

10 WATTS OUTPUT PLUS TREMENDOUS RECEIVER — 22 CHANNELS
Ready to go with crystals for 5 frequencies at no extra charge
$289.00
Inoue IC-230 synthesized, no crystals to buy. 2 meter transceiver $489.00
IC-3PA Power Supply, Deluxe Regulated for IC-22 or IC-230 $99.00

G.E. 1400 PIV @ 250 AMPS BRAND NEW $90.00 VALUE ONLY $20.00

BARKER & WILLIAMSON

334A DC-300 MHz, 1000 watts $139.95

BARRY HAS NEW VENUS SS2 SLOW SCAN MONITOR IN STOCK $349.00
COME TAKE A LOOK OR WRITE

SBE

SBE-450 TRC, for use with 10 watt, 2 meter transceiver to operate on 450 mHz $179.95

BARRY HAS ANTENNAS

C.D. HAM "M" ROTATORS, new complete $99.95
CD Ham-M for 220 VAC in stock $175.00
C.D. TR-44 ROTATORS, new (complete) $ 63.95
CABLE for Ham-M & TR-44 ..... @ 14¢/ft.
CD AR-22R cmplt. rotator for small beams $33.95
BN86 Balun by HyGain ..... $ 14.95
RG-8A/U 100 ft. rolls. VHF connector PL-259 one end Type "N" (UG-21E/U) other end $ 12.50
RG8A/U — 65 feet with PL-259 connectors on each end ..... $ 9.50

Tube Headquarters. Diversified Stock. Heavy inventory of Eimac tubes, chimneys, sockets, etc.
572B $19.50
4-1000A — Removed from equip. r.f. tested OK. Guaranteed $75.00
EIMAC 3-500Z or 3-400Z (either one) $37.00

Barry Now Stocks Bogen, Electrovoice & University. Call or Write.

We carry marine electronics: Andrea, Sonar, Pierce-Simpson, HyGain, Antenna Specialists.

CASH PAID . . . FAST! For your unused TUBES, Semiconductors, RECEIVERS, VAC. VARIABLES, Test Equipment, ETC. Write or call Now! Barry, W2LN1. We Buy! We ship all over the World.
☐ Send for Green Sheet Supplement 23.
Send 50¢ postage & handling (refund 1st order).

BARRY ELECTRONICS

512 Broadway NY, NY 10012
212-WA-5-7000
TELEX 12-7670
DEPT. C-2

The standard QRPp calling frequencies that have been used in the past are: C.W., 3540, 7040, 14065, 21040 kHz. Use these frequencies regularly. DX QRPp stations should note the 14065 and 21040 frequencies. We invite all stations to listen for QRPp signals on these frequencies, and if you hear a CQ QRPp, give the guy a report at least. It will be appreciated. I'd like to hear from those who work the weekly get-togethers, with details as to which stations were worked and heard so that we can make some evaluation of this approach. There were quite a few QRPp stations on during the recent QRPp Contest, and we hope to be able to report results in the next column. Keep the cards and suggestions coming.

73, Ade, K8EEG

Contest Calendar [*from page 56*]

the bands were in sad shape. So chalk up another one for George.

Hope we had a good one for the 160 contest last month. Conditions have been good so far this season and there has been some good DX activity. Be sure to send in your logs.

73 for now, Frank, W1WY

DX [*from page 53*]

Island (JA1MCU/C21-53 1.8 mHz QSO's). The W1BB 160 Meter DX Bulletin is issued 3 times a year and may be obtained by sending an SASE to Stu. (36 Pleasant St., Winthrop, Mass. 02152). Stu also reports his marriage to Marguerite, his longtime neighbor who has graciously allowed W1BB to run antenna wires over, under and through her property for many years. Well, . . . That a FB start Stu, Congratulations!

Mt. Athos QSL's

QSO's for the second Mt. Athos DXpedition April 21-April 25, 1973 will be QSL'ed direct immediately by DL1CU, Box 585, D-7, Stuttgart-1, West Germany. SASE please. Only cards bearing imprint of a special Greek stamp on the back are valuable for DXCC, according to Felix, DL1CU, who has the original logs. He can also QSL the last c.w. DXpedition to HV3SJ.

California DX Convention

The California DX Convention will be held in Fresno, California on April 27 & 28. This years affair will be sponsored by the Southern California DX Club and will be headed by Frank Cuevas, W6AOA. Inquiries may be made to W6AOA or WA6GLD.

QSL Information

Any DX Station desiring a stateside QSL Manager may contact W4KA, Leo Haijsman, 1044 S.E. 43 St., Cape Coral, Fla. 33904.

A4XFJ—via K4FCZ
AP2KS—via SM1CNS
EL2DO—via W1NGQ
FG0ZZ/FS7—via F2QQ
FK8AU—via I1PQ
FP0AA—via WA2FBI
FP0ZZ—via WA2FBI
HB0AIC—via HB9AIC
HB0NL—via HB9NL
HK7DBA—via WA1QBH
KA1BL—via K0SVW
PJ9GIW—via K4BAI
SJ9WL—via SSA Bureau
TA2QR—via W5QPX
TU2DV—via WA6NFC
VK4AK/LH—via VK4AK
VP2MAH—via W4GSM
VP2MDX—via W4PRO
VP2MQB—via W5MYA
VP2VAN—via K2FJ
ZF1GS/VP7—via WB4NXR
WB4NXR/VP7—via WB4NXR
WB4TAF/VP7—via WB4NXR
VU2AJW—via WA6NFC
XE2EIF—via W6EIF
XW8DK—via WA6NFC
ZD8JD—via F2JD
ZF1FBI—via WA2FBI
ZF1KXJ—via WA0KXJ
3D2ER—via K4FCZ
4C5AA—via W2GHK
4C9AA—via W2GHK
4W1BC—via G3SUW
5U7AZ—via CN8GG
WA2FBI/6Y5—via WA2FBI
WA0KXJ/6Y5—via WA0KXJ
8P6EU—via W1CER
WB4BUQ/8RI—via WA6MWG

73, Jerry, WA6GLD

SSTV [*from page 46*]

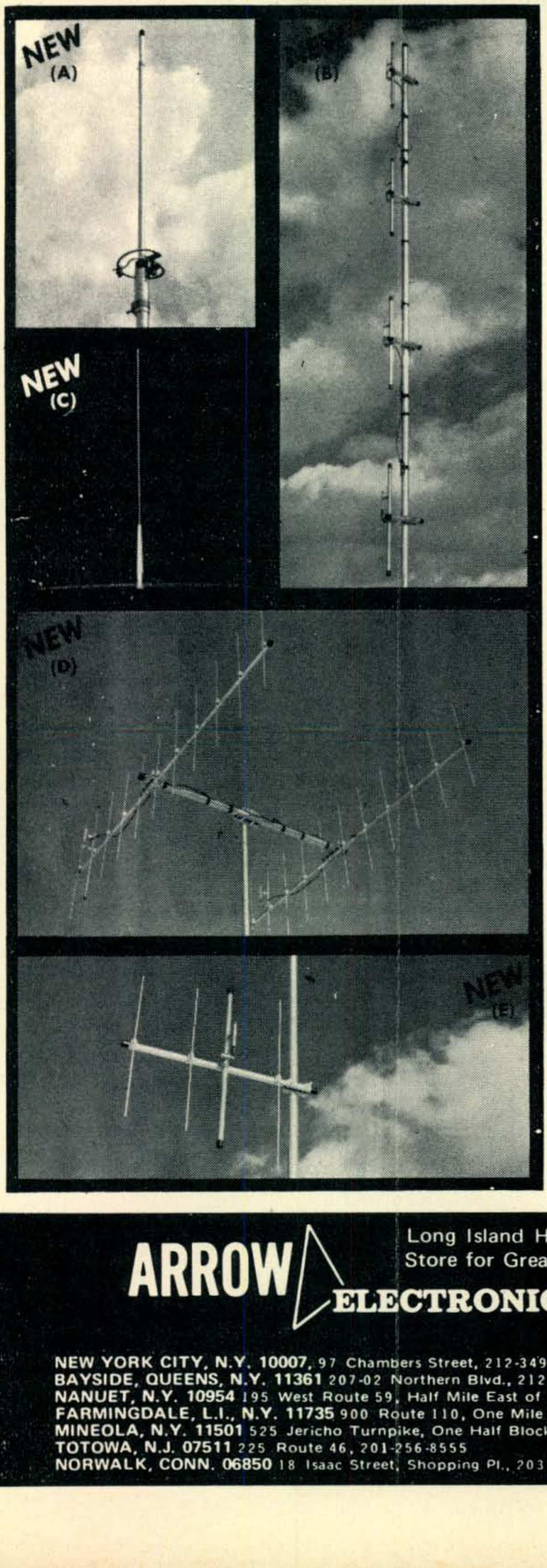
keep transistors dissipation down to ½ or less of the maximum rating at 25 degrees C.

Regarding step 4c, use your best guess as to what the *minimum* Beta will be under the chosen operating conditions. The minimum beta for the 2N5828 is given by the manufacturer as 400 at a collector current of 2 ma. Beta is somewhat dependent on collector current. 400 is still a good number at ten times and one tenth of 2 milliamps, but it drops at higher and lower currents. At 50 milliamps and at 10 microamps, for example, the Beta might drop as low as 200. Another thing to keep in mind is that the equations for Z in and Z out become inaccurate at low impedance levels. Even with a very low source resistance, the Z out will never drop below a minimum value characteristic of the particular transistor type and collector current. This value might be 1 or 2 ohms in a power transistor, and perhaps 25 ohms in a small signal type.

A comment on 6 b). This divider fixes the input voltage to the emitter follower, and thus the output voltage too. We want a divider that is stiff enough so that it will not be unduly loaded down by the transistor base current. Since we are not sure what the exact transistor Beta will be, we want the voltage to remain about the same with any transistor having minimum Beta or above. The ten times maximum base current rule is adequate in most cases.

Most small signal transistors these days have gain bandwidth products of 100 mHz or more. This means that they are capable of oscillating at v.h.f. and u.h.f. frequencies. When we design an audio amplifier we don't intentionally design a v.h.f. oscillator at the same time, but sometimes it happens. The hardware takes *all* the laws of nature into account, which is what

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**

ARROW ELECTRONICS, INC.

Long Island Hams — Visit our Farmingdale Store for Great Local Service . . .

NEW YORK CITY, N.Y. 10007, 97 Chambers Street, 212-349-4411, Between Broadway and Church Street
BAYSIDE, QUEENS, N.Y. 11361 207-02 Northern Blvd., 212-423-0910, Half Block East of Clearview Expressway
NANUET, N.Y. 10954 195 West Route 59, Half Mile East of Thruway Exit 14
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

we poor mortals aspire to, but never even come close to doing. V.h.f. oscillations in an audio or d.c. amplifier distort the signal, change the d.c. bias, and change the low frequency gain. Since they are sometimes tough to track down, prevention is generally better than cure. The biggest danger of oscillation occurs when we have high Q L and C paths to ground at v.h.f. frequencies in all three transistor leads. In an emitter follower the collector goes to ground via the Vcc bypass capacitor. If the emitter drives a capacitive load, or several inches or feet of wire, this is a second high Q path. If there are also long leads or appreciable C to ground in the base circuit, or coupling between input or output; watch out! My usual preventative and curative measures are: 1. Putting a 100 to 500 ohm resistor in series with the collector lead, close to the transistor. 2. Or, putting a 1K resistor in series with the base lead near the transistor. 3. Or, putting ferrite beads on the transisitor leads, particularly the emitter lead. The resistors generally work more reliably than the ferrite beads, and I generally save the beads for high current situations where the voltage drop across the resistors would be excessive.

Next month we'll work out some practical examples. 'Til then—

Vy 73, Cop, WØORX

Oscar News *[from page 41]*

6165	20	0011	50.5
6178	21	0106	64.2
6190	22	0006	49.2
6203	23	0101	62.9
6215	24	0001	47.9
6228	25	0056	61.6
6241	26	0151	75.4
6253	27	0051	60.4
6266	28	0146	74.1
6278	Mar. 1	0046	59.1
6291	2	0140	72.8
6303	3	0040	57.8
6316	4	0135	71.5
6328	5	0035	56.5
6341	6	0130	70.3
6353	7	0030	55.2
6366	8	0125	69.0
6378	9	0025	54.0
6391	10	0120	67.7
6403	11	0020	52.7
6416	12	0115	66.4
6428	13	0015	51.4
6441	14	0110	65.1
6453	15	0010	50.1
6466	16	0104	63.8
6478	17	0004	48.8
6491	18	0059	62.6
6504	19	0154	76.3
6516	20	0054	61.3
6529	21	0149	75.0
6541	22	0049	60.0
6554	23	0144	73.7
6566	24	0044	58.7
6579	25	0139	72.4
6591	26	0039	57.4
6604	27	0134	71.2
6616	28	0034	56.1
6629	29	0129	69.9
6641	30	0029	54.9
6654	31	0123	68.6
6666	Apr. 1	0023	53.6
6679	2	0118	67.3
6691	3	0018	52.3
6704	4	0113	66.0
6716	5	0013	51.0
6729	6	0108	64.7
6741	7	0008	49.7
6754	8	0103	63.5
6766	9	0003	48.5
6779	10	0058	62.2
6792	11	0153	75.9
6804	12	0053	60.9
6817	13	0148	74.6
6829	14	0048	59.6
6842	15	0142	73.4
6854	16	0042	58.3
6867	17	0137	72.1
6879	18	0037	57.1
6892	19	0132	70.8
6904	20	0032	55.8
6917	21	0127	69.5
6929	22	0027	54.5
6942	23	0122	68.2
6954	24	0022	53.2
6967	25	0117	66.9
6979	26	0017	51.9
6992	27	0117	65.7
7004	28	0012	50.6
7017	29	0106	64.4
7029	30	0006	49.4

Computerized Orbital Data Available

Orbital information necessary for communicating through the AMSAT-OSCAR 6 satellite can be calculated from the data given in the above tables, but there's a much easier way to do it.

Thanks to William Johnston, WB5CBC, who has been able to utilize a conveniently available computer program, what may well be the ultimate in OSCAR orbital data is now available for the small investment of $2.50 and a large self-addressed stamped envelope. (For stations in Canada and Mexico, the cost is $3.20, airmail postage paid, and for all other countries it is $3.50, which also includes postage for airmail delivery.)

The computer print-out, tailor-made for your own exact location, covers a 21-day period. For every two minutes that the satellite will be within communications range of your QTH, it shows the azimuth, elevation and range to the satellite.

Since the satellite's orbital cycle repeats itself every 263-orbits (almost exactly 21-days), with only minor corrections (3.6 minutes later and 0.9 degrees of longitude

further west), the computer print-out can be used to locate AMSAT-OSCAR 6, for as long as it remains operative.

Here's a one orbit sample of what the print-out data looks like, centered on W3ASK's QTH

W3ASK GMT H M S	3 AUG 73 AZ DEG	(215) EL DEG	ORBIT 3650 R KM
4:06:35	254	0	4545
4:08:35	264	2	4360
4:10:35	276	3	4283
4:12:35	288	2	4319
4:14:35	299	1	4463
4:16:35	309	-1	4704

To receive your personalized, perpetual orbital print-out send the following to William Johnston, WB5CBC, 1808 Pomona Drive, Las Cruces, N.M. 88001.

1. Name and mailing address
2. Latitude (indicate North or South) and Longitude (East or West), as accurately as possible in degrees, minutes and seconds
3. Altitude above sea level (indicate feet or meters)
4. A self-addressed stamped envelope, 9″ by 12″, or larger, with enough postage for a weight of 6 ounces. The envelope is not required for stations outside the USA.
5. Send the appropriate payment ($2.50 in USA; $3.20 in Canada and Mexico and $3.50 elsewhere) in US, Canadian or Mexican funds, by either personal check, money order or international bank draft.

What can be easier for locating the AMSAT-OSCAR 6 satellite!

Plans Finalizing For AMSAT-OSCAR 7

Arrangements have been completed with NASA for the launch of what is expected to be the next radio amateur communications satellite. It will probably take place *during the late spring or early summer months*. Components developed by radio amateurs in Germany, Australia, Canada and the United States are now being assembled in finalized form, and the satellite will soon begin the usual severe pre-launch testing period. Once successfully operating in orbit it will be called AMSAT-OSCAR 7.

Briefly, it is planned to have the following components aboard the satellite:

A 432 mHz (432.125 to 432.175 mHz passband) to 2 meter (145.975 to 145.925 mHz passband) inverted linear repeater on the order of 10 watts PEP output.

A 2 meter (145.85 to 149.95 mHz passband) to 10 meter repeater (29.40 to 29.50 mHz passband). Similar to the repeater presently operating in AMSAT-OSCAR 6, but with 2 watts output PEP.

Beacon signals on 29.50, 435.1 and 2304.1 mHz.

Morse and Teleprinter telemetry encoders.

CODESTORE, for storing and forwarding c.w. messages, similar to AMSAT-OSCAR 6.

Experiment Control Logic for selecting the spacecraft operating modes, and protecting the satellite against excessive battery drain.

An input solar power-battery charger regulator for properly charging the batteries from the solar arrays, and to prevent overcharging and battery damage.

A special article dealing exclusively with the AMSAT-OSCAR 7 satellite will appear shortly in *CQ*, in enough time prior to its launch so that radio amateurs throughout the world can prepare for it. ■

CQ Reviews: Ten-Tec [*from page 37*]

A five-position switch on the panel selects the modes of operation which are: Reverse Sideband; CW-1 (c.w. filter in sharper position); CW-2 (c.w. filter in broader position); Normal Sideband; Calibrator. When the calibrator is engaged, the receiver is set up for the normal sideband only. The calibration also holds for the c.w. modes.

The front and rear panels and the bottom and top covers of the set are aluminum, while the end pieces of the box are plastic. The top and sides have a wood-grain finish. A 2½″-diameter speaker is mounted in the top cover. The Phones/Speaker jack is a standard-size type at the rear where the other connectors are phono jacks. The line cord is attached.

Operation and Performance

Measurements on the model 315 produced the following results: *Sensitivity*—0.25 μv at 3.5 mHz and 0.55 μv at 4 mHz for 10 db S+N/N, 0.25 μv or less on the other bands;[3] *Image Rejection*—68, 68, 75, 82, 59 db on the 3.5, 7, 14, 21, 28 mHz bands respectively; *I.F. Signal Rejection*—66, 36, 48, 54, 55 db on above respective bands; *Unwanted-Sideband Suppression*—30 db at 1 kHz; *Overall Bandwidth* (including i.f. and

[3] On the three highest bands our readings were somewhat better than those stated; however, the figure of 0.25 μv *or less* has been given, inasmuch as measurements can vary by 1-2 db (particularly in the low-microvolt region), depending on the difference in output-level accuracy between different signal generators, the exact receiver-input imepdance and the method of matching thereto.

HEAR YE... HEAR YE...

RUSH . . . RUSH . . . RUSH

SAVE! SAVE! SAVE!

ONE DAY ONLY – AT ALL HARRISON STORES

"Ham Headquarters, U.S.A.®"

SHOP THESE STAR-SPANGLED SAVINGS!

WASHINGTON'S BIRTHDAY GIANT RIOT SALE

ALL DAY — WASHINGTONS BIRTHDAY — MON. FEB. 18th

(Sorry, we cannot give any information by phone or mail.)

COME AND BE SURPRISED!

Doors open 8:30 A.M.

COME IN . . .
TAKE YOUR PICK OF

100

BRAND NEW RECEIVERS AND TRANSMITTERS

FANTASTIC SAVINGS!

Come in you won't be disappointed!

COME IN . . .
CHOOSE FROM

101

FULLY GUARANTEED TOP CONDITION TRADE-INS RECEIVERS AND TRANSMITTERS

In the world famous Harrison Trade-in Center. At prices chopped 'way down for this super sale!

TRADE-INS WELCOMED
BRING 'EM ALONG

ONLY ONE SPECIAL SALE ITEM TO A CUSTOMER
Thousands of other items specially reduced for this sale
NO DEALERS ADMITTED!

AMPLE PARKING

Harrison

CHARGE IT!
GECC
BANKAMERICARD
MASTER CHARGE

"Ham Headquarters, U.S.A.®"

★FARMINGDALE, L.I.
2265 ROUTE 110
Only 26 minutes from N.Y.C.
L.I. Expressway to Exit 49S,
South 2 miles to our big parking field

★NEW YORK CITY
8 BARCLAY STREET
Just 1½ Blocks East of our famous old landmark store in lower Manhattan.
(Near Broadway and City Hall)

★VALLEY STREAM
10 SUNRISE HWY.
(At Rockaway Avenue)
Just East of Green Acres Shopping Center

a.f. sections): For s.s.b. nominally 350-3000 Hz at 6 db, with CW-1 (sharp) 700-990 Hz at 6 db peaking at 825 Hz and with 500-1825 Hz bandwidth at 30 db, CW-2 (broad) 700-875 Hz at 6 db peaking at 750 Hz and with 625-2725 bandwidth at 30 db.

A.G.C.—(7 mHz band)—5 db a.f. output change with r.f. input change of 80 db (10-100,000 μv), somewhat flatter on the higher bands, a.g.c. threshold varied from band to band due to changes in band gain as may be noted from the S-meter readings which follow; *S-Meter* (input signal required for stated meter reading on the above respective bands)—13, 8, 2, 2, 3 μv for S-4, 25, 19, 4.5, 4.5, 8 μv for S-9 32, 22, 7, 7, 11 μv for S-9 +40 db; r.f. intermodulation—better than the run-of-the-mill vacuum-tube and solid-state jobs, requiring two test signals 55 db above 1 μv (or 560 μv signals) to produce a 1 μv 3rd-order I.M. product (also indicative of better cross-modulation and desensitizing characteristics[4].

A-f output with 1000 Hz into 8 ohms was 1 watt with 1.6% distortion; but, with r.f. signals above 1000 μv the distortion rose quite a bit at the 1-watt level. However, this situation can be avoided by reducing the r.f. gain which might normally be done, anyway, with strong signals.

Frequency Stability

After a 15-30-minute warmup drift of 200-600 Hz (depending on the band) the frequency stability of the receiver held to within the manufacturer's rating of 100 Hz or less per hour. Vibration tests indicated no adverse affects on the frequency. The calibration linearity was quite good, holding to within 2 kHz when calibration was made at the nearest 100-kHz point. No change in frequency was found on any band with line-voltage variations of ± 10%.

On-The-Air Results

With on-the-air operation the receiver shaped up well in accordance with the foregoing measurements. During the recent *CQ* WW Phone and CW Contests and while using a 4-foot test lead as an antenna for the set, we were not only able to copy all the DX stations the "locals" were working, but also were able to do so with no more difficulty from exceptionally strong adjacent-channel signals than experienced with more sophisticated vacuum-tube and solid-state receivers used under the same conditions. Nor were problems encountered with the lower-than-usual unwanted-sideband suppression. Some QRM difficulties might have occured had a full-sized antenna been used; however, use of the r.f. gain control (which still allows the S-meter and a.g.c. to function) could forestall such a possibility.[5]

The input impedance on the three highest bands was found to be close to 50 ohms, but on 40 and 80 meters it dropped quite a bit. Thus, a short or random-length antenna, which may present a relatively high impedance, will not usually provide a good input-signal level unless a matching coupler is employed. On the other hand, antenna-line impedances of 25-100 ohms work out okay without further matching required.

As may be noted from the S-meter characteristics, its readings are quite generous; as a matter of fact, when a band is open with many lively signals, the meter often remains pinned at the top of the scale. However, from our point of view, this is not a detriment, since the object is to adequately *hear* a signal—not *look* at it. Besides, S-meter readings between other different receivers and from band to band do vary considerably, making the readings meaningless, unless the meter in each case is accurately calibrated to indicate signal strength in microvolts.

In spite of the small-size speaker, the a.f. quality from the set is exceptionally good. There is no need to go to an external speaker of larger size.

The size of the model 315 is 4½" × 13" × 7½" (H.W.D.) and it weighs a mere 6 lbs. Power consumption at 115 v.a.c., 50/60 Hz, is approximately 30 watts. At 12 v.d.c. the current drain is nominally 300 ma with pilot lamps on, 170 ma with the lamps off.

The manual for the 315 is an excellent one, being repete with technical data on each section of the receiver, voltage readings, photographs, operation, maintenance and alignment.

The Ten-Tec Model 315 Amateur Communications Receiver is priced at $229. The C.W. Filter accessory is $14.95. The manufacturer is Ten-Tec, Inc., Sevierville, Tennessee 37862.

—W2AEF

[4] See "Receiver Signal Handling Capabilities," *CQ*, Jan. and Feb. 1970, pp. 39 & 51 respectively.

[5] See "Antenna Sense," Q & A Column, *CQ*, March 1969, p. 87.

Radio In New Guinea [*from page 30*]

Since then the station's policy has been to increasingly localize the content of its broadcast day. Keith Jackson, Station Manager, said that the station now programs a very high percentage of local news, frequent interviews with local personalities, and a great deal of local music. Local government councils are regularly queried for their programming suggestions. Though the recent opening of the nearby Bougainvlle Copper Mine, the largest industrial project in the Territory, created additional frictions between the administration and the Islanders, Radio Bougainville now seems to be firmly back in their good graces.

But perhaps the attitude in which the stations are accepted is best illustrated by an incident that occurred in a sparsely populated area along the Gulf of Papua . . .

At 6:30 each evening all D.I.E.S. stations broadcast service messages. These are messages from District Commissioners, police, hospitals, and other authorities, directed to individual people whose location is unknown or could not be contacted in any other way, there being little inter-city telephone service in New Guinea.

One night a message requested that a particular native appear in Port Moresby, the Capitol, as soon as possible. It instructed him to request a voucher for an airline ticket from any Government officer he could reach.

As it happened, the man was on a fishing expedition far from his village. He had no radio and he was unknown in the area. During a chance meeting with some local people they recalled his name from the broadcast and passed on the message. Days later the fisherman reached a Government outpost. He related his story to the officer. Though he had no form of identification and the officer had not heard the radio request, he promptly issued the voucher with the comment that, "If you say it was announced on the radio it must be true."

Amazingly, over the years virtually all service messages have eventually reached the persons to whom they were directed.

In the words of John Smeeton, Manager of Radio Daru and one of the most respected old-timers in the Territory, "We must never be wrong . . . both the people and the administration believe in us . . . the degree of confidence in our stations is our most valuable asset." ■

WPX Results [*from page 34*]

Hawaii

K5CIT/KH6	**14**	**271,122**	**731**	**146**

Nauru

C29ED	**A**	**393,684**	**1238**	**106**

New Zealand

ZL1BKX	**A**	**182,700**	**422**	**145**
ZL1AGO	"	27,011	109	59
ZL2GJ	**14**	**69,100**	**251**	**100**
ZL4BO	**7**	**187,884**	**352**	**102**

Papua

VK9RY	**21**	**343,826**	**1407**	**82**

Philippines

DU1GJM	**A**	**882,255**	**1811**	**165**
DU1JMG	**14**	**872,025**	**1125**	**275**

Samoa (American)

KS6DH	**A**	**873,120**	**1656**	**170**

South America

Argentina

LU5HFI	**A**	**1,130,268**	**1481**	**261**
LU2DEK	**28**	**62,532**	**266**	**81**

Brazil

PY6OA	**A**	**29,719**	**207**	**101**
PY5YC	"	26,196	137	74
PY8JO	"	21,120	112	88
PY1BDU	"	9,342	65	54
PY1MB	**28**	**60,724**	**232**	**94**
PY1BOL	**21**	**27,348**	**112**	**86**
PY2BZD	"	5,986	56	41
PY3APH	**14**	**336,960**	**609**	**195**
PY2FDO	"	2,336	38	32

Chile

CE5GO	**A**	**58,612**	**244**	**82**
CE8AO	**28**	**10,442**	**82**	**46**

Colombia

HK3CPW	**28**	**12,240**	**106**	**40**

Netherlands Antilles

PJ9JT	**A**	**160,923**	**504**	**97**

Peru

OA4AKL	**A**	**98,900**	**221**	**115**
OA4AHA	**14**	**9,776**	**83**	**47**
OA6NCT	**3.8**	**9,472**	**48**	**37**
OA4AGR	"	3,780	31	27

Trinidad

9Y4VU	**A**	**1,198,832**	**1490**	**248**

Uruguay

CX1JM	**A**	**891,660**	**1366**	**210**
CX9BT	3.8	1,880	25	20

Venezuela

YV5IZ	**A**	**5,977**	**54**	**43**
YV3XY	**14**	**303,934**	**600**	**174**

MULTI-OPERATOR

Single Transmitter

United States

W1YK	**782,400**	**941**	**300**
K1CPF	521,400	712	257
W6KG	**269,127**	**647**	**153**
WA6GLD	199,187	525	139
W3YXM	**153,426**	**344**	**182**
WB6JOD	140,481	431	121
WA0ETC	**101,916**	**284**	**149**
WB5AEH	**71,808**	**312**	**136**
WA9JCO	**66,177**	**210**	**129**
WA8UUY	**51,460**	**205**	**124**
WB9GIT	49,590	220	114
W6VPZ	48,400	199	100
K4ZA	**32,754**	**140**	**103**
WA3QWA	2,024	71	44

North America

VP2MYA	**2,792,720**	**3950**	**280**
VE3BMV	**518,178**	**878**	**201**
VE6AN/6	**40,661**	**224**	**73**

Asia

JD1YAA	**535,262**	**1654**	**91**
KA1DX	**489,041**	**1299**	**133**
JH1YDT	**113,148**	**324**	**126**
JA2YAB	70,607	275	121

Europe

I6FLD	**751,298**	**1251**	**323**
SK5AL	**554,130**	**1100**	**262**
SP5PWK	**412,160**	**777**	**256**
OE6HZG	**348,742**	**839**	**254**
G3RCV	**341,690**	**745**	**235**
SP6PZB	307,476	687	219
LZ2KPD	**299,490**	**796**	**201**
YU2CBM	**297,450**	**771**	**225**
DM3QO	**290,318**	**645**	**233**
EI1AA	**246,566**	**616**	**226**
LA1K	**181,598**	**659**	**202**
SP9KRT	141,670	538	155
YU1INO	123,420	520	165
HA3KNA	**118,944**	**387**	**168**
SK6CF	108,717	341	167
OH2AG	**68,453**	**300**	**127**
G3EKW	52,515	266	135
GM4AXE/A	**41,788**	**271**	**124**
SP9PRO	23,996	141	89
OK2KWL	14,628	102	69

Oceania

KH6GMP	**664,674**	**1459**	**141**

South America

PY7BDX	**3,286,287**	**2627**	**423**
4M5BPG	**2,598,884**	**2207**	**284**
ZX7AAD	**1,589,124**	**1850**	**302**
PY3CKZ	349,968	678	184
PY1MO	190,512	480	144
PY1BQK	17,287	105	59

U.S.S.R.

Club Stations

Asia

4J9B	**2,985,004**	**2397**	**358**
UK0AAB	**438,346**	**940**	**214**
UK9CAE	292,383	573	189
UK0AAC	180,661	469	169
UK6QAA	1,794	28	23

Europe

4L3Z	**1,642,560**	**2093**	**354**
UK6LAZ	795,678	1174	303
UK5IAZ	**507,773**	**1092**	**251**
UK3SAB	395,826	1025	222
UK2PAF	**340,632**	**769**	**228**
UK3AAC	336,603	941	219
UK3NAA	274,026	658	218
UK5EAQ	250,879	692	211
UK5MAG	246,627	678	201
UK4WAC	217,467	595	219
UK4WAB	214,110	565	183
UK5QAU	158,424	514	184
UK5ICD	123,025	404	185
UK2GAZ	**121,920**	**422**	**160**
UK3YAB	115,938	350	171
UK2GCF	106,950	370	150
UK2WAF	**95,403**	**373**	**147**
UK3AAY	90,882	346	153
UK5GAB	87,080	300	140
UK2WWW	78,680	317	140
UK2LAK	78,020	237	166
UK2PAO	72,009	301	127
UK2IAD	62,250	298	125
UK5VAA	58,295	228	131
UK2GAR	57,584	246	118
UK4WAK	24,570	156	90
UK3GAA	7,280	107	56
UK6HBV	3,124	56	44

MULTI-OPERATOR

Multi-Transmitter

WA3HRV	**1,731,750**	**1448**	**375**
KA1CQ	**1,040,019**	**2641**	**211**
YU1JRS	**950,300**	**1457**	**325**
SV1GA	**555,537**	**1311**	**281**
VA6NQ	**90,582**	**425**	**93**
WB8JBM/8	**64,856**	**237**	**134**
SK1AQ	**34,608**	**169**	**103**

Our thanks to the following stations who submitted their logs for checking purposes: CE3EZ, CR7RM, DM2DGO, DM2FGN, DM2YLO, HA2KRB, HA4YF, HA5KFA, OH5SK, OH5YX, OK1AWR, OZ6RT, SM1CXE, SM0BDS, SP6KKE, SP9UH, UA3DAO, UA3FT, UA3IE, UA3NG, UA3RR, UA6NX, UA6PG, UA0ABC, UK2AAS, UK2RAX, UK3LAC, UK3MAX, UK3TAA, UK4HBU, UK5LAS, UQ2AS, UQ2HO, UT5HP, UV3DN, UW6CV, UY5EM, UY5ZT, VE1AIH, WA2AUB.

STATION OPERATORS

Multi-Operator Single Transmitter

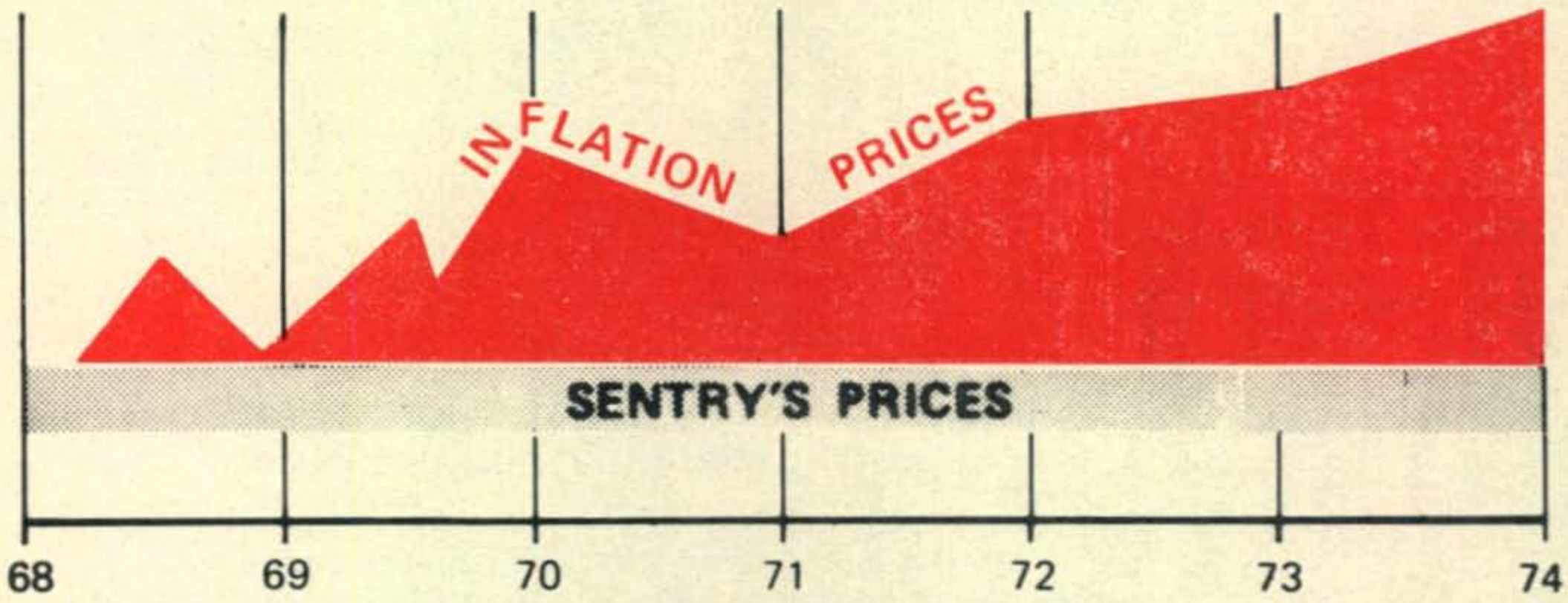
DM3QO: DM2DTO, DM3XHF. **EI1AA:** EI2BB, EI2CA, EI7CC, EI9V. **G3EKW:** G2FUB, G3VUI, G3WFV, G3YUT, G3ZUV, G4AFJ, G4ANS. **G3RCV:** G3VLX, G3WVP, G3XMD, G3YQG, G3ZAY, G3ZEN, G3ZRJ. **GM4AXE/A:** GM4AFF, GM4BFX, GM8FTJ. **HA3KNA:** HA3JNG, HA3NA, HA3NS. **I6FLD** & I6PLN. **JA2YAB:** JA2BY, JA2DDD, JA2DGD, JA2EV, JA2HO, JA2HZA, JA2JSF, JH2ACL. **JD1YAA:** Group. **JH1YDT:** JH1AGH & 5 Oprs. **K1CPF** & K1CSJ. **K4ZA** & WA6QAU, WB4SPG. **KA1DX:** KA2BW, KA8VR, WA5IIS. **KH6GMP** & KH6GQW. **LA1K:** LA1BP, LA1FR, LA2RR, LA4CQ, LA5MK. **LZ2KPD:** 2 Oprs. **OE6HZG:** 3 Oprs. **OH2AG:** OH2KQ, OH2LU. **OK2KWL:** OK2BGR, OK2BNG, OK2BNX. **PY1BQK** & PY1CHP, PY1DBE. **PY1MO** & PY1HU. **PY3CKZ** & PY3CEN, PY3CGP. **PY7BDX:** PY7AEW, PY7AKW, PY7AOJ, PY7APR, PY7APS, PY7AUR, PY7AZQ, PY7ZAH. **SK5AL:** K2LZQ, SM5BGK, SM5BUT, SM0GM. **SK6CF:** SM6CKU, SM6EBQ, SM6FYJ. **SP5PWK:** SP5BSV, SP5DZI & 2 Oprs. **SP6PZB:** SP6FAF, SP6-5039. **SP9KRT:** SP9ZW, SP9-2236 & Club. **SP9PRO:** SP9EWO, SP9FOW, SP9-2351. **VE3BMV** & VE3ABN. **VE6AN/6** & VE6GS, VE6LB. **VP2MYA:** W5MYA & W5QBM. **W1YK:** WA1JLD & WA1PID. **W3YXM:** WA2ZRG, WA3JVG, WA3MNN, WA3QIA, WA3QYM, WA3TAC. **W6KG** & W6DOD. **W6VPZ:** W6CFM, W6LYY, W6YOJ, WA6BIL, WA6DCT. **WA3QWA** & WA3SVN. **WA6GLD** & WA6DGQ. **WA8UUY** & WB8IAY. **WA9JCO** & WA9AKT. **WA0ETC** & WB0AAM. **WB5AEH** & WA5AWF, WB5FFIO. **WB6JOD:** K6QJZ, W6KHS, W6SMW, WA6HCL, WA6OHO, WB6IFO, WB6RWO, WB6RWU, WA7UHE. **WB9GIT** & WB9EBP. **YU1INO:** Club. **YU2CBM:** YU2RMG, YU2RW & Club. **ZX7AAD:** PY7AF, PY7AST, PY7GAI, PY7GV. **4M5BPG:** F5QQ, K5LWL/YV6, YV5BPG.

Multi-Operator Multi Transmitter

KA1CQ: KA1IW, KA2AI, KA2AS, KA2BL, KA2PJ. **SK1AQ:** SM1CJV, SM1CXE. **SV1GA** & SV1EN. **VA6NQ:** VE6AGV, VE6AMU, VE6AYU, VE6JD. **WA3HRV** & K3EST, WA3AZD, WA3IAQ. **WB8JBM/8:** WB8DQP, WB8IRL, WB8JJA, WB8JOZ, WB8JPA, WN8MQC, WN8MQD, WN8OOB, WN8PKK. **YU1JRS:** Club Group.

Tired of Inflated Prices?

Check Sentry's Offer to hold down your 2 Meter FM crystal expenses.



BUY ANY THREE crystals at the regular price and receive **ONE CRYSTAL AT 25% OFF!**

NO PRICE CHANGE IN THE LAST 5 YEARS – and in some cases, volume prices have been slashed.

UNCHANGING POLICY OF:

- *Warranty* – Sentry guarantees any Sentry crystal to be free of defects in workmanship for an unlimited time.
- *Customer Service* – When you buy a Sentry crystal, service is part of the package.
- *Ease of Ordering* – You need only specify manufacturer, model and channel frequency. Sentry maintains up-to-the-minute files on all fixed station, mobile, aircraft and marine radios.
- *One Stop Shopping* Sentry offers a complete series of amateur, general purpose, commercial, precision, CB, I.F., 2M FM, aircraft and marine crystals (32 KHz to 210 MHz) crystals to MIL 3098 also.
- *Fast Delivery* – Any tolerance on any crystal, 5 working days for one to three crystals.

OFFER EXPIRES 28 FEBRUARY 74 SO PLACE YOUR ORDER NOW

All of this "PLUS" Inflation Fighting Prices.

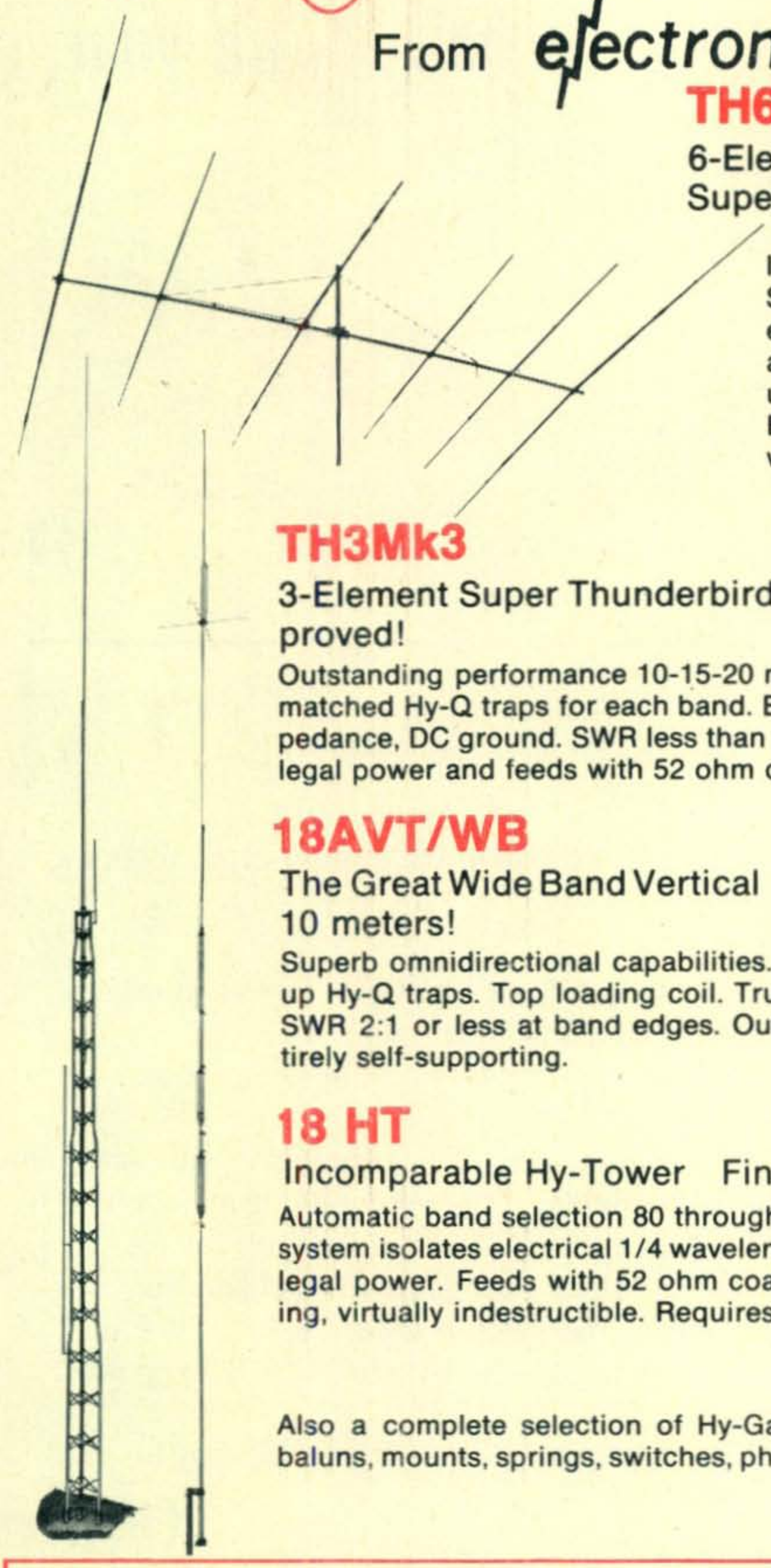
When you order, just say you read it in CQ Magazine

If you don't have our 1974 catalog, write for yours today.

SENTRY MANUFACTURING COMPANY
Crystal Park, Chickasha, Oklahoma 73018
PHONE: (405) 224 - 6780 TWX - 910 - 830 - 6425

hy-gain Antennas!

From electronics center, inc.



TH6DXX

Dallas

6-Element Super Thunderbird DX
Superior Performance TriBander!

Impressive coverage 10-15-20 meters. Separate, improved Hy-Q traps for each band...SWR less than 1.5:1 on all bands. Takes maximum legal power, up to 1 kw AM, 2 kw PEP. Exclusive Beta Match. Factory pre-tuned. Feeds with 52 ohm coax.

$189.95

TH3Mk3

3-Element Super Thunderbird Popular TriBand Beam Improved!

Outstanding performance 10-15-20 meters at reasonable cost. Separate, matched Hy-Q traps for each band. Exclusive Beta Match for tapered impedance, DC ground. SWR less than 2:1 at resonance. Accepts maximum legal power and feeds with 52 ohm coax.

$154.95

18AVT/WB

The Great Wide Band Vertical Super Performer 80 through 10 meters!

Superb omnidirectional capabilities. Automatic band switching. Beefed-up Hy-Q traps. Top loading coil. True 1/4 wave resonance on all bands. SWR 2:1 or less at band edges. Outstanding low radiation pattern. Entirely self-supporting.

$79.95

18 HT

Incomparable Hy-Tower Finest Multiband on the Market!

Automatic band selection 80 through 10 meters. Unique stub decoupling system isolates electrical 1/4 wavelengths for each band. Takes maximum legal power. Feeds with 52 ohm coax. 24′ tower is entirely self-supporting, virtually indestructible. Requires only 4 sq. ft. for installation.

$219.95

Also a complete selection of Hy-Gain accessories including: rotators, baluns, mounts, springs, switches, phone patches and lightning arrestors!

Electronics Center carries complete lines of Ham equipment, accessories and antennas. Write or call Walt, W5ZYA, or Al, W5PXH for your HAM needs.

electronics center, inc.
2929 N. Haskell • Dallas, TX 75204 • 214/526-2023

Home of the world's largest
Electronic Flea Market
It's free!
First Saturday of each month

HAM SHOP

****
FREE TO CQ SUBSCRIBERS
****

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publishers of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.**

RUBBER ADDRESS STAMPS. Free catalog. 45 type styles. Jackson's, Box 443F, Franklin Park, IL 60131.

FAX PAPER: For Desk-Fax, new (not surplus), precut (not rolls), $15 per thousand sheets, postpaid worldwide. Bill Johnston, 1808 Pomona Dr., Las Cruces, NM 88001.

2-MTR FM WANTED. Swap new $150 Calendar Watch, lizard skin band, boxed. W0BNF, Box 105, Kearney, NB 68847.

CAPACITORS WANTED: Computer-grades, Tantalums, Mylars, Discs. Write for top cash offer. National Electronic Supply, Dept. C1, 7231-B Garden Grove Blvd., Garden Grove, CA 92641. Phone: (213) 597-7010 or (714) 893-2900.

FOR SALE: Excellent condition, 7 months old Heath DX60B, $60. Hammarlund HQ110C, $115. WA6NZO, 3228 N. Alder Ave., Merced, CA 95340.

WANT: Collins Kwm-2 with ac, or complete S-line. Also 30L-1 or 30S-1 linear. Must be good and priced right. Richard Schark, 417 North Ferry, Ottumwa, IA 52501. Ph. (515) 682-5741.

YAESU FL2500-2KW. P.E.P. Linear 160 M.-10M. $200.00. Paul W. Haczela, 8 Yale Pl., Armonk, NY 10504. (914) 273-9067.

WANTED: Wireless gear, old receivers, msc. parts, catalogs, etc., regardless of condition. Horvath, 522 Third St., San Rafael, CA 94901.

Speaking French? I am interested to find teachers, students or individuals not necessarily fluent in French willing to speak French on Ham Bands, with high school students. Catalina Radio Club, 3645 E. Pima, Tucson, AZ 85716.

SIDEWALK SALE-Every first Saturday-now in its fourth year. Turn your surplus electronics into cash at the Southwest's leading ham store-it's FREE! Electronics Center, Inc., Dallas, TX 75204.

SAFETY BELTS Tower Climbing, Nylon (new), Lanyard/snap (used), $23.50. Link, Rt. 111, Monroe, CT. 06468.

QSL CARDS printed on Super-High Gloss Card Stock from $8.95/1,000. Full-color catalogue and samples; $1.00. Lijon Graphics, Box 48, East Longmeadow, MA 01028.

TREASURE COAST HAMFEST March 9-10. Sponsors Vero Beach Amateur Radio Club, Inc. and St. Lucie Repeater Association, Community Center, Vero Beach, FL 32960. Free continental breakfast. First prize 80-10 transceiver. Dozens of others. Speaker. Swappers row. Tickets and information, write Ike Roach, K4QM, Box 3088, Vero Beach, FL 32960.

SELL: Collins 75S-3B, $600. Hallicrafters HT-44 w/PS, $225. HT-45 linear w/PS, $300. Johnson KW matchbox, $75. All mint w/manuals. Swan 260 transceiver, needs DC PS work, $225. WB2ETI, 42 Hudson Rd., Bellerose, NY 11426. Phone (516) FL4-6792.

TEN LB. ELECTRONICS PARTS, $10, tubes for sale too. Williams, P.O. Box 7057, Norfolk, VA 23509.

GOOD NEWS: SRRC Hamfest June 2, 1974 at a fabulous new site in Princeton, Illinois Fairgrounds. SRRC/W9MKS, RFD Number 1, Box 171, Oglesby, IL 61348.

Did you know that supplements to the book, "CQ YL," are 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.

WANTED: Dow-Key 6dc or 110ac Coaxial Relays. Advise condition, price. W1BB, Stewart S. Perry, 36 Pleasant St., Winthrop, MA 02152.

PORTABLE ANTENNAE: Band master all coax antenna. Hear one on 14345 or 7240. Make a sked-Charlie. Box 1531 Lake Isabella, CA 93240. (714) 379-8101.

TRADE VW Bug '67, one owner, runs well, licensed; need new (NO AC Plug in time) 30L1 or SB220 linear in warranty. Radio WA0GYX, (816) 252-2434, 1422 So. Pearl, Independence, MO.

1919-1931 Radio Schematics and Service Data where available, $2.00 each. Cecil Bounds, Pine Springs Rte., Carlsbad, NM 88220.

DAYTON HAMVENTION expands to three days April 26, 27, 28, 1974 at HARA ARENA and Exhibition Center. Brochures mailed March 15th. Write for information if you have not attended the last two years. P.O. Box 44, Dayton, OH 45401.

SURPLUS TEST EQUIPMENT, VHF and microwave gear: bulletins; D. Edsall, 2843 St. Paul, Baltimore, MD 21218.

TNT early 30's QST type transmitter with 40 meter coil 210 tube and 500 V power supply with antenna key. Works well. Sell for $50. Box 8352, Savannah, GA 31402.

WANTED: Any information on Western Electric Micro-wave transmitting, receiving and monitoring equipment used in Bell Telephone Systems in 1950's.- Cecil Bounds, Pine Springs Rte., Carlsbad, NM 88220

COLLINS FOR SALE: Complete S-Line purchased new December, 1972. Very, very mint condx: 75S-3C, 32S-3A, 516F-2, 312B-4, 30L-1, SM-3 mic. Rec. includes 200HZ filter and MARS xtals. Cost today over $4,000. Will sell complete package for $2,950.00. R.O. Lions, K6ZWG/7, 326 Morris Ave. So., Renton, WA 98055.

WANTED: Urgently need several heavy bronze weatherproof Type CWS-60047 RF monitor cases used with Navy Model YG-1 shipboard radio equipment sold as surplus by Dayton Aircraft Products, Fort Lauderdale, FL, early 1960's. Bob Knutson, Box 243, Austin, MN 55912.

FCC type test answers general advanced extra $10 specify. DixieTec, Box 8352, Savannah, GA 31402.

ACTIVEHAMS — Monthly mailer of reconditioned and new equipment specials. Sell-Buy-Trade. Write: Associated Radio, 8012 Conser, Overland Park, KS 66204.

P.C.'s. Need a project for winter? Send a S.A.S.E. for list of available boards. SEMTRONICS, Charles R. Sempirak, Rt. 3, Box 1, Bellaire, OH 43906.

CHESS! CHESS! CHESS! Net meets 3.928mc Sun 1100; Mon 1930. SASE for details. K2SYJ.

SELL: Clean working Globe King 500A, CE20A, BC458-10 VFO, QT-1, $200.00 F.O.B., K8CCV, 5471 Norquest Blvd., Youngstown, OH 44515.

heath dx-100B with new spare finals, Hallicrafters SX99 w/Heath QF-1 Q-Multiplier. Dow-Key relay, Turner Mic., $110. WA6BTE, 1059 Harcourt, Seaside, CA 93955.

SELLING: Duplicate callbooks both commercial and amateur from 1920. Selling CQ's from 45 and QST's 1917. Send list of your wants. Erv Rasmussen, W6YPM, 164 Lowell, Redwood City, CA 94062.

NEED: Rcvr tuning cap. for Knight TR-108 Part No. 286-104 TRW No. 273-6707-293. C. Milazzo, WB2OZA, 716 Calhoun Ave., Bronx, NY 10465.

WANTED: Davco DR-30 rcvr; Sell or Trade: Box of about 60 ass'td H.R., 73, CQ, QST. WA2JTN, 300 Lawrence Ave., Oakhurst, NJ 07755. (201) 531-4732.

WANT: Crank-up or tilt tower. Local. Magnum 6 for TR4, RPC Speech Com. WB4JHS, 6092 Chase Ave., Downers Grove, IL 60515.

FOR SALE: Radio Handbook, 11th Ed. and Engrs. Application of Electronics Grub and Kiver Radio Eng. handbook. Termon, Radio Math-Cooke- all mint, $5 ea. FOB. Douglas, W6CUG, 2254 Pepper, Concord, CA 94520.

AWARD HUNTERS: For info, write to New York Chapter, N.A.H.C. Joseph Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355.

SELL: Special Power Supply and speaker for Drake T4XB. Gives higher output and better linearity, $40. David Schwartz, 1183 Southeast St., Amherst, MA 01002.

SB-33, Heath EC-1 Analog Computer. New, FM-2x w/ac and extra xtals, best reasonable offer. John Wagner, R. 2, Box 142A, Caro, MI 48723.

SALE: CLEGG 22'er FM like new, with 12 Xtals and manual, $225 fob. Pgh. Pa. 15235. K3YMN, 2185 Sampson St., Pgh., PA 15235.

SELL: 28 R/T, $50, 14 Rotr, $35. Mainline TTL-2 $100. Wking condx. Others. Mike Sorochka, Jr., 95-01 243 St., Bellerose, L.I., NY 11426. (516) 488-3166.

COLLINS 30S-1, $1050. MM2, $55. HA-1, $70. SB620, $85. DX Eng. Processor, 32 S Line, $65. Waters Coupler, No. 3001, $45. Walt, W8LJP, 313 227-7338.

CENTRAL ELECTRONICS 200V good condition. $275. W9UZC, Southwest Acres, RR 2, Harrisburg, IL 62946. (618) 252-7064.

WANTED: Gonset Comm. III or IV 2 meter AM transceiver or other make. Good am transceiver: WB4VAP, 150 Coral Circle, South Daytona, FL 32019.

SIGNAL CORPS SURPLUS COMMUNICATIONS Equipment Catalog, 25 cents. Colonel Wayne D. Russell, 9410 Walhampton, Louisville, KY 40222.

FOR SALE: SB-313 with full coverage on 80, 40 and 20 meter bands plus 49, 41, 31, 25, 19, 16 and 13 meter bands. $275. W8TXX, 1733 Santa Maria, Stevensville, MI 49127.

WILL TRADE a Unitron 3" photo equitorial telescope with full accessories for a good transceiver. WB4BUI, Star Rt. 2, Box 17, Temperenceville, VA 23442. 824-3292.

SELL: Conar Osc. scope Model 250, $50. Conar Sig. Gen. Model 280, $25. HQ-170 needs minor work, $75. WB2CCS/4. Robert Umbach, 7111 Galesville Pl., Annandale, VA 22003. (703) 256-6598.

INTERESTING LIST OF HAM GEAR Parts, etc., etc. Send SASE for list. WA8QBJ, H. Johnson, 6305 Redbird Terr. Dr., Clinton, OH 44216.

WANTED: Used Heathkit Ignition analyzer scope model IO-20. John Stiles, W0OSP, Sherwood, NO. DK. 58782.

1st and 2nd FCC TICKETS. Fast, $5.00 Study Guide. CRD Associates, Box 291, Western Spgs., IL 60558.

BARGAINS: 2" oscilloscope, $12. Eico No. 369 Sweep-Gen., $45. SASE for my listing. G. Samkofsky, K4HRU, 4803 Brenda Dr., Orlando, FL 32806.

SIX-METER TELREX 4 element beam., $10. WA2PCL, (212) 849-8458. Richmond Hill, NY 11419.

WANTED: Coils for old National SW-3 receiver, any frequency. Also any Crosley printed info 1922 to 1928. W7KE, 1109 S. 2., Hamilton, MT 59840.

FOR SALE: Galaxy GT550 with AC550 supply and speaker, xtal calibrator, and fan $350. Ameco PT preamp, $35. W8IIT, 281 Jenny Ln., Dayton, OH 45459.

DX-100 $85, new LCG 388 leader, $150, ART13 w.p.s., $45. SASE for list of test equip. Will consider trade toward cameras, SSTV camera, will ship units via freight collect. Michael Jones, Rt 1, Box 532, Fortson, GA 31808.

SBE34 XCVR with crystal cal., microphone, speech processor, mobile mount and operation maintenance manual, $250. K. Stevens, 205 Greentree Dr., E. Syracuse, NY 13057.

HEATHKIT GR-78 Solid State Portable. General Coverage Receiver. Mint. $99. W2DV. (201) 429-8880.

WANTED: HW32A with manual complete in excellent condition/performance. One owner preferred. Carl Frank, W0COS, R. 1, Rochester, MN 55901.

SALE: Drake TR-3, AC-3/spkr., $390. — Drake R4 Rcvr., $285 — Heathkit SB-310 Rcvr., $260 — Swan 260 Cygnet Transcvr., $285. — Swan 500 Transcvr, 117XPS, $454 — Swan 350C Transcvr 117XC------/14C, $463. — Swan Mark I Linear Amplifier, $295. — All postage paid. Ron Conley, K7LTV, 37 Wyoming Ave., Billings, MT 59102. (406) 259-9554.

SALE: Collins 75S-3 AM and CW filters, matching speaker, $350, SB-400 $175. All crystals. Best condition. Clarence, WB0HDM, 1004 So. Garfield, Denver, CO 80209.

FOR SALE: Eico 720 transmitter, Heath Cheyenne transmitter, Heath Transistor P.S. Model MP-1, Heath Q Multiplier Model QF-1, Gonset Super 12 converter. Excellent condition and w/manuals. W4KMS, 1112 Littlepage St., Fredericksburg, VA 22401.

NEW- Now available SPK-1 speech processor. Have a Stronger, more intelligible signal. SPK-1 Kit, $19.95 pp from SPC. K. Teague, P.O. Box 65, Alma, AR 72921.

WANTED: Johnson Viking Ranger or Valiant Ted Tsucalas, P.O. Box 515, Shelter Island, NY 11964.

SELL: DX60 fine cndx, $50 Hallicrafters S-53A Rcvr, mint $65. Both $100 Gotham V80 ant. SASE. Russ, 1620 Thurston, Olympia, WA 98506.

WANT: SB2LA, inverter, good gen. cov. rcvr. (e.g. 51J2). Sell NC-303 and converters, SX-99, TX-62 and VFO w. FM. WA9CYW, Box 163, Cannelton, IN 47520.

WANTED: Pair of Amperex 8163 or 8802. W7JI, 235 E. 15th St., Tempe, AZ 85281.

CLEARING OUT pwr xformers, fixed & variable conds., meters, etc., dating back to 1923. SASE for list. W2BGO, Kenney, Box 288 Brookway Ave., Valley Cottage, NY 10989.

HEATH TX-1 and SB-10 good condition, low hours $165 FOB. Steve Prescott, 1 Colonial Circle, Storm Lake, IA 50588.

SELL: Johnson Viking II xmtr w/manual and 122 VFO. Needs minor repairs. Best offer. Mark London, 104 Hilldale Rd., W. Hartford, CT 06117.

SELL: Drake 2B Rcvr and 2NT xtrans with manuals and cables, xtals, $250. Will ship F.O.B. WN-3VGS, Gordon, 240 E. Main St., Mechanicsburg, PA 17055.

LAFAYETTE HA-144 (solid state 2m); Hallicrafters SR42-A w/HA-26 VFO (2m); all mint w/manuals; swap for Davco DR-30 rcvr. WA2JTN, 300 Lawrence Ave., Oakhurst, NJ 07755.

MODULATION XFMR WANTED, Universal, 125 watts or better (Triad M-12AL, Stancor A-3894 or A-3898, U.T.C. S-21, Thordarson 21MG2 or 21M72, etc. Brockton High School Radio Club, 470 Forest Ave., Brockton, MA 02401.

WANT: Stock ticker, telegraph items, crystal set. Dr. D. Spence, Argonne Natl. Lab., 9700 S. Cass Ave., Bldg. 203, Argonne, IL 60439.

FREE: Research Report Capacitive Discharge Ignition Systems. K6ICS, Dr. Gauthier, 9418 Florence Ave., Downey, CA 90240.

30S-1: Just reconditioned by Collins. $900. Prefer pick-up. WA8VFK, 314 So. Western Ave., Springfield, OH 45506.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P.O. Box 73, Coram, N.Y. 11727.

HALLICRAFTERS: HT-33A, $225. SX-101A with product Det. (factory Sch.), $175. Both mint, with manuals. W1JSS, 9 Winter Terr., Westwood, MA 02090. (617) 762-5252.

WANT TO BUY: Old wireless keys, parts. T.G. Soukup, 161 Bob Hill Rd., Ridgefield, CT 06877.

FREE, Pick up only. One Acme Telephoto Transceiver Model FNP-IS. N.C. Moseley, Beechwood Dr., Tarboro, NC 27886.

WANTED: External VFO's, FV400 for Yaesu FDdx 400 and No. 410 for Swan 400. K5ENL, Ed Block, Rt. 4, Grandview, TX 76050.

SELL: DX-40/manuals, $25; BC-649 VHF Rec. w/ p.s., $30; CB-set - MC-6, $25. You pay shipping. WA5CBF, 900 No. Willard, Altus, OK 73521.

HE12A 80 mtr with HP13 DC and AC Supply, $140; BC453 200/500 khz Rcvr with pwr sup, $15, W6BLZ, 528 Colima St., La Jolla, CA 92037.

MILLIAMPERE METERS, center reading 0-150, $3.50 ppd. Goodman, 5826 S. Western, Chicago, IL 60636.

WANTED: WD11 tubes for my Radiola IIIA and any old battery radios of early '20's. John Thomas, 50 Mary West, Lindsay, Ontario, Canada.

FOR SALE: 62S-1, $675; KWSI No. 1451, $650. 75A4 No. 5667 (factory over-hauled), $450. Send for list of others. J.W. Craig, W1FBG, 29 Sherburne Ave., Portsmouth, NH 03801.

KNIGHT xmitter, c.w., 10-80 mtr 50 watts, perfect, $30. Heath HW16 with HS-24 spkr, excint thruout $90. You ship. WB9HXZ, 8864 Hillside Dr., Hickory Hills, IL 60457.

WANTED: 2.1 and 1.8 khz filters for 75A4 rcvr. W4VMS, B. DuHart, 3846 Winona Dr., Pensacola, FL 32504.

SELL: 14 Rotr, 19ASR, TTL/2 mainliner and spare TTY parts, SX117. Send SASE for details. M. Sorochka, 9501 243rd St., Bellerose, NY 11426. W2HAJ

HW-16 & HG-10B, $100. M.F. Rubio, WN6WWU, 337 W. Raymond St., Compton, CA 90220.

WANTED: An RME 4301 side band selector. For Sale: 4-814's and 2, 4-65A's. W3FDW, Birdsboro, PA. Box 26, 19508. (215) 582-8158.

FOR SALE: 4CX1000A new $100.00. HP-350D audio attenuator set, $60. Johnson low pass fltr, $5. Others. W5TEP, 1225 W. Bridge St., New Braunfels, TX 78130.

WANTED: Power transformer for HT32 Mark I. State price 1st letter. E. Richmond, RR2, 16B Wooddale, Hull, GA 30646.

BIRD elements 50-125mc 25 & 50w, $15 ea., GE Prog-line mobile p/s, $10. Berkley 700-1 counting units, $3 ea. K6KZT, 2255 Alexander Ave., Los Osos, CA 93401.

Military panel mtrs and filament transformers cheap. What do you need? WA4RDV, 1145 Kerns Ave., Roanoke, VA 24015.

COLLECTING Call Letter License Plates, all states, prov., years. Will pay postage. Art Phillips, WA7-NXL, 3401 N. Columbus, Apt. 5-O, Tucson, AZ 85712.

WANT: SBE24 or similar. Good. Will pay or trade. L.B. Fuqua, W4WBD, Maple St., Box 6, Eddyville, KY 42038.

WANTED: 2 mtr. ht. State condx and price. K6EIS, Rt. 4, Box 605, California Hot Springs, CA 93207.

GONSET Comm IV (2 mtr xcvr) w/ ac /dc cords, $125. Ameco TX62 (2 mtr & 6m) xmitter, $70. Send for free list. Colella, WA2HQD, 105 18 131st St., Richmond Hill, NY 11419. Phone: (212) 641-2559. All excellent.

WANTED: Drake 6 mtr remote vfo RV-6, Heath SB-110A & SB-200. WA8ZCO, 16245 Beechwood Birmingham, MI 48009.

WANTED: Gonset 2 mtr. Sidewinder and Gonset 2 meter 500w. amp. WA8JEI, 38251 Elmite, Mt. Clemens, MI 48043.

WANTED: Drake VHF line TC-2 TC-6 and conv. CC-1. Also any 2 mtr fm rig. K8HWW, 33727 Brownlea, Sterling Hts., MI 48077.

TT-63B/FGC Teletype Repeater Schematic or Manual wanted. Copy or buy. G. MacCormack, K0MEY, P.O. Box 298, Rye, CO 81069.

HW-101, HP-23, SB600, HM-15 GH-12A, Viroplex, phones, ant. switch phone patch, wire, coax, Complete station in mint condx. 2 yrs. old, for only $400. Contact Dave Solt, 1061 Lancaster Ave., Syr., NY 13210.

SELL: SX101 MK3, $140, Viking Invader 200, SB xmitter, $150. NC-100, .550-30mcs, $65. HA6 Transverter with 2m amp. conversion if wanted, P26 SB conversion, $150. E.N. Sieder, 4765 NE 16th Ave., Ft. Lauderdale, FL 33308.

FOR SALE: Hallicrafters HT-40 transmitter; excellent condition, with new manual. $35 and you pay shipping. Gene, WA5ETK, 817 West 11th St., Littlefield, TX 79339.

QSL CARDS: Send 15 cents for sample. The Print Shop, P.O. Box 353, Lockport, IL 60441.

Rohn 10 ft. tower sect and flat roof, new base mount, $50. W. A. Sarno, D.P.M., 477-86th St., Brooklyn, NY 11209.

REGENCY HR-2B, 2 meter fm transceiver. Never used. Call or write. (616) 344-5645. WA8CDU, 3421 Wedgewood Dr., Kalamazoo, MI 49008.

MISC. SALE: SASE for list, test eqpt., tubes, caddy, sams man., SB-303. Want VHF Gear. Victor Schorn, Rt. 5, Box 323-B, Florence, AL 35630.

MAGNUM 6 for Drake, $100. Edward Roberts, 1 Beach Ave., Auburn, NY 13021. W2PLZ.

SELL: Heath scope model 10-14. Assembled but never worked. $125. We ship. WA0JLD, Rt. 1, Box 866, Alexandria, MN 56308.

NEED VLF Receiver 10 to 30 khz, or schematic for homebuilding. Want to write with others knowledgeable this area and exchange notes. Foxworth, Box 2111 GPO, New York, NY 10001.

WANTED: Eimac tube socket number Y-149A. Will also accept type SK-800B, SK-810B, or SK-890B. Also, Eimac chimney type SK-816. Also, technical manual for Collins 51J4. Write: 8035 Boughton Hill Road, Victor, NY 14564.

WANTED: Eimac 4-400A or 4-400C. Jim Fleming, 6N705 Harvey Rd., Medinah, IL 60157.

WANTED: Invader 200. Preferably from within 100 mile radius of New York City. State price and condition. W2LRL, 2 Birch Lane, New Hyde Park, NY 11040. (516) FL4-8903.

WANTED: Apollo or equiv. rig. Need not be wkng. Must be complete. WA4TCW, 623 Avon Rd., W. Palm Beach, FL 33401.

FOR SALE: Power supplies: MP-1, $95. PM-2, $85. 516E-1, $115. L/S 350-6, $30. 350-12, $50. 400-12, $85. 500-12, $100, 400-12/115, $125. Misc.: SB-620, $85. C. E. 200-V, $395. HT33, $200. 28KSR, Electro-Com250, $395. Ranger Two, $135. James Craig, 29 Sherburne Ave., Portsmouth, NH 03801.

WORKED SO. AMER. CERTIFICATE. Work all 13 countries. Send list and $1. HC1TH, 4805 Willowbend Blvd., Houston, TX 77035.

TOUCH-TONE PADS: Twelve button, full leads, unlighted $11; lighted $15. Postpaid/insured. WA5GNT, Swank Roberts, 1130 Fuller Dr., Apt. 223, Dallas, TX 75218. Home (214) 328-9307. Work: (214) 742-7231.

HEATHKIT SB-102, cw filter, ac and dc supplies, mobile mount, remote LMO, spkr, manual, asking $475. Heathkit SB110, ac supply, spkr, manual, $225. Hallicrafters HA1 keyer, $50. J. Boston, WB-4RUA, Box 354, Calhoun, GA 30701. (404) 629-3048.

FOR SALE: Heathkit Mod. T3, $10. Heathkit TS4, TV align generator $10. Ameco CB6 converter for 6 mtrs, $5. Heathkit IM17 solid state volt-mtr, $10 W8YLJ, Del Carlin, RR1, Bryan, OH 43506.

GEN COV NAVY RCVR. 2-20 mhz 4 bands. Very good, clean condx. W/manual RBS-3, R-303/FRR, $50, or trade. H. Johnson, 6305 Redbird Terr. Dr., Clinton, OH 44216.

NEW TRIO TR-7200-G w/48 xtals, VFO & auto patch input, 14 watts out on .28. W/mike, ext spk and PA connectors. WA3MEG, 12211 Valerie Ln., Laurel, MD 20810. $400 FOB.

SUPER-PRO, BC1004 replacement IF and BFO-osc xformers, crystal filter units, also Yashicamat, LM camera. C. Meistroff, 7410 Chamberlayne Ave., Richmond, VA 23227.

SALE: Homebrew VFO beautifully converted from ARC-5. Worked FB with Viking 6 & 2 $10 post-paid. K8OUQ, 268 Annis Ct., Chillicothe, OH 45601.

FOR SALE: Galaxy GT550 with AC550 supply, spkr, crystal calib, and fan, $350, plus shipping. W8IIT, 281 Jenny Ln., Dayton, OH 45459.

WANTED: Kodak XL55 low light level movie camera, Super 8. M.J. Moss, W4UXJ, Box 28601, Atlanta, GA 30328.

HEATHKIT SB-310 Receiver. Covers 80, 40, 20 & 6 other shortwave bands, with am and ssb filters & book, $175. H. Hecht, WA1LWD, 64 Kaye Rd., West Haven, CT 06516. (203) 932-5527.

HIGH SCHOOL needs donations to start ham club. Anything appreciated. We pay postage. E. Wilson, Mariner Sr. High, 3551 McKnight Rd., White Bear Lake, MN 55110.

WANTED: Info exchange on the up-date, modification of a FB rig, the Heath HW-100 xcvr. Dial Drive, WWV, scope out & noise limiter thus far made. Any ideas most welcome. Naumoff, K7LYK, 116 Stewart St., Seattle, WA 98101.

DRAKE SW4A, $199.95. HT18 vfo, $39.95. Communicator III (2M), $119.95. H.I., Al McMillan, W0-JJK, Box 864, Council Bluffs, IA 51501.

FOR SALE: New RCA test equipment, never used. Audio Gen. WA504A $75. Transistor tester,--- WT501A $50. VTVM WV98C, $75. Surrett, 530--- S. Ledbetter St., Anniston, AL 36201. Phone: (205) 237-4137.

BOUGHT NEW SS-200 & like very much; however, will hav 2 sell a few things arnd here (or make it look like I'm at least tryin) Will sell our SWAN 500CX 4 the very low price of $395 & W the $130 dollar PS4 $50 (the rig has the new quartz filter) plus a 1972 very beautiful BMW bl & chrome motorcycle (only 7000 miles on it) Offer... 455-41st Ave., San Francisco, CA 94121. Kenny, (415) 386-6313. First check 4 the SWAN at this low price takes it.

KENWOOD R599 receiver with 5599 speaker, excellent condx. $310. T.A. McKee, 1306 Grove Rd., Lynchburg, VA. 24502. Phone (804) 239-5002.

CALCULATOR: MITS Model 908M. memory, square root, reciprocal. Brand new, never used. Cost $120. Sell $85. PP. H. Marhoff, P.O. 569, Largo, FL 33540.

WANT: Halftone storage CRT, manual for AN/UXH-2 facsimile recorder, fax equipment, cheap SP400 or SP600 receiver. WA5NQE, 701 Carolyn Ave., Austin, TX 78705.

2MTR FM RCA carphone CMC25 2 channel w/ crystal 28/88 and 52 direct, $75. 4 Western Union desk fax, $10 ea. 5516 Grand Lake, Houston, TX 77036.

HEATH HW16, excellent, $75. Knight T150B $50. 2 mtr tuneable conv., $10. J. Pumo, 2512 Crane Pl., Union, NJ 07083. 687-5680.

WANTED: 51J4 filter, 1-3 or 6kc, also scraper for spare parts, reasonably priced, please. K5OPO, 1046 Greymont Ave., Jackson, Miss. 39202.

WANTED: HW18-3 160 meter transceiver, WB2LTS 133 N. 19th St., Wyandanch, NY 11798.

WANTED: HF-UHF signal generator with calibrated output attenuator, Measurements Model 80 or equivalent, K2QIV, 66 Anytrell Dr., Webster, NY 14580.

SIX-METER TELREX 4 element beam, $10. WA2-PCL, 101-23 Lefferts Blvd., Richmond Hill, NY 11419.

JOIN World's biggest DX & Awards Hunters' Club CHC. Over 1000 awards listed in CHC Awards Directory, $5. POB 383, Bonita, CA 92002.

SELL: New TR switch, $10; 0.1 watt 2m FM xmtr $30; Heath twoer $25. Wanted for college club, HRO60 coils. W5QNQ, 2025 O'Donnell, Las Cruces, NM 88001.

HAVE EXTRA RIDERS MANUALS. Need Vol 23 and all indexes. What do you need? Want Collins 312B4 station control. W7KSG, 1876 E. 2990 So SLC, UT 84106.

COLLINS 310B-1 for sale. $95. Pick up. Peter Butler, W1BPW, 3 Elizabeth Dr., Merrimack, NH 03054. (603) 424-7373.

WANTED: Heath HG-10B VFO. Write Joe Marsala, 46 Swanty Johnson Rd., Uncasville, CT 06382.

WANTED: Drake TC-2 transmitting cnvtr, slugs for Bird 43 wattmeter. Also drill press bench type, in good condx. For Sale HA-750 6-mtr mobile rig. K4BPY, 1031 Bayfield DR SE, Huntsville, AL 35802

SALE: Shure 777 Mike, $10; Squires Sanders Noise Silencer, $10. Plus postage. List for SASE. Erickson, 13 Robert Cir., S. Amboy, NJ 08879.

BOSTON HAMS! 50' telescoping mast (used once on Field Day) at 1/3 off; i.e., $19. WN1PSB or WB6CEP.

SX-101 with 6EH7 RF 6BY6 prod det manual $125 or trade for fm gear. W5RC, R.M. Terrill, 3706 Alta Vista, Dallas, TX 75229.

WANTED: National HRO-5 receiver, or pre-war HRO. Unmodified. Bill Orr, W6SAI, Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Drake Spr-4. Write: Harrison, P.O. Box 234, Bloomsbury, NJ. 08804. Please state price and condition.

NUMBERED HAM SENTENCES in 54 languages for you to copy! K3CHP's DX QSL GUIDE. $3.95, Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

WANT: Antique radios, info on bioelectricity cells, or any help; VLF rcr any make or condx. Jim Gunn, WN1QNK, Ossipee, NH 03864.

STAR 700E rcvr & Star xmtr, 300 wts. PEP, 80-10 mtrs, xclnt condx, cost $790 urs for $395. Silbert, White Sulphur Springs, NY 12787.

NOVICES: HW16, Drake low pass and 6 xtals, $85. CQ machine (works with a tape recorder, $15. WN2HFJ-14 Andover Dr., Syosset, NY 11791. (516) 921-3583.

LINEAR BUILDERS: Send SASE for list of goodies, HiPower--Lo price. Mace, 8600 Skyline Dr., Hollywood, CA 90046.

FOR SALE: Several models and ranges of panel meters. Let me know what you need. James Fred, R1, Cutler, IN 46920.

SELL: Realistic DX-150A Rcvr, mint condx, will take $70. Please contact Emmett Hoops, WN2RRM, 300 Windsor Pl., Bklyn, NY 11218.

SELL OR TRADE: Like new 2 KW PEP Gonset 201 Mark III Linear with 572B's. Can ship in orig. packing. Make offer or consider trade for gd rcvr or 2 meter gear. L. White. W2CNQ, 32 Rutgers St., Closter, NJ 07624. Phone: (201) 768-5958.

FOR SALE: Hallicrafter HT32 xtm, $150. HallicrafterSX101 rcvr,$125. Gonset Linear (1500 watts GSB-201, $150. Sell all or by one piece. Jerry Macari, WA2KDB, 138-23 59th Ave., Flushing, NY 11355.

2MTR FM: SBE144 solid state transceiver 9 channels, crystalled $200 or best offer, want SB610 am/or SB650, WA1MCY, 53 Old Amesbury Line Rd., Haverhill, MA 01830.

HEATHKIT: Tuner FM-2, Amplifier EA-2, Multiplex Adapter AC-11. Complete $50. Cabinet $35. Estate W8IMU, 7390 Bartholomew, Cleveland, OH 44130.

WANTED: INOUE IC-3P power supply. WA7TYZ, Mike Aronson, 2521 Broad St., Bellingham, WA 98225.

SALE: Fisher Stereo 100-watt tube X-100-C amplifier. Orig. Sld. $200. New Cond., never used $140. Also, TRC-18 Realistic 12 chan. CB Radio, like new $50. Contact Mitchell Rakoff, Box 427, Rego Pk., NY 11374. Phone: (212) 275-8072.

SWAP: Lightning Switch SPST, 100 amps: Size 15" x 3" mint condx. Will swap for early 1920's radio parts. W8BHT, Leo L. Gibbs, 701 Brookfield Rd., Kettering, OH 45429.

WANTED: Central Electronics 600L Linear amplifier. W7JI, 235 E. 15th St., Tempe, AZ 85281.

SWAP: Fone Directory yr city for zip code book or perpetual calendar. CA only. Specify. K4CLA, 5/111-A Oak, Lex., SC 29072.

GENERAL ELECTRIC TPL Mod. TE7 3KA6,80 watt with PL, on 151.745 Mhz. $185. Also RCA Super Carfone Mod. CMUA35J2, currently on 451-.850 Mhz. $225. Both radios are fully solid-state except for driver and final tubes. Robert Bliss, 1440 Lakeview Ave., Minneapolis, MN 55416.

SELL: CQ's from 45, QST from 1916, one or a hundred. Call books from 1920. List for Stamp. Erv Rasmussen, W6YPM, 164 Lowell, Redwood City, CA 94062.

WANT: Metal case (outer cover) for Tektronix 513-D scope. Sell older GR lab equipment. Send SASE for list. W5JJ, 5824 N.W. 58th St., Oklahoma City, OK 73122.

FOR SALE: Globe Scout Deluxe transmitter, 90 watts C.W. and 75 watts phone. Sale for $100. Like new. With large number of crystals. W.J. Surrett, 530 S. Ledbetter St., Anniston, AL 36201. Phone: (205) 237-4137.

SB-101, CW filter, SB-600 and HP-23. Works and in fair condx. Sold as is, $180 FOB, W7JKG, 103 E. Bartlett Ave., Selah, WA 98942.

OLDTIMERS: Get your kid on the air. Swap Heath Kit Cheyenne and HR-10B for a Tri-band. W.B. Wadsworth, WB9MCW, 267 Woodland Barr., IL 60010.

COLLINS "S" line round emblem V.G. units wanted. Ray Clark, Box 1216, Dunnellen, FL 32630.

WANTED: Collins KWM-1, with 516F-1 power supply, must be A-1. Russell, 19680 Mountville Dr., Maple Hts., OH 44137.

DX-PEDITION XYL approved? Montserrat W.I. House in tropical setting, pool, maidservice. VE3-FHO, Box 1077, Elmira, Ontario.

Signal Corps Surplus Communications Equipment Catalog, 25 cents. Colonel Wayne D. Russell, 9410 Walhampton, Louisville, KY 40222.

WANT: Early Helix or Oscillation Transformer and Spark Gap. Dr. D. Spence, Argonne Nat'l Lab, 9700 S. Cass Ave., Bldg. 203, Argonne, IL 60439.

DRAKE TR4, $400. L-4 Linear, $500. Both $850, both have new finals and are in mint condx. WA8 VFK, Springfield, OH.

WANTED: Waters Model 337-SI Q-Multiplier/notch filter for Collins 75SI Receiver. WA6 AHF, 17494 Via Alamitos, San Lorenzo, CA 94580.

SELL: Mint HT37 $160, mint HQ170C, $150, you ship. K9 ARZ, 338 Sophia, West Chicago, IL 60185.

FOR SALE: Various parts and equipment for the beginner and builder. SASE for reasonably priced list. Lisaius, 116 Orton, W. Caldwell, NJ 07006.

MAGAZINES FOR SALE: CQ/73/QST/Ham Radio. Send SASE for list. E. Guimares, RFD 2, Box 480, Middleboro, MA 02346.

FOR SALE: Plate xfmr for SB-220 new $25. 18AVT/WB vertical new condx $50. S-line style cabinet w/front new $25. 2-813's used, $10. For the pair. You pay postage. G.L. Myers, WB6 RVH, 44641 21st St. W, Lancaster, CA 93534.

21 ISSUES CQ MAG, various mos. years. 1952-1959. No dupes. Good cond. $6.50 postpaid. K8-OUQ, 268 Annis Ct., Chillicothe, OH 45601.

SELL: Weston 4" lab quality, illuminated, 0-1 MA D.C. Meters, $40 catalog price, only $4.00 ea., plus shipping. G. Samkofsky, 4803 Brenda Dr., Orlando, FL 32806.

SELLING COLLINS GEAR? I'll pay top dollar. 555 W. Middlefield, H-103, Mountain View, CA 94040.

FOR SALE: Heathkit Twoer, perfect, $40 postpaid, in U.S. W0NY, 717 Crest, Ft. Dodge, IA 50501.

CONNECTICUT WIRELESS ASSN — Ham Radio Auction — Roger Smith Hotel, Stamford, CT, Wed. Jan. 9, 1974, 8 p.m. Buy or Sell "Gears."

SX-101 with 6EH7 RF 6BY6 prod det manual, $125 or trade for fm gear. W5RC, R.M. Terrill, 3706 Alta Vista, Dallas, TX 75229.

FOR SALE: Freed-Eisman NR5 (1923) fair condx with tubes. Best offer. W2DQC, 229 Sarles Ln., Pleasantville, NY 10570.

FOR SALE: Eldico transmitter, rcvr, and sta. control unit w/watt meter, phone patch, and R.F. output meter. Also manuals. $325. WB4PUD, P.O. Box 805, Springfield, TN 37172.

FOR SALE: SSB transceiver, Natl. 200 and AC supply, $250. Mint with manual. Wanted: MP-10 converter and Hustler 20 mobile tip. T. Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, CA 95453.

FOR SALE: C.E. 100V — C.E. 20A — Valiant — HQ170 — AF67 — GPR90 — R390A — Test gear galore. Write: P.W. Binford, 561 Atherton, Novato, CA 94947.

SELL OR TRADE: Best offers for HRO-60 6M. "AD" coil, new PE-103 dynamotor, pair selsyns, Jones model 252U1 Micromatch, BC221 w/ac and modulation. W5AMK. P.O. Box 96, Temple, TX 76501

250w. plus LINK Base — .76 — .94 w/scan $200 or trade SP-600 or equal rcvr. K7LQY. 1849 Stevens Dr., Richland, WA 99352.

SELL/Swap: Complete (ATV) amateur tv sta. presently on the air, 445 Mhz. SASE for further detail. W.L. Haskell, W7HFR, 3915 N. Campbell Ave., SP 102. Tucson, AZ 85719. (602) 327-3960.

WANTED: Drake SPR-4. Write: Harrison, P.O. Box 234, Bloomsbury, N.J. 08804. Please state price and condition.

SELL: Clean, working Globe King 500A, CE20A, BC458-10 VFO, QT-1, $200.00 FOB, K8CCV, 5471 Norquest Blvd., Youngstown, OH 44515. Want: Johnson Desk KW, need coils for 1937 RCA ACT-20 xmtr.

FOR SALE: DX-100 xmtr., $90.00; Ameco TX-62 xmtr, $95.00. Both gud cond. No ship. F. Kurz, P.O. Box 347, Zion, IL 60099.

POLYCOMM 62, Transceiver for sale, covers 2 & 6 meters, AC & DC supply, needs work, $70. Jim, K4VBH, P.O. Box 268, Americus, GA 31709.

NEW SB-401 xtal pack, $15; old DX-60, $20. Charles Smith, Box 543, Conyers, GA 30207.

SELL: R388 (51J3) in good condx. $285. with Collins mech filter adaptor, $315. K0GCJ, 4322 Blauvelt Rd., Grand Island NE 68801.

CLEANING SHACK, BIRD thru SSTV. List SASE. Want YAESU FT-2 Auto. Trade? W4API, Box 4095, Arlington, VA 22204.

JOHNSON VIKING II w/122 VFO, 160-10m., gud novice xmtr, NYC vic., $90. Auslander, 1499 N. Meadow Rd., Merrick, NY 11566.

SELL: Mint SB-220 linear, $335. HW-32A, $50. HW32 $25. WA2RJV, 301 Blacksmith Rd., Camphill, PA 17011.

TOUCH-TONE PADS: Twelve button, like new. $11.00 unlighted, $15.00 lighted. S. Roberts, WA-5GNT, Dallas, TX (214) 328-9307.

WANTED: Vols. 20-21 and 23 Riders Trouble Shooters Radio Manuals. Also SX88 or SX73 Hallicrafters. Send price and cond. to H.E. Parr, Clifton Hill, MO 65244.

WANTED: DC pwr supply for Galaxy V transceiver. State price and condition to Jerry, W5SRN, 9011 Briardale, Austin, TX 78758.

SELL: Hallicrafters SX-100; Heath DX60A with HG-10; Twoer; Motorola T43GGV-3. Send SASE for details and price. WA5TJU, 5222-42nd St., Lubbock, TX 79414.

SBE-144 12 sets xtals, $190, 275w Matchbox/swr, $50. TH-3JR, $50. SRC-146A extra xtals, mike, nicads, case, $210. Ray Mustafa, WA2-NBG, 216-15 Sawyer Ave., Holliswood, NY 11427.

BC610-I, BC-614, Tuning units, coils, spare tubes and manuals. Make offer. FOB, Cupertino, CA W6OTW, 10385 Mann Dr., Monta Vista, CA 95014.

SELL: New condition, 75S3B, $600 certified chk, and will ship prepaid. Also new R-390A cond. new $650.00. W4AIS, 300 Thornwood, Taylors, SC 29687.

YAESU FTDX570 for sale. Best offer, 1 yr. old. Tom Dornback, K9MKX, 2515 College, Downers Grove, IL 60515.

FOR SALE: Laffe. Audio Gen., $30. EICO 950A Rcl Bridge, $39.95. Eico 584 batt. tstr, $9.95. 944 Yoke and fly tsry, $34.95; 536 VOM, $15. All FOB. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy., Jamaica, NY 11432.

HY-GAIN TH-2 MK3, $59.95. (W6RQZ), 1330 Curtis, Berkeley, CA 94702. (415) 526-7345.

WANTED: SB610 Heathscope, any condn give details ask price first letter. KP4BCL, WB28 Urb. Los Angeles, San Juan 00913.

TRADE like new SB-220 for similar SB-200 and $140.00 cash. Paul, K8CJX, 22960 Valley View, Southfield, MI 48075.

ATTENTION Independent County Hunters--- Are you registered with the Original Mobile QSL Bureau, P.O. Box 146, Lakeside, CA? 92040.

FOR SALE: Spectra Physics 2.0 mw071-2 HeNe lasertube, brand new with power supply schematic, $110.00. WA2NDM, 5 Melville Rd., Great Neck, NY 11023.

SELL: 1918 Marconi Trench Set W/T receiver. This rare antique is in near perfect condition with original batteries. Unused since W.W.1. Highest offer secures. Melton. 5, Highlands, Flackwell Heath, Buckinghamshire, England. Tel. Bourne End 26861.

EICO 460 scope with low cap probe and manual $85 or trade for FM gear. W5RC, R.M. Terrill, 3706 Alta Vista, Dallas, TX 75229.

READER SERVICE

To obtain literature from advertisers, simply check the number next to the name of each advertiser listed below whose product or service is of interest to you.

FEBRUARY, 1974

1 Amateur Electronic Supply
2 Arrow Electronics, Inc.
3 Barry Electronics
4 Bomar Crystals
5 Collins Radio Company
6 Cush-Craft, Inc.
7 DX Engineering
8 Digital Concepts
9 Drake, R. L., Co.
10 Eimac, Div. of Varian
11 Electronic Distributors, Inc.
12 Emergency Beacon Corp. (EBC)
13 Fair Radio Sales
14 G & G Radio Electronics Co.
15 Gam Electronics, Inc.
16 Goldstein, Lou, K4LAN
17 Greenlee Tool Co.
18 Gregory Electronics Corp.
19 H & L Associates
20 Hallicrafters Co., The
21 Hamtronics
22 Harrison Radio
23 Heath Company
24 Heights Mfg. Company
25 Henry Radio
26 Hy-Gain Electronics Corp.
27 International Crystal Mfg. Co.
28 Jan Crystals
29 Liberty Electronics, Inc.
30 MFJ Enterprises
31 McMahon's Vintage Radio
32 Millen, James, Mfg. Co., Inc.
33 Mosley Electronics, Inc.
34 New-Tronics Corp.
35 Omega-T Systems Inc.
36 Palomar Engineers
37 Regency Electronics, Inc.
38 Savoy Electronics, Inc.
39 Sentry Manufacturing Co.
40 Space Electronics
41 Standard Communications
42 Structural Glass Limited
43 Swan Electronics
44 Telex Communications, Inc.
45 Telrex Communications Engineering Laboratories
46 Ten-Tec, Inc.
47 Unadilla Radiation Products
48 Venus Scientific, Inc.
49 Wilson Electronics
50 World QSL Bureau
51 Yaesu Musen USA Inc.

CQ Reader Service
14 Vanderventer Ave.
Port Washington, N.Y. 11050

Name ..... **Call** .....

Street Address .....

City ..... **State** ..... **Zip** .....

ADVERTISER'S INDEX

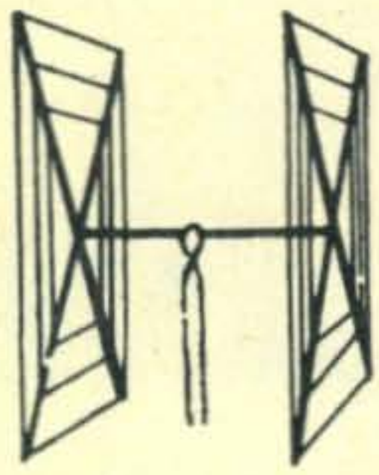
Amateur Electronic Supply 48, 49
Arrow Electronics, Inc. 73
Barry Electronics 71
Bomar Crystals 87
Collins Radio Company 11
Cush-Craft, Inc. 84
DX Engineering 80
Digital Concepts 19
Drake, R. L., Co. 6
Eimac, Div. of Varian ..... Cov. IV
Electronic Distributors, Inc. 87
Emergency Beacon Corp. (EBC) 20
Fair Radio Sales 67
G & G Radio Electronics Co. 69
Gam Electronics, Inc. 91
Goldstein, Lou, K4LAN 79
Gotham 98
Greenlee Tool Co. 88
Gregory Electronics Corp. 96
H & L Associates 67
Hallicrafters Co., The 2
Hamtronics 75
Harrison Radio 77
Heath Company ..... Cov. II, 1
Heights Mfg. Company 93
Henry Radio 16, 17
Hy-Gain Electronic Corp. 4, 9, 82, 83
International Crystal Mfg. Co. 12
Jan Crystals 90
Liberty Electronics, Inc. 69
MFJ Enterprises 92
McMahon's Vintage Radio 65
Millen, James, Mfg. Co., Inc. 8
Mosley Electronics, Inc. 10
New-Tronics Corp. 13
Omega-T Systems Inc. 91
Palomar Engineers 90
RP Electronics 88
Regency Electronics, Inc. 52, 53
Savoy Electronics, Inc. 15
Sentry Manufacturing Co. 81
Space Electronics 67
Standard Communications 23
Structural Glass Limited 65
Swan Electronics 21
Telex Communications, Inc. 22
Telrex Communication Engineering Laboratories 14
Ten-Tec, Inc. 79
Unadilla Radiation Products 93
Venus Scientific, Inc. 47
Wilson Electronics 18
World QSL Bureau 67
Yaesu Musen USA Inc. ..... Cov. III

WHICH ANTENNA WINS THE CONTEST ?

In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15 meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices - rely on the results of open, competitive contests. Ask yourself: Why do Gotham antennas win?

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts...



W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount: uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished): 52 ohm coaxial cable

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

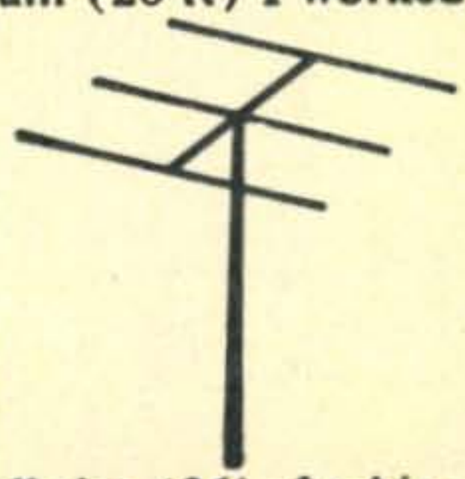
10-15-20 CUBICAL QUAD	$41.00
10-15 CUBICAL QUAD	36.00
15-20 CUBICAL QUAD	38.00
TWENTY METER CUBICAL QUAD	31.00
FIFTEEN METER CUBICAL QUAD	30.00
TEN METER CUBICAL QUAD	29.00

(all use single coax feedline)

GOTHAM
2051 Northwest 2nd Ave., Miami, Fla. 33127 Dept. CQ,

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$25	4 EL 10	24
3 EL 20	31*	7 EL 10	38*
4 EL 20	38*	4 EL 6	24
2 EL 15	21	8 EL 6	34*
3 EL 15	25	12 EL 2	31*
4 EL 15	31*		
5 EL 15	34*		

*20' Boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT. Moral: It's the antenna that counts!
FLASH! Switched to 15 c.w. and worked KZ5-IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$18.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$20.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$22.95

"SASE for FREE Literature. Club members write for discounts."

"HOW TO ORDER: Send money order (bank, store, or United States) in full. We ship immediately by best way, charges collect. DEALERS WRITE."

YAESU

Your assurance of Performance and Quality

YAESU FTdx401-B Transceiver

More For Your Money

FTdx401	**$599.00**
Built-in AC Power Supply	No charge
Built-in WWV 10 MHz Band	No charge
Built-in Noise Blanker	No charge
25 and 100 KHz Calibrators	No charge
VOX	No charge
Clarifier	No charge
Break-in CW with Sidetone	No charge
1 KHz Readout	No charge
Selectable SSB	No charge
6 Month Warranty by Dealer	No charge
Cooling Fan	No charge
AM Position	

Total only $599.00
Amateur Price Net
Price Subject To Change

Tomorrow's Transceiver Today: 20 tubes plus 50 silicon semiconductors, passive crystal filter (6 pole), velvet smooth tuning, superb noise blanker, standard electrical parts. This is truly the best buy in the amateur field today. See your local dealer for brochure & demonstration.

Factory Service is available even after your warranty has expired for the cost of labor and parts.

YAESU DEALERS

ADIRONDACK RADIO SUPPLY /518-842-8350
185 W. Main Street, Amsterdam, New York 12010
AMATEUR ELECTRONIC SUPPLY /414-442-4200
4828 W. Fond du Lac Avenue, Milwaukee, Wisconsin 53216
AMATEUR ELECTRONIC SUPPLY /305-894-3238
621 Commonwealth Avenue, Orlando, Florida 32803
FRECK RADIO SUPPLY /704-254-9551
38 Biltmore Avenue, Asheville, North Carolina 28807
GRAHAM ELECTRONICS /317-634-8486
133 S. Pennsylvania St., Indianapolis, Indiana 46204
HAM RADIO CENTER /800-325-3636
8342 Olive Blvd., St. Louis, Missouri 63132
HAM RADIO OUTLET /415-342-5757
999 Howard Avenue, Burlingame, California 94010
HAMTRONICS /215-357-1400
4033 Brownsville Rd., Trevose, Pennsylvania 19047
HARRISON RADIO /516-293-7990
20 Smith Street, Farmingdale, L.I., New York 11735
HENRY RADIO /213-272-0861
11240 W. Olympic Blvd., Los Angeles, California 90064
ED JUGE ELECTRONICS /817-926-5221
3850 S. Freeway, Fort Worth, Texas 76110
RACOM ELECTRONICS /206-255-6656
15051 S.E. 128th St., Renton, Washington 98055
WEBSTER RADIO /209-224-5111
2602 Ashlan, Fresno, California 97326
WILSON ELECTRONICS /702-451-6650
P.O. Box 116, Pittman, Nevada 89044
ELECTRONIC EXCHANGE CO. /508-834-9000
608 Papworth, Metairie, Louisiana 70005
QUEEN CITY ELECTRONICS, INC. 513-931-1577
1583 McMakin Avenue, Cincinnati, Ohio 45231

YAESU

YAESU MUSEN USA INC.

7625 E. Rosecrans Avenue, Unit #29
Paramount, California 90723 Phone 213-633-4007

This is the world's most powerful shortwave transmitter.

This compact, single tube amplifier, located in the EIMAC facility, develops over 1300 kilowatts of 100% modulated carrier. It is quickly and easily tunable over the range of 15 to 30 MHz. Drive power at the grid of the tube is less than 5 kilowatts.

Using a single EIMAC X-2159 super-power tetrode in a Continental Electronics transmission line-cavity configuration, this amplifier combines high power gain with excellent operating stability and complete freedom from circuit parasitics.

A single amplifier stage using two EIMAC X-2159 tubes is capable of over 2.5 megawatts of 100% modulated carrier. Two amplifiers combined would make a 5 megawatt transmitter a practical reality.

The EIMAC X-2159 super-power tetrode is designed for MF and HF broadcast service, VLF communications, SSB linear service and extremely high power pulse modulator applications.

The X-2159 is another example of tomorrow's tube that's ready today at EIMAC. For complete information, contact EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or any of the more than 30 Varian/EIMAC Electron Tube and Device Group Sales Offices throughout the world.

Eimac®
division
varian