Amateur Radio

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CQ

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

pacesetter in amateur radio

TS-930S "DX-traordinary"

TS-930S

We call it "DX-traordinary" because the TS-930S has now become the favorite rig of the serious contester! Its superior capability for full break-in split-frequency operation, the speed and convenience with which its eight memory channels can be accessed, its unsurpassed receiver dynamic range and its remarkable ability to select the desired signal during periods of heavy QRM, utilizing VBT, Slope tuning, IF Notch filtering, and tuneable audio filtering, have all combined to make this the rig that gives you the EXTRA EDGE!

The TS-930S is loaded with all the special features that you always wanted in an HF transceiver. Full coverage of the 160 through 10 meter bands, including the new WARC frequencies, (easily modified for HF MARS), plus a general coverage receiver that can tune any frequency from 150 kHz to 30 MHz. Operation in the SSB, CW, FSK, and AM modes, with selectable full or semi CW break-in. All solid-state, with 250 watts PEP input on SSB, CW, FSK, and 80 watts input on AM. SWR/power meter. Triple final protection circuits plus two cooling fans built-in. 10-Hz step synthesized frequency control. Available with optional automatic antenna tuner built-in, another industry first! Dual digital VFO's. Eight memory channels that store both frequency and band information, with internal battery back-up, (batteries not supplied). Dual mode adjustable noise blankers, especially effective in eliminating "woodpecker" type interference. SSB IF slope tuning, for maximum rejection of interference. CW variable bandwidth, with pitch and sidetone control. IF notch filter. Tuneable audio peaking filter. Unique six digit white fluorescent tube digital display is easy-on-the-eyes during those long contests. RF speech processor, for higher average "talk-power." SSB monitor circuit. 4-step RF attenuator. VOX. 100-kHz marker. AC power supply built-in, 120, 220, or 240 VAC.

TS-930S Optional Accessories: AT-930 automatic antenna tuner, SP-930 external speaker, with selectable audio filters, YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filter, YK-88A-1 (6 kHz) AM filter, all plug-in type. SO-1 commercial stability TCXO, MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, MC-42S mobile hand microphone, TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter, 160 ~ 6 meter, SW100A SWR/power/volt meter 160-2m HS-4, HS-5, HS-6, and HS-7 headphones.

Isn't it about time you stepped into the winner's circle?

More information on the TS-930S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation

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TS-430S "Digital DX-terity!"

TS-430S

Digital DX-terity...that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.

Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories:
In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own," the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160~6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

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KENWOOD

paceseller in amateur radio

TM-201A/TM-401A

TM-201A/TM-401A "comp-ACT"... tough act to follow.

The word "compact" best describes the TM-201A VHF (a big 25 watts!) or the TM-401A 70-cm (12 watts) mobiles. Measures 5.6Wx1.6Hx7.2D inches (the TM-201A and TM-401A are the most compact rigs available). Ideal in size, their performances are superlative. Each features a HI/LO power switch, dual digital VFO's built-in, 5 memories plus a "COM" channel with lithium battery back-up, memory scan, programmable band scan, priority alert scan, and GaAs FET RF (front end) amplifiers. They have a highly visible yellow LED digital display, a repeater offset switch, a reverse switch, and a "beeper" to confirm operation of various switches. For superior sound quality, the separate, external speaker, can be easily mounted to project the sound in the desired direction. A 16-key autopatch UP/DOWN mic. allows easy remote operation of major front panel functions. Thanks to KENWOOD, compact radios are now available for the popular VHF and UHF bands providing high performance and superior sound quality.

Optional FC-10 Frequency Controller

Connects to the TM-201A or TM-401A. Convenient control keys for frequency UP/DOWN MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green LCD display indicates transmit/ receive frequencies, memory channel number, ALERT, and SCAN (with blinking MHz decimal).

Other TM-201A/TM-401A Optional Accessories:

TU-3 Programmable two-frequency CTCSS encoder, KPS-7A fixed station power supply, MA-4000 dual-bander mobile antenna with duplexer, SW-100A/B SWR/power meter, MC-55 mobile microphone with time-out timer.

TW-4000A

TW-4000A
FM "Dual-Bander"

KENWOOD'S TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2-m and 70-cm FM functions in one compact package. It covers the 2-m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, and the 70-cm band (440.000-449.995 MHz), all in a package only 6-3/8 W x 2-3/8 H x 8-9/16 D inches. RF output power measures 25 watts on either band. The TW-4000A features a large, easy-to-read LCD display, front panel illumination for night operations, 10 memories with OFFSET recall and lithium battery backup, programmable memory scan, band scan in selected 1-MHz segments, priority watch function, common channel scan, dual digital VFO's, repeater reverse switch, GaAs FET front ends, rugged die-cast chassis, "beeper" through speaker, a mobile mount, and a 16-key autopatch UP/DOWN mic.

The new optional VS-1 voice synthesizer has everyone talking! A voice announces the frequency, band, VFO A or B, repeater offset, and memory channel number when these functions are selected.

Other TW-4000A optional accessories:

VS-1 voice synthesizer, TU-4C programmable two-frequency CTCSS encoder, KPS-7A fixed station power supply, SP-40 compact mobile speaker, SP-50 compact mobile speaker, MA-4000 dual-band mobile antenna with duplexor, MC-55 mobile microphone with time-out timer, and a SW-100B SWR/power meter.

More information on the TM-201A/TM-401A and TW-4000A is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation.

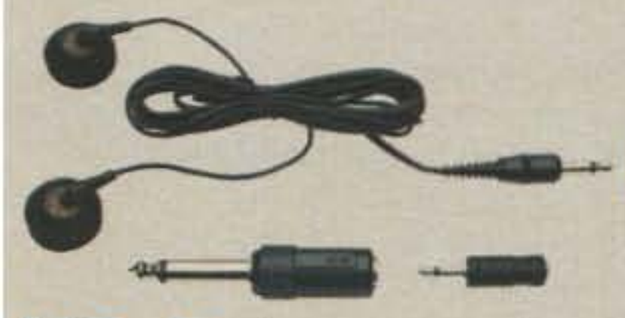
ACCESSORIES

SW-2000

160~6-m 2 KW SWR/PEP-POWER Meter
Up to 3 separate directional couplers may be connected. (One SWC-3 is supplied.) Optional couplers: SWC-2 (2-m/70-cm, 200 W) & SWC-3 (160~6-m, 2 KW).

MC-85

Multi-Function Desk Top Microphone (8-pin)
700 Ω Uni-directional Electret Condenser Mic. Built-in mic-amp with output and tone control, meter, XCVR selector and UP/DOWN switch. Optional mic cables: PG-4D (4-pin), PG-4E (6-pin) & PG-4F (8-pin).



MC-80

Desk Top UP/DOWN Microphone (8-pin)
700 Ω Uni-directional Electret Condenser Mic. with "FLEX" type boom. Built-in mic-amp and UP/DOWN switch. Optional mic plug adaptors: MJ-84 (8p-4p) & MJ-86 (8p-6p).

HS-7

Micro Headphones (16 Ω)
Ultra light weight and portable ear-fitting headphones supplied with two audio adaptor plugs.

DM-81

700 kHz-250 MHz Dip Meter
All solid-state and built-in battery.

SP-50

High Quality External Mobile Speaker

TL-922A

160~15-m 2 KW PEP/1 KW DC Input Linear Amplifier
Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

MC-55 (8P/6P)

Mobile Microphone (8-pin or 6-pin)
700 Ω Electret Condenser Mic. with flexible boom, and separate STAND-BY box built-in UP/DOWN switch and 5 minute Time-Out-Timer.

MA-4000

2-m/70-cm Dual Band Mobile Antenna
5/8 λ for 2-m and stacked 5/8 λ for 70-cm. Duplexer is supplied.

PC-1A

Phone Patch (FCC Part 68 registered)

SM-220

Station Monitor/High-Performance Oscilloscope
Pan-display capability with optional BS-8 (for TS-830S/820S/180S) or BS-5 (for TS-520 series). Transmitted waveforms and/or receiving signal waveform monitor. Built-in 2-tone generator.

SW-100A/B

A: 160-m ~ 2-m, B: 2-m ~ 70-cm. 150 W SWR/POWER/VOLT Meter
Compact design with separate coupler, ideal for mobile use. Built-in 0-20 V voltmeter.

MICROPHONES:

- **MC-60A** Deluxe desk top microphone with UP/DOWN switch. (8-pin) Pre-amplifier. 500/900 Ω
- **MC-60N4** Deluxe desk top microphone (pre-amp. not included). (4-pin) 50 k/500 Ω
- **MC-50** Desk top microphone. 50 k/500 Ω (4-pin)
- **MC-48** 16-key autopatch UP/DOWN microphone. (8-pin)
- **MC-46** 16-key autopatch UP/DOWN microphone. (6-pin)
- **MC-42S** Hand microphone with UP/DOWN switch. (8-pin)
- **MC-35S** Noise-cancelling hand microphone, 50 k Ω (4-pin)
- **MC-30S** Noise-cancelling hand microphone, 500 Ω (4-pin)

MICROPHONE CABLES:

- **PG-4A/4B/4C** For MC-60A/60N4. PG-4A(4-pin)/4B(6-pin)/4C(8-pin)
- **PG-4D/4E/4F** For MC-85. PG-4D (4-pin)/4E(6-pin)/4F(8-pin)

MICROPHONE PLUG ADAPTORS:

- **MJ-48** (4-pin mic to 8-pin XCVR)
- **MJ-84** (8-pin to 4-pin)
- **MJ-86** (8-pin to 6-pin)

HEADPHONES:

- **HS-6** Lightweight headphones
- **HS-5** Deluxe headphones
- **HS-4** Standard headphones

GENERAL PURPOSE AC POWER SUPPLIES:

- **KPS-7A** 13.8 VDC, 7.5A intermittent
- **KPS-12** 13.8 VDC, 12A intermittent
- **KPS-21** 13.8 VDC, 21A intermittent

ANTENNAS:

- **RA-3** 2-m 3/8 λ Telescoping antenna with BNC connector
- **RA-5** 2-m 1/4 λ /70-cm 5/8 λ Telescoping dual-band antenna with BNC connector

Other accessories:

- **RD-20** Dummy load, 50 Ω, DC-500 MHz, 50 W intermittent
- **SP-40** Compact external mobile speaker
- **AL-2** Lightning & static protector, 50 Ω 1 KW output
- **PG-3A** DC line noise filter for mobile

SERVICE MANUALS:

- Available for most transceivers, receivers, and major accessories.

NOTE: Prices and specifications of all Trio-Kenwood products are subject to change without prior notice or obligation.

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TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

New!

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4000 SERIES

FM TRANSCEIVERS

10 METERS & DOWN

PCS-4000
2-m FM Transceiver

COMMERCIAL-GRADE QUALITY AT AMATEUR PRICES

EXCLUSIVE 1 YEAR LIMITED WARRANTY! *COMPARE!*

THE 4000 SERIES

PCS-4300 70-cm FM Transceiver

PCS-4500 6-m FM Transceiver

PCS-4800 10-m FM Transceiver

SALE
PLEASE CALL FOR SPECIAL PRICE

PCS-300
2m Handheld
FM Transceiver
142-149.995 MHz

- **WIDE FREQUENCY COVERAGE:** PCS-4000 covers 142.000-149.995 MHz in selectable steps of 5 or 10 kHz. PCS-4200 covers 220.000-224.995 MHz in selectable steps of 5 or 20 kHz. PCS-4300 covers 440.000-449.995 MHz in selectable steps of 5 or 25 kHz. PCS-4500 covers 50.000-53.995 MHz in selectable steps of 5 or 10 kHz. PCS-4800 covers 28.000-29.990 MHz in selectable steps of 10 or 20 kHz.
- **CAP/MARS BUILT IN:** PCS-4000 includes coverage of CAP and MARS frequencies.
- **TINY SIZE:** Only 2"H × 5.5"W × 6.8"D. COMPARE!
- **MICROCOMPUTER CONTROL:** At the forefront of technology!
- **UP TO 8 NONSTANDARD SPLITS:** Ultimate versatility. COMPARE!
- **16-CHANNEL MEMORY IN TWO 8-CHANNEL BANKS:** Retains frequency and standard simplex or plus/minus offsets. Standard offsets are 600 kHz for PCS-4000, 1.6 MHz for PCS-4200, 5 MHz for PCS-4300, 1 MHz for PCS-4500, and 100 KHz for PCS-4800.
- **DUAL MEMORY SCAN:** Scan memory banks either separately or together. COMPARE!
- **TWO RANGES OF PROGRAMMABLE BAND SCANNING:** Limits are quickly reset. Scan the two segments either separately or together. COMPARE!
- **FREE AND VACANT SCAN MODES:** Free scanning stops 5 seconds on a busy channel; autoresume can be overridden if desired. Vacant scanning stops on unoccupied frequencies.
- **DISCRIMINATOR SCAN CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency.
- **TWO PRIORITY MEMORIES:** Either may be instantly recalled at any time. COMPARE!
- **NICAD MEMORY BACKUP:** Never lose the programmed channels!
- **FREQUENCY REVERSE:** The touch of a single button inverts the transmit and receive frequencies, no matter what the offset.
- **ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Unparalleled ease of operation.
- **BRIGHT GREEN LED FREQUENCY DISPLAY:** Easily visible, even in direct sunlight.
- **DIGITAL S/RF METER:** Shows incoming signal strength and relative power output.
- **BUSY-CHANNEL AND TRANSMIT INDICATORS:** Bright LEDs show when a channel is busy and when you are transmitting.
- **FULL 16-KEY TOUCHTONE® PAD:** Keyboard functions as autopatch when transmitting (except in PCS-4800).
- **PL TONE:** Optional PL tone unit allows access to private-line repeaters. Deviation and tone frequency are fully adjustable.
- **TRUE FM:** Not phase modulation. Unsurpassed intelligibility and audio fidelity.
- **HIGH/LOW POWER OUTPUT:** 25 or 5 watts selectable in PCS-4000; 10 or 1 watt selectable in PCS-4200, PCS-4300, PCS-4500, and PCS-4800. Transmitter power is fully adjustable.
- **SUPERIOR RECEIVER:** Sensitivity is 0.2 uV or better for 20-dB quieting. Circuits are designed and manufactured to rigorous specifications for exceptional performance, second to none. COMPARE!
- **REMOTE-CONTROL MICROPHONE:** Memory A-1 call, up/down manual scan, and memory address functions may be performed without touching the front panel! COMPARE!
- **OTHER FEATURES:** Dynamic microphone, rugged built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses, and hardware are included.
- **ACCESSORIES:** CS-7R 7-amp ac power supply, CS-4.5R 4.5-amp ac power supply, CS-AS remote speaker, and Communications Specialists SS-32 PL tone module.
- **ONE YEAR LIMITED WARRANTY!**

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CQ The Radio Amateur's Journal

ON THE COVER: Hank Goldman, WA2OVG, is shown trying to snag a rare one on c.w. Photo by Larry Mulvehill, WB2ZPI.

MAY 1984 **VOL. 40, NO. 5**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

The Orlando and Charlotte Hamfests this year were outstanding. There does seem to be an upward trend in attendance and buying power. More and more folks are leaving shows with cartons of new stuff and wonderful *objet d'art* retrieved from the fleamarket. There is a resurgence of excitement over amateur radio, and with this has come the wide-eyed looks of those just getting into the hobby who want to know everything. It's all out there, and we'll have a good time yet—if we allow ourselves.

Good News

Congratulations to the amateurs in Ohio who got this one going, especially Terry Falknor, N8EEO. Representative Robert Netzley introduced House Bill 713 on February 22 to modify the Ohio Revised Code to give Ohio amateurs some protection from restrictive antenna ordinances. The new wording to be added is as follows:

"Such sections confer no power on any, Rural Zoning Commission, Board of County Commissioners, or Board of Zoning Appeals to prohibit the erection of amateur radio antenna or the tower supporting such antenna. However, a County Zoning Resolution or Amendment or Supplement to such a Resolution may regulate the maintenance or manner of construction of amateur radio antenna or its tower where such regulation is necessary to protect public health and safety."

I imagine that Terry will be walking around mighty proud this year at Dayton.

In case you missed it, Robert Foosaner, Chief, Private Radio Bureau, FCC (read his interview with *CQ* on page 13) dismissed the acerbic petition brought forward by Wayne Green, W2NSD, on increased demonstration of code proficiency. The date was March 9th.

Another good item to report is that Herb Pressman's call came just a few days after we closed the April issue, so we couldn't include it until now. Of course, the new business cards and the nameplate badge are on order. We welcome the addition of KA2UGV, as Herb is affectionately called around here now.

Trophies

From time to time we get letters from some of you who have won a *CQ* trophy or plaque. Many of these awards, especially those from our contests, are donated, meaning that some individual or club wants to recognize a particular feat by sponsoring an award in their name or as a memorial to a friend or fellow club member. (*Sponsor* is basically just another way of saying that they'll pay for it.) These awards are well publicized, and *CQ*, the sponsor, and the recipient receive recognition from our fellow amateurs.

The letters we receive state that the recipient has never received the trophy or plaque. What it boils down to is that there are a small number of sponsors who want the recognition but are unwilling to pay the bill. We are now in the midst of "cleaning house," whereby those sponsors will be replaced by individuals or clubs of greater integrity, honesty, and respect for their fellow amateurs. Again, we are talking about a small number, and they will be replaced.

Orlando and Charlotte

This year as we got down to the wire for Orlando (the day before), it became evident that our travel plans might be upset by Mother Nature in the form of a predicted snow storm in New York. Smarter heads prevailed, and we opted to scramble through a Thursday evening departure instead of a Friday morning flight. Good thing, as the snow hit on Thursday evening, and the New York airports were closed until mid-Friday. We were met at the airport by Dick's folks, who live in the Orlando area, and they guided us to the hotel. Arnie and I checked into the hotel, and Dick went on with his folks to catch up on family things and to sample Mom's cooking.

The Orlando Hamfest is one of those which open on Friday evening. They have the new Civic Center facilities which are excellent and easy to get to. Some exhibitors couldn't get there on time due to the weather, and others chose not to open on Friday evening. They missed a nice crowd which did show up to sample the wares. The *CQ* Team took turns at the booth and spent the remaining time early-birding the fleamarket. It was much larger than the last time I was there, and there was plenty of good stuff to buy. Saturday and Sunday saw good crowds attending the hamfest. There was a team of young ladies who went around to the various exhibitors, making sure that we had cold drinks and sandwiches (which were very good, by the way). Since Arnie got his ticket he, too, has been loading up with good stuff at the fleamarkets. It is catching, you know. Dick, Arnie, and I managed to bring home a lot of stuff this time. It was hard to carry some of it, as the folks who gave out the shopping bags ran out of them Saturday afternoon.

We managed to get a week's worth of work done at the office in the next four days, as the following Friday Dick, Jack, and I were off to Charlotte. This time it was Howard, Jack's son, who met us at the airport and drove us downtown. Jack's wife, Ruth, came with us to spend time with the southern Gutzeits. Somehow I have the feeling that the fact that Howard lives in Charlotte had something to do with our adding Charlotte to the travel list years ago.

Once again the turnout was larger than last year and the people were enthusiastic. I got the promise of a few good construction articles which I hope work out; one in particular seems like a great idea. Of course we all got to the fleamarket, and of course we all loaded up on goodies.

One aspect of these ever-growing fleamarkets is quite interesting. About half to three quarters of the people who set up tables at these fleamarkets are cleaning house. The remainder are the "professional" sellers who travel from fleamarket to fleamarket and make either all or part of their income from them. Of the house cleaners, an increasing percentage can be found later in the weekend "trading up"—that is, taking the money they received and buying newer, bigger whatevers. One fellow told me that he had to sell three items at a reasonable price to buy a new transceiver he had in mind. By Sunday morning he had made it. Everyone was happy.

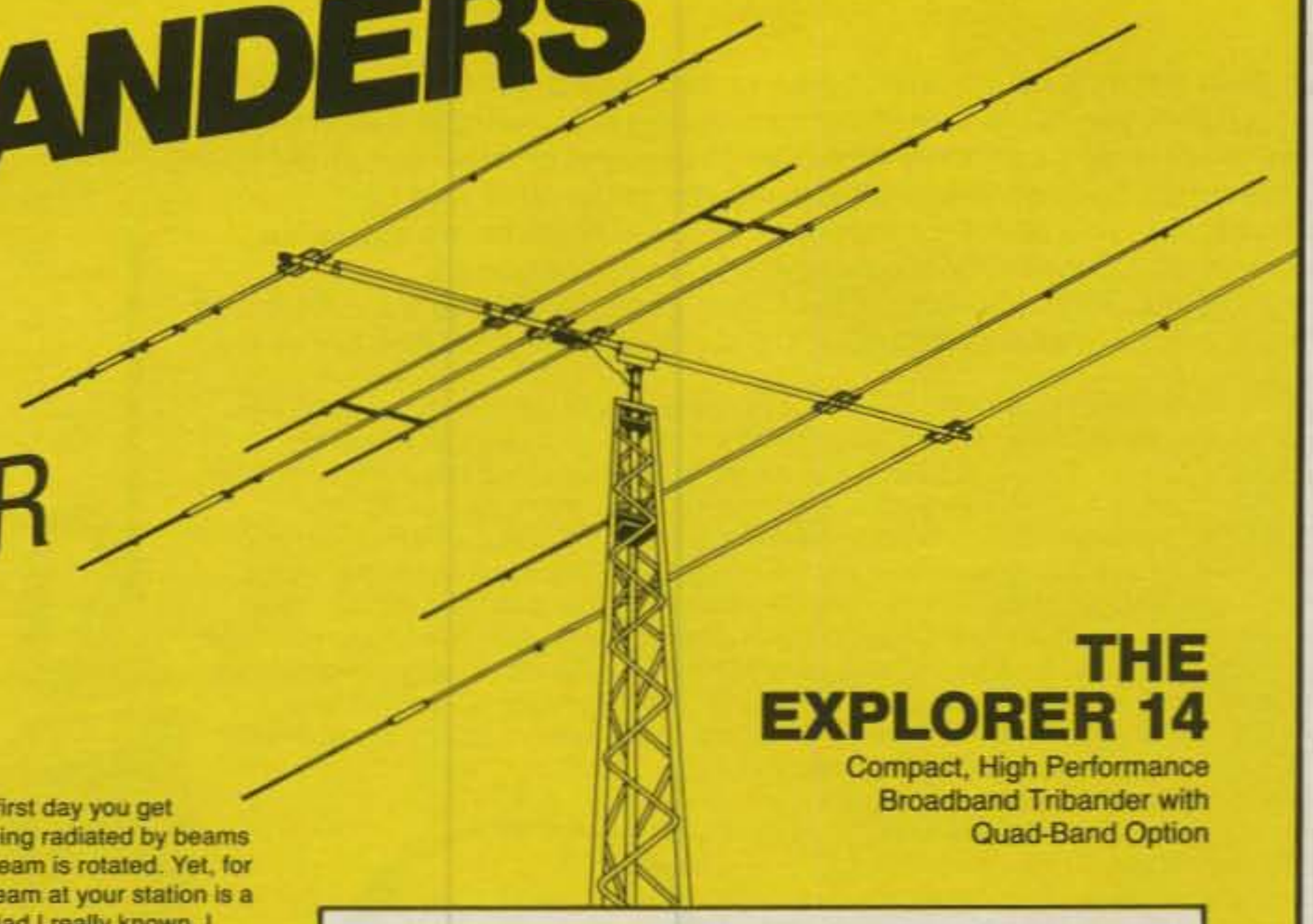
The two weekends back to back had us all tired by the time we got to the airport Sunday afternoon. As it turned out, most of the flights heading north were delayed, and ours was no exception. We were delayed about 3½ hours due to mechanical problems. One by one, various exhibitors gathered at the terminal for their homeward flights. Since we all were delayed, we hung out at one terminal and compared notes on the show and discussed where we would be going next and how tired we were. A plane arrived at the next terminal gate, and when the passengers began leaving, I noticed a little girl carrying what I thought was a very large toy duck. Well, the "toy" was alive. It started to squirm and move, and when I mentioned it to the rest of our party, they thought I was crazy and had been to one hamfest too many. I was vindicated and my sanity was restored when the little girl passed our area, and they could see for themselves that she was indeed carrying a live duck. I'll let you know when I've been to too many hamfests.

Some of you still haven't been to a single hamfest, and some of you still need coaxing. Granted, you don't always get to see a duck, but you do get to have a good time. You get to see old friends and make new ones. You get to see the latest gear, and you really are encouraged to touch it and check it out. You get to learn about something new, and as everyone will tell you, you will have a good time. Come on out and join in the fun. 73, Alan, K2EEK

hy-gain®

BROADBANDERS

MAXIMIZE THE POTENTIAL OF YOUR HAM GEAR



There is nothing like a beam!

You hear about the importance of the antenna system from the first day you get involved in amateur radio. You hear the big signals on the air being radiated by beams and you hear those same signals virtually disappear when the beam is rotated. Yet, for whatever the reason, getting on the air for the first time with a beam at your station is a down-right exhilarating experience. The universal reaction is "Had I really known, I would have installed a beam years ago".

The gain of a beam multiplies the effective radiated power of your transmitter just like an amplifier. More importantly, it amplifies the signal from the station being beamed. Off the sides and back of the antenna, the effective radiated power of those kilowatts on/near your frequency are reduced to manageable QRP levels.

A well-designed beam is by far the best performance buy you can make and it doesn't use any electricity. Further, if you buy a good one, it will last longer than some of the electronics gear in your shack. In terms of cost per hour of enjoyment, a beam antenna is among the least expensive major station components.

As sunspot cycle 21 winds down over the next few years the priority for a good beam shifts from "great to have" to "essential!" To maximize your station capability on the high bands choose one of these super broadband arrays.

THE EXPLORER 14

The same compact size as the well-known TH3Mk3 it replaces. The driven element uses an open sleeve dipole which is a concept that we call PARA-SLEEVE (Patent Pending). The para-sleeve design achieves the broadband performance objective. The forward gain and front to back ratio is very impressive, especially when compared with other antenna designs in the same size class. 43 lbs. (19.5 kg) of superb performance on a 14 ft. (4.3 m) boom. Turning radius 17 ft. (5.3 m) and 7.5 sq. ft. (.69 m²) of surface area. The EX 14 is the ideal choice where space is limited. Great for roof mount or on smaller towers. Optional QK7-10 kit adds your choice of either 30 or 40 meters to the driven element.

FIVE ELEMENT THUNDERBIRD TH5Mk2

Broadbanding is achieved with our unique dual driven element system. Five elements on the 19 foot boom (5.8 m), with four active elements on each of the three bands. 72 lbs. (32 kg) of rugged antenna with 7.4 sq. ft. (.68 m²) of surface area. Turning radius is a manageable 18.4 ft. (5.6 m).

SEVEN ELEMENT THUNDERBIRD TH7DX

This is a broadband successor to the legendary TH6DXX. Five active elements on 10 meters and four elements on both 15-20 meters. The TH7DX represents the ultimate in high-performance arrays whether you're comparing other large tribander's or stacked monobander's. 76 lbs. (35 kg) with a surface area of 9.4 sq. ft. (.87 m), a 24 ft. (7.3 m) boom and a turning radius of 20 ft. (6.1 m). If you own a TH6DXX, a conversion kit is available which includes the second driven element, the completely new matching system, a full set of stainless steel hardware, and of course, step by step instructions. After conversion, your TH6DXX is a TH7DX, exactly.

FEATURES COMMON TO EX 14, TH5Mk2, and TH7DX:

- Separate Hy-Q traps for each frequency. Factory assembled and individually resonated to insure uniform performance.
- Handles maximum legal power with a respectable margin of safety.
- Unique broadband beta match assures efficient energy transfer and places the entire antenna structure at dc ground.
- BN 86 balun supplied as standard.
- Top quality stainless steel hardware supplied at no added cost.
- Super strong, taper swaged 6063-T832 thick-wall aluminum tubing used throughout.
- Unique Hy-Gain die cast aluminum boom to mast bracket. Accepts mast diameters up to 2½" (63 mm).
- Twist and slip proof die formed heavy gauge aluminum element to boom brackets.
- All tubing deburred and cleaned for ease of assembly.
- Only one set of dimensions for complete coverage of all three bands below 2:1 SWR.
- Designed to survive winds of 100 mph (160 km/hr).

THE EXPLORER 14

Compact, High Performance Broadband Tribander with Quad-Band Option

The value of a Directional Antenna was one of my early "discoveries". Over the years, I have built or bought numerous Quads and Yagis. I have never been so impressed as I am with my TH7DX. I enjoy QRP but now have a problem convincing folks that I am only running 5 watts! The TH7DX is a superb antenna, both from a performance and a structural point of view.

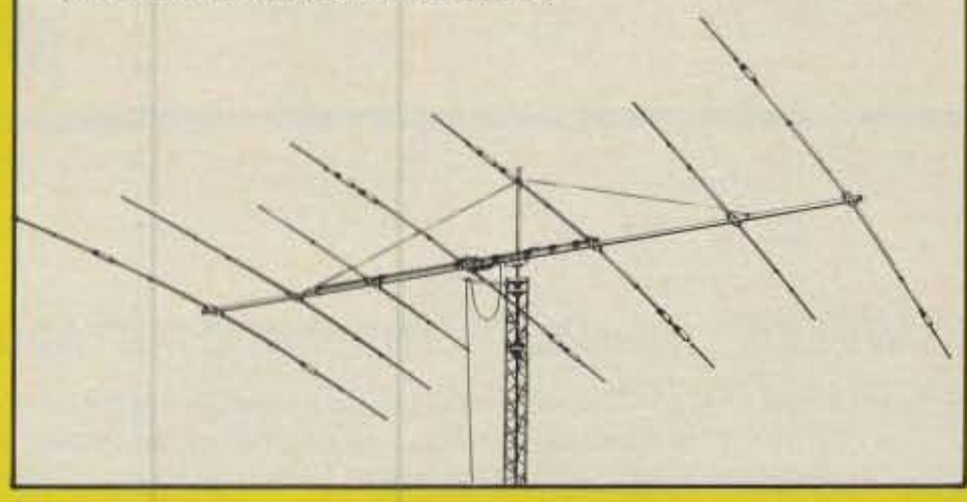
Congratulations!

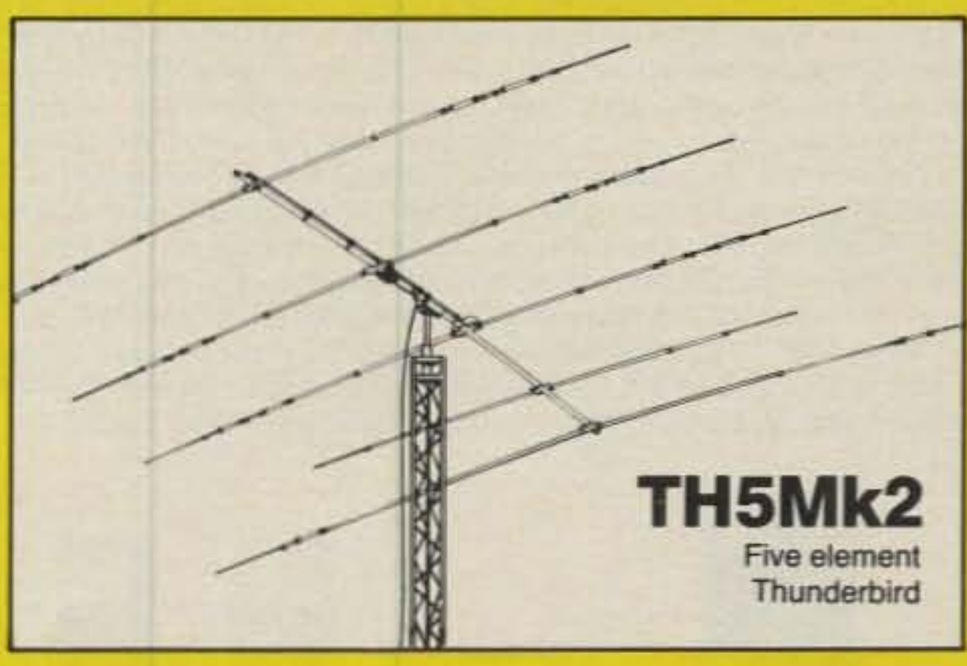
Jack Falker
W8KR

(W8KR has worked all countries but two!)

TH7DX

Seven element Thunderbird





TH5Mk2

Five element Thunderbird

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Santec's smarter handhelds help the user by providing widest frequency coverage for MARS and CAP operations as well as amateur radio. Any value of offset on 10 KHz steps can be set and stored in any memory location, thus requiring only one memory per transceive frequency pair. Single stroke memory recall of all 10 memories and the required offset means no more switch flipping when repeater frequencies are changed. Because lower power output from the transmitter helps the user to get longer service times on each battery charge, Santec provides three switchable power levels from the full power level of 4 watts plus down to a midrange of around one watt and a battery conserving 100mw. The Santec user gets plenty of helpful information from the complete display on the large size LCD frequency display using six digits plus the offset direction and memory number. Mode of scan, PLL lock and the receiver and transmitter indicator are all usable at the same time without any extra effort. All the neat features you expect plus a good, solid performing transceiver section with excellent sensitivity and high quality audio make Santec your best choice for a handheld transceiver.

For specifications and a full catalog of Encomm, Inc. products send us a QSL. Specifications subject to change without notice or obligation. Information in this ad does not constitute warranty.

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FM-2033

2m 25W Mobile Maxpack

- Liquid Crystal Display with soft orange lighting for direct sunlight viewing plus night viewing.
- Repeater Offsets (+ , − ,S) Stored in memory along with the frequency information.
- WIDE frequency coverage for MARS and CAP capability (142-149.995 MHz)
- New chrome front with soft pearl gray cabinet for today's auto decor.
- Memories with valid data scanned, blanks are skipped.
- Repeater reverse switch for monitoring repeater's input frequency.

Coming Soon
50 MHz—FM-6033
440 MHz—FM-7033
220 MHz—FM-4033

The KDK FM-2033 represents a significant advance in user convenience and simplicity of operation for the user. The KDK '33' series provides excellent readability in any lighting condition for the operating frequency and the memory channel in use. Warm orange background LCD displays improve readability by providing easy-on-the-eyes contrast.

Simplicity of operation has always been the mark of the KDK design team and the FM-2033 is no exception. From the single knob frequency and memory selection to the automatic recall from memory of the desired repeater offset, the FM-2033 provides relaxed, comfortable mobile operation.

Once the 10 memory frequencies have been selected, a single knob is all that is required for operation on the standard simplex or repeater channels. Using the audible beep as the end-of-memory marker allows setting to a particular channel without even looking at the radio.

In the scan mode, scanning for a busy memory or pre-programmed band scan keeps you up to date on the happenings in the area. Very busy frequencies can be skipped by using the up key on the TM-2 microphone. If a full 10 memories are not used, the unused ones can be marked for scan skip so that no time is wasted checking them.

The FM-2033 provides a clean 25 watt output signal across 142–149.995 MHz to operate in balance with most repeaters and provide quieting for simplex operations. MARS (Navy too!) and CAP frequencies are also accommodated even with their unusual repeater splits.

You want convenience, reliability and easy operation for your mobile station and a tough-to-beat dollar value, right? Then check out the FM-2033 at your local dealer TODAY or send QSL for specifications. We think you will want one for yourself.

Specifications are nominal and are subject to change. All KDK transceivers meet or exceed FCC regulations regarding spurious emissions.

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The THL line of antenna couplers provides fine quality hand crafted antenna matching networks for both low power applications and larger power amplifiers running the legal limit. The THL antenna coupler series has full features like built-in antenna switching for changing antennas or by-passing the coupler and an accurate V.S.W.R./power output indicator on all models. Sturdy construction and honestly rated components and capabilities make the THL series of tuners your best choice.

THL has introduced a unique 440 MHz handheld product, the MICRO-7 utility transceiver. This transceiver can be on the air for less than you would ever guess. THL now has 1 dB GAS-FET pre-amplifier for the 2 m and the 70 cm bands. See your THL dealer for details.

Put The Helpful Line to work helping you. Drop us a QSL type card with your name and address for a full catalog of THL products and specifications.

Bottom row: HL-160V25 25W in 150W out 2m • HL-160V - 3 or 10W in for 160W out 2m • HL-90U 10W in 90W out UHF • HC-2000 2KW antenna tuner • Second Row: HL-110 3 or 10W in 100W out 2m • HL-82V 10 in 80W out 2m • HL-45U 10W in 45W out UHF • HC-400 200W antenna tuner and VSWR Power Meter • Third Row: HL-30V economy HT amp 3W in 30W out 2m • HL-32V 3W in 15 or 30W out 2m SSB or FM portables • HL-20U .2 or 3W in 20W out UHF • HC-200 the Economy-With-Quality HF antenna tuner. An HRA2 GAS-FET preamp sits atop the HC-200 • Also shown is the MICRO-7 Utility UHF transceiver and headset.

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Please send all reader inquiries directly.

Announcing

● **Motor City Radio Club Anniversary** - To celebrate this event, W8MRM will be on the air during Michigan Week in May, Field Day in June, and the BSA Jamboree in October, plus W8MRM conducts a 2 meter net every Tuesday on the Wyandotte Repeater (147.84/.24). A special QSL will be issued for an s.a.s.e. sent to the Motor City Radio Club, Box 337, Wyandotte,MI 48192.

● **Volunteer ARC of Dickson County Special Event** - Operation for this event will be on May 5 from 1500–1900Z on s.s.b. 7.240, 14.240, and 28.540 kHz. A certificate for a QSL sent to NY4N, Box 74, Burns, TN 37029.

● **Fairfield, CT** - The Greater Fairfield ARA will operate WB1CQO from 1300–2200 UTC on May 12 during the Annual Dogwood Festival. Certificate for an s.a.s.e. sent to Greater Fairfield ARA, P.O. Box 1364SM, Fairfield, CT 06430.

● **Special-Event Station K4EG** - The Alamance ARC, K4EG, will operate on May 12–13 from the site of the Regional Hot Air Balloon Race, Burlington, NC. Operation will be from 1100–2200 UTC each day 10 kHz inside the lower General phone portion of 40 and 15 meters, and 7.125 and 21.130 kHz in the Novice bands. A commemorative QSL will be issued for a QSL and s.a.s.e sent to Alamance ARC—K4EG, P.O. Box 3064, Burlington, NC 27215. The club will also be on the air on May 19–20 from 1400–2100 UTC Saturday and 1700–2100 UTC Sunday on the same bands.

● **Armed Forces Day From West Point** - The Meadowlands ARA will be on the air from West Point on May 12–13 using the call N2BMN (1400–2000Z on the 12th, 1400–1700Z on the 13th). Frequencies: s.s.b. 14310, 7.250, 144.225, 50.125 MHz; f.m. 146.550 MHz. Send large s.a.s.e. for certificate to the Meadowlands ARA, P.O. Box 324, Little Ferry, NJ 07643.

● **Delavan, WI** - The Lakes Area ARC will operate WB9PZH on May 19 from 1700–2300Z 25 kHz up from the lower edge of the General phone bands on 40, 20, and 15 meters. Send QSL and two 20¢ stamps for certificate to WB9PZH, Rt. 2 Box 253, Elkhorn, WI 53121.

● **W4ODR To Operate For Armed Forces Day** - W4ODR, located aboard Naval Air Station Memphis, Millington, TN, will operate May 19 from 1400–2200Z on 7.230, 14.280, and 21.370 phone (±10 kHz); c.w. 21.145; and 146.52 two meter. For a certificate, QSL to W4ODR, P.O. Box 54278, Millington, TN 38054.

● **K8DMZ From U.S. Air Force Museum** - K8DMZ will operate in celebration of Armed Forces Day from the museum on May 19 from 1400–2200Z in the General phone segments of 75, 40, 20, 15, and 10 meters, plus the Novice subbands, plus f.m. and s.s.b. operation on the 144, 220, and 432 MHz bands. A special certificate is available from the U.S. Air Force Museum, Wright-Patterson AFB, OH 45433.

● **Armed Forces Day Communications Tests** - This year's tests between amateurs and military communications systems will take place on May 19. Featured are military-to-amateur cross-band communications and message receiving tests. To find out about the schedules and frequencies, contact W.W. Kirkwood, U.S. Navy-Marine Corps, MARS, 4401 Massachusetts Ave., N.W., Washington, D.C. 20390.

● **N9BRO From Wheaton, IL** - The Wheaton Community Radio Amateurs will be on the air as N9BRO on May 19–20 beginning at 1700Z for 24 hours. Frequencies will be 50 kHz up from the bottom of the General phone bands and 25 kHz up from the bottom of the c.w. and Novice bands. RTTY on 146.70 simplex, 14.087 and 21.087, and 2 meters on 147.54 simplex. Certificate via WCRA, P.O. Box QSL, Wheaton, IL 60189 ($1.00 or 5 IRCs).

● **Owensboro, KY** - The Owensboro ARC will operate K4HY from 0000–0430Z May 19 and 1500Z May 19 to 0430Z May 20 as a special-event station. Frequencies 7237 (±5 kHz) and 7125 and 7150 c.w. Certificate for QSL and s.a.s.e. to N4EKG, 1615 East 23rd St., Owensboro, KY 43201.

● **Niska-Day 84** - The Niskayuna High School Club station WB2OKK will operate from Niskayuna, NY, on May 26 from 1500–2100Z up 10 kHz from the low end of the General phone bands on 15, 40, 75, and 2 meters. For a commemorative QSL send s.a.s.e. to ARS WB2OKK, Niskayuna High School, 1626 Balltown Rd., Niskayuna, NY 12309.

● **Mayfest Arts Festival & Preservation Fair** - N9DLD will operate during this event on May 26 25 kHz from the upper edge of the general phone band on 40 meters. A certificate will be issued for QSL and s.a.s.e. plus $1.00. QSL to Mayfest—N9DLD, P.O. Box 66, Mt. Carroll, IL 61053.

● **Portsmouth, Virginia** - The Portsmouth ARC will operate W4POX at the Portsmouth Seawall Festival at Portside May 26, 27, and 28 from 1500–2200Z. Frequencies will be around 7230 and 14.290 MHz. For commemorative QSL, send your card and s.a.s.e. to W4POX, P.O. Box 6503, Portsmouth, VA 23703. For QSL and certificate, send your card and a 9" × 12" envelope with two 20¢ stamps.

● **ZS5RSA From Durban, South Africa** - To celebrate Republic Day in South Africa on May 31 the Durban branch of the South African Radio League will operate using the call ZS5RSA on 3.5 to 28 MHz c.w. and s.s.b. as far as band conditions will permit. A special certificate will be available for a QSL sent to South African Radio League, TAK Durban Branch, P.O. Box 1058, Durban 4000, South Africa.

● **The following hamfests, etc., are slated for May:**

May 4–6, **10th Annual Eastern VHF/UHF Conference,** Nashua, NH. Contact Lewis D. Collins, W1GXT, 10 Marshall Terrace, Wayland, MA 01778, or phone 617-358-2854 (before 10 p.m.).

May 5, **12th Annual Sacramento Valley Amateur Radio Hamswap,** Roseville, CA. Contact D. Long, 8810 Swallow Way, Fair Oaks, CA 95628.

May 5–6, **Lawton/Fort Sill ARC Hamfest,** Lawton, OK. Contact Lawton/Fort Sill ARC, P.O. Box 892, Lawton, OK 73501.

May 5–6, **Greenville Hamfest,** at the American Legion Fairgrounds, southwest of Greenville, SC. Contact John Chism, ND4N, Rt. 6, 203 Lanewood Dr., Greenville, SC 29607.

May 12, **Northwest Arkansas ARC Hamfest/Swapfest,** Rogers, AR. Contact Roy Milliren, AF5W, 2014 So. 16th St., Rogers, AR 72756.

May 13, **Southern Alleghenies Hamfest,** Bedford County Fairgrounds, west of Bedford, PA. Contact Tom Gutshall, W3BZN, at 814-942-7334.

May 13, **Medina County Hamfest,** Medina, OH. Contact Medina Two Meter Group, P.O. Box 452, Medina, OH 44258, or phone 216-725-5021.

May 13, **TCRA Hamfest,** Stirling, NJ. Contact Dick Franklin, W2EUF, Tri-County Radio Assoc., P.O. Box 182, Westfield, NJ 07090, or phone 201-232-5955.

May 18–20, **42nd Annual Fresno Hamfest,** Fresno, CA. Contact Fresno ARC, Inc., P.O. Box 783, Fresno, CA 93712, or phone 209-268-6314.

May 18–20, **Green Country Hamfest,** Western Hill Lodge, Sequoyah State Park, west of Wagoner, OK. Contact Broken Arrow ARC, P.O. Box 552, Broken Arrow, OK 74012.

May 19, **Durham Hamfest,** Durham, NC. Contact Milan Burger, KE4IM, Durham F.M. Assoc., P.O. Box 8651, Durham, NC 27707.

May 19–20, **BirmingHamfest,** Birmingham, AL. Contact BirmingHamfest, P.O. Box 603, Birmingham, AL 35201, or phone Keith Landrum, KD4DQ, at 205-823-1628 after 6 p.m. Central.

May 20, **Warminster ARC Hamfest,** Wrightstown, PA. Contact Bill Cusick, W3GJC, Garner House, Apt. 706, Hatboro, PA 19040 or phone 215-441-8048.

May 20, **Pittsburg Repeater Organization Hamfest,** Pittsburg, KS. Contact Pittsburg Repeater Organization, c/o Steve Cooper, 1405 N. Elm, Pittsburg, KS 66762.

May 20, **Northwest Oklahoma Eyeball & Swapmeet,** Mooreland, OK. Contact Gordon Richmond, KB5XI, Rt. 1 Box 12, Mooreland, OK 73852, or phone 405-994-5394.

May 20, **16th Annual Wabash Hamfest,** Wabash, IN. Contact Don Spangler, W9HNO, 235 Southwood Dr., Wabash, IN 46992, or phone 219-563-5564.

May 20, **Nontachusett ARA Fleamarket,** Fitchburg, MA. Contact Jim Beauregard, KB1AY, 7 Mountain Ave., Fitchburg, MA 01420.

May 20, **Sandusky & Ottawa County Combined Hamfest,** Ottawa County Fairgrounds, 3 miles east of Oak Harbor, OH. Contact John Dickey, 545 N. Jackson St., Fremont, OH 43420.

May 20, **Evansville TARS Hamfest,** Evansville, IN. Contact Mike Anderson, KA9LQM, P.O. Box 3284, Evansville, IN 47732.

May 25–27, **Rocky Mountain Division Hamvention and Conference,** Holiday Inn Holidome Convention Center, Denver-Aurora, CO, metro area. Contact Bill Sheffield, KQ0J, 1444 Roslyn St., Denver, CO 80220, or phone 303-355-6400.

May 26–27, **Radio Amateur Club of Knox County Hamfest,** Knoxville, TN. Contact Larry Poore, N4EHR, 4320 Felty Dr., Knoxville, TN 37918, or phone 615-687-3154.

May 27, **Maryland FM Assoc. Hamfest,** West Friendship, MD. Contact MFMA Hamfest Committee, c/o John Elgin, WA3MNN, 8216 Styers Ct., Laurel, MD 20707, or phone 301-621-2352.

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A CQ Exclusive Interview:

Robert S. Foosaner, Esq.
Chief, Private Radio Bureau, FCC

DR. THEODORE J. COHEN*, N4XX

Robert S. Foosaner, Chief, Private Radio Bureau, FCC.

Mr. Robert S. Foosaner is the Chief of the FCC's Private Radio Bureau. As head of the PRB, he directs a staff of 225 multidisciplined individuals in the regulation and administration of the Private Radio services, including the Amateur and Amateur-Satellite services. Before becoming Chief of the PRB in August 1983, he served as the Bureau's Deputy Chief for two years. Bob received his undergraduate degree from Rutgers University in 1965, and graduated from American University Law School in 1968. A career FCC employee since 1968, he has held positions in the Broadcast Bureau, Office of General Counsel, and the Office of Science and Technology. Bob has received numerous commendations and performance awards during his years of government service, including a recent Senior Executive Service Bonus in recognition of his "Exceptional" rating. He was also named Outstanding Senior Executive in 1982 and 1983, the highest rating a government employee can obtain. In addition to his other duties, Bob was designated as a member of the Steering Committee for the World Administrative Radio Conference, served as Chief of a policy task force, and served as a United States delegate to two international conferences; the most recent was the 1983 Mobile WARC in Geneva, Switzerland. A native of New Jersey, Bob and his wife, Jeanne, reside in Brookeville, MD, with their children, Eve and Matthew.

It is with great pleasure that we now present this exclusive CQ interview with Mr. Robert S. Foosaner, Chief, Private Radio Bureau, FCC.

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CQ: Bob, everyone is interested in the decision-making process that led to the Commission's rejection of the "no-code" license proposal. As such, could you first review briefly the actions that led to the creation of Notice of Proposed Rule Making (NPRM) in this matter?

Foosaner: What led to the proposed rulemaking was a concern that bright, young, technically oriented people were not being attracted to the Amateur service. Historically, you could always count on finding such people tinkering in their radio shacks. Today many of them are in the computer department of their local electronics stores. We were concerned that the Morse code telegraphy requirement might be viewed as archaic and alienate these people from the Amateur service. Secondly, the Commission was concerned that the slow code requirement was an unfair requirement to place on handicapped individuals.

The Commission knew when it proposed a codeless license for amateur radio that it would be controversial. But if the service needed drastic change to keep it attractive and advancing, it would be wiser to act than to let the service slowly deteriorate. Knowing this, the Commission was willing to make the proposal, comfortable in the fact that it was *only* a proposal and not a final rule.

CQ: Based on the comments received by the Commission, what were the most persuasive arguments *for* creation of the no-code license?

Foosaner: The most persuasive comments in favor of the proposal were those from sincere, intelligent people—both young and old—who wanted to be amateurs but simply did not have the time or inclination to learn Morse code. I'm sure many of your readers know somebody like this: they are interested in ham radio, may have attended a few club meetings or even taken some instruction, but just can't seem to get serious about learning the code. Many such people commented that a codeless entree to amateur radio was just what they needed.

Other persuasive comments came from licensed amateurs who last touched a code key when they were preparing for their examinations. They did not feel that Morse code had any relevance to their particular interests in amateur radio and some even resented having had to learn it. They liked the idea that the codeless license was to be limited to very high frequencies. They considered the proposal a good match of license to qualifications.

Finally, it was interesting to learn that computer buffs had indeed found their way into amateur radio and were using their skills to transmit code at 99 words per minute from computer to computer. Of course, you don't have to *know* the code in order to transmit it in this way—so why, people argued, make licensees learn it?

Robert S. Foosaner, Chief, PRB, discusses an urgent rule-making issue with the Bureau's Deputy Chief, Michael T.N. Fitch.

CQ: What were the most persuasive arguments *against* the proposal?

Foosaner: The most persuasive arguments against the proposal, Ted, were those which demonstrated that amateur radio is indeed healthy, vital, and growing at an acceptable rate. They showed us that our concern for the vitality of the service was unfounded. The comments from the handicapped were especially persuasive. Not only did they not want any special treatment, but they pointed out that Morse code is often critical to them because of its flexibility to be transmitted and received in many different ways which can be tailored to work despite almost any disability. Third, a review of the comments showed that the slow code requirement could be achieved by study in a reasonable period of time. The benefit of having code knowledge in emergency situations as a communication of last resort could not be discounted.

CQ: Based on your Bureau's analysis of the comments received and on the merits of the proposal itself, what conclusions were drawn and what recommendations were made?

Foosaner: The conclusions that we drew in the Bureau are stated in detail in our Report and Order in Private Radio Docket 83-28. In short, we found that the Amateur service is healthy and expanding at a reasonable rate, that the slow-speed code requirement should not be a deterrent to those interested in having the privilege of an amateur license, and that handicapped individuals favored retention of the code. The Commission adopted our conclusions essentially without modification. I personally presented this document to the Commissioners at the open meeting where this was considered. I told the Commission, "I strongly recommend that we maintain the code requirement, [that] we endorse the Service as it is, and [that] we bury the concept of 'no code.'"

CQ: Were your staff members unanimous in their views against the creation of a code-free license? If not, what were some of the minority views set forth?

Foosaner: The proposed rules and the comments they engendered were the subject of long and vigorous debate at staff level. Believe me, Ted, every aspect of this thing was looked at: whether to do it; whether not to do it; whether to do it, but at what frequencies? You'll recall we also had the "Canadian digital" option on the street, too. That was vigorously debated as well. Opinions ranged all over the lot, not only within my staff, but also throughout other interested offices in the Commission. The Commission was presented with a summary of the comments on both sides of the issue, and the correct decision was reached.

"The rejection of the no-code license was a strong endorsement of the Amateur service—an endorsement which is deserved."

CQ: How did you personally feel about a no-code license?

Foosaner: My personal opinions may be found in the Order cited in the previous question as well as in my presentation of the item to the Commission. The rejection

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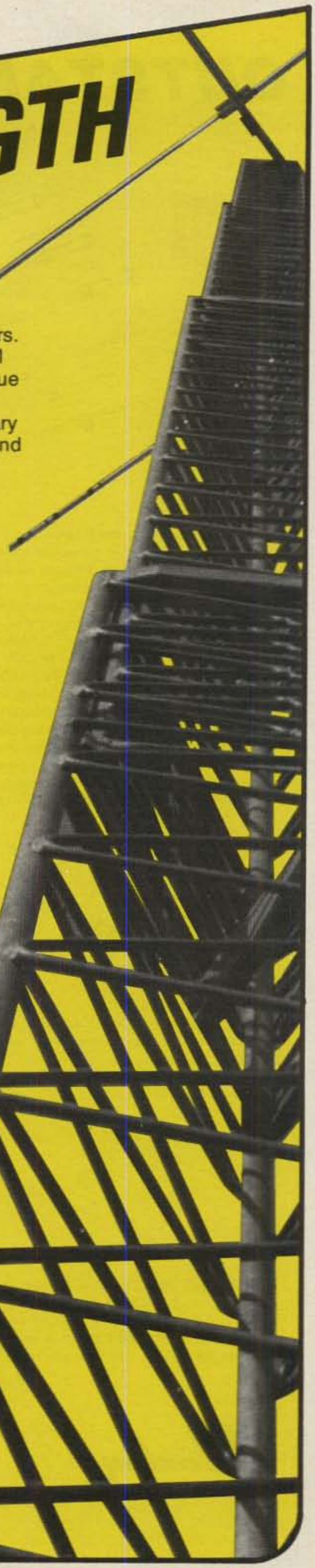

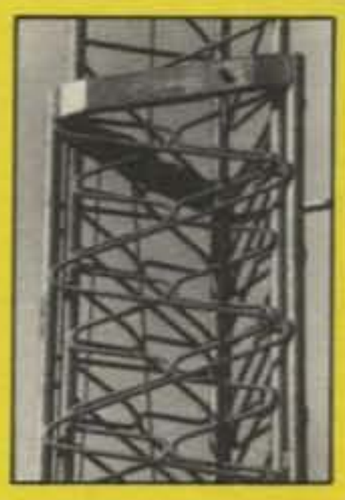

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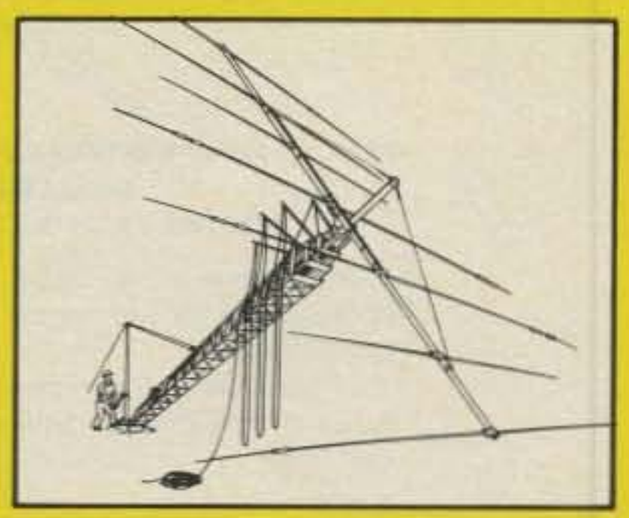

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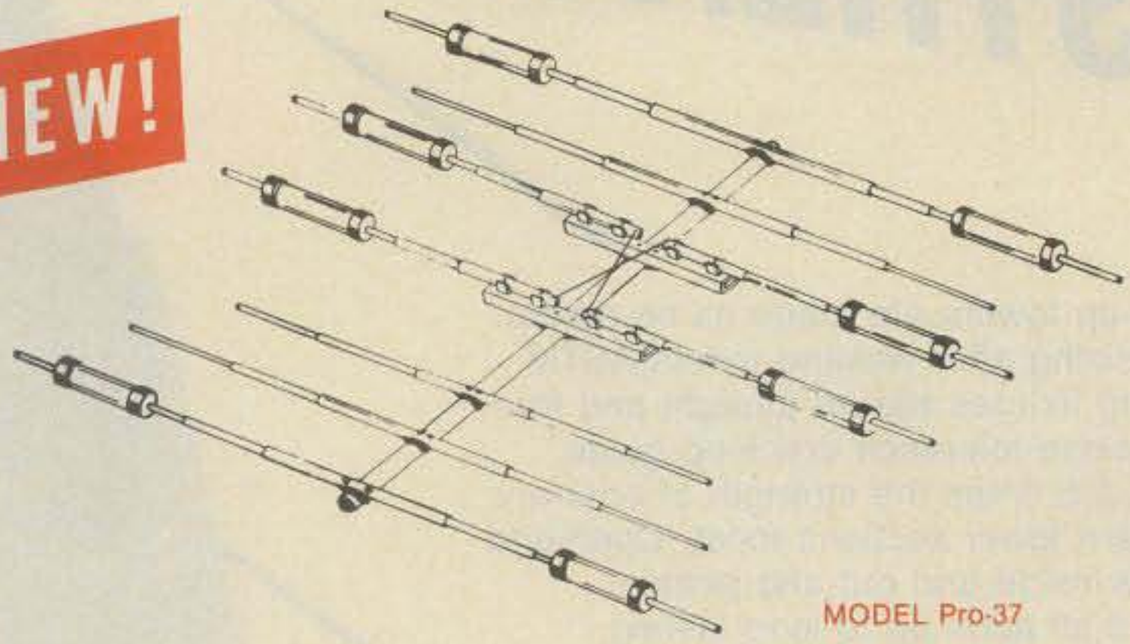

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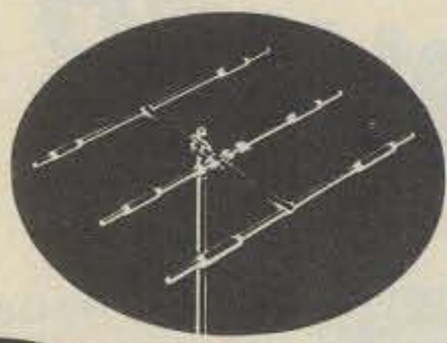

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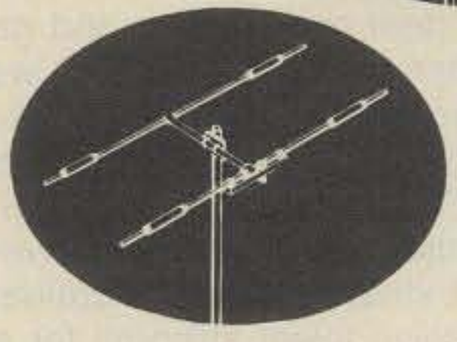

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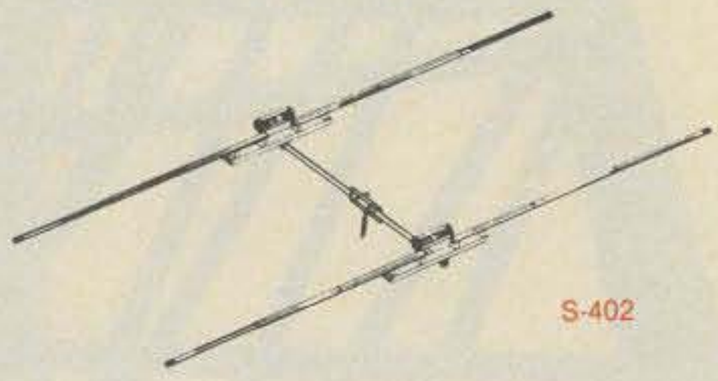

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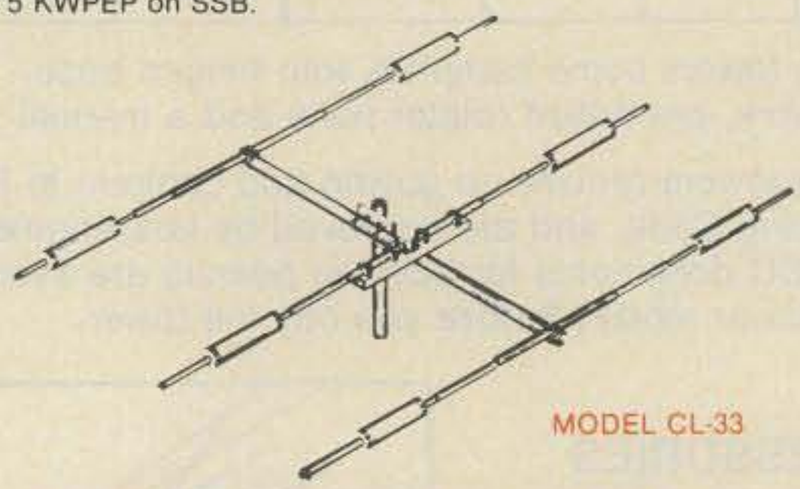

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of the no-code license was a strong endorsement of the Amateur service—an endorsement which is deserved.

CQ: Bob, you once told me that your term as Chief of the PRB would be judged by the way the no-code matter was decided. Given the Commission's decision, how do you think amateurs feel about you today?

Foosaner: When I made that statement, I was concerned about the overemphasis on this one decision. The point I was making was that there are many more important matters concerning the amateur community, but few being given as much attention. As far as how the amateurs feel about me today, I would *like* the amateur community to consider me as open, available, and concerned. I do not think I am in a position to judge how amateurs feel about me, however.

"I appreciate all who participate in FCC proceedings and encourage that participation."

CQ: In general, how would you characterize the responses you received on no-code?

Foosaner: There was a mix of responses. Some were thoughtful, sincere, factual, and worth reading. Others were emotional or accusatory. However, I appreciate all who participate in FCC proceedings and encourage that participation.

CQ: Do you have any suggestions for amateurs as to how they should respond to future rule-making inquiries from the Commission?

Foosaner: They seem to do quite well without any suggestions from me. But I would say that emotional comments do little to advance anyone's cause and make it all the harder to see the merit of that side's arguments. Information gathered from publications such as *CQ* would be a valuable tool in preparing comments.

CQ: There has been talk within the Commission regarding the creation of a new "Computer Hobbyist Radio Service." Could you comment on this?

Foosaner: Many comments filed by hams in the no-code docket suggested the creation of a computer hobbyist license as an alternative to our proposals. We have not received any petitions on this matter. If there is a need for such a license, we need to know a lot more about it: what frequencies, eligibility for a license, etc. Presumably it would not have a telegraphy requirement. Therefore, it would not be part of the Amateur service. Additionally, the Commission previously has rejected such a concept.

"Since the no-code proposal was not adopted, one of the proposed amateur uses for this (220–225 MHz) band no longer exists."

CQ: The Commission is currently looking into the merits of reallocating part or all of the 220–225 MHz band to the Fixed or Mobile services. Could defeat of the no-code proposal—which, if it had been approved, might have seen no-code licensees assigned here—have any effect on the Amateur service's current allocation in this band?

Foosaner: The 220–225 MHz band is not available to amateurs in most of the world, only here in Region 2 *(North and South America—ed.)*. U.S. hams have been permitted to use it on a *Secondary* basis. The rules require that amateur stations transmitting in the 220–225 MHz band must not interfere with government radiolocation operations in this band. In the implementation of the Final Acts of the 1979 WARC *(Gen. Docket 80-739—ed.)*, the Commission proposed shared Fixed and Mobile, government Radiolocation and Amateur use. The American Radio Relay League opposed the addition of Fixed and Mobile, claiming that the amateur community needed the band, especially if a codeless license were established. The sharing matter was not resolved in the Second Report and Order *(adopted November 8, 1983—ed.)*. I would note that since the no-code proposal was not adopted, one of the proposed amateur uses for this band no longer exists.

CQ: What is the status of the Commission's ongoing study regarding allocations in the 220–225 MHz band?

Foosaner: As you probably know, Ted, our study of the spectrum requirements for the Land Mobile services concluded that it may be necessary to reallocate two megahertz from the bands between 216–225 MHz, channelized at 5 kHz. We have asked the FCC's Office of Science and Technology to look at this band and identify the technical issues in this spectrum, but I don't have any firm information about whether this spectrum might be available or what portions might be used for what purposes. Additionally, maritime interests for use of the band have arisen.

CQ: One of the biggest issues before the Commission is the implementation of the Volunteer Examiner Program. Where do we stand on this program today, and what's the situation regarding the ARRL's Request for Agency Action in the matter?

Foosaner: The Novice class segment of

"Nothing is preventing an organization interested in being a volunteer examination coordinator (VEC) without reimbursement from commencing operations."

the volunteer examiner program got underway last August, and it is working well. Not only are new Novices receiving their licenses some two months earlier than under the old mail-back system, but we are seeing some real savings in printing and clerical costs.

The remainder of the program is moving along much slower. We still have not received enough questions from amateurs for examination Elements 4(A) and 4(B), and we have had to slip our plans for releasing those lists. We are receiving and reviewing proposals from various parties interested in becoming Volunteer Examiner Coordinators (VECs). However, many of the inquiries are from amateur radio clubs that are only interested in providing examination sessions in their immediate locale. As you know, a VEC must serve an entire call-sign region. Possibly such groups will form some sort of regional federation of clubs. Such an organization could then become a VEC, and the club members could administer examinations at their hamfests and meetings. I would encourage that.

The ARRL's Request called for the implementation of provisions in Public Law 98-214. This new law authorizes volunteer examiners and VECs to recover from an examinee reimbursement for out-of-pocket costs. We are working on the details and necessary changes to the rules. I have assigned this work a high priority in the Private Radio Bureau. However, nothing is preventing an organization interested in being a VEC without reimbursement from commencing operations.

CQ: Are you getting sufficient support from amateurs on the VEP to assure the success of the Program? If not, where are the deficiencies?

Foosaner: We are very optimistic about the program. Examinations will be administered in more places and at more times than ever before. The quality of the examinations should greatly improve. From what we've heard from amateurs and their clubs, they are anxious to get started. However, they will have to be patient until VECs can get organized and established in their regions and until the new systems are in place.

While I do not view this as a deficiency, initially, I think we should be prepared to see a somewhat higher failure rate than has been the case in recent years. I am told that many people have been taking shortcuts in preparing to become amateur radio operators. Instead of learning the rules, practices, and procedures they need to know in order to operate an amateur station properly, they have simply memorized the answers to the exam questions without really developing an understanding and appreciation for the amateur radio art. With the valuable assistance of the volunteer examiners, such questionable practices can be brought to an end. Only truly qualified persons will be able to pass the tests.

CQ: Some people have argued that amateurs who are given exams by volunteers will not value their licenses as highly as those who took their exams from a Commission employee. They further argue that the VEP will lead to a breakdown in the high ideals and respect for the Commission's rules that has typified the Amateur service during this century. Would you comment on this?

Foosaner: We are certainly proud of the job our Commission examiners have done for the amateur community over the years. They were very hard-working, dedicated public servants who often went out of their way to be of service to the amateur community. As a result, they were highly respected by the amateur radio operators who were the beneficiaries of their work.

I think the new program certainly can work well. Consider that there are almost 35,000 Extra class licensees who can administer all of the exams, and another 95,000 Advanced class licensees who can give Technician exams. Even if each one were to volunteer a few hours each year to the program, the work-force resource would be something like 25 times that which we were able to assign for this work during the peak years! But it will take organization and cooperation to channel all of this energy and enthusiasm in the proper directions.

I am totally in the hams' corner in this program. I am fully confident that they will do a magnificent job.

"If those who seek your frequencies ever listened to some of the garbage on the ham bands that we have heard, . . . I can assure you that it could seriously damage your arguments for retaining the frequencies you now enjoy."

CQ: What do you perceive to be the two or three greatest problems facing our service today?

Foosaner: One fundamental fact I would advise every radio service to keep in mind is that the radio spectrum is a very

precious natural resource. There is not enough of it to go around to all of the various individuals and groups who place claims on it. There are many interests who would like to have your frequencies. You have very valuable blocks of frequencies throughout the spectrum that could be used in many other ways by other interests.

Against that backdrop, I will put at the top of your problem list *malicious interference*. If those who seek your frequencies ever listened to some of the garbage on the ham bands that we have heard on the tapes sent to us by concerned hams, I can assure you that it could seriously damage your arguments for retaining the frequencies you now enjoy. It is a serious problem that could eventually affect every ham.

By the way, Ted, we devote a large portion of our enforcement resources to this problem. When we obtain probative evidence of malicious interference by an amateur, we begin license revocation and suspension proceedings. Recognize, however, that gathering evidence is a painstaking process which may consume a great deal of time and effort in an individual case.

I would also include as a major concern the growing problem of *business communications* on the ham bands. The amateur radio frequencies would be valuable for broadcasting, radio common carrier, marine radio, and land mobile radio. Some hams would use the amateur frequencies for those purposes. Not only is this an improper use of the amateur frequencies, but it helps strengthen the case of those who would have your frequencies reallocated for the other purposes.

CQ: How do you think amateurs should go about addressing these problems?
Foosaner: In the case of malicious interference, you should recognize it as abnormal behavior on the part of social misfits. Do not let it cause you to lower your own operating standards. Cooperate with our FCC field engineers by passing along any information you have.

As for business communications, be aware of the guidelines developed by the ARRL. We have reviewed them, and we feel they fit the letter and the spirit of the rules. When new situations arise, work within those guidelines.

CQ: The Amateur service has its roots in experimentation. Today, however, licensees increasingly appear more interested in the communications aspects of the service. Is this a good trend?
Foosaner: From the many technical articles I see in the numerous amateur radio publications, it is hard to detect any trend away from experimentation. Often, we first hear of new applications of technology to radio communications in the Amateur service. I understand that amateurs now purchase much of the equipment that they used to construct themselves. However, then as now, they still build where they can't buy. That is where the experimentation often comes in. Our rules intentionally provide for both experimentation and communication. Possibly there is more communication and less experimentation than in the past. However, I think the mix is still good. Fundamentally, the service is healthy.

CQ: The Commission has gone on record as saying that coordinated 2 meter repeaters have "first rights" to a frequency pair. This appears to break a long tradition in the Amateur service that basically gives any amateur the right to use any frequency authorized to him or her. Why the change in policy?
Foosaner: It's not so much a change in policy as it is a balancing of interests. "First in time, first in right" is still basically the policy in amateur radio. And most of the time there's plenty of spectrum for the second, third, and subsequent operators to use. But repeaters, by their nature, cannot easily change frequencies. Therefore, it became necessary for us to support the work of the volunteer frequency coordinators, without whose efforts there would be chaos.

CQ: How realistic is it to implement a similar policy for h.f. nets?
Foosaner: H.f. nets present some similarities and some differences to the repeater situation. We are seeing a degeneration of operating practices on some nets, and some response by the FCC seems to be necessary. We can deal with the deliberate interference with enforcement sanctions, but we would like to eliminate the underlying cause of the disputes if we could. A policy statement might do the trick. However, unlike repeaters, nets are not coordinated. Also, they can more easily change frequencies. I just do not know at this time whether similar treatment for nets is in the offing.

CQ: Ray Kowalski, Chief of your Special Services Division, has indicated a desire to "open a dialogue" with amateurs regarding h.f. nets. What are Ray's concerns regarding nets, and do you share these concerns?
Foosaner: One of Ray's first assignments when he came to the Private Radio Bureau as the Senior Trial Attorney was to look into the continuing problems with nets. Today, as one of my division chiefs, he has mellowed somewhat, but he still has a burning desire to rectify the net problem. As the head of the division which writes the Amateur service's rules and policies, he is in the perfect position to do just that. He knows that there are several sides to every issue, and I completely support his efforts to open a dialogue on the subject. We will not rush to create new rules on the subject, especially not rules that are based on *our* view of the solution. All we know is that there must be a solution, and I would like to have the amateurs tell Ray what it is.

CQ: Bob, what are some of the things that impress you the most about the Amateur service?
Foosaner: I am impressed by the enthusiasm and competence of the amateurs I have met. I consider them to be the cream of the crop among radio people. There seems to be no end of hams like Mark Baratella and Owen Garriot, who pop up in the most unexpected places at exactly the right time! The international goodwill that is generated as a result of the amateurs is immeasurable.

CQ: And the things that impress you the least?
Foosaner: My pet peeve with amateurs is their obsession with special call signs. We continue to receive many requests for special call signs. Some hams can be quite insistent. Answering them detracts from our other work. The more I see these requests and the more I listen to the arguments, the more I have come to appreciate the Commission's no-special-call-sign policy. If we ever granted even just one, we'd have to do thousands of them. Administratively, that is simply out of the question. I believe the requests are degrading to the Amateur service.

"My pet peeve with amateurs is their obsession with special call signs. I believe the requests (for such call signs) are degrading to the Amateur service."

CQ: Last year you authorized amateurs in California the use of special prefixes for the Olympics. Could you explain this apparent contradiction to the stated policy?
Foosaner: What I did was authorize *all* amateur stations in California to use the numbers 23 or 84 in place of the numeral 6. The only work for us was the simple blanket Order. But before I did this, I assured them that this was a very special, one-time-only rule waiver that would not set any kind of precedent. I think there is a big difference between *individual* special call sign requests which have no *public* interest benefits, and an action like this, which promotes an international event for a limited time only.

CQ: Where do you stand on "unregulation" vis-a-vis the Amateur service? Has the Commission gone too far, or do you still have the rules in place that you need to effectively administer the service?
Foosaner: Under the regulatory review program we were able to eliminate a lot of

"The bands that you have that appear to be the most secure for the present are those which have been allocated exclusively to the Amateur service worldwide. Neither the 220–225 MHz nor the 420–450 MHz bands have been so allocated."

unnecessary rules, yet keep in place the basic rules we need to effectively administer the Amateur service. Moreover, we totally eliminated the huge backlog of rule-making petitions from amateurs that were awaiting action. I feel we have a good set of rules.

CQ: You once stated that you would be a "vigilant and vigorous defender" of our service's frequency allocations. From where should amateurs expect attacks on these allocations? That is, what services now seek—or do you expect to seek—access to our bands?
Foosaner: Frankly, I can't think of any other radio service that wouldn't be pleased to have your frequencies. Your h.f. bands propagate to all parts of the globe. Your v.h.f. and u.h.f. bands could solve a lot of frequency shortages for those with shorter-range communication needs. The bands that you have that appear to be the most secure for the present are those which have been allocated exclusively to the Amateur service worldwide. Neither the 220–225 MHz nor the 420–450 MHz bands have been so allocated.

CQ: Given your Bureau's many responsibilities to various telecommunication services, do you believe that the Amateur service is given sufficient attention in your Bureau's day-to-day work?
Foosaner: Yes, Ted, I certainly do. In the Bureau's Special Services Division, both the Personal Radio Branch and the Compliance Branch devote a large share of their time to the Amateur service. In Gettysburg, our Licensing Division's General Radio Branch spends most of its time on amateur radio. A large portion of telephone calls and correspondence we answer in this Bureau and in the Field Operations Bureau are about amateur radio. Supporting amateur radio also requires the Commission to act on a great number of rule waiver requests, petitions, and rule-makings. Individual amateur licensees are deeply interested in our actions, and they let us know what's on their minds.

CQ: The budget cuts of recent years have forced the Commission to reduce staff. Do you foresee future budget cuts, and if so, what Bureau activities could be affected?
Foosaner: This is an election year, and it's clear that the federal deficit is one of the major issues. You reduce a deficit by raising taxes—unlikely in an election year—or by cutting spending, so more budget cuts are always a distinct possibility. Now understand that the FCC's budget, which is in the neighborhood of $80 million, is only a droplet (not even a drop!) in the federal bucket. But when cuts are made, we absorb our share. So far we've been able to minimize the impact by trimming levels of supervisory and administrative personnel. Amazingly enough, we've actually been able to do more, in the way of application and petition processing, with fewer people. If there are more cuts, we will do our best to spread the impact so that no single activity is unduly affected.

CQ: Bob, what do you like best about your job?
Foosaner: I have the opportunity to meet many talented and dedicated individuals whose activities we regulate. I work with equally talented and dedicated individuals in an effort to satisfy the needs of our regulatees. I have found my government service to be very rewarding by having the opportunity to serve the public interests and by knowing that the public benefits as a result of the actions that we have proposed.

CQ: What do you like the least?
Foosaner: Individual call-sign requests!

CQ: Do you think the Amateur service is well represented in Washington?
Foosaner: Amateurs are extremely well represented in Washington. First of all, they're everywhere. They are sprinkled not only throughout the Commission, but throughout other agencies, Capitol Hill, law firms—everywhere. Nothing can happen in amateur radio without amateurs learning of it immediately. By the same token, these people also have a tremendous amount of input to *make* things happen.

CQ: How about our representation in the international telecommunications community?
Foosaner: Let me tell you a story about how well represented amateurs are in the international arena. Last year I attended the World Administrative Radio Conference for Mobile Communications in Geneva, Switzerland. The first thing I saw at the conference was a bulletin board for the amateurs in attendance, despite the fact that the conference did not deal with amateur radio! Chuck Dorian made sure I attended an amateur social function while I was at the conference. On another note, Vic Clark, the late President of the ARRL, was extremely proud of the efforts amateurs had made and of the results they had achieved at the 1979 World Administrative Radio Conference, which did deal heavily with amateur frequencies. Therefore, I would say that you have no worries about the quality or quantity of amateur representation, either nationally or internationally.

CQ: Do you think today's amateurs understand just how important it is to maintain a continuous dialogue with the Commission?
Foosaner: Yes, I do. Since becoming Bureau Chief, I have received a surprising number of letters and telephone calls from amateurs—and not those in any official capacity, but just plain folks—who just want to exchange views or "chat," if you will. This has given me a feel for what's really on people's minds, and they, in turn, have come to know me better. I think this indicates that today's amateurs are aware of the importance of establishing communications with the Commission.

CQ: As a relatively new bureau chief, what changes, if any, have you made in the Bureau's operations?
Foosaner: As you know, Ted, before my appointment as Bureau Chief, I served as Jim McKinney's deputy. Together we completely reorganized the Private Radio Bureau two years ago. We streamlined the Bureau's management structure, and we completely overhauled the application processing in our Gettysburg, Pennsylvania, licensing facility. We are now reaping the benefits of a very smoothly running operation, and I have no plans for any significant changes.

CQ: Many amateurs are worried about the service's ability to attract new blood. Do you have any suggestions as to how this can be accomplished?
Foosaner: Amateur radio is one activity among many competing for attention in the "leisure time" category. Since it appeals to people of all ages, it competes with interests in sports, travel, camping, computing—you name it. However, the beauty of amateur radio is that it can be *combined* with many of these activities. Therefore, I don't think anything specific should be done except, perhaps, to increase the publicity for amateur radio. And recently there's been no shortage of that, considering the space shuttle and Granada. Publications such as this play an important role in public relations and in attracting individuals to the Amateur service.

CQ: Bob, any other comments before we close?
Foosaner: Yes, Ted. The amateur community suffered a major loss due to the untimely death of Vic Clark. I would like to state my appreciation for his sage advice. He was an individual upon whose counsel I often relied. I would also like to say that it's a pleasure to be associated with the Amateur service. CQ

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Memorial Day weekend in Alaska. Many of us would like to have been this cool during the contest. Here KL7RA and AL7CQ bring in some of the gear for KL7RA's multi-single effort.

Sixteen-year-old Zvi, 4X6FR, in his first WPX C.W. Contest, set a new Asia 14 MHz record.

RESULTS OF THE 1983 CQ WORLD-WIDE WPX C.W. CONTEST

BY STEVE BOLIA*, N8BJQ

A *record-breaking weekend.* Excellent propagation coupled with increased participation led to 31 world and continental records broken in the 1983 CQ WPX C.W. Contest. With 20 meters open just about round the clock and 15 meters above normal, scores were generally up in all parts of the world.

Thirteen single ops broke 2 million points with 7 multi-multi's topping 5 million and 5 multi-single entries over 4 million points. As expected, the low bands were quite noisy, but 6 new records were set on 7, 3.5, and 1.8 MHz, including the first ever 3.5 MHz entry from Oceania (T32AF). Even though 10 meter scores were down, there is still activity on the band and many good multipliers can be found there.

Leading the onslaught was Jorge, L8DQ, who racked up 4,128,084 points to become the first single op to break the 4 million point barrier. Jorge made over 2500 QSO's, with 600 plus on 10 meters. Yuri, CY3BMV, bettered the previous 14 MHz world mark on the first day on his way to a score of 2,341,680, and Albert, YU3EF, raised his existing world 1.8 MHz record to 47,250. Three multi-multi crews broke the old world record led by the group at YZ1EXY with 9,858,240 points, followed closely by YT4I and YP3A. The 756 prefixes worked by YZ1EXY are also a new c.w. record. For the third consecutive year Stu, KC1F, was the USA single op winner, with a record 2,927,400 points, good for number 2 in the world. Will Stu make it four in a row this year? Jeff, N8II, took advantage of the excellent 20 meter conditions to set a new USA record, while Adam, N6QR, did the same on 7 MHz and N6IG used NE6W's station to set a new USA 3.5 MHz record. NA5R assembled an exceptional c.w. crew and walked away with the USA multi-single record and a sixth place in the world. In the QRP category N3RS added to his existing USA record with a fine score of 494,884 and finished number one in the world. Congratulations to all. Up-dated c.w. world records can be found elsewhere in this issue, along with a breakdown of continental leaders.

The YU DX Club, led by multi-multi station YZ1EXY in this contest, and also the s.s.b. contest, is the new world club champion. For the second year in a row the North Texas Contest Club is the USA club champion, edging out N.O.A.R.S. for the honor. Congratulations to both the YU DX Club and the North Texas Contest Club for their fine performances. In all, 77 clubs were represented, a slight increase over previous years. To receive the proper club credit, remember to put your club affiliation on your summary sheet for both contests. A couple of logs might

*7659 Stonesboro Drive, Huber Heights, OH 45424

John, CY6OU, logging some of his 1700-plus QSO's on his way to number one in Canada.

make the difference in winning or losing the club trophies.

The contest expedition trophy was won by Tack Kumagai, JE1CKA, for his operation from Saipan as N1BTP/WH0. Tack used his US call and the WH0 prefix to finish number one in Oceania and number nine in the world. Tack is the contest editor for *CQ Ham Radio* in Japan. Nice going, Tack.

For the prefix hunters there were several new or unusual ones to work such as HG35, HG19, YP3, WH0, IR2, CY, CI, CZ7, YT3 & 4, YZ1 & 4, and EK1 & EK0. In addition, TT8AD provided many with a new c.w. country and also a new country on 40, with T32AF doing the same on 3.5 MHz. With all the new prefixes in use, you can easily qualify for the basic WPX awards, and also take advantage of the many DX stations to work toward WAZ or DXCC.

While checking logs, the committee adjusted several for miscopied callsigns and exchanges. Please check your logs over for questionable calls, as excessive errors can lead to disqualification. If in doubt, take it out.

If you work the contest, or even a small part of it, please send in your log even if only as a check log. Each year, we see many calls in the logs that we cannot verify because we do not receive a log. Even a small check log will help us do a better job of cross-checking.

Thanks to the committee, W8ILC and W8IMZ, who did an excellent job again. Without them it would not be possible for me to get everything done in time. They spent many hours checking and cross-checking the 1300-plus logs (up 17% from last year) we received this year. Special thanks also go to the "gods of propagation" who smiled on us and gave us excellent conditions. May they bless us again in '84.

The next WPX C.W. Contest will be 26 & 27 May 1984 (GMT). There are no rules changes for this year. The current rules are published in the January 1984 *CQ* magazine. Please mail your logs to Steve Bolia, N8BJQ, 7659 Stonesboro Drive, Huber Heights, Ohio 45424, or to CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

There are still some vacancies if anyone is interested in donating a trophy for the C.W. Contest. If you or your club is interested, drop me a line. Also, pictures, either black and white or color, are welcomed.

Thanks to all of you for making this the best C.W. WPX Contest ever. Hope to work you in the '84 contest. See you at Dayton!

73, Steve, N8BJQ

Random Comments

"I was really impressed by the quality of operators. C.W. isn't dead! . . . *W1IHN.* I expected to make only a few QSO's but band conditions were so good! . . . *K1SA.* Nice to work YC0 and 9K2. No new countries, but a few new prefixes. Wish the statesiders with the exotic calls would QSL when sent s.a.s.e. Had fun. CU next year . . . *W1CNU.* First operation in WPX test. Will try to do better next year . . . *N1RC.* Was still putting the computer in on Sat. a.m. Spent the rest of the contest learning how to use the new gear. Had a FB time . . . *W1BK.* Had to take 13-hour off time when rotator broke at 1 a.m. Saturday . . . *KA1R.* First time I had operated since I passed my Extra . . . *KA1GHR.* I'm lucky this wasn't a phone contest! You should've heard what I said when my amp committed suicide with 30 minutes to go! . . . *KA2AEV.* First contest and busy holiday weekend also—quite hectic! . . . *KT2G.* Lots of time listening, but only found 4 prefixes that have never been on before (YP3, IR2, WH0, CZ7) . . . *K2VV.*

The Good: bands open, new countries, only a few stations not identifying frequently. The Bad: almost no answers to my CQ's. The Ugly: me when I realized I'd overslept Saturday morning! . . . *KT2D.* My favorite contest. Everybody is rare DX! . . . *N2EEC.* Wish this contest was not held on a holiday weekend so I could get more operating time . . . *KC2PL.* Very good condx. Lot of fun. Age 71 plus . . . *W3GM.* Working T32AF on 80 with 75 W. output . . . *W3ARK.* Band (15 mtrs) like peak of cycle . . . *AI3Q.* Sure were a lot of unusual prefixes on this weekend . . . *K3UA.* Nice to have a new country call me—tnx TT8AD . . . *WB3JRU.* Very poor condx this time of year on 80, but 15 meters fantastic . . . *KA3R.* 3V8AA was a new country for me on c.w. . . . *NQ4I.* Great condx. Running 100 W. but WC4 prefix was my amp . . . *WC4E.* 28 MHz failed us and so did 7 mc! . . . *W4WKQ.*

Nice to hear the band (10 meters) open at least a little bit. L8DQ was really rolling up the score; he had the best DX sig here. Very interesting that YZ4I, YZ1EXY, and YP3A were coming thru for several hours both days. Not very loud, but workable . . . *KT4W.* Half of the reflector element fell off the antenna prior to the contest. I used a 2½ el. Yagi . . . *KS4Q.* Love the DX! Got two new countries! These contests are great for someone like me who

uses them to search for DX. Don't have much time to get on radio, and this contest helped find DX in short time . . . *N5EYF.* Conditions on 15 meters excellent this year in comparison to last year . . . *AG5C.* Anyone working 80 meters deserves a gold star. Never saw "S" meter drop below 10 over S9 with QRN . . . *N5TV.* Still I am increasingly frustrated at the no identification practice . . . *W5OB.* Absolutely tremendous conditions . . . *N5RZ.* TT8 and 3V8 both new countries called me . . . *AF5K.* Tried to work T30AT for months and months QRP and QRO. He just couldn't hear me. Finally gave up. So who calls me in contest? . . . *KU5E.* Where were all the US prefixes? This contest will be right at the top each year for me now that I've seen what fun it is with all that DX activity . . . *KZ5M.*

Super conditions on 15 and 20 meters . . . *K6XO.* Fun contest! With conditions excellent on the high bands, activity was low on 40 . . . *N6QR.* Not much time to operate, but a real thrill to catch TT8AD on c.w. . . . *N6AR.* Excellent condx to Europe! . . . *WB7FDQ.* Had a blast working a band I rarely use. Worked more DX on 40 in one weekend than in 6 yrs. previous, combined . . . *KN7N.* Temperature in Portland was a record-breaking 102 degs. May 28, heat QRM at times but an enhancement effect was noticeable May 29 a.m., very interesting. Contests give good chances to study prop. vagaries. High point was working HH2VP on 40 mtrs. Unheard of from OR or scarce anyway . . . *KA7FEF.* Where did all the WA, WB, and WD prefixes go? . . . *KG7A.* Operated my first 3 hrs. with the input lead to amp unhooked! Didn't think rig was working right. Wish test wasn't on holiday weekend!! . . . *KC8JH.*

Having suffered thru each WPX C.W. so far, it was great to have above-average conditions for the first time (maybe the best conditions ever on 20 meters at this time of year). Twenty was open to EU until 0400 local time and open again at 0445 . . . *N8II.* Working a new one (OY7) with my indoor antenna . . . *KA8JZR.* Was going along great until amplifier went with 2 hrs. left . . . *KQ8M.* Band conditions not too bad this year. Biggest thrill was 3V8AA calling me in a pileup . . . *W9AA (Op. WD9IIX).* Great condx on 15 meters! One of my favorite contests . . . *AKØM.* Five new countries; 91 new prefixes. Now if I could just get those QSL's . . . *KSØT.* Conditions really opened up well for the contest . . . *WØRXL.* Took wife out Friday and Saturday night and went fishing Sunday afternoon . . . *KØRWL.* Let's have a contest every weekend so 15 will open up to Europe. Best since 1981 . . . *WB8ZRL/Ø.* Boy! This is fun. I can work the same neat DX as the "big guns." CU all next year . . . *KMØL.* Memory keyers sure beat straight keys . . . *NØBSH.* During contest had 2 tornadoes, 3 hail storms, 2 inches of rain, and constant power-line noise . . . *WAØTKJ.*

First WPX. Got a lot of new ones plus countries never heard before . . . *WA2CNF/Ø.* Doing this QRP on 80 is really self-abusive, but had fun . . . *KS9U.* Condx were great, but local thunderstorms kept me from putting in full time . . . *W9PNE.* Finally broke 100K. Biggest thrill: JA run on 40 meters . . . *KH6CP.* Best QRP conditions ever in a major contest. It was nice for a change . . . *KW2J.* Enjoyed working some good DX on first call QRP . . . *K4ADI.* Bands were in good shape. Wish I could have spent more time operating . . . *W2JEK.* Operated portable—field-day type. Camped in the Sequoia National Forest at about 8000 ft. Got a dipole up 40–45 feet over a branch and ran

German multi-single station DFØEB. Left to right are DF4RD, DL6RAI, and DJ3TF.

Craig, KC9T, the USA 9th District winner on 14 MHz.

an HW-8 from a lantern battery. One watt output on 15 & 20—maybe 1.5—2 watts on 40. Very rough going at times with no QSO's for stretches of 30 mins. to an hour. Other times managed as many as 12 an hour on 20 and 40 at nite. Worked all 10 call areas, 4 continents, and 8 countries, better than I thought I'd do. Was very surprised to work Japan and S. America at all. Heard some fairly strong European sigs., but couldn't work 'em at all! Much fun. Thanks for the contest . . . *WB9HRO/6.*

Condx were extremely good on the second day of the contest for the European stns! . . . *JA1YWX (Op. JA6-9330).* Very bad conditions on ten, but L8DQ made a good operation . . . *DJ6TK.* Openings to NE and NW were terrific. This was my first WPX, and it has to be the best contest I have every participated in. See you again next year, for sure . . . *NN6O.* VY QRM but propagation VY good . . . *I4KRF.* Had considerably longer than 18 hours rest! The temptation of the boat and a fine weekend was too great! QTH a few hundred yards from the sea . . . *G3CWL/A.* Five watts and a dipole are enough. But vigor is a necessity for QRP operation . . . *JH7IMX/2.* My first shot at QRPp was enhanced by such very good conditions . . . *KK9A.* QRP during WPX is always vy interesting. I enjoyed it vy much with my own computer system . . . *JA1NLX.* Conditions sure were hard for QRP from VK4 land during the contest, but still enjoyed the challenge . . . *VK4SF.* Very difficult with 2 watts . . . *Y21OL.* It was nice to have FB band conditions on 40 mtrs. this time of year . . . *AA8S.* I was very glad to do some DX's in QRP! . . . *YO3CDN.* Very good contest. Tnx . . . *SP6EIY.* My first contest! VY FB! . . . *YO3CTK.*

My first WPX WW Contest, and enjoyed every moment despite the "Big Guns" invariably ignoring my frantic calls . . . *VK5APX.* 15 meter condx lousy Friday night and all day Saturday. Sunday was very good. With better condx should have cracked 2M. Oh well, should be a new continental 21 MHz record anyway . . . *N6HR/NH6.* Lousy conditions for 3.5 MHz in Central Pacific. Should have gone fishing . . . *T32AF.* Unbelievable openings to EU on 21 MHz . . . *N1BTP/WHØ.* From the beginning of the contest I was a very tired operator . . . *LU1EWL.* Very poor condx! . . . *CX7BY.* It was very pleasant to get into the "WPX Test" for the first time. I got many new and rare prefixes and I was glad to give some fellows the quite unusual YV7 prefix in c.w. 73 and 'till the next time! . . . *YV7PF.* I have a very bad callsign for contests. Everybody thinks that I'm contest number 008. Hi! . . . *TT8AD.* My goal was to make 1000 QSO's. I made it before taking out the dupes. Next thrill was 80M QSO! I will get organized for lower bands for next test. CU then . . . *5Z4CQ.*

Broke our old Canadian record! . . . *VE1DXA.* After using 4N1U and YZ1E, we found that giving "EXY" in suffix helps in remembering. There is no more "who can it be?" . . . *YZ1EXY.* All the new prefixes make for an enjoyable contest . . . *CY3PCA.* To our great joy it was very nice condition during this contest . . . *JA7YAA.* Tnx for contest! . . . *UKØQAH.* Don't hope to have such good condx next 6 years! . . . *UK2PAP.* Thank you for the nice contest! . . . *UK5OAR.* Glad to beat VE1DXA at last (we hope) . . . *UK2RDX.* YV FB contest. We'll try again next year . . . *JA7YAF.* Great conditions. Should have gotten more sleep before start of contest. Surprised to see how well 28 MHz worked . . . *NH6R.* Condx were fantastic. Wish we had more up in the air . . . *NA5R.* Condx really FB all weekend. One of those new 2 X 1 calls sure would have helped. Nobody wants to work a W8 in WPX! . . . *W8UA.* With only 2 ops and 3 usable bands, we had a great time. We'll be back next year . . . *KJ9D.* Best conditions in a long time . . . *AC8W.* Biggest thrill: Scoring 1.2 million points with 70 watts and antenna only up 25 feet . . . *KY2P.* This is the first WPX that we had over 36 QSO's. Great test. You should have a 200 watt or less category . . . *KW2D.*

Trying to beat 4N4Y record! . . . *LZ7A.* The original call of this special one is HA6KNB. QSL via HA6KNB . . . *HG6N.* If each fly we killed during the contest would count one QSO point, we'd set up a new world record . . . *DFØEB.* Great contest. Big, big fun. We hope to do better next year . . . *IO2UIY.* Very difficult to take part in that contest when you have to work and have a baby care, but we did what we could. Didn't hear anything on 10 metres . . . *OZ8AE.* I was very excited by the explosion of 15 meter band's condition! . . . *JI1QPU.* I did not hear a U.S.A. station on 10. Very bad condx . . . *JHØLFE.* Good condition! Big open to all EU's, all USA's, XE & KP4 in both midnights! Wonderful . . . *JI1CQA.* This is my first contest of over 500 QSO's. Vy Gud . . . *JH1APK.* Very good contest, but Africa not many . . . *JA6BIF.* Very pleased to make 1000 for the first time from here on single band. Pity it was spoiled by dupes. Hope to still be hr next year . . . *9K2BE (Op. G4WBP).*

Best C.W. WPX yet. Great conditions . . . *CY6OU.* What a difference one year can make! Super conditions and a reasonable amount of activity made for the most fun in years. Can 84 be better? . . . *CY3IY.* Best conditions ever! Condx super, CY px, no power line noise, radios worked, world record beaten first day, WOW! . . . *CY3BMV.* This contest seems only to be getting better . . . *CI1QU.* Blew up friends linear but still had fun. See you

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CIRCLE 23 ON READER SERVICE CARD

next year . . . *CY7EOQ*. Penticton has been given the special prefix of CZ7 to celebrate its 75th anniversary (May 23–June 5). My first contest. Wish my c.w. was better . . . *CZ7EIK*. Murphy struck 4 hours into the contest and lost linear. Had to run barefoot. My first c.w. contest, but not the last . . . *CY7CQK*. My first WPX test on 160 c.w. CU next year . . . *VE3ABG*. "Enjoyed" listening to 10½ hrs of QRN on 160! . . . *CY3INQ*.

This effort was supposed to set a new North American 7 MHz record. Unfortunately, recovering from surgery, visitors, and work cut seriously into my operating time . . . *KG4CD*. Good condx—15 mtrs open to Japan all day long . . . *HH2VP*. Had planned to work the test QRP, but Murphy blew the final transistors in my QRP rig 5 days before the contest. Next year! . . . *W9NXD/HR2*. How did you guys get the local power company to shut off the AC three times? Forced some long rest periods. Hi! . . . *VP2MIU*. Hope to have not so many visitors during the next contest. May 28 was my birthday . . . *KP4EQF*. In this contest I worked 14 new prefixes and my total log WPX wrkd is 1750, all on c.w. Many thanks for a beautiful contest . . . *UZ3TG*. VY FB condx in the contest . . . *UQ2GDQ*. I am vy glad to work in this vy fine contest . . . *YO6KNX*. This is my first WPX contest. I enjoyed it very much . . . *YO3CRJ*. Having had my HF ticket for 3.5 months, I found that working 30 w.p.m. on a straight key brought me some nice cramps. Will be electrified next year . . . *OZ1HQG*.

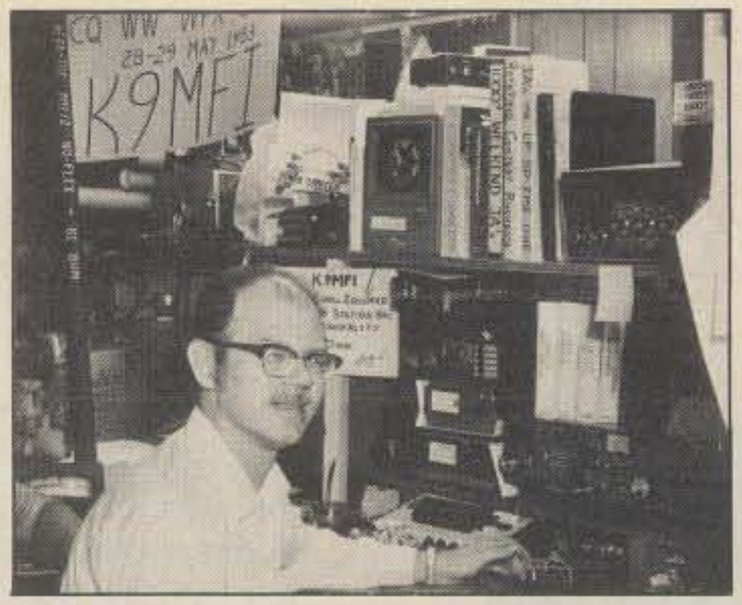
One of the most interesting contests . . . *SP2JKC*. My first international c.w. contest! Great fun . . . *SMØKNV*. The biggest thrill: 5R8AL called me . . . *I4IND*. Picked wrong band for single band entry! Biggest thrill was finding a station to work. Some good DX, though. Band up one minute and completely dead the next . . . *G4AAQ*. This contest certainly gets your brain working hard. Once again a very enjoyable contest. Despite the fall in sunspots I was very pleased to nearly double my last year's score . . . *G4CNY*. Good conditions. Hard to choose time for pauses . . . *OK1DWA*. VY problems TVI. I cannot transmit during TV programs . . . *OK1DVK*. Biggest thrill: in 10 minutes KP4, 9K2, 5Z4, and UJ8! . . . *HB9BOW*. A neighbor cut down my antenna coax, so little chance to continue as contester . . . *YU1NZW*. Condx were quite good, but very poor for EU to EU contact, so missed lot of EU prefixes . . . *YT3A (Op. YU3TVI)*.

Nice contest but hard work checking multipliers. I got married on July 9th and I am sending my log from my honeymoon . . . *YU3TWT*. Log written in Fairchild Hiller FH-227B from Paris to La Rochelle on the way to the vessel "Andrea" . . . *YU2WV*. Great contest. You've activated YO, a rare DX on 160 . . . *LZ1KSN (Op. LZ1-L38)*. Over doubled my QSO's according to last year, 82. Next year with full legal power and better low-band antennas and code practice. We'll see! . . . *OH3RF*. The linear has worn out tubes . . . *OH6TG*. As usual, just two days before the deadline my logs are ready. Anyway, the contest was great fun . . . *DK8AX*.

Station Operators

Multi-Operator, Single Transmitter

NA5R & K5GA, K5GN, K5ZD, KN5H, KG5U. **W8UA** & K8CC, K8GL, WA8RRR, WA8YVR. **K4CG:** K7SV, K4PQL, K3TW. **KJ9D** & KK9V. **AC8W** & K8DD, KJ8A, KZ8K, N8CJX, NA8I, WA8BSF, WB8ITB. **KYØS** & N9NC, NØEBM, ADØO, KB9YO. **AD1O** & KB1CN, KB1CM. **K9MFI** & WB9JKI. **KY2P** & KY2O, KA2OJM.



Phil, WB9JKI, and Stan, K9MFI, racked up over 1300 QSO's as K9MFI.

Ole, LA6ZV, was the number one single op in Norway.

KC5DX & KY5P, KS5O, KY5N. **NY4X** & NU4O. **KW2D** & KC2KK. **XE2MX:** K6XT, N6ND. **VE1DXA:** VE1BSE, VE1CEG, VE1CES, VE1CER, VE1NN, VE1YX. **KL7RA** & AL7CQ. **JA9YBA:** JA9's LNJ, NFO, OTX, QCE, QWJ, VBW, VDA, JHØCAZ. **JA3YKC:** JE3MAS, JF3PMM, JH4RHF, JR4BSM. **JA1YFG:** JL1OLH, JG1VCZ, JL1BLW. **8J5SUN:** JH4OWG, JA5RYZ. **JA6YDH:** JR6GHN, JH6SWF, JR6QHK, JG1TAW, JR6QPB. **JA7YAF:** JH7VNR, JR7SZJ, JR7TRW. **JA1YNE:** JA1VNA, JR2BJE, JA4WOO, JA6QJG. **JA6YAI:** JR6EZE, JE6UWI, JF6VFJ. **JA4YQO:** JR4MOQ, JH4WAT, JR2EVU.

HG6V: Simon, Suszter, Varga, Laki, Macsuga, Csepanyi. **LZ2KTS:** LZ2HE, LZ2PO, LZ2DF, LZ1-A-310/2, LZ2CC. **EA3VY** & EA3's LL, AIR, AVV, EEE, KU. **LZ7A:** LZ1MS, LZ2AF, LZ2DC, LZ2UU, LZ1JY, LZ2-F-166, Vanyo, Krassy Latinov, Krassy Petkov. **HG5A:** HA5GF, HA5ML, HA5UA, HA7SU, HA5OM, HA5FN, HA5WE. **HG6N:** HA6ND, HA6NN, HA6NF, HA6OQ, HA6NQ, HA6NY, HA6ON. **HA7KSR:** Barsony, Varadi, Dollos, Demeter, Franjo, Hugyah. **OH6AM:** Club Group. **HG1Z:** Biczo, Fersh, Borsai, Gosztolai, Tansoly, Tiszalatin. **Y35L:** Y23CL, Y23DL. **SK6RR:** SM6CVT, SM6LRR, SM6LGW. **OH2TI:** OH2BSI, OH2BSQ, OH5BA, OH5IS, OH6DD. **OK3KSQ:** Club Group. **HG8U:** HA8UI, HA8VF, HA8-069, HA8ZC, HA8ZB, HA8UB. **HA5KKC:** HA5's LV, MA, MD, MO, KP, OG. **DFØEB:** DJ3TF, DF4RD, DL6RAI. **OH2AQ:** OH2BCI, OH2BUQ. **OK3KEE:** OK3CTL, OK3CGG, OK3YEC, OK3MB, OK3CTA. **LA4O:** LA1WQ, LA4DCA, LA8UU, LA9HW, LAØBS. **YO4KCA:** YO4BCG, YO4FM, YO4PX, YO4PZ.

OZ5EDR: OZ1HET, OZ2JZ, OZ6ZZ, OZ3QN. **OH2BAH** & OH2BAQ, OH2FR. **IO2UIY:** I2UIY, I2ZZZ. **TO6KCP:** F5QF, F6EZV, F6GUP. **DA1WA/HBØ:** DJ9CB, DJØLC, DA1PG. **HA8KVK:** Lukacs, Magyar, Nanai. **HA5KFL:** 6 Oprs. **OK1KRQ:** OK1AYQ, OK1DLF, OK1DRQ, + Oprs. **OH9AB:** OH9UW, OH9PH, OH9SJ. **OK3VSZ:** OK3ZAF, Mitimko, Csanyi. **OH5TR** & OH7YN, OH5MQ. **OK3KEX:** OK3ZAZ, OK3-26928, OK3-17780. **ON4ALL** & ON4ALS. **OZ8AE** & OZ1FFG. **SP5JTR** & SP5ALP. **EA6RCM:** EA6's EJ, DO, JD; BD, KC, DI, KF. **YU4CBC:** Club Group. **HA3KNA:** Club Group. **OK3RKA:** Club Group. **LZ1KAA:** Club Group. **W1PL/HB9:** W1PL & HE9EVI. **OK3RKM:** Club Group. **OK2KWI:** Club Group. **LZ2KAF:** Club Group. **LZ2KHB:** Wally, Iwan. **4K1B:** Club Group. **NH6R** & WB7SYM.

UKØJAA: UAØJA, UAØJB, UAØJAD, UAØJAY, UAØJEH. **UK7LAA:** UL7LEN, EZ7LAA, UL7LCA, UL7LCB. **UK9OAZ:** UA9-145-921, UA9-145-813, UA9OFI. **UK9OAE:** Club Group. **UKØDAA:** Club Group. **UK9ADY:** UA9ADH, UA9ADI, UW9AT, UA9AFH, UA9ANZ, EZ9ADE, UA9ACP. **UKØQAH:** UAØRP, UAØQWN, UAØQDL. **UK2PAP:** UP2OX, UP2PAQ, UP2BLW. **UK5MAF:** UB5's MDC, MNY, MUV, MNX. **UK1AAF:** A. Levkin, A. Ovchaz, A. Pushkovskij. **UK4WAA:** Igor, Vladimir Markov, Vladimir Kuznestov. **UK5IAB:** Zhukov, Gubsky, Lavrinenko. **UK5RAI:** Club Station. **EK9D/1:** UA9CJK, UA9COO, UA1POL, UA1PAO. **UK5ICX:** Club Group. **UK5FAD:** Grishchenko, Vasiliev, Kuzoedov, Fisakov, Denisov. **UK6LAZ:** UA6-150-1060, UA6-150-1070, UA6-150-1357. **UK2PRC:** UP2BIL, UP2BDM. **UK2BCC:** UP2BDW, UP2-038-346, UP2-038-1656, RP2BFU, UP2-038-1600. **UK5OAR:** Alexey, Igor, Oleg. **UK6PBE:** Antsupov, Romanov, Uzlov.

UK1QAX: Antonov, Burov, Strachov, Patrakeev. **UK2BBB:** UP2PX, UP2BAS, UP2-038-892. **UK2BBQ:** Sigito, Petro, Broniaus. **UK5ZBY:** Club Group. **UK3ABO:** UA3-170-559, UA3AMB. **UK5QBE:** Club Group. **UK4WAB:** Baranov, Blinov I., Blinov N., Enokjaeva, Klepanova, Krylov. **UK3ADZ:** UA3AFQ, UA3ABD, UA3AEZ, UA3-170-926. **UK2AAG:** UC2-009-756, UC2-009-105, UC2-009-490. **UK1ZZZ:** UA1ZX, UW1YY, UA1ZCP, UA1ZWW, UA1ZCQ. **UK2AAB:** Art, Al, Serge, Vlad. **UK5IBB:** UB5IOK, UB5IQS, UB5IPP, UB5IML, UB5-073-2077. **UK5HAR:** Zawyalov, Serdyuk, Budanov. **UK2RDX:** UR2RRJ, UR2RFE, UR2RHF, UR2RNA, UR2RNJ, UR2RNX. **UK1AFA:** UA1-169-2026, UA1ARL, UA1-169-2031. **UK5GAA:** Club Group. **UK4PAE:** Tarasov, Mokeev, Mahalov, **UK5WCA:** UB5WDW, UB5-068-309, UB5WCG. **UK4SAM:** S. Dubnikov, S. Poroshin. **UK3YAM:** V. Kurkovsky, A. Belevantsev, A. Ilyushin. **UK2FAH:** Club Group.

MULTI-OPERATOR MULTI-TRANSMITTER

YZ1EXY: YU1AM, YU1EW, YU1FD, YU1FW, YU1NW, YU1PAW, YU1UU, YU1PKC, YU1RL, YU3TOA, YU7QCN, YU7QCZ, YU1EXY, Lilly, Mira, Sile, Dragan. **YT4I:** YU4GD, YU4CF, YU4WE, YU4WCA, YU4WRR, YU4WST, YU4WCW, YU4WEU, Dule, Zlatko, Zdravko. **YP3A:** YO3's AAJ, AC, AWC, CFF, FU, JJ, JP, JW, NP, QK, RG, RU; YO4's ATW, HW, SI, XF; YO8BAM, YO9AGM. **UK2PCR:** UP2BBT, UP2BCT, UP2BDF, UP2BFL, UP2BFN, UP2BJK, UP2PAV, UP2PCI, UP2-038-728, UP2-038-1049, UP2-038-1050, UP2-038-1541. **JA2YKA:** JG1GIF, JJ1BTA, JJ1BTC, JH2QXG, JR2GMC, JE2RQI, JE2VYM, JF2DQJ, JG2BFR, JI2JXR, JG3OET, JH4VBQ, JH6RPZ, JE6GTX, JA9SSY, JA9XXS. **YU1ELM:** Club Group. **YZ4Z:** YU4's VQT, WIA, WFT, WFW, WAW, WIM, WIK, BT, VTR; YU1PJQ, Kas, Almir, Jack, Boris, Hamo. **CY3PCA:** VE3KKB, VE3CRG, VE3MHI, VE2ZP. **JA3YBF:** JF3KKO, JF3PGA, JG3IUG, JI3KWZ, JI3XBE, JJ3MIZ, JJ3PYI, JR4AGT, JR4IZK, JE6BXJ, JA9TOZ, JA9VIZ, JG3LZG, JF3KIA. **JA7YAA:** JJ1MVV, JH7CUO, JH7HWR, JE7HLZ, JH9DLW. **KØUK** & WØKEA, WØRSG, WDØASM. **JA2YEF:** JR2PVI, JR2TPA, JR2UWZ, JE2KEA, JE2UGT, JE2FRT, JF2ERM, JF2NFC, JF2VRV, JF2SFF, JG2MPX. **YT3T:** YU3TUW, YU3TUX, YU7EIJ. **Y33ZL:** Club Group. **JA1YXP:** JL1ROT, JHØNPR, JR6NJD, JE6IGU, JJ1OHJ. **DL4BAH:** DF5BW, DL4BAD, DL4BAH. **YU1PJQ/4:** YU1PJQ, YU1PQB, YU1RS-955.

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New styling! Brushed aluminum front. All metal cabinet.
New SWR/Wattmeter! More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/ balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 watts RF power output.

Matches everything from 1 8 to 30 MHz: dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ-940B, $79.95, 300 watts, SWR/Wattmeter, antenna switch on rear. No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.
MFJ-945, $79.95, like MFJ-940B with balun, less antenna switch.
MDJ-944, $79.95, like MFJ-940B with balun, antenna switch on front panel, less SWR/Wattmeter.
Optional mobile bracket for 940B, 945, 944, $5.00.

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Matches coax, random wires 1.8-30 MHz. Handles up to 200 watts output; efficient airwound inductor gives more watts out. **$49.95** (+$4)
5x2x6 in. **Use any transceiver,** solid state or tube. Operate all bands with one antenna.

OTHER 200 WATT MODELS:
MFJ-901, $59.95, like 900 but includes 4:1 balun for use with balanced lines.
MFJ-16010, $39.95, for random wires only. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz.

MFJ-949B 300 WATT DELUXE VERSA TUNER II

$139.95 (+4) **MFJs best 300 watt Versa Tuner II. Matches everything** from 1.8 - 30 MHz, coax, randoms, balanced lines, up to 300W output, solid state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2 range wattmeter (300W and 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case. 10 x 3 x 7 in.

MFJ-962 1.5 KW VERSA TUNER III

Run up to 1.5 KW PEP **$229.95** (+$10) and match any feedline continuously from 1.8 to 30 MHz; coax, balanced line or random wire. Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. **6 position** antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 inches.

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$329.95 (+$10) **Meet "Versa Tuner V". It has all the features you asked for,** including the new smaller size to match new smaller rigs - only 10 3/4"W x 4 1/2"H x 14 7/8"D.

Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP- the power rating you won't outgrow (250 pf-6KV caps).

Roller Inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

Built-in 2% meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter MFJ-1312 is available for $9.95.

6-position antenna switch (2 coax lines, through tuner or direct, random/ balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ-981, $239.95. 3 KW, 18 position switched dual inductor. SWR/Wattmeter. 4:1 balun.

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CIRCLE 2 ON READER SERVICE CARD

C.W. & S.S.B. CLUB COMPETITION

YU DX Club	**36,564,807**
North Texas Contest Club	**24,931,656**
Ontario Contest Club	22,111,472
Northern Ohio Amateur Radio Society	22,014,827
Lithuanian Contest Group	19,332,341
Kaunas Polytechnic Institute	18,959,017
Alaska DX Association	14,190,666
Central Florida DX Club	14,026,644
Northern California Contest Club	12,680,750
Yankee Clipper Contest Club	11,468,836
Kansas City DX Club	11,388,202
Potomac Valley Radio Club	11,384,215
Halifax ARC	11,168,805
East Anglian Contest Club (England)	9,671,269
LZ Contest Club (Bulgaria)	9,563,822
Fraser Valley DX Club	8,102,770
B.F.R.A. Contest Group (Bulgaria)	7,842,210
Prince George Zulu Contest Club	6,543,579
Frankford Radio Club	6,230,452
The Bullmertz (Sweden)	5,971,164
Southern California Contest Club	5,937,296
Ponce DX Club (Puerto Rico)	4,436,644
Texas DX Society	4,024,590
Dixie DXers	3,727,558
Moscow Radio Club (U.S.S.R.)	3,583,839
Grand Mesa Contesters	3,251,018
Harvey Mudd College Radio Club	3,224,276
Central Indiana Contesters	2,623,288
East Bavarian DX Association (Germany F.R.G.)	2,068,693
Willamette Valley DX Club	1,806,504
Ventura County ARC	1,765,808
Ashtabula County ARC	1,476,801
Western Washington DX Club	1,347,730
Alma Ata's Club (Kazach)	1,220,083
SP DX Club (Poland)	1,150,979
Murphy's Marauders	1,082,532
Ill Wind Contesters	1,030,407
Danish DX Group	941,973
Central Arizona DX Assn.	796,092
P.A.C.R.A.T.S. (Hawaii)	791,229
Gloucester County ARC	678,656
Mississippi Valley DX & Contest Group	628,342
Rhein-Ruhr DX Assn. (Germany FRG)	597,758
Dayton Amateur Radio Assn.	571,041
Southern California DX Club	557,686
Southeastern DX Club	509,788
Radio Club of Mallorca (Balearic Is.)	501,638
Wagga Amateur Radio Club (Australia)	498,104
Rubber Circle Contest Club	435,602
Lower Columbia Amateur Radio Assn.	353,864
Bavarian DX Group (Germany FRG)	334,950
Central Pennsylvania DX Club	290,970
Order of Boiled Owls	254,092
Great Southbay ARC	252,797
VHF & UHF Exp. Club (Belgium)	247,650
Flyweight DX Group	239,184
Armavir Radio Club (U.S.S.R.)	161,704
Benelux QRP Club	160,896
South Jersey Radio Assn.	107,672
Poway ARS	99,029
Eastern Michigan ARC	95,210
Univ. of Pennsylvania ARC	84,667
Central Virginia Contest Club	82,328
LVOV Region Radio Club (Ukraine)	81,834
Radio Club of Tallinn (Estonia)	59,024
Michigan DX Association	50,344
Central California DX Club	38,013
Team of Lexhrkqc (Japan)	37,280
River City Contesters	36,036
Northern California DX Club	26,660
Rip Van Winkle ARS	26,429
Eastern Iowa DX Assn.	23,527
Sevier County ARC	17,325
ARC of Greater Milwaukee	10,560
Dade Radio Club	4,068
Boeing Employees ARS (BEARS)	750
Reading Radio Club	558

CONTINENTAL LEADERS

ASIA

AB	UL7MAR	2,217,152
28	JH7UJU	96,450
21	UL7QF	1,220,083
14	4X6FR	1,444,300
7	UL7AAS	122,808
3.5	UA9FAR	142,912
1.8	RF6FFW	3,116

AFRICA

AB	5Z4MX	1,804,572
28	No Entry	
21	CT3DJ	175,420
14	No Entry	
7	No Entry	
3.5	No Entry	
1.8	No Entry	

EUROPE

AB	**UQ2GDQ**	**2,322,030**
28	UB5ZCW	50,274
21	YU2CQ	1,171,600
14	OH6DX	1,773,006
7	I4IND	969,300
3.5	**HA8KQX**	**219,660**
1.8	YU3EF	47,250

NORTH AMERICA

AB	**KC1F**	**2,927,400**
28	KT4W	15,678
21	KP4EQF	1,816,416
14	**CY3BMV**	**2,341,680**
7	N6QR	693,036
3.5	NE6W	105,672
1.8	VE3ABG	1,824

SOUTH AMERICA

AB	**L8DQ**	**4,128,084**
28	No Entry	
21	PY1DFF	440,707
14	CX7BY	1,309,200
7	PY2DP	60,800
3.5	4M3AZC	142,780
1.8	No Entry	

OCEANIA

AB	**N1BTP/WH0**	**2,312,380**
28	ZM2RY	24,896
21	N6HR/NH6	1,203,552
14	ZM1BXW	197,877
7	VK2AYD	116,739
3.5	T32AF	93,480
1.8	No Entry	

MULTI-SINGLE

AS	JA9YBA	3,470,256
AF	No Entry	
EU	**UK6LAZ**	**4,552,063**
NA	XE2MX	4,089,888
SA	No Entry	
OC	NH6R	240,592

MULTI-MULTI

AS	JA2YKA	5,895,628
AF	No Entry	
EU	**YZ1EXY**	**9,858,240**
NA	**CY3PCA**	**4,977,817**
SA	No Entry	
OC	No Entry	

QRPp SECTION WORLDWIDE

N3RS	A	494,884	612	307
W8ILC	A	235,712	400	254
KE7V	A	192,920	396	212
			(Op. K7SS)	
W9PNE	A	166,278	342	222
PA#PUR	A	160,896	349	192
AD2Y	A	160,230	339	210
KH6CP	A	113,490	256	117
YO3CR	A	107,787	300	183
SM5CCT	A	104,920	327	172
JA1KFX	A	88,281	230	153
KW2J	"	82,680	222	156
KJ6F	A	81,337	238	163
OK3CGP	A	81,054	221	158
YU3TMJ	A	79,242	307	141
HA5KF	A	68,740	247	140
KA1CZF	A	65,913	211	127
N8CQA	"	57,233	192	121
K4ADI	A	45,760	162	130
KN1H	"	43,335	161	135
YO4ZX	"	28,704	150	104
DF5SF	A	19,344	155	93
Y27HL	A	18,445	125	85
N1AFC	"	16,896	76	66
CY5ACY	A	14,490	95	70
WA9FWO/#	A	13,608	78	72
YO4BQV	"	10,220	105	70
Y3#CTL	"	9,536	92	64
N1COG	"	7,155	62	45
AK9N	"	7,128	67	54
W2JEK	"	4,080	45	40
WB9HRO/6	"	1,978	51	46
JA1YWX	28	25,947	143	93
		(Op. JA6-9330)		
DJ6TK	28	900	23	20
EA1AER	"	45	5	5
NN6O	21	83,514	280	186
G3VMY	21	63,114	221	134
UR2CR	21	59,024	201	136
I4KRF	21	28,126	148	98
UB5QCK	21	8,712	77	66
JK1RJQ	21	8,083	69	59
G4GIU	"	6,944	66	56
G3CWL/A	"	1,575	27	25
SM3AGO	21	675	15	15
AH6EK	21	396	12	12
NN4Q	14	120,003	307	221
JH7IMX/2	14	101,574	237	171
KK9A	14	88,555	312	199
OK2BMA	14	84,084	309	156
JA2DN	"	74,176	181	152
JA1NLX	"	52,560	173	120
YO6AVB	14	31,320	139	116
OK1DZD	"	17,724	148	84
UQ2IF	14	11,154	72	66
YO6HQ	"	7,182	103	63
VK4SF	14	5,016	44	38
OK2BPF	"	2,795	49	43
Y21OL	14	1,288	35	28
OK1DCP	7	107,016	312	156
Y26JD	7	78,010	263	145
AA2U	7	31,744	168	128
OK2PAW	"	21,320	129	82
AA8S	7	12,012	87	77
JM1NKT	7	11,660	63	53
UB5FDM	7	9,440	77	59
YO3CDN	7	8,700	90	50
KB1DH	7	8,308	68	62
OI2HJ	7	3,876	49	38
		(Op. OH2BFG)		
SM#LPO	7	3,876	57	34
YO3MS	"	2,520	48	30
JA6WLG	"	24	2	2
OK1DIQ	3.5	23,584	138	88
UP2BZ	3.5	22,720	125	80
SP6EIY	3.5	13,580	98	70
OK3BRK	"	9,747	171	57
Y27KL	3.5	9,600	83	64
Y26WM	"	6,726	71	57
YO3CTK	3.5	2,368	38	32
Y23OH	"	1,680	33	30
OK1MNV	"	1,600	32	25
KS9U	3.5	1,258	42	37
Y26PL	"	882	25	21
RA2FDE	1.8	8,211	76	51
OK1KFQ	1.8	3,276	67	42
EZ3ACO	1.8	3,072	54	32
EZ3ABF	"	1,728	40	27
OL4BIA	"	1,450	43	29
OL8COJ	"	600	28	20
OL8COZ	"	48	6	4

SINGLE OPERATOR NORTH AMERICA

UNITED STATES

KC1F	A	2,927,400	1911	510
W1IHN	A	994,734	1050	351
W1MHV	"	180,095	376	199
K1SA	"	172,250	329	175
W1CNU	"	140,280	303	167
K1MXO	"	135,992	300	178
KN1I	"	117,120	315	192
N1RC	"	69,888	208	128
K1ZZJ	"	45,186	160	102
W1OPJ	"	10,808	69	56
AK1B	21	159,210	348	183
K1JB	"	93,456	236	144
W1BK	"	21,052	102	76
W1BET	"	8,140	69	44
KA1R	14	1,213,020	1225	414
K1XA	14	1,082,532	1064	417
WA@AXH/1	"	76,475	239	161
K1XM	7	10,800	50	50
KA1GHR	"	8,064	50	48
KQ2M	A	2,131,116	1475	494
KZ2S	A	1,993,420	1697	442
KA2AEV	A	698,950	831	350
KF2O	"	298,377	451	257
W2FTY	"	284,862	451	241
KT2G	"	87,171	215	147
W2FUI	"	75,012	214	141
K2QF	"	30,458	130	97
K2VV	"	28,512	114	88
W2DW	"	26,429	119	107
KT2D	"	20,210	104	86
KC2DE	"	3,604	41	34
N2GT	"	850	35	34
K2SX	14	254,092	472	278
N2EEC	"	103,935	275	195
KC2PL	"	34,170	162	134
KR2Q	7	373,388	504	289
W3GM	A	1,655,256	1329	408
W3ARK	A	423,280	578	286
K3OX/m	"	70,180	199	116
KK3V	"	25,853	122	103
AI3Q	21	237,900	402	244
K3UA	"	82,008	210	136
W3FQE	"	18,906	95	69
WA3DMH	"	5,997	49	43
N3GB	"	5,124	42	42
N3BJ	14	606,393	742	333
WB3JRU	"	394,625	564	287
WA3JXW	"	6,006	58	39
KM3T	7	349,002	499	281
KA3R	3.5	6,466	77	61
N4WW	A	2,620,440	1714	522
NQ4I	A	1,536,040	1351	440
WC4E	A	779,275	945	365
K4BAI	"	553,488	691	312
W4BV	"	300,000	440	250
K4FPF	"	128,331	308	147
W4WKQ	"	96,188	256	173
W4KMS	"	50,468	166	124
W9TS/4	"	33,454	139	86
KT4W	28	15,678	98	78
K4OAQ	14	239,184	447	264
K4OD	"	27,016	111	88
KB#C/4	"	8,280	68	46
K4JUN	"	544	16	14
KS4Q	7	564,138	633	337
K4XO	"	4,662	39	37
K5MR	A	1,946,648	1483	484
AF5K	A	1,180,797	1126	471
KA5W	A	682,866	795	354
K5RX	"	523,894	667	322
AC5K	"	86,668	307	188
N5CFU	"	84,669	250	167
W5OB	"	60,915	200	155
W5ASP	"	43,680	162	104
W5EIJ	"	16,200	85	75
N5EYF	"	231	13	11
KZ5M	21	644,385	825	357
AG5C	"	80,004	217	177
N5RZ	14	1,469,664	1282	504
KZ5D	14	640,889	762	379
KU5E	"	299,992	619	308
KW5P	"	122,640	334	219
KB5FU	"	116,127	288	207
KV5Y	"	24,206	114	98
KM5X	7	92,872	280	188
K5UR	3.5	13,176	150	108
N5TV	"	4,662	86	63
K6XO	A	751,182	847	372
KA6LAF	A	439,701	686	291
W6OKK	A	407,100	552	230
WB6JMS	"	341,901	523	242
W6OUL	"	277,560	464	270
KE6PQ	"	252,880	441	218
N6AR	"	144,455	313	167
KV6H	"	144,060	338	196
AA6EE	"	87,265	245	155
WA6TKT	"	71,520	210	149
K6CSL	"	37,400	164	110
W6BYH	"	37,113	147	89
NB6G	"	36,036	242	154
WA6HAD	"	216	17	12
W6BIP	21	260,286	424	282
KI6P	14	1,417,565	1330	509
			(Op. WA6VEF)	
WA6DBC	14	863,421	913	393
K6SG	"	65,800	198	140
KS6Q	"	192	12	12
N6QR	7	693,036	681	279
NE6W	3.5	105,672	254	148
			(Op. N6IG)	
KS7T	A	218,592	424	216
KC7V	A	125,883	306	197
W7TWL	"	109,824	265	192
KA7FEF	"	13,120	102	82
W7JKA	21	35,378	135	98
W7YD	"	22,794	112	87
			(Op. KB7G)	
K7RI	14	1,162,755	1114	435
			(Op. KE7V)	
WB7FDQ	14	185,328	412	234
W7AYY	"	53,568	182	124
KS7P	"	25,568	121	94
KB7G	"	5,800	62	58
W7EKM	"	2,233	33	29
K7UR	7	195,730	326	185
KT7G	7	193,880	358	185
KN7N	"	178,360	374	196
KG7A	"	135,872	330	176
KQ8M	A	1,683,000	1462	450
N8BJQ	A	445,368	612	308
KU8E	A	410,831	611	311
W8UPH	"	264,334	453	239
KZ8Y	"	240,648	409	222
K8OQL	"	129,996	283	157
KA8JZR	"	125,685	293	147
N8TN	"	66,305	195	149
AI8S	"	28,086	118	93
KW8M	"	21,476	116	91
K8MR	"	1,606	22	22
N8II	14	1,542,060	1305	468
KW8J	"	304,180	542	268
KC8JH	"	93,800	280	175
W8EX	"	4,218	40	38
AG8P	7	225,128	467	263
			(Op. WD8IXE)	
KV8Q	"	102,024	354	218
W8LRL	1.8	1,482	55	39
K9BG	A	822,268	835	398
WD9DBC	A	604,373	774	329
W9OA	"	177,694	348	197
KS9S	"	161,838	383	243
W9QWM	"	132,810	394	190
AJ9U	"	520	20	20
KS9J	21	11,356	80	68
KC9T	14	875,604	980	393
W9AA	"	127,654	327	166
			(Op. WD9IIX)	
KK9G	"	105,830	291	190
AB#I	A	1,542,240	1400	420
			(Op. KJ#D)	
N#TT	A	904,293	1039	393
KM#L	A	759,437	854	371
KS#T	"	363,559	549	311
KM#R	"	301,476	484	259
WA2CNF/#	"	169,686	327	198
WB8ZRL/#	"	71,709	200	123
KE#Y	"	52,122	169	119
AK#M	"	33,948	145	92
N#BSH	21	113,125	252	181
WA#TKJ	14	491,451	726	321
K#RWL	14	342,348	530	282
WA2HFI/#	"	30,537	142	117
W#RXL	"	9,964	67	53
KJ#D	3.5	11,008	120	86
			(Op. N7DF)	

ALASKA

KL7Y	A	718,947	788	333
KL7AF	3.5	45,360	125	70

CANADA

CY6OU	A	2,563,081	1789	487
CY3IY	A	2,463,531	1681	511
CY3JTQ	"	1,168,552	983	392
CY3JAQ	"	1,027,140	1125	380
VE3DZV	"	492,654	601	282
VE6CNV	"	178,286	330	194
CY1TX	A	86,400	220	150
CY3FRA	"	41,225	149	97
CY4AEX	A	26,260	112	101
VE2AEJ/3	28	3,094	39	34
CY3BMV	14	2,341,680	1627	528
CI1QU	14	243,460	419	235
CY7EOQ	14	190,476	399	198
CY1AJJ	"	104,912	259	166
CZ7EIK	"	96,876	273	162
CY1BSL	"	63,888	207	132
CY7CQK	7	157,080	247	140
VE1AIH	3.5	67,204	138	106
VE3ABG	1.8	1,824	30	19
CY3INQ	"	1,200	26	15

CAYMAN IS.

ZF2CM	A	461,130	664	285
			(Op. K#BJ)	

COSTA RICA

TI5BGA	A	95,613	230	157

DOMINICAN REPUBLIC

HI8LC	14	63,750	219	125

GUANTANAMO BAY

KG4CD	7	263,160	318	180

HAITI

HH2VP	A	2,663,936	1876	512

HONDURAS

W#NXD/HR2	A	549,192	767	294

JAMAICA

6Y5HN	A	1,433,120	1241	416

MONTSERRAT

VP2MIU	14	418,728	647	292

PANAMA

HP1AC	A	231,240	335	246

PUERTO RICO

WP4CEQ	A	349,643	532	251
KP4EQF	21	1,816,416	1495	476

AFRICA

CANARY IS.

EA5YU/EA8	A	180,250	323	175

CHAD

TT8AD	A	573,375	633	275

KENYA

5Z4MX	A	1,804,572	1266	441
5Z4CQ	"	959,725	970	325

MADEIRA IS.

CT3DJ	21	175,420	304	196

ASIA

ISRAEL

4X6FR	14	1,444,300	1221	401

JAPAN

JI1QPU	A	2,017,400	1605	440
JH#LFE	A	1,139,578	1100	374
JA1HGY	A	1,037,880	1005	360
JA#DAI	A	885,560	909	338
JA6LDD	A	463,977	596	279
JA#CGJ	"	455,840	600	280
JA9CWJ	"	276,675	453	217
JF3CCN	"	274,026	449	218
JH1KLN	"	231,340	408	215
JH7DNO	"	192,960	380	180
JR3WXA	"	160,556	322	178
JA7CPW	"	129,855	249	165
JA1BNW	"	111,134	231	181
JF1SEK	"	100,472	237	152
JR7XKN	"	100,050	247	150
JH1MTR	"	98,560	252	160
JH3JYS	"	95,916	255	148
JI1PCN	"	78,535	225	139
JF3PLF	"	60,492	216	142
JJ1CZR	"	48,222	153	114
JR3BOT	"	41,106	148	102
JA8CAQ	"	33,150	121	102
JA6YBR	"	21,080	135	85
			(Op. JF6DEA)	
JG3NKP	"	24,735	104	85
JH#NVX	"	24,682	102	82
JE7IVP	"	16,226	82	61
JA2WAC	"	13,193	71	68
JA1OYB	"	11,656	67	62
JA1PS	"	10,449	78	43
JN1UEP	"	8,500	61	50
JA7KM	"	7,400	46	40
JJ1VTE	"	4,061	37	31
JA8CJY	"	2,759	32	31
JA9JKL	"	2,581	29	29
JA1GTF	"	2,156	30	28
JR6CF	"	1,679	25	23
JA1AAT	"	926	15	14
JH7UJU	28	96,450	297	150
JH#BBE	28	55,224	226	117
JR1KSK	"	23,403	131	87
JH1RNZ	"	21,244	125	94
JA1GO	"	19,418	112	73
JE2SOY	"	10,325	82	59
JA7YFH	"	9,735	88	55
			(Op. JR7UQL)	
JE1AYU	21	790,014	843	353
JF2EZA	21	719,476	749	356
JH#BBA	21	554,635	638	315
JK1OLT	"	487,305	652	273
JL1MUT	"	378,873	531	267
JA2FXV	"	282,498	429	239
JI1CQA	"	95,520	232	160
JA7TJ	"	85,280	219	160
JG2LGM	"	46,138	156	118
JR4ISK	"	37,674	154	117
JA6AKV	"	28,512	122	96
JH5OXF	"	27,156	139	93
JA2KPV	"	26,746	117	86
JR1TLA	"	22,078	106	83
JE3IGA/JE2	"	19,039	87	79
JN1LSB	"	18,360	105	72
JA7ARW/1	"	17,181	90	83
JN1ENK	"	16,154	91	82
JH7XGN	"	11,058	68	57
JA7OYM	"	7,987	58	49
JH#USD	"	7,182	60	54
JI3HAK	"	6,572	61	53
JA6IP	"	4,998	57	49
JA4AQR	"	3,424	37	32
JA2SAP/1	"	1,426	24	23
JN1TEO	"	1,020	21	20
JA1AJA	"	192	8	8
JF2FIT	"	189	10	9
JR1RNC	14	768,564	820	333
JF3HKY/9	14	589,280	753	290
JH1APK	"	367,744	502	272
JG1GGF	"	186,528	352	201
JA4MES	"	156,909	304	193
JG1OGQ	"	55,250	162	130
JI3AXU	"	37,177	144	113
JH7AJY	"	29,520	130	90
JA1OP	"	16,116	82	68
JH4DRB	"	15,939	88	69
JH1BYE	"	6,558	61	54
JA4FMA	"	5,248	48	41
JH2XTV	"	225	10	9
JF1PJK	7	82,716	174	113
JH7BDS	7	63,860	136	103
JA6BIF	"	38,640	104	84
JH7WKQ	"	26,850	95	75
JA6AZH	"	9,800	57	49
JA3BCT	"	3,360	25	24
JA6GGD	"	1,908	22	18
JG1RVR	3.5	1,840	29	23

KUWAIT

9K2BE	21	813,131	995	319
			(Op. G4BWP)	

SAUDI ARABIA

HZ1HZ	A	1,309,716	1083	402

U.S.S.R.

ASIATIC

UV9AX	A	1,865,640	1278	420
UA9IM	A	1,790,373	1478	377
UA9NN	"	563,135	616	335
UA9AHP	"	44,620	165	97
UA9WFU	"	21,465	141	81
UA9DC	"	18,018	110	77
UA9AU	"	11,594	68	62
UA9QBT	"	9,512	76	58
UA9TS	"	3,162	36	31
UA9CBM	21	796,355	821	373
UA9YBO	"	113,022	369	161
UA9ADQ	14	1,265,472	1083	416
UA9XEQ	"	738,496	787	316
UA9AGY	"	339,533	532	263
UA9SIO	"	6,615	61	49
UA9CBR	7	91,080	194	99
UA9FAR	3.5	142,912	230	112
UA9OO	"	68,544	159	84
UA9XWT	"	21,924	72	54
UA9SHU	"	8,092	41	34
UA#AG	A	408,384	633	288
UA#SLN	A	64,800	180	135
UA#CDM	"	19,988	105	76
UA#SBQ	"	19,418	104	73
UA#LAF	"	8,786	61	46
UA#SGN	21	977,625	1059	375
UA#SKF	"	48	4	4
UA#FEO	14	203,910	384	210
UA#QDC	"	78,246	211	138

ARMENIA

UG6GDS	A	63,552	224	96

AZERBAIJAN

UD6DHM	3.5	51,156	152	58

GEORGIA

UF6FCZ	A	7,482	65	43
UF6FFF	14	1,008,486	1230	358
UF6DA	3.5	37,752	100	66
RF6FFW	1.8	3,116	28	19

KAZACH

UL7MAR	A	2,217,152	1565	448
UL7GAA	"	441,061	757	227
UL7GDH	"	51,400	178	100
UL7QF	21	1,220,083	1284	373
UL7LAW	"	607,383	740	311
UL7TAY	"	76,446	239	137
UL7CT	"	54,405	174	117
UL7LDR	14	514,676	189	107
UL7GBP	"	4,840	51	40
UL7AAS	7	122,808	218	129
UL7IBQ	"	65,296	138	88

KIRGHIZ

UM8MDX	A	1,032,134	1098	307
UM8MAZ	"	6,402	38	33
UM8MCY	21	58,957	196	107
UM8QAH	14	123,250	274	170
UM8MBA	7	52,920	117	90

TADJIK

UJ8JAS	21	1,099,210	1094	383

UZBEK

UI8BI	A	1,029,594	1275	303

EUROPE

AUSTRIA

OE7SHI	14	153,272	437	184
OE5JDL	1.8	4,080	85	24

BALEARIC IS.

EA6GP	14	224	14	14

BELGIUM

ON4FD	A	542,720	877	320
ON4XG	"	347,150	591	265
ON6FT	"	126,982	331	173
ON5WL	3.5	48,840	309	110

BULGARIA

LZ1XS	A	319,260	637	255
LZ2BR	"	195,494	422	206
LZ1HY	"	230	10	10
LZ1QI	21	83,928	231	156
LZ2VP	14	208,362	496	242
LZ1RN	"	12,397	92	77
LZ2SL	"	4,800	60	50
LZ2KCS	"	2,080	43	32
			(Op. Wasco)	
LZ1DQ	7	76,950	239	135
LZ2RW	"	12,800	80	64
LZ1GN	"	6,888	47	41
LZ1IA	3.5	10,382	88	58
LZ2RF	1.8	28,392	158	84
LZ2BE	"	23,976	146	81
LZ1KSN	"	23,040	153	80
			(Op. LZ1-L38)	

U.S.A. TOP SCORES SINGLE OPERATOR

ALL BAND

KC1F	**2,927,400**	KQ8M	1,683,000
N4WW	2,620,440	W3GM	1,655,256
KQ2M	2,131,116	AB0I	1,542,240
KZ2S	1,993,420	NQ4I	1,536,040
K5MR	1,946,648	AF5K	1,180,797

SINGLE BAND

28 MHz		**7 MHz**	
KT4W	15,678	N6QR	693,036
		KS4Q	564,138
21 MHz		KR2Q	373,388
KZ5M	644,385	KM3T	349,002
W6BIP	260,286	AG8P	225,128
AI3Q	237,900	K7UR	195,730
AK1B	159,210		
N0BSH	113,125	**3.5 MHz**	
K1JB	93,456	NE6W	105,672
		K5UR	13,176
14 MHz		KJ0D	11,008
N8II	**1,542,060**	KA3R	6,466
N5RZ	1,469,664	N5TV	4,662
KI6P	1,417,565		
KA1R	1,213,020	**1.8 MHz**	
K7RI	1,162,755	W8LRL	1,482
K1XA	1,082,532		

QRPp

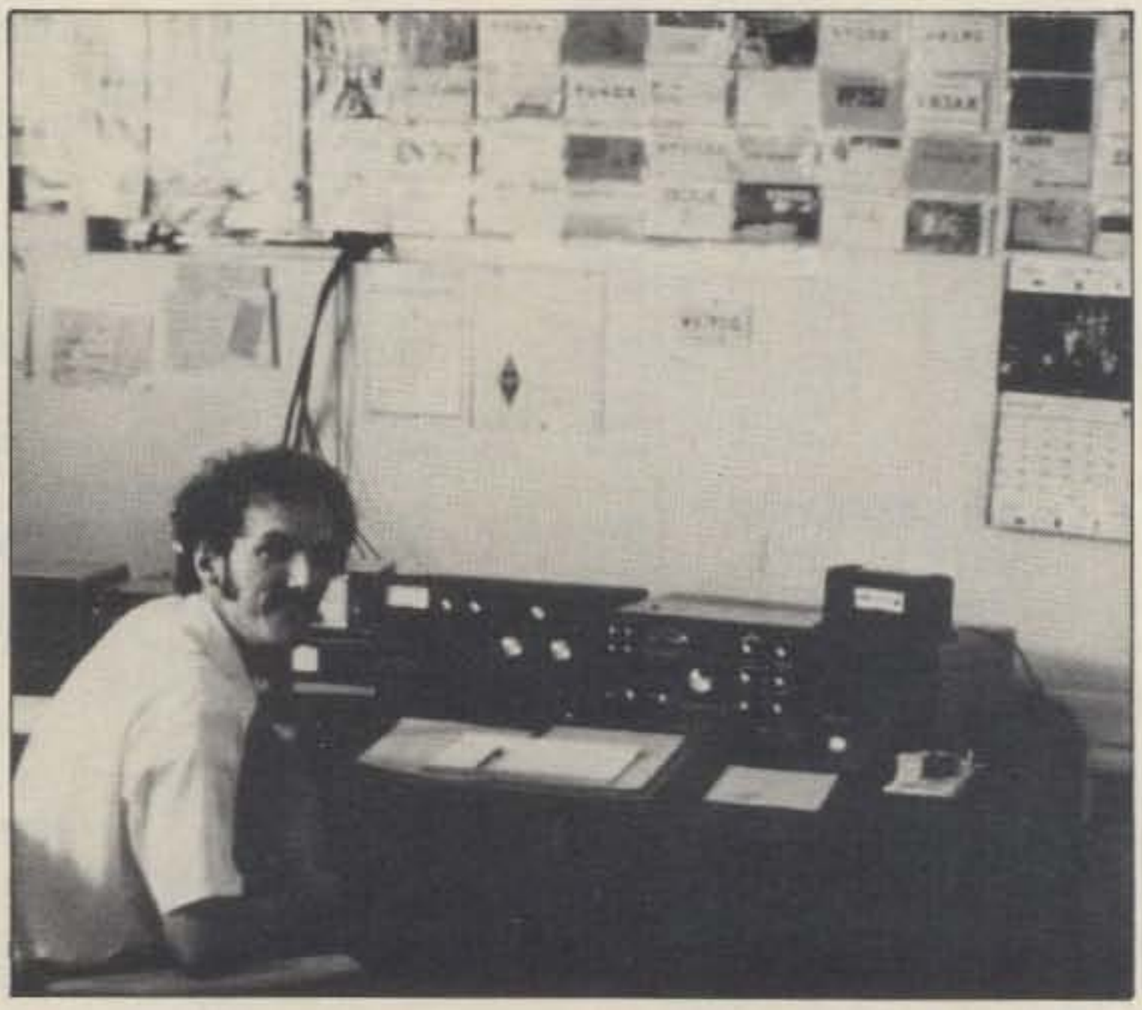
N3RS	**A**	**494,884**	NN4Q	14	120,003
W8ILC	A	235,712	AA2U	7	31,744
NN6O	21	83,514	KS9U	3.5	1,258

MULTI-OPERATOR SINGLE TRANSMITTER

NA5R	3,986,592	AC8W	2,010,946
W8UA	3,172,400	KY0S	1,727,475
K4CG	3,139,768	AD1O	1,629,629
KJ9D	2,623,288	K9MFI	1,534,950

MULTI-TRANSMITTER

K0UK	2,101,456



Mark, WB7FDQ, finished number 2 on 14 MHz in the 7th District.

THE STANDARD OF EXCELLENCE

The world of CW, RTTY, and new DUAL AMTOR is as close as your fingertips with the new brilliantly innovative state-of-the-art microcomputer controlled* **EXL-5000E.**

Automatic Sender/Receiver: Due to the most up to date computer technology, just a console and keyboard can accomplish complete automatic send/receive of Morse Code (CW), Baudot Code (RTTY), ASCII Code (RTTY) and new ARQ/FEC (AMTOR).
Code: Morse (CW includes Kana), Baudot (RTTY), ASCII (RTTY), JIS (RTTY), ARQ/FEC (AMTOR).
Characters: Alphabet, Figures, Symbols, Special Characters, Kana.
Built-in Monitor: 5" high resolution, delayed persistence green monitor – provides sharp clear image with no jiggle or jitter even under fluorescent lighting. Also has a provision for composite video signal output.
Time Clock: Displays Month, Date, Hour and Minute on the screen.
Time/Transmission/Receiving Feature: The built-in timer enables completely automatic TX/RX without operator's attendance.
Selcal (Selective Calling) System: With this feature, the unit only receives messages following a preset code. Built-in Demodulator for High Performance: Newly designed high speed RTTY demodulator has receiving capability of as fast as 300 Baud. Three-step shifts select either 170Hz, 425Hz or 850Hz shift with manual fine tune control of space channel for odd shifts. HIGH (Mark Frequency 2125Hz)/LOW (Mark Frequency 1275Hz) tone pair select. Mark only or Space only copy capability for selective fading. ARQ/FEC features incorporated.
Crystal Controlled AFSK Modulator: A transceiver without FSK function can transmit in RTTY mode by utilizing the high stability crystal-controlled modulator controlled by the computer.
Photocoupler CW, FSK Keyer built-in: Very high voltage, high current photocoupler keyer is provided for CW, FSK keying.
Convenient ASCII Key Arrangement: The keyboard layout is ASCII arrangement with function keys. Automatic insertion of LTR/FIG code makes operation a breeze.
Battery Back-up Memory: Data in the battery back-up memory, covering 72 characters x 7 channels and 24 characters x 8 channels, is retained even when the external power source is removed. Messages can be recalled from a keyboard instruction and some particular channels can be read out continuously. You can write messages into any channel while receiving.
Large Capacity Display Memory: Covers up to 1,280 characters. Screen Format contains 40 characters x 16 lines x 2 pages.
Screen Display Type-Ahead Buffer Memory: A 160-character buffer memory is displayed on the lower part of the screen. The characters move to the left erasing one by one as soon as they are transmitted. Messages can be written during the receiving state for transmission with battery back-up memory or SEND function.
Function Display System: Each function (mode, channel number, speed, etc.) is displayed on the screen.
Printer Interface: Centronics Para Compatible interface enables easy connection of a low-cost dot printer for hard copy.
Wide Range of Transmitting and Receiving: Morse Code transmitting speed can be set from the keyboard at any rate between 5-100 WPM (every word per minute). AUTOTRACK on receive. For communication in Baudot and ASCII Codes, rate is variable by a keyboard instruction between 12-300 Baud when using RTTY Modem and between 12-600 Baud when using TTL level. The variable speed feature makes the unit ideal for amateur, business and commercial use.
Pre-load Function: The buffer memory can store the messages written from the keyboard instead of sending them immediately. The stored messages can be sent with a keyboard command.
"RUB-OUT" Function: You can correct mistakes while writing messages in the buffer memory. Misspellings can also be erased while the information is still in the buffer memory.
Automatic CR/LF: While transmitting, CR/LF automatically sent every 64, 72 or 80 characters.
WORD MODE operation: Characters can be transmitted by word groupings, not every character, from the buffer memory with keyboard instruction.
LINE MODE operation: Characters can be transmitted by line groupings from the buffer memory.
WORD-WRAP-AROUND operation: In receive mode, WORD-WRAP-AROUND prevents the last word of the line from splitting in two and makes the screen easily read.
"ECHO" Function: With a keyboard instruction, received data can be read and sent out at the same time. This function enables a cassette tape recorder to be used as a back-up memory, and a system can be created just like telex which uses paper tape.
Cursor Control Function: Full cursor control (up/down, left/right) is available from the keyboard. Test Message Function: "RY" and "QBF" test messages can be repeated with this function.
MARK-AND-BREAK (SPACE-AND-BREAK) System: Either mark or space tone can be used to copy RTTY.
Variable CW weights: For CW transmission, weights (ratio of dot to dash) can be changed within the limits of 1:3-1:6.
Audio Monitor Circuit: A built-in audio monitor circuit with an automatic transmit/receive switch enables checking of the transmitting and receiving state. In receive mode, it is possible to check the output of the mark filter, the space filter and AGC amplifier prior to the filters.

CW Practice Function: The unit reads data from the hand key and displays the characters on the screen. CW keying output circuit works according to the key operation.
CW Random Generator: Output of CW random signal can be used as CW reading practice. **Bargraph LED Meter for Tuning:** Tuning of CW and RTTY is very easy with the bargraph LED meter. In addition, provision has been made for attachment of an oscilloscope to aid tuning.
Built-in AC/DC: Power supply is switchable as required; 100-120 VAC; 220-240 VAC/ 50/60Hz + 13:8VDC.
Color: Light grey with dark grey trim – matches most current transceivers. **Dimensions:** 363(W) x 121(H) x 351(D) mm: Terminal Unit.
Warranty: One Year Limited

Specifications Subject to Change

Everything built in – nothing else to buy!

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**Dual Amtor: Commercial quality,* the EXL-5000E incorporates *two completely separate modems* to fully support the amateur Amtor codes and *all* of the CCIR recommendations 476-2 for commercial requirements.

CIRCLE 115 ON READER SERVICE CARD

CZECHOSLOVAKIA

OK1DWA	**A**	**2,318,688**	**1812**	**498**
OK2BHV	**A**	**1,417,044**	**1298**	**449**
OK1AVD	**A**	**1,117,200**	**1137**	**400**
OK1ZP	"	391,425	655	255
OK1AJN	"	350,740	595	260
OK1AES	"	332,169	569	263
OK3FON	"	255,535	404	245
OK3IA	"	250,614	515	238
OK3IF	"	233,298	483	234
OK2KLN	"	218,772	497	206
		(Op. OK2-21623)		
OK1KZ	"	205,416	470	216
OK3BA	"	197,750	414	226
OK2RU	"	184,255	364	215
OK1DVK	"	178,152	357	196
OK3PQ	"	73,554	221	138
OK2PBG	"	68,586	176	138
OK3CQD	"	62,874	310	126
OK1MAA	"	59,584	230	133
OK1DKU	"	58,716	207	126
OK2BWH	"	47,400	192	120
OK3CFA	"	44,460	178	114
OK1MIZ	"	40,680	190	120
OK1AOU	"	40,584	150	114
OK1MHI	"	25,620	115	84
OK2BQZ	"	12,852	73	63
OK1AD	**28**	**20,596**	**114**	**76**
OK2QX	**21**	**271,890**	**433**	**265**
OK1XC	"	22,572	128	108
OK2ABU	"	3,264	46	34
OK2SPS	"	3,120	46	30
OK1HH	"	810	21	18
OK1MAW	**14**	**123,487**	**288**	**161**
OK2BGR	**14**	**88,281**	**224**	**153**
OK1AXB	"	70,072	194	152
OK2SGY	"	31,816	155	112
OK1AYQ	"	22,272	175	87
OK3CLR	"	10,855	95	65
OK2BBJ	"	7,400	56	50
OK1JDJ	"	7,248	58	48
OK2QR	"	6,150	50	41
OK1AOR	"	5,796	46	42
OK1MZO	"	4,370	57	46
OK2LN	"	2,790	34	30
OK2BCI	"	2,294	33	31
OK1FBH	"	1,456	34	28
OK8ACW	**7**	**368,424**	**548**	**238**
		(Op. UA9WDP)		
OK3TOA	"	20,640	125	80
OK2BBQ	"	11,765	91	65
OK1AEH	"	1,104	24	23
OK3CEI	**3.5**	**102,204**	**319**	**153**
OK3CQR	**3.5**	**77,352**	**301**	**132**
OK1MKI	"	66,612	267	122
OK2HI	"	58,320	235	120
OK1DRQ	"	13,870	96	73
OK3CPW	"	11,284	95	62
OK2BJG	"	5,704	65	46
OK1DNH	"	3,774	58	37
OL4BDY	**1.8**	**14,832**	**130**	**72**
OK1JDX	**1.8**	**9,499**	**104**	**59**
OL6BHV	"	3,784	70	44
OK2BQU	"	1,456	28	26
OK2BWM	"	1,104	31	24
OK1HBT	"	1,008	32	24
OK2PGU	"	966	27	23
OL6BFB	"	572	28	22
OL8COS	"	330	25	15
OL2BHZ	"	234	24	13
OK2KUB/P	"	216	12	9
		(Op. OK2BQU)		
OL1BGA	"	108	16	6
OL7BGX	"	240	12	10
OL4BHI	"	72	22	12

DENMARK

OZ7JZ	**A**	**353,740**	**556**	**230**
OZ5KU	**A**	**352,688**	**642**	**268**
OZ7BW	"	79,328	220	134
OZ1NF	"	45,012	197	124
OZ6EI	"	34,117	129	109
OZ1HQG	"	4,950	74	50
OZ8QW	"	4,444	48	44
OZ5PA	"	1,440	25	24
OZ1FTE	**28**	**4,000**	**52**	**40**
OZ2PG	**21**	**168,438**	**325**	**201**
OZ8E	21	3,850	50	35
OZ8XW	"	3,384	40	36
OZ2E	"	216	10	9
OZ8CT	**14**	**158,410**	**440**	**217**
OZ9MM	"	13,072	113	76

ENGLAND

G4CP	**A**	**1,383,015**	**1223**	**411**
G3ESF	"	464,720	757	296
G4OKN	"	119,448	331	168
G4AAQ	**28**	**11,316**	**87**	**69**
G3HRY	**21**	**146,568**	**297**	**197**
G3XQX	"	70,152	225	148
G3XWZ/A	"	14,213	119	61
G4CNY	**14**	**1,414,755**	**1376**	**447**
G4MVA	"	77,400	255	180
G6NK	"	23,765	172	97
G2AJB	"	3,822	50	49

FAROE IS.

OY3H	**A**	**136,620**	**470**	**198**
OY7ML	"	59,220	269	140

FINLAND

OH1MA	**A**	**1,860,130**	**1618**	**458**
OH3RF	**A**	**1,270,269**	**1229**	**423**
OH6AD	"	644,966	922	322
OH2BJG	"	397,332	630	283
OH3BU	"	257,275	501	251
OH7NW	"	143,112	338	201
OH3OS	"	92,976	339	156
OH2VZ	"	46,168	151	116
OH5JU	"	30,192	141	111
OH1XX	"	13,200	70	66
OH2KI	"	12,610	80	65
OH2AA	**21**	**563,496**	**760**	**318**
		(Op. OH2BFV)		
OH5UO	**21**	**132,296**	**297**	**184**
OH6TG	"	52,416	174	126
OH9KA	"	28,665	133	91
OH2BFG	"	22,176	102	77
OH2BJU	"	18,942	101	82
OH7HM	"	13,860	83	63
OH6NH	"	6,116	47	44
OH6DZ	"	2,624	32	32
OH6DX	**14**	**1,773,006**	**1606**	**461**
OH3IQ	**14**	**1,151,325**	**1340**	**387**
OH2AW	"	319,176	505	279
		(Op. OH2BBH)		
OH6RC	"	84,960	260	180
OH6CD	"	52,256	238	142
OH3NM	"	48,737	175	163
OH3DC	"	14,430	117	78
OH5YX	"	2,160	30	27
OH8PF	**7**	**409,704**	**651**	**258**
OH6QU	"	106,904	290	161
OH5QY	"	1,008	24	21
OH3AA	**3.5**	**155,760**	**388**	**177**
		(Op. OH6DO)		
OH3TQ	**1.8**	**1,380**	**31**	**23**

FRANCE

F6IKG	**A**	**82,026**	**192**	**189**
F6WHU	"	55,755	169	135
F9BB	"	52,801	140	133
F9DK	**14**	**47,872**	**205**	**136**
F6GNC	"	46,710	180	135
F5IN	**7**	**17,940**	**90**	**69**

GERMANY (FRG)

DJ8YI	**A**	**895,781**	**972**	**391**
DJ1YH	**A**	**264,870**	**531**	**243**
DL1TH	"	171,840	361	192
DL4NAC	"	118,917	259	181
DF3QN	"	83,681	262	157
DJ2YE	"	59,075	174	139
DK4RM	"	51,000	209	125
DL1AM	"	2,607	36	33
DL7MAE	**21**	**334,950**	**495**	**275**
DL1RB	"	114,699	261	173
DL1QT	"	29,799	130	99
DL8QS	"	9,676	73	59
DK9CK	"	2,706	34	33
DF3CE	**14**	**293,370**	**558**	**258**
DK8AX	"	163,924	395	214
DL9LAI	"	33,156	183	108
DL3EBX	"	5,280	80	55
DH2FAW	**3.5**	**92,400**	**322**	**150**

GERMANY (GDR)

Y51UE	**A**	**1,163,193**	**1241**	**381**
Y25TG	**A**	**755,112**	**732**	**488**
Y43VI	**A**	**723,008**	**900**	**352**
Y25XA/A	**A**	**708,638**	**890**	**343**
Y47YN	"	671,880	844	330
Y41VF	"	414,093	808	291
Y43ZK	"	354,051	653	279
Y36UE	"	312,984	599	252
Y46XL	"	307,629	569	257
Y30DJJ	"	145,176	395	184
Y32LK	"	130,386	362	186
Y41YO	"	122,998	408	178
Y30AJH	"	110,000	301	176
Y23RJ	"	90,428	309	158
Y39YD	"	89,121	240	183
Y58ZL	"	88,208	283	148
Y58WN	"	77,810	275	155
Y48UJ	"	74,692	215	142
Y21EA	"	48,625	224	125
Y59VA	"	32,616	147	108
Y37UF	"	24,910	160	94
Y45SA	"	21,658	110	91
Y30CLM	"	13,230	103	70
Y46YH	"	11,245	94	65
Y26MH	"	11,000	66	50
Y24LA	"	10,380	67	60
Y24EA	"	7,636	60	46
Y26SO	"	6,860	56	49
Y49RF	"	6,822	61	54
Y58ZA	"	5,610	62	51
Y34UF	"	3,738	54	42
Y26BH/A	"	2,821	33	31
Y59QA	"	1,785	41	35
Y62AH	"	1,248	30	26
Y21DH	"	1,176	21	21
Y33VL	"	468	12	12
Y48XF	"	96	6	6
Y62XG	**28**	**1,449**	**26**	**23**
Y54XA	**21**	**223,815**	**419**	**215**
Y30AYA	**21**	**58,750**	**190**	**125**
Y30UE	"	42,864	150	114
Y30BYE	"	29,492	120	101
Y26ML	"	14,950	82	65
Y21YH	"	6,670	52	46
Y47XF	"	2,695	35	35
Y37ZB	"	1,872	33	27
Y30BFK	"	1,040	21	20
Y31XF	"	360	12	12
Y57RH	"	341	11	11
Y30ADG	"	243	9	9
Y54ZA	"	160	8	8
Y25TO	**14**	**237,416**	**550**	**236**
Y22TO	**14**	**196,452**	**387**	**214**
Y38YE	"	53,664	195	129
Y24MI	"	32,940	182	108
Y23UH	"	30,956	180	109
Y51YJ	"	29,952	171	104
Y30AMF/A	"	12,261	111	67
Y23JA	"	8,905	81	65
Y24VF	"	5,719	56	43
Y44WA	"	3,096	55	43
Y22OB	"	864	18	18
Y21FL	"	792	28	22
Y56ZA	"	247	15	13
Y53TA	"	27	3	3
Y24RK	**7**	**262,000**	**400**	**200**
Y24YH	"	26,544	130	79
Y24IF/P	"	25,800	153	86
Y30AUB	"	2,240	37	32
Y66VL	"	176	9	8
Y44XI	**3.5**	**98,150**	**337**	**151**
Y67XL	**3.5**	**96,036**	**333**	**151**
Y32KE	"	91,980	319	146
Y52YG	"	54,936	266	126
Y24MF	"	34,272	184	102
Y38ZB	"	3,608	52	44

HUNGARY

HA8IT	**A**	**629,062**	**821**	**343**
HA5LZ	**A**	**545,292**	**744**	**324**
HA7PF	"	354,177	616	261
HA4XX	"	322,326	556	254
HA3NU	"	115,920	305	168
HA5KFV	"	53,186	221	131
		(Op. HA5FA)		
HA5KDB	"	39,160	163	110
		(Op. Csaba)		
HA7UJ	"	16,950	100	75
HA5FA	"	11,656	75	62
HA6NJ	"	6,300	73	60
HG5UA	**28**	**2,108**	**36**	**31**
HA7TM	**21**	**122,816**	**328**	**152**
HA8KZC	"	59,776	210	128
		(Op. Szekely)		
HA7RB	**14**	**280,340**	**582**	**262**
HA7LM	**14**	**195,288**	**484**	**237**
HA1ZG	"	173,259	424	207
HA8DT	"	107,456	351	184
HA5RL	"	81,375	414	105
HA3GA	"	59,328	250	144
HA8AT	"	53,466	240	134
HA6NW	**7**	**4,644**	**62**	**43**
HA8KQX	**3.5**	**219,660**	**492**	**210**
		(Op. HA8IE)		
HA6NL	"	128,800	394	161
HA9KSF	"	86,112	330	138
		(Op. HA9SU)		
HA9PP	"	66,766	262	133

ITALY

I2UBI	**A**	**1,729,672**	**1400**	**469**
I2JIN	**14**	**1,647**	**30**	**27**
I4IND	**7**	**969,300**	**815**	**359**
I1XPQ	"	160,820	323	170
IK1AAW	**3.5**	**79,734**	**275**	**137**

THE NETHERLANDS

PA3ADM	**A**	**196,443**	**421**	**219**
PA0DIN	**A**	**116,400**	**291**	**194**
PA3BDK	"	34,230	184	105
PA0INA	"	5,832	36	36
PA0SOL	"	5,198	60	46
PA0CF	"	1,960	28	28
PA3BTH	**21**	**40,040**	**154**	**110**
PA3ABA	**14**	**21,160**	**120**	**92**
PA3BFM	**7**	**45,114**	**175**	**103**

NORWAY

LA6ZV	**A**	**342,689**	**603**	**263**
LA7SI	"	33,880	132	110
LA9XG	"	6,235	51	43
LA7TO	"	4,484	43	38
LA2KD	"	2,158	31	26
LA1VL	**14**	**27,195**	**135**	**105**
LA8XM	**7**	**1,040**	**22**	**20**
LA2GV	**1.8**	**10,450**	**99**	**55**

POLAND

SP3HLM	**A**	**745,284**	**866**	**359**
SP2JKC	**A**	**585,555**	**852**	**309**
SP5BR	"	222,750	450	225
SP9AKD	"	128,128	301	176
SP5AD	"	52,204	197	124
SP7AWA	"	25,056	111	96
SP7HOV	"	10,431	69	57
SP8GSC	"	5,236	47	44
SP8GUV	"	3,201	35	33
SP3AOT	28	392	14	14
SP2UU	"	319	13	11
SP7IVW	**21**	**18,147**	**89**	**69**
SP6DVP	"	10,441	70	53
SP6FER	"	4,294	41	38
SP8ARK	"	1,197	21	19
SP2AYC	**14**	**324,306**	**540**	**258**
SP9BRP	"	101,805	345	165
SP1DPA	"	14,040	80	65
SP6BEN	"	9,975	69	57
SP9EML	"	5,668	62	52
SP1ETC	"	3,103	37	29
SP8EMO	**7**	**63,210**	**204**	**129**
SP9EMI	"	54,264	187	119
SP6CIK	**3.5**	**53,100**	**231**	**118**
SP1ADM	**1.8**	**8,364**	**84**	**51**
SP3GVX	"	2,604	43	31

PORTUGAL

CT1CBW	**14**	**6,210**	**75**	**54**

ROMANIA

YO6KAF	**A**	**220,890**	**619**	**222**
		(Op. Victor)		
YO2BEH	**A**	**217,371**	**505**	**231**
YO7DO	**A**	**210,720**	**392**	**240**
YO3JG	"	116,698	351	166
YO6ADW	"	30,268	163	92
YO8BSE	"	12,222	82	63
YO2CMI	"	10,494	108	53
YO4CEM	**28**	**25,872**	**128**	**88**
YO5AVP	"	6,384	61	42
YO6KNX	"	3,069	45	33
		(Op. Victor)		
YO2GZ	**21**	**9,360**	**62**	**60**
YO4CBT	"	408	12	12
YO4BEW	**14**	**142,956**	**444**	**198**
YO7FO	"	117,000	451	180
YO9AFY	"	90,112	260	176
YO3BTN	"	5,311	56	47
YO8GF	"	3,784	47	43
YO9IE	"	799	17	17
YO3CD	**7**	**276,300**	**464**	**225**
YO8KOD	**7**	**115,800**	**342**	**150**
YO3CRJ	"	51,146	254	107
YO2CEQ	"	31,806	135	93
YO7UP	"	14,478	124	57
YO4DCF	"	6,956	57	47
YO9HP	**3.5**	**52,895**	**220**	**116**
YO5BEU	"	36,800	219	80
YO8CIE	"	15,984	124	72
YO6BTY	"	2,924	48	34

SCOTLAND

GM3RAO	**14**	**272,896**	**604**	**256**
GM8SQ	"	520	14	13

SICILY

IO9VDQ	**21**	**1,002,144**	**1117**	**416**
IO9AF	**14**	**1,024,623**	**1299**	**411**

SPAIN

EA3CRX	**A**	**189,952**	**485**	**212**
EA3BOW	**A**	**165,424**	**366**	**196**
EA2CR	"	56,654	274	181
EA1CDF	"	8,052	75	61
EA2IA	**21**	**124,950**	**318**	**175**
EA4AYD	"	16,950	88	75
ED3PE	**14**	**589,600**	**941**	**335**
ED7AIN	"	133,985	363	211
EA2OP	**7**	**771,324**	**713**	**323**

SWEDEN

SK0LM	**A**	**1,084,680**	**1234**	**414**
		(Op. SM0DRD)		
SM0CCM	**A**	**558,576**	**802**	**324**
SM7KIL	**A**	**465,992**	**694**	**278**
SM5DAC	"	306,229	500	287
SM2DIR	"	213,855	424	265
SM6DED	"	207,603	398	233
SM7LSU	"	150,288	314	202
SM0CGO	"	137,975	330	185
SM0MLL	"	85,316	327	154
SM5RE	"	54,145	247	119
SM6MYF	"	41,948	168	116
SM5DUT	"	20,657	109	91
SM0KNV	"	7,425	60	55
SM5ARL	"	3,230	41	38
OH0BT/SM7	"	2,470	45	38
SM7KVZ	"	1,794	27	26
SM6NFK	"	1,320	24	24
SM0KV/0	**21**	**35,404**	**134**	**106**
SM7TV	"	25,632	115	96
SM7LAZ	"	23,436	111	84
SM6NWL	"	4,160	46	40
SM7CNA	"	1,200	20	20
SM0BVQ	**14**	**172,040**	**400**	**230**
SM6CST	"	42,904	151	124
SM6ADW	"	37,407	206	111
SM5DYC	"	24,102	160	103
SM7NSX	**7.0**	**60,416**	**235**	**128**
SM5FNU	**3.5**	**24,288**	**140**	**88**
SM6MIS	"	13,400	105	67

SWITZERLAND

HB9BOW	**A**	**6,250**	**62**	**50**

YUGOSLAVIA

YU2OG	**A**	**1,001,288**	**1167**	**376**
YU2OB	**A**	**922,260**	**1060**	**380**
YU7SF	"	350,280	608	252
YU1NZW	"	65,565	198	141
YU7ORQ	"	6,157	63	47
YU2CQ	**21**	**1,171,600**	**1140**	**404**
YT3L	**21**	**1,169,717**	**1135**	**401**
		(Op. YU3BC)		
YU7AV	**21**	**1,118,651**	**1130**	**391**
YU7KMN	"	1,103,760	1176	378
		(Op. Petar)		
YU4YA	"	646,584	727	348
YU3TU	"	274,432	429	268
YU4WW	"	159,528	352	204
YT3A	**14**	**1,714,048**	**1566**	**448**
		(Op. YU3TVI)		
YU3TWT	**14**	**1,626,934**	**1464**	**439**
4N3E	"	965,816	1168	362
		(Op. YU3HAM)		
YU7AF	"	564,768	842	333
YU3TLG	"	2,479	59	37
YU3EY	**7**	**1,091,038**	**801**	**377**
YU7BCD	**7**	**872,358**	**703**	**347**
YU3TCZ	"	242,820	416	213
4N9WG	"	188,668	435	193
		(Op. Kosmajoc)		
YU3VM	**3.5**	**194,670**	**483**	**189**
YU2WV	**3.5**	**174,168**	**425**	**177**
4N3X	"	123,120	365	162
		(Op. YU3HMX)		
YU6ZAX	"	123,024	339	176
YU4ECI	"	114,504	390	156
YT3B	"	113,208	380	159
		(Op. YU3TBX)		
YU3DGG	"	105,144	307	156
YU3EF	**1.8**	**47,250**	**230**	**105**

U.S.S.R.

EUROPEAN

EM3A	**A**	**2,190,402**	**1962**	**486**
UA4CK	**A**	**654,060**	**968**	**330**
UA3DFK	**A**	**493,416**	**775**	**308**
UA6ARX	"	262,651	550	256
UW3GL	"	229,392	431	236
UV3DN	"	226,575	527	225
UA3AJK	"	220,342	457	262
UA1CE	"	199,045	494	235
UA3DIW	"	141,050	342	182
UA3DTD	"	100,011	349	159
UA3AGF	"	95,256	504	189
UA4WCE	"	82,967	260	163
UA6AJG	"	75,208	217	158
UA3RCT	"	54,808	215	134
UA3ALQ	"	44,200	212	130
UA4WBJ	"	39,663	160	117
UA4ALI	"	36,900	200	100
UA6WBZ	"	30,528	169	96
UA4ACA	"	26,560	107	83
UA3DEV	"	22,428	118	89
UA3AFJ	"	22,140	123	90
UA4YAZ	"	15,504	108	76
UA1DF	"	14,240	80	68
UA1TCO	"	12,586	75	62
UA3XCM	"	11,152	78	68
UA3RAO	"	9,420	65	60
UV3CM	"	8,030	59	55
UA3TBW	"	5,984	62	44
UA3LCC	"	3,268	40	38
UA3IAK	"	1,680	40	20
UA6HOF	"	1,368	35	19
UA3AQP	"	814	30	22
UW6OE	"	672	24	21
UA3TFZ	28	976	21	16
UW3UO	**21**	**509,392**	**724**	**316**
UA4HBP	**21**	**311,080**	**529**	**280**
UA3RDH	"	131,712	315	224
UA3EAL	"	98,952	178	152
UA4HDV	"	71,786	222	143
UA1ZDW	"	32,643	119	93
UA3TAM	"	29,340	125	90
UA6AKT	"	450	16	15
UA3LM	**14**	**719,840**	**900**	**352**
UA3AGL	**14**	**427,200**	**701**	**320**
UA4PNX	**14**	**343,296**	**584**	**288**
UA3DRT	"	202,943	373	233
UA3TDK	"	117,720	280	218
UA3IDX	"	84,840	251	180
UA3PGZ	"	81,900	354	175
UA4CFC	"	74,120	280	170
UA4CDL	"	61,690	240	155
UA3RFV	"	49,280	223	140
UA1XM	"	36,645	132	105
UZ3TG	"	34,238	205	106
UA3ICF	"	22,826	138	101
UA3DQS	"	19,110	116	91
UA6AYX	"	16,808	145	88
UA6ALV	"	15,252	104	82
UA3GGQ	"	13,245	134	85
UA6PDN	"	8,540	64	61
UA4MX	"	8,909	61	59
UA4NBD	"	7,884	65	54
UA3DNV	"	4,753	57	49
UA3QEE	"	3,108	42	42
UW3BX	"	984	29	24
UA3DWQ	**7**	**103,968**	**320**	**144**
UA3LAR	"	53,788	189	119
UA3GDJ	"	20,790	125	77
UA4CIF	"	3,904	42	32
UA3DUF	**3.5**	**39,872**	**164**	**112**
UA3LEO	**1.8**	**5,474**	**67**	**46**
EZ3ABW	"	1,440	31	24
RA6AJQ	"	182	15	7

BYELORUSSIA

UC2LBE	A	546	16	14
UC2OBP	**21**	**134,432**	**313**	**198**
UC2WBL	**7**	**9,300**	**73**	**50**
UC2AFZ	"	7,956	76	51
UC2OBB	**3.5**	**17,856**	**116**	**72**

ESTONIA

UR2OI	**21**	**428,076**	**617**	**282**
UR2TBG	"	225	9	9
UR2RNG	**7**	**62,738**	**225**	**127**
UR2RND	**3.5**	**44,600**	**227**	**119**
UR2RNA	"	25,272	148	81

KALININGRAD

UA2EC	**A**	**215,488**	**439**	**224**
UA2FBO	"	63,130	177	95
UA2DM	**21**	**75,684**	**222**	**159**
UA2FFD	**7**	**463,218**	**695**	**269**

LATVIA

UQ2GDQ	**A**	**2,322,030**	**1880**	**493**
UQ2GLW	"	72,063	261	153
UQ2GCV	**14**	**26,316**	**120**	**102**
UQ2GCF	"	8,960	102	64
UQ2GCN	**3.5**	**96,096**	**308**	**143**

LITHUANIA

UP2BAO	**A**	**1,172,704**	**1202**	**416**
UP2BFH	**A**	**373,198**	**725**	**266**
UP2PAW	"	190,723	392	221
UP2PBM	"	115,659	328	181
UP2BEG	"	89,596	284	158
UP2BBF	"	86,618	283	161
UP2BDX	"	39,576	177	136
UP2PCX	"	26,159	129	101
UP2BFE	**28**	**7,650**	**75**	**50**
UP2BB	**21**	**7,884**	**62**	**54**

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ALL BAND

L8DQ	**4,128,084**	OK1DWA	2,318,688
KC1F	**2,927,400**	**N1BTP/WH0**	**2,312,380**
HH2VP	2,663,936	UL7MAR	2,217,152
N4WW	2,620,440	EM3A	2,190,402
CY6OU	**2,563,081**	KQ2M	2,131,116
CY3IY	2,463,531	**JI1QPU**	**2,017,400**
UQ2GDQ	**2,322,030**	KZ2S	1,993,420

SINGLE BAND

28 MHz

JH7UJU	96,450
JH0BBE	55,224
UB5ZCW	50,274
YO4CEM	25,872
ZM2RY	24,896
JR1KSK	23,403
JH1RNZ	21,244

21 MHz

KP4EQF	1,816,416
UL7QF	1,220,083
N6HR/NH6	1,203,552
YU2CQ	1,171,600
YT3L	1,169,717
YU7AV	1,118,651
YU7KMN	1,103,760

14 MHz

CY3BMV	**2,341,680**
OH6DX	1,773,006
YT3A	1,714,048
YU3TWT	1,626,934
N8II	**1,542,060**
N5RZ	1,469,664
4X6FR	1,444,300

7 MHz

I4IND	969,300
YU7BCD	872,358
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EA2OP	771,324
N6QR	693,036
KS4Q	564,138
UA2FFD	463,218

3.5 MHz

HA8KQX	**219,660**
YU3VM	194,670
UP2BCR	186,368
YU2WV	174,168
OH3AA	155,760
UA9FAR	142,912
4M3AZC	142,780

1.8 MHz

YU3EF	47,250
LZ2RF	28,392
LZ2BE	23,976
LZ1KSN	23,040
OL4BDY	14,832
LA2GV	10,450
OK1JDX	9,499

QRPp

N3RS	**A**	**494,884**	NN4Q	14	120,003
W8ILC	A	235,712	OK1DCP	7	107,016
JA1YWX	28	25,947	OK1DIQ	3.5	23,584
NN6O	21	83,514	RA2FDE	1.8	8,211

MULTI-OPERATOR SINGLE TRANSMITTER

UK6LAZ	**4,552,063**	LZ7A	3,890,185
HG6V	**4,545,450**	UK2RDX	3,802,194
LZ2KTS	4,374,162	HG5A	3,754,540
XE2MX	4,089,888	HG6N	3,752,008
UK2PAP	4,032,138	**VE1DXA**	**3,728,256**
NA5R	3,986,592	UK5IBB	3,659,760
EA3VY	3,910,984	KL7RA	3,567,568

MULTI-OPERATOR MULTI-TRANSMITTER

YZ1EXY	**9,858,240**	YU1ELM	5,835,583
YT4I	9,578,280	YZ4Z	5,370,408
YP3A	8,787,461	**CY3PCA**	**4,977,817**
UK2PCR	7,023,236	JA3YBF	4,722,407
JA2YKA	5,895,628	JA7YAA	3,707,865

UP2BCW	**14**	**712,712**	**870**	**356**
UP200	**14**	**547,288**	**736**	**337**
UP2BEI	"	254,140	519	262
UP2BEX	"	175,724	451	223
UP2BCQ	"	77,144	291	164
UP2BJQ	"	1,512	25	24
UP2NK	**7**	**799,980**	**791**	**335**
UP2BIP	"	210,528	433	204
UP2BCR	**3.5**	**186,368**	**481**	**182**
UP2BBM	"	47,970	208	117
UP2BEN	"	47,300	209	110

MOLDAVIA

UO5OWC	**A**	**330,264**	**806**	**264**

UKRAINE

UB5INO	**A**	**460,010**	**801**	**293**
UB5WCJ	**A**	**420,042**	**549**	**274**
UB5VK	**A**	**217,871**	**500**	**223**
UB5UBY	A	210,784	499	224
UB5ENI	"	143,558	500	179
UY5TE	"	109,136	342	173
UB5WCX	"	81,834	239	138
UB5LCU	"	67,032	245	147
UB5ULP	"	51,832	177	124
UB5ICS	"	49,491	164	117
UB5CAY	"	48,848	145	104
UB5LJD	"	41,340	200	106
UV5VAW	"	27,324	155	108
UT5RW	"	24,651	130	83
UB5MPD	"	17,487	71	67
UB5UKW	"	15,544	85	67
UB5QAU	"	15,438	100	83
UT5HP	"	7,946	67	58
UB5WCG	"	7,802	70	58
UB5UCH	"	7,600	58	50
UB5UWZ	"	2,450	36	25
UB5DW	"	2,117	31	29
UB5ZCW	**28**	**50,274**	**192**	**133**
UB5VAA	"	13,110	99	57
UB5QDU	"	9,462	79	57
UB5ZDF	"	1,540	26	22
UB5VDO	"	1,050	28	25
UB5QAP	**21**	**141,906**	**322**	**201**
UB5MLP	"	94,977	265	183
UB5UGO	"	12,342	78	66
UT5WW	**14**	**939,300**	**1109**	**404**
UT5PI	**14**	**650,310**	**977**	**409**
UB5IAN	**14**	**295,885**	**569**	**295**
UB5CBA	"	283,798	530	289
UB5WCD	"	246,888	466	191
UB5SG	"	156,860	382	230
UB5QHM	"	96,441	312	183
UB5QJA	"	85,434	270	174
UB5ZFR	"	57,368	211	142
UB5WAR	"	19,800	103	90
UB5GBN	"	12,900	140	86
UB5QIP	"	4,331	71	61
UB5LEE	"	3,200	42	40
UB5IHF	**7**	**236,570**	**414**	**205**
UB5UBI	**7**	**176,700**	**335**	**186**
UB5ZEQ	"	153,680	386	170
UB5ADN	"	57,500	196	115
UB5EPV	"	42,400	176	100
UB5ZAL	**3.5**	**130,510**	**366**	**155**
UB5EEP	"	77,400	281	129
UB5RCA	"	69,420	246	130
UB5NDD	"	25,578	149	87
EY5IGY	**1.8**	**5,382**	**59**	**39**

OCEANIA

AUSTRALIA

VK2BQQ	**A**	**354,594**	**445**	**226**
VK4XA	**A**	**214,560**	**391**	**180**
VK3AEW	**A**	**167,442**	**286**	**177**
VK3DEU	"	122,988	251	148
VK5GZ	**A**	**81,468**	**217**	**124**
VK5APX	"	66,187	196	121
VK2AYD	**7**	**116,739**	**181**	**119**

FIJI

3D2CJ	**A**	**31,242**	**132**	**82**
		(Op. GW3JI)		

HAWAII

KH6IJ	**A**	**19,278**	**123**	**81**
N6HR/NH6	**21**	**1,203,552**	**1072**	**378**

INDONESIA

YC0VM	**21**	**596,850**	**1812**	**346**

KIRIBATI

T32AF	**3.5**	**93,480**	**188**	**95**

NEW ZEALAND

ZM2RY	**28**	**24,896**	**144**	**64**
ZL2MM	**21**	**17,640**	**98**	**63**
ZM1BXW	**14**	**197,877**	**313**	**213**
ZM3AGI	"	24,768	105	86

PAPUA NEW GUINEA

P29NPL	**21**	**30,576**	**132**	**91**

PHILIPPINES

DU1TV	**21**	**59,470**	**210**	**95**

SAIPAN

N1BTP/WH0	**A**	**2,312,380**	**1965**	**398**

SOUTH AMERICA

ARGENTINA

L8DQ	**A**	**4,128,084**	**2530**	**548**
		(Op. LU8DQ)		
LU1EWL	"	195,840	336	192
LU5WP	"	62,292	168	116

BRAZIL

ZY5CIG	**A**	**97,681**	**241**	**137**
PP2JT	**A**	**90,628**	**227**	**139**
PP2WV	"	19,952	67	58
PY3CNW	"	12,210	95	74
PY1AJK	"	5,580	64	30
PY2CMS	"	560	14	14
PY1DFF	**21**	**440,707**	**539**	**277**
PY1PL	"	2,241	29	27
PY2DP	**7**	**60,800**	**111**	**95**

CHILE

CE3DOF	**7**	**21,624**	**71**	**53**

URUGUAY

CX7BY	**14**	**1,309,200**	**1105**	**400**
CX8DT	**3.5**	**14,476**	**61**	**47**

VENEZUELA

YV4ABR	**21**	**9,996**	**66**	**51**
YV7PF	**14**	**448,538**	**547**	**274**
4M3AZC	**3.5**	**142,780**	**203**	**121**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

NA5R	**3,986,592**	**2369**	**634**
W8UA	**3,172,400**	**2089**	**560**
K4CG	**3,139,768**	**2201**	**538**
KJ9D	**2,623,288**	**1824**	**538**
AC8W	2,010,946	1604	478
KY0S	**1,727,475**	**1627**	**465**
AD1O	**1,629,629**	**1455**	**491**
K9MFI	1,534,950	1339	450
KY2P	**1,216,780**	**1167**	**415**
KC5DX	761,024	905	352
NY4X	261,000	516	300
KW2D	109,890	289	185

NORTH AMERICA

XE2MX	**4,089,888**	**2576**	**528**
VE1DXA	**3,728,256**	**2147**	**584**
KL7RA	**3,567,568**	**2372**	**586**

ASIA

JA9YBA	**3,470,256**	**2330**	**522**
JA3YKC	**1,672,325**	**1338**	**443**
JA1YFG	1,525,992	1437	402
8J5SUN	785,781	1031	327
JA7YAF	637,332	776	307
JA6YDH	541,698	714	274
JA1YNE	292,774	513	218
JA6YAI	48,260	191	127
JA4YQO	46,410	159	119

EUROPE

HG6V	**4,545,450**	**2725**	**666**
LZ2KTS	**4,374,162**	**2831**	**603**
EA3VY	**3,910,984**	**2509**	**616**
LZ7A	3,890,185	2806	617
HG5A	3,754,540	2741	541
HG6N	3,752,008	2736	559
HA7KSR	3,009,552	2221	546
OH6AM	**2,946,424**	**2249**	**533**
HG1Z	2,765,664	2090	528
Y35L	**2,430,316**	**2023**	**511**
SK6RR	**2,393,536**	**1890**	**502**
OH2TI	2,156,606	1994	467
HG8U	2,087,564	1903	458
HA5KKC	1,806,640	1676	440
DF0EB	**1,496,400**	**1368**	**430**
OH2AQ	1,440,747	1425	441
OK3KEE	**1,439,100**	**1364**	**450**
LA4O	**1,406,790**	**1477**	**441**
YO4KCA	**1,292,856**	**1575**	**412**
OZ5EDR	**1,277,044**	**1324**	**404**
OH2BAH	1,209,750	1396	375
IO2UIY	**1,014,832**	**1175**	**364**
TO6KCP	**905,625**	**1184**	**345**
DA1WA/HB0	**813,939**	**1063**	**339**
HA8KVK	758,976	1043	357
HA5KFL	693,265	1027	305
OK1KRQ	603,432	849	306
OH9AB	593,450	1001	325
OK3VSZ	530,178	737	319
OH5TR	440,562	853	303
OK3KEX	432,568	734	278
ON4ALL	**401,391**	**624**	**309**
OZ8AE	**368,281**	**630**	**257**
DL4BAH	296,559	678	249
HA2KMR	288,920	588	233
SP5JTR	**277,290**	**430**	**237**
EA6RCM	**244,374**	**723**	**241**
YU4CBC	**229,050**	**506**	**225**
HA3KNA	186,984	432	196
OK3RKA	183,274	301	266
LZ1KAA	105,865	268	155
W1PL/HB9	**54,945**	**218**	**135**
OK3RKM	22,932	105	84
LZ2KAF	21,390	131	93
OK3KFO	17,380	106	79
OK2KWI	13,032	110	72

LZ2KHB	3,128	40	34
OK3KSQ	2,508	40	33
SP7KTE	75	5	5

OCEANIA

NH6R	**240,592**	**404**	**176**
4K1B	**207,480**	**307**	**152**

U.S.S.R.
CLUB STATIONS
ASIA

UK7LAA	**2,481,932**	**1800**	**452**
UK9ADY	**1,915,392**	**1505**	**384**
UK8JAA	**1,369,282**	**1425**	**391**
UK9OAZ	371,910	573	253
UK8QAH	294,063	579	209
UK9OAE	256,048	489	208
UK8DAA	6,615	56	45

EUROPE

UK6LAZ	**4,552,063**	**2891**	**653**
UK2PAP	**4,032,138**	**2594**	**597**
UK2RDX	**3,802,194**	**2547**	**594**
UK5IBB	**3,659,760**	**2681**	**598**
UK2BBB	3,104,892	2171	567
UK5MAF	2,535,834	2174	519
UK2PRC	2,368,800	1879	525
EK9D/1	2,132,000	2166	500
UK2AAB	**1,869,120**	**1711**	**472**
UK1ZZZ	1,781,196	1745	453
UK3ADZ	1,701,592	1749	454
UK5QBE	1,625,052	1704	429
UK4WAB	1,226,265	1690	435
UK5FAD	978,885	1170	405
UK1AFA	967,064	1144	392
UK5IAI	926,209	1137	389
UK4WAA	817,443	1082	359
UK2BCC	805,803	1076	339
UK3ABO	741,588	1024	348
UK6LTA	716,096	1073	334
UK5IAB	461,970	815	295
UK5RAI	385,552	731	294
UK2BBQ	294,640	547	290
UK5ZBY	293,103	669	261
UK2AAG	256,300	618	233
UK1AAF	208,266	556	206
UK5OAR	**206,304**	**504**	**224**
UK6PBE	174,406	488	194
UK1QAX	100,320	351	165
UK5ICX	96,222	292	158
UK5HAR	22,213	153	97
UK5GAA	11,270	89	70
UK4PAE	9,861	65	57
UK5WCA	7,992	71	54
UK4SAM	5,900	61	50
UK3YAM	5,590	52	43
UK2FAH	2,340	49	39

MULTI-OPERATOR MULTI-TRANSMITTER

YZ1EXY	**9,858,240**	**5263**	**756**
YT4I	9,578,280	5077	760
YP3A	**8,787,461**	**5621**	**743**
UK2PCR	**7,023,236**	**4244**	**682**
JA2YKA	**5,895,628**	**3321**	**614**
YU1ELM	5,835,583	3987	673
YZ4Z	5,370,408	3823	621
CY3PCA	**4,977,817**	**2703**	**611**
JA3YBF	4,722,407	2711	598
JA7YAA	3,707,865	2286	553
K8UK	**2,101,456**	**1646**	**464**
YT3T	1,720,446	1458	483
Y33ZL	**1,525,080**	**1707**	**426**
JA2YEF	1,014,336	1282	288
JA1YXP	806,238	1092	282
DL4BAH	**296,553**	**634**	**249**
YU1PJQ/4	15,330	145	73

Disqualified: NI6W, UK8FAD, for excessive unverifiable QSO's.

CHECK LOGS: The following logs were used for cross-checking. Check logs & s.w.l. logs are always appreciated. Thank you. AA2Z, AA4QZ, AK2H, CY1BEI, EA6FD, EA7CFW, GU3HFN, JA6FYM, K6ZDL, LA1H, LA5BS, LA7UCA, LA8CJ, LA8WY, LA9WCA, LZ2CJ, N2RS, N6UW, NC5K, OH2BFO, OK1DCX, OK1IAR, OK1MIN, OZ1IDL, OZ4RT, OZ4XX, OZ5MJ, OZ7GN, PA0PHK, PA3BLI, PA3CBV, PY2FNE, SM1HPV, SM5APS, SM5BDV, SM6AYM, SM6CDN, SM7KNW, SP2FF, SP3AOT, SP3XR, SP6DMJ, UA1ANA, UA1CBX, UA1NBD, UA3ABI, UA3ACJ, UA3DBB, UA3DIN, UA3RDK, UA3VAN, UA3VAQ, UA3VDO, UA3XBY, UA4CGF, UA4HFK, UA4LBE, UA4SBF, UA4YAT, UA6APP, UA6AQJ, UA6LFQ, UA6PCH, UA6YCK, UA9COB, UA9XAB, UB5-067-2160, UB5ABY, UB5DCT, UB5EF, UB5EM, UB5EU, UB5IPJ, UB5KBV, UB5MMF, UB5QBF, UB5QKN, UB5UBU, UB5WDD, UK1ACT, UK1ADR, UK1OAV, UK1OAZ, UK3DBV, UK3XAM, UK3XAU, UK5DAA, UK5EDI, UL7TAG, UP2BEB, UQ2GBR, UQ2PQ, UW4NP, UY5GG, VO1AW, W1PM, W1WY, W8IMZ, WB4VQO, Y2-13117/E, Y2-9812/H, Y22DK/A, Y23FK, Y30ADC, Y41WM, YU2BHI, YU7FN.

TROPHY WINNERS
SINGLE OPERATOR - ALL BAND

WORLD - Canadian DX Assn. Trophy. Won by: **Station L8DQ**; Opr. **Jorge H. Bozzo, LU8DQ.**
U.S.A. - Steve Bolia, N8BJQ Trophy. Won by: **Stuart R. Santelmann, KC1F.**
CANADA - Canadian Amateur Radio Federation Trophy. Won by: **Station CY60U**; Opr. **John Sluymer, VE6OU.**
EUROPE - Sig Jakobsson, TF3CW Trophy. Won by: **Gunars Auseklis, UQ2GDQ.**
JAPAN - Palm Gardens Contest Club Trophy. Won by: **Toshirou Ogino, JI1QPU.**
WORLD QRPp - Nevada Amateur Radio Assn. Trophy. Won by: **R. Sigismonti, N3RS.**

SINGLE OPERATOR - SINGLE BAND

WORLD - Pedro Piza, Jr., NP4A Trophy (Pedro Piza, Sr., KP4ES Memorial) Won by: **Station CY3BMV.** Opr. **Yuri Blanarovich, VE3BMV.**
U.S.A. - Kansas City DX Club Trophy. Won by: **Jeffrey W. Hartley, N8II.**
WORLD - 3.5 MHz - Lance Johnson Eng. Trophy. Won by: **Station HA8KQX; Opr. Diem Ferenc, HA8IE.**
U.S.A. 1.8 MHz - Bernie Welch, W8IMZ Trophy. Won by: **Wallace C. Eckles, W8LRL.**

MULTI-OPERATOR SINGLE TRANSMITTER

WORLD - Ron Blake, N4KE Trophy. Won by: **Station UK6LAZ; Oprs. UA6-150-1060, UA6-150-1070 & UA6-150-1357.**
CANADA - Tehrahedral Contest Circle Trophy. Won by: **Station VE1DXA; Oprs. VE1BSE, VE1CEG, VE1CES, VE1CER, VE1NN & VE1YX.**
EUROPE - Jonas Bjarnason, TF3JB Trophy. Won by: **Station HG6V; Oprs. Simon, Suszter, Varga, Laki, Macsuga & Csepanyi.**

MULTI-OPERATOR MULTI-TRANSMITTER

WORLD - North Florida DX Assn. Trophy. Won by: **Station YZ1EXY**; Oprs. **YU1AM, YU1EW, YU1FD, YU1FW, YU1NW, YU1PAW, YU1UU, YU1PKC, YU1RL, YU3TOA, YU7QCN, YU7QCZ, YU1EXY, Lilly, Mira, Sile & Dragan.**
NORTH AMERICA - Dick Weber, K5IU Trophy. Won by: **Station CY3PCA; Oprs. VE3KKB, VE3CRG, VE3MHI & VE2ZP.**

CONTEST EXPEDITION

WORLD - Northern Ohio DX Assn. Trophy. Won by: **Tack Kumagai, JE1CKA, for his operation as N1BTP/WH8.**

CLUB COMPETITION (S.S.B. & C.W.)

WORLD - Canadian DX Assn. Trophy. Won by: **YU DX Club (Yugoslavia)**
U.S.A. - Northern Ohio Amateur Radio Society Trophy. Won by: **North Texas Contest Club.**

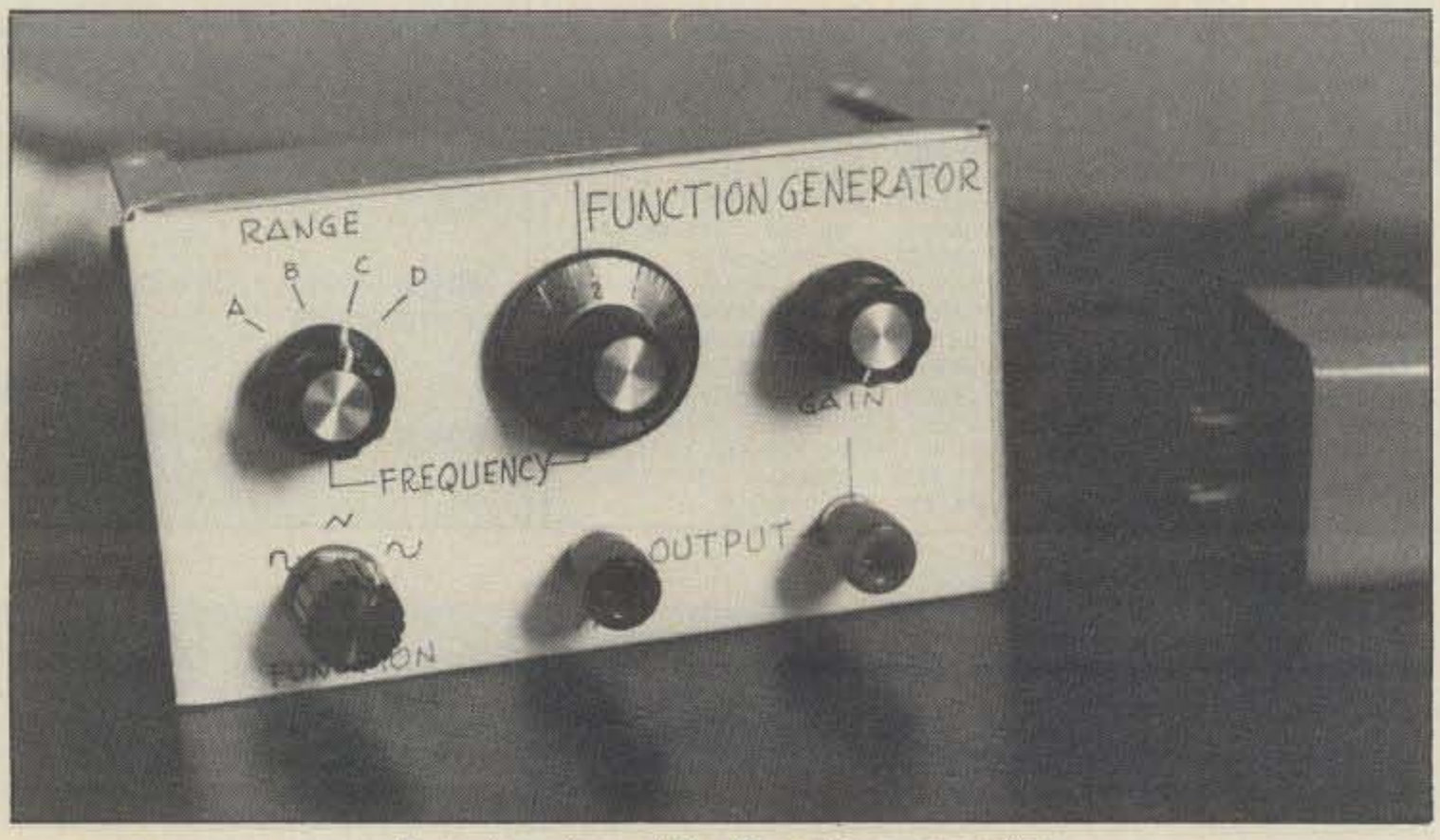
If you're in a building mood, here's a good project that will make a welcome addition to your test equipment.

How To Build A Practical Function Generator

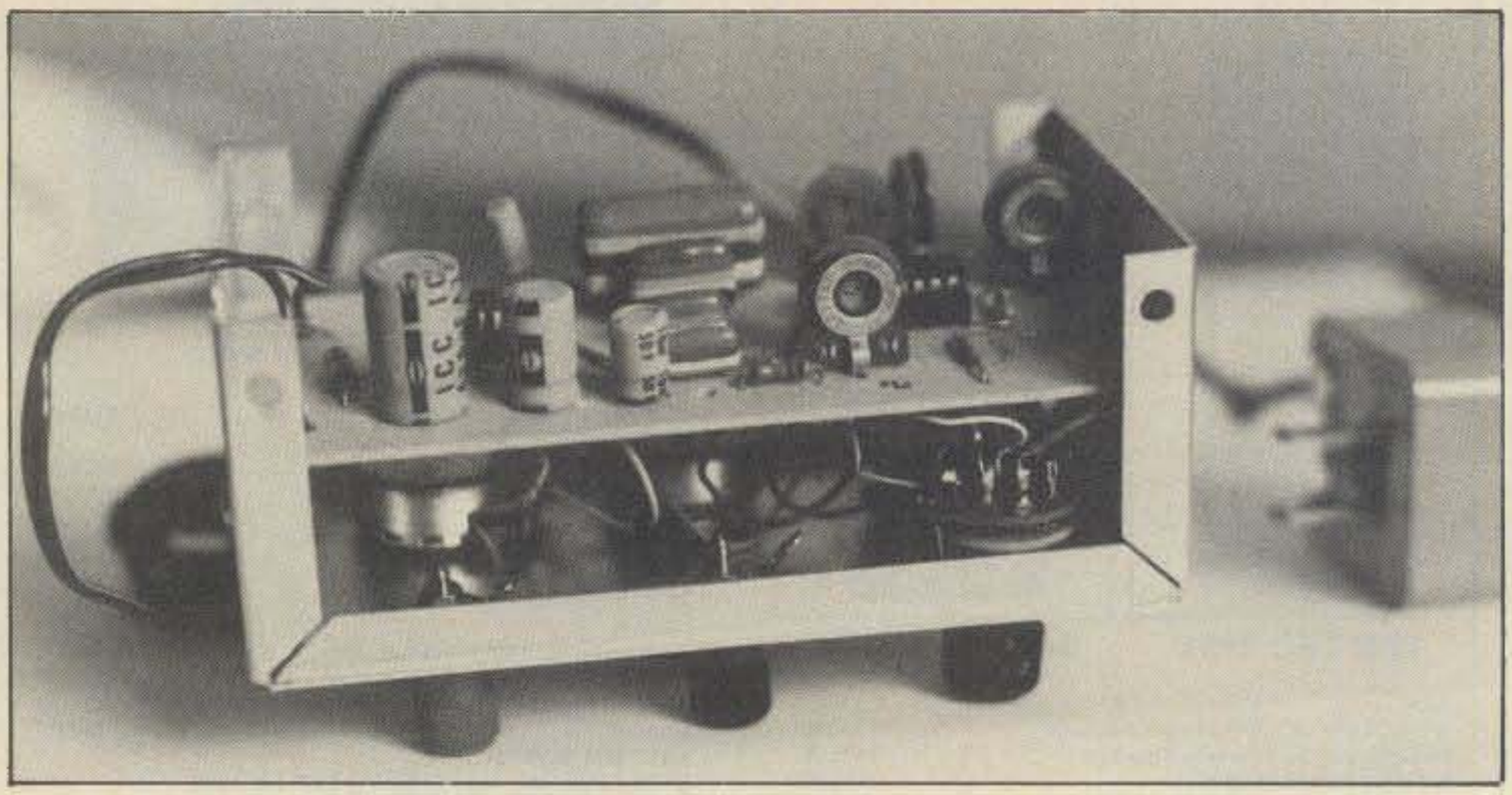
BY CORNELIO C. NOUEL*, KG5B

According to the dictionary a function generator is "a device capable of generating one or more desired waveforms." Most function generators are designed to operate in or around the audio frequency range.

Depending on the degree of sophistication, this device can be a very precise, complicated, and versatile instrument (and also very expensive), or it can just be a simple audio oscillator. It can be very useful in analyzing the performance of speech amplifiers, processors, equalizers, etc., during the design, testing, or repairing of amateur gear, especially when used in conjuction with an oscilloscope.



Exterior view of the function generator.



Interior view showing the method of construction.

Description

The unit shown was built based on an ICL 8038 integrated circuit. This IC is called a waveform generator and is widely available from most electronic parts stores for around $3.00 to $6.00. It usually comes with a specification sheet showing basic data and applications.

The 8038 chip can actually be used by itself with nothing more than a couple of resistors, a capacitor, and a source of power. However, such a simplistic approach would hardly meet the most basic requirements.

The schematic diagram shows a unit which performs quite well. It has a range from about 10 Hz to 100 kHz with an essentially constant output and excellent stability and linearity. It will provide about 3 volts peak-to-peak into any lead from a few hundred ohms up, with little distortion in any of three waveforms: square, sawtooth, or sine wave.

The output of the 8038 is isolated from the load by an LM741 operational amplifier with feedback-controlled gain.

The frequency is controlled by the timing capacitors C4 to C1 which select the range, and the variable resistor R1, which together with R2 and R3, selects the exact frequency for each range. R1 is shown as a 10K ohm linear pot, and the timing capacitors are 0.0015, 0.015, 0.15 and 1.5 mF, respectively. However, a 15K ohm pot can be used with 0.001, 0.01, etc., to attain the same results. With the set of values mentioned above, range **A** will cover from 10 to 100 Hz, range **B** from 100 Hz to 1 kHz, range **C** from 1 kHz to 10 kHz, and range **D** from 10 kHz to 100 kHz. These frequencies are approximate,

**184-B Glenbrook Drive, Brownsville, TX 78521*

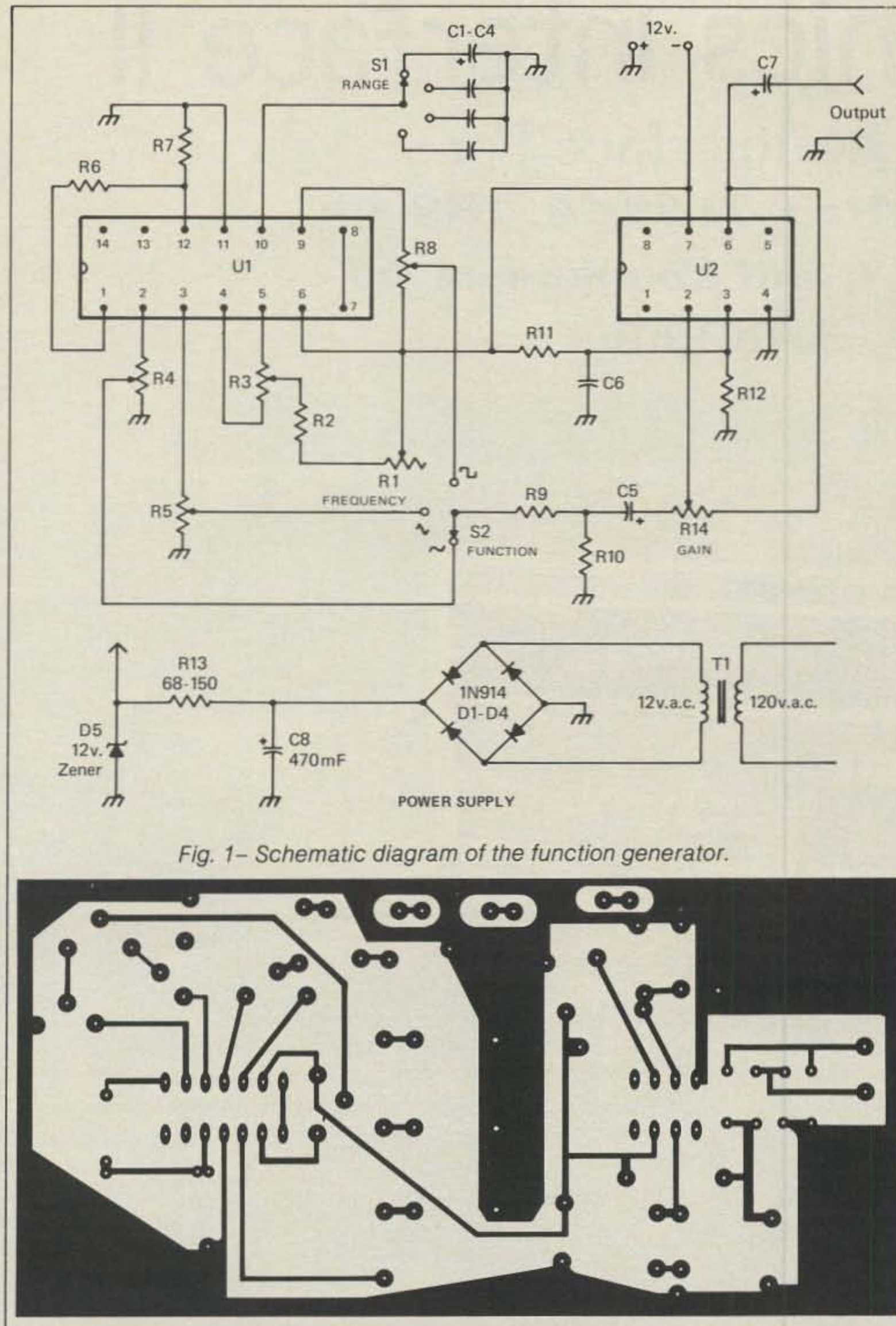
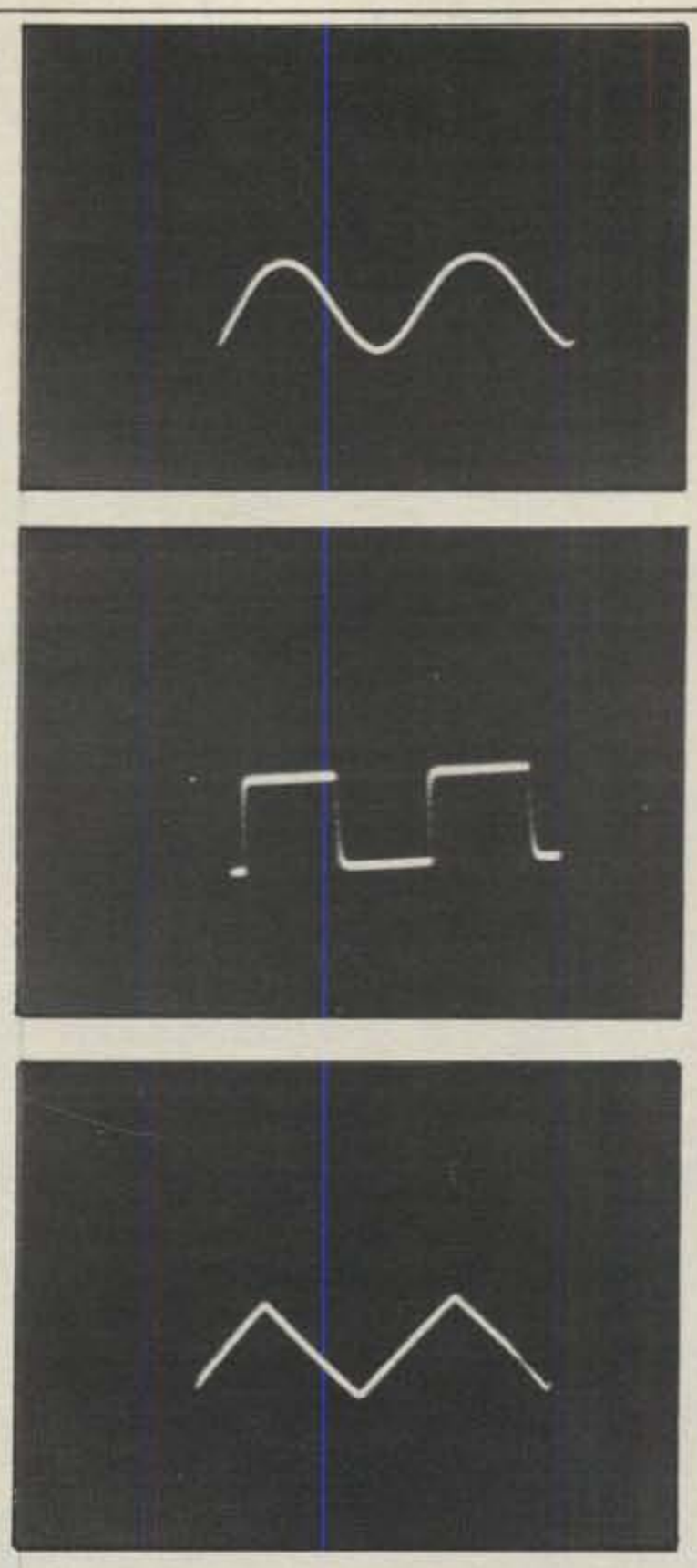


Fig. 1– Schematic diagram of the function generator.

Fig. 2– PC board layout shown full size for the function generator. This is the foil side.



Oscilloscope pictures of the various waveforms achieved from the function generator. On the top is a sine wave at about 5 kHz, in the middle is a square-wave pattern at 10 kHz, and above is a sawtooth waveform.

since they depend on the exact values of **C** and **R**. The timing capacitors should be of the best possible kind: mica, polystyrene, mylar, and similar materials are suitable for all ranges. They need not be of a high voltage rating, but they should be of at least 10% tolerance. For the lowest frequency range a tantalum type can be used, as long as the value is right and polarity is observed.

R3 is a 500 ohm trimpot that controls the duty cycle, or the ratio of the positive part of the cycle to the whole cycle, of the waveform. This will usually be adjusted around midpoint to provide the normal 50% duty cycle. If this adjustment is not desired, the pot can be deleted and pins 4 and 5 of U1 shorted. R4, R5, and R8 are 10K ohm trimpots which are used to normalize the various outputs into the op-amplifier. Again, the builder may leave out any of these if that specific function is not desired. For instance, you may eliminate the sawtooth waveform by deleting R5 from the circuit, and if you use the PC board contruction, it can always be put back if needed. R9 and R10 are used mainly to keep the d.c. component of the square wave function from inverting the polarity of C5.

Some function generators are provided with an **Offset** control; this is to permit the generated signal to be displaced or offset above or below a given reference voltage level. This requires additional components, including a dual-voltage power supply. In the interest of simplicity and cost, that feature was not incorporated into this unit. Therefore, the output of the generator is referenced to a zero volt or chassis ground.

R6 and R7 are used to improve the linearity of the sine wave and will not affect other functions. The values shown were chosen by trial and error until the best waveform was obtained. They may vary from IC to IC or if a different supply voltage is used. The unit can be run by batteries, but the total current drawn is about 15 ma (without the zener diode) at 12 volts, so it seems more practical to use the a.c. power supply or perhaps an a.c. adapter.

Construction

The original unit was built on an "Experimenter's Board" (Radio Shack 276-151) but this is no longer available. The builder therefore may prefer to make

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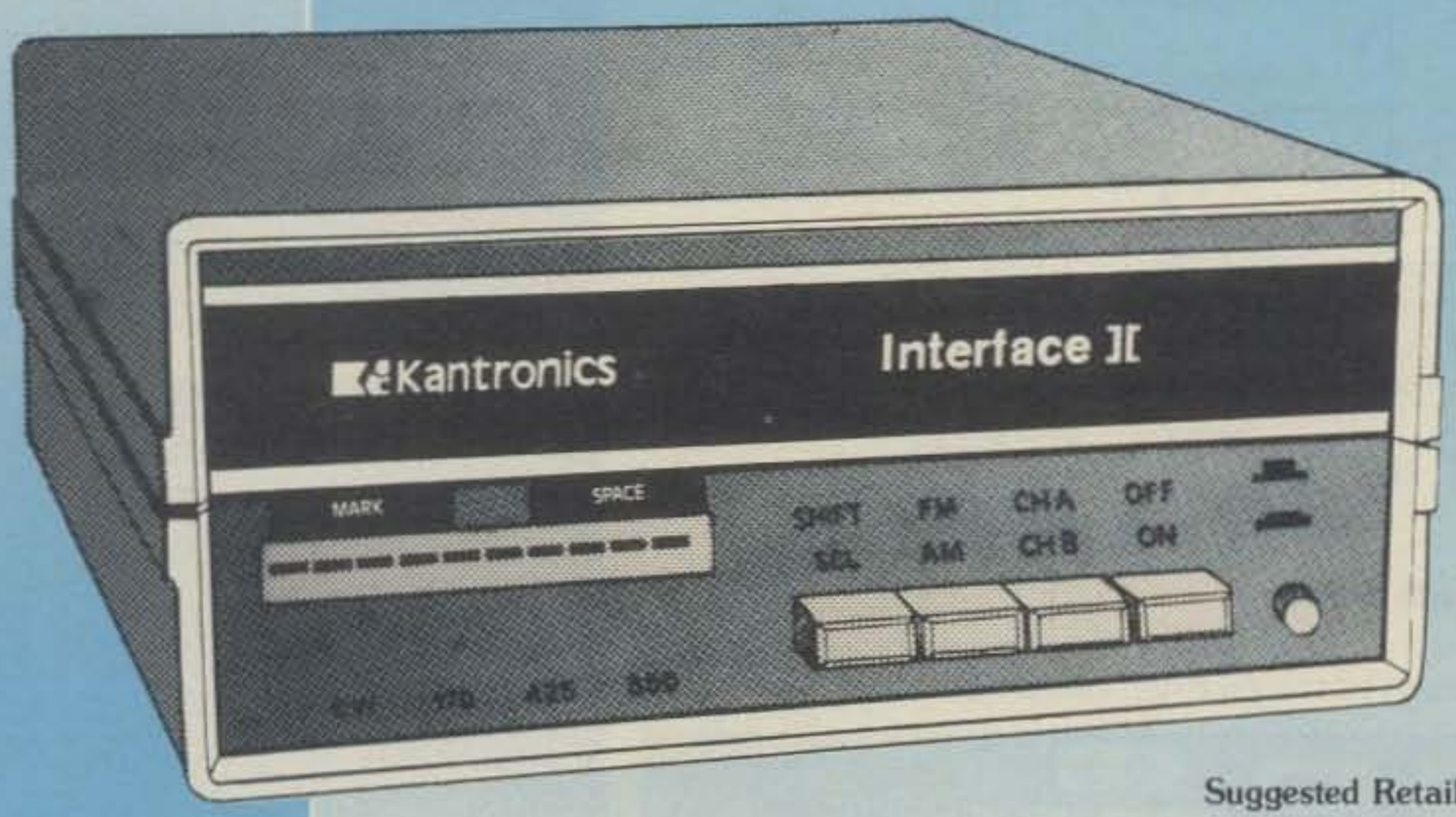

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Hamtext

All the features of Hamsoft with the following additional capabilities: text editing, received message storage, variable buffer sizes, diddle, word wraparound, time transmission, and text transmission from tape or disc. The program is available on cartridge for the VIC-20 or Commodore 64, and diskette for the Apple. Suggested Retail $99.95.

Hamsoft/Amtor

This program has Hamsoft features with the added ability of communicating in the newest coded amateur format-AMTOR. AMTOR offers error free low power communication. Hamsoft Amtor is available for the Atari, TRS-80C, VIC-20, and Commodore 64 computers. Suggested Retail $79.95.

Amtorsoft

For the serious AMTOR operator using a VIC-20, Commodore 64, or Apple computer. This program is similar to Hamtext in capabilities, but can only be used for AMTOR. The Apple version includes both Hamtext and Amtorsoft on one diskette ($139.95), while the Vic-20 and Commodore 64 cartridge is just Amtorsoft ($89.95).

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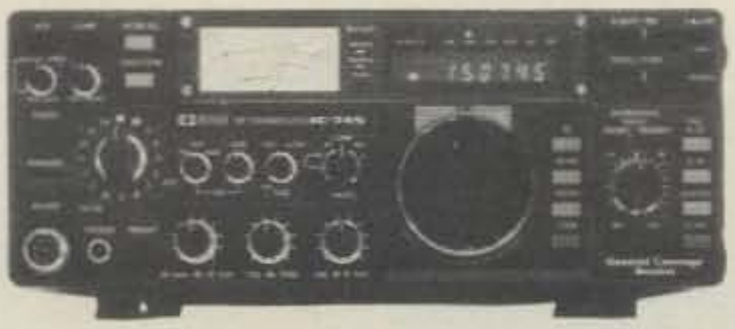

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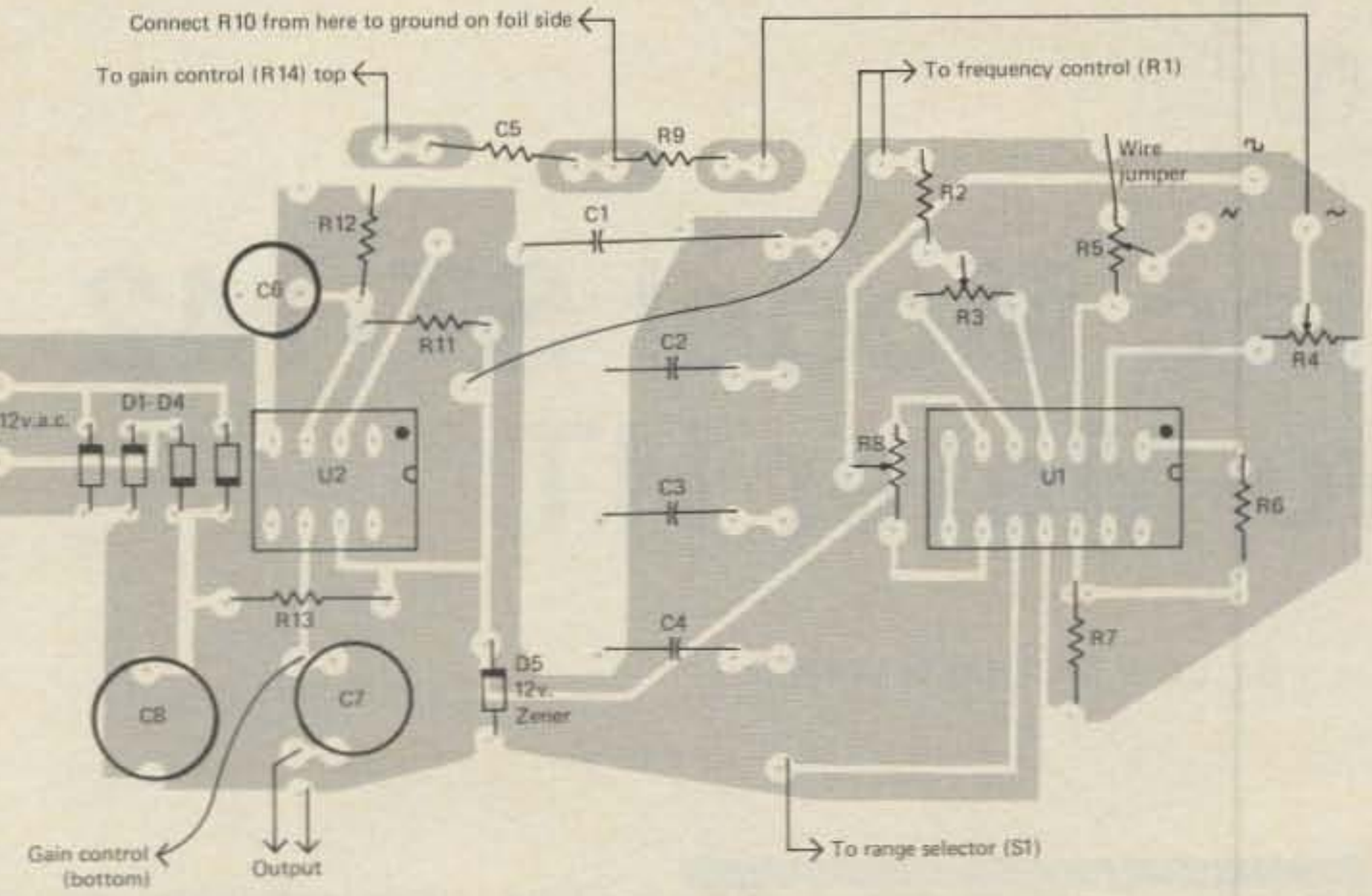

Fig. 3– Parts layout and component location for the function generator.

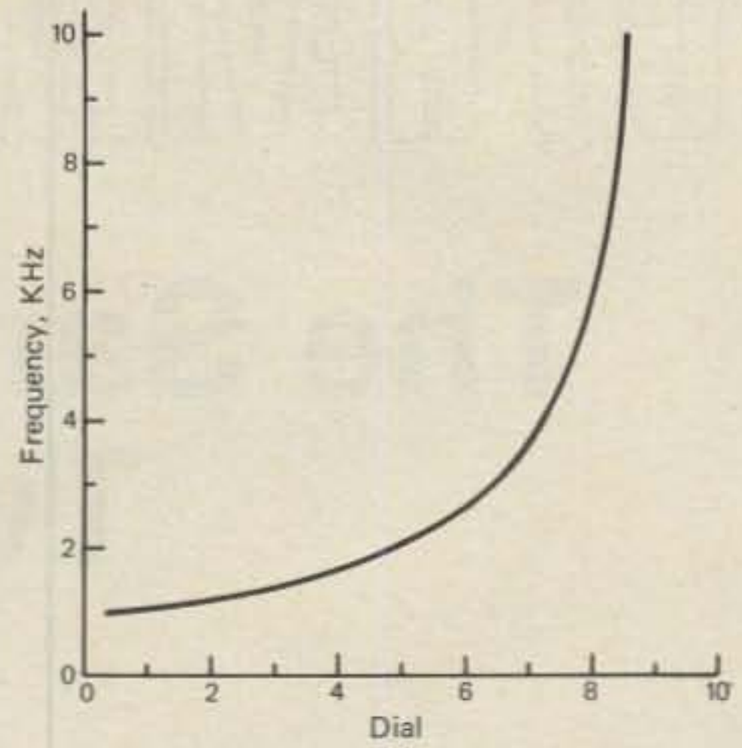

Fig. 4– Calibration chart for Range C.

his own PC board from the drawing or perhaps use point-to-point wiring on a perforated board. In any case, the arrangement of components is not critical, except that the transformer should be mounted on the outside to avoid hum pick-up problems. A 10 to 20 v.a.c. plug-in transformer can be used. The value of R13 should be about 68 ohms for the lower voltage and about 150 ohms for the higher voltage. Incidentally, all resistors in the unit are ¼ watt. The supply voltage does not really have to be very stable, since it will not affect the performance very much. However, it is always a good idea to keep the zener in the circuit as extra protection.

The board can be installed in any suitable cabinet or box (preferably a metal one) for shielding. The box shown in the photograph is small aluminum one 5¼" x 3 x 2⅛" (Radio Shack 270-238).

Testing and Calibration

Connect an electronic a.c. voltmeter to the output. Set R3, the duty-cycle control, to the middle, and R4, R5, and R8 to their minimum setting. Set the range switch to **C** (1–10 kHz). Now turn R14 all the way to the right, and set R4, R5, and R8 so the output is about 1 volt rms. This adjustment can also be made with the oscilloscope. A pair of headphones or a small speaker can also be used to monitor the sound, but at full output it will be quite loud. After this initial adjustment a scope should be used to make fine adjustments to the duty-cycle control. Use the square wave for this, since it will be easy to match the length of the positive and negative parts of the cycle.

The easiest way to calibrate the frequency is by the use of a frequency counter. Some counters lack sensitivity at the lower frequencies, so this should be taken into consideration and extra amplication should be provided if necessary. Also, square waves sometimes seem to give more stable readings, so this may be tried.

Because the tolerance of the timing capacitors will probably be rather large, any attempt to make a one scale dial may prove to be an impossible task. A graduated skirted knob seems to be the most practical solution; charts or tables then can be made using the counter or other suitable means. If exact frequencies are needed, the counter must be left connected to the output, although readings may become unreliable when the level is reduced.

The frequency setting resistor R1 is listed as a linear or reverse log pot. When using a linear pot, the frequency scale will tend to crowd towards the high end or low resistance end of the control, so a reverse audio taper would be preferable —in other words, a resistor the value of which changes more slowly toward the lower resistance side. However, this is not a real limitation and can be appreciated from the calibration graph.

No problems have been noted while using the generator in a strong r.f. environment perhaps because a dummy load is always used for testing. However, it is possible that they may occur, and the usual precautions, such as grounding the cabinet and bypassing the transformer leads to the chassis, should be taken.

When feeding the generator into a microphone input, even the lowest setting may prove too high; in these cases a suitable attenuator network must be inserted between the generator and the transmitter or amplifier input. Attenuators made out of a few resistors can easily be calculated using data from the various handbooks. No data is given here, since the impedances and amount of attenuation will vary considerably from case to case.

With regard to the timing capacitors, the units shown are polypropylene 10% units which are quite stable and low priced. These units are usually color coded and are small and can be obtained from many sources. The power supply shown uses 1N914 diodes, but practically any silicone diodes will do, since both the voltage and current are so low. According to the specs, the 8038 can be frequency modulated or frequency swept, but this has not been tried, and it is left to the individual experimenter to explore these possibilities. CQ

Parts List

R1: 10K ohms carbon linear or reversed log taper if available.
R2: 820 ohms if R1 is 10K; 1200 ohms if R1 is 15K.
R3: 500 ohms trimpot.
R4, R5, R8: 10K ohms trimpot.
R6: 6.8K ohms.
R7: 15K ohms.
R9: 10K ohms.
R10: 4.7K ohms.
R11, R12: 10K ohms.
R13: 68 to 150 ohms (see text).
R14: 100K ohms linear pot.
C1: 1.5 mF.
C2: 0.15 mF.
C3: 0.015 mF.
C4: 0.0015 mF (see text).
C5: 10 mF 35 volt electrolytic (observe polarity in diagram).
C6: 10 mF 35 volt electrolytic (observe polarity in diagram).
C7: 100 mF 35 volt electrolytic (observe polarity in diagram).
C8: 470 mF 35 volt electrolytic (observe polarity in diagram).
D1, D2, D3, D4: 1N914 or similar (see text).
D5: 12 volt zener (see text).
U1: ICL 8038 waveform generator IC.
U2: LM741 operational amplifier IC.

CQ REVIEWS:

The Santec Model ST-142 Two-Meter HT

BY LEW MCCOY*, W1ICP

One of the advantages of doing reviews of new equipment is that I get to compare the various features of each new piece of gear. Because of this, I am more or less familiar with most of the new equipment reaching the market. Two-meter hand-held transceivers offer a wide range of differences in some fields and much similarity in others. Needless to say, I was happy to be able to review the newest of Santec's line of hand-helds in the 2 meter field, the ST-142. The designers gave plenty of thought to the operator when they made this piece of equipment.

Table I provides all of the general specifications, and I might point out that the ST-142 easily met and exceeded all of the specs. The hand-held covers 142.00 to 149.995 MHz on both transmit and receive (covering MARS and CAP frequencies as well as the amateur 2 meter band). Also, the user can employ any split desired within that frequency range (more about that in a moment). There are three power levels available—**H** (high), **M** (medium), and **L** (low)—and these are available via a three-way switch on top of the radio case. The battery pack provided with the radio is a NiCad, 9.6 volt, 500 maH unit made up of 8 Penlite-type NiCad cells. An interesting point here is that most of the other commercial hand-helds provide a smaller battery pack with their units. A common curse of using a hand-held is the loss of battery power after a prolonged period of use. Santec's use of a larger pack does much to eliminate this annoyance.

Fig. 1 is a front drawing of the ST-142 along with a blow-up of the LCD (liquid crystal display). There are 16 keys on the front numbered 1 through 0 plus "*" and "#." The other four keys are lettered "A" through "D." Using and programming the ST-142 is very simple, assuming you sit down first and *read the instruction manual!* The fact that amateurs don't like to read instruction manuals has long been a problem. They would rather first turn on the gear and see if they can make it work. However, with modern-day equipment such procedures are impossible. You *must* read the manual first and this is where Santec shines. It took me about half an hour of reading to learn how to use the radio.

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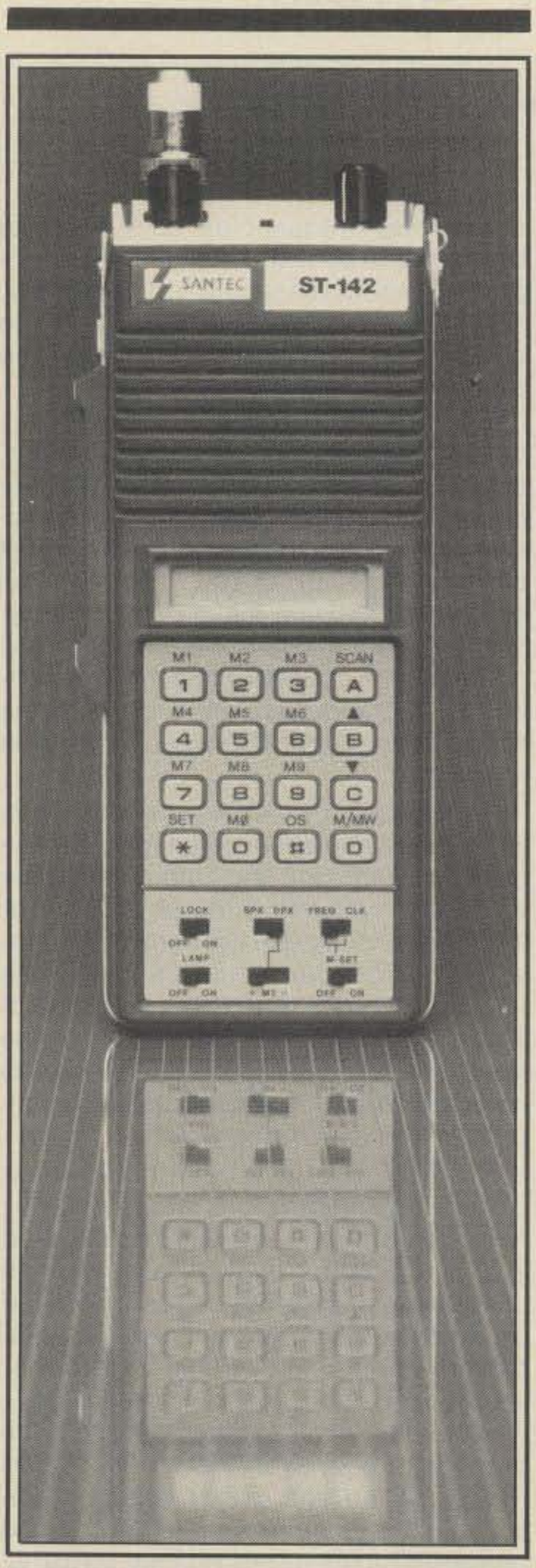


This is the Santec ST-142.

I found the manual to be very, very explicit. For example, to put in a frequency you wish to use, just tap the keys in the sequence of the numbered frequency. In other words, to put in 146.940, just punch in the number and you'll see it appear on the LCD display; just tap the **SET** key and you are ready to go simplex. To add to the usual offset transmit frequency of 600 kHz down, put the **SPX/DPX** switch in **DPX** and the **+M–** switch in **–**. When you press the transmit (push-to-talk) key on the side of the case, the LCD will display 146.340 and the letters **TX**, indicating you are transmitting on the shown frequency. I really like the feature of having a predetermined offset of 600 kHz available because this offset is the most common. (Some of the other hand-helds require separate programming for the offsets, including the commonly used one of 600 kHz.) Any desired offset can be set, and the procedure is detailed very clearly in the manual.

I also like the memory storage feature. Up to 10 preset frequencies (and their offsets) can be stored. This is also very simple to do. You just enter the frequency as described above and then move the slide switch on the lower panel to **M-SET**, tap the **D** key until **MW** appears on the LCD, and then tap whichever numbered channel (1 through 10) in which you wish to store the frequency. (Actually, you can do this much more quickly than I can write this sentence!)

There are several scanning functions available. These are **MAN, SCAN, SRCH,** and **OPEN**. The different modes are available by pressing the **A** key (which is the **SCAN** key) and observing the LCD. The mode will appear on the top line of the LCD. When the unit is first turned on, it is in the manual, or **MAN**, mode. By depressing the **B** or **C** keys the scan is stepped; **B** decreases the frequency and **C** increases it. If either key is held for more than a second, continuous scanning takes place, but the mode is really for stepping. In the **SCAN** mode, the scanning goes up or down in frequency depending on whether keys **B** or **C** are depressed. The scanning stops for a period of 15 seconds when receiving a signal and then starts again. In the search mode, **SRCH**, the scanning goes until it encounters a signal, where it will stop. In the **OPEN** mode the scanning stops on a signal and will hold there. If the signal disappears for 3 seconds, scanning will be resumed. The scan step size and frequency scan coverage can be set to your desired amount.

A. General

Semiconductors	Transistor . . . . . 21 each
	FET . . . . . 5 each
	IC . . . . . 26 each
	Diode . . . . . 39 each
Frequency Range	142.000 to 149.995 MHz for TX/RX
Type of Emission	F3
Number of Channels	1600 (5 kHz-step) for TX
	1600 (5 kHz-step) for RX
Memory Channels	10 Channels
Antenna Impedance	50 Ohms
Power Source	9.6 VDC nickel cadmium battery pack, 8 "AA" cells welded 8N500AAF
D.C. Power Used	35 mA for squelch RX
	12 mA computer-controlled RX current
	150 mA for receiving with max audio
	1.0 A for transmitting (H)
	550 mA for transmitting (M)
	300 mA for transmitting (L)
	(Note: Above currents are approximate values.)
Dimensions	68mm (W) x 17mm (H) x 47 mm (D)
Weight	650 grams

B. Transmitter Section

RF Output Power	3.5W (H), nominal at 10.5V
	1.0W (M), nominal at 10.5V
	0.1W (L), nominal at 10.5V
Modulation	Frequency modulation
Maximum Frequency	Deviation ±5 kHz
Transmit Spurious	Less than −50 dB
Type of Microphone	Condenser microphone

C. Receiver Section

Receiving Methods	Double superheterodyne
I.F. Frequency	16.9 MHz, 1st IF
	455 kHz, 2nd IF
Receiver Sensitivity	12 dB Sinad, less than 0.35 μV
Squelch Sensitivity	Less than 0.35 μV
Band Width	±7.5 kHz at 6 dB down
Selectivity	±15 kHz at 60 dB down

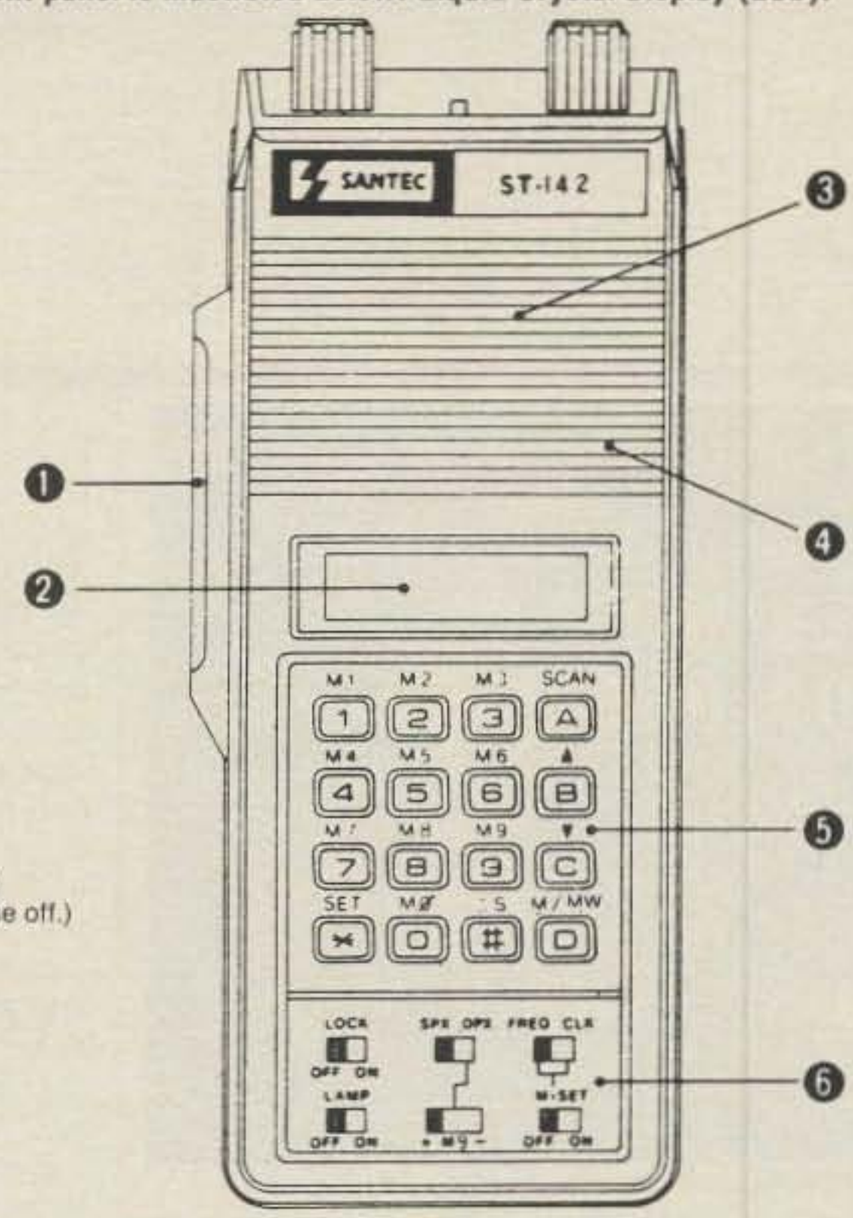
NOTE: The specifications and circuitry may be changed for engineering development and quality improvements without notice or obligation.

Table I– These are the specifications of the ST-142. Our tests showed that the unit tested met or exceeded all specifications.

The SANTEC transceiver, Model ST-142 front panel is illustrated below. Liquid Crystal Display (LCD).

A. Liquid Crystal Display (LCD).

1. PTT Switch
2. LCD
3. Speaker
4. Condenser Microphone
5. 16-Key Keyboard
6. Slide Switch Board



The following is displayed on the LCD.

1. Frequency (frequency or memory mode)
2. Memory Channel (memory mode)
3. Scanning Mode
4. Memory Mode (memory read and memory write)
5. Battery Alarm (Blinks when Battery Low otherwise off.)
6. Up/Down Arrows
7. TX
8. RX
9. SPX ( )/DPX (+ or −)/Mem − 9(1)
10. Error
11. Time (available by setting the slide switch)
12. PLL Alarm (Out of lock indicator)
13. Scan Lockout (memory mode)

Fig. 1– This drawing shows the ST-142 and the various controls. The LCD is particularly large and easy to read.

By depressing the proper keys it is also possible to do just **MEMORY MODE** scanning. In this mode the memory channels (1 through 0) are scanned for activity. The other scan mode is **PRIORITY** scanning, in which case a desired channel is locked on if activity is present. If there is no activity, the other channels are scanned. However, when activity appears on the priority channels, regardless of where your scanning has stopped, scanning will jump to the priority channel.

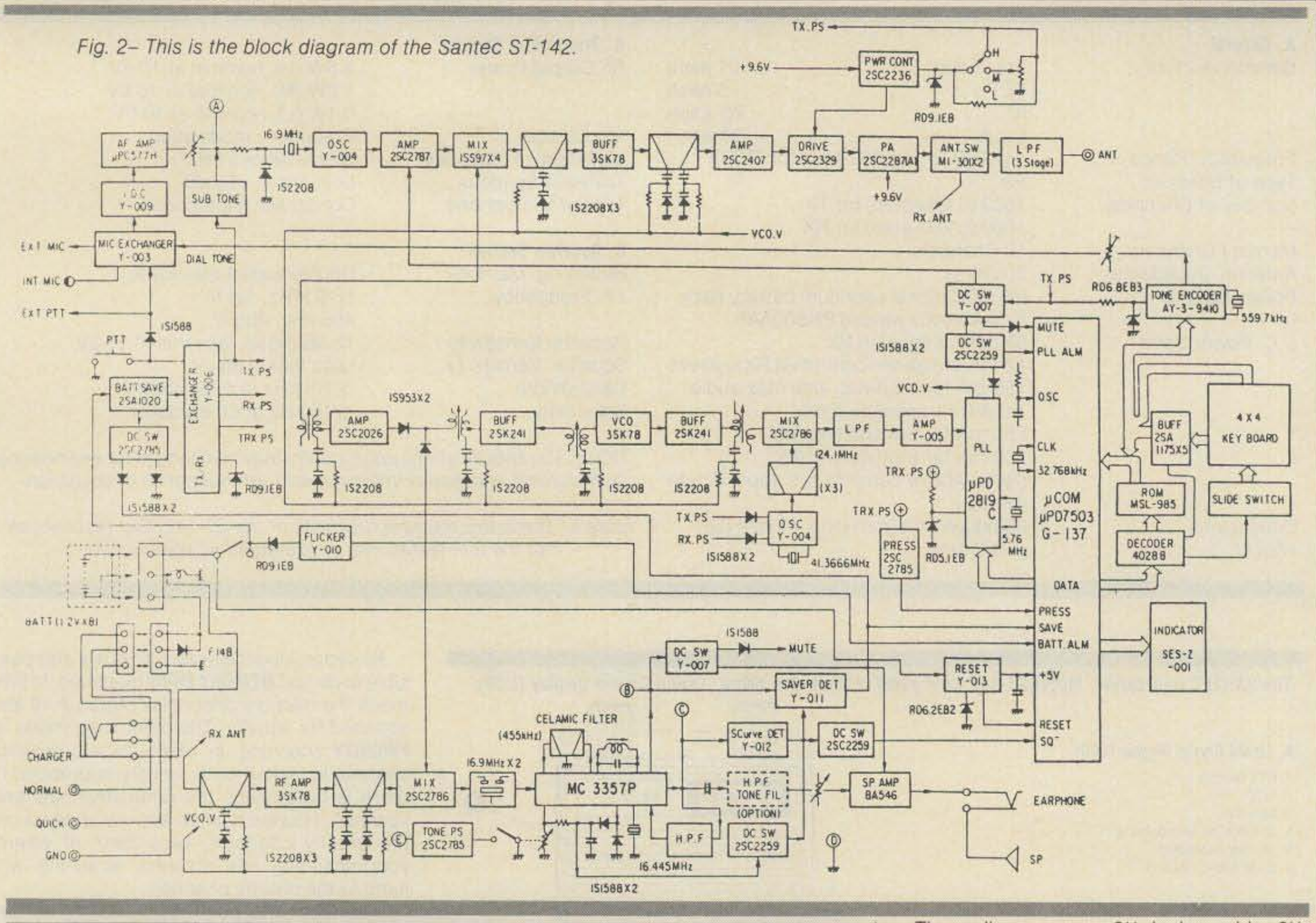
Whenever the push-to-talk switch is depressed, dial tone signals can be transmitted via any of the 16 keys available, which are standard autopatch tones. The 16 keypad keyboard is labeled the same as a telephone keyboard. There are no "sidetones" heard during this operation.

Also built into the unit is a 24-hour clock. The readout is available on the LCD. In order to read the time, all you need to do is set one of the switches on the lower front panel to **CLK** and the time will appear on the LCD. (Probably also useful for hiding the frequency you are on from inquisitive eyes, eh?)

Fig. 2 is a block diagram of the ST-142. The heart of the unit is a CMOS 7503 four-bit microcomputer. This chip has built-in ROM and RAM. Using CMOS technology, the computer consumes less than one-half milliampere of current. When power is turned off to the main body of the radio, the CPU shuts down all but the most necessary functions. In this condition less than 100 microamperes is required to keep the memories alive and the clock active. This current drain is less than actual shelf life for the NiCad battery. When the radio is turned on again, the processor will remember where it was with respect to the same mode, memory, or band functions and what the last operating frequency was.

In my tests of the ST-142 I found that as far as the power output was concerned, it was slightly higher than at what Santec had rated it. With the 9.6 volt battery pack I got 6 watts out at the high position and about 1.5 watts out at the medium setting. The 0.1 watt setting was only slightly high (about 0.15 watts out), but that could be an error in my reading. The battery pack is easily accessible by removing the back panel, which is held by tabs and a camera-type, $^1/_4$ turn, single screw.

Fig. 2– This is the block diagram of the Santec ST-142.



The radio measures 2½ inches wide, 6½ inches high, and 1¾ inches deep. It weighs a little over 1 pound. The case is a combination of tan plastic and brushed aluminum. The ST-142 comes with the 9.6 volt battery pack, 45 mA charger, earphone, hand strap, and flexible helical antenna (rubber ducky). There are many accessories available such as a leather case, wall charger, drop-in charger, cigarette-lighter power line, external speaker and microphone, and belt clip. Also available is the SS-32, which is a subaudible tone encoder ($29.55). There is a plug-in spot at the bottom inside rear of the radio for the code encoder circuit board, and details for its installation are in the regular manual. (Also, we have been informed that a new tracking encoder should be out by the time you read this.)

Of the different commercial units I have had the opportunity to test or use, I find the ST-142 to be pretty close to my top choice. The ease of programming the frequencies, audio quality from the speaker (excellent), and the powerful battery pack are all hard-to-beat features. As to on-the-air reports of audio quality, they were all outstanding.

One last important point: Wherever possible in *CQ* product reviews we will try to provide service information. Equipment has become so complex that few, if any, amateurs want to tackle fixing their own gear. We checked with Encomm, Inc., who is the distributor of the Santec line, and they informed us that their service policy is seven working days turnaround time. We consider that to be an excellent policy.

The Santec ST-142 is listed at $329.00 and is distributed in this country by Encomm, Inc., 2000 Avenue G, Suite 800, Plano, TX 75074 (phone 214-423-0024). CQ

Here's an idea to help ease the record-keeping chore for all County Hunters out there while getting some more mileage out of your computer.

A County Hunter's Logging Program For The IBM Personal Computer

BY JOHN F. KRAY*, KA2CNG

Many amateurs are finding out that the computer is just as much at home in their ham shack as are transceivers, linears, antennas, and slow-scan TV, RTTY, or satellite gear. Not all amateurs are interested in some of these more sophisticated areas of the hobby, but an increasing number are turning to the personal computer for a variety of tasks. For example, the personal computer is an excellent tutor for learning Morse code. Many families are finding out that the PC they purchased to help the kids learn to type, play games, or pursue other educational objectives has wound up in the ham shack.

The PC can be of great help in keeping track of a variety of records. One does not have to be a professional programmer to learn to write useful applications in the BASIC language. Amateurs know that amateur radio and education have always gone hand in hand. If one can master the electronic theory and Morse code required to obtain an amateur radio license, then one can also learn to program in BASIC. Also, while learning to write his own applications, an amateur can make use of programs such as the one described in this article. Other useful programs can be purchased for a nominal cost.

The IBM Personal Computer could become one of the most popular PC's in any well-equipped ham shack. A combination of an excellent keyboard, a very convenient operating system (DOS), and an enhanced version of BASIC all contribute to a more efficient and productive amateur operation.

The logging program described in this article was developed for the IBM Personal Computer. It is specifically tailored to the needs of those amateurs like myself who are chasing counties in search of the MARAC Worked All Counties Award.

As I make contacts on the air, I usually assign each a log number so that I can easily confirm the contact in my station log when the QSL cards are returned. In addition to the county and state, each entry in my station log contains the date, time, signal report, and callsign of the station worked. Since I personally prefer to keep a written station log, I have not made use of the computer for this purpose. Some may prefer to use a computer to do this also. When you keep a written station log as I do, it is very difficult to keep track of how many counties remain to be contacted, or how many QSL cards remain outstanding. The program described in this article provides this useful function. It provides another useful function as well: It all but eliminates the frantic search through the MARAC Coloring Book to find out if you need a particular county. A few keystrokes to enter the name of the county, and the needed information is returned to you in seconds.

The program is divided into two main sections. The first section provides a full screen menu with one entry for each state (see fig. 1). Once the user has specified which state he is interested in, the appropriate input file (consisting of county and state name and log number) is opened for input. Control is then passed to the second section of the program, the update subroutine.

```
RUN

select one of these states:

 1  ALABAMA    18  LOUISIANA  35  OHIO
 2  ALASKA     19  MAINE      36  OKLAHOMA
 3  ARIZONA    20  MARYLAND   37  OREGON
 4  ARKANSAS   21  MASS.      38  PENNA.
 5  CALIF.     22  MICHIGAN   39  R. ISLAND
 6  COLORADO   23  MINNESOTO  40  S. CAROL.
 7  CONN.      24  MISSIP.    41  S. DAKOTO
 8  DELEWARE   25  MISSOURI   42  TENN.
 9  FLORIDA    26  MONTANA    43  TEXAS
10  GEORGIA    27  NEBRASKA   44  UTAH
11  HAWAII     28  NEVADA     45  VERMONT
12  IDAHO      29  N. HAMP.   46  VIRGINIA
13  ILLINOIS   30  N. JERSEY  47  WASH.
14  INDIANA    31  N. MEXICO  48  W. VIRG.
15  IOWA       32  NEW YORK   49  WISCONSIN
16  KANSAS     33  N. CAROL.  50  WYOMING
17  KENTUCKY   34  N. DAKOTA

enter selection ==>5
```

Fig. 1– A full screen menu with an entree for each state.

The update subroutine is the real work horse. Once the user enters a county name, a full screen menu is displayed to specify all the possible file manipulations to the internal storage arrays (see fig. 2).

All input files were entered in alphabetical order by county name within a given state. Since many county names are common in several states (e.g., LEE Alabama and LEE Georgia), it is possible to have multiple county name entries in a file that spans more than one state. The NEXT option always searches the file consecutively from top to bottom. The scan terminates on the first county name encountered that agrees with the search argument. To find multiple occurrences of the same country name the REPEAT option is used. The CHANGE option is useful for correcting minor typing errors in a file entry. The changed entry occupies the same location in the file so the alphabetical ordering of the file remains unchanged after its use. If for any reason an entry cannot be found in the file, the system speaker will beep and a message **No Record Found** is issued. As mentioned earlier, I prefer to keep a written station log as I make contacts on the air. Each contact is given a log number. Periodically I enter this log number into the computer files to help me cross-reference to my station log when confirmation is received. The LOG option is used for this purpose.

501 Colgate St., Vestal, NY 13850

```
UPDATING RECORD FOR :
COUNTY          STATE           LOG INFO
sierra          calif           1960

  TO UPDATE
                    TYPE SELECTION

                    LOG INFO    , ENTER (L)
                    NEXT RECORD, ENTER (N)
                    CHANGE RECD, ENTER (C)
                    DELETE      , ENTER (D)
                    ADD RECORD  , ENTER (A)
                    REPEAT      , ENTER (R)
                    TO EXIT     , ENTER (X)

cfile1: ala - haw tot#= 136 rec#= 54
```

Fig. 2– The update subroutine. This menu displays the possible file manipulations to the internal storage arrays.

Another useful convenience built into this program is the abbreviated county name search. A county name only needs to be specified to make it unique from any other entry in the file. For example, if you are searching for GREENVILLE county, you can enter GREENV to distinguish it from a county named GREEN that may also exist in the file.

Once a signed mobile reply card or QSL is received from the called station, the DELETE option is used to erase the entry from the file. DELETE automatically replaces the county name in the in-storage array with a null string. Later when all records for this file have been processed, the in-storage arrays not containing null strings are written back to disk. If it becomes necessary to add an entry to the file for any reason, the ADD option function is used. ADD searches the county name array for the first null string and replaces it with the information to be added. Note that after several deletions and additions to the file, the original alphabetical order is destroyed. This is of little concern unless the user intends to print out the files periodically. In this case, simply sort the files prior to printing with any SORT facility you may have available.

The last line of every display screen of the update program (see fig. 2) contains useful information on the file being processed and is never erased from the screen. This line contains the file name, the states included in the file, the total number of records in the file, and the record number of the last record processed. However, if TOT# is less than 75 for two consecutive files, consider combining them for added efficiency. When all your entries can be contained in a single file, the day you get your Cliff Corne number is within sight.

When all entries have been processed for a particular file, two records are written to the statistics file. The first record lists the number of counties yet to be confirmed. The second record lists the number of counties worked (contain a LOG number) but not confirmed.

When EXIT is specified, the in-storage arrays are written to disk and all files closed. Only those records which do not contain null strings are written. Thus, all files should continuously grow smaller over a period of time, as there will be many more selections than additions to the file.

Fig. 3 shows a complete listing of the programs. You may wish to make some modifications to suit your own preferences. Also, keep in mind that this program was written for the IBM PC and will not run on other personal computers without modifications. Good luck to you in chasing those rare counties. I hope this program will save you much valuable time in keeping your records.

For those who own an IBM PC and would like a copy of this program, I will be happy to supply you with one upon request and payment to cover the cost of a diskette and mailing. CQ

```
10 REM counties to go
20 REM save as ###county####
30 REM john f. kray, ka2cng
40 DIM CNTY$(175),STE$(175),CLOG$(175)
50 DIM AFILE$(6)
60 '
70 REM ####main menu
80 '
90 LOCATE 3,1
100 PRINT  "select one of these states:"
110 LOCATE 5,1
120 PRINT " 1  ALABAMA"TAB(14)"18  LOUISIANA"TAB(28)"35  OHIO"
130 LOCATE 6,1
140 PRINT " 2  ALASKA"TAB(14)"19  MAINE"TAB(28)"36  OKLAHOMA"
150 LOCATE 7,1
160 PRINT " 3  ARIZONA"TAB(14)"20  MARYLAND"TAB(28)"37  OREGON"
170 LOCATE 8,1
180 PRINT " 4  ARKANSAS"TAB(14)"21  MASS."TAB(28)"38  PENNA."
190 LOCATE 9,1
200 PRINT " 5  CALIF."TAB(14)"22  MICHIGAN"TAB(28)"39  R. ISLAND"
210 LOCATE 10,1
220 PRINT " 6  COLORADO"TAB(14)"23  MINNESOTO"TAB(28)"40  S. CAROL."
230 LOCATE 11,1
240 PRINT " 7  CONN."TAB(14)"24  MISSIP."TAB(28)"41  S. DAKOTO"
250 LOCATE 12,1
260 PRINT " 8  DELEWARE"TAB(14)"25  MISSOURI"TAB(28)"42  TENN."
270 LOCATE 13,1
280 PRINT " 9  FLORIDA"TAB(14)"26  MONTANA"TAB(28)"43  TEXAS"
290 LOCATE 14,1
300 PRINT "10  GEORGIA"TAB(14)"27  NEBRASKA"TAB(28)"44  UTAH"
310 LOCATE 15,1
320 PRINT "11  HAWAII"TAB(14)"28  NEVADA"TAB(28)"45  VERMONT"
330 LOCATE 16,1
340 PRINT "12  IDAHO"TAB(14)"29  N. HAMP."TAB(28)"46  VIRGINIA"
350 LOCATE 17,1
360 PRINT "13  ILLINOIS"TAB(14)"30  N. JERSEY"TAB(28)"47  WASH."
370 LOCATE 18,1
380 PRINT "14  INDIANA"TAB(14)"31  N. MEXICO"TAB(28)"48  W. VIRG."
390 LOCATE 19,1
400 PRINT "15  IOWA"TAB(14)"32  NEW YORK"TAB(28)"49  WISCONSIN"
410 LOCATE 20,1
420 PRINT "16  KANSAS"TAB(14)"33  N. CAROL."TAB(28)"50  WYOMING"
430 LOCATE 21,1
440 PRINT "17  KENTUCKY"TAB(14)"34  N. DAKOTA"
450 LOCATE 23,1
460 INPUT "enter selection ==>",SEL
470 '
480 REM open appropriate input file
490 '
500 IF (SEL > 0) AND (SEL <12) THEN OPEN "cfile1.dta" FOR INPUT AS #1:FILE$="1":
GOTO 560
510 IF (SEL > 11) AND (SEL< 19) THEN OPEN "cfile2.dta" FOR INPUT AS #1:FILE$="2"
:GOTO 560
520 IF (SEL > 18) AND (SEL< 32) THEN OPEN "cfile3.dta" FOR INPUT AS #1:FILE$="3"
:GOTO 560
530 IF (SEL > 31) AND (SEL< 39) THEN OPEN "cfile4.dta" FOR INPUT AS #1:FILE$="4"
:GOTO 560
540 IF (SEL > 38) AND (SEL< 44) THEN OPEN "cfile5.dta" FOR INPUT AS #1:FILE$="5"
:GOTO 560
550 IF (SEL > 43) AND (SEL< 51) THEN OPEN "cfile6.dta" FOR INPUT AS #1:FILE$="6"
560 '
570 REM read data from file into arrays
580 '
590 FOR I = 1 TO 175
600  INPUT #1,CNTY$(I),STE$(I),CLOG$(I)
610   IF EOF(1) THEN 630
620 NEXT I
630 GOSUB 660 'call update subroutine
640 GOTO 2170 'after rtn from update
650 '
660 REM #### update file subroutine
670 '
680 RECNO = I
690 SELECT$ = ""
700 AFILE$(1) = "cfile1: ala - haw"
710 AFILE$(2) = "cfile2: idaho-lou"
720 AFILE$(3) = "cfile3: maine-nme"
730 AFILE$(4) = "cfile4: n.car-pen"
740 AFILE$(5) = "cfile5: s.car-tex"
```

```
750 AFILE$(6) = "cfile6: utah -wyo"
760 KEY OFF
770 CLOSE #1 'input county file
780 K = 1
790 OPEN "cstats.dta" FOR INPUT AS #2
800 INPUT #2,A$,CTOGO,B$,LOGNO
810 '
820 REM ####UPDATE MENU
830 '
840 CLS 'clear screen
850 LOCATE 12,1
860 COLOR 15,0
870 INPUT "ENTER RECORD NAME TO UPDATE";KINPUT$
880 COLOR 7
890 IF KINPUT$ = "" THEN 950 'display update menu
900 IF J = 176 THEN 1790 'no record
910 FOR J = K TO 175
920 IF KINPUT$ =LEFT$(CNTY$(J),LEN(KINPUT$)) THEN 950
930 NEXT J
940 IF J= 176 THEN 1790
950 CLS 'CLEAR SCREEN
960 COLOR 15,0
970 LOCATE 4,1
980 PRINT "UPDATING RECORD FOR : "
990 PRINT "COUNTY"TAB(15)"STATE"TAB(25)"    LOG INFO"
1000 PRINT CNTY$(J),STE$(J),CLOG$(J)
1010 PRINT
1020 COLOR 7
1030 PRINT "  TO UPDATE"
1040 COLOR 23
1050 PRINT TAB(19)"TYPE SELECTION"
1060 PRINT
1070 COLOR 7
1080 PRINT TAB(19)"LOG INFO   , ENTER (L)"
1090 PRINT TAB(19)"NEXT RECORD, ENTER (N)"
1100 PRINT TAB(19)"CHANGE RECD, ENTER (C)"
1110 PRINT TAB(19)"DELETE     , ENTER (D)"
1120 PRINT TAB(19)"ADD RECORD , ENTER (A)"
1130 PRINT TAB(19)"REPEAT     , ENTER (R)"
1140 PRINT TAB(19)"TO EXIT    , ENTER (X)"
1150 LOCATE 24,1
1160 PRINT AFILE$(VAL(FILE$));TAB(19);"tot#=";RECNO;TAB(29)"rec#=";J
1170 '
1180 'STOP PROGRAM UNTIL KEY IS PRESSED
1190 KINPUT$ = INKEY$: IF "" = KINPUT$ THEN 1190
1200 KIN = INSTR("LlNnCcDdAaRrXx",KINPUT$)
1210 ON KIN GOTO 1240,1240,2100,2100,1660,1660,1570,
1570,1860,1760,1760,1340,140 0,1400
1220 BEEP: GOTO 950 'invalid selection
1230 '
1240 REM####UPDATE log number#####
1250 '
1260 COLOR 15,0
1270 INPUT "ENTER LOG NUMBER";KINPUT$
1280 IF KINPUT$ <> "" THEN LOGNO=LOGNO+1
1290 COLOR 7
1300 PRINT
1310 CLOG$(J)=KINPUT$
1320 GOTO 810 'display menu again
1330 '
1340 REM ####get the next record
1350 '
1360 KINPUT$ = CNTY$(J)
1370 K = J + 1
1380 GOTO 880
1390 '
1400 REM#####EXIT AND WRITE FILE####
1410 '
1420 CLOSE 1
1430 CLOSE 2
1440 OPEN "cstats.dta" FOR OUTPUT AS #2
1450 WRITE #2,A$,CTOGO
1460 WRITE #2,B$,LOGNO
1470 OPEN "cfile" + FILE$ + ".dta" FOR OUTPUT AS #1
1480 FOR J = 1 TO 175 'dta arys to disk
1490 IF CNTY$(J) = "" THEN 1510
1500 WRITE #1, CNTY$(J),STE$(J),CLOG$(J)
1510 NEXT J
1520 FOR J = 1 TO 175 'blank data arrays
1530 CNTY$(J)="":STE$(J)="":CLOG$(J)=""
1540 NEXT J
1550 GOTO 2060
1560 '
1570 REM #### DELETE THIS RECORD FROM FILE
1580 '
1590 CTOGO = CTOGO - 1
1600 IF CLOG$(J) <> "" THEN LOGNO = LOGNO - 1
1610 CNTY$(J) = ""
1620 STE$(J) = ""
1630 CLOG$(J) = ""
1640 GOTO 950 'display menu again
1650 '
1660 REM #### change record
1670 '
1680 CLS 'CLEAR SCREEN
1690 LOCATE 12,1
1700 INPUT "ENTER county";CNTY$(J)
1710 INPUT "ENTER state";STE$(J)
1720 INPUT "ENTER log info";CLOG$(J)
1730 IF CLOG$(J)<>"" THEN LOGNO=LOGNO+1
1740 PRINT CNTY$(J),STE$(J),CLOG$(J)
1750 GOTO 950 'display menu again
1760 '
1770 REM ####no record found
1780 '
1790 LOCATE 23,1
1800 BEEP: COLOR 23
1810 PRINT "record not in file"
1820 COLOR 7
1830 J = 1
1840 GOTO 870
1850 '
1860 REM #####add a record to the file
1870 '
1880 CTOGO = CTOGO + 1
1890 FOR I = 1 TO 175
1900 IF CNTY$(I)= "" THEN GOTO 1940
1910 NEXT
1920 CLS
1930 LOCATE 12,1
1940 INPUT "enter county";CNTY$(I)
1950 INPUT "enter state";STE$(I)
1960 INPUT "enter log info";CLOG$(I)
1970 IF CLOG$(I)<>"" THEN LOGNO=LOGNO+1
1980 PRINT CNTY$(I),STE$(I),CLOG$(I)
1990 CLS 'CLEAR SCREEN
2000 COLOR 15,0
2010 PRINT "MAKE SELECTION"
2020 PRINT "UPDATING RECORD FOR : "
2030 PRINT "COUNTY"TAB(15)"STATE"TAB(25)"    LOG INFO"
2040 PRINT CNTY$(I),STE$(I),CLOG$(I)
2050 GOTO 1010 'display menu again
2060 REM exit from subroutine
2070 J = 1
2080 RETURN
2090 '
2100 REM #####repeat entry####
2110 '
2120 K = 1
2130 GOTO 810 'display menu again
2140 '
2150 REM####MORE FILES TO PROCESS
2160 '
2170 CLS
2180 PRINT "to continue type Y/N"
2190 KINPUT$ = INKEY$: IF "" = KINPUT$ THEN 2190
2200 KIN = INSTR("YyNn",KINPUT$)
2210 ON KIN GOTO 2220,2220,2250,2250
2220 CLOSE
2230 I = 1
2240 GOTO 90 'redisplay main menu
2250 END 'program end
```

Fig. 3– A complete listing of the programs.

Chubi dori Triangle is reminiscent of Times Square, except these are all electronic emporiums and are but a fraction of the shops dealing exclusively in circuitware.

A window display of the latest amateur gear greets the arriving passenger at Akihabara train station.

Electronic supplies can be found in Radio Center, a collection of highly specialized, separately owned shops such as this one.

For a travelling amateur, a bargain only stops being a bargain when he can't fit it through the airplane door. WD6HAK describes an amateur's paradise, slightly west of Dayton.

The World's Largest Electronic Bargain Basement

BY AL GORDON*, WD6HAK

Just a short train ride from a bustling, downtown metropolis is a neon-emblazoned amateur's paradise. Here, brand new shining gear, hot off the arms of the wave-soldering robots, sell for prices that undercut even the most aggressive national Watts-line chains. The city? Tokyo. More specifically, a microcosm of Japan's capital city known locally as "Akihabara." It's almost like New York City's fabled radio row, only here block after block of small shops and larger stores with duty-free sections display with pomposity new, glistening electronic wares, contrasting with the surplusy tone of the old New York vendors. The dinning display of commercialism on Akihabara's main streets is a byproduct of the competition that keeps prices low. In short, a Tokyo trip isn't complete without an investigation of this new Meiji marketplace.

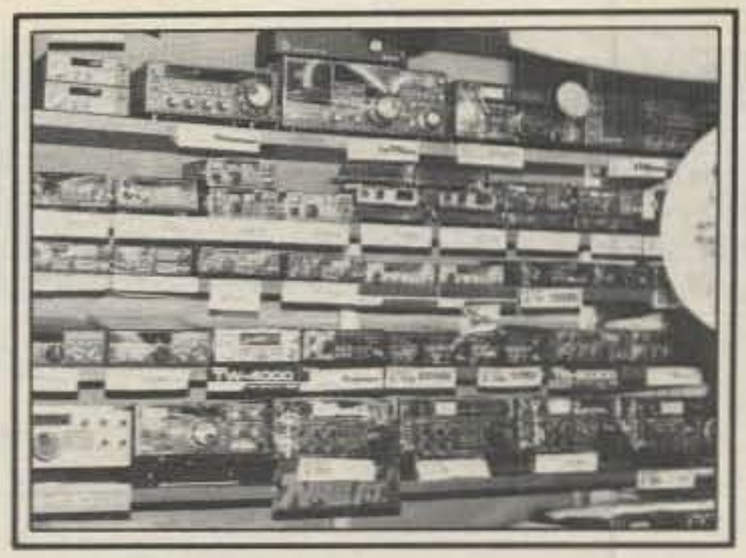
Things To Watch Out For

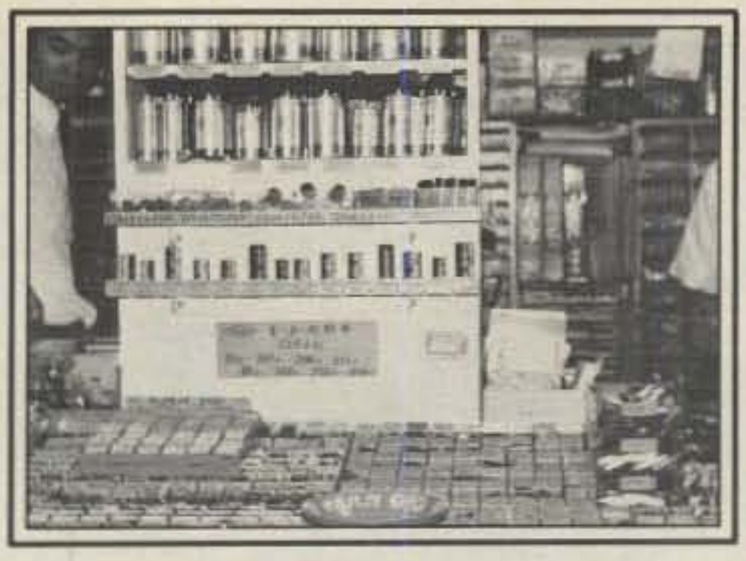
A few words of caution are in order, though. Before shelling out your hard-earned cash, be certain that what you are buying is functional in the United States. Some equipment, such as wattmeters, s.w.r. indicators, antennas, and the like, will work in practically any location, but if what you want must be a.c. powered, be careful! Japan's power and signal requirements are different. One-hundred volts at 50 Hertz is used in eastern Japan (including Tokyo), while 100 volts at 60 Hertz is used in western Japan. And if all that is not confusing enough, the band plans and/or allocations can be completely different. Be especially careful of "channelized" gear, such as 2 meter f.m. transceivers. Be certain that they have the U.S. input/output frequency splits. Even some equipment designated for export, particularly to Europe, may not have the 600 kHz used on this continent.

The safest way to shop for a plug-in bargain in Akihabara is to visit the many shops with duty-free floors. Some of the bigger ones include Yamagiwa, X-one, Hirose Musen, Nakaura Denki, Laox, and Rocket. Here you will find merchandise which only foreigners can purchase for use in his home country. The shopkeeper will staple a "Record of Purchase of Commodities Tax-Exempt for Export" form to your passport which you must surrender

*1726 Spreckels Lane, Redondo Beach, CA 90278

Tsukomo House is a shop featuring floor-to-ceiling amateur gear.



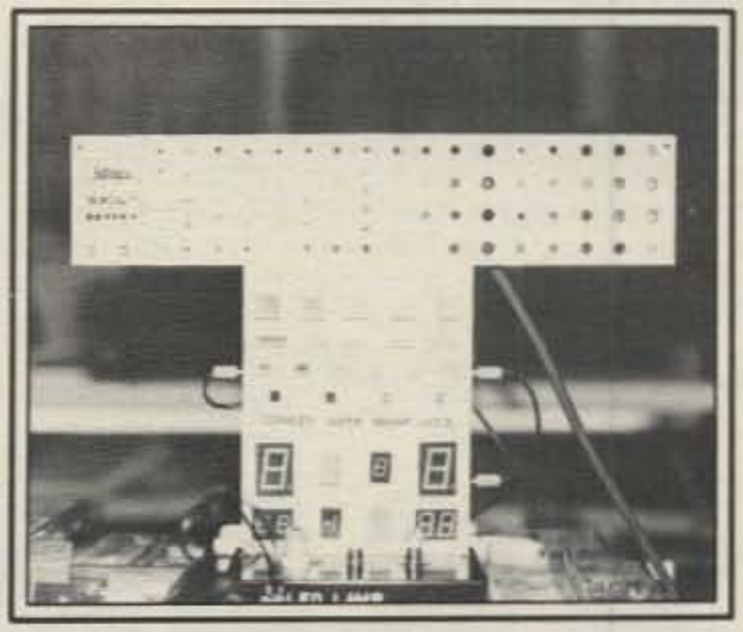


This booth in Radio Center in Akihabara sells only capacitors.

to Japanese customs officials when you leave the country. By buying at duty-free locations, you avoid paying Japanese excise tax on the purchase. The problem, though, with confining your search to the export stores is that selection can be limited, and you may not find some specific item you wish to purchase. In addition, two of the larger amateur specialty stores (Toyomura Musen and Tsukomo House) have no duty-free floors. So what to do it you want a particular piece of equipment geared for export?

One alternative is to look in the Japanese stores and check the spec plate on the back or bottom of the item. In many cases, the manufacturer recognizes whether the gear is designed well enough to tolerate those few extra volts and cycles difference in the a.c. mains between here and Japan; indeed, the very same unit may be the identical export item with some minor change other than the power requirements made to it. In such a case the plate will require "100–120 volts a.c., 50–60 Hz" and in all probability, it will work in the U.S. Some of the wording on the plate may be in Japanese script, but the numbers "100–120" and "50–60" will be readily apparent. In a few cases, a lock-down switch is provided, one position for 100 volts, 50 Hz and the alternate position for 117 volts, 60 Hz. Changing the rig to meet U.S. power requirements is then only a matter of throwing the switch. Of course, if you buy non-plug-in goodies (for example, antenna tuners, parts, etc.) such considerations are unimportant.

Purchasing parts in Akihabara is a reminder that you have touched foreign turf. It is much different from the United States experience. Instead of large stores with many diverse kinds of components, here you find highly specialized small shops grouped in large centers. One man's booth might specialize only in semiconductors, heat sinks, and chassis boxes, while inches away the neighboring vendor sells only capacitors. One small booth deals only in precision resistors! These miniaturized shops are congregated in bazaars, kind of like American shopping centers. Two larger areas are Radio Center (located very near the Akihabara railroad station) and Hirose



A "working" LED display at Morishima Musen allows the buyer to select the one most suited to his application.

Musen. Blister packing is the exception rather than the rule, and prices are very reasonable: s.p.d.t. miniature toggle switches for $.83, 16-pin IC sockets for $.08, 6AU6 vacuum tubes (!) for $2.00, 6146B tubes for $11.00, etc.

Surplus houses are a rarity, but at New Akihabara Center a surplus 60 watt, 8 ohm, 16 inch speaker costs $7, typical of their many bargains, which include test equipment, audio gear, and other components. Another stop on the surplus-hunting trek should include Morishima Musen.

How To Get It Back To The Hacienda

In order to get your new goodies back to the States, the basic rule to follow is: *If at all possible, carry it back yourself.* This *modus operendi* should present few problems when dealing with handy-talkies, small station accessories, or even some low-band transceivers. But if you feel that shipping it home would be more convenient, be advised that most stores will send it only air cargo, and this is expensive! In fact, you may find that your purchase wasn't such a bargain after all if you must resort to shipping. The *minimum* air-cargo charge from Tokyo to Los Angeles is 13,200 yen (about $55) for weights up to 1 kg. Then there is an 1895 yen/kg ($7.90/kg) surcharge on top of this minimum. Just as an example, an average-size video cassette recorder costs about $150 to ship to California. As an alternative, most passenger airlines will allow you to check well-packed larger items as baggage; insurance is quite inexpensive.

Concerning imports, U.S. citizens traveling abroad are allowed up to $400 in purchases to be brought into the country duty free. This allowance applies to each family member. Furthermore, if you travel with a companion who has purchases totalling well under this limit, you may be able to avoid some import duty by "joint ownership," in which case you split the cost of the item with another person. When doing this, be certain you have separate store receipts for each person involved in the joint venture for the fractional amount of his ownership.

All things considered, Japan is alive with amateur equipment bargains if you know where to look, what to look for, and how to transport. A little advance planning is all it takes to save beaucoup bucks when visiting the Orient. CQ

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	IC02AT	Icom IC-M12 (Marine)
		Tempo M-1

DRAKE, TR-7A, R-7A, L-7, Earth Satellite Receiver ESR-24, THETA 9000E & 500, EARTH SATELLITE STATION ESS-2250

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With the antenna season upon us, KG5B presents a useful and easy-to-make project that will help tweak even the most stubborn antenna.

How To Build a Cheap and Easy R.F. Noise Bridge

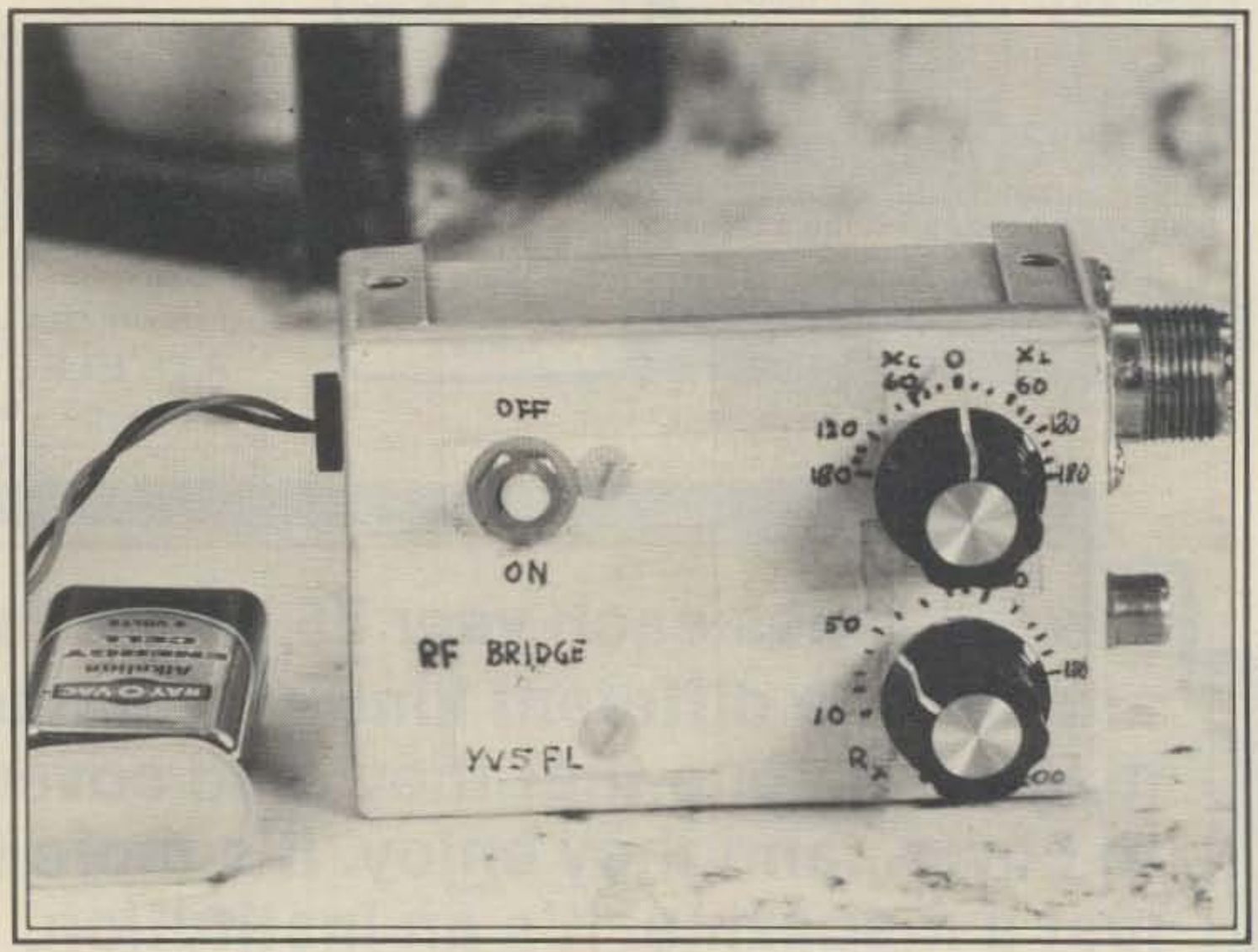
BY CORNELIO C. NOUEL*, KG5B

There have been many good articles about the r.f. noise bridge in the past.[1] However, sometimes we don't have the time or the facilities to make our own printed circuits, and so an otherwise interesting and useful project is put aside.

An r.f. noise bridge consists of a noise generator, a broadband amplifier, and a transformer bridge, also called a hybrid transformer. It is used to measure the impedance of an antenna. The noise generator is usually a zener diode back-biased to its avalanche voltage. This produces a wideband random noise of a very low level which is amplified to the proper level by a broadband amplifier. This wideband signal is then applied to the bridge transformer. A receiver tuned to the appropriate frequency is then used as a null detector. It is then possible to measure the resistive and reactive components of a load, such as an antenna system. The bridge configuration can be connected in either series or parallel capacity as shown in fig. 1(A) and 1(B). The series connection is usually preferred since it permits simpler mathematical calculations, but either circuit will give the same final results.

It is not the intent of this article to dwell on the theory or uses of the noise bridge, since this has been treated extensively in the references. I simply want to show how one can easily be built. The unit described uses a BAX-1 broadband amplifier sold by International Crystal in kit form.[2] The noise diode uses a switching-type NPN transistor connected between base and emitter; several should be tried to get the best noise output. The amplifier itself requires only the addition of a resistor for the noise diode. Replacing the input and output capacitors with 0.01 ceramics may also give slightly better output at the higher frequency end of the instrument range. Perhaps the only critical part of the instrument is the broadband transformer. In the unit described, a ¾ inch O.D. ferrite toroid was used (h.f. mix). The windings consist of six quadrifilar turns of #26 enameled wire. Two of the windings are connected in series and used as the primary, with one side floating as shown. The other two windings are also connected in series and are used as the secondary or bridge winding. The beginning of one winding should be connected to the end of another to achieve proper phasing.

All connections must be kept very short so that accurate results can be obtained especially at the higher frequencies. The variable resistor is a 200 or 250 ohm linear carbon potentiometer. The capacitor used in the unit shown is a 360 pF poly insulated (Calectro), but any small air-insulated variable can be substituted. Do not use values of less than 150 pF since this will limit the usefulness of the instrument. A straight-line capacitor is recommended for ease of calibration.

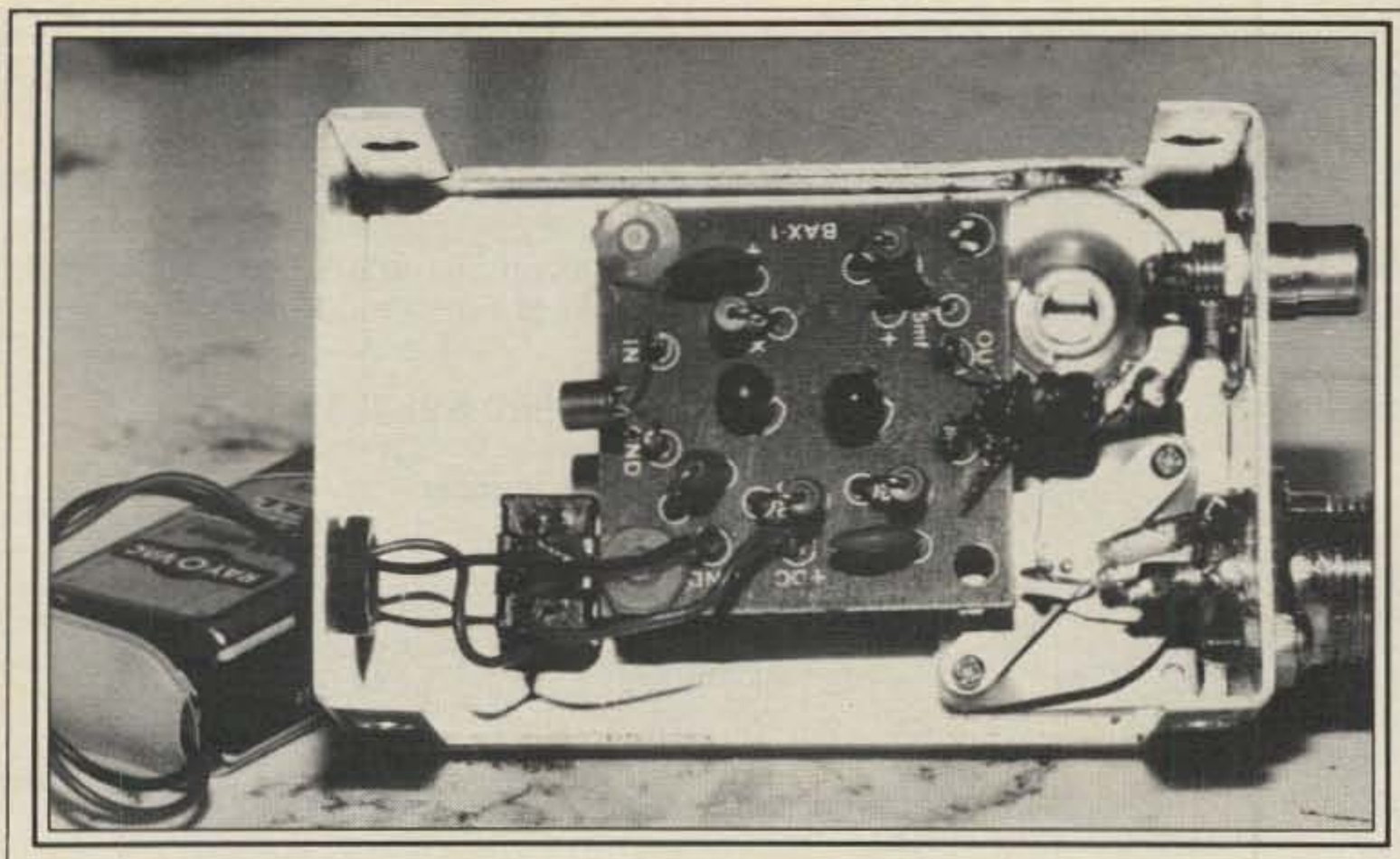


Front view of the noise bridge. Note that the battery is external to the unit.

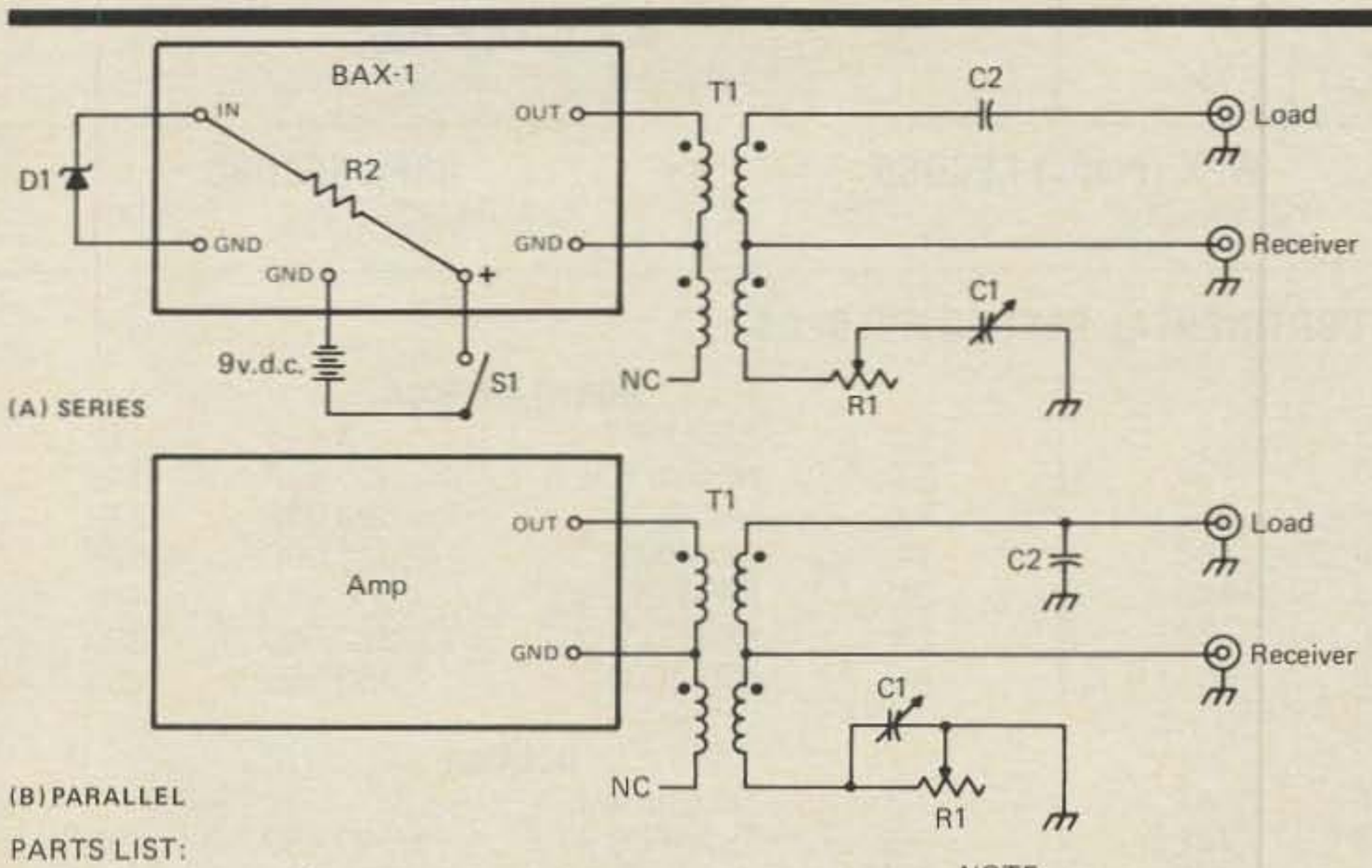
*184-B Glenbrook Dr., Brownsville, TX 78521

[1]*John J. Schultz, "An Improved Antenna Noise Bridge," CQ, Sept. 1976. Robert A. Hubbs and Frank Doting, "Improvements to the RX Noise Bridge," Ham Radio, Feb. 1977. T.J. Anderson, "Noise Bridge Calculations," Ham Radio, May 1978.*

[2]*International Crystal Mfg. Co. Inc., 10 North Lee, Oklahoma City, OK 73126.*



The interior view shows the simple construction around the International Crystal BAX-1 broadband amplifier.



PARTS LIST:

D1 = Zener (see text).
R1 = 200Ω or 250Ω carbon potentiometer (linear).
R2 = 4.7K, ¼w. (solder underneath circuit board).
T1 = ¾" O.D. Ferrite toroid, wound with six or seven quadrifilar turns of #26 or 28 enamel wire.
C1 = 360pF miniature variable (straight line capacity) or similar.
C2 = 180pF mica or polystyrene (exactly half of variable).

NOTE:
• denotes beginning of winding.

Fig. 1–Schematic diagram of the r.f. noise bridge. At (A) is the series version and at (B) is the parallel version.

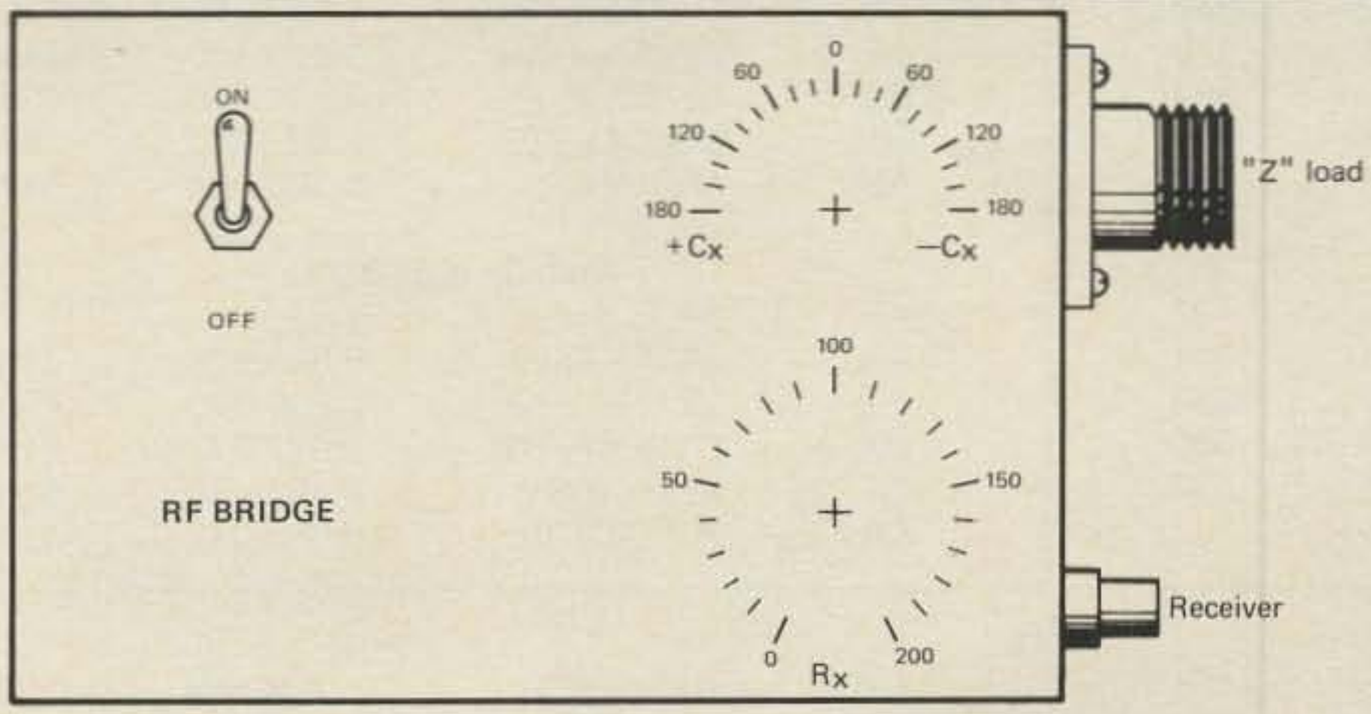


Fig. 2–A face-plate template for the author's noise bridge.

The reference capacitor, C2, should be *exactly* one half of C1 and of good quality. This will provide the zero mark in the middle of the dial.

The aluminum box used is $3\frac{1}{2}" \times 2\frac{1}{8}" \times 1\frac{5}{8}"$ which happened to be available. Any reasonable size can be used. The 9 volt battery should be mounted on the outside for the sake of keeping stray capacitance at a minimum. This also allows easy replacement of the battery. However, the drain is only about 10 ma, so the battery should last a long time; we used nylon screws and spacers. The bridge grounds must all return directly to the case. A regular coax connector can be used for the **load** and a small RCA-type connector will do for the **receiver** connections. Calibrating procedures have been explained in the referenced texts, so they will not be repeated here. The variable resistor can be calibrated simply by measuring it with an accurate ohmmeter.

When properly built and calibrated, this little gadget will allow the user to make many antenna and feedline measurements such as impedance, reactance, velocity factor, and antenna coupler adjustments. It can even be used as a signal generator for r.f. and i.f. touch-up alignment. It thus will prove a very useful adjunct to the serious amateur test equipment, especially since it allows all these measurements to be carried out with the transmitter turned off.

CQ World-Wide WPX C.W. Contest All-Time Records

BY STEVE BOLIA, N8BJQ, Director CQ WPX Contest

This contest is held each year on the last full weekend of May. The All-Time Records will be updated and published annually. Data following the calls below are year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	YU3EF('83)	47,250	105
3.5	4Z4DX('81)	379,652	182
7.0	OA4AWD('82)	1,752,254	329
14	CY3BMV('83)	2,341,680	528
21	HD0E('80)	3,544,416	496
28	LU8DQ('80)	1,627,660	388
AB	L8DQ('83)	4,128,084	548

Multi-Operator Single Xmtr.

	UZ9A('80)	5,000,135	511

Multi-Operator Multi-Xmtr.

	YZ1EXY('83)	9,858,240	756

U.S.A. RECORD HOLDERS

Single Operator

1.8	AE6U('80)	3,444	42
3.5	NE6W('83)	105,672	148
7.0	N6QR('83)	693,036	279
14	N8II('83)	1,542,060	468
21	K6LL/7('81)	1,433,457	459
28	N4ZC('81)	136,086	222
AB	KC1F('83)	2,927,400	510

Multi-Op Single Xmtr.

	NA5R('83)	3,986,592	634

Multi-Op Multi-Xmtr.

	AI6V('81)	4,174,927	551

CLUB RECORD
YU DX Club ('81) 41,003,768

WPX (Prefix) RECORD
YZ1EXY('83) 756

QRPp RECORD
4Z4UH('82) 1,028,904

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	No Entrant		
3.5	EA8RL('81)	108,648	108
7.0	EA9GT('81)	579,824	217
14	EL2AV('82)	906,840	330
21	5Z4CS('82)	2,104,245	429
28	ZS6BUX('81)	8,850	50
AB	5Z4MX('83)	1,804,572	441

ASIA

1.8	UA9SJL('82)	15,456	42
3.5	4Z4DX('81)	379,652	182
7.0	4Z4DX('80)	717,336	243
14	4X6FR('83)	1,444,300	401
21	UL7QF('83)	1,220,083	373
28	4X4UH('81)	1,081,262	338
AB	A4XJO('82)	2,366,976	402

EUROPE

1.8	YU3EF('83)	47,240	105
3.5	HA8KQX('83)	219,660	210
7.0	I4IND('83)	969,300	359
14	YT3A('83)	1,714,048	448
21	YU3BO('81)	1,550,390	394
28	9H1CH('81)	307,433	259
AB	YT2D('81)	2,826,075	525

Multi-Op Single Xmtr.

AF	4K1A('81)	79,249	97
AS	UZ9A('80)	5,000,135	511
EU	UK6LAZ('83)	4,552,062	653
NA	NP4A('82)	4,208,050	550
O	KH3AB('81)	1,547,451	333
SA	No Entrant		

NORTH AMERICA

1.8	AE6U('80)	3,444	42
3.5	NE6W('83)	105,672	148
7.0	N6QR('83)	693,036	279
14	CY3BMV('83)	2,341,680	528
21	KP4EQF('83)	1,816,416	476
28	KP4EQF('81)	577,500	300
AB	KP2A('80)	3,463,593	483

OCEANIA

1.8	No Entrant		
3.5	T32AF('83)	93,480	95
7.0	ZL1AMO('80)	351,050	165
14	VK4QK('80)	1,276,584	344
21	N6HR/NH6('83)	1,203,552	378
28	KG6DX('81)	1,238,806	334
AB	KG6SW('79)	2,848,320	345

SOUTH AMERICA

1.8	PY5AAX('81)	96	6
3.5	4M3AZC('83)	142,780	121
7.0	OA4AWD('82)	1,752,254	329
14	ZW4OD('79)	1,410,320	340
21	HD0E('80)	3,544,416	496
28	LU8DQ('80)	1,627,660	388
AB	L8DQ('83)	4,128,084	548

Multi-Op Multi-Xmtr.

AF	No Entrant		
AS	JA2YKA('83)	5,895,628	614
EU	YZ1EXY('83)	9,858,240	756
NA	CY3PCA('83)	4,977,817	611
O	KH6XX('81)	7,424,460	540
SA	HD1A('79)	6,052,032	474

QRPp

AF	EA8ACL('82)	139,965	155
AS	4X4UH('82)	1,028,904	344
EU	UB5ZEQ('82)	340,059	263
NA	N3RS('83)	494,884	307
O	KH6CP('83)	113,490	117
SA	OA8V('81)	444,768	246

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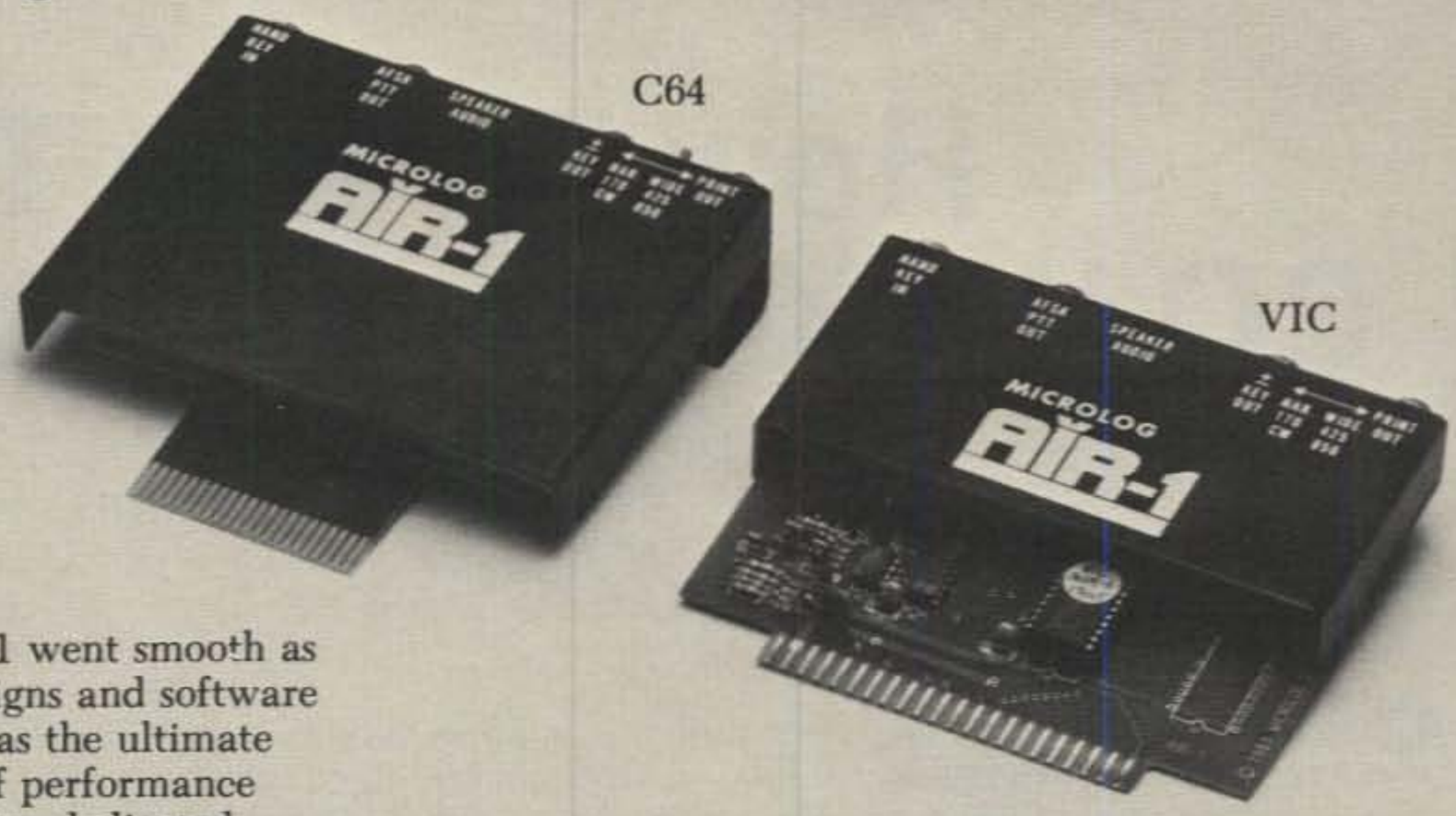

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- Full speed RTTY 60 to 132 WPM, CW to 150 WPM, & 110/300 Baud ASCII.
- Choice of full or split-screen display with large type ahead text buffer and programmable memories.
- On screen tuning indicators mean you never have to take your eyes off the video for perfect copy tuning. RTTY "scope" cross hatch and "red-dot" signal acquisition monitor right on the screen.
- Keyword or manual control of VIC or Parallel printer and receive buffer storage.
- Convenient plug-in jacks for all connections.
- Single board design contains TU & ROM software that does not require external power.
- Full one year warranty.
- WRU, UNshift On Space, Word wrap-around, Test "Quick Brown Fox" & "RYRY" in ROM. Break buffer, Random Code generator, Hand-key input, Real-time clock, sturdy metal cover and more.

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INNOVATORS IN DIGITAL COMMUNICATION

The optional on-board 4 mode AMTOR includes these exciting extras:

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- Word processor mode for full editing of transmit and receive text.
- The unprecedented ability to transmit BASIC programs over the air directly from memory!!! Just load your program normally by hand, disc or tape, jump to AIR-1 to establish communications, and type a special control command. The AIR-1 does the rest. All standard Commodore Basic and screen control commands are transmitted/received intact, just as you typed them, for immediate RUN/SAVE. Share BASIC programs with your friends around the world without tedious "two-step" re-typing or mailing fragile discs and tapes.

AIR-1 Future

There's room for expansion and adaptability with some really "neat stuff" planned for the AIR-1. But then, why tip off the competition? Now you understand how we live up to the title "Innovators in Digital Communications." The complete AIR-1 for VIC-20 or C-64 is $199 (with AMTOR, $279). See it at your local dealer or call Microlog Corporation, 18713 Mooney Drive, Gaithersburg, Maryland 20879. TELEPHONE (301) 258-8400, TELEX 908153.

CIRCLE 53 ON READER SERVICE CARD

Give yourself a pep talk instead of increasing your p.e.p. and put yourself in the winner's circle. KR7L explains some of the tricks of the trade in setting out to win the CQ WPX Contest on QRP.

How To Win The CQ WPX Contest With QRP

BY BRADLEY WELLS*, KR7L

Operating the *CQ* WPX Contest with 5 watts of power is not much different from operating that same contest with a full-bore 2000 watts. Operators at both power levels are striving for the maximum number of valid contacts within a limited period of time. However, successful contest operation is not directly related to the input power of your final amplifier. It is definitely correlated with your antenna system, operating savvy, and attention to detail.

When operating a QRP rig in the WPX Contest, you are not competing against the amateur down the street with the full gallon, but only against other amateurs like yourself. The competition may be less intense, but don't count on it. Many amateurs have discovered the joys and frustrations of low-power contesting, and winning is as much a challenge as with high power.

Equipment options are more limited for the QRP operator than for his high-power counterpart. Many low-power enthusiasts roll their own, and nothing is more satisfying than making contacts with custom-built equipment. For those of us who buy our radios over the counter, there are even commercial QRP rigs on the market today.

Actually, any rig that can be powered down to a 5 watt output is QRP. This is all that is needed to operate in the WPX Contest. An advantage to using one of the commercial QRP rigs is that they have many of the features found in the higher powered equipment. This is a definite asset when you are engaged in contest combat.

Two features that differentiate the QRP winner from the also-ran are antennas and location. Good location is the most difficult factor to obtain. Most of us don't buy our homes because they are good locations for radio operation. If this were the case, most amateurs would live like hermits on high mountaintops far removed from civilization. While some locations are better than others, most of us live in average areas. This is a fact that only the truly fanatical contesters change.

What can be improved in every case is the state of our antennas. The old adage "the bigger the better" was never more true than with QRP. Put up the biggest, highest beam antenna that you can afford. A DX contest, and the *CQ* WPX Contest is no exception, requires a beam of some type to be competitive. Those of you who live in apartments and are restricted to a dipole or vertical have a problem. You do, however, have a chance to win, and we will discuss this later. Needless to say, a good beam will really boost your signal and give you the competitive edge.

Many of the people who operate QRP seem to think that poor antennas are the order of the day. They take delight in running a couple of watts to their bed frames and making some contact with this combination. Well, not in this contest, not if you want to win.

Another thing: be sure your antennas are in top condition. Don't just stick your head out the window to see if they're still up in the air. Give them a good checkout once a year. Remember, the time *not* to work on your antenna is during a contest. Replace your coax every three to four years, and use the best quality cable you can afford. Don't, under any circumstances, use something like RG-58 for the run to the antenna.The attenuation is so great that you can very easily put yourself in the milliwatt class. Use nothing less than high-quality RG-8 cable.

It is not unusual to find avid QRP contesters using hardline coax. It presents the least signal attenuation and transfers the maximum possible power to the antenna. Use Coax-Seal® to weatherproof the exterior coaxial fittings and prevent moisture from entering the cable. Clean all conections on the beam and apply coductive grease to protect them from corrosion.

How you operate in a contest is one of the biggest factors in how well you score. Nothing separates the good from the average as quickly as a pile-up in the WPX Contest. Two things must be done before the start of the contest.

First, psych yourself up to winning. Forget the idea that you are just going to work a few contacts. You're going to win and don't you forget it! Keep this in mind before, during, and after the contest. Positive mental attitude is an absolute prerequisite for winning in any contest.

Second, study the records from prior contests. This is where the amateur with the vertical or dipole has a chance. In many cases you will discover that there are categories that nobody from your call area ever entered. Particularly in the WPX Contest where one can operate single-band QRP, you may find one or more bands for which there have been no entries. That's your opportunity if you have a poor antenna or limited time to operate. I have a job that requires working both nights and weekends, so I operate single band on 10 or 15 meters. I operate during the day and work at night. The same applies in reverse if you work during the day. Operate single band on 20 or 40 meters during the night. The competition is less intense, and you boost your chances of being a winner. Those of you new to con-

*5053 37th Ave. SW, Seattle, WA 98126

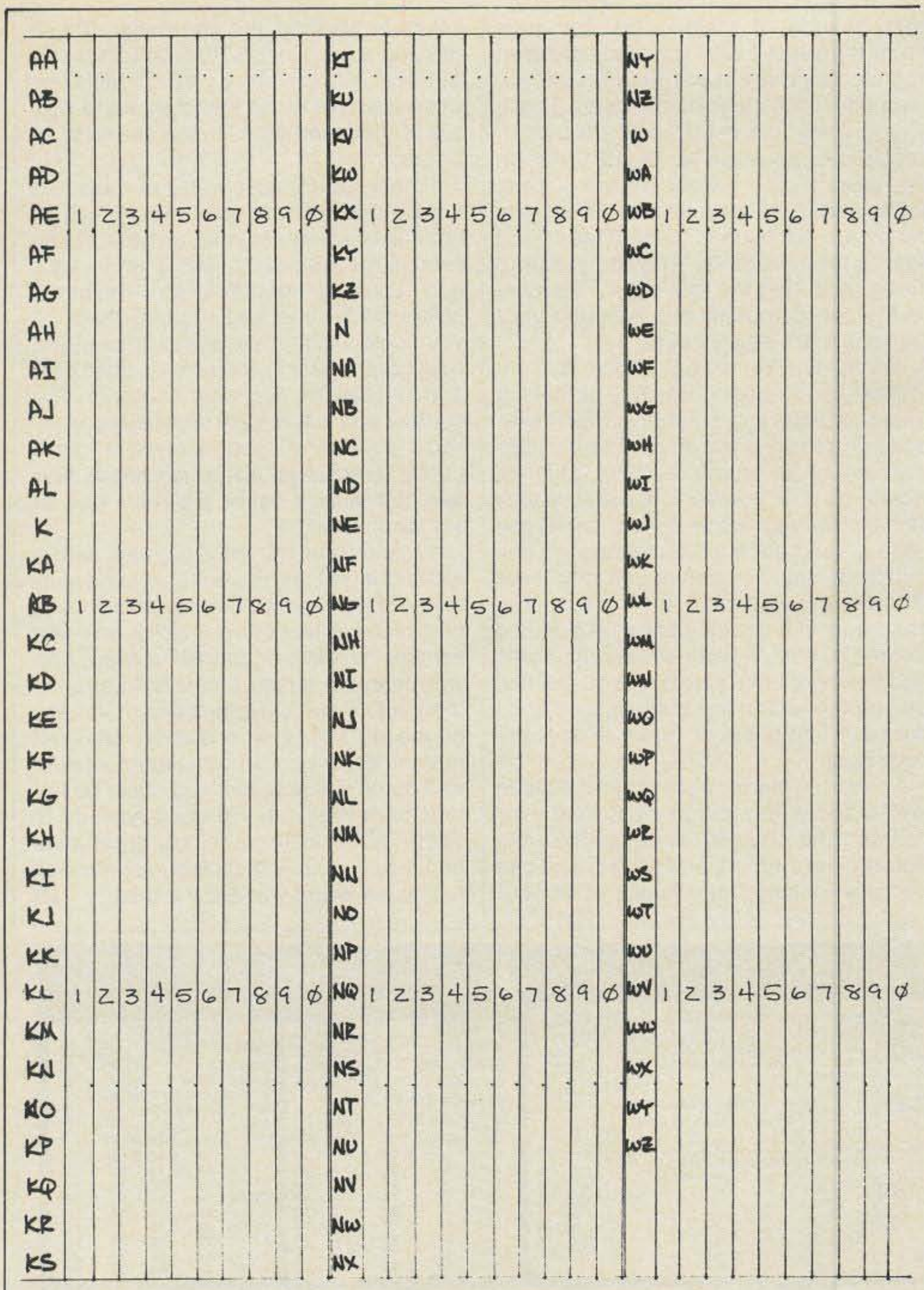

Fig. 1– A sample dupe sheet devised by the author for WPX stateside contacts.

testing should also follow this strategy. It will help you gain the experience to go all out and operate multiband for an entire weekend.

If you are operating QRP, don't waste your time calling "CQ Contest." There is no faster way to frustrate yourself. Your signal is simply not strong enough to pull it off. During a contest most amateurs will not answer a weak "CQ" unless you're operating portable from Spratley or Clipperton Island. The "search-and-pounce" technique is the best method for the QRP operator. With practice your contact rate can equal that of a station calling "CQ." Begin at the top end of the band and work down. Reaching the bottom edge of the band, immediately go back to the high end and start over. Keep moving and answering calls. Don't waste a lot of time trying to work a single station. If he doesn't come back on the third call, move on and work him at a later time. The least productive area for the QRPer will be the lower 25 kHz of the band: Kilowatt Alley. This is where the high-power stations congregate and the level of QRM is enough to cause receiver meltdown.

The "search-and-pounce" technique necessitates keeping an accurate and up-to-date dupe sheet. There is no point in working any station more than once on the same band. It is a waste of time for him and you. In addition, it complicates the problem of keeping an accurate log. The *CQ* WPX Contest is *unique* in that prefixes are the multipliers. This can complicate the problem of dupe sheets, since it

requires separate dupe sheets just for prefixes. The problem is compounded when we consider contacts with stations within the United States. They are worth no points, but count for multiplier credit. Many do not like the way that the FCC has assigned call signs, but it has made the U.S. the richest source of multipliers in the world. My dupe sheet for multiplier in the States is shown in Fig. 1. QRP operators who don't go after and use stateside prefixes are going to lose the contest.

There is no need to begin operation at the start of the contest. The first several hours of the WPX Contest are spent with the big-gun stations working other big-gun stations. They work each other very quickly and begin to pay far more attention to the weaker signals. Starting a few hours after the beginning is far more practical and a lot less frustrating.

Know the propagation conditions for the weekend. This involves several factors. Listen to the WWV forecasts at 18 minutes past each hour. These provide current information on ionospheric conditions and 24-hour forecasts. Use this information to complement the forecasts made monthly in all the amateur magazines. The charts in *CQ* magazine are particularly easy to read and are very detailed. In addition, special charts are produced for the major *CQ* contests.

Know in which direction you have the best chance of making DX contacts. From the West Coast it would be Japan and Oceania. From the East Coast, Europe offers the most DX contacts. Those of you living in the Midwest are caught between a rock and a hard spot. Living on the West Coast, I work as many JA's, VK's, and ZL's as possible. When the bands are not open in these directions, I search for multipliers. They are easier to come by during the last day of the contest, when competition is less and your signal is more easily heard.

For the QRPer, the *CQ* WPX C.W. Contest offers the best possibility of making many contacts and a higher score. Power doesn't seem to make as much difference with c.w. as with s.s.b. In addition, working a c.w. contest is a painless way to build up your code speed. Using the "search-and-pounce" technique will pay big dividends for those of you who have difficulty copying at 20 or 25 w.p.m. You can figure out the exchange by listening to the DX station work several contacts and then work him yourself. You will find that by the end of the contest your code speed will be 5 w.p.m. faster than at the beginning.

Invest in a memory keyer. It saves time and reduces frustration. Just load your call and the contest exchange information into the memory and go to it. You can be busy logging the contact while your keyer is sending the exchange. Those amateurs who decry the fact that this method makes for a lot of 5NN exchanges have never sent their call a couple of thousand times in the space of 24 hours.

Finally, be familiar with the rules and regulations of the contest. They do change from year to year, and there is no excuse for not being up to date. In addition, use the sponsor's log sheets. It saves them time and trouble checking your logs, and there is less chance of you making a mistake. Be sure to check for and remove all duplicate contacts. The contest sponsor is very unforgiving of errors, omissions, and excessive duplicates. **Never forget that more contests have been lost through sloppy paperwork than for any other reason.**

Working the *CQ* WPX Contest with 5 watts is a real test of your operating ability and skill. Those who win with QRP have no reason to feel inferior to the amateur with the full gallon. Contesting with a kilowatt is much easier and less frustrating than with 5 watts. Remember that many of the amateurs who use an amplifier figure that power can substitute for talent and determination. Nothing could be further from the truth. So don't hesitate to operate QRP. With planning and perspiration, you can have that plaque on the wall telling the world you are the best. CQ

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CIRCLE 10 ON READER SERVICE CARD

1983
CQ WW DX S.S.B. Contest
High-Claimed Scores

The following are S.S.B. high-claimed scores as of January 15, 1984. These are raw scores only, subject to verification.

United States
Single Operator
All Band

AI6V	3,658,249
K1AR	2,453,230
K2VV	2,424,620
N8II	2,176,112
K1OX	2,001,897
W3BGN	1,936,799
N2FB	1,876,950
WA8YVR	1,844,602
K2EK	1,575,442
K2XA	1,419,072
N2LT	1,270,732
W1WEF	1,270,048
KI7M	1,130,724
K5RX	1,101,022
N7TT	1,016,520
K4CEF	972,325
N2PP	966,276
N6QR	938,168
W3VT/4	933,984
K8AZ	889,017

28 MHz

NU4Y	142,155
W6XJ	126,635
W4FLA	105,203
KT4W	96,015
W4NL	83,220
W4ORT	81,586
W5VGX	77,830
WØGOR	77,605
AA4VK	77,468
N4VZ	76,125
NY4X	75,744
KG1E	67,472
N4BSN	57,855
AA4M/6	57,828
W8ZF/4	57,285

21 MHz

W6YA	718,718
K7JA	555,841
KM6B	536,544
K1RM	374,712
KVØQ	309,632
K3KG	303,715
NO4J	269,780
KS1Y	162,249
KG7A	134,988
AG7M	133,644
WB5UDX	124,187
K8ZR	119,784

14 MHz

K1UO	729,582
WØZV	596,478
W7IL	367,354
K9PPY	347,820
K9RF	343,530
N4PN	267,344
W6BH	247,625
KM7E	246,264
K5TSQ	224,840
W5WMJ	219,450
W2AO	211,200

7 MHz

N7DD	218,466
N6RJ	197,820
W6AM	179,466
K4PI	113,670
KS8S	92,476
KM4K	72,690
K5RR	72,226
N2DT	66,504

3.8 MHz

W1ZM	177,862
W6NLZ	76,090
N4BAA	60,950
N7DF/Ø	45,990
NØXA	42,315
W8UVZ	38,647
W7IVX	37,818
KT7G	35,952
N6JL	23,668
W4PZV	21,804

1.8 MHz

W8LRL	15,480
AA1K	9,152
K5UR	8,832
N4SU	6,762
N4IN	5,382
AB1A	5,016
KS1L	4,400
N4KE	3,572

Multi-Single

KX4S	4,191,225
N4ZC	3,007,719
WA7NIN	2,854,832
K1RX	2,783,620
KØUK	2,594,316
W8UA	2,410,804
K3TUP	2,255,755
K4VX/Ø	2,219,112
AD8I	2,097,160
KS9K	2,042,952
N3AD	2,004,080
AK1A	1,792,990
W6TMD	1,784,384
K5LZO	1,753,828

Multi-Multi

N2AA	8,402,096
KN3O	7,210,035
N5AU	7,160,370
W3LPL	6,440,900
N6RO	4,321,200
K6UA	4,017,696
K6XO	3,478,132
W3GM	3,021,054
N5RZ	2,868,775
K3ZUF	2,519,154
AA6T	2,021,940

DX
Single Operator
All Band

PJ2FR	10,696,590
YV3OS	8,696,590
NP4A	8,651,286
4ZØDX	5,218,983
VP2KBZ	4,784,000
TU2NW	4,155,800
VK9NS	4,081,152
JY8RF	4,051,861
CT2FH	3,900,688
K4JPD/C6A	3,014,508
DJ4PT	2,655,300
HK3NBB	2,442,726
CE5GG	2,255,400
JI1QPU	2,211,644
JA6YAI	2,205,024
ZS1CT	2,051,096
YCØVM	2,030,748
VE7WJ	2,017,011
ED2QU	1,822,366
I6FLD	1,818,365
K4IIF/KV4	1,784,150
PP2ZDD	1,764,000
DL1WCY	1,730,694
WP4CBB	1,721,523
ZP5JCY	1,644,035
H44SA	1,625,733
PY8ZWM	1,611,925
JAØJHA	1,578,852
KH6ND	1,564,536
DA2ER	1,508,390

28 MHz

CE6EZ	1,261,452
CX4BW	1,109,556
LU4DM	838,355
KP4EQF	755,161
FO8JP	751,700
LU2FDR	653,278
CE3BFZ	544,255
EA6ET	525,632
5B4LP	521,118
4M7QP	512,490
YV5BY	499,874
CP6EL	496,386
ZS6XD	488,592
4Z4WCY/5	441,480

21 MHz

KD7P/KH2	1,778,062
T32AF	1,304,600
CX7BY	1,219,077
4X6FR	881,402
EA9IB	696,080
TO3TV	691,254
YU7AV	677,490
YU3VM	645,150
I1KN	612,315
4X6GS	571,290
AX6NSD	556,710
JA2APA	552,640
TO6GYT	550,314
YU7KMN	496,920
HC1OT	475,125

14 MHz

PW8EH	1,343,201
ZM1BIL	1,334,232
ZY5EG	1,217,229
CX2CS	1,208,390
YW5A	1,181,739
N2BZQ/4X	1,139,092
G3FXB	982,432
CI3BMV	905,800
EA4LH/CE3	762,433
4N4Y	761,076
OA4OS	728,728
YU2CT	709,762
CU1BKW	709,295
G4CNY	609,168
JH3DPB	593,368

7 MHz

YV2AMM	524,745
FM7CD	431,121
IO3JSS	360,072
ZL4BO	269,757
VO1CV	257,712
EA8RCT	224,532
UQ2GDQ	208,768
LU8DQ	187,435
HA9RE	178,504
UA1DZ	154,019
VK2ZIA	143,175
ZY3ZZ	102,830
UR2MG	101,300

3.8 MHz

YV3AZC	263,783
G3XWZ/A	246,560
UW9AF	222,192
EA7LM	140,319
CT2DL	136,488
ZL1BQD	117,024
CR5NH	114,608
I4EAT	107,613
HA8IE	84,350
OK3CUM	77,880

1.8 MHz

UP2BBT/U6F	203,416
YU3EF	35,616
UP2BAW	24,035
VE3MFA	23,275
4X4NJ	20,962
UA9CBO	17,505
PAØHIP	14,504

Multi-Single

9Y4W	16,302,310
ED9CM	10,263,129
RF6V	8,184,405
4V2C	7,970,400
I5NPH	7,712,067
NP4Z	7,116,618
YV1AVO	6,657,595
V3ØAA	6,098,816
VK2LHI	5,523,650
GJ6UW	4,894,573
VE1DXA	4,288,607
HG5A	4,259,287
EA7EL	4,235,700
YBØARA	4,017,640
G3RRS	3,906,672
HBØBHA	3,813,880
HZ1AB	3,800,852
T2YKC	3,744,934
UK2RDX	3,665,088
KH6MD	3,556,850
TR8DX	3,552,120
HG6N	3,511,937
UK6LEZ	3,473,118
JG1ZUY	3,387,705
CE2AA	3,306,618
CE4TA	3,289,076
FC9UC	3,256,660
OK1KRG	3,218,156

Multi-Multi

TI1C	24,539,598
VP2VDH	19,803,114
VP9AD	17,862,890
XE2SI	13,487,670
JA9YBA	7,243,572
JA2YKA	6,273,036
XE2BC	3,642,970
YV3IUP	3,623,312
VE3PCA	3,407,112
JA3YBF	3,092,436
JF1ZRQ	3,051,606
JA7YRR	3,000,704

QRP

AA2Z/1	509,106
PY7ZZ	438,012
I5JHW	436,934
DF4RD	401,014
K7BTB	200,788
K3WS	186,480
JA1WSK	151,902
KZ2E	150,384
K5KLA	135,100
WAØVBW	128,499
JA1ZLO	125,424
JA1HGY	120,954

The C.W. High Claimed Scores were being compiled as this issue was being completed. They will be presented next month.

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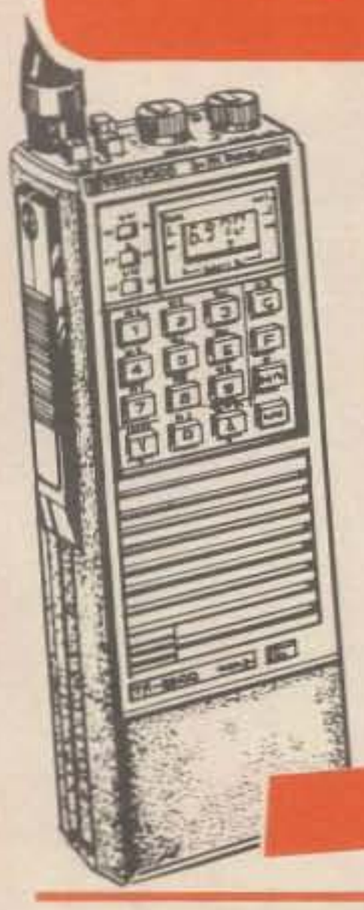

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Features 143.9 to 148.995 MHz coverage, LCD readout and built-in keyboard for direct frequency entry and autopatch functions. Selectable 2.5 or 0.3 watt power output. Complete with flexible antenna, NiCad battery pack and AC charger.

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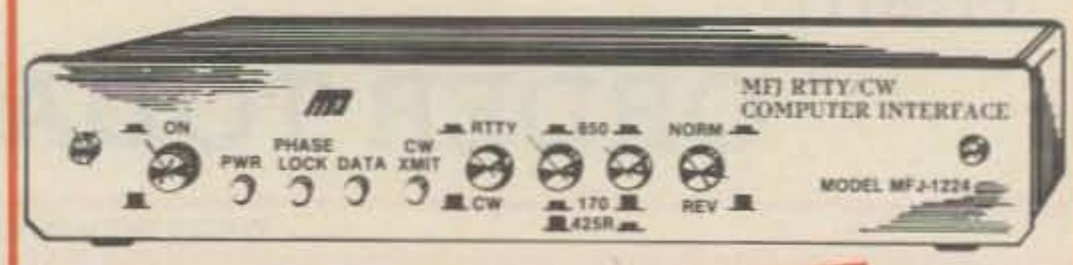

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CIRCLE 6 ON READER SERVICE CARD

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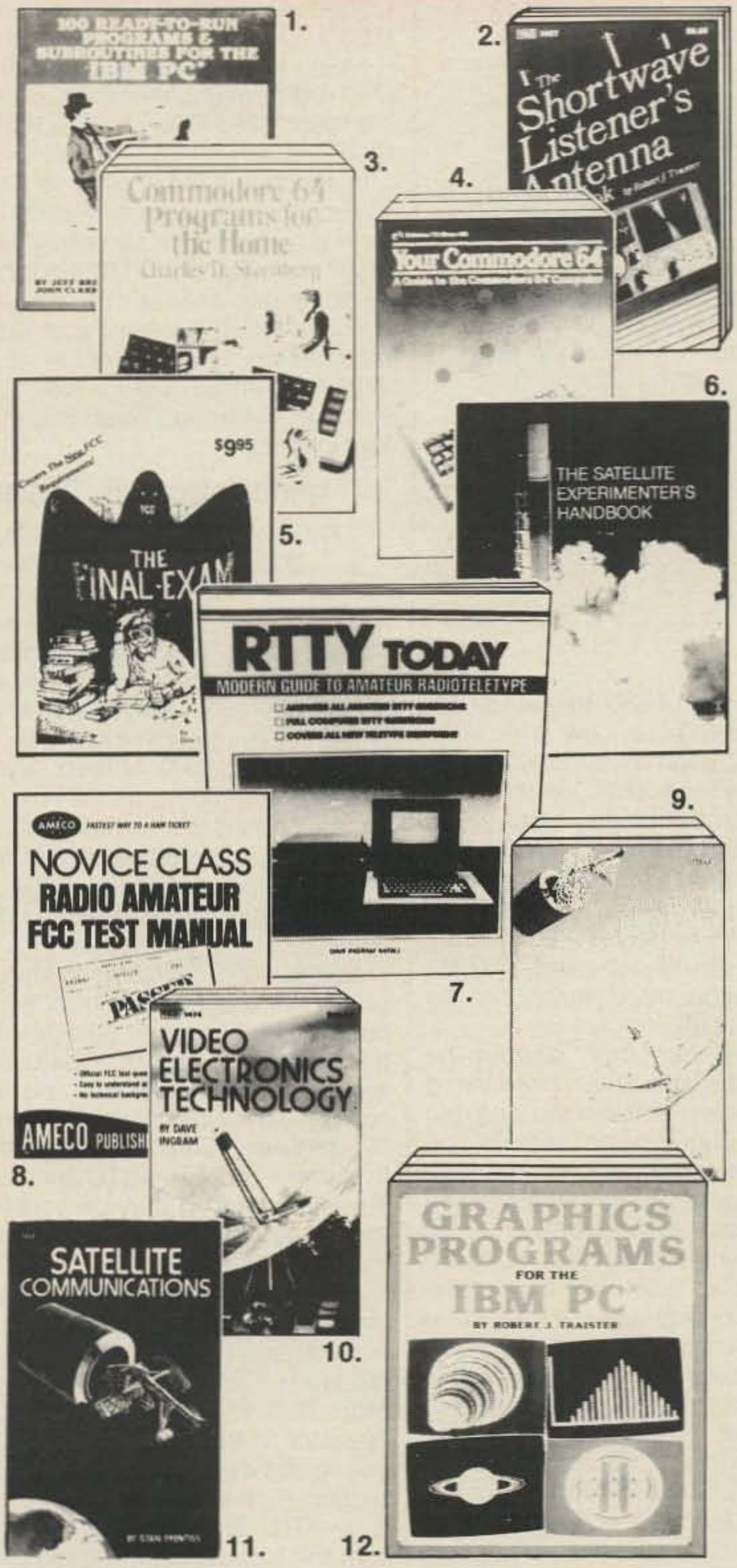

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CIRCLE 1 ON READER SERVICE CARD

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The following is a sequel to last month's column in which I said I was a bit apprehensive about what would happen in our 160 Meter C.W. Contest the last weekend in January. Depending on your location, the propagation was fair to good. The static level was acceptable. The s.s.b.'ers folded their tents for the weekend, or moved their operation to frequencies above 1855 kHz. Even W1AW cooperated and cancelled its nightly broadcasts on 1818 kHz (many thanks, fellows).

The Europeans started to show up in the DX window in the late evening requesting QSX to frequencies lower in the band. It appeared that we were in for a good night of DXing and contesting. However, that did not last long. Suddenly a strong South American station opened up in the middle of the window and started an on-frequency operation. The resulting pile-up deteriorated into the usual hectic pattern characteristic of this type of operation when chasing a DX station. Utter confusion, abusive remarks, name calling, and malicious interference by a few spiteful individuals were noted. Disqualification would be justified, not for operating in the window (that problem was caused by the DX station), but for the unsportsmanlike conduct of a few in the pile-up (which probably would be meaningless, since the offenders were not participants in the contest). Later a couple of Europeans started the same type of operation.

All of this could have been avoided if the DX stations had been more cooperative and had heeded the advice of a few lucky ones who were able to contact them and who suggested that they QSX to frequencies lower in the band.

Common sense should tell you that on-frequency operation in the narrow 5 kHz of the window is not only nonproductive, but the resulting QRM from the strong stateside signals drowns out the weaker Europeans who are trying to establish a split operation. If a station is not equipped to work split-frequency, he should confine his operation to an out of the window section of the band.

The same situation was also evident here in the east in the early morning hours. Two prominent DX stations in the Pacific were also working on-frequency right smack in the middle of the window. They would have more than doubled their QSO totals in the short space of time they were being heard here in the eastern section of the states if they had observed the accepted practice of split-frequency operation out of the DX window.

Working DX, even though very exciting, is not what the 160 Contest is all about, however. Contacting other stateside stations and trying for WAS is perhaps more rewarding for the average station. Having only a modest layout myself, I am directing my remarks to the majority of you fellows on the top band. Without your participation there would not be much of a contest.

I'm sure the "big guns" now on the band understand what I have been trying to say. There was a time not too long ago when we were operating on the same level under restricted regulations. As a matter of fact, many of you had little or no interest in 160 back in those days.

It's a different and more competitive band now, but let's not lose the reputation we have built up over the years that 160 is the "gentleman's band."

Again the usual reminder: May 15th is the deadline for material for the August issue, and June 15th for the September issue. Sending it to my home address will give you at least a week's advantage.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Apr.	28-29	Massachusetts QSO Party
*	Apr.	28-29	"King of Spain" Contest
*	Apr.	28-29	Swiss Helvetia Contest
*	Apr.	28-29	County Hunters SSB Contest
*	May	5-6	Florida QSO Party
†	May	5-6	"Seville" WW Contest
†	May	5-6	USSR "CQ-M" Contest
	May	5-6	G-QRP Group SSB Activity
†	May	5	World Telecomm. CW Contest
	May	12	World Telecomm. SSB Contest
	May	19-20	Georgia QSO Party
	May	19-20	Michigan QSO Party
	May	**26-29**	**CQ WW WPX C.W. Contest**
	Jun.	2-3	New York State QSO Party
	Jun.	9-10	South American CW Contest
	June	16-17	All Asian Phone Contest
	June	16-17	NINE Land CW Party
	July	7-8	Venezuelan SSB Contest
	July	28-29	Venezuelan CW Contest
	Aug.	18-19	SARTG RTTY Contest

* *Covered last month.*
† *Not official.*

G-QRP Club SSB Activity

Saturday & Sunday, May 5 & 6

This is not a contest, but as the name implies, it is an event to promote QRP activity. The following times (GMT) and frequencies will be used for this event.

3690 kHz—1200–1300, 1400–1500.

7090 kHz—1100–1200 and 2000–2100.

14285 kHz—0900–1000, 1300–1400, 1730–2000, and 2200–2300.

21385/28885 kHz—1000–1100, 1500–1730.

In addition to the above events, members of the group have weekly activity periods on Sundays between 1100Z and 1230Z and again from 1400Z to 1530Z on the above international QRP frequencies.

You are invited to send your reports of participation to: Christopher J. Page, G4BUE, Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW England.

World Telecomm. Contest

Phone: May 5 C.W.: May 12
0000Z to 2400Z Saturday

No announcement has been received for this year's Telecomm. Contest. In the past it has been held on the first and second weekends in May in celebration of World Telecommunications Day.

It's a world-wide contest, the object being to contact stations in other ITU Zones. Scoring will be based on all-band operation, single operator and multi-operator, both phone and c.w.

Exchange: RS(T) plus your ITU Zone number.

Scoring: QSO points as follows. (1) between stations in same country, 0 points, but okay for multiplier; (2) different country, same zone, 1 point; (3) different zone, same continent, 3 points; (4) different zone, different continent, 5 points.

Final Score: Total QSO points multiplied by number of different ITU Zones worked. The same station may be contacted on each band for QSO points but zones are counted once only.

Awards: Diplomas to the highest scoring single and multi-operator station in each country. Gold, silver, and bronze medals to the top three world single operators. A silver plate to the top world multi-operator station. Separate awards for phone and c.w., and additional awards if participation warrants.

The ITU Trophy goes to the country with the highest aggregate single operator scores. The Trophy remains in the possession of the national association of that country affiliated with the IRU for one year. It is retired by the country winning it three times within five years.

Mail logs before June 30th to: L.A.B.R.E.,

U.I.T. Contest Coordinator, P.O. Box 07-0004, 70.000-Brasilia, Brazil. Include your address label and IRC's for results.

USSR CQ-M Contest

2100Z Sat. to 2100Z Sun., May 12–13

We have not received an official announcement for this year's CQ-M contest. Rules should be the same as last year, but will be repeated for the benefit of those who did not see them.

Keep in mind that this is a world-wide-type contest, so do not limit your operation to the USSR only. Contacts may be made on c.w. or s.s.b., 3.5 through 28 MHz. The same station may be worked on each band, but not both modes for QSO and multiplier credit. Contacts via Oscar count as an extra band if made on u.h.f.

Classes: (A) Single operator, single band. (B) Single operator, all band. (C) Multi-operator, single transmitter, all band only. (D) S.w.l.

Exchange: RS(T) plus a three-figure QSO number. USSR stations add the number of their region (oblast) to their report.

Points: Contacts between stations on the same continent one point; different continents three points. Own country may be worked for multiplier credit but no QSO points.

Multiplier: Is determined by the number of countries worked on each band. The USSR "R-150-S" list is the standard, which essentially is the same as our DXCC, plus the following oblasts: 002, 013, 014, 056, 084-5-6-7-8-9, 090-1-2-3-4-5-6-7-8, 159, and UA1 Novaya Zemlya, UA0 Kuril Is., UA0 New Siberian Is.

Final Score: Total QSO points from all bands times the country/oblast multiplier from each band.

The s.w.l.'s get one point for reporting one station in the exchange, and three points if both stations are reported.

Awards: A large selection of trophies, medals, and badges in all classes for overseas winners. Badges to all entries contacting at least 10 USSR stations.

Contest contacts may be credited for USSR awards in lieu of QSL cards if request is made with entry (R-150-S, R-100-0, W-100-U, R-15-R, R-6-K, R-10-R).

Mailing deadline is July 1st to: Krenkel Central Radio Club, CQ-M Contest Committee, P.O. Box 88, Moscow, USSR.

"Seville" World Wide Contest

2000Z Sat. to 2000Z Sun., May 5–6

I have not heard from the Seville Radio Club this year, so therefore I cannot vouch for the special award of an all-expense-paid trip to the overall winners. However, this event has always been held the first full weekend in May, so make your own decision.

It's a world-wide-type contest similar to our *CQ* WW. Use all bands, 1.8 through 28 MHz, only single operator, all band, s.s.b., or c.w. operation. The same station may be worked on each band, but not both modes for QSO and multiplier credit.

Exchange: RS(T) plus a QSO number starting with 001.

Points: Contacts with stations in the same country, 2 points. Between stations in different countries, 3 points. (Between EA, EA6, EA8, and EA9, 2 points.)

Multiplier: Each different DXCC country worked on each band.

Final Score: Total QSO points from all bands multiplied by the sum of countries worked on each band.

Awards: Plaques to the 10 top scorers. Certificates to each station making 300 or more QSO's. A special award to the two overall winners, Spain and the World—an all-expense-paid trip for two to the Seville April Fair Feast offered by the Seville City Council for the following year. *(Again, I'm not sure about this one.)*

Use a separate log sheet for each band, and indicate each multiplier only the first time it is worked on each band. Use a separate sheet indicating your duplicate contacts on each band. Include a summary sheet showing the scoring, comments, and other essential information, and the usual signed declaration. Logs will be closely checked for excessive dupes and other violations and will be subject to disqualification.

Entries must be postmarked no later than June 15th, and go to: The Seville World Wide Contest, Radio Club Sevilla, P.O. Box 555, Seville, Spain.

Georgia QSO Party

1600Z Sat. to 2400Z Sun., May 19–20

The Atlantic Radio Club is again the sponsor of this year's party. There are three classes of entries: single operator, multi-operator single transmitter, and Georgia mobile/portable operating outside own county.

The same station may be worked on each band and each mode for QSO credit, but a multiplier is counted once only. Georgia to Georgia contacts are permitted for QSO point credit, and mobiles in each county change.

Exchange: RS(T), and QTH. County for Georgia; state, VE province, or country for others.

Scoring: Georgia stations multiply total QSO's by the number of states, provinces, and continents (maximum 6) worked. Others multiply total Georgia QSO's by the number of Georgia counties worked (maximum of 159).

Frequencies: C.W.—1805 and 60 kHz up from bottom of each band. S.S.B.—3900, 3975, 7245, 14290, 21360, 28600. Novice/Tech.—3718, 7125, 21110, and 28110.

Try 160 at 0300Z, 10 on the hour, and 15 on the half hour from 1300 to 2300Z.

Awards: Certificates to the top scorers in each state, VE province, DX country, and each Georgia county. Second- and third-place awards where activity warrants. There are three plaques: the overall winners in Georgia and out-of-state stations, and Georgia mobile/portable.

Certificates will also be awarded to Georgia stations making 100 or more contacts and out-of-state stations making 25 or more Georgia contacts.

Include a summary sheet and a check sheet for those making 200 or more contacts. Logs must be received before June 30th and go to: Atlantic Radio Club, Att: Dave Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092.

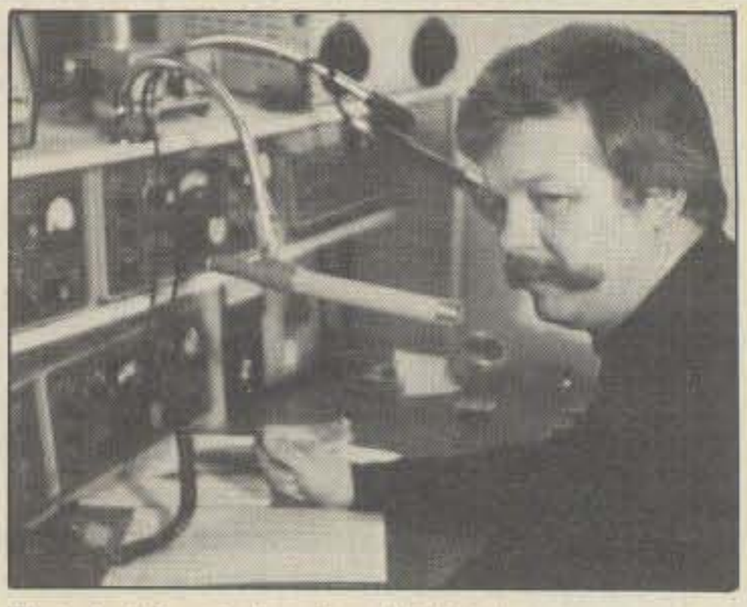
Michigan QSO Party

1800Z Sat. to 0300Z Sun., May 19–20
1100Z Sun. to 0200Z Mon., May 20–21

This year's party is again being sponsored by the Oak Park ARC. The same station may be worked on each band and mode, portable/mobile in each county change. Contacts between Mich. counties are permitted for multiplier credit.

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

Scoring: *For Mich.*—One point for phone contacts, 2 points if on c.w., and 5 points if with W8MB. Multiply total by (states + countries + Mich. counties)



This is Martin Luther, VK4VU, the big signal from "Down Under." Martin is wondering how and when he will set up all that gear and the antenna farm at a new location. He pulled up stakes in March and moved to VK5 Land. When he was not chasing DX or in a contest pile-up, he still found time to write a contest column for a VK magazine.

worked for final score. KH6 and KL7 count as states, VE as a country (maximum of 85 possible).

Out-of-state—One point for each Mich. phone QSO, 2 points if on c.w., and 5 points if it's with Club station W8MB. Multiply total by Mich. counties worked (maximum of 83).

V.H.F. scoring same as above except multipliers from each band are added together for total multiplier. Repeater contacts are not permitted.

Frequencies: C.W.—1810, 3540, 3725, 7035, 7125, 14035, 21035, 21125, 28035, 28125. S.S.B.—1815, 3905, 7280, 14280, 21380, 28580. V.H.F.—50.125, 145.025, 146.52.

Awards: Certificates to winners in each state, country, and Mich. county. Seven plaques to top winners: single operator, upper peninsula, multi-operator, v.h.f., mobile, and aggregate Club score, and out-of-state top score.

Party contacts do not count toward the Michigan Achievement Award unless one fact about Mich. is exchanged.

A summary sheet is requested with your entry showing the scoring and other pertinent information, plus a signed declaration that rules and regulations have been observed. Include a large s.a.s.e. for a copy of the results.

Mailing deadline is June 30th to: Mark Shaw, K8ED, 3810 Woodman, Troy, MI 48084.

1983 SARTG RTTY
North America Results

KA3GIK	116,250	WØBWJ	17,050
W4CQI	105,600	W3KV	14,420
KB2VO	105,525	VE3KQS	9,975
K6WZ	44,490	K4AGC	8,875
WB4UBD	44,200	WØIHS	5,830
VE7YB	31,600	TI2DO	4,880
XE1VV	29,785	VE3IR	1,800
AA4CK	27,080	KE6T	1,485
W7MI	26,445	W8TCO	120
W2KHQ	20,650		

ON4UN was the World winner. KA3GIK was #10 out of 85 entries.

European WAEDC Contest 1983 C.W. Results*

U.S.A.

KC1F	**1,088,960**	W2GKZ	18,720
K1KI	**950,606**	W1CNU	17,762
WA8YVR	**661,912**	**K4FW/8**	**15,762**
W3GM	**605,320**	**KE5CK**	**15,498**
KZ2S	**564,860**	KE6PQ	14,948
AK1B	224,200	W6BIP	9,834
K4BAI	**170,683**	W4KO	9,315
K4YKZ	**149,058**	N3GB	8,512
KA2MRP	**125,343**	W9QWM	7,700
N6AR	**110,656**	N6ZZ	7,400
W9RE	**104,958**	WB9TBU	7,080
N6AW	82,467	KR2Q	6,643
K9TUS	79,998	K2POF	6,528
K5KLA	**78,722**	W4DGJ	5,852
W4BV	71,904	W6OKK	5,082
K2QF	70,104	W4KMS	4,466
W3BGN	61,005	W5EIJ	4,056
DJ6LK/W4	**58,968**	AA6EE	3,990
K1XM	56,625	W1OPJ	3,752
W8UVZ	51,705	KC7V	2,880
KQ1F	45,018	W5NR	2,703
KE9U	**34,416**	W4YN	2,600
K4FPF	30,800	N3RC	1,398
W2DW	29,007	KA7FEF	1,260
W3ARK	27,600	W4MLA	990
KW2J	26,910	W1BET	320
WB1EIL	**21,306**		

Canada		**Continental Winners**	
VE2WA/3	**20,895**	Europe	YU3EY
VO1CA	6,313	Africa	ZS1CT
		Asia	4X6FR
Multi-Opr.		N. Amer.	KC1F
K1AR	**446,880**	S. Amer.	LU8DQ
W8LU	**419,680**	Oceania	VK2APK
W3AKD	**100,130**		

Multi-Opr.		**Special Trophy**
Europe	UK2PCR	KC1F, DL7AV, G4DAA
Asia	UK9FER	
N. Amer.	K1AR	**Boldface indicates certificate winners.*
S. Amer.	PY2BW	

Michigan Achievement Week

May 19–26, 1984

All contacts with Michigan stations made during Michigan Week, May 19–26, as well as Party QSO's, may be used for this award if the following requirements are fulfilled.

1. Mich. stations—Submit a log with information, name and address of station worked if possible, of 15 or more QSO's with out-of-state or DX stations with information about Mich.

2. Out-of-state stations including Canada—Submit a log with information, name and address if possible, of at least 5 Mich. stations worked who related facts about Mich.

3. DX stations—Work at least one Mich. station, with log information, name, and address, and relate fact about Mich. given by the station worked.

4. Only contacts made during Michigan Week, May 19–26, are valid for this award.

Applications for certificates must be postmarked no later than July 1, 1984, and mailed to: Governor James Blanchard, Lansing, MI 48902.

(Facts about Michigan: State Bird, Robin; Fish, Trout; Flower, Apple Blossom; Tree, White Pine; Stone, Petoskey; or any local facts.)

CQ WW WPX C.W. Contest

0000Z Sat. to 2400Z Sun., May 26–27

This is a reminder of our *CQ* WPX C.W. Contest coming up at the end of this month. Results of last year's contest in this issue may be used as a guide to choose the best class for your operation.

Rules and scoring are exactly the same as for the s.s.b. section in March, and these rules were given in detail in the January issue, with a follow-up in the March Calendar. A few items to keep in mind are as follows:

Par. I—Only 30 hours out of the 48-hour contest period may be used by single operator stations. The off times may be taken in up to five periods.

Par. IV—Multi-operator, single transmitter. Only one transmitter and one band permitted during the same time period (defined as 10 minutes). No QSYing to another band to pick up a new multiplier.

Par. VI—QSO points on the three lower bands—7, 3.5, and 1.8 MHz—are worth double those for contacts on 28, 21, and 14 MHz. Own country may be worked, but for multiplier credit only (making U.S. QSO's very attractive).

Par. VII—The prefix multiplier is counted once only, not once on each band. Definition of a prefix is clearly spelled out in the rules, and was again reviewed in the March Calendar. The WPX Awards list can no longer be used as a guide for contest operation.

Stations operating in a call area other than that of the call sign are required to indicate the area of operation. The portable prefix is the multiplier (i.e., W8IMZ/4 counts as W4; N8BJQ/KV4 counts as KV4).

Par. IX—There will be 17 plaques awarded in this year's contest. Eligibility remains at 2 years except for areas in categories as indicated.

Mailing deadline is July 10th, but will be extended for rare isolated areas. Be sure to indicate C.W. on the envelope.

It's desirable that logs be sent directly to the Contest Director: Steve Bolia, N8BJQ, 7659 Stonesboro Dr., Huber Heights, OH 45424. Of course, they are always acceptable at CQ, 76 N. Broadway, Hicksville, NY 11801.

New York State QSO Party

1600Z Sat. to 0400Z Sun., June 2–3

This is a new one sponsored by the Salt City DX Association of Baldwinsville, NY. The same station may be worked on each band and each mode for QSO point credit.

Exchange: RS(T) and QTH. County for NY stations; state, VE province, or DX country for others.

Scoring: One point for phone contacts, two points if on c.w. NY stations multiply total QSO points by the number of states, provinces, and DX countries worked. Others multiply total NY QSO points by the number of NY counties worked (maximum of 62).

Frequencies: Phone—1835, 3905, 7280, 14295, 21380, 28580. C.W.—1810, 3540, 7035, 14035, 21035, 28035. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the winners in each state, province, DX country, and New York county.

Mailing deadline for all entries is July 15th to: John Cariot, K2ZJ, 3720 Dutchman Drive, Baldwinsville, NY 13027. Include a large s.a.s.e. for a copy of the results.

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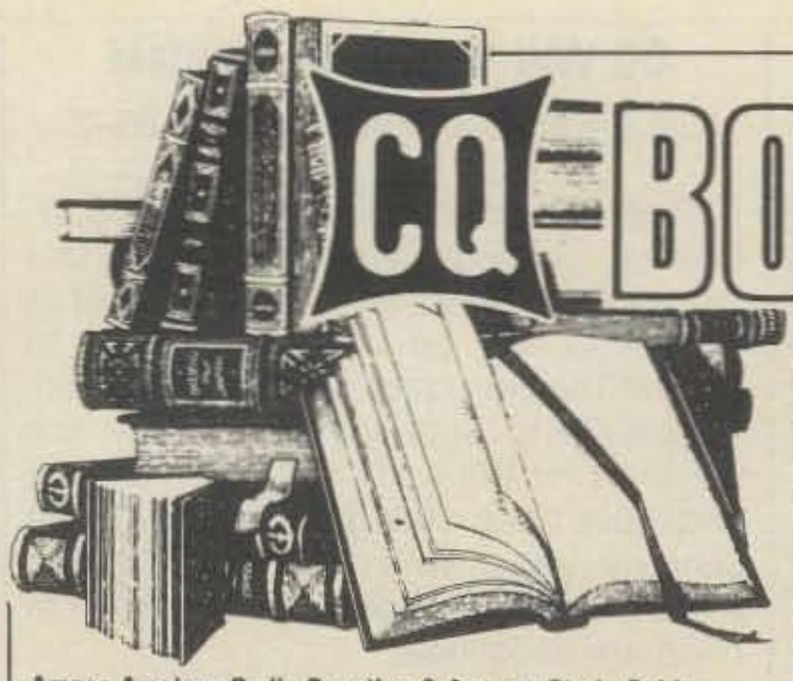

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CIRCLE 67 ON READER SERVICE CARD

Until last August XU Cambodia had not been heard on the air since 1975. XU1SS was started up by JA operators last year, and is now manned by Khmer Radio Club members.

KAMPUCHEA XU IS HEARD AGAIN!

BY MICHIAKI WATANABE*, JH1KRC

Cambodia went off the air in 1975, and for DXers it was a long wait until XU1SS came on the air from the town of Ampil, in what is currently known as Kampuchea. It was a major DX effort by JA amateurs, and this is the report on how the operation came about.

I had know Yoshi, JA1UT, since being close to some other JA-DX efforts. In 1981 I was in the Maldives with 8Q7BI. One has only to be on the bottom of a DX pile-up at a DX spot to know that experience will always be remembered. In February I met Yoshi at Meguro at the Association of Aid for Indochina Refugees (AAIR), and we got to talking of a possible XU operation. AAIR was working in Cambodia to construct villages (Ampil and Obbock) for Cambodian refugees. The refugees in the camps in western Cambodia came as a result of attacks launched from Vietnam during the dry seasons. The estimate of the number of homeless Cambodians has been put as high as 600,000.

We started making inquiries on the possibility of getting operating permission. While our first inquiries were tentative, we were surprised at the early results. AAIR forwarded some inquiries to the Khmer Peoples National Liberation Front (KPNLF), directing them to Mr. Son Sann, who was the Prime Minister of the coalition government which administered the area in which the refugee villages were located. We got a good reception on our request for operating permission and an initial approval by the Prime Minister.

In April 1983 permission was given to a JA group to operate from Kampuchea. The group included 10 operators, along with my friend Yoshi, JA1UT, JA1HQG, Ang Arisaka, a Director in the JARL, seven other JA amateurs, and myself. In early May three of us—JA1UT, JA1HQG, and myself—went to Thailand to cross over into the Kampuchea area. Our purpose was to visit the area and to meet the coalition government's Prime Minister, Son Sann, for the first time. Everything seemed feasible at that point and there were no obvious problems, though our visit was only for a few short hours.

This is the JA crew who worked successfully to put XU1SS on the air. This official group picture was taken in front of the Ampil village administration building.

The planning and consultations continued, and when the Prime Minister came to Japan for a visit in June, we were able to review the plans for an amateur radio operation as well as to show the equipment being donated by individuals, manufacturers, and radio clubs. In July the name of 10 JA DXers were submitted to the Thai government to arrange for border passes for crossing into Kampuchea. During these preparations amateur gear was being shipped in small lots into the refugee camps to await our arrival. Neverthless, when we prepared to depart in August, we had to carry a heavy amount of gear with our baggage.

Our operating plan called for two groups. One would go first and set up the station, get things operating, and start instructing KPNLF students in radio theory and practice. The other group would come in at intervals to continue the work

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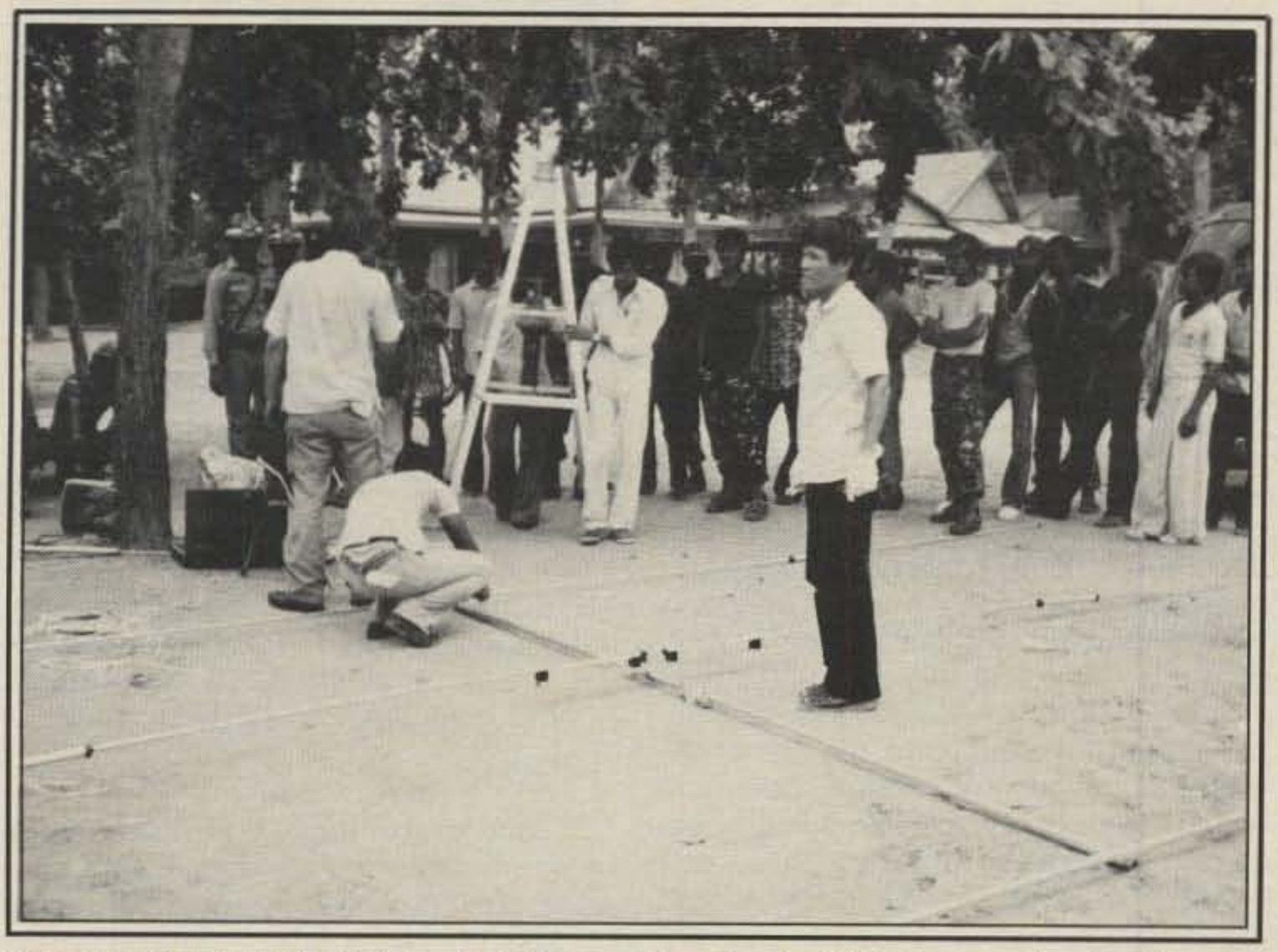
The village administration building in Ampil in western Cambodia just across the border from Thailand. This was the QTH for the XU1SS operation in August 1983. The beam is visible on the roof. The crew trained by the JA-DX group continues to put XU1SS and XU1KC on the air.



Assembling the Mosley TA-33 Jr. in Kampuchea for the XU1SS operation last August. Big construction jobs always draw a crowd of sidewalk superintendents.

of instructing and operating. In the first group was JA1UT, who had been instrumental in promoting the effort; JA1HQG, who would be the XU1SS QSL Manager; JE1OMO from AAIR, who once was WA2EPV; JK1KHT, who brought experience in outdoor activities; and myself, JH1KRC, a teacher.

From Japan the group headed for Bangkok and the first overnight stop. There was a mountain of boxes, cartons, and personal baggage hauled from the airport to the hotel, and there were some questioning glances directed at the pile of gear for what appeared to be just five ordinary tourists.

Things went easier from Bangkok. We departed accompanied by a Kampuchean citizen, Son Soubert, who was also headed for Ampil across the border from Thailand. By mid-afternoon we had arrived at the village, roughly just 24 hours after the departure from the Narita Airport in Tokyo.

Chak Bory, the President of the Khmer Amateur Radio Association, was on hand to greet the JA DXers. Already on hand were a couple of the transceivers shipped long before our departure from Japan. The safe arrival of the gear had been an ongoing worry. Some of the worry came from concern about getting radio transmitting gear past the Thai customs and into Kampuchea.

Our first day in Ampil was mainly concerned with patrolling, because we had to be back across the Thai border before it closed at 5 p.m. The way the first day went was pretty much a preview of the following days when XU1SS and XU1KC were on the air. The group had to be at the Thai border each morning at 8 a.m. when it opened and be back into Thailand each night as the border closed at 5 p.m. The gear was left in the refugee village, and armed soldiers guarded the building at night. All of this may answer some questions asked about the operating schedule at XU1SS. It was an 8 a.m. to 5 p.m. proposition, and when the sun was low in the west, it was QRT until the next day.

With the schedule pretty well nailed down, plans were directed towards getting the maximum operating time possible. The JAs stayed in the Thai town of Aranyaprathet; the hotel was just a few kilometers from the border. The refugee village Ampil (Ban Sa Ngae in the Thai language) was only a few kilometers on the other side of the border. The location of the XU1SS operation was approximately 230 kilometers east of Bangkok. There is a large population of Chinese businessmen in Aranyaprathet, and most of our evening dining was in the various Chinese restaurants in the village. The hotel cost 150 Bhats a day (about $6.00 U.S.). Actually, from the hotel into the village was 70 kilometers, or just over 40 miles.

On August 9th a telephone call was made to Japan to alert the waiting and anxious DXers that Kampuchea would come on the air shortly. Then began the daily run to Ampil—the stop at the border in front of the sand-bagged machine-gun installation, the crossing of the tank trap into Kampuchea, and then on to the village. The Thai soldiers who manned the border post were mostly under 20 years old. Each stop was a ritual—the submission of identification and border passes, the writing in a notebook, and then the polite bowing of the group across the border.

The station was set up in the main administration building in Ampil and not in the refugee village itself. Work was started assembling the Mosley TA-33 Jr. on the ground in front of the building. This antenna was mounted on top of the administration building along with the rotator, and the FT-77 and the FL2100B were unpacked and prepared for operation. Chak Bory, also a principal administrative official in the Khmer Peoples National Liberation Front, was on hand to lend assistance and to expedite matters. However, all the preparations and planning were not enough to have things ready to go on that day.

The next day, August 10th, found us with everything on line and ready to go. First, there were photographs taken of Prime Minister Son Sann departing for a trip to the United States. Then at 1255 local time in Ampil JA1UT fired up the rig

on 15 meters and called CQ a couple of times. He got a quick response; a station admonished him, " . . . the frequency is in use!"

While we were putting the station together, we started a school to instruct a select group in radio theory and practice, and a number of these Khmer students were watching XU1SS come into operation. After a few more minutes of calling CQ, JA6GRX finally came back to XU1SS. In the planning it had been decided that in the initial contacts there would be a complete exchange of information: QTH, name, signal report, and what usually would be handled in a normal QSO. All this was being intently watched by the future Khmer amateur operators, and it was but a short time before they were hearing a full-bore DX pile-up. The second contact was made with JA1ELY, and then came VK1WB. About this point we changed procedures so that a JA operator would pick up a call sign and make the initial contact, and then he would pass the microphone to one of the Khmer students to complete things. This was the way the first amateur activity out of Cambodia since May 1975 came on the air.

For the Khmer operators getting their first exposure to amateur radio,the effect was somewhat stunning. Intent on what was going on, they tried to keep to the instructions drilled into them. However, sometime they forgot to talk but logged, or logged and forgot to talk, everything else gone from their minds. Things rattled along for awhile with most of the stations worked being JAs in Japan. Then KH6WU and KH6ACD got through.

A Russian station then made contact and caused some confusion. The Khmer operators had been carefully drilled in ICAO phonetics, and the Russian station gave his name with his own phonetics: "Vlad—Victorrr London Alabama Denmark." On the other hand, the Khmer operator also may have caused some confusion. Their phonetics came out "Eggsh-ray Unifoom One Shrarraa Shrarraa." However, it is not strange to find almost any language with what appear to others to be strange expressions. But even with the passing confusion, the Khmer operators were quick to ask why Vlad had a call sign that did not begin with the "J" that they had been hearing. The fact that they had worked a station in Russia brought a startled look and a somewhat paler Khmer operator. The initial shock did not last long, however. They adapted quickly as they learned procedures, and worked many more Russians before we departed.

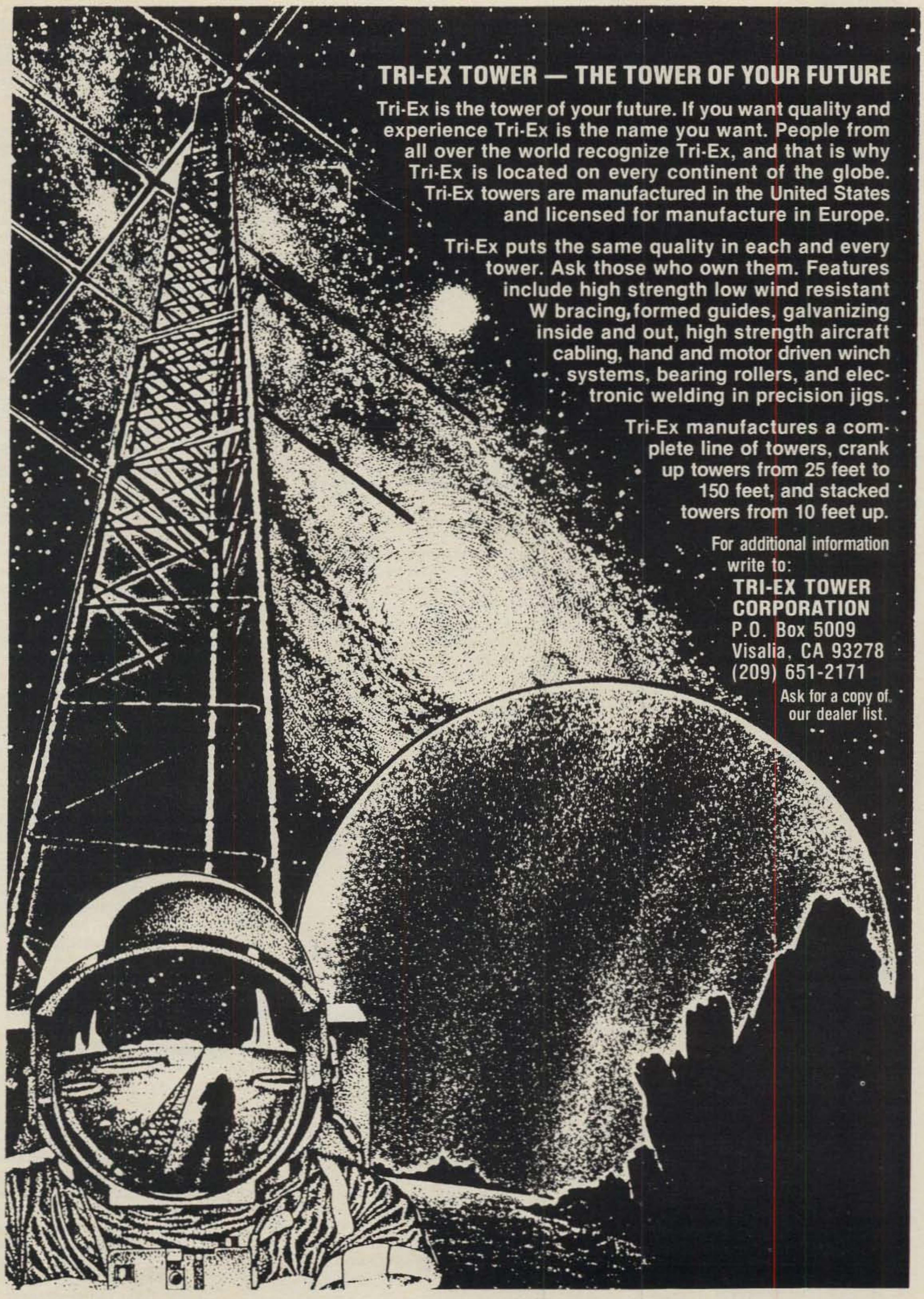
The first day the station was shut down at 4:30 p.m. local time. The afternoon's work on the first day had brought 94 contacts on 15 meters. The next day XU1KC was set up and ready to go. While the operators handled the pile-ups, I lectured the Khmer students on the various parts of amateur radio, ranging all the way from how to operate split frequency, how to QSL, and how to trap a QSL manager, to basic instruction in radio theory and operating. Most days had three or four hours of classroom work, with the maximum instruction crammed in while the opportunity lasted.

The first YL operators of XU1SS smile for the camera. Most of these women came with some c.w. experience from previous communication work.

The first group of Khmer Radio Club operators to qualify to work XU1SS and XU1KC. Since the JAs finished setting up the station in August 1983, members of the Khmer Amateur Radio Association have continued the station activity.

On August 13th it was time for the first group to start heading back to Japan. Only JA1HQG and myself from the orginal five stayed on. By this time much of the operating time was being handled by the Khmer students, although when the paths opened to Europe or the United States, usually on 10 or 15 meters, I took over the rig. The propagation conditions we encountered in Kampuchea were unusual and much better than had been anticipated. There was a general feeling that for the middle of August the conditions were very good.

On 15 meters the first 8 contacts were a surprise; they were all with Europe and all with LZ Bulgaria. Then SM5LPC broke in, then another LZ, a UB5, another LZ,



CIRCLE 9 ON READER SERVICE CARD

and SM5AQD. Some UA broke in and a string of European stations was run, with JE1OMO working about 50 in a 45-minute period at about 2 p.m. local Kampuchea time.

The next day while lecturing to the Khmer students I started to wonder if a BY station was on the air, and I tuned the transceiver looking for it. I soon recognized the chirpy humming signal of BY8AA in a pileup working mostly JAs. I jumped into the ongoing pileup calling BY8AA, being a bit more insistent at every call, until the JAs caught the XU1SS call sign and switched to call me. This alerted the BY8AA operator to XU1SS being on the air. A QSO was quickly made, followed shortly by one with XU1KC, which was operated by Mao Sovann.

August 16th brought the second JA group to Ampil: Yuh, JF1GKF, JL1UXH, and JH4RUB. They immediately got into the action working many Europeans and the States on both 20 and 15 meters c.w. and s.s.b. Ang, JA1HQG, left Ampil to return to Japan; by the time he left Ang was a well known DXer, as his call was being given as the QSL route for XU1SS.

The vice-president of the Khmer Peoples National Liberation Front, General Dien Del, had his residence next to the administration building in Ampil and often invited the JA operators to his home for lunch. He always took delight in serving cheese and red wine from France; these were brought to the General by old friends visiting him from France. In appearance General Dien Del was very upright, his stance promising a strong and strict attitude. Nevertheless, he was very friendly to the JA group and even extended permission for six YLs to be included in the electronic training.

The students from the Khmer Amateur Radio Club whom I taught were very intelligent and showed a high level of education and dedication. Among them were graduates from technical and administrative schools, and some had higher education degrees at the baccalaureate level. Some of the students had been military officers up to the time of the Khmer Rouge attack in 1975. The usual story of their experiences included having to flee through the jungles to escape when events turned against the government then in power.

The refugee villages usually contained several coalition parties, each with their own army and their own people residing in individual villages. This separation did not keep them from uniting in what they considered a common cause against a common enemy. Many of the refugees were recent arrivals, including small children showing wounds from past battles in Cambodia.

My stay in Ampil ended on August 20th when I had to leave for my return to Japan. By this time some 7000 contacts had been made, including about 800 with the United States and another 800 with European stations.

Just after I left, Hide, JH4RUG, a 6 meter enthusiast, got a run going and worked almost 400 JAs in three days. The rotation continued then and JF1GKF and JL1UXH departed. JA1PCY and JA3UB arrived to take over the operation of XU1SS from August 24th to the 30th.

Hiro, JA1PCY, often a winning contester, found an opening into Europe for a good number of contacts, but could not find good conditions to the States. There was some concern about the lower bands, because of the possibility of interference with commercial traffic. However, it was decided to try 40 meters with a special temporary permit. Using a simple dipole antenna, the frequency chosen was 7015 kHz and the rig was fired up at 1600 local time when the sun was still above the horizon on the 28th and 29th of August.

Back in Japan watching on 40 meters I heard the chirpy, hardly audible signal. I heard JH1GTV call, and XU1SS responded with a 599 report, receiving a 439 report in return. I jumped in with a 539 report—perhaps the signal was easier for me to copy as I was used to it—and received back a 599RST. Other stations came on to jump in, and more were worked on the following day. However, the signal stayed weak, and only about 11 stations were worked on 40 meters. The overall total of QSOs made from Ampil was about 10,000.

Eventually all the JA operators left Kampuchea, but XU1SS and XU1AA have continued to be active. The stations have been coming on around 21296 kHz and 14195 kHz for s.s.b. and about 30 kHz up from the bottom of both bands for c.w. work. They do listen for the States and European stations. Possibly by now they have been heard more frequently on 40 meters as they were planning to work both c.w. and s.s.b. on that band.

In a QSO I had with the XU1SS group a couple of months after they had come on the air, they reported that the student schedule was calling for two hours of English instruction, two hours of c.w. training, and then four hours of operating the station usually from 0900Z to 1400Z each day. On Sundays they were operating from 0200Z to 0500Z and then again from 0700Z to 1400Z. The original plan was to try 40 meters on weekends and at times on weekdays to 1400Z.

At the start of this year there were 20 operators qualified at XU1SS/XU1KC, with some of these in turn serving as instructors to the new groups of students. After my return to Japan I wrote a textbook for advanced radio instruction. It is 34 pages long and written in English. The book is currently being used by the Khmer Amateur Radio Association in the instruction of new classes of students.

The group of XU1SS continues to need support and can use any books that relate to amateur radio and electronics, or any textbooks in the electronics field. They need books for both basic and advanced instruction and are especially interested in books or bulletins on DXing, contesting, awards, or any amateur activity. They can utilize any electronic gear, complete or components, for operating or instructing. Any items should be sent to:

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For the JAs who made the trip to put XU1SS on the air and again make Cambodia heard on the amateur bands, it was an unforgettable experience. The country and the unflagging courage of the people will long be remembered. Perhaps in this instance, as in no other, one comes to realize just what amateur radio and especially DXing can really mean. None of us in the HA group will forget August 1983.

No-79-80

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Technical Terminology Tripe

The short definition *cycles per second (cps)* clearly defined waveshapes that occurred any specific number of times during one second of time. Related terms such as kilocycles (kc/s, thousands of cycles) and megacycles (mc/s, millions of cycles) were easily understood. The cps term was superseded by Hertz with no change in meaning, of course. It is now correct to express frequency only in Hertz (Hz), kilohertz (kHz), megahertz (MHz), and higher prefixed values. It hurts to use Hertz when cycles per second is a better term. The term *Hertz* is used in honor of Heinrich Rudolf Hertz (1857–1894), a German physicist. Since an ungrounded half-wave antenna is a Hertz antenna, it seems we have one Hertz too many in our electronic terminology.

Conductance is the ability of a circuit, conductor, or other device to conduct electron flow. It is the opposite of resistance, which is in opposition to electron drift. The basic unit of resistance is the Ohm, and it is named in honor of German physicist Georg Simon Ohm (1787–1854), the father of Ohm's Law, which is fundamental to electricity and electronics. Since conductance and resistance have opposite effects on current, it was natural to reverse the term for the basic unit of resistance (Ohm) to produce the term for the basic unit of conductance (mho). This is what was done and mho served us well until recently. The simple relationship between these two terms appears to have been too clear to suit the scientific sages; they changed mho to Siemens in honor of the German-born British inventor Sir William Siemens (1823–1883).

The basic unit of electrical current is the ampere. This term honors French physicist Andre Marie Ampere (1775–1836). Since Ohm's Law shows that current equals resistance (R) divided into voltage (E), perhaps the cognizant group will use *RintoE* (R – into – E) to supersede ampere. At least the use of RintoE would remind us of the basic version of Ohm's Law, and it has the same number of letters as Ampere.

The basic unit of voltage (also electromotive force, potential difference, and IR drop) is the volt. This term honors Italian physicist Count Alessandro Volta (1745–1827). If change is wanted for change's sake, push could be adopted to replace volt, since voltage provides the force (push) that causes electrons to move in a closed circuit. What the heck. His name was not Volt anyway; it was Volta. Kilopush and megapush sound nicer than kilovolt and megavolt.

2814 Empire Ave., Burbank, CA 91504

Fourteen-year-old Mike Betz, KA8ROX, who operates from Galion, Ohio, obtained his Novice License in February 1983 after attending a licensing course at a local amateur radio club. His station includes a Heath HW-101 transceiver and a multiband dipole antenna. Mike has contacted amateurs in 42 states and 35 countries, including one aboard a ship sailing off the coast of Portugal. His favorite operating bands are 15 and 40 meters. Mike operated the Novice station that was part of his club's 1983 Field Day contest setup.

The basic unit of inductance is the Henry. This term honors American physicist Joseph Henry (1797–1878). Those of us who enjoy Henry Winkler's excellent acting performances might be agreeable to using Winkler in lieu of Henry, since Henry Winkler is better known to most of us than Joseph Henry. My wife likes Winklers better than Henries; she says Winklers make her think about stars twinkling in the sky. it is not smart to displease one's wife, folks!

The basic unit of capacitance is the Farad. It was named in honor of the English physicist Michael Faraday (1791–1867). We commonly use capacitance values in the micro (millionths) and micro-micro (millionths of millionths, pico) ranges. It seems likely that the term *Mike* would be an acceptable replacement for Farad. In today's world I am sure people would have called him Mike, rather than Michael Faraday. We may as well be friendly to his memory. Since capacitance values are commonly expressed in millionths (or less), terms such as micro-mikes and picomikes would sound nice. Anyway, his name was Faraday (not Farad), and the present term does not honor Mike properly.

Amateurs who contact other amateurs in foreign countries frequently use the Celsius scale when exchanging temperature information. The Celsius temperature scale was solely adopted a few decades ago in honor of Swedish astronomer Anders Celsius (1701–1744), who invented (you guessed it) the centigrade temperature scale. The old name was obviously too easily understood, since the prefix *centi* (100, or hundredth part) clearly applies to a basic 100-part scale, and the suffix grade (step, degree) obviously means that each of the 100 parts is a degree on the centigrade temperature scale. Anders Celsius could have named the temperature scale after himself if he had wanted to. He obviously was a clear thinker who selected a highly suitable name for his temperature scale, which thoughtfully shows the freezing and boiling points of water as zero and 100 degrees, respectively. This descriptive term did well to last two centuries before it was replaced. It must have gone unnoticed.

If you have concluded that I do not consider these past changes to be either beneficial or necessary, you have read this article well. It is time for those of us who use these terms to let our objections be known to those who control them. The heading for this article is "Technical Terminology Tripe." One of the nicer definitions of tripe is that it is something poor, worthless, or offensive. It is my opinion that the continuing changes to technical terminology fit these descriptive terms very well. The term *mho* should be restored since it shows an electrical relationship. Mho also honors George Simon Ohm, since it is the reversal of his last name. If mho will not be reinstated, the last "s" should be deleted from Siemens to make it simpler to use this term in the plural. If Volta and Faraday can be shortened to volt and Farad, certainly Siemens can become Siemen as a basic unit.

If you prefer terms such as cycles per second (c/s) and mho over Hertz and Siemens, take the time to make your performance known. If you do not act, we may end up with my tongue-in-cheek suggested terms of anti-Siemens (ohm), Mike (Farad), push (voltage), RintoE (ampere), and Winkler (Henry). On the other hand, my "suggested" terms may be too sensi-

This picture of Jerry Reimer, KA5QAP, of Houston, Texas, was taken during a three-day hiking trip in Arkansas. He modified a Heath HW-8 low-power transceiver for portable use by adding C-size NiCad batteries and a solar panel to supply electrical input power. He also added an internal speaker, dial lighting, and a standing-wave-radio (s.w.r.) metering circuit board. Jerry uses dipole antennas made of 22-gauge wire when operating in the field. When he is home, he uses 10–40 meter indoor dipoles. Jerry has been interested in amateur radio since he was first exposed to it by a Casper, Wyoming school group about 1969. He obtained his Novice license in January 1983 at age 30. Ronald Frishmuth, W2HQE, has helped Jerry get a good start in amateur radio. Jerry has contacted amateurs in 28 states so far. He is an ARRL and QRP-ARCI member.

ble to be adopted; the sages may produce "better" ones.

There are well-founded jokes about things getting messed up when they are accomplished by committee. This terminology mess is better understood when one realizes that three committees provide inputs to the bureau that oversees such matters. If one committee can produce a certain amount of confusion, it seems reasonable to assume that three committees can produce three times as much confusion. The International Committee on Weights and Measures (CIPM) reports to the General Conference on Weights and Measures (CGPM). The Consultative Committee on Electricity (CCE) and the Consultative Committee on Units (CCU) work closely with the International Bureau of Weights and measures (BIPM). Basically, CCE and CCU help CIPM oversee the work of BIPM. It appears that comments about past and future changes would be redirected to the proper committees if they are sent to:

Dr. Pierre Giacomo
Director, Bureau International des
Poids et Mesures
Pavillon de Breteuil
F-92310 Sevres
France

If you want background information and precise definitions of basic units, you can order a copy of The International System of Units (commonly referred to as SI), which is National Bureau of Standards Publication 330. The 1981 issue of this booklet is available for $3.25 each from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

FCC Publications

The Federal Communications Commission has published several items that are of interest to new and aspiring amateurs. These items are available from the Downtown Copy Center, 1413 K Street NW, Washington, D.C. 20005, where the telephone number is 202-289-4140. The cost is 10 cents per page, plus postage, and the minimum charge is $3.00. If you want to obtain copies of items, you should request exact charges before submitting your order. A few of the more interesting items are listed herein:

Information Bulletins

1 Information Service and Publications (13 pp.)
4 The FCC in Brief (5 pp.)
5 Radio Station and Other Lists (6 pp.)
6 A Short History of Electrical Communication (15 pp.)
7 Private Radio Services (28 pp.)
9 Station Identification and Call Signs (5 pp.)
11 Frequency Allocation (7 pp.)
13 Memo to All Young People Interested in Radio (3 pp.)
14 Letter to a Schoolboy (9 pp.)
15 Field Operations Bureau (4 pp.)
19 International Communications in Amateur Radio (2 pp.)

PR Bulletin 1003— Information About the Amateur Radio Service (4 pp.)

PR Bulletin 1035— Study Guide for the Amateur Radio Operator License Examinations (4 pp.)

Public Notice 3701— Distributors of FCC Press Releases (1 p.)

Public Notice 4736— Specifications Used by FCC for Amateur Radio Morse Code Test Tapes (2 pp.)

FCC Field Office Examination Schedule FO-28 (6 pp.)

QSO Definition

I recently noticed that my *Webster's New Collegiate Dictionary* includes the term *QSO*. The definition is interesting: It shows that QSO represents a Quasi-Stellar Object, which is a quasi-stellar radio source. This is further defined as very distant celestial objects that resemble stars, but emit unusually bright blue and ultraviolet light, plus radio waves.

Ten Meter Novice Band Activity

Those of us who operate in the 10 meter Novice band know that it is presently useless for anything but short-range (ground-wave) contacts most of the time. This condition will continue to worsen as we approach the 1987 sunspot low point. However, I have noticed that this Novice band is sometimes not being used when it is open for coast-to-coast and foreign (DX) contacts. I advise you to tune through the bottom end of the band to obtain a more dependable indication of band condition than what may seem to exist in the Novice band. If you hear code activity in the 28,000–28,040 kHz segment, the 28,100–28,200 kHz Novice 10 meter band is also open. The same system can be used to determine whether or not it is worthwhile to call CQ (general call to all stations) on the 15 meter Novice band (21.1–21.2 MHz).

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an s.a.s.e. if a picture must be returned. A free one-year *CQ* new subscription or renewal is awarded to the amateur whose picture I select as the winner for the month. If you are a subscriber, enclose the mailing label (or copy) from your latest *CQ* issue.

73, Bill, W6DDB

dateline... Washington, D.C.

a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

CQ Presents Exclusive Interview With Robert Foosaner, Chief, Private Radio Bureau

Elsewhere in this issue readers will find a penetrating and candid interview with Robert S. Foosaner, Chief of the FCC bureau responsible for regulating and administrating the Amateur service. In office for less than a year, Foosaner has already faced explosive issues such as the no-code license and the implementation of the Volunteer Examination Program. Among the issues addressed in the interview are the analyses that led to the Commission's rejection of the no-code proposal, the major problems facing amateur radio today, the threats posed to our frequencies by other services, and Foosaner's own perceptions of our service and its operators. To see how we stack up in the eyes of the Chief of the Private Radio Bureau (PRB), don't miss this month's exclusive *CQ* interview with Robert S. Foosaner.

FCC Moves Against Unlicensed Operation

The Field Operations Bureau, working in cooperation with the U.S. Attorney's Office, has closed down an unlicensed amateur station operated by Harold Claypoole, ex-N6BII. Claypoole, whose license had previously been revoked for violations of the Commission's Rules, continued to operate, broadcasting, among other things, recordings he had made of conversations with FCC officials.

As a result of these violations Federal officials moved in on Claypoole while he was on the air, shut down his station, and seized his equipment. The criminal proceedings now underway, said Ray Kowalski of the Special Services Division, PRB, could result in a maximum fine of $10,000 or two years in jail, or both, for Claypoole.

Field Operations Bureau Imposes Forfeitures on Amateurs

Under delegated authority from the Private Radio Bureau (PRB), in the first quarter of FY84, the Field Operations Bureau (FOB) imposed $2150 in forfeitures on operators in the Amateur service. All of the cases involved "willful and repeated violations" of Part 97 of the Commission's Rules. The FOB has had such delegated authority for over a year, and together with the PRB, is moving aggressively to identify and cite violators.

R.F.I. Complaints On The Increase Again

Jeffrey Young, Enforcement Division, FCC, reports that during the first quarter of FY84 (October, November, and December 1983),r.f.i. complaints to the Commission totaled 17,391. This is an increase of 13% from the 15,447 complaints filed during the same period last year, and suggests that r.f.i. problems are once again on the rise.

Of the 17,391 r.f.i. cases reported, 13,650 involved television receivers. Thus, almost 80% of all r.f.i. cases still involve a TV receiver as the victim device, something the FCC is now empowered to address under legislation passed into law late last year.

Amateurs were cited in 1,040 of the r.f.i. complaints filed in the first quarter, with alleged t.v.i. accounting for 689 complaints. Amateur-to-amateur interference was reported in 316 cases, and this breakdown in the self-policing aspect of our service still concerns the Commission.

Finally, CBers were cited in 11,068 r.f.i. complaints during the first quarter. Of these, 10,103 cases involved a TV receiver as the victim device.

Complaints From Amateurs Force Radionavigation Systems Off 420 MHz Band

Radionavigation systems manufactured in France and operated by U.S. companies involved in oil exploration off the west coast of the United States have long been a source of interference to operators using the 420–450 MHz band. And while the devices were to have been operated on a *Secondary* not-to-interfere basis in a band populated by government radiolocation and amateur signals, they made very poor neighbors indeed! So great was the interference, in fact, that a group of southern California amateurs who are experimenting with fast-scan television has finally forced one of the companies operating the noisy radionavigation systems to shut down its operations. Specifically, *The Westlink Report* notes that working in conjunction with the FCC, the amateurs forced Navigation Services, Inc., to remove eight of its systems that were interfering with ham communications.

Meanwhile, reports are circulating that interference of a similar nature is affecting amateur operations in the band 420–450 MHz on the Gulf coast of the U.S. Efforts are underway to resolve the problem as quickly—and as amicably—as possible.

Telephone R.F.I. Concerns Rise

With the break-up of AT&T and the increasing number of manufacturers who are producing telephones for the home, concerns are rising relative to the potential for interference to these devices from nearby radio transmitters. In particular, the ARRL's RFI Task Group is worried about the influx of "cheap" consumer-owned devices which, while they may be purchased at "bargain" prices, offer no immunity from strong r.f. signals. The problem, of course, is not yet at the unmanageable level. Regardless, if you or a neighbor experience telephone interference, you are urged to file a formal complaint with the ARRL and the FCC:

The American Radio Relay League
Attn: RFI Task Group
225 Main Street
Newington, CT 06111

Federal Communications Commission
Attn: Field Operations Bureau
1919 M. St., NW
Washington, DC 20554

It should be noted that under Public Law 97-259, the FCC is empowered to set r.f. immunity standards for telephones and other consumer electronic devices. Unfortunately, the Commission has yet to carry out the will of the Congress by adopting the standards necessary to protect the public.

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FCC Puts Plan In Place To Counter R.F.I. At Olympics

To say that the radio spectrum in the vicinity of the 1984 Olympics will be crowded is an understatement! Signals of all types will flood Los Angeles, from the f.m. voice communications used for coordinating Olympic activities to the video signals transmitted over remote television links. This has everyone concerned. Unintentional interference—especially on the bands used for remote TV transmission—could be significant. But what about intentional interference caused by those who wish to disrupt the activities for political or other reasons?

To counter the expected r.f.i. problem, says *The Westlink Report*, the FCC has agreed to station three monitoring vehicles around the Olympic grounds during the Games. These mobile monitoring stations, together with personnel and equipment to be provided by local broadcasters, will be used to pinpoint an interfering signal source in a matter of seconds so that action can be taken to silence the problem. These monitoring activities, by the way, will operate around the clock.

Early Access To New 18 MHz Band Not In The Cards

According to sources in Washington, access to the new band at 18.068–18.168 MHz is still several years away. While inquiries have been made by the League into the possibility that amateurs be allowed to operate here on a "non-interference" basis, such proposals have been rejected by the U.S. military services, which still use the band. In addition, with the solar cycle now declining towards a minimum, the 18 MHz band is taking on increasing importance as more and more spectrum users are being forced downward in frequency. (Typically, the h.f. spectrum available for worldwide communications during a sunspot minimum is one-half that available during a sunspot maximum.)

While entry into the 18 MHz band may be delayed for some time, declining activity by current users of the 24.890–4.990 MHz band suggests that amateurs may not have to wait long before operation can begin there. Accordingly, it is expected that shortly the ARRL will petition for amateur entry on a non-interference basis.

FCC Clarifies Novice Examination Procedures

In June 1983 the Commission adopted new rules governing the procedures for Novice examinations. Specifically, the new rules eliminated the so-called "mail-back" requirement between the Morse code and technical exams, thereby speeding up the examination process. Under the new rules Novice Examiners are allowed to develop a set of 20 questions from a pool of 200 and to administer the written portion of the test upon successful completion of the code test. Unfortunately, the new rules contained provisions which prevented tests from being administered by persons having an employer-employee or employee-employee relationship with the applicant. These provisions, according to the ARRL, would severely reduce opportunities for prospective Novices to take exams, and so the League filed for partial reconsideration of the Commission's Report and Order In Docket 82-727.

In its response to the League, the Commission noted that under the rules adopted for the Volunteer Examination Program in Docket 83-27—rules which now include the Novice examination procedures—the prohibition of employer-employee and employee-employee relationships was omitted. However, the FCC reiterated that an applicant must not be related to an applicant. This prohibition includes relatives by marriage (e.g., father-in-law, mother-in-law, etc.).

Gettysburg Having Problems With Novice Exam Submissions

According to John Johnston, PRB, FCC, the Commission is now processing Novice license applications at the rate of 2000 per month. Unfortunately, in about 15% of the cases mistakes on the part of volunteer examiners are holding up the li-

censing process. In particular, some examiners are still requesting the written exams once produced by the Commission, when they should instead be using the new procedures specified for developing the written test. Further, many examiners are still sending the actual exam papers back to the Commission; this is not necessary. Finally, some Form 610s are being returned because the examiner did not write in or type a note on the form to the effect that "the applicant did pass both the Morse code and written tests."

Canadian LORAN Off the Air

According to sources in the Commission, the Canadians have terminated their LORAN operations in the 1900–2000 kHz band. This is welcome news to 160 meter operators, who not only have long endured the LORAN noise-like signal, but who also have had to operate under strict power and frequency controls.

With the Canadian stations silenced, the FCC is expected to move quickly to lift the power and frequency limits incorporated in Part 97 of the Rules. Unfortunately, whatever rights are granted to the U.S. amateurs in the 1900–2000 kHz subband may only be temporary. The reason is that with the a.m. broadcast band about to expand into the region 1625–1705 kHz, radiolocation systems now operating here are expected to move into the 1900–2000 kHz subband. Thus, the amateur allocation in the 1900–2000 kHz subband is in jeopardy, with loss of this subband a real possibility.

FCC Expected To Appoint Five Vecs

By the time this is read, the Commission is expected to have appointed up to five regional Volunteer Examination Coordinators (VECs) to administer amateur examinations under the newly implemented Volunteer Examination Program. The five regions are the KL7 district (Alaska); the 2nd, 8th, and 9th U.S. call areas; and the Caribbean area.

According to John Johnston, the number of requests for appointment as a VEC are increasing, with the quality of the submissions on the rise. To apply for VEC status, send your requests to Federal Communications Commission, Private Radio Bureau, Attn: Mr. John Johnston, Chief, Personal Radio Branch, 1919 M St., NW, Washington, DC 20554. Remember that you must propose to be a VEC for an entire region.

ARRL Seeks Qualified Amateurs For New Interference Reporting System

The League's new Interference Reporting System (AIRS) is a revitalization of the former Intruder Watch, whose members for many years protected the amateur bands from harmful intruders. With modulation schemes becoming more and more sophisticated, however, and with the number of harmful interference sources on the rise, the League deemed it necessary to requalify observers for service in AIRS. According to *The ARRL Letter*, therefore, people are being sought with the skills, equipment, and time to provide quality monitoring data. If you think you qualify for this important and demanding job, contact League headquarters in Newington, CT.

AMSAT Seeks Relationships With Universities And Colleges

As part of its continuing program to focus engineering talent on current and future amateur satellite programs, The American Satellite Corporation (AMSAT), according to *Amateur Satellite Report*, "is keenly interested in developing relations with universities and colleges through engineering faculty and students who are licensed amateurs."

"AMSAT," says its General Manager, Bill Lazzaro, N2CF, "views the nation's university and college system as a virtual boundless reservoir of engineering talent searching for worthwhile projects." At West Virginia University, for example, Lazzaro found a group of 50 students and faculty to be particularly interested in the development of digital equipment and propulsion systems for satellites. And at Weber State College in Utah, a group is building a satellite under the guidance of Gill Moore of Thiokol Corporation (this company, among other things, produces the Thiokol kick motors).

If engineering students and faculty at your university or college are interested in working with AMSAT, contact Bill Lazzaro, AMSAT General Manager, P.O. Box 27, Washington, DC 20044, or call Bill at (301) 589-6062.

IEEE Membership Poll Says Engineer Shortage Exists

Whether an engineer shortage actually exists in the U.S. may never be determined to anyone's satisfaction. Some engineers claim that the electronics industry—by crying "shortage"—is just trying to drive up interest in engineering as a vocation. This in turn will assure the industry of an ample supply of engineers far into the future. Other engineers see the claims of a shortage as an excuse by industry to hire alien engineers.

Whatever actually may be the case, a recent survey by the Institute of Electrical and Electronics Engineers (IEEE) shows that a majority (57%) of those members polled believe a shortage does exist. According to *The Institute*, an IEEE publication, "views appeared to differ with age: older engineers tend to believe there is less of a shortage than the one their younger counterparts perceive."

As to the matter of alien engineers, 67% of those responding in the survey approved of alien engineers being allowed to work in the U.S., but only under certain conditions. Most often cited "conditions," said *The Institute*, were that "alien engineers should be employed only in fields where there is a known shortage and that they should not accept wages lower than those paid comparable U.S. engineers."

Commission Expected To Act On PRCS This Summer

The move to implement a Personal Radio Communication Service (PRCS) in the 900 MHz band, a concept originally proposed by General Electric, continues to move through the FCC. According to Ray Kowalski, Chief, Special Services Division, PRB, a decision in the matter of General Docket 83-26 is expected this summer. As envisioned by some, the new service would be assigned two bands: 898–902 and 937–941 MHz. Two bands would be required for split-frequency operation if full-duplex capabilities are to be provided to users. If the Commission approves the creation of a PRCS, amateurs with experience in the set-up and operation of repeaters would be in a position to develop and run such stations as a business for operators in the new service. Moreover, PRCS activity at 900 MHz would be expected to stimulate the production of equipment which presumably could be modified for use by amateurs in the 902–928 MHz region (should the Commission authorize amateur activity here).

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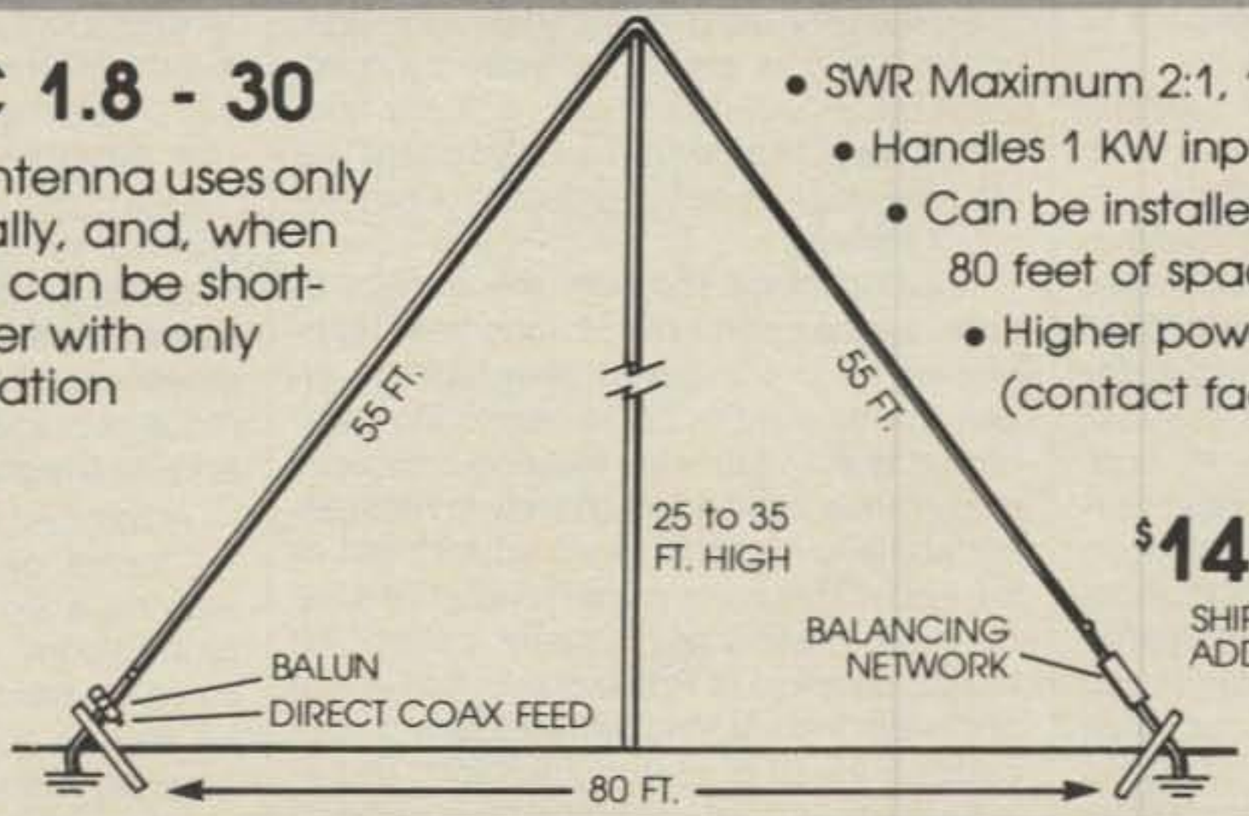

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World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Future Views of Amateur Radio

Although some of us might hesitate to realize or admit it, we are living in a unique era of amateur communications. This present Golden Age of Radio surely will be remembered during future decades as a period which bridges intermediate electronic levels with tomorrow's advanced technologies. Far-fetched thoughts, you say? Not really. Imagine for a few minutes that you're living in the 21st century, and then look back on the concepts of present times. The largest portion of our activities are still dependent on that medium of nature called the *ionosphere.* Home computers, propagaton forecasts, and beacon networks can alert us to possible band openings, etc., while multi-memory rigs and instant band changing allow creditable operating flexibility. Yet with our many "modern" assets, we still might be compared to surfers, riding the waves of ether to communicate over long distances.

Our equipment has generally become more compact, but most of us still are confined to using a dedicated area where we sit in front of our rigs to operate. Handheld talkies have added a notable flexibility, but their overall range is usually limited. We can expect these concepts to be quite different during future times. Such evolution will be rather gradual and hardly noticeable in a step-by-step or day-by-day progression, but a later comparison of two decades worth of changes should prove rather surprising. As a means of clarifying our statements, let's take a brief look at our present work and then expand those concepts to visualize future times.

Most of us will agree that amateur radio today is significantly different from that of a few decades ago. Both operating trends and equipment designs have changed quite noticeably. Streamlined h.f. transceivers with solid-state and broadband circuits allow previously unkown flexibilities in instant-on and no-tuneup operations, while trapped antennas and multi-memory microprocessor-controlled rigs allow us to join the action on various frequencies according to propagation shift and changes. These techniques may seem quite advanced when compared to previous eras, but the Gattlin gun of yesteryear's western frontier fame also seemed the ultimate weapon to its generation's users.

*Eastwood Village No 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

Spark sets were replaced by tube rigs, which are now being replaced by solid-state units. Should not one logically conclude, then, that tomorrow's concept will also be significantly different from today's trends?

Looking back through the annals of time, we can see how various new techniques were pioneered by amateurs either more interested in exploring new horizons than enjoying existing concepts or by those individuals merely investigating some unusual area of activity out of curiosity. This is the prime reason why we continue stating our sincere belief that the Golden Age of Radio is presently alive and well and thriving within today's specialized areas of communication. Therein lie the true frontiers being pioneered by today's gusto amateurs. We should also realize that any specialized area, regardless of its actual merit, is meaningless without useful application by a creditable number of amateurs. Our ranks are thus necessarily (and fortunately) comprised of two interdependent groups: operators and innovators. Each supports the other, and each serves a definite purpose in directing our future evolution.

Looking Ahead

While predicting concepts and trends of future times can prove a mite tricky, it can also be calculated logically and accurately by first comparing techniques and resultant evolution over several past decades. That information is blended with discussions among technical innovators and noted manufacturers, and then finally mixed with a liberal portion of inside information on amateur gear presently being developed for future times. Considering those facts while filling a few open holes with educated visions actually results in a surprisingly clear view of future times. Doesn't that make sense?

OSCAR satellites and the amateur space program will play a major role in communications of future times. Boasting a new freedom from our long taken for granted ionosphere, Phase IV and later satellites will globally link amateurs on a continuously reliable and fully predictable basis. Communication directions will initially be determined by selecting appropriate uplink frequencies, while earth-based uplinking repeaters will open the door to worldwide communications via true shirt-pocket rigs (which are only two or three years down the road at this time). Those v.h.f. talkies, which can easily and inconspicuously be used with a subminiature earphone and boom mike, will probe the ultimate answer for hands-free portable operations.

Operating similar in concept to present-day 10 and 20 meter linked f.m. repeaters, tomorrow's satellite-compatible repeaters will also carry f.m. to s.s.b. mode converters (this conversion technique is being perfected in the European area at the present time).

Advanced data networks and expanded forms of electronic mailboxing will also be a significant part of future communications. Through such message store-forward and retrieve actions we will be able to conduct truly meaningful and ongoing discussions with others during our respective leisure times. Basically, that concept works in the following manner. Let's say that you generate a message of the desired length for some JA or VK friend, and place it in either your rig's or an amateur satellite's electronic mailbox for polling. Later the distant amateur recalls the message and leaves a reply for your later polling and review. Again, these concepts are being pioneered at the present time and on both RTTY and c.w. modes. That's right— you need not be involved with RTTY to enjoy "unattended" operations on our existing h.f. bands. That should kindle some interesting thought among avid DXers. Rig a package consisting of antenna and solar power source with a remote-programmable and home-computer-controlled rig for unattended use from some choice DX location, and then convince some traveler or naval group to zip it ashore during their travels. Why, one could actually fire-up one's own c.w. DXpedition at will with such a setup and monitor the action right from the home station.

Not to be forgotten during future times, our h.f. bands will continue to be popular among those hearty amateurs seriously pursuing our original-heritage communications games of chance and skill. Their h.f. rigs will boast a minimum number of front-panel controls and more roomy layouts, an Americanized version of present imports, and hand-held remote control with 500 or 600 foot range seem appropriate. Since the majority of amateur activity will have shifted to v.h.f., u.h.f., and microwave bands, the h.f. spectrum will be pleasantly clear (the reverse of our present-day situation).

The home computer craze will have passed, with true professional computing

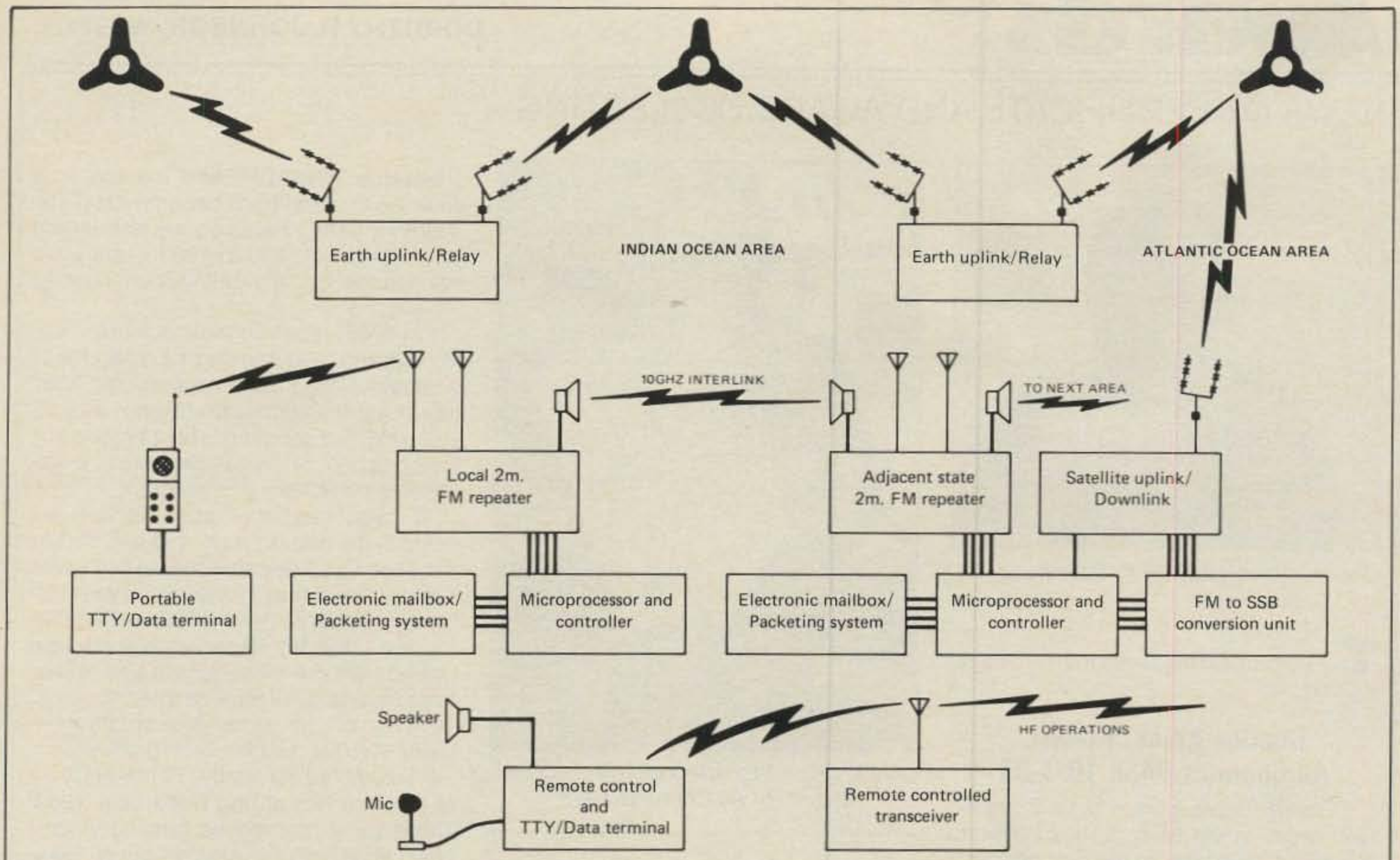


Fig. 1– A glimpse of future amateur communications systems illustrating use of small units for worldwide operations.

systems proving to be more attractive replacements and communicating with large master computers in other areas.

We can expect to see various forms of amateur video make some phenomenal advancements during the future. Following the widespread use of 12 GHz DBS satellites, amateur Fast Scan relaying via conventional (3.7 to 4.2 GHz) satellites may become popular. Ditto for ATV repeaters which will operate within our present u.h.f TV band (a true boost for public relations). Then, too, the upcoming space telescope project (which will include amateur TV capabilities) and long-range plans for an ATV repeater on the moon are both gaining momentum. Holographic video is now only a few years away, and that concept holds substantial promise. Visualize, for example, being able to view any portion of a scene's area right in your own room independent of a camera's view. You would be standing within the scene itself as if you actually were there. Possibly first-generation transporters then will be close to reality. This is not of immediate concern, however, as computer programming time for electronic transportation would surely be excessively expensive.

It's quite possible that later in the 21st century a totally new form of communications may evolve. Such a revolutionary system would not employ any form of electromagnetic radiation, and thus would not be detectable by any of our presently existing types of equipment. At the present time there are several appealing candidates for use in pioneering these areas (such as various isotopic elements and beta forces), but the individual's cost of setting up a suitable experimental laboratory is excessive. Amateur radio itself is thus ensured a long, healthy, and enjoyable future which should extend well beyond our present generation's lifespan.

That's the view as we see it from here, gang, and we hope you share our enthusiasm for those upcoming times. You know, sitting in front of an h.f. setup during the early days in 1984 could really start one wishing for future evolutions. Evening ionospheric conditions dropped like a brick, almost isolating us from the rest of the world. OSCAR 10 wasn't noticeably affected by those doldrums. However, satellite communications are still primarily of a c.w. or s.s.b. nature. Slightly improved h.f. conditions during daylight hours could inspire one's thinking about remote-control systems for lunch-hour activities. Maybe a couple of the wireless Cobra "Walkman Intercoms" could be quick-rigged with a mobile rig. Each unit's VOX would reduce interfacing to mere speaker and mike connections. A simplex autopatch could be used as a 2 meter rig and home h.f. setup for easy talkie access, or a home computer setup for c.w. could operate while one monitors from a distant location. Dreams or reality you ask? That depends on your personal viewpoint and initiative!

73, Dave, K4TWJ

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

Charles Akins, USA-CA All Counties #438.

The story of the month as told by Chuck, KC4WL, is:

Charles Akins, KC4WL
All Counties #438 10-3-83

"Guess I have always been intrigued with radio. In the early thirties I used to slip off and run over to my grandfather's home to listen to all those fascinating sounds coming from his Atwater Kent.

"I built my first radio in the late thirties while attending science class at my old Alma Mater, Cordova High School, in Alabama. This little crystal gem would pick up two stations—both at the same time. I made the galena by melting lead and then adding sulphur to make it crystalize. A fine piece of wire was used as a cats-whisker. An antenna and a pair of Bell headphones completed my radio station. In 1939 I ordered a two-tube Philmore shortwave radio and listened to hams all over the world. I was amazed at the variety of radios and amateur radio equipment available. I dreamed of the day I could afford a good shortwave receiver.

"In 1940 I joined the United States Navy, taking my Philmore radio with me. I learned the Morse code during boot camp and after training was sent to several electronic schools. I was preparing to get my amateur license, but World War II began and I was assigned to an aircraft carrier. Before leaving the U.S. I married my wife, Margie, a home-town girl, and all thoughts of ham radio vanished.

"I was discharged from the Navy in 1946 and returned to Alabama. I began work for the Union Carbide Company and in 1947 accepted a job with the Parks Division, State of Alabama. During this time I ordered all kinds of surplus radio gear from the budding Heath Surplus Company. I built several more radios from this surplus. In 1948 I began work with the United States Government at the Naval Air Station in Jacksonville, Florida. I joined the Naval Reserve, and at night I attended the Jacksonville School of Technology. I started brushing up on my code and then lo and behold my fourth son was born, so once again my radio pursuits were thwarted.

"The Korean conflict came along and I volunteered to go back in the regular Navy. Upon my discharge in 1954 I returned to my position with Uncle Sam. In 1955 I accepted a position with the Marine Corps Supply Center at Albany, Georgia. It was not until 1961 that I decided for the last time to get my ham ticket, so one of my sons and I ordered materials from the ARRL and started to study for our tests. On my birthday, March 21, in 1961, I became WN4AOM, and the son who took the exam with me became KN4VTN. Within a year I received my permanent call, WA4AOM, and in 1981 I upgraded my license, and my call was changed to KC4WL.

"In 1966 I received the shock of my life. My wife and I became the proud parents of a beautiful daughter. Imagine a girl after four boys, the youngest of whom was 16 years old. Our daughter is now 17, a senior in high school, and a semifinalist in the National Merit Scholarship program.

"I might add that after serving six years in the regular Navy and six years in the reserves I decided the service was not my 'cup of tea.' However, 16 years after my discharge from the Naval Reserve I joined the Army Reserves and am now retired from the military. I am also retired from Federal Civil Service after 40 years.

"Two of my sons are amateurs—Larry, K4VTN, and Ricky, WB4BCU.

"I stumbled across the 75 meter County Hunters Net during December 1969. There were no mobiles running when I checked in from Dougherty County, Georgia. I promptly received several calls from stations needing my county, so I was on my way. I checked into the net occasionally for a while, and then on February 18, 1970 a mobile was running a county line in Virginia, so I called him. This was my first contact with a mobile station. You will remember him as Willie, WA4RDV (now N4XE), who has All Counties #37. I sent him a QSL card, and he promptly sent me a sample of a mobile reply card and told me that I had better get some. That same month I ran mobile for the first time.

"I have remained active since my first check-in and have run over 350 counties in the southern states. Perhaps the reason it took me so long to finish all the counties is that I enjoy running counties more than collecting them. I really did not get serious about finishing until I retired three years ago.

"There have been many thrills over the years, but none will compare with the joy of working that last county of them all. On July 2, 1983, Franz, WB6ALC, gave me a call from Kemper County, Mississippi, and the 5/5 report was music to my ears. The ensuing congratulations were an emotional climax to 13 years of a beautiful and rewarding relationship with a wonderful bunch of people.

"I wish to express my appreciation to all the mobiles, the net controls, and others too numerous to mention who make it possible for us to finish. Thanks to those at *CQ* magazine for their devotion to amateur radio—73, Chuck, KC4WL."

Chuck, KC4WL, proudly displays his award for All Counties #438.

KC4WL almost into Clay County, Georgia.

333 South Lincoln Ave., Mundelein, IL 60060

Special Honor Roll
All Counties

#455 Karl M. Steele, KB3SN 1-5-84
#456 Dr. Richard Tornatore, KA2K 1-7-84
#457 Richard F. Torrey, AI1Q 1-7-84
#458 Claude B. "Moe" Dreher, KB5DM 1-9-84
#459 Leo A. Brown, Jr., W0BXM 1-12-84
#460 D. Vernon Harrah, W7EFO 1-13-84
#461 Dixie Johnson, WD9ITF 1-16-84

Awards Issued

Karl Steele, KB3SN, finished them all before he applied for the award and claimed All Counties #455, All 20 Meters, All Mobile, S.S.B., 1-5-84.

Dr. Richard Tornatore, KA2K, got his last 76 confirmations and qualified for All Counties #456 Mixed, 1-7-84.

Richard F. Torrey, AI1Q, did all his paperwork and received All Counties #457 Mixed, 1-7-84.

"Moe" Dreher, KB5DM, took time from acting as NCS on the County Hunters Net and running counties in Arkansas to finish his own paperwork and was issued All Counties #458 Mixed, 1-9-84.

Leo Brown, Jr., W0BXM, claimed All Counties #459, All 20 Meters, All Mobile, S.S.B., 1-12-84. Leo won his first USA-CA Award in 1965 when he was operating as KZ5BX.

D. Vernon Harrah, W7EFO, worked all the counties with mobile stations and won All Counties #460, All Mobile, S.S.B., 1-13-84.

Dixie Johnson, WD9ITF, left the snowmobile and motorcycle trails long enough to send for All Counties #461 Mixed, 1-16-84. Dixie's husband, Ken, K9DZG, has All Counties #218, 3-19-79.

Bob Disbrow, WB2ZSO, added USA-CA 2500 #550 and USA-CA 3000 #490 Mixed to his fine collection.

Eugene Kowalewski, W1TEE, added USA-CA 3000 #491 Mixed to his collection.

Ellis Evans, GW3CDH, had me send him the seal for USA-CA 2000 #603 and USA-CA 2500 #551 All S.S.B. These awards are both #2 to Wales. Ellis and his wife, Jean, are enjoying retirement now and plan to visit the County Hunters Convention in 1985.

USA-CA Honor Roll

3000		KB5DM	599	W0BXM	822
KB3SN	484	W0BXM	600	W7EFO	823
AI1Q	485	W7EFO	601	AL7O	824
KB5DM	486	WD9ITF	602	WD9ITF	825
W0BXM	487	GW3CDH	603	WB0ZEZ	826
W7EFO	488	WB8JYX	604	WB8JYX	827
WD9ITF	489				
WB2ZSO	490			500	
W1TEE	491	1500		KA5W	1906
		KB3SN	666	WA2JHD	1907
		AI1Q	667	KB3SN	1908
2500		KB5DM	668	AI1Q	1909
KB3SN	544	JA1SGX	669	KB5DM	1910
AI1Q	545	W0BXM	670	JA1SGX	1911
KB5DM	546	W7EFO	671	VE1BBW	1912
W0BXM	547	WD9ITF	672	W7EFO	1913
W7EFO	548	WB0ZEZ	673	AL7O	1914
WD9ITF	549	WB8JYX	674	JA2DXD	1915
WB2ZSO	550			WD9ITF	1916
GW3CDH	551			KA6PPQ	1917
		1000		WB0ZEZ	1918
		KB3SN	818	DL8UI	1919
2000		AI1Q	819	KC9P	1920
KB3SN	597	KB5DM	820	VE1AIT	1921
AI1Q	598	JA1SGX	821	WB8JYX	1922

Ben, DL8UI, working at his station in Witzenhausen, West Germany.

Luigi, I2KKL, showing his fine collection of awards at his station in Mantova, Italy.

Don Ferris, WB8JYX, claimed USA-CA 500 through USA-CA 2000 #604 Mixed.

Ronald Lutz, WB0ZEZ, added two seals to his certificate. Ron was awarded USA-CA 1500 #673 and USA-CA 1000 #826.

Row Kase, JA1SGX, claimed USA-CA 500 #1911 and USA-CA 1000 #821, All 10 Meter S.S.B.

Richard Henry, AL7O, received USA-CA 500 #1914 and USA-CA 1000 #824, All 20 Meter Mobile.

USA-CA 500 Awards were issued as follows:

Joe Rubenstein, KA5W, #1906 Mixed, 1-1-84.

Bill Greene, WA2JHD, #1907 Mixed, 1-1-84.

Karl M. Steele, KB3SN, #1908 20 meter, Mobile, S.S.B., 1-5-84.

Richard F. Torrey, AI1Q, #1909 Mixed, 1-7-84.

"Moe" Dreher, KB5DM, #1910 Mixed, 1-9-84.

Row Kase, JA1SGX, #1911 All 10 Meter S.S.B., 1-10-84.

Dave Harrison, VE1BBW, #1912 Mixed, 1-11-84.

D. Vernon Harrah, W7EFO, #1913 All Mobile, S.S.B., 1-13-84.

Richard Henry, AL7O, #1914 All 20 Meter S.S.B., 1-15-84.

Mitsuzi Suzuki, JA2DXD, #1915 Mixed, 1-16-84.

Dixie Johnson, WD9ITF, #1916 Mixed, 1-16-84.

Hall B. Baker, KA6PPQ, #1917 All 2×C.W., 1-20-84.

Ronald J. Lutz, WB0ZEZ, #1918 Mixed, 1-21-84.

Bernd Nasner, DL8UI, #1919 Mixed Band, All S.S.B.

Raymond Hassler, KC9P, #1920 Mixed Band, S.S.B.

G.L. "Lin" Titus, VE1AIT, #1921 Mixed, 1-30-84.

Don Ferris, WB8JYX, #1922 Mixed, 1-30-84.

New Awards

Balearic Islands Awards Program. Following are the general rules for this awards program:

1. Balearic Islands awards will be issued to amateur stations and s.w.l.'s.

2. Each claim must be accompanied by a QSL card list furnished with the callsigns of stations worked, and dates, bands, and modes of the contacts.

3. Each list must be accompanied by a statement from the applicant's national society or from any two amateurs other than the applicant that the QSL cards of the contacts listed are in the possession of the applicant.

4. A fee of 10 IRC's will be charged for each award.

5. All correspondence should be sent to: URE, Delegacion Regional, P.O. Box 34, Palma Mallorca, Balearic Islands, Spain.

Awards issued and requirements:

CWEA6—May be claimed for having contacted (heard) and received QSL cards from 6 amateur stations located in Balearic Islands (EA or EA6).

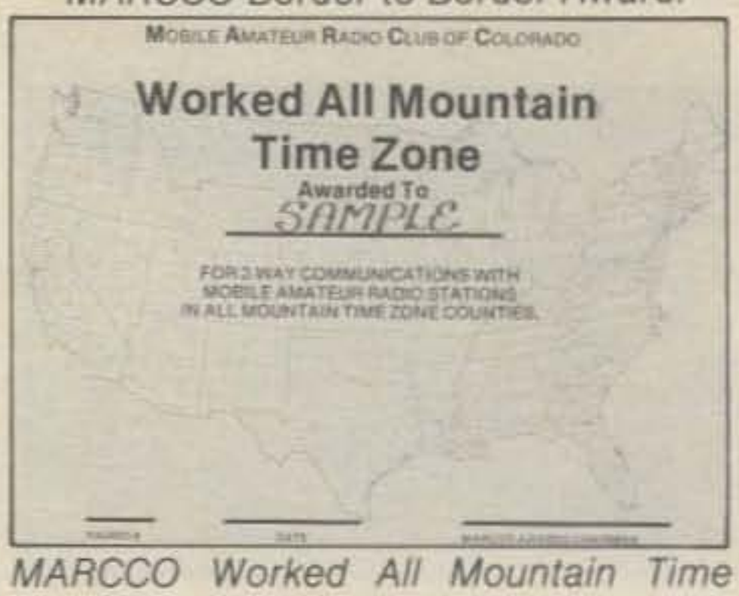
Three Islands—May be claimed for having contacted (heard) and confirmed: 5 amateur stations located in Mallorca Islands; 1 amateur station located in Menorca Island; 1 amateur radio station located in Ibiza or Formentera Island. Mode: s.s.b., c.w., RTTY.

Balearic Islands—May be claimed for having contacted (heard) and confirmed 15 amateur stations on 2 bands or 20 amateur stations on 3 or more bands. Mode: s.s.b., c.w., RTTY.

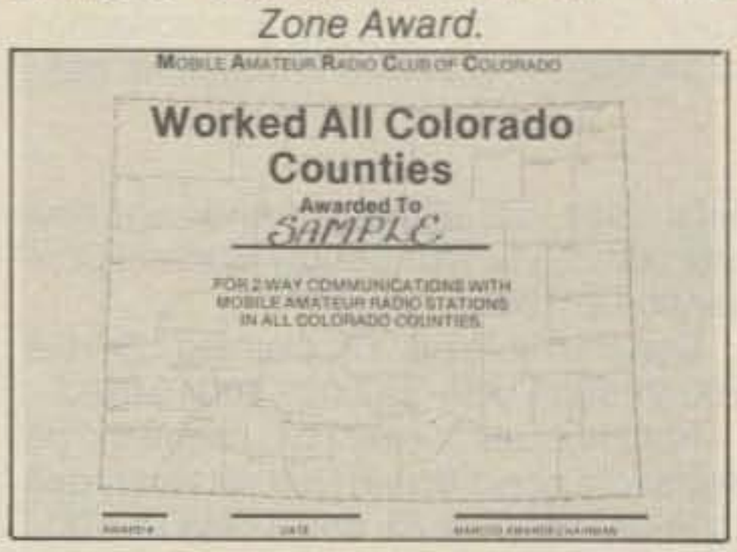
Nortown Amateur Radio Club. VE3NAR is the sponsor of two long established and internationally famous awards: WAVE, "Worked All VE," and WACAN, "Worked All Canada." Rules are listed below. A sworn affidavit, certified by a president or vice-president of a legitimate amateur organization or a commissioner for taking affidavits, should be submitted in lieu of QSL cards. A photocopy of QSL cards is also acceptable. Under no circumstances should actual QSL cards be sent.

Rules for WAVE Award. Produce confirmation to verify QSOs with 2 different stations on different bands in each of the following 8 sections: Prince Edward Island VE1 or Nova Scotia VE1 or New Brunswick VE1 (2 contacts only), Quebec VE2, Ontario VE3, Manitoba VE4, Saskatchewan VE5, Alberta VE6, British Columbia VE7, Yukon or Northwest Territories VY1 or VE8. All contacts must be

MARCCO Border-to-Border Award.



MARCCO Worked All Mountain Time Zone Award.



MARCCO Worked All Colorado Counties Award.

made from an area within a radius of 200 km of one point and after January 1, 1939. Submit proof of 16 contacts with $3.00 or 5 IRC's.

Rules for the WACAN Award. Produce confirmation to verify QSOs with 2 stations on different bands in each of the following 12 sections: Prince Edward Island VE1, Nova Scotia VE1, New Brunswick VE1, Quebec VE2, Ontario VE3, Manitoba VE4, Saskatchewan VE5, Alberta VE6, British Columbia VE7, Yukon or Northwest Territories VY1 or VE8, Laborador VO2, Newfoundland VO1. All contacts must be made from an area within a radius of 200 km of one point and after January 1, 1939. VO contacts must be made after March 31, 1949. Submit proof of the 24 contacts with $3.00 or 5 IRC's. Proof of contacts submitted for WACAN will automatically be applied towards the WAVE award. (If the WAVE Award is desired, please indicate as such.)

Rules of WACAN Award (for holders of WAVE Award). Produce confirmation to verify QSOs with 2 stations on different bands in the remaining 4 sections: Laborador VO2, Newfoundland VO1, and the two remaining VE1 provinces not submitted for WAVE Award. Submit proof of the 8 contacts, WAVE Award number, and $3.00 or 5 IRC's. (Please note price increase for the WACAN Awards.)

Mobile Amateur Radio Club of Colorado (MARCCO) Awards. The basic MARCCO rules are as follows:

A. All contacts must be made on or after January 1, 1981, except for the W0GV Memorial Award Endorsement. All contacts made with W0GV will count no matter what the date of contact.

B. Only contacts made with mobile stations qualify.

C. Any bands, 10–160, and all modes qualify.

D. Log information must be supplied. Logs must include date, call, and county worked. Your name, address, and call must appear on all info sent in.

E. A fee of $2.00 is required for each award and must accompany the application. Endorsements are $1.00 each. Please make all checks or money orders payable to MARCCO.

MARCCO Awards and Endorsements:

Border-to-Border: Work an unbroken string of counties from Canada to Mexico. At least three of the string must be in Colorado.

Coast-to-Coast: Work an unbroken string of counties from the Pacific Ocean to the Atlantic Ocean. At least three of the string must be in Colorado.

Worked All Mountain Time Zone (WAMTZ): Work all counties lying wholly or partially in the Mountain Time Zone.

Worked All Colorado Counties (WACCO): Any mobiles count.

W0GV Memorial Award (endorsement seal to WACCO Award): Work all Colorado counties with a single mobile. All contacts made with W0GV may be counted, no matter what the date worked, and combined with any other single mobile, providing the other mobile contacts are after July 2, 1981.

Send requests for information and award applications to: Bill Miller, KC0VB, 3316 S. Clarkson, Englewood, CO 80110.

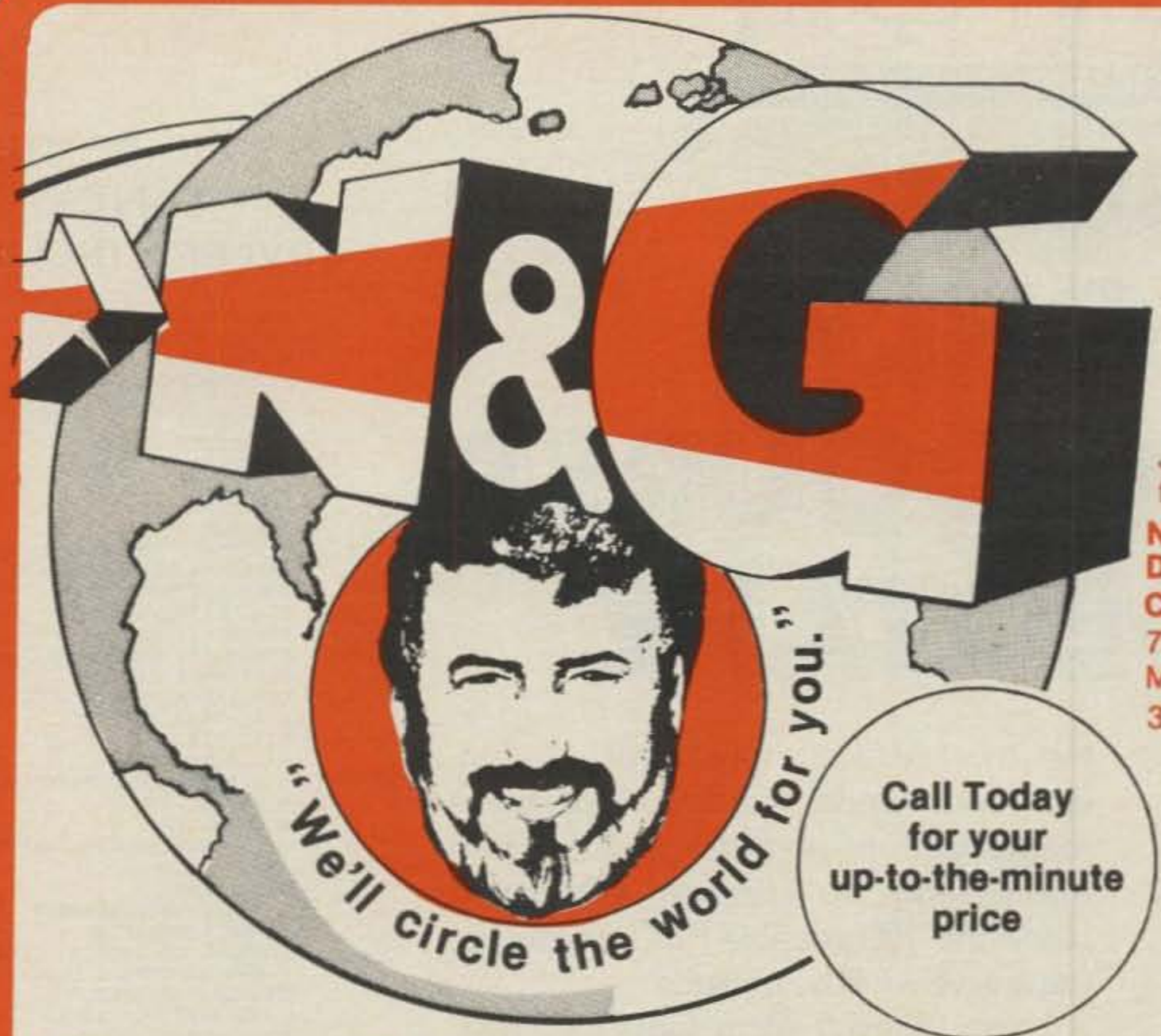
Notes

In October 1983 we published a list of the Life Members of the Virgilian DX Group. The complete and correct list of Life Members is I2YKV, I2CXI, I2KUW, I2YJO, and I2UQT. Thanks to Umberto, I2KUW, for the correction.

A new *County Hunters' Handbook* and *County Hunters' Directory* are available. Send an s.a.s.e. to B & B Shop, 1348 Pinewood Drive, Woodbury, MN 55125, for further information.

A group from the YL-ISSB System has organized an operation from Missouri's highest point, Taum Sauk Mountain in Iron County, from 0001Z to 2359Z May 19–20. You will find W0TT, W0TA, NA0V, and K0RDJ on 7285, 14285, and 21385, plus or minus a few kHz. Send your QSL cards to: Rick Connolly, K0RDJ, Star Route #1, Crocker, MO 65452.

73, Dorothy, WB9RCY



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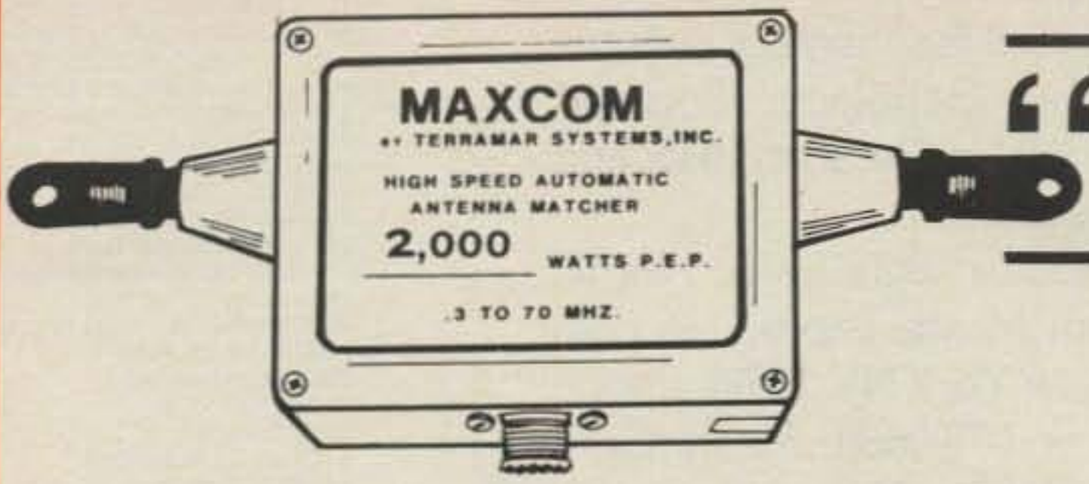

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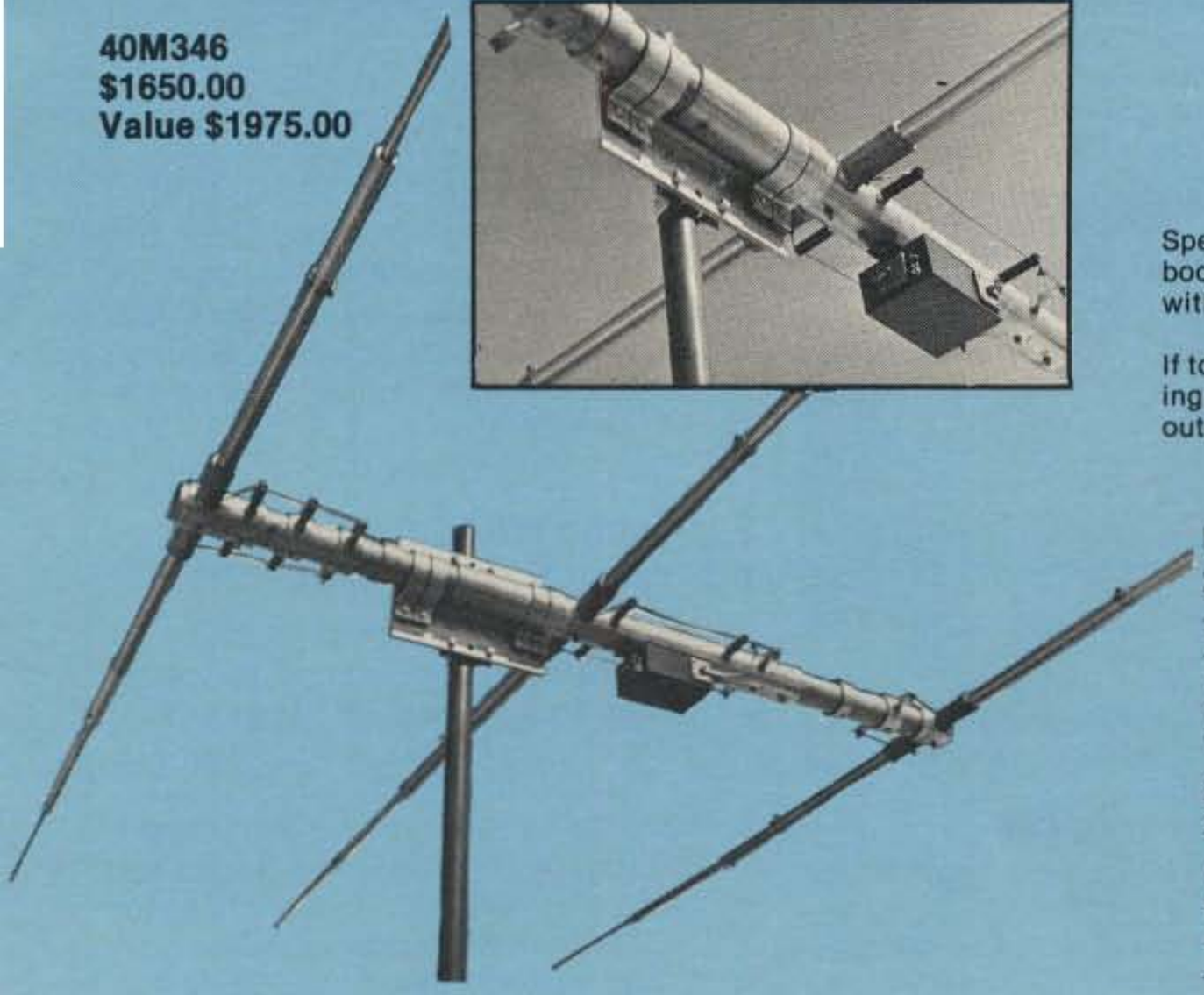

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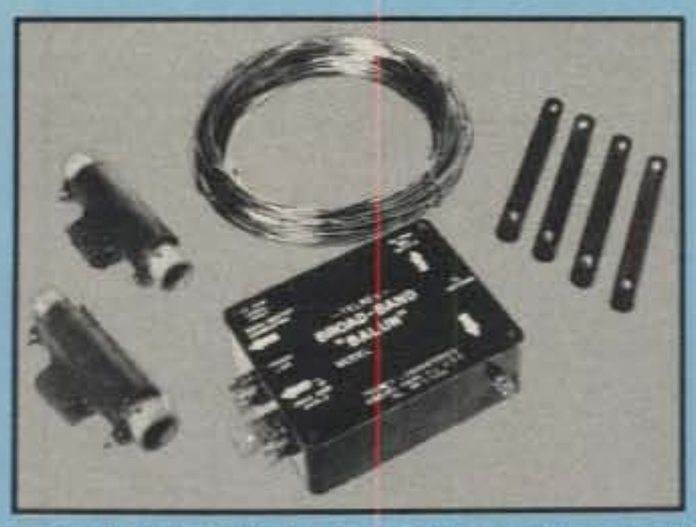

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15M845	15 Meter 8 element	(15 DBD)	1120.00	**925.00**
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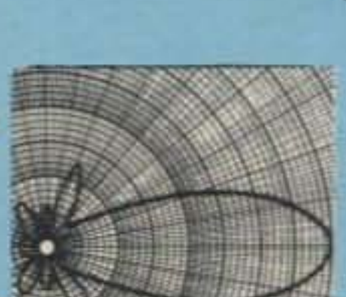

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The model B-240 (one-phase, 120/240 volt for residence and small business) sells for $249.95, while the model Y-208 (three-phase, four-wire, 120/240 volt) sells for $359.95, both plus $4.00 shipping and handling. For more information, contact Electrical Surge Protection, Inc., P.O. Box 2349, Palm Court, FL 32037, or circle number 101 on the reader service card.

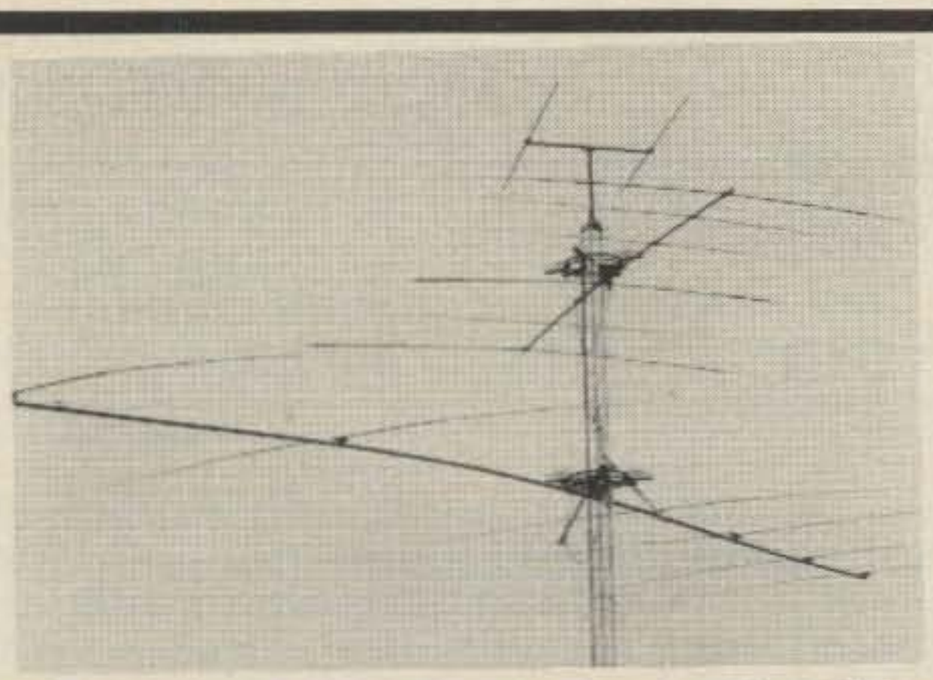
Communications Specialists Digital Readout Universal Tone Encoder

Communications Specialists has introduced the TE-64D, a new version of their TE-64 universal encoder. The TE-64D encoder offers a digital LED display which indicates a two-digit code for each of the 32 subaudible and 32 audible tone frequencies. Frequency selection is made by turning a rotary knob on the front panel. The two-digit code is cross-referenced to the tone frequency on a chart located on the face-plate. The TE-64D is well suited for whenever high visibility readout is required. It operates on 6–16 v.d.c. and measures 5.25" x 3.3" x 1.7". Frequency accuracy is ±.1 Hz on the group A tones (subaudible) and ± 1 Hz on the group B tones (audible).

The TE-64D is priced at $129.90. The digital display portion of the TE-64D is available as an add-on option for existing TE-64s. Price for the add-on kit is $49.95. The add-on kit can be installed at the factory at no additional charge. For more information, contact Communications Specialist, Inc., 426 West Taft Ave., Orange, CA 92665, or circle number 104 on the reader service card.

Fox Tango WARC Bands Kit For Yaesu FT-101 Series

Fox Tango Corporation has announced a new kit which provides receive/transmit capability on all three WARC bands for all models of the FT-101 except the ZD. While only the 10 MHz band has been authorized for use to date, not much additional effort or expense is required to add all the bands while the circuit changes for the 10 MHz are being made. Based on a tried and tested design by G3LLL, the WARC bands kit is complete with all needed crystals, relay, switch, and detailed instructions for moderately easy installation. Price of the FT-101 WARC Band Kit #4N is $25 plus $3 shipping and handling. For more information contact Fox Tango Corp., Box 15944C, West Palm Beach, FL 33416, or circle number 102 on the reader service card.



— Yes, that's a six element 20m monobander with a 57' boom.

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— Eliminates inaccessable and top heavy arrays while allowing a maximum utilization of the entire tower structure for antenna mounting locations.

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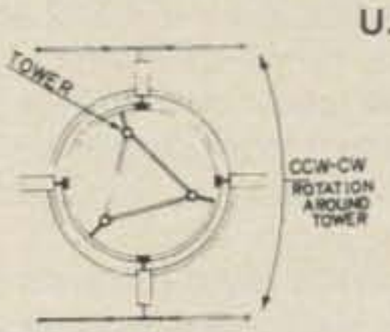

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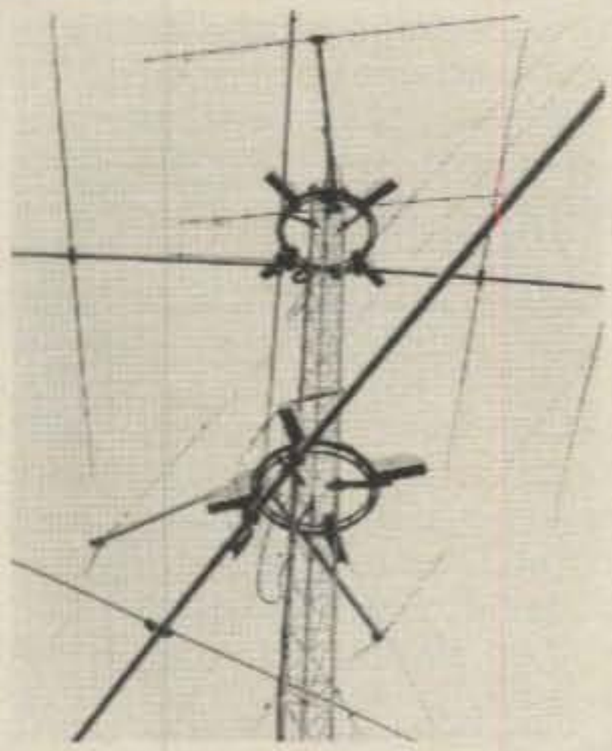

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CIRCLE 37 ON READER SERVICE CARD

Antennas

a monthly feature by
KARL T. THURBER, JR., W8FX

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

The First Four

Last month in CQ columnist W8FX discussed several interesting propagation and software topics. This month he steps back to "smell the roses" of four years as CQ Antennas columnist. We think that you'll find his summary interesting and informative.

In last month's Antennas column we looked at the fact that once one has installed a beam antenna, the twin questions of "when" and "where" to aim it come to fore. To help answer these questions we focused on several new commercial propagation prediction programs, including the "MUFPLOT," "DX-PREDICTOR," and "PROCAST/VICCAST." We also examined a variety of useful hamshack software from several firms.

This month in the Antennas column we will begin a review of the progress of the column over the last four years under our stewardship, listing the highlights of the first two years, 1980 and 1981, in this issue. Next month we will continue with information on 1982 and 1983 columns. We believe that you will find this two-part review both interesting and instructive.

Foreword

Aside from the fact that it's interesting for us to review the column's progress, we undertake this project with a constructive purpose in mind. I regularly receive mail from readers seeking advice and help. Typically, I answer these letters with a brief explanation, often with reference to previous columns. By gathering and sorting out previous columns here, we should be able to provide a baseline of background material for reader reference.

As we have pointed out previously in the column, we make an effort to answer all reader mail (except for the few "crank" letters which all columnists receive). We do ask that questions be as specific and discrete as possible. For obvious reasons, it's not possible or practical for us to offer comprehensive technical advice, or to present complex, custom designs for antenna systems. Writing to our home address, rather than to the magazine's editorial offices, will help speed your reply. S.a.s.e.'s or IRCs are appreciated, as we, not *CQ*, pay the postage bill in answering reader mail.

If you missed the topics presented this month and next, and don't have the appropriate back issues, there are several ways to obtain the needed columns. Many amateur clubs maintain a back-issue file, and a large number of public and university libraries save past issues of *CQ*. Failing these free sources, you can obtain back copies of most *CQ* issues or reprints of the column for $2.00 each directly from the magazine's editorial offices. Requests should be addressed to *CQ* at 76 N. Broadway, Hicksville, NY 11801.

As a last resort, we can provide copies of past Antennas columns and other *CQ* articles which we authored. Figure about $1.25 per column to cover the cost of copying and postage, and write directly to me at 317 Poplar Drive, Milbrook, AL 36054.

317 Poplar Drive, Millbrook, AL 36054

1980: The First Year

In late 1979, *CQ* was sold by Cowan Publishing Company to members of the editorial and business staff. The sale ushered in a number of major changes to the magazine. An incidental change was the departure of the long-time Antennas columnist, Bill Orr, W6SAI, who joined the staff of *Ham Radio* as a contributing editor. Bill's departure left a void on the magazines's staff, which Alan Dorhoffer, K2EEK, *CQ*'s Editor, asked me to fill, my having done several articles for the "old" *CQ* and its then sister publication, *Modern Electronics*. I began production of the Antennas column in November 1979, and my first column appeared in the March 1980 issue. Needless to say, how time flies!

Actually, the first W8FX article that appeared in the "new" *CQ* was not an Antennas column article. Instead, it was a tutorial on transmatches/antenna-coupler design and techniques. This article was "Matching Your Way to DX: A Look at the Transmatch," which appeared in February 1980 (the article was too lengthy to fit in as a regular column piece).

Most of the columns in 1980 and 1981, and for that matter to date, have been tutorial in nature, being aimed at the beginner or middle-of-the-roader who is more interested in the practical side of things than in the strictly technical aspects of hamming. We decided to keep the first few columns as simple and straightforward as possible. Thus, our first two columns, which appeared in the March and April 1980 issues, kicked off the Antennas column by providing some very basic facts on antennas and transmission lines, as well as a glossary of several dozen of the more important terms relating to antenna topics.

In these two initial columns we also dished out a little bit of our philosophy to be: that of trying to clear away garbled facts, half-truths, and superstitions to steer a "common sense," middle-ground approach to amateur antenna design, construction, and use. We indicated that future columns would try to cater to the widest possible range of interests and would place particular emphasis on the beginner's needs. Hopefully, we've kept to that early philosophy as we round the four-year mark.

Wishing to solidly lay the baseline for future columns, we continued in the May and June 1980 issues with a plain-language summary of some 50-odd common-sense gems of "antenna wisdom" collected over 25-plus years of hamming—nothing revolutionary here, but lots of solid pointers that the beginner, especially, would be able to use. Various antenna "facts" and rules-of-thumb were presented along lines such as simple h.f. antennas, rotary beams, v.h.f. arrays, and transmission lines.

"The Dependable, Ubiquitous Dipole" appeared as a two-part tutorial feature of the column in July and August 1980. In this series we discussed simple doublets, harmonically related and multiple dipoles, folded dipoles, Vees and "slopers" of various descriptions, double and extended double Zepps, and dipoles operated in the vertical plane. Also covered were installation, tweaking, tuning, and troubleshooting.

Demanding equal time in the next few issues were h.f. vertical antennas. The September, October, and November 1981 issues discussed verticals from A to Z. Included were basics on horizontal vs. vertical antenna polarization; vertical antenna theory and design configurations; regular, parallel, and folded ground-plane antennas; shortened and loaded verticals; and multiband antennas of several types. The September column also featured the first "Antenna of the Month" box in which we described the Hy-Gain 18HT multiband h.f. vertical. This feature has become a regular part of the column

and appears frequently, space permitting.

It was back for a postscript on dipoles in the December 1980 issue, with "More on Dipoles: Multiband Antennas with Tuned Feeders." This column highlighted the fact that coaxial cable isn't sacred as a transmission line, and that there's a great deal to be said for parallel feed when it comes to easily constructed and inexpensive h.f. multiband antennas. Both centerfed and end-fed Zepps were described. The December column closed out the year by featuring as the "Antenna of the Month" the popular Slinky Dipole.

1981: Year Number Two

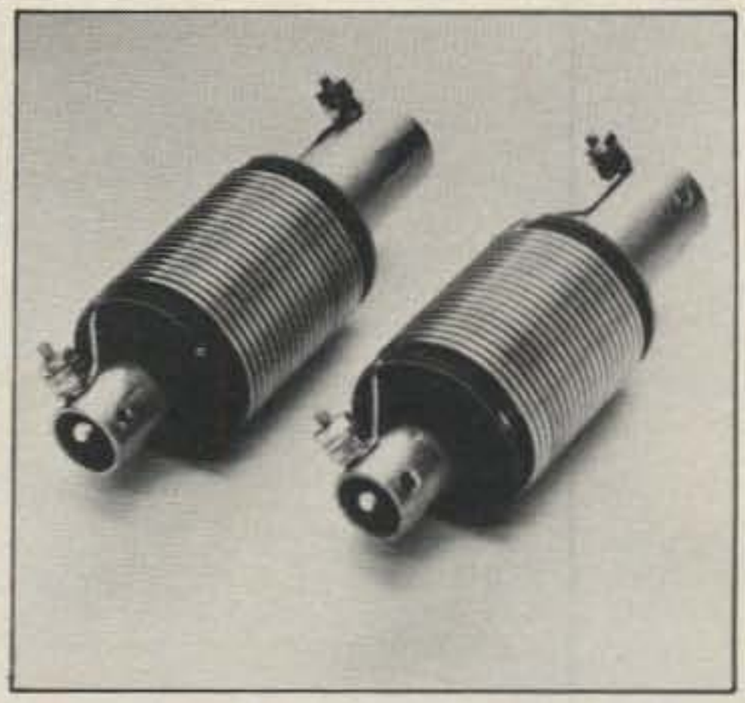
"The Windom and Its Close Cousins" ushered in the new year in the January 1981 issue. Here we provided an update on two old-time versions of the off-centerfed Hertz or Windom antennas of 1930s and 1940s vintage. The column illustrated various flattop dimensions and feeding techniques, showing that there is indeed room for the Windom and its close relatives in today's antenna picture.

February and March 1981 saw a two-part series of trap dipoles in the column. Pointing to the trap dipole's extreme popularity, the article discussed the pioneering trap development by Howard K. Morgan in the 1940s, and Chester Buchanan, W3DZZ, in the mid-1950s. Topics covered included a discussion of the trap's principles of operation, feeding techniques, and trap adjustment and tuning. The March "Antenna of the Month" feature showed a departure from our practice of describing a popular commercial antenna. Instead, we featured the massive low-frequency antennas used at the National Bureau of Standards (NBS) site near Fort Collins, Colorado. These unusual antennas were used for v.l.f. station WWVL and l.f. station WWVB, which broadcast special-purpose time and frequency information on 20 and 60 kHz, respectively.

Longwires were featured in another two-part tutorial which appeared in the April and May issues. After first clarifying just what a longwire antenna is (true longwire is one at least several wavelengths long), we went on to discuss topics such as singlewires; randomwires; end-, center-, and unsymmetrically-fed radiators; v.h.f. longwires; and specialized matching and feeding techniques. In the May issue we highlighted as the "Antenna of the Month" the unusual and even controversial "Little Giant" beam antennas. These highly compressed, miniature arrays for 80 through 10 meters were offered for many years by Stan Byquist, K8VRM, through his Little Giant Antenna Laboratories of Vaughnsville, Ohio.

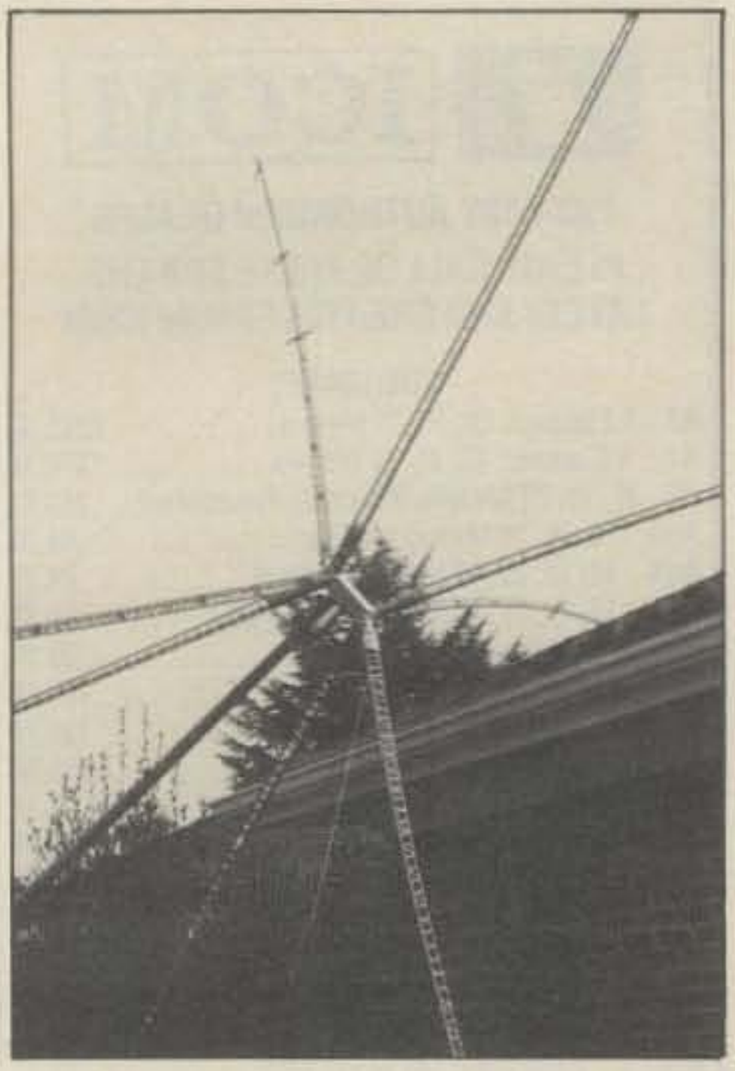
Turning to the needs of the s.w.l., "Antennas for the Listener" was a three-part series which appeared in the June through August issues. While at the time it seemed to be a radical departure to feature s.w.l. antennas on the pages of *CQ*, reader response to the series was excellent and made us realize that, after all, receiving is half of the two-way communications equation, and also many longtime amateurs are also s.w.l.'s at heart! The success of sister publication *Popular Communications* confirms the wisdom of covering listener-oriented subjects in *CQ*.

The "Listener" series began by covering common randomwires, verticals, and dipoles on the shortwave bands; traps for listening; receiving loops; space-saving antenna designs; and tuning devices. Featured in the July issue was the Datong

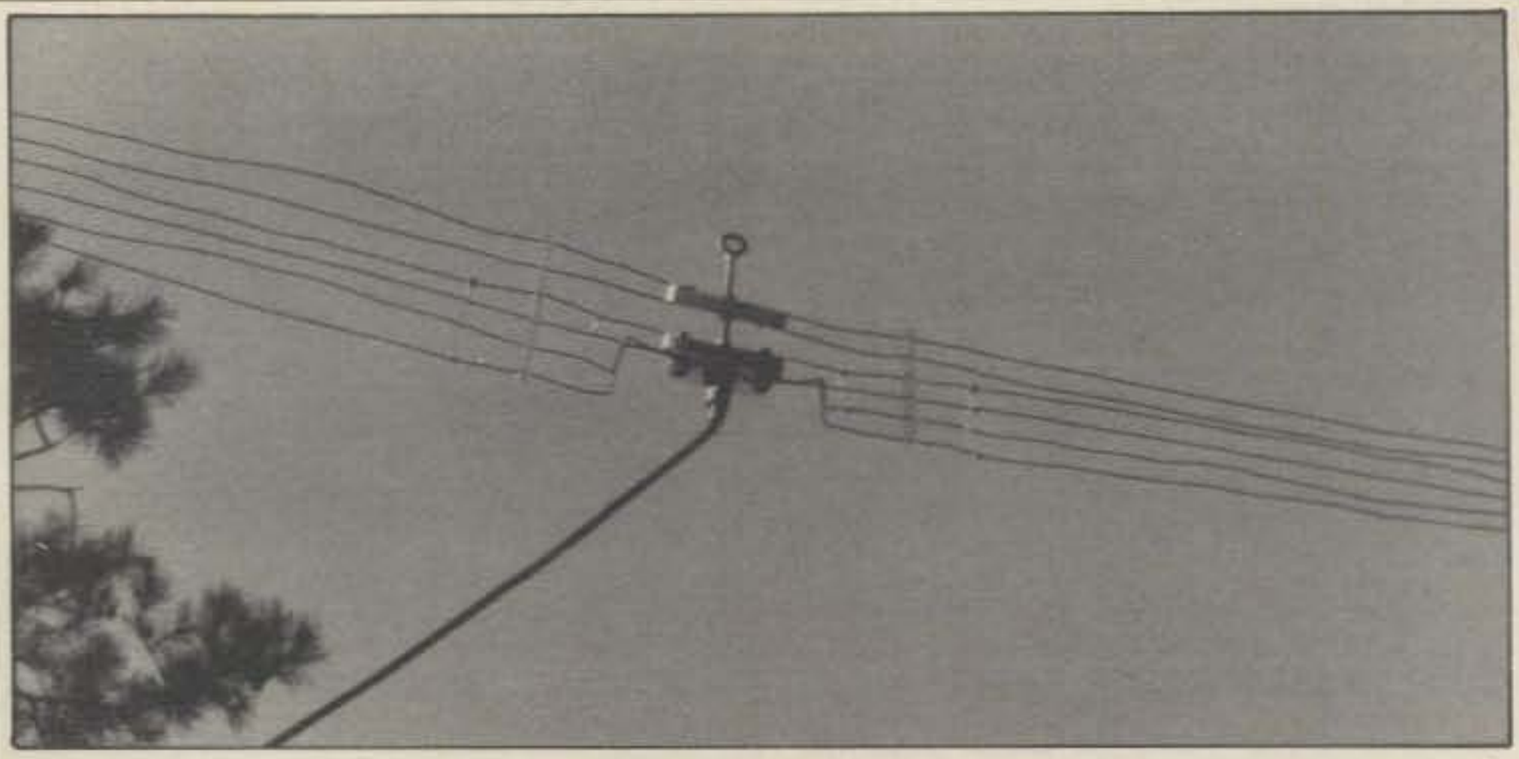


Trap antennas of various kinds formed the subject matter for the February and March 1981 Antennas columns. Shown here are a set of Reyco dipole antenna traps to enable multiband operation with a single flattop. (Photo Unadilla/Reyco)

The "Antenna of the Month" feature for May 1981 centered on the controversial "Little Giant" beam antennas offered by Stan Byquist, K8VRM, through his Little Giant Antenna Labs of Vaughnsville, Ohio. In this photo the inventor stands next to several of his interesting antennas. At least three versions are available for operation on various bands from 80 through 10 meters.



The Canadian-produced, two-element Gem-Quad was reviewed in an article which appeared in the July 1981 CQ. The antenna is shown here just prior to its being raised into position. (W8FX photo)



The Mor-Gain "half-size" h.f. multiband dipole was described in the "Antenna of the Month" feature for December 1981. The five-band antenna shown here is still installed at the author's QTH. It is 66 feet long and is fed directly with 75 ohm coax. (W8FX photo)

AD-170 Active Antenna, followed by the Palomar Engineers Amplified Loop Antenna in the August issue.

Outside the framework of the Antennas column, in the July issue we reviewed the popular, Canadian-produced Gem-Quad, which appeared as a separate article beginning on p. 58. The article described construction, erection, tuning, and operation of the three-band boomless quad, along with some general background information on quads.

Piggybacking on the Gem-Quad review was a long, three-part article on quads. This series, conducted separately from the monthly column, appeared in the August and December issues as "A Primer: The Cubical Quad Antenna," Parts I and II, respectively. Part III appeared later, in the April 1982 issue. The article covered topics such as the historical origins of the quad; loops; two-and multiple-element quads; and Yagis versus Quads. Also discussed were miniquads; "Quagi's"; expanded and delta designs; feeding and matching; tuneup; v.h.f. and u.h.f. operation; and other quad topics.

A followup to the Listener series of columns was the September 1981 column, "Improved Receiver Performance." In this column we discussed devices such as receiving antenna tuners, preamplifiers, and preselectors. A sidelight feature of this issue was a presentation of various "do's and don'ts" relating to antenna safety—applicable equally to amateurs, s.w.l.'s, CBers, and scanner buffs.

The last three months of 1981's Antennas columns were devoted to scanners and scanner antennas. This series of three articles, which appeared in the October through December issues, provided a wide range of information for the scanner enthusiast. In the October issue the major spectrum portions dealing with scanner activities were described on a band-by-band basis, as were basic and advanced v.h.f. and u.h.f. monitor receivers. The primary focus in the November and December issues was on the various types of antennas suitable for scanning purposes: simple top-of-radio whips; beams and logarithmic arrays; base-station antennas; and mobile antennas. Also covered in the latter issue was a listing of specialized clubs and publications devoted to promoting scanning as a serious hobby. The November issue's "Antenna of the Month" featured the AEA Isopole and Isopole Jr. v.h.f. verticals. The column pointed out that while the Isopoles were designed primarily for amateur band use, the antennas were also capable of good reception performance over the range 110 to 174 MHz. This feature, of course, makes them well-suited as scanner base-station antennas.

So, there you have it for the first two years of the Antennas column, 1980 and 1981. Next month we'll tackle the past two years, 1982 and 1983.

Getting the "Edge" on DX

In connection with the propagation research we undertook over the past few months in MUF and LUF calculation, we came across an interesting product called the "DX Edge." It is offered by Xantek, Inc., P.O. Box 834, Madison Square Station, New York, NY 10159.

We found this slide-rule-like device to be a useful operating aid of interest to the DXer and contester. The device allows you to determine rather quickly those areas of the world that are in darkness, and those in daylight, at any time of the day and in any month of the year. It is also possible to determine sunrise and sunset times throughout the world, the location and shape of the so-called "gray line" (which is an important propagation indicator), and local times throughout the world.

The "DX Edge" consists of a carrier and a set of slides. The carrier is 12" x 4¾" and made of plastic, which is imprinted with a double map of the world. The map shows the 40 *CQ* zones and a representative sampling of country prefixes. Included with the package are 12 transparent plastic slides, one for each month, showing the "gray line" areas and areas of daylight and darkness. By sliding the inserts through the carrier, you can make the various determinations described in the previous paragraph.

The device allows you to "solve" a number of important problems relating to propagation. For example, you can easily find local sunrise and sunset times for operating at those times when "freak" conditions are likely to occur; determine the direction in which to look for unusual DX; find propagation paths that will see the most sunlight (or darkness), as desired; judge when and where to look for rare DX multipliers; and determine when long-path openings are most probable. Also, it can be useful to know the actual shape of the "gray line" (which separates the areas of the world in darkness from those which are in daylight). The shape of this demarcation changes throughout the year, and its position changes during the day. Often, special propagation conditions exist along the line; the monthly charts provide a graphic depiction. For example, in searching for "gray line" openings, one might begin operation by beaming along this line slightly before sunrise (for paths to the east) or slightly after sunset (for paths to the west).

We should note here the fact that the "Edge" does not predict MUF, LUF, or other ionospheric conditions. However, the device can be especially effective if

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Introducing New Ultra High Performance Antennas from KLM Electronics, Inc.

KLM Electronics is fueling the Moonbounce and Oscar 10 revolution with Antenna Equipment that delivers truely Out-of-This-World performance.

For the Moonbouncer, our New 2M-16LBX is designed to be the highest gain 2 meter antenna available on the market today by more than a full db, making the 2M-16LBX an outstanding performer as a single antenna or in Moonbounce (EME) arrays.

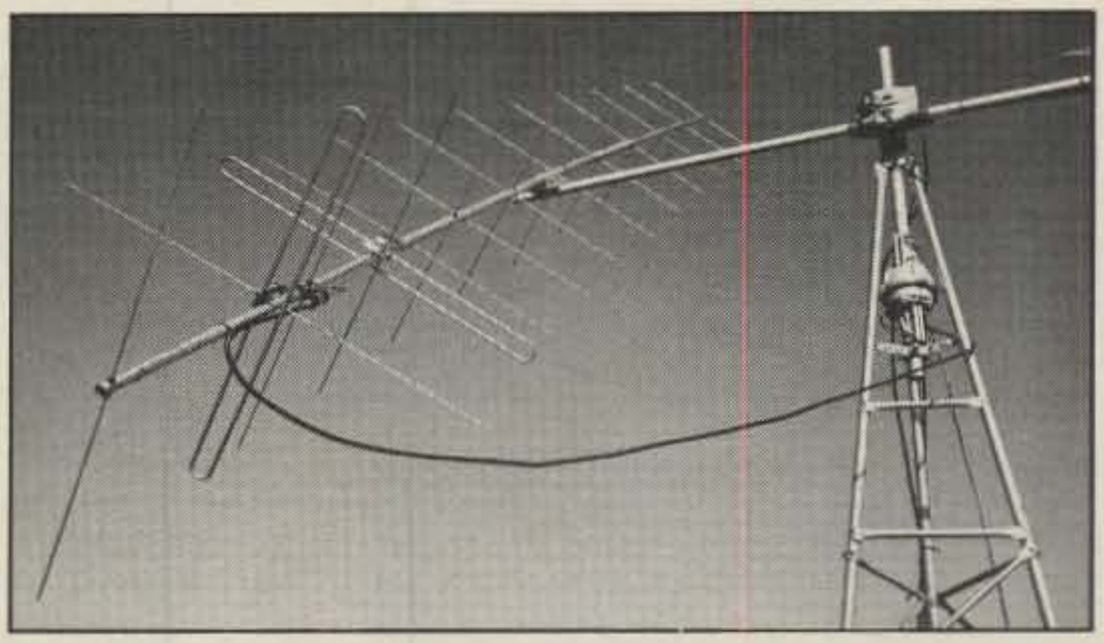
The New 432-30LBX follows the same pattern as the 2M-16LBX, and soon will become the industry's standard of comparison.

Featuring straight forward construction, and an innovative tapered boom that greatly reduces windload and adds strength and durability. Virtually unbreakable, insulated, 3/16" rod parasitic elements are anchored through the boom to insure years of trouble-free performance.

For the satellite enthusiasts, the 2M-22C high gain 2 meter, circular polarized antenna, features the same rugged construction and total flexibility as our very popular 2M-14C with a 2db increase in gain.

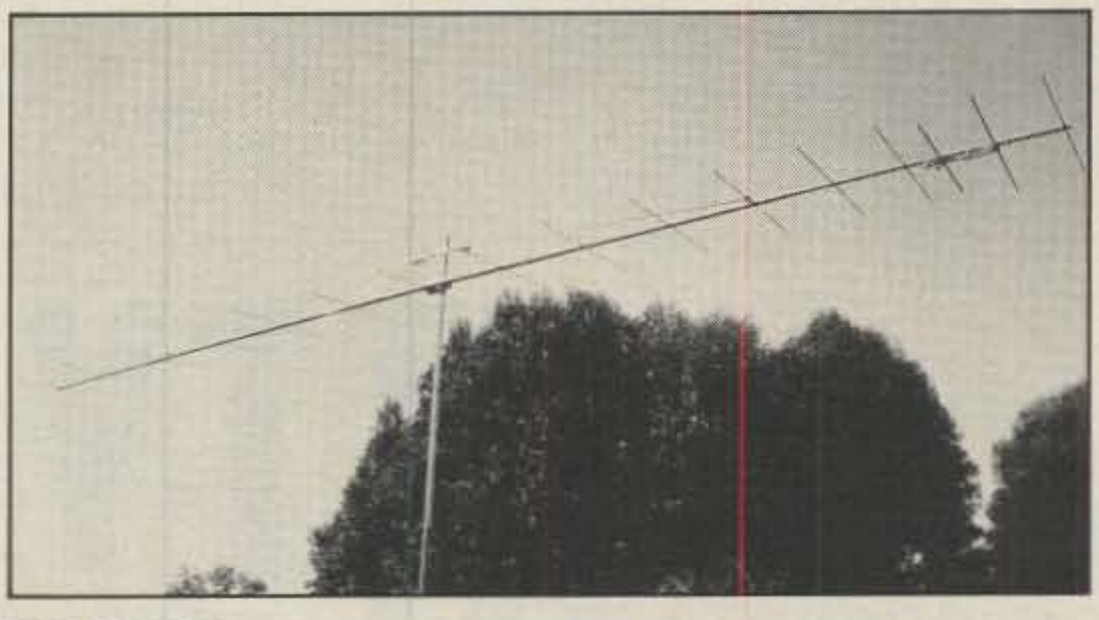
Four or more 2M-22Cs make an excellent array for Moonbounce (EME) by elminating Faraday fading.

Fiberglass/aluminum stacking frames are available as well as 2 and 4 port power dividers and phasing harnesses to optimize the performance of these type arrays. Watch for our new elevation drive system coming soon.



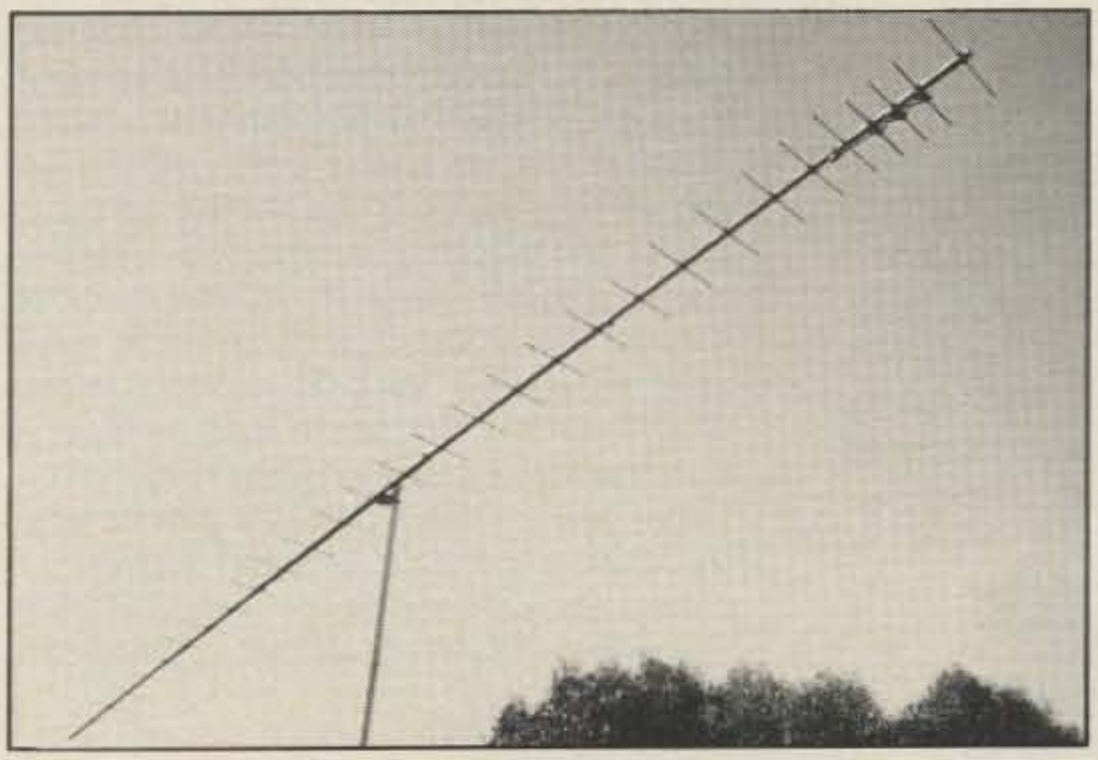
2M-22C

BANDWIDTH	144–148 MHz
GAIN	13 dBd
BEAMWIDTH	34°
FEED IMP	50 ohms unbal.
BALUN	(2) 4:1 coax
BOOM LENGTH	19 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	1.85 sq. ft.
ELLIPTICITY	3 dB max.
CIRCULARITY SWITCHER	CS-3 included
WT. (lbs.)	11 lbs.



2M-16LBX

BANDWIDTH	143–146 MHZ
GAIN	(144 MHz) 14.8 dBdc
BEAMWIDTH	(V) 28°, (H) 33°
FEED IMP	50 ohms unbal.
BALUN	4:1 RG303, Teflon
BOOM LENGTH	28 ft. 1 in. (tapered)
VSWR	1.4:1
WINDLOAD	(H) 1.75 sq. ft. (V) 2.44 sq. ft.
WT. (lbs.)	10 lbs.
TURNING RADIUS	15 ft. 6 in.



432-30LBX

BANDWIDTH	430–440 MHz
GAIN	17.3 dBd
BEAMWIDTH	20°
FEED IMP	50 ohms unbal.
BALUN	included
BOOM LENGTH	21 ft. 9 in.
F/B	20 dB F/S 35 dB
VSWR	1.5:1
WINDLOAD	1.43 sq. ft. (typical)
TURNING RADIUS	12 ft. 5 in.
WT. (lbs.)	9 lbs.

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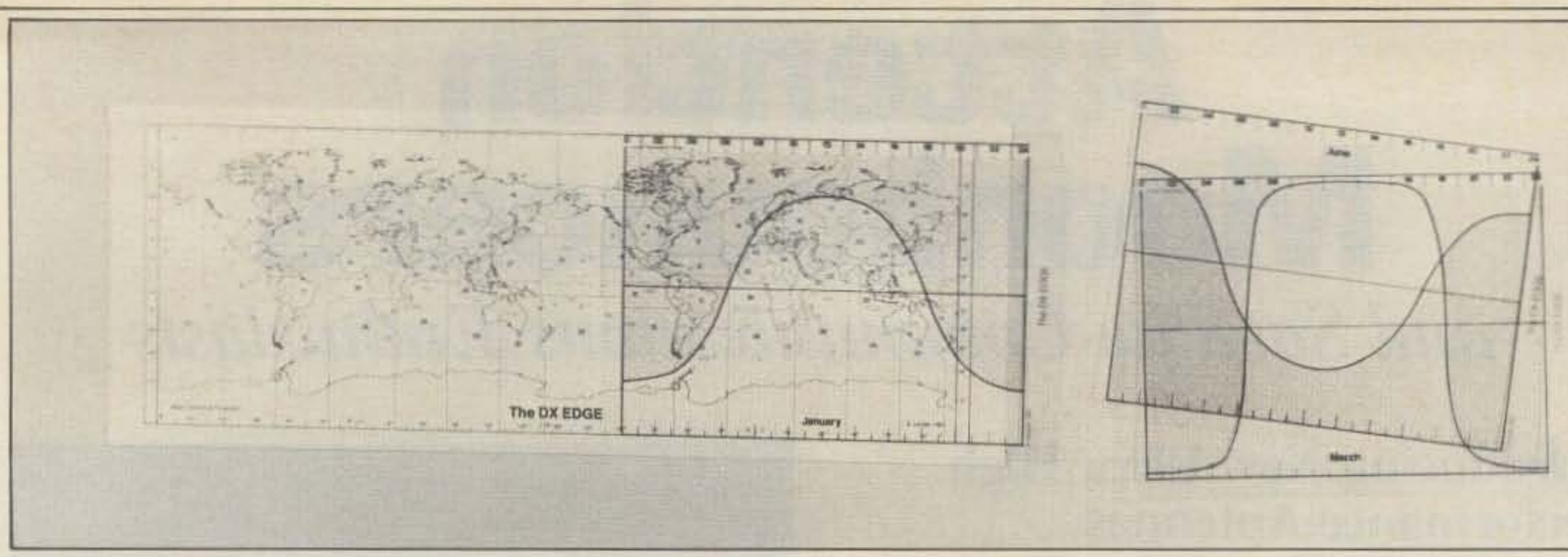


The DX Edge is a novel operating aid for the DXer and contester. It is a slide-rule-type device which allows the user to determine quickly those areas of the world which are in daylight and in dark ness at any given time; sunrise and sunset times throughout the world; and the location and shape of the so-called "gray line," which separates the areas of the world that are in darkness from those which are in daylight. The device comes with transparent plastic slides for each month. (Photo courtesy Xantek, Inc.)

Main menu display of N7BCU's "C.W. Instructor" program for the Commodore 64 computer. The software offers several training options, as noted in the text of this month's column. (W8FX photo)

used in conjunction with current information regarding atmospheric propagation. This information may be based on published magazine or newsletter data, or on computer-assisted MUF/LUF determination programs (as discussed in recent Antennas columns). Two good sources of general information about ionospheric propagation are *The Radio Amateur's Handbook*, published annually by the American Radio Relay League, and *The Shortwave Propagation Handbook* by George Jacobs, W3ASK, and Theodore J. Cohen, N4XX. (The latter book is available from the *CQ* Book Shop). In addition, *CQ*, *QST*, *Ham Radio*, and several DX bulletins carry regular shortwave propagation predictions.

Incidentally, according to Anthony F. Japha, N2UN, Xantek obtained the basic data for constructing the device from charts showing the zenith angle of the sun at various latitudes published long ago by the Federal government. These data were then transposed into curves that show all of the points that have zenith angles of 90 degrees at the same time. This line is the "gray line" we mentioned previously, which shows all points on the earth that are going through local sunrise or sunset at the same time. According to N2UN, the "DX Edge" is in use in over 60 countries. I found the device useful and easy to use, even for someone who is never quite sure in which direction the sun rises and sets each day!

Postscript: In several previous columns, we mentioned the many ham radio programs available from Public Domain, Inc. for the PET, Vic-20, and Commodore 64 computers. A short sunrise/sunset calculation program known simply as "Sunrise/Sunset" is contained on the PET U4 utility disk or tape; the program also runs on the Commodore 64 computer. A graphic worldwide time calculating program is available as well; the program allows user input of local time and produces a world map on the video screen showing time in selected major cities around the globe. The program is available in a PET version called "World Clock" on the G4 game disk or tape. A Commodore 64 version known as "World Time" is contained in the C1 disk or tape. (A catalog of Public Domain software is available by writing to the firm at 5025 S. Rangeline Rd., West Milton, OH 45383.)

Software Notes

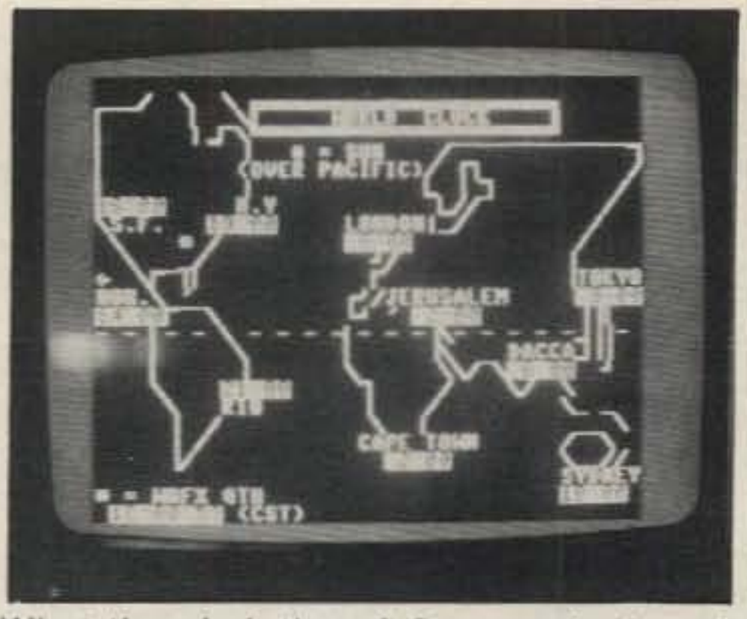
Taking a look at software that might be of interest to readers of the column, we recently came across a low-cost source of Apple and Commodore programs offered by the Association of North American Radio Clubs (ANARC). In case you are unfamiliar with the organization, ANARC is a major umbrella federation of North American DX associations; it pub-

lishes a newsletter and also holds a national DXers' convention.

ANARC's Computer Information Committee has published a listing of noncopyrighted computer programs related to the radio hobby. While the majority of the ANARC programs are of primary interest to medium- and short-wave listeners, some of the programs are also useful to licensed amateurs. A recent program listing showed some 24 available programs. Some of the Apple listings included several programs for logging and log sorting, as well as propagation prediction. Vic-20 and Commodore 64 programs included MUF calculation, antenna design, sunrise/sunset calculation, and other subject areas.

The programs themselves are available not for cash, but for one International Reply Coupon (IRC) for simple printed listings, or for three IRCs for ready-to-run programs on tape cassettes. There are no additional charges for postage worldwide. A catalog of available program listings can be had for a business-size s.a.s.e. sent to the ANARC Computer Information Committee, 6700 153rd Lane N.W., Anoka, MN 55303.

This doesn't have a darned thing to do with antennas, but let me share an interesting program which I came across in investigating and exchanging various hamshack computer programs. I think the program would be of particular interest to beginners.



What time is it there? Screen display of small "World Clock" Public Domain program described in the text. (W8FX photo)

Dennis Olver, N7BCU, offers a novel C.W. code program entitled the "C.W. Instructor." It is a menu-driven program for the Commodore 64 which is designed to be an aid in teaching c.w. to beginners, as well as help c.w. operators to increase their speed and efficiency.

The program has three main modes of operation. These include keyboard-input code practice, random code generation, and practice using prerecorded "c.w. tests." Various practice options are possible using the random code menu selection option (letters only, numbers only, all characters, selected characters, etc.). The prerecorded c.w. test option makes good use of relative files, which allow very rapid file access and thus minimize student waiting time for practice messages to appear after selection. Several prerecorded "tests" are provided, and a separate program is included in the disk-version package that enables one to create up to 200 different test messages on a disk. The test messages can also be sent and updated using the tape version of the program, but it necessarily makes use of data statements for message storage—much slower than when disk is used.

The instructional program is available from Dennis Olver, N7BCU, 20909 So. Ferguson Rd., Oregon City, OR 97045. Price at this writing is $15 for either the disk or tape version.

Wrap-Up

This month in the Antennas column we've paused to reflect on the first two years of our editorship. We have described how to obtain article copies, and have identified the contents of the first two years' columns. We have also described the "DX Edge," useful in fine-tooth propagation applications. Finally, in the "Software Notes" section we mentioned some inexpensive ANARC software, in addition to a well-designed c.w. instructional program of interest to both the beginner and the operator in search of upgrading.

Next month in the Antennas column we will continue with a review of the 1982 and 1983 columns. See you then.

73, Karl, W8FX

QRP

a monthly feature by
ADRIAN WEISS, K8EEG

THE ART OF VERY LOW POWER OPERATING

QRP Field Day 1983: Part I

Judging from the number of entries for the Milliwatt Field Day Trophy program jointly sponsored by *The Milliwatt* and the *QRP ARC I*, 1983 was a good Field Day year. Luckily, the 1982 Field Day story appeared in the June issue just in time to alert many of the fellows about the program and the potential joys of a QRP Field Day. Several of the long-standing "regulars" such as K6TG, W6SKQ, WA6POC, and others show up in the results, and many newcomers to the fray turned out some noteworthy results. The clubs appear to have had a great time as well.

The most satisfying part of going through the 1983 entries occurred in the 1 watt category. No entries were received in this category last year, which led to a dire warning that it would be discontinued if less than five entries resulted. Gladly we received twice that number! And the 1 watt group did quite a respectable job in this annual extravaganza. A glance at the results illustrates just how well the group performed. Bear in mind that the scoring provides a power multiplier twice that of the 5 watt categories (*i.e.*, 5 watt = ×4, 1 watt = ×8), so an equal number of QSOs at the 1 watt level produces approximately twice the score of the 5 watt level. The number of QSOs for each entry is included as a second index for comparing results.

Note the outstanding performances of KA1R, W5LXS, and N0BYC. KA1R's 550 QSOs topped the entire list of entries for the one-transmitter/two-operator categories. W5LXS's 342 QSOs gave him a fourth-place standing in the 5 watt class by a wide margin. Admittedly, both these stations operated from the home QTH (with battery/solar power) using the regular antenna systems. Nonetheless, they demonstrate the type of results possible with less than 1 watt, a good antenna (Yagi at 50 feet, inverted vee at 45 feet), and operating savvy.

The antennas used may explain the difference in QSO totals posted by the top three in the 1 watt category. N0BYC produced 241 QSOs with nothing more than a ground-mounted vertical over four 3′×25′ pieces of chickenwire and six 70′ radials. K5WNH/0, the 1981 winner of the One Watt Trophy, similarly used a simple antenna setup to produce 239 QSOs. There is no reason to doubt that these two operators could have gone much higher given a Yagi at 50 feet for the high bands. But there is really no reason to go to such extremes! One watt to a simple antenna can provide tremendous satisfaction!

Interestingly enough, results in the 5 watt, one-transmitter/two-operator class were quite a bit better than last year. Last year N5EM took the trophy with 259 QSOs; this year Ed turned out 448 QSOs (perhaps experience helps). Overall, the top six entries show over 250 QSOs, a fairly difficult level to reach with QRP on a QRO Field Day! What fascinates me is the success attained on s.s.b. My experience has always been that a weak c.w. signal is likely to fair much better than a weak s.s.b. signal during Field Day. But then I'm not much of a phone operator myself. Those who are can apparently do some impressive work despite the QRM. So much for my rundown, and on to the reports!

83 Suburban Estates, Vermillion, SD 57069

1983 Milliwatt Field Day Trophy Results

Station	QSOs C.W./S.S.B.	Total QSOs	Score
One Watt Class			
1. KA1R	375/175	550	6600
2. W5LXS	342/0	342	4104
3. N0BYC*	241/0	241	3042
4. KN1H	195/0	195	2490
5. KM8X	181/0	181	2322
6. K6TG	153/0	153	1836
7. KB1DH	67/1	68	544
8. KA5NLY	2/28	30	510
9. KH6CP	8/1	9	258
5 Watt, 1 Trans./2 Op. Class			
1. N5EM†	423/25	448	2838
2. WA0VBW*	113/322	435	2760
3. W3TS	418/2	420	2670
4. W9OA	250/7	257	1692
5. NI4R	170/79	249	1644
6. K8IF	255/0	255	1530
7. KA8LCJ	12/167	179	1224
8. KN7W	170/7	177	1212
9. WA1VVX	0/188	188	1128
10. KA1CZF	111/71	182	1092
11. W6YVK	0/181	181	1086
12. KK7C	139/38	177	858
12. KR2V	118/0	118	858
13. N3ANW	10/85	95	720
14. WA5BUC	0/87	87	672
15. W0VS/7	60/0	60	510
16. KW8B	87/0	87	348
17. N3AWS	74/0	74	296
18. W8EAO	60/1	61	244
19. N5EYF	42/0	42	168
Club Class, 2 Op./2 Trans.			
1. N2RI*	354/345	699	4344
2. KN9W	396/247	643	4008
3. W2LZ	618/19	637	3972
4. W0VM	394/0	394	2514
5. N5AE	151/128	279	1824
6. W6SKQ	117/142	259	1704
7. WA6POC	158/87	245	1620
8. KQ5U**	87/1	88	1206
9. W6JTH	75/3	78	618

**Trophy winners (KA1R, W5LXS home stations, ineligible for trophy).*
***One watt club entry.*
†N5EM ineligible (trophy winner of previous year).

The Reports

Curby Rule, N0BYC, writes: "I've been a ham about three years and have operated other field days, but this is the first full-portable. I set up in my parents-in-law's backyard facing a lake. The equipment was a TS-130V, Heath micromatic keyer, Bencher paddles, a YP-150 wattmeter (modified to a 1-watt scale using your October 1973 *Ham Radio* article as a guideline), and the battery from my pickup. For an antenna I used a Butternut HFV ground-mounted with four 3′×25′ pieces of chickenwire criss-crossed for a ground screen, and six 70′ wire radials.

"From the back of my pickup to the first QSO took 58 minutes total. I had planned on operating in the 5 watt class, but Saturday morning when I heard WWV announce that the *K*-index was 0, I figured that 1 watt was the way to go! I found that during the 10 meter opening on Sunday my best rate (20 QSO/hr.) was realized by calling CQ near the band edge. It seemed as if most people were seach-and-pouncing and not calling CQ on 10 meters. Also, I reached a 20 QSO/hr. rate during the last hour of the contest calling CQ around 14030 kHz. A severe string of thunderstorms drove me off the air from 0530 to 1130 UTC, so I didn't get to spend as much time on 40 and 80 meters as I would have liked. I had fun even though my mosquito-bite to QSO ratio was about 2:1! I hope to do better next year (less bites, more QSOs)!"

Matt Power, KA1R, operated from the home QTH and offers some observations: "Four of my contacts were made by calling CQ, and the remainder by answering stations. I found that it was not possible to hold a frequency while running less than 1 watt. Thanks to the many operators who listened many times to pull out my callsign even when this was not to

The classic-type QRP FD setup of Mike, KN7W. A portable table in a tent provides the operating position for the Argonaut with mike and keyer. Mike only turned seven s.s.b. QSOs, but is to be commended for bringing the mike along.

their advantage in maintaining a high QSO rate. One source of frustration was those operators who called a long CQ immediately after ending a QSO. If they simply signed their callsign and "FD K," it would have proven more efficient for them. Also, this would have avoided generating a pileup of louder stations who block out QRP callers. Some of those operating 10 meters did not realize that *sporadic-E* can cause a 30 dB variation in signal strength within a few seconds. On 10 meters it is usually a good idea to ask a weak station to repeat his exchange several times in the hope of getting it during a signal peak." *(You QRO operators take note!—ed.)*

Zach Lau, KH6CP (DXCC QRPp #47), comments: "After operating for 18 months on the mainland, it is difficult to see why the 1 watt category is so unpopular. One watt signals with a decent antenna are more than enough for dozens of easy contacts. Even QRO is useless if the other station has its receivers blocked, a common problem in hastily set up mult-multi stations."

Carl Perkins, N5EYF, had a slightly different conclusion than KH6CP: "The June 1983 FD column got me interested in QRP. What really made me go to QRP on FD was your statement, 'We'll give the 1 watt category one more year . . .' The thought of something dying out due to lack of participation bothered me. I was determined to help keep the 1 watt category kicking—at least I thought I was determined! I had great difficulty in getting my Ten-Tec Century 21 down to the 1 watt level, but I finally managed and got on the air. I called CQ, I answered loud CQ's, but to no avail. After 36 minutes I gave up and cranked the power up to about 5 watts output. Then I started making contacts! I could not believe it; only two stations failed to respond to me. I even got three QSOs by calling CQ! I still can't believe what 5 watts can do—very exciting. However, I do not think I have the patience to continue this QRP business. Maybe I'll head out into the field with a 1 watt rig, batteries, and straight key next year!" *(Well, Carl, I think your excitement will keep you coming back to QRP. You don't have to discontinue QRO operation to be considered a genuine QRP operator!—ed.)*

Bob Moore, KB1DH, writes: "Well, I now know the true meaning of the word 'cacophony': FD on 40 meters! It was tough with my homebuilt 1 watt transceiver (direct conversion), but I tried to hang in there. I've been exclusively QRP since being relicensed in October 1982, and I love it. I have about 35 states and 20 countries—all on 40 c.w. You *do* need patience to operate QRP, but I also credit most QROers with as much or more patience in trying to copy my signal!"

Steve, N3ANW, had a successful first outing: "Fritz, W3NZ, suggested that I build a full-wave loop for 40 meters. With his help I put it together the week before FD and tested it temporarily on his 50' tower. On FD I drove out to my father-in-law's as he has several acres with plenty of tall trees. Believe it or not, I had the 6 oz. sinker and line up over a limb at about 40' on the first try! I decided not to tempt fate by trying for the 50' level that Fritz recommended. The whole process of erecting the antenna only took a few minutes. I used several solar panels loaned by K3DBD to charge two sets of gelcels the day before, and the panels maintained the batteries during the contest.

WA1VVX shown at his elaborate home QTH setup. He went on s.s.b. exclusively and turned out a good showing at 188 QSOs. Several fellows operate the QRP FD from the home QTH each year and submit results to support the program, even though they are not eligible for a trophy award. Realistically, a lot of operators just don't have the time to get out into the field, but their results still are important for showing what QRP can do!

Operating QRP using the loop was an incredible amount of fun. It took some effort on the part of the guys on the other end, but I made contacts! In addition, I used the 40 meter loop to work 20 stations on 15 meters and 1 on 10. The weather was ideal—sunny with low humidity. All in all, I could not have asked for a more pleasant introduction to portable QRP operation. In closing, I'd like to pass along a point made by friend KD3H: '1 watt or 1000, you're always 599 somewhere; it's just a matter of finding someone listening there!' "

Mary-Pat, NI4R, and **Fred, KZ4D, Morris** combined vacation and FD: "This was our first attempt at QRP and needless to say, it will not be the last! Vacation this year was at the Apache Campground in Myrtle Beach, SC. Weather was great—no bugs and plenty of super sunshine. We operated from a picnic table under the trailer awning. Since no trees were available, a 25' mast provided support for a balanced feed 40 meter inverted-vee. The rig was a modified TS-130S. Conditions were super on 40 s.s.b. and a bit more hectic on c.w. It was a surprise to find 15 c.w. open to all parts of the country, so we spent most of our time on that band. A couple of items are worth noting about operating technique. Band-edge contacts proved easier to make than elsewhere, and short calls are a must. Our antenna worked very well on 40 and 15 meters, but proved poor when tried on 80, 20, and 10 meters. The only other comment: 'Look out for us next Field Day; we are going to be hotter than ever!' " *(In the spirit of the location, NI4R/KZ4D called themselves The Beach Bums.—ed.)*

Corky Rhines, W8EAO, made use of FD to "get on" from his new QTH: "What a time for Field Day to show up! Moved into the new QTH a month before FD, rig was still packed, antennas all torn apart, and I'd just started a new job. I decided to forget about Field Day for this year, but on Saturday morning I was pacing like a caged lion and driving the XYL nuts. So, that afternoon I took one of the elements from the disassembled 15 meter beam, added some tubing to make a quarter-wave vertical for 20, and put up a ground-mounted vertical. Ran the coax feedline into the storage shed, displaced the lawnmower and bicycles, and set up a card table and folding chair for the rig. I only operated 37% of the available contest time and only on 20 meters with a marginal antenna, so I was happy with my 7 QSO/hr. average, 27 states and 2 provinces, and best of all, Field Day is still a lot of fun!" *(Accepting limitations imposed by the antenna is very important as far as attitude and results are concerned, as Corky makes quite clear!—ed.)*

John Collins, KN1H, an avid QRPer, was a mountain-topper this year: "Antennas were a 40 meter and a 20 meter dipole, up somewhere around 40–50'. The FD site was on the summit of Mt. Ascutney in Windsor, VT (about 12 miles from home) at 3000' altitude. I used an Argonaut with a 1 watt output powered by a 12v 4.5 amp/hr. gelcel which was charged by an Int'l Solar Products PhIII 4 watt panel."

Chris Hethorn, KM8X (DXCC QRPp Trophy #36), tried the 1 watt category: "Well, I finally got a chance to operate FD at the 1 watt level and had the time of my life. Would have done better except that I had some prior commitments on Saturday and a minor health problem that prevented sitting for very long stretches. I set up in a farmer's field (corn) just south of Lansing with my tent, battery, lantern, HW-8, and a 40 meter inverted-vee up 35'. I couldn't believe how good conditions were this year after the solar flares of last year held me to a total of 31 QSOs. One big improvement: the day before FD I went to Radio Shack and purchased a pair of their feather-weight mono communications headphones for $10 and did they work! After the first few hours on the rig, my ears didn't feel like I'd been in a boxing match for a change, and they provided more than ample volume and clarity. This really made a difference. I operated in the 1 watt category using the HW-8 and car battery, and detuned the final tuning capacitors on each band to result in about 900 milliwatts output as read on a Bird wattmeter (*i.e.*, C95, C99, C103, C106). Not much detuning was needed on 15, since my HW-8 only puts out about 1.1 watts on that band. I sure hope that

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CIRCLE 64 ON READER SERVICE CARD

Tom, KR2V, and Carl, KA2GSM, on a logging road in NY. A 20 meter quad is mounted on the TV telescoping mast seen rising from the rear of the van. Tom didn't include details about the device on which the mast is mounted (center of bumper), but it looks like some bracket-winch designed especially for the job. Maybe he'll be kind enough to send in further details!

KR2V and KA2GSM shown at the plush operating position at the rear of the van. Looks like the end of a regular living room! The shelf is built to accommodate the Century 21 and accessories neatly. The little lamp at the top is a touch of luxury. I guess FD can be lived comfortably!

the 1 watt class is not dropped next year, as it was so much fun and a chance to show the QRO stations that a lot of power is not needed." *(Chris's showing on 40 meters was especially good—128 QSOs.—ed.)*

K6TG notified me that **Dick Simpson, W6JTH**, and **John Grebenkemper, K6TG,** backpacked an HW-7, and HW-8, and a TR-2400 to the top of a high ridge in Lassen Volcanic Nat'l Park. The weather was fine, but they were able to operate only 10 hours on FD, concentrating on 40 meters with 52 QSOs on that band. K6TG observes: "Those guys really get with it every FD. I have been out in the wilds twice with W6JTH. The first time he used a neat homebrew rig and I used the Argo. Second time I again had the Argo and Dick used my HW-8. Both times we were putting rare CA counties on the air during CA QSO parties. Dick and John may be the best mountaineer QRP amateurs in the world!"

Jim Droege, WØVS/7, toted a 40 lb. backpack to the bare top of a 9214′ mountain peak above the treeline for this FD: "I did my operating lying flat on my stomach on a mountain peak. This is *not* the best way to go! Your comments in the June 1983 FD column are excellent. I checked out the HW-8 ahead of time and found that two switching diodes in the final were blown. Finally got it operational on Thursday, just before FD. Unfortunately, absorption on 80 meters was too high for me to make a single QSO. My advice: Get a non-direct conversion receiver, since direct-conversion receivers are not well suited to contest QRM. This became apparent from using the HW-8. The antenna was a random wire worked against tuned radials for 80, 40, and 20 meters which actually were dipoles placed on the ground under the wire."

Last year **Tom Jones, KR2V**, operated along from a VT location and notes: "This year, with help from **Carl, KA2GSM**, we operated from a deserted logging road amongst the tall pine trees 8 miles east of Saratoga Springs, NY. We ran a Century 21 with a Daiwa 620B power meter monitoring output from the rig at under 5 watts using battery power. Antennas included a 2-element quad on 20 meter at 34′, and verticals on 40 and 80 meters. We made 118 contacts during the full 24-hour contest period. Our biggest problem—QRM on 20! But we're both ready for next year!"

Mike Taylor, KN7W, summarizes: "Thanks for the great QRP columns. They inspired me to try QRP and I love it! For FD I took my Argo 509 and HW-8 up about 6000′ to Buckskin Ridge in the Sawtooth Mountains of Idaho. Using a homebrew tenna-tape in the inverted-vee configuration, I netted 175 QSOs on the h.f. bands. Next year I will be back out with a beam, and boy, look out!"

And we'll round out this first part of the 1983 FD report with **Jim Walroth, N3AWS:** "Enclosed is my first entry to your FD QRP program. I am a medical student, and my hobby must take a 'back seat' to my studies for the time being. Nevertheless, I hope to participate in years to come. It was my intention to operate portable, but a number of difficulties occurred at the last minute and prevented this. As it was, I only managed 7½ hours of operation. The rig was a Swan 270B held to 5 watts output. Conditions were very good, and I was especially pleased to make 19 QSOs on 10 meters. The antennas were inverted-vees which performed better than I expected. However, a shack temperature of over 100° made operation tedious. Within the coming year I hope to find the time to homebrew a 28 MHz or 21 MHz c.w. rig in the 1 watt output range and operate exclusively in the Novice/Technician segments of those bands. Novices are a pleasure to contact!"

Finally, **Dan Michael, W3TS**, and **WB3IDP** comment: "Well, our local club did not show much interest in QRP again, so Art and I went out to the field behind my house and set up in a tent and used the trees along the fence row for antenna supports. We used a 2-element wire beam at 30′ on 20 meters, and inverted-vees on 80 and 40 at about 50′. The wire beam didn't seem to help out much on 20, though. I guess a good, high inverted-vee is the best bet—works just as good and is a lot easier to erect. Seems like we did much better this year, even though I was only able to operate until 0230 and Art didn't arrive until 0700 Sunday. It was convenient being set up at the end of my backyard—could always go back to the shack for something I forgot. Only one problem being this close to home—my junior ops were helping us operate. They're 4 and 6 years old and work for Murphy! Maybe next they can stay up at Grandma's place!"

Well, gang, we'll have more interesting reports next month. Since quite a few commented on the usefulness of last year's "Planning and Operating FD" column, we'll include that again to provide guidance for newcomers. In the meantime, it isn't too early to start experimenting with antennas for FD!

73, Ade, WØRSP

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATIONS AROUND THE WORLD

Count that day lost
When low descending sun
Finds an empty logbook
And no new DX won . . .

There still may be those locked into the premise that the sight of a groundhog a few months back was the clue to the coming of spring. Here we tend to believe that a QRPer trotting up the hill with another question on the Eternal Enigmas of DXing is a sure sign that the long winter is over and summer is at hand. Last week a QRPer came up the curve of the road around the hill to ask some questions.

"Is it me," he asked, "or has the world really changed and I've missed the switch? What happened to the good times when we enjoyed DXing and the meetings on the bands? Certainly this year must be a time when strange things are going on, and maybe more strange things than I can ever remember having happened before, and I've been a DXer for a long time—almost five years now."

There are some who might have been tempted to remind the QRPer that things always change and thus are always the same. We thought of it, but figured we had better find out what was worrying him if we were to start the new DX season off right. "What's the problem?" we asked, hopefully expecting that an incisive question would spur the QRPer to reveal his problem. It did.

"Back a month or so," the QRPer started in quickly, "I was down at the Astrology Resources Center trying to get a line on what DX the new year would bring. Mostly they were holding up foreboding hands. Most everyone I talked with quickly pointed to the fact that Neptune was going into Capricorn this year and Pluto was moving into Scorpio. They said that two planets moving into different signs in a single year would be significant, and that Neptune moving into Capricorn represents a dissolution of reliance on old structures and values. What do you think of all that?"

Think! We are having trouble even understanding just what he was talking about. We had presumed that he came to talk about DX, but at this point we suspected that we might have pulled the wrong lever. We regrouped quickly and were back into the discussion with a succint, "Yes?" It was all we needed.

"After talking with those people," the QRPer plunged onward, his face showing

77 Coleman Dr., San Rafael, CA 94901

Here is Tom Wong, VE7BC, who has brought BY1PK and a handful of others on the air for the Deserving DX types. Note that Tom goes to DX Conventions prepared to be read at any distance. This was at the Northwest DXCC Convention in Seattle. On the right is one of the local QRPers from Marin County, WA6AUD.

the concentration he was giving the subject, "I got to thinking that maybe some of the things they were pointing to are already showing in DXing. Neptune is a total solvent, one told me, while Pluto's transition through Scorpio means an increase in polarization and a possible change in the collective consciousness. You see what all of this means to the DXers, don't you?" Frankly, we did not, and we started to feel that we were losing ground in whatever was going on.

We moved quickly to regain our footing. "Maybe we should head up the hill to the Old Timer and see what he thinks," we suggested, and without even waiting for a reply, our caps were on our heads and we were on our way. The QRPer quickly followed.

"It is all the commotion one runs into on the bands," the QRPer put in after discussing briefly the astrological portents with the Old Timer. "It seems that a year or so back I would get on the bands and listen for DX, sometimes catching up with a callsign I knew belonged to another DXer, and we'd pass a few words. Sometimes they'd give me a bit of DX information, sometimes I could help them. But now it seems that if one does not come up against someone with an over-bored linear trying to blast everyone out of his way with his non-stop CQs, it's someone else working from the other corner to display his big antenna system. Maybe the only good thing is that when they are on, the jammers are drowned out. But just let the big CQer or the bigger antenna types shut down for a few minutes and you'll find one of the mindless types whose routines change but not the effect. It may be bad enough when one of them sits on a DX station. It is worse when one of them gets going on a 2 meter repeater. What has happened? It never used to be this way!"

We were starting to get the idea that it was not the zodiac about which the QRPer was concerned, but rather it was DX itself, and that had to be a plus. At least that was something we could understand. We waited to hear what the Old Timer had to say, and it was not long in coming.

"Actually, little has changed," the Old Timer said, and there was an instant questioning look on the face of the QRPer. "Little has changed except possibly for one's awareness. A year or two back you had just gained a DXCC and the world of DX was new and bright and interesting. Back then you met with other DXers in the same category as you were, just over the hundred country mark, and you enjoyed working together, right?" The QRPer was quick to nod his head.

"But things do change," the Old Timer went on, "and since then you probably have worked about a hundred more countries, or close to it. These days you are not hanging out at the old corner anymore. Along the way you learned where the hot DX action is, and you've moved down there to look for it. You're in a new neighborhood with your enhanced total. You've moved to where a lot of DXers are lurking, looking for the countries they need, and often these are the same ones you need. When a rare one is on, everyone knows where it will show, and most everyone knows where the DXers will be listening. Too frequently this sets the stage for some to show their prowess and their cleverness. Certainly you've noticed all of this, haven't you?" The QRPer shook his head and said that he had not.

The Old Timer thought for a moment and then was off on a fresh start. "Have you ever noted that sometimes some DXers show what might be signs of ego as well as possible longing hope that posterity will remember them? Some DXers are unable to conceal their own cleverness as DXers and must constantly roll it out for the DXers to admire. At least that is what they think happens. And there is also a belief among some DXers that if one attains the Honor Roll and works every possible DXCC country, the world will long remember them. They hope that posterity will remember them forever. Possibly they think that an Honor Roll plaque is better than a bronze statue down in the city park for remembrance. Absolutely!" The Old Timer leaned close to hold the QRPer's eye. "Certainly you

The WPX Program

Mixed

1087	K1SF	1089	JJ1EEA
1088	YU7KV		

S.S.B.

1640	W5LLU	1643	VE2DRN
1641	JH8DEH	1644	GW4BKG
1642	JF2AFJ		

C.W.

2242	VE7WJ	2243	K9LJN

VPX

234 HE9DWW

Endorsements

Mixed: 450 WD4PVI, YU7KV. 500 YU7KV. 550 YU7KV, KS7T. 600 YU7KV, KS7T. 650 YU7KV. 700 YU7KV. 750 VE2PD, YU7KV, K2POF. 800 N4IB, YU7KV. 850 N3RL, OE1KJW. 900 N3RL. 950 N3RL, W6OUL. 1000 W6OUL, JA2KVD. 1250 I2DMK. 1400 WA4QMQ. 1850 N4NO. 1900 N4NO.

S.S.B.: 350 W5LLU, AB4D. 400 W5LLU, AB4D, OE1KJW. 450 K2POF, W5LLU, AB4D, I6COC, WA8KMK. 500 W5LLU, AB4D, WA8KMK. 550 AB4D. 600 AB4D, KØREF. 650 KBØTD. 700 KBØTD, KC9DS. 750 N3RL, N4IB, VE2PD, KBØTD. 800 KZ2P, N3RL, KBØTD, JA2WRK. 850 KZ2P. 1100 WA1JMP. 1200 I6NOA. 1300 I2JSB, N4NO, W4BQY. 1350 WA4QMQ, N4NO. 1600 WØYDB.

C.W.: 350 Y37XJ, VE7WJ, K9LJM, KW9M, WA7NXL. 400 Y37XJ, VE7WJ, K7DBV, K9LJN, WA7NXL. 450 Y37XJ, VE7WJ, K9LJN, WA7NXL. 500 Y37XJ, VE7WJ. 550 Y37XJ, VE7WJ, N3RL. 600 Y37XJ, K2POF, VE7WJ, N3RL. 650 Y37XJ, VE7WJ. 700 YE7XJ, WA4QMQ, JA7FFN/1. 750 Y37XJ. 800 Y37XJ. 850 Y37XJ, HP1AC. 900 Y37XJ, WA1JMP, KL7AF. 950 Y37XJ. 1000 Y37XJ, N4IB. 1550 N4NO. 1600 N4NO, W3BQY. 1650 N4NO.

10 meters:	JA2KVD.
15 meters:	K2POF, JH8DEH, JF2AFJ, JJ1EEA.
40 meters:	W3ARK, KZ2P.
80 meters:	Y37XJ, W3ARK.
160 meters:	K9BG.
Asia:	JJ1EEA, Y37XJ, HP1AC, KZ2P, JH8DEH.
Africa:	W3ARK, KZ2P.
No. America:	HP1AC, JA5SIX, N4IB, JA3WBK.
So. America:	W3ARK, KZ2P.
Europe:	W9ROK.
Oceania:	JJ1EEA.

Award of Excellence: VE7WJ with 160 meter bar. 160 meter bar: K9BG

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

must have noticed all of this before, haven't you?"

The QRPer was silent, obviously thinking things over. "I hear you saying that we should ignore those types," he finally said, "and that to dispute them is to encourage them, right?"

The Old Timer nodded his head. "Most times to dispute with them on the air—the jammer, the band hog, or the exhibitionist—is to encourage them, because you give them exactly what they want—attention. Too many times they develop the feeling that there is nothing wrong with what they do, that any complainant is jealous of their cleverness, and the envy is emphasized by any argument given them." This brought another period of thought to the QRPer.

"You know something," he finally got around to saying, "I came here thinking that maybe the planets and the signs of the zodiac had something to do with things, and I still think that maybe Pluto's moving into Scorpio is producing the polarization they are talking about and maybe that polarization is aimed at the jammers. But how about Neptune moving into Capricorn and the dissolution of reliance on old structures and values? What about those changes?" The Old Timer was nodding as he listened to that question.

"Maybe there is something there," he said. "For one thing, I'm watching to see what comes of this talk about starting DXCC all over again. Maybe it is coming with Neptune moving into another zodiac sign. For years I've been watching for Bouvet, and now I'm also watching for Peter I Island. Should either of these show, I'm sure there definitely will be a change in the collective consciousness of DXers. That will be something to watch for, and I find it interesting to note that astrology might be pointing that way. Interesting, isn't it?"

Both of us were quick to admit that it might be. Anytime that Bouvet or Peter I Island is possible, there will be things stirring for sure. But finally we ourselves had to ask a question of the QRPer.

"What else did you learn down at the Astrology Resources Center?" we asked. "I mean, what else about DX did you learn?" All the attention was obviously pleasing to the QRPer, and he actually seemed to have grown an inch or two since we first sighted him coming up the hill. He actually beamed.

"You are right about seeking information about coming things in DX," he said, "and I was especially asking questions to gain such information. One piece of advice was that with Neptune, which is about spiritual growth, moving into Capricorn, which is about the material world, our DX spirituality will tend to become more practical, confronting that need for DX countries that one may not have worked. Isn't all of this just wonderful?"

Well, to ourselves we had to admit that it would be if . . . But long ago we learned one basic never forgotten tenet about DX. If it brings you a new country, it's bound to be good. We had a feeling, however, that the Old Timer might not be buying all of this, but he wasn't saying anything. For a bit we hesitated to say anything more, not quite sure if we should. Frankly, we did not understand all the significance of the zodiac signs. Thinking that perhaps questions would mask our confusion, we asked the QRPer, "You understand all of this?" His response was immediate. "Of course I do! Don't you? And if you don't understand yet, just believe. Somewhere along the way you will learn all about these things, and you will understand the stars and their significance. DXers have to be believers. There was a pause in his words, and suddenly we found ourselves feeling a bit uncomfortable, as we thought we could see a calculating look in the eyes of the QRPer.

"You know that the sun is actually a star, don't you?" he asked, and we had to admit that we did know that. "And you know what happen to DXing when the sunspots get few and the cycle heads down?" he continued, and we again had to admit that we had heard about all of these things. "Well, then," he continued, and we definitely were feeling lost as we heard his words, "if you can believe and understand all of that about our nearby star, why can't you believe how other stars will affect our DXing? Can you explain your inconsistencies in thinking?

We didn't even try. We were ready to proclaim that we believed everything. But all the signs of dissolution of old structures and values, the changes in the collective consciousness with a total sovent, left us floundering a bit. As we headed down the hill we were quiet. Maybe, we were telling ourselves, tomorrow we will understand all of this, but we sure didn't today. We were ready to admit, as many old DXers have to admit at times, that maybe these younger QRPers are on to something that some of we mature types don't quite understand. But we finally decided that we would think about it tomor-

The WAZ Program

10 Meter Phone

271	JA7HMZ	272	W9ZR

15 Meter Phone

191	JAØWRF	193	PA3AZF
192	WD9IIX		

20 Meter Phone

487 W6RDL

40 Meter Phone

24 K6YRA

15 Meter C.W.

103	JA7HMZ	105	JH7BGG
104	JF1SEK		

20 Meter C.W.

210 N4OI

All Band WAZ

S.S.B.

2801	WB1GR	2807	CT3BM
2802	EA3CFW	2808	KD7CL
2803	WØJCB	2809	WDØAWL
2804	DF4PL	2810	OH1NU
2805	WB2DCP	2811	WB6SRK
2806	K7CE	2812	ZP5MJY

C.W. and Phone

5695	NX4N	5703	W2RQH
5696	KD8V	5704	JH8DEH
5697	EA7KF	5705	AJ7Z
5698	N4IR	5706	KV5Y
5699	N6BTY	5707	IT9VDQ
5700	G3FAS	5708	WB6SRK
5701	FC6GSE	5709	NG6W
5702	PY2BW		

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

row—or maybe even next week. Maybe that total solvent had unglued us a bit.

Turkey

Dr. Unal Akbal, TA1UA, confirms that licenses will be issued again in Turkey and more TA DXers will be heard. Dr. Akbal lives in Istanbul and is Secretary General of the Turkish Radio Amateur Club.

While not especially enthusiastic about contest operating, TA1UA is often on 15 meters working c.w. in the 21010–21020 kHz slot on Saturdays from 0300–1400Z. QSLs must go direct, and the right address is Dr. Unal Akbal, Box 787, Istanbul, Turkey. S.a.e./IRC will be appreciated. There should be more TAs being heard with the new wireless rules and amateur regulations coming on line.

Mobile Marine

During the last several years amateur radio has been included more and more in the electronic gear aboard sailboats making long ocean passages. There are a number of maritime nets on the amateur frequencies which are regularly used by the cruisers both for possible emergency communication as well as for the normal ragchewing. While acknowledging the value and utility of amateur radio, many of the long-distance cruisers have operated in other years without licenses. However, this has improved.

A recent sailing magazine article analyzed 20 sailboats anchored in Papeete, the analysis covering everything from boat construction, food, anchors, and costs, to amateur radios. Ten of the sailboats had amateur rigs aboard; three-quarters of these had licensed amateurs. That figures out to 7.5 amateurs, so possibly there was a Novice or technician or something aboard.

Dr. Unal Akbal, TA1UA, is the Secretary General of the Turkish amateur radio association in Istanbul. TA1UA confirms that new license rules and regulations are being issued this year, and the TAs should be heard a bit more often.

Another magazine pointed out that those contemplating using amateur radio had better get a license, as many shoreside amateurs were running questionable callsigns through computers to check them. Some Pacific Nets such as the Pacific Maritime Net or Tony's Net in New Zealand are said to be running calls through the callbook/computer sieve. Years back we read a cruising book wherein the author noted the advantages of amateur radio and how easy it was to get a license in Panama. Things have changed, and some of us have grown older. The same author recently advised having amateur radio on a cruising boat and to avoid the maritime s.s.b. frequencies. Our curiosity about licenses was not answered.

Anyhow, if you check in on any of these maritime nets, self-interest should always be kept in mind when unlicensed operations are encounterd. In the northwest there recently were cases in which commercial fishermen were buying 2 meter gear and finding it most convenient even without a license. Some enjoy following the cruising boats across the oceans and beyond strange atolls; some should be avoided when there is doubt about licenses.

Overseas Licenses

The ARRL notes that JH1VRQ/N1CIX has about completed work on revising the information about obtaining foreign amateur licenses or operating permits. There is a small but steady demand for such information, and by the time you read this, Nao should have completed his work. Nao Akiyama, JH1VRQ, is a well-known JA DXer out of the Tokyo area and has been working in downtown Newington as the International Services Officer for the ARRL.

If you are looking for some licensing information for the upcoming DX trip, there it all is. Some may be for contests, some for vacations, but what has always surprised us is the number of newlyweds who come looking for information as they are taking the rig on their wedding trip. But then again, one has to start things off right, right?

New Zealand Callsigns

With the start of this year the New Zealand prefixes were modified, some familiar prefixes being phased out, while others having some changes. For those who need to know, the new prefix assignments are ZK1 Cook Islands, ZK2 Niue, ZK3 Tokelau, ZL1–ZL4 Main New Zealand Islands, ZL5 Antarctica, ZL6 Intruder Watch, ZL7 Chatham Island, ZL8 Kermedec Island, ZL9 Auckland & Campbell Islands. Tokelau is changed and some other islands no longer have the /– identifier. ZLØ will still be issued to visiting types.

Wallis Island

Not a very rare stop, but usually someone is looking for this one. In other years there were occasional calls by someone planning a big contest or vacation DXpedition who would ask about a good spot

to go for the operation. The usual suggestion was Wallis, and the usual reaction was that this was not one of those exotic spots that drive needy DXers mad. It was even served by scheduled air service. The feeling still is that Wallis and Futuna are good DX and not as common as many might think. DX is always a relative thing, and more so when it is something you need.

Anyhow, FW8AF has been active this year from Wallis and says that he will be around for most of the rest of the year. Francois has been showing on 40 meters around 7085 kHz after 0700Z. Most everyone knows that Wallis and Futuna are out in the Pacific; they are just west of Western Samoa 140°N/177°W. Any QSLing goes direct to Box 92, Matauta, Wallis Island, Pacific Ocean.

Tristan da Cunha

This is another one that somehow never gets to the extremely rare status but is always a bit difficult for the needy DXer with a low DXCC total to corner. There are some reasons, one being that while there are a number of valid ZD9 licenses, there are but two stations on the island, and one can only operate when the commercial broadcast station is not—interference or something like that.

Anyhow, your best chance to work Tristan da Cunha is ZD9BV, Andy Repetto, who owns the only regularly operating station on the island. Andy has a beam up, plus some antennas for the low frequencies. The other station is the club station located in the broadcast and commercial radio building, and it is only activated when there is no other activity going on in the building. Occasionally ZD9BV passes the QSL information on to his QSL manager, W4FRU, at 21265 kHz around 1630Z.

Other valid calls in Tristan include ZD9BZ, ZD9CE, ZD9CJ, and ZD9CS. There is a ZD9BU who is aboard a fishing vessel, and ZD9YL is currently in England for educational work. While close to the traffic lanes, Tristan is far enough off most tracks that it gets but a handful of vessels stopping each year. A couple of large fishing vessels make stops. A couple of other commercial vessels stop—usually one in January and the other about October. You can get some attention with a ZD9 operation. You might have trouble ending the run should you ever be thinking about going there. Even Don Miller got stuck in the Cocos for six or seven weeks some years back. He just kept operating and watching the horizon. The long run then was a surprise to some DXers as many were ready to certify that Don could walk on water. Some way he proved it at Maria Theresa, but that was another time and another decade.

U.S. Callsigns

The bin of amateur Extra callsigns for Alaska reached bottom just before the turn of the year, and the Puerto Rico and Hawaii supplies were just about gone. A proposal was made that a new batch of 2X1 callsigns be brewed, these to include AL8, KL8, NL8, and WL8 for Alaska; AH7, KH7, NH7, and WH7 for Hawaii; KP5, NP5, WP5 for Puerto Rico. KH7K, etc., would be reserved for Kure.

All this seemed simple enough. The ARRL's Washington vedette ran the idea past the FCC's licensing division, who shot it down. The feeling was that it would cost too much to program the computer changes for the new callsign prefixes. So the affected areas will get 2X2 callsigns when the 2X1's run dry, just like the Advanced class.

Kampuchea

Mike Wantanabe, JH1KRC, says that the stations at XU1SS/XU1KC and XU1YL are still active, and the best time to catch them is on Saturdays and Sundays, 0100–0500Z and 0700–1400Z. XU1KC is the headquarters station, while XU1YL is a special station for the YL operators.

Mike reports that JA1HQG has cleaned up the initial surge of QSLs, being current up to late fall, and continues to grind them out. The weekend operation includes both s.s.b. and c.w., both 20 and 15 meters.

5 Band WAZ

Standings as of February 1, 1984

All 200 zones worked:

1. ON4UN	25. K5UR	49. YO3AC
2. K4MQG	26. K9AJ	50. K3TW
3. SM4CAN	27. SM3EVR	51. XE1OX
4. AA6AA	28. LA5YJ	52. VE7IG
5. W8AH	29. DL3RK	53. OK1ADM
6. W6KUT	30. N4WJ	54. CT1FL
7. EA8AK	31. G3MCS	55. WA1AER
8. LA7JO	32. SM5AQD	56. N4RR
9. EA3SF	33. W0MLY	57. UW0MF
10. OH1XX	34. I0RIZ	58. W4DR
11. EA8OZ	35. ON5NT	59. OK1MP
12. W0SD	36. OH6JW	60. W1NW
13. K0ZZ	37. OK1AWZ	61. OE1ZJ
14. ON6OS	38. IV3PRK	62. HB9AHL
15. OK3TCA	39. DJ6RX	63. HB9AMO
16. K6SSS	40. OH3YI	64. LA6OT
17. ZL3GQ	41. I4RYC	65. UR2QD
18. OK3CGP	42. ZL1BIL	66. UK2RDX
19. SM0AJU	43. I4EAT	67. ZS5LB
20. OZ3PZ	44. ZL1BQD	68. F6DZU
21. I3MAU	45. TG9NX	69. DL4YAH
22. I2ZGC	46. XE1J	70. LA7ZO
23. 4Z4DX	47. F5VU	71. W9ZR
24. N4KE	48. W3AP	

The top 12 contenders for 5 Band WAZ:

1. VK9NS, 199	7. W8VUZ, 198
2. N4KG, 199	8. LA9GV, 198
3. ZL1BOQ, 199	9. W6GO, 198
4. JA3EMU, 199	10. K4CEB, 198
5. N4WW, 199	11. OK1MG, 198
6. W1NG, 199	12. K6YRA, 198

249 Stations have attained the 150 zone level

DX Clubs

Down in the Georgia country, on the banks of the Etowah and the Ocmulgee, the Southeastern DX Club in the Atlanta area has elected new officers, and everyone of them a DXer! President Carl Henson, WB4ZNH; Vice President Grover Meinert, KC4BX; Treasurer Carol Shrader, WI4K; Secretary Joel Levine, WA4HNL; and Activities Chairman Jim Streible, K4DLI.

Up in the Carolinas, the Carolina DX Assn. also held a spirited election. DX clubs are always loaded with eager types willing to accept the DXer's burden, and the officers for this year are President Ted Goldthorpe, WA4VCC; Vice President Roger Burt, N4ZC; Secty/Treas. Gary Bader, KD4RH; Editor Murphy Ratetree, W4WMQ; and Net Manager Larry Sassoman, K4CEB. Generally based in the Charlotte area, the Carolina DX Assn. has over 100 members in the Carolinas, Virginia, and Georgia areas.

Father Moran, 9N1MM

As far as DXers are concerned, Father Moran is Nepal. Currently at St. Xaviers Godavari School in Kathmandu, Father Moran will be visiting the States this fall, arriving September 4. Ed Konop, W3WGS, is scheduling a trip for 9N1MM around the States and would like to hear from any DX clubs interested in having Father Moran as a guest for two or three days.

Some Late Spring DX Notes

Bill Pasternak, WA6ITF, and the *Westlink Report* stalwart, ran into some hurdles in trying to line up facilities for third-party traffic during the coming Olympics in Los Angeles. The Olympic Committee early on was against amateur stations being inside the Olympic Village because of security concerns.

Bill never gave up, and efforts were continuing to arrange for temporary third-party permits as well as to establish amateur stations in or near the activities. The FCC is reported as scheduling three monitoring vehicles on the scene during the activities, there being plans to eliminate, or even minimize, any interference to commercial activities such as TV, etc.

ARRL's membership hit the skids in 1982, down 12.5%, but got back on track in 1983 with a gain of 0.9%, there being an increase in both the U.S. and Canadian membership last year.

W4ZWE arrived in Egypt a month or so back and expects to be there for a year operating on the air. D68WB showed not too long ago in the Comoros, often being found around 14166 kHz from 2130Z. QSLs go to Box 540, Morono, Republic of the Comoros. Some have noted that the space devoted to an activity in *QST* is often determined by the amount of input received on that activity. Thus, contest reporting and information are determined by the number of entries received. Therefore it can be presumed that DX activity might be linked to the amount of mail, or interest, shown in the activity. There is something buried in all of this and perhaps you get the idea.

CTØBI was a special call used in March on an operation from Berlenga Island. Joao Paulo, CT4UW, and Luis Teixeira, CT4NH, made the effort to go to the location at 39°24'N and 9°30'W. QSLs go to the Callbook address of the operators. If you have not heard of this QTH, the population is reported to be mainly rabbits, seagulls, and seabirds. The Clipperton operation was also set for March, and if you caught them, QSL to the YASME Foundation, Box 2025, Castro Valley, CA 94546. The game plan was to use only one call on each band, and the line-up of calls included FOØXU, FOØXV, FOØXW, FOØXX, FOØXY, and FOØXZ.

While working the FOØ callsign area, Jay and Jan O'Brien have cleaned up the QSLing for their French Polynesia efforts. While FOØJO and FOØOJ may not ring out as household calls in the DX world, think of the W6GO/K6HHD QSL List. The same. Statistics from their 1982 and

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. This report reflects the deletion of Serrana Bank, Bajo Nuevo, and the SA/I Neutral Zone. Total countries are now 315. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsements involving the issuance of a sticker is $1.00. The basic award fee is now $4 for *CQ* subscribers and $10.00 for non-subscribers. Please attach your latest *CQ* mailing label to qualify for the $4.00 rate.

C.W.

W6PT	315	K4XO	309	WA8DXA	302	W1WLW	289	WD9IIX	279
DL7AA	314	N6CW	308	K9QVB	302	SM6CST	286	K9IW	279
ON4QX	314	W4BQY	308	SM3EVR	300	WD9IIX	284	W4BV	277
W3GRS	314	K6LEB	308	K3FN	298	W9RY	283	N8MC	277
N4PN	314	W4OEL	307	WØIZ	298	K8PYD	281	WB4RUA	277
W9DWQ	313	W1NG	306	DJ7CX	297	WA4JTI	281	K8LJG	277
K4CEB	313	DL3RK	306	W6SN	295	YU2RTW	281	K1VHS	277
W8KPL	313	AA6AA	305	WØSR	295	K7ZR	280	K4SE	275
K6EC	312	W9BW	304	K3UA	293	WA2HZR	280	DL1QT	275
K9MM	312	N4KG	304	W7CNL	292	I5XIM	280	W6YQ	275
K6JG	312	N4MM	303	AB4H	291	W2LZX	280	WØHZ	275
W6ID	311	K1MEM	303	N5DX	291	WD9IIC	280	WA4DAN	275
N6AV	310	OK1MP	302	I3OBO	290				

S.S.B.

K2FL	315	N7RO	311	W8JXM	303	WD8MOV	293	VE4AT	283
W6EUF	315	EA4LH	310	IØMBX	303	KB8KW	293	AE5B	282
K6WR	315	K6XP	310	W6DN	302	WB4UBD	293	CT1UA	282
W3GRS	315	OE2EGL	310	K1MEM	302	WA4LOF	292	KC8YM	282
W3NKM	315	DK2BL	310	VE3MRS	302	I5BDE	292	AI9R	282
DL9OH	315	I3LLD	310	N5FG	302	WB4KTG	292	IØSGF	282
W4UG	315	K9RF	310	G4CHP	301	ACØA	292	VE3DLR	282
VE3MR	315	OE3WWB	310	VE3FJE	301	W9RY	291	TG9EP	281
IØAMU	315	K4XO	310	K9HQM	301	KV2S	291	I1POR	281
F9RM	315	4Z4DX	310	WB4NDX	301	I2MQP	291	KB5FU	281
VE3MJ	315	W9SS	310	W7OM	301	VE3IPR	291	K9TI	280
W4EEE	315	VE3GCO	309	WA3HUP	301	N5AWS	291	N5FW	280
W9DWQ	314	K8LJG	309	K8CMO	301	WB3DNA	291	K8ZZU	280
I8AA	314	W2SUA	309	W8ILC/QRPp	301	KB5FU	291	VE3FEA	280
IØZV	314	N6AW	309	AI8S	301	WB6GJF	291	W8IMZ	279
I8KDB	314	DL6KG	309	WD8MGQ	300	W4JFE	291	KA8T	279
K6YRA	314	N4PN	309	W4OHZ	300	JH4PRU	290	KB5DN	279
ZL1AGO	314	VE7WJ	308	WAØTKJ	299	KKØC	290	EA3KW	279
XE1AE	313	W1NG	308	I6PLN	299	W6NLG	290	W6MFC	278
I4ZSQ	313	VK4VC	308	YU2RTW	299	W4UNP	289	AI8M	278
W9KRU	313	YV5AIP	308	W6SN	299	JA5PUL	289	K4BYK	278
ZL3NS	313	LU3YL	308	W6FET	298	KM6B	289	N9AMF	278
VE3GMT	313	ZL1BIL	308	DJ7CX	298	WDØBNC	289	W6BQQ	278
YV1KZ	313	N2SS	307	K9SM	298	W9TA	289	I5EFO	278
W3AZD	313	VE4SK	307	I8LEL	298	K4CXY	289	VE3IUE	278
ZS6LW	313	K8PYD	307	K8NA	298	KR9O	289	WD8PUG	278
DJ9ZB	313	OZ8BZ	307	W2FGY	298	KC8JH	289	KB3KV	277
W4DPS	313	N4KG	307	HP1JC	297	W7FP	288	KB8O	277
N4WF	313	AA6AA	307	K3UA	297	KØGT	288	KP4EQF	277
K6JG	313	N4KE	306	K5DUT	297	I8KCI	288	WBØUFL	277
W9JT	313	N6AV	306	JH1VRQ	297	N2ATD	288	K9TI	277
VE2WY	312	K1UO	306	WA4DAN	297	K1VHS	287	W4PTT	277
F2MO	312	W8PCA	306	IØMBX	297	EA9IE	287	WØIYR	277
K9MM	312	WØSR	306	WAØDCQ	296	AB9E	287	N7ASL	276
K9LKA	312	K9BWQ	306	K9IW	296	KB9KD	287	WA6DTG	276
W3GG	312	VE1YX	306	XE1NI	296	KE3A	287	ZL1BOQ	276
W9BW	312	N6OC	306	WD9IIX	296	W4BQY	287	WA4OPW	276
I8YRK	312	YV5DFI	305	I8ACB	295	KB3OQ	286	WA2FKF	276
OZ3SK	312	W8ILC	305	IV3YRN	295	K8VFV	284	VE6PW	276
CT1FL	312	WB1DQC	305	I3OBO	295	KB5RF	284	AI9U	276
WØSD	312	W2CC	305	K9UAA	295	NA5W	284	I8INW	275
K6EC	311	VK3JF	305	K9QVB	295	WØKU	284	JH4PRU	275
W4SSU	311	YU1DZ	305	SM4CTT	295	N8BKF	284	W8LKG	275
K4MQG	311	LA7JO	305	WA9PWN	295	WB3HAX	283	WB3CQN	275
WØSFU	311	9H4G	304	W1LQQ	294	VP9CP	283	WB1EAZ	275
I4LCK	311	WA4JTI	304	KB8DB	294	XE1OW	283	VE7BSM	275
OK1MP	311	WA4WTG	304	AI5I	294	XE1OX	283	KZ2P	275
N4MM	311	XE1J	303	I8ZTE	294	VE3CKP	283	K8NWD	275
K5OVC	311	XE1KS	303	K4SE	293	VE3MV	283	K4LR	275
WØYDB	311	W2LZX	303	NA5W	293	WØULU	283		

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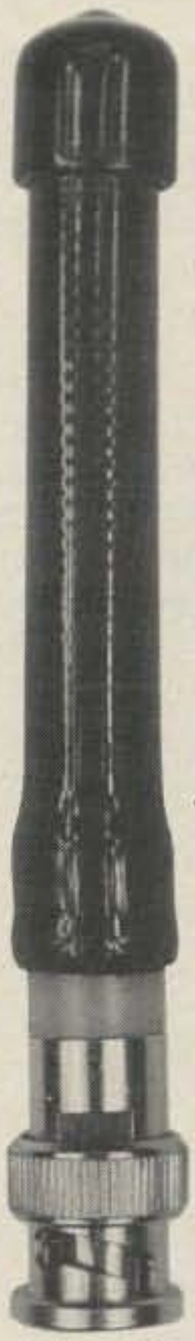

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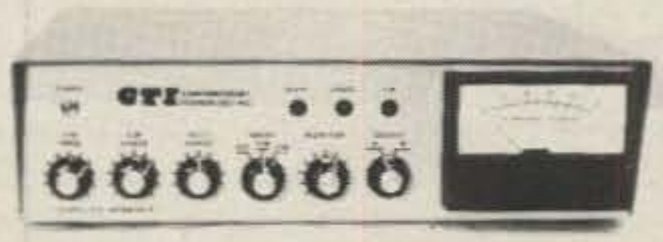

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S.S.B.

1305	K3UA	1308	G4KDV
1306	VE3DLR	1309	KE5GF
1307	K9JDF	1310	KI4DH

C.W.

606	K3UA	608	K9DDO
607	WA4JTI		

S.S.B. Endorsements

310	N4WF/313	275	W4JFE/291
310	I@AMU/315	275	I2MQP/291
310	K6JG/313	275	N5AWS/291
310	VE2WY/312	275	KK@C/290
310	N7RO/311	275	W6NLG/290
310	4Z4DX/310	275	KC8JH/289
310	AA6AA/307	275	VE4AT/283
300	N6OC/306	275	VE3DLR/282
300	LA7JO/305	275	AI9U/276
300	YU1DZ/305	200	KA9I/210
300	W8ILC/QRPp/301	150	G4KDV/160
275	YU2RTW/299	28 MHz	WA@TKJ
275	W6SN/299	28 MHz	K9JDF
275	K3UA/297	28 MHz	KZ2P
275	WA4DAN/297	3.5/7 MHz	G3XTT

C.W. Endorsements

310	K6JG/312	275	WD9IIC/280
300	AA6AA/305	275	WA4DAN/275
275	K3UA/293	1.8 MHz	G3XTT
275	WA4JTI/281	3.5/7 MHz	G3XTT
275	YU2RTW/281	28 MHz	G3XTT

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

1983 operations show that per QSO the JAs had the highest percentage of QSLing (45%), this followed by the Europeans who QSLed (43%), South America (40%), VKs (36%), USA (33%), Africa (31%), VEs (27%), and ZLs (22%). By the bands, QSOs on the 30 meter band brought a 33% response, 10 meters 31%, 80 and 15 meters 26%, 40 meters 20%, and 20 meters 19%.

If you wonder what the QSL list is, drop a line to Box 700, Rio Linda, CA 95673 and enclose a large envelope with one U.S. postage rate.

There are other ways to feel a bit older than by noting how young some on the Honor Roll are these days (maybe not very far into their fifties), but a year back we ran a photo of ZK1CG, Victor Rivera, and his bride at their wedding in Rarotonga. A month or so back Victor forwarded a note about Tuatai, ZK1MA, and Ron, ZK1XL, heading out for a month's operation on Penrhyn Atoll, one of the easternmost spots in the Northern Cooks. Victor said he could not make the trip as he and the XYL, Marsha, have a new baby girl, Heather, to keep them close to the home QTH. Anyhow, Tuatai and Ron were planning everything from 10 through 160, mostly c.w., and if you worked them on Penrhyn, QSL to ZK1CG, Box 618, Rarotonga, Cook Islands (s.a.s.e. or s.a.e./IRC needed). It hardly seems that long since we ran that wedding photo, but it is.

Elsa, 9Y4LL ("Lovely Lady"), and John, 9Y4JW, are shown above at their operating position for their station on Trinidad. They are also known as Elsa, 8P6MH, and John, 8P6JX, on Barbados, and QSL manager for either call is K2QIE. (Photo via W2LZX)

Chuck Van Hoorn, KG9N, was down in the Bahamas for the WPX S.S.B. Test just a bit back signing KG9N/C6A, and if you worked him, QSL to home QTH (Box 57, Goodfield, Illinois 61742). The TN8EE QSLs are being accepted by the DXCC Desk, but the 1S1CK are still held at arms' lengthy. The Sixes will be using the "23" or "84" in the callsign in July and August to mark the XXIII Olympiad and the year. With the normal situation being everyone wanting to work the elusive Sixes, things will be even more interesting in a month or so.

The sunspots continue to slip downward as Cycle 21 nears its end. The good Dr. A. Koeckelenbergh of the Sunspot Index Data Center in Brussels was figuring that the smoothed monthly sunspot numbers would be February 61, March 59, and April 57. When they get down close to 10, you can figure the end of the cycle is near, but one is never sure. Most times it is not positive that the cycle has ended and the new one has started until a couple of months after the event. Sunspots showing in the high latitudes on the sun's surface are an indicator; they tend to drift lower and lower during the life of the cycle, usually appearing close to the sun's equator as the cycle ends.

On the marine v.h.f. channels we recently heard the marine telephone operator calling for a vessel named "RST." Undoubtedly a c.w. operator somewhere in there.

Most DXers probably saw the statistics compiled by W3IQS on QSLing via the various routes, with a QSL manager being the best route and the bureaus the least likely way (88% return versus 50% return). Most DXers will be nodding their heads at the compilation, knowing from experience that there are instances in which it is easier to work the country than to get the QSL. Actually, the W3IQS information showed QSL managers to be the best route, then direct, and way down and almost tied was sending just the QSL card or via the bureau.

About a decade back we innocently accepted a duty involving checking cards and issuing an award. It was more work than one can imagine, but the surprise was the time it took incoming cards to arrive via the bureaus. One big amateur population country better left unnamed controls the amateurs through a government bureau. Cards sent via that bureau would not even be shipped out of that country for six to eight months after the amateur had submitted them via channels. Bureaus serve a need for a cheap route for mass, or is it gross, QSLing. But the best way has always been via the QSL managers or direct. Some things change over the years, but that hasn't.

And, finishing up with a word that is always welcomed, though possibly repetitious, our deadline is still three months prior to the appearance of *CQ* on the amateur scene. As we heard somewhere else sometime ago, write early and often—especially early. We know that *CQ* is the best read item in any DXer's household, and think of the glow that will come when you see your upcoming DXpedition or contest plans there in solid black and white saved for all posterity. In other words, allow us the necessary lead time.

QSL Information

Note that elsewhere there is reference to the W3IQS findings on the reliability of various QSL routes. QSL Managers are always the fast route and valued by those needing QSLs for DXCC counters. Down in the Alabama territory there stands Cheryl Whitlock, N4SFV, Rt 1, Box 244B, Opelika, AL 36801, who says she is a volunteer for duty as a QSL Manager for a DX station. DX stations take note! And with an assist from W9LNQ . . .

A92NH to W8LU
CE0SAB to VE1AJH
CT2DL to KE4OC
DL7NS/HB0 to DL7NS
DL8YR/LX to DL8YR
FG0HLI/FS to N6DX
GD0WCY to GD3KHE
HC1OT to W2KF
J37AE to 84 CBA
J73PB to 84 CBA
J6LCQ to W2LZX
JW1UW to LA1UW
KB0Y/DU2 to KA0HFR
KA4EIN/TI4 to N5BQR
KA6NOR/KP2 to KA6NOR
KG4AW to WA4TAY
KH0AC to K7ZA
P47LTA to K4LTA
T26FE to DL4BC
TN8AJ to Y25LO
TL8TX to K0VZR
VP8KF to G3VPW
WL7E to KL7GNP
Y1C0P to UW1BJ
Y80ARA to K6DLV
ZD9CC to ZS2DK
ZD9BV to W4FRU
ZP5XDW to N4DW
ZS1CT to DL2MY
ZS3N to DK2DZ
4K1QAV to UA1QAV
4N4CA to YU4CA
5J5LR to HK3SO
5T5RY to F6FNU
5W1ET to VE3XG
6Y5DA to VE4JK
A92P to PB 14, Manama, Bahrein Island
AH9AB to POB 248, Wake Island 96898
BY4AA to PB 205, Shanghai, Peoples Republic of China
HC2AIR to POB 3285, Guayaquil, Ecuador
KG9N/C6A to Box 57, Goodfield, IL 61742
FO0JO/FO0OJ to Bx 700, Rio Linda, CA 95673
FO0XU-XZ to YASME
OY8R to POB 343, Torshavn, Faroe Islands 3800
TR8JLD to BP 484, Libreville, Gabon Republic
YN5JAR to PB 22, Jino Tepe, Nicaragua
YS9CAT to POB 0515, San Salvador, El Salvador
ZK1MA/P to Box 618, Rarotonga, Cook Islands
ZK1XL/P to Box 618, Rarotonga, Cook Islands
ZK2RS to Box 37, Niue, South Pacific
ZS4AE to POB 1902, Wekom, 9460 South Africa
4T4WCY to YASME
4U1ITU (Dec 9–14, 1983 only) to Christian Schneider, DL8MBS, Kopernikusstr. 24, 8900 Augsburg 21, Federal Republic of Germany

73, Cass, WA6AUD

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Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Solar activity continues to decline pretty much as expected. The Royal Observatory of Belgium reports a monthly mean sunspot number of 57.6 for January 1984. This results in a provisional 12-month running smoothed sunspot number of 65.5 centered on July 1983. The intensity of a solar cycle is measured by the smoothed sunspot number. A smoothed sunspot number of approximately 45 is forecast for May 1984.

May Conditions

During May expect *lower* optimum frequencies during the daylight hours, and somewhat *higher* frequencies during the late afternoon, early evening, and nighttime hours, than were observed during the winter and early spring months. A considerable increase is expected in sporadic-*E* ionization, and this should result in more frequent short-skip openings on the h.f. bands and on the v.h.f. bands. A seasonal *increase* in the static level is also expected during May.

The following is a thumb-nail sketch of h.f. amateur band openings expected during May 1984. For specific times of DX openings refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts valid for both May and June, as well as Charts centered on Alaska and Hawaii.

The Short-Skip Charts contain propagation forecasts for openings varying in distance between approximately 50 and 2300 miles. For day-to-day variations expected in propagation conditions during May see the Last Minute Forecast which appears at the beginning of this column.

10 Meters: This band should continue to offer fairly good DX conditions into Central and South America, parts of Africa, and the South Pacific area. Band conditions should peak during the afternoon hours when signals should be strongest, but check at other times during the daylight hours as well. DX openings on this band should follow the sun westward. Expect a considerable increase in short-skip openings between distances of approximately 750 and 1400 miles.

15 Meters: A seasonal decrease in DX openings on this band is normal for May and the summer months, but some fairly good openings to many parts of the world still should be possible during the hours of daylight. The afternoon hours should be best for DX possibilities. Numerous short-skip openings, between approximately 600 and 2300 miles, should be possible on many days.

20 Meters: This most probably will be the best band for DX during May. Opening shortly after sunrise, good DX conditions can be expected to one area of the world or another through most of the daylight hours and well into the hours of darkness. Peak conditions are expected during the sunrise period and again during the late afternoon and early evening. Expect excellent short-skip conditions, often with exceptionally strong signal levels, between distances of approximately 350 and 2300 miles. Quite often, particularly during the late afternoon and early evening, optimum conditions will exist for both short and long skip, and stations a few hundred miles away will be heard at the same time as DX stations several thousand miles away, causing considerable QRM!

40 Meters: Fewer DX openings are expected because of the shorter hours of darkness and the higher levels of static expected in the northern hemisphere during May, but some good openings to many areas of the world still should be possible during the hours of darkness and the sunset and sunrise periods. Good daytime short-skip openings should be possible for distances ranging between approximately 150 and 750 miles, with nighttime openings extending up to the one-hop limit of 2300 miles.

80 Meters: A considerable decline in DX possibilities is expected during May because of the shorter hours of darkness and seasonal increase in static levels. Some fairly good DX opportunities should continue to occur, however, for openings to many areas of the world during the hours of darkness and the sunrise period. Weak signals will often be masked by high static levels. Excellent short-skip openings should be possible during the daylight hours over distances of approximately 50 and 250 miles. During the hours of darkness short-skip openings should increase up to approximately 2300 miles. Short-skip propagation may also often be marred by high static levels.

160 Meters: Skywave openings are considered to be hopeless during the day on this band because of the high absorption levels and seasonally high static levels, which combine to prevent communications. Openings up to about 1200 miles should be possible fairly regularly, however, during the hours of darkness and the sunrise period. An occasional opening beyond this range may be possible when static levels are low.

V.H.F. Ionospheric Openings

May is generally a good month for ionospheric openings on the v.h.f. bands resulting from sporadic-*E* propagation, meteors, trans-equatorial propagation (TE), and auroral activity.

Sporadic-*E* ionization increases considerably during May, and some fairly frequent 6 meter short-skip openings should be possible. These are most likely to occur over distances between approximately 1000 and 1400 miles. Although sporadic-*E* openings can happen at any time of the day or night, the best time to check is between 10 a.m. and 2 p.m. and again between 6 and 10 p.m. local daylight time.

During periods of intense and widespread sporadic-*E* ionization, two-hop openings considerably beyond 1400 miles should be possible on 6 meters, and short-skip openings between approximately 1200 and 1400 miles may also be possible on 2 meters.

Some 6 meter, and perhaps 2 meter, trans-equatorial (TE) scatter openings

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for May 1984

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 2, 14, 24-25	A	A	B	C
High Normal: 7-8, 16, 23, 26, 28-29	A	B	C	C-D
Low Normal: 1, 3, 6, 9, 13, 15, 18, 20-22, 27, 30	A-B	B-C	C-D	D-E
Below Normal: 4-5, 10, 12, 17, 19, 31	B-C	C-D	D-E	E
Disturbed: 11	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and 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 band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on the 1st, excellent (A) on the 2nd, good-to-fair (B-C) on the 3rd, fair-to poor on the 4th, etc.**

11307 Clara Street, Silver Spring, MD 20902

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. 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) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

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

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

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

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

CQ Short-Skip Propagation Chart
May & June, 1984
Local Daylight Savings Time
At Path Mid-Point

Band (Meters)	Distance Between Stations (Miles)			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	08-10 (0-1) 10-14 (0-2) 14-18 (0-1) 18-22 (0-2) 22-00 (0-1)	08-10 (1) 10-14 (2) 14-18 (1-2) 18-22 (2) 22-00 (1) 00-08 (0-1)	08-10 (1-0) 10-22 (2-0) 22-23 (1-0) 23-08 (1-0)
15	*Nil*	07-10 (0-1) 10-14 (0-2) 14-18 (0-1) 18-22 (0-2) 22-01 (0-1)	07-10 (1-2) 10-14 (2-3) 14-18 (1-3) 18-20 (2-3) 20-22 (2) 22-01 (1)	07-10 (2-0) 10-17 (3-1) 17-20 (3-2) 20-22 (2-1) 22-23 (1) 23-07 (1-0)
20	10-21 (0-1)	07-10 (0-2) 10-13 (1-3) 13-18 (1-4) 18-20 (1-3) 20-21 (1-2) 21-23 (0-2) 23-07 (0-1)	07-08 (2) 08-10 (2-3) 10-13 (3-4) 13-18 (4) 18-20 (3-4) 20-21 (2-4) 21-23 (2-3) 23-01 (1-2) 01-07 (1)	07-08 (2) 08-10 (3-2) 10-16 (4-3) 16-21 (4) 21-23 (3) 23-01 (2) 01-07 (1)
40	08-10 (1-2) 10-12 (2-4) 12-18 (3-4) 18-20 (2-4) 20-22 (1-3) 22-00 (0-2) 00-08 (0-1)	08-10 (2-4) 10-15 (4-2) 15-16 (4-3) 16-20 (4) 20-22 (3-4) 22-00 (2-3) 00-08 (1-2)	08-09 (4-3) 09-10 (4-2) 10-15 (2-1) 15-16 (3-1) 16-19 (4-2) 19-22 (4) 22-00 (3-4) 00-03 (2-4) 03-05 (2-3) 05-08 (2)	08-09 (3-1) 09-10 (2-1) 10-16 (1-0) 16-19 (2-1) 19-22 (4-3) 22-03 (4) 03-05 (3) 05-07 (2) 07-08 (2-1)
80	08-11 (4) 11-19 (4-3) 19-22 (4) 22-00 (3-4) 00-06 (2-3) 06-08 (3-4)	08-10 (4-1) 11-16 (3-0) 16-18 (3-1) 18-19 (3-2) 19-20 (4-2) 20-00 (4) 00-06 (3-4) 06-08 (4-3) 10-11 (4-0)	08-09 (1) 09-10 (1-0) 10-16 (0) 16-18 (1-0) 18-20 (2-1) 20-23 (4-3) 23-03 (4) 03-06 (4-3) 06-08 (3-2)	08-09 (1-0) 09-18 (0) 18-20 (1-0) 20-21 (3-1) 21-23 (3-2) 23-03 (4-3) 03-06 (3-2) 06-08 (2-1)
160	06-09 (4-1) 09-10 (2-0) 10-19 (1-0) 19-21 (3-1) 21-23 (4-2) 23-06 (4-3)	06-09 (1) 09-19 (0) 19-21 (1-0) 21-23 (2-1) 23-01 (3-2) 01-04 (3) 04-06 (3-2)	08-09 (1-0) 09-21 (0) 21-23 (1) 23-01 (2-1) 01-04 (3-2) 04-07 (2) 07-08 (1)	08-21 (0) 21-01 (1) 01-04 (2) 04-06 (2-1) 06-07 (1) 07-08 (1-0)

ALASKA
May & June, 1984
Openings Given in GMT

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

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

* Indicates best time for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.

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

should be possible during May. They are most likely to occur between 9 and 11 p.m. local daylight time on long north-south paths which cross the geomagnetic equator at approximately a right angle. TE openings favor locations in the southern third of the USA, but from time to time openings further north may be possible.

The *Eta Aquarids* meteor shower should intersect the earth's atmosphere between May 4 and 6. This should be a major shower reaching maximum intensity during May 5 with an average of 20 meteors an hour. Chances are good for meteor-burst short-skip openings during the three-day period of this shower.

Some auroral activity may be possible during May, resulting in short-skip auroral-scatter-type openings on the v.h.f. bands. Such activity is most likely to occur during periods of ionospheric storminess. Check the Last Minute Forecast at the beginning of this column for those days that are likely to be Below Normal or Disturbed during May.

73, George, W3ASK

HAWAII
May & June, 1984
Openings Given in Hawaiian Standard Time

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

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"THE SWAP LIST" has bargains galore. Subscribe now! Six months for $4.00; one year only $6.50. "THE SWAP LIST," Box 988-C, Evergreen, CO 80439.

COMPUTER PROGRAMS for TI99/4A, VIC-20, Commodore 64, Apple II; Ham, educational, and financial software from $6.95, LICENSE PLATE FRAMES read "Amateur Radio—Licensed Operator," $5.00/pair or $3.50 each, Write ELECTRONIC PUT-ONS, 7805 N.E. 147th Ave., Vancouver, WA 98662.

H*A*R*K Hear Amateur Radio (over) DX Crystal detectors. SASE TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

SWAP: Horace G. Martin Vibroplex 1907, serial #11584, one set contacts for both dits & dahs, gud condx for ham gear. WA2PCL, 101-23 Lefferts, Jamaica, NY 11419.

R.I. sked needed on 80 Mtrs CW to complete 5BWAS. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

SB-110 6M xcvr, D-104, HP-23 Pwr supply $200, HR-10B Rcvr $50, Cushcraft 6M Beam $35, Hy-Gain 5BDQ Doublet $50, NC-270 Rcvr $100. All Excellent condition. KD7EC, 602-428-7719.

FOR SALE: Experimenter's varactor tripler, 432 to 1296 MHz, about 1 watt, w/filter. $20 pp. E. Erickson, 343 Catherine, S. Amboy, NJ 08879.

HAMMARLUND HQ-100-A receiver $85, Motorola WWV receiver & VHF station monitor $35, Hallicrafters HT-18 $35. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANTED: ELMEC 400 Amplifier in best condx. (uses single 813 tube). KF6CQ, 7438 Kester Ave. #8, Van Nuys, CA 91405. Phone (213) 781-2077.

FOR SALE: Central Electronics Compression Amplifier, $20/manual. 12V Power Supply for SB-34 Transceiver with cables, $100/manual. Gavin 6 mtr. tunable filter with power output meter with manual, $25. Waterman Mod 5-10-A Oscilloscope with weak CRT. All in good operating condition. T.K. Brown, RD1 Box 225, Forksville, PA 18616.

WANTED: Butternut HF6V. W7OM via CallBook.

NOVICE ALL-AMERICAN Certificate: Work a Novice in all 10 call areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

WANTED: J-390/GR panel and C-806/GR indicator units. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

WANTED: EBY PCK 40/80 2-tube CW TX from late 50's era. Sever, 7267 Tara Drive N., Mobile, AL 36619.

SELL: DS-2000 Hal RTTY ASCII video keyboard. Excellent, $299 ppd. WA7YOU, 943 W. 4th St., Laurel, MT 59044, phone 1-406-628-6151.

HW-7 power supply and manuals $90; Bencher paddle $20; Regency 2 meter xcvr, model HR-312 $150; 20 meter mobile antenna $8; Broomstick 2 meter antenna $8. Joseph Schwartz, K2VGV, 2701 Sunrise Lakes Drive E., Sunrise, FL 33322, phone (305) 748-5138.

WANTED: Callbook Volume 27 Issue 4 Winter 49-50, $40. K7MF, Rt. 1 Box 114, Vaughn, WA 98394.

FOR SALE: Two matched pair 6MJ6 tubes. Brand new, never used. $10.00 per pair. W5IHD, 9739 EBB, Houston, TX 77089.

SELL: New, boxed, rare 4D32 "Raytheon" $30. Limited supply. WANTED: Machinist Tools from retired toolmaker, must be reasonable. W5QJT, P.O. Box 13151, El Paso, TX 79913, phone 915-581-2017.

WANTED: Ten-Tec Model 200 VFO, Heath GH-17 Soldering Iron & IM-103 Line Voltage Monitor, Solar Panel for QRP, Automotive-Type Battery Load Tester, set of "82" Callbooks. TO SELL: Century CRT Testivator w/manual & leads $35, Hickok Antique Tube Tester AC-47 w/manual $45, Simpson O-15 Amp 4"×4" Panel Meter $15, CDR Rotor Control for AR1 or 2 $15. Tom Coddington, WB6AWC, 7825 Scotts Valley Road, Lakeport, CA 95453.

WANT: 72' E-Z-Way tower; SA1480 coax switch; digital GMT clock; Auto-Mate K5/50 keyer manual; two 8-ohm outdoor speakers. W4EOB, 1412 Winkler Ave., Ft. Myers, FL 33901.

NEED ROOM: Drake, Heath, etc., reasonable, S.A.S.E. for price list. Joe Bedlovies, 241 Dover St., Bridgeport, CT 06610.

CLUB NEWSLETTERS WANTED. Please send a copy of your club newsletter to Don Bishop, NØEA, 561 Geneva St. #100, Aurora, CO 80010.

FOR SALE: National NCX-5 Transceiver with A.C. power supply. Good condition. Priced to sell. Call: NØEBA, Bill Bishop, 515-684-6185.

INFO-TECH M-200F $400, HT-37 $110, D-104 $25, 75A-4 2.1, .8, $400. Russ Adams, 710 E. 21st St., Pl. So., Newton, IA 50208.

CQ MAGAZINE, 1945 to present, prefer sell by years, 1940s $15 per year, 1950s $10 per year, 1960s $8 per year, 1970s $6 per year, 1980s $4 per year. You pay postage. Include S.A.S.E. Nate Williams, W9GXR, 6915 Prairie Dr., Middleton, WI 53562.

FREQUENCY LIST for worldwide shortwave English Language broadcasts. Also included are addresses of each station for QSL verification. Send $2 and SASE (long) to Brian, P.O. Box 403595, Miami Beach, FL 33140.

FOR SALE: Torin TA450 Fan for GLA-1000A or B, $10. Also 50 watt zener to increase bias and lower idle current to 100 ma to extend tube life per factory modification, $5. Inc. shipping. Bob Bradley, W9WGD, 1002 Forest Road, La Grange Park, IL 60525.

ROHN AND HY-GAIN TOWERS: Self-supporting, fold-over, guyed, and crank-ups. Get our bid! Cushcraft, Hy-Gain, Butternut antennas and accessories. RF ENTERPRISES, RR7, St. Cloud, MN 56301. Phone (612) 255-0855.

B&W 850A plate tank inductor, 80-10 w/bandswitch, data sheet, $45. Alda 103, $295. Bishop, NØEA, 5625 S. Sycamore 102, Denver, CO 80120.

"STOP!! SUPER SAVINGS" Kenwood R-2000 $499.50, R-1000 $409.50, FRG-7700 $429.50. Sony 2002 $225.50. Panasonic RF-B300, RF-B600, CALL! Uniden CR-2021 $209.50. Regency HX-1000, HX-3000, MX-5000, MX-7000, IN STOCK CALL!! BEARCAT BC-100 $288.50, BC-250 $249.50, BC-300 $359.50. Frequency Directories, Cordless Phones, Rotors, Coax, Antennas, Much, More! FREE UPS SHIPPING & INSURANCE TO 48 STATES. 25-Page Picture Catalog $1.00 (REFUNDABLE). GALAXY ELECTRONICS, Box 1202, 67 Eber Ave., Akron, Ohio 44309, phone 216-376-2402 9–5 p.m. EST.

JUNE 3–SRRC HAMFEST, Princeton, Illinois. SASE to SRRC/W9MKS, RFD #1, Box 171, Oglesby, Illinois 61348 for complete details, map, registration materials, etc.

SWEEP TUBE LINEAR OWNERS: Matched tube sets for Galaxy 2000, LA550, SBE Linears, Dentron, etc. Matched pairs also avail.: 6HF5, 6KD6, 6LQ6, 8122, etc. SPENCER TUBE CO., Box 24, Spencer Hill Rd., Corning, NY 14830.

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FOR SALE: TS-820 w/CW Filter, Rmt VFO, Ex Cond with Manuals & Orig Box. $500 UPS Paid. Jerry Hagen, N6AV, 9407 White Hemlock, Matthews, NC 28105, phone (704) 847-7513.

"I PIG OUT ON HAM RADIO" bumper sticker. $2.00 + long SASE. KT5Y, 1112 N. Rubey, Macon, MO 63552.

REALISTIC DX-300 Digital Readout General Coverage Receiver, $190. KAØPCK, Box 123, Tea, SD 57064, phone 605-743-2959.

WANTED: Heathkit HR-20 Receiver, Byron, WA5PLK, 401 Bayridge, League City, TX 77573.

SUPER BARGAIN: Tempo I (Blackface) Transceiver with Power supply/speaker and all manuals. Retubed, realigned, and ready, $280. J. Dickerson, P.O. Box 56, Morehead, KY 40351.

FOR SALE: Stancor filament transformers; 5VCT @ 30 Amps, new $20, and 10 VCT @ 10 amps, new $17. Hallicrafters S-38 Receiver, best offer. WB5ZKR (601) 265-5072.

MINT LINEAR AMP Heathkit SB-230 conduction-cooled 80–10M, 1200W pep, Best Offer. WB5KEA, Dennis Miller, 901 W. Nixon, O'Fallon, IL 62269.

WANTED: SB-104, basket-case, cheap. Sell Gonset GSB-201, 4-811A's, $200, plus shipping. WA4TOJ, Marvin, 2957 Gaffney Rd., Richmond, VA 23237, phone (804) 275-1252.

BC-610 TRANSMITTER $150, you pay shipping. W.R. Hempkins, Rt. #1 Box 273C, Denison, TX 75020.

WANTED: Callbook Volume 33 Issue 4 Winter 1955, $30.00. K7MF, Rt. 1 Box 114, Vaughn, WA 98394.

I AM INTERESTED in setting up a regular sked with other hams who are interested in working the Historical Processes of Photography such as Carbro, Bromoil, Oil Transfer, etc. Please contact W2OQK, Tracy Diers, 58-14-84th. St., Elmhurst, NY 11373.

FOR SALE: DENTRON Model MLA 2500 Linear Amplifier, $600. LEADER MOdel LTC-905 Transistor Curve Tracer, $100. Simpson Model 311 VTVM plus High Voltage Probe, $65. Wm. D. Shevtchuk, 1 Lois Ave., Clifton, NJ 07014, phone 201-471-3798.

FOR SALE: Heathkit SB-220 w/manuals and/or Dentron Clipperton-L w/manuals and pair of extra tubes. Your choice $500. Aric Keck, KN8P, 406 W. Washington St., Dewitt, MI 48820, phone (517) 669-3138.

B&W T-R switch $25; B&W 850A inductor $65; 750 watt Variac $35; 10VCT @ 10A fil xfmrs $10 ea.; CDR AR-22 rotor $20. Don Bishop, NØEA, 561 Geneva #100, Aurora, CO 80010, phone 303-363-8070.

FOR SALE: Heath model HW-7, HWA-7-1- power supply with manuals, $90. I ship. Joseph Schwartz, K2VGV, 2701 Sunrise Lakes Drive E., Sunrise, FL 33322. Phone (305) 748-5138.

VU5KV-Laccadives: Can anyone help me obtain a QSL for a 1971 QSO from this station? Contact WA3CGE, Doug Stark, 1290 Lakemont Drive, Pittsburgh, PA 15243.

ANTENNA TOWER: Tri-Ex Model-W 40 ft. crank-up including 5 foot, 2 inch diameter mast, plus mounting bracket, good condx, come and get! $300. Hy-Gain AR22XL Rotor, new condx, $45 plus $4 for UPS shipping. K2POA 516-546-5426.

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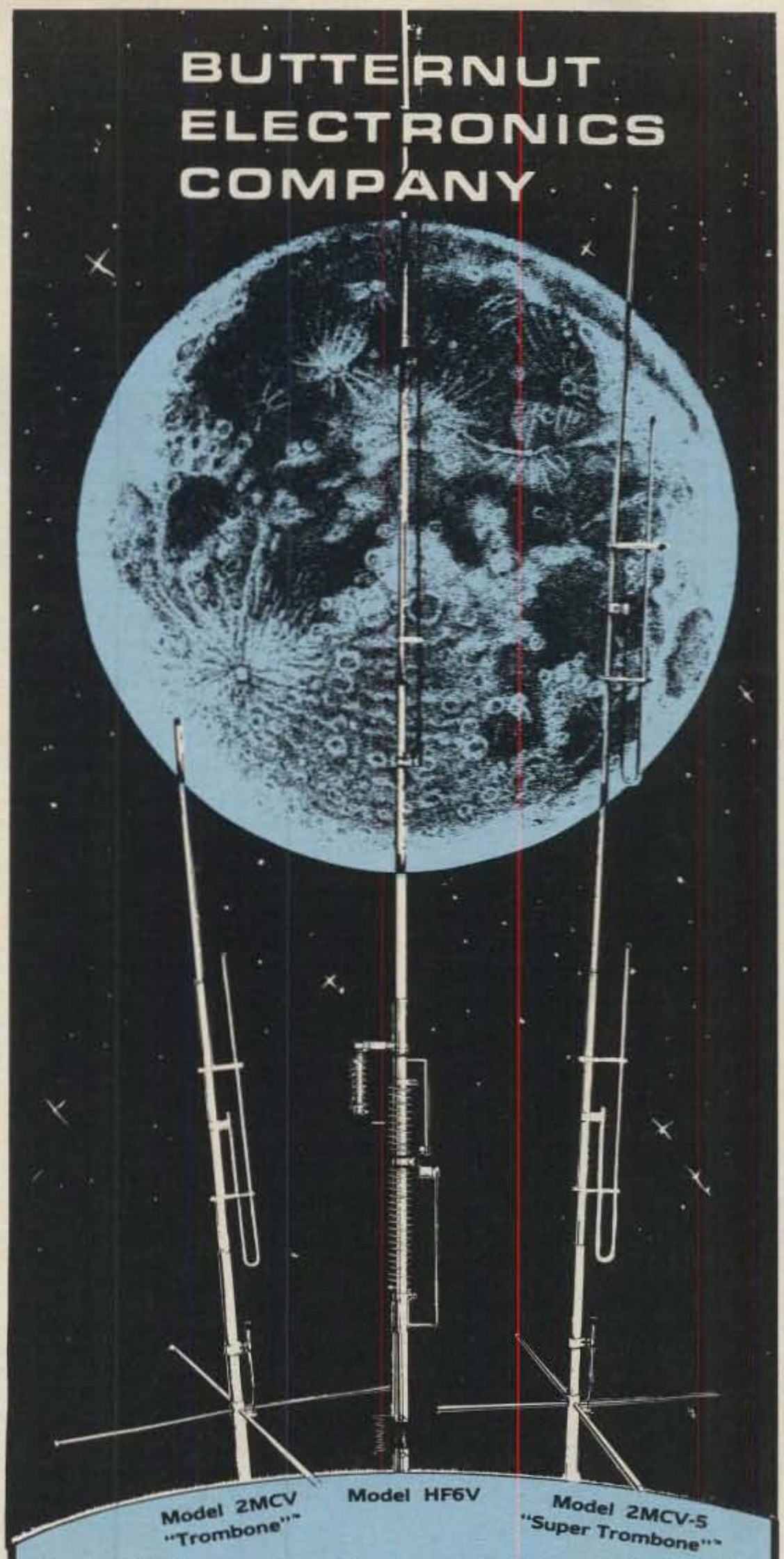

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WANTED: Old RCA, Cunningham, Western Electric, etc., tubes. Also old Thorens, Western Electric speakers, amplifiers, McIntosh, Marantz, Dynaco, tube amps. Phone 713-728-4343. Corb, 11122 Atwell, Houston, TX 77096.

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WANTED: Unused and good used #45 and large globe #50 tubes. Write Tom Wright, 4933 Yakima, Pocatello, Idaho 83204. State quantity and asking price.

WANTED: Hallicrafter P.S. 150–120 power supply. FOR SALE: Heathkit HP 23 power supply. Send SASE to R. Goodpaster, 415 Harmon Hts, Stanford, KY 40484.

THE 574TH AND 565TH S.A.W.B.N.S. SECOND REUNION is scheduled for July 1984 in St. Louis, MO. Former members write to Chas. A. McGaffin, San Mateo Rd., San Mateo, FL 32088, phone (904) 328-9576, or Angel M. Zaragoza, W6ZPR, 1571 9th St., San Bernardino, CA 92411, phone (714) 889-2380 for information.

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WANTED: Hammarlund HQ-145 receiver, Knight T-50 transmitter. Any condition. Sell CQ and QST's from 30's. Don Trayes, WB4CVH, 38 Elmwood Place, Goose Creek, SC 29445.

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SELL COLLINS 51 S-1 excellent condition. $1,400. A.M., 640 Clyde Court, Mountain View, CA 94043, phone (415) 968-7680.

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WANTED: Walkie-Talkies on Business Band or Marine Band, also under-dash units. Low prices please. Military radios included. Call 617-683-9540, or send list to H.S. Kelley, P.O. Box 1684, Haverhill, MA 01831.

M-204 WILSON 20 Monobander $45. HY-GAIN 14AVQ Tribander $15. Pickup only, 616-435-7031 W8MAW.

FOR TRADE for Santec uP-144 2-meter hand-held: Azden PCS-300 with wall charger, holster with belt-loop in excellent condition (Santec should be comparable). Also have a Pace FM-152 VHF-FM for sale ($350) or trade for synthesized 2-meter mobile. Pace has desk charger, remote speaker/mic, nicads, and holster. Also have Regency HR-2B to throw in with Pace in trade for 2-meter mobile. Jeff Howell, WB9PFZ, P.O. Box 187, Milton, KY 40045.

WANTED: Old HQ129X for parts. Manual and Diagram also (xerox ok). Will pay postage. W. Droese, W1DYH, 4 Carver St., Amesbury,MA 01913.

YAESU MK3 w/FM $590; 444D $30; MK3 VFO $70; HAL DS2000 w/Morse $350; IRL FSK 500 $125; Yaesu 208R w/acc & Henry 80W amp $350. N3DCV, 1415 2nd Ave., Berwick, PA 18603.

WANTED: Collins 1500 Hz bandpass filter (F455FA-15), Morsematic or Grandmaster keyer or similar units, HQ-1 Mini Quad antenna, also need rotor and roof or chimney mount. Write to N1CNB, 8 Westwood Hills, Ellsworth, ME 04605, or call collect 207-667-7706.

WANTED: Johnson Fleetcom 557 or equivalent. Bob Fitzpatrick, 2129 Lester-B, Las Cruces, NM 88001.

LIKE NEW T.S.130S Complete Station. 1.8 kc Filter Mtg. Bracket, Mic, 20 amp AC Power Supply, J.S.R. Ant. Tuner, Hustler Ant. 10-15-20-75 mtr. coils, $695. KE4IM, Durham, NC 919-471-6971 after 5:30.

WANTED: Have discovered a complete, unassembled Heathkit Receiver AR3. Need assembly manual for "original" touch. Write O. Lane, Box 413, Ear Falls, Ont., Canada, P0V 1T0.

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WANTED: Power Supply for Tempo-One, in good condition, reasonable. Leonard Powell, WD8NDE, 3290 Twp. Road 221, Marengo, OH 43334.

KENWOOD TS-180S with dfc and 4 memories $525. Heathkit SB-104A excellent condition $350. Yaesu FT-404R with dtmf on 446 MHz $165. Wallace Domier, Rte. 1 Box 25, Buxton, ND 58218. Phone 701-847-2446.

WANTED: Solar Panel or photovoltaic cells, automotive-load-type battery tester, Heath GH-17 soldering iron and VIC-20 software and accessories. Tom Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, CA 95453.

WANTED: AC pwr supply and any accessories for Galaxy GT550, also want AC supply for Gonset G-76, G-66, and modulator for G-77A. Bill Kipping, 3806 6th Ave No., Great Falls, MT 59401, phone (406) 453-1989.

FOR SALE: Kenwood TS-430S, PS-430 AC Pack, and MC 42S up-down mic. Brand new, $890 inc. UPS. Bob Bradley, 1002 Forest Road, La Grange Park, IL 60525. Phone (312) 354-6031.

FOR SALE: YAESU FT-401 B, VFO and speaker patch manuals, $475, you pay shipping. Bob Alvis, RR#2, Box 413, Momence, IL 60954, phone (815) 472-2115.

SELL: FT-101B Yaesu aligned $375; Hal PS-2000 $299; HW202 $75; All ppd. WA7YDU, 406-628-6151.

QRPpers: Get details of the G-QRP-Club and free sample magazine from Rev. G.C. Dobbs, G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham, B37, England.

MICOR, MVP, PAC PL wanted, incomplete units OK for amateur use. Trade 8877/$, etc. Reid, W6MTF, 2019 Blake St., Berkeley,CA 94704.

SELL: New boxed Raytheon 4D32 Transmitting tubes @ $30 each, list price $125. Collection of 30 years receiving tubes only one dollar each. Send list of requirements for availability. W5QJT, P.O. Box 13151, E.P., TX 79913. Tel. 915-581-2017.

WANTED: Modulator unit for EICO 720 transmitter. Also need schematic for modulator. Contact Jim Groll with your price at 1137 West 10th Place, Mesa, Arizona 85201, phone 834-0422.

WANTED: Info. on OSCAR for 2 meters, 80–180 watt amp for 2 meters, 20–50 amp power supply. Mike Klemens, N6IMY, 3208 Los Prados, San Mateo, CA 94403.

HALLICRAFTERS HT-37, original owner, $130. Drake 2A Receiver with Drake 2BQ Q Multiplier/Speaker, $100. Both excellent, with instruction manuals. Prepaid UPS. W2NDJ, 516-798-8664.

YAESU FT-207R synthesized HT, AC/DC charger, case, extra BP; Drake TR-3 5-band xcvr, AC p.s., remote VFO/Speaker; $220 each. WA5DTK, 817-855-8859.

MFJ 1040 preamp/preselector, mint condition, $70 ppd. Al Plotnick, 77 Woodlawn St., Hamden, CT 06517.

TEN-TEC Argosy with linear switching kit, noise blanker, model 225 AC power supply and manuals. Mint condition, $450. Dennis Roossien, 4549 Rhodes Ave. SW, Wyoming, MI 49508.

FOR SALE: TS-180S with DFC, CW filter, optional SSB filter, clean, with manual, $550. Rich, W7RFE, Star Route, Rim Rock, AZ 86335.

FOR SALE: Two matched pair 6MJ6 tubes. Brand new, never used. $10.00 per pair. W5IHD, 9739 Ebb, Houston, TX 77089.

SELL: Heathkit SB-220 (perfect condition) $500.; Hallicrafter HT-37 $150; Hallicrafter HT-32 $100; Heathkit HM-2140 Wattmeter $75; Heathkit HD-1250 Grid Dip Meter $60. Jim Ince, WA7UPT, Rt. 2 Box 67, Milton-Freewater, OR 97862.

WANTED: Information or manuals for Military Transmitter T-67-ARC-3 and Receiver R-77-ARC-3 radio's. Any information will help. Will pay. Also for trade: complete Black & White Darkroom Set Bogen T-35 enlarger, and all accessories. All are top-of-the-line equipment. Will trade for good QRP rig. D. Kaiser, 212 East B, Ellinwood, KS 67526, phone 316-564-3617.

FOR SALE: Carbon and wirewound resistors; potentiometers; power-audio-transistor transformers. SASE T. Wojciechowski, 101-45 94th St., Ozone Park, NY 11416. Phone 212-845-4756.

SB-220 2KW amp, excellent $500, FT-107M, DMS, WARC, FP-107E, SP-107P, mint $800, FT-208R, NC-8, FBA-2, spkr-mic, case, spare battery, mint $395. Garry Drummond, phone (804) 331-1689 or 665-5638.

WANTED: Kenwood TS-600 transceiver and YAESU FT-625RD transceiver. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

CQ, 1976–1982, inc., $24.; 73, 6/76–6/83, $24.; QST, 5/75–1981, inc., $24. AA4GR, 804-384-6248.

FOR SALE: Henry 3k Classic-X (Factory mod. to "X") Maxi-Tuner, Ant. Mart, Bencher, Vibroplex, Heathkit, Bird, Rohn, Cubex, Omega, Garrett ASD III Detector, all accessories. Send SASE for list W1AGA.

RETIRING: Fifty-year-old QSL printing business for sale. Contact "Brownie," W3CJI, 2705 Andrea Drive, Allentown, PA 18103, phone (215) 433-4485.

WANTED: HW7 or HW8, also ham magazines. Ken Hand, WB2EUF, P.O. Box 708, East Hampton, NY 11937.

NATIONAL NCX-3 TRANSCEIVER 20-40-80 meters SSB, CW, AM w/Hy-Gain 14AVQ. Less than 100 hrs use. Any reasonable offer. T. Richard, WA5JOE, 17625 El Camino Real #200, Houston, TX 77058.

TRADE: 3000 watt continuous-use generator water-cooled army surplus for ham equipment. W9NTH, Lew Gould, (914) 358-4134.

KLM KT34XA 6-element triband beam with extra LEXAN element support insulators. Usual price about $460, but will sell for $300 o.b.o. W6MUO, Oceanside, CA (619)724-0323.

TS-520S, cw filter, outboard VFO excel. cond. Prefer local to Phila. area sale $600. Call A.M. 215-364-1336, Larry, K3BFQ.

ELECTRONIC SURPLUS catalog of many items, including gov. surplus, components, gear, and much more. Send SASE to Chuck Kitchton, 10182 Bessmer Lane, Fairfax, VA 22032.

WANTED: Davco DR-30 receiver, any condition, DR30 S Power Supply, any condition, parts for Davco DR-30. Also want information on modifying and improving the DR-30. Would also appreciate any info on other Davco products. Thanks. VE2FW, P.O. Box 642, Victoria Station, Montreal, Canada H3Z 2Y7.

DRAKE TR-3, power supply, and desk mike in excellent condition, $325. J.F. Kray, KA2CNG, 501 Colgate St., Vestal, NY 13850. Phone 607-797-7891.

WANTED: Jacobs or Wincharger 32 volt generator. State condition, model, and serial no. any condition considered. Write: Terry Hancock, WA9KLZ, 2536 Smith Dr., Lafayette, IN 47905.

TEN-TEC OMNI D, Series B, 243 VFO, 252MO PS, 1.8, 500, 250 Hz filters, MINT. $650 plus shipping. Yaesu XF-30C, 600 Hz filter, $25. K4VHH, 703-896-7534.

TEMPO ONE: 10–80 meter xcvr, matching speaker & AC supply. Excellent condition, $225 or swap for fast or slow scan gear. N2BQT, Frank, 333 Ashford Rd., Toms River, NJ 08753. Phone (201) 244-8560.

TRADE: Mint condx Ten-Tec 405 Linear Amp (matches Argonaut transceiver) for Drake 2B or 2C receiver. Will consider HW-8 & PSU or $150 cash. Write: R.H. Arland, G5CSU, Box 1454, APO NY 09127.

WANTED: Hallicrafters 3.2 or 500 ohm speaker for SW radio. J. Titus, 611 Fairview Ave., Blacksburg, VA 24060.

CENTURY 21 all-band CW XCVR, calibrator, SWR meter, like new $200. SX160 all-band receiver like new $90. John Elrod, W3NVD, 10933 Riverview Rd., Ft. Washington, MD 20744. Phone 301-292-3286.

WANTED: Byte, Oct. 1976 or xerox copy, readable, pp. 12–70. Likewise Nov. 1975 pp. 42–45. H.L. Schultz, Jr., 610 Young Apt. 1, Erie, PA 16509.

HANDSOME CERTIFICATE: Work hams in Marin, Sonoma, Mendocino, Humbolt, and Del Norte counties of CA. $2.00 to REDXA, Box 4881, Santa Rosa, CA 95402.

KENWOOD CW FILTER YG-455C $65. Wanted: Single lever (non-iambic) paddle, Kenwood MB-100 mobile mount. W1BL, 727 Pine St., Bristol, CT 06010.

WANTED: Auto-Mate K5/50 keyer manual; two 8-ohm outdoor speakers; 72-foot E-Z Way tower; Thermiodyne TF-6 antique receiver. W4EOB, 1412 Winkler Ave., Ft. Myers, FL 33901.

COMPUTER-RADIO INTERFACE: Send & receive programs on VHF without a TU. Also does tape duplication without computer. $32 UPS. Also have COCO hardware and software. Info SASE. W8CBR, 80 W. Mennonite, Aurora, OH 44202.

FOR SALE: Kenwood TS-520, very good condition, $400. Will consider trade for Argosy or Argonaut. Heath IM-17 VOM $25. WAØLUI, Jack, Box 52, Walhalla, ND 58282. Phone 701-549-3673.

SELL: Drake, Heath, Dentron, etc. Reasonable. S.A.S.E. for list/prices. Joe Bedlovies, 241 Dover St., Bridgeport, CT 06610.

ICOM IC-21 2 meter rig AC-DC supplies, 24 channels, mike and manual $125. Al, KC8UP, 517-686-6187.

SELL: FT-101 B $399, DS-2000 $299, HW-202 $105. All good and ppd. WA7YDU, 943 West 4th Street, Laurel, MT 59044, phone 1-406-628-6151.

CUSHCRAFT R3 Antenna, used one month, $130 UPS prepaid. Also Palomar RX Noise Bridge, brand new, never used, $35. Parcel Post prepaid. W1DBS, John Savonis, 410 Blake Rd., New Britain, CT 06053.

WANTED: To use schematic for Heathkit Model SG-8 R.F Signal Generator. KØHQW, Tort, 65 Dellbrook Ct., O'Fallon, MO 63366.

SELL OR TRADE for 2m transceiver: Sierra 164B Wattmeter 3 to 1000 MHz $100. HQ-129X rcvr & spkr $100. Want Master Mobile Quick Disconnect. K6SHA, 519 W. Taylor Sp. 117, Santa Maria, CA 93454, phone 805-925-5572.

FOR SALE: SBE CONSOLE V 40 channel 27 MHz SSB rig, excellent shape, use as is or convert to 10 meters, $250. WDØEWJ, P.O. Box 245, Moorhead, MN 56560.

WANTED: Operation and Maintenance manuals for TS-418/URM-49 and TS-510A/USM-44A signal generators. Bruce A. Rahn, WB9ANQ, 410 Coronado Trail, Enon, OH 45323.

HEATH: Novice and General courses, BOTH $60 ppd. HW-8 (built in spejaker), HD1410 keyer, AC to 13.8VDC 3 amp pwr supply, $200 ppd. Gee, POB 589, Bassett, VA 24055.

CDR AR-22 rotor, $20; Alliance Tenna-Rotor, $40; B&W 850A inductor, $65; B&W T-R switch, $15. Want mobile HF antenna. Don Bishop, NØEA, 561 Geneva #100, Aurora, CO 80010. Phone (303) 363-8070.

HEATH HW5400, Transceiver Kit, P/S, Filter, Entry Keyboard, Mike. New unopened prize from hamfest. $900 or best offer. W2FXA, 21 Hidden Valley, Elma, NY 14059. Phone 716-655-4162.

TIMEX/SINCLAIR PROGRAMS: Ham related programs for the Sinclair computers both expanded and unexpanded. Send SASE for information to KA2LHO, Kraig D. Pritts.

SELL: Telrex TB6EM, 6-element triband beam, good condition, disassembled. Prefer local pick-up. Asking $300. N. Balicki, 1216 Boston Rd., Springfield, MA 01119. phone 413-783-6330.

NAVY-TYPE RCK Radio Receiver, RCA reconditioned, 115–156 MHz AM. Mint condition, Best Offer. R.W. Boyd, Box 793, Stn "A," Montreal, P.Q. H3C 2V5.

FOR SALE: Heath HW-7 QRP. WANTED: Argonaut 509 or 515 QRP rig. Price and details by mail to: Dave Elmore, KD4QD, 1 Camphor Dr., Shenandoah, GA 30265.

FOR SALE: NEW unused Stancor filament transformers; 5 VCT @ 30 Amps $20, and 10 VCT @ 10 Amps $15. Antique telegraph line pole insulators $3 each plus shipping. WB5ZKR (601) 265-5072.

WANTED: Xmtr and rcvr for Novice station. Mike, 908 N. Causeway Boulevard, Metairie, LA 70001, telephone 504-835-3100.

DELUXE QTH So. Idaho, 3.5 ac., fruit berries, garden shop, brick home, basement station, Rohn HDBX48, Mosley CL36, owner carry. SASE KU7Z 83 Call Book.

"Cherry" FT-101E, CW filter, fan, desk mike, Landliner spkr/patch, manuals, original cartons, $600. WA6GYG 619-749-1093.

SELL: SWAN 400 xcvr, 420 VFO, 117 VAC PS, spkr. & mic., also Kenwood R-1000 rec. A.A. Treadwell, 200 Rothwell Dr., Lutherville, MD 21093, phone 301-828-5568.

WANTED: Ohio Valley DX Bulletins by W4KVX, No. 22 and June/July 1957 issues. Pse airmail to Jock, ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

TEKTRONIX Dual Trace Oscilloscope with mobile cart. Good condition, $250. KV9P, Box 278B, Louisville, IL 62858, phone (618) 665-3030.

FED UP WITH CONTEST QRM? Split-frequency DX QRM? Express your disgust in writing to Wireless Institute of New Orleans, Box 6541, New Orleans, LA 70174.

ANTENNA/TOWER SALE!

BUTTERNUT ELECTRONICS CO.

- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES . . .
- New Model HF6V $129.00
- New Model TBR-160HD (High Power 160 meter Base Resonator) $49.00.

Model RMK-11 (roof mount kit with multiband radial kit $39.00.
Model STR-2 (Stub Tuned Radial Kit) $29.00.

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)

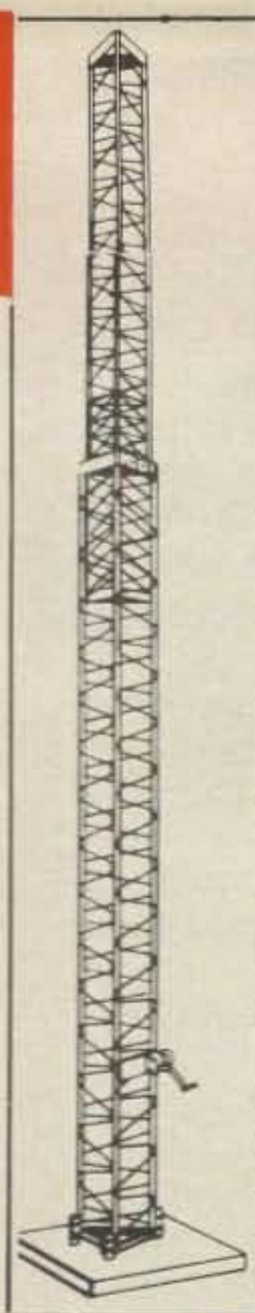
UNARCO-ROHN Self Supporting Towers — On Sale!

Freight Prepaid

These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! How's that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	289	24	313
HBX48	48 ft	10 sq ft	303	BXB7	369	26	395
HBX56	56 ft	10 sq ft	385	BXB8	449	30	479
HDBX40	40 ft	18 sq ft	281	BXB7	339	26	365
HDBX48	48 ft	18 sq ft	363	BXB8	429	30	459



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All Models Shipped Factory Direct— Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting— no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft.	9 sq. ft.,	$ 679
HG52SS	52 ft.	9 sq. ft.,	$ 959
HG54HD	54 ft.	16 sq. ft.,	$1499
HG70HD	70 ft.	16 sq. ft.,	$2399

Masts—Thrust Bearings—Other Accessories Available —Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!

RG-213U

$.29/ft $279/1000 ft Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

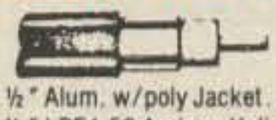
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss Foam Dielectric
- Non-contaminating Vinyl Jacket

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™



Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft
½" LDF4-50 Andrew Heliax ™	$1.69/ft
⅞" LDF5-50 Andrew Heliax ™	$3.99/ft

select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax ™	$22	$22	$22	$22
⅞" Heliax ™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259	$1.25	Nickle PL259	$.90
UG21B N Male	$2.95	UG23D N Female	$2.95

ANTENNA WIRE & ACCESSORIES

12 Ga. Copperweld	$.12/ft	14 Ga. Copperweld	$.10/ft
14 Ga. Stranded	$.10/ft	18 Ga. Copperweld	¼ mi $30
450 Ohm H.D. Line	$.16/ft	H.D. End Insulators	$2/ea
Van Gorden 1:1 Balun			$11
Van Gorden Center Insulator			$6

HUSTLER

6BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $89 5BTV 80-10 mtr Vert $109
G6-144B 2-mtr Base $89 G7-144 2-mtr Base $119

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$12	$12	$15	$18	$22
2KW Super	$18	$20	$22	$26	$36

Bumper Mounts - Springs - Folding Masts in Stock!

CUSHCRAFT

MULTI-BAND HF ANTENNAS

A3 3-el Tribander	$219	A4 4-el Tribander	$289
R3 20/15/10mtr Vert	$279	A743/A744 40mtr Kit	$75

HF MONO-BAND ANTENNAS

10-3CD	$ 95	10-4CD	$109
15-3CD	$119	15-4CD	$129
20-3CD	$199	20-4CD	$279
40-2CD	$289	D40	$149

VHF/UHF BEAMS

A50-5	$ 79	617B	$199
214B	$ 79	3219	$ 95
220B	$ 95	424B	$ 79

OSCAR/TWIST ANTENNAS

A144-10T	$ 52	A144-20T	$ 75
A147-20T	$ 63	416TB	$ 59
A14TMB	$ 29	PS4	$ 69

VHF/UHF FM ANTENNAS

A147-4	$ 29	A147-11	$ 49
214FB	$ 79	228FB	$219
A449-6	$ 29	ARX2B	$ 39

HY-GAIN

Broadband 3-el Triband Beam Explorer-14, In Stock—$289

QK710 30/40 mtr. Add-On-Kit	$79.00
V2S 2-mtr Base Vertical	$39
TH5MK2S Broad Band 5-el Triband Beam	$389
TH7DXS 7-el Triband Beam	$439
TH3JRS 3-el Triband Beam	$179
TH2MK3S 2-el Triband Beam	$159
HY-QUAD 2-el Triband Quad	$299
402BAS 2-el 40-mtr Beam	$219
205BAS 5-el 20-mtr Beam	$329
155BAS 5-el 15-mtr Beam	$189
105BAS 5-el 10-mtr Beam	$129
204BAS 4-el 20-mtr Beam	$249
203BAS 3-el 20-mtr Beam	$149
153BAS 3-el 15-mtr Beam	$89
103BAS 3-el 10-mtr Beam	$69
DB1015BAS 3-el 10/15 mtr Beam	$179
64BS 4-el 6-mtr Beam	$59
66BS 6-el 6-mtr Beam	$119
18HTS 80-10 mtr Hy-Tower Vertical	$429
LC-160 160-mtr Coil Kit for 18HTS	$39
214 14-el 2-mtr Beam	$39
2BDQ 80/40 mtr Trap Dipole	$59
5BDQ 80-10 mtr Trap Dipole	$119
BN86 80-10 mtr KW Balun W/Coax Seal	$19

MOSLEY

CL-33 3-el Triband Beam	$279
TA-33 3-el Triband Beam	$249
TA-33JR 3-el Triband Beam	$189
TA40KR 40mtr Kit for TA33	$119

Tri-Ex TOWERS SPECIAL PRICES! SAVES!

Model	Height Up	Down	Wind Load	List	Sale
W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$999
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$2999
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$6200	Call

ALPHA DELTA COMMUNICATIONS

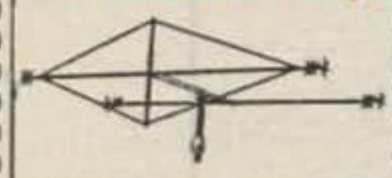
Transi-Trap™ Surge Protectors—In Stock Now!

Model LT 200W UHF Type	$19
Model HT 2KW UHF Type	$29
Model LT/N 200W N Type	$39
Model HT/N 2KW N Type	$44
Model R-T 200W Deluxe	$29
Model HV 2KW Deluxe	$32

KLM

KT34A 4-el Broad Band Triband Beam	$339
KT34XA 6-el Broad Band Triband Beam	$489
80m-1 80-mtr Rotatable Dipole	$469
40m-1 40-mtr Rotatable Dipole	$179
40m-2 2-el 40-mtr Beam	$309
40m-3 3-el 40-mtr Beam	$339
40m-4 4-el 40-mtr Beam	$649
20m-6 6-el 20-mtr Beam	$689
15m-6 6-el 15-mtr Beam	$439
10m-6 6-el 10-mtr Beam	$259
10-30-7LPA Log Periodic Beam	$639
2m-13LBA 13-el 2-mtr Beam	$79
2m-14C 14-el 2-mtr Satellite Antenna	$89
435-18C 435 MHz Satellite Antenna	$65
432-16LB 16-el 432 MHz Beam	$69

MINI-PRODUCTS HQ-1 only $159!



Wing Span - 11 ft
Boom - 54 in. long
Wind Area - 1.5 sq ft
1200W P.E.P. Input
6-10-15-20 mtrs

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating)	$109
Alliance U110 (for small beams & elevation)	$49
Telex HAM 4 (15 sq ft rating)	$199
Telex Tailtwister (20 sq ft rating)	$249
Telex HDR300 Heavy Duty (25 sq ft rating)	$479
Kenpro KR-500 Heavy duty elevation rotor	$189.00

Standard 8 cond cable $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

UNR-ROHN GUYED TOWERS

10 ft Sections 20G $37.50 25G $46.50 45G $107.50

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	829
FK2558	58 ft	13.3 sq ft	$ 899
FK2568	68 ft	11.7 sq ft	$ 959
FK4544	44 ft	34.8 sq ft	$1159
FK4554	54 ft	29.1 sq ft	$1259
FK4564	64 ft	28.4 sq ft	$1359
25G Foldover Double Guy Kit			$249
45G Foldover Double Guy Kit			$269

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

All Foldover Towers Shipped Freight Pre-Paid!
Foldover prices 10% higher west of Rockies.
All Rohn 25G & 45G Accessories in stock - Call!

TOWER/GUY HARDWARE

3/16 "EHS Guywire (3990 lb rating)	$.13/ft
1/4 "EHS Guywire (6000 lb rating)	$.16/ft
5/32 " 7 × 7 Aircraft Cable (2700 lb rating)	$.12/ft
3/16 "CCM Cable Clamp (3/16 " or 5/32 " Cable)	$.35
1/4 "CCM Cable Clamp (1/4 " Cable)	$.45
1/4 "TH Thimble (fits all sizes)	$.30
3/8EE (3/8 " Eye & Eye Turnbuckle)	$5.95
3/8 "EJ (3/8 " Eye & Jaw Turnbuckle)	$6.95
1/2 "EE (1/2 " Eye & Eye Turnbuckle)	$8.95
1/2 "EJ (1/2 " Eye & Jaw Turnbuckle)	$9.95
3/16 " Preformed Guy Grip	$1.99
1/4 " Preformed Guy Grip	$2.49
6 " Diam - 4 ft Long Earth Screw Anchor	$12.95
500D Guy Insulator (5/32 " or 3/16 " Cable)	$1.39
502 Guy Insulator (1/4 " Cable)	$2.49
5/8 " Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.43/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$6.95
9902LD Cable End (for 6700 cable)	$7.95
Socketfast Potting Compound (does 6-8 ends)	$12.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$25	$49	$59	$79
.18 in Wall	$39	$69	$99	$109
.25 in Wall	$69	$129	$189	$249

SOUTH RIVER ROOF TRIPODS

HDT-3 3 ft Tripod	$19	HDT-5 5 ft Tripod	$29
HDT-10 10 ft Tripod	$49	HDT-15 15 ft Tripod	$69

Heavy Duty Tripods include mtg hdw-UPS Shippable

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DIV. OF TEXAS RF DISTRIBUTORS INC.

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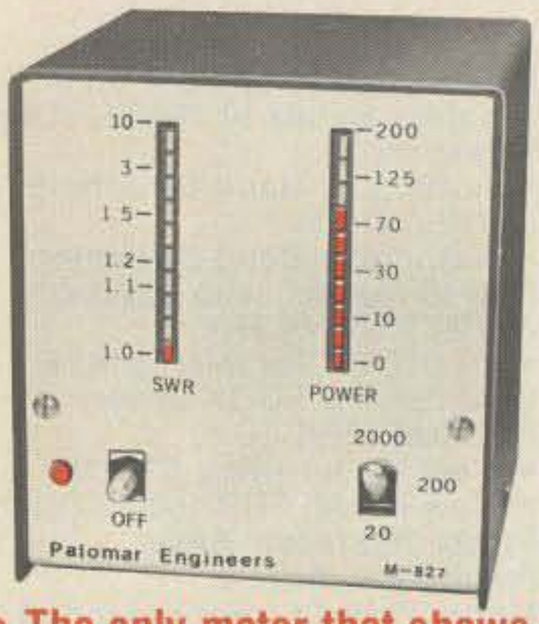

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B215	2M	Yes	2W	150W	22A	$259
B108	2M	Yes	10W	80W	10A	$159
B1016	2M	Yes	10W	160W	20A	$249
B3016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	20W	5A	$ 79
C106	220	Yes	10W	60W	10A	$179
C1012	220	Yes	10W	120W	20A	$259
D24	440	No	2W	40W	8A	$179
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RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

MODEL RS-50A

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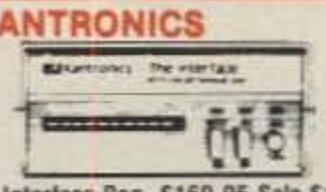

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Quantities Limited — Hurry!

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CAT SYSTEM—Computer Aided Transceiver

- Wide Dynamic Range • Low Noise Front End
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- All Mode Transceive—CW/SSB/AM/FM/FSK!
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- Dual VFOs
- 8 Memories with Lithium Backup
- IF Shift/IF Width Controls
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- Many, Many Other Features

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New 80-10mtr Compact HF Transceiver

- Digital Readout • Adj Noise Blanker
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All Mode Digital Communications Receiver .15 to 29.99Mhz—Receives SSB/AM/FM/CW, Built-in S Meter, Speaker, Noise Blanker, Timer, FM Squelch, AC Supply and More!

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- LCD Display • 10 Memories
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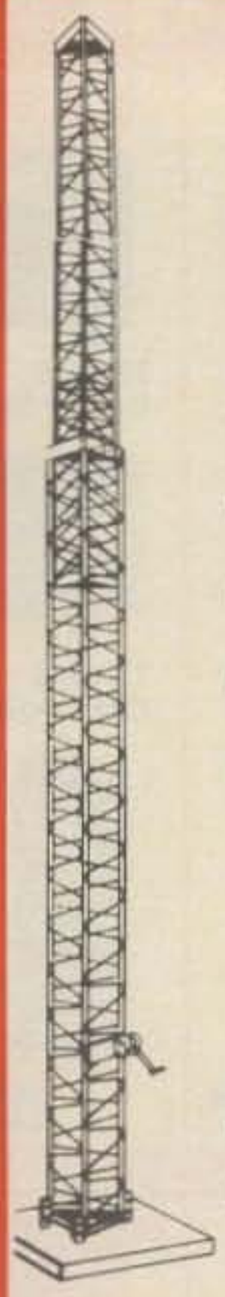

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All Models Shipped Factory Direct—Freight Paid*!

Check these features:

- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
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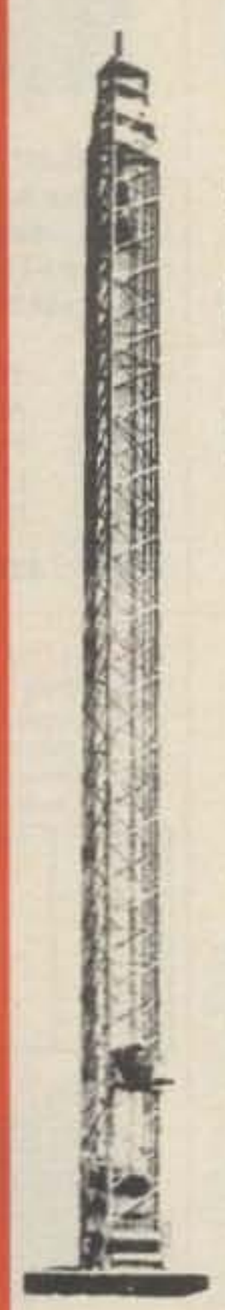
Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



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These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

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- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
W-36	36 ft.	9 sq. ft., 50 mph	$579
WT-51	51 ft.	9 sq. ft., 50 mph	$999
LM-354	54 ft.	16 sq. ft., 60 mph	$1599
LM-470D (Motorized)	70 ft.	16 sq. ft., 60 mph	$2999

Masts—Thrust Bearings—Other Accessories Available at Sale Prices—Call!

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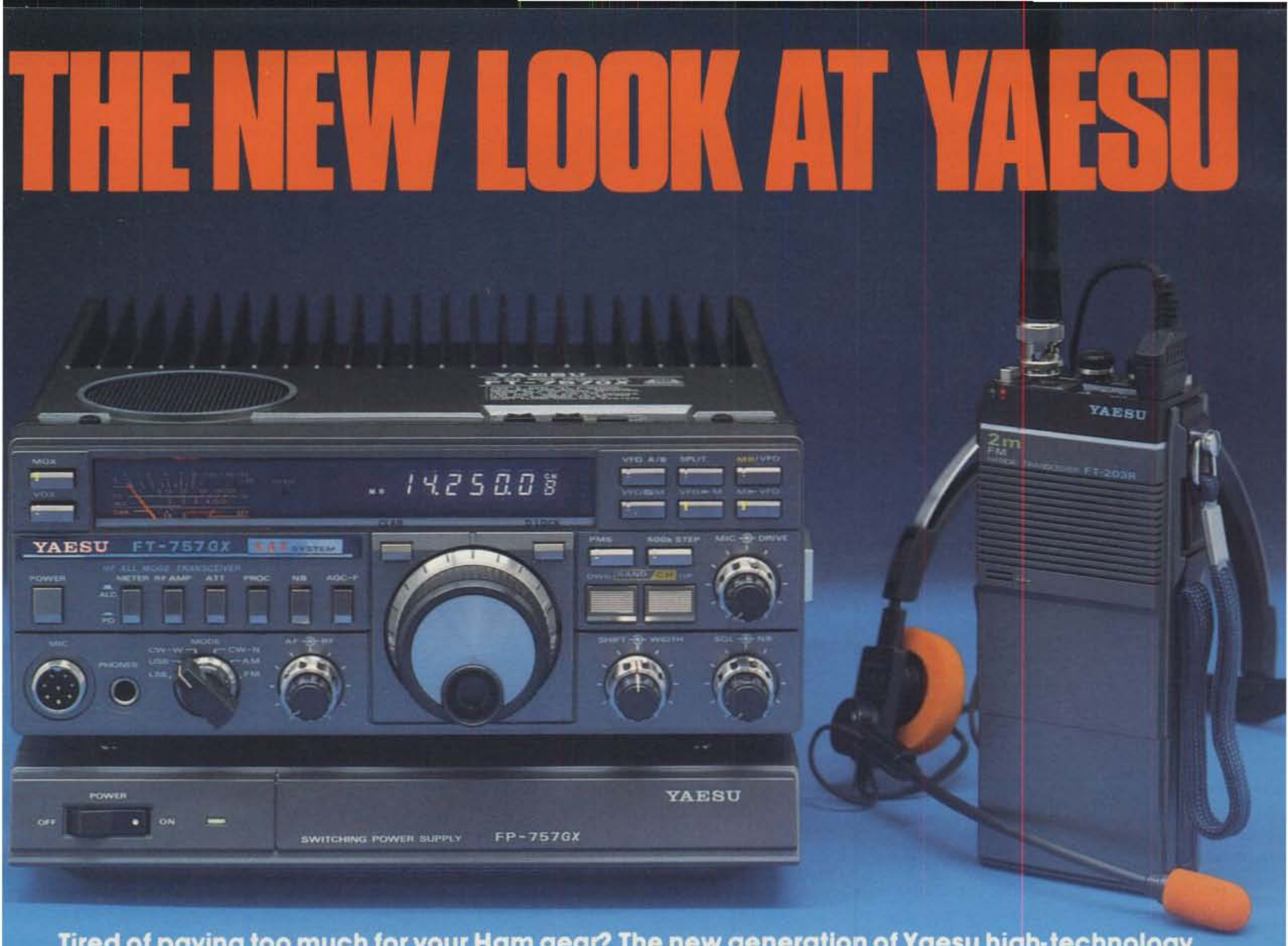
THE NEW LOOK AT YAESU



Tired of paying too much for your Ham gear? The new generation of Yaesu high-technology equipment is designed with you in mind! New advances in computer-aided design and robotics manufacture help you save money while being assured of the best . . . from Yaesu!!!

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Affordable Excellence

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Full CW QSK, full 100 watts output at 100% duty cycle (SSB/CW/FM), and full microprocessor control with dual VFOs, eight memories with bilateral memory/VFO swap, and personal computer (CAT System) compatibility make the FT-757GX a winner, at home or away.

FT-757GX ACCESSORIES
FP-757GX Switching Power Supply, FP-757HD Heavy Duty Power Supply (for 100% duty cycle operation), FC-757AT Automatic Antenna Tuner with Memory, FAS-1-4R Remote Antenna Selector, SP-102 Speaker with Audio Filters, MD-1B8 Desk Mic, MH-1B8 Hand Mic, FIF-232C Computer Interface Module.

FT-203R Line

The Compact Companion

ULTRA-COMPACT DESIGN
Chip components installed by Yaesu's assembly robots significantly reduce circuit board size, resulting in a rugged, reliable transceiver with a weight of only 450g, including the standard FNB-3 battery.

HANDS-FREE VOX
A VOX (voice-actuated transmit) unit is built-in, allowing hands-free operation when the optional YH-2 Headset is used. Ideal for tower work, public safety, or other applications where manual PTT control is inadvisable. Level control provided.

FULL FLEXIBILITY
Built-in S-meter, thumbwheel frequency programming, HI/LOW power switch, busy channel and transmit indicators are standard. DTMF Encoder versions, as well as 220 MHz and 440 MHz lines, are coming soon!

FT-203R ACCESSORIES
FTS-7 CTCSS Module, FBA-5 AA Cell Case, YH-2 Headset, MH-12 Speaker/Mic, FNB-4 High-Capacity Battery, PA-3 Mobile Adapter, MMB-21 Mobile Hanger, NC-15 Quick Charger/AC Adapter, FTT-3 DTMF Keypad.

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Prices and specifications subject to change without notice or obligation.

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ICOM IC-04AT

440MHz, PL Tones, Scanning, Plus...

ICOM is proud to announce the latest in 440MHz handheld transceiver technology. The IC-04AT represents the best in a multifunction, multifeature handheld for 440 — 450 MHz.

Features. Features. Features. The IC-04A and IC-04AT cover from 440 — 449.995 MHz. Frequency entry, control functions and the 32 PL tones are controlled by the 16-button pad on the face of the radio. Also included are priority, scanning (both of memories and programmable band scan) and DTMF (04AT only). For scanning, 5, 10, 15, 20, or 25 KHz increments are front panel selectable. Ten memories with internal lithium battery backup give the ultimate in flexibility for channelizing operation of this sophisticated handheld for easy access to most used channels. Thus, the IC-04A(T) may be used to individually bring up any frequency between 440 and 449.995MHz with 5KHz spacing, or favorite frequencies may be stored in the memory and recalled at the touch of a button. The IC-04A(T) has all the features you could want in a handheld.

Compatible Accessories. The IC-04A(T) has the same styling, control features and functions of the IC-02A(T). The IC-04A(T) utilizes the exisiting accessory line available for the IC-2A and IC-2AT, plus new accessories such as long-life and high-power battery packs and a boom headset. Multiple battery packs allow the widest flexibility in charging: either from a wall charger, cigarette lighter plug, stand-up desk charger, or through the top of the radio. Twelve volts applied through the top of the radio not only provides operation of the radio at high power, but provides charging of the battery packs at the same time — a feature not commonly found in handheld units.

Built to Last. The IC-04A(T) comes with a sealed case, providing resistance to moisture, dust, and other elements detrimental to the operation of the radio. An aluminum back provides a massive heatsink for the power module allowing the IC-04A(T) to run at a standard 3 or 5 watts (optional battery required). A battery lock is provided to ensure the battery will remain secure, and the unit will continue to operate even if mishandled. A custom LCD readout with S-meter is unique to the ham industry

Expanding on our line of available accessories, the IC-04A and IC-04AT become the most versatile handhelds in their class. See the IC-04A(T) at your nearest ICOM dealer.

CIRCLE 22 ON READER SERVICE CARD

ICOM

The World System

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