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Amateur Radio

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CQ

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THE RADIO AMATEUR'S JOURNAL

TS-930S

"DX-traordinary"... superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

A superlative, high-performance, all solid-state HF transceiver, that covers all Amateur HF bands, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range.

TS-930S FEATURES:

- 160-10 Meters, with 150 kHz-30 MHz general coverage receiver. Covers all Amateur frequencies, plus WARC, on SSB, CW, FSK, and AM. UP conversion digital PLL circuit.
- Excellent receiver dynamic range. Typical two-tone dynamic range, 100 dB (20 meters, 50-kHz spacing, 500 Hz CW bandwidth).
- All solid-state 28 volt operated final amplifier. Lowest IM distortion. Power input 250 W on SSB/CW/FSK, 80 W on AM. SWR/ Power meter.
- Available with AT-930 automatic antenna tuner built-in, or as an option. Covers 80-10 meters, including WARC bands.
- CW full break-in. CMOS logic IC, plus reed relay. Switchable to semi break-in.
- Dual digital VFO's, 10-Hz steps, includes band information.
- Eight memory channels. Stores frequency and band data. Internal battery memory back-up, est. 1 yr. life. (Battery not Kenwood supplied.)
- Dual mode noise blanker, NB-1, with threshold control, for "pulse" noise. NB-2 for "woodpecker."
- SSB IF slope tuning, allows independent adjustment of the low and/or high frequency slopes of the IF passband.
- CW VBT and pitch control. VBT tunes out interfering signals. CW pitch control shifts IF pass-band and beat frequency. "Narrow-Wide" filter switch.
- Tuneable, peak-type audio filter for CW.
- AC power supply built-in.
- Fluorescent tube digital display (100 Hz resolution, modifiable to 10 Hz) with digitalized sub-scale, in 20-kHz steps.
- RF speech processor.
- One year limited warranty.
- SSB monitor circuit.

Optional Accessories:

- AT-930 Auto. antenna tuner.
- SP-930 External speaker with selectable audio filters.
- YG-455C-1 (500 Hz) or YG-455CN-1 (250 Hz) plug-in CW filters for 455 kHz IF.
- YK-88C-1 (500 Hz) CW plug-in filter for 8.83 MHz IF.
- YK-88A-1 (6 kHz) AM plug-in filter for 8.83 MHz IF.
- SO-1 commercial grade TCXO.
- MC-42S UP/DOWN hand mic.
- MC-60A deluxe desk mic.
- MC-80 desk top UP/DOWN mic.
- MC-85 multi-function desk mic.

TS-430S

"Digital DX-terity"... General coverage, Superior dynamic range, 2 VFO's, 8 memories, Scan, Notch, COMPACT!

Combines compact styling with state-of-the-art circuit design and performance.

TS-430S FEATURES:

- 160-10 meters, with 150 kHz-30 MHz general coverage receiver. Covers all Amateur frequencies, plus WARC. UP-conversion digital PLL circuit.
- USB, LSB, CW, AM, and FM (optional) all mode.
- Compact lightweight design. Only 10-5/8 (270) W x 3-3/4 (96) H x 10-7/8 (275) D, inches (mm); only 14.3 lbs. (6.5 kg.).
- Superior receiver dynamic range with Dyna-Mix high sensitivity direct mixing system.
- 10-Hz step dual digital VFO's. Operate independently, include band and mode information. Dial torque adjustable. Step switch for 10-Hz or 100-Hz steps. A=B switch shifts "B" VFO to "A" VFO frequency and mode, or vice versa. VFO LOCK switch. RIT for VFO or memory. UP/ DOWN manual scan with optional UP/DOWN microphone.
- Eight memories store frequency, mode, and band data. 8th memory stores RX/TX frequencies independently.
- Lithium battery memory back-up. (Est. 5 yr. life.)
- Memory Scan.
- Programmable automatic band scan width.
- IF shift circuit for minimum QRM.
- Tuneable notch filter, built-in.
- Narrow-wide filter selection on SSB and CW (filter optional).
- Speech processor, built-in.
- All solid state. Input rated 250 W PEP on SSB, 200 W DC on CW, 120 W on FM (optional), 60 W on AM. Operates on 12 VDC or on 120 VAC, or 220/240 VAC with optional PS-430 AC power supply.
- Fluorescent tube digital display indicates frequency to 100 Hz (10 Hz modifiable).
- All-mode squelch circuit, built-in.
- Built-in noise blanker.
- RF attenuator (20 dB).
- VOX circuit, plus semi break-in with side-tone.

Optional accessories:

- PS-430, PS-30 or KPS-21 AC power supplies.
- SP-430 external speaker.
- MB-430 mobile mounting bracket.
- AT-250 automatic antenna tuner, 160-10 m, incl. WARC.
- AT-130 compact antenna tuner, 80-10 m, incl. WARC.
- FM-430 FM unit.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) SSB filter.
- YK-88A (6 kHz) AM filter.
- MC-42S UP/DOWN hand mic.
- MC-55 (8P) mobile mic.
- MC-60A deluxe desk mic.
- MC-80 desk top UP/DOWN mic.
- MC-85 multi-function desk mic.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

TR-2500

BIG performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g. (1.2 lbs). 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D. mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch encoder.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.

CONVENIENT TOP CONTROLS

- Optional MS-1 mobile or ST-2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mAH Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply.
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25H Heavy-duty 490 mAH Ni-Cd battery pack.
- DC-25 13.8 VDC adapter.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.

TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W, Low-300 mW.
- TX OFFSET switch, ±5 kHz to ±9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- RA-3 2 m 3/8 λ telescoping antenna (for TR-2500).
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-7950/7930

Big LCD, Big 45 W, Big 21 memories, Compact.

Outstanding features providing maximum ease of operation include a large, easy-to-read LCD display, 21 multi-function memories, a choice of 45 watts (TR-7950) or 25 watts (TR-7930), and the use of microprocessor technology throughout.

TR-7950/TR-7930 FEATURES:

- New, large, easy-to-read LCD digital display. Easy to read in direct sunlight or dark (back-lighted). Displays TX/RX frequencies, memory channel, repeater offset, sub-tone number, scan, and memory scan lock-out.
- 21 new multi-function memory channels. Stores frequency, repeater offset, and optional sub-tone channels. Memory pairs for non-standard splits. "A" and "B" set band scan limits. Lighted memory selector knob. Audible "beep" indicates channel 1 position.
- Lithium battery memory back-up. (Est. 5 yr. life.)
- 45 watts or 25 watts output. HI/LOW power switch for reduction to 5 watts.
- Automatic offset. Pre-programmed for simplex or ±600 kHz offset, in accordance with the 2 meter band plan. "OS" key for manual change in offset.
- Programmable priority alert. May be programmed in any memory.
- Programmable memory scan lock-out. Skips selected memory channels during scan.
- Programmable band scan width.
- Center stop circuit for band scan, with indicator.
- Scan resume selectable. Selectable automatic time resume-scan, or carrier operated resume-scan.
- Scan start/stop from up/down microphone.
- Programmable three sub-tone channels with optional TU-79 unit (encoder).
- Built-in 16-key autopatch encoder, with monitor (Audible tones).
- Front panel keyboard control.
- Covers 142.000-148.995 MHz in 5-kHz steps.
- Repeater reverse switch. (Locking)
- "Beeper" amplified through speaker.
- Compact lightweight design.

Optional accessories:

- TU-79 three frequency tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

FM-2033

2m C-MOS MICROPROCESSOR CONTROLLED
DIGITAL SYNTHESIZER FM TRANSCEIVER

Shown actual size.

6 in 1

Exclusive KDK 6 in 1 control is now joined by 6 exciting new KDK features:

NEW! % Soft Orange background Liquid Crystal Display (LCD) for direct sunlight viewing plus lighting for night viewing.

NEW! % Offset (+, −, S) stored in memory along with the frequency information.

NEW! % Frequency coverage of 142.000 to 149.995 MHz for M.A.R.S. and C.A.P. usage.

NEW! % Chrome front panel with accent knobs and lighter color on case to match today's auto decor.

NEW! % Scan for signal now has 3-second delay before resume after loss of signal.

NEW! % Repositioned controls for more convenient operation.

The Exclusive KDK 6 in 1 Knob.

- Only memories with data are scanned; blanks are skipped.
- Complete memory back-up with power unplugged. Re-chargeable Ni-Cd with capability of several months back-up of memory.
- Single frequency sub-audible tone generator included as a standard feature.
- Tone unit switch on front panel to prevent "humming" on the wrong channel.
- Repeater input monitor capability with the push of a single momentary switch.
- Solid-state level meter for both output level and input level monitoring.
- User programmable initial characteristics for band limits, channel step size, etc.
- Odd repeater splits can be handled with the memory in the AxB mode.
- Programmable band-scan limits are stored in protected RAM.
- Modular construction with pluggable interconnecting wiring.
- Touch-Tone® microphone TM-2 is standard with each radio.
- Change channels, skip-scan or step up and down the band from TM-2 microphone.
- Audible beep for end-of-band or last memory location for better "eye's off" operation.

The KDK FM-2033 represents a significant advance in user convenience and simplicity of operation for the radio user. The KDK '33' series of transceivers provides excellent readability in any lighting condition for either the operating frequency or the memory channel number in use. The use of a warm orange background for the LCD displays improves the readability by providing an easy on the eyes contrast improvement.

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 of the desired repeater offset from memory, the FM-2033 continues to provide 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 repeater signals and provide quieting on the simplex operations. M.A.R.S. (NAVY too!) and C.A.P. frequencies are also accommodated.

You want convenience, reliability and easy operation for your mobile station and a tough to beat dollar value. Check out the FM-2033 at your local dealer TODAY or send a QSL for specifications.

® Touch Tone is a Registered Trade Mark of American Telephone and Telegraph.

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

KDK

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CIRCLE 57 ON READER SERVICE CARD

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Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: 516 681-2922. CQ (ISSN 0007-893X) is published monthly by CQ Publishing Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year $16.00, two years $29.00, three years $42.00; Canada/Mexico—one year $18.00, two years $33.00, three years $48.00; Foreign—one year $20.00, two years $37.00, three years $54.00; Foreign Air Mail—one year $73.00, two years $143.00, three years $213.00. Entire contents copyrighted CQ Publishing Inc. 1984. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

CQ The Radio Amateur's Journal

ON THE COVER: John Hall, WD4SFG, of Miami, Florida is shown working the Oscar 8 satellite in mode J from his backyard. Photo by Larry Mulvehill, WB2ZPI.

FEBRUARY 1984 **VOL. 40, NO. 2**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

No-Code is dead. Death came at 9:59 a.m. on December 14, 1983. It was mercifully quick, the deliberations taking less than 10 minutes. What wasn't as quick or sure was the process leading up to this day, a process that took some 12 years.

Those of us who gathered at the FCC Commission Meeting Room on the 8th floor of 1919 M Street in Washington, D.C. were keyed up expecting it to go either way; it still seemed at this late date to be unsure. I sat next to Perry Williams of the League, and we discussed, or tried to guess, which way it would go. The Commission people filed in: Bureau Chiefs, Commissioners, aides, and others directly interested in this item and other items on the agenda. The No-Code item would come up third that morning.

As I looked at the make-up of the Commission, I realized that none of the participants, with the exception of Commissioner Quello, had been involved with the concept from the beginning. The make-up of the Commission had changed several times in the 12-year period. This was the first chance for the newest Commissioner, Dennis R. Patrick, to appear publicly and vote. Commissioner Patrick at 31 is the youngest member of the five-person Commission. The other Commissioners present were Henry Rivera, James Quello, and M/M Weyforth-Dawson. The Commission was presided over by Chairman Mark Fowler.

When the No-Code item came up on the agenda, Private Radio Bureau Chief Foosner gave "editorial" comment on the item. This was an overview of the reasons for the item and results, if any, on a study of those reasons. As Mr. Foosner saw the item, he cited three basic reasons originally stipulated for the proposed legislation. (1) A No-Code license would promote needed growth in the amateur radio service. Mr. Foosner stated that in 1930 there were about 30,000 licensed radio amateurs. By 1975 there were about 300,000 licensed amateurs, and in 1983 that number exceeded 400,000, so that was a demonstration of continued growth with the existing system. (2) Proficiency in the International Morse code was a barrier to obtaining an amateur license for many. Mr. Foosner replied to this with comments from handicapped amateurs saying in effect that if *they* could do it, anyone could. He reported on the more than 5,000 comments received on the docket, most of which supported the tradition of a Morse code requirement for an amateur radio license. (3) Morse code is a barrier in general to obtaining an amateur radio license. This item, though unclear to me, was answered by (1) and (2). Mr. Foosner also gave the analogy of continued military training in Morse code as an apriori reason for the amateur requirement.

The next step in the deliberations was questions from the Commissioners themselves. Mr. Rivera asked about the possibility of a digital class of license for those heavily involved in computer technology. This has long been a favorite position of the Office of Science and Technology. Mr. Foosner said that a study of the Canadian Packet License (a model of a digital class license) which has been in effect for over four years has produced 150 licensees, so there appeared to be no great interest in that area. Commissioner Dawson related her experiences in studying Morse code. She stated that she was interested in obtaining an amateur radio license so that she would be more familiar with the exam process and with amateurs in general who were in a sense her constituents. Most of the comments at this point were about slow-speed Morse code and the entry-level point of exam. Commissioner Dawson pointed out that she was using learning time estimates and that her own experiences would tend to double that amount of time.

Listening to the meeting one did get the feeling that something other than the original intent was being argued. The material was presented in the form of either/or. It would seem that either code or no-code was being discussed as the basis for amateur radio. The intent of attracting greater numbers of young people to the service, with the emphasis on the word *young*, was not discussed. Having greater numbers of amateurs with a rapidly increasing median age was not the intent of this proposal. Abolishing Morse code for the traditional h.f. bands was not the intent either.

It is also ironic at this point to relate another piece of legislation which was tied to the no-code proposal. Effectively in the same breath, the Commission voted down the requirement for a "demonstration of Morse code proficiency" in obtaining a maritime license. Shipboard operators no longer have to know Morse code. When questioned about this obvious disparity, Mr. Foosner wisely and rightly said that modern technology and the availability of commercial equipment made it unnecessary. From this it would seem that Morse code in amateur radio was a traditional requirement and therefore it should be preserved.

Just prior to the official vote, Commissioner Dawson asked about the possibility of a no-code service, if there wasn't to be one within amateur radio. Mr. Foosner stated that there would have to be further available spectrum studies done, and they were looking "down the road" to some sort of service within the auspices of CB.

The rest is history. We probably will never see a No-Code proposal come up again for amateur radio within our lifetime. I do say *probably*, since anything can happen. There are no great ramifications. We really didn't win a great battle, nor did we lose too much from our future. We did, however, open the possibility for new concerns.

A new spot to look for as a result of this decision is the strength and health of 220 MHz. The FCC held off final implementation of WARC results by keeping 220 MHz as sort of a buffer zone in case the No-Code license was approved. This in all likelihood would have been the assigned area for the new licensee. The Land Mobile section of the FCC has been eyeing 220–225 MHz for some time now. In January 1983 an internal memo was generated by the FCC to study the feasibility of compandered s.s.b. by the Land Mobile service for at least 2 MHz of the 220 to 225 MHz band. At 9:59 a.m. on December 14, 1983, with no-code out of the way, the band became fair game again. Anyway, it has become something else to think about.

The only further consideration in amateur licensing to think about is the licensing itself. Now that a funding program of sorts has been approved, it is up to *us* to see that there is no slack in the availability of test points and examiners. There are now two national groups: the ARRL and another who would like to be the National Coordinators for the VEC program. I have been asked by people within the FCC to remind amateurs that the VEC program was designed to be local, grassroots organizations with volunteers taking charge of their own areas. It may be simplistic and naive to think that we as amateurs and club members can and will take the initiative to responsibly administer a program. Let's face it; regardless of the rhetoric, the FCC is backing out of the licensing business. By "backing out" I don't mean to imply that they are slowly easing out with some sort of smooth transition in mind. We can do it if we want to badly enough. The ball is in our court and we must go with it.

If we were to do an autopsy on the cadaver that was No-Code, we probably would find a contributing cause of death in the volunteer program. It's a form of unspoken but emotional blackmail in that you can't ask some group to administer something that they are vehemently against and will not do, especially on a volunteer basis. Well, No-Code is no longer an issue. It was taken out of consideration within 10 minutes. The rest is up to us. If you like to think that we've won a point, then use the exuberance that comes with winning to do something to further that cherished tradition you fought for. *Get involved.*

73, Alan, K2EEK

The real beauty of the Collins KWM-380 is behind the panel, not on it.

At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and virtually

unaffected by temperature and humidity which cause intermittents in the more commonly used phenolic boards.

Once built, every KWM-380 undergoes 24-hour burn-in, then is aligned and tested to meet or exceed every spec on the data sheet. Which makes us very confident about warranting your KWM-380 for one full year.

The result is a radio with superior performance and lasting quality, not front-panel glitter. Frequency stability is just one example of its beauty: typically, drift is as low as 10-12 Hz per hour for normal ham shack environments. Other companies haven't matched our performance because they don't match our quality behind the panel.

Add some real beauty to your station. See the KWM-380 at your nearest authorized dealer. Collins Telecommunications Products Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, IA 52498. Phone (319) 395-5963. Telex: 464-435.

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...where science gets down to business

CIRCLE 5 ON READER SERVICE CARD

Our Readers Say:

It Takes All Kinds

Editor, *CQ:*

A Montreal newspaper *The Gazette* printed an article on 2 December 1983 accompanied by an 8½" × 6" picture of VE3MZH at his operating position in North Bay, Ontario. The headline read "Ontario Radio Operator 1st to Reach Shuttle." The article described how VE3MZH was monitoring the 20 metre band (14295 kHz?) and heard voices commenting on snow particles in the atmosphere. He gave his callsign and asked for a QTH. Astronaut Garriott personally confirmed the QSO with the shuttle, made shortly after launch, and the space centre then advised the shuttle that they were 11 miles up.

It is reported that Owen Garriott's comments back to the centre then were "We already have a ham aboard—not only the first radio contact with an outside party, but the first DX from a Canadian."

The perpetrator(s) of this thoughtless hoax will be pleased to know that Mike Pecore, VE3MZH, is thrilled with his history-making QSO. He (they) might also like to know that Mike is a quadriplegic.

Ron MacLean, VE3MJX
Ottawa, Ontario, Canada

Thanks From the Experimental Engineering Branch, FCC

Editor, *CQ:*

I want to let you know how pleased I am with the article in your November 1983 *CQ* magazine about the FCC's Experimental Engineering Branch. Ted Cohen did an outstanding job in assembling the article, and your staff deserves equal credit for the impressive layout in the magazine.

The FCC laboratory has had very little exposure over the years. Yet the laboratory performs highly critical functions in assuring that new technology and equipment will not adversely affect the radio environment. Hopefully, articles like the one in your magazine will help to let the public know some of the important things their tax dollars are helping to support.

Ralph A. Haller, Chief
Experimental Engineering Branch, FCC

Band Plan Proposal

Editor, *CQ:*

Enclosed find my entry for the 1983 CQ World-Wide Phone DX Test. Operating this contest indicated that the recent trend in increasing QRM is continuing to worsen. Most of it is caused by stateside stations who prefer to call "*CQ* test" rather than listen for the DX stations. Perhaps it is their zeal to make contacts, but I personally feel that much of it is due to "muscle-flexing."

For example, on 80 meters, from early evening to morning, the spectrum from about 3.785 to 3.810 consisted of very strong signals (S9 + 30/50 dB), many of them 6's and 7's spaced about 1–1.5 kHz apart calling "*CQ* test" (I doubt that even half of them actually entered the contest). I have to say that it was almost impossible to work even the JA's (in their spectrum of 3.795–3.802) because of this continual calling. I noted that many of these individuals (I hesitate to use kinder or coarser descriptions), once they made contact (which was infrequently), had one hell of a time getting the respondent's call and contest exchange. This situation seemed to be self-feeding, in that many other hams in their frustration seemed to join in the cacophony while probably knowing full well they stood little likelihood of making a QSO!

The situation on 15 meters was almost as bad, with the spectrum from 21.250–21.300 pretty much occupied in a similar fashion. The pack was not quite as dense as on 80, and at least the local signals were not that loud to cause problems for us. But they probably made it rough on the mid-west and east. Twenty was a little better, and 10 was a little better yet (of course, there is a lot more room here!). Forty was the best, primarily because of the DX for the most part having to work "split." The situation was as bad, if not worse, during the C.W. fracas, as everyone was trying to crowd into the lower 30 kHz or so of each band.

I would like to suggest that *CQ* consider setting up band plans for DX contests, in essence reserving the lower portion of each band (which seems to be preferred by DX) for DX stations to call "*CQ* test" and permitting stateside stations to answer these calls in these "windows." Statesiders who prefer to talk rather than listen could continue to call "*CQ* test" to their heart's content, but only in the higher portion of each band. I would suggest limiting DX "windows" to:

80 meters: C.W.—3.500–3.535 (to permit General/Advanced opportunities); Phone—3.785–3.810 (for Advanced).

20 meters: C.W.—14.000–14.035; Phone—14.150–14.200.

15 meters: C.W.—21.000–21.035; Phone—21.250–21.290.

I think this would really relieve the congestion as well as increase interest of non-"big guns" in participating in the contests if they thought they had a reasonable chance to work stations. It might also make some of the "offenders" realize that the contests are for all the ham fraternity and not just for a few of the guys who can afford the big stations. Who knows, it might even contribute to the return of gentlemanly conduct on our bands. Thanks for listening!

Phil Finkle, K6EID
Northridge, CA

Grab a fistful of TEN-TEC's new 2 meter FM talkie

it has features never before available in one handheld, it's made in the USA and it's priced right!

COMPARE TENNESSEE TECHNOLOGY WITH THE OTHERS...

Do their handhelds have memory lockout?
Exclusive memory lockout on the TEN-TEC 2591 allows scanner to temporarily bypass channels for quick lockout of busy frequencies yet retain them in memory for normal operation on demand.

Do theirs store transmit offset?
The 10 memories of the 2591 allow stored offset for easiest operation. And memory channel 0 accepts any non-standard offset.

Do theirs offer selectable SKIP or HOLD?
When scanning with the 2591, choose HOLD to stop and stay on a busy frequency. Choose SKIP to stop for several seconds and continue.

Do theirs offer modifiable Band Scan without complete reprogramming?
With the 2591 you can scan any section of the band with user defined upper and lower limits in steps of 5, 10, 15, 25, or 30 kHz. Change step size, upper and lower limits independently. Manual Scan also, up or down, in 5 kHz steps.

Do theirs have Quick-Release NI-CAD Battery Pack?
The 2591 battery pack slides off easily, yet is secure in use, has a heavy duty 450 mAH rating at 8.4v, and the 2591 has capacitive memory retention to permit pack changing without reprogramming.

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TEN-TEC

DESIGNED AND MANUFACTURED IN TENNESSEE and it carries the famous TEN-TEC 1 year warranty. See your dealer for the best in 2 meter FM—the TEN-TEC 2591. Or write for information to TEN-TEC, Inc., Sevierville, TN 37862.

Announcing

• **Hams in Space** - To commemorate the amateur radio operation of W5LFL aboard Space Shuttle *Columbia* STS9, a special philatelic cover (envelope) was to be issued in conjunction with Solomon Islands Radio Society. The cover states "First Amateur Radio Operation from Earth Orbit" within the amateur Satellite Corp. (AMSAT) log. A 45¢ Solomon Islands postage stamp featuring orbiter *Columbia* is affixed to the cover and was cancelled on the first day of operation. The cover is available from P.O. Box 81, Honiara, Solomon Islands at a cost of U.S. $1.00 (or 5 IRC's) for direct mailing by air. Covers can be supplied in mint condition within a sealed envelope, by air, for an additional $1.00 each for up to 10 covers.

• **Benicia, California Special Event** - The Benicia ARC will operate KE6IA and N6HOA from 1800Z to 0100Z Feb. 11 from the oldest capitol building in California to commemorate their 101st anniversary. Operations in the General class phone band portions of 40 and 20 meters. QSL with large s.a.s.e. via P.O. Box 845, Benicia, CA 94510 for certificate.

• **Cherryland ARC Swap and Shop** - The Cherryland Amateur Radio Club will hold its 11th annual Swap and Shop on Feb. 11 at the Immaculate Conception Elementary School gymnasium, 218 Vine Street, Traverse City, MI. Hours 8:00 a.m. through 2:30 p.m. Table setup at 6:30 a.m., $3.00 per table; admission $2.50. Talk-in on 146.25/.85. For details, send s.a.s.e. to Jerry Cermak, K8YVU, 3905 Slusher Rd., Traverse City, MI 49684, or call 616-947-4848.

• **K2IQ from Utica, New York** - The Utica Amateur Radio Club will operate K2IQ commemorating its 50th anniversary from 1700Z Feb. 11 to 2200Z Feb. 12 on s.s.b., 25 kHz from the upper edge of the 40, 20, and 15 meter bands and also 25 kHz from upper edge of the 40 meter Novice band. QSL with s.a.s.e. and contact number for an attractive certificate to: K2IQ, P.O. Box 71, Utica, NY 13503.

• **Mansfield, Ohio, Mid*Winter Hamfest** - The Mansfield Mid*Winter Hamfest/Auction will be held Sunday, Feb. 12 at the Richland County Fairgrounds, Mansfield, Ohio. Prizes, auction, and fleamarket in large, modern, heated buildings. Doors open to the public at 8:00 a.m. Tickets $2.00 in advance and $3.00 at the door. Tables $5.00 in advance and $6.00 at the door. Half tables available. Talk-in on 146.34/94. For additional information or advanced ticket/tables, send s.a.s.e. to Dean Wrasse, KB8MG, 1094 Beal Road, Mansfield, OH 44905, or phone (419) 589-2415.

• **Valentine's Day Special Event** - The Oregon Tualatin Valley ARC will operate stations KA7HJT, K7JF, and K7RXV from 1700Z Feb. 12 until 0300Z Feb. 13 in celebration of Valentine's Day and Oregon's 125th anniversary of statehood. Frequencies will be 14.280, 21.360, and 28.510. Those making contact with any of these stations may obtain a certificate by sending a large s.a.s.e. to the *Callbook* address of the station worked.

• **Midwinter Madness Hobby Electronics Show** - On Feb. 25 this show will be sponsored by the Robbinsdale ARC and held at the Totino-Grace High School, 1350 Gardena Ave., Fridley, Minneapolis, MN. There will be seminars, refreshments, a fleamarket, and exhibitors of amateur radio, computer, satellite TV, and other electronics products. The show will be held from 9 a.m. to 3 p.m. Talk-in on 146.52 simplex or 147.60/00 K0LTC/r. For more information, contact the Robbinsdale ARC, P.O. Box 22613, Robbinsdale, MN 55422, phone 612-533-7354.

• **Fourth Annual Ohio State Convention and Flea-Market** - The even bigger Cincinnati ARRL '84 convention will be held on Feb. 25 and 26. Activities for hams and electronics enthusiasts: forums, meetings, vendors, Wouff Hong, women's activities, banquet, hospitality suite, and more. Hospitality suite Friday and Saturday nights. The $5 convention registration includes all convention awards. Fleamarket is $4/space for two days, ham and electronics items only. Write to: Cincinnati ARRL '84, P.O. Box 11300, Cincinnati, OH 45211, or telephone 513-825-8234. Vendor and exhibitor inquiries are invited.

• **Davenport, Iowa Hamfest** - The Davenport Radio Amateur Club, Inc. will hold its 13th annual hamfest on Sunday, Feb. 26 from 8 a.m. to 4 p.m. at the Davenport Masonic Temple on Highway 61, Brady Street and 7th Street, in Davenport, Iowa. Advance tickets are $2.00, $3.00 at the door. Table rental is $7.00 each with an additional charge of $2.00 for electrical hook-up. Talk-in on 28/88, the W0BXR Repeater. Table reservations and advance tickets are available by writing to: Dave Johannsen, WB0FBP, 2131 Myrtle Street, Davenport, IA 52804.

• **Plateau ARA Hamfest** - The Plateau Amateur Radio Association will sponsor their sixth annual hamfest on Sunday, Feb. 26 at the Fayetteville High School, Fayetteville, WV. Doors open at 9 a.m. Donations $3.00, children under 12 free. Food, prizes, tailgaters. For lodging and other details, contact John Witt, W8OQC, 111 Fayette Ave., Fayetteville, WV 25840, telephone 304-574-0532.

• **Cuyahoga Falls ARC Electronic Equipment Auction/Hamfest** - The Cuyahoga Falls ARC 30th annual Electronic Equipment Auction and Hamfest will be held on Sunday, Feb. 26 at North High School, Akron, OH from 8 a.m. to 4 p.m. Tickets are $2.50 in advance, $3.00 at the door. Sellers may bring own tables, or some available for $2.00. Advance table reservations advised (s.a.s.e.). Plenty of room for buyers and sellers—over 32,000 sq. ft. Talk-in on 87/27. Details from CFARC, P.O. Box 6, Cuyahoga Falls, OH 44222, or telephone K8JSL at 216-923-3830.

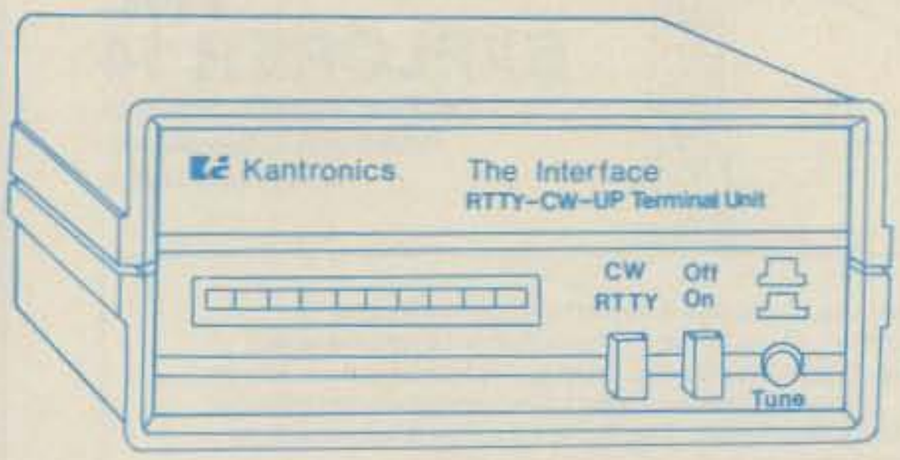
• **Splitrock ARA Auction** - The Splitrock ARA will hold its annual auction on Friday, March 2 at the VFW Post in Morris Plains, New Jersey. The doors will open at 7 p.m. and the auction will begin at 8 p.m. A cash bar will be available. Talk-in on .385/.985 and .52.

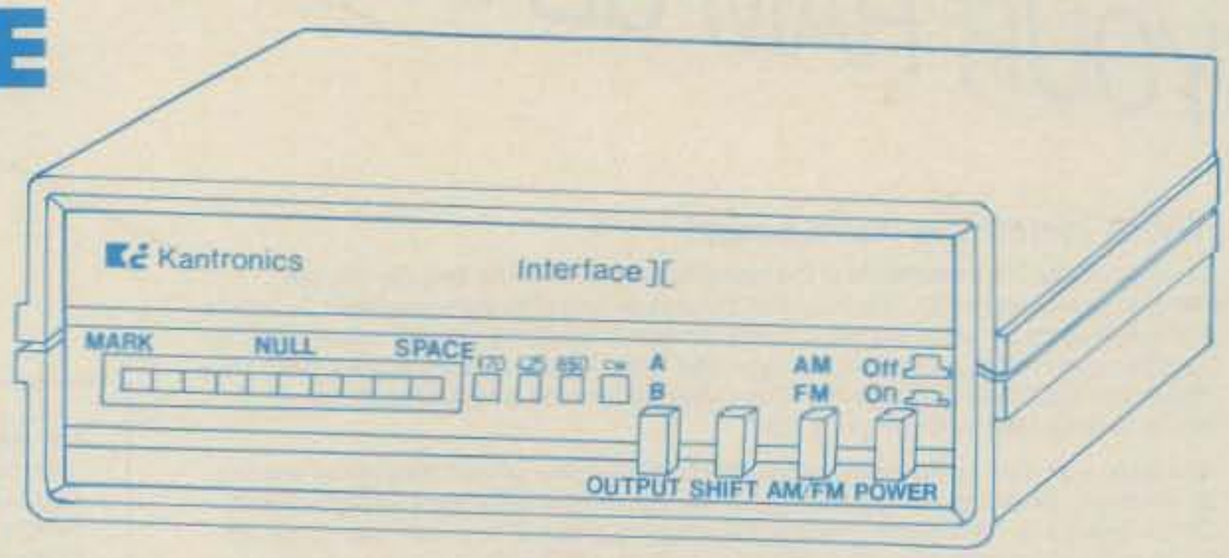
• **Livonia, MI Swap 'n Shop** - The 14th Annual Livonia ARC's Swap 'n Shop will be held on Sunday, March 4, from 8 a.m. to 4 p.m., at Churchill High School in Livonia, Michigan. There will be plenty of tables, door prizes, refreshments, and parking. Talk-in on 144.75/5.35 and 52 simplex. Reserved table space of 12-foot minimum available. For further information, send s.a.s.e. to Neil Coffin, WA8GWL, c/o Livonia Amateur Radio Club, P.O. Box 2111, Livonia, MI 48151.

• **King of the Pumpkin Hamfest** - The Teays ARC, of Circleville, Ohio, will hold its seventh annual King of the Pumpkin Hamfest on Sunday, March 4, from 8 a.m. to 4 p.m. This year the location has been moved to the new Knights of Columbus building at 2489 N. Court St. Large parking lot, door prizes, and food. Tickets are $2 in advance and $3 at the door. Tables are $4 in advance and $5 at the door. For more information, contact Dan Grant, W8UCF, 22150 Hulse Road, Circleville, OH 43113, or telephone 614-474-3026.

Blueprint for Success

THE INTERFACE





THE INTERFACE][

Kantronics | TITLE: THE INTERFACE – INTERFACE][PROPOSAL

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Suggested Retail **$139.95**

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Please send all reader inquiries directly.

KANTRONICS SOFTWARE
Hamsoft,™ Hamtext,™ and Amtorsoft™

```
MORSE                    00:00:00
TRANSMIT SPEED   25
RECEIVE SPEED    28
-------------------------------
ENJOY YOUR MEAL AND
WE'LL TALK TO YOU
REAL SOON . . . 73'S . . .
WA5RGU
-------------------------------
WEATHER HERE IS WARM TODAY
WITH LOTS OF SUN. . .XYL SAYS
TIME FOR DINNER SO 73'S WØXI
```

Kantronics has led the amateur community in software and total computer communications systems with our original program, **HAMSOFT**. With five-computer compatibility and reasonable prices **HAMSOFT** has become the industry standard. **HAMSOFT** includes split screen display, type ahead buffer, message ports, and complete keyboard control for Morse Code, Radioteletype, and ASCII communications. With THE INTERFACE or INTERFACE II, **HAMSOFT** can make any of five computers a complete amateur communications terminal. All programs are on a ROM board, except the Apple diskette.
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HAMTEXT is our advanced CW/RTTY/ASCII program for the VIC-20, COMMODORE 64, and APPLE computers. **HAMTEXT** gives you the ability to store incoming messages in the computer's memory, transmit files directly from tape or disk, and use your computer to its fullest potential. Features like Diddle, Time Transmission, Text Transmission, Printer Outputs, and Word Wraparound, make **HAMTEXT** the program for the serious amateur. **HAMTEXT** was created with input from our users as guidelines, and with total use of the computer in mind.
Suggested Retail **$99.95**

```
                         00:00:00
        PROGRAM OPTIONS
A. RETURN TO BASIC
B. EDIT MESSAGE PORTS
C. SAVE MESSAGE PORTS
D. LOAD MESSAGE PORTS
E. SET XMIT BUFF SIZE
F. EDIT HOLDING BUFFER
G. SAVE HOLDING BUFFER
H. LOAD HOLDING BUFFER
I. SET TIME
```

```
                         00:00:00
KANTRONICS AMTORSOFT
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CHOOSE
 S (AMTOR SLAVE)
M (AMTOR MASTER)
 L (AMTOR LISTENER)
 P (PROGRAM OPTIONS)
 T (T/R OPTIONS)
```

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A CQ EXCLUSIVE

CQ Interviews:

Joyce S. Davila

Chief, Public Service Division Field Operations Bureau, FCC

BY DR. THEODORE J. COHEN*, N4XX

Joyce S. Davila, Chief of the FCC's Public Service Division, is originally from West Virginia and has a degree in Management from the University of Maryland. She has a wide-ranging background in public information and minority affairs. During her government career, she has held positions with the Department of the Navy, the National Guard Bureau, and the Environmental Protection Agency. In all of these positions she was responsible for developing public awareness strategies and for establishing feedback mechanisms; in addition, she had overall responsibility for planning and directing nationwide dissemination of information programs to specialized audiences. Ms. Davila was appointed Acting Chief of the Commission's Regional Services Division on January 6, 1983. On August 7, 1983, when the Regional Services Division became the Public Services Division, she was appointed Chief, PSD. It is with great pleasure that CQ now presents this exclusive interview with Ms. Joyce S. Davila.

CQ: Joyce, just what does the Public Service Division do?
Davila: Well, Ted, the Division—which is part of the Field Operations Bureau headed by Richard Smith—manages and coordinates the Bureau's public service programs, including its public information activities, the licensing of radio operators, and the management of antenna survey matters. In fact, the Division has three branches devoted to these three areas of activity.

CQ: Let's take the branch dealing with public information first. What does it do?
Davila: The Public Contact Branch, as it's

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Joyce S. Davila, Chief, Public Service Division, FOB, FCC.

"The Public Service Division manages and coordinates the Field Operations Bureau public service program, including its public information activities, the licensing of radio operators, and the management of antenna survey matters."

called, is responsible for developing, planning, organizing, and conducting the Field Operations Bureau's public service and information program at both the national and local levels. This includes assisting the Regional Directors and District Office Supervisors in the development and implementation of their public information and assistance programs. It also maintains liaison with the media, special-interest groups, other government agencies, and other FCC offices, both at Headquarters and in the field.

CQ: We understand that the public service program was initially established in 1974 to meet the demand for information on radio frequency interference and to assist in resolving interference complaints. Do these activities still play a large part in your work?

Davila: Oh, yes! Responding to interference complaints and to inquiries made by the public, licensees, representatives of the telecommunications industries, and other government agencies continues to dominate the activities of the public service program. These contacts, of course, are initially made at the Commission's field offices and monitoring stations located throughout the United States and Puerto Rico.

CQ: What other types of inquiries do you handle?

Davila: The types of requests we receive from the public are extremely diverse in content. They range from requests for

"Responding to interference complaints and to inquiries made by the public, licensees, representatives of the telecommunications industries, and other government agencies continues to dominate the activities of the public service program."

forms and information on Commission activities, to pleas for help from persons experiencing serious r.f.i. problems on their communications equipment. Also, close congressional liaison is maintained in order to assist constituents with their communications questions and problems.

CQ: Since your Division is essentially the Commission's point-of-contact with the public, how does the information you gather affect the Commission's activities?

Davila: Personnel of the Public Service Division analyze and evaluate public complaints and inquiries, and we report our findings to management. These data, in conjunction with other Bureau data, are used to redirect Bureau priorities and resources. The data also provide the Commission with an accurate summary of the national communications environment.

"The number of public contacts is expected to increase significantly during the next several years due to the Commission's recent action approving Low-Power Television, Cellular, and new FM Radio Station assignments."

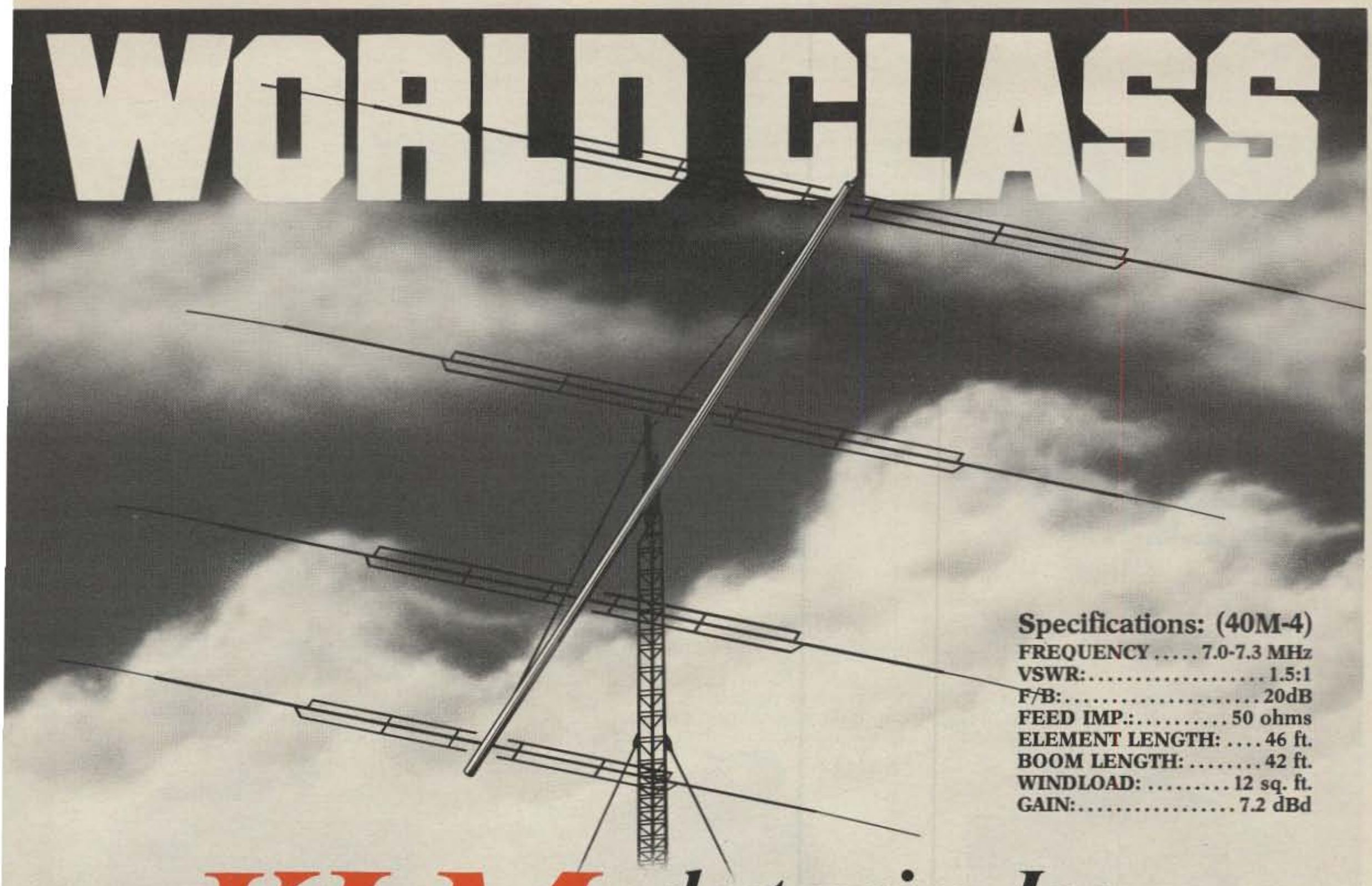
CQ: We suspect that with the introduction of new communication technologies, you may find yourself rather busy this year!

Davila: That's an understatement! The number of public contacts is expected to increase significantly during the next several years due to the Commission's recent action approving Low-Power Television, Cellular, and new FM Radio Station assignments.

CQ: Let's switch to the branch that deals with licensing.

Davila: Okay, but let me give you a little history first. Statutory requirements for much of the commercial radio operator and amateur radio operator programs

WORLD CLASS



Specifications: (40M-4)
FREQUENCY ..... 7.0-7.3 MHz
VSWR: 1.5:1
F/B: 20dB
FEED IMP.: ..... 50 ohms
ELEMENT LENGTH: .... 46 ft.
BOOM LENGTH: ..... 42 ft.
WINDLOAD: ..... 12 sq. ft.
GAIN: ..... 7.2 dBd

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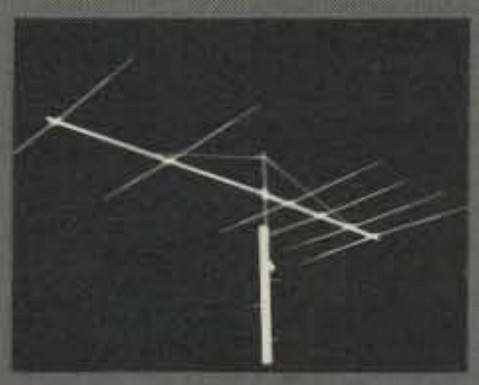
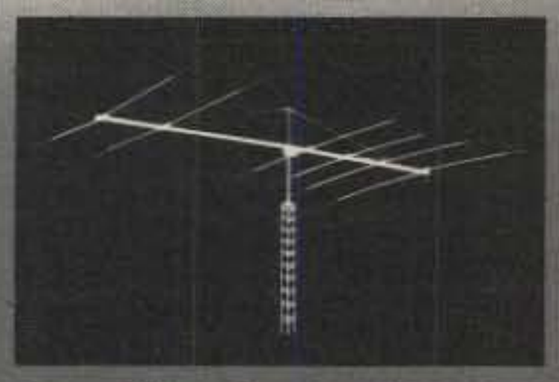
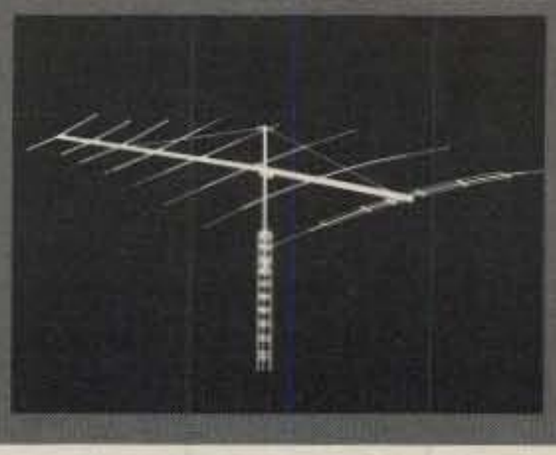


Specifications: (20M-6)
BANDWIDTH: ... 13.9-14.4 MHz
VSWR: 1.5:1
F/B ..... 35 dB
FEED IMP.: ..... 50 ohms
ELEMENT LENGTH: .... 37 ft.
BOOM LENGTH: ..... 57 ft.
WINDLOAD: ..... 12.8 sq. ft.
GAIN: ..... 11 dBd



Specifications: (30M-3)
BANDWIDTH: ... 10.1-10.150 MHz
VSWR: 1.5:1
F/B ..... 20 dB
FEED IMP.: ... 50 ohms unbal.
ELEMENT LENGTH: .... 35'6"
BOOM LENGTH: ..... 24'3"
WINDLOAD: ..... 7 sq. ft.
GAIN: ..... 7.0 dB



Specifications: (15M-6)
BANDWIDTH: ... 21.0-21.5 MHz
VSWR: 1.5:1
F/B: ..... 30 dB
FEED IMP.: ..... 50 ohms
ELEMENT LENGTH: .... 25 ft.
BOOM LENGTH: ..... 36 ft.
WINDLOAD: ..... 8.5 sq. ft.
GAIN: ..... 10.5 dBd

Specifications: (7.2/10-30-7LPA)
BANDWIDTH: ..7.2/10-30 MHz
VSWR: ..... 2:1 typical
F/B: 10/15
FEED IMP.: .... 50 ohm unbal.
ELEMENT LENGTH: .... 46 ft.
BOOM LENGTH ..... 42 ft.
WINDLOAD: ..... 12 sq. ft.
GAIN ..... 3/7 dBd typical

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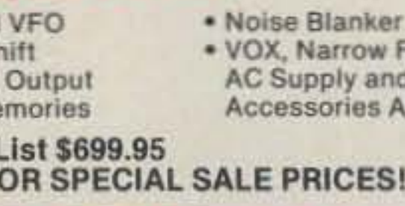

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CIRCLE 68 ON READER SERVICE CARD

A typical meeting of the Public Service Division is likely to include representatives from all of the branches. Shown here left to right are Joyce S. Davila (Chief, Public Service Division), Sharon M. Agee (Public Service Division, Public Contact Branch), James G. Voigt (Public Service Division, Chief, Antenna Survey Branch), and Shirley C. Earlewine (Public Service Division, Public Contact Branch).

stem from provisions in the International Radio Regulations of the International Telecommunications Union. These provisions specify classifications for operator licenses and qualifications for radio operators of stations used for international communications. The qualifications required for the various license include manual Morse code telegraphy skills and radio knowledge of an operational, legal, and technical nature.

CQ: Where does the Communications Act of 1934 fit into all of this?
Davila: The Communications Act of 1934, Ted, authorizes the FCC to prescribe the qualifications of station operators, to classify them according to the duties to be performed, and to license those who are qualified.

CQ: So this is where the Radio Operator Branch comes in, right?
Davila: Right! This Branch is responsible for all tasks relating to the examination and licensing of commercial radio operators. In addition, FOB is responsible for the amateur radio operator license program. This program, as your readers well know, is now being restructured to use volunteer examiners, and I expect that the new examination procedures will be implemented this year.

CQ: Won't the implementation of the volunteer examination program put a big burden on the Radio Operator Branch?
Davila: No. Actually, the Field Operations Bureau will save six work-years annually—distributed over all of its field offices—by *not* administering amateur radio operator examinations. Instead, this work will be done by private sector volunteers. This constitutes a savings of

"In the decade ahead, public service will be one of the most important functions of the Field Operations Bureau."

$96,000 annually. These resources will be used by the Field Operations Bureau for public service and enforcement functions. We are now redirecting some of our resources toward developing and operating a centralized computer system for the production of examinations, and for the storage and retrieval of license records, which we hope to make more efficient and cost-effective.

CQ: That would be quite an accomplishment! Now tell us a little about the Antenna Survey Branch, if you will.
Davila: The Antenna Survey Branch was established on February 14, 1951, in the office of the Chief Engineer to administer the then recently adopted Part 17 of the Rules on "Construction, Marking, and Lighting of Antenna Structures." Subsequently, the Branch was placed with the Field Operations Bureau, where it remains today. In this Branch, antenna proposals are analyzed for new or modified transmitting tower construction to ensure compliance with Commission and FAA standards used to prevent hazards to air navigation.

CQ: What happens after a tower is erected? Does the Branch continue to monitor the structure?
Davila: Yes. Once a structure is erected, the Branch monitors a licensee's continued compliance with the Commission's requirements. This is done by analyzing public complaints and by reviewing the results of FAA flight checks. On-site inspections are also conducted by the FOB's staff to verify antenna heights, locations of towers, light outages, and towers constructed along airway routes in proximity to airports.

CQ: What does the future hold for this Branch?
Davila: The Antenna Survey Branch will continue to be the Commission's liaison with other FCC offices and bureaus and with the FAA when it comes to antenna tower matters. Further, the manual processing of applications will soon be automated, giving us the ability to retain the actual application documents, minimize the likelihood of delays in the processing of applications, and reduce the loss of applications. Consideration will also be given to interacting with the FAA through this system, thereby making the whole tower application process more efficient and cost effective. Finally, we see an increase in the number of tower applications resulting from Commission action in the areas of Low Power TV, Cellular, and FM Broadcast assignments.

"Linked with other Field Operations Bureau programs, public-complaint processing will provide the Commission with an analysis of communications technology in the 'real world.' "

CQ: It looks like you really have a wide range of responsibilities, Joyce. Do you have any other comments for our readers?
Davila: I could summarize our discussion by saying that in the next decade public service will be one of the most important functions of the Field Operations Bureau. Linked with other Bureau programs, public-complaint processing will provide the Commission with an analysis of communications technology in the "real world." It will also provide the Commission with an overview of the "market-place" theory. Reports given to the Commission will be used to identify regulatory deficiencies or areas where changes are required in the Commission's programs. Through it all, public service personnel must remain flexible to meet technological changes. And the involvement of the public service staff with audiences at the local and national levels will be a key link between the FCC and the public it serves.

CQ: Thank you for this interesting look at the Public Service Division, Joyce.
Davila: It was a pleasure to be here today.

CQ REVIEWS:

The Heath SS-9000
H.F. Synthesized Transceiver

BY JOHN J. SCHULTZ*, W4FA

The Heath SS-9000 h.f. all-band transceiver has been a fairly long time in coming on the market. However, it is now available as Heath's top-of-the-line transceiver. It is only available as a completely assembled unit, and the only accessories available for it are a matching power supply and a service manual. No other accessories are available simply because a full range of filters is standard with the SS-9000.

By now everyone who has followed the Heath line of amateur radio products knows that there is something very new and different about the SS-9000. It is not simply a transceiver one can manually tune and operate, but rather it can be *completely* remote controlled via a terminal.

However, as tempting as it is to race on to describe the computer controlled possibilities of the SS-9000, we'll first describe it as a manually operated transceiver. This should give the reader a feel for the capabilities of the unit as a radio, and then we'll go on to the terminal control possibilities for the unit. After that, if one basically can understand what the radio can do and how it can be controlled, one will easily be able to appreciate some of the new possibilities it opens up for all sorts of innovative ideas regarding h.f. transceiver usage.

The SS-9000 on the operating table with the PS-9000 power supply below it.

Specifications

Table I lists the general specifications for the SS-9000. Basically, the transceiver is an amateur-band-only unit designed for s.s.b., c.w., and RTTY service. All control frequencies within the unit are frequency synthesized. Two six-digit frequency displays are provided for what are essentially the v.f.o. A/B frequencies. There is also one frequency memory per band. Tuning of the transceiver is done by a main tuning control which has a fixed tuning rate of 5 kHz/revolution. Table II shows the transmitter specifications. The transceiver is rated to deliver 100 watts PEP and 100 watts carrier on c.w./RTTY into a 50 ohm load. The automatic cutback in power output when the load v.s.w.r. reaches 2:1 is only to 80 watts. As shown in the table, a combination time/temperature factor also determines the power output. The rest of the specifications regarding carrier suppression, unwanted sideband suppression, harmonic radiation, etc., are all quite good, being in the 50 + dB range. Table III shows the receiver specifications. The sensitivity is very respectable for a modern-day transceiver. The s.s.b. shape factor is 2.38 (6/60 dB), which, on the other hand, is not exceptional for a modern-day transceiver. Image rejection and i.f. rejection are specified at a very good −70 to −90 dB. RIT is provided with a specified range of ±250 Hz.

Circuitry

Fig. 1 shows a block diagram of the SS-9000's circuitry. If one concentrates on the Preamp, PA, Transmit/Receive, and Audio circuit boards, it is fairly easy to follow the receive/transmit signal flow paths.

Received signals first pass through separate low-pass and high-pass filter assemblies on the PA circuit board. They are then applied to a receive preamplifier which is followed by a PIN diode attenuator (which acts as the r.f. gain control) and an assembly of nine electronically switched bandpass filters. The signal goes on to the first mixer stage where it is mixed with the h.f.o. signal and translated to a 9 MHz i.f. This is followed by an amplifier and bandpass filter stage, and then the signal goes on to a second mixer. In the second mixer the signal is mixed with an approximately 12.4 MHz i.f.o. frequency and translated to its final i.f. of 3.395 MHz. This signal then passes through the main s.s.b. filter, further amplification, either of the two c.w. filters when desired, more amplification, and then on to a product detector. Final audio amplification of the audio output of the product detector is preceded by a low-pass filter stage.

For transmit, microphone input signals are amplified and applied to a balanced modulator stage which produces a d.s.b. signal at the 3.395 MHz i.f. This signal passes through a first s.s.b. filter and then, if it is activated, through the r.f. speech processor circuit. After that circuitry, it passes through a second s.s.b. filter and then is translated to the 9 MHz i.f. The signal is then further translated to its final output frequency and amplified through an amplifier chain to its final output level.

A basic frequency standard and three synthesizer loops for the voltage-controlled oscillator sections are on the Transmit/Receive board (h.f.o., i.f.o., and b.f.o. signals) form the synthesizer.

A simply labeled block "controller" is, however, the "intelligent" heart of the SS-9000. As can be seen from fig. 1, this element performs an interface function between external commands (via front-panel controls or from a terminal interface) and the internal circuits on all

*c/o CQ Magazine

GENERAL	
Frequency Readout	Two 6-digit electronic displays
Readout Accuracy	To the nearest 100 Hz
Frequency Control	Synthesized VFO, HFO, and BFO for stability and easy tuning.
Tuning	100 Hz per step, 5 kHz per knob rotation. Push-buttons provided for up/down tuning (rate is internally adjustable).
Operation	Split transmit/receive or transceive from either readout.
Synthesized Lock Indicator	Visual indication when the synthesizer is un-locked. Transmitter is disabled when the synthesizer is un-locked.
Frequency Coverage (megahertz)	1.8 to 2.0*. 3.5 to 4.0*. 7.0 to 7.3*. 10.1 to 10.15. 14.0 to 14.350*. 18.068 to 18.168*. 21.0 to 21.450*. 24.890 to 24.990. 28.0 to 29.7. WWV @ 15.0
*Extended receiver coverage (above and below these bands).	
Frequency Stability	Less than 3 ppm drift from turn-on for first 15 minutes. Less than 3 ppm/hour drift after 15 minutes warm-up. Less than 20 ppm drift from 0° C to +40° C. (Single crystal-controlled 10 MHz frequency standard.)
Modes of Operation	LSB. USB. CW-Wide. CW-Medium (400 Hz filter). CW-Narrow (200 Hz filter). RTTY (LSB, 400 Hz filter).
Operating Temperature Range	0° C to +40° C.
Speech Processing	Adjustable RF speech compressor.
IF Shift	Incremental plus and minus passband shift (−600, −400, −200, −100, 0, +100, +200, and +400 Hz) in the SSB modes.
Power Requirements*	11 to 16 VDC with a nominal current maximum of 25 amperes at 100 watts CW output. Receiver current is 2 amperes nominal.
Front Panel Connectors	Microphone, headphones.
Rear Panel Connectors & Control	Antenna (SO-239). Linear ALC In. Linear ALC Adjust. Low Power Enable. Spares (5). DC Power Input. CW Key Jack. External Transmit Audio In (2). Speaker Out. External Receiver Audio. T/R In. T/R Out. Mute. Mute (inverted). External Relay (linear). RS-232 Computer interface.
*All specifications are referenced to 13.8 VDC at 25°C ambient.	

Table I– General specifications of the SS-9000.

of the previously mentioned circuit boards. The controller consists of a CPU, a peripheral interface adapter, a static memory interface, a read-only memory, 256 bytes of CMOS RAM, and various latches and gates.

The block marked "Terminal Interface" contains an asynchronous communications element (**ACE**). This device performs the functions of the conventional **UART** and has an internal software programmable baud rate generator, modem control, and self-test functions.

Physical Construction

The specification tables give the size and weight data for the SS-9000. The front panel is

TRANSMITTER	
RF Power Output	SSB: 100 watts PEP. CW & RTTY: 100 watts.
Duty Cycle	100% with appropriate automatic power output reduction by an internal thermal sensor. This reduction is determined by the time factor and the ambient temperature. The nominal parameters are as follows: Ambient Temperature: +25° C. Supply Voltage: +13.8 VDC. Frequency: 14.1 MHz. Mode: CW key down, 100% duty cycle. Example: Power Output / Time 100 watts / 0 min. 80 watts / 3 min. 60 watts / 10 min. 40 watts / Infinite
Load Impedance	50 ohms.
VSWR	This Transceiver is stable at any VSWR and load impedance. The VSWR cutback circuitry guarantees at least 80% of rated power at any VSWR less than 2:1 and a minimum of 15 watts at any VSWR.
Transmitter Protection	Thermally protected. High VSWR cut-back. Over-current protection.
Carrier Suppression	50 dB down from a 100 watt, single-tone (1000 Hz) output.
Unwanted Sideband Suppression	55 dB down from a 100 watt, single-tone (1000 Hz) output.
Harmonic Radiation	50 dB down below 50 MHz; 65 dB down above 50 MHz.
Spurious Radiation	50 dB down, except at 17 meters (40 dB down).
Third Order Distortion	30 dB down from a 100-watt, PEP, two-tone output.
T/R Operation	SSB: PTT or VOX. CW: Semi break-in.
CW Sidetone	To speaker or headphones (800 Hz tone, adjustable level).
Microphone Input	High impedance (25 k ohm) with a rating of −55 dBm.
Front Panel Meter	Receive: S units. Transmit (selectable: ALC, relative RF power, or speech compression).
Phone Patch Impedance	4 ohm output to speaker, high impedance input to transmitter.
Available Accessories	AC power supply/speaker with built-in dual time 12/24-hour clock. Customer Service Manual.
Cabinet Dimensions	6-1/8" high × 14" wide × 13-3/4" deep (15.6 × 35.6 × 34.9 cm).
Weight	35 lbs (15.9 kg).

Table II– Transmitter specifications of the SS-9000.

of die-cast zinc construction with a brushed metal rim around the entire front panel and again around the frequency display area. The panel has a two-tone light/dark gray finish, and the control markings, which are all cast and raised from the panel, are painted white. Various LED's indicate the setting of functions such as RIT on/off, Noise Blanker on/off, etc. The two frequency readouts use green LED displays. The transceiver is enclosed by a two-part rolled steel enclosure such that one can access either the top or bottom half of the interior. Overall, the external appearance of the SS-9000 is very impressive. The knobs all have a very smooth operating feel, and they are well spaced and logical in their arrangement.

The photographs illustrate what one sees if one starts to take the top and bottom covers off of the SS-9000. Although the preceding circuitry description may have sounded a bit simple, the SS-9000 is a very complicated "machine" inside. However, it is extremely well constructed. All of the components are very neatly mounted, the PC boards are absolutely "clean," and there is a generous amount of individual copper shields around sensitive circuit areas. The front panel hinges forward for service accessibility, and all of the main circuit boards fan out for easy access without having to use extenders. For service access, should it ever be required, the construction of the SS-9000 has to be rated as outstanding.

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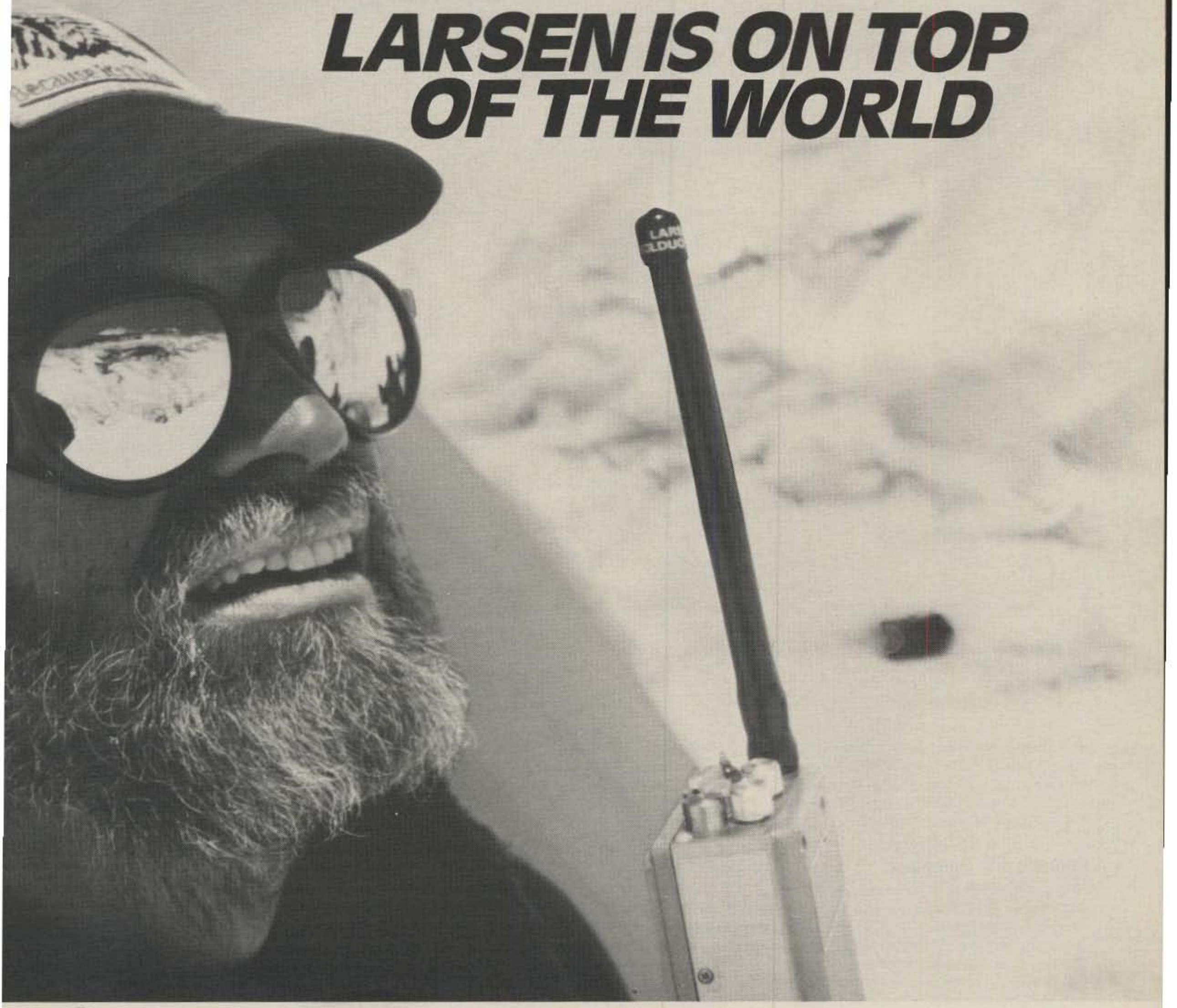

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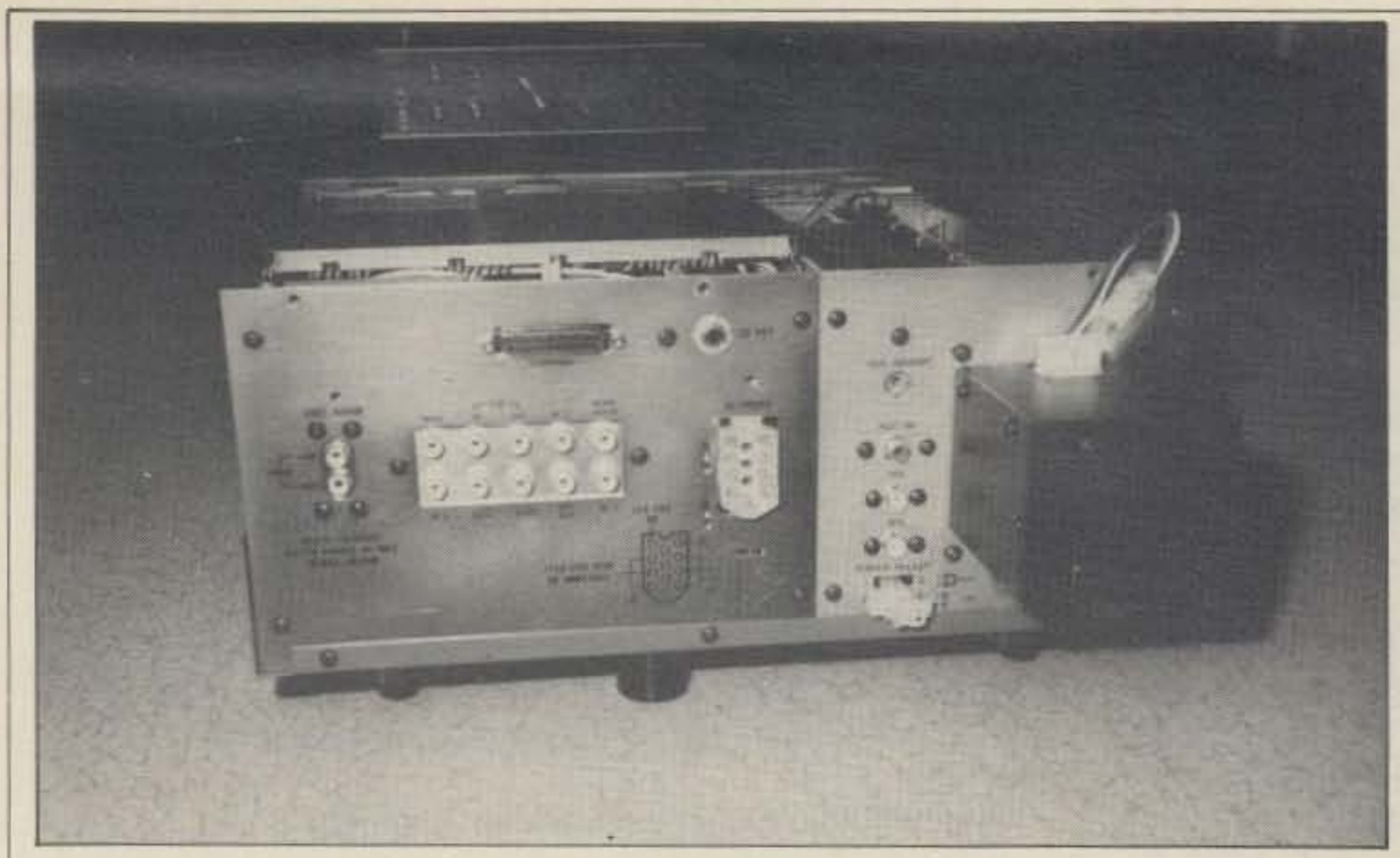
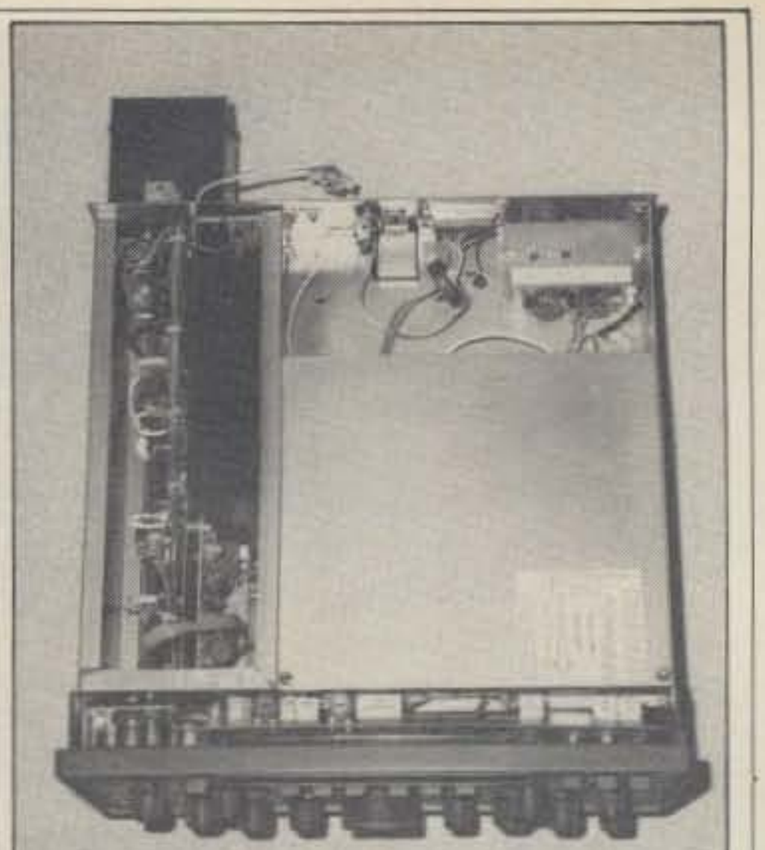


Rear panel of the SS-9000. The box on the right contains the bandswitch motor. External connections are provided for just about any purpose: linear amplifier, ALC, audio connections, PTT, etc.

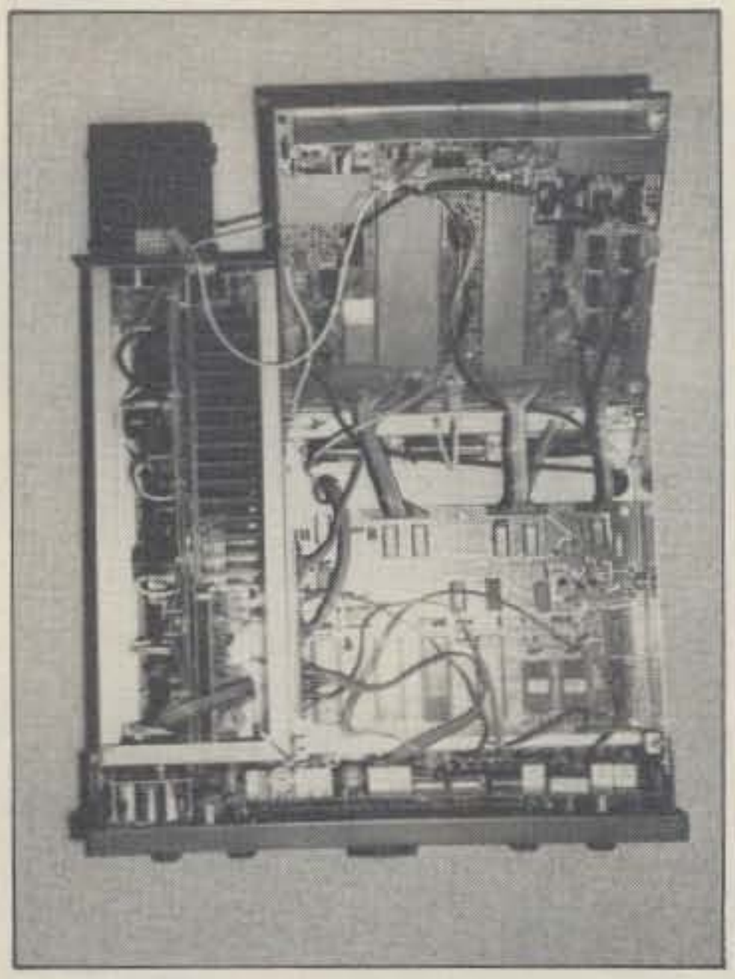


Just taking the top cover off the unit, one notes the very clean, well-shielded construction.

RECEIVER

Sensitivity	0.3 μV for 10 dB (S+N)/N SSB on the 40 thru 10 meter bands; 0.5 μV on the 160 and 80 meter bands.
Selectivity	2.1 kHz at 6 dB down; 5 kHz at 60 dB down.
	CW filters:
	CWM: 400 Hz at 6 dB down; 1.5 kHz at 60 dB down.
	CWN: 200 Hz at 6 dB down; 1 kHz at 60 dB down.
Overall Gain	Less than 1 microvolt for a .25 watt audio output.
Audio Output	1.5 watts into 4 ohms at less than 10% THD.
AGC	Fast-attack with switch selectable Off, Fast, and Slow decay.
Intermodulation Distortion 20 kHz spacing	−70 dB.
Image Rejection	−80 dB (except −65 dB on the 17 and 12 meter bands).
Second IF Rejection	−90 dB.
First IF Rejection	−80 dB (except −60 dB on the 40 and 30 meter bands).
Internally Generated Spurious Signals	Generally below the noise level; all below 1 μV equivalent.
RIT	± 250 Hz.

Table III– Receiver specifications of the SS-9000.



One shielded cover hinges upward to reveal still more PC boards and individually shielded assemblies. Note the heatsink on the left for the internally mounted PA stage.

The arrangement of the PA stages within the transceiver is particularly interesting. As can be seen from the photographs, the PA stage is mounted internally with its heat sink and does not need any fan!

Controls and Operation

Fig. 2 shows the front-panel controls on the SS-9000 in detail. Many of the controls are self-explanatory, and obviously Heath laborec quite a bit on the subject of which functions should be assigned front-panel controls in order to achieve operating ease and clarity, versus having the front panel look like the cockpit of a commercial airliner.

Separate a.f. and r.f. gain controls are available as well as a.g.c. selection which includes an "off" position. The RIT knob is conveniently located next to the main tuning knob. The Passband Shift Control will slide the fixed i.f. filter bandwidth above or below the i.f. center frequency. The Main Tuning is noted as adjusting the receive frequency in 100 Hz steps and that is true, but the coverage per revolution is 5 kHz. The meter indicates S units in receive and a.l.c., power output or compression level in transmit. The Meter Select pushbutton changes the meter function, and as it is alternatively depressed, the LED's for **ALC**, **PWR**, or **COMP** will be illuminated. In a similar manner, if the pushbuttons for **TUNE**, **RIT**, or **NB** are depressed, the LED's above them will illuminate to indicate an "on" status. The Power Output control allows one to adjust the power output from a few watts to the nominal, full 100 watts output. Although the power output scale on the panel meter is supposed to be only a relative indicator, it does, in fact, indicate almost the exact power output over the 20–100 watt range. The Speech Compression control, although it is not indicated in fig. 2, does have a click-stop "off" position at its extreme CCW rotation point. The two pushbuttons below the main tuning knob provide for a frequency scan function. If either the **up** or **down** button is depressed, the receive frequency will be scanned accordingly. The operation is completely a manual start/stop one. The rate of scanning can be set internally to be from 2.5 to 270 kHz/sec.

Any user should find most of the controls to be extremely easy to understand. The pushbuttons under the dual frequency display are

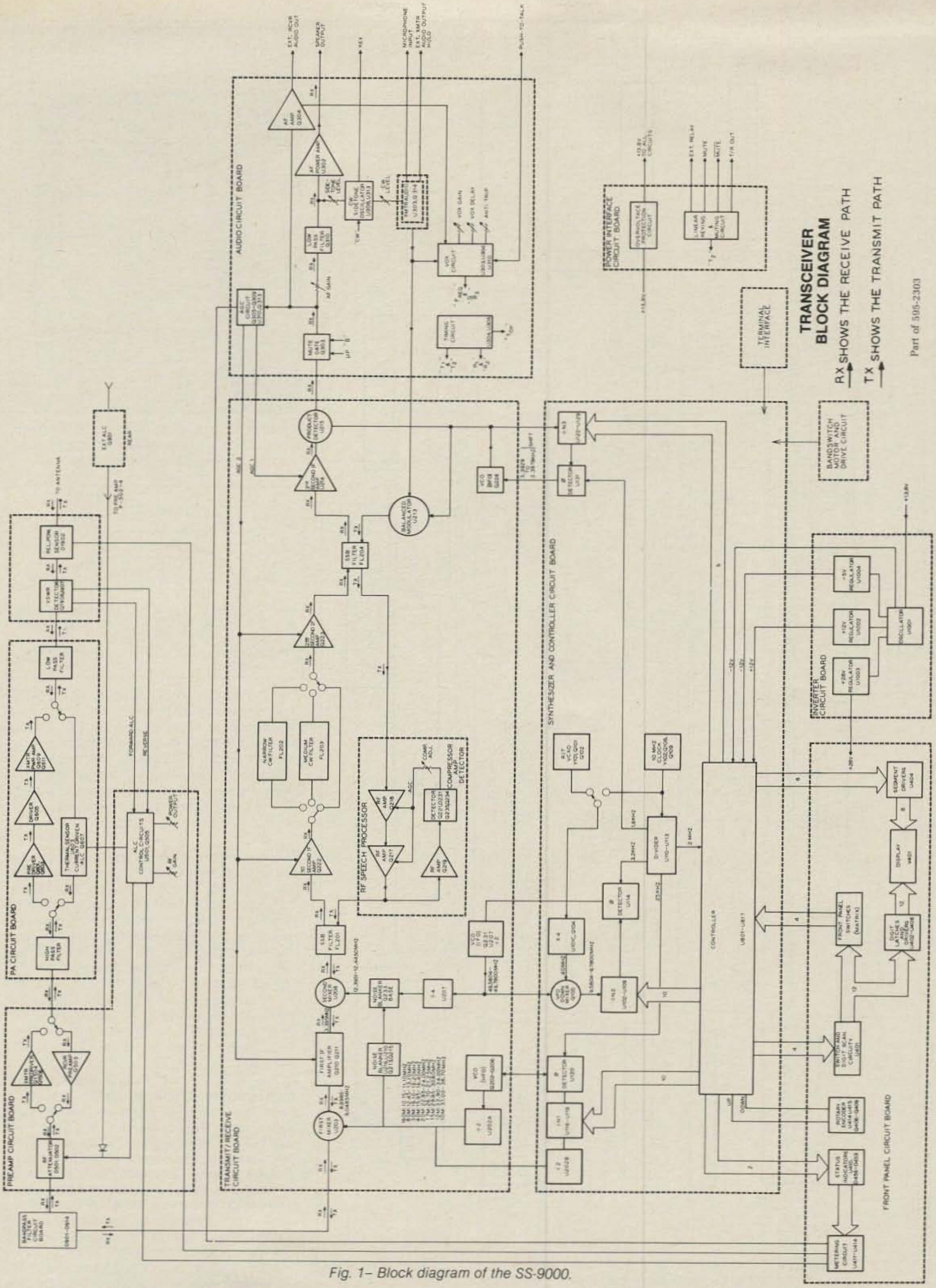


Fig. 1– Block diagram of the SS-9000.

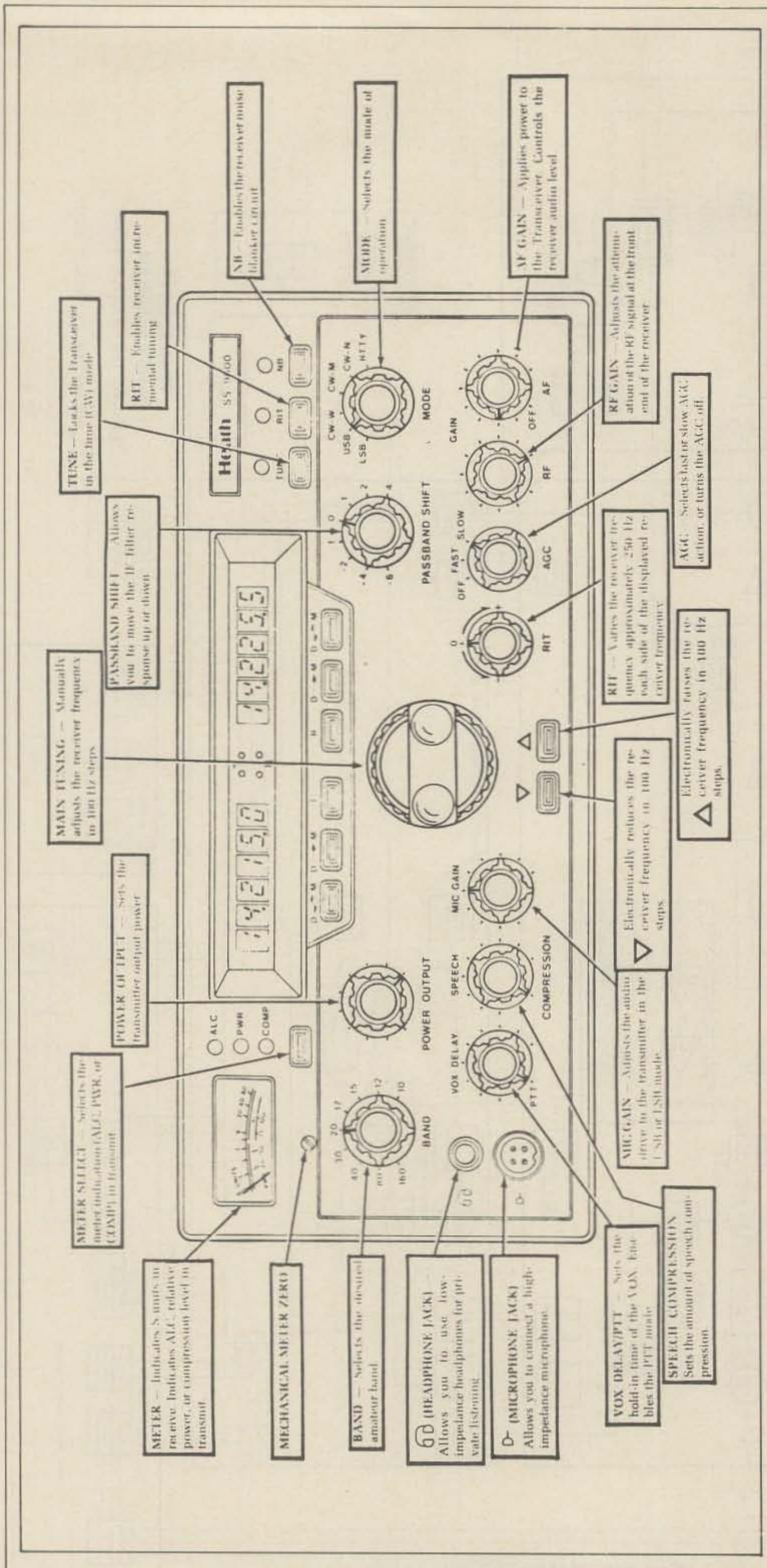
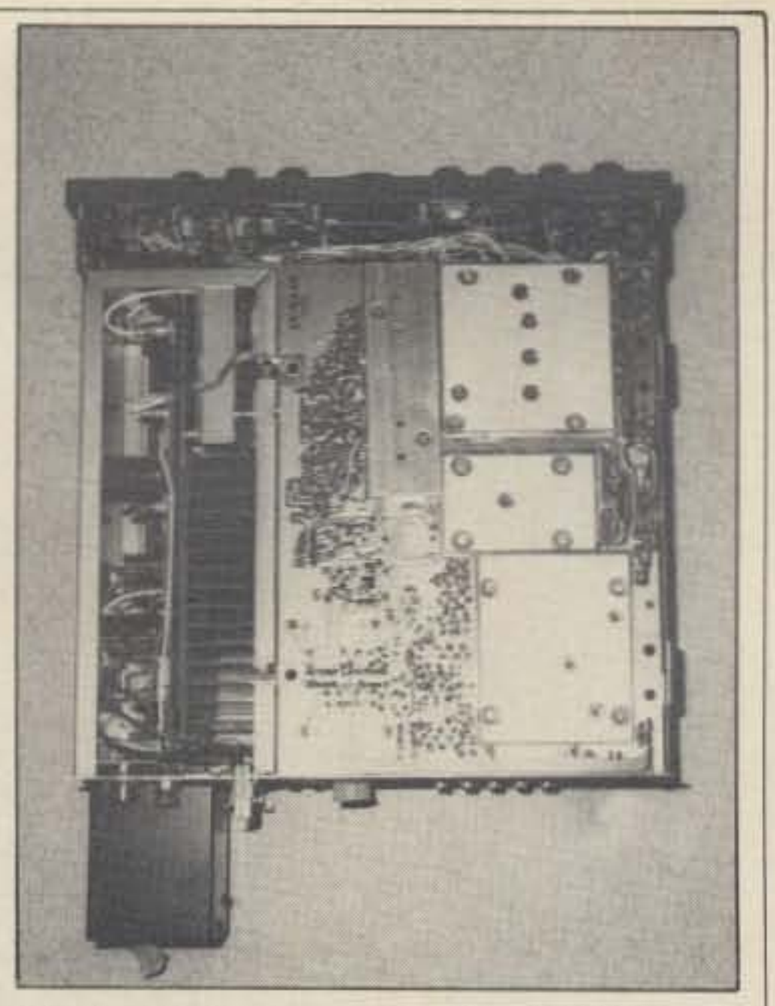


Fig. 2– Front-panel controls on the SS-9000.



A look at the bottom inside of the SS-9000 with more shielded assemblies and the PA heat-sink again on the left side.

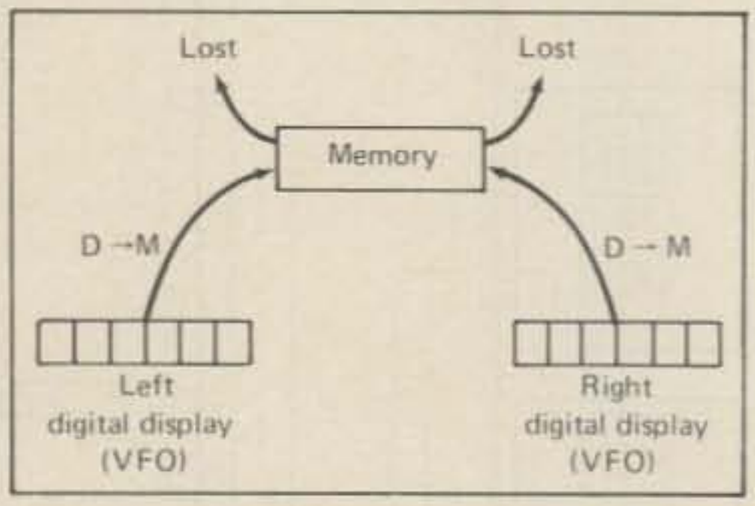


Fig. 3– Basic memory system in the SS-9000. If the D→M pushbutton under either display is depressed, the frequency from that display goes into memory. Whatever frequency was in memory is lost. A separate D⇄M pushbutton under each display allows one to toggle the displayed and memory frequency without changing the memory frequency.

also extremely easy to use, but they do require just a small bit of explanation. Between the two frequency displays there are four LED's. The upper set has red LED's and is associated with the **T** (transmit) pushbutton. The lower set has green LED's and is associated with the **R** (receive) pushbutton. By using the pushbuttons, one can set the right or left digitally displayed frequency to be both the receive and transmit frequency, or one to be the receive frequency and the other the transmit frequency, or vice versa. So, split frequency operation is possible over the complete extent of any one band.

The pushbuttons marked **D** and **M** with the arrows control the memory function on each band. The memory operates as shown in fig. 3. There is one memory per band, and if the **D→M** pushbutton under either display is pressed, the displayed frequency will go into memory, erasing whatever frequency was in memory. The displayed frequency does not change, so one can go on tuning. The **D⇄M** pushbuttons under each display simply exchange the displayed frequency and the frequency in memory. One push on the switch will call up the memory frequency on the display, and another push will restore the originally displayed fre-

Band	Low Freq. (MHz)	High Freq. (MHz)
10	28.000.0	29.700.0
12	24.890.0	24.990.0
15	20.925.0	21.760.0
17	17.699.0	18.200.0
20	13.925.0	15.000.8
30	10.100.0	10.150.0
40	6.925.0	7.375.0
80	3.425.0	4.075.0
160	1.745.0	2.055.0

Table IV– Actual SS-9000 frequency coverage.

quency. The frequency written in memory is not affected by use of the **D⇄M** pushbutton. The transceiver will also remember which v.f.o. was set up for receive and transmit on each band. The dual v.f.o./memory system is not the most elaborate one found in a manual transceiver, but it is very straightforward and easy to use.

Performance

Table I indicated that the actual frequency coverage extended beyond some band edges. The actual frequency coverage of the SS-9000 unit tested is shown in Table IV. As can be seen, there is quite generous extended coverage on some bands. It's only too bad that the 30 meter coverage couldn't be extended down to 10.0 MHz.

As was mentioned before, the arrangement of the various controls is nicely done and the transceiver is very easy to use in practice. The 5 kHz tuning rate is a nice compromise for s.s.b. and c.w. tuning, especially when using the narrow c.w. filter. Unfortunately, one has to take the top cover off to set the scan tuning rate and once it's set, that's it. The front-panel selection of two tuning or scan rates would have been a helpful feature. The manual tuning "feel" is excellent—smooth without being too loose. The simple pushbutton marked **Tune** is a very great convenience feature, and it's hard to understand why more transceivers don't have such a feature. When the pushbutton is depressed, the transceiver is keyed in the c.w. mode. Since the PA is automatically s.w.r. protected, to adjust an antenna tuner, for instance, one simply presses the **Tune** button and adjusts the tuner. The power output automatically comes up as the tuner is adjusted to present a 50 ohm load to the SS-9000.

On receive, one gets the impression that received signals sound very "clean." This was confirmed by bench measurements which showed the SS-9000 to easily meet its claimed specifications. A few very minor spurious signals (equivalent to less than 0.5 μV) were found on the upper end of 10 meters, but they would never be noted in actual operation. The s.s.b. selectivity is adequate except for extreme conditions when a bit better shape factor would be helpful. The passband shift is moderately helpful under bad QRM conditions. The RIT control actually had a range of $\pm$400 Hz and was perfectly adequate for s.s.b. or c.w. use, but the received frequency display does not indicate the offset set by the control. The display itself is perfectly stable and flicker-free. It is also easy on the eyes with its green color. Heath does not give overload specifications and overload measurements were not made, due to a lack of time before changing QTH's, but the impression one gets when operating the lower end of 40 meters at night is that the SS-9000 can easily hold its own. The noise blanker is very effective against almost any impulse (e.g., ignition) type noise. Overall, on receive the SS-9000 demonstrates excellent performance, although some operators might like to have more QRM fighting aids (e.g., variable bandwidth tuning and a notch filter).

On transmit, the SS-9000 also easily meets its specifications. The power output ranged from 105 to 110 watts over the entire range of the transceiver. The PA was absolutely stable with any type of mismatched load. With a proper load, it easily maintained full power output for repeated full 5 minute periods before the automatic circuitry started to reduce the output to prevent overheating. There is no fan, so operation is perfectly quiet. On s.s.b. the third-order IMD products measured a respectable -32 dB. Keying is smooth and semi-break-in is possible since the VOX delay time can be used to adjust the transmit hold-in time on c.w. Sidetone monitoring is provided with adjustable level at a fixed 800 Hz frequency. The r.f. speech processor is very effective, and numerous on-the-air reports of "very, very good" audio were received (a common, medium-impedance dynamic microphone was used). The only awkward thing about the processor is that one must note the meter scale reading when the meter is set to **Comp** with the tune switch activated and then adjust the compression-level control to that same meter reading while transmitting. There is no separate "compression" scale on the meter.

Terminal Interface

The 25-pin "D" connector on the rear panel of the SS-9000 is the key to unleashing the real capabilities of the transceiver. It is the RS-232C signal-level standard in/out terminal which allows the transceiver to interface with an ASCII terminal, modem, or computer. If you have a Heath H-19 or Zenith Z-19 video terminal, you just plug the extension cable that comes with the terminal into the SS-9000. If you do not have that equipment, instructions are given for general interconnection.

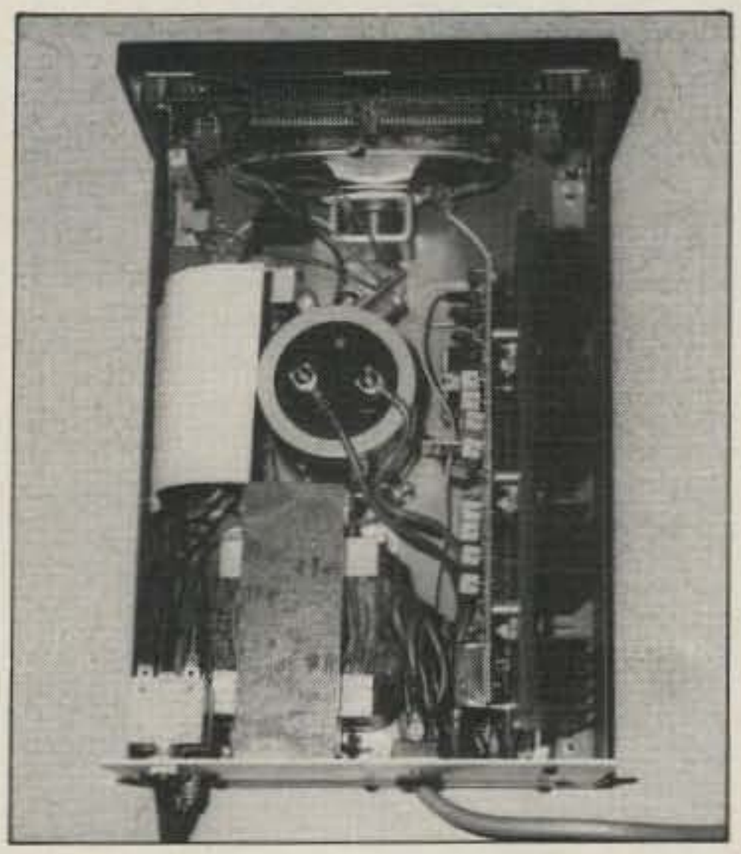
Commands will be accepted by the transceiver to control and monitor all functions that are under the control of the microprocessor in the order received, and if they are not in the proper syntex, the transceiver will generate one of 12 error codes (e.g., numbers which will indicate attempted out-of-band operation, improper switch command, etc.). The same command that can be used to set a parameter to a particular value also allows one to examine the currently set value of that parameter. Table V shows the commands accepted by the transceiver. One can, for instance, note that one command will print the current setting of the bandswitch, and then the same command can be used, if desired, to change bands. Expressions are used to specify frequencies for either the display or memory. The transceiver can do numerous things under terminal control which it cannot do under manual control. The scan rate can be set as desired, frequencies can be added to or subtracted from the left or right displays or memory on different bands, memory frequencies may be combined for use on one band instead of having just one memory per band, etc. Basically, the SS-9000 can be commanded by a terminal to do anything except turn itself on.

In practice, this means that one can sit at a terminal and completely control the transceiver. For example, one might ask for a listing of frequencies and various control settings. Then by keystroke, one can change bands, put different frequencies in the v.f.o.'s, tune or scan up and down from a set frequency, adjust the passband shift, etc. On s.s.b. one still

COMMANDS

BR[ate]=	Prints the current Baud Rate setting.
BR[ate]=n	Sets the Baud Rate setting.
	where: n = 50, 75, 110, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, or 9600.
BA[nd]=	Prints the current Band switch setting.
BA[nd]=n	Rotates the Band switch to the n meter band.
	where: n = 16[0], 8[0], 4[0], 3[0], 2[0], 17, 15, 12, or 1[0].
MO[de]=	Prints the current Mode switch setting.
MO[de]=n	Sets the Mode to n.
	where: n = LO[wer], UP[per], W[ide], M[edium], N[arrow], or R[TTY].
SH[ift]=	Prints the current PASSBAND SHIFT switch setting.
SH[ift]=n	Sets the Passband Shift to n.
	where: n = −6[00], −4[00], −2[00], −1[00], 0, 1[00], 2[00], 4[00].
S[can]=	Prints the current SCAN switch setting.
S[can]=n	Sets the Scan rate to n.
	where: n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or 16. NOTE: 1 = approximately 2.5 kHz per second; 16 = approximately 300 kHz per second.
SW[itch]=	Releases all switches to their physical settings. NOTE: This includes the BAUD RATE switches.
L[ock]	Locks all switches to their current state.
PS[witch]	Prints the switch settings. NOTE: An "L" (locked) appears after any switch setting that was set from the terminal.
PF[req]	Prints the frequencies in memory for all bands.
PF[req]<band>	Prints the frequencies in memory for <band>, where <band> is one of the values for n listed in the BA[nd] command (see above). NOTE: The frequencies that are selected for receive and transmit are indicated by R and T, respectively.
RI[ndicator]	Toggles the receive indicator for the current band
RI[ndicator] <band>	Toggles the receive indicator for <band>.
TI[ndicator]	Toggles the transmit indicator for the current band
TI[ndicator] <band>	Toggles the transmit indicator for <band>.
RE[ceive]	Sets the Receive mode.
TR[ansmit]	Sets the Transmit mode.

Table V– Terminal commands for the SS-9000.



A look inside the PS-9000 power supply. Note the hefty heatsink on the right side for the regulator pass transistors.

needs audio in/out connections to the transceiver. However, with a suitably equipped terminal, c.w. and RTTY can be automated for all practical purposes.

Since the SS-9000 can be terminal-controlled, it can, of course, be operated by a computer program. What sort of program one might want to devise is left up to the imagination. One could write a program for the transceiver to check certain frequencies on certain bands at specific times, to scan specific band segments at certain times, to set up itself for a certain mode of operation on a specific frequency at given times, etc. If a signal-recognition device could also be integrated into the system, a computer program could be written such that the transceiver would search various segments of various bands and sound an alarm when a specific signal is found. It probably will not be too long, for instance, before stations who like to keep DX schedules will be using computer-controlled transceivers to automatically search out the best band, including crossband possibilities, and frequencies with the least QRM for their schedules immediately before the schedule time starts and to set up the transceiver at each end for operation.

The software demonstration package (5¼ inch diskette) which comes with the SS-9000 doesn't suggest anything like the foregoing idea. However, it does introduce one to terminal control of the SS-9000 in a very practical manner by asking the operator to perform various control functions from a keyboard and then performing various control functions on its own for illustrative purposes. Although it has a "teaching" function, it also illustrates how the SS-9000 can be controlled by a computer program.

Antenna Switch Interface

The bandswitch on the SS-9000 is controlled for non-manual operation by a motor assembly on the rear of the transceiver. The motor assembly has some external connections such that it can be interfaced with the Heath SA-1480 Remote Coax Switch. When this is done, any one of up to five antennas can be automatically selected when the bandswitch on the SS-9000 changes.

Accessories

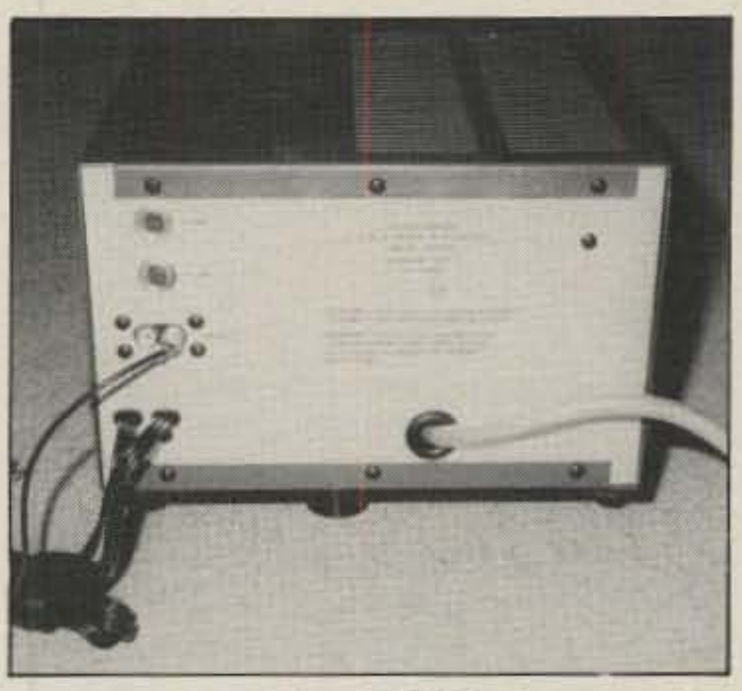
The main accessory for the SS-9000 is the PS-9000 power supply. It is styled to match the SS-9000 and basically supplies a regulated 13.8 v.d.c. output with a 25 ampere intermittent or 15 ampere continuous rating. It has current limiting and thermal protection but no apparent over-voltage crowbar circuitry. Filtering in the unit is mainly provided by a hefty 39,000 mF capacitor. Construction is quite rugged, and it can be set up to operate on 110/220 volt, 50/60 Hz.

The unit also contains two independent 2400-hour format clocks and a good-quality speaker. Two separate line cords are provided so the clocks can remain on an unswitched line and the power supply itself can be connected to a station's "big switch" a.c. line. The clocks can be set by front-panel pushbuttons, and an internal adjustment is provided to set the brightness of each clock. The clocks use the line frequency for timing purposes and must be reset if an a.c. power interruption should occur.

The only other accessory for the SS-9000 is a service manual costing $35.00. The owner's manual which comes with the SS-9000 gives very complete and clear installation and operating instructions. However, the SS-9000 is a complex unit, and it makes good sense for detailed service information to be contained in a separate manual. The manual itself was not examined, but considering the clarity of the owner's manual and all other Heath manuals, it undoubtedly is of the same high quality.

Summary

The SS-9000 is a very high quality transceiver in every respect—construction, performance, and control. It is also an expensive transceiver. In considering purchase of the unit, one primarily would have to balance the cost of the unit against one's anticipation of making use of its extraordinary terminal control possibilities. CQ



A rear view of the PS-9000. Separate line cords are provided for the power supply/clock circuits and there are two circuit breaker resets (one for each of the two 110 V primary windings on the power transformer).

Recently, an amateur radio course was begun for sixth, seventh, and eighth grade students. The results have been very encouraging, which shows that this is a hobby for all ages.

A Course in Amateur Radio

BY CAROLE J. PERRY*, WB2MGP

Carole Perry, WB2MGP, with a student using an HT in front of Intermediate School 72 in Staten Island.

The eighth-grade Novice class.

The seventh-grade Novice class with a 2 meter rig.

Last year an introductory course in amateur radio was offered at Intermediate School 72 in Staten Island, New York. The course was taught by Carole Perry, WB2MGP, who brought her electronics background to the school, having been an executive for an electronics manufacturing firm for ten years. She also teaches science courses. Here is her story of how amateur radio became an important part of the student's lives. —K2EEK

Last year an introductory course in amateur radio was offered at Intermediate School 72 in Staten Island, New York. The course was offered to sixth, seventh, and eighth grade students of diverse backgrounds and abilities. The term began with an enrollment of 300 students, many of whom had reading problems and a definite anxiety about learning anything technical. My first task was to build a feeling of self-confidence in these children, followed by creating in them a love for the hobby. I assured them that they were all starting out on an equal footing in having to learn a new language called Morse code. I told them that all that was needed to learn the code was the desire to do it—to do the "three P's": Practice, Practice, Practice.

Once the children began to see the results of mastery of the code, and once they saw that I believed in them, their self-confidence grew and an epidemic of fierce determination broke out. Children came to me and asked what library books they could get to learn more about amateur radio. Many of the books we used were license manuals and publications of the ARRL.

The course was always conducted with the philosophy that amateur radio is a hobby. It was a class that they could look forward to coming to, and one in which they could feel the positive sense of accomplishment. The atmosphere was relaxed and friendly, yet well within the boundaries of proper school decorum.

Equipment was nonexistent at the beginning of the course. The first group of students didn't even have the benefit of experiencing on-the-air QSO's. Yet out of the 150 children who took the Novice license exam 100 were licensed. This is a real testimony to extraordinary motivation and enthusiasm.

The rules of courtesy on the air and in the classroom were stressed every day, as was the intelligent and responsible use of the airwaves. I also began to notice in the students an awakened interest in geography, world affairs, foreign customs, and scientific phenomena. We discussed all of these areas as they became relevant to what we were doing. The ARRL map of the world came alive when the children began to plan their DX contacts. Letters requesting information were written in class to the ARRL, electronic supply stores, and repeater clubs such as Metroplex in New Jersey.

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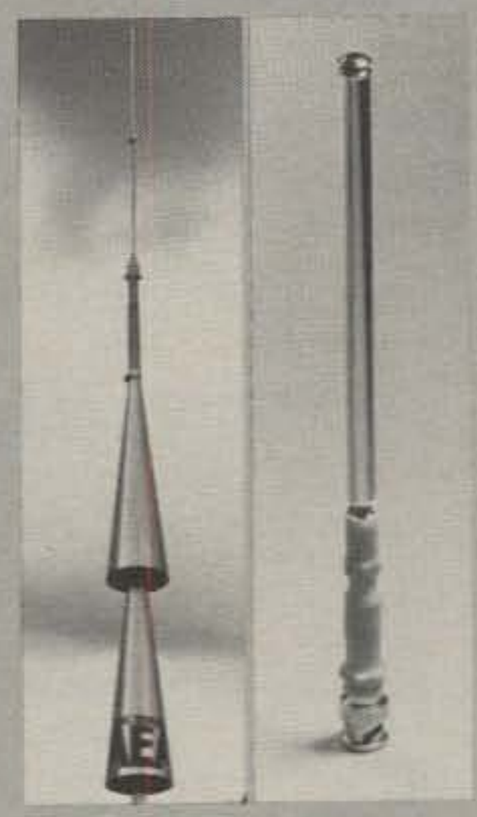
ANTENNAS



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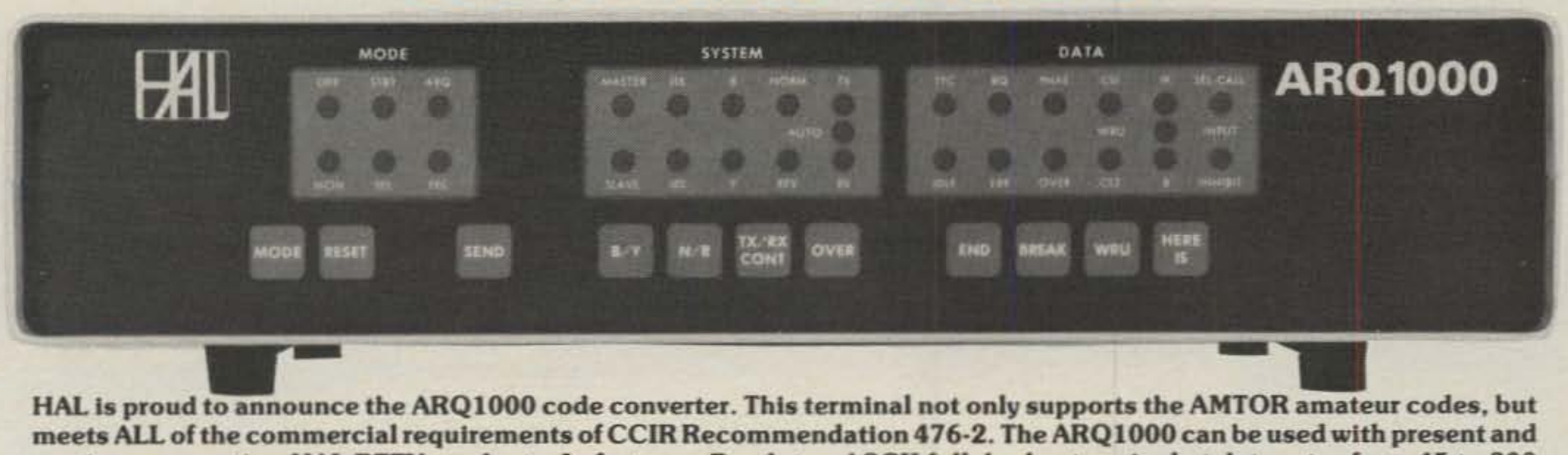
Sixth graders are also a part of the amateur radio course program.

On one Sunday twelve students and myself appeared on a cable television show which was hosted by Larry Horne, N2NY. Each child who had just been licensed told what he or she planned to do with amateur radio in the future. I feel sure that these children will contribute a great deal to our hobby.

We have been using my Yaesu 207R HT with a 35 watt amplifier and a ⅝ wavelength antenna. We have been considering different ways to raise money to buy some equipment. Other teachers in the school have gotten swept up in the spirit of amateur radio, too. One teacher took the licensing exam with the children and is now a ham. Others are studying to take the exam in the future.

I strongly advocate the introduction of amateur radio courses in the school systems with the goal of bringing responsible new amateurs into this incredible hobby of ours, while teaching children self-confidence and good operating habits. 73

AMTOR RTTY



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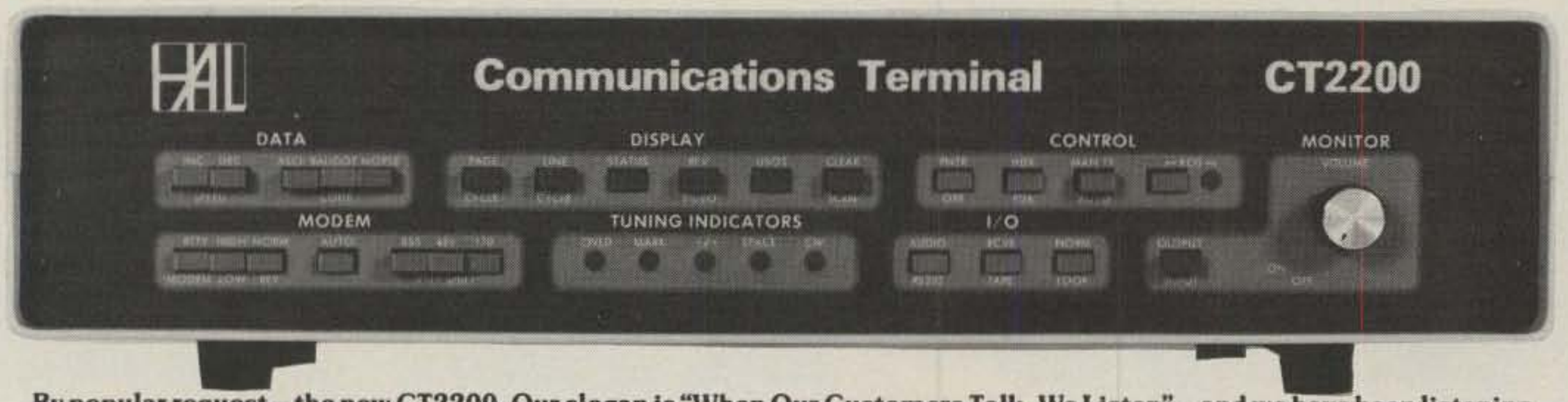

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In this concluding part, W3WDF gets the "big stick" up in the air and functional. It is obvious that a lot of planning went into this installation. Some of the details may help you in designing that ultimate antenna system.

An Antenna System To Remember

Part II—Conclusion

BY ED SCHAAD*, W3WDF

We take up the concluding part of this story at the point where the final refinements are being added to the support mast. The accompanying photographs show the magnitude of the project. Of primary concern are durability and safety with as much protection to the system as possible. Although it is unlikely that this installation will be duplicated, many of the facets described herein can be applied to any antenna installation.

*Rt. 3, Box 771, San Antonio, TX 78218

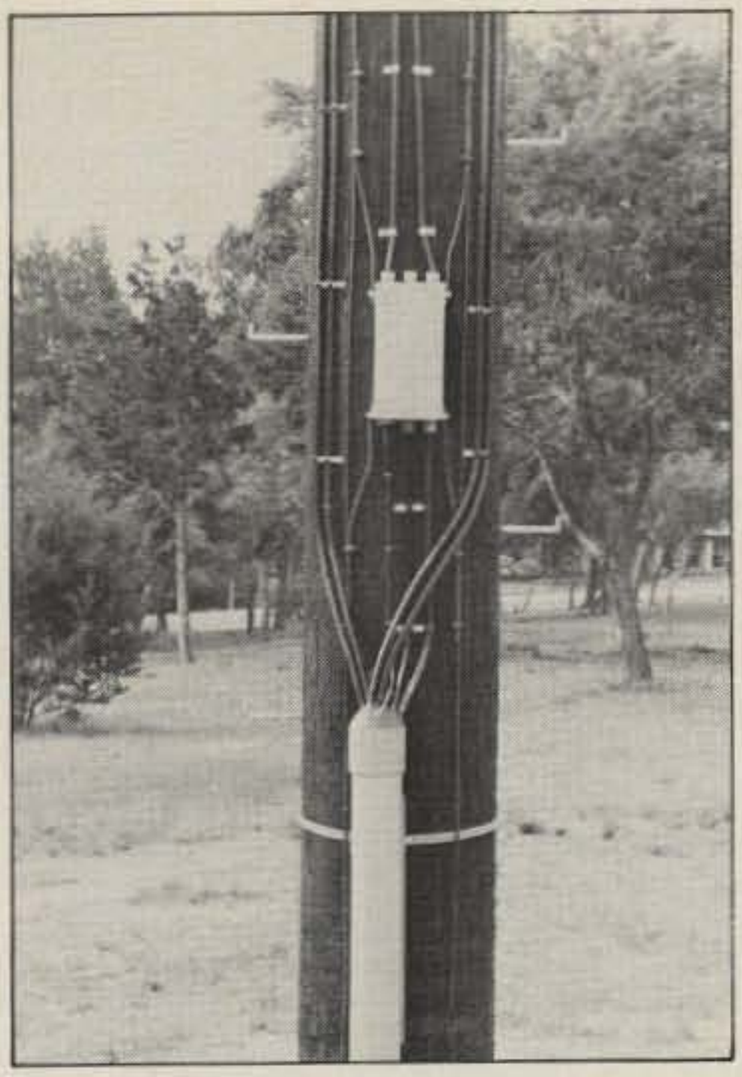
You need a lot more than muscle to move this antenna support. Here you can see all of the copper cable running down the pole terminating at the almost solid copper spiral at the bottom, making a good grounding and lightning protection system.

The Mast

The top end of the 3 inch mast was covered by a plumber's 3 inch ID solid-copper tubing cap. To keep the wind from blowing it off, two holes were drilled and threaded into the mast to secure the cap with 10/32 stainless-steel screws. Just below the cap the two half-moon strut-straps were installed, with turnbuckles in place, and the strut cable was rolled up and tied. Below that, two 5/16 steel eyebolts (eyelet welded closed) were installed in an offset position for the pulley block to hang on one eyelet and for the terminal end of the block and tackle line to hang on the other.

The next operation was to run a 120 v.a.c. rubber-covered cable up the pole to the rotator box, keeping the heater on a separate circuit from the control cable. Also, there was some thought to connecting an area lighting device off this same circuit. Following that, a color-coded 12-conductor rotator control cable was connected to the rotator box. Both cables were terminated into a rainproof terminal box 19 feet from the bottom of the pole end (actually, it became 5 feet above the ground).

Aren't we about through with this phase? No, not yet. A sturdy lightning ground system was installed. Two #4 AWG stranded copper conductors (one on each side of the pole) were used. These conductors were all connected by copper compression-type ¼ inch hole lugs. Each branch grounding circuit was bonded to the main runs with three #4 copper *Servits* (compression clamps). All branch circuit feeds were configured into downward sweeping curves and offered little resistance to the velocity of a lightning discharge to earth ground. The pair of conductors were initially secured on the bottom side of the radial bearing plate with lug terminals right at the base of the radial bearing frame. As the ground conductors passed each successive bearing shelf, a branch circuit conductor was secured from the lowest end of each shelf support and junctioned to each ground run. This run passed the rainproof terminal box and branch circuits run to the corners of both upper and lower portions of both sides of the box. The 120 v.a.c. circuit portion of the rotator control cable and the 120 v.a.c. heater line had GE-type lightning protectors installed in the box. From this point both grounding conductors continued along the pole until they reached the bottom end of the butt. Here the two conductors were interspaced in-



A detailed shot of the cable head, terminal box, and grounding system as described in the text.

Duane Price, WB5VWX, and Craig Kennedy, KB5BI, of Kennedy Associates, Inc., feed Andrews Hardline into the underground duct with the aid of a lot of cable soap.

to a flat spiral coil (covering the bottom) and stapled in place, and the ends were terminated into a flat copper disc which was secured to the bottom covering the spiral coil. This made a reasonable lightning grounding system, for the pole was set 14 feet into moist, solid limestone.

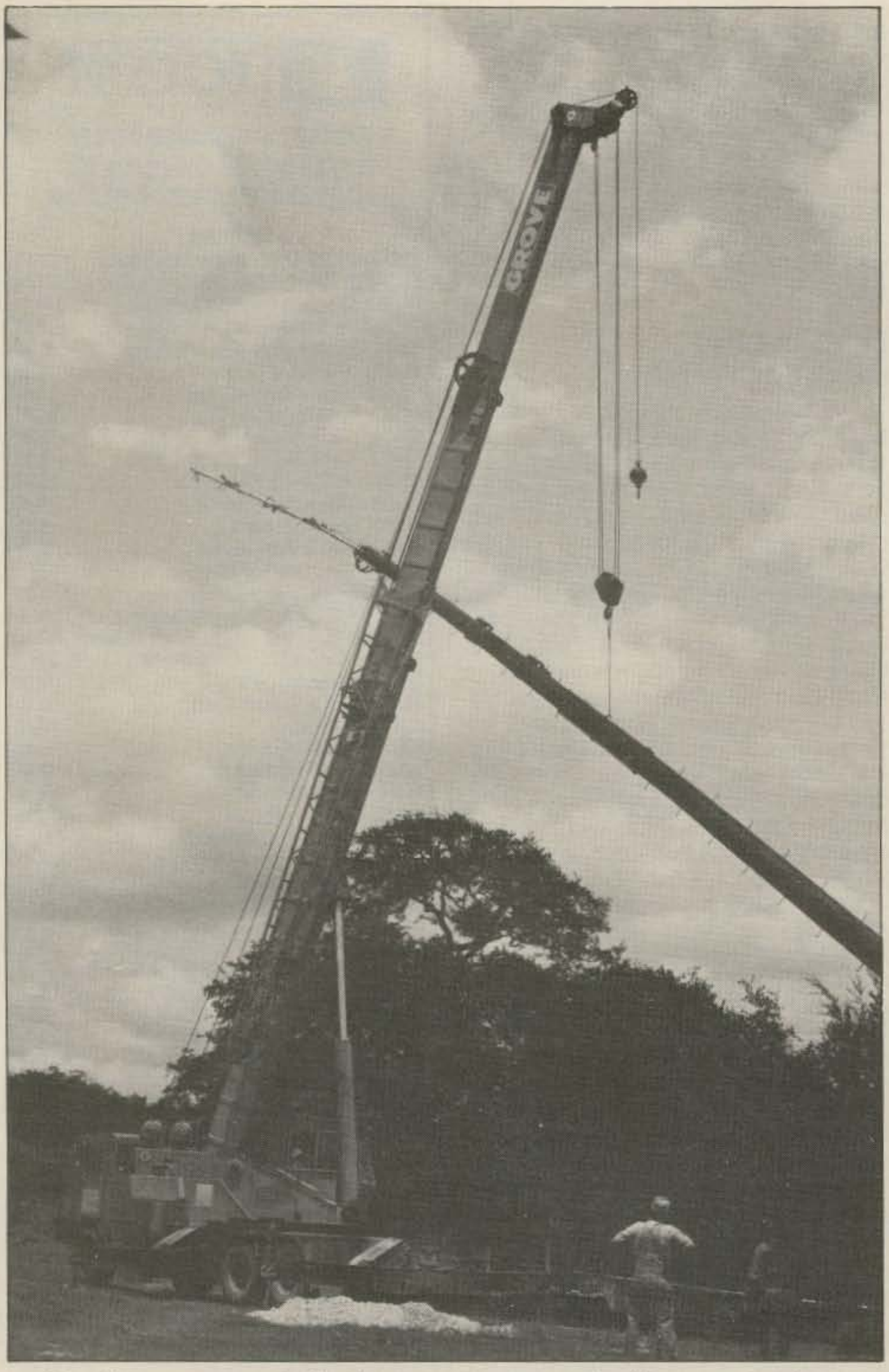
Next the pole was stepped to the top with commercial-grade pole steps procured from a local independent power company. The layout and installation procedures were the same as for telephone and power-line poles. One last consideration was taken in this phase, and that was the assembly of a cable saddle around the circumference of the pole at a point indicated by the electrical contractor. Several pieces of lumber 2″×4″×8′ were installed around the girth to avoid the steel lifting cable from cutting into the pole. A shallow trench was dug under the pole saddles for securing the steel cable loops.

Drilling the Hole and Setting the Pole

The preliminary ground work having been completed, the electrical contractor was called in for his role in the installation. First the huge boring machine arrived. It was a large, heavy apparatus supported by a gasoline truck chassis with outriggers. On the truck-bed beams was a large-diameter turntable with spur teeth. It was driven by its own diesel-powered engine mounted on top of the turntable along with the operator's cab with the hydraulic controls, auger support frames, and boom. The auger shaft could be extended down four times its normal length. The auger was hydraulically pressured downward. The bit tips were made of extremely hard steel. After two hours of drilling and playing water on the bit, the job was done.

Next a 15 tone crane came onto the site. Here the electrical contractor directed the crane operator's every movement. Caution and safety were the order of the day. The cable was quickly secured to the pole. As the pole was about to be raised, the contractor placed a 10 foot 3 inch diameter pipe lever between the pole and the mast shaft just above the rotator to avoid the rotator assembly from suddenly surging downward and striking the ground. Initially the pole went up somewhat horizontally until the butt end came off the ground. As the pole was lifted upward, the heavy mast did not look good. In fact, it looked very bad. It had a droop that was not complimentary to all the planning and efforts thus far expended. However, the metallurgist insisted that once the pole reached between 15 and 12 degrees from 0 (vertical), the mast would right itself. It did. He certainly was correct, and we all breathed easier. Not only would the mast remain vertical under its own weight, it would not give way under the total down-thrust load, nor would it yield to bowing under the load of hoisting the 200 pound 40 meter beam to the top.

The crane lowered the pole gently into the ground (limestone), and it held the pole slightly above the bottom of the hole. Two tripods were set up at 90-degree right angles to the pole. Plumb-bobs were suspended from the center of the tripods. The pole was "sighted in" as well as orientated by the far end of the rotator box, which faced Magnetic North. As was explained before, the rotator had been cali-



The 15 ton crane gently lifts the support system as the big moment arrives.

brated to 0 degrees facing the front end "dead ahead." With the gussets already having been secured in the same plane, the resulting booms and their directors would be installed to face the proper direction. Magnetic North was determined by a surveyor's compass. Long, narrow, white panels of cloth were nailed to the ground from the pole position out following Magnetic North. This made orientation of the pole and rotator box an easy job. (*Note:* During the initial operation checks, the azimuthal control head was adjusted to indicate true north based upon the magnetic declination as it is known to be at Randolph Air Force Base, Texas. The final orientation, then, was to be reasonably compatible with certain government and other azimuthal charts.)

The pole was packed with 12 bags of dry cement with sand randomly mixed as the stuff was packed down. The saddle loops were detached from the pole, and the crane and the rest of the crew left.

Installation of Transmission Lines

Before any final installation of the Yagi beams could take place, the matter of the transmission lines had to be dealt with. Initially, the location of the antenna system was chosen in the "out-back" area of the three acres because of inherent noise radiation surrounding the pole pig on the premises and the safety of getting the antenna as far as reasonably possible from the very high-voltage local feedline. The exact site was selected on the basis of zero noise level and a reasonable distance away from trees, plus easy access to heavy mechanial equipment via a private road that was somewhat to the right in the "out-back." All of this amounted to a total run of 330 feet of all cables terminating at the radio.

Well, the XYL of the QTH had ideas of her own. She had plans for some of the "out-back" area, and they didn't include antenna transmission lines! While her plans did not necessarily include the exact spot of the antenna support system (it came close, though) nor the elements' overhang, they were, however, somewhat extensive. She had plans for a swimming pool out there! So, 210 feet (across the immediate "out-back") of transmission line went underground. Ouch! Under limestone would be the appropriate term.

The survey was made, the trench line was staked out, and the 4 inch diameter heavy-duty PVC tubing was ordered and delivered. An excavating contractor with an air hammer dug a trench 6 inches wide, 18 inches deep, and 210 feet long into solid limestone. The trench had to pass alongside a huge oak tree and the patio portion of the pool. The order of the day was not to harm the tree's tap roots.

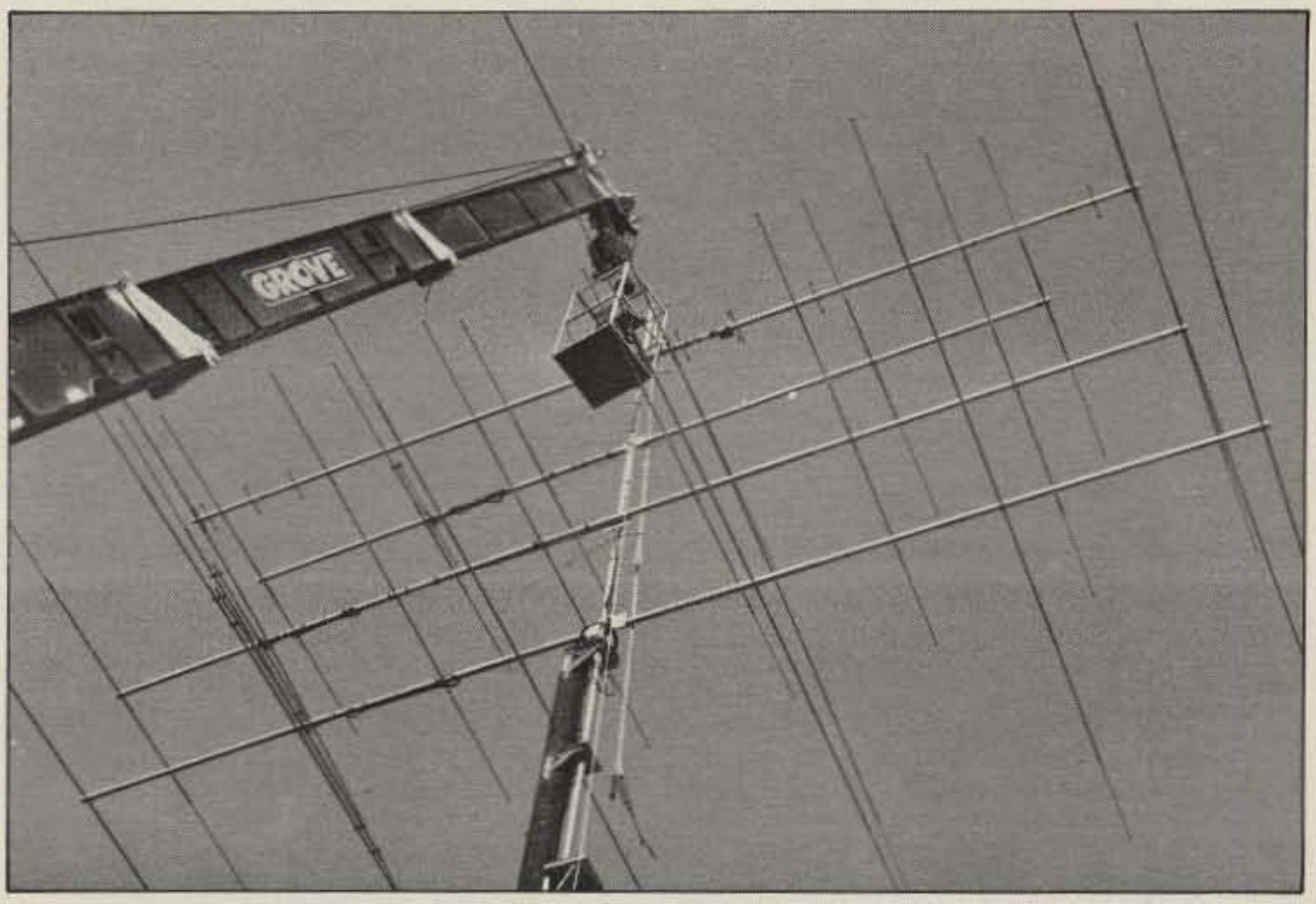
Finally, the cable heads were established, and a series of 10 foot sections of PVC were cemented together. The run was completed, and the trench filled in and dressed with topsoil. The contractor (same as the one for the aerial work) was called to install the transmission lines through the ducts and up the pole, and to connect the Andrews Model LDF4-50 to the RG8/U circuits which fed the rotary beams.

A block-and-tackle was established on the pole steps. A cable "come-along" was readied. A heavy surveyor's cord then was installed inside each 10 foot section of PVC as it was joined. This was to pull the heavier "come-along" line through to the other end of the duct at the cable reel source. Well, the best laid plans do not always work. When an attempt was made to pull the "come-along" through, tension built up on the cord. A steady pull was exerted on the cord and it snapped! Why? Because upon examining the end of the severed cord, it had PVC cement on it and it had been bonded to the inside at a joint junction. The cement had bled through.

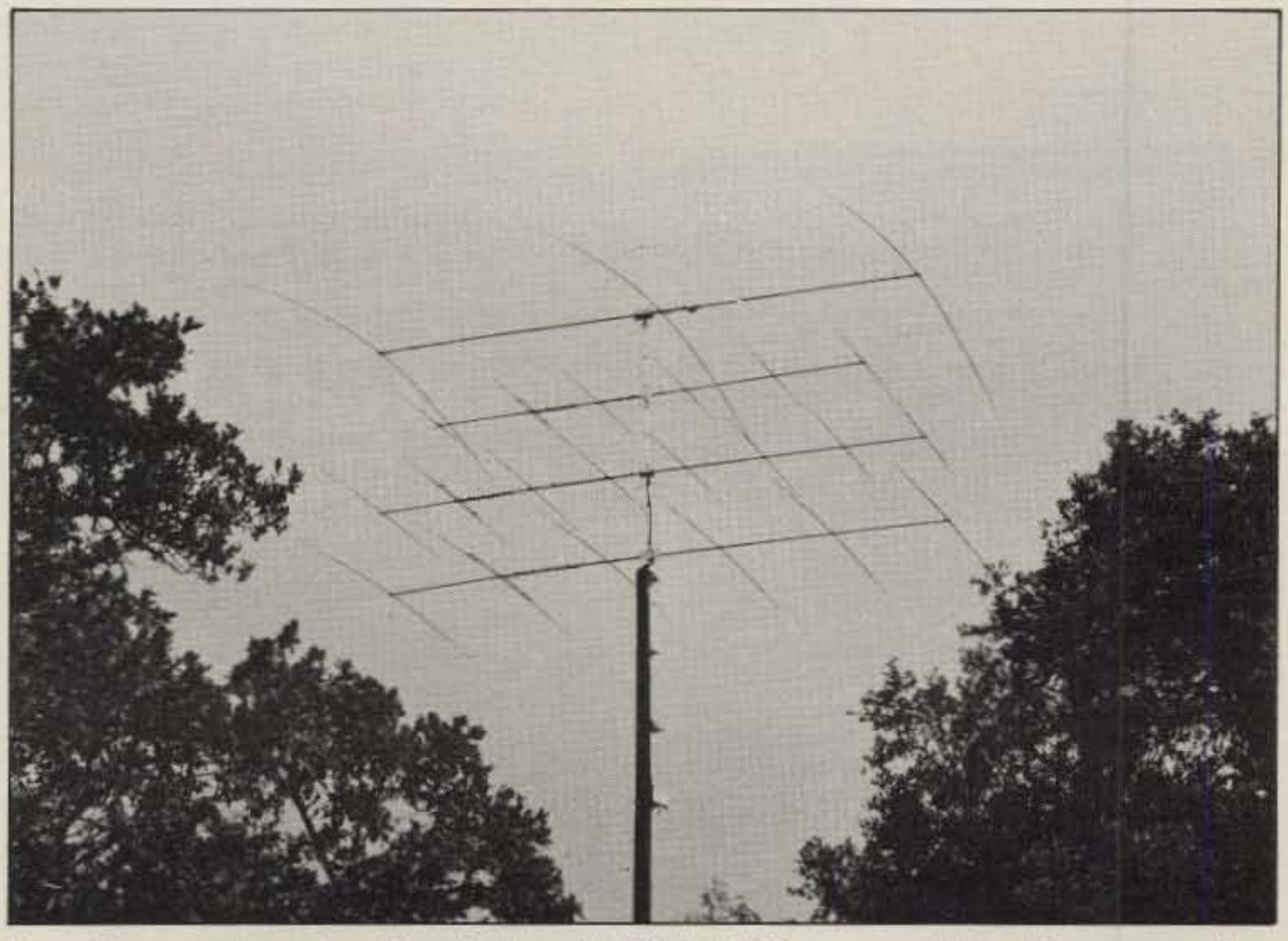
What now? Someone was quickly dispatched to the nearest electrical supply house in the San Antonio metro area to procure a 200 foot electrician's tape pulling reel (that was the longest reel available). After fishing with about 130 feet of tape, the remaining cord apparently entangled itself around the tape and the tape withdrew successfully with the cord attached. From then on things went much better. The hardline and all other cables were pulled one at a time because

of the long travel drag on the duct and against other cable. An additional cable was added. It was an eight-conductor cable for use with future weather equipment on the pole. Plenty of cable soap was used. The team at the pole had pulled the proper lengths of coaxial hardline to begin installation up the pole. Some cables terminated in the rainproof terminal box on the pole. The other ends of the cables were fed into the attic via the roof overhang and on down to the radio set. At the pole end the lines were hoisted up to the top (connectors were factory installed) and junctioned to the RG8/U. The hardline was dressed neatly along the pole and secured with half-moon metal cable stays.

In the meantime, the task of assembling all the beams was underway. The area that the beams required for assembly was quite large. The area was available, but the trees were the problem. Pockets of spaces were chosen, as near the site as possible, where the assembled beams could be removed without interference from obstacles. One thing that was quickly recognized is that the beams should not have been assembled on the ground. It would have been a back-breaking job because of the number of beams and the elements involved. Eight sawhorses were constructed from 2" × 4" lumber, and the rest was quite easy. One rule that should always be practiced is don't wait until the installation crew is on hand before assembling the antenna. Take your time. Review the drawings.



WB5VWX makes good use of the crane and basket. Here he is shown making those final but critical adjustments.



Here it is up and running. Was it all worth it? W3WDF answered this with a resounding, "You bet it was!"

Choose the optimum frequency for each beam. Check and double-check the element dimensions. Coat the telescoping element surfaces with an anti-seize compound. Coat the exterior of the beams with DC-4, Dow-Corning silicone paste.

The 40 meter beam was so large when assembled, that the very end sections could not be secured in place because of interference in movement. Once the beam was at the base of the pole, all end elements were installed quickly.

Aerial Installation Phase

At the appointed date, Kennedy Associates of San Antonio arrived with a team of three men, including Craig Kennedy, KB5BI, and Duane Price, WB5VWX. The 50 tone crane with 130 foot boom and its operator arrived minutes later. J.D. Tindall, formerly with the Air Force, was present to ensure all mechanical and safety precautions were observed. No time was lost in positioning the crane. Sometime before, an installation operations order had been written for this phase which indicated and directed the sequential work performance, and which indentified the raw material to be used and the specific tools required. All material and tools were furnished on site.

The personnel basket was fastened to the ball, and WB5VWX took the lead in securing the pulley block to the top of the structure at 96 feet. He would then be lowered to the first gusset position, open the boom straps, and wait for the 40 meter beam to come into place. A hard lesson was learned immediately: It took three men to attempt to hoist the 200 pound antenna about 15 feet above the ground. Either a multiple "whip and runner" block-and-tackle or two 6 inch single "whip and runner" blocks should have been used. The block-and-tackle procured was composed of two well-made 3 inch diameter steel blocks with 200 feet of ½ inch 600 pound test line. The problem seemed to be not enough leverage radius with the 3 inch pulleys.

To overcome this obstacle immediately, J.D. Tindall brought his half-ton four-wheel-drive pickup truck into the area. Another pulley block was placed at the bottom of the pole, and the line was fed through it at 90 degrees onto the rear of the truck. The truck, in four-wheel drive and in creeper gear, did a good, safe job. The 40 meter beam went up with tag lines at each end of the boom guiding it away from each shelf level. Each boom of each beam was color coded at the director end to ensure the identity of the beam and director end at a glance.

Once the boom was secured at the gusset, the strut cable eye bolts were inserted in the boom sections, and the coaxial feedline was secured permanently down the boom to the driven element. Lugs were secured to the terminals, weather sealant was applied, and the tag lines were unhitched. All of this would not have been possible without the use of a crane and a man working uninhibited (with safety equipment) within the personnel cage. A long crane boom was essential to bring the cage up and over the top of the antenna support system to the other side without having to reposition the heavy crane.

All went well with the repeated operational procedures after the 40 meter beam, and then on to the 10 and 15 meter beams, and then something happened. The struts of the 20 meter beam would not fall into place as all the others had done before. One side was short, the other too long. This meant a delay in the opening of all three "U" clamps down each strut on each side and it meant adjusting them in the "ball park" in the air, which was difficult.

During the dry run when all dimensions were laid out, it was assumed that the center of gravity for the 20 meter beam was in the middle of the boom, as it was on all the others. It was not. The center of gravity was actually offset by 7 inches, as was determined in beam assembly. During assembly of the beam on the ground, it was determined upon closer examination of the drawing that an error had been made on the 20 meter boom in the dry run. It was corrected and new markings were made on the boom. There was no room for error, except the boom struts were not readjusted because of this change. It was an oversight. Fortunately, the coaxial feedline became longer instead of shorter as a result of correcting the error.

Outside of the pulley-block delay and the required adjustment to the struts of the 20 meter beam, all went perfectly in the least possible time and with the least possible cost.

After all booms were in place and all electrical work was completed, the final horizontal alignment of the booms and the horizontal alignment of all the elements had to be done. It was a vernier adjustment, as the beams and elements were not much off. Three men were selected to view the angles from various positions about the installation. They had to be in agreement on their findings and direct the degree of adjustment to be made. The installer up in the cage nearly had a nervous breakdown making the tedious adjustments demanded by the three observers. All in all, the end product was about as perfect as one could expect. It was about as perfect an alignment job as the team had seen.

The team departed. The official photographer, K8OZL, of Bulverde, had taken the first of a series of photographs and departed. There had been no safety infractions, no casualties, and the installation had been done with highly competent people. The antennas were of the finest quality with the highest gain within current design parameters. Patience had paid off—it was believed.

The azimuthal control head was adjusted to control the beam heading from Magnetic North at 0 degrees to true North at 0 degrees accounting for the magnetic delineation of the area. The antenna coaxial lines were terminated into a coaxial selective switch, and a common circuit from that switch was run to another coaxial selective switch connecting several operating positions.

A few hours were spent in initial operation with high hopes and eager anticipation. Sometime later after working the Antarctic, Paraguay, Russia, Indonesia, an American on a schooner off the coast of the Fiji Islands (a phone patch to Chicago was made for him), and having the ZLs and the VKs call on 40 meters, plus working the South Africans right through the pile-ups, the antenna seemed impressionable enough! But, was it really worth all the sweat and effort? You bet it was!

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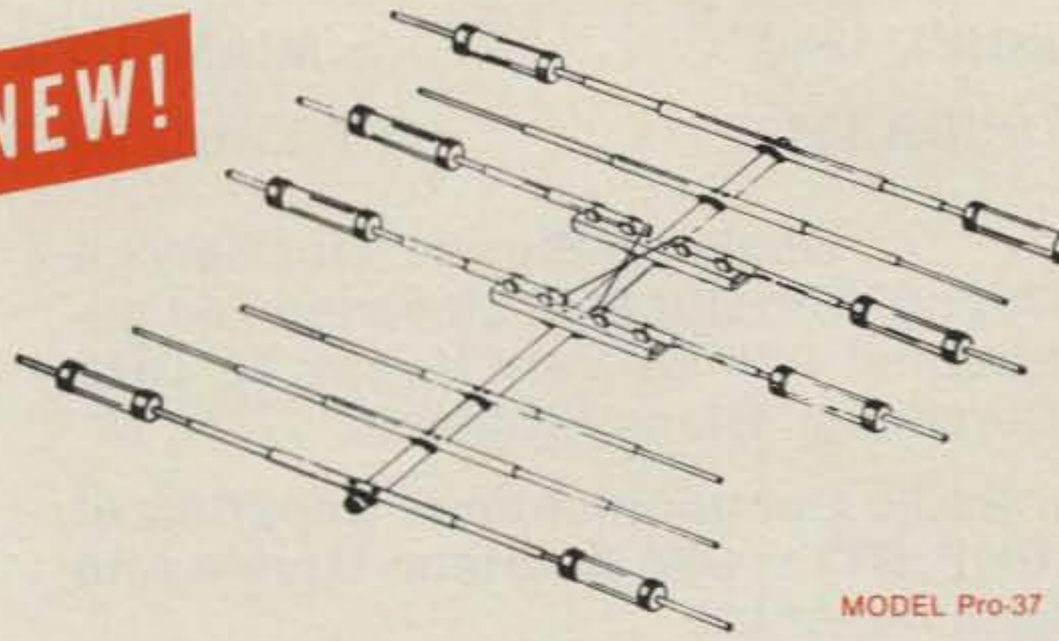
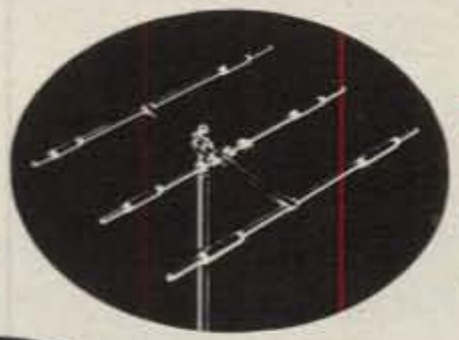


MODEL Pro-37



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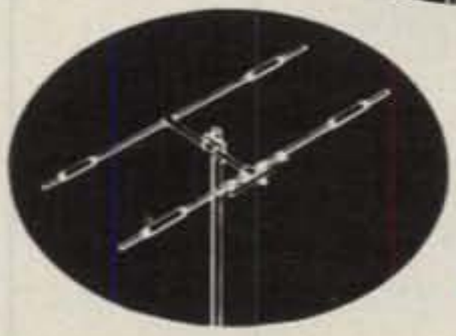
Rated to 300W.



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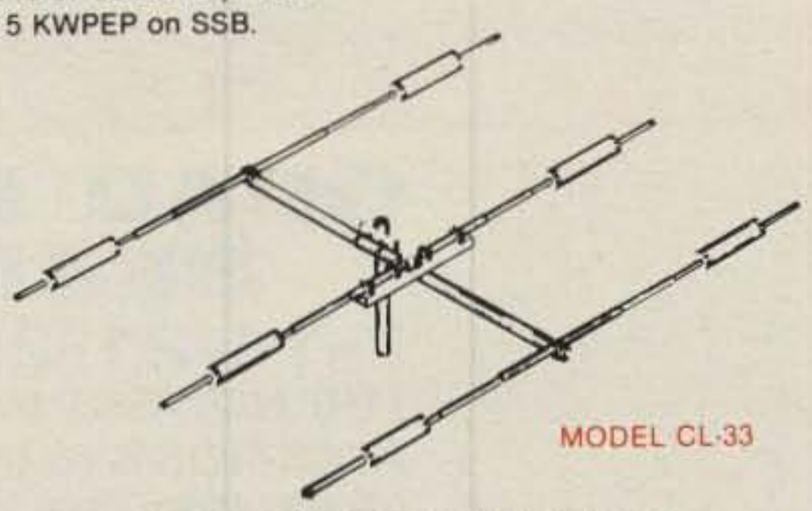

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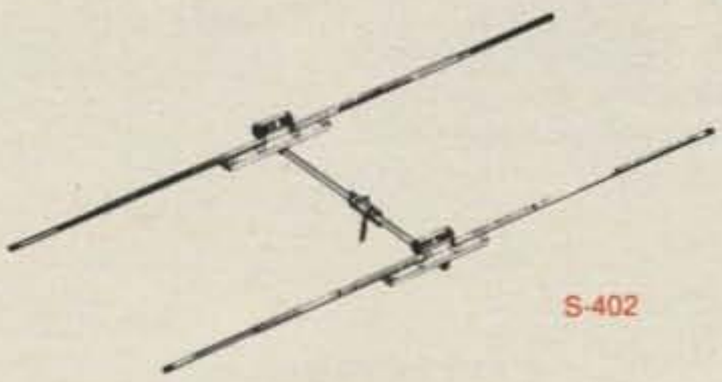

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Joe, WB6WOD, at the microphone and Juan Carlos, CE0ZAD, checking the log.

WB6WOD/CE0Z seems to be checking out dinner.

It's a lot of fun to finally meet a DX buddy after a few years of regular skeds. It's even more fun if you can tie in a DXpedition with the visit. WB6WOD accomplished both.

A DXpedition to Juan Fernandez Island (Robinson Crusoe's Island)

BY JOSEPH E. PENA*, WB6WOD

As a low-profile amateur who is mostly involved in rag chewing with minimal DXing, I never imagined I would ever be involved in a DXpedition to an exotic island. One QSO on an evening in April 1982 changed all of that.

It started when CE0ZAD broke into my QSO with a South American station. The operator, Juan Carlos, and I have had many QSO's since that night, and I became his friend and QSL Manager. Eventually he invited me to visit him and his family on Juan Fernandez Island, the island on which Robinson Crusoe was marooned.

The invitation was tempting, but I kept thinking of the many obstacles: XYL, family, my lack of experience in handling pileups, getting a CE0Z license. I was encouraged by many of my friends, such as Bob, WB6QPG, who also became a good friend of Juan Carlos, and Frank, KC2DI, of the "Family Hour" net, who promised to help from stateside. I started to gain confidence, and soon my XYL gave her approval (in exchange for my being an exemplary husband and father the rest of my life!).

Obtaining the CE0Z license was facilitated with the help of Edwardo, CE3BOC, and Patricio, CE3GN. Their efforts enabled me to get the license within three weeks. The license fee in CE land is $30.

Travel arangements were made. I would leave San Francisco on October 21, 1982, arrive in Santiago, Chile, the next day, and onto Juan Fernandez Island on October 23rd.

Two days prior to my departure, I answered an emergency medical call. A station in Chile was calling for assistance. A seven-year-old girl suffering from a brain tumor needed a special medicine not yet available in Chile. My plans for the DXpedition lost their importance at that moment. My only concern was to try to locate the medicine needed by that little girl. After several phone calls, the medication was located and arrangements were made for me to carry it down to Santiago. (This was really what amateur radio is all about!)

My carry-on luggage consisted of my rig, power supply, v.f.o., and keyer. Coax, wires, antenna tuner, etc., were packed in a box and put in the freight compartment. The medication for the little girl was packed in a plastic bag.

Twenty-eight hours after leaving home, I landed at Santiago airport. I was greeted by an immigration official and the little girl's father, who was waiting for the medicine. (I'm sure that's one guy who will never complain about TVI.) Also there to greet me was Carlos, CE3DNP, who took me to the headquarters of the Radio Club de Chile.

My visit with the members of the club was a memorable one for me. Even though I was a stranger, I felt the camaraderie and comfortable feeling of belonging to the same fraternity—amateur radio. In addition, I was elated when the members presented me with a banner and their club pin.

Early the next morning, after much anxiety, my big day had come. While waiting at the airport for the plane to Juan Fernandez, I met Rudy, CE0EVG/0Z, who was headed back to the island. He is a coworker of Juan Carlos who operates the government weather station.

The plane was a ten-passenger Cessna. Since the main activity on Juan Fernandez is lobster fishing, the plane had no seats, as it was used to carry lobsters. Thanks to Rudy, I got to ride in the copilot's seat while he sat on a crate. The flight to the island took 2 hours and 15 minutes. However, for the last hour of the flight I was able to speak to CE0ZAD over the plane's radio.

*1018 Lewis Ave., Arcata, CA 95521

Due to low-hanging clouds we could not see the island until we descended in preparation for landing. Once below the clouds, I saw the rugged beauty of the island with its steep mountains and beaches. It was breathtaking.

The pilot gave me an aerial tour of the island while Rudy pointed out items of interest. When he indicated Juan Carlos's house, I saw him standing at his entrance waving up at me with a white sheet. He was ensuring that we wouldn't miss him.

Because of the mountainous terrain, the dirt landing strip is on the opposite side of the Island from the village. The landing was smooth. But it was not the end of my trip.

Because of the terrain there are no roads to the village, and we had to board a small boat to reach the village from the sea. However, the boat could only be reached by a five hour hike from the airstrip! Five hours of walking over very difficult terrain! I soon discovered that my physical endurance left a lot to be desired. But with the help of Rudy and Ernesto, the pilot, I made it to the boat.

The 2-hour boat trip in the 12-foot outboard to the other end of the island gave me a breather. I also got to see the caves where Alexander Silkirk, on whom the story of Robinson Crusoe was based, supposedly lived. It mattered not if the story was real or otherwise; it was exciting. Seeing the abundance of wild goats on the verdant mountainsides, the steep mountains plunging into the sea, the playful seals surrounding our boat made me wish that my little son Pepe were with me. How he would have loved the adventure.

There were people awaiting our arrival at the dock. Rudy pointed out Juan Carlos, who was in the crowd. We waved to each other, and on landing embraced like long-lost relatives. I'm sure Juan Carlos was as excited as I was as he introduced me to his family and friends.

We walked to Juan Carlos's house, where his lovely wife Margaritta and their two children who called me "Tio Jose," made me feel at home. She was very understanding when after brief formalities we had to curtail our pleasant chat so as to set up my equipment. We had set a schedule with Frank, KC2DI, on the Family Hour net for 2330Z.

Once the antenna was inspected, the elements readjusted, and the radio tuned up, we spun up and down the 15 meter band. Stateside was coming in 59, but the butterflies in my stomach were acting up. I tuned up to 21.345, and there I heard Frank chatting with Irv, W6OMR, and alerting the net that I was expected any moment.

At 2330Z came "Willie Baker 6 Willie Oscar Delta, this is KC2DI. Are you there, Joe?" I'm sure we all remember the emotions of our first contact or our first DX contact. Well, I had that feeling again. The moment of truth had arrived. I wondered what kind of signal I would have. I knew many stations were waiting for me, and I didn't want to disappoint their hopes for a contact with a new country. I gave KC2DI a comeback, and when he gave me a "Beautiful Joe, 5 and 5," Juan Carlos and I were greatly relieved.

I had planned my first contact with Frank, and now I would QSY off frequency so that my friend Bob, WB6QPG, could patch me into my family while KC2DI took a list on the net.

That night I worked 100 stations on the Family Hour net from 0000Z to 0145Z. At 0200Z I had a schedule with Al, KE6JU, on the IDX net on 20 meters. Propagation was great; I made about 175 contacts.

Once I had kept my schedules with the nets I decided it was time to find out how the rest of the world was coming into Juan Fernandez Island. I felt like a little boy in a toy store. Almost every time I called CQ I had someone coming back to me. My first big pile-up was with JA stations. They are such courteous and patient operators that I had little difficulty with their pile-ups. During the first 4 days, I worked an average of 16 hours a day and made over 2,000 contacts with 110 countries.

Besides the FHO and IDX nets I tried to drop in as many nets as possible, and all of them seemed happy to have me. The African Safari net was one of my favorites. When the net was on, propagation was great into the States and Europe, so I was able to work the eastern and western hemispheres at the same time.

Often after working a pile-up on s.s.b. I would go on c.w. to give my throat a rest. Unfortunately, I am not the best at c.w., but it was fun. Remembering my Novice days, I did go on the Novice portions several times, and believe it or not, I never made a contact on those parts of the bands!

I had planned to stay on the island 14 days, but I had to lop off 3 days in order to make plane connections. Leaving all my new friends was the only sad part of my DXpedition, and I wished I could have stayed longer. However, it was not goodbye, but "hasta la vista" with a hope to return soon. I scheduled my return trip through Argentina and was hosted by LU2MAI and LU2MEF. They made my short stay a pleasant one.

While on Juan Fernandez I met the only doctor who tends the needs of the 50 inhabitants. He informed me of the great need for a dentist. Once home, I informed my good friend and neighbor, Joe Zamboni, D.D.S., of their situation. He immediately volunteered to help. He is planning to go there for a month's stay with his family this year and give the inhabitants free dental care.

To all who have helped me with this endeavor I wish to say "many thanks" with special acknowledgement to my XYL; my daughter Carla; WB6QPG who helped send out QSL's; KC2DI, KB2HK, and W6OMR of the Family Hour net; KE6UJ and KA3DSA of the IDX net; and Juan Carlos, CE0ZAD, and all the people on Juan Fernandez Island.

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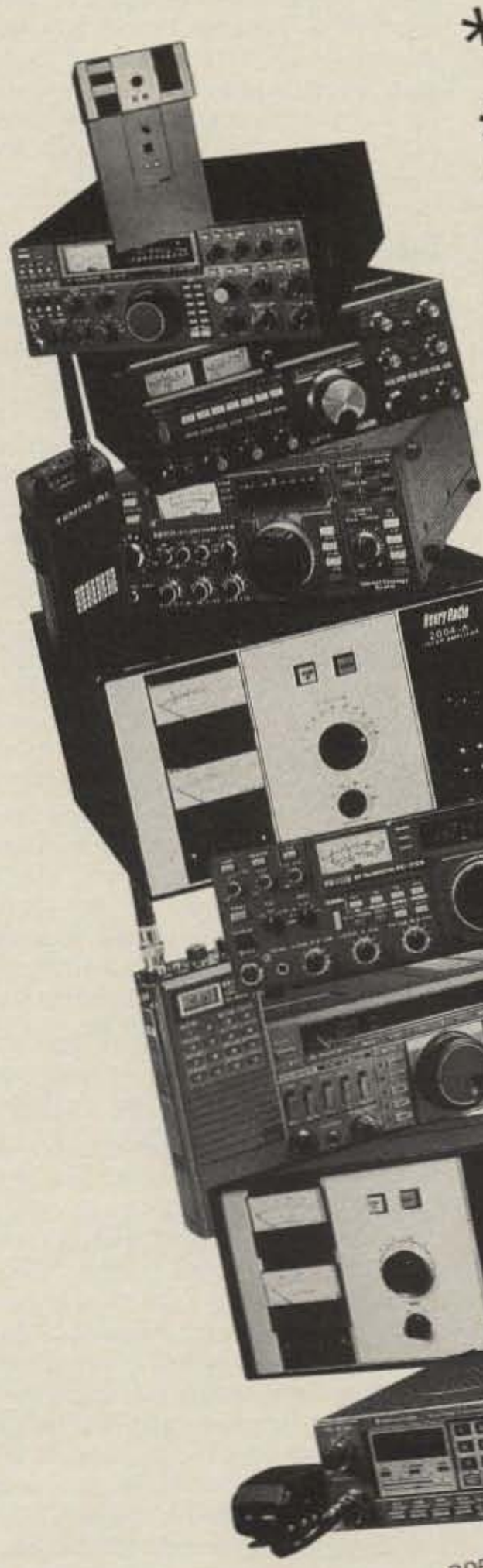

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BY DAVE INGRAM*, K4TWJ

The Ten-Tec 2591 2 Meter Talkie

What's this? An American-made 2 meter talkie challenging the imports? Indeed so, and the new Ten-Tec 2591 is a little gem that's loaded with useful features. It's small and lightweight, it's attractive and serviceable, and it's easy to operate almost anytime or anywhere. Every part of this unit is U.S. manufactured, and it carries Ten-Tec's well-known one-year warranty. If you've ever heard anyone talk about a Ten-Tec problem, you probably know their service is second to none. That consideration is reassuring when you're looking for your talkie and it hits the ground with a horrendous thud, or when you need a case or unusual part replacement at some later date.

Weighing in at slightly less than one pound, the Ten-Tec talkie is 6.67 inches high by 2.6 inches wide by 1.6 inches thick. Combine those specs with a switch selectable r.f. output of 2.5 or 0.3 watts, and you have a unit small enough to fit comfortably in your hand yet powerful enough to provide reliable 2 meter communications. The talkie is supplied with a rubber-ducky antenna, 14-hour wall charger, NiCad battery pack, belt clip (with mating screws), plus plugs for an external mike and speaker. The complete package truly adds new enjoyment to one's v.h.f. activities. If you're one of the few amateurs who hasn't yet experienced the fun of 2 meter f.m. via a hand-held talkie (or if you're looking for a super new "bells and whistles" unit), Ten-Tec's 2591 is an ideal way to join the action.

Initial inspection of the 2591 talkie reveals a smoothly constructed and tight-fitting case with a well-balanced feel. The talkie's front and rear covers are completely flat without any protrusions to catch on coat pockets (a true "brick"). The unit's "traditional" layout is complemented by a middle-located clear-plastic window which covers the LCD frequency readout, and a small pushbutton that activates two small lamps directly behind the display for easy night viewing. A red LED beside the display illuminates during transmit and flashes intermittently when the 8.4 volt 450 maH NiCad battery pack needs recharging. That feature is a definite "plus" when using the talkie while wearing sunglasses (which slightly attenuate continuous light from a red LED). The battery pack slides on/off the talkie's bottom section and is equipped with a "wall charger" jack, charge-monitoring LED, and recessed screw terminals for mating with the Ten-Tec 2992 drop-in charger.

There are top-panel switches for transmitter offset, scanner hold or skip (carrier-operated or time-actuated squelch), keyboard lock,

The Ten-Tec 2591 2 meter talkie is lightweight, powerful, and loaded with special features.

and high or low power output. There are also jacks for an external earphone and/or microphone on the panel.

A Closer Look

The Ten-Tec talkie covers 143.500 to 148.995 MHz in front-panel-selected steps of 5, 10, 15, 25, or 30 kHz. There are 10 programmable memories which store both the operating frequency and transmitter offset. The tenth memory can be used for oddball splits. Memory backup during "off" periods draws less than 75 microamps from the battery pack, and a capacity storage setup allows 30-second battery-pack swaps without losing memories (we've tried that, and it works great). Band scanning and memory scanning are also included (along with some new and unique features which will be detailed presently), and the front keypad functions as a two-tone autopatch encoder during transmit.

Technically speaking, the talkie employs a dual-conversion receiver with the popular 10.7 and 0.455 MHz i.f.'s. The sensitivity of 0.4 uv for 20 dB quieting is more than adequate, and intermod rejection is surprisingly good. The transmitter employs a popular varicap modulation scheme, with conventional circuitry and Motorola solid-state devices being used in most stages. Indeed, the unit's block diagram and schematic are easy to see and understand within a couple of minutes. Nice! Operationwise, the transmitter's high-power current drain of nearly 700 ma and average receiver drain of 120 ma yield comparatively long operating periods between battery charges. An extremely heavy hour's use, for example, might be visualized and compared with other talkies as follows. Fifteen minutes total transmitting time equals one-quarter of 700, or 175 ma. Thirty minutes receive time equals roughly one-half of 160, or 80 ma. Fifteen minutes squelched time equals approximately one-quarter of 25, or 7 ma. The total drain of 262 ma only depleted the battery pack to slightly less than half charge—a noteworthy consideration for emergency operations. Faithfully carrying a talkie such as this might truly prove its worth at some unexpected time.

Bells and Whistles

This little unit is chock-full of useful features and frills, many of which are keyboard activated with a simple "one-two punch." Either manual or automatic band scanning is provided in 5, 10, 15, 25, or 30 kHz steps. Upper and lower scan limits are also programmable (enter the lower frequency, tap **F**, **LWR**, enter the upper frequency, tap **F**, **UPR**, then hit **F** and **PS**), and the unit's ten memories should prove more than adequate for storing located frequencies of interest. Since the talkie recognizes only programmed memories, it is easily adapted and changed according to one's needs.

One of the unit's most impressive and useful features is its memory-lockout capability. Assuming one desires to check area activity when one or two repeaters are busy with long-winded conversations, those frequencies can be locked out by punching **F** *twice* and then tapping **MS** (memory scan). The locked-out memories can be recalled when desired by tapping **F**, **9** (lock clear), and **MS**. Individual memories can be separately recalled by pressing **MR** (memory recall) and the desired number. This is the first talkie with that feature.

Operating the Ten-Tec Talkie

On-the-air activity with the 2591 is a true delight, and the talkie's "bells and whistles" are quite useful. The capability of storing repeater frequencies and their transmitter offsets in some memories and "direct" frequencies in other memories is superb, and there are usually some leftover memories which can be programmed for listening on repeater inputs. Any of those frequencies can easily be locked out for regular scanner operations, yet they can instantly be checked by tapping **MR** and their related memory number. Scanning any portion of the band beginning with any frequency recalled from memory can be accomplished merely by pushing the keypad's **UPR** or **LWR**

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

General
Frequency Range: 143.5–148.995 MHz
Channel Steps: 5, 10, 15, 25 or 30 kHz
Memories: 10
Non-standard Split: One
Emission Type: F3
Voltage Requirement: 8.4 vdc, 450 maH (NiCad battery pack)
Antenna Impedance: 50 ohms unbalanced—BNC type connector
Case Size: 6.67"H × 2.6"W × 1.6"D
Weight: 17.5 ounces with battery pack

Transmitter
R.f. Output Power: Hi—2.5 watts, Lo—300 mw.
Modulation: Variable reactance direct modulation
Frequency Deviation: ± 5 kHz
Spurious Radiation: More than 60 dB below carrier
Microphone: Built-in condenser type
Current Drain: Hi power—less than 700 ma, Lo power—less than 375 ma
Memory Drain: Less than 15 ua

Receiver
Circuit Type: Double conversion superheterodyne
Intermediate Frequencies: 10.7 MHz, 455 kHz
Sensitivity: Better than .5 uV for 20 dB quieting; squelch less than .4 uV
Selectivity: More than ±7.5 kHz @ −6 dB, less than ±15 kHz @ −60 dB
Spurious Response: Better than 50 dB
Audio Output: 325 mw @ 8 ohms
Current Drain: Squelched −25 ma, maximum audio −175 ma

Table I– Basic specifications for the Ten-Tec 2591 2 meter talkie.

buttons while tapping **MR**, and that memory's number returns to the originally stored frequency. Likewise, switching the talkie to scanning its programmed memories can easily be accomplished anytime by tapping the **MS** button. Please don't assume that this talkie is difficult to operate. It isn't. I'm merely detailing specific keystrokes for "bells and whistles" enthusiasts.

While the talkie's supplied manual is quite complete and very understandable, Ten-Tec also includes with each unit a single pocket reference sheet of condensed operating instructions. Using that guide a new owner can have the talkie buzzing like a nimble sports car within a couple of minutes.

Both receive and transmit audio of the Ten-Tec 2591 are good with very slightly more high-frequency response or articulation than some talkies (we've used and compared them all). Autopatch dialing from the talkie is also trouble-free and enjoyable. The squelch action is positive and sharp, not "sneezy sounding" like some units.

Checking the unit from our local "intermod alley" (which on many talkies sounds like a cross between a New Year's Eve party and a 20 meter pileup) revealed a noticeably quieter and well-designed receiver section.

Conclusion

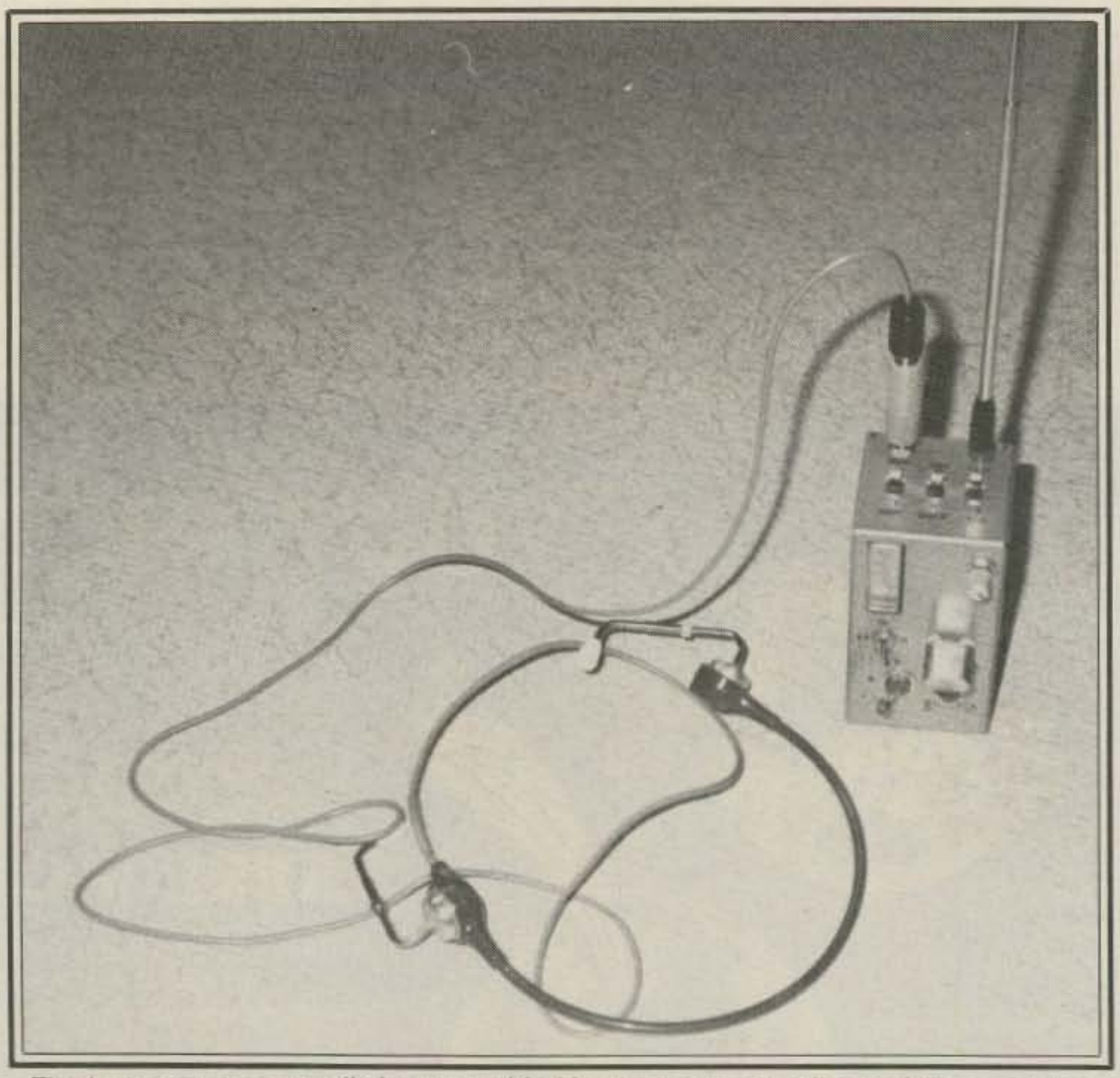
The Ten-Tec 2591 talkie seems to be a tremendous little unit containing almost every operating feature one could visualize or want. The fact that it's the first American-made talkie and that the company is readily available for service generates considerable interest when it's used on the air. The talkie is supported by a variety of related accessories, including the Model 2202 leather case, 2201 subaudible tone encoder, 2425 25-watt power amplifier, 2700 speaker/mike, 2991 extra 450 maH battery pack, 2992 5-hour drop-in charger, 2993 12-volt d.c. adapter pack, and 2994 extra a.c. wall charger. What else could one desire?

For more information on the Ten-Tec 2591 2 meter f.m. talkie, contact Ten Tec, Inc., Sevierville, Tennessee 37862.

Here's an interesting and fairly simple piece of test gear you can put together and use the same weekend. You can even find out exactly what you sound like in the privacy of your own home.

Build Your Own Combined S.S.B. Modulation Monitor/Multi-Function Test Instrument

BY JOHN J. SCHULTZ*, W4FA



The instrument can easily be assembled in almost any small snap-box enclosure.

Very few test instruments, except perhaps for an s.w.r. meter, are in continuous use at an amateur radio station. Therefore, multi-function test instruments that an amateur can construct make good sense from an economic viewpoint. The only restriction might be to keep a "multi-function" instrument from becoming so multi-faceted that it is confusing to use. Ten-in-one instruments are fine only if one can clearly discern and use all of the ten functions.

The multi-function test instrument described in this article is mainly intended for amateurs interested in improving their s.s.b. audio sound, although it does include quite a few other functions that can find more general applications around an amateur radio station. As far as s.s.b. audio sound improvement is concerned, the instrument provides one with a *totally* independent capability for s.s.b. modulation monitoring. Using the instrument, one does not have to ask another station to record one's audio and play it back for test purposes with all of the inherent disadvantages to such an approach: noise, subjective tuning by the receiving station for audio sound, QSB, etc.

Improving one's s.s.b. audio sound can be a challenging experience regardless of whether one believes "improvement" lies in the direction of generating a studio-quality sound or a sound with distinctive "punch" to penetrate DX pile-ups. Dozens, perhaps hundreds, of articles have been written on speech compressors, clippers, processors, frequency equalizers, etc. The increasing realization, however, that s.s.b. audio sound is something that has to be tailored for each amateur's individual voice characteristics is attested to by the fact that more and more of the newer transceivers coming on the market have provisions for some form of audio side-tone monitoring, audio a.f. or r.f. processing, and audio frequency equalization, or even a combination of all three. However, even the newer transceivers do not allow for direct off-the-air monitoring of one's s.s.b. audio. Those which do include an audio monitoring capability that detects the audio after the internal s.s.b. generation/processing circuits at an i.f. frequency.

The off-the-air monitoring of s.s.b. audio is not as simple as in the good (?), old a.m. days when almost any simple diode detector would suffice, regardless of the operating frequency of a transmitter. To detect s.s.b. audio, one has to use a product detector that has a carrier oscillator operating on the same frequency as the suppressed carrier frequency of the s.s.b. transmitter. The simplest form of such a monitor is shown in fig. 1. The monitor can only be used on a single fre-

*c/o CQ Magazine

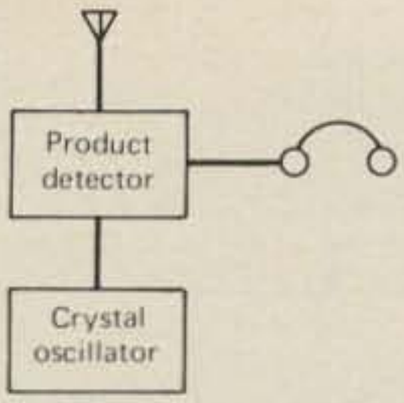


Fig. 1– Very basic s.s.b. monitor scheme.

quency within an amateur band, because of the crystal oscillator. But, in reality, this is no great disadvantage for the adjustment or test of speech-processing circuits, different microphones, etc., the characteristics of which are independent of operating frequencies. It also would be very unusual that the distortion products generated by a transceiver or linear would change significantly over the expanse of any one amateur band.

Various circuits for monitors based on the idea shown in fig. 1 have been described in magazine articles over the years. A pioneering and still quite notable circuit is that of the "RF Sniffer" developed by G3OGR and shown in fig. 2. However, they all have had some shortcomings such as being designed for single band use only, being relatively insensitive, and having no provisions for direct a.f. testing of different microphones. Fortunately, it doesn't take much additional circuitry to turn the rather humble test instrument outlined in fig. 1 into the rather more useful instrument outlined in block form in fig. 3. The broadband r.f. amplifier provides just enough gain so one does not have to practically insert the monitor's antenna into the enclosure of a well-shielded transceiver in order to pick up a cleanly demodulated signal.

The changing of the crystal oscillator circuit into a universal 1–30 MHz type with insertable crystal and transistor provisions plus an output level meter circuit not only allows for use of the monitor on any desired band or frequency, but also turns it into a universal transistor/crystal tester. The addition of a simple a.f. amplifier stage increases the practical sensitivity of the monitor multi-fold, since the detector stage is not directly loaded down by a headphone connection, and it also allows the independent testing of various microphones at audio frequencies using headphones plus its universal adaptation as an audio test amplifier. Last, but not least, if the crystal oscillator stage is not operational either because no transistor or crystal has been inserted, the output meter associated with the crystal oscillator stage is driven by the product detector stage and functions as a very sensitive field-strength meter.

The complete diagram of the practical circuitry to realize the functions shown in fig. 3 is shown in fig. 4. In spite of its perhaps apparent complexity, it is really quite easy and inexpensive to construct,

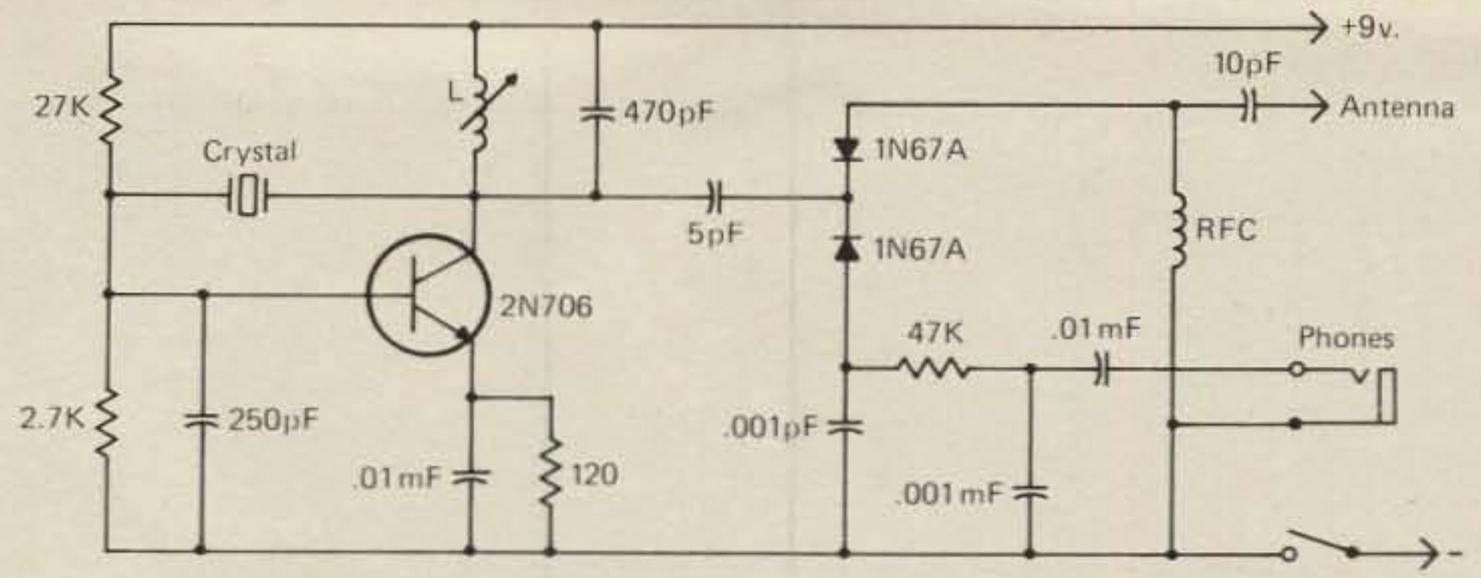


Fig. 2– The original "S.S.B. Sniffer" from G3OGR. L is a small slug-tuned coil that in conjunction with the 470 pF paralleled capacitor forms a resonant circuit at the crystal frequency.

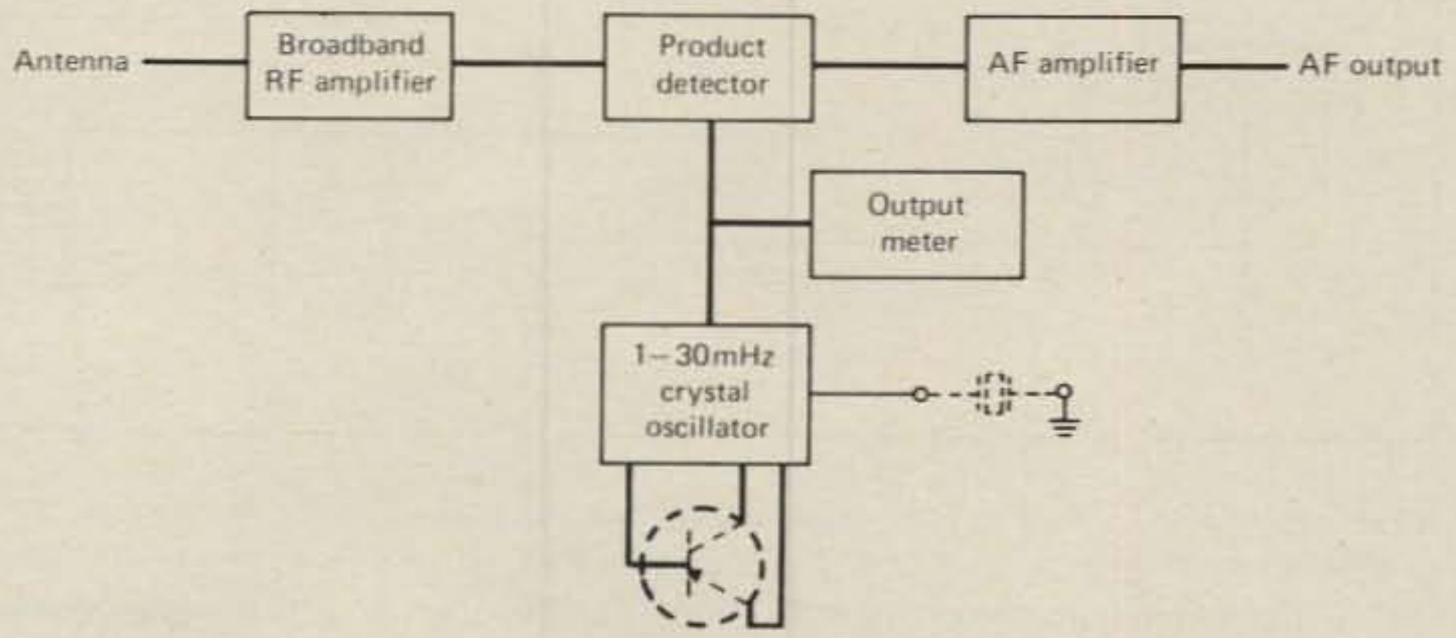


Fig. 3– Block diagram of the expanded s.s.b. modulation monitor/multi-function test instrument.

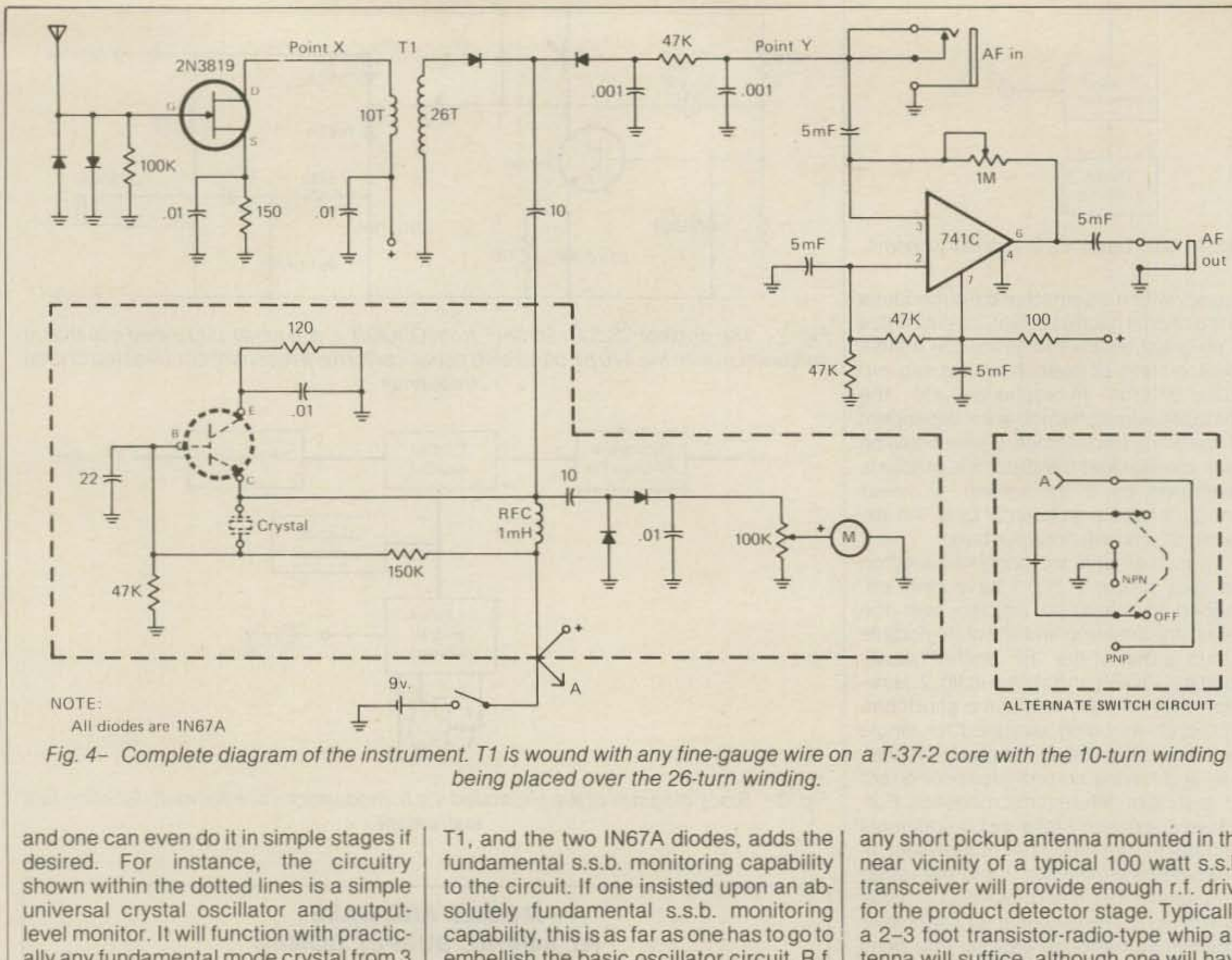


Fig. 4– Complete diagram of the instrument. T1 is wound with any fine-gauge wire on a T-37-2 core with the 10-turn winding being placed over the 26-turn winding.

and one can even do it in simple stages if desired. For instance, the circuitry shown within the dotted lines is a simple universal crystal oscillator and output-level monitor. It will function with practically any fundamental mode crystal from 3 to 20 MHz and practically any bipolar-type NPN transistor. When testing transistors, the circuitry, of course, actually places the transistor into oscillation so a relative dynamic indication of a transistor's amplification ability can be obtained. Therefore, one can compare the relative performance of transistors which will be operating at some r.f. frequency.

For instance, if one leaves a 7 MHz band crystal in the XTAL socket, the differing output level of various NPN transistors inserted into the E-B-B socket can be observed. On the other hand, if a fairly universal NPN oscillator-type transistor is left in the E-B-C socket, such as a 2N706, and different crystals are tested by inserting them into the XTAL socket, their relative output activity can be determined. The circuit, as shown, is designed to test only NPN-type transistors. This was done deliberately to keep the circuit as simple as possible and because 90% of today's transistor circuits use NPN bipolar types. A very simple modification can turn it into an NPN/PNP transistor tester as shown in fig. 4. A d.p.d.t. toggle switch with a center-off position is wired to reverse the battery polarity for the testing of PNP transistors.

The product detector stage, comprising a broadband r.f. input transformer, T1, and the two IN67A diodes, adds the fundamental s.s.b. monitoring capability to the circuit. If one insisted upon an absolutely fundamental s.s.b. monitoring capability, this is as far as one has to go to embellish the basic oscillator circuit. R.f. input could be fed to the primary side of T1 at Point **X** from an antenna pickup and a high-impedance headphone connected to the output of the detector stage at Point **Y**. If a transmission at 14.240 kHz, for example, was desired to be checked, a 2N706 transistor would be inserted in the E-B-C socket, a 14.240 kHz crystal in the XTAL socket, and one would be ready. Possibly a 7.120 kHz crystal could even be used if it were active enough to provide a good second-harmonic output level in the oscillator circuit. Assuming that the unwanted sideband suppression in the transmitter being monitored is reasonably good, from −40 to −50 dB, one can obtain good monitoring results.

The main disadvantage to the circuit is that it is relatively insensitive. It requires several volts of r.f. input for good, clear monitoring, and this is difficult to obtain unless one provides a tap-off point on a transmitter output line or inserts the pick-up antenna very close to the output tank on a power amplifier stage. The former is awkward, and the latter perhaps is even dangerous in the case of tube-type finals because of the high voltage present. Adding the few components associated with the 2N3819 r.f. amplifier stage, as shown in fig. 4, solves the problem nicely. The stage provides just enough gain such that any short pickup antenna mounted in the near vicinity of a typical 100 watt s.s.b. transceiver will provide enough r.f. drive for the product detector stage. Typically, a 2–3 foot transistor-radio-type whip antenna will suffice, although one will have to try different orientations and placements of the antenna for the most effective pickup.

Adding the 741C a.f. amplifier stage, as shown in fig. 4, adds the final small but finishing touch to the test instrument. It allows for far easier audio output monitoring, since almost any medium- (2000 ohm) to high-impedance pair of headphones can be used. One can adjust the audio output level as desired without having to move the pickup antenna around to adjust the input/output level. It also provides, by means of its input jack, a means to disconnect the product detector output into it and to use an external input such as a microphone for test purposes. It must be noted, however, that its ability to serve as an independent headphone amplifier stage for a microphone being tested will vary depending upon a microphone's output level. For many crystal, ceramic, and medium to high output level dynamic-type microphones, it will work fine. For microphones with very low output levels it can only function as a preamplifier stage, and additional external audio amplification will be needed.

Construction of the instrument is easily done using point-to-point wiring on perforated board stock and enclosing the board in a snap-box-type of enclosure.

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There is nothing critical about the construction of the unit as long as lead lengths are kept short, and as long as one takes a bit of care to keep the input of the r.f. amplifier stage reasonably separated from the output of the crystal oscillator stage. Starting with a 4" × 4" piece of perforated board stock, one can start to mount the components with the inner 2 inch square of the board just by following fig. 4. Then the excess board stock can be clipped away with diagonal cutters, and the board can be mounted inside a suitable-size snap-box enclosure. Since each builder might construct the unit a bit differently or use an enclosure on hand, no exact dimensions are suggested. The meter sensitivity and volume controls can either be PC-mount types, which one has to screwdriver adjust, or one can make them panel controls. The metering instrument used can be any simple surplus type (e.g., tape-recorder type) with a 100 to 250 μa range.

There is nothing to align or adjust in order to put the instrument into operation. However, one does have to be sure that the crystal oscillator circuit does function. If one uses a crystal known to be active and a general-purpose h.f. oscillator transistor such as a 2N706, one should easily be able to monitor the output signal on a receiver, and the output meter should show a vigorous indication.

When using the instrument for s.s.b. modulation monitoring without the r.f. amplifier stage being incorporated, there is practically no danger of overloading the instrument. A slight possibility of this does exist when the r.f. amplifier stage is incorporated. The instrument first should be positioned and its pickup antenna oriented so a clear, low-level audio signal can be monitored from a transceiver under normal modulation conditions without any form of speech processing being used. Leaving the test instrument's original setup untouched, one can then proceed to try different speech-processing methods, microphones, etc. It is rather surprising to hear how one can clearly discern the effect of even small changes in speech-processing equipment adjustments. Better yet, perhaps, one can clearly and immediately obtain "feedback" regarding the best microphone "technique" to use in order to obtain effective modulation.

Although not a lot has been written on the subject and the whole subject is certainly subjective in nature, there does not seem much doubt that microphone "technique" (soft, loud-speaking, articulation, orientation to a directional microphone, etc.) cannot simply be ignored if one is really searching for maximum modulation impact. Optimizing that possibility is certainly greatly enhanced by the test instrument described in this article. Its various other uses around an amateur radio station are a bonus that one will quickly learn to appreciate. CQ

World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Resurrecting Quality Signals and Standards

Listening to some of the muddy sounding s.s.b. signals on our h.f. amateur bands can often become a hair-raising experience. While splatter and distortion are the most commonly noticed and discussed offenders, excessive bassiness and muffled audio contribute heavily to poor readability and an overall "flat" sound which lacks the clarity and brilliance to stand alone in an attractive manner. In some cases, this has been blamed on imported gear and its associated microphones. Alternately, some amateurs have related this as the difference between vacuum tube and transistor processed audio. These are merely idle excuses, however, for means of improving one's s.s.b. signals are both relatively inexpensive and readily available.

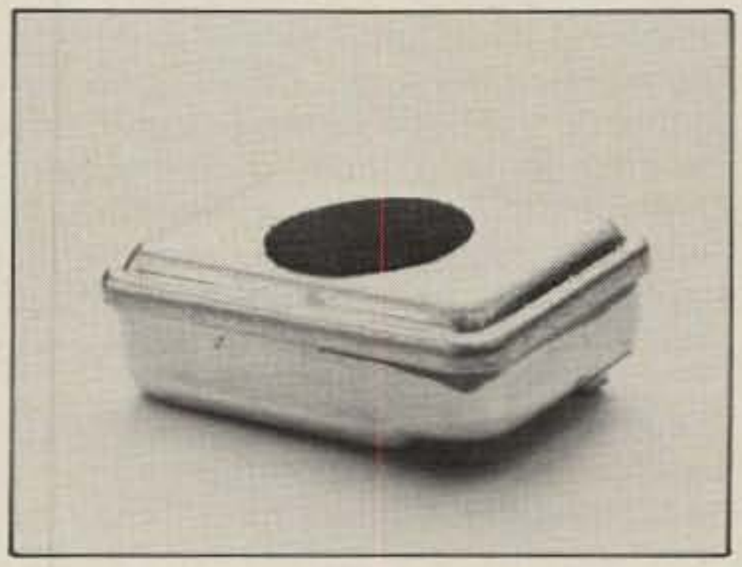
Why the concern over transmitted signal quality? Because, quite simply, it is your on-the-air image. Almost anyone will agree that physical appearance establishes first (and lasting) impressions. As radio amateurs, our on-the-air "appearance" is comprised of our audio and signal quality. Occasionally listening to and critiquing our own off-the-air signal quality thus holds the same merit as checking our physical appearance in a mirror.

When making such s.s.b. checks (using a communications quality speaker on an input-protected auxillary rig, while the primary rig drives a dummy load), tune your received signal in the normal manner. Is your voice crystal clear and attractive or boomy and bassy? While paying attention to mike gain and the auxillary receiver volume to avoid audio feedback, tune to your signal's "low" and "high" sides. Notice if there's more energy at the edges than in the desired mid-passband range. Listen for excessive higher frequency "tweets" (highly unlikely unless you're using an unequalized D-104) or a muffled kind of splatter or distortions slightly lower than your main frequency (often noticed with MC50's). Is yours the kind of signal you would enjoy hearing or contacting on the air?

During the days of a.m., extended bass response was in vogue. Indeed, many signals boasted low frequencies that would rattle almost any speaker. As s.s.b. became an accepted mode, the significance of also retaining high frequency response for recovering audio clarity gained renewed precedence. During this same time, transistors began replacing tubes and Japanese gear began appearing in amateur s.s.b. setups around the world. Slowly our "points of reference" were replaced with ideas that reduced quality was s.s.b.'s trade-off for extended communications capabilities. Fortunately, that assumption isn't totally correct. While it's true there's a particular quality (a glamour or "sparkle") in tube-processed audio, this shouldn't become a scapegoat for neglecting smooth and brilliant-sounding s.s.b. signals. This does mean, however, that simply using a mike with a frequency response of 200 to 7000 Hz isn't sufficient: it may have a 6 dB boost at 400 Hz or a peaked response at 6000 Hz. Those variations must be altered to achieve proper articulation.

Enlarged view of the Heil HC-3 s.s.b. tailored microphone element (actual size is approximately ½ by ¾ inch). Unit can be installed inside almost any mike case, and resulting audio is beautiful.

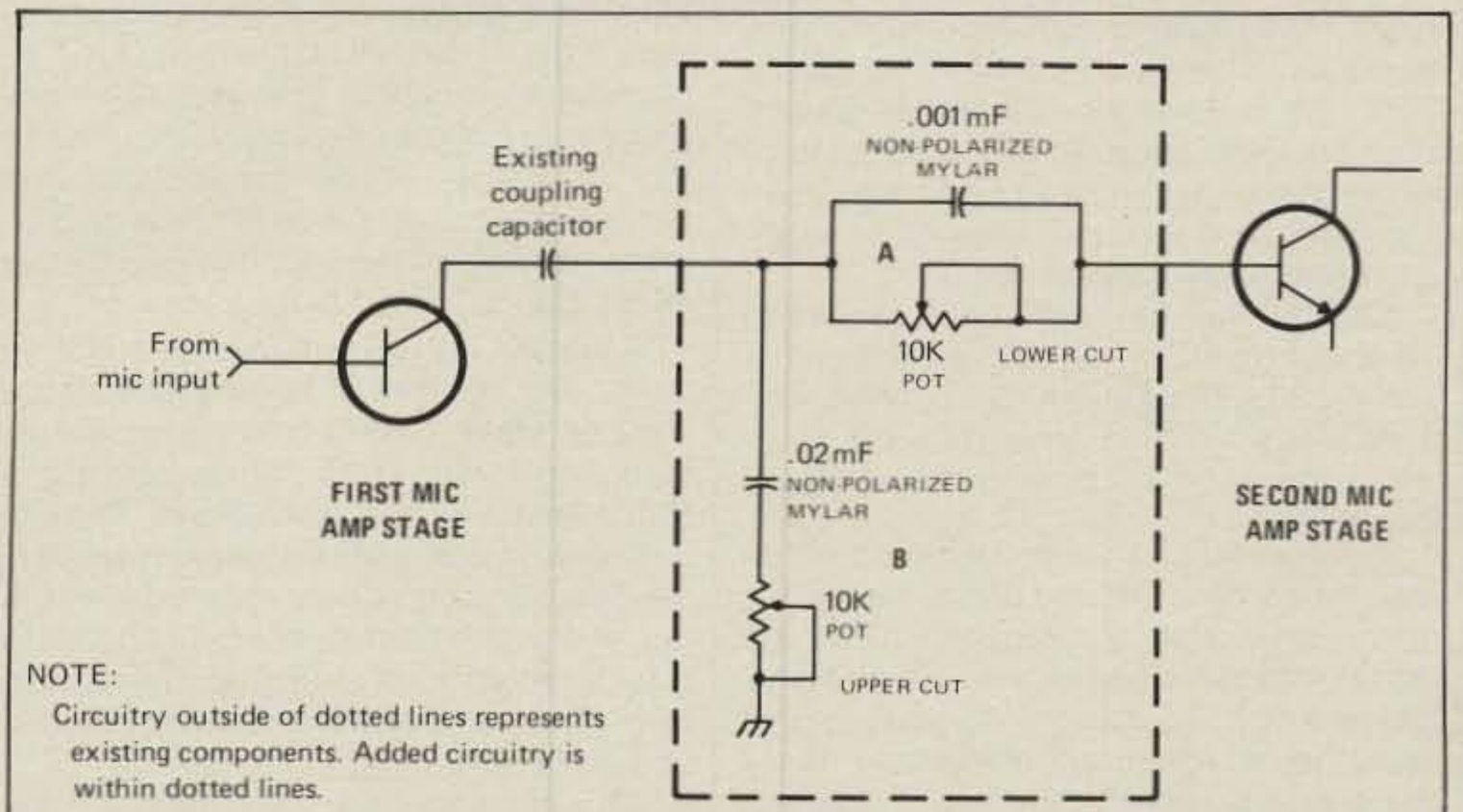
The preassembled and ready-to-use Heil HM-5 microphone, which uses an HC-3 element, can be used with any low-impedance input transceiver.



Improving Transmitted and Received Audio

Assuming use of a well-tailored s.s.b. microphone (and, naturally, a properly tuned and operating rig), some of the

Fig. 1– Hypothetical example of circuits for equalizing audio response of s.s.b. transmitters. Values shown are typical "starting points," which may require alterations according to various transceiver designs. Circuit at "A" passes highs through capacitor, while lows must pass through variable resistor. Circuit B kills highs to ground, according to setting of variable resistor. As an installation alternative, circuits within dotted line can be wired between mike element and rig's front-panel socket.



NOTE:
Circuitry outside of dotted lines represents existing components. Added circuitry is within dotted lines.

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

highest quality signals on the air today are emitted from older Collins transceivers. Next in line are imported rigs with tube finals, and these are closely followed by all solid state units (with maybe a few coupling capacitors and solid state devices in stages between the mike input and the balance modulator. Finally, there's the difference between how tubes are operated on their dynamic characteristic curves compared to transistors. Let's take a closer look at these variables.

Surely the most common mistake most of us make is using a particular mike with a rig because it has a mating plug. Most imported mikes (and many speakers) are unnecessarily bassy. Ever notice how some signals become more readable but no stronger when their rig's processor is switched on? It's attenuating low tones and emphasizing highs. A similar effect can be produced by placing a cardboard tissue roller tube in front of an MC50 or similar mike's grille. This treble boost, however, isn't complete without audio response shaping. Audio shaping can be acquired by replacing a mike's cartridge with a tailored unit such as the Shure 526 or the truly superb Heil HC-3 element (the Shure 526 *element only* must be used. *Do not* use the 526T transistor preamp). It may also prove beneficial at that time to change some interstage audio coupling capacitors inside the rig, especially if ".000x" values (such as .000470 mFd) are used. We've found non-polarized values of ".0X" (such as .05 mFd) provide improved audio response. If you're thinking of this as only a low frequency extension, remember a tailored mike element has been substituted. Some ICOM gear includes a preamplifer stage in the mike proper rather than inside the rig. This is not a problem, however, as elements can be directly changed within the hand mike. The overall results of previously described alterations are a transmitted signal which stands out like a sparkling clean auto amidst a grimy mess of freeway traffic.

If you don't care for internally modifying a rig's circuitry, consider adding an audio equalizer such as the Heil HC200. This unit provided continuously adjustable compensation for untailored microphone elements and audio sections in almost any rig (and it can save many hours of "component experimenting").

Concerning the difference between tube and transistor rig signals, listen to a KWM-380 with a Heil HC-3 mike element. That's encouraging proof that any properly processed s.s.b. signal can sound beautiful.

Receiver audio is another area which can easily be improved and expanded in a more DX-worthy direction. While the small internal speakers in most transceivers are convenient for occasional use, they simply can't effectively reproduce a signal affected by nearby grumble and grunge (are you still cupping your hands around your rig's speaker area to understand weak signals?). Increasing volume merely causes the cabinet to resonate, rattle, and/or produce "cracking audio." External speakers enclosed in effective baffles work wonders. If you would like an extreme example that will open your eyes . . . er . . . ears, try using a small paging trumpet instead of your rig's internal speaker. One of those little gems might become a permanent piece of your DX paraphenalia. After testing some of the previous suggestions, you'll surely have some audio ideas of your own. You're now moving in the right direction and headed towards making quality improvements in a rather overlooked area.

An effective means of externally tailoring both microphone and transmitter audio response is the Heil EQ200 equalizer.

Deregulation and No-Code License

Another area which we seriously feel is being overlooked and its long-term consequences ignored is mass federal deregulation. Eliminating the First 'Phone class commercial license and blowing open the doors for anyone to operate a broadcast station was the first step. Next, amateur logging requirements were dropped and various operating restrictions were "eased." Was it so difficult measuring 1 kw d.c. or 2 kw PEP that we had to resort to reading 1500 watts on output meters, and how many cynical wizards will "personally interpret" that as 3000 or 4000 watts input (poor voice characteristics, you know; 90 percent QRM-generating bass and 10 percent articulation). Moreover, who's to challenge such logic. What will be the next steps . . . opening all amateur frequencies to any mode and any class licensee? Permitting foul language, music broadcasts, and f.m. jamming contests on 20 meters? Surprise passing of the no-code license for all h.f. bands? Head's up, gang.

Visualize, as an analogy, instigating such concepts in a heavily populated area or state. Speed limits a problem? Eliminate them. Traffic lights and signs troublesome? Take them down. Double street parking illegal? Forget it. Next, add the clincher . . . *give* everyone a driver's license and tell them to have at it. Vigilante groups would soon spring up to establish their own forms of law and order (shades of the old west, eh?).

Whether people admit it or not, they desire discipline. This is quite obvious in schools, colleges, and businesses. Children respect (and unconsciously prefer) reasonably demanding teachers. They expect discipline, just as adults desire to perform in a specifically outlined manner.

As radio amateurs, we are a proud and conscientious breed. Our activities have purpose and meaning, and we don't want that heritage derated . . . now or later. If deregulation continues, we must move to establish our own *quality guidelines* along with the *authority* and *power* to *enforce* them. League policies will need to be changed. Extensive monitoring and corrective programs must be instigated. Associated local groups must be coordinated nationally. The list is endless. It could take years to regain our long taken-for-granted appreciation and respect. Don't sit by quietly and watch our standards crumble, and don't assume we've heard the last of no-code license! Voice your opinion while there's still time.

One of the prime attractions of no-code license is big money . . . manufacturers, political groups, importers, distributors, etc. Those big businesses will be supported by thousands upon thousands of "end users." No code licensing worked in Japan because they are an extremely disciplined country. Think about that. Meanwhile, start pondering what portion of which band could best be sacrificed for (special call-equipped) no-code licensees . . . the lower portion of 10 . . . the upper part of 6 . . . 220 MHz . . . etc. Remember, also, present and future OSCAR satellites can turn v.h.f. and u.h.f. bands into our prime allocations. As the leaders for future amateur radio generations, we can determine our fate by guiding today's activities in the right direction.

Amateur Licenses

Have you considered the possibility and benefits of upgrading your own amateur license during this cold winter season? Extra Class allocations aren't overly congested like General Class frequencies, and high power amplifiers aren't vital for survival. In fact, that "10 dB improvement" (both transmitting and receiving) is the best investment you could make. As I've said before, you can get on Extra Class portions of 20 meters nearly any Friday or Saturday night and work the world with less than 50 watts. Several good Morse training programs are available for home computers. Some even flash sent letters on their monitor's screen. Using that setup, you could improve your c.w. while relaxing or eating.

At the expense of inaccurately being dubbed a supporter of Wayne Green's humorous proposal for 45-plus wpm license (our present speeds are quite satisfactory), I would also like to suggest a new Superior Class License. Such a license would be one or two steps above the Extra, and would *never* support any special operating privileges: it would be strictly personal-incentive oriented to replace the Extra's position before the days of incentive licensing. What's your opinion?

MFJ RTTY / ASCII / AMTOR / CW
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Easy, positive tuning with twin LED indicators.

Narrow 800 Hz active CW filter. Automatic PTT.

Exar 2206 sine generator for AFSK output.

Shielded XCVR AFSK/PTT interface cable provided. Plus or minus CW keyed output. FSK out.

Powered by computer (few mA.), no power adapter to buy or extra wire to dangle or pick up/radiate RFI.

Glass epoxy PCB. Aluminum enclosure. 4½x4½x1".

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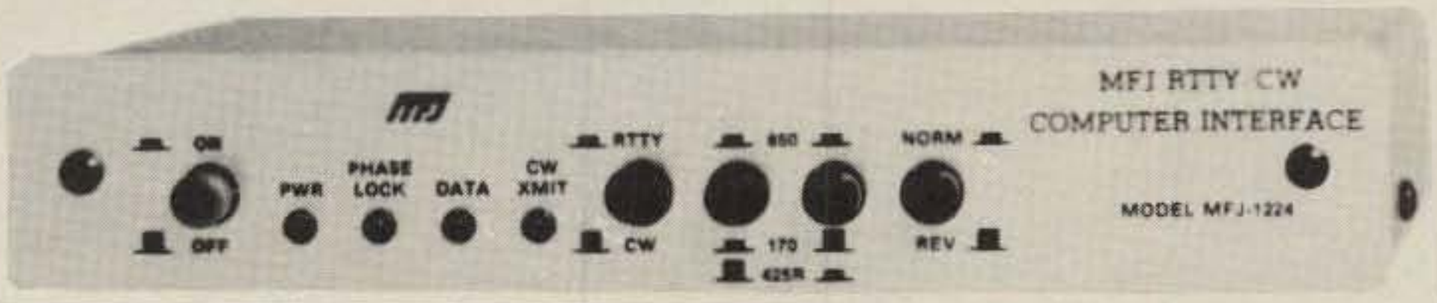
Lets you send and receive computerized RTTY/ASCII/AMTOR/CW. Copies all shifts and all speeds. Copies on both mark and space. Sharp 8 pole active filter for 170 Hz shift and CW. Plugs between your rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 or most other personal computers. Uses MFJ, Kantronics software and most other RTTY/CW software.



MFJ Software plus MFJ Interface for VIC-20/C-64

Software cartridge alone, $49.95. Order MFJ-1250 for VIC-20, MFJ-1251 for Commodore 64. Includes cable to interface MFJ-1224 to VIC-20 or C-64.

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Easy, positive tuning with twin LED indicators.

Copy any shift (170,425,850 Hz and all other shifts) and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII).

Copies on both mark and space, not mark only or space only, to improve copy under adverse conditions.

Sharp 8 pole 170 Hz shift/CW active filter gives good copy under crowded, fading and weak signal conditions. Automatic noise limiter suppress static crashes for better copy.

Normal/Reverse switch eliminates retuning. +250 VDC loop output drives RTTY machine. Speaker jack.

Automatic tracking copies drifting signal.

Exar 2206 sine generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone line: AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying output. Plus and minus CW keying. CW transmit LED. External CW key jack.

Kantronics compatible socket.

Exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL lines: RTTY demod out, CW demod out, CW-ID input, +5 VDC, ground. All signal lines are buffered and can be inverted using an internal DIP switch.

Use Galfo software with Apple, RAK with VIC-20, Clay Abrams with TRS-80C, N4EU with TRS-80 III, IV. Some computers with some software may require some external components.

Metal cabinet. Brushed alum. front. 8x1¼x6 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ-1223, $29.95, RS-232 adapter for MFJ-1224.

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4 pole 100 Hz bandwidth active filter. 800 Hz center frequency. 3 pole active lowpass post detection filter. Exclusive automatic tracking comparator.

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Use MFJ (see this ad), Kantronics, AEA and most other RTTY/ASCII/AMTOR/CW software.

Copies all shifts and all speeds. Twin LED indicators makes tuning easy, positive. Normal/Reverse switch eliminates tuning for inverted RTTY. Speaker out jack. Includes cable to interface MFJ-1224 to VIC-20 or Commodore 64. 4½x1¼x4¼ inches. 12-15 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

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Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The story of the month as told by Fred is:

Fred K. Klein, KS7T
All Counties #423, 5-14-83

"It all started back on March 3, 1945 in the Bronx, N.Y. at the Royal Hospital across from Yankee Stadium, when the doctor handed a lifeless little package over to the nurse and said, 'Here, he's your problem.' You see, it almost didn't start because I wasn't breathing when I was born. However, the nurse wouldn't give up. Fifteen minutes later, the little reluctant package (I suppose I was just afraid and not all too sure of what I was about to get myself into) began to utter his first sounds. I don't rightly remember what they were, but probably 'ouch!' because the nurse was slapping me on the back repeatedly. Then she brought me over to my mother and said, 'Here, he's *your* problem now.'

"Well, I proceeded to be just an ordinary problem until the age of ten, when the amateur radio 'bug' bit. I caught it from my older brother, Marty, who I can thank for giving me a lot of other childhood diseases as well. This time, though, the prognosis was pronounced as incurable, and then I became a major problem. I won't go into all the sordid details of why, but it can well be imagined that when my Dad purchased a Hallicrafters S-38D for my brother for his birthday, I worked my way into monopolizing it. The year was 1955, and due to the S-38D, both my brother and I became avid s.w.l.'ers. I used to marvel at all those guys sending those 'secretive' beep-beeps to each other and often wondered how they could possibly know what all that means.

"Then one day Marty shoved this book in my face and told me to call out a letter and he would give the symbol in dots and dashes next to it. At the time he was sixteen and I was ten. I said 'O.K., I'll help you but I won't try to learn that stuff because its for older kids like you,' and I didn't try to learn it. I just kept looking at the book and would tell him when he got a letter right or wrong. After a number of sessions like this, pretty soon I didn't have to look at the book anymore to know whether he was right or wrong. We had done that so many times, that to my own amazement, I knew A from B and so on. Once my brother had mastered the code, he drilled me on an oscillator so I could start recognizing it in dits and dahs instead of dots and dashes.

333 South Lincoln Ave., Mundelein, IL 60060

Fred, KS7T, a professional radio announcer, at home with his hobby.

"In January 1956 the mailman delivered an envelope addressed to Marty which caused all kinds of excitement. The long awaited 'ticket' from the F.C.C. had arrived informing my brother he was now owner/operator of amateur radio station KN2RAE. Well, a Viking Adventurer and an NC-125 receiver and a dipole soon replaced the S-38D in our house in Queens, NY. I sat excitedly by, jumping for joy every time I heard those dits and dahs on the 40 meter Novice band spell out KN2RAE as his 'CQ's' were answered. Realizing how much fun he was having, I thought I would start studying the manual and maybe someday the mailman would have a 'ticket' for me in the mail. On July 31, 1956 the mailman came through. I could hardly wait to tear the envelope open to see what my call letters were; and there they were—KN2UAR. I ran down the basement stairs, flipped the switch on the Adventurer and NC-125, slapped out a rough resemblance of a CQ on the J-28 key, and to my amazement, there it was, someone coming back calling KN2UAR. It was KN2TOA all the way in upstate NY. Now, nearly 27 years later, I'm still excited by the QSO's. Nothing, however, will ever replace the initial thrills of the first years of amateur radio.

"Marty went into the Air Force in 1957 and I soon had the rig all to myself. I proceeded to get involved in all kinds of things: rag chews, DX, roundtables of nets, pile-ups, and contests. Soon I was meeting other hams in the neighborhood and making lots of ham friends. Radio was now in my blood to stay. So much so, that ultimately my chosen career was in radio. In 1967 I graduated from Hofstra University with a B.A. in speech along with many hours of broadcasting courses and five years with the University radio station, WVHC-FM, of which I was a charter member and chief announcer in my senior year. Then I proceeded to study for my first-class commercial license and attended Announcers Training School in

Special Honor Roll
All Counties
#438 Charlie Akins, KC4WL 10-3-83.
#439 Roy Glasscock, II, KC0JG 10-12-83.

Shack near Butte, Montana, belonging to Fred, KS7T (ex-W7JYW, K2UAR).

USA-CA Honor Roll

3000		2000		1000	
KC4WL	470	KC4WL	581	KC4WL	801
KC@JG	471	KC@JG	582		
2500		**1500**		**500**	
KC4WL	527	KC4WL	649	KC4WL	1880
KC@JG	528			WB9CIF	1881
				DL6RAI	1882

NY. I obtained my license in 1968. Since then, I have worked at radio stations as an announcer at WLIR, Garden City, L.I.; WDKC, Albany, NY; KMON, Great Falls, Montana; KXLF, Butte, Montana; and currently at KBOW, Butte, Montana. I came to Montana in 1971 to rejoin my brother, now K7TAZ, who stayed to live in the Treasure State after being stationed here while in the United States Air Force. He encouraged me to try to get a job with KMON in Great Falls. I applied with a homemade audition tape and two weeks later I was on their staff.

"I heard about County Hunting in early 1962. I had 25 pieces of wallpaper gracing my shack, and wondered what to do next. I looked at the USA-CA literature again and decided that maybe I could try for 500 counties, but 3079 counties—no way! That would take a lifetime and I was just about to enter my freshman year of college so there wouldn't be time for that. Besides, I thought, that would be nearly impossible for anyone. Well, a going over of the QSL's already on hand showed I already had 500 confirmed before I even got started really working for it. I had managed to work a few more in the years that followed during college, but wasn't really serious about county hunting until I came across K1ZFQ, net control of the c.w. county hunters net on 14.070 in late 1967 from Albany, NY. K@WNV/mobile was running a county on the c.w. county hunters net. A pile-up of other stations kept me glued to the frequency. Soon I caught on to what was going on and from that point on I was hooked.

"The county hunting 'bug' bit and I discovered I had a terminal case. I wasn't satisfied with just working the counties; I wanted to be mobile and get those guys clamoring for my county just like they had for K@WNV. So, a Swan 260 was purchased in 1969 and not only was I now mobile, but on s.s.b. as well. That's when I discovered the Independent County Hunters Net on 14.336 and also on 3.943. Mobiling, net controlling, and working the mobiles became a steady activity.

"The years spent with this outstanding congenial group of amateurs both on c.w. and s.s.b. have been an incredible source of joy, knowledge, and achievement. Having the opportunity to share the joy of giving out a county to a fellow county hunter gave me as much pleasure as working a new county. Having the opportunity to eyeball fellow county hunters through the years has been a tremendous thrill. I'm not going to mention any calls of people I wish to thank, because I would wish to thank each and every one of you, and the list is endless on the c.w.

Luigi, I2KKL, and his 4-element Swan in Mantova, Italy.

and s.s.b. county hunters nets for the unending phenomenal devotion to making amateur radio what it is supposed to be all about—people helping other people. Without this type of tireless willingness from each and every person who has given out a county on the nets the joys we all have known would never have been possible and working them all would have been just a dream. All Counties #423 was made possible because I lasted long enough to work them all with your help.

"Now that the certificate is hanging on the wall, I can truly say it is a beautiful award, but how it got there is even more beautiful. Thanks to all of you and especially to that nurse, without whom I would have missed it all."

73, Fred, KS7T (ex-W7JYW, K2UAR)

Awards Issued

Charlie Akins, KC4WL, waited until he had finished them all and then qualified for All Counties #438, Mixed.

Roy Glasscock, II, KC@JG, completed USA-CA 2000 through All Counties to earn All Counties #439, Mixed. Roy's father, Roy Glasscock, Sr., K@DJC, holds All Counties #261.

USA-CA 500 certificates were issued to Mark E. Musick, WB9CIF, endorsed all C.W., and to Bernard (Ben) Buettner, DL6RAI, endorsed Mixed.

Awards

The Helvetia Award. A few U.S. amateurs have won this colorful historical award since 1979. USKA wishes to make known two changes in the rules. The award is for those who can produce QSL cards confirming contacts with all 26 Swiss cantons and half cantons since January 1, 1979. Cross mode and cross band contacts are not valid. The award is issued in four classes with separate numbering: (1)

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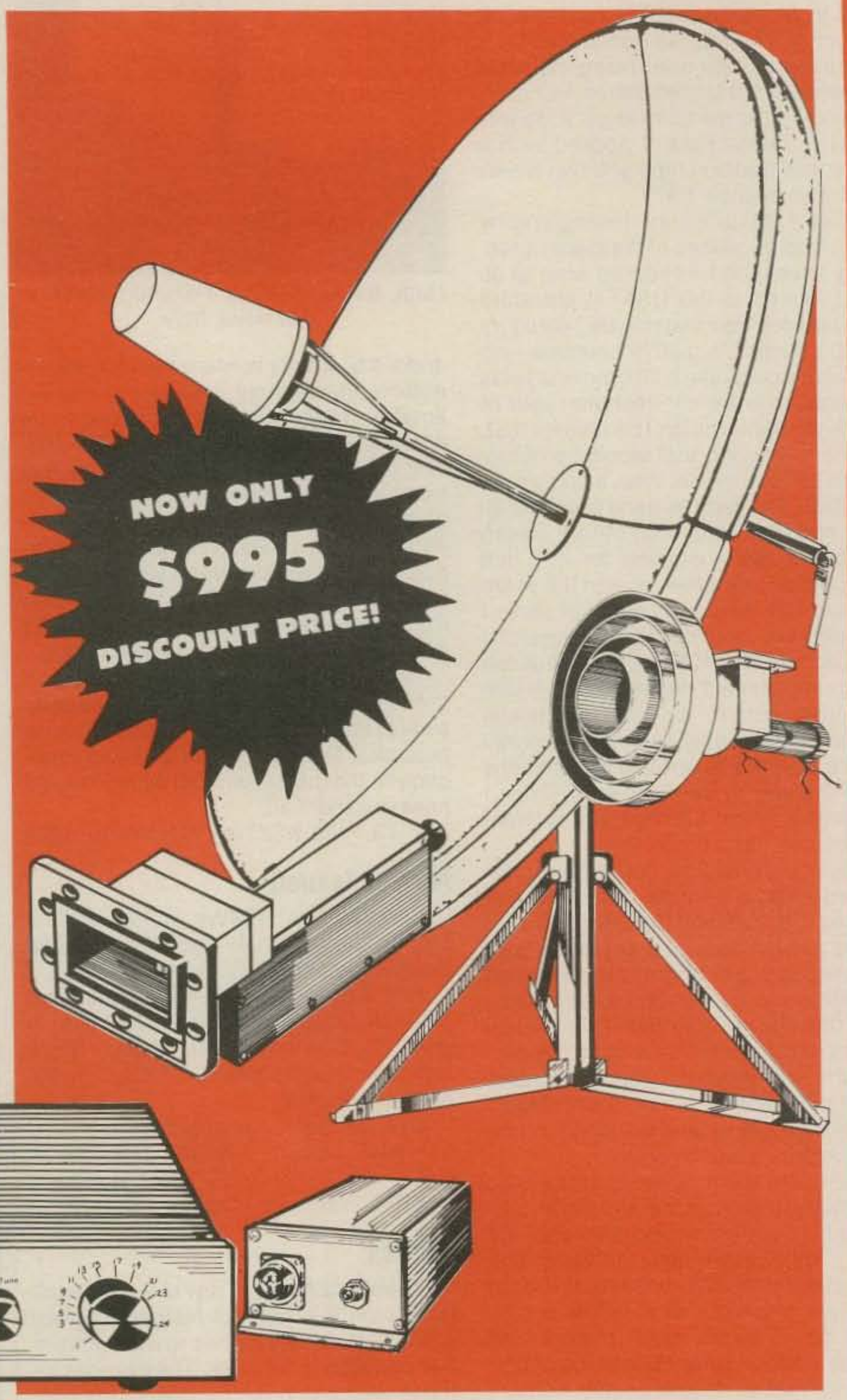
Note: Small cables not included. Shown with optional fiberglass LNA cover.



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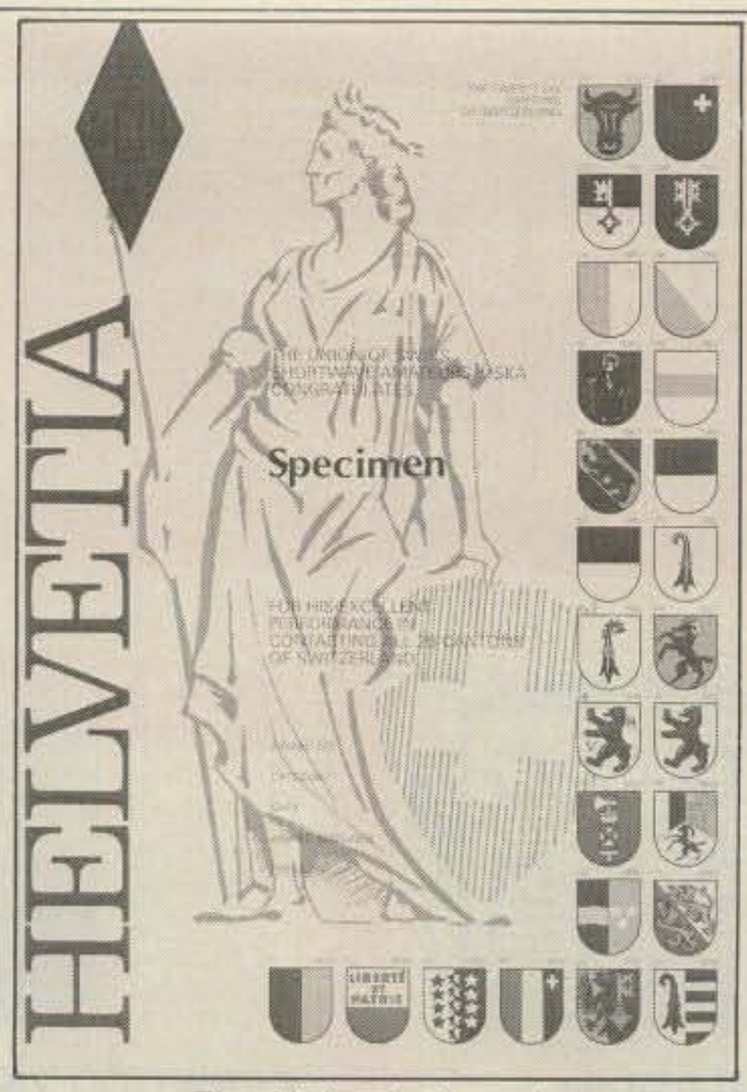


The Helvetia Award.

The Q-5 Award of Excellence.

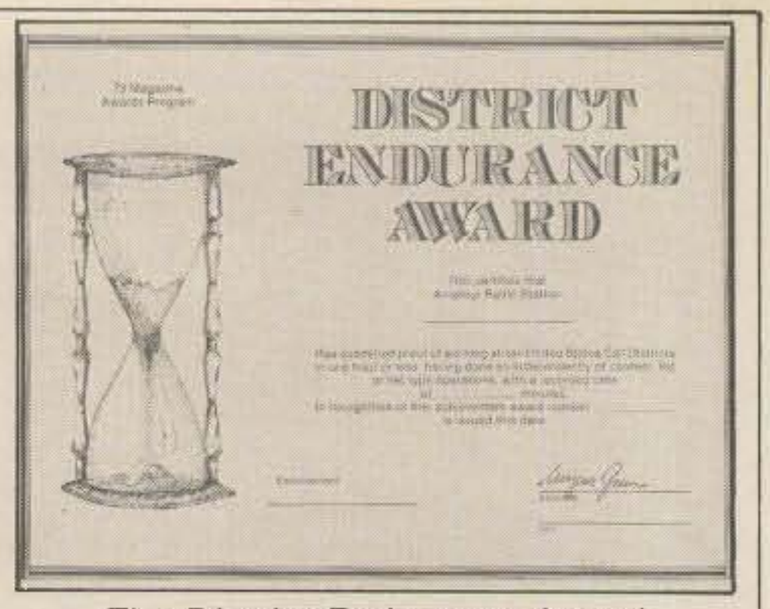
telephony, telegraphy, or mixed, (2) all telegraphy, (3) RTTY, and (4) SSTV. The abbreviations used by the cantons are as follows:

AG	Aargau	GE	Geneva
AI	Appenzell Inner Rhoden	GL	Glaris
AR	Appenzell Outer Rhoden	GR	Grisons
BE	Berne	JU	Jura
BL	Basle-Country	LU	Lucerne
BS	Basle City	NE	Neuchatel
NW	Nidwalden	TG	Thurgau
OW	Obwalden	TI	Ticino
SG	St. Gall	UR	Uri
SH	Schaffausen	VD	Vaud
SO	Solothurn	VS	Valais
SZ	Schwyz	ZG	Zug
FR	Fribourg	ZH	Zurich

QSL's must show clear evidence of the canton where the station was located, and they should be sent, together with a signed list showing callsign, location, date, frequency band, and the class of emission used for each contact to: HB9MX, Kurt Bindschedler, Strahleggweg 28, 8400 Winterthur, Switzerland.

The award is free but sufficient IRC's or equivalent to cover return postage of QSL's must be sent.

The Q-5 Award of Excellence. To be valid, all contacts must be made on or after January 1, 1979. All contacts must be made operating the c.w. mode in those frequencies assigned to the American Novice. Applicants are cautioned that power limitations



The District Endurance Award.

are 250 watts input. There are no band restrictions but applicants may request special band endorsement on the award if the request is made at the time of application. To qualify applicants must work ten US call districts and receive no less than a Q-5 report. A valid report might be 569, 539, 579, etc., while an RST of 449, 349, or 479 would not qualify.

Do not send QSL cards! Have your list verified by two amateurs, a local radio club secretary, or a notary public. Enclose with your application the fee of $4.00 or 12 IRCs. Send application and fee to Bill Gosney, KE7C, Micro-80, 2665 North Busby Road, Oak Harbor, WA 98277.

District Endurance Award. To be valid, all contacts must be made on or after January 1, 1979. There will be no band or mode restrictions, but if you are fortunate enough to work these requirements on a single band, it will be recognized when processing your award.

One of the most important rules applicable to this award is that all contacts must be made independent of nets, any net-type operation, or while any contest is underway.

To qualify, applicants must work all ten US call districts in one hour or less. The time will commence the moment the first contact is established and end with the time logged for the last district required.

To apply, applicants must prepare a signed declaration that all contacts were independent of net or contest operation. Applications must include a list of stations worked in callsign order by district, the date and time worked in GMT, the band and mode of operation, and the state. Do not send QSL cards! Have your list of contacts verified by two amateurs, a local radio club secretary, or by a notary public. Accompanying your application should be a $4.00 award fee or 12 IRCs. Send application to: Bill Gosney, KE7C, Micro-80, 2665 North Busby Road, Oak Harbor, WA 98277.

Notes

A little reminder. This column is submitted to the editor eight to ten weeks before publication, so if you have award information for publication, please remember. As always, best wishes to you all.

73, Dorothy, WB9RCY

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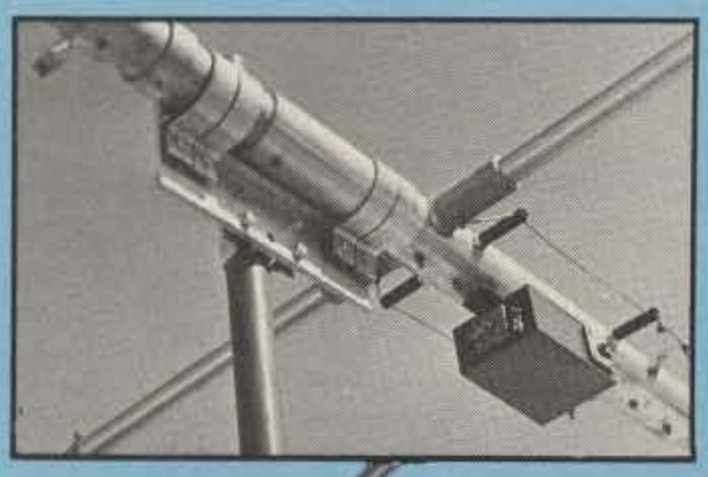

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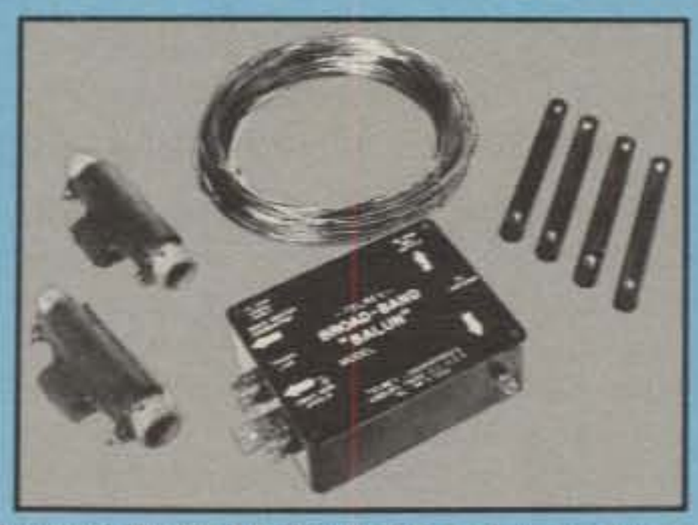

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15M532	15 Meter 5 element	(13 DBD)	545.00	**455.00**
15M845	15 Meter 8 element	(15 DBD)	1120.00	**925.00**
20M536	20 Meter 5 element	(12 DBD)	645.00	**535.00**
20M646	20 Meter 6 element	(14 DBD)	1130.00	**945.00**
40M214	40 Meter 2 element	(5.6 DBD)	740.00	**615.00**
40M329	40 Meter 3 element	(8.3 DBD)	1139.00	**950.00**
40M346	40 Meter 3 element	(9 DBD)	1975.00	**1650.00**
TB4EC	10, 15, 20M Tri-Band	(5.5 DBD)	252.00	**205.00**
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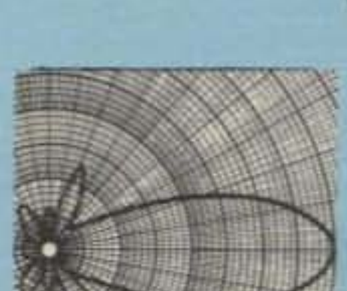

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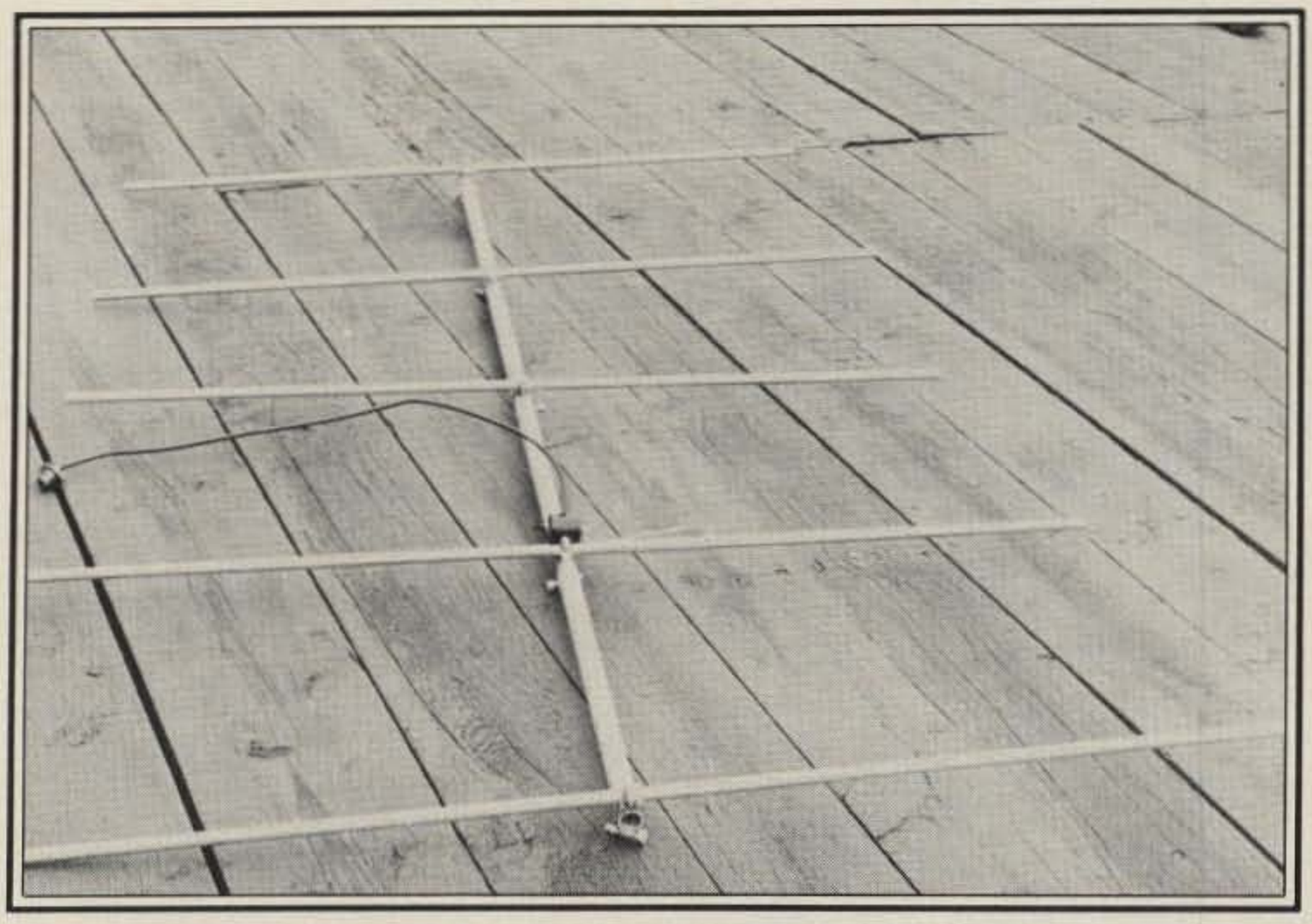
What? Another 2-Meter Antenna?

BY LEW MCCOY*, W1ICP



This is the five-element beam. In actual use, the SO-239 coax fitting was mounted directly on the boom near the driven element.

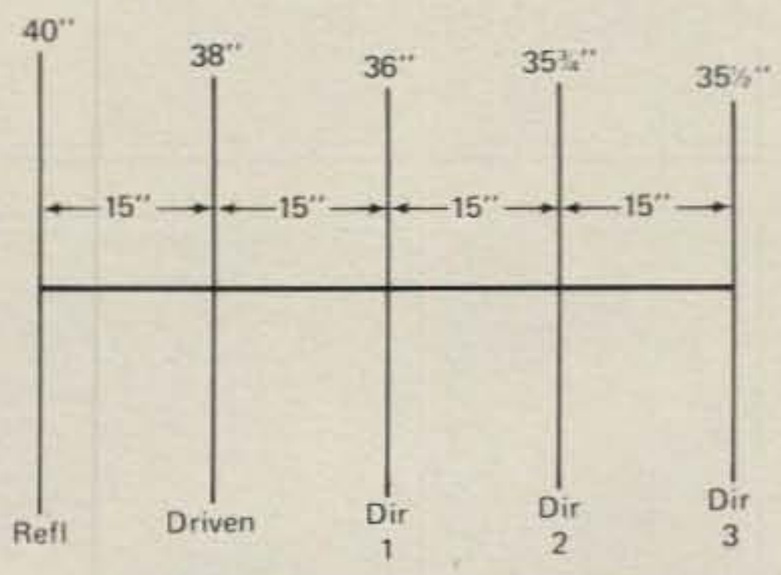


Fig. 1– This gives the element and boom length plus other critical dimensions based on 146 MHz.

Like the title says, why another 2 meter antenna? There certainly are plenty of them described in amateur literature. However, you may find yourself in the same fix I was in simply because there was so much information around. I needed to make beam for a handicapped friend of mine, but I found that all the handbooks gave different advice and numbers for figuring element lengths and spacing. So, after much searching, I came up with the information needed to build a Yagi-type beam, plus my test dipole. Both antennas seemed worthy of description because they both offer something different from normal.

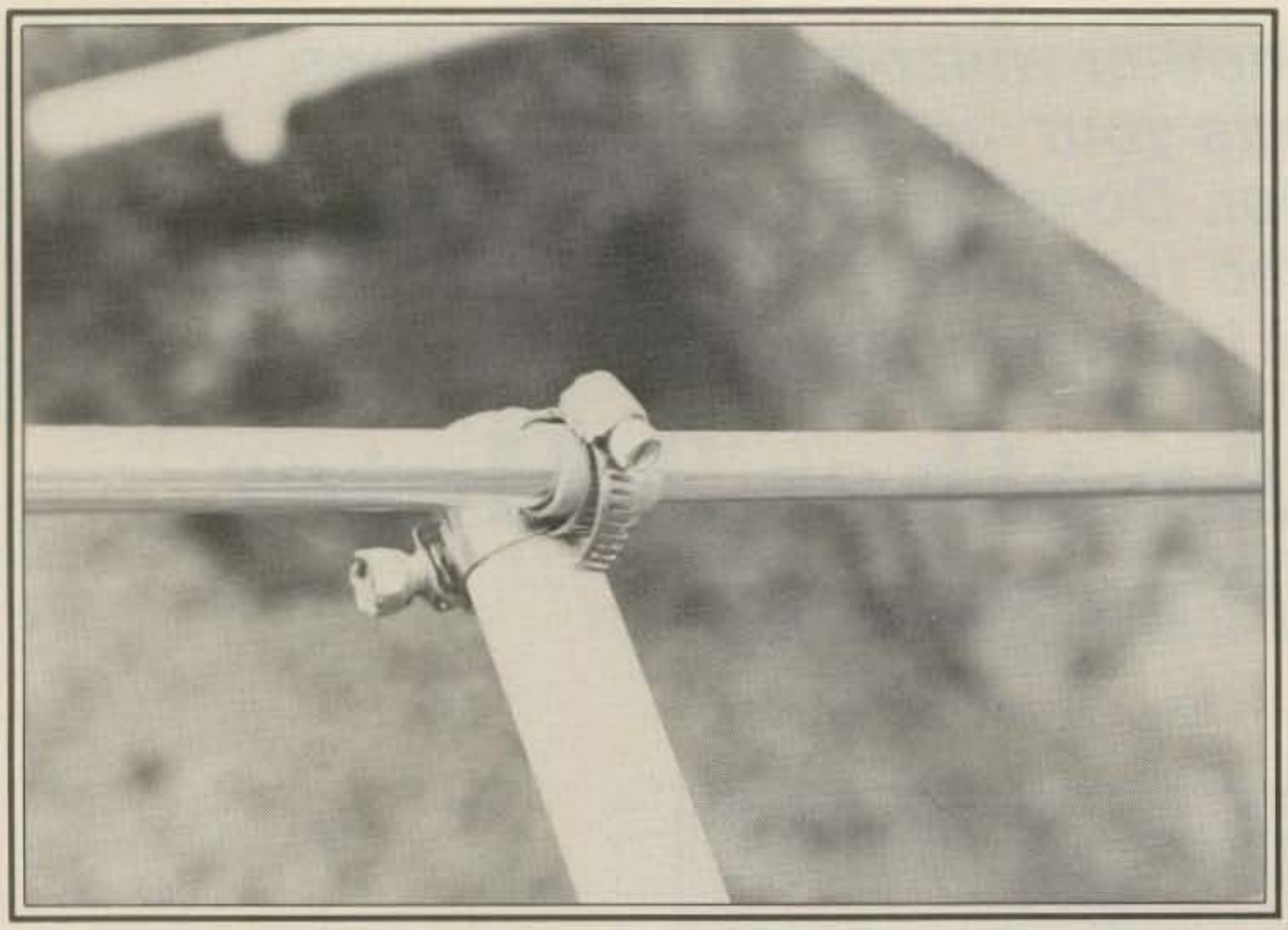
What They Are

The friend of mine who was short on funds was in need of a good beam and asked my advice on what to use for a 2 meter antenna for repeater work. Here in southwest New Mexico we have plenty of repeaters, but in most cases, you need a beam if you want to work into more than just a local system. (Good grief, McCoy, that is true of any rural area!) In my friend's case, a simple beam with about 7 dB of gain or so would be adequate. I could have made the beam with lots of elements, but it appeared that from the material on hand, balance points, etc., five elements would be adequate. This consisted of a driven element, reflector, and three directors. Such an antenna would approach about 9 dB of gain over a dipole and would be compact enough for the purpose.

Incidentally, a three-element beam has a theoretical gain of about 7 dB as measured over a half-wave dipole. In order to achieve 3 dB more gain, which would be twice the power, you must double the size of the beam. This usually means having a boom twice as long and twice as many elements, or a six-element beam to achieve 10 dB. In order to get 13 dB gain, you would have to double the size of the beam again, both in boom length and element number. You run into a law of diminishing returns if you seek to have an extremely high gain antenna. The boom length becomes unreal, and the only way to achieve the next 3 dB step is to stack another antenna of equal size above or alongside the existing one. Phasing and harnessing lines become a problem with design and losses.

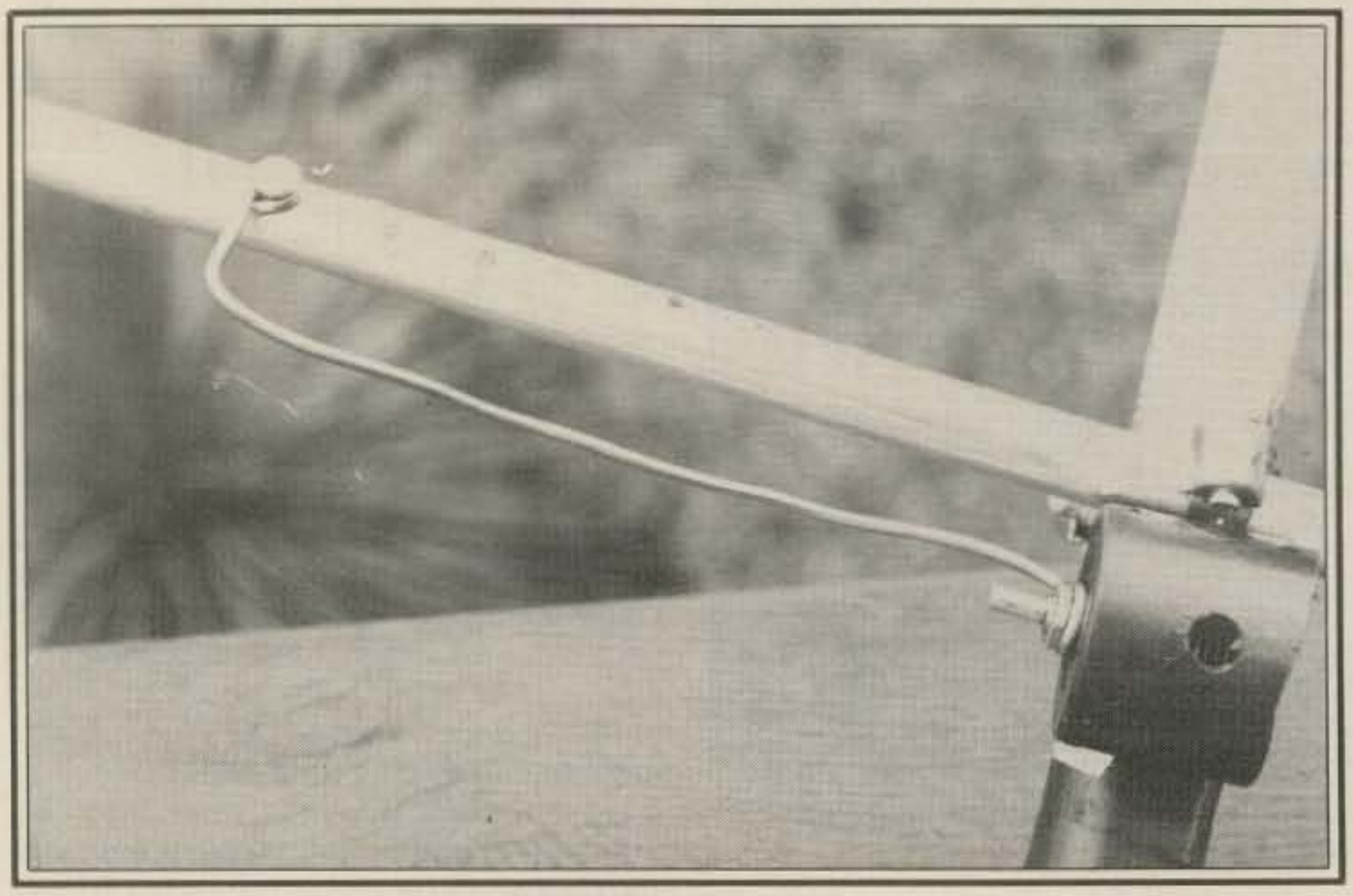
When you understand the information in the above paragraph, it will make you more knowledgeable when it comes to building your antenna or reading advertising claims and actually selecting an antenna. When a manufacturer specifies gain figures, try to determine what the gain is compared to a half-wave dipole, an isotropic, etc. Keep in mind that the 7 dB gain figure for a three-element beam is for a perfectly spaced monoband beam. Any reduction in size or spacing will result in less gain. How much gain depends on too many factors to discuss here. However, and this is very important, amateurs want beams for more than just the gain. Directivity, front-to-back and front-to-side, can be more important than gain in many cases. I would be remiss if I didn't point out that most antenna manufacturers these days make excel-

*Technical Consultant, CQ, 200 Idaho St., Silver City, NM 88061

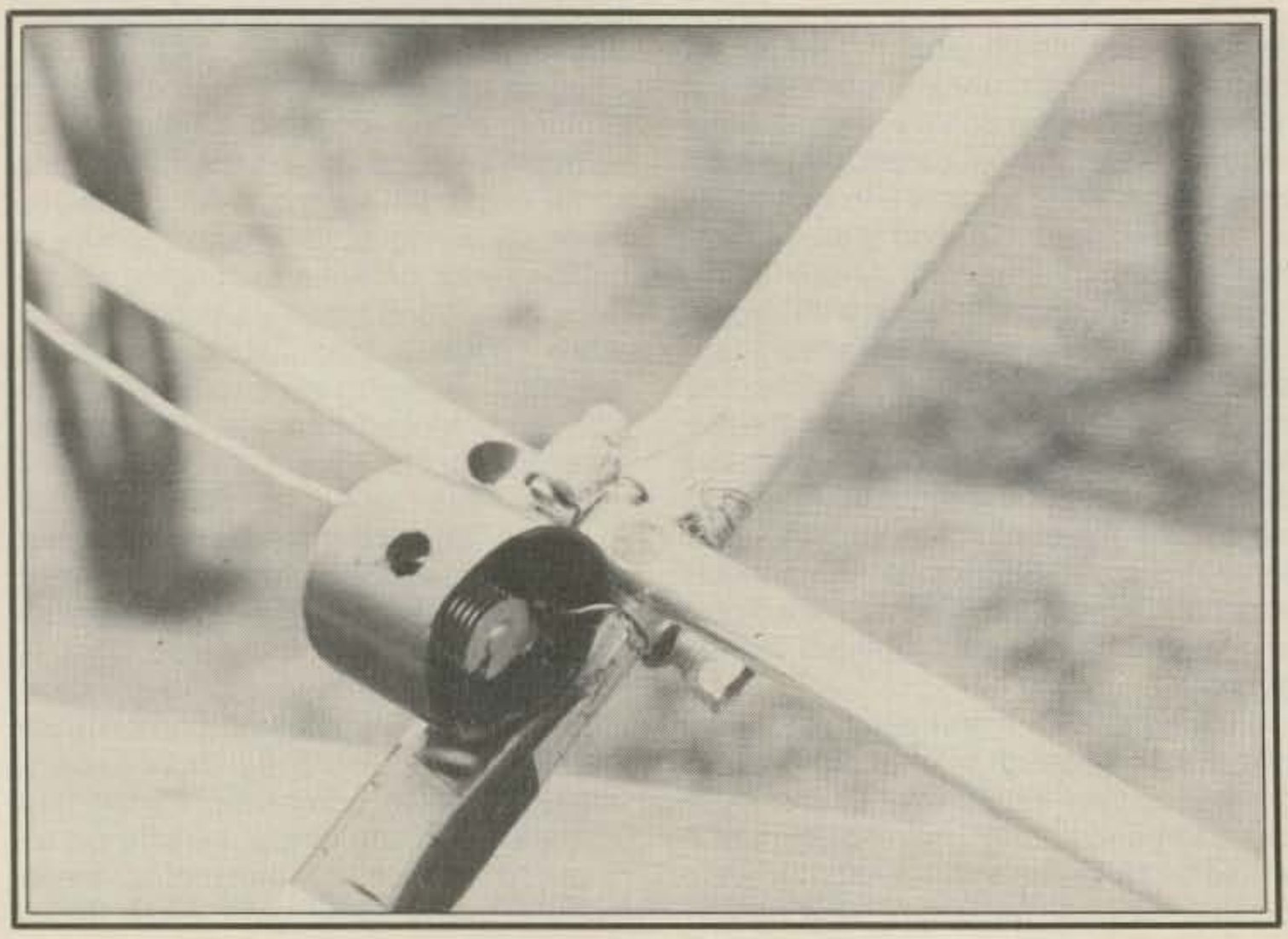


Here is a close-up view showing the method for mounting the elements. Note the plastic strip under the element clamp.

The gamma rod is made from No. 12 copper wire, one end mounted under the capacitor rotor shaft screw and the other end on the element.



This close-up shows the gamma capacitor mounted in the 35mm photo cartridge box.



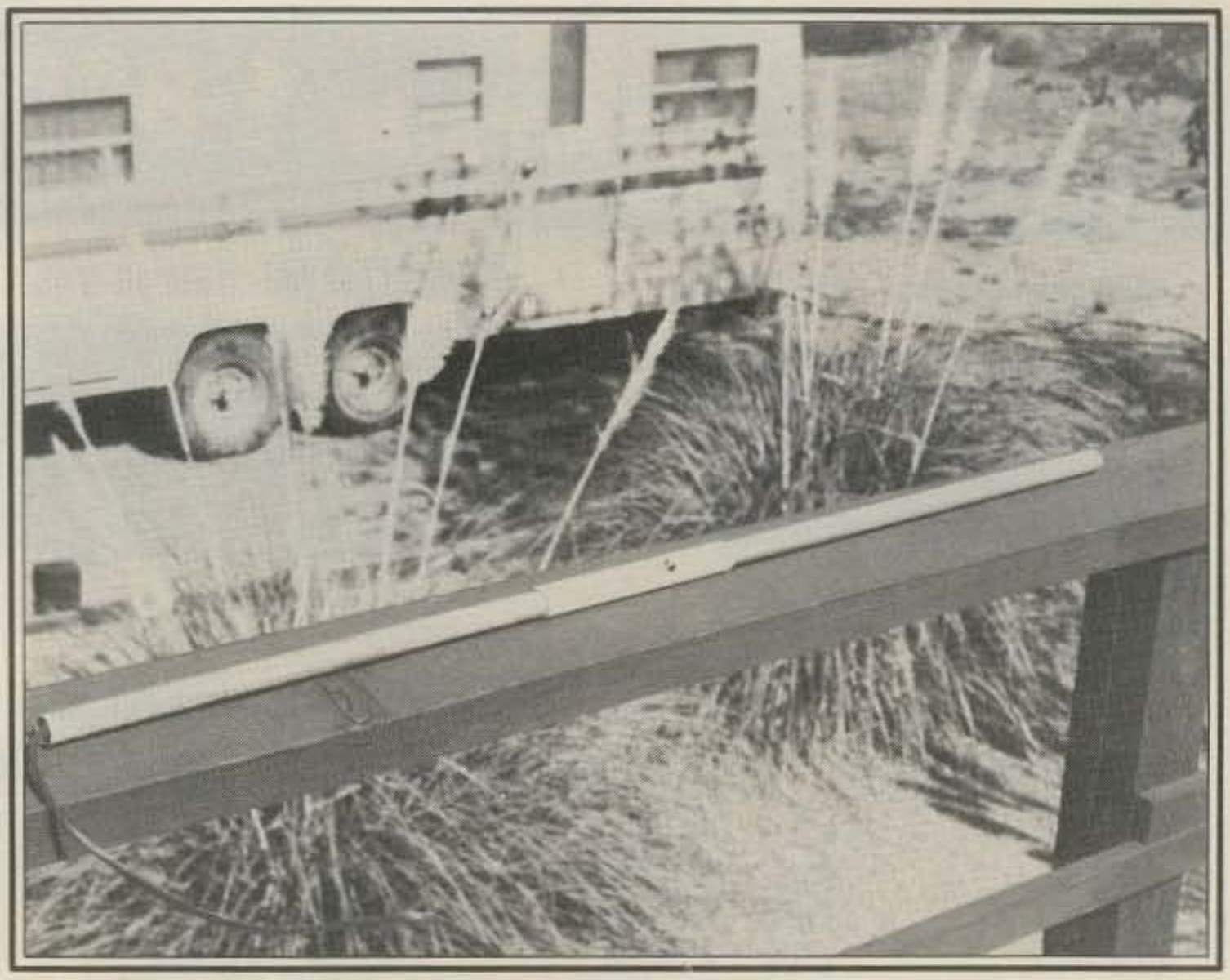
lent antennas. A great deal of work has gone into the design and construction of their products. So as a rule, you can buy with safety even if they are inclined to "push" their gain figures slightly.

While the above side-track hasn't got a great deal to do with the construction of this five-element beam, it may be information that the reader will find useful, based on my years of experience in working with antennas. Fig. 1 is a drawing of the beam giving the dimensions needed. The photographs provide the details needed on mounting the elements and installing the gamma match. Note how the elements are mounted. I recently did a product review on the Austin 2 meter antenna (*CQ*, January 1984 issue), and Dick Austin uses this method of supporting his elements. I think it is excellent and simple, so thanks to Mr. Austin for the idea.

This brings up the question of having ungrounded or grounded elements (Plumber's-Delight-type construction). I have heard the subject argued pro and con for many years, but I have never seen any real proof that one system is better than the other. On the other hand, I am sure one must be better than the other. In any case, I elected to insulate all but the driven element in this antenna, so I guess I can play both sides of the fence in the continuing argument.

Compression-type clamps, available at any hardware store, were used to support the elements (the Austin idea). One clamp goes around the boom, and the other clamp goes around the element and under the one around the boom. In order to insulate the elements, I cut up a plastic 35mm photo cartridge case and made strips of plastic which fit around the element, insulating it from the clamp (and the boom).

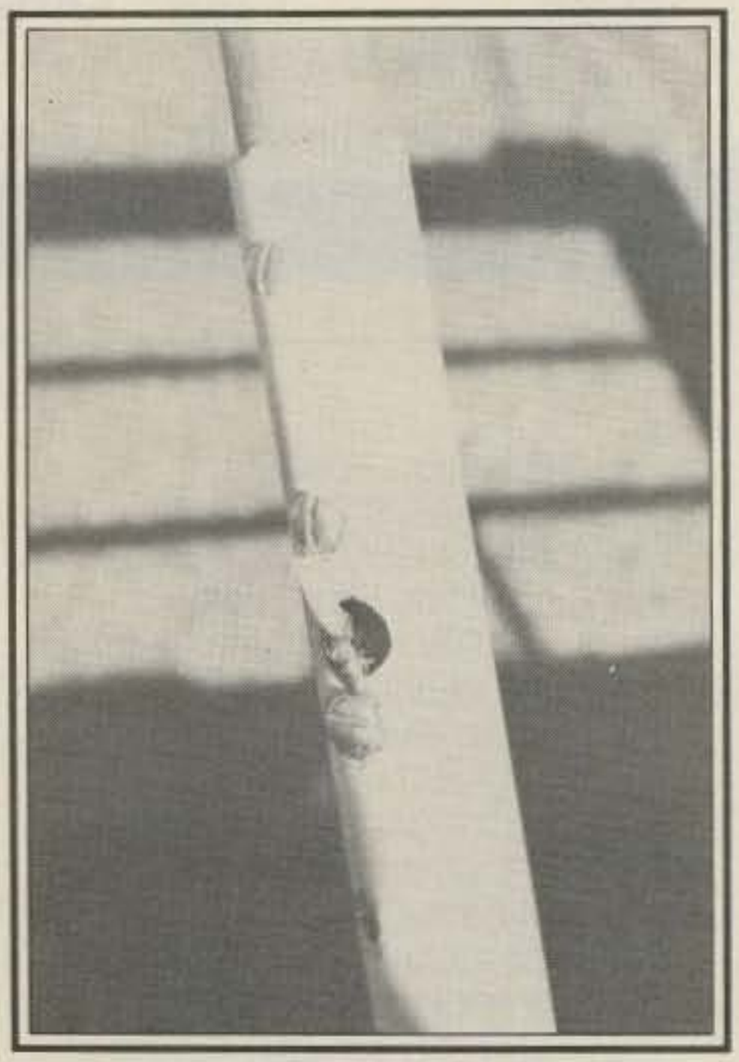
This beam was constructed from aluminum tubing, ½ inch OD, 60 inches long for the boom, and the elements were constructed from ⅜ inch OD tubing. I could have used aluminum clothesline wire for the elements if I had any, but such material appears to be a scarce item in Silver City. Another material that is cheap, but would make a fine antenna, is electrician's thin-wall tubing. This only costs about $2.50 for a 10 foot length from discount hardware stores, and two lengths provide plenty of material for the boom



The test dipole made from thin-wall tubing with a PVC center support.

and elements. The antenna would be slightly heavier using thin-wall, but not so much that it would be a concern.

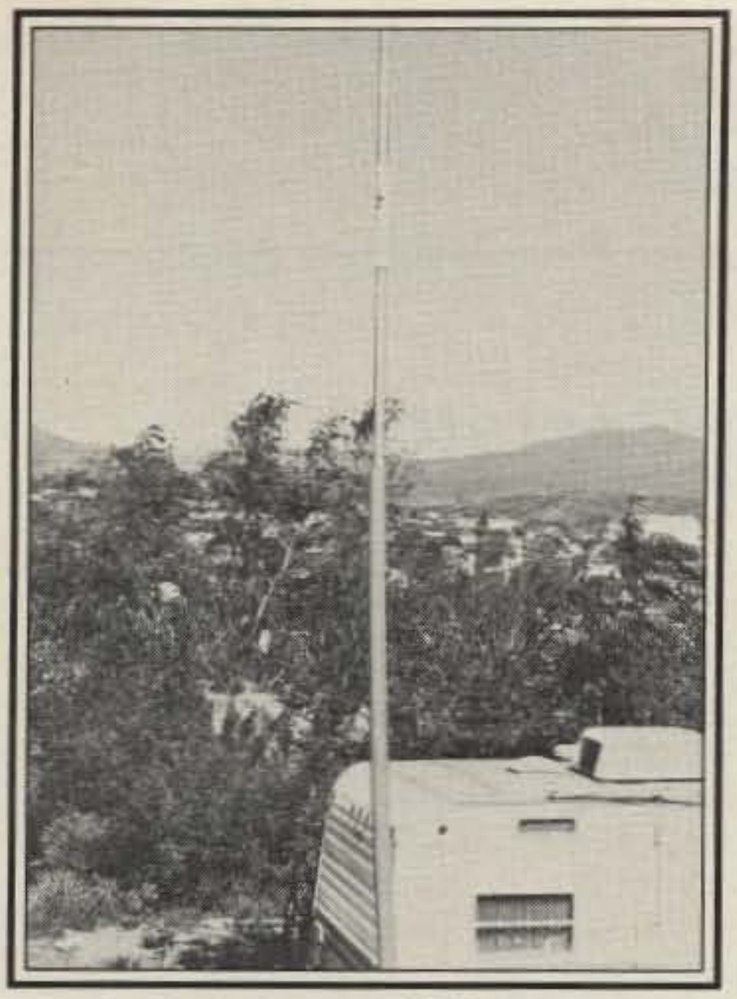
As I said at the beginning, digging out the necessary information to build a v.h.f. Yagi can be a real chore because there is a wide variation in the numbers when it comes to element spacing. And, for that matter, there is considerable confusion over element lengths. One basic formula for a resonant dipole is 5600 divided by the frequency in MHz, and the answer is in inches. A reflector is five percent longer and a director is five percent shorter. As more directors are used, they become progressively shorter—generally ¼ inch shorter for each director. Element spacing is usually on the order of 0.15 to 0.2 wavelength. From my own experience, you can spend hours tuning and adjusting element spacing and length and have little to show for the work. You may gain or lose a half dB, but to me it just isn't worth the effort. You can use the figures just given and be reasonably sure that a good beam will be the result. However, even though I have made all these tests many times in the past, I still wanted to check this beam to make sure it had respectable gain. To that end I made a test dipole.



Close-up of the center feedpoint for the dipole. In use, the coax would be taped for weatherproofing.

The Test Dipole or a Simple RV and Portable Antenna

I could have made a simple ground-plane antenna to test the beam, but I decided to fool around with a half-wave vertical dipole. I have never used a vertical half-wave, so I was interested in what would happen. I made the dipole using ½ inch electrician's conduit. When I used the formula length (5600/F[MHz]) for 146 MHz, I found the dipole tested too long. (I used an s.w.r. curve to determine resonance.) The dipole had two pieces of tubing 19 inches long to provide 38 inches of dipole. However, as you can see from the photos, I used a piece of PVC tubing to hold the two sections together. There was a gap of ½ inch between the sections, making an overall length of 38½ inches, and I assumed this was my problem. I cut ½ inch of tubing from each end, and the dipole then appeared to resonate around 146 MHz.



A cheap but good RV antenna.

At first, I fed the dipole with the coax coming away at a strict 90-degree angle to avoid any feedline coupling that could upset the s.w.r. tests. Incidentally, the match was about 1.4 to 1 at resonance, which is more or less what it is supposed to be. However, the dipole had to be mounted vertically, same as the beam, which meant it wasn't practical to run the feedline at right angles to the antenna. I then fed the coax up through one end of the dipole and brought the connections out at the center through a hole in the PVC tubing. I expected the s.w.r. to go bananas, but it stayed about the same as the 90-degree feed. I did use a 10 foot length of PVC to support the vertical dipole, bringing the feedline down through the antenna and PVC pipe.

Of course, in true amateur spirit, I had to see how many repeaters I could turn on with the simple dipole. Frankly, I was surprised at how well the half-wave performed. In fact, I told myself here was a neat antenna that only cost a couple of dollars, that could be used on an RV (note the photo), and would be handy for many applications. So, if you don't want to bother with a beam, this is a good idea for a portable antenna. The PVC tubing is held in place by a few metal self-tapping screws. Just be sure the screws aren't too long because they could short out the coax feedline.

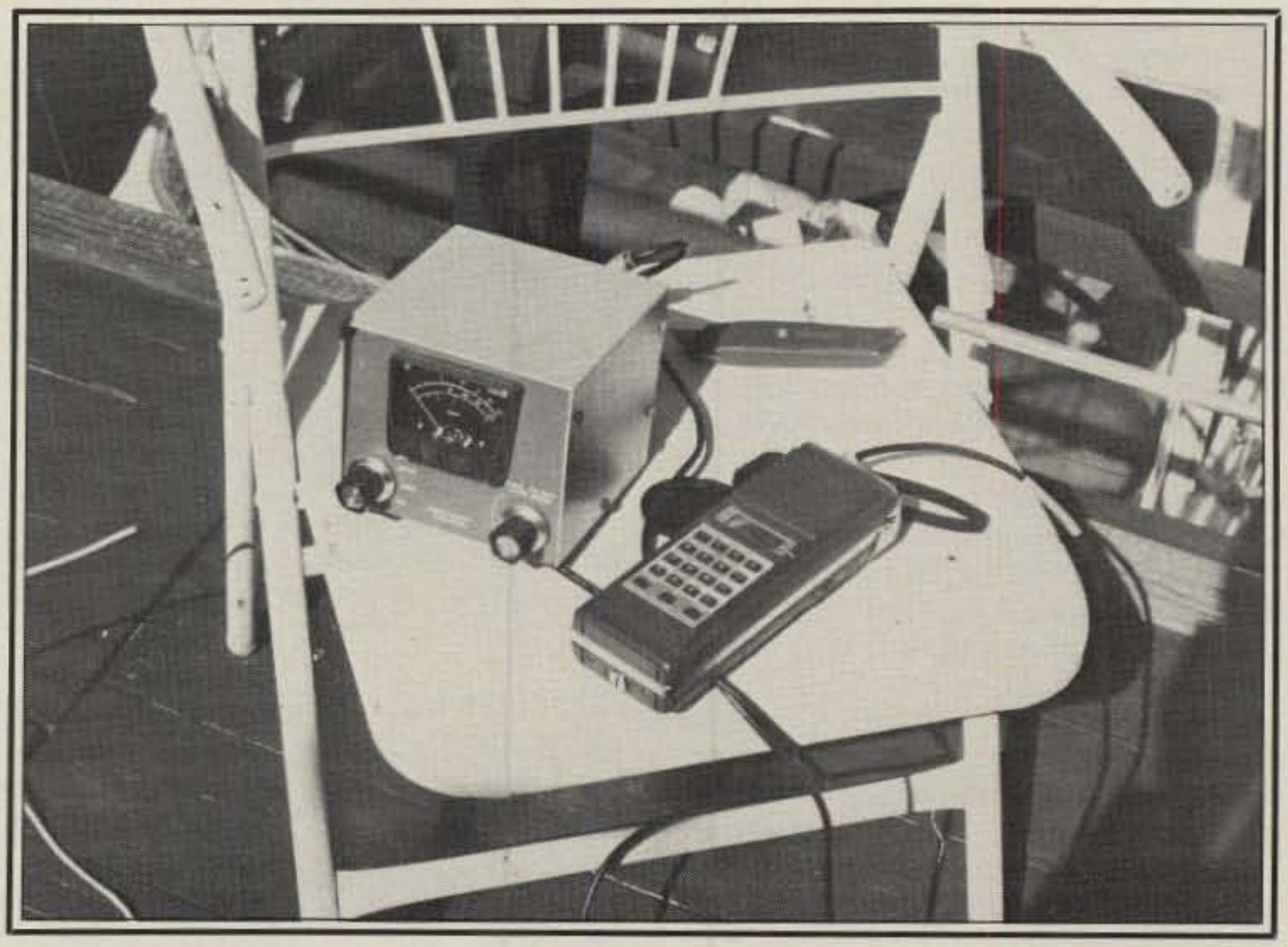
Matching The Feedline to the Beam

Getting back to the beam, I tried several different feed methods looking for a simple one. However, I finally decided on a gamma match simply because there are never any doubts about the gamma match. Once installed and adjusted, it is almost impossible to beat. I have never really liked "hairpin" matches or matching bars, etc., where the match is not adjustable. Don't misunderstand; these matching devices are great for commercial beams, but if you are building your own beam, the gamma is hard to beat for a perfect match.

Any small variable capacitor can be used in the gamma. The value can be anything from 25 to 50 pF maximum. It only took about 10 pF to achieve a perfect match, so I would guess anything covering that range should work. Small receiving-type variables will easily handle up to 100 watts. The capacitor should be protected from the weather, so it should be housed in some type of weatherproof box. I used a 35mm photo cartridge case with the variable arm mounted through the case as shown in the photograph. The case was secured to the boom with a self-tapping sheet-metal screw. The gamma rod is a piece of No. 12 copper wire (although No. 14 would be okay). It is 5½ inches long not counting the amount of wire used under the capacitor nut and the screw at the element. The wire goes out 4½ inches from the capacitor and then 1 inch down to the element. As you can see from the photos, I drilled holes for self-tapping screw holes every half inch or so, giving me some room to find the correct matching point for the gamma. The handbooks gave 5 inches as the matching point, but I found that in my case I had to go to 6 inches out to get the match. I should also point out that the match was a perfect 1 to 1 when the gamma capacitor was adjusted.

Conclusions

That's about it. The beam is simple to make, and a wide variety of materials could be used. I said that the dipole would make a good portable antenna. However, there is no reason why the beam also couldn't become a good portable antenna. One only has to release the clamps and the one screw holding the gamma rod to make a neat package. Also, to be even lighter, only three elements would be needed for a 7 dB gain beam, driven, reflector and director. Good luck! CQ



My test equipment is not very fancy, just a good s.w.r. bridge and transceiver.

dateline... Washington, D.C.

a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

Goldwater Honors Amateur Radio Operators

Speaking of the "traditions" that have made this nation great, Senator Barry Goldwater read the following commendation of amateur radio operators into the Congressional Record following the military actions in Grenada:

"Mr. President, with all due respect to our fighting forces and what they have been through in the last several weeks, there are . . . traditions which perhaps have been less noticed—especially in the case of Grenada—that I do not think should go unnoticed.

"And it is (the) tradition of service from the amateur radio fraternity that I speak of today. During the first 2 or 3 days during which our forces were conducting operations in Grenada, the island was virtually cut off from the outside world communications-wise. . . . However, on this particular occasion, probably the most up to date accounts of what was happening in and around St. George's Medical College area were given by ham radio operators. Mark Barettella, KA2ORK/J3, and Don Atkinson, J37AH, maintained communications throughout a very critical situation and were, at times, the only sources of information coming from Grenada. Ham radio operators here in the United States monitored frequencies used by Mark and Don and stayed in contact with them night and day. Ham radio operators provided a great service, not only to their government, but also to the people of the United States. Like hams that have gone before them, they have a tradition of service in times of local and national emergencies.

"I think it is fitting today that we should honor these amateurs, and the amateur radio community in general, for also being a part of the finest traditions of this country. They are a national resource that we should be proud of and should appreciate.

"Mr. President, in addition, I would like to enter into the record the call signs of at least a few amateurs that we know of at this point: N2DRA, K3RZR, W3DOS, KA3DTE, KC2PK, WD4CNR, KØIND, VE3AJN, K4MM, WA4ZHC, W4PP, W1ISO, WA4CCK, WD4AHE, WB4CKO, WR4S, WB4FTK, and N4GFQ. *[To this list we would also add W4PPC.—ed.]*

"I am sure that there are many others who are known to us and who are not included in this list that should receive our thanks."

Amateur Community Honors Senator Barry Goldwater

In recognition of his many contributions to the amateur service, the League created an ARRL Scholarship Endowment Fund to honor the Senator. And to officially launch the Fund, a ceremony was held in the Senator's office on Capitol Hill in early November 1983. Attending the ceremony for the FCC were Chairman Mark Fowler and Robert Foosaner, Chief, Private Radio Bureau, while the League, according to Chris Imlay, N3AKD, was represented by the late President Vic Clark, W4KFC, Hugh Turnbull, W3ABC, Perry Williams, W1UED, Chuck Dorian, W3JPT, ARRL Foundation President Robert York Chapman, W1QV, and Imlay, himself. Also attending were Director Ethel Smith, K4LMB, and QCWA President Stuart Meyer, W2GHK. Following remarks by President Clark, Senator Goldwater addressed the attendees and the entire amateur community via K7UGA on 20 meter s.s.b.

CQ Interviews Joyce S. Davila, Chief, FCC's Public Service Division

Elsewhere in this issue readers will find an exclusive interview with Joyce S. Davila, Chief, Public Service Division, Field Operations Bureau. The Division manages and coordinates the FOB's public service program, including its public information activities, the licensing of radio operators, and the management of antenna survey matters. For an inside look at one of the lesser known activities within the Commission—but one, nevertheless, that is directly responsible for dealing with the public—don't miss this month's exclusive *CQ* interview with Joyce S. Davila.

FCC Warns That Amateur Frequencies May Not Be Used For Active News Gathering

During the military action in Grenada, radio and television correspondents sought to use amateur communications for active news gathering. Among those seeking access to our bands (via amateur operators) was Dan Rather, anchorman of the "CBS Evening News."

Responding to this situation, the Federal Communications Commission sent an advisory notice to both the amateur and broadcast communities, warning against the use of amateur frequencies for "business communications on behalf of any party." This part of the amateur rules has been on the books for some time and was further clarified by the Commission last July.

It should be noted that at no time did the Commission interfere with reporters who monitored and recorded amateur communications. However, Ray Kowalski, Chief of the Special Services Division, Private Radio Bureau, FCC, made it clear that interviews conducted over an amateur station—either directly by a reporter or indirectly through the amateur operator—were prohibited under the rules.

ARRL-CATV Discussions Continue

Discussions between the League and representatives from the National Cable Television Association continue in an attempt to deal with cable television interference (CATVI). The problem centers on the operation of CATV systems in bands allocated to the Amateur service. In particular, leaky CATV systems have been subjected to interference from—and have interfered with—amateur operations in the 144 and 220 MHz bands (other CATV cable assignments fall in the 420 MHz band).

According to *The ARRL Letter*, a newsletter for League members only, there is some difference between the ARRL and the NCTA as to the definition of the problem. The Association believes that some "interaction" between cable systems and amateur operations should be tolerated "to some degree." NCTA also stated "that radio amateurs were unreasonable in their expectations for a clean amateur spectrum, and that hams can no longer expect to enjoy the freedom from RFI they once did years ago."

We will repeat what we said earlier on this matter: cable television systems have no radio-frequency allocations. They are permitted to operate on the proviso that they neither radiate—nor intercept—signals from stations authorized to use the frequency bands in question. If CATV operators cannot guarantee the

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signal integrity of their systems on certain frequencies, they're only alternative is to cease operation there. Put another way, if CATV operators experience interference from or interfere with amateur operations in the 144, 220, or 420 MHz bands, CATV channels E and K, among others, should be vacated.

Goldwater Introduces Measure To Permit VEC To Recover Out-of-Pocket Expenses

Senator Barry Goldwater has introduced S.2045, a bill in the 98th Congress, that would amend the Communications Act of 1934 in the matter of volunteer administered amateur radio examinations. Specifically, the measure, if enacted and signed into law, would add the following provisions to the Act:

"With respect to the acceptance of voluntary uncompensated services for the preparation and processing of examinations for amateur station operator licenses pursuant to subparagraphs (A) and (B) of this paragraph, individuals and organizations which provide or coordinate such authorized volunteer services may nonetheless recover from examinees reimbursement for out-of-pocket costs. The total amount of allowable cost reimbursement per examinee shall not exceed four dollars, adjusted annually every January first, for changes in the Department of Labor Consumer Price Index. Such individuals and organizations shall maintain records of out-of-pocket expenditures and shall certify annually to the Commission that all costs for which reimbursement was obtained were necessarily and prudently incurred."

Passage of this bill would pave the way for the ARRL to participate in the Volunteer Examination Program (VEP) as a Volunteer Examination Coordinator (VEC). Regardless, until the bill becomes law, the League is supporting the Commission as the latter attempts to initiate the VEP.

Goldwater Suggests That Printing and Distribution of Amateur Examinations Be Shifted To Private Marketplace

Following the Commission's recent action on Docket PR 83-27 (the Volunteer Examination Program), Senator Barry Goldwater wrote FCC Chairman Mark Fowler to suggest that "the printing and distribution of the higher class examinations and the associated costs can be shifted to the private marketplace with beneficial results."

Noting that two publishers have already announced competing Novice examination packages—both of which include a sealed package containing an examination in the Commission-approved format, an answer sheet, and an FCC application form—Sen. Goldwater encouraged Mr. Fowler to consider using the same method to address the exam-preparation problem for Technician, General, Advanced, and Extra Class exams. In this way, said the Senator, the cost of the exam material is determined in the competitive publishing marketplace with no governmental interference.

In concluding his comments, Sen. Goldwater noted that the adoption of such procedures by the FCC "would increase participation in the volunteer examination system and ultimately would result in a more successful program."

CHARS Petitions Commission for Reconsideration on Volunteer Examination Program

Late in 1983, the Capitol Hill Amateur Radio Society (CHARS) petitioned the Commission for reconsideration of certain amendments to its rules which had been adopted on 22 September 1983. Specifically, in the matter of the "Use of Volunteers to Prepare and Administer Operator Examinations in the Amateur Radio Service," CHARS suggested deleting section 97.27(d) of the Commission's regulations; relettering subsection (e) and (d); and amending subsection (c) to read:

"(c) Elements 2, 3, 4(a) and 4(b) may be designed by any person from pt bulletin 1035 (A), (B), (C), or (D), as appropriate (latest date of issue). Such examinations shall be designed in such manner as to ensure that no applicant could have foreknowledge of the exact questions and answer choices on the examination (except as presented in the appropriate PR Bulletin itself). Commercial preparers of such examinations shall market no fewer than 30 different question combinations, except for element 2 there shall be no fewer than 15 different question combinations simultaneously on the market. All preparers of examinations within 30 days of release of any revised PR Bulletin 1035 shall make changes to their examinations to reflect changes in the bulletin, but examinations already printed may remain on the market until supply has been exhausted."

This petition provides the Commission with the vehicle to expeditiously adopt the "sense" of the suggestions outlined by Senator Barry Goldwater in his letter to Commission Chairman Mark Fowler (see above). David R. Siddall, K3ZJ, President, CHARS, submitted the petition on behalf of the Society's membership.

Coordinated Repeaters Win Over Strays

In an interview with Steve Mendelsohn, WA2DHF (published in *Westlink Report*), amplified in comments to your Washington Editor, Ray Kowalski, Chief, Special Services Division, Private Radio Bureau, FCC, stated that for "the greater good," the Commission "encourages coordination—that is, coordination" in the use of 2 meter repeaters. And while the Commission does not want to appear to "bless" the operations of any given machine, Kowalski felt that having an overall coordination plan was simply "good amateur practice" and appeared to be a practical solution to a complicated problem.

Asked what action the Commission would take in the event that an uncoordinated repeater causes interference to the operation of a coordinated machine, Kowalski stated that he would issue sanctions to the operators of the stray. "It's in the public's interest for amateurs to operate effective two-meter repeater links," he said, "and amateurs should honor the fact that a repeater has the right to exist on the frequencies to which they have been coordinated."

"Coordination is the best way we've seen to ensure the orderly and structured use of the band," said Kowalski, "and we'll continue to go this route unless someone can suggest a better method." In this regard, he asked for a dialogue on the subject with the amateur community, and encouraged amateurs to contact him with their thoughts and ideas. Kowalski also requested that amateurs contact him with their thoughts on net operations in this country, an area of increasing concern to the Commission. To comment, write to the Federal Communications Commission, Attn: Ray Kowalski, Chief, Special Services Division, Private Radio Bureau, 1919 M St. NW, Washington, DC 20554.

State Supreme Court Judge Awards Amateurs Damages in Case Involving Malicious Interference

A New York State Supreme Court judge ruled in favor of three repeater groups in a case against a non-amateur accused of jamming their repeaters and of harrassing operators using the machines. In their case against Chris Busacco of Staten Island, legal counsel for the repeater groups presented evidence linking the jamming transmissions to Busacco's home; in addition, tape recordings alleged as being of Busacco's voice were entered as evidence. Busacco denied all charges.

In his ruling, Justice Hurwitz noted that while the FCC is responsible for the licensing and operation of stations, nothing in the Commission's rules provides a remedy for those who suffer at the hands of others. Thus, he awarded the plaintiffs $200 in damages.

According to both Ray Kowalski, PRB, FCC, and Attorney Preston Douglas, WA2IFZ, who represented the plaintiffs (and was quoted in *Westlink Report*), the New York State Supreme Court findings are significant in that this was probably the first action involving malicious interference to amateur operations in which a state court has assumed jurisdiction.

Radio Club of America Announces Award Winners

Among those members of the Radio Club of America (RCA) honored at the Club's 1983 Annual Banquet were several amateurs. Below is a list of these amateurs and the awards bestowed on them.

The Sarnoff Citation—For Significant Contributions to the Advancement of Electronic Communications, 1983 Winner: William J. Halligan, W9AC/W4AK, Founder of Hallicrafters.

The Allen B. Dumont Citation—For Important Electronic Contributions to the Science of Television, 1983 Winner: Fred M. Link, W2ALU, former employee at DuMont Labs and the "Father of Two-Way Mobile Radio."

The Ralph Batcher Memorial Award—For assisting substantially in the History of Radio and Electronic Communications, 1983 Winner: Joseph R. Pavek, WØOEP, Founder of the Museum of Wonderful Wireless.

The Henri Busignies Memorial Award—For the Advancement of Electronics for the Benefit of Mankind, 1983 Winner: David Talley, W2PF, An Authority on Telephone Switching Systems.

The President's Award—For unselfish Dedication to the Support of the Radio Club of America, 1983 Winner: Stuart F. Meyer, W2GHK (/forever), Manager, Government Relations, E.F. Johnson.

Congratulations to all on their awards and their many accomplishments!

R.F.I. Complaints to the Commission Remain at High Levels

According to Jeffrey Young, Investigations and Inspections Branch, Enforcement Division, FOB, FCC, the number of r.f.i. complaints made to the Commission in the last quarter of FY83 (July, August, September) totaled 16,445. This is almost the same number of complaints in the same period last year (16,805), and indicates that r.f.i. problems continue unabated.

Of the 16,445 complaints received, 12,669 involved a television receiver as the victim device. CBers are alleged to have been responsible for 8,786 of the TVI cases reported, while amateurs were cited in 621 cases. In all, complaints involving CBers totaled 9,857, while amateurs were cited 880 times.

As was the case last year, a large number of complaints were filed by amateurs who complained of amateur-to-amateur interference. For the quarter, 228 such complaints were recorded. This is down from the 342 complaints filed last year (4th quarter), but is still high enough to cause the Commission some concern.

For all of FY83, a total of 67,803 complaints were received by the FCC, down from the 75,641 complaints received in FY82. As we said early in 1982, while commenting on the downtrend in r.f.i. complaints during the 1981-82 time period, it is not known whether the lower numbers represent an actual reduction in the number of r.f.i. cases reported or only an "apparent" reduction brought about by the closing of FOB field offices. Regardless, the number of cases reported certainly exceeds the number of actual r.f.i. cases experienced, and with the numbers still running nearly 70,000 per year, there still appears a need for the Commission to set susceptibility standards for electronic home-entertainment equipment.

Touch-Control Lamps and Light-Operated Switches Continue To Cause R.F.I.

Letters reaching your Washington Editor continue to paint a bleak picture regarding radio-frequency interference (r.f.i.) produced by electronic devices used in the home. High on the list of offending devices are the touch-controlled lamps sold by various retailers and department stores around the country. But now, another device has been cited in complaints to the ARRL's RFI Task Group: light-controlled switches. In one such complaint, involving controls manufactured by Thyrocon Controls Corporation of Telford, PA, an amateur cited interference on all bands from 160 to 20 meters (no interference was observed on the 15 meter band).

In their letter response to the amateur, Andrew D. Derkosh, Product Sales Administrator for Thyrocon, stated that "all controls will create some level of RFI . . . the resulting noise does not affect FM radios or TV, but it does affect shortwave and AM radios. This is especially true if it is on the same branch circuit or in close proximity to an AM radio."

The above notwithstanding, the FCC Rules are specific in their treatment of devices that radiate incidental radio frequency energy. According to Para. 15.25, "Operating Requirements: Incidental Radiation Device," the following applies:

"An incidental radiation device shall be operated so that the radio frequency energy that is emitted does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take

steps to eliminate the harmful interferences."

What steps? Ask the manufacturer to fix the problem or to pay to have the problem corrected. If this approach fails, contact your District FCC Field Office, and provide them with full details of the case (be sure to keep copies of all correspondence).

FCC Closes Down Puget Sound Fishermen

For months, amateurs in western Washington complained to the FCC that commercial fishermen in Puget Sound were using amateur equipment and the 2 meter band for their communications. Moving to stop the illegal operation, Jack W. Bazhaw, the Engineer in Charge of the District in which the violations were taking place, "hit" the fishermen with citations for unlicensed operation, and with both criminal and civil sanctions. In exchange for the government's agreeing to drop all charges, the fishermen forfeited all of their 2 meter radio equipment and agreed to desist in using the amateur bands for their communications.

FCC Issues Bulletin on Examination Schedule

The Commission has announced that during 1984, radio operation examinations may be taken in cities where the FCC maintains a field office as well as in certain specified cities which the Commission's engineers will visit on a scheduled basis. In all cases, the examinations will be given *by appointment only*.

At its field offices, examinations will be held February 6–10, May 7–11, August 6–19, and November 5–9. The cut-off date for applications in all cases is the 15th day of the preceding month.

If you will be taking an exam at a location which is to be visited by the FCC, an appointment will also be required. In addition, the application must be mailed to the appropriate field office at least 30 days before the beginning of the month in which the examination is to be given. The FCC field office will notify you as to the time and place of your examination.

To obtain more information on the examination program, the Commission's field offices, and on the locations of other examination sites, refer to Bulletin FO-28 (Field Operations Bureau, November 1983).

Charles Dorian, W3JPT, Accepts Washington Post with ARRL

Captain Charles Dorian, W3JPT, has accepted a position with the ARRL to assist the League's Washington Coordinator, Perry Williams, W1UED, in maintaining liaison with various federal agencies and the Congress. Dorian, who retired from COMSAT in August of 1983, is no stranger to the communications/electronics community, and is well known—and respected—within the Federal City for his work at COMSAT, in the CCIR, and at international conferences sponsored by the ITU.

Dorian's status with the League will be that of a consultant, and he will normally work only a few days each month. However, because he lives in Washington, Dorian will be able to respond to assignments on a moment's notice.

The staff of *CQ* joins your Washington Editor in extending congratulations to Chuck and in wishing him every success in his new position.

MINIMUF for IBM PC Published in QEX

One of the more popular pastimes these days is that of forecasting openings on the high-frequency bands. And a computer program called MINIMUF, which was written by Robert Rose, K6GKU, and published in the December 1982 issue of *QST* is one of the more popular ways to make these forecasts. Until now, however, those amateurs who have IBM PCs had to convert the code published by Rose so that the program could be run on their personal computers. Not any more, though, for John Anderson, WD4MUO, has now published a version of MINIMUF written especially for the IBM PC. If this interests you, pick up a copy of *QEX*, the ARRL Experimenters' Exchange, for November 1983. What you'll find is not only a listing of the program for the IBM PC, but a detailed, step-by-step description of the program as well.

Antennas

a monthly feature by
KARL T. THURBER, JR., W8FX

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

More "This and That"

This month, it's more followup on previous antennas columns, as well as some new antenna topics, plus a look at several commercial software offerings.

In last month's *CQ* we provided some additional information on the WB3GXV tower photos presented in a previous issue. We took a look at a modified version of the Windom antenna, and we also illustrated a simple, shirt-pocket "J-pole" 2 meter antenna, highlighted some new antenna products, and looked at some on-the-air ham computer users group activities.

This month in the Antennas column, you'll find another potpourri of antenna topics. We'll take another and closer look at reflection mechanics concepts, and then examine some new amateur radio computer software. We'll also take a second glance at the double bazooka antenna which we highlighted in a previous column. Let's look at reflections first.

Reflective Recollections

Old-timers have passed down the exhortation that there are three subjects you shouldn't discuss in connection with ham radio: religion, politics, and sex. I might add a fourth: that of s.w.r. (standing wave ratio), unless you are on very firm ground and are prepared to back up what you say very carefully!

A great deal has been written about s.w.r. and "reflection mechanics," in the broader sense. A lot of information about s.w.r. is, in fact, misinformation, and like rumors, is hard to refute—only doubly so when in print. One writer's errors, misconceptions, and fuzzy statements are picked up by others and tend to become institutionalized. Your columnist has been less than lucid in several previous columns in which several s.w.r.-related topics were discussed. Unintentionally, we have probably added to the erroneous conceptions about s.w.r. by what we said in two recent columns, which appeared in the July and September 1983 issues of *CQ*. So, let's open the column this month with a fresh look at s.w.r. and the broader subject of reflection mechanics.

The basic concept of s.w.r. has been covered many times in magazine articles and in standard reference books. We won't rehash s.w.r. basics needlessly, but a few observations are in order.

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In the view of many amateurs, the s.w.r. bridge only tells "half the story," and one is reduced to working with a sort of dimensionless figure when interpreting s.w.r. The antenna noise bridge gives resistance and reactance readings on a wide variety of antennas. It can also be used to adjust series and parallel tuned circuits, much in the fashion of a dip meter. (Photo courtesy Palomar Engineers)

S.w.r. is the ratio of the maximum to minimum r.f. voltages on a transmission line. A 1:1 s.w.r. is said to be ideal; in connection with antennas and transmission lines, the s.w.r. is established by the feedpoint impedance of the antenna and the impedance of the feedline being used. The impedance (total opposition to alternating current or r.f. by an electrical circuit, expressed on ohms) of a typical half-wave dipole is about 70 ohms. If the antenna is fed with a transmission line having approximately that characteristic impedance, the antenna and line impedances will match. The s.w.r. would be 1:1, at least at the resonant frequency of the antenna. However, at frequencies considerably removed from the resonant frequency, say at band edges, reactance is introduced into the feedpoint impedance. Although the reactance itself does not consume power, the reactance in the antenna system inhibits power transfer from the transmitter to the feedline. Depending on the reactance and degree of mismatch, reflections come into play. The s.w.r. on the feedline rises above the "ideal" 1:1 ratio, and feedline losses increase somewhat.

So far, all this isn't too hard to see. But, the rub comes in when one asks the question, "is the 'reflected power' real, and if so, where does it go when the s.w.r. is other than 1 to 1?" I have found this question not easily answered, and the source of much confusion, including my own. The answer is highly mathematical and not suitable for detailed presentation in this column. Nevertheless, this question has been closely examined in print by several writers, but most succinctly by antenna expert and ARRL Technical Adviser (TA) Walter Maxwell, W2DU, writing in an early 1970s series of articles in *QST* (see bibliography).

Studying some of W2DU's and others' observations and conclusions regarding reflection mechanics, it's useful to summarize them here. Take a look at the following "laundry list" of reflection mechanics and s.w.r. points:

1. Reflected power is real, not imaginary or illusory in nature. However:

2. Reflected power does not represent power actually lost or dissipated, since the reflected power is totally reradiated by the antenna.

3. On a lossless line, forward power less reflected power is equal to both the power absorbed by the antenna or load and the source (transmitter) power.

4. Power bridges and meters will indicate forward power and, when switched, reflected power. As indicated above, the actual or "real" power output will be the difference between the 2 meter readings.

5. Reflected power and s.w.r. are not, by themselves, important factors in determining how efficiently power is transferred to the antenna. Low s.w.r. doesn't necessarily equate with a good antenna system, nor high s.w.r. with a poor antenna system.

6. Transmitter loading problems on "high s.w.r" lines are caused not by the s.w.r. itself, but by the abnormal line input impedance into which the transmitter looks as a result of the s.w.r. condition.

7. Impedance matching at the transmitter (using an antenna coupler/transmatch) has considerable merit, following from (6) above, in order to normalize the line impedance at the transmitter.

From the foregoing, it appears that we are "down" on s.w.r. and reflected power (no pun intended!). To an extent, this is true. However, the concept of s.w.r. and its intelligent application in the hamshack has value. For example, it is convenient to measure s.w.r. between a transmitter and the antenna coupler for easy and rapid tuneup, and continuous monitoring of s.w.r. in an antenna system will often give quick warning of problems with the antenna or feedline. More importantly, s.w.r. is of little consequence when low-loss feeders, such as open-wire line, are used. S.w.r. does come into play when solid dielectric cable is used as the transmission line.

With respect to solid dielectric cable, the line losses for coax are normally ex-

```
100 REM *** CBM-64 REFLECTED POWER
105 REM *** BY LEW MCCOY W1ICP
110 REM *** CQ SEPT 1983 PAGE 56
115 REM *** MODIFIED FOR MODEL 1526
120 REM *** PRINTER BY GARY HUFF K9AUB
140 POKE53280,6:POKE53281,6:PRINT"■":REM ** SCREEN BLUE WITH WHITE LETTERS **
150 PRINT "□": REM ** CLEAR SCREEN **
160 PRINT
170 PRINT "■  *** DETERMINING REFLECTED POWER ***  ■"
180 PRINT:PRINT:PRINT
500 INPUT "ENTER FORWARD POWER (WATTS)";F
550 PRINT
600 INPUT "ENTER MAXIMUM VSWR";VM
650 PRINT
700 INPUT "ENTER VSWR STEP SIZE";S
900 REM *** PRINT ROUTINE ***
910 OPEN1,4
915 OPEN2,4,1
920 OPEN3,4,2
925 OPEN4,4,4
930 PRINT#4  :  REM *** ENABLE ERROR DIAGNOSIS ***
935 F$="   999.9       999.999999                9999.99999"
940 PRINT#3,F$
950 PRINT#1
960 PRINT#1,SPC(13)"< FORWARD POWER IS";F;"WATTS >"
970 PRINT#1
980 PRINT#1,"     VSWR";SPC(05);"REFLECTED PWR (W)";SPC(06);"TRUE RAD PWR (W)"
985 PRINT#1
1000 REM *** CALCULATION ***
1010 FOR V=1 TO VM STEP S
1160 R=F*(((V-1)/(V+1))*((V-1)/(V+1))):T=F-R
1170 PRINT#2,V;R;T
1180 NEXT
1200 PRINT:PRINT:PRINT:PRINT
1210 PRINT#1:CLOSE1
1215 END
1220 REM *** PRINTER LISTING ROUTINE ***
5000 CLOSE4:OPEN1,4:CMD1:LIST
5010 PRINT#1:CLOSE1

READY.
```

Fig. 1–CBM-64 reflected power program. In the September 1983 issue, we printed a computer program for determining reflected power and "true radiated power." This program was adapted from a previous CQ article by Lew McCoy, W1ICP, and was intended to run on a Commodore 64 computer and Commodore 1525 printer. Reader Gary Huff, K9AUB, found that the program will not print correctly on the new Commodore 1526 printer. Gary modified the printer routine, and suggested that we publish the revised program in a future issue. This listing is as submitted by K9AUB.

The antenna coupler or transmatch provides the necessary impedance matching action at the input end of the transmission line. Although the transmission line's s.w.r. cannot actually be reduced by the transmatch, for most h.f. operations the advantages of input-end matching outweigh the advantages of antenna-end line matching. These generally compensate for increased line loss caused by the existence of a high s.w.r. condition. (Photo courtesy MFJ Enterprises)

pressed in terms of attenuation in dB per 100 feet at a given frequency. At 30 MHz, for example, these losses run from about 2.4 dB/100 feet for RG58/U, down to about 1.1 dB/100 feet for RG-213/U, and as low as 0.23 dB/100 feet for ⅞ inch hardline. At v.h.f. frequencies these figures grow considerably, hence the trend to hardline for long runs at v.h.f. and higher frequencies.

However, additional losses at all frequencies are created when there is an impedance mismatch between the antenna and the transmission line. These additional losses can be significant, even catastrophic, on the v.h.f./u.h.f. bands where cable runs are long, many connectors are used, and poor quality or old coax is used. An s.w.r. of 7:1, for example, can generate an extra 3 dB of line loss in a system where the line loss when properly matched is but 3 dB.

The Antennas column for July 1983, "More Random Headings: Part III," included two charts on page 73 which show: (1) typical line loss for perfectly matched popular transmission lines; and (2) the additional loss generated when there is an impedance mismatch between the antenna and the transmission line. For your convenience, we have reproduced that chart here as fig. 2.

As a practical matter, however, with high quality coax used under 30 MHz, line lengths under a few hundred feet, and an s.w.r. of 4:1 or 5:1 or less, the line attenuation is really low enough to ignore. In fact, it's probably not worthwhile to expend great efforts to minimize s.w.r. further, at least from a power- or signal-loss standpoint.

Notwithstanding all this, keep in mind that most solid state transceivers are designed to operate within a relatively small "window" of antenna terminal impedance. They tend to "get into trouble" when forced to work outside this fairly narrow window. This impedance is generally 50 ohms, and the "window" is usually conveniently stated in terms of maximum line s.w.r. limits, typically 2:1 or 3:1. Attempting to operate outside of these impedance/s.w.r. limits will generally either cause the transmitter to throttle back on power output or even to cut off transmission. Thus, the main significance of an s.w.r. above 1:1 from the transmitter's standpoint is that the impedance as seen by the transmitter will not be the desired 50 ohms. Rather, it will vary, according to the electrical length of the transmission line, through a family of

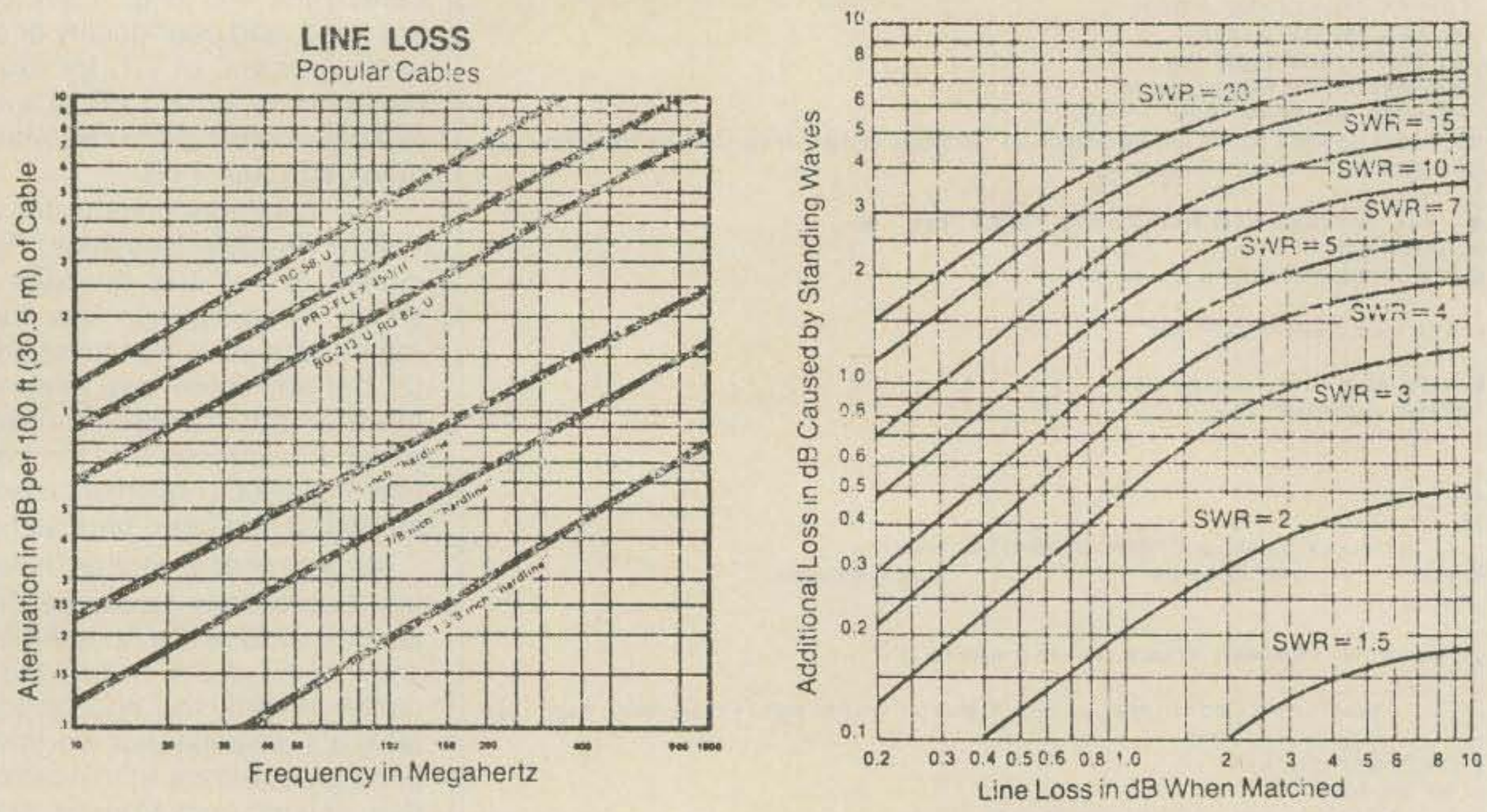
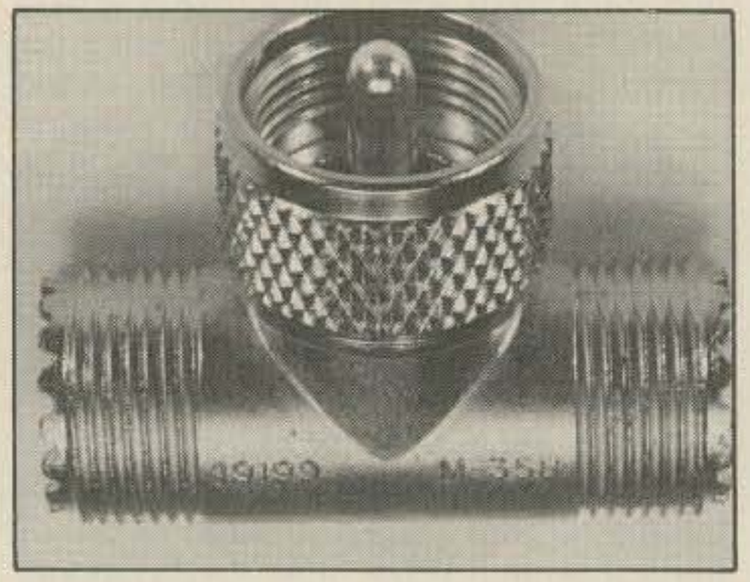


Fig. 2– Transmission line losses. Reprinted from CQ, July 1983, p. 73. (Source: Professional Communications Catalog ASP-1005, 9/82, Antenna Specialists Company.)



The charts in fig. 1 show typical coaxial cable line losses when the transmission line is perfectly matched, as well as additional losses which are occasioned by an impedance mismatch between the antenna and the transmission line. Additional care must be taken in the use of cable splices and connector hardware to avoid additional losses. These can be catastrophic on v.h.f. and u.h.f. frequencies. (Photo courtesy Radio Shack)

Computer applications in the hamshack are many and varied. In this photo, your columnist's XYL is putting the final touches on one of the columns using a word-processing program and viewing the work on a video monitor. (W8FX photo)

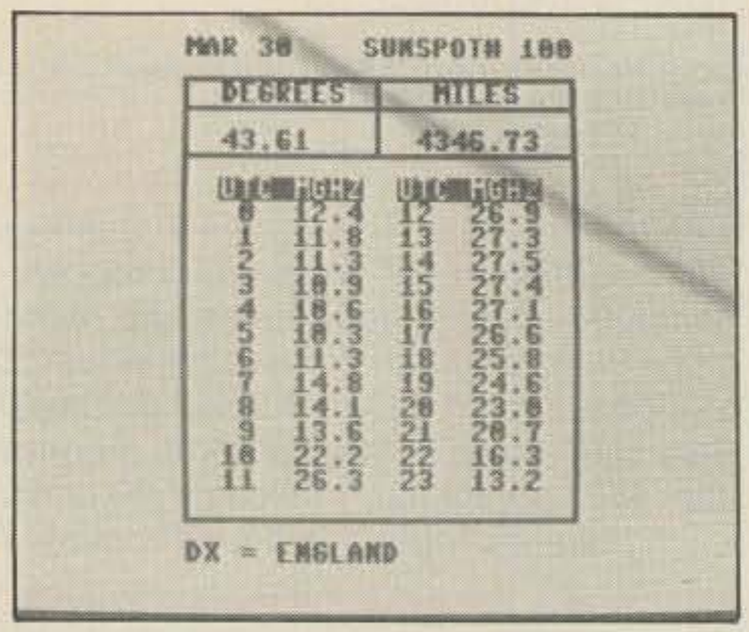
impedances, having various values of capacitive or inductive reactance. The "off" impedance seen by the transmitter may cause the power output/loading problem described above, plus other problems such as output stage nonlinearity, harmonic and spurious emissions, lowpass filter upset, and like maladies. In inadequately protected final amplifier circuits, and under extreme mismatch conditions, the final output stage may even be ruined.

Postscript: A typo crept into the July column, p. 72, where I stated the formula for percentage reflected power. The entire quantity ((SWR – 1) divided by (SWR + 1)) should be squared. Sorry!

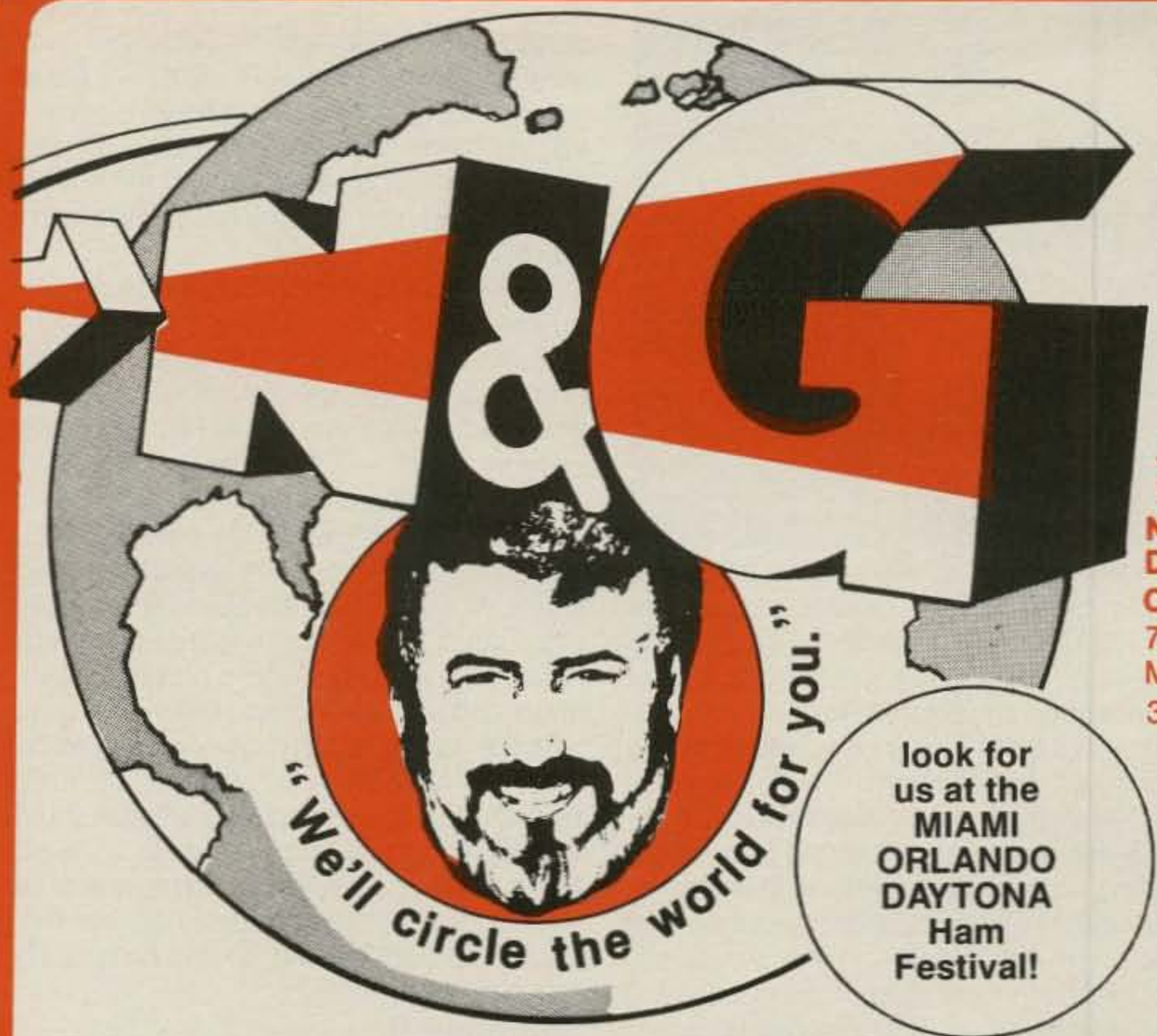
Ham Software Notes

A flyer describing a small collection of amateur radio programs caught my attention recently. Called the "Amateur Radio Program Manual" and offered by Engineering Consulting, P.O. Box 216, Brea, CA 92621, the package consists of a baker's dozen programs of amateur radio and technical interest. The package is written in a non-specific BASIC and so should be adaptable to a variety of personal computers. Included are several antenna-related and technical electronic programs. These include separate programs for Quad and Yagi beam and trap dipole design. Also offered are programs relating to tower wind load, strip lines, filters, pi and T-pads, Ohm's law, op-amp and microwave design, and small coils. Other programs in the package include a disk-based logging program and a global distance calculating routine.

Another program collection that represents a "good deal" for Commodore computer owners is the PET/CBM program collection offered by Robert W. Baker, WB2GFE. The more than 40 programs offered represent a compendium of useful programs—mostly utility, word-processing, small business, practical household programs, and a few games. Also included are two amateur radio programs ("Dupe Check" and "WAS Records"). Mostly taken from his *Kilobaud* and *Microcomputing* magazine columns, the programs are professionally constructed and adequately documented. The collection consists of two disks, the main program disk, plus a separate documentation disk from which the user may produce a hardcopy printout of the programs' instructions. Although designed primarily for the PET computer, most of the programs also run on the popular Commodore 64 computer. Current price at this writing is $25 postpaid from Baker Enterprises, 15 Windsor Drive, Atco, NJ 08004.



Next month in the Antennas column, we expect to take a look at the Ham Data Co. MUF determination program for the Commodore 64 and Vic-20 computers. Such programs are becoming highly useful for DXers. Many such programs also provide beam heading and distance information. (W8FX photo)



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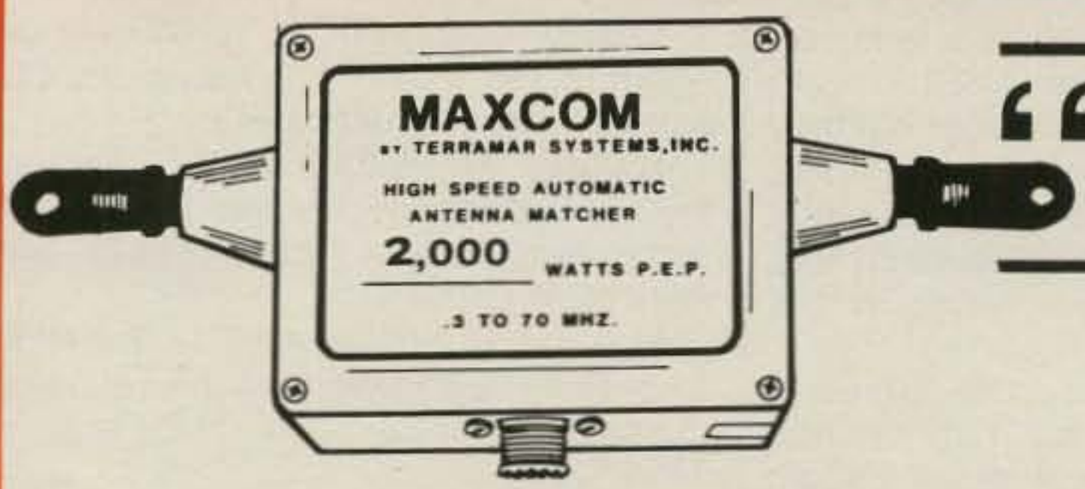

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CIRCLE 51 ON READER SERVICE CARD

Another series of amateur radio programs, written exclusively for the Commodore 64 and Vic-20 personal computers, is offered by Ham Data Co., 3331 Bybrook Lane, Woodbridge, VA 22192. According to Chip Lohman, NN4U, his firm specializes in full-feature logging routines and contest/dupe check logs. In addition to these, a DX maximum usable frequency (MUF) chart program is also available that generates a 24-hour display of the MUF between any two points, as specified by the user, using WWV or W1AW propagation inputs.

An interesting "electronic magazine" for the Vic-20 which has a strong ham flavor is the *vicCOMM Journal*, and it is published by Edwin B. Cox, AA4BB. Many highly technical but carefully documented programs for the Vic are presented in the Journal, which is published bimonthly. Subs are available either in regular magazine, cassette, or disk format from vicCOMM, Box 5491, Duke Station, Durham, NC 27706.

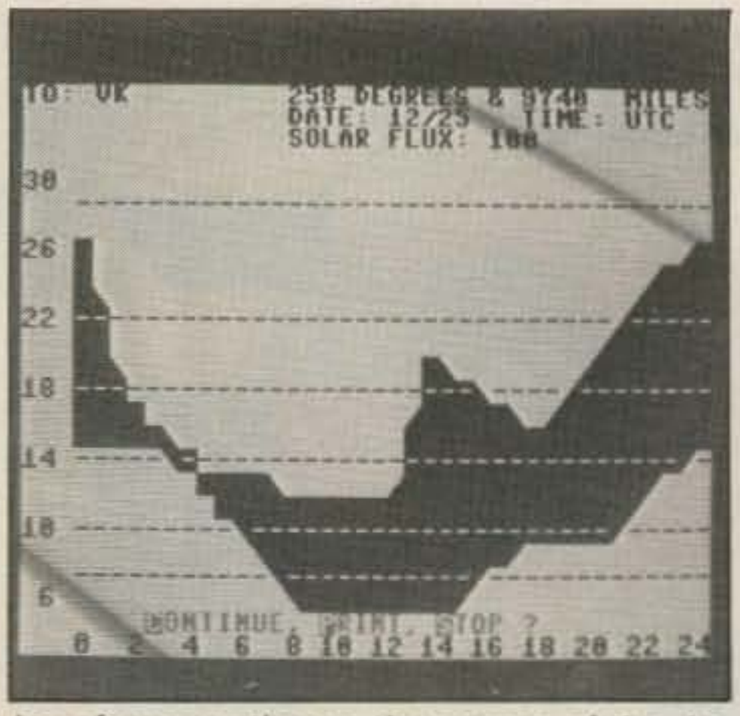
For the TRS-80 gang, Sunderland Software, 39256 Sunderland Drive, Mount Clemens, MI 48044, offers a multipurpose "Ham-Pak"™. Designed for a 48K Model III with two disk drives, the package offers beam heading calculations, comprehensive QSLing, and various mathematical formulas. By the time this appears in print, a modified version of the Ham-Pak should be available for the Commodore 64, less the QSL logging routines. I hope to take a closer look at the Ham Data, vicCOMM, and Sunderland software in an upcoming column.

Incidentally, for readers interested in writing their own antenna design computer programs, Philip S. Rand, W1DBM's article in August 1983 *CQ* should be of some help. His article, in case you missed it, is entitled, appropriately, "Writing Antenna Design Programs for your Personal Computer," and it appears on p. 44.

Double Take on the Double Bazooka

In the Antennas column for last June, we made mention of the double bazooka, a coax-fed antenna that is said to offer broadband operating characteristics. The antenna, designed primarily for 80 and 40 meters, consists of a section of coax opened at the center, with the coax feedline being connected at that point, and end sections made of open wire line, as illustrated in the June column, p. 103.

In presenting this antenna design—more as a curiosity than anything else—we were aware of the controversy surrounding claims for increased bandwidth over the conventional dipole, and we mentioned the investigations of Walter Maxwell, W2DU, into the characteristics of the double bazooka. Apparently, we did not present the arguments against the claimed characteristics of the antenna forcefully or clearly enough, as we received letters criticizing us for recirculating a discredited design.



In a few months on the pages of the Antennas column, we expect to put the MUFPLOT program package from Base 2 Systems through its paces. This very comprehensive program for Commodore computers goes a long way toward determining just "where" and "when" to point one's antenna by providing maximum usable frequency, lowest usable frequency, bearing, and distance information to virtually all DX prefixes. (The two diagonal bands are not defects in the video display, but rather are in the method used to photograph the monitor's screen presentation.) (W8FX photo)

In additional technical data relating to the W2DU analyses kindly provided us by John M. Haerle, WB5IIR, we now feel convinced that the double bazooka as described in fig. 2 on p. 103 of the June column has been discredited as an antenna that provides significantly better bandwidth than the ordinary dipole. Thus, while the antenna will perform much like the dipole, it is unlikely to perform better in any way, nor will it offer improved balance to ground, additional harmonic suppression, or gain, as some proponents have asserted. The antenna has not been published in the ARRL *Antenna Book*, and though it once was described in the *ARRL Handbook*, it is no longer printed in recent editions.

Nevertheless, we did ask for field reports from hams who have used the double bazooka. Excerpts from a letter received from Chuck Parker, N8BLP, seem to indicate that some hams feel that they have had good results with this antenna; the technical evidence would suggest that the wide bandwidth achieved is more by quirk or by chance, however. Writes Chuck:

"I had an inverted Vee up for 75 meters and it was narrowbanded; I always had problems with s.w.r. because of the angle of the legs, I think. I put up a double bazooka for 75 meters, and the highest s.w.r. was 2.0:1 from 3.5 to 4.0 MHz. At the resonant frequency, approximately 3.750 MHz, the s.w.r. was 1.1:1. The antenna has come down three times since then, and the s.w.r. is now 1.6:1 at 3.525 MHz and 2.1:1 at 4.0 MHz. The weak spots in my antenna are at the center conductor and where the 300 ohm twinlead is attached to the RG58/U . . . Make sure some type of a strain relief is provided at these connections. Also in your June article you talked about the folded dipole. That might be my next antenna for 75 meters."

Although this report is not conclusive, due to the possible influence of other factors on performance, the s.w.r. picture obtained by N8BLP is somewhat better than that which would be painted by an ordinary dipole. The dipole, fed with 70–75 ohm coax, might show a 3:1 or greater s.w.r. at the 3.5 MHz and 4.0 MHz band edges, if cut for resonance at midband. At this point, I would recommend the folded dipole for single-band operation on 75 and 80 meters where it is desirable to operate across the whole band without being overly concerned about s.w.r. or the line input impedance at the transmitter, assuming that a balun transformer or transmatch is used. At least, there is less controversy surrounding the folded dipole than there is concerning antennas such as the double bazooka!

Wrapping It

That's about it for this month's Antennas column. We have looked at several topics this month. These have included a reexamination of reflection mechanics concepts, as well as some new ham computer software offerings. We also did a "double take" with respect to the double bazooka. Next month, we anticipate several more antenna subjects of current topical interest. Special emphasis will be placed on computer programs having an antenna and propagation orientation. See you then.

73, Karl, W8FX

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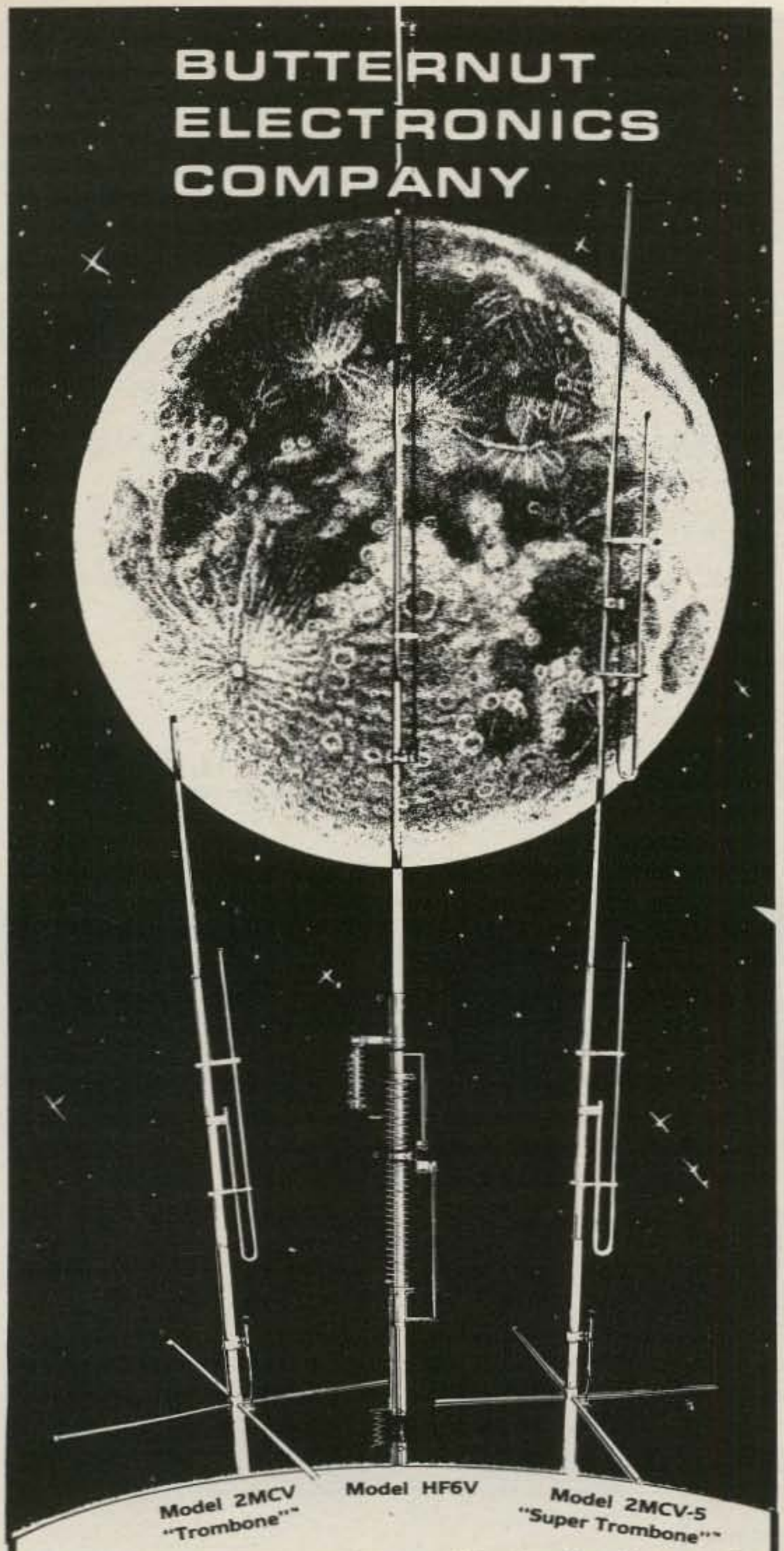

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CIRCLE 96 ON READER SERVICE CARD

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Add another trophy to our WPX S.S.B. Contest coming up next month: the Terry Appelton, W4GSM Memorial Award, sponsored by Joe Arcure, W3HNK, and Toshi Kusano, JA1ELY. It goes to the Japanese operator making the highest score on 28 MHz. It is planned to make the presentation at the annual JA DX Convention in Tokyo in February 1985.

While on the subject of contest awards, as I have announced many times in the past, requests for trophy sponsorship should be addressed to me. Give me the details and I will advise you as to availability and requirements. Except for special requests, the fall *CQ* World-Wide DX Contest is pretty well saturated with a full compliment of awards. However, there are some available areas in the spring WPX Contest. The 160 Meter Contest awards may be open next year; there is a possibility that the present donors will not pick up the sponsorship in 1985. We would also like to see a multi-operator award now that that category has become so popular. There are a couple of other awards pending just as soon as we get the necessary information.

I was saddened to read that Jean Denimal, F8EX, was reported a Silent Key in the RSGB *DX News Sheet*. Jean was licensed in 1925, a pioneer French amateur, and an honorary member of the R.E.F. He was instrumental in getting 160 meter operating privileges for French amateurs in our 160 Meter Contest. Jean's QSL card for our contest QSO at 2213Z on January 28, 1977 indicated that he believed it was the first 160 meter contact between France and the U.S. May he rest in peace.

A reminder: deadline for announcements for May activities is February 15th, and March 15th for June. Send information to my home address, please.

73 for this time, Frank, W1WY

Calendar of Events

*	**Jan.**	**27-29**	**CQ WW 160 M. C.W. Contest**
*	Jan.	28-29	Michigan YL QSO Party
*	Jan.	28-29	U.B.A. Trophy Contest
*	Jan.	28-29	French C.W. Contest
*	Jan.	29-30	Classic Radio Exchange
	Feb.	4-5	RSGB 7 MHz Phone Contest
	Feb.	4-5	Vermont QSO Party
	Feb.	4-5	ZERO District QSO Party
	Feb.	4-5	Arizona QSO Party
	Feb.	4-6	New Hampshire QSO Party
	Feb.	5	North American C.W. Sprint
	Feb.	11-12	QCWA C.W. QSO Party
	Feb.	11-12	YL-OM Phone Contest
	Feb.	11-12	TWO Land QSO Party
	Feb.	11-12	Dutch PACC Contest
	Feb.	12	North Amer. S.S.B. Sprint
	Feb.	18-19	YL ISSB Phone QSO Party
	Feb.	18-19	ARRL DX C.W. Contest
	Feb.	18-20	Amer. Radio Club Contest
	Feb.	18-26	Roman Castles Contest
	Feb.	**24-26**	**CQ WW 160 M. S.S.B. Contest**
	Feb.	25-26	YL-OM C.W. Contest
	Feb.	25-26	RSGB 7 MHz C.W. Contest
	Feb.	25-26	French Phone Contest
	Mar.	3-4	ARRL DX Phone Contest
	Mar.	3	DARC "Corona" 10 M. RTTY
	Mar.	10-11	QCWA Phone QSO Party
	Mar.	10-11	IARS CHC C.W. Contest
	Mar.	17-18	Bermuda Contest
	Mar.	17-18	QRP Spring C.W. Activity
	Mar.	17-18	YL ISSB C.W. QSO Party
	Mar.	17-18	IARS CHC S.S.B. Contest
	Mar.	**24-25**	**CQ WW WPX S.S.B. Contest**
	Mr.31	Ap.1	Connecticut QSO Party

** See January issue.*

RSGB 7 MHz Contest

Phone: Feb. 4–5 C.W.: Feb. 25–26
1200Z Sat. to 0900Z Sun.

Rules are the same as those used last year. Only single operator entries will be recognized. The following rules are for stations other than the British Isles.

Bands: Phone—7.04 to 7.10. C.W.—7.00 to 7.03. (B.I. stations please note that this will require split frequency on phone for U.S. stations.)

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

Scoring: Stations in Europe score 5 points for each B.I. contact. Those outside Europe score 15 points per contact.

Multiplier: One for each different British Isle country prefix worked (G2, GC3, GD4, GI6, GJ8, GM3, GU5, GW8, etc.), maximum of 42 possible. No credit for GB prefix.

Final Score: Total QSO points times the country prefix multiplier worked.

Awards: Certificates will be awarded to the first, second, and third place winners in the British Isles, Europe, and non-Europe in each section of the contest.

Include a summary sheet showing the scoring and a list of the country prefixes worked, and the usual signed declaration that all rules and regulations have been observed.

There is also an s.w.l. section with the scoring same as above. Overseas listeners log B.I. stations only. Record the call as well as the serial number sent. The call sign of the station being worked may only be repeated once in every three contacts logged unless it's a new multiplier.

Unmarked duplicate contacts will be penalized at ten times the number claimed. Logs containing in excess of five unmarked duplicates will be automatically disqualified.

Phone entries must be received no later than April 1st; c.w. April 22nd. This year they go to: G3OZF, RSGB HF Contests Committee, "Mayerin," Churchway, Stone, Aylesbury, Bucks., England.

Vermont QSO Party

2100Z Sat. to 0700Z Sun., Feb. 4–5
1100Z to 2400Z Sun., Feb. 5

The Central Vermont ARC is again sponsoring this annual party. The same station may be worked on each band and each mode (phone, c.w., and RTTY) for QSO point credit, but the multiplier is counted once only.

Exchange: QSO no. and QTH. County abbreviation for VT stations; state, province, or DX country for all others.

Scoring: One point for phone contacts, 2 points for c.w. or RTTY. VT stations multiply total by sum of U.S. states, VE provinces, and DX countries worked. All others use VT counties for their multiplier (maximum of 14).

Frequencies: Phone—3910, 7230, 14260, 14320, 21360, 28570, 50110, 144.2. C.W.—3530, 3730, 7030, 7130, 14060, 21060, 21160, 28060, and RTTY sub-bands.

Awards: Certificates to the top-scoring stations in each state, province, and DX country. Each VT station submitting a log will also receive a certificate. A plaque will be given to the VT overall winner.

Log forms and results sheets are available by sending a large s.a.s.e. for each item. Entries and requests go to: D. Nevin, KK1U, West Hill, Northfield, VT 05663. Mailing deadline for logs is March 1st.

ZERO District QSO Party

1900Z Sat. to 0100Z Sun., Feb. 4–5
1500Z to 2400Z Sun., Feb. 5

This year's party is being sponsored by a new group, the Davenport RAC. Dates have been changed to a month later, and there have been some changes in the scoring and the awards.

Stations outside the ZERO District will be working ZERO's only; ZERO's may contact anyone. The same station may be worked on each of the 5 bands, 10 through 80 meters, and on each mode. Mobiles in each county change.

Exchange: RS(T) and ARRL section. ZERO's will also include their county.

Scoring: Phone QSO's count 1 point; c.w. 2 points. ZERO's multiply total QSO

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points by the sum of ARRL sections, ZERO counties, and DX countries worked for their final score. All others use ZERO district counties for their multiplier.

Frequencies: C.W.—3560, 7060, 14060, 21060, 28060. Phone—3900, 7270, 14300, 21370, 28570. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the top scorer in each ARRL section, DX country, Novice/Tech., and Mobile. Plaques to the overall high scorer in ZERO land and outside the ZERO area.

Include a large s.a.s.e. for a copy of the results and a participation certificate. Mailing deadline is March 10th and logs go to: W0BXR, 2131 Myrtle, Davenport, IA 52804.

Arizona QSO Party

1800Z Sat. to 0600Z Sun., Feb. 4–5

This is the second time around for this one sponsored by the Southern Arizona DX Assn. Each station may be worked only once per band per mode. Only single operator entries are eligible, except club station W7NQ.

Exchange: RS(T) and QTH. County for Arizona; state, province, or DX country for others. (Novice and Tech. must sign /N or /T.)

Scoring: Count 1 point for phone contacts, 2 points if on c.w. or other modes, and 4 points if with a Novice or Tech.

Did you know that CQ also publishes a Spanish edition of the magazine? No? Well it sure does, and this is Angel A. Padin de Pazos, EA1QF, who runs the Spanish "Contest Calendar." Good luck, Angel. You appear to have many productive years ahead of you.

Arizona stations multiply total QSO points from all bands by the number of states, provinces, and DX countries worked.

Non-AZ stations use AZ counties for their multiplier (maximum of 15). Work club station W7NQ and get an additional multiplier of one. Work all AZ counties and W7NQ, and double your multiplier.

Frequencies: Phone—3895, 7230, 14280, 21365, 28560. C.W.—60 kHz up from lower edge of each band. Novice—25 kHz up from lower edge of Novice bands.

Awards: Certificates to highest scorer in each category, AZ, non-AZ, and Novice/Tech. Also for each state, VE province, DX country, and AZ county, and to the club with the highest aggregate score from at least 5 members.

Include a summary sheet with your log, and dupe sheets for bands with more than 50 QSO's. Club entries must be submitted by an officer of the club.

All entries must be received by March 4th, April 4th for club entries, and they go to: Southern Arizona DX Assn., Att.: Philip M. Stickney, N7BUP, 1890 West Paseo Cuenca, Tucson, AZ 85704.

New Hampshire QSO Party

1900Z Sat. to 0700Z Sun., Feb. 4–5
1400Z Sun. to 0200Z Mon., Feb. 5–6

This year the party is being sponsored by the New Hampshire ARA. The same station may be worked on each band and mode for QSO points, but the multiplier is counted once only. N.H. stations may contact each other for QSO points and multiplier credit.

Exchange: RS(T) and QTH. County for N.H.; ARRL sections or country for others.

Scoring: N.H. score 1 point per QSO and multiply total by (ARRL sections + countries + N.H. counties) worked for their final score.

Others score 5 points for each N.H. contact and multiply total by N.H. counties worked (maximum of 10).

Frequencies: C.W.—1810, 3555, 7055, 14055, 21055, 28055. Phone—3935, 3975, 7235, 14280, 21380, 28575. Novice—3730, 7130, 21130, 28130. RTTY—3625, 7085, 14085, 21085, 28085. V.H.F.—50.115, 145.015 simplex.

Appropriate awards and the Worked New Hampshire award will go to qualifying stations in the party.

Mailing deadline is March 15th to: Pete Cantara, KI1M, 19 Haverhill Street, Hudson, NH 03051. Include a large s.a.s.e. for a copy of the results.

North American "Sprint"

C.W.: Feb. 5 S.S.B.: Feb. 12
0100Z to 0459Z Sun. (Sat. night)

As the name implies, it's a real shorty, only 4 hours, and is organized by the National Contest Journal. Activity will be between North American stations, as well as other countries, single operator only.

Exchange: Call, QSO no., name, and QTH; state, province, or country.

Scoring: Multiply total QSO's by the sum of states, VE provinces, and No. American countries worked (US and VE are not countries; KH6 not a state).

Frequencies: Three bands only: 3540, 7040, 14040 kHz on c.w., and 3890, 7225, 14275 on s.s.b., plus or minus QRM.

Awards: A trophy to the highest scoring station on each mode. Certificates to the winners in each US call area, Canada,

and other countries. The top 10 scorers, the winning team, and each member of the team will also be rewarded.

Team competition is limited to a maximum of 10 operators as a single unit. Pre-contest registration is required for each team at least 24 hours before the start of the "Sprint." W6OAT is the coordinator.

There are other detailed rules, a special QSY rule, etc. If you do not have a copy of the Journal, I suggest you write to W6OAT or K7GM for details.

Entries must be received no later than 30 days after the end of each "Sprint." The c.w. entries go to Rusty Epps, W6OAT, 948-H Kiely Blvd., Santa Clara, CA 95051. The s.s.b. go to Rick Niswander, K7GM, 1914 W. Cortez Circle, Chandler, AZ 85224.

QCWA QSO Party

C.W.: Feb. 11–12 S.S.B.: March 10–11
0001Z Sat. to 2000Z Sun.

This is the 27th annual QSO Party for the Quarter Century Wireless Association. The emphasis this year is on renewing old friendships and making new ones.

Rules have been simplified as can be seen in this brief format. C.w. and s.s.b. are separate activities and require separate log entries.

The same member may be contacted on each of the five bands, 10 through 80 meters, for QSO credit, but the chapter multiplier is counted once only.

Exchange: QSO number, name, and chapter name or number (if no chapter affiliation, use "at large," or AL).

Points: One point for each QCWA member contacted on each band.

Multiplier: Each new chapter worked, counted once only.

Score: Total number of QSO's multiplied by the total number of chapters worked (maximum 146 as of Nov. 1983).

Frequencies: C.W.—3545, 7045, 14045, 21055, 28055. S.S.B.—3915, 7245, 14295, 21365, 28615. Plus or minus 10 kHz.

Awards: Plaques to the "Top Banana" in each party, and certificates to the next nine high scorers. Party QSO's can be applied for the many QCWA awards. Make your request on the summary sheet of your entry.

The standard QCWA log forms have 25 contacts to the page. If you prepare your own, have columns for the time in UTC, station worked, QSO number sent and received, name, chapter, and multiplier the first time it is worked. A column indicating the band would be helpful, or use a separate log sheet for each band. Include a summary sheet, of course.

Submit your log right after each party, but no later than March 31st. C.w. entries go to: Buck Lewis, W4BV, 835 119th Ave., Treasure Island, FL 33706. S.s.b. to: Jack Mandel, W4PLW, 4301 11th Ave. N., St. Petersburg, FL 33713.

YL-OM Contest

Phone: Feb. 11–12 C.W.: Feb. 25–26
1800Z Sat. to 1800Z Sun.

It's the YL's working the OM's in this annual activity organized by the YLRL. All bands may be used, but cross-band contacts or contacts with stations on net frequencies do not count.

Phone and c.w. are separate contests and require separate logs. The same station may be worked once only regardless of band.

Exchange: QSO no., RS(T), and ARRL section or DX country. (See *QST* for sections list.)

Scoring: Each QSO is worth 1 point. Multiply total by number of ARRL sections and DX countries worked for final score.

There is also a power multiplier of 1.25 for stations running 150 watts or less on c.w., and 300 watts p.e.p. on s.s.b. Multiply your final score by the above factor if you qualify.

There is a penalty of three contacts for each duplicate contact removed from the log by the contest committee.

Awards: First place cups to both YL and OM winners in each contest; second and third place winners will receive certificates. The top scorers in each U.S. and VE call district and DX country will also receive certificates.

Logs must be mailed by March 15th and received no later than April 5th to be eligible. They usually go to the vice-president, but we do not have her name at this writing. We will provide it at a later date, or you can get it from the present VP, Rose Ellen Bills, N2RE, 17 Craig Place, Pennsville, NJ 08070.

Two Land QSO Party

2100Z Sat. to 0300Z Mon., Feb. 11–13

This year's party is again sponsored by the Gloucester County ARC of New Jersey. The same station may be worked on each band and mode, mobiles and portables in each county change. NJ and NY may also contact other in-state stations for QSO and multiplier credit.

Single operator stations are limited to 24 hours; multi-operators can operate the full 30 hours.

Exchange: RS(T) and QTH. County and state for Two-Landers; state, province, or country for all others.

Scoring: Each s.s.b. contact is worth 2 points; c.w. contacts 3 points.

Two-Landers multiply total QSO points by number of (states + provinces + countries + Two-Land counties) worked on each band. (NJ, NY, US, and VE are multipliers.) All others multiply total QSO points by the number of Two-Land counties worked on each band, 10 through 160 meters, with a maximum of 83 possible per band.

Frequencies: C.W.—1805 and 60 kHz up from bottom of each band. S.S.B.—1815, 3900, 7230, 14280, 21355, 28600. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the top scorers in each Two-Land county, each state, VE province, and DX country. Also top mobile, portable, Novice, and multi-operator stations. The top single operator Two-Lander will also be rewarded.

Indicate each new multiplier in a separate column as worked. A summary sheet and the usual signed declaration are also requested. A large s.a.s.e. will get you a copy of the results.

Mailing deadline for all entries is March 20th to: Gloucester County ARC, Att: Dennis Sandole, WB2GES, 814 West Kings Highway, Mt. Ephraim, NJ 08059.

Dutch "PACC" Contest

1400Z Sat. to 1700Z Sun., Feb. 11–12

It's the world working The Netherlands on all six bands, 1.8 through 29.7 MHz, in the band sections recommended for contest operation by the IARU. The same station may be worked on each band, but on one mode only, phone or c.w., for QSO and multiplier credit.

Categories: Single operator, multi-operator, and s.w.l.

Exchange: RS(T) plus a QSO number starting with 001. Dutch stations will add two letters to identify their province. There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, YP, ZH, and ZL.

Scoring: Each QSO with a PA/PB/PI station counts one point. DX stations determine their multiplier by the number of provinces worked on each band (maximum of 72).

Final Score: Total number of QSO's times the number of provinces worked on each band.

Awards: Certificates to the top scoring station in each category in each country and call areas of JA, LU, PY, UA9/0, VE/VO, VK, W/K, ZL, and ZS. Also second and third place awards if returns justify.

S.w.l.'s must log the call of the Dutch station as well as the station being worked and both serial numbers. Scoring same as above. Indicate the multiplier in a separate column in your log only the first time it is worked on each band. Include a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration.

Mailing deadline is March 31st to: PACC Contest, Att: F. Th. Oosthoek, PA0INA, P.O. Box 499, 4600 AL Bergen Zoom, The Netherlands.

YL ISSBers QSO Party

Phone: Feb. 18–19 C.W.: March 17–18
0001Z Saturday to 2359Z Sunday

Rules are quite lengthy. Therefore, I suggest you send an s.a.s.e. to K0RDJ for a detailed copy. The party is open to all, but the emphasis is on membership participation.

The same station may be contacted on each band for QSO points, but it counts once only as a multiplier. You are required to take two rest periods of 6 hours each during the 48-hour contest period.

Exchange: Name, RS(T), SSBers number, US state, VE province, country, and DX/WK partner (non-members send no number).

Categories: Single operator, DX/WK partners, and OM/YL teams.

Points: Three points for each member contacted on own continent, six points if on a different continent. Non-member QSO's count only one point.

Multiplier: Only member stations count as a multiplier. One for each of the following: both DX/WK partners worked, each OM/YL team worked, each US state, VE province, and DX country worked. Two when DX/WK partners work each other, and two if your d.c. power input is 250 watts or less. *(Should add up to quite a sizable score.—ed.)*

Frequencies: Use the General Class portions of the US bands for both phone and c.w. On 20 avoid the net frequencies on 14313, 14332, and 14336. Check 40 and 80 meters on the hour. V.h.f. and u.h.f. may also be used, but simplex only.

Awards: Special certificates to the overall winners in each category. Regular certificates to the winners in each US state, VE province, and DX country.

Logs should be set up as outlined in the "Exchange" section above. All entries must be received by June 1st. They go to: Rick and Minnie Connolly, K0RDJ and NA0V, Star Rt. #1, Crocker, MO 65452.

ARRL International DX Contest

C.W.: Feb. 18–19 Phone: March 3–4
0000Z Saturday to 2400Z Sunday

Rules are the same as last year. However, I strongly recommend that you study the announcement in the December issue of *QST* for more details. Also send a large s.a.s.e. (2 IRC's for DX) for sample log and entry forms.

All bands may be used, 1.8 through 28 MHz, but not 10 MHz. Aeronautical or maritime mobile stations cannot be worked for contest credit. Following is a brief outline.

Categories: Single operator, both single and all band. Multi-operator, one transmitter and two transmitters. Also multi-operator, multi-transmitter. Also QRP, all band only. Multi one and two transmitter stations must remain on a band at least 10 minutes once a contact is made. Multi-transmitter stations no limit, but only one signal per band.

Exchange: RS(T) and state or province for W/VE; RS(T) and power input for DX stations (three-digit number).

QSO points: W/VE stations earn three points for each DX contact. DX get three points for each W/VE contact.

Multiplier: Each DXCC country worked on each band for W/VE's. DX stations use US states (48) and VE districts VE1–8, plus VO for their multiplier (9). (Maximum multiplier of 57 per band.)

Final Score: Total QSO points times the sum of the multiplier from each band. Entries with 500 or more QSO's must include a QSO check sheet.

Awards: Certificates given in each category, in each country, and in each ARRL section, plus a wide selection of plaques. Also certificates to DX stations making over 500 QSO's.

Disqualification regulations will be strictly enforced and are listed in the official rules. Mailing deadline for all entries is March 3rd, and they go to: ARRL DX Contest, 225 Main Street, Newington, CT 06111.

American Radio Club Contest

0500Z Sat. to 0500Z Mon. Feb. 18–20

This is the second annual international contest for the American Radio Club. The object is to contact club members for awards. Activity will be found on the 10, 15, 20, and 40 meter bands (frequencies not specified).

Contact two club members during the two-day period and you will be eligible for the Silver QSL Award; work three members and you qualify for the Special Gold Award. S.w.l.'s may also apply for these awards.

Send your QSL's and application with $2.00 or 6 IRC's to: American Radio Club, P.O. Box 3576, Hialeah, FL 33013.

Roman Castles Contest

0001Z Sat. to 2300Z Sun., Feb. 18–26

This is the third International Trophy contest sponsored by the A.R.I. Radio Club of Albano Laziale (Rome). The purpose is to promote activity and interest in the area for which the trophy is named. Look for stations calling "CQ Romecast Contest" and exchange signal report and QSO serial number starting with 001. The same station may be worked once per day on each mode: c.w., s.s.b., and RTTY.

Scoring: Contacts with stations in countries bordering the Mediterranean count one point; rest of Europe, two points; all other countries, three points.

The highest scorer on all three modes wins the Roman Castles Trophy. There are additional awards, cups, and plaques, for separate modes and areas, and a bronze medal for scores of 10 or more points. (A $6.00, or the equivalent, fee is required for the major awards.)

I advise you to contact the awards manager, I0YKN, for more details. You have until March 15th to submit your entry. Entries go to: Roman Castles Contest, Att.: Nuccio Meoli, I0YKN, P.O. Box 10, 00119 Ostia Antica, Roma, Italy.

CQ WW 160 Meter S.S.B. Contest

2200Z Fri. to 1600Z Sun., Feb. 24–26

Just a reminder that our 160 Meter S.S.B. Contest will be coming up the last weekend of this month. Extensive coverage has been given to this event with complete rules appearing in last month's issue. There are no changes from last year's new format.

Exchange: Signal report and QTH (no QSO serial number).

Scoring: Contacts with stations within own country count two points; with stations in other countries but the same continent, five points; with stations in other continents, ten points.

The multiplier remains the same: each US state (48), VE province (12), and DX country. (US and Canada are not country multipliers.)

It is strongly requested that the "DX Window," 1825–1830, be kept free from W/K and VE/VO activity. Work the DX split frequency. (KP4 and KV4 should also observe this request.)

Mailing deadline for last month's C.W. Contest is February 29th. This month's S.S.B. Contest's deadline is March 31st. Send them to: Don McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32901. Of course, you can always use the *CQ* address: 76 N. Broadway, Hicksville, NY 11801. (Please indicate c.w. or s.s.b. on the envelope.)

BY the way

An old friend of *CQ*, Tom Wong, VE7BC (he's on the right) sent in this photo of the latest operation from The Peoples Republic of China.

The first s.s.b. operation from BY1PK was on October 3, 1983. This was not a DXpedition as many amateurs were hoping for, as contest-style operation is not part of the present program. Although Tom was allowed to do so, this type of operation is still a few years away.

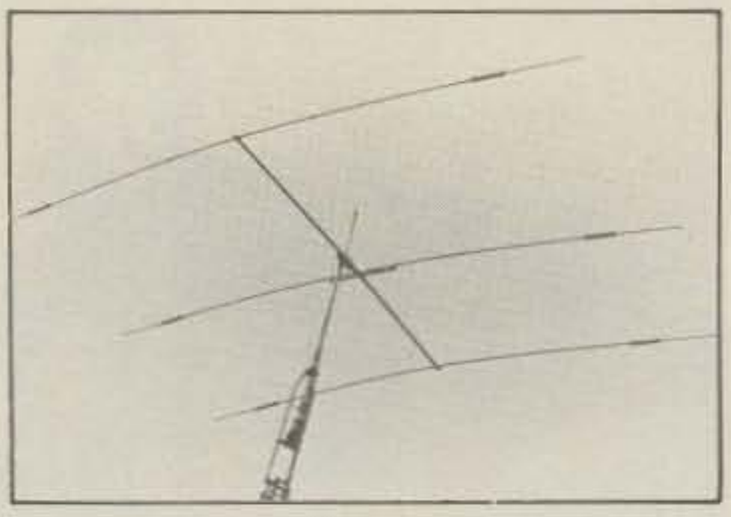
The Chinese operators all took part in the s.s.b. exercise. They had many earphones all in parallel plugged into the transceiver, and were copying calls down on paper. Later they compared notes. During the three-day operation they worked 1,300 contacts, even though they encountered a few technical problems. Three-quarters of the 1,300 contacts were from North America. When working by district, they did work a few stations out of turn, and these were amateurs who have helped to put China on the air.

Tom will be going over there again in early April 1984 with a group of well-known operators. Hopefully, they will get some good propagation. Have patience, it will just be a matter of time until they learn English, and then they will be on every day.

The first s.s.b. operation from BY1PK, The People's Republic of China. Tom Wong, VE7BC, on the right, will be in China again in April of this year.

No - 83 - 84

CQ SHOWCASE



Palomar Engineers Triband Beams

Palomar Engineers has announced the availability of two triband beams: Model DX-33 has three elements on 10, 15, and 20 meters; Model DX-43 has four elements. These antennas are being made available in the U.S. for the first time. Designed for use with solid state transceivers, the antennas feature low s.w.r. and wide bandwidth. Gain and front-to-back ratio are particularly good. Each trap is individually sweep tested at the factory for uniform performance. Stainless steel "U" bolts are used throughout.

For more information contact Palomar Engineers, 1924-F West Mission Road, Escondido, CA 92025, or circle number 105 on the reader service card.

Simpson Digital Multimeter

Simpson Electric Company has announced their Model 467E 3½-digit hand-portable DMM. The Model 467E has 26 ranges that cover 100 μv to 1 kv d.c., 100 μv to 750 v.a.c., 100 na to 2000 ma a.c./d.c. current, and 0.1Ω to 20 MΩ resistance. It features 0.1% basic accuracy, true RMS measurement capability, peak hold, and continuity modes. A diode test function provides quick "good-bad" checks of diodes, transistors, and ICs. The 467E also has high-voltage transient protection and a double fusing system.

The compact 2" × 5.6" × 4.6" 1½ lb. unit is available in a choice of blue or black high-impact molded case. Priced at $225, the 467E comes with 9 volt battery, UL Recognized test leads with screw-on alligator clips, and operator's manual. Optional accessories include carrying case, amp-clamp adapter, high-voltage probes, two "universal" test lead systems, plus temperature and r.f. probes. For more information, contact Simpson Electric Company, 853 Dundee Ave., Elgin, IL 60120, or circle number 102 on the reader service card.

P.C. Electronics TC-1 plus ATV Transmitter/Downconverter

P.C. Electronics has upgraded their TC-1 420–450 MHz full-color ATV unit with some new features plus many options now standard that were once offered at an additional cost. Separate video and audio inputs were added to the existing camera and mic inputs, allowing front-panel switching back and forth between the camera and computer, or transmitting both the VCR audio along with voice over commenting using a microphone. Capability for external 13.8 v.d.c. in addition to the built-in AC supply has been provided. A video monitor output enables seeing your own picture exactly as it is transmitted to better set modulation levels, lighting, etc.

The TC-1 + has the new TXA5-5 exciter/modulator which features two frequency plug-in crystal switching with the addition of an SPST switch. Also the built-in sync stretcher and hi/lo power switch capability enable superior stable color video if a higher power linear amplifier is added later. With the TC-1 +, the only other items necessary to get on ATV are a good 70 cm antenna and low-loss coax, your TV set, and any device with a standard 1 volt p-p composite video output. A Technician class or higher amateur radio license is required for operation and purchase. For more information contact, P.C. Electronics, 2522 Paxson, Arcadia, CA 91006, or circle number 104 on the reader service card.

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XL-500 - 500 watts-non tunable **$25**

XL-150 - 150 watts-non tunable **$15** MC & VISA

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CIRCLE 73 ON READER SERVICE CARD

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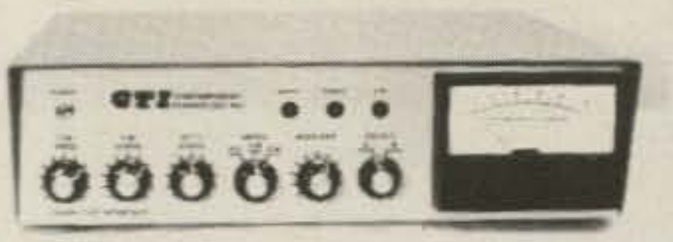

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Tuna Tin 2-WAS 40 Meter Transmitter QST May '76 p 21	5.50
Mini Miser's Dream Receiver QST Sep '76 p 21	13.50
20 Meter Direct Conversion Receiver QST Apr '78 p 12	7.25
Amplifier for HW-8 QRP Transceiver QST Apr '79 p 18	13.55
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Prices include postage.

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Get POWER into your antenna. See ARRL Handbook p. 585 or 19-9 or 6-20.

1KW—4:1 Impedance	$12.50
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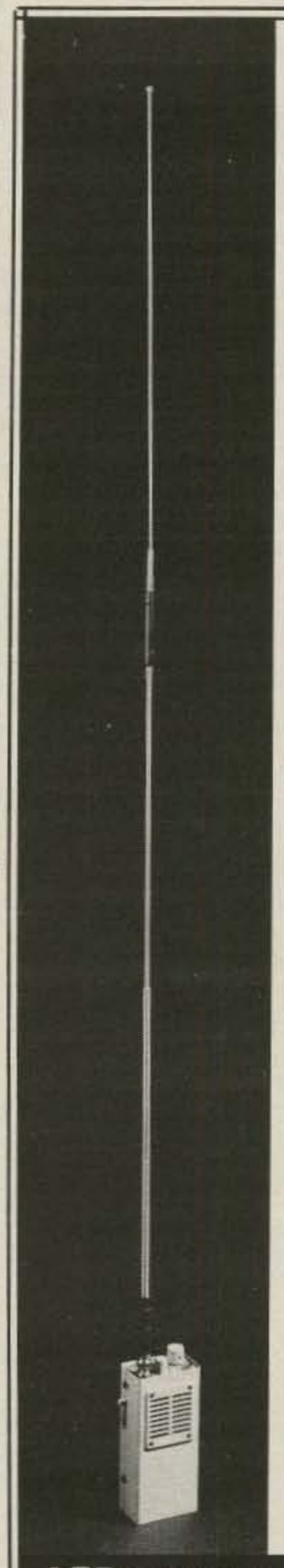
2KW—6:1, 9:1, or 1:1 (pick one)	16.50
100W—4:1, 6:1, 9:1, or 1:1 (pick one)	8.50

Many other interesting coil kits in our NEW LIST 5C. You must send a stamped envelope to receive our coil kit list.

CIRCLE 28 ON READER SERVICE CARD



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The **MX-15** comes with full 90 day warranty and is available from factory direct or **HENRY RADIO** **(800) 421-6631**

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ACCESSORIES SUPPLIED

- Standard Frequency crystal of your choice
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MX Channel crystal.... (Standard Frequency)	$7.00
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PR-1 Mobile Rack Kit	$23.50
VX-15 External VXO (one crystal supplied)	$53.50
PL-15 10W Linear amplifier	$89.50

Photo shown MX-15, VX-15, PL-15, SP-15, MS-1 and PR-1

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CIRCLE 69 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

During February expect a seasonal decrease in the range of frequencies that will propagate long distances during the daylight hours, and an increase during the hours of darkness.

While fewer *10* meter DX openings are expected during February, some very good ones should be possible to many areas of the world during the daytime hours. The *15* meter band is forecast to be the best band for world-wide DX propagation conditions during the daylight hours. Excellent openings are predicted to most areas of the world, with generally strong signals and little fading or noise. The band should open towards the east shortly after sunrise, peak towards the north and south during the early afternoon hours, and towards the west during the late afternoon and early evening. Good openings world wide are also forecast for the *20* meter band from shortly after sunrise through the early evening hours. The band is expected to remain open well into the hours of darkness for paths towards the south and west.

Fairly good DX propagation conditions are expected on the *40* meter band from late afternoon and continuing through the hours of darkness until shortly after local sunrise. Fairly high signal levels are expected during many *40* meter DX openings. A seasonal increase in static levels is expected to result in somewhat poorer DX propagation conditions on *80* meters. Despite weaker signals and higher static levels, some fairly good DX openings are forecast to many areas of the world during the hours of darkness. Some DX openings may also be possible on the *160* meter band during the hours of darkness and the sunrise period.

For short-skip openings less than 250 miles, *80* meters should be best during the daylight hours, followed by *40* meters, while *160* meters is expected to be optimum during the hours of darkness, with *80* meters as a follow-up. For distances between 250 and 750 miles, try *40* meters during the day and *80* meters at night. The best band for openings between 750 and 1300 miles during the daytime hours of February should be *20* meters, with *40* meters optimum from sundown to midnight and *80* meters recommended from midnight to sunrise. For short-skip openings between 1300 miles and the one-hop limit of 2300 miles, check *15* and *20* meters during the day and *40* and *80* meters at night. Good short-skip openings between approximately 1000 and 2300 miles are expected on *10* meters throughout much of the daytime period.

P.O. Box 1714, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1984

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1, 10, 18, 28	**A**	**A**	**B**	**C**
High Normal: 2, 16-17, 19-20, 29	**A**	**B**	**C**	**C-D**
Low Normal: 5-6, 9, 11, 15, 21-22, 26-27	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 3-4, 7-8, 12, 14, 23, 25	**B-C**	**C-D**	**D-E**	**E**
Disturbed: 13, 24	**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 excellent (A) on the 1st, good (B) on the 2nd, fair-to-poor (C-D) on the 3rd and 4th, good-to-fair (B-C) on the 5th and 6th, etc.

Sunspot Cycle Progress

The present solar cycle continues its decline at a slow pace. The Royal Observatory of Belgium reports a monthly mean sunspot number of 55.2 for October 1983. This results in a 12-month running smoothed sunspot number of 81.5 centered on April 1983. This is a drop of four numbers from the previous month's level. A smoothed sunspot number of 69 is forecast for February 1984.

V.H.F. Ionospheric Propagation

Auroral displays tend to occur somewhat more frequently during February than during the earlier winter months. Unusual short-skip conditions often occur on the v.h.f. bands during such displays as a result of the ionization associated with auroras. Openings over distances of several hundred miles and up to as much as 1300 miles may take place by means of reflection from such regions. Auroral-type openings are characterized by flutter fading and multi-path echoes. To take maximum advantage of such openings, antennas should be pointed towards the auroral display, if it is visible, or in a generally northerly direction.

The sun's energy, which causes auroral displays in the earth's atmosphere, often is also responsible for producing large areas of sporadic-*E* ionization. Reflection of v.h.f. signals from such regions can make possible short-skip openings between distances of approximately 750 and 1300 miles. Unlike auroral-type propagation, signals reflected by sporadic-*E* ionization are often strong and stable.

Auroral activity usually takes place during periods of radio storminess. Check the Last Minute Forecast at the beginning of this column for those times during February which are likely to experience radio storminess.

No significant meteor showers are expected during February, but there should be an improvement in trans-equatorial, or TE, v.h.f. openings. The best chances for such openings are between the southern tier states and South America on paths approximately at right angles to the equator. They are more likely to occur on 6 meters, but an occasional 2 meter opening also may be possible. The best time to check for TE openings is between 7 and 10 p.m. local time. TE openings are characterized by very weak signals with considerable flutter fading.

This month's propagation charts contain band-opening predictions for major DX paths for the period February 15 through April 15, 1984. A short-skip propagation forecast for February appeared in last month's column.

73, George, W3ASK

February 15 - April 15, 1984
Time Zone: EST (24-Hour Time)
EASTERN USA To:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1) 11-13 (2) 13-14 (1)	07-08 (1) 08-09 (3) 09-12 (4) 12-13 (3) 13-15 (2) 15-16 (1)	04-07 (1) 07-09 (4) 09-12 (3) 12-15 (4) 15-17 (3) 17-19 (2) 19-21 (1)	17-19 (1) 19-20 (2) 20-01 (3) 01-02 (2) 02-03 (1) 19-21 (1)* 21-22 (2)* 22-23 (3)* 23-00 (2)* 00-01 (1)*
Northern Europe & European USSR	08-12 (1)	07-08 (1) 08-11 (2) 11-14 (1)	05-07 (1) 07-09 (3) 09-11 (2) 11-13 (3) 13-14 (2) 14-18 (1)	18-20 (1) 20-22 (2) 22-02 (1) 20-00 (1)*
Eastern Mediterranean	09-13 (1)	08-09 (1) 09-11 (3) 11-13 (2) 13-15 (1)	07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1) 16-18 (3) 18-22 (2) 22-23 (1) 04-07 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

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

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left-hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

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

(4) Opening should occur on more than 22 days
(3) 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.

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

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

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

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

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA To:

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

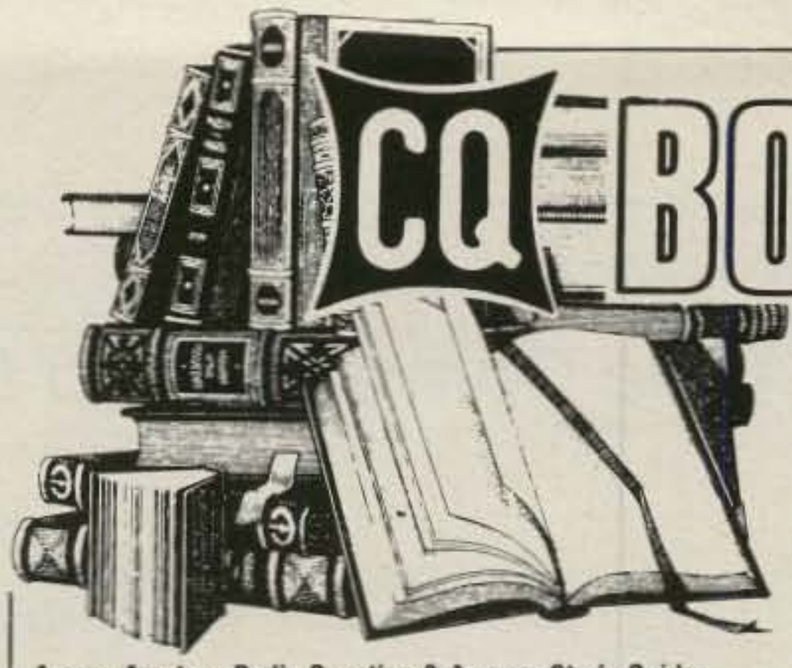
Time Zone: PST (24-Hour Time)
WESTERN USA To:

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

*Predicted 80 meter openings. Openings on 160 meters are also likely to occur during those times where 80 meter openings are shown with a forecast rating of (2), or higher.

CIRCLE 26 ON READER SERVICE CARD

CIRCLE 67 ON READER SERVICE CARD



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Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Universal Time Conversion To Local Time

One of the things that confuses new amateurs is converting between local time and Universal Time Coordinated (UTC). Table I provides this information in a simplified and uncluttered format. One soon becomes familiar with these time differences and soon has no need for this table. However, it is very useful until one attains that degree of familiarity.

UTC was previously called Greenwich Mean Time (GMT), which is also called Zebra time, Zulu time, and Z-time. It is still better known as GMT than as UTC or UT (Universal Time); however, UTC has been the correct term for several years.

Since we are still in our previous evening's hours when Europe is into its next morning, there is a period of time (4 to 8 hours) when the UTC day and date are one ahead of our local day and date. As an example, if our local day is Thursday and our local date is the tenth of the month (and assuming someone on Pacific daylight savings time), at 8 p.m. PDST local time it is 0300 UTC Friday on the eleventh day of the month.

	Pacific		Mountain		Central		Eastern	
UTC	Standard	Daylight	Standard	Daylight	Standard	Daylight	Standard	Daylight
0000	4		5		6		7	8
0100	5		6 PM		7		8	9
0200	6		7[1]		8		9	10
0300	7		8		9		10	11
0400	8		9		10		11	12
0500	9		10		11		12	1
0600	10		11		12		1	2
0700	11		12		1		2	3
0800	12		1		2		3	4
0900	1		2		3		4	5
1000	2		3		4		5	6
1100	3		4		5		6	7
1200	4		5 AM		6		7	8
1300	5		6[2]		7		8	9
1400	6		7		8		9	10
1500	7		8		9		10	11
1600	8		9		10		11	12
1700	9		10		11		12	1
1800	10		11		12		1	2
1900	11		12		1		2	3
2000	12		1		2		3	4
2100	1		2 PM		3		4	5
2200	2		3[2]		4		5	6
2300	3		4		5		6	7
2400	4		5		6		7	8

Notes: [1]Evening of date prior to UTC date.
[2]Same date for both local and UTC.

Table I– A simplified means of converting between local time and UTC.

Temperature Conversion

One of the confusing factors that new American amateurs encounter when they start contacting amateurs in foreign countries is the Celsius temperature scale that is used by most DX (distant station) operators. Americans are accustomed to using the temperature scale established by German physicist Gabriel Daniel Fahrenheit. Amateurs in most of the other countries are more familiar with the temperature scale developed by Swedish astronomer Anders Celsius, who called it the Centigrade scale. Relatively recently the excellent name "Centigrade" was changed to the non-descriptive name "Celsius," which probably caused Anders to turn over in his grave.

Fig. 1 provides fast and easy conversion between Fahrenheit and Celsius values. If the DX amateur tells you that her/his local temperature is 10 degrees C, a glance at the figure shows 50 degrees F to be the equivalent value. The figure also enables one to convert from the more familiar Fahrenheit scale to the less familiar Celsius scale, and to give the DX amateur our local temperature in Celsius degrees.

Note that Celsius and Fahrenheit scales match precisely at three points in the figure: 140, 50, and minus 40 degrees Fahrenheit are 60, 10, and minus 40 degrees Celsius, respectively. In the temperature range we use when exchanging weather information, each 10 degrees Fahrenheit is roughly equivalent to 5.5 degrees Celsius.

This conversion scale is a useful operating aid that you could duplicate and post in your shack. After you become familiar with the Celsius temperature scale, you will have no further need for this aid. Until that time arrives, you are urged to use it to improve your DX contacts. You may also find that your family, friends, neighbors, and work associates would like copies of this aid. Celsius is replacing Fahrenheit, whether or not we like it.

2814 Empire Ave., Burbank, CA 91504

Ten-Year License Term Approved

The FCC has changed the term of the amateur radio operator and station license from five years (maximum) to ten years (maximum). At the same time, the renewal (grace) period for the station and operator license was changed to two years; previously it had been five years for the operator license and one year for the station license. This latter change means that the station callsign will not be lost if you forget (or are unable) to renew your license within one year after it expires. As long as the license renewal application is made within two years after the license expiration date, the callsign can be retained. The authority to implement this change was included in Public Law 97-259, which was enacted in September 1982.

Code Test Requirements

IARU Article 32 covers the Amateur Service and the Amateur Satellite Service. Item 3 (2735) of Section I is quoted herein for your perusal and consideration:

"(1) Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz."

Think about the preceding international requirement and consider the fact that the FCC does not include a sending test in current amateur radio operator examinations.

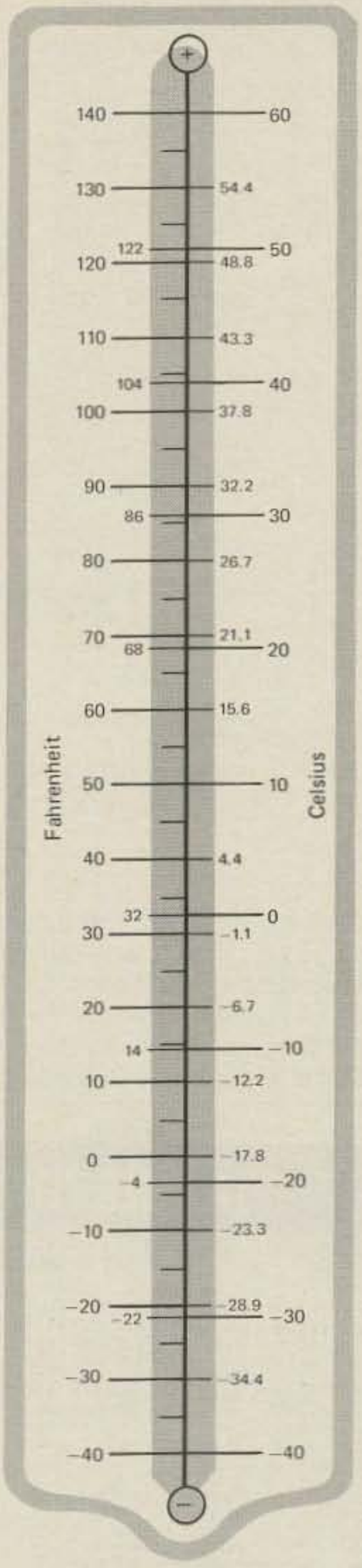

Fig. 1– A fast and easy method of converting between the Fahrenheit and Celsius temperature scales.

U.S. Government Printing Office Publications

One of the best sources of printed items that are useful to new (and aspiring) amateurs is the U.S. Government Printing Office (GPO). The GPO has so many books, pamphlets, and charts on electric, electronic, and communications subjects that a brief listing would fill about a 30 page flyer. This article makes no attempt to cover all suitable GPO items; I am just trying to make you aware of this source of printed material. The best way to find out which publications the GPO has available is to obtain copies of their subject bibliographies 53 and 296. SB-053 covers "Electricity and Electronics," whereas SB-296 lists "Telecommunications" items. One can obtain free copies of these subject bibliographies by requesting them from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The following list shows typical titles. The last known stock number and price are included, although both are subject to change. If you intend to order publications from the GPO, it is wise to obtain the latest subject bibliographies to determine current stock numbers and prices. A representative list of GPO publications follows:

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008-047-00066-9, $6.50
Electrician's Mate, Third and Second
008-047-00317-0, $13.00

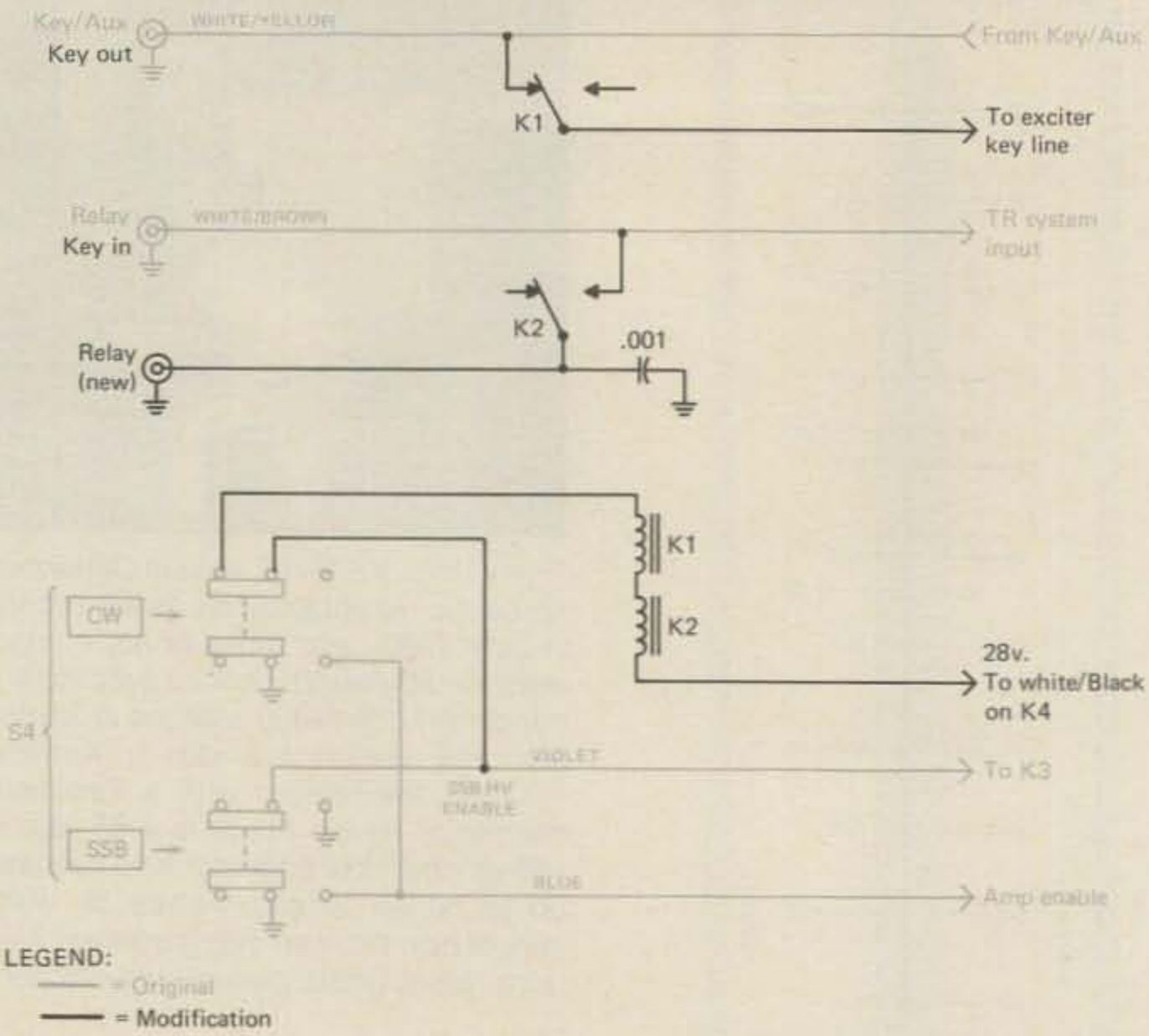
Frank Dole, KB4FHR, lives in Cottondale, Alabama. He obtained his Novice license in July 1983, and most of his contacts were on 40 meters until he erected a tri-band Yagi-Uda beam antenna in September. His station includes a Kenwood TS-430S transceiver with a Pacesetter electronic keyer. Frank is a 68-year-old retired chemical engineer who had wanted to be an amateur since he was a school boy. He is an avid gardener. Frank also raises goats, geese, and chickens.

Electronics Technician
Volume 1, First and Chief
008-047-00277-7, $10.00
Volume 2, Second and Third
008-047-00332-3, $9.00
Volume 3, Second and Third
008-047-00334-0, $7.00
FCC Rules and Regulations
Part 97, Amateur Radio Service (1979)
004-000-00357-8, $3.75
Fundamentals of Electronics
Volume 1A, Basic Electricity/Direct Current
008-047-00097-9, $6.00
Volume 1B, Basic Electricity/Alternating Current
008-047-00098-7, $7.00
Volume 2, Power Supplies and Amplifiers
008-047-00099-5, $6.50
Volume 3, Transmitter Circuit Applications
008-047-00100-2, $6.50
Volume 4, Receiver Circuit Applications
008-047-00105-3, $7.00
How to Identify and Resolve Radio-TV Interference Problems
004-000-00345-4, $2.00
Introduction to Amplifiers
008-047-00339-1, $6.00
Principles and Applications of Mathematics for Communications/Electronics
008-020-00061-2, $7.50
Radioman, Third and Second
008-047-00248-3, $9.50
Soldering Electrical Connections: A Handbook
003-000-00246-7, $4.50
Troubleshooting and Repair of Radio Equipment
080-020-00040-0, $8.00
United States Frequency Allocations (chart)
003-000-00469-4, $1.75
Use of National Bureau of Standards High Frequency Broadcasts for Time and Frequency Calibrations
003-003-01449-4, $4.75

If you want to order one of the preceding items without waiting to verify the price, just send about ten percent more than the amount that is shown. Any overpayment will be refunded in coupons that can be applied to subsequent purchases of GPO material. 73, Bill, W6DDB

Jerry Morin, KA1JFT, is a 38-year-old machinist who lives in Johnston, Rhode Island. He was active in CB for about eight years before he obtained a Hammarlund HQ-170 receiver, which exposed him to the world of amateur radio. Jerry operates on 15 meters most of the time using a vertical, a dipole, and a homebrew Yagi-Uda beam. He uses a randomwire antenna on 80 meters. His rig is a Swan 700CX transceiver. Jerry has contacted amateurs in 48 states and 47 countries. He won first place for Rhode Island in the 1983 Novice Roundup contest.

The Glitch Department



In the January 1984 issue we ran the article "More Convenient Mode Switching for the ETO Alpha 78 Linear" by Richard A. Ross, K2MGA. Due to a printing error, fig. 1, the simple modifications necessary to add complete mode versatility to the ETO Alpha 78 linear amplifier, was incomplete. Part of the black area was missing. We have reprinted the figure here in its entirety. If you found that the modification didn't work the first time, try it again. You now have all the necessary information!

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DX

a monthly feature by

HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATIONS AROUND THE WORLD

Lend me the stone strength of the past
And I will lend you the wings of the future,
For I am a DXer!

There are hidden things and hidden meanings that one learns with the passage of the years, and one thing eventually learned is that not all things are the same to all DXers. A week or so back one of the QRP types came puffing up the hill to talk of various puzzling mysteries, most of them relating to DX.

"It's the signal reports that I get that puzzle me," the QRPer said, "I worked both of the *CQ* World-Wide DX tests before Christmas, and though I was always careful with the reports I gave, in getting the contest forms ready to send in I noticed something strange. In the phone test all the forms going to Bob Cox had me receiving five by nine reports in every instance. Then I looked at the c.w. reports going to Larry Brockman, and every one I received was a five nine niner. Does that sound right?"

Of course it did. While everyone knows that the example for reports giving in the WW contest rules shows five by seven reports, one would have to search far to find many contest reports that are not either five by nine or five nine niner. As much as we listened in contests, we could not recall having ever heard anything else. We were sure that we knew the answer to this question, but having learned to live warily in the DX world, we thought we should probe for more questions before trying some answers. "Anything else puzzling you?" we asked, and soon found that there was.

"Remember when Malpelo was on last fall?" the QRPer asked, and we had to admit that we did recall the operation. There are hardly any of the Suffering Sixes who do not. "Well, during that operation I heard stations with big signals work HKØTU and get everything but their signal report. I just couldn't understand what the problem was, as they seemed to hear their call but not the signal report. They asked two or three times for repeats. Seems that if they gave HKØTU a five by nine report, they were hearing their report. How does one give such reports but not understand what's coming one's way? Heck, some of them were even on other bands on other days gone by and they still had the same problem; they could not read their reports. Do you understand what the trouble was?"

77 Coleman Dr., San Rafael, CA 94901

Jarmo J. Jaakola, OH2BN, from Helsinki happily remembers some of the good DX that he has worked since he was first licensed back in 1959. For some years he edited the c.w. column in the Finnish Amateur Radio magazine Radioamatoori, *but he found that it did not allow full attention to DXing. He belongs to several c.w. clubs, including FOC/HSC/TOPS and the A1-OP clubs. He works c.w. only!*

We were not sure whether or not we should explain, but we thought that we would try. "Perhaps you might understand," we started in cautiously, "that often DXing has overtones of ego fulfillment. When one has a big antenna system, a full-bore linear, and maybe a bit more, will you really be appreciated if you don't call attention to just how clever your operating might be? Maybe some of them do have flat spots in their hearing range; maybe some are looking for a chance to hold center stage just a bit longer. After all, one has to consider how disappointed the LIGA and the HKØTU operators would be if the signal report was not exact. One has to consider both sides of the exchange. Would one happily put a QSL on the wall that shows less than a five by nine report? Or give up being right up front while others stand in line to work the DX station? A less than a five by nine report can be a heavy burden."

Perhaps we were drawing from a hidden recess of the DX past. After awhile one has difficulty in recalling the individual QSOs on the way to a DXCC certificate, but we have always remembered working our first American Samoan station at a time when KS6s were not exactly plentiful. The rig was an HT-37 running barefoot, and the path to the Pacific went right through a tall hill, we being on the east side. "You're five by zero," the KS6 station said, and then he must have realized almost immediately how ridiculous such a report would be. "No, better make it five by one-half," he corrected, and that was it. Would one feel a DXer's fierce surge of pride when showing such to other DXers? Would even Bob White accept it for DXCC credit? Actually, he did. Later we found we had worried in vain, as the DXCC Desk was not worrying about the signal reports, only that a two-way contact was confirmed.

The QRPer before us was having difficulty visualizing anything less than a five by nine signal report. "I never did get a report like that," he said, "but last week I heard a station question his signal report. He got a five by eight and he kept asking for a recheck. "I've never gotten less than a five by nine plus forty. Do you think your meter might be off?" he kept saying. The other fellow would not change the report and even said that he recently had had the meter calibrated and that a five by eight signal meant that it was perfectly readable and a strong signal. They got to arguing, one fellow complaining that he'd never gotten anything less than a five by nine plus forty and could not understand why he was getting anything else. Apparently he felt slighted. He could not really argue, so he finally told the fellow on the other end not to expect a QSL card. I guess that that really showed him."

It undoubtedly did, and a deep wound is long remembered. "But all that aside," we said, moving to pick up the thread of the conversation before something else got entangled," remember that when you work a DX station whose QSL you need for a DXCC counter there is one report and one report only. It is never less than a five by nine or a five by nine niner, and you can throw in as many decibels as your conscience or need for the country will stand. Always! No smart DXer would ever jeopardize the chance for a needed QSL that means a new country by giving anything less than a truthful report, and they are always sounding five and nine." We leaned close to fix the QRPer with our gaze. "You really do understand all of this, don't you?" we asked.

Apparently he did not. After all the explanations and appeals to his logic and reason, this QRPer was still not sure about things. "But suppose the signal is not a five by nine," he protested. "Am I supposed to say that it is?"

Even a couple of days later we still found ourselves shaking our heads when we recalled that naive query. Everyone knows that DXers always tell it just as they hear it, and when you hear a long-sought DXCC country, it always comes through five and nine, especially when they are giving your callsign—always perfectable readable, extremely strong, and on c.w. always with perfect tone. That is the way it has always been and

The WPX Program

Mixed

1073	I2EAY	1076	FM7WD
1074	JA6GWU	1077	AK9N
1075	WA2SSH		

S.S.B.

1628	WD9EWT	1632	G4DTE
1629	JI1WLL	1633	JA1DNQ
1630	I2WTU	1634	F6FNA
1631	9Y4RD/SU		

C.W.

2230 ..... KK2J

Endorsements

Mixed: 450 FM7WD. 500 FM7WD. 550 YU7DX. 600 YU7DX, HB9BYZ. 650 YU7DX, HB9BYZ. 700 YU7DX, KØBQL, K2POF. 750 YU7DX, I1ZQD. 800 I5HOR, YU7DX, I1ZQD. 850 YU7DX, AI6Z. 900 YU7DX, JA2KVD. 950 YU7DX. 1000 DJ5VQ, YU7DX, W1CNU. 1050 DJ5VQ, YU7DX. 1100 DJ5VQ, YU7DX. 1150 DJ5VQ, YU7DX. 1200 YU7DX. 1250 YU7DX. 1300 YU7DX. 1350 YU7DX. 1400 YU7DX. 1450 YU7DX, YU2RTW. 1500 YU2RTW. 1550 YU2RTW. 1600 YU2RTW. 1650 YU2RTW. 2050 N4MM.

S.S.B.: 350 I8XTX, I2WTU, F6FNA. 400 I2EOW, I8XTX, WD9EWT, F6FNA. 450 W7KWI, I8XTX, WD5HEG, F6FNA. 500 I8XTX, AI6Z, F6FNA. 550 I8XTX. 600 I8XTX. 650 W6BCQ, I8XTX. 700 I8XTX, DJ5VQ, DK3EG. 750 I8XTX, DJ5VQ, DK3EG. 800 I8XTX, DJ5VQ, DK3EG. 850 I1POR. 900 I1POR. 1050 K4CKS. 1100 K4CKS. 1150 WA4OIB.

C.W.: 350 KK2J, YU4ELI, PY1AYE. 400 KK2J, KN7K. 550 OZ5EDR, K2POF. 600 OZ5EDR, WA2CNF. 700 DJ5VQ, AI6Z. 750 DJ5VQ. 800 DJ5VQ. 1000 SM6AYM. 1400 N4MM.

10 meters:	YU7DX.
15 meters:	YU7DX, OZ5EDR, AI6Z.
20 meters:	YU7DX, AI6Z.
40 meters:	YU7DX.
80 meters:	YU7DX.
160 meters:	YU7DX.
Asia:	AI6Z, Z21GJ, YU7DX.
Africa:	K4CKS, YU7DX.
No. America:	DJ5VQ, YU7DX, HB9BYZ.
So. America:	DJ5VQ, YU7DX.
Europe:	K9BQL, YU7DX, PY1AYE, Z21GJ.
Oceania:	AI6Z, YU7DX.

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.

that is the way it will always be! Five by niner, plus something, always!

While we had hoped to enlighten the QRPer, the more we talked the more he shook his head. "All the time I thought that DXing was an exact science," he said, "but the more I learn, the less I know. What was simple to me when I first got interested is now complex and difficult to comprehend. If it is like this when I am near the hundred country mark, what will it be later on?"

We could have tried to enlighten him, but we felt that he probably would not understand. When a learning DXer has to ask a question like that, the probability is that he will not understand the answer. As one grows and matures, either with the years or with DXCC countries, things do change, and the insight and understanding that initially was only suspected becomes an easy and natural understanding of the complexities of DXing. One only has to ask an Old Timer about any of the Eternal Enigmas and the answer is always there.

Possibly one of these days when this QRPer has added 150 or so countries to his DXCC total he will understand. Certainly a DXer pushing the 300 mark knows things not comprehended by the initiate. Along the way one learns that signal reports are often what you want or need them to be and for some listenings your hearing is better than for others.

"Just keep in there and never stop working DX," we finally had to advise the QRPer. "There are things that all DXers learn and you will, too." RST reports are always the movable feasts of DXing, and they move the way one needs them to.

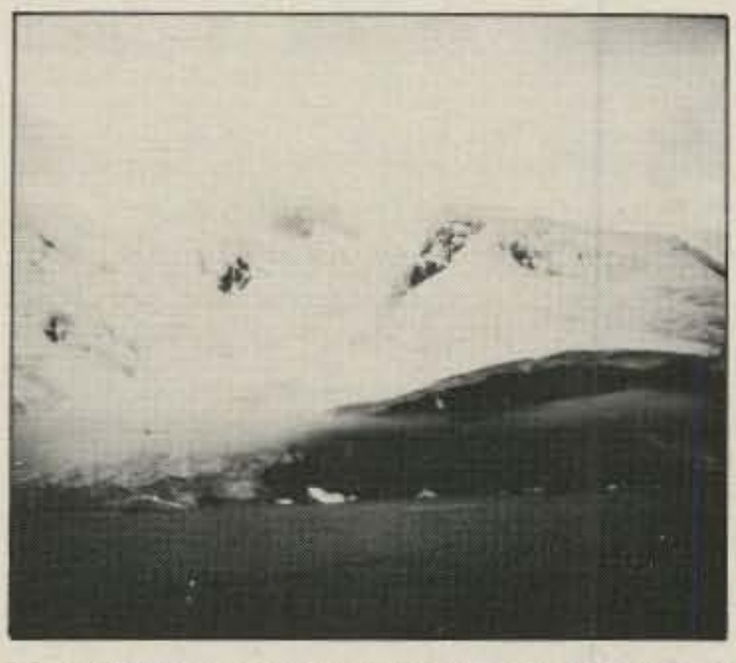
Curacao

John Thompson, W1BIH, is down in Curacao until the end of March and will be active on any of the live bands, including OSCAR 10. Look for him signing W1BIH/PJ2, and in the contests you may also find him signing W1BIH/P42J. QSLs go to Marvin Nettleton, W1KDD, 99 Elmwood Terrace, Torrington, CT 06790 (s.a.s.e. needed).

Peter I Island

Since the ARRL DXCC labeled this one a new country when someone manages to get there and operate, there has been a lot of interest mixed with anticipation. There were some dedicated types who said that they might soon be headed for the island, and the hopes of the needy DXers soared. However, going to Peter I Island is not exactly like hopping over to Barbados. Actually, it is a difficult place to get to, difficult to get ashore, and there have been but two recorded landings since the island was discovered in 1821.

After the island's discovery, the first landing was not until February 1929, when the Norwegian research vessel *Norvegia* put a crew ashore in the vicinity of Cape Ingrid Christensen on the west side of the island. Though a number of other vessels have been in the vicinity over the years, the ice pack often kept them at a distance. In 1960 the *USS Glacier* and *USS Burton Island* were in the vicinity and reported the ice pack just five miles south of the island.



This is the good side of Peter I Island and the side where the only two landings were made since the island was discovered in 1821. The center peak is Mt. Lars Christansentoppan, which is 5700 feet high. The right side of the photo is Cape Ingrid Christensen on the south side of which is a cave sometimes considered a possible DXpedition site. The only recorded landings on Peter I Island were in 1929 by a Norwegian survey crew and in 1982 by a crew off the cruise ship World Discoverer. *(WB6ZUC photo)*

Though there has been increased Antarctic activity in the last 50 years, there has been only one other landing on Peter I since 1929, and that was in 1982 when the *M/V World Discover* on a circumnavigation cruise of the Antarctic managed a landing at Norvegiabukta in the area of the previous landing. The same vessel the year before was not able to make a landing.

The accompanying photo of the island was made by WB6ZUC, who was a passenger on the *World Discover* on the cruise in 1982, Josephine taking the picture at 2300 local time on January 29th. It shows the general area where landings have been made on the island. Some idea of scale can be derived from knowing that the highest of the peaks is 5750 feet above sea level.

The island is volcanic in origin, 11.5 by 6 miles in size, and composed of basalt rock. The island drops off steeply on most of the west side although there are offshore rocks and reefs indicated by breakers and disturbed water. Most of the close approaches seem to have been made in the vicinity of Cape Ingrid Christensen. Notes on the island mention a large, remarkable cave on the south side of this Cape, and some discussions on possible DXpedition efforts have speculated on the possibility of setting up a camp in this cave. The two landings on Peter I both have been made on the west side, the Norwegians landing both north and south of the Cape. A small depot hut was erected on a steep platform of basalt lava at the head of Sandefjordbukta.

To some extent Peter I Island is only partly explored, and some charts of the island show scant features on the east side. While every DXer will live in anticipation of hearing this one, longevity could be a definite factor. But then again, DX has always been for the enduring, and, as anyone who has 300 DXCC countries knows, new ones come hard.

The DXCC Award

After the quiet period of WW II, amateur radio returned in November 1945. However, it was not until March 1947 that the new DXCC was announced, this coming after long study of the country list and the DXCC criteria.

Next year will mark the 40th anniversary of the return of amateur radio, and at conventions, DX meetings, and things like that across the country there have been recurrent raisings of the possibility of starting things all over again. Some have voiced the idea that this would be a magnificent idea. Others have groaned quietly

The WAZ Program

10 Meter Phone

261	YU7KV	264	JK1NLS
262	I2RFJ	265	I4KDJ
263	WB5RCS	266	JA8EZR

15 Meter Phone

181	JA7UPL	183	JA2BXV
182	JE2SPQ	184	VK3RF

20 Meter Phone

474	KA9I	477	XE1MD
475	I5ZJK	478	WA2VUY
476	WØIJN	479	WA8CZS

40 Meter Phone

23	JA4IKD	24	I4EAT

80 Meter Phone

24	I4EAT

10 Meter C.W.

48	PAØGT

15 Meter C.W.

96	JA1PS	99	SM6MCO
97	PAØGT	100	JA1CZI
98	JR3GWZ		

20 Meter C.W.

205	JA8CAO	206	K9IW

40 Meter C.W.

47	WA2SON

All Band WAZ

S.S.B.

2763	W7HKI	2769	W6MDH
2764	EA5AKY	2770	WBØRXF
2765	WA9IVU	2771	N6BFQ
2766	GM4JDU	2772	KU5L
2767	K6PKO	2773	WB6OKK
2768	KAØIQR	2774	WA8CZS

C.W. and Phone

5651	CP6EL	5659	SM5AKS
5652	K2QF	5660	SM5DAC
5653	JR3EQA	5661	JR4IQH
5654	VK3QI	5662	OH9SV
5655	NA5C	5663	NØZA
5656	4X4JO	5664	JT1AO
5657	JA1QZC	5665	WA8CZS
5658	SM6KQK		

All Phone

585	WA8CZS

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z 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.

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and wondered how they ever found the fortitude to run the course in the first place. There is a wide spectrum of feeling on this proposal, this often easily indexed by noting whether one has just over 100 countries or is on the Honor Roll.

There are inequities in the DXCC; there always have been and probably always will be. And, as many a parent learns, it is easier to give than to take back, and while no one complains in anticipation, bristles will rise when a suggestion is made that things be equalled by taking back something once honorably earned.

A recent query in the *Southern California DX Bulletin* asked, "How many did W6ODD work from Diu? Did anyone else operate there?" Diu? That's a DXCC country? It was until January 1962, and then it was on the long, long trail into the Deleted Country List. Heck, even Don Wallace, W6AM, missed this one! Once in a nostalgic mood Don was heard to say, "It was only on for a brief period, and I missed it!" The prefix was CR8, and it was a Portuguese enclave on the Arabian Sea side of India up just below the Gulf of Kutch.

If you have any ideas on starting anew on the DXCC you might sort out your own arguments on one side or another. Should the topic see daylight, and the signs are that it will, you will be prepared to discuss the topic rationally. After all, if you are bumping the top on the Honor Roll listings, they still count (in parentheses), your total including the deleted ones, but only if you worked them before they were deleted. Even to get them listed in parentheses took a lot of wrangling. However, it may come that everything will be deleted and everyone starts again clean. Get your enthusiasms organized!

The Colvins

During the CQ WW Phone Test just before the turn of the year Lloyd and Iris were in Bogota signing W6QL/HK3. They worked some 6000 contacts from Colombia about equally divided between phone and c.w.

From Bogota the Colvins were planning a stop on San Andres island to sign W6KG/HKØ, alternating their personal calls as they usually do. They plan to move on into other countries in South America, working both modes and covering all bands. Late information on their plans can be gained from copying the DX bulletins on W6TI at 14002 kHz on Mondays at 0200Z. You'll not only hear the Colvins' plans but other late breaking DX news. After Colombia they are headed for HC Ecuador.

The Good Ol' Days

Eventually one tends to learn that these are the good days; those others were only good because you survived them. Jan Perkins, N6AW, notes that back a few years, in 1920 or so, things were changing from spark to c.w. Actually, following WW I, spark was the big signal for close to two years, John Reinartz coming up with a c.w. tuner in the early twenties, and the ability to copy the narrow c.w. signals was available to amateurs. But things were not yet easy.

Should you lean to the thinking that if you cannot work all the continents in a contest weekend then things are real bad, think a bit about how things were then. In 1921 during certain time periods British amateurs listened for stateside signals. They heard none. QRM from regenerative receivers was a good part of the problem.

In late 1921, 2XE spent 10 nights on a windswept and foggy moor in Scotland listening for the Deserving stateside amateurs. In the 10 nights of listening he heard 18 c.w. signals and 9 spark signals. The following year another try was made, and this time 316 stateside calls were heard, including two of the Suffering Sixes. Note that these were only heard, not worked.

It was not until the following year that two-way communication across the Atlantic was made. The French station 8AB on 100 meters worked 1MO and 1XAM in the same evening. As N6AW notes, it marked the death knell for spark and c.w. was with us.

It might be interesting to note that after WW I most amateurs lurked around the 200 meter area with some big guns up in the 800 meter area. Selectivity was a rumored thing; signals were about 100 meters wide, and the loud signals were the ones that were worked—the louder the better.

All this comes from the *Southern California DX Club Bulletin.* It might also be relevant to note that those involved were the early DXers. DXers have always been out in front. They always need the new ones.

---

5 Band WAZ

Standings as of November 1, 1983

All 200 zones worked:

1.	ON4UN	34.	IØRIZ
2.	K4MQG	35.	ON5NT
3.	SM4CAN	36.	OH6JW
4.	AA6AA	37.	OK1AWZ
5.	W8AH	38.	IV3PRK
6.	W6KUT	39.	DJ6RX
7.	EA8AK	40.	OH3YI
8.	LA7JO	41.	I4RYC
9.	EA3SF	42.	ZL1BIL
10.	OH1XX	43.	I4EAT
11.	EA8OZ	44.	ZL1BQD
12.	WØSD	45.	TG9NX
13.	KØZZ	46.	XE1J
14.	ON6OS	47.	F5VU
15.	OK3TCA	48.	W3AP
16.	K6SSS	49.	YO3AC
17.	ZL3GQ	50.	K3TW
18.	OK3CGP	51.	XE1OX
19.	SMØAJU	52.	VE7IG
20.	OZ3PZ	53.	OK1ADM
21.	I3MAU	54.	CT1FL
22.	I2ZGC	55.	WA1AER
23.	4Z4DX	56.	N4RR
24.	N4KE	57.	UWØMF
25.	K5UR	58.	W4DR
26.	K9AJ	59.	OK1MP
27.	SM3EVR	60.	W1NW
28.	LA5YJ	61.	OE1ZJ
29.	DL3RK	62.	HB9AHL
30.	N4WJ	63.	HB9AMO
31.	G3MCS	64.	LA6OT
32.	SM5AQD	65.	UR2QD
33.	WØMLY	66.	UK2RDX

The top 10 contenders for 5 Band WAZ:

1.	N4KG, 199	6.	W8VUZ, 198
2.	JA3EMU, 199	7.	LA9GV, 198
3.	N4WW, 199	8.	K4CEB, 198
4.	W1NG, 199	9.	OK1MG, 198
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BY1PK

Tom Wong, VE7BC, expects to be at Beijing operating BY1PK in April. This may be another chance for s.s.b, Tom being reported in the *Totem Tabloid* of the Western Washington DX Club as saying there are no operators at BY1PK with a fluent command of English, and maybe no command at all.

Frequency instability in the transceiver plagued the s.s.b. effort last fall. Tom reported that when he tried to tune in a station on the receiver frequency, the v.f.o. in the transmitter portion would jump a bit, and often it was apparent that the station being worked could not hear Tom's return.

Local interest resulted in a number of the Beijing crew listening on earphones paralleled across the audio output. This did not help too much; there was even less of an edge when a capacitor arced in the 3 kw linear and forced some QRP operation—500 watts. It is hoped that all the problems will be out of the way when April comes.

Some JAs and others have operated in recent months. A BY4AA effort was a joint Yokohama/Singapore club operation. VE7BC tends to believe that it will be some time before another s.s.b. operation from BY4, although c.w. should be heard from time to time.

VE7BC travels to China on business, mostly in the import/export field, although at times some suspect that Tom is doing a good job of selling amateur radio. Once in awhile you may encounter some DXer who has yet to work BY China. There are plans to assuage the hurt.

Needed

Every DXer needs something. Even if you have worked them all and are sitting right on top of the numbers, you need to be alert always so that nothing slips by you. A month or so back Bill Poellmitz, K1MM, was working up a quiz for the annual bash of the Southern New England DX Assn. and was looking for what was needed a couple of years ago. Things change, as surprisingly as it may seem.

Five years back the *West Coast DX Bulletin* ran an exhaustive poll of the needed ones. This list was made from over 700 W/K amateurs, and the need was analyzed down to the #153 position. At that point only 2% of the respondents needed Kenya and 1% needed Southern Sudan.

But what was the top of the list back then? Going from W1 and progressing up to WØ, the top of the list ran: W1-Bouvet 2-Okinotorishima, 3-Burma, 4-China, 5-Bouvet, 6-Bouvet, 7-Neutral Zone, 8-China, 9-China, and Ø-Bouvet. Five years later Okino, Burma, China, Neutral Zone have faded, and Bouvet is probably still right on top. The second position in each call area might also be interesting. It ran W1-China, 2-Spratly, 3-Heard Is., 4-Bouvet, 5-China, 6-Neutral Zone, 7-Mt. Athos, 8-Neutral Zone, 9-Neutral Zone, and Ø-Neutal Zone.

Five years later the list has had many changes, including some deletions such as Okinotorishima and the Neutral Zone. W1AM with his computer was the one back then doing the heavy work. The needed list was worked out by calling areas because of the belief that what W1s need is not necessarily what W3s need, and each call area has different needs on its list. The years have changed, but this premise has not, and the list that time had over 1500 listings in the ten call areas. The Extra class calls in the response constituted 44%, and those holding WAZ 65%. Average DXCC country listing was 268.

National Capitol DX Club

DXPO '84 will be held in the Washington area this year. Stu Meyer, W2GHK, has taken on the job of chairman. The plans to hold DXPO '83 outside the Washington area last year ran into problems, and it was cancelled. The NCDXA voted unanimously to host the 1984 effort.

New officers of the NCDXA are President John Boyd, W4WG; Vice-President John Kanode, N4MM; Secretary Bob Chapman, WB4FTU; and Treasurer Henry Herman, W3UJ.

Some DX Notes

FOØXX was still on track at the end of the year and final plans should have been

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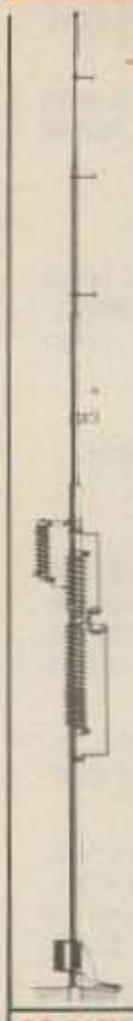

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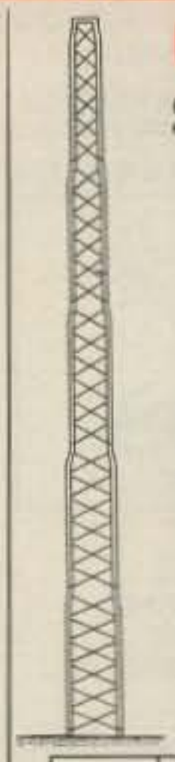

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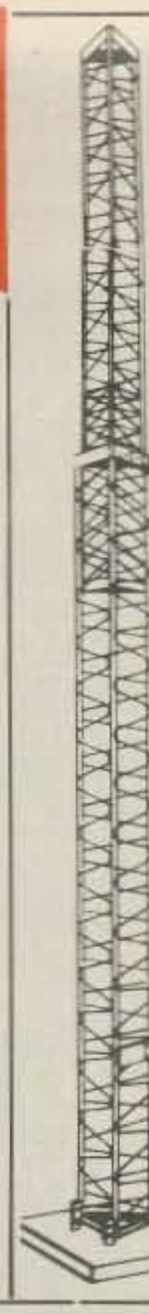
HDBX48	48 ft	18 sq ft	363	BXB8	429	30	459



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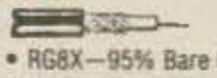

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⅞" Heliax	50	.1	.2	.5	.9

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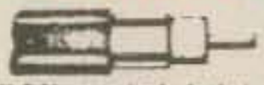

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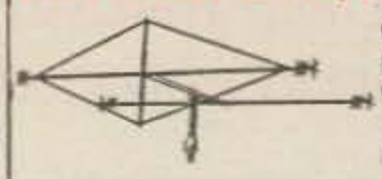

Wing Span - 11 ft
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Wind Area - 1.5 sq ft
1200W P.E.P. input
6-10-15-20 mtrs

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating)	$109
Alliance U100 (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			$199
45G Foldover Double Guy Kit			$229

*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!

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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	$39	$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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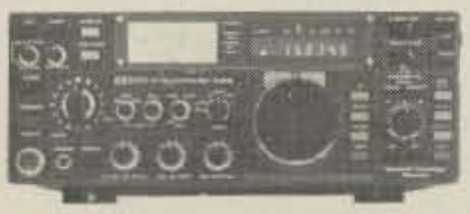

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List $319
FT-708R 440 MHz HT
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2M HT

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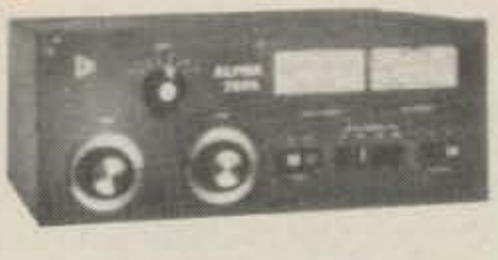

76PA $1699!

Model	List	Sale*
76A	$1985	CALL
76PA	$2395	CALL
76CA	$2695	CALL
374A	$2595	CALL
78	$3495	CALL

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4229 2KW Tuner Kit $189.95!

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CRI-100 List $249 SALE $229.95!
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CWR6750	$629.95	MPT3100	$2199.95
CT2100/KB2100	$749.95	RS2100	$289.95
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List $339 Sale $299

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QSA-6	$41	432PL	$59
PB-30	$25	PB144	$25
PB-50	$25	PB220	$25

MIRAGE AMPLIFIER SALE!

B1016
$249

Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
A1015	6M	Yes	10W	150W	20A	$249
B23	2M	No	2W	30W	5A	$ 79
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
D1010N	440	No	10W	100W	20A	$289

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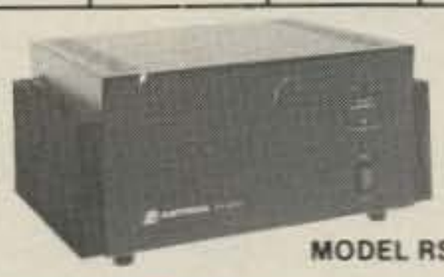
Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229



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CP-1 COMPUTER PATCH
List $239.95 SALE $189.95!

CP1-20	$219	CP1-64	$219
MP-20	$219	MP-64	$219
VIC-20 MBAText	$79	C-64 MBAText	$79

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MFJ 1224 COMPUTER INTERFACE $89.95

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901 300W Tuner	$59.95
941C 300 W Tuner	$89.95
989 Deluxe 2KW	$299.95

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Apple Amtor Soft/Hamtext	$139	VIC-20 Hamsoft	49
Vic-20 Amtor Soft	89	Hamtext VIC-20	99
Model 64 Amtor Soft	89	Hamtext Model 64	99
Apple Hamsoft	29	Atari Hamsoft	49
		TRS-80C Hamsoft	59

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The WPX HONOR ROLL

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MIXED

2522	F9RM	1703	W7LLC	1312	IN3ANE	1013	W8ILC	800	YU2CQ
2522	YU4HA	1690	PA0SNG	1287	SM3EVR	1011	I2MQP	789	K7CU
2469	YU2DX	1650	4Z4DX	1263	N6AW	1005	WB8ZRL	783	JA9FAI
2225	W2NC	1659	N2AC	1204	JH1VRQ	995	LA7JO	768	EA1JO
2201	K6JG	1657	YU2RTW	1204	K8LJG	987	EA9IE	757	AI8M
2200	K2VV	1538	YU7AW	1204	DA2DC	975	KC8CC	747	VE2FOU
2168	VE3GCO	1520	I6SF	1196	N6JM	958	YU2CBK	732	N2AIF
2150	K6XP	1488	SM7TV	1192	CT1LN	942	KA3A	718	W6OUL
2021	N4MM	1481	W8CNL	1189	W8RSW	928	N4IB	700	KJ7N
1920	W4BQY	1451	I2PHN	1180	W7CB	888	DK2BL	697	KC8JH
1888	W9DWQ	1448	K9BG	1154	KL7AF	859	WD9IIC	690	WD4RAF
1866	YU7BCD	1422	K6DT	1108	DJ2UU	856	W6YMH	685	VE2PD
1776	N6JV	1415	K6ZDL	1026	N3ED	852	W0JIE	658	K8HF
1772	N6CW	1409	KF2O	1023	K2QF	822	G3ZRH	656	K9TI
1726	N4NO	1401	YU1DZ	1022	G4FAM	817	N8BJQ	656	K2POF
1725	K5UR	1400	W0SFU	1014	NN4Q	809	I1ZQD	651	OE1KJW
1704	N9AF	1397	N6FX						

S.S.B.

2438	F9RM	1446	PA0SNG	1070	CT1FL	924	WB6GFJ	702	I0SGF
2148	I0ZV	1400	WD8MGQ	1063	WA4OIB	922	TG4NX	700	EA7AZJ
1970	I0AMU	1399	I0MBX	1057	W2NC	898	W2LZX	694	ON6IT
1911	K6XP	1391	W9DWQ	1056	G4CHP	865	CT4NH	692	W0ULU
1901	K6JG	1301	WA4QMQ	1034	JH1VRQ	850	NN4Q	670	JH5FQO
1865	K2POA	1294	YU7AW	1033	KC4OV	846	AC2J	665	VE2PD
1856	K2VV	1289	N2SS	1032	N6FX	842	WA2FKF	665	DK4AP
1818	N4MM	1271	I6ZJC	1029	W6YMV	832	K8LJG	649	OE8MOK
1810	ZL3NS	1247	N4NO	1027	WF4V	818	I1POR	646	KB2DE
1642	I4ZSQ	1243	W4BQY	1009	I2MQP	805	W8ILC	637	KB0C
1577	I8KDB	1238	I2PHN	1001	TG9GI	797	W3ARK	616	WN5MBS
1568	I8YRK	1158	PY3BXW	997	ZP5RS	793	Z21GJ	612	YB0ACL
1530	HB9AAA	1107	KF2O	973	WB8ZRL	768	W6LQC	608	KA3A
1510	YU7BCD	1099	I0NOA	955	N2AC	764	N3ED	607	KC8YM
1506	OZ5EV	1098	F2MO	947	KL7AF	750	N4IB	604	W8RSW
1503	W0YDB	1091	VE1YX	946	XE1OX	746	W3GXK	601	W6YMH
1501	CT1UA	1089	W2CC	933	KC8CC	732	VK6YL	600	WD9HAW
1476	K5UR								

C.W.

2004	W8RSW	1509	N4NO	1295	W9FD	1093	N4YB	756	NN4Q
1996	W2NC	1508	YU7BCD	1281	I6SF	1045	JE1JKL	719	KA3A
1790	W8KPL	1496	W4BQY	1245	VO1AW	1024	JA1KRU	689	G4FAM
1738	N6JV	1491	G2GM	1225	LZ1XL	925	KF2O	663	KA7T
1723	WA2ZHR	1486	W9DWQ	1197	K6ZDL	876	K8LJG	656	VE2FOU
1714	DL1QT	1482	N2AC	1182	YU7AW	861	YU7SF	644	EA1JO
1706	K2VV	1402	N4MM	1105	N6FX	848	KL7AF	616	W8ILC
1670	ON4QX	1344	WA1JMP	1101	YU3NP	801	N3ED	605	N2AIF
1630	K6JG	1340	K5UR	1093	N4YB	796	AK9Z	600	OE1KJW
1580	K6XP	1304	4X4FU	1045	JE1JKL	787	DJ1YH	600	WA2CNF
1556	W3ARK	1300	VE7CNE	1101	YU3NP				

issued by now. The target date was for March/April, and things should be heading downhill by the time you read this. With the sunspot cycle heading down, it would be well to work this Clipperton effort on the higher frequencies.

KC7UU was expecting to head for the Niger Republic in January and possibly some action has been noted. Carl and Martha Henson, WB4ZNH and WN4FNU, were also possibilities for some 5U7 activity about this time. Carl works for an airline, and much of his travel has been possible because of reduced fares available to airline employees, this often on a reciprocal basis with other airlines. Recently there have been proposals that such work-related privileges should be taxed as a form of income. Carl fears that should this proposal be enacted, his far-reaching DX trips might be more memory than expectation.

Amateur radio station and operator licenses are now being issued for a ten-year term, the new longer term being phased in as licenses are renewed. The FCC made this change under P.R. Docket No. 83 337. Senator Goldwater has introduced legislation to allow out-of-pocket expenses which may be incurred under the new Volunteer Examiner Coordinators program. This is SB 2045.

Here is Alex Kasevich, VP2MM, on the right greeting his QSL Manager, Rick Casey, AB1U, who has just flown in to pick up VP2MM logs. Actually, Rick stayed a bit longer to enjoy the Montserrat scenery; he and his wife Karen were Alex's guests. Alex is currently visiting in Florida and thereabouts but will return to VP2M Montserrat in mid-summer. His home call is W1CDC, but that only heads a list of calls that includes PJ9CEC, PJ9USA, PJ8USA, FG0EXC, J3ABL, and VP2MBC.

The action by KA2ORK in Grenada in October has drawn praise and commendation. Being one of the few and reliable sources of information on what was going on, Mark Barettella got a lot of media attention. Efforts to use him for on-the-air interviews or for news reporting drew negative rulings, the word being that it was okay for non-amateurs to listen, but amateurs were not to be used directly in the news-gathering process because of the lack of a third-party agreement. On October 25th the FCC issued a temporary authorization for emergency third-party traffic for emergency health and welfare traffic; this was cancelled the following day.

There are also reports that this year the FCC will go to a quarterly examination schedule, and even for this application would have to be made in advance. With the proposals for volunteer examiners getting a lot of attention, it may be that things are going to be different sometime this year.

XU1SS/KC/IP and PV are being accepted for DXCC counters. There were recurrent rumors that VE7BC cut short his BY1PK s.s.b. effort last October because of QRM and the local authorities' disenchantment with the QRM. Other sources say this was not the problem, but that Tom had not intended a long operation because of business commitments and also that the Sports Center had been scheduled for other events.

Kermedec Island is supposed to get more activity with the turn into this year. ZL3AFH was due to arrive last fall and has been reported using the new ZL8 prefix. Initially he was using the low bands to work stations back in the ZL homeland, but he was expected to be heard up in the higher frequencies in the early part of this year. Also reported as headed for Kermedec was the HIDXA who was aiming for action the latter part of January or February.

Alex Kasevich, VP2MM, is in Florida for a visit until mid-year and probably will only be heard on 2 meter f.m. until he returns to Montserrat. Alex plans to take back with him equipment for working through OSCAR 10. Alex has been in VP2M for two years now and is active most days. His home call is W1CDC, but that is not the QSL route. Rick Casey, AB1U, 85 Hacienda Circle, Plantsville, CT 06479, handles Alex's cards for VP2MM, VP2MBC, and PJ8USA. S.a.s.e.? Naturally!

KD7P/KH2 will be on Guam for another year and a half and has been active on RTTY. His stateside QSL Manager is Patti Meeks, KS7L, 4514 76th St. SW, Mukilteo, WA 98275. Patti gives fast turnaround on cards and requests s.a.s.e.'s.

Steve Bonar, VE7BBC, is presently in

American Samoa signing VE7BBC/KH8. He will be there for at least another 18 months, possibly longer, and has applied for a KH8 call. A year back Steve was in Nigeria signing VE7BBC/5N1, and this can be QSLed to Dennis Pekrul, VE7CXN, 2131 Duthie Ave., Burnaby, British Columbia V5A 2S1. QSLs for Steve's KH8 operations also go via that route (s.a.s.e. or s.a.e./IRC requested).

Bruce McCoun, W2HWS, was in Antigua in December signing V2AZL, this being an annual winter trip for Bruce looking for the sun and some DXing. He handles his own QSLing, and cards go to him at Deer Path, Quogue, NY 11969. He guarantees 100% QSLing and an s.a.s.e. is always appreciated.

Ian Davies, G3KZR, backs N4AM's comments in the August *CQ* letter section. Ian wonders if a contest along the lines of the European QRA-Locator system in the h.f. bands might not find a lot of support. Putting it simply, the idea is based on squares of 1° × 1° latitude and longitude over land portions of the earth. Thus, there would be some rare squares, probably not in metropolitan areas with big amateur populations, but possibly not too far distant. Thus, one could operate from a "rare" square without too much travel. In sparsely populated areas one might not have to even leave home to be rare. Ian believes that this would counter what some consider the increasing ordinary quality of callsigns to be worked in those countries or areas with numerous amateurs, and possibly would lessen the increasingly intolerable pressure on operators from rare QTHs where every attempt to operate brings a howling pile-up.

There has been some speculation on the possibility of Nevis in the West Indies being a separate DXCC country, this because under the recent independence of St. Kitts/Nevis, the latter was guaranteed autonomous status with local control of its affairs. Actually, there is only a two mile strait between St. Kitts and Nevis, the islands going independent last September. Many may have worked the IDXF sponsored operation last summer when VP2KBH, VP2KBI, VP2KBJ, and VP2KBK operated. QSLs for this effort go to Andy Anderson, K8EFS, 4300 South Cochran, Charlotte, MI 48813 (s.a.s.e. or s.a.e./IRC needed). With the talk about separate status for each island, you may wonder where the above effort was. It was on St. Kitts at the Fairview Inn.

In other times and other places some have raised the point that DX pile-ups should be confined to somewhat narrow segments of a band to avoid interference with more worthwhile endeavors such as ragchewing. Some have wondered whether the recent Malpelo effort was hampered in the early going by attempting to hold the pile-up to some confinement and that possibly some of the BY operations have found similar difficulties, mainly it being if you can't hear them you can't work them. We've heard reports that the idea came from a discussion at a DX club. Later we heard that the same club petitioned the FCC to be compassionate and not suspend the license of one of its members nailed for interference. Whatever it is and whosoever might spring the idea, never take such suggestions lightly even though at first you may consider the proposal slightly ridiculous. Often such proposals are run up the flagpole to see who might shoot them down. Should they not be shot down, the tacit assumption is, "See, the idea must be good. No one is shooting and everyone is saluting."

What does a gung-ho DXpedition look like? Here is the crew that operated from St. Kitts last year and ran up a big total of contacts, including 244 in 10 countries on 6 meters. From the left are Kaye Brauer, N8AKY; Don Wilke, WB8BKC; Donna, KA8LDO; and Merlin "Andy" Anderson, K8EFS. If you wonder why Andy looks so motivated, it was just decided that he would handle all the QSLing for the effort. Calls used in this outing can easily be determined by close scrutiny.

QSL Information

A82LC to SM4CWY
C38AAL to F6EYS
CE8FCM/Z to WB6WOD
CT2FH to W4JVU
F8AQJ/FC to HB9ANZ
FB8WH to F6BFH
K8SD/HR2 to WB0MZB
OG1AF to OH1AF
OH2BZ/8 to OH2BZ
OX3PT to WA2TTI
PZ5JR to K3BYV
TU2NW to AK3F
VP2BKH to K8EFS
VP2KBI to K8EFS
VP2KBJ to K8EFS
VP2KBK to K8EFS
VP9KA to W1BPM
VP9KM to W1BPM
VP2KBZ to VE3KZ
VE1CBK/1 Sable Island to VE1AJH
VE7BBC/KH8 to VE7CXN
VE7BBC/5N1 to VE7CXN
VP8AEN to GM3ITN
VQ9JD to N6AFD
VU2JXO to WA3TLB
ZS1AO to VE3HK
3D2DM to KE4OC
4K1F to UK3ACR
5H3DM to G3NXR
5Z4CI to PA0ADC
8P6RE to KC3EK (ex-KA3GSN)
EA8AGF to Box 123, Las Palmas, Canary Islands
EA9LZ to POB 265, Ceuta via Spain
FG7BP to POB 65, Goyave F97128, Guadeloupe, West Indies
FR7ZN to POB 65 - 97462, St. Denis, Reunion Island via France
KD7P/KH2 to Patti Meeks, KS7L, 4514 76th St. SW, Mukilteo, WA 98275
N4SF/6Y5 to N4SF, 1208 Lochcarron Lane, Cary, NC 27511
T2ADE to C. Roberts, POB 5, Funafuti, Tuvalu, Central Pacific
V2AZL to Bruce McCoun, W2HWS, Deer Park, Quoque, NY 11959
V3FB to POB 108, Coro, Belize
3D6AN to POB, Manzini, Swaziland
6Y5EE to POB 188, Kingston 5, Jamaica
9X5PE to B.P. 202, Gisenyi, Republic of Ruwanda
W1BIH/PJ2 to W1KDD, 97 Elmwood Terrace, Torrington, CT 06790
W1BIH/P42J to W1KDD, 97 Elmwood Terrace, Torrington, CT 06790

All this was done with a lot of help from Bob, W9LNQ.

DX Ten Years Back

In February 1974 there were the persistent rumors that Clipperton would soon be heard. EA7DJ was operating from Melilla. K3RLY was saying that INDXA would rise again—it didn't. There was a report that some 9Q5s were being heard, along with the rumor that the cost of a license there in Zaire was a dollar per watt. A JA call book was available—900 pages on thin rice paper. The ARRL spring board meeting voted to consider associating with the Sister City Program. Don Riebhoff was putting XU1AA on the air regularly, but had a game plan to drop everything and head for the border should there be any significant changes—changes such as artillery shells coming in to find the range. W7PHO was greeting visitors around 2330Z with regulars such as VS5MC, XW8FA, XV5AC, XU1AA, and other SE Asia types coming in to chat. W1JFL had the logs from A51PN for '72 and '73. WA7IXE/KP6 was on Palmyra. From Yemen 4W1CW was being heard. JY1 was planning to attend the ARRL New York City convention. SM2DWH was on from Dacca in Bangladesh. W1GEY was headed for China to comply with an invitation to present his company's product and was hoping to put a BY station on the air.

73, Cass, WA6AUD

Ham Shop

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non subscriber) will be printed unless accompanied by full remittance. Non-commercial ads free to CQ subscribers (maximum 3 lines per month). All ads must be typewritten double spaced. Recent CQ mailing label must accompany ad. **Closing Date:** The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

MAGNETIC CALL SIGNS . . . 2 inches by 8 inches . . . Great gift idea. Easy transfer from one car to another. Your call letters or repeater frequencies available in the following colors (on white background): Black, Blue, Red, Green, Brown, or Orange; $5.00, add $.50 per sign for postage. SIGN-ON, Dept. Q., 1923 Edward Lane, Merrick, New York 11566.

HAM HOLIDAY SRI LANKA: Write to Spangles Travels, 84 Templers Road, Mount Lavinia, SRI LANKA. + 5 IRCs.

WANTED: Cash paid for used SPEED RADAR EQUIPMENT. Write or call: Brian R. Esterman, P.O. Box 8141, Northfield, Illinois 60093, phone (312) 251-8901.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

AHOY—SAILOR/HAMS: Why not charter a new MORGAN 41 foot sailboat from Ft. Lauderdale equipped with a TS-130SE and Hustler Ants. for your next Vacation/Dxpedition. Call Shelly at 800-237-2291 or 813-753-3934 (Fla.) and reserve "SOJOURNER."

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WANTED: Pre-1950 TV sets and old TV GUIDE magazines. W3CRH, Box 90-C, Rockville, MD 20850.

COMPUTER SOFTWARE: For Apple, Atari, C-64, IBM/PC, Timex-Sinclair, TRS-80, and VIC-20. Mark Electronics, 17589 Birch, Romulus, MI 48174.

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

NEW KID on block: For QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing—instructions included. Stamp appreciated.

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels. Also "Skyrider Commercial" early transmitters such as HT-1, HT-3, HT-19, and other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

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IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 2:00–3:00 PM Eastern. 1 Pryer Manor Rd., Larchmont, NY 10538.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $18.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specifiy Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

QSL's by W4TG. Prices from $16 per 1000. Send SASE to P.O. Drawer F, Gray, GA 31032.

ATTENTION CONTESTERS: CONTEST SUPER PROGRAM now available for Radio Shack TRS-80 Model III, 2 disk drives, 48K of memory, and printer. FAST, EASY TO USE. Handles up to 9000 contacts, almost instantaneous duping, and prints log during contest. Prints dupe sheets, score sheets, and QSL card labels after contest. Sixteen-page instruction packet. Only $34.95 (PA residents add 6% tax). Send your check or money order today to LAWRENCE R. WALKER, N3CQM, P.O. Box 459, Springfield, PA 19064.

SCHEMATICS: Radio Receivers, 20's/60's. For details send namebrand, Model No., SASE. Scaramella, P.O. Box 1, Woonsocket, RI 02895-0001.

QUICK-FIND CALLSIGN LOG. Quickly know if and when you worked that call, and if you WANT to work it again! $2.00, full price. Quick-Find, 2725-C Sandicrest, Cantonment, Florida 32533.

COMPUTER SOFTWARE for VIC-20, Commodore 64, and Apple. Ham, educational, and clerical programs from $6.95. Write: ELECTRONIC PUT-ONS, 7805 N.E. 147th Ave., Vancouver, WA 98662.

FOURTH ANNUAL Ohio State Convention and Flea Market: Join in the even bigger "Cincinnati ARRL '84," February 25 and 26. Activities for Hams and electronics enthusiasts: forums, meetings, vendors, Wouff Hong, women's activities, banquet, hospitality suite, more. Sure cure for "cabin fever." Hospitality suite Friday and Saturday nights. The $5 convention registration includes all convention awards. Flea market is $4/space for two days—Ham and electronic items only. Write: Cincinnati ARRL '84, P.O.B. 11300, Cincinnati, OH 45211, or telephone 513-825-8234. Vendor and exhibitor inquiries invited.

DAYTON HAMVENTION '84: The largest amateur radio show of the year will be held April 27, 28, 29, 1984 at the Hara Arena And Exhibition Center, Dayton, Ohio. For information write to Dayton Hamvention '84, Box 44, Dayton, OH 45401.

SELL: Teletype Model 32ASR with 60 wpm gears installed, ready for amateur use. All machines in excellent condition. $125. Bob, KL7HDY, 907-563-6209.

MILITARY COMMUNICATIONS RADIOS: R-174 (GRR-5) Receiver, tunes 1.5–18 MHz AM-CW-SSB, $47.50 mint, $27.50 good. Canadian PRC-510 Backpack Radio (identical to American PRC-10), transceives 38–54 MHz FM, with headset, antenna, battery box, $39.50, 2/$77.50 good condition. CPRC-26 Canadian Portable Field Radio, transceives 42–54 MHz FM, 6 channels, with battery box, antenna, one crystal, $22.50, 2/$42.50 good condition. ARC-27 Aircraft Guard Receiver, 220–250 MHz AM single channel, $12.50 mint. R-108 Receiver, 20–28 MHz FM, $27.50 mint. 45 Day Replacement Guarantee. Schematics included. Add $5/unit shipping. Baytronics, Dept. CQ, Box 591, Sandusky, OH 44870.

WANTED: Printhead ASSY for Texas Instruments Silent 700 Series Data Terminal Model 742 T.I. Part No. 95422-0001. Mike Holley, VE7AVM, 6586 196th Street, Langley, B.C. Canada V3A 4P7, phone (604) 534-6466.

CHASSIS AND CABINETS KITS: SASE K3IWK.

NEW SOCIETY formed for Hams, SWLs, Handicapped, and War Veterans. Beneficial to all. Several awards available. SASE for particulars to: RCSW, 32 Applegate, Bennington, VT 05201.

LOUISIANA'S NEWEST HAM STORE! DIXIE ELECTRONICS, GONZALES, LA. Azden PCS-4000 $279.00, PCS-300 $269.00, Hy-Gain TH-7 $369.95, NEW Explorer 14 $279.95, Ten-Tec Corsair $999.95. All Hustler Resonators In Stock. Call Robin, WB5UXA, 1-800-535-8134 in LA. Phone 1-800-272-8293.

SUPER CQWW and ARRL CONTEST programs. TRS-80 Model I, III (IV in III mode). Completely machine language. AUTOMATIC identification of country and zone (CQ) from call letters. DUPE SPEED 12000+ contacts per SECOND. Screen displays zones still needed (CQ), total points, zones, countries, etc. Automatic cw generator with 2 buffers. Log Print program prepares logs AND dupe sheets. Log Preparation program for hand logs. Similar features to above. QSL Label program for both. *CQ* WPX now being written. FREE fact sheet and sample printouts. K4SB, 3496 Velma Dr., Powder Springs, Georgia 30073.

Henry 3K-A 80–10M, Mint, $1250. Leader LB0520A Dual Trace, $450. K4QDK, 804-359-1191, eves.

QSL CARD HOLDERS 40 cards per holder, 7 holders $6.00, dealers inquire. EZN Holder, Dept. 2, POB 23371, Knoxville, TN 37933-1371.

SECURITY ALARM SYSTEMS EASILY LEARNED. Explore the possibilities of this RAPIDLY GROWING field. INFORMATION PACKAGE $2.00. SECURITY ELECTRONICS INTERNATIONAL, P.O.B. 1456-SQ, Grand Rapids, Michigan 49501.

ROHN TOWERS: Wholesale direct to users. All products available. Write or call for price list. Also we are wholesale distributors for Antenna Specialists, Regency, and Hy-Gain. HILL RADIO, P.O. Box 1405, 2503 G.E. Road, Bloomington, IL 61701-0887. Phone 309-663-2141.

TEN-TEC ARGONAUT with manual $215.00, NATIONAL NC-125 Receiver with manual $110.00, OLYMPUS OM1N 35 mm camera body mint $130.00, ICOM IC202 2M SSB portable with manual $205.00. All include UPS paid. TOM HAGERMAN, NØDST, 1812 Neihardt, Branson, MO 65616.

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DUPED OUT? End paperwork with the remarkable APPLE II + Contest Logging and Checking Package. All contests supported including powerful realtime Sweepstakes with unique data recognition feature. $25 postpaid. Write: AnTech, P.O. Box 8964, Fort Collins, CO 80525.

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HELP! Need Collins 30 L-1 linear amplifier for parts. Will pay cash. Poor condition or basket case ok. Contact Jim Mozzillo, 619 Prospect Avenue, Hot Springs, Arkansas 71901.

FOR SALE: Vic-1212 Programmers Aid Cartridge for the Vic-20 computer. Vic-1525E Graphics Printer, works with either Vic-20 or Commodore 64 computers. Both in excellent condition, with manuals. Karl Thurber, W8FX, 317 Poplar Drive, Millbrook, AL 36054.

ROSS $$$$ NEW February SPECIALS: Callbook 1984 U.S. $16.00, FOREIGN $15.00, COLLINS HF-380 MAKE OFFER, KWM-380 $2890.00. If this month's special is not what you are looking for, send call letters, name, & phone # for personal price quote. Over 5,000 ham-related items in stock. ICOM # IC-02AT $314.90, IC-745 $859.90, IC-R70 $569.90. KENWOOD # TS-530SP $649.90, TS-530S $589.90, TR-9000 $379.90, TS-780 $839.90, TR-7950 $349.90. YAESU # FT-708 $259.90, FT-757GX $$$ PHONE, FRG-7700 $379.90, FRG-7 $239.90. All major lines stocked. USED KENWOOD TS-520 $429.90, TS-520S $489.90, TS-120S $449.90. L.T.O. MENTION AD. PRICES CASH, FOB PRESTON. CLOSED MONDAY AT 2:00. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263, (208) 852-0830.

COMMODORE 64: "1541" Disk-based Log and QSL program. Approx. 1900 QSO's per disk. Data output to screen or printer. Print QSL's for less than 1¢ each. User guide open disk. $15.00 ppd. For INFO send SASE to: Harv Nelson, KA9KUH, P.O. Box 736, Stevens Point, WI 54481.

S-LINE OWNERS: TUBESTERS replace tubes, make 75S-rcvrs all solid state, cut 32S-xmtrs heat in half. Over a thousand users. For brochure, specs & prices: SKYTEC, Box 535, Talmage, CA 95481, (707) 462-6882 any time, 7 days.

WANTED: Schematic and instruction manual for Hammarlund HQ-100 general-coverage receiver. David McDonald, 504 Columbus Road, Streator, IL 61364.

QUADS, * db QUADS * 2, 3 & 4 elements, complete kits, fiberglass spreaders, components, wire. 3 first class stamps for complete brochure. db + Enterprises, Box 24, Pine Valley, NY 14872.

WANTED: MILITARY SURPLUS RADIOS. WE NEED COLLINS 618T, ARC-72, ARC-94, ARC-102, RT-712/ARC-105, ARC-114, ARC-115, ARC-116, RT-823/ARC-131, or FM-622, RT-857/ARC-134 or WILCOX 807A, ARC-159, RT-1167 or RT-1168/ARC-164, RT-1299/ARC-186, RT-859/APX-72, APX-76, ARN-82, ARN-84, ARN-89, APN-155, RT-804/APN-171, MRC-95, 718F-1/2, HF-105, COLLINS ANTENNA COUPLERS 490T-1, 490T-2, 490T-9, CU-1658A/ARC, CU-1669/GRC, 490B-1, 690D-1, CU-1239/ARC-105. TOP DOLLAR PAID OR TRADE FOR NEW AMATEUR GEAR. Write or phone Bill Slep 704-524-7519, SLEP ELECTRONICS CO., Hwy. 441, Otto, NC 28763.

POWER TRANSFORMERS FOR LINEARS AND OTHER RADIO EQUIPMENT REWOUND. $100.00 minimum. Write to: TRANSFORMERS, P.O. Box 13773, Orlando, FL 32859.

MATCHED TUBE SETS: Factory fresh Novar and Duodecar sweep tubes in matched sets for multi-final xmtrs. All types available: 6KD6, 6LF6, 6LQ6, 6JB6, etc. $28.00 pair PPD in USA. SPENCER TUBES, RD2 Box 24, Corning, NY 14830.

"KT5B" MULTI-BAND ANTENNA 160–10m $59.95, SO239/PL259 Weather Boot Kit $5.95, 2M DDRR Mobile Antenna $39.95, 2KW Roller Inductor 28mh $47.50, plus more! Kilo-Tec, P.O. Box 1001, Oak View, CA 93022. Tel.: 805-646-9645.

DX HEADING MAPS centered on Baltimore, Philadelphia, NYC, Boston, LA, Detroit, Dallas, St. Louis, New Orleans, Atlanta, Chicago. Small $1.75 pp. Large $5.95 pp. Specify city. W.A. Massey, P.O. Box 397, Hainesport, NJ 08036.

RECLAIM SILVER from electronics scrap! Write RALTEC, 25884C Highland, Cleveland, OH 44143.

BUMPER STICKER: "My Favorite Radio Station is (your call sign)." Display on car, in shack, anywhere! Nice gift for hams, $3. Arpress, Dept. C3, 1556 Hicks Pike, Walton, KY 41094.

RTTY HEADQUARTERS: All your RTTY needs. Dealers for "HAL" and "INFO-TECH" products. You can't beat our prices! Call or write Dick, DIALTA Amateur Radio Supply, 212 48th Street, Rapid City, SD 57701. Phone (605) 343-6127.

MILLEN 90711 VFO & orig. manual, clean; Heath AA-80 12V, 10W Audio PA & book, mint; 12V-.5A supplies, tubes, etc. SASE list, K8DTS, 25884C Highland, Cleveland, OH 44143.

QSL Card Holders, Foreign or U.S., 12 hangers, 18 pockets each, $9.95. QSL Report Forms, pressure sensitive, 100 per roll, $3.95. RCO PRODUCTS, Box 7333, Kansas City, MO 64116.

WOW! New MFJ 1224 CW/RTTY/ASCII Terminal Units. See MFJ ads and call/s.a.s.e. for details. Speedy delivery. Amateur Accessories, 6 Harvest Court, Flemington, NJ 08822. Phone (201) 782-1551, 6:30–10:30 PM Eastern.

DRESS UP YOUR CLUB—Jackets, T-Shirts, Hats, Sportshirts, etc. with your logo or we'll custom design. Wavelength Productions, 20-22 120th St., College Point, NY 11356.

GROUND RADIALS WORK: Solve your vertical antenna radial problems with the fantastic ground plane one (GP-1). A 10" diameter, 24-point cast aluminum buss that fits any 2" diameter or smaller mast. Radial problems solved for only $24.95. See photo Sept. 83 CQ, page 72. Lance Johnson Engineering, P.O. Box 7363, Kansas City, MO 64116.

WANTED: Troubleshooting Procedures Manual and Operation/Maintenance Manual, schematic copy for the Oak M-26 CATV Converter. Donald G. Seibel, BDSR Box 13, Tribune, KS 67879.

COLLECTORS ITEM (scarce) 1937 RCA ACT-40 amateur transmitter and manual. 160 thru 20 meters, rack-mounted in 30 inch cabinet, nice condition, spare tubes. No shipping, must pick up. Make offer. W8ZJO, 216-324-4914.

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66' DIPOLE 75-40-20-15-10M, $75 plus $3 S&H. Info SASE pse. LR Labs, Owensboro, KY 42302-0044.

COPY SATELLITE PHOTOGRAPHS, Weather Maps, Press. The FAXS are clear on our 18-inch-wide Recorders. Information and Equipment Booklet $1.00. Atlantic Sales, 3730 Nautilus Ave, Brooklyn, NY 11224. Phone (212) 372-0349.

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FREE CATALOG. Sophisticated IC's and Quality components. Best prices on Tantalum and Electrolytic Capacitors. GOLDSMITH SCIENTIFIC, Box 318A, Commack, New York 11725.

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HATS: With Name and Call, $4.95 plus $1.50 shipping. SASE. Specialty Printing, Box 361, Duquesne, PA 15110.

TELETYPEWRITER parts, gears, supplies, manuals. SASE list. TYPETRONICS, Box 8873, Ft. Lauderdale, FL 33310. N4TT. Buy unused Teletype repair parts.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504 brings data sheet.

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FREE SAMPLE: Send stamp. Buy/sell radio, computer equipment in "Electronic Exchange," Box 486, Dept. B, Forest Lake, MN 55025.

COMPUTER CALCULATED BEAM HEADINGS from your QTH to over 325 DX locations. Short path, long path, mileage. $6.00 ppd. Also antenna design program for Commodore 64, calculates precise dimensions for beams, quads, slopers, more. $12.50 ppd. HUFF, Box 1112, Springfield, IL 62705.

WANT 72' E-Z-Way tower; used fast-scan station; remote antenna coax switch; two 8-ohm outdoor speakers; Auto-Mate KS-50 keyer manual. W4EOB, 1412 Winkler Ave., Fort Myers, FL 33901.

FOR SALE: Crosley Tridyn 3R3 in good to excellent condition. $100.00. A Dorhoffer, K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

TELREX 6-EL 20 meter Monobander, $500. You pay shipping or pick up, Cedar Hill, MO. KØVP, 314-522-6700, ext. 637.

ELECTRON TUBES: Current and hard-to-find types. Special-purpose, transmitting, receiving and cathode-ray tubes. SASE for our free list. RUTAN ELECTRONIC SALES CO., 202 Miriam Parkway, Elmont, NY 11003.

HEATH MODEL SO-4541 Scope. Solid-State; Factory Built. $150.00 plus shipping. Call 218-744-1818, NØEWA, P.O. Box 5, Iron, MN 55751.

SEVERAL HUNDRED DOLLARS PROFIT ON EACH SIMPLE BURGLAR ALARM INSTALLATION. Very easy, inexpensive way to learn. INFORMATION $2.00. Order today. DYNAMIC SECURITY MARKETING, P.O.B. 1456-S, Grand Rapids, Michigan 49501.

HALLICRAFTERS HT-37 Transmitter, Heath SB-300 Receiver, $275, firm. Marc, WB2CUZ, (212) 347-5988.

WANTED FOR HAMMARLUND SP-600-JX: 5R4GY tube holder, top & bottom covers or complete cabinet, limiter switch, historical info. except manual, for cash. Sloan F. Million, 102 Ithaca Drive, Security, Colorado 80911.

WANTED: ALPHA 374 Amplifier. Send S.N. and condx in first letter. SELL: Gonset GSB-201 (4 811 As) amplifier $250.00. Wm. Fulcher, 217 Bluegrass Dr., Hendersonville, TN 37075, phone 615-824-7810.

SUPER CQ WPX CONTEST programs. TRS-80 Model I, III, IV (in III mode). Completely machine language. Logs 2800+ contacts per BAND. AUTOMATIC prefix identification and points. Automatic logging. DUPE SPEED 5000+ contacts per SECOND. Screen displays QSO info, points, QSO Nr, total prefixes, etc. Two CW buffers. $1 sends call entered and complete report. $2 sends any CQ Test message. Log Print program prepares complete logs AND dupe sheets. $39.95 Log Preparation program for hand logs. Similar features to above. $29.95 FREE fact sheet and sample printouts. K4SB, 3496 Velma Dr., Powder Springs, Georgia 30073.

BUSINESS-RESIDENTIAL BURGLAR ALARMS . . . FANTASTIC BUSINESS. INFORMATION $2.00 (REDEEMABLE). SECURITY ELECTRONICS INTERNATIONAL, P.O.B. 1456-FQ, Grand Rapids, Michigan 49501.

HELP WANTED: Who knows how to convert a Yaesu FT301D to the new WARC bands without loosing existing bands? DL3ME, G. Jacoby, Widdersbergerstr. 40, D 8138, Andechs, FRG.

KWM2A REJ TUNING WE 516F-2 MP1 $700; 312B-5 $350; 62S1 $550; or package deal $1400; 75S1 $275. Certified check. Chuck Tieber, WA9FCN, 2720 Sterling Ave., Peoria, IL 61604. Phone (309) 682-6343.

ULTRAHEADINGS: Beam headings, distances from your QTH to DXCC countries. $18.50/cass. for C-64 and TRS-80 (I&III). No computer? Custom listing for your QTH, $4.95. ULTRAMORSE for C-64: Learn code ultrafast with Ultramorse First Course; $14.50/cass. Upgrade with Ultramorse Code Practice; $12.50/cass. SASE for info. $1.00 shipping, all orders. ULTRA Ham Software, Box 119, Macedonia, OH 44056.

KENWOOD R-1000. Bought new 1983. Perfect. $319 prepaid. (Replaced with TS-430.) Pat Matthews, White Oak, SC 29176.

AEA MBA RO Reador, Morse, Baudot, ASCII, with manual. Very handy for verification. Perfect condition $189 postpaid. W.R. Cottrell, W9DI, 13 E. Hickory St., Hinsdale, IL 60521.

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.

WANTED: Heath HP-24 AC power supply; state price & condition. WA5DTK, 113 Jupiter, Wichita Falls, TX 76311.

"dahdidahdit dahdahdidah" vinyl bumper sticker, $1.00. D. Mollan, WB7FDE, 7805 N.E. 147th Ave., Vancouver, WA 98662.

FOR SALE: Complete Apple II system hardware and software. Will sell as package or separately. Write or call for complete list. M.W. Babb, N4PF, 506 Westwood Drive, Louisville, KY 40243. Phone (502) 245-3476.

SEND SASE for list of parts, tester, high power tubes and sockets, and rec. WA7NNH, 3560 Kilarney, Boise, ID 83704.

HENRY 2K-4 amplifier in excellent condition, 80–10 meters, 2 kw easily, $900. Saul Abrams, K2XA, 518-474-7579 days, 518-439-5700 evenings.

WANTED: Ten-Tec AC-4 QRP SWR bridge, AC-5 antenna tuner, PM-2B transceiver. Winston, K4CWQ, P.O. Box 1143, Carrollton, GA 30117.

WANTED: RT-174/URR Receiver and PP-308/URR Power supply. Manuals for AN/ARC-5, SCR-274N, ARA/ATA. Noel Anderson, N5CEM, 2240 Lockwood Dr., Carrolton, TX 75006.

WANTED: Used 1981 or 1982 U.S. Callbook. Please quote price. W1FNU, 13 Joslyn St., Newport, ME 04953.

FOR SALE: Parks model 144-1 2 m. converter 26–30 MHz IF $30.00, Gonset 2-meter Communicator IV $75.00, Gonset model 3357 VFO (50-144-220 MHz) w/built-in FM mod. $35.00, Ameco CMA 12 v. mobile solid state converter 80–2 meters w/crystals for 6/2 (600–1600 kc IF) $35.00. ALL MINT. You UPS. E. Taylor, W7BYF, 2921 Loyola Dr., Davis, CA 95616 (1-916-756-7372).

FOR SALE: 5 Eimac 4X250F Tubes, never used, $59 each. 5 Eimac SK600 Sockets, $25. Henry M. Samplin, WB7AWA, 4432 W. Larkspur, Glendale, AZ 85304. Phone (602) 938-8643.

WANTED: US Callbook Volume 38 Issue 4 Winter 60–61 $25.00. K7MF, Rt. 1 Box 114, Vaughn, WA 98394.

FOR SALE! Vintage, oak case, Radio City vom. Operating perfectly, Model 447. Reads to 1K A/C Volts, 2.5K D/C Volts, also ohms and amps. Best offer. W9MCJ, 219-272-2482.

Please send all reader inquiries directly.

WANTED: Kenwood TS-600S 6M Transceiver. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

FOR SALE: MANUALS for Collins 51S1 and 55G1. $12 for both, postpaid. E. Erickson, W2CVW, 343 Catherine St., S. Amboy, NJ 08879.

HP-200 Audio Osc. $35, Precision E-400 Sweep Gen. $45, E-200 Marker Gen. $30. SASE for Heath & other test equip. list. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANTED: Two good 8875's pull outs. Phil Lashley, 4 Sunset Way N.E., Rome, GA 30161.

WANTED: 4CX250L or 4CS100L tubes with two volt filiament. Griebe, K8HCZ, Rt. 1, Parksville, KY 40464.

NEED CIRCUIT DIAGRAM for 2M Synthesizer Model MK 1. Jung Y. Lem, KB6BO, 5222 Coring:. Dr., Los Angeles, CA 90042.

WANTED: U.S. Army radio receiver set AN/GRR-5 with receiver R-174/URR and power supply PP-308/URR in working condition. Robert McGee, Route 4, Box 406, Rogersville, AL 35652.

HELP: Junior High School needs donations of old magazines, books, parts, etc., to help amateur radio program. G. Skloot, KE2N, 320 Beach 104 Street, Rockaway Park, N.Y. 11694.

WANTED: Heathkit HG10 VFO. White, KA4ZID, 320 Ohio, St. Cloud, FL 32769.

WANTED: Preselectors, Convertors, Signal Tracers, Test instruments, etc. R.K. Tracey, 809 West End Place, Moberly, MO 65270.

SELL: Contest amplifier. Henry 2-K, very clean, factory 10 meters, (2) 3-400Z finals, $565. Pickup only in Nassau County, NY. Call (516) 486-4500 (days); (516) 569-1687 (eves.).

WANTED: US Callbook Volume 41 Issue 4 Winter 63–64, $25. K7MF, Rt. 1 Box 114, Vaughn, WA 98394.

WANTED: Antique radio equip. Rcvrs., Trans., Tubes, Test Equip., Old Wireless, Spark, Ham Gear. W6SPQ, 18934 Celtic St., Northridge, CA 91326.

MOTOROLA REPEATER: 18W tube type with silver-plated duplexer. Spare strip included. $300.00 plus shipping. Phone (517) 647-7349, Ralph, W8LCU.

WANTED: HP TEK test equip catalogs, TEK 3L5, LASERDISCS, Collins 200 Hz filter, MILLEN GDO coils. W7KSG, 1876 E. 2990 So., Salt Lake City, UT 84106.

SELL: L4B Excellent Condition $625 plus shipping. Kantronics Mini-Reader $175. W1GAJ, David Schwartz, 1183 Southeast St., Amherst, MA 01002.

TRADE: Continuous-use water-cooled 3000 watt AC generator, excellent for field day, electric start. Want ham equipment. W9NTH (914) 358-4134.

VIC 20 HAMS: Key your rig from the TV audio with simple reed relay and program. Three programs available. Send SASE to Ken, N6GDQ, 2018 Scott, Santa Clara, CA 95050.

FOR SALE: Locally Only—QST, CQ, HRH, PE, EI, S9, 73 from 1930's to 1980's, or trade for 10–80 amplifier, etc. Want Mini Quad, Drake RV-4 VFO. WB4CVH, 805 Pine Brook Rd., Eatontown, NJ 07724.

CENTURY 21 with calibrator, $200, or horse trade for Argonaut. Art Trick, WA4HXS, Rt. 6 Box 39, Jonesboro, TN 37659. Phone (615) 753-5593.

SIMPLEX AUTOPATCH for 220 MHz/up. CES 500SA full T-tone decode, CW ID, modular plug. $98, I ship. VY FB condx. N2WX, Box 905, Melbourne, FL 32902-0905.

WANTED: 70-foot galvanized steel crank-up, tilt-over tower; working Thermiodyne TF-6 antique radio receiver; fast-scan TV station. W4EOB, 1412 Winkler Ave., Ft. Myers, FL 33901.

SELL: ALDA 105 solid state xcvr with power supply, excellent, $250. R. Sever, 424 Browning Ave., No. Canton, OH 44720.

SELL: Icom 202, ps, Atronic single letter code reader; Yaesu FT227R, ps. Prices, trades, negotiable. J.W. Cates, 3241 Eastwood Rd., Sacramento, CA 95821.

GLB 400B synthesizer, $40. Scientific calculator and wall charger, $30. TS520SE with filter, $490. All mint. 5W CB talkie, extras, $50., KB3VH, (814) 445-7486.

I HAVE AN ANTIQUE 35mm Suitcase Movie Projector, 16mm Musicals. Will trade for Gov't Electronic & RTTY T/M's. Dan, Box 9064-CQ, Newark, NJ 07104.

SELL: Two volume Heath course "Electronics for Hobbyists" with components. New cond., $40, shipping paid. N6FML, 1505 Alto Dr., San Bernardino, CA 92404. Phone (714) 882-1130.

COLLINS 51S-1 and 55G-1 Tuner, mint, always covered, manuals, $1800. NORDEMENDE portable, 15 bands, $150. H. Marhoff, 980 7 St. N.W., Largo, FL 33540. Phone (813) 584-2988.

FOR SALE: Kenwood TR-2400, ST-1 Rapid Charger, extra battery, orig. boxes and manuals, $275. Bob, W5XC (713) 498-8300.

FOR SALE: 120' super-strong microwave tower, 4 KW electric-start generator. WANT: any National equipment. T.N. Colbert, 13609 Colony, Burton, OH 44021.

HARK. Hear Amateur Radio (Over). Proposed SWL Group SASE. TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

HELP: Junior High School 180 needs donations of old books, magazines, equipment, and parts for amateur radio program. Contact G. Skloot, KE2N, JHS 180, 320 B 104 Street, Rockaway Park, NY 11694. Phone 212-945-4200.

HALLICRAFTERS HT-18 $35, Hallicrafters R-46 Speaker $30, National NC-60 Receiver $35. K6KZT, 2255 Alexander, Los Osos, CA 93402.

NOVICE ALL-AMERICAN Certificate: Work a Novice in all 10 call areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

WANTED: R-220/URR Receiver w/ manual(s). Charles T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

WANT TO BUY, RENT, BORROW to copy the manual for Knight Star Roamer Recvr. Will pay postage both ways. Don, KØJVE, Box 68, University Park, IA 52595.

WANTED: Rohn 25 or 45 fold-over tower or conversion parts. Eddie Hatcher, 840 Wixom, Dallas, TX 75217.

SELL: Collection of 35 yrs receiving tubes only dollar each. Send list of your needs. WANTED: Quote on Vibroplex Presentation, Electronic Keyer, W8FYO Paddle, Drake FS-4. W5QJT, P.O. Box 13151, El Paso, TX 79913.

VIKING RANGER FOR SALE: 75 watts, 80–10 mtrs, in operating condition, $75.00 plus shipping. Lawrence Felman, WB2ZRR, 15 Jagged Rock Rd., Parsippany, N.J. 07054.

YAESU FT301S, 160–10m, with 250/600 Hz CW filters, MFJ CW filter, $400. FV301 VFO, $100. AA1K, 302-834-8323.

FOR SALE: Tempo One, black face, dig. readout, mike, p. meter, $375.00. KA9OAQ, Freeport, IL, 1-815-232-4261.

CLEANING OUT HAM SHACK: Heath HX-1681 with power supply recently factory aligned, $225.00, Heath HX 1680, $125.00. DRAKE T4X with power supply, $175.00, DRAKE R-4A, $175.00. MFJ-410 Professor Morse, $50.00. KA5NYG (512) 699-3348.

WANTED: Signal Corps AN/GRR-5 Receiving Set in good operating condition. Quote best price. No dickering. W8SQS, 7864 English, Brecksville, OH 44141.

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If there is one place in your station where you cannot risk uncertain results it is in your antenna.

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All mode synthesized general coverage receiver—perfect for serious shortwave listening. Options include 12-channel Memory Unit, VHF Converters, Antenna Tuner and an Active Antenna.

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Feature-packed FM Handhelds that have proven their superior performance. Microprocessor control assures convenient operation while incorporating every worthwhile feature the serious operator needs.

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FT-708R 1W/200mW RF:
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Compact FM mobiles engineered for reliability and convenience. The perfect balance of current drain and power output for all mobile needs. Built to withstand years of punishing mobile use.

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FT-290R 2.5W/1W RF: 143.5–148.5 MHz
FT-790R 1W/200 mW RF: 430–440 MHz

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All mode base/mobiles with power and performance in all SSB, CW and FM applications. Optional matching FP-80A AC Power Supply makes the perfect base station.

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FT-480R 10W RF: 143.5–148.5 MHz
FT-780R 10W RF: 430–440 MHz

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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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MEET THE NEW YAESU FT-102

The FT-102 is factory equipped for operation on all present and proposed Amateur HF bands. An extra AUX band position is available for special applications. Equipped for SSB, CW, and AM (RX), the FT-102 may be activated on FM and AM (TX) via the optional AM/FM-102 Module.

The all-new receiver front end utilizes a low-distortion RF preamplifier that may be bypassed via a front panel switch when not needed. Maximum receiver performance is yours with this impressive lineup of standard features: IF Notch Filter, Audio Peak Filter, Variable IF Bandwidth Control, IF Shift, Variable Pulse Width Noise Blanker, Independent SSB and CW Audio Channels with Optimized Audio Bandwidth, and Front Panel Audio Tone Control. Wide/Narrow filter selection is independent of the Mode switch.

The celebrated transmitter section is powered by three 6146B final tubes, for more consistent power output and very low distortion. An RF Speech Processor, Mic Amp Audio Tone Control, VOX, and an IF Monitor round out the transmitter lineup.

Futuristic panel design and careful human engineering are the hallmarks of the FT-102. Convenient pop-out controls below the meters may be retracted when not in use, thus avoiding inadvertant mistuning. Abundant relay contacts, rear panel phono jacks for PTT, microphone/patch input, and other essential interface connections make the FT-102 extremely simple to incorporate into your station.

SPECIFICATIONS

TRANSMITTER–Power Input: (1.8–25 MHz) SSB, CW 240W DC; AM 80W DC (28–29.9 MHz) SSB, CW 160W DC, AM 80W DC, FM 160W DC; Spurious Radiation: Better than – 40 dB.
RECEIVER–Image Rejection: Better than 70dB from 1.8–21.5 MHz. Better than 50dB from 24.5–29.9 MHz. IF rejection: Better than 70 dB. Selectivity (– 6 dB/ – 60 dB): SSB, CW, AM; 2.7/4.8 kHz (with no optional filters). Width adjusts continuously from 2.7 kHz to 500 Hz (– 6 dB).

Special Supplier of Ham Radio Equipment for the Sarajevo 1984 Winter Olympic Games
YAESU

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SP-102

The SP-102 External Speaker/Audio Filter features a large, high-fidelity speaker with selectable low- and high-cut audio filters. The front panel A-B switch allows selection of two receiver inputs for maximum versatility. Also available is the SP-102P Speaker/Patch.

FV-102DM

The FV-102DM Synthesized External VFO tunes in 10 Hz steps. Keyboard entry of frequencies, UP/DOWN scanning, and 12 memories make the FV-102DM a "must" for serious DX or contest work.

FC-102

The FC-102 Antenna Coupler is capable of handling 1.2KW of transmitter power, with an in-line wattmeter, separate SWR meter, and A-B input/output selection expanding your station's capability. The optional FAS-1-4R allows remote selection of up to four antennas via one coaxial cable connected to the FC-102.

See your Authorized Yaesu Dealer today for a hands-on demonstration of the rig that everybody's talking about. It's the FT-102, The Transceiver of Champions!

Price And Specifications Subject To Change Without Notice or Obligation 1082R

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ICOM IC-R71A

The Best Just Got Better

ICOM introduces the IC-R71A 100KHz to 30MHz superior-grade general coverage receiver with innovative features including keyboard frequency entry and wireless remote control (optional).

This easy-to-use and versatile receiver is ideal for anyone wanting to listen in to worldwide communciations. Demanding no previous shortwave receiver experience, the IC-R71A will accommodate an SWL (shortwave listener), Ham (amateur radio operator), maritime operator or commercial operator.

With 32 programmable memory channels, SSB/AM/RTTY/CW/FM (optional), dual VFO's, scanning, selectable AGC and noise blanker, the IC-R71A's versatility is unmatched by any other commercial grade unit in its price range.

Superior Receiver Performance. Utilizing ICOM's DFM (Direct Feed Mixer), the IC-R71A is virtually immune to interference from strong adjacent signals, and has a 100dB dynamic range.

IC-RC11
Infrared
Remote

Passband tuning, a deep IF notch filter, adjustable AGC (Automatic Gain Control) and noise blanker provide easy-to-adjust clear reception, even in the presence of strong interference or high noise levels. A preamplifier allows improved reception of weak signals.

Keyboard Entry. ICOM introduces a unique feature to shortwave receivers... direct keyboard entry for simplified operation. Precise frequencies can be selected by pushing the digit keys in sequence of frequency. The frequency will be automatically entered without changing the main tuning control. Memory channels may be called up by pressing the VFO/M (memory) switch, then keying in the memory channel number from 1 to 32.

VFO's/Memories. A quartz-locked rock solid synthesized tuning system provides superb stability. Three tuning rates are provided: 10Hz / 50Hz / 1KHz.

32 Tunable Memories. Thirty-two tunable memories, more than any other general coverage receiver on the market, offer instant recall of your favorite frequency. Each memory stores frequency, VFO and operating mode, and is backed by an internal lithium memory backup battery to maintain the memories for up to five years.

Options. FM, synthesized voice frequency readout (activated by SPEECH button), RC11 wireless remote controller, CK1 DC adapter for 12 volt operation, MB12 mobile mounting bracket, two CW filters FL32 — 500Hz, and FL63 — 250Hz, and high-grade 455KHz crystal filter FL44A.

ICOM
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. R711283

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