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Amateur Radio

CQ

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SEPTEMBER 1983 $2.00

Results of the 1982 CQ WW DX Phone Contest

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THE RADIO AMATEUR'S JOURNAL

NEW

"DX-traordinary."

Superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

TS-930S

The TS-930S is a superlative, high performance, all-solid state, HF transceiver keyed to the exacting requirements of the DX and contest operator. It covers all Amateur bands from 160 through 10 meters, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range.
Among its other important features are, SSB slope tuning, CW VBT, IF notch filter, CW pitch control, dual digital VFO's, CW full break-in, automatic antenna tuner, and a higher voltage operated solid state final amplifier. It is available with or without the AT-930 automatic antenna tuner built-in.

TS-930S FEATURES:

- **160-10 Meters, with 150 kHz-30 MHz general coverage receiver.**
  Covers all Amateur frequencies from 160-10 meters, including new WARC bands, on SSB, CW, FSK, and AM. Features 150 kHz-30 MHz general coverage receiver. Separate Amateur band access keys allow speedy band selection. UP/DOWN bandswitch in 1-MHz steps. A new, innovative, quadruple "UP" conversion, digital PLL synthesized circuit provides superior frequency accuracy and stability, plus greatly enhanced selectivity.
- **Excellent receiver dynamic range.**
  Receiver two-tone dynamic range, 100 dB typical (20 meters, 50-kHz spacing, 500 Hz CW bandwidth, at sensitivity of 0.25 μv, S/N 10 dB), provides the ultimate in rejection of IM distortion.
- **All solid state, 28 volt operated final amplifier.**
  The final amplifier operates on 28 VDC for lowest IM distortion. Power input rated at 250 W on SSB, CW, and FSK, and at 80 W on AM. Final amplifier protection circuits with cooling fan, SWR/Power meter built-in.
- **CW full break-in.**
  CW full break-in circuit uses CMOS logic IC plus reed relay for smooth, quiet operation. Switchable to semi-break-in.
- **Automatic antenna tuner, built-in.**
  Covers Amateur bands 80-10 meters, including the new WARC bands. Tuning range automatically pre-selected with band selection to minimize tuning time. "AUTO-THRU" switch on front panel.
- **Dual digital VFO's.**
  10-Hz step dual digital VFO's include band information. Each VFO tunes continuously from band to band. A large, heavy, flywheel type knob is used for improved tuning ease. T.F. Set switch allows fast transmit frequency setting for split-frequency operations. A=B switch for equalizing one VFO frequency to the other. VFO "Lock" switch provided. RIT control for ±9.9 kHz.
- **Eight memory channels.**
  Stores both frequency and band information. VFO-MEMO switch allows use of each memory as an independent VFO, (the original memory frequency can be recalled at will), or as a fixed frequency. Internal Battery memory back-up, estimated 1 year life. (Batteries not Kenwood supplied).
- **Dual mode noise blanker ("pulse" or "woodpecker").**
  NB-1, with threshold control, for pulse-type noise. NB-2 for longer duration "woodpecker" type noise.
- **SSB IF slope tuning.**
  Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection. HIGH/LOW cut control rotation not affected by selecting USB or LSB modes.
- **CW VBT and pitch controls.**
  CW Variable Bandwidth Tuning control tunes out interfering signals. CW pitch controls shifts IF passband and simultaneously changes the pitch of the beat frequency. A "Narrow/Wide" filter selector switch is provided.
- **IF notch filter.**
  100 kHz IF notch circuit gives deep, sharp, notch, better than -40 dB.
- **Audio filter built-in.**
  Tuneable, peak-type audio filter for CW.
- **AC power supply built-in.**
  120, 220, or 240 VAC, switch selected (operates on AC only).
- **Fluorescent tube digital display.**
  Six digit readout to 100 Hz (10 Hz modifiable), plus digitalized sub-scale with 20-kHz steps. Separate two digit indication of RIT frequency shift. In CW mode, display indicates the actual carrier frequency of received as well as transmitted signals.
- **RF speech processor.**
  RF clipper type processor provides higher average "talk-power," improved intelligibility.
- **One year limited warranty on parts and labor.**

Other features:
- SSB monitor circuit, 3 step RF attenuator, VOX, and 100-kHz marker.

Optional accessories:
- AT-930 automatic 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 stability TCXO (temperature compensated crystal oscillator). Requires modifications.
- MC-60A deluxe desk microphone with UP/DOWN switch, pre-amplifier, 8-pin plug.
- TL-922A linear amplifier (not for CW QSK).
- SM-220 station monitor (not for pan-adapter).
- HS-6, HS-5, HS-4, headphones.

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

KENWOOD

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Digital DX-terity...

General coverage, Superior dynamic range, 2 VFO's, 8 memories, Scan, Notch...COMPACT!

TS-430S

The TS-430S combines the ultimate in compact styling with advanced circuit design and performance. An all solid-state SSB, CW, and AM transceiver, with FM optional, covering the 160-10 meter Amateur bands, it also incorporates a 150 kHz-30 MHz general coverage receiver having a superior dynamic range, dual digital VFO's, 8 memories, memory scan, programmable band scan, IF shift, notch filter, all-mode squelch, and built-in speech processor.

TS-430S FEATURES:

- **160-10 meter operation, with general coverage receiver**
  With 160-10 meter Amateur band coverage, including WARC 30, 17, and 12 meter bands, it also features a 150 kHz-30 MHz general coverage receiver. Innovative UP-conversion digital PLL circuit, for superior frequency stability and accuracy. UP/DOWN band switches for Amateur bands or 1-MHz steps across entire 150 kHz-30 MHz range. Two digital VFO's continuously tuneable from band to band. Band information output on rear panel.
- **USB, LSB, CW, AM, with optional FM**
  Operates on USB, LSB, CW, and AM, with optional FM, internally installed. AGC time constant automatically selected by mode.
- **Compact, lightweight design**
  Measures only 10-5/8 (270) W x 3-3/4 (96) H x 10-7/8 (275) D, inches (mm), weighs only 14.3 lbs. (6.5 kg.).
- **Superior receiver dynamic range**
  Use of 2SK125 junction-type FET's in the Dyna-Mix high sensitivity, balanced, direct mixer circuit provides superior dynamic range.
- **10-Hz step dual digital VFO's**
  10-Hz step dual digital VFO's operate independently, include band and mode information. Different band and mode cross operation possible. Dial torque adjustable. STEP switch for tuning in 10-Hz or 100-Hz steps. A=B switch quickly shifts "B" VFO to the same frequency and mode as "A" VFO, or vice-versa. VFO LOCK switch provided. RIT control tunes VFO or memory. UP/DOWN manual scan possible using optional microphone.
- **Eight memories store frequency, mode, and band data**
  Memories store frequency, mode, and band data. Eighth memory stores receive and transmit frequencies independently. M.CH switch for operation of memory as independent VFO, or fixed frequency.
- **Lithium battery memory back-up**
  Estimated five-year life.
- **Memory scan**
  Scans memories in which data is stored.
- **Programmable automatic band scan**
  Scans programmed band width. Scan speed adjustable. HOLD switch interrupts band or memory scan.
- **IF shift circuit for minimum QRM.**
  IF passband may be moved to place interferring signals outside the passband, for best interference rejection.
- **Tuneable notch filter built-in**
  Deep, sharp, tuneable, audio notch filter.
- **Narrow-wide filter selection**
  NAR-WIDE switch for IF filter selection on SSB, CW, or AM, when optional filters are installed. (2.4 kHz IF filter built-in.)
- **Speech processor built-in**
  Improves intelligibility, increases average "talk-power."
- **Fluorescent tube digital display**
  Indicates frequency to 100 Hz (10 Hz modifiable).
- **All solid-state technology**
  Input rated 250 W PEP on SSB, 200 W DC on CW, 120 W on FM (optional), 60 W on AM. Built-in cooling fan, multi-circuit final protection. Operates on 12 VDC, or 120/220/240 VAC with optional PS-430 AC power supply.
- **All-mode squelch circuit, built-in**
- **Noise blanker, built-in**
- **RF attenuator (20 dB)**
- **Vox circuit, plus semi break-in with side-tone**

Optional AT-250 Automatic Antenna Tuner
Designed to match the TS-430S in size, color, and appearance. Functionally compatible with any HF transceiver of 200 watts PEP or lower. (Requires manual bandswitching.)
• Covers 160-10 meter incl. WARC • ABC Automatic Band Changing System (when used with TS-430S) • SWR/Power meter • 4 antenna terminals • Built-in AC Power Supply.

Other optional accessories:

- PS-430 compact AC power supply.
- PS-30 or KPS-21 AC power supplies.
- SP-430 external speaker.
- MB-430 mobile mounting bracket.
- 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) narrow SSB filter.
- YK-88A (6 kHz) AM filter.
- MC-42S UP/DOWN hand microphone.
- MC-60A deluxe desk microphone, UP/DOWN switch.
- MC-80 UP/DOWN desk microphone.

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

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SP-600

THROUGH LINE POWER METERS

SP-600 Select 1 of 3 sensors by soft touch switch. Three wide bandwidth sensors cover 1.6-500MHz. **$159.00**
RS-1: 1.6-60MHz 0-2kW RS-2: 1.6-150MHz 0-200W RS-3: 130-500MHz 0-200W

SP-200 Two position antenna switch and indicators. Three power ranges to 1kW, 1.8-160MHz. **$107.00**

SP-400 Three band sensors (2m, 220, 450MHz), 10 percent accuracy, 0-150W CW, LED power range indicators. **$109.00**

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SP-15M 1.8-150MHz, 200 watt, low-profile wattmeter. VSWR, FWD PWR, REF PWR, 1.5W SWR sensitivity. Great for mobile HF. **$60.00**

SP-45M VHF-UHF to 100 watts. 3W sensitivity for SWR, 10 percent accuracy. All metal shielded construction. **$85.00**

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WELZ

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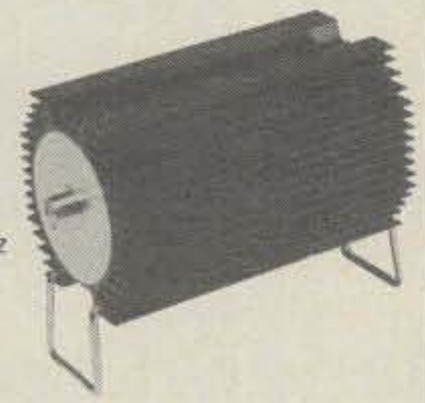
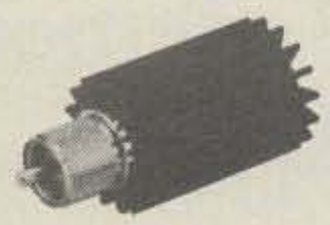
CT-300
Oil-less aircooled,
1kW peak for 3 min.,
300W avg. DC-250MHz
$68.00



CT-150
Oil-less aircooled,
400W peak for 3 min.,
150W avg. DC-250MHz
$46.00



CT-15A
50W peak, 15W avg.
SO-239 Screw-on dummy
DC-500MHz, VSWR<1:1.2
$12.00

CT-15N
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Type N Dummy Load.
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Low loss, low VSWR.
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BNC connector,
5W talkie checker.
Field calibratable,
3W avg. Dummy Load,
1W center. 50-500MHz.
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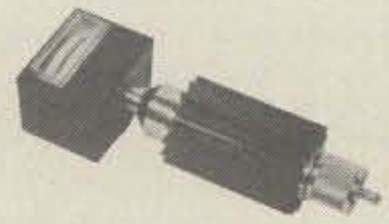

TP-25A
25 watt version of
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Larger Dummy Load.
50-500MHz
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MASTHEAD

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CQ The Radio Amateur's Journal

ON THE COVER: It's contest time again, and Norm Goldberg, WD4EXF, limbers up for the world's biggest amateur radio contest . . . the CQ WW DX Contest. Photo by Larry Mulvehill, WB2ZPI.

SEPTEMBER 1983 **VOL. 39, NO. 9**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

September is here and the *CQ* contest season is starting up in grand style. This month we bring you the results of the *CQ* WW DX S.S.B. Contest from last year, and if things go as we hope, the certificates should be in the mail (and arriving) by now. There is no easy way to handle the certificates, especially if you are dealing with several thousand examples of "strange" handwriting. Amateurs, it seems, learn penmanship from the same texts used to train doctors. From the logs received here, it is always amazing to me that they got here in the first place. This year I hope that more people print.

This month also features the rules for the 1983 *CQ* WW DX Contest. Read them carefully, as there are a few changes from last year's rules. I'm sure that some of the big guns have their DXpedition plans in order for this year's bash in the hopes of toppling some record scores. It's always reassuring to know that these mind-boggling "forays" of tactical, logistical, and operating strength still need you, the average amateur and contester, for those all-important multipliers and points. Every single amateur operating a contest and turning in a log (regardless of size) is vitally important to the success and growth of that contest. Obviously we all can't win, but we can make a difference in who does.

With the above in mind, let us remember that the prime objective of this or any contest is to have fun. It is a test of operating skill, equipment reliability, and the willingness to compete. Our rules are kept purposefully simple and concise. They are easy to understand and comply with, and if necessary they can be enforced. We don't have rules excluding the wonders of technology and "operating aides" that a bountiful credit rating can provide simply because it affects very few of us and we have to recognize that the same facilities theoretically are available to all. No matter what techniques are used, it still comes down to the thousands of amateurs who take part in a contest in order to make those million-point-plus scores possible.

Our Fourth Anniversary

September technically is the fourth anniversary of the New *CQ*. Although our first issue was December 1979, it was mid-September when we moved to Hicksville and set up shop. It has been four years of very hard work by a very dedicated crew here at *CQ* and by the many contributors and columnists who believe in the magazine and all it stands for. Our unparalled growth in the amateur radio publishing industry, while others faltered, is due to your faith and support. We will continue to strive to bring you the best, most interesting, and most fun-reading amateur radio magazine available today.

September is also the first anniversary of our new publication, *Popular Communications*. Again, the acceptance of this predominantly shortwave-listener-oriented magazine has been terrific. We've shown *Popular Communications* at all the hamfests we've been to this past year, and it has always drawn favorable comments, plus many new subscribers. Many of us started out on the road to amateur radio via the s.w.l. route, and evidently many of us still pursue this pastime.

This month (hopefully) our new Spanish-language edition will hit the newsstands of Spain, South and Central America, and, of course, the U.S. We've gotten numerous requests from U.S. dealers and readers to be among the first to receive the new publication.

As you can tell it has been a very busy four years for us, with a lot of planning being done as to the next four years.

Travels With CQ

I'm glad to say that the intrepid *CQ* staff is back home (for a while) after some hectic traveling. In mid-June, Gail and I winged our way to Washington, D.C. for the AFCEA amateur radio luncheon, which is hosted by our own Ted Cohen, N4XX. About 200 amateurs from industry have made this event a yearly ritual. The exhibits at the show feature really amazing equipment and techniques used by the military (both ours and others). Although generally we only get to spend one day there, it literally would take the three days or so that the show runs to see and appreciate it all. It's the closest thing we've seen to an electronic Disneyland.

Two days later Herb and I flew to Atlanta for their annual hamfest. Meanwhile, Dick had left for Europe to get a first-hand look at Germany's biggest show in Friedrichshafen. Jack and Arnie left that weekend for a two-week tour of the west coast, where they visited with those wonderful folks who help make all of this possible—our advertisers. The Atlanta Hamfest this year was held at the Civic Center, a great improvement over last year. The lighting, air conditioning, and treatment by all was superb. It was classic southern hospitality, right down to the young ladies who made sure that the exhibitors had enough cold drinks and sandwiches to keep them going through the weekend. The crowds were bigger than last year, and the fleamarket was bigger, too.

From what Dick described to me, the show at Friedrichshafen is something that really must be experienced. About 13,000 or so amateurs show up for this one. The booths are totally unlike what we normally have here, and the variety of gear also is generally unlike ours or unavailable here. They have a big fleamarket, and Dick showed me one prize possession he brought back—a brand-new (still in the original box) American J-38 key. If I can get him to develop the two rolls of film he brought back, we'll have more to show you later on about the "Dayton of Europe." Jack and Arnie reported that everything is alive and well on the west coast, with an up mood and anticipation of better times ahead. Although it's hard to picture Jack being away from a rig that long, Arnie assured me that Jack kept his HT humming for two weeks. He even managed a detour to get in some Field Day time at the QTH of Chip Margelli, K7JA. Chip is with Yaesu and is an avid DXer and operator.

Miscellaneous

Those of you trying to find the error in the "Errata" section of last month's Zero Bias found it in the breakhead itself. It was one of those things which looked right at the time but obviously is wrong in retrospect.

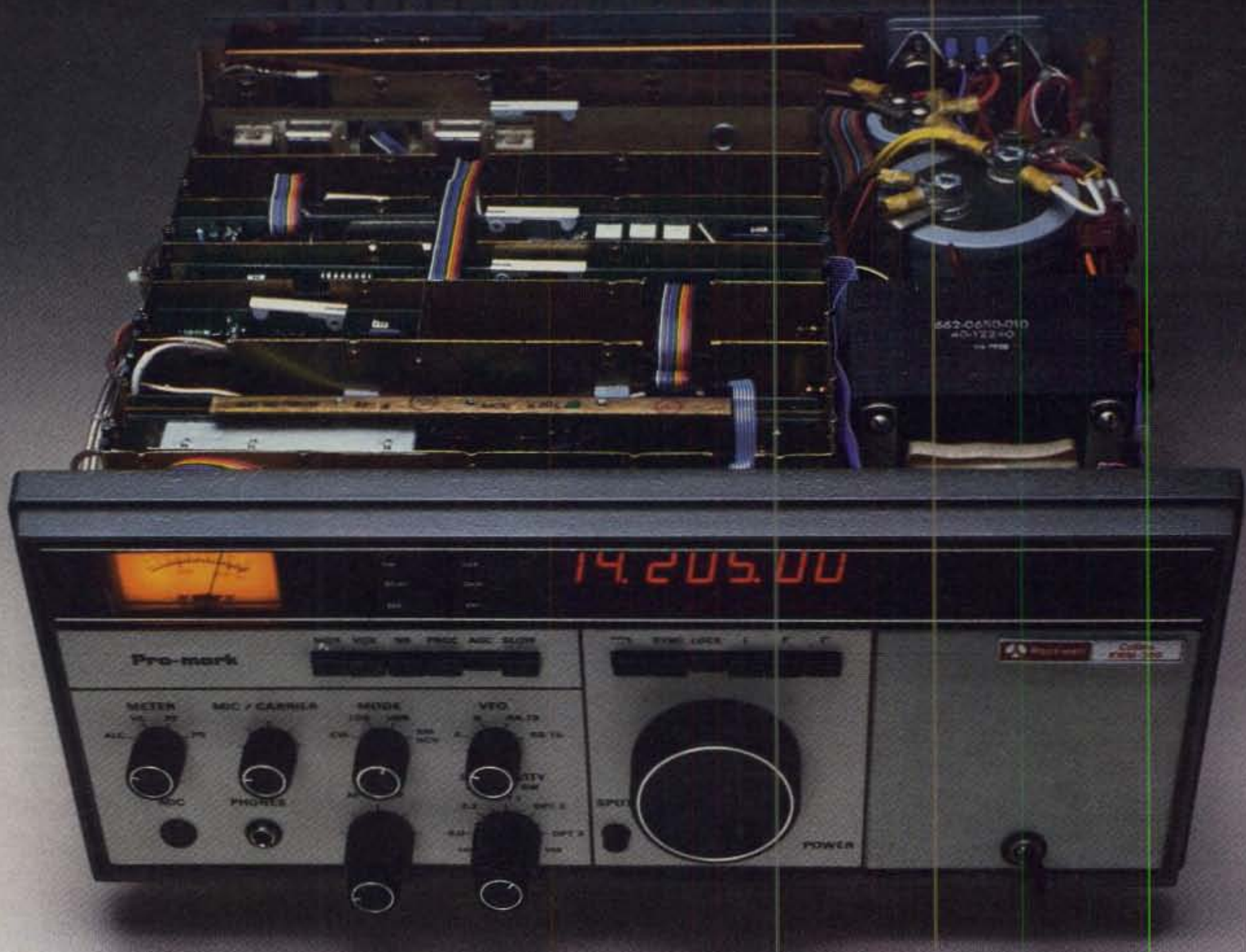
Our traveling pace will be lighter during the remaining summer months, and I hope to catch up on my mail. I know what it feels like to write for information and have to wait an extraordinary amount of time for an answer. The first week in February I wrote to a leading wire manufacturer for some information to clarify an article. The answer came the second or third week of June.

We've got some great articles coming up for the winter season, so look under that pile of junk in the basement for your soldering iron (or gun) and try to get a few of your tools back from your kids. Besides some nifty building projects, the 1983/84 contest season is shaping up to be a big one for operating. Do yourself a favor and send in early for all logs and summary sheets (include an s.a.s.e.).

For all those who have hounded me about the loss of our annual index, I am subtly trying to get a volunteer here at the office to start working one up. It is obvious that this is not the sort of fun job that people rush to do nor look forward to digging into. There truly hasn't been the time or personnel here to work on one. We haven't forgotten it though, and maybe we can get someone to work on it this year.

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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CIRCLE 50 ON READER SERVICE CARD

Our Readers Say

Fond Memories of CQ

Editor, *CQ:*

Just a line to let you know how much I have enjoyed *CQ* through the years. I still have about every issue since October 1951. As an electrician by trade and following heavy construction, I have had several portable locations in the last 30 years and have met in person several amateurs whom I had talked to on the air. Even worked the original holder of "6KG," later W6KG.

Now due to a heart condition I will not be able to work at the trade any longer, so I will be on a fixed income and will have to cut back on my expenditures. The XYL is checking on all of my electronic magazines, etc., to see where I can cut back, and she has brought up a point that I can't argue with. I have always built most of my gear and converted war surplus for mobile and portable use. She pointed out that every one of the electronic magazines I receive has about 80% advertisements and very little on build-it-yourself or conversions. Therefore, I am dropping all of my subscriptions and just buying an occasional one off the stand. Well, I guess that progress has finally left the old man behind, but with fond memories of amateur radio as it used to be and with 30 years of old *CQ's, Popular Electronics, QST's, Radio & TV News, Radio Electronics, Electronic Servicing,* etc., to while away my time I bid you 73.

Herman H. Lofdahl, W7PTO
Santa Clara, CA

QRP Up The Mountain

Editor, *CQ:*

Thanks for the *excellent* QRP column in the June 1983 issue. All of Ade Weiss's tips were on the money. I wish I had taken the one about antennas more to heart. It is a 3 hour hike up a mountain to my site, but I could have saved some weight by putting the thing up in my yard to find out that it wouldn't load. I had to carry it up the mountain to find out. It came out okay, however, because I also carried a lot of extra wire and put up a random wire with a lot of radials. Worked well!

I ran into an HW-8 problem that I had never heard of. It took me two years, but I finally found out that one of the switching diodes in the final filter was bad. It caused *very* low power (.25 watt). In the circuit, the ohmmeter said they were okay. I replaced them in desperation because they were cheaper than coils and caps. (I was desperate!) I cured it Thursday p.m. and hiked up for Field Day on Friday morning.

Next year Ade might mention something that Bill Dickerson, WA2JOC, wrote: "QRO operators usually have ears to match." Several stations were blasting in but couldn't hear me or other stations. I also worked some stations who heard me better than I heard them!

Keep up the good work in *CQ!*

Jim Droege, WØVS
Schofield Barracks, HI

Three Cheers for CQ!

Editor, *CQ:*

We want to thank you for being such a helpful part in our effort to produce another successful hamfest. We appreciated your very nice door prize gift of the subscriptions to your publication of *CQ* magazine. We hope our credits which were made via our sound and video system during the day proved adequate, and that you will want to be a part of our next 1984 hamfest. Again, thank you very much.

Jake Life, W9VJX
Randolph Amateur Rado Assoc.
Winchester, IN

Thanks From A Hall of Fame Member

Editor, *CQ:*

I want to thank John Attaway, K4IIF, and the CQ DX Committee for the most pleasant amateur radio award of my life, the *CQ* "Hall of Fame" plaque.

I know that the feeling I had in Visalia, which was noticed by the several hundred at the banquet, was very evident. My surprise was followed by tears, and whatever I said (I don't even actually know—Hi!) seemed to cause some tears in others' eyes, too. In all, it was a positive experience, and no less than a few dozen came up to congratulate me. SMØAGD and OH2BH even hugged me later! Thank you for the most kind consideration, and I shall never forget the honor as long as I live. I am still at a loss for words, and that is unusual for me!

I just returned from my Southeast Asia trip and ended up my DXpedition with over 11,000 QSOs. The total since 1969 is now 85,000 and probably no more for a while, since I'm returning to practice of medicine this summer. Glad I now have all countries worked and am at the top of Honor Roll so that I can concentrate on the medical practice and not DX. Hi!

Thank you and your staff again so much!

Dr. San Hutson, K5YY
Little Rock, AR

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American made RF Amplifiers and Watt/SWR Meters of exceptional value and performance.

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B108 10W in=80W out $179.95
(1W=15W, 2W=30W) RX preamp

B1016 10W in=160W out $279.95
(1W=35W, 2W=90W) RX preamp

B3016 30W in=160W out $239.95
(useable in: 15-45W) RX preamp
(10W=100W)

220 MHz ALL MODE

C106 10W in=60W out $199.95
(1W=15W, 2W=30W) RX preamp

C1012 10W in=120W out $289.95
(2W=45W, 5W=90W) RX preamp

C22 2W in=20W out $89.95
(useable in: 200mW-5W)

RC-1 AMPLIFIER REMOTE CONTROL $24.95
Duplicates all switches, 18' cable

WATT/SWR METERS

- peak or average reading
- direct SWR reading

MP-1 (HF) 1.8-30 MHz
MP-2 (VHF) 50-200 MHz
$119.95

430-450 MHz ALL MODE

D24 2W in=40W out $199.95
(1W=25W)

D1010 10W in=100W out
(1W=25W, 2W=50W) $319.95

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Remarkably Compact, High Performance Broadband Tribander with Quad-Band Option

New Para-Sleeve Design

The Explorer 14 is a new antenna design we call PARA-SLEEVE which uses an "open-sleeve" dipole optimized for maximum bandwidth and directivity. Here is the concept. A central dipole, driven directly by the transmission line, has a ½ wave resonance on the lowest operating frequency. Two shorter sleeve elements, tightly coupled to the central dipole, modify its impedance to create a ½ wave resonance to the highest operating frequency. This para-sleeve system is expanded by the addition of 15 meter traps and 20 meter element tips. A revolutionary new concept for HF tribanders. *So unique, we've applied for a patent.*

Broadband Performance

The Explorer 14 will load solid state tranceivers to maximum output with VSWR below 2:1, eliminating the need for an antenna tuner. You'll have edge to edge broadband performance on 20, 15 and 10 meters with gain and front-to-back ratio competitive to giant tribanders that cost twice as much or more. You'll be able to work stations you cannot even hear with a dipole antenna. And, the Explorer 14 handles maximum continuous legal power with a respectable safety margin.

Short Boom Save Space and Money

If your space or budget was too limited for a long boom tribander, chances are the Explorer 14 will fit both. The boom is only 14′ (4.3 m) long and the turning radius requires only 17′3″ (5.3 m). The compactness of the Explorer 14 reduces its overall weight and windload surface so you can mount it on a roof tripod, a mast or a tower. For Example, the Hy-Gain CD-45II rotator and HG52 tower are a perfect match for the Explorer 14. This saves you the cost of an extra heavy duty rotator and tower.

Superior Construction

The Explorer 14 includes passivated stainless steel hardware and heavy gauge, pre-formed element and mast brackets. High grade 6063-T832 thick wall swaged aluminum tubing is used throughout. A BN86 balun is included and a new Beta Multi-Match provides DC ground to reduce lightning hazard and precipitation static. It's a rugged, easily assembled antenna that survives winds to 100 mph (160 km/h).

Quad Band Option

You can add a fourth band, either 30 meters or 40 meters to the Explorer 14 with the QK-710 kit. A kit that attaches to the central dipole and is easily adjusted for either 30 meters (WARC) or 40 meters at minimal extra cost.

Lew McCoy, W1ICP, is among the most authoritative writers in amateur radio. For over 30 years he served on the ARRL technical staff with his last position as assistant senior technical editor. Presently he is the technical writer for CQ magazine. Here is what he had to say about the Explorer 14:

"In my opinion, with Explorer 14, Hy-Gain produced a truly high gain, high performance antenna in a small package. The "para-sleeve" design provides the amateur a whole new ball game, particularly in the area of broadbanding. I was really surprised when I actually verified the gain, front-to-back and bandwidth during my recent visit to the Hy-Gain labs and antenna range in Lincoln, Nebraska. The Explorer 14 is a winner."

Feed point and balun

Specifications:

Electrical

Frequencies of operation:	20M	15M	10M
Under 2:1 VSWR (MHz)	14.0-14.35	21.0-21.45	28.0-29.7
Maximum F/B Radio (dB)	27	27	21
Maximum Gain (dB)	7.5	8.0	8.0
Maximum Power		Maximum Legal DC Ground	

Mechanical

Boom Length	14′1½″ (4.3 m)
Turning Radius	17′3″ (5.3 m)
Net Weight	43 lbs. (19.5 kg)
Wind Surface Area	7.5 sq. ft. (.69m²)

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3) MA-4000 Duo-band Mobile Antenna. $44.95 value.

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IO5OYY with some contest graffiti in the background.

LU4F—the boys from LU put on quite a show for this contest!

FOØJO with W6GO at the mike.

1982 CQ WORLD-WIDE DX CONTEST PHONE RESULTS

BY BOB COX*, K3EST, AND LARRY BROCKMAN, N6AR**

The fates that control those radio waves decided to shake things up a bit in the 1982 *CQ* World-Wide S.S.B. Contest. After the dust had settled on the weekend it was clear that conditions on the low frequencies were excellent—probably the best they have ever been—while the higher frequencies were excellent, good, or poor, depending on where you were on the planet. Even though there was a disturbance which affected the polar routes, new world records were set on both 28 and 21 MHz. The conditions on 160 were exceptional, with over 80 countries in participants' logs! Many stations on the east coast of the U.S. commented on working a VK mobile on 160.

When it was all over and all the logs were checked, the overall Single-Operator winner was 9Y4VT operated by N6AA. Dick made over 7000 QSO's in the 48-hour period—Wow! HH2WW operated by N4WW made nearly as many, but had to settle for second place. Austin was followed by N1GL/6Y5. In the U.S.A. W1ZM operated by K1ZM pulled away from the pack and took away the high U.S.A. crown. He was followed by last year's winner, K1AR. Third place in the states was hotly contested, and K1RX emerged as the winner.

Records broken other than those mentioned above were as follows: Single Operator All Band—Asia UF6CR, Europe YU3EY. World Record Single-Operator Single-Band winners were 7 MHz YU3BRF; 21 MHz AHØAB (Opr. JA3ODC); and 28 MHz YV2AMM. Continental Single Band records were set by EA8AK (1.8), 4X4NJ (1.8), N2BZQ/4X (14), YU3EF (1.8), YT3A (3.8), KH6XX (3.8), AHØAB (21), AHØB (28), YM3AZC (3.8), YV3BRF (7), CX4CR (21), YV2AMM (28). U.S.A. records were set by W8LRL (1.8), KØGU (7), and K1KI (14) who broke the longest standing U.S.A. record on the books set way back in 1970 by WA4PXP.

Eight stations broke the World Multi-Single record in 1982. The score of 9Y4W topped the list with 16.7M points. They were followed by NP4A and FM7CD, two well-manned efforts. The group from RG6G deserves special attention! They (UK2BAS) took down their entire station, towers and all, and drove it by truck to UG6 and put it up again on a mountain-top—quite a feat! The following stations set new Multi-Single records: 9Y4W (SA); NP4A (NA); RG6G (AS); CN8CX (AF).

In the U.S. three stations broke the old Multi-Single record. W4QAW's multiplier helped to edge out KR2N and KX4S for top honors.

The battle of the giants (i.e., Multi-Multi) involved a careful check of the submitted logs. After it was all done, OHØW edged out EW6V for top honors. Both stations did not just *happen* to be on the air. Months of planning went into setting up these and other multi-op stations. To show you what is possible on 160, check out EW6V's breakdown in the band-by-band box! OHØW set a new multiplier record of 917—Wow! VP9AD finished third in their category. They almost pulled off a surprise victory. In South America the boys with the abbreviated call sign HCØ did quite a job and finished fourth. In the U.S., N2AA pulled out all the stops to beat runners-up W3LPL and K1OX to win the Multi-Multi hat.

When you have the right experience and location you can make 5 watts sound like a kw. That is exactly what TG9GI did in setting a new all-time QRPp record of over one million points! Germano looks to the sky in thanks in his photo. Both DF4RD and UB5UCJ finished second and third, respectively, in the world.

This year there were lots of rare places on the air. Those fellows who made the contest much more exciting by traveling torare and interesting places were: OHØW, RG6G, EW6V, VP9AD, W8OK/VE2, 8P6KX, 8P6J, K6OJ/C6A, ZF2FL, HH2WW, N1GL/6Y5, VP5KP, K4IIF/KV4, DJ6QT/CT3, VS6DO (K7TI), 9K2BE, 9N1WW, 9Y4W, FOØJO, T32AF, AHØB, AHØAB, 9Y4VT, 5W5DM, 4T4O, VP2EC, V3DX, VP2VDH,

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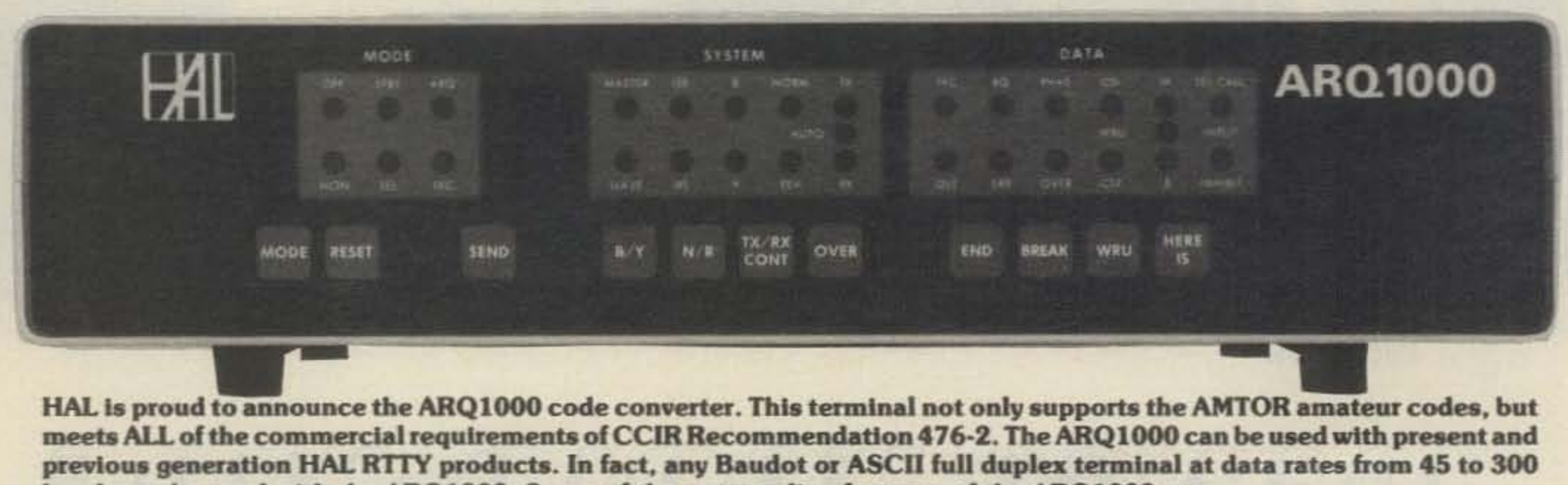

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- Encryption option available for commercial users
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In addition, an update kit is available so that all CT2100 owners can update their CT2100's to include CT2200 features. The kit even includes a new CT2200 front panel! Rather than making a proven product obsolete, HAL put even more behind the buttons. Pick up a CT2200 at your favorite HAL dealer and join the RTTY fun. Write for our full RTTY catalog.

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**Specifications measured by independent laboratory*

OK2PBM, magazine in hand.

VE5GF and VE5MC (in the background).

TG9GI—new record QRPp!

ZF2GH, HH2CQ, FM7CD, NP4A, VP5B, J20DU, GD5CGV, 4U1ITU, GJ5EOV, and HB0BHA. We thank you one and all.

All of the logs were checked, and most scores were changed usually to a higher score. People still forget to count UK1N (UN1), IT9, GM (Shetland), and JW (Bear Island) as separate countries. Remember that the DXCC list plus the WAE country list are what we count. Remember to send in a check sheet if you make over 200 QSO's in a band. There is a new winner box this year: High Single Operator All Band by Zone; hope you like it!

The fellows you can thank for hours of hard work in tabulating the scores are: K1AR, K2SS, K2VV, KR2Q, N2AA, N3ED, AD6C, N6SV, K6NA, N6CW, N6AW (Jan, a new member), W7EJ, and K9DX. Thanks also to W1WY and K2MGA for their suggestions and help.

Congratulations to all the winners and we hope to see you all as entrants in 1983!

73, Bob, K3EST, and Larry, N6AR

PHONE TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

World
HH2WW (Opr. Austin Regal, N4WW)
Donor: Bill Leonard, W2SKE

World QRPp
Germano Bezzina M., TG9GI
Donor: Adrian Weiss, K8EEG/0

U.S.A.
W1ZM (Opr. Jeffrey T. Briggs, K1ZM)
Donor: Potomac Valley Radio Club

Canada
David William Dudley, VE3BVD
Donor: Jack Baldwin, VE7RG

Carib./C.A.
William J. Ovca, Jr., N1GL/6Y5
Donor: Jim Nieger, N6TJ

Europe
Tine Brajnik, YU3EY
Donor: Thomas J. Peruzzi, Jr., W4BVV

Africa
Walter Skudlarek, DJ6QT/CT3
Donor: Gordon S. Marshall, W6RR

Asia
A.N. Karamyan, UF6CR
Donor: Japan CQ Magazine

Japan
Tadao Katsuta, JH7DNO
Donor: Palm Garden Contest Club

Oceania
R.M. Luther, VK4VU
Donor: Northern California DX Club

South America
Jorge Cangas, EA4LH/CE3
Donor: David Novoa, KP4AM

SINGLE OPERATOR, SINGLE BAND

World—14 MHz
Raymundo Rodriguez Diaz, YS1X
Donor: K2HLB Memorial
(No. Jersey DX Assoc.)

World—21 MHz
AH0AB (Opr. Masato Hata, JA3ODC)
Donor: Lee Wical, KH6BZF

World—3.8 MHz
Randall F. Sobol, KH6XX
Donor: Fred Capossela, K6SSS

USA—14 MHz
Thomas Frenaye, K1KI
Donor: So. California DX Club

U.S.A.—28 MHz
W6YA (Opr. Thomas Hoyne, N6NI)
Donor: Donald Thomas, N6DT

U.S.A.—3.8 MHz
Clarke Greene, K1JX
Donor: Arnold Tamchin, W2HCW

Canada—21 MHz
John Sluymer, VE6OU
Donor: Gene Krehbiel, VE7KB

Carib/C.A.—21 MHz
Perry Brittain, VP2MR
Donor: KP4ES Memorial
(Pedro Piza, Jr., NP4A)

Europe—28 MHz (Zone 14)
Jorge Alemani Sanz, EA3AIN
Donor: A.G. Anderson, GM3BCL

Japan—21 MHz
Masanori Kawakami, JR1CBC
Donor: DX Family Foundation

South America—28 MHz
Sergio Giacomo Pontoni B, YV2AMM
Donor: Rafael Ponce de Leon, CX3BR

MULTI-OPERATOR SINGLE TRANSMITTER

World
9Y4W (Oprs. WA3LRO, N3ED, KA3E, KB2XZ)
Donor: Don Wallace, W6AM

U.S.A.
W4QAW (Oprs. W4QAW, K3EST, K3RV, W3ZZ, N4RP,, W4BVV, Fara)
Donor: Theodore Pauck, Jr., K8NA

Canada
VE1DXA (Oprs. N1CIX, VE1AIH, VE1BSE, VE1CEG, VE1CER, VE1FH, VE1MX, VE1YX)
Donor: Calgary Amateur Radio Assoc.

MULTI-OPERATOR MULTI-TRANSMITTER

World
OH0W (Oprs. OH2BW, OH2BNP, OH2BQS, OH2JA, OH2BBM, OH2BU, OH2MM, OH2BH, OH2BAD, OH2BCP, OH2BBR, OH2BAZ, OH2BEJ, OH2KI, OH2VB, OH1MA, OH1XX, OH1NM, OH5UX, OH5LF, OH5NZ, OH5KS, OH3YI, OH3ZE, OH3UU, OH8SR, OH6DX, OH6UM, OH6JW)
Donor: Radio Club Venezolano

U.S.A.
N2AA (Oprs. K2GL, K2GM, K2SS, K2TT, K2TW, KR2J, KR2Q, K2NG, K2BQ, K5NA, W2RQ, N2CTV, KC2X, KR2W, KU2M, Greg.)
Donor: Dale Hoppe, K6UA

Europe
YT4I (Oprs. YU4GD, YU4CF, YU4VFF, YU4WCA, YU4WST, YU4WCW, YU4WMM, YU4WEU)
Donor: Bob Cox, K3EST

CONTEST EXPEDITIONS

World—Single Operator
VS6DO (Opr. Alastair N. Couper, K7TI)
Donor: Stuart Meyer, W2GHK

World—Multi-Operator
EW6V (Oprs. UP2OO, UP2OU, UP2BBT, UP2BCT, UP2BDF, UP2BFI, UP2BFL, UP2BFN, UP2BJK, UP2PAV, UP2PBW, UP2PCI, UP2NK, UP-038-1050)
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- High quality glass circuit board
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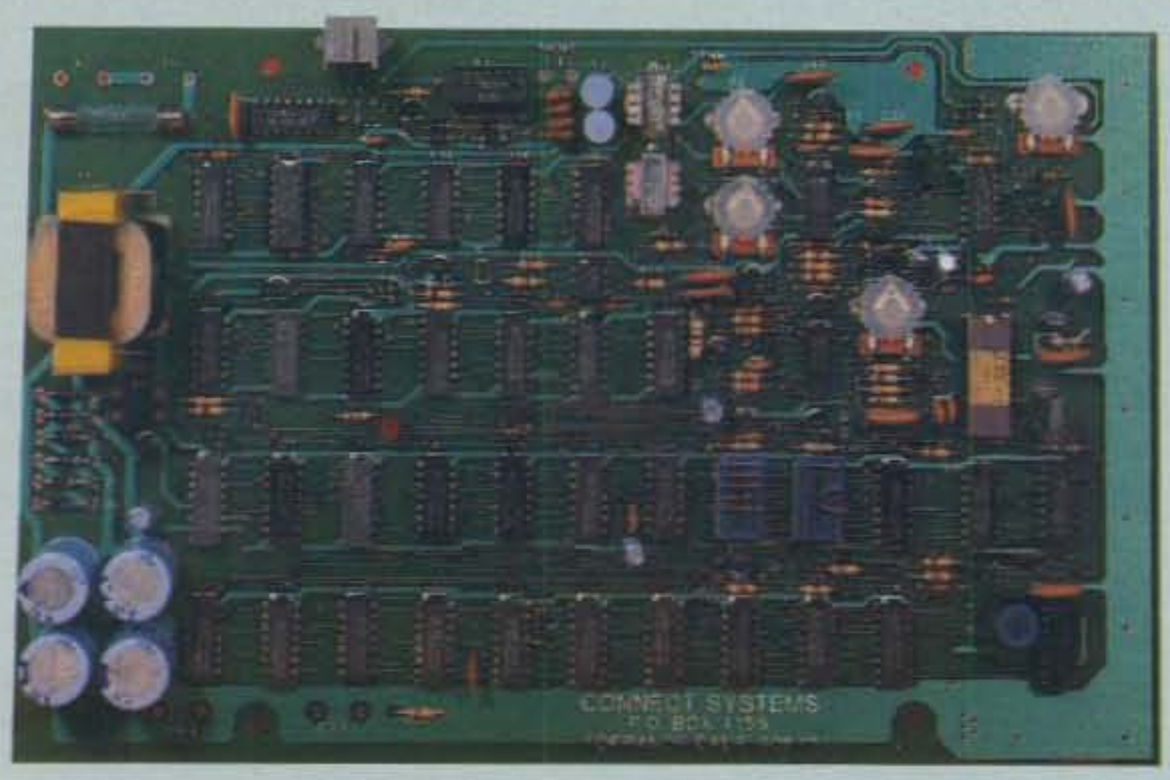

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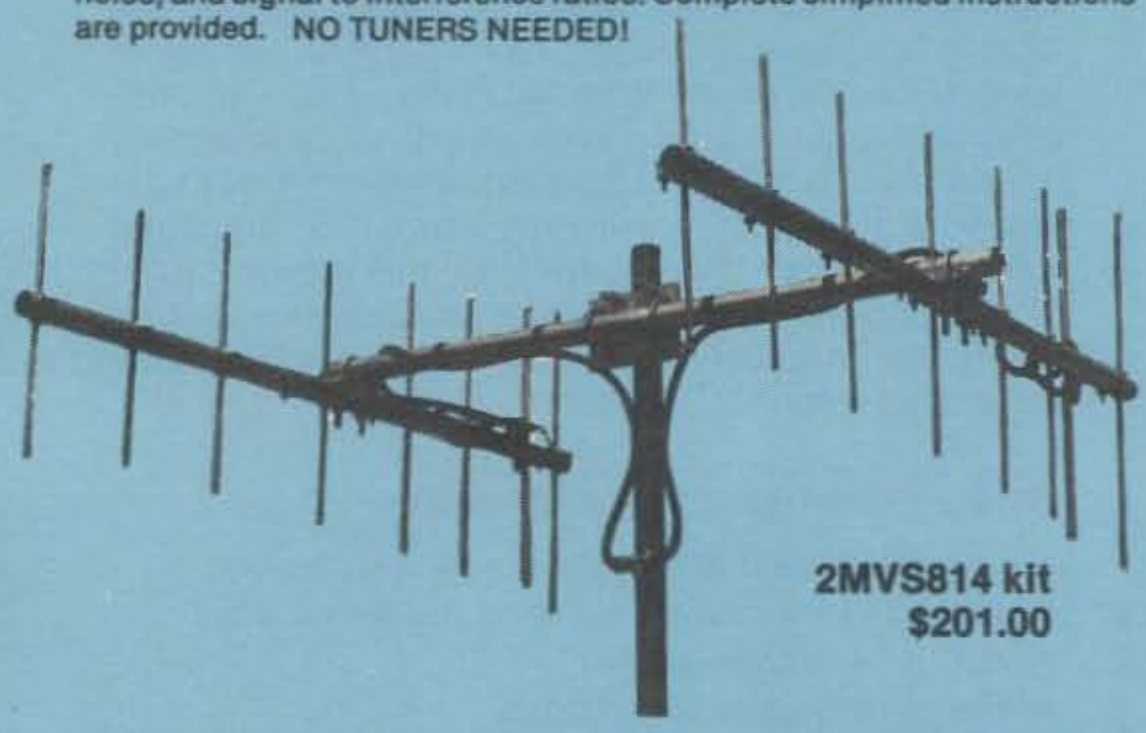

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MODEL	Description	GAIN	Value	PRICE
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10M523	10 Meter 5 element	(13 DBD)	342.00	**285.00**
10M636	10 Meter 6 element	(14.6 DBD)	745.00	**625.00**
15M532	15 Meter 5 element	(13 DBD)	545.00	**455.00**
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**
TB5ES	10, 15, 20M Tri-Band	(8.5 DBD)	398.00	**330.00**
TB6EM	10, 15, 20M Tri-Band	(10 DBD)	735.00	**565.00**

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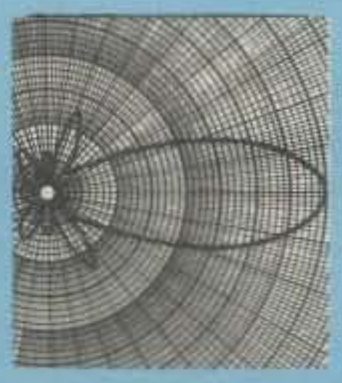

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U.S.A. QRM

Another big year on 10 meters—band was fantastic for multipliers . . . *K4GFH.* Forty and 80 conditions were super, but other bands were a big disappointment . . . *N4AJZ.* Seventy-five meters sounded like 20 meters first nite . . . *KD4UH.* Is the legal limit 5 kw in some QTH's? . . . *K4BAM.* Working FB8WG on first call . . . *WB4FTU.* Best contest JA opening in years . . . *KV4P.* Did the woodpecker eat 10 meters Saturday nite? . . . *WB5YOT.* Too many of the DX stations not signing—working call areas, etc. . . . *W5OB.* A big kudo for nice turnout from CE gang . . . *N5HB.* First time in 10 years I've done a serious CQ WW. Great contest! . . . *N6BV.* Worked all telephones in Amador county . . . *W6YKM.* Very educational! Especially after 42 years out of ham radio and DX. Thanks! . . . *NG6W.* Geomagnetic storm blocked polar path from W6 on 10 meters. OH0W came crashing through anyway . . . *WB6MBF.* Please send JA some dupe sheets . . . *NI6W.*

Everything worked for a change—good Test . . . *KR2N.* Called CQ on quiet 10M band, then VU9, A4X, EI3, GI3 in less than 2 minutes . . . *K2ITG.* Way too many U.S. stations outside band on 40, 75 . . . *KA2CDJ.* Condx on 160 excellent . . . *W4QAW.* Murphy hit us this year. Lost SB220, MLA2500, plus bad line noise . . . *N4ZC.* Accidentally worked Canada on dummy load . . . *N5DXQ.* Duping computer crashed three times . . . *KA7MDM.* Not a bad effort for confirmed c.w. ops . . . *KS8S.* Wonder how other YLs did during the Test? . . . *KM7E.* European openings getting more spotty . . . *W7FGT.* Bands were great the week *before* the Contest—what happened? . . . *K7LXC.* The various "woodpeckers" make it challenging—ugh! . . . *N7AM.* Poor conditions especially over the Pole. Sign of the times? . . . *W7KSA.* Went from two to three elements on 40. Still not enough! . . . *W7XN.*

Biggest thrill? No TVI complaints! . . . *WB8VPA.* DX should I.D. more . . . *KC8JH.* By now the football fans at Ohio State are used to seeing our antennas rotating above the stadium during games! . . . *W8LT. CQ* WW—the world's most demanding contest . . . *KB8FJ.* After 58 years of radio there are no more "thrills," but the WW is always fun . . . *W8YGR.* No time to operate—getting ready for Heard Island . . . *K8CW (Thanks, Al—ed.).* The non-stop calling on 75 meters hurts *all of us,* fellows. Time to evaluate our methods? . . . *K8MN (Amen—ed.).* Snagged #161 on 160M. Thanks to all for another great Test . . . *W8LRL.* Conditions so poor on 10/15, even the woodpecker went to 40! . . . *KE9A.* Everything was normal—still connecting the beam coax when the Test started . . . *K9GM.*

Spent Friday putting up a new 75M vertical. Neither it nor I worked too well Friday night . . . *K9QXY.* Being a dentist, found myself giving advice to a Canadian DXer who was suffering from a toothache! . . . *KC9MF.* My computer dupe/QSL program was written by a 13-year-old student of mine . . . *WA9BZW.* As a policeman I'm usually too busy working Halloween to allow time for the Contest . . . *K9YAX.* As usual, CQ WW was "the greatest" . . . *KK9A.* Those "double multipliers" sure feel great . . . *W0UA.* Never heard OH0W. Where were they? . . . *W0IYR.* If you think it's tough from home, try it in your car! . . . *KD0U/m.* Refreshing to hear more courtesy this year . . . *W0BWJ.* Took a break Saturday long enough to pluck a BY1PK QSL out of the mailbox . . . W0ZV.

Finished DXCC on 40M . . . *WB1EAZ.* Great way to snag new ones for *CQ* DX Awards . . . *K1VHS.* No soap box, it is never printed anyway . . . *K2NJ.* Eleven trips up tower to turn beam (son cut cable with lawn mower!) . . . *WA2SPL.* Good Contest! Is it over already? . . . *N1API.* Working ZD9YL on first call . . . *KB2WN.* Having all equipment work for a full weekend . . . *N2BLT.* Hard to operate—expecting first baby this weekend. Potential DXer Christopher born 4 November . . . *KT2M.* My first! Great fun . . . *WA2SSH.* It's been a long time . . . *N3RS.* Contest theorem #101: antenna put up day before always works well . . . *K3ZJ/1.* I just followed N6RO around . . . *KI9A.* Increased my total to 199 with one watt . . . *K7BTB.* 160 fabulous—worked 23 countries in two hours . . . *K1ZM.* Great 160M opening . . . *AA2Z.* Biggest thrill was working the KA's in zones 3, 4, and 5 during JA openings . . . *N2LT.* Being notified by EA7TH Friday night that I had won the Seville DX Contest . . . *W3BGN.*

DX QRM

Lots of fun and new countries—one of the best contests . . . *DL0TR.* We really enjoyed this contest. The greatest contest on earth . . . *EA7TH.* Really enjoyed our first try at Multi-Single *CQ* WW DX Phone; we'll be back next year! . . . *GB2AL.* This DXpedition was specially planned and made for the CQ WW DX Contest . . . *GD5CGV.* Enjoyed beer and propagation . . . *HB9CAT.* What a beautiful feeling when hard to copy JT1AN answered on 40! Bad condx and alot, *alot* of QRM! . . . *YZ4M.* First I ever worked a bicycle mobile (WA4YDR) . . . *OA8CW.* Being DX for a day . . . *VE3CKR.* A lot of smoke and fire, a lot of ice-up and broken antennas. Had a great time! . . . *RG6G.* The most equipment failures in my contest life . . . *RK3ABO.* Thanks for FB QSO's . . .

UP2BBF. Best wishes from Western Siberia . . . *UK9UAA*. We thank CQ for the good contest! . . . *UKØAMM*.

More than 100 watts only makes QRM on 160M . . . *EA9EU*. Where were the Africans? . . . *ZS3HL*. Never lose a good slot—elbowing your way back can be rough going . . . *ZS6BRZ*. Last contest operated was 1969 CQ WPX SSB from ZD8AR . . . *ZS6WB*. Scoring inequalities give little incentive for S.E. Asians to attempt any major efforts . . . *VS6DO (Opr. K7TI)*. VU9 was a special prefix to commemorate the 9th Asian Games in India . . . *VU9AJ*. Enjoyed listening to the great op at VP5B . . . *N2BZQ/4X*. Israeli amateurs now have permanent permission to work 160M . . . *4X4NJ*. Now I know what it is like on the other side of the pile-up; Ruff!! . . . *HL9AZ (Opr. KA4NCZ)*. Best we can do, as Sat./Sun. are working days . . . *9K2BE (Opr. G4BWP)*. My first time in any major contest . . . *YK1AO*. My latest antenna design gave me the best score in any contest I have entered . . . *VE1TG*.

Worked KX6OB at 8 AM local time (full daylight). Tnx for your patience OM . . . *VE1LI*. Coffee and aspirin stock must have gone up; I invested heavily . . . *VE1BNN*. Condx awful on 15M . . . *VO2CW*. Comments and queries regarding my VD prefix could fill a book, hi hi . . . *VD3GCO*. Thanks to W's for points . . . *VE3BMV*. Can't remember working so hard for so little results . . . *VE4CCC*. Artic path extremely poor for those of us in northern latitudes . . . *VE7CVM*. Never heard pileups like this on 160M before . . . *VE7BS*. This was my first "DXpedition." What fun! . . . *FOØJO (Opr. W6GO)*. Big thrill having JT1AN call me in JA pileup . . . *K6SVL/KH6*.

The hurricane was a nuisance . . . *AH6BK*. My first *CQ* WW DX Contest; I will do better next year . . . *YC2BSF*. Fun for the first 24 hours, but not so the second day . . . *T32AF (Opr. KH6UR)*. Experience of last year and this year gave me a conclusion that the maximum number of JA's workable from DX on one band during a contest is about 3500. JA's aren't a limitless resource . . . *AHØAB (Opr. JA3ODC)*. Amateur radio contest operating should be considered for the Olympics . . . *DU1CPL*. I used an Echo II Voice Synthesizer and had no microphone hooked to the rig—quite an experience . . . *KH6GMP*. First fone contest for a dyed-in-the-wool CW operator . . . *KH6JWK*.

Could hear V3DX for hours on 40M but no contact . . . *VK3SM*. A long wire's a poor substitute for last year's 5el Yagi on 20M . . . *VK1RJ*. Went all weekend with only one TVI complaint—my own! . . . *VE3EEW*. My very first contest and did I learn lots! . . . *ZS4GL*. Amused to work an American station mobile on a bicycle . . . *ZS5IV*. Action-packed 48 hours . . . *ZS6AF*.

Contest conditions very poor first half of contest. QRM from snowmobiles terrible . . . *VO2WL*. Our participation in contest was to honor a distinguished local radio ham, XE2PL, Jose Podolsky, who passed away one year ago . . . *XE2CNL*. Had great fun. Contest QTH near lake in Africa; the bugs ate us alive at night . . . *ZS6PT*. The intensifying magnetic storm made this try a flop . . . *JW5VAA*. All stations were worked between 21,150–21,200 MHz because EC's (Novice operators) only can transmit on this part of 21 MHz . . . *EC4AVC*. Lots of fun from the other end . . . *G5CFJ/K6PU*. Sunday was frustration day with S1-2 signals from the USA; so you could just hear the pile-ups the guys in the Mediterranean had . . . *DK1FW*. We are only allowed to work on one single frequency on 160 SSB (1.835 MHz) . . . *DK8NG*. Very variable conditions, and you could find the craziest propagation paths . . . *LA8DY*. Very strong aurora Saturday and Sunday evenings; made it very difficult in long periods. Nevertheless, great fun! . . . *LA7JO*. My first *CQ* contest. I am in ham radio only eight months. Thirty-nine zones confirmed and about 185 countries . . . *CT1BWY*. A mere eight USA contacts is no fun . . . *SMØBDS*.

STATION OPERATORS

Multi-Operator Single-Transmitter

AE2E & KA2AAN, KA2QJP, WA2KRO. **AIBS** & KB8IZ, KB8QS, KC8KO, W8CY. **AB8I** & N7DF, KØRWL, KØUAA, KØUR, KBØPR, KBØU, KBØWD, KCØCL, KJØD, KMØL, WØJLC, WAØTKJ. **AKØM** & KBØV, KCØRD. **CE2AA:** CE2MH, CE2HI, CE2BNT, CE2MM, CE2DWT, CE2CC, CE2DW, CE2WO, CE2CIA, CE2DAM, CE2BMV, CE2DOV, CE2DCR, CE2BNT, CE2HN, CE2CM, CE2DBW, CE2EEQ, CE2BYE, CE2DQE, CE2BMU, CE2ACR, CE2DMZ, CE2OP, CE2HI. **CE2PA:** CE3RR, CE3CMW, CE3AJS, CE3AOQ, CE3CTF. **CE5CJA:** XQ5BIB, CE5BYY, CE5CFR, CE5CIE, CE5CNT, CE5DVS, CE5DRD, CE5EOT, CE5EMZ, CE5SG. **CN8CX:** CN8CX (K4BF), CN8CY (G3GJQ), CN8CO (W3EMH), CN8EU (W6AXX), KE4XH.

DFØSI: DF6CZ, DL1MAR, DL8MBS. **DF3GY** & DF3GN, DJØJJ, DK5GV, DL2GBT. **DKØDL:** DF1NH, DK5QL. **DKØDX:** DL9NC. **DKØKX;** DF3QL, DF9YY, DK3RG, DL8OH. **DKØMM:** DJ7IK, DK9FS. **DL8DC** & DL1VF, DL8CH, DL8CM, DL8FR, DL8HA. **DLØER:** DF2EY, DH1EAF, DJ6QF, DJ6QO, DK8JL, DL1MT, DL8EAD, DL9EAP, DL9ON. **DLØKQ:** DJ7VY, DK2VQ, DL7DA, DL7JP, DL7KT, DL7LA, DL7RT, DL7SP, DL7YC, DL7ZL, DL9GI. **DLØTR:** DF1AL, DF4PI, DF5PK, DF6PK, DF7PX, DF9PG. **DLØUE:** DF2OA, DF3AV, DK1II, DJ5FT, DJ7MG, DL3LU, DL5OL, DL7BI, DL8RL. **EA2RCI** & EA2AKC, EA2AZW. **EA7TH** & EA5BRA, EA7CEC, EA7CFW, EA9EO. **ED3CB:** EA3BOW, EA3BOX, EA3CVA, EA3DDU. **ED6MDX:** EA6JW, EA6JZ, EA6KZ, EA6MQ, EA6MR. **ED9CM:** EA9FN, EA9GS, EA9HE, EA9HY, EA9IB, EA9IE, EA9JE, EA9JV, EA9KF, EA9KN, EA9KQ, EA9LZ, EA7BMZ.

F3TV: F6ARC, F6BEE, F9IE. **F6CTT** & F6HRP, F6BDN. **F6GDK/p** & F1GHS, F6ASS, F6BPX. **F6KAW:** F6BBO, F6CWN, F6DZS, F6EBN, F6EPY, F6FLV, F6GWV, F6IFR. **FM7CD:** FM7CD, F5QE, N6ZV, K6YRA, KJ6F, W6TJI. **G5YC:** G4GSP, G4GWR, G4JCX, G4LXT, G4MLM, G6IHA. **GB2AL:** GM3RAO, GM3WOJ, GM4BYF, GM4COX, GM4CXM, GM4FDM, GM4IGS, GM4NFC, GM4NFI, GM8YJU. **GD5CGV:** DF7FH, DL4FF. **GI4MWA** & G4BGH. **GJ5EOV:** WA3NGL, WA4WPO. **GW4BRS:** G4DZE, GW4JOG, GW4MOZ, GW6IOA, GW6LCU, GW8NVN, GW3ZIY & SWL's.

G8JC: G3DEF, G3RMF, G3TQD, G3TQZ, G4FWR, G4TKW, G4LUB, G4NEC, G4NRD, G4OPD, G8ASO, G8NWR, G8TIC. **HA1KZH:** HA1ZZ, HA1XO, HA1ZN, Mihalhy, Horwoth, Zdikaiaji. **HA2KMR:** Kiss, Peli, Eder, Juhasz. **HA2KMK:** Istvan, Tibor, Szilard. **HA3KNA:** Szabo, Hudanik, HA3NS, HA3NU, Kisantal. **HA5KFZ:** Janosi, Molnar, Hadamcsik. **HA5KHS:** HA5KV, HA5PI, HA5LC, Dezsi, Fekete, Koszcgi. **HA5KXC:** HA5MA, HA5LV, HA5MD, HA5MO, HA5UM, HA5KP. **HA6KNB:** HA6NO, HA6NF, HA6OQ, HA6NN, HA6NQ, HA6NY, HA6ON. **HA7KRK:** Szekely, Taskai. **HA7KSR:** HA7PQ, HA7PL, HA7SH, HA7SQ, HA7UG, HA5OV. **HA8KUC:** Szabo, Nemeth, Varga, Cserto. **HG5A:** HA5FN, HA5FM, HA5UM, HA5GF, HA5ML, HA5WE, HA5LN, HA5LZ, HA5HO, HA5UA, HA7SU, HA7RY. **HG6V:** Simon, Suszler, Varga, Laki, Macsuga, Makrai. **H44R:** H44DX, H44SH. **HB8BHA:** DF9GQ, DH9NAP, DJ2EH, DK7NM, DL5NP, DL8NBH, DL9NAP, HB9BHA. **HB9CAT** & HB9AGC, HB9LG, HB9ZE. **HH2CQ:** K4JPD, W5VUX, N4DVW, HH2MC.

IØSNY & IØIFG, IØRUM, IØVBT, IØZQB, IØZUT. **I1GJC** & I1AHF, I1DIE, I1DSG, I1GUB, I1PCT, I1RBP, I1UUZ, I1WWG. **I5MPK** & IK5BAF, I5MPN, I5MXX, I5NPH, I5SDG. **I03MAU** & I3BYT, I3DYG, I3EVK, I3FIY, I3GNX, IV3GOW, I3ON, IV3TQE. **I04YSS** & I4JMY, I4KDJ, I4OUT, I4YNO, I4ZNU, IW4APD. **I05OYY** & I5NSR, I5NXH, I5UKS, I5VXG. **ISØYUJ** & ISØDTK, ISØBYR. **J28DU:** W6KG, W6QL. **JA1YAD:** JE2QIZ, JR6JOE, JH9ADA. **JA4YFH:** JG3HCI, JG3IIO, JR4TKR, JH4UID, JF3GPS. **JA6YBR:** JE6QFE, JE6UXS, JF6BHN, JF6DEA, JR6DUU. **JA6YCU:** JA5UIM, JR6IQI, JF6MZH, JH6XYR. **JA6YDH:** JA4JYL/6, JE6PSL, JE6VFJ, JE1TAW/6, JA6SWF, JR6BZC, JR6GHN, JR6PKJ, JR6QHK, JR6QPB, JE6LMW. **JA7YAB:** JH7AJY, JH7CUU, JH7IHR, JH7MAJ, JH7XNJ, JR7CDI, JH7SSJ, JE2DQC, JH7KJI. **JA7YAF:** JE7HLZ, JR7HMS, JR7SZJ, JR7TRW. **JA7YCQ:** JH7IMX, JH7UGG, JR7MZC, JF2GJD. **JA7YFB:** JJ1GXY, JR70ZF, JH7XMO, JR7LCI, JR7JVO. **JA8YCX:** JH8CLU, JH8DIY, JH8RTZ, JH8SNI. **JA9YBA:** JK1APO, JA9LNJ, JA9OTX, JA9QOE, JA9RZJ, JA9UAD, JA9VBW, JHØCAZ, JHØHHU. **JG1ZUY:** JG1ILF, JG1IMM, JI1QQI, JR2UNY, JH7PKU, JA6-9330. **JH3YJM:** JA3BAG, JA3MMQ, JA3XGF, JH3FJG. **JH7YJF:** JA7DWU, JH7NHE, JH7LRS, JH7PNL, JR7QKR, JR7FEK, JH7VNV, JH7XWT, JH7GGI. **JR1YPU:** JA8CZW, JH1PHR, JE1RFP.

K1CC & K1GX, K1TO, W1GNC. **K1NG** & K1IG, KB1AW, KJ1N, N1BYH, WA1TFF. **KA1GG** & K1KJT, W1KM, WA1OEZ. **KA1RE** & N3MC. **KG1D** & K1DD, K1NYK, KA1VC. **K2CC** & KK1W, WB1AFZ, AB2L, AD2Y, KA2KDU, KT2H. **K2FL** & W3SOH. **K2ITG** & WB2KCN. **KA2CDJ** & N2DEM. **KC2KK** & KA2PZZ, KW2D, WA2UYM. **KQ2O** & K2BK. **KR2N** & K1EB, K1TA, KB1H, N1EE, N1XZ, KQ2M, WB2DHY, WB2ITR, WB2PWV. **K3HP** & KB3HE. **K3TUP** & K3USC, KB3A, KB3X, KF3M, KJ3L, N3BJ, WA3UCS. **KA3GIX** & WB3FIZ. **KC3AJ** & WB3JRU. **KI3I** & KA1CQM, K3BVQ, KD3H, KI3K, KI3S, N3ANW, N3BPF. **KX4S** & K3RZR, KG4W, N4HB, N4ND, W4DR, W4MYA, WA4HOT, WB4BUY, WD4IMC. **K5QY** & WB3DBI, N4QS, KM5K, KM5R, KY5N, KY5P, N5EG, N5BQQ. **K6SG** & KV6H. **KE6PQ** & KE6ZA. **KQ6U** & W6OVO. **K7GEX** & WB7BNP. **KA7MDM** & WB7RPJ. **KC7EY** & K7ZSD. **K8EPV:** AC8W, K8DO, K8JLB, KA8AMX, KA8APL, KA8KCN, KJ8A, N88KO, N8CJX, N8DBI, N8DKU, WA8BSF.

KA8BLF & N88YV. **KF8X** & WD8QFQ, WD8QWD. **KS8S** & AD8P, K8NZ, N8ABL, W8CAR, W8FN, WA8SAE. **K9BIL** & N9CPW, WB9NOV. **K9CJK** & K9LWT, KB9US, N9BBQ, SM7DZT, WB9AUK, WB9UAI. **K9EC** & KA9CQF, KB9BC, KC9NN, WA9PAM, WB9YUH. **KK9G** & WN8GUE, KB9Z, KI9U, KN9C, WB9RCI. **KQ8M/8** & KCØNM, KCØNQ. **K8FU/9** & K9HWU, N9BYL, WD9DSS. **K8JSY** & WØWP. **K8PKK** & WA2HFI. **K8UK** & K9MWM, KAØBAD, KAØLRW, NØAFO, WØKEA, WAØBBI, WBØFOR, WBØITG, WDØASM. **KBØFP** & KØINR. **KCØXK** & WØEAN. **KL7Y:** AL7DN, AL7H, KL7EC, KL7Y, NL7G, NL7P, WL7E. **KMØP** & KMØR, NØDWC, WØHBH, WAØLTF. **LA1K:** LA1JU, LA6IBA, LA6JBA, LA6MP, LA6MV, LA7VV, LA9MW, LA9UX. **LA5C:** LA1JBA, LA2GV, LA9GX, LA9ZV. **LG5LG.** LA1WQ, LA4DCA, LA8UU, LA9HW, **LU4DQ:** LU6ETB, LU4DP, LU1DFO, LU4DCK. **LU4F:** LU5FGG, LU2FFD, LU8FEU, LU1FJH, LU1FDJ, LU6FDK, LU2FAO, LU8FP, LU4FDV, LU5FBG, LU8FDZ, LU9FFJ, LU2FDR, LU1FKI. **LZ1KOZ:** Misho, Stefan. **LZ2KSB:** Metin, Lyubomie.

N3ARK & KB3MM. **N4BS** & KA4ADF, KA4ZKI, KA4ZRS, KC4TX, N4ERR, WA4GHO, WA4UIV, KA4TFC. **N4KG** & KU4J, N4QB. **N4ZC** & AA4S, AA4VK, K4NYV, N4EUU, N5TR. **NQ4I** & W1UA, AA4OK, KA4KMH, KA4MNS, N4DPI. **NU4Y** & WA3UBA, KA4JMU, KF4S, KW4T, N4GNP, N4HCR, N4HGB, N4UF, NF4L, NO4J, WB4KSP. **N5DXQ** & N5EZI. **N6ESV** & WD6EIW. **N6OJ** & AE6H, AF6F, K6ANP, KA6JHM, KB6HT, KD6GC, KK6X, N6BLN, N6DCJ, WB6NBR. **N7RO** & AI7P, KA7AUH, W7EKM, WA7ZWG, WB7CLU. **N8CSL** & KA8MLA, KB8WC, N8DMP, WD8IVL. **N9AKE** & K9BQL, K9LUW, KA9HVC, KA9HVV, KA9KDZ, KA9LDS, KC9JT, KC9LP, N9AG, WB9YRX, WD9GIG. **N9GB** & KA9KKD, KB9YW, KC9OA, W9QQ, WB9RGA. **NØEEN** & KAØGLS, KAØGOA, KAØMUG, KAØMZN. **NØXA** & ABØX, AEØK, KØCS, KØXR, KBØX, WBØUXI. **NP4A:** K5ZD, K5TM, K5GN, NP4A, N4TO, KP4CC, KP4O, WP4CBB.

OH1AF: OH1IS, OH1CN, OH1EH, OH1HS, OH1LA, OH1XM. **OH3AC:** OH3BQ, OH3SF, OH3ST, OH8MV. **OH4MI:** Kari, Seppo, Risto. **OH5BM** & OH4NB, OH5LP, OH5UQ. **OH6AC:** OH6CS, OH6SM, OH6WZ. **OH7AB:** OH7PF, OH7UE, OH7VR, OH7XI, OH7XM, OH7YF. **OH9AB:** OH9NV, OH9PH, OH9UW. **OK1KPX:** OK1FKA, OK1TA, OK1TN, OK1-19668. **OK1KRG:** OK1ADS, OK1ALW, OK1AWZ, OK1DWA. **OK1KSO:** OK1AEZ, OK1JCW, OK1JJB, OK1JWA, OK1WT. **OK2KYC:** OK2BSK, OK2BUC, OK2SMO. **ON4AWC:** ON4BB, ON5JE, ON5KH, ON6DK, ON6KD, ON6TC, ON6YR. **OZ2PG/A** & OZ5KG. **RG6G:** UG6AI, UP2BAO, UP2BAW, UP2BIG, UP2BIL, UP2PAJ, UQ2GFN, Alex, Slav. **PI1GOE:** School pupils. **RK3ABO;** RA3ANG, UA1ODP, UA3AGW, UA3AMB, UA3APF, UA3ANG, UA3DRG. **SK6JX:** SM6FHZ, SM6FQE, SM6FYU, SM6MFK, Reino. **SM5AOE** & SM6BJI. **SM5AZU** & SMØATN, SMØBGM, SMØMC. **SM6KRE** & SM6JNA, SM6JWU.

UK1AAW: UA1-169-1843, UA1-169-2008, UA1-169-2023. **UK1NAO:** UA1NBF, UA1NBO, UN1CC. **UK2AAB:** Club. **UK2AAW:** UC2ACF, UC2AFE, UC2-009-494. **UK2ABC:** Club. **UK2BAG:** UP2BAE, UP2DT. **UK2BBB:** UP2BBB, UP2BIJ,UP2BKW, UP2PX, UP2-038-892, UP2-038-1052, UP2-038-1053. **UK2BBF:** UP2BKP, UP2-038-794.**UK2BBX:** UP2BCO, UP2BCW, UP2-038-1643, Shal. **UK2BCC:** UP2BDW, UP2BHK, UP2-038-346. **UK2FAA:** Club. **UK2FAD:** Club. **UK2GAB:** Club. **UK2GAZ:** UQ2GLW, UQ2-037-081, UQ2-037-221. **UK2GJW:** UQ2-037-293, UQ2-037-294, UQ2-037-295. **UK2GKO:** UQ2GAG, UQ2GBU, UQ2GHT, UQ2-037-152. **UK2LAN:** Club. **UK2PAP:** UP2OX, UP2PAQ, UP2-038-1638, UP2-038-1645. **UK2PAD:** UP2BCR, UP2BJP, UP2BJQ, UP2BKP, UP2-038-728, UP2-038-1541, UP2-038-1600. **UK2PRC:** UP2BBM, UP2BDM, UP2BLA, UP2MB. **UK2RAW:** UR2RMZ, UR2TAX, UR2-083-157. **UK2RDX:** UR2REE, UR2RCU, UR2RNA, UR2RNJ, UR2RNX, UR2RRJ, UR2TAX, UR2QD. **UK3ABT:** EZ3ABO, EZ3ACO, EZ3ACX, RA3ADR, UA3-170-428, UA3-170-501, UA3-170-1014. **UK3DBV:** UA3DFO, UA3-142-1762, UA3-142-1770. **UK3DBW:** Club. **UK3MAA:** UA3MDE, UA3MDO, UA3MDS, UA3NG. **UK3TBF:** Andrei, Sergei. **UK3WAF:** Club. **UK3XAB:** Club. **UK4ACE:** Club. **UK4CCC:** EZ4CCB, UA4CBO, UA4CCF, UA4CHU, UA4CIB, UA4-152-416, UA4-152-1069.

UK4HAW: UA4HAD, UA4HBR, UA4HCV. **UK4LAA:** RA4LBZ, UA4LBE, UA4-164-259. **UK4SAM:** Club. **UK4WAA:** Club. **UK4WAB:** Club. **UK5CAO:** Club. **UK5EAA:** UB5EDX, UB5-060-86, UB5-060-2518. **UK5EAE:** Club. **UK5ECV:** Club. **UK5EFW:** Club. **UK5GKW:** Club. **UK5HAB:** UB5HEW, UB5-071-73. **UK5IBB:** UB5IJK, UB5INI, UB5IML, UB5IOK, UB5IPP, UB5IQS. **UK5ICX:** Club. **UK5LAS:** CLub, **UK5LAX:** CLub. **UK5LBJ:** UB5LNS, UB5LNU, UB5LPZ. **UK5MAA:** UB5EC, UB5MBZ, UB5MBY, UB5MCD, UB5MNO, UB5MQF. **UK5MAF:** UA3ZIL, UB5MEI, UB5MLX, UB5MNM, UB5MNX, UB5MNY, UB5MOA, UB5MUV, UY5LK. **UK5MBQ:** Club. **UK5MCK:** UB5MMG, UB5MSF, UB5MSV, UB5MTB, UB5-059-454, UB5-059-456. **UK5MCO:** UB5MPN, UB5MRO, UB5MTS, UB5-059-11. **UK5MCP:** EZ5MDL, RB5MST, UB5MPD, UB5-059-197. **UK5MDI:** Club. **UK5MEG:** RB5MVB, UB5MAQ, UB5MRB, Victor. **UK5QBE:** Club. **UK5UDX:** UB5XCM, UB5-065-734. **UK5VAT:** RB5VDK, UB5VAQ, UB5-066-391. **UK5WBG:** Club. **UK6HCZ:** UA6HHF, UA6HJU, UA6HKP, UW6FC. **UK6LAA:** Club. **UK6LAZ:** UA6AUN, UA6LHK, UA6-150-263, UA6-150-1070, UA6-150-1103, UA6-150-1135. **UK6LBM:** RA6LER, UA6LFX, UW6LI, UA6-150-959, UAG-150-1074, UA6-150-1109. **UK6LEZ:** Serge, Sam, Gary. **UK6QAA:** UF6-014-74, UF6-014-91, UF6-014-100. **UK6XAA:** Club. **UK7FAP:** UA9AKO, UL7FAF, UL7FCB. **UK7LAA:** EZ7LAA, UL7LEG, UL7LEN, UL7LER. **UK7NAQ:** UL7NAC, UL7NAJ, UL7NCF. **UK7PAL:** UL7PAE, UL7PBI, UL7PBY, UL7PCZ, UL7PEZ, UL7-023-158, UL7-023-202, UL7-023-434. **UK7RAB:** Club. **UK8MAF:** UM8MBW, UM8MCW, UM8PAC, UM8-036-141. **UK9ADS:** Club. **UK9ADT:** UA9AIS, UA9AJD, UA9ALP, UA9AMU, UA9AOA.**UK9CAA:** UA9CGT, UA9CLT, UA9CNF, UA9COO, UA9-154-21. **UK9CAE:** UA1TAC, UA4WBV, UA9CTW. **UK9FER:** UA9FAJ, UA9FAL, UA9FAR, UA9FGJ, UA9FGR, UA9-140-121. **UK9FFF:** UA9FAT, UA9FDL, UA9-140-17. **UK9HAD:** Club. **UK9SBI:** RA9SUV, UA9SCG, UV9SN, UW9SG, UA9-167-648. **UK9UAA:** UA9UFR, UA9-130-833, UA9-130-834. **UK9UAO:** UA9UGS, UA9UOB, UA9UOC. **UK9UCZ:** UA9UPS, UA9-130-178, UA9-130-275. **UK9XBH:** UA9XBV, UA9-090-491, UA9-090-537. **UK9YAZ:** UA9YDI, UA9YEI, UA9YFE, UA9-099-93. **UKØAAB:** UAØAGI, UAØ-103-114, UAØ-103-239, UAØ-103-274, UAØ-103-390, UAØ-103-551. **UKØAMM:** UA9LAS, UAØADR, UAØAMA, UAØ-103-235. **UKØOAA:** UAØOAS, UAØOBB, UAØQCA. **UKØSAV:** UAØSMM, UAØ-124-490, UAØ-124-491, UAØ-124-502.

V3DX: V3DX (N6ADI), V3CQ (WA6VNR), V3JY (KA7EST), V3C, V3JHK. **VE1DXA:** N1CIX, VE1AIH, VE1BSE, VE1CEG, VE1CER, VE1FH, VE1MX, VE1YX. **VE3CYX:** VE3CKF, VE3CYX, VE3FRA, VE3ICR, VE3MMB, VE3MFP, VE3WT. **VE3PCA:** VE3MHI, VE3JDO, VE3CRG, VE3KKB, VE3ZP. **VE5GF:** VE5ADA, VE5AE, VE5AEJ, VE5AGA, VE5ACM, VE5MC, VE5GF, VE5QY, VE5XK. **VE6AO;** VE6AMR, VE6CHW, VE6CCX, VE6COG. **VO2WL;** VO2CZ, VO2BF, VO2AH, VO2CC, VO2AS, VO2AG. **VP2EC:** N5AU, KC5EA, KA5OZL. **VP2VDH:** NP4CC, KP4BZ, N6CW. **VP5B:** N4KE, N4CC, N4BAA, W4FDA, WB4EYX, WA4DRU. **VP9IB:** VP9IB, N5UR, K5PP. **WB1ELC** & K1FWE. **W2BHK** & K2ZSY, KD2T, W2NM. **W2HG** & WA2LOG, WA2PHA. **W2UI** & N3KR. **W2VJN** & K2BMI, N2BA, WA2ZKY, N6BZA. **W2YC** & N2CQ. **W2YV** & K2EK, K2XA, N2NT, K3UA. **WB3DJF** & AA3B. **W4QAW** & K3EST, K3RV, W3ZZ, N4RP, W4BVV, Fara. **WA4MOJ** &

KC4ZD, NW4I, WA4L, WB4TVQ, WC4E. **WA4QQV** & N4AOC, WA4QMQ, WB4FLB, WD4MDY. **WD4PAJ** & WD4RAD.

WD5COV & WA5IPS. **W6BH** & WA6IQM. **W6BIP** & WA6DJI. **W6OAT** & WB6GFJ. **W6UA** & W6UM. **WB6GFJ** W6OAT. **W7RX** & K7XX, KE7V, W7YOZ, WB7FFF. **W8UA** & K8GL, K8NA, K8SS, N8AJF, W8LU, WA8YVR. **W8UM:** KC8ES, KM8C, KT8K, N8CBA, WD8DPA, WD8PFS. **WA8MTX:** KA8LAQ, KA8LAR, KC8K, KK8K, KM8Y, W8YZ, WA8VPU, WB8SEZ, WD8QKJ, WD8QMB. **W9DUB** & K9BN, K9JF, K9UWA, KA9KAS, KB9I, N9AU, N9AW, W9RN. **WB0UFL** & KA0IES, KA0JUJ. **WB0VFN:** WA4CHI, KC0KO. **WD0CHW** & WA4PGM, KB0KK, N0BGS, N0DBS.

XE2CNL: XE2ABA, XE2AFL, XE2AGH, XE2AQ, XE2GDD, XE2PQ, XE2XX. **Y21YK:** Y21DK, Y21YK, Y23EK, Y24UK, Y29AK. **YU6GAH:** YU2RKN, YU3FK, YU7QDA, Gile. **YU7EU** & YU7MAT, YU7PEE. **YZ4M:** Dubo, Ferid, Edin, Nedim, Necko, Ilfan, Sandy, Goran, YU4SA, YU4VQT, Deny, YU1TF, Mladen, Davor, Rade, Nedo, YT4WAW. **YZ7Q:** YU7ORS, YU7MCL, YU7PXX, Voja. **ZF2GI:** W4OWY, W4GIW, W4HR. **ZL2AH:** ZL2AH, ZL2IR, ZL2PV, ZL2AEW, ZL2AOE, ZL2QA. **ZS6BPL:** ZS6BPL, ZS6BIM, ZS6BTY. **ZS6PT:** ZS6PT, ZS6YO, ZS6BYI.

4D1AU: 4D1AU, 4D1FDY. **4T4O:** N6KT, WA6UEF, N6BT. **4U1ITU:** K1DG, K3NA. **4U1VIC:** OE2VEL, WA4EWN. **5W5DM:** KB6JK, 5W1DQ. **5Y4ITU:** 5Z4GM, 5Z4NQ, 5Z4CS, YU3TCB, W4KM. **6D5VIC:** XE1VIC, XE1AZ. **6E5EBE:** AA6DP, W6TSE, W6LEN. **6E5MX:** K6NA, N6ND. **9Y4W:** WA3LRO, N3ED, KA3E, KB2XZ.

STATION OPERATORS

Multi-Operator Multi-Transmitter

AD3V & W3NX, W3DRD, W3HB. **AI6V** & WB6EXW, N6KB, AA4KB. **EA1YV** & EA1EY, EA1KV, EA1PI, EA1XR, EA1ZC, EA1APY, EA1ASG, EA1ASZ, EA1AXG, EA1BEP, EA1BLQ, EA1BTC, EC1AOW, EC1AWI, EC1BCG. **EW6V:** UP200, UP20U, UP2BBT, UP2BCT, UP2BDF, UP2BFI, UP2BFL, UP2BFN, UP2BJK, UP2PAV, UP2PBW, UP2PCI, UP2NK, UP2-038-1050. **GB4ANT:** G3JOC, G3MPN, G3LDI, G3VZT, G3XLL, G3ZIG, G3XBY, G4BTY, G4BAH, G4FNL, G4GVW, G4DRS, G4JQL, G4CSU, G5EEC, G8LBS, G8NGD, G8VLL. **HC8:** HC5EA, HC5NW, HC6XE, HC1HV, HC1GZ, HC1EE, HC1JQ, HC1RE, HC1PS, HC1HC, HC1EA, HC1SK, HC1RF, HC1IH, HC1HN, HC1BI, HC1IC. **HZ1AB:** W7KJJ, K8JJ, WA8MOA, W7SE, W5UJF, WB5YAH, KO5V, VK3BSX, G4FTC, W5JIZ, N6GTK. **IY4FGM:** I4TJE, I4UFH, I4UXX, I4UYL, I4UYN, I4ZGI, IK4AUY. **JA1YNE:** JA1CG, JA1BAL, JA1IAM, JA1KGW, JA1VNA, JR1QQG, JA2UGX, JR2BJE, JA3MID, JA4WWO, JA6QJG. **JA1YXP:** JR6NJD, JH4OWG, JJ1OHJ, JL1ROT. **JA2YKA:** JG1GIF, JJ1BTA, JJ1BTC, JH2QXG, JR2GMC, JE2RQT, JE2SRB, JE2TEM, JE2VYM, JF2DQJ, JG2BFR, JA4UDP, JH4VBQ, JH6RPZ, JE6GTX, JA9NFO, JA9SSY, JA9XXS, Tam-San. **JA3YKC:** JA3PRR, JA3VOT, JR3KEG, JE3BLA, JE3MAS, JE3MXQ, JF3PMM, JF3RAL, JF3SFP, JF3UNQ, JG3EMB, JG3IQJ, JG3LLB, JI3ANR, JH4RHF, JH4UIM, JH4WER, JR4BSM, JA5GZB, JA5MOU, JA5TDH, JA5XUQ, JH5EML, JR6JNF.

JA4YEB: JA5POE, JH4LGI, JH4NJC, JH4WAT, JH4WEK, JR4CBJ, JR4IWE, JR6JZT. **JA7YRR:** JA7CEC, JA7CFB, JA7CLN, JA7CLX, JA7CXV, JA7FDY, JA7JUD, JA7LBY, JA7WSC, JA7OZW, JA7RQE, JH7MEV, JH7VHZ, JR7LVA. **JF1ZRQ:** JH1CNT, JH1NRC, JH1VPP, JR1RNC, JF1CYV, JI1PYD. **JH1YDT:** JE1QMV, JF1EAL, JK1CQG, JK1DLQ, JK1FLU, JL1GPO, JL1NNC, JP1AIE, JH4UTP, JE6CEK, JE6HIC, JH0HNI. **K1OX** & K1XX, K1GQ, K1VR, KA1R, KA1VQ, KC1F, KA1UA, W1HNZ, W1FJ, WB8BJH. **K1SA** & W1OO, N1AFC, KB1U, KA1GQR. **K1XM** & KA1GHR. **K2UA** & N3AD, N3DAY. **K3II** & K3NL, WA3IMY, K3JLK, K3JJG. **K3ON** & K3ZZ, WA3EKL, KA3GSN, W3FG, KA3BGZ, WB3HMX, N3SB. **K3ZUF** & KB3LF, N3BHF.

K4VHC & K4BAI, N4BGH, W4FIZ, N4EBZ, WG4F. **K4VX/0** & KD9Q, N0SS, KR0Y, WB0IUN, WB0GEV, KA0DQI, K0OO. **K6RU** & AA6AD, W6OWQ, WB6DSV, N6XI, K6XO. **K6ZM** & AK6T, KC6O, NB6L. **K9GL** & K9NO, K9RS, K9DX, K9HMB, K9PW, K9PPY, WA6DGX, WD9IIC, WB9TIY, WA9EYY, WB9CAS. **KB6I** & WA6OTU, AA6RX, N6TR. **KC8SD** & N8DPD. **KL7CQ** & KL7AP, KL7LO, KL7IWC, KL7HFQ, KL7LL, KL7SL, KL7OX, KL7PU, KL7DU, KL7EB, KL7JIM, KL7OY, KL7IFK, KL7PQ, KL7VB, KL7SA, KL7VC, KL7VT, KL7SV, KL7FS, KL7VN, KL7FB, KL7OG, KL7SE, KL7IZZ, KL7HO, W4IGM, WL7AXI, WL7AQF, AL7AW. **KL7RA** & KL7RN, KL7IEH, KL7IXZ, NL7M, NL7V, AL7CG, AL7AF, AL7CQ, AL7AU. **KP4BO** & WP4CEQ. **N2AA** & K2GL, K2GM, K2SS, K2TT, K2TW, KR2J, KR2Q, K2NG, K2BQ, K5NA, W2RQ, N2CTV, KC2X, Greg, KR2W, KU2M. **N2RM** N2MM, N2ATX, KB3TN. **N3AW** & WA3NHO. **N4RJ** & AA4GA, K4EWG, K4KKJ, K4SMX, K4UEE, KD4VK, N4HH, N4HU, N4OL, N4PN, N4VZ, W4GTS, W4LVM, W4MGX, W8ZF, WA4QQE, WD4AHN.

N5AU: K9MK, K9LA, K8CC, K5TSQ, K5FUV, K5MM, K5HM, K5AQ, K5MR, KM5X, KS4Q, N5CR, WB5VZL, WB5WHR, WN4KKN, G4CEB, G3UKS. **N6RO** & N6AUV, N6IG, N6NE, N6QW, NI6D, N4ID, K6TMB, K9LBQ, KT7W, KN6K, WA6DIL, AA6G. **N6RZ** & WA6OCV, WB6CBJ, NI6G. **N6VV** & K6XV, K6PJY. **N7BIT** & KF3R. **N9BZR** & KA9DVY, KA9HHC, KA9IZQ, WA9RSD, KC9QP, WD9COL. **OH0W:** OH2BM, OH2BNP, OH2BQS, OH2JA, OH2BBM, OH2BU, OH2MM, OH2BH, OH2BAD, OH2BCP, OH2BBR, OH2BAZ, OH2BEJ, OH2KI, OH2VB, OH1MA, OH1XX, OH1NM, OH5UX, OH5LF, OH5NZ, OH5KS, OH3YI, OH3ZE, OH3UU, OH8SR, OH6DX, OH6UM, OH6JW. **OK7AA:** OK3ZAF, OK3LU, OK3EA, OK3JW, OK3LZ, OK3TMF, OK3TMR, OK3CQW, OK3CUM, OK3WM, OK3TCH, OK3-26928. **ON7KL** & ON4GO, ON5AV, ON5IQ, ON6AH, ON6MH, ON7ZV. **VE3UM:** VE3OU, VE3CTY, VE3WQG, VE3JWK, VE3IXW, VE3IZY. **VE7ZZZ:** VE7ENI, VE7ENF, VE7EOC, VE7EOQ, VE7DLO, VE7VX, VE7SK, VE3CRD. **VP9AD** & G5CMX, N3BB, N3RD, VP9BY, VP9IJ, W3MA. **W1YN** & AG1E, K1HI, K1GW, KA1O.

W3GM & K3ND, N3VV, W3FV, KB3YY, K3GM. **W3LPL** & W3ABC, W3MR, K3DI, K3RA, K4PQL, WD4AXM, WA3KCY, KA1GD, KF3P, KC8C. **W3YFV** & K3PPI. **W4XJ** & KE4HX, K4RIG, WA4ZBC, WD4NYU, W4UWC. **W7RM** & W7XR, W7ZR, W7TJ, N7ZZ, KB7G, KG7D, W7EJ, VE7SV. **W8NGO** & K8ZE, W8MNL, W8ONA, KC8HX. **W8OK/VE2** & N8BJQ, W8KKF, W9SWM, KB8U. **WB6KBZ** & K6GSS. **YT4I:** YU4GD, YU4CF, YU4VFF, YU4WCA, YU4WST, Y4WCW, YU4WMM, YU4WEU. **YZ1E:** YU1EW, YU1FW, YU1OPI, YU1OLO, YU1OYA, YU1PKC, YU1UU, YU1PAW, YU2MM, YU7QCZ, YU7ODT, File. **ZY3ZZ:** PY3ZZ, PY3CDL, PY3CMC.

WORLD TOP 10 QRPp
(5w input)

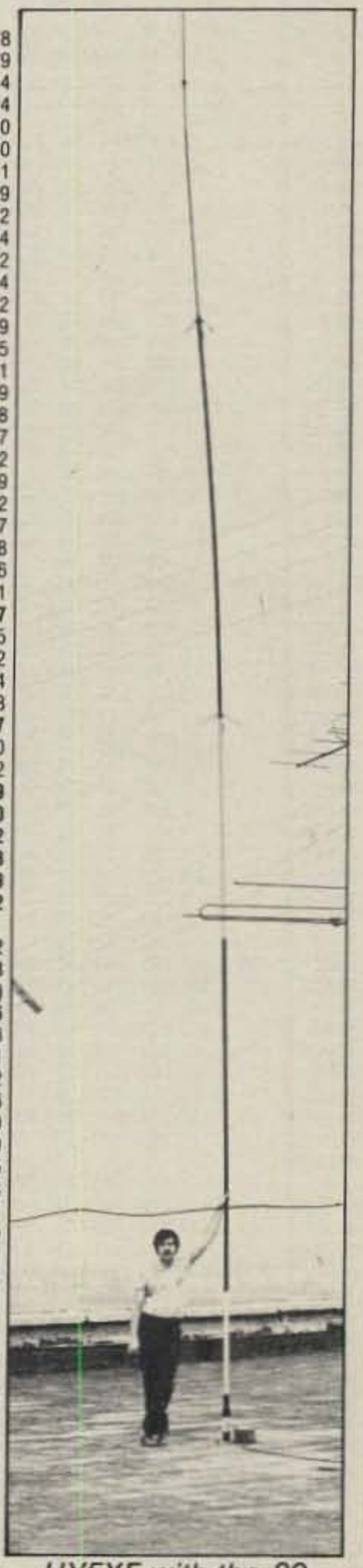
1.	TG9GI	1,035,693
2.	DF4RD	431,547
3.	UB5UCJ	387,416
4.	K8IA	337,666
5.	UP2BIM	315,563
6.	OA8CW	288,674
7.	W8UVZ	248,256
8.	ON6NL	246,749
9.	K4LTA	233,122
10.	G3FTQ	122,570

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

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

W1ZM	**A**	**3,182,460**	**1790**	**150**	**470**
			(Opr. K1ZM)		
K1AR	"	**2,510,235**	**1501**	**141**	**444**
K1RX	"	**2,431,136**	**1611**	**138**	**406**
AA2Z/1	"	2,085,270	1379	130	404
W1RR	"	2,037,000	1423	128	397
K1UO	"	1,991,236	1353	129	385
K3ZJ/1	"	1,771,056	1426	112	329
KG1E	"	1,651,779	1292	121	346
K1EA	"	1,377,000	1067	119	340
N1API	"	691,224	736	84	248
K1BW	"	663,012	632	107	271
KA1FGH	"	553,521	627	83	224
W1ZK	"	515,822	553	96	253
W1BWS	"	510,719	588	94	225
W1IHN	"	409,590	441	92	241
K1VDF	"	379,172	496	70	178
K1EFI	"	352,768	487	64	192
KB1W	"	346,320	519	69	171
N1AU	"	317,566	424	85	189
W1CWU	"	304,842	423	78	204
K1IK	"	179,428	506	28	96
W1ICH	"	174,097	312	63	146
N1BEY	"	171,785	299	68	147
W1FM	"	109,826	230	58	120
KA1CLV	"	80,352	197	52	110
KE1E	"	66,132	181	43	89
K1ZZJ	"	54,249	182	33	74
KA1EKR	"	44,486	134	38	80
N1CW	"	31,625	107	44	71
AE1X	"	11,880	50	22	44
W1WY	"	8,890	51	29	41
K1JYM	"	3,149	33	23	24
AA1M	"	1,736	27	13	15
W1WEF	**28**	**379,533**	**826**	**32**	**127**
W1HJF	"	53,227	189	26	75
W1BIH	"	45,600	174	32	95
N1BPJ	"	7,436	50	16	36
K1RB	"	5,117	45	15	28
KA1CDC	**21**	**165,770**	**477**	**28**	**93**
WA1FCN	"	130,875	366	30	95
K1BV	"	33,774	155	22	56
W1PLJ	"	3,782	43	7	24
K1KI	**14**	**695,453**	**1287**	**39**	**148**
W1GG	"	254,185	606	35	110
K1WJL	"	100,056	270	33	99
AB1U	"	77,367	251	27	84
KA1UE	"	10,856	69	18	41
K8UR/1	**7**	**91,304**	**307**	**29**	**84**
KA1XN	"	49,900	212	25	75
WB1FSW	"	40,568	176	21	67
WA1AER	"	18,720	97	21	51
WB1EAZ	"	8,690	63	18	37
WA1ZAM	"	8,528	69	15	37
K1JX	**3.8**	**99,645**	**391**	**22**	**83**
K1PT	"	77,322	329	25	73
AB1A	"	63,112	250	25	73
W1HX	"	3,280	34	13	27
KE1F	"	3,060	49	12	18
K1VHS	"	1,728	30	10	17
K2VV	**A**	**2,395,848**	**1570**	**132**	**414**
K2BU	"	**2,368,314**	**1590**	**130**	**392**
N2LT	"	**2,320,122**	**1565**	**134**	**384**
K2DM	"	1,604,697	1219	125	346
N2SS	"	1,559,948	1221	115	343
W1GD/2	"	1,076,277	936	108	309
WA2OOS	"	933,812	804	112	306
K2QF	"	806,053	795	102	271
KF20	"	649,440	645	106	263
N2MR	"	610,720	638	101	251
K2NJ	"	586,496	658	88	228
WA2SPL	"	585,453	663	93	246
K2TR	"	532,004	871	55	159
KB2CR	"	499,728	515	102	257
N2VW	"	483,644	548	90	232
N2JJ	"	382,230	516	83	191
K2SNK	"	293,776	429	72	172
W2GD	"	291,959	393	86	195
W2BTU	"	238,000	349	72	166
K2SHL	"	195,294	311	80	162
N2BLT	"	164,528	274	73	153
W2KI	"	153,846	257	74	148
KB2SE	"	152,250	279	68	142
W2FGY	"	144,664	257	70	144
N2AIF	"	133,525	279	54	121
KK2A	"	122,061	236	63	120
KB2WN	"	118,300	261	52	117
W2NC	"	114,072	216	59	137
K2QIL	"	99,360	227	46	114
W2SDO	"	95,040	182	62	118
KA2MNJ	"	88,088	232	41	102
W2TZ	"	83,622	204	51	103
W2FTY	"	67,070	136	66	124
W2PHT	"	62,967	178	45	94
W2GKZ	"	51,500	158	40	85
KT2M	"	29,480	128	29	59
WB2BBA	"	27,090	109	29	61
WA2WVU	"	16,224	86	31	47
KB2GW	"	13,662	68	23	46
KS2C	"	13,575	70	29	46
WA2UDT	"	7,797	50	30	39
KN2B	"	7,370	61	22	33
K2TV	"	4,433	70	23	40
KC2DE	"	3,492	35	16	20
WB2MBM	"	1,827	25	9	20
N2AIR	**28**	**314,109**	**734**	**30**	**123**
KC2ME	"	195,990	512	32	107
KB2NU	"	113,920	315	30	98
K2MFY	"	73,300	256	27	73
KJ2N	"	55,100	205	29	66
K2OLG	"	33,264	108	28	84
KC2PL	"	26,208	123	24	54
K2SPO	"	25,730	105	26	57
N2KA	"	21,424	76	30	74
WA2SSH	"	8,060	58	16	36
KB2SG	"	2,360	25	17	23
N2PP	**21**	**346,500**	**786**	**33**	**121**
W2HPF	"	249,288	622	31	110
WA2QNW	"	171,118	507	30	104
WB2TKD	"	45,600	166	26	74
W2AYJ	"	36,120	154	22	62
WB2SZY	"	34,656	157	21	55
KA2LQJ	"	31,540	147	21	55
W2KHQ	"	25,308	120	18	58
W2DW	"	18,768	103	19	49
K2RD	**14**	**315,296**	**674**	**38**	**128**
KS2F	"	60,614	155	34	105
N2BK	"	2,430	27	12	23
WB2CUZ	"	1,416	27	9	15
KA2BXH	"	198	8	4	5
K2IGW	**7**	**84,164**	**280**	**27**	**79**
N2KK	**3.8**	**77,066**	**269**	**27**	**86**
K2LP	"	6,820	62	12	32
WA2IFS	"	2,070	32	12	18
W3BGN	**A**	**2,414,458**	**1556**	**138**	**409**
N2FB/3	"	**1,989,198**	**1441**	**125**	**361**
K3OO	"	**1,955,792**	**1400**	**130**	**372**
K3NZ	"	1,348,768	1074	118	334
N3RS	"	1,123,339	1050	97	286
K3KNH	"	1,117,770	1070	107	264
K3JLT	"	1,058,471	813	132	361
W3AP	"	938,582	778	127	312
KI3L	"	883,184	848	111	271
N3RL	"	849,464	776	114	280
K3FN	"	805,566	700	123	303
W3XU	"	748,525	698	112	267
N3HW	"	652,720	726	93	235
WB3CIW	"	649,486	667	95	254
K3WW	"	618,436	627	98	266
N4QQ/3	"	594,384	635	91	245
N3NA	"	583,044	663	89	219
K3WJV	"	561,824	577	109	253
W3ICM	"	532,062	564	103	251
K4JLD/3	"	526,071	595	94	235
W3GK	"	458,128	588	74	200
W3ARK	"	377,655	539	64	191
W3DHM	"	345,690	383	97	248
W3UJ	"	344,652	410	93	215
W3GW	"	308,992	447	82	174
W3GRS	"	306,464	374	103	211
W3GL	"	292,640	371	96	199
K3AV	"	288,510	356	81	214
WB3KIL	"	275,028	393	74	184
W3EVW	"	250,832	370	79	178
W3KV	"	235,445	344	66	179
W3JPT	"	225,364	401	62	144
K3KP	"	204,166	387	64	114
K3VW	"	135,790	267	55	130
W3HVM	"	135,100	261	63	130
K3TC	"	129,256	228	73	141
K3OX	"	122,760	250	58	129
W3RJ	"	112,868	279	37	102
W3INK	"	107,326	227	62	144
W3GRF	"	97,696	207	60	112
K3RH	"	96,075	212	61	114
W3EAN	"	91,606	227	51	112
KB3NQ	"	67,160	188	47	99
W3IDT	"	66,229	227	28	75
K3MBF	"	60,060	203	34	71
K3UC	"	57,164	165	45	79
WB3CAC	"	53,352	168	46	68
K3JGJ	"	48,314	151	42	77
W3FQE	"	48,178	175	37	72
KB3YL	"	47,880	158	41	79
WA3YTI	"	23,200	92	38	62
KF3C	"	17,848	69	35	57
WA3YJA	"	14,514	78	34	48
K3GYS	"	10,804	66	28	46
WA3YOB	"	9,776	72	16	31
N3CQM	**28**	**136,424**	**386**	**31**	**97**
K3ZO	"	71,788	246	27	75
N3AZS	"	67,650	219	28	82
W6GMZ/3	"	42,800	188	26	64
N3CHL	"	39,235	152	27	68
K3LWM	**21**	**258,474**	**649**	**31**	**107**
WA3CGE	"	82,348	250	29	90
WB3FXF	"	25,792	152	20	42
N3EC	**14**	**116,640**	**286**	**35**	**109**
W8FJ/3	"	**1,836**	**24**	**14**	**20**
WA3VUQ	**7**	**34,850**	**151**	**23**	**62**
K3UA	**3.8**	**42,180**	**170**	**22**	**73**
AI3Q	"	**3,608**	**33**	**15**	**29**
AA1K/3	**1.8**	**1,197**	**40**	**7**	**12**
K4CEF	**A**	**928,884**	**793**	**122**	**332**
K4CG	"	**887,616**	**797**	**119**	**283**
			(Opr. K7SV)		
K0CMF/4	"	**875,925**	**751**	**119**	**306**
AI2C/4	"	852,432	755	120	293
K4KZZ	"	760,806	714	105	281
NN4Q	"	733,125	716	103	272
K4GFH	"	673,560	690	104	256
N4MO	"	647,848	594	106	270
W4RW	"	464,550	593	76	209
N4AJZ	"	453,103	495	108	235
K4OD	"	397,201	459	99	218
KB4CD	"	370,566	452	95	211
KD4UH	"	339,796	392	103	220
KE4ZU	"	279,292	407	81	181
W4BV	"	257,286	355	86	188
KE4XW	"	243,840	361	79	161
W4WKQ	"	240,516	428	60	144
NW4Y	"	219,699	370	78	159
W4YE	"	165,006	285	64	142
K4YT	"	141,500	236	96	15
W9KTB/4	"	122,015	394	30	85
K4DLI	"	120,960	203	78	146
K4BAM	"	97,920	206	57	113
W2DSE/4	"	94,608	280	51	93
WD4IKI	"	92,463	228	44	103
W4WJJ	"	90,374	243	52	94
N4AA	"	81,816	180	58	110
WB4GNT	"	78,672	172	58	118
N4JF	"	76,384	198	47	107
KA4BDW	"	74,480	202	56	96



UY5XE with the 80 meter vertical.

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
9Y4VT	39/7/9	404/17/57	748/25/78	1620/32/89	1476/34/96	2795/31/93
HH2WW	138/6/16	315/15/50	624/21/62	974/33/88	1093/27/80	3490/32/100
N1GL/6Y5	57/9/18	213/16/48	459/25/57	814/30/88	1669/28/92	2350/28/88
DJ6QT/CT3	20/7/14	296/16/64	332/19/67	697/32/89	1229/31/92	1363/31/105
UF6CR	37/5/14	171/9/35	629/13/67	1742/31/102	1231/30/88	656/21/65
YU3EY	24/6/23	136/12/60	469/22/77	576/34/102	889/30/94	1076/32/99
FR@FLO		118/19/25	140/22/39	733/34/91	1017/35/97	1317/32/97
DK3GI	9/2/8	318/13/59	191/16/57	750/36/108	949/37/107	959/34/105
ZF2FL	1/1/1	498/16/41	560/11/26	1804/36/96	843/25/61	1086/21/53
VP5KP	31/3/6	134/7/15	573/17/26	1294/25/93	1408/26/56	2399/24/60

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
W1ZM	36/10/26	155/18/59	110/23/59	388/34/108	504/33/106	597/32/112
K1AR	8/5/7	99/18/52	85/20/62	327/35/102	470/30/109	512/33/112
K1RX	16/6/8	98/16/48	116/21/56	390/37/96	397/29/90	594/29/108
W3BGN	27/10/20	117/19/57	114/19/53	399/32/90	316/28/89	583/30/100
K2VV	27/8/17	77/15/43	77/19/47	270/30/93	389/29/99	730/31/115
K2BU	1/1/1	104/16/51	102/33/49	323/33/95	379/27/93	681/30/103
N2LT	16/8/12	79/14/42	93/19/47	363/36/97	423/28/86	591/29/100
N6BV		34/12/15	408/26/41	196/30/69	924/32/79	477/25/63
K6HNZ	16/8/7	74/15/19	315/21/32	130/27/66	915/27/68	604/25/61
KM6B		82/17/29	214/27/47	132/25/61	1024/29/80	368/27/70

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

9Y4W	124/8/25	296/17/59	594/27/86	1953/35/127	2104/35/121	3026/36/122
NP4A	153/15/36	579/25/82	537/28/87	1759/36/125	1969/36/127	3794/34/128
FM7CD	16/6/14	258/17/59	739/30/96	2134/38/137	2738/38/135	2388/36/135
4T4O	10/8/8	213/17/36	889/25/58	939/35/106	2258/34/121	3564/33/102
RG6G	151/13/49	385/16/70	446/26/83	1653/36/128	1349/33/116	2028/32/112
VP2EC	163/6/15	356/16/58	537/22/73	818/30/95	2198/34/102	4240/33/125

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

W4QAW	23/11/20	105/21/65	197/28/80	438/38/135	1001/37/122	394/32/129
KR2N	19/9/17	132/22/68	111/26/73	682/36/124	575/31/115	793/35/121
KX4S	18/9/16	85/24/66	105/29/78	676/36/126	657/33/117	579/33/134
K1CC	18/7/11	93/20/60	136/23/71	493/33/113	469/31/113	589/30/119
N4ZC	17/9/15	51/17/43	150/28/79	504/37/126	468/31/105	542/32/123
W2YV	43/12/28	127/22/72	184/25/72	322/33/101	568/33/115	435/31/109

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

OH@W	575/10/44	1294/24/92	1394/35/109	2423/40/168	2716/40/162	2371/39/154
EW6V	1092/9/36	1212/11/58	973/18/68	2020/36/134	2415/35/125	2388/33/123
VP9AD	366/8/18	1002/16/49	877/23/69	2624/36/124	3095/33/120	2732/32/109
HC@	107/7/11	561/19/40	895/22/54	1842/37/113	2159/36/108	3059/34/106
N2AA	102/15/39	401/24/84	445/31/94	1148/38/137	1246/34/137	1029/33/140
YT4I	39/4/17	447/11/50	892/25/89	2161/38/142	1657/35/115	1623/34/117

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

N2AA	102/15/39	401/24/84	445/31/94	1148/38/137	1246/34/137	1029/33/140
W3LPL	53/12/25	213/22/75	353/31/95	929/38/147	1136/36/138	1170/34/148
K1OX	100/9/25	313/24/84	305/29/86	918/34/123	1300/34/144	976/33/132
W7RM	83/13/16	400/26/50	549/30/88	604/36/115	1993/36/115	791/31/85
N5AU	158/10/19	175/25/57	513/31/89	915/39/150	1135/34/114	877/33/128
K9GL	59/15/25	219/25/69	264/27/83	844/39/145	923/34/131	654/33/126

WB4FTU	"	73,315	182	63	92
N4RA	"	69,454	171	49	105
NA4D	"	68,396	328	26	45
N4JAT	"	61,662	182	39	90
WC4E	"	58,653	166	45	88
KB4IY	"	53,448	152	44	87
K4STE	"	49,896	147	47	79
WB4MAI	"	49,640	131	54	92
KD4PP	"	40,832	144	42	74
W4ZR	"	40,005	117	36	91
K4XO	"	37,023	109	50	79
WD4PVI	"	36,594	131	31	76
N4TZ	"	36,300	124	38	72
W4OGG	"	34,692	114	44	74
WD4GXT	"	30,135	112	48	75
W4KMS	"	26,786	96	47	71
WB5YLT/4	"	26,724	142	19	49
W4GTS	"	24,024	104	36	52
WB4ZPF	"	22,736	93	39	59
KF4FP	"	19,448	94	35	53
N4DLE	"	18,144	90	32	52
AJ2E/4	"	17,004	82	29	49
W5OG/4	"	14,432	65	37	51
NN4K	"	12,150	61	24	51
W1OR/4	"	12,848	66	27	46
WA4ECA	"	12,008	58	34	45
N4DCC	"	11,340	67	23	40
KA4YII	"	10,948	64	29	39
N4UA	"	10,584	62	27	36
NX4Y	"	9,792	51	28	44
K4ERE	"	9,734	69	22	40
W1ESN/4	"	9,503	48	32	41
KQ4G	"	6,328	48	22	34
K4FPF	"	6,283	45	27	34
KA4LUW	"	6,251	104	19	28
N4TL	"	2,190	25	10	20
AK4T	"	620	15	9	11
N4ZZ	**28**	**388,755**	**889**	**33**	**126**
KT4W	**"**	**307,520**	**712**	**31**	**124**
N4IJ	"	252,000	652	30	110
KC4B	"	126,813	364	32	91
WA4MIT	"	73,590	238	28	82
N4PB	"	61,182	211	27	76
W4IIR	"	57,222	199	28	74
KA4MCM	"	35,178	271	25	53
KC4UC	"	27,888	130	25	58
WB5YMS /4	"	21,976	101	24	58
N4HOH	"	19,229	105	22	45
K4ISV	**21**	**428,730**	**999**	**35**	**129**
N4MM	"	371,790	879	33	120
KV4P	"	148,720	435	31	99
KC4HN	"	84,609	256	29	90
W4ZTW	"	80,682	281	25	77
WA4JJW	"	71,604	234	29	79
N4HIC	"	4,040	56	14	26
N4FXF	"	476	16	9	8
K3KG/4	**14**	**389,064**	**890**	**40**	**134**
KB@C/4	"	81,549	256	31	86
KD4ST	"	78,987	267	29	84
KC4GR	"	20,124	97	25	53
K4IR	"	6,517	48	21	28
K4PI	**7**	**76,986**	**255**	**30**	**87**
K4KUZ	"	25,585	111	25	60
KC4YM	"	16,884	95	19	48
NJ4Q	"	7,605	65	15	30
WB4UBD	"	6,985	51	19	36

WA4SVO	**3.8**	**58,104**	**215**	**29**	**79**
K@TPF/4	"	17,284	118	15	43
K4WHN	"	5,985	51	13	32
W4BAA	"	4,056	46	13	26
N4IN	**1.8**	**4,305**	**46**	**13**	**28**
N4SU	"	4,066	61	12	26
W4PZV	"	2,592	39	10	22
W5XZ	**A**	**1,832,827**	**1300**	**140**	**359**
K5RX	**"**	**1,390,512**	**1065**	**130**	**342**
K5DX	**"**	**1,028,360**	**1037**	**122**	**254**
K5NW	**"**	**919,996**	**855**	**121**	**285**
N5JB	"	747,574	729	122	260
W5GN	"	625,974	752	98	225
K5IID	"	518,295	605	104	223
K5LP	"	475,760	576	99	205
N5CMI	"	355,667	516	83	168
W5ZPA	"	311,480	464	77	183
W9PL/5	"	294,455	466	67	168
WA5CVQ	"	216,195	382	66	137
N5UA	"	174,640	289	85	151
W5LMG	"	168,296	303	84	134
W5BE	"	156,166	257	78	148
W50B	"	142,800	262	76	134
K2SCU/5	"	127,086	273	67	110
AC5K	"	124,972	249	69	130
KT5Q	"	114,948	246	69	137
W5JC	"	102,284	216	67	115
KA5W	"	72,885	230	48	81
W5AE	"	61,568	159	60	88
N5HB	"	60,288	170	58	99
WA5IYX	"	60,240	190	42	78
W5IYR	"	59,885	159	51	94
WA3AHQ /5	"	44,744	161	29	65
W5BPT	"	40,820	112	47	83
W5NJ	"	30,602	99	35	72
K5KR	"	30,300	131	37	64
K5RSG	"	23,067	92	39	60
W5EIJ	"	19,552	90	35	59
W5NVU	"	12,136	65	34	48
KD5PM	"	11,390	65	28	39
WA5YFQ	"	8,940	56	26	34
WD5DUD	"	3,350	34	23	27
K5RC	**28**	**457,867**	**989**	**34**	**129**
N5DDO	**"**	**275,128**	**830**	**31**	**105**
KD5RJ	"	133,400	526	29	87
K5RF	"	93,032	288	28	88
WB5YOT	"	91,080	268	30	90
KN5D	"	81,480	172	30	75
W5AH	"	62,021	209	29	80
W5CB	"	47,241	192	27	60
K9MK/5	"	37,683	190	27	52
W5VP	"	33,454	152	24	62
K5HUI	"	32,424	137	25	59
W5KCR	"	28,804	133	22	54
WD5HEG	"	24,150	134	24	46
N5KT	"	15,616	86	20	44
W50SL	"	4,182	41	16	25
N5EYF	"	1,425	22	11	14
K5GA	**21**	**495,021**	**1101**	**34**	**123**
WB5UDX	"	188,087	545	31	96
KV5B	"	141,240	433	31	89
W9ZTD/5	"	111,780	355	29	86
W5LKP	"	67,650	219	30	80
W50SJ	"	37,995	167	24	61
WB5LYT	"	20,448	113	23	48

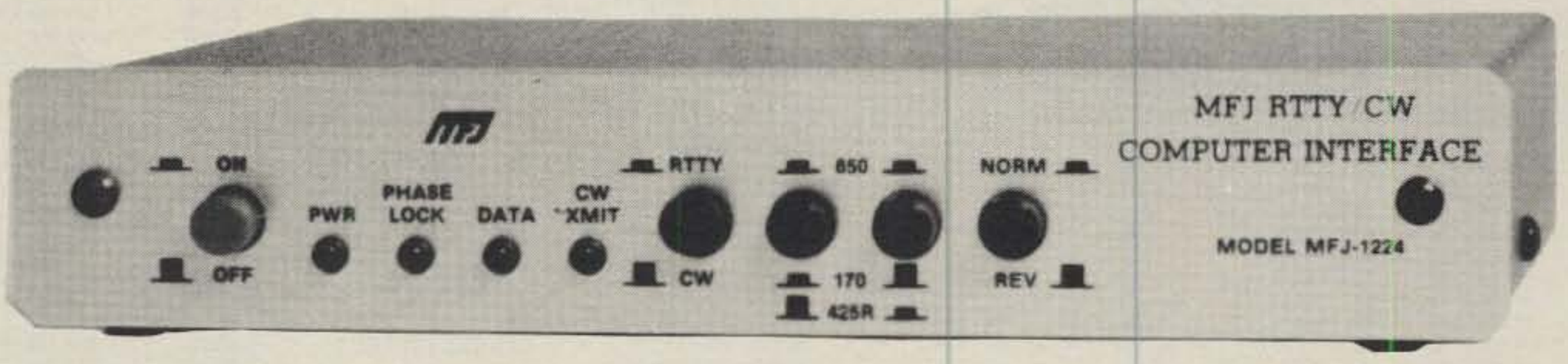
W5WMU	**14**	**305,660**	**713**	**38**	**117**
AF5K	"	123,195	374	31	98
N5NO	"	4,050	36	18	27
KB5AS	**7**	**73,100**	**302**	**24**	**61**
K5RR	"	54,624	206	25	71
WA5IHS	"	34,188	157	27	57
WB5ZKR	"	4,816	47	15	28
W5UR	"	2,542	33	14	17
K5BZU	**3.8**	**9,744**	**74**	**21**	**37**
N5BA	"	5,754	63	13	29
K5GOE	"	3,069	48	11	20
KN5S	"	2,040	31	10	20
K5YY	**1.8**	**3,366**	**67**	**12**	**21**
N6BV	**A**	**2,258,704**	**2039**	**125**	**267**
K6HNZ	**"**	**2,211,256**	**2054**	**123**	**253**
KM6B	**"**	**2,123,448**	**1820**	**125**	**287**
W6MSF	"	1,631,812	1551	121	243
			(Opr. WA6HCI)		
W7CB8/6	"	1,199,556	1186	112	236
N6QR	"	1,176,441	1140	128	243
N6AR	"	1,170,125	1036	125	282
N6CW	"	1,057,162	1305	98	191
			(Opr. K1LL)		
K6HIH	"	822,528	1055	94	195
			(Opr. K6AUC)		
KD9E/6	"	511,272	590	108	216
N6HR	"	483,060	618	95	196
W6BSY	"	425,256	544	90	192
WB6FDQ	"	414,873	553	96	183
N6DHV	"	397,320	664	71	139
K6EID	"	362,304	476	92	180
W6FSJ	"	357,178	471	91	180
WB6JMS	"	331,240	508	89	156
W2KVA/6	"	305,200	505	85	133
WA6HAE	"	276,750	451	82	143
WA6LFF	"	275,424	467	83	145
K6DR	"	270,027	443	84	135
NE6I	"	260,736	423	81	143
N6AN	"	240,620	428	77	135
W6YKM	"	205,492	410	67	112
W6ZKM	"	185,005	303	80	147
AD6D	"	155,112	306	71	113
KS6H	"	138,112	266	64	102
WA6UFY	"	132,194	326	60	97
W6XX	"	127,506	294	54	104
KB6GV	"	125,762	281	66	116
K6MSK	"	125,643	245	63	130
W6OKK	"	108,000	384	40	56
N6NF	"	107,214	362	42	65
W6OUL	"	100,254	208	70	116
W8AKS/6	"	88,750	238	57	85
W6CS	"	87,575	215	59	96
WA6BOB	"	73,187	176	64	99
KD6LB	"	71,288	200	48	85
W6ISQ	"	61,308	166	59	72
N6JM	"	45,000	175	36	54
W6BYH	"	43,428	128	57	75
W6MFZ	"	38,812	116	46	78
AA6EE	"	38,160	130	45	75
KJ6Z	"	35,424	137	43	65
K6CSL	"	32,580	136	42	48
K6SSX	"	32,155	125	44	65
NG6W	"	29,321	106	44	65
WA6AHF	"	26,880	104	36	60
N6ADK	"	26,730	120	36	45

YV4CYV /W6	"	19,344	107	33	45
K6EDA	"	18,810	74	35	60
KE6PO	"	16,030	86	32	38
WD6FLB	"	15,096	78	34	40
K6QS	"	14,630	77	29	41
K6RQ/M6	"	11,036	65	22	40
W6KBD	"	10,595	72	30	35
KE6PK	"	5,910	78	15	15
W6SX	"	5,828	47	21	26
N6GG	"	2,482	26	15	19
WD6EIW	"	1,125	18	11	14
W6YA	**28**	**537,774**	**1351**	**33**	**108**
			(Opr. N6NI)		
WA6DBC	**"**	**433,331**	**1157**	**32**	**105**
NN6U	"	245,570	760	34	96
WB6FCR	"	197,560	660	26	84
AB6R	"	186,717	613	29	80
WB6MBF	"	69,417	309	24	57
WA6AUE	"	42,240	232	22	44
N6UW	"	27,389	163	21	40
NN6R	"	19,529	117	20	39
N6IC	"	12,900	79	20	40
W6LAG	"	10,528	74	20	36
K6SMH	"	7,205	40	19	36
KS6Q	"	4,394	61	10	16
W6DTV	"	3,960	36	17	27
W6HJ	"	1,742	24	13	13
W6NXB	"	663	18	6	7
NI6W	**21**	**249,984**	**826**	**29**	**83**
WA6TKT	"	112,612	423	28	66
N6HK	"	95,718	472	25	61
W6XJ	**14**	**91,511**	**285**	**33**	**86**
			(Opr. WB6OKK)		
W6HXW	"	63,180	232	29	83
W60K	"	38,272	152	26	66
N6TO	"	23,048	120	23	44
W6AM	**7**	**163,317**	**562**	**31**	**70**
			(Opr. N6AW)		
N6SV	"	121,056	429	30	67
			Opr. KM6K)		
N60C	"	8,556	53	23	39
N6VR	**3.8**	**12,857**	**123**	**16**	**27**
W6AQ	"	8,960	89	15	25
N6JL	"	5,772	59	16	21
AE6U	**1.8**	**5,005**	**280**	**13**	**22**
K6SE	"	1,071	43	9	12
KI7M	**A**	**851,088**	**1068**	**107**	**191**
KU7M	**"**	**686,898**	**886**	**103**	**176**
KM7E	**"**	**558,859**	**1038**	**69**	**134**
KT7Y	"	540,864	677	94	194
N7ABJ	"	514,080	706	86	166
W7AEP	"	476,735	650	89	176
WB7EEI	"	472,626	728	83	148
W7FP	"	460,872	523	103	230
W7FGT	"	318,860	527	71	143
W7FG	"	287,231	401	88	171
N7CDH	"	171,952	351	58	118
K7ZA	"	149,388	300	62	115
K7LXC	"	149,370	270	75	120
W7GUR	"	127,890	271	55	119
W7ZI	"	126,100	244	72	122
N7CTY	"	122,670	414	54	87
W7KKR	"	101,520	217	68	120
K7NF	"	75,000	222	51	69
N7TT	"	62,330	211	49	66

W7LGG	"	53,888	151	41	87
N7AME	"	53,436	171	52	70
KC7V	"	51,184	192	47	65
AG7P	"	43,771	169	30	61
N7AM	"	36,540	143	35	55
K7UU	"	34,574	112	47	71
KB7ND	"	34,239	127	38	63
W7QK	"	25,100	89	42	58
K7AA	"	19,796	74	37	64
KC7RN	"	17,955	112	28	29
K1SC/7	"	17,806	116	27	31
KA7NXV	"	7,847	57	25	34
AK7F	"	6,440	47	27	29
W7BCT	"	5,698	53	15	22
W7RIR	"	2,590	28	17	20
K7RI	**28**	**336,375**	**1067**	**30**	**95**
			(Opr. K7SS)		
WB7FDQ	"	141,065	621	27	62
K7RDG	"	115,800	344	29	91
K7IDX	"	56,584	228	24	64
W7AYY	"	49,284	237	22	52
W7KSA	"	37,037	181	25	52
K9JNB/7	"	2,567	51	9	8
AG7M	**21**	**304,437**	**1031**	**30**	**79**
W7LXR	"	102,400	355	30	70
KC7GX	"	46,575	224	22	53
WA7CGR	"	8,400	119	11	13
K7HBN	**14**	**185,776**	**474**	**34**	**102**
WB7WQE	"	141,010	411	29	89
W7MB	"	17,250	80	25	50
W7XN	**7**	**43,560**	**182**	**30**	**58**
K7UR	**3.8**	**18,750**	**166**	**17**	**33**
N7EA	"	14,280	103	21	39
W2IQZ/7	"	2,139	30	11	20
KA7AUH	1.8	1,254	29	10	12
WA8TBQ	**A**	**1,715,472**	**1184**	**148**	**380**
W3HKK/8	**"**	**1,028,092**	**836**	**119**	**323**
KB8LH	**"**	**879,665**	**813**	**117**	**278**
WB8VPA	"	544,137	564	109	254
WB8WKQ	"	446,880	580	79	201
KC8JH	"	418,488	500	100	229
N8ATR	"	417,391	490	103	228
K8MR	"	200,970	323	72	159
K8MNG	"	188,160	330	71	153
W8UPH	"	181,641	354	58	133
AC8C	"	162,954	305	62	136
K8CV	"	156,420	292	69	129
W8LT	"	142,272	251	74	160
			(Opr. WD8IXE)		
WB8LFO	"	127,588	252	70	121
KN8P	"	105,575	212	75	130
K8TMK	"	93,960	211	56	118
WB8RNY	"	86,625	196	55	110
WD8MRF	"	83,174	181	70	112
W8EX	"	81,880	189	62	116
KB8FJ	"	69,690	177	47	91
KC8HJ	"	63,707	173	41	92
N8BRQ	"	55,544	164	49	82
W8VEN	"	51,500	161	47	78
WD8KXN	"	45,000	141	50	75
N8DSG	"	42,560	157	31	64
WB8NBA	"	41,886	143	46	71
K8BA	"	38,624	121	54	88
K8PSR	"	38,199	133	38	69
KB8WB	"	33,748	126	43	75
W8HTM	"	28,520	82	55	69

MFJ RTTY / ASCII / CW COMPUTER INTERFACE

Lets you send and receive computerized RTTY/ASCII/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 Kantronics software and most other RTTY/CW software.



- *Copies on both mark and space tones.*
- *Plugs between rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.*
- *Uses Kantronics software and most other RTTY/CW software.*

$99.95
MFJ-1224

This new MFJ-1224 RTTY/ASCII/CW Computer Interface lets you use your personal computer as a computerized full featured RTTY/ASCII/CW station for sending and receiving.

It plugs between your rig and your VIC-20. Apple, TRS-80C, Atari, TI-99, Commodore 64, and most other personal computers.

It uses the Kantronics software which features split screen display, 1024 character type ahead buffer, 10 message ports (255 characters each), status display, CW-ID from keyboard, Centronic type printer compatibility, CW send/receive 5-99 WPM, RTTY send/receive 60, 67, 75, 100 WPM, ASCII send/receive 110, 300 baud plus more.

You can also use most other RTTY/CW software with nearly any personal computer.

A 2 LED tuning indicator system makes tuning fast, easy and positive. You can distinguish between RTTY/CW without even hearing it.

Once tuned in, the interface allows you to copy any shift (170, 425, 850 Hz and all shifts between and beyond) and any speed (5 to 100 WPM on RTTY/CW and up to 300 baud on ASCII).

Copies on both mark and space, not mark only or space only. If either the mark or space is lost the MFJ-1224 maintains copy on the remaining tone. This greatly improves copy under adverse conditions.

A sharp 8 pole active filter for 170 Hz shift and CW allows good copy under crowded, fading and weak signal conditions. Uses FET input op-amps.

An automatic noise limiter helps suppress static crashes for better copy.

A Normal/Reverse switch eliminates retuning while stepping thru various RTTY speeds and shifts.

The demodulator will even maintain copy on a slightly drifting signal.

A +250 VDC loop output is available to drive your RTTY machine. Has convenient speaker output jack.

Phase continuous AFSK transmitter tones are generated by a clean, stable Exar 2206 function generator. Standard space tones of 2125 Hz and mark tones of 2295 and 2975 Hz are generated. A set of microphone lines is provided for AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying is provided for transceivers with FSK.

High voltage grid block and direct outputs are provided for CW keying of your transmitter. A CW transmit LED provides visual indication of CW transmission. There is also an external hand key or electronic keyer input jack.

In addition to the Kantronics compatible socket, an exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. The following TTL compatible lines are available: 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.

For example, you can use Galfo software with Apple computers, or RAK software with VIC-20's. Some computers with some software may require some external components.

DC voltages are IC regulated to provide stable AFSK tones and RTTY/ASCII/CW reception.

Aluminum cabinet. Brushed aluminum front panel. 8x1¼x6 inches. Uses 12-15 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

RTTY/ASCII/CW Receive Only SWL Computer Interface

$69.95
MFJ-1225

Use your personal computer to receive commercial, military and amateur RTTY/ASCII/CW traffic.

The MFJ-1225 automatically copies all shifts (850, 425, 170 Hz shift and all others) and all speeds.

It plugs between your receiver and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.

It uses Kantronics software which features CW receive 5-99 WPM, RTTY receive 60,67,75,100 WPM, and ASCII receive 110, 300 baud, plus more.

An automatic noise limiter helps suppress static crashes for better copy, while a simple 2 LED tuning indicator system makes tuning fast, easy and positive.

In addition to the Kantronics compatible socket, a general purpose socket provides RTTY out, RTTY inverted out, CW out, CW inverted out, ground and +5VDC for interfacing to nearly any personal computer with most appropriate software.

Audio in, speaker out jacks. 4½x1¼x4¼ in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

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CIRCLE 126 ON READER SERVICE CARD

Single Op All Band Zone Winners

1. KL7D
2. No Entrant
3. N6BV
4. VE3BVD
5. W1ZM
6. 6D5ZZA
7. No Entrant
8. HH2WW (N4WW)
9. 9Y4VT (N6AA)
10. No Entrant
11. PP2ZDD
12. EA4LH/CE3
13. LU1VK
14. DK3GI
15. YU3EY
16. UB5MBP
17. UL7LAW
18. UV9PP
19. UA0LCZ
20. LZ2AB
21. UF6CR
22. 9N1WW (JA8BMK)
23. No Entrant
24. VS6DO (K7TI)
25. JA1ELY
26. No Entrant
27. KG6FAE
28. 9V1VP
29. VK6AJW
30. VK4VU
31. AH6J
32. FO0JO (W6GO)
33. DJ6QT/CT3
34. No Entrant
35. No Entrant
36. ZD7BW
37. 5Y4DE (N4VV)
38. ZS3HL
39. FR0FLO
40. JW1UW

N8TN	"	28,025	117	33	62
KA8HJG	"	26,226	119	33	60
K8RSH	"	24,820	107	33	52
AI8W	"	23,653	86	46	63
K8KUH	"	20,202	103	24	50
KV8E	"	17,024	95	19	45
KC8NR	"	15,106	78	33	50
N8BHD	"	12,264	59	35	49
W8YGR	"	9,804	47	34	42
WB8YEW	"	7,259	55	24	37
KA8IIN	"	5,192	43	16	28
K8HF	"	814	19	9	13
N8II	**28**	**423,680**	**920**	**34**	**126**
N8CNT	"	84,420	345	26	79
W8DWJ	"	67,023	236	27	72
WD8IDE	"	41,856	160	28	68
WB8VPQ	"	31,734	138	25	61
WA8NDE	"	16,560	106	19	41
KW8M	"	629	15	5	12
N8DOE	"	532	12	9	10
N8UM	**21**	**362,666**	**855**	**34**	**115**
K8DU	"	86,884	270	27	89
K8RWL	"	68,544	208	29	83
KB8IO	"	43,700	173	26	69
KW8E	"	33,756	148	22	65
W8TWA	**14**	**142,392**	**388**	**35**	**101**
K8CW	"	12,449	77	15	44
AD8C	**7**	**57,500**	**208**	**27**	**73**
K8VFV	"	23,100	118	24	53
N8RA	"	19,430	103	18	49
W8EDU	**3.8**	**50,424**	**249**	**24**	**64**
			(Opr. WA3FET)		
K8MN	"	20,022	121	20	51
WA8YTM	"	1,892	55	9	13
W8LRL	**1.8**	**16,191**	**154**	**18**	**45**
K9SH	**A**	**900,674**	**835**	**112**	**286**
KE9A	"	**860,180**	**776**	**118**	**292**
W90P	"	**603,911**	**660**	**99**	**242**
K9GM	"	582,978	589	115	248
N9AFV	"	570,032	571	108	260
KO9Q	"	513,162	567	87	219
N9GT	"	426,915	574	77	188
K9QXY	"	351,830	425	100	202
WA9TGL	"	338,580	442	91	194
KC9MF	"	336,687	457	94	197
KB9AW	"	295,596	411	87	189
WA9OAK	"	274,040	400	82	178
W9ZM	"	164,220	270	77	153
WA9OVU	"	153,454	290	63	131
N9AMF	"	152,771	276	75	152
W9NA	"	147,052	318	56	138
KC9EW	"	131,943	276	61	122
WA9BZW	"	129,888	281	72	126
K9YAX	"	126,266	240	68	135
N9CSF	"	118,800	232	63	117
W9RF	"	114,918	248	57	122
KB9OC	"	103,880	215	72	124
K9YNF	"	96,976	235	55	97
N9BBM	"	91,798	221	63	103
K9IZT	"	91,324	219	56	102
N9CHN	"	88,038	225	50	96
W9AMM	"	80,703	177	67	116
KC9FC	"	75,680	169	57	103
W9DIM	"	74,520	181	58	104
W9RE	"	71,012	176	65	99
KB9PY	"	55,044	149	44	95
WB9ZGY	"	53,955	121	52	113
KC9GL	"	48,944	147	46	87
WA9ETR	"	48,384	159	33	79
KA9KKU	"	35,700	136	39	66
W9TNZ	"	30,912	109	41	71
KC9SO	"	23,085	94	35	60
WB9GLB	"	22,784	97	31	58
KA9JOX	"	18,507	80	34	59
KB9PB	"	14,628	94	36	56
KB9LC	"	12,354	66	29	42
KJ9I	"	10,065	58	20	41
WD9FEN	"	6,210	48	24	30
K9KVA	"	4,601	43	16	27
K9GDF	"	460	13	10	10
W9YCV	"	234	11	7	9
K9CLO	**28**	**127,002**	**381**	**31**	**91**
K9MDO	"	**124,572**	**341**	**30**	**98**
WB9IVC	"	90,720	300	29	79
KA9DOO	"	87,285	275	30	85
W90A	"	76,014	226	30	93
N9ACP	"	63,023	215	27	80
K9IW	"	61,182	213	29	74
WD9IIX	"	50,611	170	31	76
KK9L	"	41,008	163	26	62
WD9IRV	"	35,619	141	29	64
KG9D	"	28,122	129	26	60
N9CXJ	"	23,927	124	25	46
KE9Y	"	22,608	117	21	51
W9CA	"	4,662	40	12	30
WA9MRU	"	390	11	4	9
KE9U	**21**	**140,081**	**387**	**30**	**97**
WA9LCU	"	69,874	253	27	71
AE9Y	"	68,801	222	29	78
KC9FS	"	66,352	246	29	75
KA9ERV	"	47,025	180	28	67
WA9JWL	"	46,992	181	24	65
WA9CXY	"	26,554	141	22	49
KA9HAC	"	5,888	50	18	28
KK9A	**14**	**286,728**	**648**	**36**	**120**
W9NUF	"	144,838	383	31	108
KB9TI	"	3,325	39	14	21
W9CH	**7**	**66,447**	**228**	**27**	**80**
W9LT	"	31,790	139	24	61
KA9V	"	17,082	89	24	49
AG9S	"	12,864	79	21	43
AI9J	**3.8**	**67,068**	**310**	**26**	**66**
KB9KD	"	1,830	27	11	19
W9ZR	**1.8**	**3,366**	**52**	**12**	**21**
KB8AC/9	"	1,554	138	9	12
W8FR/9	"	550	27	5	6
K0RF	**A**	**2,079,660**	**1491**	**148**	**342**
			(Opr. W0UA)		
N0GA	"	**661,329**	**655**	**115**	**258**
K0LUZ	"	**655,074**	**641**	**112**	**266**
AC0N	"	511,896	604	94	214
N0BSH	"	320,534	427	88	190
WB0ISW	"	293,440	383	94	168
K0TLM	"	285,480	346	101	204
N0ZA	"	241,109	369	84	169
K0GT	"	202,464	270	109	179
W0FF	"	184,320	295	81	159
W6FN/0	"	179,304	284	79	164
W0OSK	"	154,812	297	64	130
W0IYR	"	151,554	276	64	137
KA0D	"	124,146	236	75	134
KD0U/M	"	105,523	232	69	112
W0PPF	"	102,784	222	58	118
KK0R	"	101,374	197	66	116
W0BWJ	"	95,654	221	56	113
WA0DCB	"	86,016	202	60	108
WD0EIF	"	50,304	143	46	85
K0VXU	"	41,262	113	52	86
W0RT	"	35,937	120	53	68
K0JV	"	33,333	110	53	70
WB0IEL	"	25,774	100	37	61
K0VM	"	25,029	109	27	54
K0VUA	"	20,276	101	27	47
WB0TCF	"	20,273	85	40	57
W0RXL	"	19,227	90	33	54
N0EAL	"	6,565	47	30	35
K0AL	"	4,089	36	16	31
KS0T	"	3,276	34	18	24
W0SR	"	1,740	30	14	15
W0YK	**28**	**268,732**	**742**	**32**	**95**
WA0ETC	"	110,331	323	30	93
W0GOR	"	109,197	397	26	73
WB0YUC	"	15,616	90	20	41
W0ZV	**21**	**631,331**	**1429**	**37**	**114**
N0AFL	"	39,783	155	23	66
N0CKN	"	39,648	176	25	59
N0AT	**14**	**140,760**	**386**	**35**	**103**
K0BJ	"	760	15	7	13
K0GU	**7**	**195,624**	**587**	**32**	**82**
KB0WT	"	11,590	67	22	39
W0JU	**3.8**	**8,592**	**80**	**15**	**33**
K0CS	"	**8,450**	**74**	**18**	**32**
W0VX	"	5,740	63	14	27
KA0IQR	"	5,320	61	13	27
W0FI	**1.8**	**2,250**	**36**	**11**	**19**

ALASKA

KL7D	**A**	**443,930**	**947**	**79**	**127**
KL7NT	"	18,081	53	18	31
KL7AF	**28**	**58,900**	**564**	**18**	**32**

BAHAMAS

K6OJ/C6A	**A**	**1,122,670**	**2023**	**85**	**177**

BARBADOS

8P6KX	**A**	**3,530,488**	**3747**	**112**	**297**
			(Opr. K6KLY)		
8P6J	"	2,042,866	3251	90	197
			(Opr. N6TJ)		
8P6PS	**21**	**466,816**	**2162**	**31**	**81**

BRITISH VIRGIN ISLANDS

VP2VIN	**A**	**55,404**	**358**	**31**	**45**

CANADA

VO1QU	**A**	**618,540**	**1270**	**46**	**149**
VO1AW	"	76,575	88	25	50
VE1TG	**21**	**275,561**	**808**	**30**	**113**
VE1CAN	**14**	**81,969**	**405**	**24**	**65**
VO1CV	**7**	**131,860**	**594**	**22**	**73**
VE1LI	**3.8**	**26,825**	**370**	**12**	**25**
VE1AIH	"	5,863	56	10	31
VE1BNN	**1.8**	**24,886**	**271**	**12**	**34**
VE2AYU	**A**	**695,100**	**872**	**90**	**241**
VE2PD	"	136,188	306	59	135
VE2JO	"	91,609	233	50	111
VE2FUY	"	76,840	226	43	93
VE2FTU	"	31,878	101	48	78
VE2DRN	"	30,752	107	49	75
VE2DVI	**28**	**83,076**	**391**	**25**	**59**
VE2FSU	"	15,180	95	21	45
VO2CW	**21**	**440,368**	**1355**	**32**	**104**
VE2EVO	"	96,900	328	29	85
VE2FOU	**3.8**	**64,790**	**527**	**18**	**44**
VE3BVD	**A**	**2,918,826**	**2443**	**129**	**372**
VD3GCO	"	**2,196,920**	**2148**	**122**	**318**
VE3GP	"	564,575	862	80	195
VE3KZ	"	339,404	568	85	159
VE3DYB	"	134,106	263	52	134
VE3FEA	"	62,784	166	53	91
VE3FRA	"	60,799	154	54	109
VE3GWM	"	27,100	122	32	68
VE3KOY	**28**	**109,384**	**394**	**28**	**85**
VE3NBE	"	60,300	244	23	67
VE3JTO	21	33,348	145	26	58
VE3BMV	**14**	**895,712**	**2035**	**38**	**146**
VE1BCZ/3	**7**	**38,913**	**374**	**16**	**35**
VE3CPU	**3.8**	**53,838**	**487**	**15**	**39**
VE3EEW	"	51,615	712	12	25
VE3IPR	"	51,184	465	17	39
VE3BBN	**1.8**	**5,936**	**192**	**7**	**9**
VE3ABG	"	4,662	169	7	7
VE3INQ	"	2,688	104	7	7
VE4RP	**A**	**221,760**	**562**	**61**	**115**
VE4AIY	**28**	**40,596**	**269**	**22**	**46**
VE4AEX	"	4,664	41	17	27
VE4CCC	**14**	**74,008**	**312**	**49**	**67**
VE5XU	1.8	680	72	3	2
VE6OU	**21**	**697,186**	**2156**	**33**	**100**
VE7BTV	**A**	**1,891,812**	**2188**	**128**	**234**
VE7CVM	**28**	**290,466**	**1650**	**27**	**54**
VE7AVU	**14**	**89,870**	**449**	**27**	**59**
VE7BS	**1.8**	**6,048**	**70**	**8**	**7**
VE8XO	A	736	28	7	9
VY1DD	3.8	1,152	49	6	6

CAYMAN ISLANDS

ZF2FL	**A**	**4,262,180**	**4792**	**110**	**278**
			(Opr. N6RJ)		

COSTA RICA

TI5BGA	14	5,808	45	16	32

CUBA

CO2HS	**A**	**104,420**	**428**	**40**	**75**
CO2HQ	"	53,840	306	25	45

DOMINICA

J73PP	A	171,632	478	47	89

DOMINICAN REPUBLIC

HI8LC	**28**	**236,256**	**1122**	**24**	**72**
HI8GB	**3.8**	**91,380**	**749**	**17**	**43**

GUATEMALA

TG9EW	**21**	**270,860**	**897**	**28**	**88**

HAITI

HH2WW	**A**	**3,079,850**	**6634**	**134**	**396**
			(Opr. N4WW)		

JAMAICA

N1GL/ 6Y5	**A**	**6,873,661**	**5572**	**136**	**391**
6Y5HN	"	2,250,963	2440	97	254

MEXICO

6D5ZZA	**A**	**1,313,468**	**2199**	**94**	**268**
XE1AOK	"	41,650	140	41	78
XE1ZW	**21**	**137,200**	**561**	**28**	**70**
6D5RM	**14**	**120,227**	**500**	**30**	**79**

MONTSERRAT

VP2MR	**21**	**996,303**	**3279**	**33**	**100**

PANAMA

HP1XAT	21	25,300	539	11	12
HP5AHF	14	13,446	106	18	36

TURKS & CAICOS

VP5KP	**A**	**3,903,548**	**5836**	**101**	**215**
			(Opr. W6SZN)		

U.S. VIRGIN ISLANDS

K4IIF/ KV4	**A**	**1,749,600**	**3000**	**87**	**201**

AFRICA

CANARY ISLANDS

EA8AFB	**A**	**345,030**	**731**	**48**	**111**
EA8AGF	"	598	12	11	12
EA8ADY	**28**	**74,847**	**411**	**17**	**44**
EA8VV	"	32,163	155	22	49
EC8VI	**21**	**77,865**	**315**	**22**	**65**
EA8YV	**7**	**195,480**	**748**	**21**	**69**
EA8ZS	**3.8**	**94,950**	**433**	**16**	**59**
EA8AK	**1.8**	**34,220**	**201**	**12**	**46**

CAPE VERDE ISLANDS

D44BC	**A**	**1,652,553**	**1569**	**97**	**260**

CEUTA & MELILLA

EA9EU	**1.8**	**25,080**	**194**	**8**	**36**

DJIBOUTI

J28DM	**A**	**592,720**	**856**	**70**	**169**

KENYA

5Y4DE	**A**	**1,207,233**	**1490**	**81**	**199**
			(Opr. N4VV)		
5Y4DA	**21**	**153,368**	**678**	**19**	**57**

MADEIRA ISLANDS

DJ6QT/ CT3	**A**	**6,417,306**	**3937**	**136**	**431**
CT3AJ	"	72,996	168	50	104

NAMIBIA

ZS3HL	**A**	**3,386,277**	**3417**	**91**	**242**
ZS3AG	**28**	**331,316**	**1031**	**29**	**84**

REUNION ISLAND

FR0FLO	**A**	**4,739,132**	**3325**	**142**	**349**

ST. HELENA

ZD7BW	**A**	**1,137,136**	**1378**	**81**	**203**

SOMALIA

OH2JL/T5	A	37,576	170	30	47

SOUTH AFRICA

ZS6BRZ	**A**	**1,113,626**	**1277**	**87**	**211**
ZS4SP	"	640,916	1138	61	102
ZS6AF	"	481,572	583	98	196
ZS5IV	"	456,260	1096	43	97
ZS4GL	"	157,069	409	43	88
ZS6WB	**28**	**253,614**	**671**	**31**	**98**
ZS5MY	"	168,688	552	26	78
ZS4NS	"	37,905	227	22	35
ZS6AOO	**14**	**769,272**	**1700**	**38**	**114**

TANZANIA

5H3BH	A	59,019	211	35	68

ZIMBABWE

Z26JD	**A**	**835,662**	**1112**	**85**	**173**

ASIA

HONG KONG

VS6DO	**A**	**2,783,572**	**3918**	**146**	**305**
			(Opr. K7TI)		

INDIA

VU9AJ	**A**	**51,072**	**157**	**41**	**87**

ISRAEL

4X6DF	**28**	**680,632**	**1662**	**31**	**118**
4X6DK	"	44,091	275	20	51
4X8U	**21**	**900,399**	**1847**	**39**	**138**
			(Opr. 4X4UH)		
4Z4VG	"	33,756	126	26	71
N2BZQ/ 4X	**14**	**1,142,964**	**2347**	**36**	**135**
4Z4AB	**3.8**	**48,488**	**286**	**11**	**47**
4Z0O	"	38,556	239	9	45
			(Opr. 4Z4OM)		
4X4NJ	**1.8**	**6,417**	**77**	**6**	**25**

JAPAN

JA1ELY	**A**	**2,021,455**	**1684**	**135**	**280**
JH7DNO	"	**2,005,080**	**1764**	**127**	**265**
JA3HTT	"	**1,119,008**	**1357**	**104**	**185**
JG1RVR	"	986,576	1096	112	201
JH6SOR	"	**843,500**	**877**	**118**	**232**
JA8YAK	"	**756,250**	**968**	**96**	**179**
JA6LDD	"	653,600	762	110	194
JF1SEK	"	547,370	758	90	164
JA6BIF	"	434,160	653	86	154
JH0LFE	"	366,629	580	88	141
JA9JFO	"	**365,312**	**521**	**91**	**165**
JA7JND	"	351,000	621	76	124
JA4CUU	"	**341,256**	**538**	**86**	**150**
JE3DYW	"	309,120	487	85	145
JA6CNL	"	284,270	396	87	175
JM1NKT	"	271,937	518	66	127
JH8JYV	"	**259,120**	**454**	**77**	**128**
JA1ALX	"	226,950	438	64	106
JA1JKG	"	219,010	465	62	93
JA7JWF	"	190,877	364	80	113
JI1PLX	"	165,949	403	54	97
JA0VHI	"	155,770	312	74	111
JR3WXA	"	143,516	364	54	83
JA0DMV	"	143,550	315	58	107
JA6ABG	"	142,204	358	48	98
JA5CPO	"	71,260	202	58	82
JA6AKV	"	68,880	202	42	78
JA6AZQ	"	68,445	180	53	82
JA7VSO	"	68,061	173	60	87
JA6CM	"	66,150	172	53	82
JA7JH	"	62,320	146	59	93
JA7ARW/1	"	55,854	193	31	76
JR0ACP	"	52,725	199	35	60
JH7DBI	"	47,088	155	43	66
JA6IP	"	46,761	152	47	62
JA8SW	"	45,902	151	49	69
JA4ESR	"	45,780	150	44	65
JA7EDZ	"	44,792	179	38	50
JL1EJO	"	42,262	138	52	61
JH1MTR	"	34,800	124	43	57
JH1APK	"	28,288	104	42	62
JN1RVS	"	27,225	139	36	39
JE3SEN	"	26,962	150	27	34
JA7UFZ	"	23,030	98	32	38
JA1AOD	"	22,436	104	35	44
JM1AHX	"	22,403	118	30	37
JA6WW	"	20,292	89	37	52
JA4AQA	"	19,764	86	29	52
JA3BBG	"	17,780	93	28	42
JH7UJN	"	13,452	78	35	41
JA6JNG	"	12,505	106	23	38
JG1OWV	"	10,431	63	27	34
JF3CEC	"	10,310	98	20	19
JL1VKX	"	9,856	87	20	24
JR1TLA	"	7,952	57	26	30
JH8NBJ	"	7,849	57	16	31
JA8ECJ	"	7,009	59	19	24
JH4QJT	"	6,321	45	19	30
JA2YKD	"	2,250	33	14	16
JH1FJK	"	1,450	22	13	16
JH1AJT	**28**	**889,776**	**1845**	**34**	**133**
JA5GOE	"	**344,375**	**964**	**33**	**92**
JA6YAI	"	**299,968**	**953**	**32**	**77**
JA3EQC	"	**255,474**	**788**	**31**	**83**
JA2JSF	"	**245,476**	**792**	**31**	**82**
JR6OJD	"	236,500	669	32	93
JH1RNZ/2	"	207,690	635	32	83
JA5JFB	"	141,570	430	34	83
JH2JUK	"	140,620	546	23	66
JR2MIN	"	128,934	378	31	83
JR3SOT	"	109,263	340	35	86
JA3BLN	"	107,107	385	31	76
JA8GCI	"	**98,300**	**353**	**30**	**70**
JA1MYW	"	93,002	336	31	67
JA6EFT	"	87,714	329	27	72
JA3XOG	"	65,645	238	28	67
JM1AFK	"	64,641	278	26	61
JA2BNN	"	62,084	275	24	59
JH2WMN	"	61,464	289	26	52
JA0TPE	"	59,856	255	27	60
JH0MXV	"	55,226	228	28	58
JA1JGP	"	49,920	222	25	55
JA8JQV	"	48,000	235	25	50
JR7CDL	"	47,656	227	24	50
JA1EHA	"	45,036	201	28	53

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TOP SCORES

WORLD		USA	
Single Op All Band		**Single Op All Band**	
9Y4VT	11,954,696	W1ZM	3,182,460
HH2WW	8,079,850	K1AR	2,510,235
N1GL/6Y5	6,873,661	K1RX	2,431,136
DJ6QT/CT3	6,417,306	W3BGN	2,414,458
UF6CR	5,898,240	K2VV	2,395,848
YU3EY	4,913,574	K2BU	2,368,314
FR0FLO	4,739,132	N2LT	2,320,122
DK3GI	4,735,162	N6BV	2,258,704
ZF2FL	4,262,180	K6HNZ	2,211,256
VP5KP	3,903,548	KM6B	2,123,448
Single Op Single Band 28 MHz		**Single Op Single Band 28 MHz**	
YV2AMM	1,839,004	W6YA	537,774
AH0B	1,788,430	K5RC	457,867
4M3AGT	1,579,888	WA6DBC	433,331
KB7IJ/KH2	1,441,158	N8II	423,680
CE6EZ	1,324,790	N4ZZ	388,755
IO4EAT	900,473	W1WEF	379,533
21 MHz		**21 MHz**	
AH0AB	1,923,840	W0ZV	631,331
CX4CR	1,602,120	K5GA	495,021
KG6DX	1,455,214	K4ISV	428,730
VP2MR	996,303	N4MM	371,790
4X0U	900,303	N8UM	362,666
LZ2KTS	835,380	N2PP	346,500
14 MHz		**14 MHz**	
YS1X	1,176,400	K1KI	695,453
N2BZQ/4X	1,142,964	K3KG/4	389,064
VE3BMV	895,712	K2RD	315,296
YV5ANE	869,632	W5WMU	305,660
CX7BY	863,211	KK9A	286,728
ZS6AOO	769,272	W1GG	254,185
7 MHz		**7 MHz**	
YV3BRF	528,193	K0GU	195,624
ZY5EG	232,603	W6AM	163,317
OH1IJ	199,440	N6SV	121,056
K0GU	195,624	K8UR/1	91,304
ZL4BO	186,684	K2IGW	84,164
LA7JO	185,096	K4PI	76,986
3.8 MHz		**3.8 MHz**	
4M3AZC	203,280	K1JX	99,645
KH6XX	161,622	K1PT	77,322
YT3A	154,972	N2KK	77,066
LZ1KDP	143,022	AI9J	67,068
YU4BR	130,205	AB1A	63,112
IO6NOA	126,324	WA4SVO	58,104
1.8 MHz		**1.8 MHz**	
EA8AK	34,220	W8LRL	16,191
YU3EF	27,956	AE6U	5,005
EA9EU	25,080	N4IN	4,305
VE1BNN	24,886	N4SU	4,066
W8LRL	16,191	K5YY	3,366
I4RYC	13,932	W9ZR	3,366
Multi-Op Single Transmitter		**Multi-Op Single Transmitter**	
9Y4W	16,775,034	W4QAW	4,455,190
NP4A	14,953,818	KR2N	4,371,389
FM7CD	14,481,363	KX4S	4,237,545
4T4O	13,494,118	K1CC	3,244,602
RG6G	12,276,352	N4ZC	3,148,890
VP2EC	11,754,309	W2YV	3,061,264
Multi-Op Multi-Transmitter		**Multi-Op Multi-Transmitter**	
OH0W	19,030,501	N2AA	10,003,266
EW6V	18,746,136	W3LPL	8,806,995
VP9AD	15,929,459	K1OX	8,393,616
HC0	14,994,328	W7RM	7,518,720
N2AA	10,003,266	N5AU	7,424,865
YT4I	9,948,515	K9GL	6,191,968

CE6COR on 80 meters.

ZY3ZZ Multi-Operator Multi-Transmitter. Left is PY3CDL, and right is ZY3ZZ.

CE2AA working hard during the contest.

JA1JGH	"	42,375	227	24	51
JA7FFY	"	39,680	178	27	53
JR2CFD	"	38,290	193	26	44
JA4AYU	"	34,009	160	26	45
JI3BFG	"	33,609	176	25	44
JA6XGQ	"	31,990	170	23	47
JR7OMD	"	31,872	179	17	47
JH0ALB	"	30,810	171	22	43
JH7UJU	"	27,824	201	19	28
JE1PJR	"	24,282	149	23	34
JI1JQQ	"	24,080	122	23	47
JA8LYV	"	23,700	159	20	30
JA1FO	"	22,701	120	21	48
JF3KNQ	"	21,390	125	19	43
JA7YAA	"	21,200	295	12	13
JA4KWU	"	20,640	96	28	52
JA1AAT	"	19,521	88	34	47
JE4BTE	"	17,976	121	20	36
JO1RFR	"	13,724	104	19	28
JA4AQR	"	12,299	90	19	30
JE6JVJ	"	11,954	96	18	25
JR2NTC	"	11,128	75	17	35
JA1AAV	"	7,661	58	20	27
JH2ORJ	"	6,642	54	18	23
JA6PL	"	5,808	46	16	28
JR7WAY	"	5,328	56	13	24
JA6ADA	"	2,604	32	10	21
JH8RGQ	"	558	11	8	10
JL1CCX	"	528	11	6	10
JA5DQH	"	287	15	4	3
JA2APA	**21**	**395,351**	**1091**	**35**	**92**
JR1CBC	**"**	**356,574**	**915**	**35**	**99**
JR1WHW	"	321,480	908	34	86
JA1USO	"	310,905	757	38	103
JF3NLQ	**"**	**164,192**	**499**	**33**	**79**
JL1TVV	"	127,102	439	34	69
JF6IWU	**"**	**116,300**	**410**	**30**	**70**
JR1DZA	"	69,048	287	29	55
JA8UJY	**"**	**65,570**	**273**	**28**	**55**
JJ3AIO	"	64,034	225	33	68
JA3YKM	"	63,336	262	26	61
JH7NAB	**"**	**62,568**	**309**	**24**	**48**
JH6HYL	"	56,722	239	27	50
JA5IMB	"	48,772	195	30	59
JA1DCO	"	48,676	199	26	60
JI1QLB	"	46,056	213	26	50
JR4DFO	"	45,980	209	25	51
JF1ASB/4	"	43,650	205	26	46
JI1LLD	"	41,001	175	26	53
JH5EVO	"	40,040	185	27	50
JA7GYR	"	37,587	206	23	44
JK1WBW	"	37,520	191	26	44
JR7OKK/1	"	36,936	163	29	52
JH3EQG	"	28,365	116	38	55
JR3EGT	"	26,975	146	23	42
JA6ZJD	"	25,193	144	22	39
JR4ISK	"	22,862	117	26	45
JA9CWJ	"	20,940	120	21	39
JA0UMV	"	18,113	110	21	38
JM1JAL	"	17,574	121	20	38
JE7DOT	"	16,050	114	21	29
JN1UZU	"	14,711	115	20	27
JA2SAP	"	7,257	65	18	23
JH5NJJ	"	4,960	55	14	18
JE3XWJ	"	4,840	48	16	24
JA4GHZ	"	4,690	48	14	21
JH7HJF	"	4,305	49	14	21
JR2MQK	"	2,147	41	10	9
JA6GGD	"	1,386	21	6	16
JF3NRT	"	950	18	7	12
JA7KM	"	945	17	9	12
JA2PCZ	"	915	24	7	8
JA6QDU	"	325	9	6	7
JM1XWP	"	144	12	6	6
JR8MSM	"	45	3	2	3
JA0GZ	"	45	5	4	1
JH8SIT	"	45	3	2	3
JA8JHA	**14**	**520,704**	**1239**	**37**	**107**
JA6GIJ	**"**	**450,996**	**1022**	**39**	**117**
JH3DPB	**"**	**425,580**	**878**	**39**	**134**
JA1JXU	**"**	**267,300**	**697**	**36**	**99**
JR1EFI	"	161,728	517	32	80
JA8KSD	**"**	**148,896**	**403**	**35**	**97**
JH8NYK	"	125,292	417	33	73
JA7DOT	**"**	**101,864**	**348**	**35**	**72**
JA8DAY	"	86,700	376	34	66
JA1SKE	"	81,917	248	34	87
JH7CUO	"	34,030	162	28	54
JA5BAB	"	30,495	125	33	62
JA4CVJ	"	21,138	98	28	50
JA3AOL	"	19,338	113	25	41
JR3BOT	"	18,590	109	24	41
JA0AGA	"	16,874	106	16	43
JA7RXU	"	15,860	93	21	40
JH2CJW	"	9,780	60	24	36
JA9YE	"	5,980	48	22	30
JE1ILP	"	3,268	32	19	19
JE1GZB	"	1,296	22	11	13
JK1MZT	"	828	14	10	13
JA2BAY	**7**	**172,992**	**629**	**30**	**66**
JA9AGX	**"**	**52,780**	**269**	**27**	**43**
JF1EEK	**"**	**46,200**	**252**	**26**	**40**
JH4AAG	**"**	**26,600**	**150**	**30**	**35**
JA5PUL	"	4,218	45	17	21
JA5OP	"	3,565	45	15	16
JG3RPL	"	2,470	44	14	12
JH4MTE	"	2,070	35	12	11
JH3LFE	"	1,540	30	10	10
JG3VKW	"	1,184	31	9	7
JA6IEF	**3.8**	**14,892**	**108**	**23**	**28**

KOREA

HL9AZ	**A**	**2,043,596**	**2321**	**116**	**387**
					(Opr. KA4NCZ)
HL9KE	**21**	**247,101**	**1368**	**29**	**64**

KUWAIT

9K2BE	**28**	**329,621**	**997**	**24**	**89**
					(Opr. G4BWP)

MONGOLIA

JT1BG	28	9,460	107	12	31
JT1AO	**14**	**273,300**	**1309**	**30**	**70**

NEPAL

9N1WW	**A**	**491,960**	**1159**	**79**	**172**
					(Opr. JA8BMK)

OMAN

A4XJO	**A**	**3,821,976**	**3144**	**108**	**328**

SAUDI ARABIA

HZ1HZ	**A**	**1,836,720**	**1817**	**90**	**270**

SINGAPORE

9V1VP	**A**	**369,600**	**969**	**88**	**176**

SYRIA

YK1AO	**A**	**136,382**	**554**	**27**	**70**

U.S.S.R. ASIA

ARMENIA

UG6GDS	**A**	**98,528**	**281**	**50**	**82**
UG6GAT	"	4,680	96	20	25
RG6GBW	28	78,375	394	19	56
UG6LQ	**14**	**630,500**	**1640**	**34**	**116**

ASIATIC S.S.R.

UA9MR	**A**	**938,058**	**1146**	**97**	**269**
UV9PP	**"**	**705,860**	**978**	**85**	**205**
UA9UAR	"	552,475	968	71	174
UA900	"	347,270	531	66	176
UA0LCZ	**"**	**117,012**	**538**	**64**	**83**
UA9UUN	"	87,354	161	70	137
UA0CFX	"	73,130	190	55	87
UA9CFC	"	65,975	165	38	107
UA0CCO	"	34,391	107	40	79
UA0CCR	"	7,680	69	15	25
UA0CDM	"	3,281	74	10	17
UA9QBE	**28**	**247,875**	**851**	**32**	**93**
RA9UAD	**"**	**234,304**	**1084**	**28**	**84**
RA9MBH	"	225,462	888	26	80
UA9UOF	"	188,598	1116	19	67
UA9CSS	"	172,458	623	30	87
UA9CTL	"	54,600	273	19	56
UA0FBZ	**"**	**52,020**	**424**	**23**	**45**
UA0QEP	"	50,728	308	17	51
UW9CR	"	30,840	200	13	47
UA9UCU	"	27,930	176	13	44
UA0SKL	"	24,596	203	11	41
RA9UNN	"	24,221	192	12	41
UA9ACO	"	23,968	163	12	44
UA9CMS	"	21,335	95	21	64
UA9YBR	"	6,264	102	12	24
RA0CDM	"	5,984	48	14	30
UA9OGF	"	3,724	133	10	18
UV0EU	"	243	17	4	5
UA9WCQ	**21**	**123,119**	**455**	**29**	**72**
UA9YBO	"	69,479	512	19	48
UA0ZBF	**"**	**65,162**	**621**	**25**	**37**
UA9AAP	**14**	**321,540**	**890**	**36**	**102**
UA9XWR	"	125,757	530	27	62
UA9OS	"	18,988	143	12	35
UV9DO	"	13,740	88	19	41
UA0SGL	7	4,650	126	11	19
UA0CCW	"	1,134	17	12	15
UA9OIE	"	435	20	5	10
UA9CBO	**3.8**	**38,052**	**240**	**13**	**50**
UA9SHU	"	20,951	187	8	33
UA0ZDD	"	15,184	223	12	14
UA9CBM	"	8,871	115	9	28
UA9SJL	**1.8**	**5,208**	**80**	**8**	**16**

AZERBAIJAN

UD6DGX	A	28,160	116	25	63
UD6DER	3.8	2,349	41	7	20

GEORGIA

UF6CR	**A**	**5,898,240**	**4466**	**109**	**371**
UF6QAH	"	11,232	76	17	37
UF6FER	**28**	**103,305**	**510**	**17**	**54**
UF6RB	"	4,462	48	8	29
UF6FBX	21	14,308	105	20	29
UF6FFF	**14**	**212,670**	**575**	**30**	**109**
UF6FEH	"	74,579	349	20	59
UF6FAO	"	3,780	64	12	33
UF6QAN	"	3,420	53	8	10

KAZAKH

UL7LAW	**A**	**1,523,438**	**1565**	**84**	**262**
UL7LEZ	**"**	**1,338,995**	**1555**	**88**	**247**
UL7DA	"	633,144	931	79	197
RL7PCV	**28**	**74,820**	**318**	**21**	**65**
UL7LCW	**3.8**	**28,292**	**241**	**8**	**36**
UL7LBM	"	18,816	171	8	34

KIRGHIZ

UM8MDX	**A**	**141,040**	**319**	**54**	**110**
UM8MKF	"	45,150	208	22	64
UM8MCY	**28**	**98,580**	**529**	**25**	**68**
UM8MCR	**"**	**80,080**	**516**	**24**	**43**
UM8MDW	1.8	120	10	2	6

TADZHIK

UJ8JKO	A	40,440	297	27	67

TURKOMAN

RH8EAK	**28**	**197,580**	**796**	**22**	**67**
UH8HCN	"	51,794	396	20	38
UH8EAA	**7**	**124,335**	**646**	**19**	**62**

UZBEK

UK8AAS	A	3,255	39	12	41

EUROPE

AALAND ISLANDS

OH2BDN /OH0	**A**	**133,308**	**652**	**43**	**118**

AUSTRIA

OE1ZHS	**A**	**260,036**	**512**	**71**	**180**
OE6HZG	"	141,000	454	41	79
SP5IXI /OE6	"	52,826	310	25	88
OE1ZES	"	8,550	70	27	48
OE1MKW	"	4,104	41	22	35
OE1MPW /3	**28**	**327,744**	**924**	**32**	**112**
OE5CWL	7	630	28	5	16

BALEARIC ISLANDS

EA6FS	**A**	**106,533**	**337**	**44**	**89**
EA6ET	**28**	**812,640**	**2200**	**37**	**123**
EA6LA	**21**	**14,630**	**142**	**19**	**51**

BELGIUM

ON6RM	**A**	**311,808**	**850**	**61**	**163**
ON4KST	"	161,142	657	30	77
ON7DR	"	128,164	380	58	121
ON4JJ	"	360	18	7	13
ON4ABW	**28**	**104,112**	**436**	**25**	**83**
ON8BK	**21**	**209,697**	**825**	**31**	**96**
ON4XG	"	44,368	294	27	67

BULGARIA

LZ2AB	**A**	**2,807,605**	**2991**	**118**	**359**
LZ1KJ	"	19,200	320	12	48
LZ1RW	"	5,600	67	16	40
LZ13CWT	"	5,350	100	13	37
LZ1CW	**28**	**98,736**	**453**	**26**	**76**
LZ1SJ	"	48,000	386	23	57
LZ1GZ	"	19,928	191	18	35
LZ2KTS	**21**	**835,380**	**1937**	**37**	**145**
LZ2PP	**14**	**50,400**	**558**	**14**	**58**
LZ1WY	"	7,803	119	13	45
LZ1KDP	**3.8**	**143,022**	**739**	**28**	**93**
LZ1PY	"	580	25	6	14
LZ1HY	"	196	14	4	10

CRETE

K2PFV /SV9	A	22,577	199	24	83

CZECHOSLOVAKIA

OK2BLG	**A**	**1,217,189**	**1218**	**110**	**381**
OK1MSN	**"**	**890,379**	**899**	**95**	**346**
OK1AJN	"	403,840	691	82	238
OK2SLS	"	368,809	713	77	252
OK3YCA	"	355,072	605	79	225
OK3PQ	"	332,633	706	76	211
OK3FON	"	188,944	371	63	178
OK1KZ	"	182,248	565	56	162
OK1KJP	"	98,697	418	43	124
OK1AXB	"	90,552	454	31	137
OK2BQL	"	57,000	207	41	109
OK2QR	"	24,846	148	29	72
OK3SIH	"	22,230	96	38	76
OK1DMM	"	19,276	117	23	56
OK3KFO	"	8,470	71	16	39
OK3CRH	"	7,750	67	18	44
OK1DHJ	"	2,709	41	14	29
OK2KVI	"	2,135	37	13	22
OK3CFA	**28**	**271,152**	**864**	**29**	**97**
OK1ATT	"	141,768	464	30	102
OK1ZL	"	72,480	297	29	91
OK1VAM	"	69,870	292	24	78
OK2ABU	"	49,170	275	19	53
OK2BSG	"	32,300	128	27	68
OK3EE	"	19,312	123	22	49
OK1AZI	"	12,293	119	18	35
OK3CAQ	"	9,130	59	18	37
OK5DX	**21**	**561,216**	**1401**	**36**	**122**
OK1ARI	**"**	**400,500**	**1281**	**32**	**93**
OK1PCL	"	12,425	83	21	50
OK3CNP	"	7,958	63	14	32
OK1EV	"	5,580	96	10	26
OK1AVU	**14**	**196,053**	**713**	**35**	**108**
OK1TD	**"**	**188,364**	**730**	**34**	**98**
OK2PBM	"	182,130	856	31	99
OK1FV	"	146,044	663	29	87
OK2TBC	"	41,000	275	26	74
OK1AJY	"	31,200	279	19	59
OK3YK	"	23,874	255	16	53
OK3CLD	"	10,692	152	13	41
OK1MIZ	"	7,434	152	9	33
OK2KMR	"	616	19	7	7
OK1DA	**7**	**35,724**	**338**	**17**	**61**
OK2PDE	"	33,600	339	15	60
OK3KCM	**3.8**	**36,917**	**496**	**11**	**56**
OK3YCL	"	21,384	387	8	46
OK3KXR	"	8,740	182	6	40
OK1MGW	"	5,289	128	6	35
OK2BRZ	"	1,830	61	5	25
OK2BRR	"	216	18	3	9
OK1KCU	**1.8**	**8,448**	**164**	**8**	**36**
OK1DVK	"	4,056	104	7	32
OK1JDX	"	3,536	103	6	28
OK1DDS	"	1,836	69	5	22
OK3CQD	"	1,326	48	6	20
OK3CLS	1.8	110	12	3	7

DENMARK

OZ5EV	**A**	**512,975**	**1156**	**92**	**263**
OZ4MD	**"**	**415,480**	**768**	**84**	**256**
OZ7JZ	"	411,570	679	72	183
OZ1FRR	"	91,800	227	52	128
OZ1GRS	"	57,810	471	19	75
OZ1APA	"	31,886	114	52	97
OZ1DAF	"	13,509	144	21	58
OZ6EI	"	11,999	81	27	44
OZ7SOL	"	6,804	50	23	40
OZ9FJ	"	6,460	52	25	43
OZ6EI	"	6,110	63	22	43
OZ1CAH	"	5,723	43	27	32
OZ4RT	"	5,160	38	26	34
OZ1HMA	"	3,483	53	15	28
OZ8T	"	1,836	22	16	18
OZ1AUX	**28**	**68,250**	**325**	**23**	**68**
OZ1FTE	"	67,509	288	29	88
OZ7BG	"	44,308	199	26	80
OZ8XW	"	34,790	167	25	73
OZ1BRV	"	11,520	90	23	37
OZ4UR	"	4,216	86	9	22
OZ6PI	"	3,126	62	10	24
OZ1AP	"	756	23	9	13
OZ9HW	21	5,280	86	10	30
OZ8CT	14	24,494	173	20	54
OZ2PA	**7**	**17,655**	**250**	**10**	**45**
OZ3ZK	3.8	2,844	110	3	33

ENGLAND

G5CFJ	**A**	**2,063,880**	**2131**	**105**	**285**
G4FAM	"	1,601,334	1305	117	420
G3XTT	"	1,305,585	1143	117	392
G3TXF	"	334,304	595	79	257
G4KIU	"	114,228	266	48	123
G3OLU	"	75,152	220	49	105
G4OKN	"	29,952	189	27	77
G2AJB	"	28,084	192	27	91
G4OHL	"	15,403	116	15	58
G5EBA	"	5,450	109	14	36
G3RRS	**28**	**443,700**	**1181**	**34**	**111**
					(Opr. G3SJK)
G3SNN	"	233,856	705	29	97
G4CHP	"	110,288	409	31	91
G4JKS	"	68,388	525	22	60
G4NSU	"	10,880	170	18	46
G3NT	**21**	**55,529**	**322**	**20**	**68**
G3FXB	**14**	**658,242**	**1615**	**38**	**136**
G3VPW	"	535,262	1309	38	144
G3WMX	**3.8**	**27,040**	**262**	**12**	**40**
G3IMW	"	11,736	326	6	30
G3XWZ/A	**1.8**	**2,976**	**80**	**6**	**26**

FINLAND

OH2PM	**A**	**1,069,944**	**1139**	**107**	**329**
OH2KP	**"**	**201,145**	**523**	**57**	**188**
OH2LP	"	172,534	394	64	217
OH7RH	"	135,733	385	51	146
OH7EU	"	105,616	282	49	136
OH7NW	"	98,952	369	40	146
OH6HI	"	82,203	288	52	207
OH1RZ	"	65,667	192	49	128

the tempo S-15

...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

The S-15 is the kind of hand held most people want. Simple, rugged, reliable, easy to use...it's the hand held for today and tomorrow. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. The S-15 operates from 140 to 150 mHz (and 150 to 160 on export models). Compare that to the others. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry...just one more indication of the kind of quality that goes into the S-15.

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- **5 watt output (1 watt low power switchable)**
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- **Electrically tuned stages. Receiving sensitivity and output power are constant over entire operating range.**
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- **A new "easy remove" battery pack**
- **One hour quick charge battery supplied (450 ma/HR)**
- **Plug for direct 13.8 volt operation**
- **Speaker/microphone connector**
- **BNC antenna connector and flex antenna**
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- **Ample space for programmable encoder.**
- **Fully synthesized**
- **Extremely easy to operate**
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OH2JQ	"	53,846	210	40	134
OH6MM	"	49,416	247	35	107
OH2BSX	"	46,116	287	40	68
OH2VZ	"	41,230	145	43	112
OH1PY	"	40,917	227	26	43
OH2BJG	"	39,000	212	33	92
OH6CD	"	24,990	204	21	77
OH5UL	"	24,411	113	33	70
OH1OR	"	19,966	104	38	96
OH2DN	"	5,422	56	18	40
OH5PA	"	5,244	43	19	38
OH1KO	"	1,804	29	16	28
OH1ED	"	1,770	26	14	16
OH1PY	"	167	88	26	60
OH50Q	"	76	7	5	7
OH1BA	"	50	5	5	5
OH1BV	**28**	**35,214**	**205**	**34**	**103**
OH2BFS	"	814	35	6	16
OH6AM	**21**	**596,167**	**1745**	**34**	**109**
OH5TS	"	**559,986**	**1778**	**32**	**102**
OH3AA	**14**	**351,648**	**1308**	**36**	**108**
OH3RF	"	203,680	865	35	99
OH4ML	"	78,881	455	26	75
OH2IO	"	76,160	350	35	83
OH6DU	"	26,880	266	17	53
OH1IJ	**7**	**199,440**	**1232**	**27**	**93**
OH2BWL	"	682	27	4	18
OH4PW	3.8	4,800	120	7	33
OH5NG	**1.8**	**7,449**	**191**	**6**	**33**
OH2BO	"	3,267	91	7	26
OH3TQ	"	815	35	5	18
			(Opr. OH3RF)		

FRANCE

F9GL	**A**	**2,099,580**	**1898**	**98**	**322**
F8WE	"	404,926	942	68	225
F6EXQ	"	255,500	551	70	222
F6FHA	"	49,046	168	42	95
F6API	"	9,960	53	31	52
F2SI	**21**	**720,940**	**1932**	**35**	**110**
F6KRC	"	599,379	1866	31	92
			(Opr. F6GLH)		
F6FNA	"	18,786	129	20	42
F6BBJ	**7**	**14,553**	**162**	**11**	**52**

GERMANY (FRG)

DK3GI	**A**	**4,735,162**	**3176**	**138**	**444**
DL8PC	"	**1,999,107**	**1844**	**119**	**358**
DK5AD	"	1,030,446	1088	101	336
DJ3HJ	"	865,555	1349	76	213
DF4ZL	"	685,620	963	93	297
DL2UH	"	567,768	866	87	241
DL3PN	"	453,083	753	80	203
DF3UQ	"	451,162	802	63	183
DJ0BA	"	421,523	648	85	184
DF2RG	"	345,450	589	69	225
DK5PE	"	323,505	661	67	206
DK5DS	"	259,461	560	68	159
DA1OV	"	255,231	694	49	158
DJ4PI	"	172,017	326	82	195
DL1LAA	"	152,856	378	62	131
DK0RD	"	146,138	481	52	126
			(Opr. DL6YAO)		
DL9EY	"	76,500	233	49	121
DL8SAB	"	53,756	236	42	109
DK1YK	"	41,760	159	45	75
DL9YC	"	26,620	109	43	78
DL7EK	"	16,632	216	24	48
DJ4JI	"	11,856	74	31	47
DL9MAA	"	4,371	72	12	19
DJ6QO	"	2,320	27	19	21
DK1FW	**28**	**537,120**	**1274**	**34**	**126**
DJ4PT	"	**477,365**	**1205**	**34**	**127**
DK2WH	"	281,799	790	33	114
DF4FR	"	242,193	560	32	101
DK2XX	"	223,300	638	33	121
DJ6TK	"	195,786	600	32	114
DJ20V	"	104,516	371	29	87
DK400	"	88,040	289	30	94
DL8NAK	"	66,148	340	22	70
DL1AM	"	19,980	333	19	41
DL3ME	"	10,422	100	14	40
DH3SAX	"	5,280	52	17	31
DK7ZT/M	"	2,100	36	12	18
DJ8RI	**21**	**621,469**	**1623**	**36**	**103**
DF8XG	"	322,909	1003	37	100
DA2DC	"	319,488	1012	31	97
DL9SN/A	"	101,280	375	32	88
DK9CK	"	8,848	63	19	37
DK8OW	**14**	**34,272**	**200**	**18**	**50**
DL8AAE	**7**	**3,042**	**71**	**7**	**32**
DF9OO	**3.8**	**118,233**	**816**	**18**	**69**
DJ2YA	"	86,785	760	15	75
DK8AX	"	62,244	630	14	64
DK8NG	1.8	858	38	5	17

GERMANY (GDR)

Y22JJ	**A**	**725,926**	**1032**	**90**	**277**
Y31PA	"	**670,500**	**1117**	**86**	**212**
Y51SL	"	**411,720**	**826**	**75**	**217**
Y43WK	"	403,448	920	75	221
Y44ZK	"	399,456	916	65	154
Y41ZH	"	344,267	830	73	190
Y58ZA	"	323,208	913	67	201
Y59UN	"	251,954	603	67	196
Y37UF	"	240,350	812	54	176
Y34NI	"	220,547	705	58	165
Y51UE	"	210,980	602	59	151
Y47XF	"	202,692	480	61	193
Y67XL	"	172,032	577	51	173
Y38YE	"	141,382	358	56	167
Y22HF	"	107,800	328	52	144
Y48YA	"	106,741	422	40	133
Y32UC	"	94,667	465	38	99
Y36YM	"	86,673	308	44	123
Y23DG	"	79,667	334	36	97
Y87XL	"	51,891	208	40	107
Y57TH	"	49,300	243	45	144
Y22WD/P	"	45,843	289	38	73
Y43ZI	"	43,484	137	49	123
Y33TA	"	32,922	118	44	74
Y33VL	"	31,892	108	44	75
Y49RF	"	29,274	123	46	73
Y23VB	"	26,950	101	39	59
Y35RK	"	26,832	243	20	84
Y32ZF	"	24,700	129	30	70
Y26PH	"	22,311	107	36	75
Y34UF	"	19,530	118	26	64
Y75YL	"	19,075	104	33	76
Y24SK/A	"	17,955	118	32	63
Y79WN	"	16,856	100	33	65
Y21JH	"	15,928	109	28	60
Y24GF/A	"	14,196	72	25	53
Y54UA	"	11,682	95	22	44
Y34XF	"	6,572	71	17	36
Y54ZI	"	6,554	82	19	39
Y62ZH	"	6,237	93	14	49
Y79VN	"	6,188	51	25	43
Y71WN	"	5,589	71	17	52
Y38WI	"	2,958	49	15	36
Y44WA	"	702	29	9	9
Y37ZE	**28**	**51,352**	**247**	**24**	**74**
Y53ZF	"	47,960	227	25	63
Y22CC/A	"	29,646	215	22	64
Y25MG/A	"	15,712	103	19	48
Y67WG	"	10,845	110	14	31
Y23GB	"	8,648	96	16	30
Y53WL	"	8,536	84	15	29
Y34SE	"	5,671	45	18	35
Y85YL	"	4,480	76	11	24
Y34YE	"	4,410	40	15	34
Y62XG	"	570	16	8	11
Y33XB	**21**	**327,206**	**1095**	**35**	**124**
Y78XL	"	202,565	781	33	94
Y24SG	"	40,568	203	22	66
Y52YG	"	17,955	173	18	43
Y26TL	"	7,955	112	14	29
Y47ZL	"	7,695	93	12	33
Y55WH	"	7,105	91	8	27
Y68SG	"	5,332	77	11	32
Y26KL/A	"	3,219	33	13	24
Y57WG	**14**	**137,588**	**624**	**31**	**87**
Y55XG	"	98,169	505	33	96
Y39YA	"	36,432	258	21	67
Y26KN	"	17,526	199	14	55
Y76VN	"	11,340	93	18	45
Y24DF	"	4,059	106	6	27
Y25DE	"	1,944	48	7	20
Y23FA	"	1,058	20	10	13
Y32KE	**7**	**31,027**	**386**	**11**	**60**
Y24LE	"	11,220	185	11	44
Y52WG	**3.8**	**51,830**	**648**	**13**	**60**
Y28AL	"	21,603	399	8	49

GREECE

SV1MO	**A**	**481,460**	**1314**	**68**	**198**
SV1JG	"	157,986	515	52	149
SV0CT	**28**	**460,465**	**1930**	**33**	**98**

HUNGARY

HA5KDB	**A**	**1,250,172**	**1811**	**93**	**303**
HA0DU	"	**1,188,250**	**1178**	**119**	**371**
HA0HW	"	444,990	882	70	203
HA5KD	"	225,504	570	65	196
HA3NU	"	153,024	410	47	145
HA7TM	"	24,108	153	27	57
HA5KFV	"	11,760	102	25	59
HG4XX	**28**	**331,128**	**1041**	**31**	**95**
HA3HZ	"	87,633	356	26	81
HG5XW	"	38,136	237	21	63
HA8ZB	**21**	**372,120**	**1103**	**36**	**104**
HA9RE	**7**	**144,243**	**992**	**24**	**75**
HA0LC	"	24,522	285	13	48

IRELAND

EI1DH	**A**	**215,562**	**919**	**25**	**86**
EI7CC	**28**	**164,052**	**616**	**26**	**98**

ITALY

IO6FLD	**A**	**3,057,612**	**2708**	**113**	**329**
I4AVG	"	**2,228,635**	**2167**	**108**	**295**
I4JBJ	"	367,129	564	76	217
I8BYG	"	230,490	590	54	141
I4CSP	"	98,910	265	53	123
I1IVK	"	63,011	250	34	97
I0MLX	"	44,896	224	33	91
IN3ASK	"	20,240	156	24	64
IO4EAT	**28**	**900,473**	**2121**	**36**	**125**
IO1FQH	"	**526,288**	**1604**	**36**	**91**
I2CZQ	"	217,008	662	31	106
I0SKK	"	167,440	641	28	84
IK4BHO	"	46,647	255	20	51
I4XLG	"	45,660	303	23	37
IO8QLS	"	412,800	1447	30	98
IO8KPV	**14**	**507,200**	**1576**	**35**	**125**
IK2BHX	"	42,080	372	20	60
IK3AWP	"	7,371	113	12	39
IN3QBR	**7**	**37,656**	**366**	**12**	**60**
IO1ZHH	"	11,592	155	11	52
IO6NOA	**3.8**	**126,324**	**838**	**29**	**87**
I4RYC	**1.8**	**13,832**	**233**	**10**	**42**

LEICHTENSTEIN

HB0BOE	**A**	**513,000**	**959**	**66**	**234**

NETHERLANDS

PA2TMS	**A**	**1,954,568**	**1949**	**120**	**412**
PA0AGA	"	**1,077,408**	**1620**	**92**	**252**
PA0GN	"	610,025	940	85	240
PA0XPQ	"	422,100	685	82	233
PA0KHS	"	421,167	820	54	257
PA3AQY	"	132,102	346	40	139
PA0DUO	"	70,350	182	61	149
PA3ADR	"	27,608	146	32	84
PA3BVM	"	27,324	157	24	68
PA3CJP	"	20,956	165	17	35
PA3BDK	"	17,919	99	35	65
PA0LIE	"	14,760	98	36	54
PA0INE	"	14,290	83	24	50
PA0KDM	"	11,376	63	25	49
PA3BVT	"	5,772	67	20	32
PA0ADC	"	5,335	39	20	35
PA0RBS	"	5,194	54	18	31
PA3ADR	**28**	**70,848**	**656**	**25**	**83**
PA3AAN	"	30,914	229	14	44
PI1PT	"	14,016	75	21	52
PA3AIR	**7**	**20,557**	**301**	**23**	**38**
PA0RRS	"	2,142	29	9	25
PA0IJM	**3.8**	**24,681**	**408**	**8**	**49**

NORWAY

LA1HCA	**A**	**108,850**	**350**	**49**	**126**
LA2AD	"	**103,805**	**391**	**44**	**114**
LA2S	"	69,052	282	41	81
LA7UAA	"	44,940	300	28	79
			(Opr. LA9WBA)		
LA2TO	"	33,630	157	33	81
LA2CBA	"	26,335	140	29	86
LA9ML	"	19,240	190	18	56
LA3JT	"	14,427	133	19	44
LA1WCA	"	6,484	53	24	52
LA4HH	"	4,950	32	22	33
LA6DH	"	2,218	122	4	11
LA1DBA	"	667	15	10	13
LA1IE	"	468	9	6	9
LA1RN	**28**	**11,448**	**144**	**15**	**36**
LA5JX	"	5,895	70	15	30
LA5TBA	"	1,066	20	10	16
LA8DY	**14**	**77,425**	**455**	**24**	**71**
LA2ZN	"	34,944	305	22	62
LA2ACA	"	29,358	337	18	45
LA7JO	**7**	**185,096**	**948**	**34**	**102**
LA5QK	"	10,044	173	7	47

PORTUGAL

CT1BWY	**A**	**650,818**	**1170**	**66**	**163**
CT4KQ	"	537,042	969	59	178
CT1BKW	"	208,430	640	43	147
CT1AHU	"	146,288	445	42	116
CT4MS	"	88,902	358	30	69
CT1AV	**28**	**44,000**	**1547**	**29**	**96**
CT4UE	"	337,250	1541	26	69
CS4UA	**14**	**467,550**	**1448**	**35**	**115**
CQ60F	"	276,274	1301	31	76
CT1AWD	"	26,746	191	22	64
CT1BKO	"	623	33	9	20
CT1AOZ	**7**	**177,016**	**767**	**25**	**84**
CS4NH	"	**133,713**	**637**	**21**	**62**
CT1FL	**3.8**	**47,850**	**420**	**15**	**60**

ROMANIA

YO6VZ	**A**	**532,798**	**998**	**74**	**192**
YO4BCG	"	**278,345**	**779**	**60**	**145**
YO6AFP	"	276,975	650	49	176
YO8BSE	"	177,080	727	50	140
YO2BEH	"	152,973	378	59	158
YO7ARZ	"	37,043	295	47	128
YO3BAP	"	30,780	217	29	79
YO4BXX	"	27,192	187	17	71
YO8BDA	"	26,299	186	25	94
YO9CBZ	"	5,300	75	20	33
YO8ATT	"	4,858	55	30	52
YO2CJX	"	572	28	6	16
YO6KEA	**28**	**164,120**	**614**	**28**	**82**
YO8CKR	"	52,984	424	20	54
YO4FM	"	19,745	225	14	41
YO9CZL	"	5,760	78	10	30
YO8ER	"	5,330	80	11	30
YO2CJ	"	1,886	38	8	15
YO9HT	**21**	**74,518**	**380**	**28**	**78**
YO6UO	"	16,014	179	13	38
YO2BON	"	14,250	155	15	42
YO8FR	**14**	**62,667**	**482**	**24**	**75**
YO5BRZ	"	60,775	547	18	67
YO2AOB	"	15,145	156	16	49
YO6AVB	"	5,720	110	8	36
YO9CUF	7	8,648	175	8	39
YO6LV	**3.8**	**9,776**	**171**	**8**	**44**
YO5BPE	"	5,180	137	5	32
YO6DBH	"	722	37	6	13
YO6BTY	"	392	29	4	10

SARDINIA

IS0LLJ	14	4,922	65	13	33

SCOTLAND

GM3BCL	**A**	**225,828**	**608**	**43**	**110**
GM4JFS	"	139,675	472	42	143
GM5EMM	"	114,342	458	40	137
GM3YOG/A	**28**	**19,026**	**150**	**16**	**47**
GM4KHE	**14**	**27,384**	**186**	**22**	**62**

SHETLAND ISLANDS

GM4GPN	**A**	**261,630**	**658**	**68**	**187**

SICILY

IT9KZW	**28**	**686,826**	**1750**	**32**	**126**
IT9GSF	**21**	**679,473**	**1900**	**34**	**119**
IT9TQH	**7**	**59,082**	**496**	**18**	**68**
IT9UJU	"	56,025	451	16	59

SPAIN

EA3CCN	**A**	**2,224,530**	**2498**	**94**	**284**
EA2QU	"	**1,550,601**	**1637**	**98**	**279**
EA1AGO	"	1,086,426	1499	194	85
EA3CUQ	"	767,130	1208	75	206
EA3NA	"	132,758	833	86	243
EA1OD	"	111,569	254	63	124
EA1NZ	"	71,604	250	46	116
EA2CR	"	21,318	129	31	72
EA7BYM	"	20,976	120	26	50
EA3ABJ	"	13,102	141	26	47
EA5BVG	"	11,944	98	19	35
EA5ANR	"	8,800	62	27	53
EA1BPS	"	7,452	80	17	37
EA1BIM	"	5,959	41	24	25
EA3AIN	**28**	**669,382**	**2016**	**33**	**104**
EA5CXS	"	229,475	610	40	97
EA3DMP	"	96,841	401	25	88
EA3DPH	"	28,743	210	21	46
EA3DFA	**21**	**164,331**	**783**	**25**	**68**
EC4AVC	"	139,780	768	30	86
EA1BCK	"	16,878	230	15	43
EC3AEA	"	315	18	3	12
EA20J	"	231	7	5	6
EA4ZO	**14**	**48,411**	**163**	**11**	**27**
EA5CDE	"	10,962	110	13	41
EA3DNC	"	1,798	52	6	23
ED1TA	**7**	**11,505**	**119**	**13**	**52**
EA7LM	"	6,550	90	8	17
EC4API	**3.8**	**26,596**	**226**	**12**	**49**
EA2IA	"	2,625	56	5	20
EA3VY	**1.8**	**10,868**	**161**	**9**	**35**

SVALBARD ISLAND

JW1UW	**A**	**4,752**	**46**	**20**	**24**
JW5VAA	"	390	12	8	7
JW6MY	"	154	14	4	7

SWEDEN

SM3BIZ	**A**	**721,517**	**995**	**84**	**253**
SM5AD	"	**648,848**	**779**	**102**	**277**
SM5DSF	"	291,500	642	62	203
SM6BGG	"	161,798	475	60	132
SM0KNV	"	157,920	404	54	170
SM2LWU	"	146,142	459	52	155
SM0DJZ	"	126,404	241	70	237
SM7KIL	"	95,816	317	39	79
SM5ARG	"	66,780	245	37	122
SK7NC/7	"	52,662	247	43	91
			(Opr. SM7ERT)		
SM6ID	"	46,282	258	36	110
SM5ALD	"	41,250	162	41	84
SP5CIC /SM0	"	36,480	184	37	90
SM0CGO	"	20,140	162	26	80
SM4CMG	"	16,650	90	25	49
SM5CSS	"	10,010	65	29	62
SM5AAY	"	5,244	66	21	36
SK0EJ	"	3,726	48	21	33
			(Opr. SM0MLL)		
SM6INC	**28**	**99,238**	**409**	**28**	**90**
SM2KWQ	"	**81,180**	**501**	**24**	**66**
SM0DRB	"	66,924	318	29	88
SM5HPB	"	61,110	203	28	98
SM0BDS	"	57,772	260	27	74
SM6KQK	"	43,610	234	24	74
SM6MYF	"	30,567	217	18	51
SM6FAX	"	29,876	210	25	52
SM6LIF	"	21,734	110	22	70
SM6CNX	"	18,122	93	21	61
SM5DYC	"	14,673	130	20	47
SM2NTU	"	11,024	141	11	41
SM0FM	"	10,088	78	19	33
SM0MLL	"	1,281	49	6	15
SM2EKM	**21**	**530,388**	**1450**	**38**	**124**
SM0FO	"	274,944	888	34	94
SM5GMG	"	148,840	491	32	90
			(Opr. KE1J)		
SM5EQW	"	110,090	500	27	82
SM6JHO	"	32,077	183	22	59
SM7TV	"	12,613	131	17	46
SM2BUW	"	7,803	110	11	40
SM0COP	"	333	37	2	1
SM0AJU	**14**	**465,960**	**1368**	**37**	**138**
SM2CEW	"	248,810	813	37	102
SM6JY	"	16,678	180	13	49
SM5GA	"	7,410	131	15	39
SM5CBM	"	2,160	32	11	25
SM5GNU	**7**	**100,626**	**608**	**22**	**71**
G4JVG /SM0	"	10,207	146	"	48
SM5CAK	**3.8**	**13,776**	**250**	**10**	**38**

SWITZERLAND

HB9AAA	**A**	**814,345**	**904**	**88**	**283**
HB9AUS	"	608,882	827	83	251
HB9ZY	**28**	**112,426**	**312**	**31**	**103**
HB9DX	**21**	**26,596**	**99**	**28**	**94**

U.S.S.R. EUROPEAN BYELO-RUSSIA

UC2OAJ	**A**	**137,632**	**465**	**53**	**131**
UC2WBL	"	32,625	167	40	87
UC2ACI	28	33,726	228	20	57
UC2AAF	"	24,674	192	21	52
UC2WAZ	14	16,965	154	16	49
UC2BA	7	2,660	50	7	28

ESTONIA

UR2RHF	**A**	**271,216**	**581**	**66**	**187**
UR2RMI	**28**	**121,452**	**509**	**26**	**90**
UR2RII	"	32,470	174	25	60
UR2RGJ	"	19,558	115	22	55
UR2RMZ	"	18,975	164	16	53
UR2RC	"	13,515	76	23	62
UR2RNO	"	13,134	142	19	43
UR2RLS	"	5,632	78	9	23
UR2LZ	"	3,731	34	15	26
UR2RBN	"	3,465	30	19	26
UR2RFL	"	1,800	33	9	16
UR2RIY	**14**	**126,408**	**928**	**22**	**70**
UR2FQ	"	88,368	429	33	79
UR2FU	"	53,613	263	32	79
UR2MG	**7**	**49,200**	**460**	**16**	**59**
UR2RKB	**3.8**	**17,664**	**338**	**7**	**39**
UR2RHK	"	15,974	307	7	42

EUROPEAN S.S.R.

UV3GZ	**A**	**1,813,322**	**2100**	**104**	**297**
UA6ALL	"	**1,094,052**	**1524**	**102**	**270**
UA3QDW	"	**541,620**	**1093**	**81**	**214**
UA3RKK	"	371,579	803	75	208
UA4NAA	"	345,239	647	77	236
UA3DRB	"	340,744	466	98	284
UA3ABI	"	333,735	736	75	210
UW6LC	"	218,757	655	63	168
UA3TN	"	194,768	424	79	180
UA1CAX	"	192,416	561	57	167
UW1BM	"	120,241	457	48	139
UA3DQZ	"	84,392	304	41	113
UA3GEA	"	38,500	292	19	91
UW4NB	"	21,131	83	40	73
UV3FL	"	19,040	115	36	76
UA6APP	"	15,222	103	25	61
UA1ZWW	"	9,522	92	21	48
UA3QQQ	"	9,024	100	15	33
UA1AET	"	8,599	108	14	38
UA3AGF	"	6,441	81	18	39
UA4CCF	"	5,238	39	23	31
UW4NN	"	3,417	43	17	34
UA6ARA	**28**	**418,002**	**1381**	**33**	**105**
UW3UG	"	**256,878**	**903**	**32**	**102**
UA4WWA	"	221,169	945	28	79
RA3TET	"	131,535	501	19	57
UA3RBS	"	97,869	475	26	75
UA6ARE	"	97,448	526	24	80
UA3TEP	"	75,207	228	30	99
UA4CDL	"	61,470	390	20	70
UA4NCI	"	60,165	404	35	70
UA6LHU	"	52,651	385	22	59
RA3DRT	"	50,358	413	19	58
UA3AEX	"	45,227	210	23	68
RA3AGN	"	30,290	256	17	48
RA3DKE	"	26,634	154	20	49
UA3TAG	"	24,217	213	19	32
UA6ARP	"	21,945	188	27	50
UA3MDV	"	20,079	157	17	52
UA3XAC	"	16,422	186	13	38
UA3AMV	"	10,944	86	16	41
RA3SCE	"	8,736	130	10	32
UA6PCE	"	7,248	69	15	33
UA3DNV	"	5,358	97	11	27
UA6AJG	"	820	20	8	12
UA6ARX	"	64	4	4	4
UA6LAX	**21**	**144,210**	**622**	**30**	**84**
UA6ALT	"	**127,568**	**600**	**29**	**90**
UA4CZ	"	65,484	377	24	78
UA1CAI	"	55,272	488	20	64
UA4AHT	"	10,846	141	18	40
UA4ACP	"	8,385	156	10	29
UA3DKT	**14**	**152,273**	**741**	**30**	**79**
UA4ACD	"	93,500	498	29	81
UA1ZCZ	"	77,376	438	26	70
UA4WBJ	"	5,734	74	13	34
UA6AZA	**7**	**17,287**	**212**	**11**	**48**
UA3TDX	"	4,850	71	13	37
UV3FD	"	3,708	67	9	27
UA3EAL	**3.8**	**33,768**	**390**	**15**	**52**
UA4UBC	"	19,120	268	12	48
UA3VAQ	"	8,159	151	7	34
UA3XBB	"	2,574	73	7	26
UA3DFK	"	1,652	52	11	20
UA4UBO	**1.8**	**1,120**	**60**	**20**	**56**

KALININGRADSK

UA2EC	**A**	**248,704**	**566**	**64**	**204**
UA2FFC	28	12,540	137	13	42
UA2FCW	"	1,176	53	5	16

LATVIA

UQ2GCN	**A**	**1,645,893**	**2157**	**113**	**310**
UQ2GLW	"	47,200	229	28	90
UQ2DZ	**21**	**135,939**	**550**	**29**	**84**
UQ2GDQ	**14**	**433,552**	**1429**	**38**	**120**
RQ2GFN	1.8	193	13	3	8

LITHUANIA

UP2BBX	**A**	**1,184,910**	**1865**	**76**	**235**
UP2BAR	"	**845,928**	**1125**	**86**	**293**
UP2DM	"	409,460	794	66	170
UP2PAW	"	294,745	770	65	188
UP2BBF	"	253,101	761	62	177
UP2BAS	"	219,936	698	54	183
UP2NO	"	74,939	345	34	103
UP2PCB	"	71,145	326	39	96
UP2PBM	"	66,792	395	29	103
UP2BDO	"	44,544	219	36	92
UP2OQ	"	41,308	197	24	68
UP2PAE	"	38,704	219	33	85
UP2NA	"	38,556	181	38	81
UP2BCL	"	26,136	309	18	48
UP2PCK	"	24,089	181	25	84
UP2BBD	"	13,826	171	21	41
UP2BHI	"	2,730	52	10	32
UP2BIS	**28**	**29,043**	**228**	**15**	**48**
UP2ND	"	8,370	99	15	39
UP2BLE	"	5,103	180	6	21
UP2AV	21	23,520	213	19	51
UP2BEX	**3.8**	**30,132**	**500**	**11**	**43**
UP2BDX	"	7,448	171	7	31
UP2BKF	**1.8**	**12,516**	**421**	**5**	**23**
UP2BCG	"	4,970	132	6	29

MOLDAVIA

UO5OWN	**A**	**152,675**	**542**	**62**	**135**
UO5OIO	28	15,606	292	9	42
UO5OIE	"	9,812	223	11	33
UO5OCL	14	21,271	124	24	65
UO5OHD	**7**	**32,913**	**412**	**14**	**55**
UO5SA	"	7,800	101	9	41
UO5GR	**3.8**	**10,715**	**165**	**9**	**38**

UKRAINE

UB5MBP	**A**	**2,006,040**	**2173**	**114**	**324**
UB5ILD	"	**1,018,412**	**1402**	**108**	**315**
UB5EDU	"	**778,824**	**1307**	**88**	**260**
UB5VAZ	"	616,641	1107	80	241
UB5MFY	"	384,411	860	72	219
UB5KAN	"	381,824	670	79	225
UB5UKO	"	277,668	451	89	235
UT5RY	"	179,928	420	58	146
UB5MSQ	"	179,422	712	42	111
UY5TE	"	157,872	570	45	163
UB5JBW	"	99,165	393	43	118
UB5MFR	"	98,592	426	39	119
UY5OO	"	79,599	471	57	112
UB5MIZ	"	78,408	474	27	94
UB5WJ	"	53,100	173	49	128
UB5ICS	"	44,144	240	36	88
UB5QFE	"	29,197	184	26	71
UB5IIQ	"	24,552	232	26	80
UB5IPJ	"	7,722	89	15	51
UB5LU	"	363	11	6	9
UB5VCD	**28**	**170,434**	**571**	**32**	**90**
UB5EJA	"	77,804	417	30	76
RB5MHY	"	74,256	409	22	80
UB5IET	"	39,770	274	22	60
UB5ELE	"	34,075	293	15	32
RB5GCE	"	31,244	218	19	53
UB5ZAB	"	25,920	165	20	44
RB5MCW	"	25,160	352	16	44
UB5FDT	"	17,632	178	16	42
UB5UBI	"	3,552	56	11	26
UB5HY	**21**	**67,140**	**320**	**27**	**63**
UB5MLP	"	30,810	252	20	58
UB5UKW	**14**	**160,776**	**770**	**29**	**103**
UB5MGV	"	56,320	391	25	63
UB5MDD	"	14,238	185	14	44
UB5WAF	"	9,780	117	14	46
UB5CE	**7**	**20,060**	**232**	**11**	**48**
UY5XE	**3.8**	**27,192**	**348**	**12**	**54**
UB5VBY	"	15,232	220	11	45
UB5EKG	"	4,608	110	6	26
UB5EEP	"	4,495	118	7	24
UB5VFG	"	3,432	84	6	27
UB5FDF	**1.8**	**6,510**	**133**	**8**	**34**

WALES

GW3MPB	**A**	**33,835**	**335**	**26**	**75**

YUGOSLAVIA

YU3EY	**A**	**4,913,574**	**3170**	**136**	**455**
YU2OB	"	**1,464,795**	**1578**	**98**	**289**
YU7AF	"	230,096	568	53	144
YU3DEM	"	211,928	570	56	180
YU3HAM	"	173,840	472	51	161
YU1NZW	"	148,416	367	53	139
4N6HN	"	130,020	450	37	89
					(Opr. YU6ZAN)
YU2OM	"	100,562	276	49	105
YU1AHX	"	65,315	284	36	111
YU7SF	"	32,452	196	31	102
YU1PJQ	"	29,988	138	41	85
YU2QU	"	26,860	161	24	61
YU7NZ	"	20,301	81	41	60
YU3TE	"	17,706	75	18	60
YU7BB	**28**	**745,368**	**1865**	**35**	**121**
YU3DRW	"	529,546	1343	33	116
YU1NR	"	477,600	1150	33	117
YU3VM	"	391,105	1175	27	116
YU3URV	"	310,849	1088	30	91
YU5RK	"	8,634	103	14	38
YU7AV	**21**	**797,742**	**2015**	**36**	**122**
YU9W	"	**663,660**	**1986**	**32**	**103**
YU3SO	"	600,102	1620	36	124
YU1DW	"	586,880	1865	34	106
YU7BJ	"	416,845	1237	35	108
YU3TWT	**14**	**753,118**	**1874**	**40**	**145**
YT3L	"	**722,360**	**1846**	**40**	**154**
					(Opr. YU3EA)
YU3DGG	"	366,750	1016	38	125
YU4DIJ	"	17,745	151	15	50
YU7ORR	**7**	**130,039**	**641**	**20**	**71**
YT3A	**3.8**	**154,972**	**806**	**28**	**84**
					(Opr. YU3DM)
YU4BR	"	**130,305**	**770**	**26**	**81**
YU4EJC	"	66,750	605	15	60
YU2RVS	"	1,392	49	5	24
YU3EF	**1.8**	**27,956**	**383**	**12**	**46**

OCEANIA

AUSTRALIA

VK4VU	**A**	**3,462,200**	**3341**	**107**	**243**
VK2WU	"	893,456	1991	53	99
VK6AJW	"	566,352	716	86	190
VK3PU	"	153,612	351	59	94
VK1RJ	"	108,808	326	45	71
VK2AYK	"	108,237	343	41	68
VK1LF	"	11,475	77	23	28
VK5NHE	"	6,025	82	12	13
VK3VZY	"	3,140	55	9	11
VK7KDD/4	**28**	**86,850**	**583**	**19**	**31**
VK6NCW	"	22,230	132	14	43
VK8BE	"	8,534	85	12	22
VK3SM	14	36,000	178	24	56
VK6FS	"	17,928	86	24	48

FRENCH POLYNESIA

FO8JO	**A**	**3,174,717**	**3952**	**98**	**175**
					(Opr. W6GO)

GUAM

KG6FAE	**A**	**809,088**	**1449**	**81**	**111**
KB7IJ/KH2	**28**	**1,441,158**	**3440**	**37**	**105**
KG6DX	**21**	**1,455,214**	**3583**	**35**	**102**

HAWAII

AH6J	**A**	**551,088**	**1309**	**63**	**81**
KH6IJ	"	42,804	249	31	27
KH6JWK	"	37,536	141	41	51
KH6GMP	"	9,504	102	18	14
K6SVL /KH6	**28**	**415,363**	**1637**	**28**	**61**
AH6BK	**21**	**755,144**	**2511**	**29**	**77**
KH6XX	**3.8**	**161,622**	**773**	**27**	**46**

INDONESIA

YB4AEP	**A**	**104,040**	**209**	**60**	**110**
YB2CR	**28**	**424,119**	**1310**	**28**	**81**
YB8ACL	"	359,446	1161	29	77
YC2BSF	**21**	**426,466**	**1060**	**31**	**96**

KIRIBATI

T32AF	**14**	**643,560**	**1810**	**36**	**88**
					(Opr. KH6UR)

MARIANA ISLANDS

AH8B	**28**	**1,788,430**	**4173**	**36**	**109**
					(Opr. JA2VUP)
AH8AB	**21**	**1,923,840**	**4509**	**36**	**108**
					(Opr. JA3ODC)

NEW ZEALAND

ZL4AS	**28**	**130,680**	**620**	**23**	**49**
ZL2RY	"	105,920	560	24	40
ZL4BO	**7**	**186,684**	**680**	**25**	**69**

PHILIPPINES

DU1CPL	**28**	**602,516**	**1781**	**32**	**81**

SOUTH AMERICA

ANTARCTICA

VP8MI	A	29,328	215	21	26

ARGENTINA

LU1VK	**A**	**944,628**	**1452**	**77**	**146**
LU4M	**28**	**305,952**	**1080**	**28**	**68**
LU6ADS	"	159,268	950	22	36
LU1ABT	"	127,170	577	21	55
LU6MP	"	3,731	26	19	22
LU9MBY	**21**	**322,200**	**1394**	**30**	**60**

BRAZIL

PP2ZDD	**A**	**1,822,848**	**2035**	**97**	**206**
PY7DY	"	615,034	919	67	156
PY2BCQ	"	311,436	505	66	145
ZY1NEZ	"	259,920	583	46	106
PY2CAR	"	21,780	86	35	64
PY6AKE	"	7,320	40	39	22
PY3HMC	**28**	**352,447**	**1059**	**30**	**83**
ZY5CIG	"	264,794	1044	23	63
PY1ZFO	"	131,920	562	25	55
PY3BC	**21**	**231,616**	**830**	**27**	**65**
PY1BSD	"	181,958	765	27	55
ZY4KB	"	37,230	182	21	52
ZY5CA	"	26,486	237	16	22
PY2FT	"	11,577	157	19	32
PT7KW	**14**	**427,609**	**1447**	**34**	**93**
PP8ZAT	"	104,920	583	19	42
PY1BKA	"	18,290	110	20	42
ZY5EG	**7**	**232,603**	**808**	**30**	**71**
PY1TBR	"	6,296	55	16	31
PY1TIA	"	924	19	7	14

CHILE

EA4LH /CE3	**A**	**3,691,500**	**3614**	**107**	**238**
CE6EZ	**28**	**1,324,790**	**3245**	**32**	**105**
CE5CFR	"	25,358	277	13	18
CE5BSS	"	10,695	160	10	13
XQ6AM	"	1,815	41	7	8
CE3NR	**21**	**721,386**	**2001**	**32**	**90**
CE3BFZ	**14**	**296,415**	**1000**	**29**	**76**
CE6DBI	7	17,920	130	20	36
CE3DOF	"	10,240	110	15	17
CE7LL	"	54	5	3	3
CE6COR	**3.8**	**14,363**	**141**	**18**	**35**

COLUMBIA

HK5BCZ	**A**	**2,010,284**	**2357**	**83**	**206**
HK8BVN	**28**	**132,200**	**410**	**28**	**85**
HK4BKB	**21**	**178,250**	**532**	**31**	**84**

EASTER ISLAND

CE8AE	**28**	**423,516**	**1652**	**26**	**61**

EL SALVADOR

YS1X	**14**	**1,176,400**	**2843**	**38**	**136**

PERU

OA4PQ	**28**	**225,618**	**884**	**29**	**64**

REPUBLIC OF SURINAME

PZ1CC	**A**	**714,235**	**1159**	**62**	**149**

TRINIDAD

9Y4VT	**A**	**11,954,696**	**7082**	**146**	**422**
					(Opr. N6AA)

URUGUAY

CX4BW	**28**	**645,460**	**1843**	**32**	**86**
CX4CR	**21**	**1,602,120**	**3519**	**36**	**120**
CX7BY	**14**	**863,211**	**1852**	**38**	**121**

VENEZUELA

YV4BOU	**A**	**1,937,280**	**1750**	**93**	**291**
YV5GMN	"	23,976	125	22	50
YV2AMM	**28**	**1,839,004**	**3700**	**37**	**130**
4M3AGT	"	1,579,888	3616	36	116
YV5ANE	**14**	**869,632**	**1906**	**36**	**122**
YV2IF	"	662,832	1707	36	108
YV5DWB	"	11,880	220	20	34
YV3BRF	**7**	**428,193**	**1403**	**31**	**96**
4M3AZC	**3.8**	**203,280**	**780**	**21**	**67**

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1CC	**3,244,602**	**1798**	**144**	**487**
K1NG	2,365,792	1476	138	434
KA1GG	1,570,167	1216	117	347
KG1D	1,425,892	1161	110	332
WB1ELC	1,044,030	914	104	286
KA1RE	237,132	339	69	152
K1WW	207,564	516	30	117
KR2N	**4,371,389**	**2312**	**159**	**518**
W2YV	**3,061,264**	**1679**	**156**	**497**
W2VJN	**2,983,672**	**1688**	**155**	**477**
K2FL	1,078,476	876	114	330
KQ2O	883,584	768	111	305
W2BHK	871,250	755	123	302
K2CC	792,246	836	101	255
K2TD	751,124	685	106	291
WA2DPU	637,738	593	110	272
W2UI	482,646	570	89	224
W2YC	465,432	525	99	229
K2ITG	464,594	538	101	233
W2HG	464,580	621	105	269
AE2E	154,448	326	63	134
KA2CDJ	65,411	178	52	97
KC2KK	7,897	57	17	36
K3TUP	**1,632,280**	**1138**	**138**	**382**
WB3DJF	**966,482**	**889**	**111**	**283**
N3ARK	718,185	681	100	281
K3HP	609,872	602	105	271
KI3I	488,133	591	89	214
KC3AJ	330,480	430	96	210
KA3GIK	221,280	330	81	159
W3AA	116,614	223	72	127
K3UEI	97,865	198	59	126
N3GB	52,745	155	52	85
W4QAW	**4,455,190**	**2158**	**167**	**551**
KX4S	**4,237,545**	**2120**	**164**	**537**
N4ZC	**3,148,890**	**1732**	**154**	**491**
N4KG	2,135,477	1377	140	437
NU4Y	1,917,804	1572	133	343
NQ4I	1,537,416	1197	129	360
WA4QQV	1,030,333	928	122	317
N4BS	882,441	752	125	316
WA4MOJ	455,010	545	84	206
WD4PAJ	98,864	242	55	112
K5QY	**1,825,276**	**1421**	**133**	**354**
WD5COV	242,528	421	66	146
N5DXQ	103,306	267	53	104
W6BH	**1,266,104**	**1396**	**101**	**221**
N6OJ	**1,074,502**	**1124**	**103**	**235**
K6SG	717,111	816	110	217
W6UA	414,540	459	98	231
W6BIP	396,517	485	100	219
AJ6V	347,635	476	99	178
KE6PQ	178,843	328	71	132
N6CCL	176,396	303	71	138
WB6GFJ	174,549	267	90	159
W6OAT	91,908	170	75	132
N6ESV	77,945	240	51	68
N6QC	72,930	201	50	80
KQ6U	35,952	128	47	60
W7RX	**1,234,059**	**1167**	**122**	**259**
N7RO	**1,181,928**	**1051**	**126**	**281**
KC7EY	508,776	773	82	150
K7GEX	356,730	515	86	167
KA7MDM	191,862	366	81	128
W8UA	**2,900,490**	**1588**	**159**	**495**
AD8I	2,716,096	1713	145	447
KS8S	1,971,585	1274	148	421
AI8S	1,504,496	1105	140	392
K8EPV	1,020,501	847	132	315
WA8MTX	414,104	524	90	206
N8CSL	326,045	463	91	214
W8UM	115,244	242	60	128
KF8X	64,246	271	61	121
KA8BLF	15,718	96	23	36
W9DUB	**2,096,250**	**1244**	**164**	**461**
K9CJK	1,721,566	1161	135	404
N9GB	778,464	696	124	300
N9AKE	746,376	678	116	295
K9BIL	583,632	650	99	237
KK9G	430,280	536	95	215
K9EC	310,954	462	83	183
AB0I	**2,964,632**	**2,059**	**149**	**422**
K0UK	**2,481,745**	**1830**	**143**	**342**
N0XA	1,647,950	1197	156	419
K0JSY	1,293,520	1012	123	337
K0FU	482,220	539	113	229
AK0M	404,424	468	105	223
WD0CHW	401,534	462	97	204
WB0UFL	349,225	449	96	209
KM0P	346,620	492	77	188
KQ8M/0	342,200	440	86	209
KC0XK	164,688	291	71	148
WB0VFN	53,312	160	40	79
K0PKK	36,036	126	52	74
N0EEN	17,100	137	41	54
KB0FP	1,254	21	11	11

ALASKA

KL7Y	**1,929,312**	**2643**	**104**	**204**

ANGUILLA

VP2EC	**11,754,309**	**8296**	**141**	**468**

BELIZE

V3DX	**4,266,864**	**3864**	**126**	**333**

BERMUDA

VP9IB	**3,018,216**	**3393**	**107**	**295**

BRITISH VIRGIN ISLANDS

VP2VDH	**8,138,728**	**6343**	**135**	**421**

CANADA

VE1DXA	**6,347,732**	**4920**	**134**	**420**
VE3PCA	**4,139,190**	**3158**	**139**	**416**
VE3CYX	3,256,120	2185	150	430
VE5GF	**1,268,730**	**1808**	**106**	**227**
VO2WL	**447,372**	**1181**	**54**	**118**
VE6AO	**93,012**	**267**	**56**	**82**

CAYMAN ISLANDS

ZF2GI	**3,057,186**	**3912**	**101**	**262**

HAITI

HH2CQ	**8,582,497**	**7164**	**134**	**407**

MARTINIQUE

FM7CD	**14,481,363**	**8235**	**165**	**576**

MEXICO

6E5MX	**3,613,760**	**4866**	**112**	**208**
6E5EBE	1,531,557	4557	71	96
XE2CNL	1,784,205	2959	101	178
6D5VIC	86,352	376	44	68

PUERTO RICO

NP4A	**14,953,818**	**8772**	**174**	**585**

TURKS & CAICOS ISLANDS

VP5B	**10,470,180**	**6367**	**158**	**521**

AFRICA

CEUTA & MELILLA

ED9CM	**9,562,650**	**5064**	**140**	**492**

DJIBOUTI

J28DU	**1,807,596**	**1826**	**80**	**247**

KENYA

5Y4ITU	**1,819,185**	**1809**	**98**	**248**

MOROCCO

CN8CX	**9,958,425**	**5816**	**126**	**449**

SOUTH AFRICA

ZS6BPL	**4,075,968**	**3306**	**126**	**290**
ZS6PT	2,426,635	2603	96	221
ZS6TJ	788,670	1178	76	154

ASIA

JAPAN

JH7YJF	**3,451,010**	**2727**	**132**	**301**
JA9YBA	**3,447,808**	**2486**	**143**	**338**
JG1ZUY	**3,034,148**	**2201**	**141**	**340**
JA1YAD	1,398,808	1100	126	246
JA6YCU	**1,108,640**	**1182**	**107**	**231**
JH3YJM	**976,854**	**1130**	**98**	**216**
JA7YAF	503,006	688	106	160
JA4YFH	**487,560**	**818**	**70**	**134**
JA7YAB	430,094	704	88	129
JA7YFB	406,245	667	85	134
JA6YBR	371,996	598	89	137
JA8YCX	114,816	265	64	92
JA7YCQ	96,984	311	40	68
JR1YPU	92,304	233	53	91

U.S.S.R. ASIA

ARMENIA

RG6G	**12,276,352**	**6012**	**156**	**558**

ASIATIC S.S.R.

UK9ADT	**1,758,710**	**1575**	**105**	**292**
UK9CAA	**1,545,480**	**1847**	**78**	**240**
UK9UAO	1,458,468	1601	113	268
UK9QAA	1,249,824	1967	91	191
UK9FER	1,145,375	1349	80	195
UK9HAD	981,791	1753	67	170
UK9YAZ	979,105	1466	86	209
UK9UAA	846,560	1291	87	199
UK0AAB	**719,044**	**1254**	**83**	**185**
UK0AMM	432,235	991	109	230
UK9CAE	416,304	933	76	120
UK9ADS	277,732	604	69	127
UK9FFF	222,573	559	59	110
UK0SAV	202,040	542	43	117
UK0XBH	76,048	294	21	76
UK9UCZ	73,060	339	47	83
UK9SBI	71,120	229	36	91

GEORGIA

UK6QAA	17,864	116	15	43

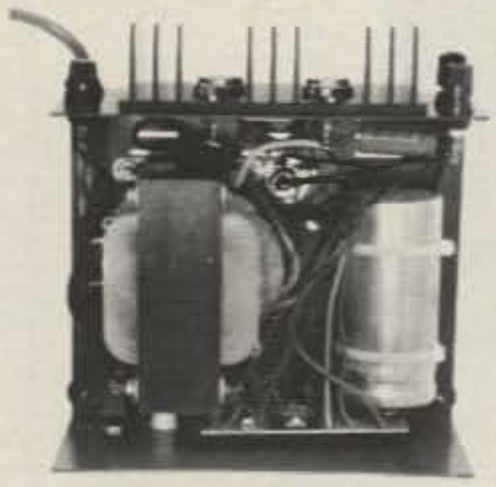
KAZAKH

UK7PAL	**3,353,400**	**2868**	**122**	**364**
UK7LAA	**1,508,087**	**1970**	**87**	**236**
UK7FAP	627,481	1182	71	148
UK7RAB	28,626	155	20	58
UK7NAQ	21,225	491	20	55

ASTRON CORPORATION
2852 Walnut Ave., Unit E
Tustin, CA 92680
(714) 832-7770

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



INSIDE VIEW – RS-12A

RS and VS SERIES

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-4A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W X D	Shipping Wt (lbs)
RS-4A	3	4	3¾ x 6½ x 9	5
RS-7A	5	7	3¾ x 6½ x 9	9
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

RS-M SERIES

MODEL RS-35M

- Switchable volt and Amp meter

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12M	9	12	4½ x 8 x 9	13
RS-20M	16	20	5 x 9 x 10½	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13¾ x 11	46

VS-M SERIES

MODEL VS-20M

- Separate Volt and Amp Meters
- Output Voltage adjustable from 2-15 volts
- Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt (lbs)
VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Continous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12S	9	12	4½ x 8 x 9	13
RS-20S	16	20	5 x 9 x 10½	18

MODEL RS-7B

- Matches EF Johnson PPL Radios Available as models.

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-7B	5	7	4 x 7½ x 10¾	9
RS-10A	7.5	10	4 x 7½ x 10¾	11

*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

CIRCLE 80 ON READER SERVICE CARD

The IY4FGM team.

KIRGHIZ

UK8MAF	**964,488**	**1185**	**109**	**199**

EUROPE

AUSTRIA

4U1VIC	60,571	386	34	85

BALERIC ISL.

ED6MDX	**1,965,504**	**2252**	**89**	**264**

BELGIUM

ON4AWC	**1,522,269**	**2117**	**95**	**236**

BULGARIA

LZ1KOZ	**283,392**	**395**	**42**	**102**
LZ2KSB	4,992	100	9	30

CZECHOSLOVAKIA

OK1KRG	**3,455,663**	**2647**	**130**	**459**
OK1KSO	**3,421,043**	**2676**	**121**	**408**
OK1KPX	1,314,984	1414	107	301
OK2KGU	94,600	563	30	120
OK2KYC	81,354	385	27	122
OK1OFA	50,457	260	29	80
OK1ORA	44,908	326	27	82
OK1KMP	21,939	186	26	77
OK1KTW	7,788	76	22	40

DENMARK

OZ2PG/A	85,560	566	20	73

ENGLAND

G8JC	**1,273,608**	**1561**	**88**	**273**
G5YC	**572,908**	**1139**	**77**	**239**

FINLAND

OH5BM	**2,651,062**	**2271**	**127**	**375**
OH1AF	1,633,973	1737	109	342
OH7AB	1,388,769	1853	96	315
OH6AC	1,181,930	1388	90	272
OH4MI	855,627	1411	80	243
OH9AB	128,520	389	52	158
OH3AC	14,544	177	18	54

FRANCE

F3TV	**5,196,800**	**3454**	**142**	**498**
F6CTT	**4,796,880**	**3703**	**121**	**407**
F6KAW	2,848,933	2707	113	330
F6GDK/p	302,798	1499	57	145

GERMANY (FRG)

DF3GY	**2,426,592**	**2200**	**121**	**350**
DKØDX	**1,882,177**	**2108**	**99**	**298**
DKØMM	1,563,910	1706	108	322
DLØUE	1,553,495	1645	113	332
DKØKX	1,396,329	1562	93	300
DL8DC	1,258,960	1152	112	348
DLØTR	1,153,080	1455	92	268
DFØSI	884,660	1353	89	267
DLØKQ	876,148	1294	100	306
DLØER	107,870	399	53	108
DKØDL	85,680	339	51	102

GERMANY (GDR)

Y21YK	**5,369,625**	**3923**	**129**	**426**

HUNGARY

HG5A	**4,835,600**	**3796**	**126**	**424**
HG6V	**3,156,447**	**2892**	**122**	**375**
HA5KKC	**2,473,184**	**2576**	**116**	**311**
HA6KNB	2,444,304	2749	97	299
HA1KZH	931,772	1510	82	210
HA7KSR	913,031	1400	94	277
HA3KMK	783,116	1300	79	235
HA3KNA	577,975	1087	74	231
HA8KUC	140,988	572	43	143
HA2KRP	134,140	511	49	141
HA2KMR	101,384	447	41	111
HA5KFZ	92,920	354	50	134
HA8KUC	34,030	572	43	143
HA7KRK	22,032	117	32	76
HA5KHS	1,716	39	11	22

ISLE OF MAN

GD5CGV	**1,743,300**	**2464**	**101**	**349**

ITALY

I5MPK	**7,954,400**	**4841**	**135**	**475**
I03MAU	**6,772,051**	**4048**	**144**	**523**
I04YSS	5,356,946	4506	121	357
I050YY	2,940,861	2741	100	339
I1GJC	1,756,414	2197	85	234
IØSNY	579,930	1326	61	134

ITU GENEVA

4U1ITU	**3,830,592**	**3332**	**125**	**437**

JERSEY

GJ5EOV	**157,603**	**911**	**51**	**122**

LIECHTENSTEIN

HBØBHA	**3,719,328**	**3528**	**123**	**393**

NORTHERN IRELAND

GI4MWA	25,012	178	22	52

NORWAY

LA5C	**1,782,555**	**1882**	**114**	**339**
LG5LG	631,022	1273	77	252
LA1K	370,206	863	62	200

SARDINIA

IS0YUJ	**713,432**	**1020**	**82**	**265**

SCOTLAND

GB2AL	**3,731,568**	**3118**	**124**	**414**

SPAIN

EA7TH	**5,553,546**	**3806**	**121**	**450**
ED3CB	669,780	1055	78	227
EA2RCI	30,644	291	19	53

SWEDEN

SM5AOE	**1,297,076**	**1434**	**111**	**340**
SM6KRE	181,890	542	67	148
SM5AZU	122,056	310	51	158
SK6JX	3,330	62	13	32

SWITZERLAND

HB9CAT	**1,127,016**	**885**	**100**	**296**

THE NETHERLANDS

PI1GOE	**207,466**	**615**	**53**	**150**

U.S.S.R. EUROPEAN

BYELO-RUSSIA

UK2AAW	**699,700**	**1257**	**85**	**278**
UK2AAB	16,450	272	9	41
UK2LAN	14,250	98	23	52
UK2ABC	2,244	66	10	24

ESTONIA

UK2RDX	**4,766,528**	**3365**	**155**	**519**
UK2RAW	198,440	564	51	191

EUROPEAN S.S.R.

UK6LAZ	**3,969,133**	**2930**	**147**	**476**
UK6LAA	**3,071,110**	**2837**	**126**	**385**
UK6XAA	**1,563,618**	**2096**	**102**	**337**
UK4CCC	1,389,782	1720	98	311
UK4WAB	1,176,814	1493	98	316
UK6LEZ	1,048,240	1222	90	270
RK3ABO	987,138	1411	87	259
UK6LBM	933,032	1551	100	264
UK6HCZ	774,877	1229	80	243
UK4WAA	726,362	1306	81	257
UK4ACE	697,552	636	101	275
UK3ABT	645,904	1276	80	236
UK4HAW	525,370	897	75	207
UK1AAW	490,200	1250	85	200
UK3DBV	438,768	1059	69	208
UK3WAF	394,415	906	77	218
UK4CBL	327,107	777	70	199
UK4LAA	181,653	741	70	181
UK4SAM	140,113	609	44	123
UK3XAB	37,800	198	28	62
UK3MAA	10,080	124	21	49
UK3DBW	9,075	106	15	40
UK3TBF	3,081	71	10	29

KALININGRADSK

UK2FAA	**1,770,444**	**1748**	**115**	**353**
UK2FAD	38,121	243	30	67

KARELO-FINNISH

UK1NAD	**444,066**	**1130**	**67**	**224**

LATVIA

UK2GKO	**1,488,800**	**1965**	**95**	**305**
UK2GAB	**1,287,616**	**1474**	**119**	**377**
UK2GAZ	185,895	463	95	148
UK2GJW	19,000	219	18	58

LITHUANIA

UK2BBB	**3,266,312**	**2657**	**135**	**449**
UK2PAD	**3,086,772**	**2599**	**133**	**431**
UK2PAP	1,876,074	1864	122	380
UK2BAG	565,056	1070	84	243
UK2PRC	413,364	943	70	224
UK2BCC	279,565	736	56	197
UK2BBX	60,888	370	29	100
UK2BBF	20,900	153	29	66

UKRAINE

UK5IBB	**5,099,934**	**3757**	**149**	**502**
UK5MAF	**3,593,876**	**2928**	**134**	**438**
UK5MCO	**2,717,000**	**2536**	**140**	**410**
UK5MAA	**2,041,538**	**2347**	**113**	**365**
UK5GKW	1,352,078	1850	106	336
UK5QBE	1,281,397	1739	101	308
UK5MCP	963,300	1435	85	240
UK5WBG	788,671	1029	97	306
UK5ECV	560,787	1088	80	241
UK5MEG	502,964	1073	81	241
UK5UDX	266,850	542	67	158
UK5EAA	216,978	718	48	126
UK5MCK	176,778	854	53	154
UK5MBQ	141,414	896	49	98
UK5MDI	121,023	791	45	108
UK5HAB	90,294	328	30	119
UK5VAT	61,920	296	34	86
UK5LBJ	54,080	188	55	114
UK5EAE	36,951	199	34	79
UK5EFW	34,126	201	31	82
UK5LAX	32,304	321	26	84
UK5LAS	29,058	263	25	62
UK5ICX	17,784	156	26	50
UK5CAO	12,462	201	15	47

WALES

GW4BRS	**922,199**	**1495**	**79**	**210**

YUGOSLAVIA

YZ4M	**5,436,501**	**3472**	**149**	**502**
YU7EU	1,487,898	2004	100	293
YZ7Q	699,062	1246	67	232
YU6GAH	562,120	757	89	287

OCEANIA

NEW ZEALAND

ZL2AH	**1,080,684**	**1826**	**73**	**125**

PHILIPPINES

4D1AU	**459,796**	**2720**	**39**	**104**

SOLOMON ISLANDS

H44R	**5,988,210**	**4896**	**141**	**294**

WESTERN SOMOA

5W5DM	**2,284,632**	**3088**	**100**	**152**

SOUTH AMERICA

ARGENTINA

LU4F	8,507,235	5517	145	372
LU4DQ	2,836,666	2605	112	259

CHILE

CE5CJA	2,064,170	2344	91	210
CE2AA	2,047,680	1208	89	199
CE3PA	1,172,360	1863	68	136

PERU

4T4O	13,494,118	7869	152	431

TRINIDAD & TOBAGO

9Y4W	16,775,034	8,097	158	540

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

N2AA	10,003,266	4371	175	631
W3LPL	8,806,995	3854	173	628
K1OX	8,393,616	3912	163	594
W7RM	7,518,720	4420	172	468
N5AU	7,424,865	3773	172	557
K9GL	6,191,968	2963	173	579
N5RO	5,713,852	3607	162	434
N4RJ	4,370,076	2436	166	518
K4VX/8	3,987,462	2292	166	476
W3GM	3,776,299	2068	152	501
K2UA	3,512,054	2130	141	457
AI6V	3,478,548	2730	138	316
W1YN	3,462,000	2101	141	459
K6RU	3,419,323	2372	140	381
KB6I	3,176,855	2591	131	314
N2RM	3,090,550	1937	127	438
N6RZ	1,948,536	1805	116	272
K4VHC	1,679,115	1319	123	348
K3ON	1,630,496	1210	122	380
N6VV	1,605,955	1396	115	288
W4XJ	1,553,112	1195	126	351
K3II	1,460,830	1048	134	375
K3ZUF	1,453,200	1012	133	386
K6ZM	1,326,200	1260	118	262
W8NGO	1,107,004	924	124	312
K1SA	1,060,064	918	110	312
N7BIT/2	936,169	824	105	298
AD3V	723,240	648	122	298
WB6KBZ	702,506	946	95	183
K1XM	488,305	579	88	217
N3AW	367,500	550	85	209
W3YFV	257,370	415	71	159
N9BZR	232,200	390	71	145
KC8SD	215,528	335	72	160

ALASKA

KL7RA	3,004,600	4046	105	227
KL7CQ	428,778	1005	62	104

BERMUDA

VP9AD	15,929,459	10696	148	489

CANADA

VE7ZZZ	3,036,195	4202	110	217
W8OK/VE2	2,097,622	3369	93	205
VE3UM	345,060	520	79	164

PUERTO RICO

KP4BO	1,225,200	2839	62	138

ASIA

GEORGIA S.S.R.

EW6V	19,181,932	10100	142	544

JAPAN

JA2YKA	5,953,860	3591	157	425
JA3YKC	3,748,110	2616	147	358
JA7JRR	2,592,760	2157	128	296
JF1ZRQ	2,522,550	2182	127	275
JA1YXP	1,574,856	1722	112	205
JA1YNE	1,456,070	1503	114	227
JH1YDT	1,383,084	1590	97	212
JA1YDU	692,624	852	102	190
JA4YEB	408,576	579	85	171
JA2YDC	197,758	409	66	112

SAUDI ARABIA

HZ1AB	7,691,938	5138	133	408

EUROPE

AALAND ISLANDS

OH0W	19,030,501	10,773	188	729

BELGIUM

ON7KL	2,180,850	2611	109	325

CZECHOSLOVAKIA

OK7AA	5,550,235	5087	136	465

ENGLAND

GB4ANT	9,184,188	6271	152	526

ITALY

IY4FGM	1,272,800	1552	95	305

SPAIN

EA1YV	1,207,800	1706	86	280

YUGOSLAVIA

YT4I	9,948,515	6819	147	530
YZ1E	9,805,090	6956	147	538

SOUTH AMERICA

BRAZIL

ZY3ZZ	741,612	1840	34	104

ECUADOR

HC8	14,994,328	8523	155	432

WORLD QRP

TG9GI	A	1,035,693	1747	75	192
DF4RD	"	431,547	643	83	256
UB5UCJ	"	387,416	581	86	230
K8IA	"	337,666	460	84	187
UP2BIM	"	315,563	659	71	210
OA8CW	"	288,674	611	61	105
W8UVZ	"	248,256	333	90	198
ON6NL	"	246,749	521	58	169
K4LTA	"	233,122	392	78	151
G3FTQ	"	122,570	508	38	132
K7BTB	"	114,504	268	55	101
W6VYK	"	66,700	241	38	62
KI9A	"	64,232	176	52	96
VK3RF	"	55,062	157	52	74
GM4ELV	"	49,389	281	26	75
KR7L	"	47,970	209	36	46
WB9HRO/6	"	37,293	143	39	54
KE6XC	"	36,846	151	41	48
N8CQA	"	36,663	120	40	81
UP2NV	"	34,500	166	32	93
LA9PCA	"	33,512	268	24	94
KA1CZF	"	30,640	141	24	56
JR2BNF	"	29,340	123	41	49
WB2BGA	"	28,033	100	30	67
W9PNE	"	27,615	115	41	64
UR2OI	"	27,306	208	21	61
I1PLX	"	27,018	142	31	81
N8AXA	"	21,386	104	23	51
EA2SN	"	20,400	115	32	68
PA3AQU	"	11,764	123	20	48
UR2HB	"	9,048	88	21	57
OE1SBA	"	8,901	57	28	41
AH6EK	"	7,350	74	19	16
N9ANK	"	5,136	41	21	27
DK8XW	"	2,106	30	16	23
KA5N	"	1,008	19	12	12
F8BLZ/FC	28	224,318	829	27	91
PY7ZZ	"	223,104	592	31	97
RA9AKM	"	150,672	425	30	99
JA1MCU	"	129,800	421	31	79
UB5DAG	"	104,780	353	29	101
UB5IMD	"	81,052	466	22	92
JA1EF	"	69,750	261	30	63
UB5IPN	"	51,876	238	29	70
KA3CRC	"	42,828	189	23	60
UB5AAU	"	40,812	292	20	56
JR6GIM/2	"	39,537	192	26	43
WD4AVY	"	35,148	150	27	60
KB7VD	"	32,896	183	21	43
JE2YPI	"	32,768	176	20	44
			(Opr. JF2GIZ)		
UA4ACA	"	26,523	278	14	49
EA6GP	"	24,984	221	20	52
N1BZG	"	21,312	122	17	47
WD8IDD	"	19,783	101	22	51
UK9UDP	"	14,560	144	9	31
WB8CTC	"	13,222	72	18	45
VE2AEJ/2	"	12,050	93	18	32
RA3DQP	"	10,304	84	17	39
DK4ID	"	9,504	76	18	36
OK3CMF	"	7,693	87	13	36
WD9AEU	"	7,384	58	17	35
UA0LCK	"	5,915	61	15	20
UR2TBG	"	5,250	76	12	30
VE5ACV	"	3,060	73	11	9
JA1HGY	21	80,224	310	30	62
W6CN	"	42,120	194	24	57
KK9Q	"	32,536	161	22	61
JA6VZB	"	31,740	159	24	45
JK1QLH	"	20,880	125	23	35
JM1GPV	"	15,925	118	19	30
K3ZR	"	6,235	51	10	33
KA6LKO	"	3,204	62	8	10
JK1PEC	"	2,403	36	12	15
VE8DX	14	13,431	148	14	23
OK2BMA	"	12,139	152	12	49
JA1TLK	"	9,328	64	24	29
WA0VBW	"	9,006	66	21	36
JH3LCU/1	"	7,987	68	23	26
KH6CP/3	"	6,342	63	13	29
OK1AYQ	"	3,800	80	7	31
YO6EZ	"	2,652	62	7	27
KA5NLY	"	1,274	26	9	17
JG1WRN	"	1,148	17	13	15
DF3IS	"	945	34	7	14
UA3PAZ	7	21,648	277	13	53
YO7DAA	"	3,600	99	7	29
VE3CKR	3.8	9,180	261	7	11
OK1AIJ	"	7,280	183	5	35
OK1DCP	"	1,211	57	3	20
OK1MNV	"	558	32	3	15
K7SS	"	48	9	3	3
UP2BKF	1.8	12,516	421	5	23
RA4HWD	"	3,030	95	7	23
RF6QAH	"	399	19	2	5
UA6HNJ	"	90	13	5	13

CHECK LOGS

We gratefully acknowledge the receipt of the following check logs:
CE3OE, CE8DQN, EA3BSE, EA4AZP, EA6DE, FE8957, FO8DF/FM7, G4PJO, HA4KYN, HA7PW, HA8DZ, HG0IG, HK3DFU, HK3NAW, I2JIN, IT9TQH, JW5NM, K5JW, K5LZO, K6FM, KA4RLP, KA5DWE, KA0NNF, KC4IH, KC5WB, KD6JY, KP4BJD, LA1H, LA2Y, LA3JT, LA4HW, LA7QI, LA7ZN, LA9BN, LA9LS, LA9OI, LU3AJW, LU6QI, LZ2CJ, LZ2DB, N4AXT, N4BVP, N4DRC, N4DW, N6FJS, N8AHA, OH1EB, OH2BMH, OH2BO, OH2QL, OH3RH, OH5OZ, OH6QU, OH6WC, OH7PT, OK1AD, OK1DMJ, OK1FDB, OK1KPA, OK1MJL, OK2BJY, OK2BNK, OK2SWD, OK3TFM, ON5FV, OY6FRA, OZ1ABA, OZ1ACB, OZ2RH, OZ2TH, OZ4ZT, OZ5BS, OZ8WD, PA2SWL, PA3ADI, PA3ASC, PA0LEG, PA0LRK, PA0RRS, PA0TV, PB/N7CVW, PI1IRC, PT1PT, PT7ZAD, PY1BPE, PY2SZK, PY3BAM, PY3EM, PY6ABW, RA3DDU, RA3DPD, RA9CEM, RA9FEC, RB5ADS, RB5GCJ, RB5QLS, RQ2GAE, RS45205, SM5FTH, SM5LL, SM5UF, SM6AVM, SM6JAO, SM7ASN, SM7NJJ, SM0LZT, SP5KCR, TF3YH, UA1AUA, UA1CAQ, UA1CJL, UA1ZAO, UA2FBR, UA2FBZ, UA2FEW, UA3AEL, UA3AGG, UA3AGL, UA3AHA, UA3DCX, UA3DDC, UA3DEV, UA3DGU, UA3DHH, UA3DIN, UA3DLD, UA3DNK, UA3DNU, UA3DQS, UA3DUA, UA3PDA, UA3QBG, UA3QHZ, UA3QJK UA3QKA, UA3TAM, UA3TBK, UA3TES, UA3VEF, UA3ZBZ, UA4CGZ, UA4FDD, UA6XAE, UA6XDO, UA9AFG, UA9ANC, UA9FAR, UA9FDW, UA9MAZ, UA9MBK, UA9MQ, UA9SDB, UA9TS, UA9UJM, UA9XSQ, UA9YCT, UA0ABC, UB5PSU, UB5QBJ, UB5UCH, UB5UGD, UB5VAF, UB5VFS, UC2AHL, UC2BFU, UC2LFE, UD6DJH, UK0KAB, UK2GJF, UK3DCK, UK3UAO, UK3WAA, UK3WAC, UA4HJA, UA4QK, UA4QM, UA4RC, UA4WBX, UA6AJO, UA6AKT, UA6ALV, UA6HAC, UA6JAY, UA6PAA, UA6RB, UA6WBZ, UA6WSV, UA0FCL, UA0JCM, UA0LFK, UA0QEZ, UA0SGJ, UB5ABY, UB5AEZ, UB5AFU, UB5FDG, UB5GAU, UB5GBF, UB5HAF, UB5HBT, UB5ITO, UK4NBM, UK4WAK, UK5EAQ, UK5FAD, UK6AJO, UK6PAA, UK9FGN, UK9SBH, UK9UDD, UK9XAN, UL7AAS, UL7BAZ, UL7GBP, UO5OCR, UP2BKX, UR2RCU, UV3DN, UV3MM, UW3RR, UW4NH, UW4NP, UW9CL, UW9DZ, UW9SG, UZ3RV, VE3MFA, VE4AKN, VE7AS, W4FOD, W7CQB, W7KEU, WA4QZR, WA6LOD/KH2, WB4BBH, WB4TIN, WB9QPG, WD4EXG, XQ6AM, Y2-EA-13112/E, Y21BC, Y21CF/A, Y22FK, Y23EE, Y23MF/A, Y23NL, Y23PF/A, Y23RB, Y23XF, Y23ZE/A, Y23ZG, Y24IF/P, Y24WL/A, Y25NL, Y25XH, Y26GN, Y26IL, Y26KL/A, Y31SC, Y32WC, Y32YF, Y32ZN, Y35TE, Y35UB, Y35WL, Y38TI, Y38YK, Y38ZM, Y39WG, Y41WM, Y41ZF, Y42TC, Y44XI, Y46WF, Y47YM, Y48KN, Y48ZL/P, Y49UH, Y49XN, Y52VN, Y52WG, Y53ZF, Y55XL, Y56YF, Y57XE, Y57ZL, Y63UG, Y63VG, Y64TI, Y66QL, Y67YL, Y75OL, Y78WN, Y78XL, Y06AVB, Y07APA, Y08FZ, Y09HP, YU7FN, YU8IA.

Disqualified: 4Z4DX—duplicates and unverifiable contacts; and I1YBM—duplicates and unverifiable contacts.

CQ REVIEWS:

The Yaesu FT-One All-Mode Solid-State General-Coverage Transceiver Part I

BY JOHN J. SCHULTZ*, W4FA

Because of the major nature of the FT-One, we are breaking tradition and running the review in two parts. W4FA has once again done a monumental job in preparing this review. Consequently, the manuscript and illustrations are quite voluminous. This unorthodox approach will allow us to present the review in its entirety. —K2EEK

The FT-One makes an impressive sight sitting on the operating desk.

Yaesu Musen must believe that h.f. amateur communications still have a great future in store. Their FT-One transceiver not only carries a prestigious designation, but it is obviously packed with features, both electrical and constructional, that are designed to preserve its value for years to come.

To start, it must be said that most advertising photographs do not do complete justice to the transceiver as I realized after I saw the real thing. The front-panel color is a soft gray with the knobs being darker gray with aluminum skirts. The main digital display is yellow (not red as seen in some photographs), while the auxiliary digital display has red digits. The two panel meters have soft-green illumination. It is an impressive-looking unit that seems to combine a functional appearance along with a visually appealing aspect. That factor may, at least, help the situation a bit when you try to convince your non-amateur XYL or OM that you need a new transceiver costing about $2,500!

According to Yaesu's literature, their design project for the FT-One started about four years ago. The following quote from their literature gives a bit of interesting insight into what it must be for a company to get involved in a completely new transceiver design rather than just adding a few more "bells and whistles" to an existing design:

"As technology progressed, the design was revamped to take advantage of the more sophisticated devices available to the engineers. Finally, early in 1981, the last major component was soldered in place, and the arduous task of evaluating the final design in computer simulations and field torture tests was begun. Assembly line fixtures were built, computerized testing programs were debugged, and hundreds of thousands of parts were ordered. A proud research and development staff presented its report to their President: "We've done it!"

Of course, Yaesu did expect to spin-off a lot of the investment in design work, assembly tools, techniques, etc., involved in the FT-One in later transceiver designs, and one can already see this appearing in designs such as the FT-980 and FT-102. However, there doesn't seem to be much doubt that the FT-One will remain Yaesu's top-of-the-line h.f. transceiver for the foreseeable future.

General

Table I gives the specifications for the FT-One. It is a long list and contains a lot of detailed information that readers might want to refer back to later on. In general, however, the FT-One represents a complete departure from the usual type of 9 MHz i.f. design transceiver Yaesu has produced over the years, which was limited to amateur-band-only coverage. The FT-One covers continuously the 150 kHz to 29.9999 MHz range on receive with tuning down to 100 Hz steps. On transmit, it covers fully all existing and proposed amateur bands and can be very easily modified for a full transmit capability from 1.8 to 29.9999 MHz for those amateurs who have a need for such a capability (e.g., MARS operation). It has provisions for s.s.b., c.w., a.m., FSK, and f.m. modes of operation with only the latter mode requiring an optional PC board instal-

*c/o CQ Magazine

TRANSMITTER

Frequency range:

160m band	1.8 to 2.0 MHz
80m band	3.0 to 4.0 MHz
40m band	7.0 to 8.0 MHz
30m band	10.0 to 11.0 MHz
20m band	14.0 to 15.0 MHz
17m band	18.0 to 19.0 MHz
15m band	21.0 to 22.0 MHz
12m band	24.0 to 25.0 MHz
10m band	28.0 to 29.99 MHz

Tuning steps:
Selectable 1 MHz, 100 kHz, 100 Hz, 10 Hz

Emission types:
LSB, USB (A3J/J3E*), CW (A1/A1A*), AM (A3/A3E*), FSK (F1/F1B*), **FM (F3/F3E*)
* New emission designation per WARC '79
** With optional FM unit installed.

Power output (minimum):

	160m through 15m	10m
SSB, CW	100W (PEP)	90W (PEP)
AM	25W	25W
FM, FSK	50W	50W

Carrier suppression:
better than –40 dB below peak output.

Unwanted sideband suppression:
better than –50 dB below peak output, (measured at 14 MHz, 1 kHz tone)

Non-harmonic spurious radiation:
better than –40 dB below peak output

Harmonic radiation:
better than –50 dB below peak output

Audio response:
better than –6 dB from 300 Hz to 2700 Hz

3rd order intermodulation distortion:
better than –31 dB below peak output

Frequency stability:
less than 300 Hz drift during the first 30 minutes after 10 minutes warm-up; less than 100 Hz every 30 minutes thereafter.

Modulation type:
A3J: Balanced Modulator
A3: Low Level Modulation
F3: Variable Reactance

Maximum deviation (FM, optional Unit installed):
±5 kHz

FSK shift frequency:
170 Hz.

Output impedance:
50 ohms, unbalanced (nominal)

Microphone impedance:
Low Impedance (500 to 600 ohms)

RECEIVER

Frequency range:
150 kHz to 29.9999 MHz (continuous)

Clarifier range:
±9.9 kHz

Sensitivity:
(CW, SSB, and AM figures measured for 10 dB S+N/N)
* 1.8 to 30 MHz ** 150 kHz to 1.8 MHz
SSB/FSK(W)/CW(W)
* better than 0.3 μV, ** better than 5.0 μV
CW(N)
(with optional XF-8.9KCN filter installed)
* better than 0.2 μV, ** better than 2.5 μV
CW(M)/FSK(N)
(with optional XF-8.9KC filter installed)
* better than 0.25 μV, ** better than 3.0 μV
AM
* better than 2.0 μV, ** better than 30 μV
AM
(with optional XF-8.9KA filter installed)
* better than 3.0 μV, ** better than 50 μV
FM
(with optional FM unit installed)
better than 20 dB of Quieting from 1.8 to 29.99 MHz

Intermediate frequencies:

1st IF:	73.115 MHz
2nd IF:	8.9875 MHz
Width/shift IF:	10.76 MHz
Noise Blanker IF:	455 kHz

FM IF (with optional FM unit installed): 455 kHz

Image rejection:
better than –80 dB

IF rejection:
better than –70 dB for all frequencies

Selectivity:

	–6 dB	–60 dB
SSB, CW(W), FSK(W)	2.4 kHz	4.0 kHz
CW(N)*	300 Hz	900 Hz
CW(M)*, FSK(N)*	600 Hz	1.2 kHz
AM*	6 kHz	10 kHz
FM**	12 kHz	24 kHz

* with optional filter installed
** with optional FM unit installed
NOTE: These figures apply as maximum bandwidths with Width control set to maximum.

RF attenuator performance:
from 0 dB to 25 dB attenuation, continuously adjustable

Dynamic range: (at maximum sensitivity)
better than 90 dB with standard SSB filter
better than 95 dB with optional 600 Hz CW(M) filter
better than 97 dB with optional 300 Hz CW(N) filter

Audio output power:
3-watts minimum (into 4 ohms, with less than 10% THD)

Audio output impedance:
4 to 16 ohms

POWER REQUIREMENTS

Voltage:
AC: 100 to 120V, or 200 to 234V; 50 to 60 Hz
DC: 13.5V ±10%, negative ground

Power consumption:

	AC	DC
Receive	90 VA	2.7 A
Transmit (100W output)	560 VA	20 A
Backup (Power Switch OFF)	3.5 VA	0.07 A

Dimensions (WHD):
approximately 370mm x 157mm x 350mm; 380mm x 165mm x 465mm with all feet, knobs and heatsink

Weight:
approximately 17 kg.

Table I– FT-One specifications.

lation. The minimum *output* power is 100 watts except on f.m. and FSK where it is 50 watts and a.m. where it is 25 watts. It is self-contained in the sense that a.c. (110/220 v.a.c.) and d.c. power supplies, cooling fan, a speaker, and optional electronic keyer are or can be built in. So, for instance, if one were using one of the newer beam antennas which provide very flat s.w.r. curves across an amateur band, one only has to add a microphone and paddle to the FT-One for s.s.b., c.w., a.m. and f.m. operation. The transceiver is completely "no-tune" in every sense for both receive and transmit operation and doesn't even have a bandswitch. The main frequency readout is on a six-digit display with an analog kHz display on the skirt of the main tuning knob.

Considering some of the foregoing, one may then wonder what functions are played by the myriad, although neatly arranged, rotary controls, switches, push-buttons, etc., on the front panel of the FT-One. They do, of course, have to do with all sorts of features contained in the transceiver, ranging from now commonplace VOX to advanced features dealing with frequency selection and storage. It takes a bit of time to appreciate how to use all the features for maximum flexibility. They are probably best highlighted and explained as a basic look is taken at the circuitry of the FT-One and then later on as performance impressions are given. However, a summary of the main features besides the frequency coverage, power, and mode capabilities just mentioned are:

1. Dual v.f.o. system with the equivalent of 10 internal v.f.o.'s.
2. Tuning steps of 10 Hz, 100 Hz, or 1 MHz, using the main tuning knob.
3. Entry of frequencies into memory from keyboard or from tuning-knob setting. Recall of frequencies by keyboard command or rotary v.f.o. switch selection.
4. Manual scanning using keyboard switches or automatic scanning with a stop-on-signal feature.
5. Full cross-band or split-frequency operation using different sidebands, if desired, and with full break-in on c.w.
6. R.f. attenuator using a PIN diode.
7. Active IC audio filter for peak/notch functions over the 300–1500 Hz range.
8. RIT (clarifier) with a ±9.9 kHz range.
9. A.g.c. selection for slow-fast-off.
10. Variable i.f. bandwidth tuning allowing control of passband width and placement (about 400–2400 Hz width adjustment).
11. Provisions to accommodate optional c.w., FSK, and a.m. i.f. filters.
12. Adjustable VOX and c.w. delay down to full break-in on c.w.
13. Noise blanker with adjustable threshold.
14. R.f. speech processor with compression adjustment.
15. Microphone squelch circuit to cut out background noise during speech pauses.
16. Dual metering with one meter serving as a multimeter (to include s.w.r.) and the other meter dedicated as an "S" meter on receive and a.l.c. level meter on transmit.
17. Full provisions for the connection of external equipment—linear, transverters, etc.

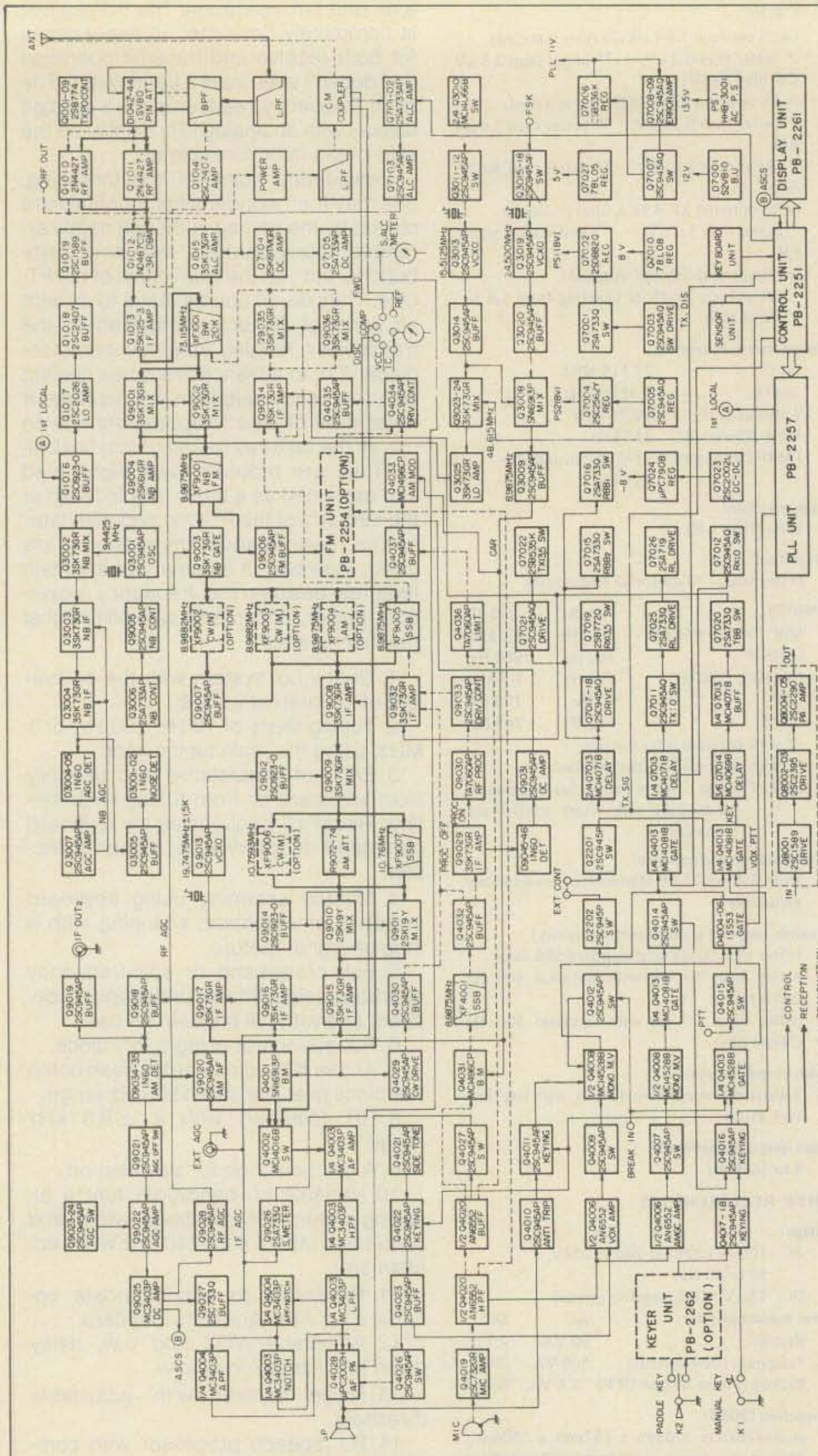


Fig. 1– Overall block diagram of the FT-One.

Circuitry

A block diagram for the FT-One is shown in fig. 1. The diagram looks overwhelming at first, but by following a few of the signal paths indicated, one can at least understand the basic circuit scheme used and appreciate a few of the novel ideas which are incorporated.

Referring to the upper right-hand corner (antenna input) of the block diagram, one can trace the receive signal path as going to a fixed low-pass filter (to reduce TV/image overload), then to a bandpass filter block containing 10 diode-switched filters, through the PIN diode antenna block, and on to a pushpull 2N4427 r.f. amplifier stage. The signal then proceeds on to a double-balanced mixer (Q1012) where it is translated up to the first i.f. at 73.115 MHz. Fig. 2 shows some details of the "front-end." The diagram is rather complex, but one can see the rather elaborate bandpass filter block on the left. The filters are switched in or out according to band data information from the microprocessor in the FT-One. The 10 bandpass filters, starting from the top, are divided into frequency ranges of:

1. 1.8 MHz and below	6. 5.0–7.0 MHz
2. 1.8–2.0 MHz	7. 7.0–10.0 MHz
3. 2.0–3.0 MHz	8. 10.0–14.0 MHz
4. 3.0–4.0 MHz	9. 14.0–20.0 MHz
5. 4.0–5.0 MHz	10. 20.0–30.0 MHz

The interesting push-pull r.f. amplifier using 2N4427's is shown in the middle of the diagram. It uses broadbanded input/output transformers. The PIN diode variable attenuator is immediately before the input transformer and consists basically of diodes D42, 43, and 44. The functions of the rest of the stages can be ascertained by comparing fig. 2 with the block markings on fig. 1. XF01, at the lower right of fig. 2, is the 73.115 MHz, 20 kHz wide i.f. crystal filter.

The 73 MHz i.f. is then translated to a 8.9882 MHz i.f. where the main signal selectivity in the FT-One takes place. Just to the right of the middle in fig. 1 one can see the various blocks which represent the standard 8.9882 MHz crystal s.s.b. filter and the optional a.m., c.w.-medium and c.w.-narrow crystal filters. The i.f. signal then flows through an up-down mixing arrangement employing an s.s.b. crystal filter at 10.76 MHz (or optional c.w. crystal filter) so the "windows" of the 8.9882 MHz filter and 10.76 MHz filter can be superimposed on each other to achieve variable passband tuning. In addition to having the bandwidth variable, an i.f. shift feature is accomplished by having the frequency of the second local oscillator made slightly variable (see Q3013 in the right middle of the diagram). After the variable passband tuning stages, the signal goes on to several stages of i.f. amplification at 8.9882 MHz and then on to the various a.m. and s.s.b. detector stages, peak/notch filter circuits, and a.f. amplifier stages. There are a great many other stages associated with the receive signal path which have to do with the "hang" a.g.c. action and, particularly, gain equalization in the i.f. stages so the switching in of different filters does not change the apparent overall gain. Other circuitry provides for various frequency offsets depending on the mode of operation so the frequency readout remains correct.

The noise blanker circuitry is a bit different from that found in most transceivers in that the 8.9875 MHz i.f. signal is translated down to a 455 kHz i.f., the noise signal detected, and the detected/rectified signal used to drive a gate

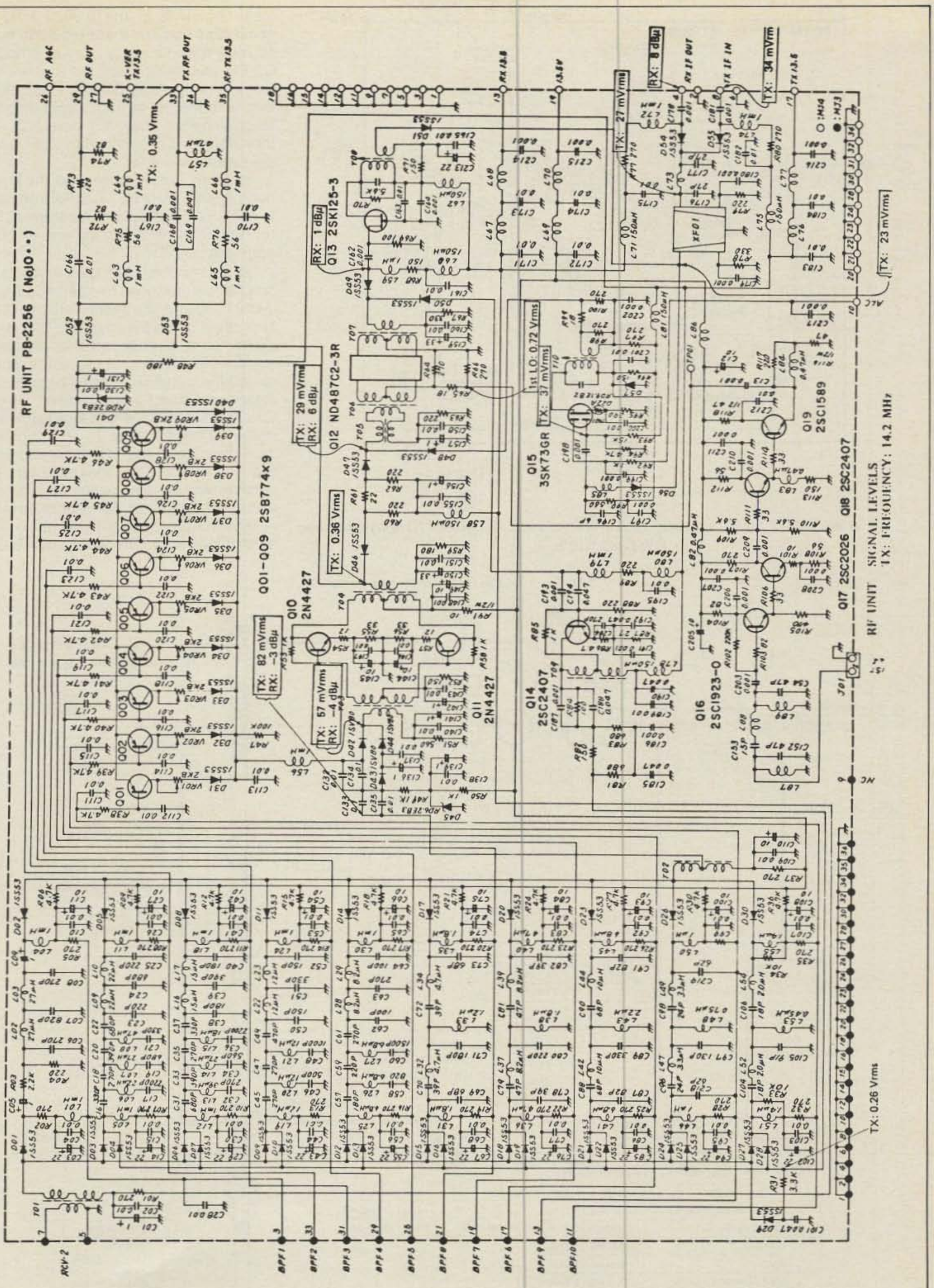


Fig. 2– The "front end" of the FT-One. It is also an interesting example of one of the large PC boards.

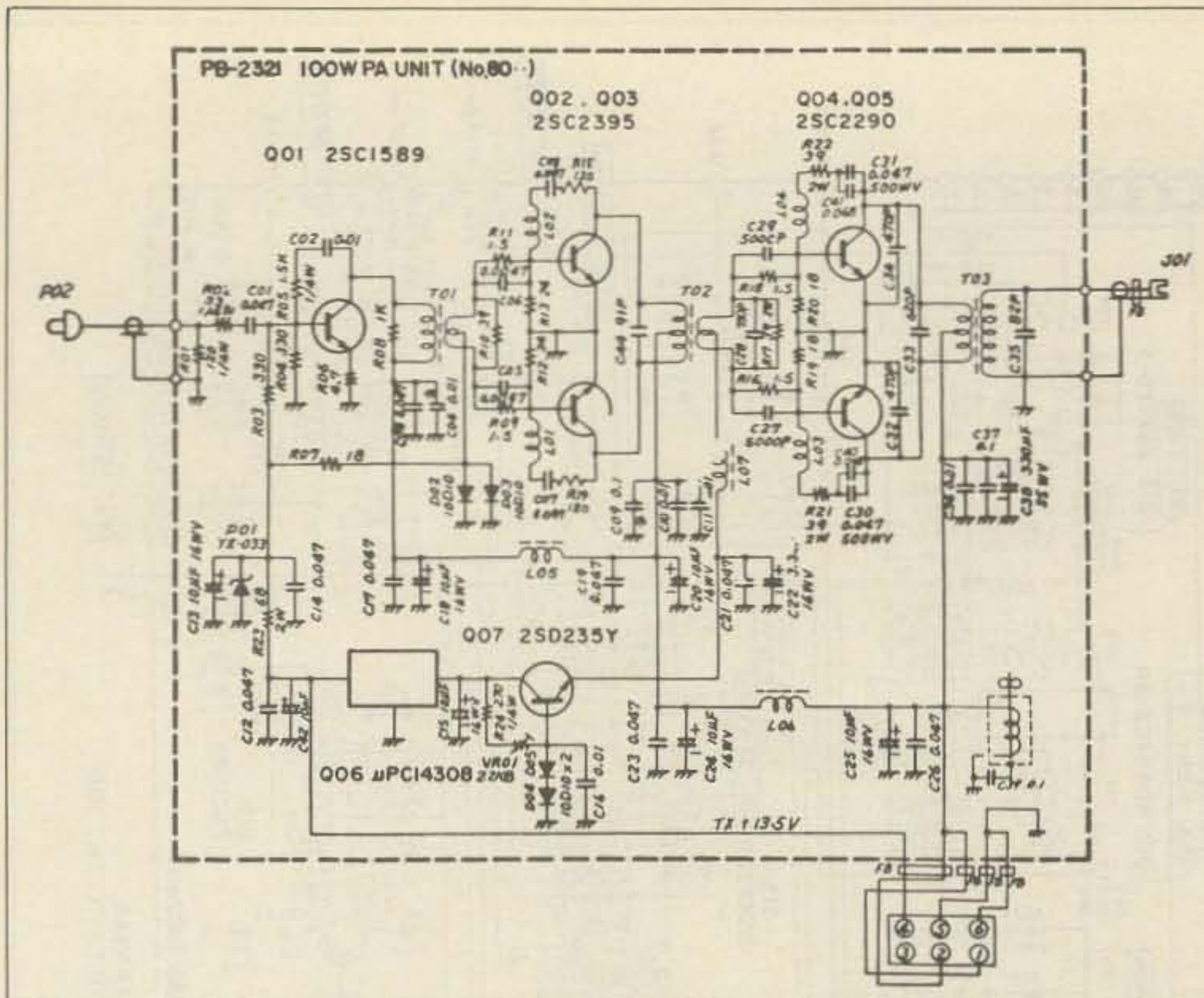


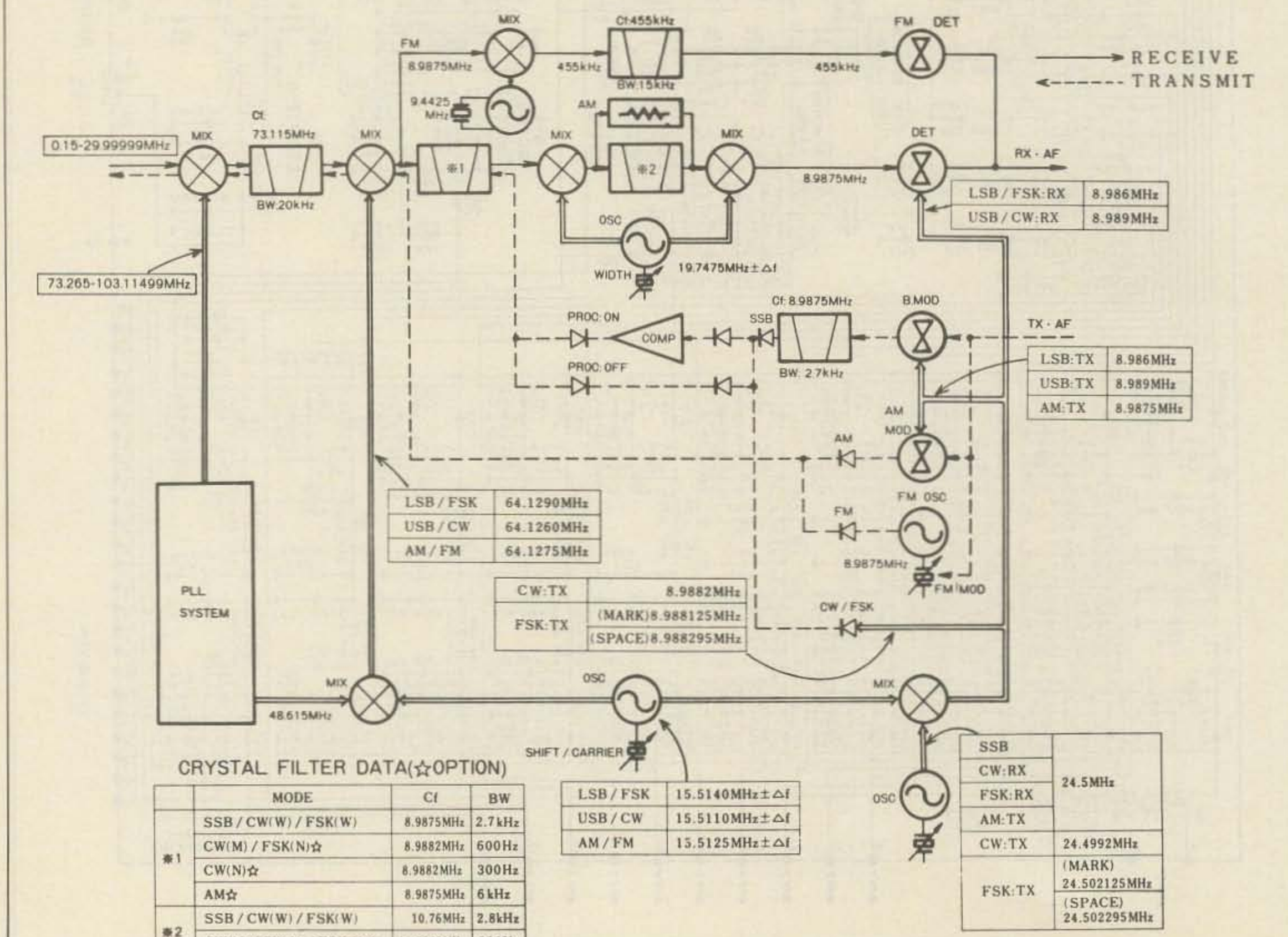
Fig. 3– The 100 watt power amplifier unit. It is followed by a bank of 10 relay-switched low-pass filters.

stage which is in the 8.9875 MHz i.f. chain. One can see these blocks in fig. 1, starting with the noise blanker amplifier Q9004 and looping around to the noise blanker gate stage Q9003. Presumably this is done to stretch noise impulse lengths before they are detected. The threshold level at which the noise blanker operates is variable.

If the f.m. option is installed, the broadband 8.9875 MHz i.f. signal is translated to 455 kHz, goes through a ceramic i.f. filter, and then on to limiting and discriminator stages.

On the transmit side, the amplified microphone signal goes to a balanced modulator (Q4031 in the middle left side of fig. 1) where it modulates the 8.9875 MHz i.f. signal. S.s.b. is produced after crystal filter XF4001. The s.s.b. signal is either routed through the r.f. speech processor stages or directly to transmit mixers Q9035 and Q9036 where it is translated to the 73 MHz i.f. The 73 MHz signal is then mixed with the first local oscillator signal to produce the desired output frequency, which then passes through one of the nine bandpass filters, as used in the receive mode, which cover 1.8 to 30.0 MHz. Essentially, the whole process is

Fig. 4– FT-One frequency relationships.



CRYSTAL FILTER DATA(☆OPTION)

	MODE	Cf	BW
✱1	SSB / CW(W) / FSK(W)	8.9875MHz	2.7kHz
	CW(M) / FSK(N)☆	8.9882MHz	600Hz
	CW(N)☆	8.9882MHz	300Hz
	AM☆	8.9875MHz	6kHz
✱2	SSB / CW(W) / FSK(W)	10.76MHz	2.8kHz
	CW(M) / CW(N) / FSK(N)☆	10.7593MHz	800Hz

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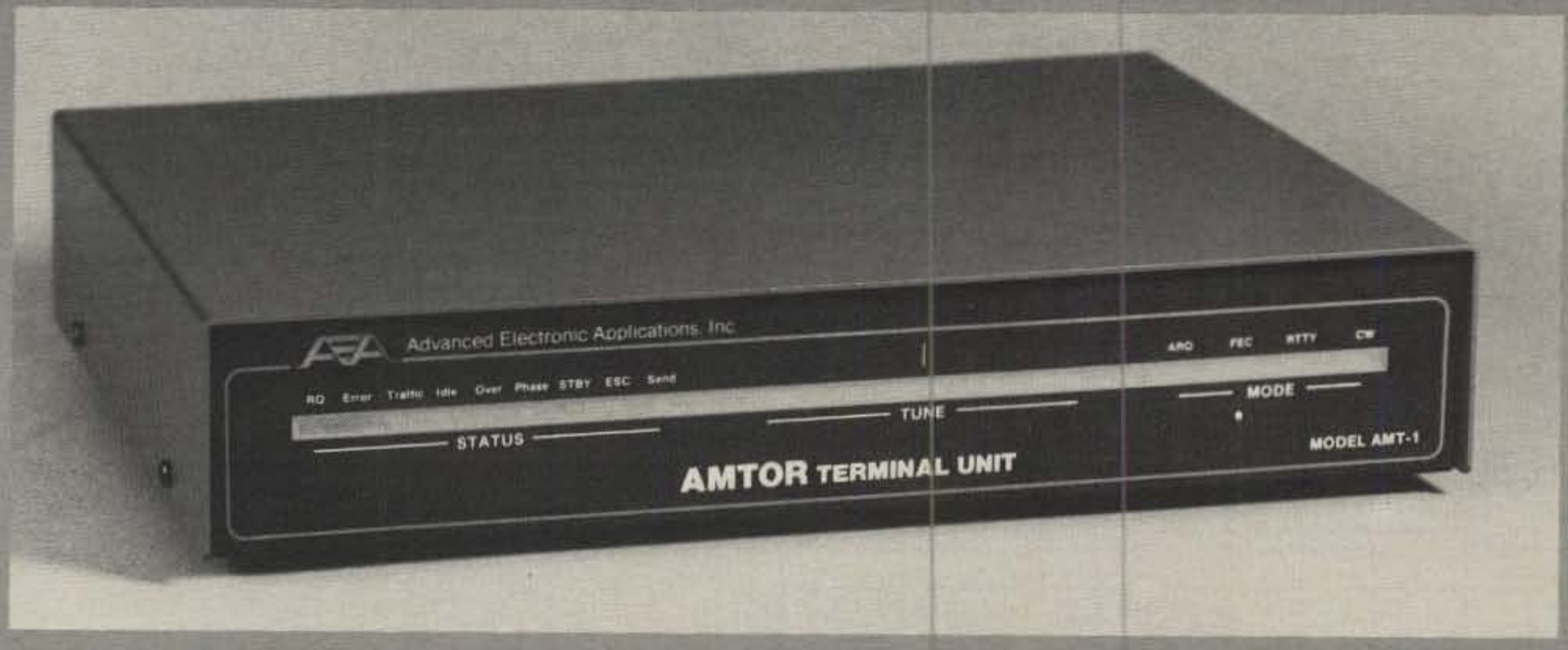

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AMTOR is the system of error correcting RTTY which has been rapidly overtaking conventional RTTY in Europe, just as its marine equivalent, SITOR, has been taking over in ship to shore communications.

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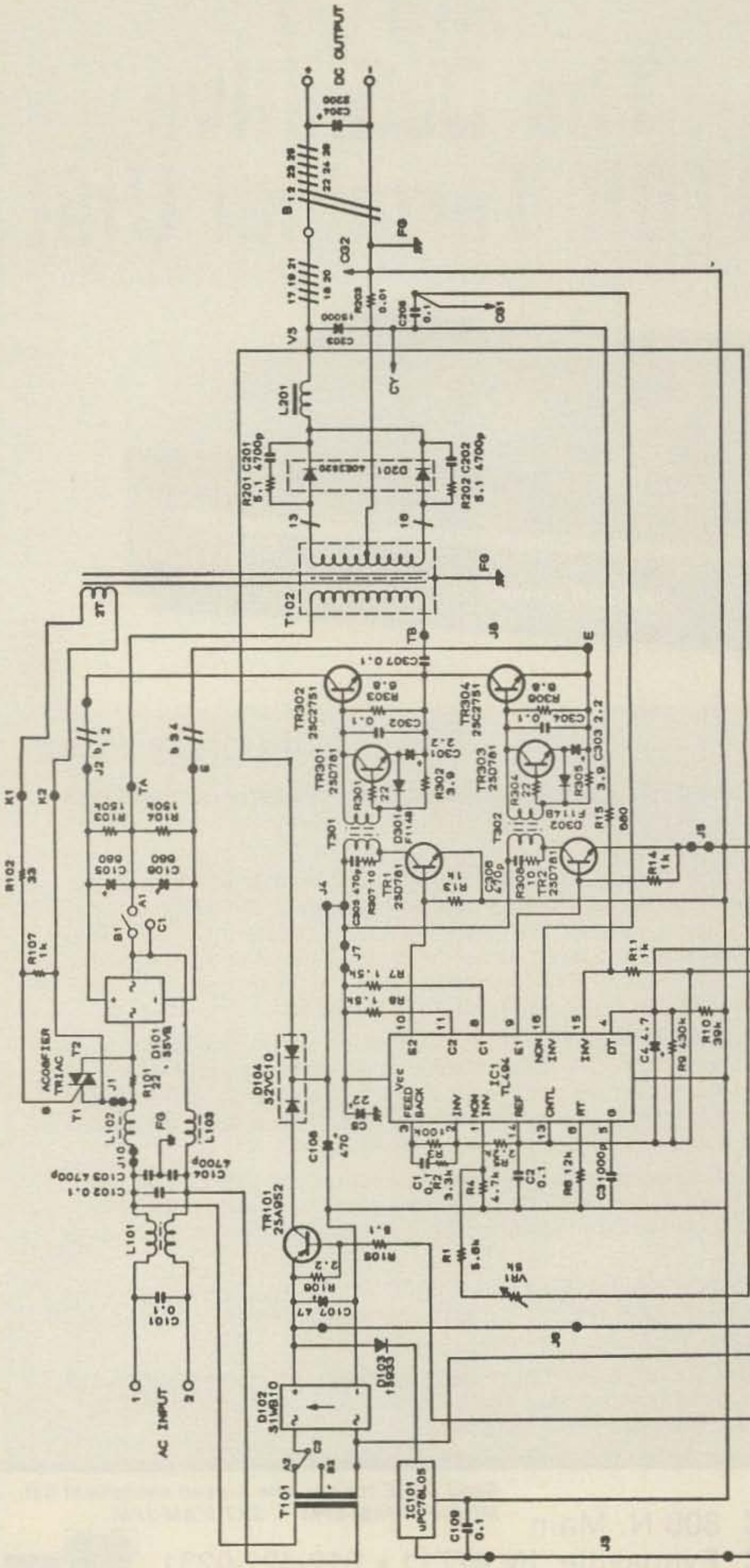
Fig. 5– The FT-One is one of the first amateur transceivers to incorporate a switching-type power supply. They probably will be very common in the future in amateur gear.

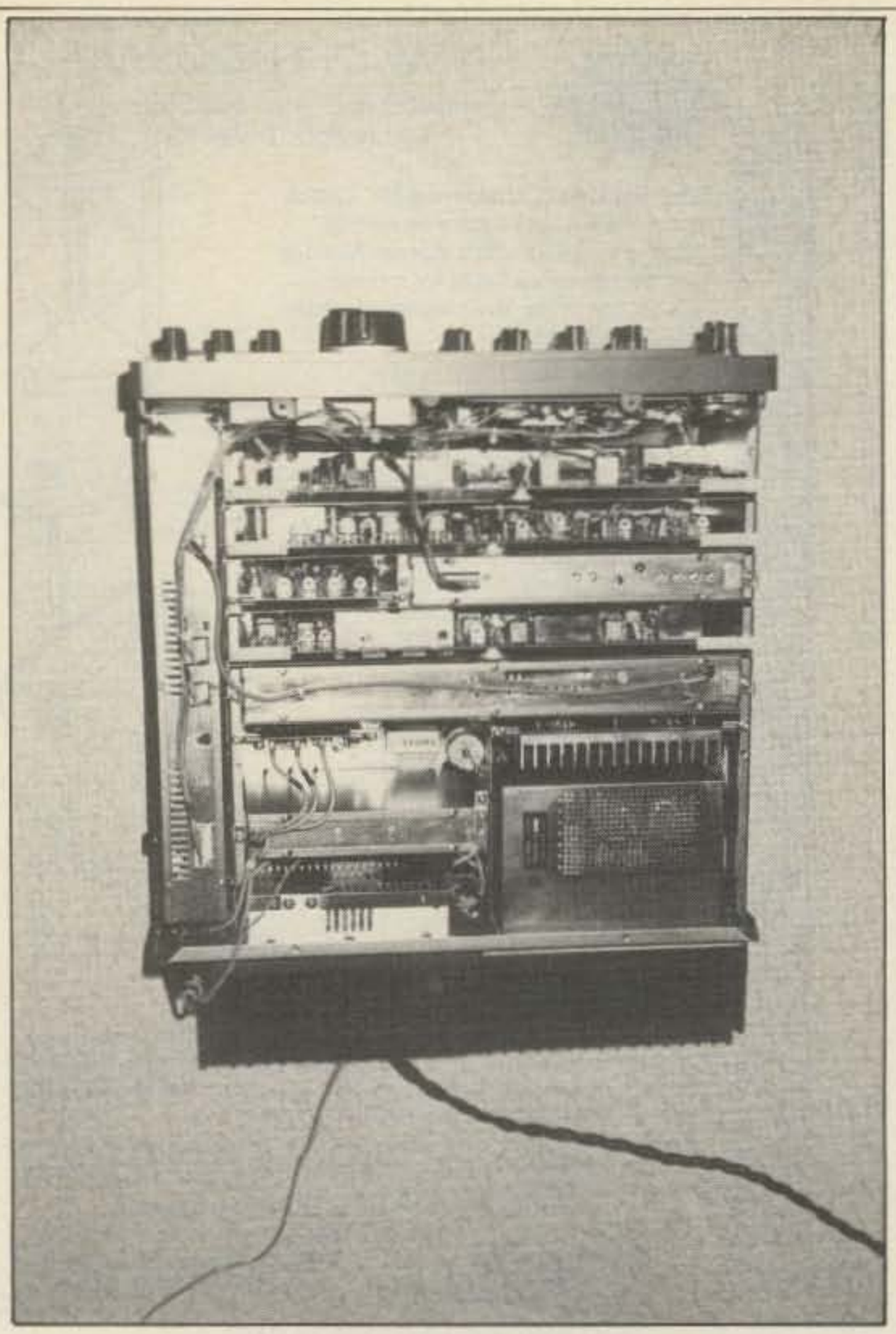


just the reverse of the signal flow path on receive. However, the low-level signal must now be amplified to the 100 watt level, and this is accomplished by the stages of the PA unit as shown in fig. 3. The output of these stages is routed through one of nine relay-selected lowpass filters.

The cut-off frequency of each of the six-pole lowpass filters corresponds to the upper frequency limit of the bandpass filters preceding the PA unit. The signal finally goes through a directional coupler unit (to provide s.w.r. readout and signal voltage for the excessive s.w.r. protection circuitry) and to the antenna switching relay.

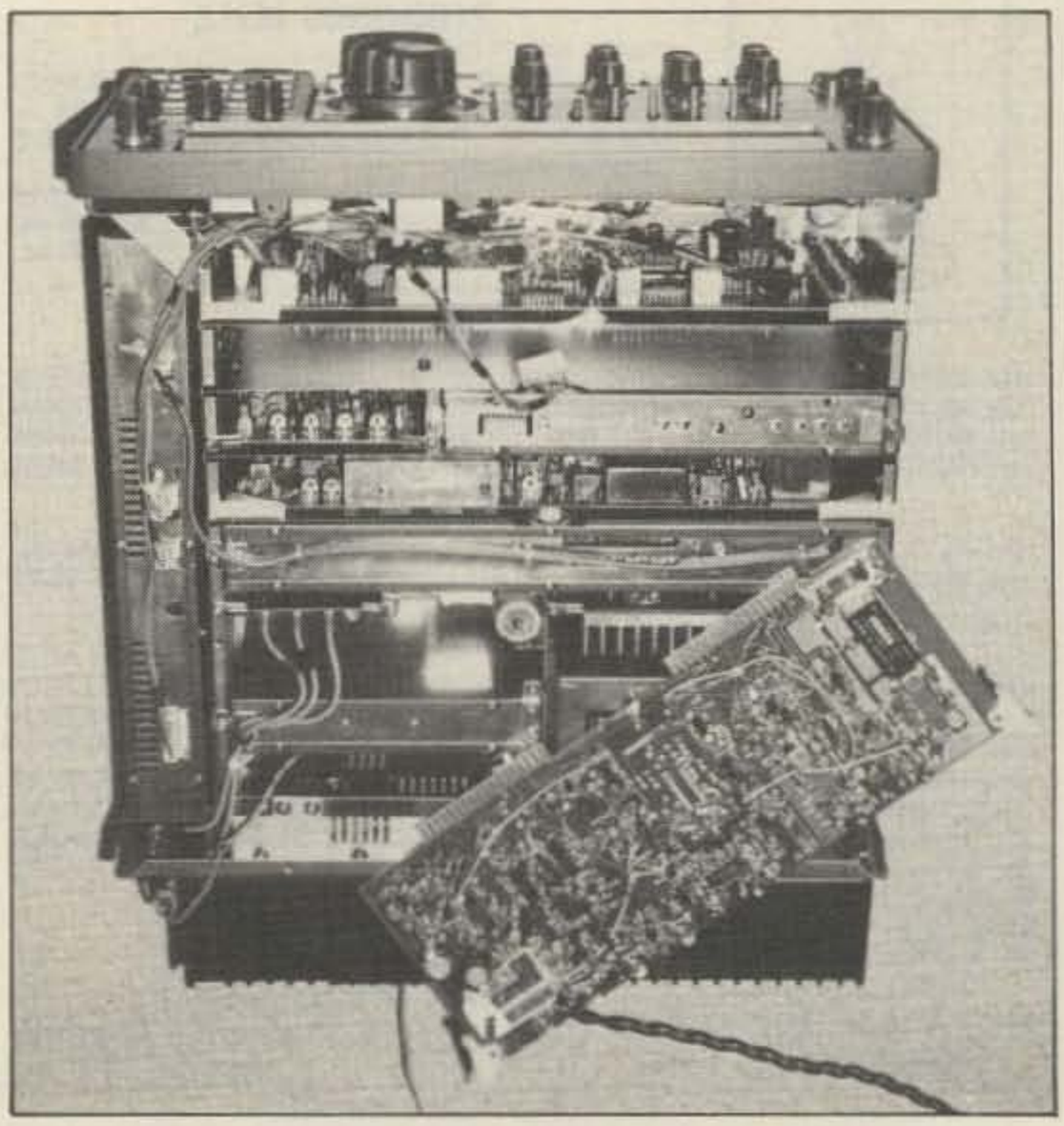
The r.f. speech-processor circuit, when in use, uses a clever bit of circuit switching such that the generated s.s.b. signal is clipped and then filtering is provided by the s.s.b. filter, XF9005, used in the receive chain. Thus, the need is obviated to have another s.s.b. filter dedicated solely to speech-processor filtering as is done in some designs.

On c.w., FSK, and a.m., the final signal paths starting with the 9 MHz i.f. amplifiers are the same, although the initial signal generation does not use the same balanced modulator path as for s.s.b. C.w. and FSK signals are provided by frequency offsets introduced into the second local oscillator stage. The a.m. modulation path does include speech processing in the form of a limiter stage.



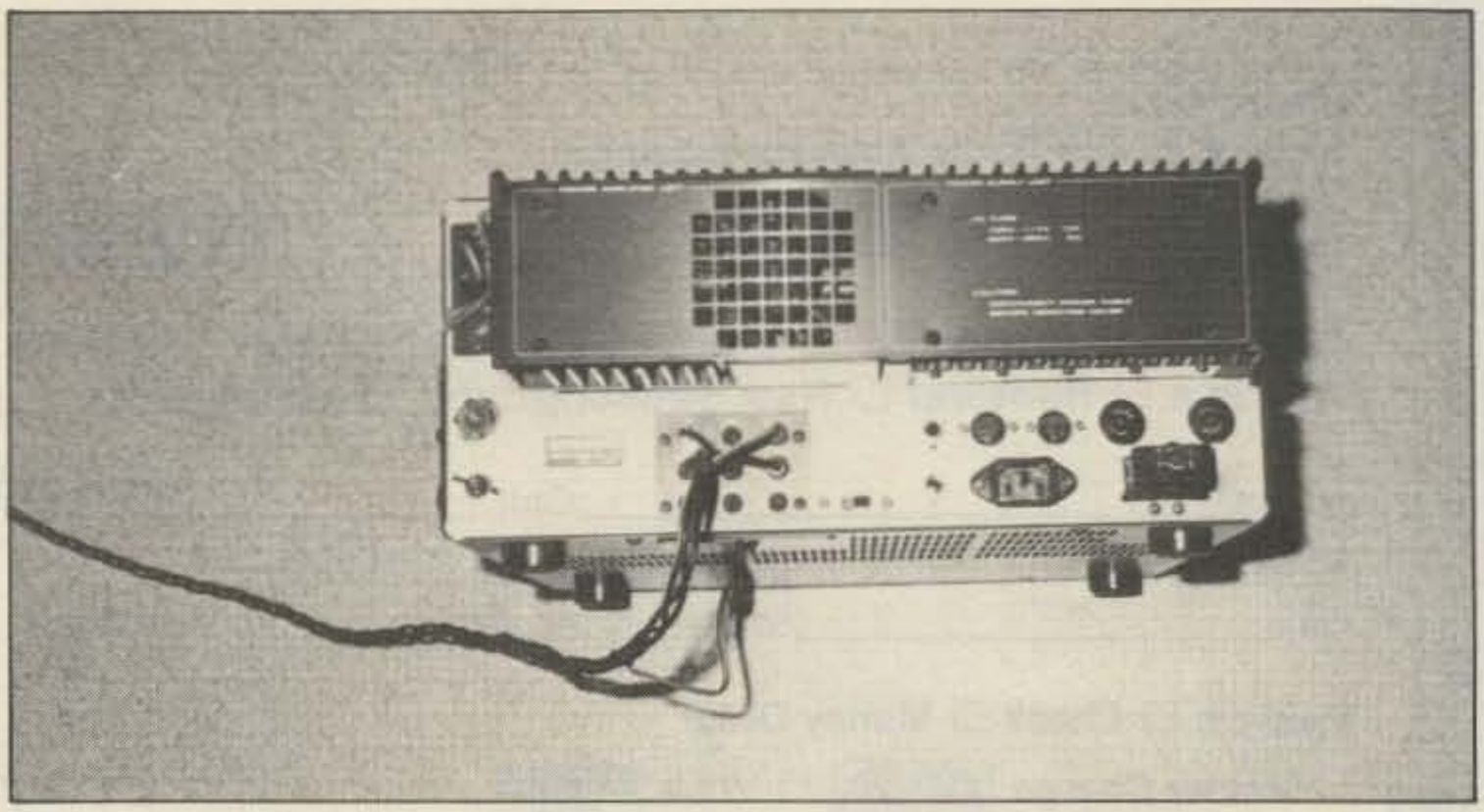
Taking the top cover off the transceiver, one sees an impressive assembly of large PC boards and shielded enclosures. The power-supply compartment is on the lower right, and the PA compartment is on the lower left. Normally one will have to take the top cover off once to reach various adjustments if one wants to tailor sidetone volume and pitch, AF monitor level, some VOX adjustments, etc., to individual preferences.

An example of one of the large PC boards which can be easily removed for any possible service work.



A better idea of the frequency relationships within the FT-One can be seen from fig. 4. If one studies it a bit, one can see the various signal relationships for different modes of operation, which oscillators (indicated as being variable) affect functions such as carrier shift, variable bandwidth tuning, f.m. modulation, FSK shift, etc. The heart of the system is, of course, the PLL block shown in fig. 4. Basically, it provides a frequency stepped 73.11500 to 103.11499 MHz output to serve as the first local oscillator signal and a fixed 48.615 MHz signal which is further mixed to provide a second local oscillator signal. Rather than present a complicated block diagram of the PLL unit, suffice it to say that it is composed of four frequency loops with crystal oscillator reference signals with finally an external control unit selecting one of the six VCO's into which the first local oscillator frequency range is divided. The reason for having six VCO's is to keep the noise output of the PLL unit as low as possible and as linear as possible. The PLL unit in turn is controlled by a Control Unit (fig. 1). This unit receives commands from the tuning-knob optocouplers, keyboard switches, microphone scan switches, and various other switches, and, in turn, via a microprocessor, it sends out commands to the PLL for which frequency steps it should use, which bandpass and lowpass filters it should select, and what frequency it should display on the digital frequency readout.

The foregoing presents only a small glimpse at the circuitry within the FT-One. A final note might be made of the built-in power supply, since the FT-One is one of the first amateur transceivers to use a switching-type power supply. The diagram of the supply is shown in fig. 5. It looks, and is, rather complex, but essentially it switches at 50 kHz and produces a square-wave voltage which is rectified by a half-wave rectifier, shown to the right of fig. 5, and then filtered using a classical choke-input LC filter. Because of the small ferrite-core inductors needed at 50 kHz, the greater filtering effect per mF of filter capacitance, regulation feedback loops allowed by the switching mode of operation, etc., the overall result is a pow-



The FT-One has provisions for a wide variety of external connections, but the rear panel is not crowded with excessive connectors. All connectors are standard.

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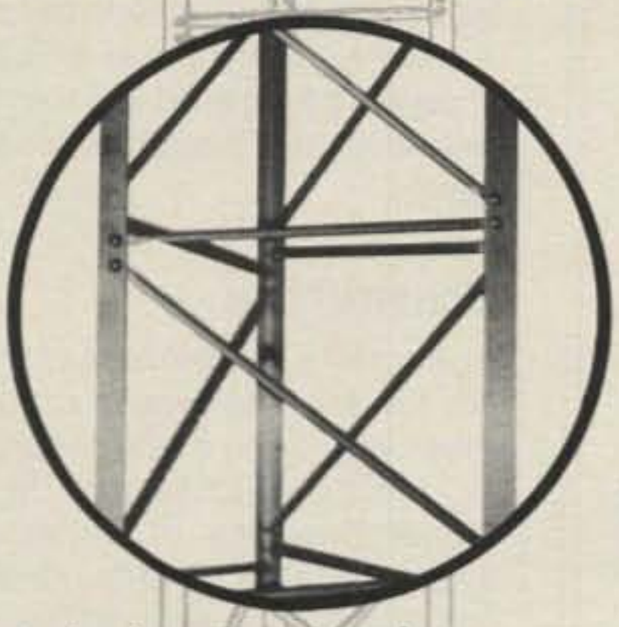

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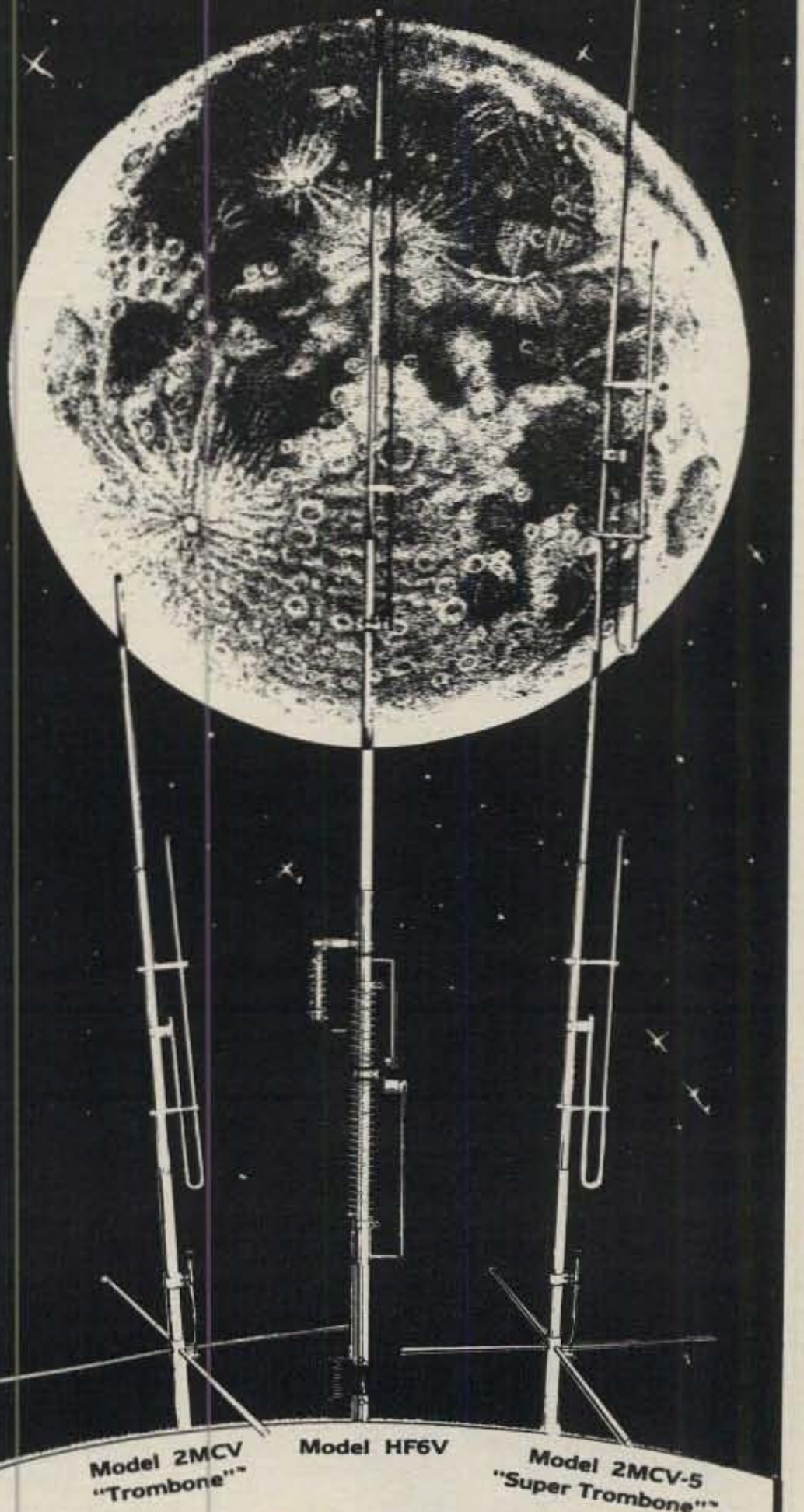

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er supply which is more compact and efficient, and which provides better regulation than a conventional power supply. The only real disadvantage with this type of design is that unless the supply is most carefully filtered and shielded, the harmonics generated by the switching action will enter equipment leads and cause havoc.

Construction

Housing a complex transceiver such as the FT-One would present any engineer with quite a few problems. Obviously, the housing has to be rugged, very good shielding must be provided between boards (and even circuits on the same boards), and yet the whole assembly must be made reasonably accessible for servicing. As the photographs with the top cover of the FT-One removed show, a basic frame is used which then houses large, individually removable PC boards and fix-mounted individually shielded enclosures. Some of the PC boards also have individually shielded sections on them.

The PC boards are easily removed by disengaging lever clamps which hold them in place. Connectors are used to facilitate the complete removal of the PC boards. The final amplifier, switching power supply, synthesizer circuits, and various oscillator circuits are all individually shielded. The construction is very impressive overall as to neatness, apparent ease of servicing, and quality of the parts used. The outside wrap-around steel shell covering has no perforations on the top half, thus providing good protection against various outside elements. The front panel is of solid die-cast aluminum. The rear panel, as can be seen in one of the photographs, mounts a large heat-sink which is effective for both the power supply and final-amplifier modules. The flush-mounted fan for the final-amplifier module can also be seen. Below the heat sink there are a variety of connectors, the function of which should satisfy just about any installation situation. There are provisions for an external receiver or receive-only antenna, PTT, speaker, a.f. out for recording, i.f. out for a monitor scope, phone-patch connections, key or paddle connections, linear-amplifier control connections, transverter drive and control connections, etc. One interesting jack is marked **AUX**, and Yaesu says it provides a special clocking signal for use only with "special" Yaesu accessories. I wonder what they have on the drawing board?

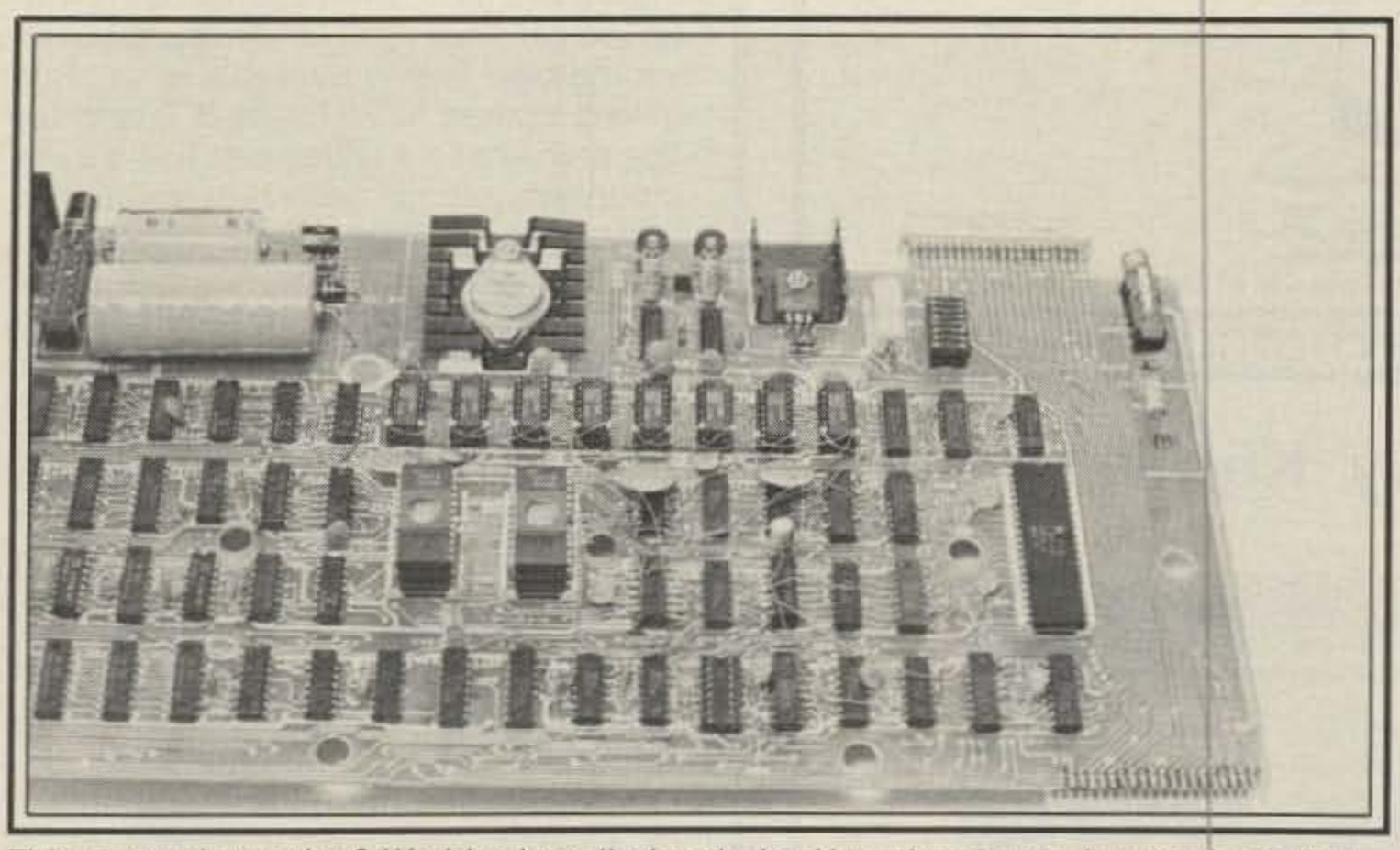
The FT-One is not light. It weighs in at about 42 lbs. However, the impression one gets is that it is a solid, well-constructed 42 lbs. worth of transceiver. Its weight and shipping dimensions are such that it can be sent by Parcel Post or UPS.

(to be continued)

With a little effort and not much money you can increase the memory of your TRS-80® Model I to include RTTY and other sophisticated modes of communication in its repertoire.

Updating The TRS-80® Model I To 48K Memory With 64K Chips

BY LEW MCCOY*, W1ICP, AND FRED TREASURE, KA5NJY**



This photo shows the 64K chips installed and wired into the circuit. As mentioned in the text, the ROMs shown bear no resemblance to the original TRS-80® . (TRS-80 is a registered trademark of Radio Shack.)

There are many reasons why the owner of a TRS-80® Model I might want to install full memory in the computer proper (not in the interface). With the recent drop in prices on 4164 dynamic RAMs (about $50 for a complete set of 8) it becomes very attractive to add memory to your Model I. The 64K chips will bring your system up to the full 48K of RAM it is capable of running. Keep in mind that the bottom 16K is reserved for ROM, which holds BASIC, operating systems, etc.

One of the advantages of using the 4164 is that it requires much less power (cooler operation). In fact, the heat reduction is dramatic. Before making the modification, the power supply pass transistor got very hot. Now it runs so cool, that it is hard to detect that it is actually operating.

*200 Idaho St., Silver City, NM 88061
**Route 8, Box 28E2, Silver City, NM 88061

Another advantage in the modification is that it cuts down on reboots from memory errors. There is a lot less chance of glitches with only 8 memory chips versus 24. And most important, the modification eliminates the memory problems so common with the interface units. This is particularly true of the earlier interface models, although the memory problem can exist with the newer interfaces.

We were lucky enough to obtain some factory rejects of interface boards, and almost invariably the problems with the boards were memory problems. By installing the 64K, 4164 dynamic RAM chips on the computer board itself, memory errors common to using the interface vanished.

4164 Variations—Watch Out!

The pin numbering on the 4164s is different from the existing RAMS used in the Model I. However, no socket changes are necessary to make the modifications. All that is required is to lift certain pins on the new RAMS (pins 8 and 9) so that the pins do not make contact with the sockets. These pins which were lifted or bent up will be wire-wrapped for their new connections. With some types of 64K RAMs, a few manufacturers require that pin 1 be connected to +5 volts. Be careful here because on the existing sockets on the TRS-80® Model I board, pin 1 is −5 volts. In our modification, such types of the 64K RAMs must have the pin lifted so that it is not engaged in the socket. They must be lifted and then strung together and connected to the +5 volt line. (The OKI chips we used do not have pin 1 connected internally and pin 1 is not connected to +5 volts, so this was not a problem in the modification shown in the photo.) Of course it would be remiss on our part if we tell you to be careful of the manufacturer and then not tell you where we got our chips. Here is the supplier: Microprocessors Unlimited, P.O. Box 8080, Beggs, Oklahoma 74421, phone 918-267-4796. The chips are designated 220 ns, OKI, plastic 64K dynamic RAMs. When we got ours, they were about $5.00 each.

Required Modifications

We could do the modifications in a step-by-step manner, but the changes are really simple. The project just requires some care. It is assumed that anyone desiring to make this change has long since voided the warranty by opening his or her computer to make changes. However, the changes should be clear so that any amateur with even basic soldering knowledge can make the mods required. First, please observe all the usual warnings and precautions about handling the 4164s. They are sensitive to static electricity and can be ruined through careless handling.

After removing the computer case, carefully remove the existing RAMs, Z13 through Z20. They are all in a line togeth-

er on the top row just below the large power-supply pass transistor. Next, carefully bend pins 8 and 9 on each of the new chips to slightly more than 90 degrees, enough so that you will be able to wire-wrap the pins. (If your 4164s have the pin 1 connected as mentioned above, you will need to lift these pins also.) Now carefully insert all the RAMs into the sockets, making sure that all pins make good connections into the sockets. Pin 8 on the new RAMs requires 5 volts, so these pins should be wire-wrapped, daisy-chained, and then connected to the 5 volt bus. In order to reduce noise pick-up, both ends of the line were connected to 5 volt points. Z20, pin 8 is connected to Z39, pin 16 (5 volt point), and Z13, pin 8 is connected to Z31, pin 16 (5 volt point). (Be careful to check your wire-wrapping to make sure that none of pins 8 are shorted to pins 9.)

In order to address this new memory we need to create a new line, **MA7** (**M**emory **A**ddress **7**). Fortunately, this is extremely simple. Z51, a 74LS157, is an address multiplexer, and if you examine it, you will find that pins 12, 13, and 14 are not connected to anything. These pins will be used to create our new line **MA7**. First, daisy-chain all the pins 9 together on the memory chips using your wire-wrap wire; then connect a lead from pin 9 of Z20 to pin 12 of Z51. We routed the wire through the large hole between Z51 and the ROM socket Z34 to make the connection to pin 12 of Z51 on the bottom side of the board. Be sure when making any of these connections to use a minimum of solder and heat. Naturally, one should check any new solder joint to make sure that it isn't shorting to any adjacent line or connection. Make a connection between Z51, pin 13 to Z38, pin 11. This is address line 14 and is needed for addressing the new memory. Likewise, connect Z51, pin 14 to Z38, pin 9, which is address line 15.

If your chips require pin 1 to have +5 volts, they must be wired together and connected to the +5 volt line. It is probably a good idea to connect both ends of the string to the 5 volt line as you did with pin 8.

One last modification is required. It is necessary to enable the memory locations above 32K by activating the signal **MEM***. We can do this by inverting A15 using a spare gate. This modification is a little trickier if we want to use the spare inverting gate that is available to us. This gate is located on Z37, pins 8, 9, and 10. The problem here is that pins 8 and 9 are grounded, and the ground connection is under the chip. We used a desoldering tool to clean out the pin holes. A small prod was used to lift the two pins from the board so we could get at them. You could get another 74LS02 and mount it piggyback and then wire it for +5 volts and ground rather than unsolder the existing pins, but that is up to you. Next connect pins 8 and 9 together and connect them to Z38, pin 9 (address line 15). Last, connect a signal diode such as a 1N4148 with the cathode (bar) to pin 10 of Z37. The anode end (arrow) is connected to pin 10 of Z74. That completes the modifications. There are no other modifications required to complete the project.

Some Conclusions

It is important to keep in mind that the first 16K of memory is reserved by the ROMs in the TRS-80® Model I. We understand that there are other operating systems available (in ROM), but presently we have no further information. In the photograph of the unit shown here, the ROMs used are a special program dedicated to various amateur radio functions such as RTTY, code copying, slow-scan, etc. But that is another story that may never be written—the system is always in a state of flux!

One last item: Those people who have interfaces with memory in them must remove the memory chips in the interface. This prevents memory contention between the two sets of memory.

We have modified three computers so far. The first took several hours of study and work. The last one took about two hours to modify using this article as a guide.

Is the work and expense worth the effort? We think it is. Getting rid of the heat and memory glitches was well worth it.

Antennas

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

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

More Random Headings: Part V

In CQ last month, Antennas columnist Thurber discussed ways to obtain acceptable reception between the ham bands, presented some range-extending cordless-telephone antenna ideas, and highlighted some big-signal arrays. This month, there are several new topics of interest.

In last month's Antennas column we returned to mainline antenna topics to discuss the problem of obtaining acceptable reception between the ham bands, such as for s.w.l.'ing or RTTY monitoring purposes. We also examined specialized antennas for cordless telephones and looked at the impressive 80 meter vertical array at N7AM.

This month, we'll look at three antenna-related items of interest. These will include some simple antennas for getting started on the new 30 meter amateur band; a modification of Lew McCoy's applications program for radiated power level determination; and an interesting new product, the Ameritron RCS-8 remote coax switch.

First, let's look at that newest of ham bands: 30 meters.

CQ Thirty

While amateur radio is truly a dynamic hobby, largely as a result of the accelerating rate of technical change associated with the hobby, some aspects nevertheless have remained fairly constant. One such constant has been the overall h.f. allocation available to U.S. amateurs. For the most part, the last major change in available bands, other than changes as a result of incentive licensing and the removal of Loran from the 160 meter band, was the opening of the then-new 15 meter band on May 1, 1952. This band turned out to be an outstanding one for DX work, although operation on the new band was a disaster at first for many in a number of areas. This was because the burgeoning TV industry was then using a 21 MHz intermediate frequency (i.f.). The close proximity of the TV i.f. to the new amateur band caused grief to many, and almost precipitated an era of open warfare between TV viewers and amateurs.

317 Poplar Drive, Millbrook, AL 36054

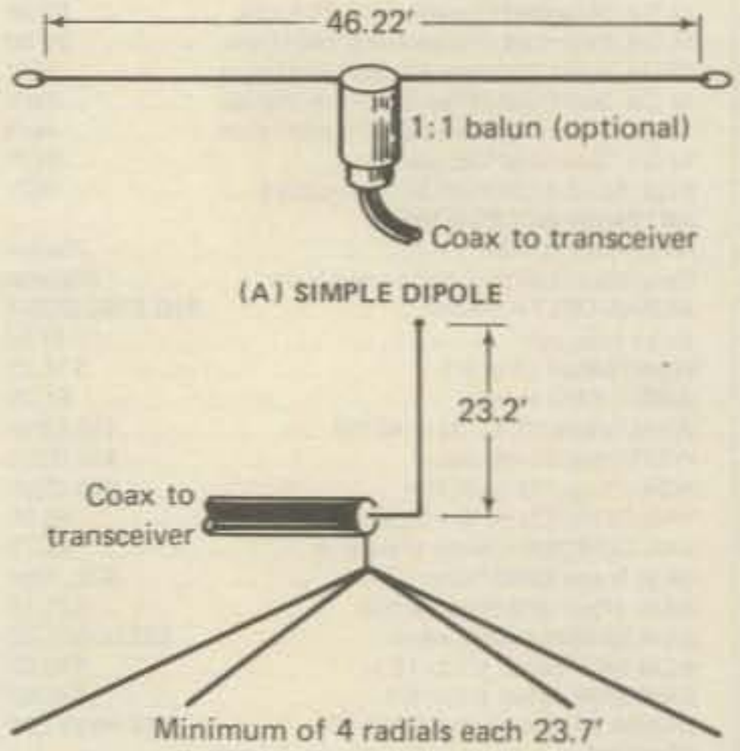


Fig. 1– Antenna ideas for 30 meters. Note: The vertical is shown as a ground plane. However, it may also be mounted at ground level, provided that it has a fairly unobstructed view of the horizon and is removed from nearby power-absorbing obstructions. If mounted at ground level, a ground rod or pipe should be used in conjunction with buried radials.

The opening of the new 30 meter amateur band, available as a direct result of the 1979 World Administrative Radio Conference (WARC) assignment on October 28, 1982, has not generated such major problems. The band promises to be an interesting one that combines much of the propagation characteristics of 40 and 20 meters, possibly favoring the former, as initial indications show. The 30 meter allocation of 10.100 to 10.109 MHz and 10.115 to 10.150 MHz is now available on a shared (secondary) basis to General and higher class operators. A maximum power level of 250 watts on c.w. and RTTY are permitted. Available on a worldwide basis, dozens of countries have already authorized operation, including Australia, Japan, and several European countries. Thus, the DX potential for 30 meters is clearly there.

Of course, not everyone with an h.f. transceiver can operate on the new 30 meter band. Most older tube-type equipment is designed for classic 5-band h.f. operation (80/75, 40, 20, 15, and 10 meters) and may not lend itself to easy, convenient, and cost-effective 30 meter operation. However, many (if not the majority of) solid state designs from about 1980 onwards made provisions for 10, 18, and 24 MHz operation. Most popular Japanese-produced rigs were furnished for domestic use without the budding WARC bands being activated (at least for transmitting). But the bulk of these transceivers require only a slight modification to enable operation on the new bands; generally, these involve cutting a particular jumper wire or similar cosmetic operation. In other rigs, particularly some manufactured at about the time new WARC bands were envisioned but before the exact nature of the frequencies were known (such as the Kenwood TS-180S), operation on the new bands is not so simple. In such gear, special WARC modification kits or boards must be purchased and installed to make various "auxiliary" transceive ranges functional. If you contemplate 30 meter operation, you should check your transceiver's instruction manual and schematic diagram carefully for details on provisions, if any, for operation on the new WARC bands, and then you should contact the manufacturer if more than a simple "clip mod" is required.

As for antennas for 30 meters, the only one of the three new WARC bands currently available for U.S. amateurs, just about anything that has been used is still being used. Generally speaking, whatever types of antennas that work well on 40 meters will work comparably well on 30, as overall band characteristics seem to resemble 40 meters somewhat more closely than 20 meters. Low- and medium-power operation with simple dipoles and verticals is generally quite competitive; even QRP appears to have a chance on 10 MHz.

Antenna dimensions for the new band are reasonable. For example, a half-wave dipole checks in at 46.22 feet overall; a ground plane's vertical radiator is 23.2 feet long, while the radials should be slightly longer, or 23.7 feet. The dimensions for a Delta Loop are somewhat more imposing, with each leg of the driven element 33.1 feet long, and each leg of the reflector 33.9 feet long. Fig. 1 shows some representative, basic 30 meter antenna sketches.

Other simple antenna ideas for those who would like to "test the waters" before becoming involved with complex designs for the new band include using existing single-wire or multiband antennas using tuned feeders. The latter option is particularly attractive, as most multiband dipoles fed with open wire or ladder line through a wide-range transmatch should present little tuneup difficulty on the new band. End-fed Zepps and single

wires should also prove attractive, although there is more risk of encountering an awkward feedpoint impedance and inducing "r.f. in the shack" type problems, common maladies on the other h.f. bands when such antennas are used.

Wire V-beams, Bruce arrays, conventional Yagis, and rhombics are also possibilities suitable for 30 meter use. Custom-designed trap dipoles and verticals offer good possibilities, although few commercial offerings have been seen. However, in the February 1983 *CQ*, Dave Ingram, K4TWJ, presented an excellent overview of the new band, and suggested some interesting 30 meter designs and modifications of existing 20 meter antennas. Also, in the August 1982 *Ham Radio*, Bill Orr, W6SAI, described a simple 2-band 30–40 meter trap-dipole design. Both articles should be of interest to the fledgling 30 meter enthusiast.

The better heeled amateurs—those who happen to sport log periodics that cover 7 or 10 MHz up, such as the KLM 10-30-7LPA, which covers 10 through 30 MHz with an option for the 40 meter band—should be able to work DX first class with no antenna modifications required. On the budget side, the Barker and Williamson model 370-15 broadband dipole (which covers 3.5 to 30 MHz continuously, to include the 12, 17, and 30 meter bands) should allow full 8-band operation, 80–10 meters, with direct coaxial feed and no tuning required when changing bands.

What can you reasonably expect from that skinny slice of 30 meter spectrum that lies just above the WWV calibration mark on your set? Initial indications are that the band shows interesting and exciting propagation characteristics combining elements of both the 40 and 20 meter bands, with a slight tilt toward the former band. The 30 meter band offers both short- and long-path conditions, often on a 24-hour basis. Good ground wave and short skip (1000 miles) are attainable in the daytime, with good long-haul DX paths opening in the late afternoon and evening. Clearly, the band represents a good gap-bridging slot between the 7 and 14 MHz bands.

It should be emphasized that at this writing the FCC's opening of the new band is technically on a secondary and non-interference basis; emission is limited to A1 and F1 modes with a maximum 250 watts input authorized. And, remember that the slot between 10.109–10.115 MHz is "off limits" for U.S. amateurs, being reserved for government operation. One thing conspicuous in its absence, at least for the moment, are contests in the new band. Because current operation is on a secondary basis, International Amateur Radio Union (IARU) societies have agreed that activity-generating contests and other sports-type operation should not be encouraged, at least until the band finally becomes an exclusive amateur allocation on a worldwide basis.

The Ameritron RCS-8 remote coax switch may be tower or mast mounted; the control console is located indoors at the operating position. With a device of this nature, only one coaxial feedline is required to operate several antennas—five in the case of the RCS-8. With the control unit turned off, all antennas are grounded. The system is designed for 120 v.a.c. operation and uses a six-conductor control cable. (Photo courtesy Ameritron, Inc.)

The Ameritron RCS-8

One who becomes involved in the "antenna farming" business will soon discover the high cost of coaxial cable, which can account for a major part of the antenna system's total cost. With a large number of antennas, it may prove worthwhile to use a remote switching device, in which short cable runs are made from the various antennas to a central (usually tower mounted) remote switching box, and a single feedline is used for the long run to the ham shack. These allow for the use of practically any number of antennas, while retaining the simplicity of a single feedline, and with no clutter at the operating position.

Typical units—such as those offered by Drake, Heathkit, Ameritron, and others—accommodate five or six antennas and have provisions for disconnecting all antennas and grounding the feedline at the remote switch location (for safety purposes). Most units require a separate run of TV rotator or similar type control cable from control head to remote switching box to carry operating voltage and switching commands.

The Ameritron RCS-8 is a remote-controlled r.f. switch that may be mounted in several different ways. The system includes an outside switching box and an indoor control head. The switching box may be mounted on a tower leg, mast, or building wall; the hardware supplied will accept a tubular mast up to 1½ inches in diameter. The two units are connected together by means of a six conductor cable (not supplied). The box is weather tight and allows selection of up to five different antennas.

The indoor control head contains the 120 volt a.c. power supply and the switching selector that sends control voltage to the remotely located coax switching box. The front panel of the control head has six green status indicator lamps that indicate which antenna is in use, or that all antennas are grounded (depending on the position of the front-panel selector switch). The switch positions on the control head are numbered on the front panel, and a space is provided above each position so that the operator can pencil-in a designation for each antenna. With the control unit turned off, all antennas are grounded and the main feedline is open circuited. A self-checking feature is provided, in that if one of the green indicator lights is dimmer than the others, or more than one light is lit at a time, a short in the control cable is indicated.

The RCS-8 boasts less than 0.2 dB claimed insertion loss below 50 MHz, a v.s.w.r. of under 1.05:1 under 30 MHz, and a power capability of 2000 watts p.e.p. High-quality gold flash and silver cadmium oxide relay contact materials are used in the remote unit, which is rated for a minimum of 100,000 operations. RCS-8 specifications are given in fig. 2.

Is use of a remote switching device advisable in your situation? Generally, the decision to use a remote switching scheme depends mainly on economics. Considerations include the number of antennas to be used, their location, cable cost and lengths required, and the cost of the switching device itself. In some cases, it's almost mandatory to use the remote switch, since an undesirable shack location might otherwise be dictated when long, multiple feedlines are required. A potential drawback to remote switching schemes is the possibility of relay box malfunctions due to moisture or electrical failure.

Number of antenna positions: 5 (each grounded when not in use)
Loss at 50 MHz: Less than 0.2 dB
V.S.W.R.: Under 30 MHz—1.05:1 or less
Under 150 MHz—1.30:1 or less
Impedance: 50–75 ohms
Power handling capability: 2000 watts p.e.p.
Relay contact materials: ⅛" fine silver (gold flash); 3/16" silver cadmium oxide
Life expectancy:
Mechanical—10,000,000 operations
Electrical—100,000 operations at rated power and with proper operating procedures
Antenna change timing: 21 MS nominal, 30 MS maximum
Operating temperature range: −45° C to 80°C
Power requirements: 120 VAC, 50/60 cycles
Price class: $130

Fig. 2– RCS-8 switch specifications.

The MFJ multi-sensor s.w.r./peak-reading wattmeter lets one monitor s.w.r. as well as peak or average power, for h.f., v.h.f., and h.f./QRP rigs. Several plug-in sensors are available that allow power monitoring from 2 to 2000 watts full-scale forward power from 1.8 to 175 MHz. (Photo courtesy MFJ Enterprises, Inc.)

Radiated Power Determination

The FCC has proposed radical changes in its maximum power rule (97.67). This change redefines transmitting power in terms of peak envelope power (p.e.p.) output, rather than in terms of power input. Proposed by the Commission is a power limitation of 1500 watts p.e.p. maximum output. Adoption of the new standard of measurement will not significantly affect most amateurs using modes such as c.w., s.s.b, and RTTY. However, classic double-sideband a.m. will be affected, due to the nature of the a.m. modulation envelope, meaning that at 1500 watts p.e.p. the maximum authorized a.m. carrier power level output would be 375 watts, since the p.e.p. of a conventional a.m. signal at 100% modulation is four times the carrier power. Assuming a final amplifier efficiency of 75%, maximum input power would be about 500 watts. A special five-year "grandfathering" period would cushion the impact, allowing 1 kw input. However, after that period the new definition for maximum power would apply to a.m. as with other modes, possibly crimping the style of some 75 and 10 meter a.m.'ers.

In the February 1983 issue of *CQ*, fellow author Lew McCoy, W1ICP, explained the power rule changes, the problems of accurate r.f. power measurement, and how to comply with the new rules. Lew pointed to the problems of measuring s.s.b. using the long standard "average power" definition, as well as the problems of determining peak power with commonly available meters. Also explained was the fact that while the new 1500 watt p.e.p. output standard does not solve all of the measurement problems, it does come close for the reason that 1500 watts p.e.p. output is the same whether it be p.e.p. of c.w, s.s.b, a.m., RTTY, television, or whatever. Thus, for most amateurs the redefinition of power measurement is beneficial and simplifies power determination. It also makes administration of the rules by the FCC an easier and even safer proposition.

From this point we get into a sticky wicket, because the next question invariably revolves around the proper relationship between forward, reflected, and "true" radiated power. If there is other than a 1:1 s.w.r. on a transmission line, where does the so-called reflected power go if it is not radiated? Many take the position that s.w.r., and hence reflected power, really doesn't count, and that all of the forward power in a transmission line (minus any line losses, of course) is radiated, regardless of s.w.r. As Maxwell and others have suggested, reflected power is real.

Although no longer offered, the Swan/Cubic WM-2000A peak-reading wattmeter is representative of devices that allow one to get a "handle" on transmitted peak envelope power (p.e.p.). The unit measures forward power to 2000 watts, as well as s.w.r. (Photo courtesy Swan Electronics)

Thus, the result is when there is a mismatch on the transmission line, the r.f. power bridge will indicate a certain forward power, and when switched, a corresponding reflected power. The actual, or "real," power output can be considered to be the difference between these two power readings.

As an example, in a situation where the forward power reading on a coaxial transmission line is 1666 watts at an s.w.r. of 2:1, the reflected power is about 166 watts. The difference, 1500 watts, is the "true" radiated power, neglecting, of course, feedline and other small losses. From this example it can be seen that in order to get "the mostest" into the transmission line and antenna in light of the new standards, one should tune up (in this example) for a forward power reading of 1666 watts when the s.w.r. is 2:1; this yields a true r.f. output of close to 1500 watts.

Needless to say, if one is to work very close to the maximum authorized power level, an accurate peak power meter is a necessity. Obviously, in s.s.b. operation bridge and meter movement response time vary widely. As a result, obtaining a 100% accurate p.e.p. reading on voice is virtually impossible, so it's wise to stay under the permissible p.e.p. limit to allow for such variances.

In the W1ICP article in February 1983 *CQ*, a Basic language computer program was presented for conveniently determining reflected power. I have modified that program somewhat for operation on a Commodore 64 computer and to provide a printer routine. The program enables one to input the forward power level

```
100 REM *** CBM-64 REFLECTED POWER
110 REM *** BY LEW MC COY, W1ICP
120 REM *** CQ, FEBRUARY 1983
130 REM *** CBM-64 BY K. THURBER, W8FX
135 PRINT"□"
140 POKE 53280,1:POKE 53281,1:PRINT"■"
150 PRINT"□"
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 OPEN 4,4:PRINT#4
960 PRINT#4, ""SPC(18)"< FORWARD POWER IS";F;"WATTS >"
970 PRINT#4:PRINT#4
980 PRINT#4,"    VSWR";SPC(12)"REFLECTED PWR (W)";
982 PRINT#4,""SPC(9)"TRUE RAD PWR (W)"
985 PRINT#4
1000 REM *** CALCULATION
1010 FOR V=1TO VM STEP S
1160 R=F*((V-1)/(V+1))*((V-1)/(V+1))):T=F-R
1170 PRINT#4, CHR$(16)"04"V;CHR$(16)"22"R;CHR$(16)"48"T
1180 NEXT
1190 CLOSE4
1200 PRINT"□"
1210 END
1215 REM *** PRINTER LISTING ROUTINE
5000 CLOSE4:OPEN4,4:CMD4:LIST
5010 PRINT#4:CLOSE4

READY.
```

Program Notes—Special Commodore characters (above)

1. Line 140—PRINT statement sets text color to black and border/screen poke to white for good readability. Hit "Commodore" key and "1".
2. Lines 150 and 1200—Clear screen. Hit "shift" and "clear".
3. Line 170—Reverse field on. Hit "control" and "9".
4. Line 170—Revese field off. Hit "control" and "0".

Fig. 3– CBM-64 program listing.

```
                < FORWARD POWER IS 1500 WATTS >


VSWR            REFLECTED PWR (W)          TRUE RAD PWR (W)

 1                    0                          1500
 1.1                  3.40136055                 1496.59864
 1.2                  12.3966942                 1487.60331
 1.3                  25.5193488                 1474.48015
 1.4                  41.6666667                 1458.33333
 1.5                  60.0000001                 1440
 1.6                  79.8816569                 1420.11834
 1.7                  100.823045                 1399.17696
 1.8                  122.44898                  1377.55102
 1.9                  144.470868                 1355.52913
 2                    166.666667                 1333.33333
 2.1                  188.865765                 1311.13424
 2.2                  210.9375                   1289.0625
 2.3                  232.782369                 1267.21763
 2.4                  254.325259                 1245.67474
 2.5                  275.510204                 1224.4898
 2.6                  296.296296                 1203.7037
 2.7                  316.654492                 1183.34551
 2.8                  336.565097                 1163.4349
 2.9                  356.015779                 1143.98422
 3                    374.999999                 1125
```

Fig. 4– CBM-64 program sample output.

and the maximum s.w.r. to be considered, and to display both reflected power and "true" radiated power for various increments of s.w.r. Thus, the relationships between s.w.r., forward power, and reflected power are easily seen. One can then determine the actual forward power level to which to tune-up, in order to yield a given output under known s.w.r. conditions. The program is easily modified to run with other Commodore computers, such as the VIC-20 and PET, and shouldn't be too difficult to rework for other Basics. Fig. 3 shows the program listing, while fig. 4 provides a sample program output. The example chosen uses a forward power of 1500 watts and s.w.r. from 1:1 to 3:1 in 0.1 s.w.r. unit increments.

The several s.w.r. and reflected power articles listed in this column's bibliography should provide suitable grist for the s.w.r. buff's mill!

Wrapping It

This month in *CQ*, we suggested some simple antennas for the new 30 meter amateur band. We also highlighted a new accessory product, the Ameritron RCS-8 coax switch. Finally, we discussed radiated power determination, including a power-level program suitable for use with the Commodore 64 computer. Next month, we'll examine several additional antenna topics. See you then.

73, Karl, W8FX

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DXPEDITION TO HEARD ISLAND

BY MICHAEL HUDGENS*, W6YQ

If you didn't make Visalia or Dayton this year, then you missed out hearing first-hand about the DXpedition of the year, Heard Island. W6YQ (Editor of the SCDX Bulletin) fills us in on the trials and tribulations of Jim Smith, KV9NS/VKØJS, before, during, and after his February 1983 DXpedition.

The ever-popular Heard Island penguins parade before the camera.

Two days before Jim Smith left Heard Island, the winds began to intensify, making eerie music that sometimes sounded like a great choir humming a requiem. The kitchen shelter housing the radio stations trembled and began to vibrate. Gusts jolted the building, lifting it off the ground every few seconds. Had it not been tied to stakes, the entire structure—with people, ICOM transceivers, and provisions inside—would have been rolled right down into Atlas Cove.

Smith looked out at the cove, which had turned into a menacing seascape of whitecaps that stretched to the horizon, and thought about words of a 1948 Heard Island visitor:

> *Start with Atlas Cove; you may think it's the posterior end of the universe, but, believe me, it's nothing compared to the rest of the place.*

Anchored in the cove was *Cheynes II*, going through the three-hour process of getting up steam. When Smith learned that the barometer had fallen from 1013 to 970 in two hours, he realized his expedition to Heard was probably drawing to a close.

Violent weather, of course, is one of the costs of doing business in the *Screaming Fifties*, that belt of southern ocean around the fiftieth parallel where there are no landmasses to obstruct the westerlies. They blow almost all year round, and when storms stir things up, the power of the winds is beyond belief.

A few weeks later, Smith was describing these events to a group in Los Angeles. "You've heard of the bottom dropping out of the glass? That's what happened. I've seen a lot of weather, but never anything like that. We thought we'd be be able to get aboard the boat and took some stuff down to the beach, but in just minutes things went from bad to worse. My wife, Kristi, VK9NL/VKØNL, was knocked flat on her back. Needless to say, we couldn't board *Cheynes II* (it was impossible) so we spent another very uncomfortable night on Heard Island."

An outside cold view of the shack.

The next morning they made it.

"Our skipper and the skipper of the *Anaconda* (the vessel that transported the IDXF group to Heard) had agreed that if the weather did get rough and help was needed, they would work together, which they did. We picked up Al, K8CW/VKØCW, and Dave, VK3DHF/VKØHI, and their gear, while *Anaconda* picked up our mountain climbers at Mechanic's Bay. It was a 50-50 situation."

Until that time, the weather on Heard had been relatively calm. "We were very lucky," Smith said. "But make no mistake. It's a hell of a place and a hell of a trip. There's no way you can beat the 5,000 miles of sea, no way to beat the

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Roaring Forties and the *Screaming Fifties*. If you don't get to Heard by January—February at the latest—you don't want to be there. Like the man said, 'Beware the Ides of March.' Anything outside the time slot is impossible. I'm not saying you couldn't go down in July and find a week of glorious weather, but the risks are monumental."

Smith was late getting to Heard, and while the weather did not work against him, propagation did. "It was heartbreaking," he said, "but still we managed to make 14,500 QSOs with 138 countries. We had the first satellite QSO from Heard, the first RTTY contact, and Kristi conducted the first YL operation."

There were four stations. "We had three operating positions in the kitchen shelter. The walls were unlined, and it was cold and drafty. The fourth station, where we did RTTY and satellite, was apart from the others. We had four generators. I owe a debt to Tony, VK2AHG, who was also VS6AG, for the ingenious coding system he devised for our TH3. Everything was labeled, and I put it together in about five minutes. We got right on the air and started making contacts. We also had three elements on 15 and three on 10, but we didn't do much on those bands. In all, there were only 150 QSOs on 10 meters. We had more on 15, but only a half-dozen were with the U.S. No propagation. On the other side of the coin, 40 meters was good—really good."

Smith had journeyed to California to speak at the International DX Convention at Visalia. From there, he would go on to Dayton. The Visalia crowd warmed up to him almost immediately.

"I worked my sixes over the long path at 1600 Zulu," he told several hundred DXers packed into a banquet room, "because I can remember when I was a G, you sixes coming over the top of my head, getting into the southern Indian Ocean. My original call was G3HSR, which I recently passed down to my eldest son. I've been licensed since 1947 and have spent most of my amateur radio life being a DXer. I cut my teeth on W6AM, W6DZZ, and VQ4ERR. In those days it seemed to me that DXing was fun. It was a much more casual endeavor. I built all my own equipment. I went on s.s.b. in 1949 and never returned to a.m. I've nearly always been DX—VS1, HZ1, 9M8, T3, C21, H44, ZM7. As P29JS I made more than 75,000 QSOs."

Smith then asked the audience to bear with him. "I have something to say regarding the mounting of two expeditions to Heard Island, with tremendous duplication of effort, with tremendous duplication of expense. The funding of an expedition to Heard Island is astronomical. Six figures are so quickly reached that you'll find yourself without even a bag of beans to eat down there."

He told of his early attempts to activate Heard: the ill-fated VKØRM effort when a TS-120S gave up the ghost after 65 contacts.

"That's when I started down the road to Heard. In those days I worked for the Australian government in Papua, New Guinea, and had some influence. I pulled strings to get on the *Cape Pilar*, which was going to Heard Island. Australia wanted to restate their claim on Heard, having abandoned it in 1951 for the slightly easier climate of the Antarctic continent. That doesn't say much for the weather on Heard, or the scenery, or the fauna and the flora. You can eat the Kerguelen cabbage. It's not bad; a sort of hot, mustardy taste. You want to leave the seals alone, though. They're pretty smelly things and not exactly friendly, either. When the weather gets bad, the elephant seals knock down the doors of the shelters and come in. Then they tear up the place. Tins and tins of food are absolutely ruined. No, it's very cold and miserable on Heard , and the Australian government found that could do all their scientific experiments on the Antarctic continent."

Passage to Heard was the big obstacle, Smith said. He did not get berth on *Cape Pilar*, and the Dick Smith *Explorer*, on which he had next pinned his hopes, went to the Antarctic instead of Heard.

In April 1982, first at Visalia and then at Dayton, the news broke that a mountain-climbing expedition to Heard was in the works, and amateur radio had been invited, providing it paid its way. Smith heard the news on the air.

"I said , 'Fair enough; somebody else can do it. I haven't done it, so let them.' And because of my contributors, I felt I should get into print, which I did very quickly."

His comments appeared in the Australian publication *Amateur Radio Action*. The author of the article said he had the documents in hand that proved Jim Smith had done a great deal of work toward a Heard Island expedition, and the only hindrance remaining appeared to be raising money for a charter and equipment.

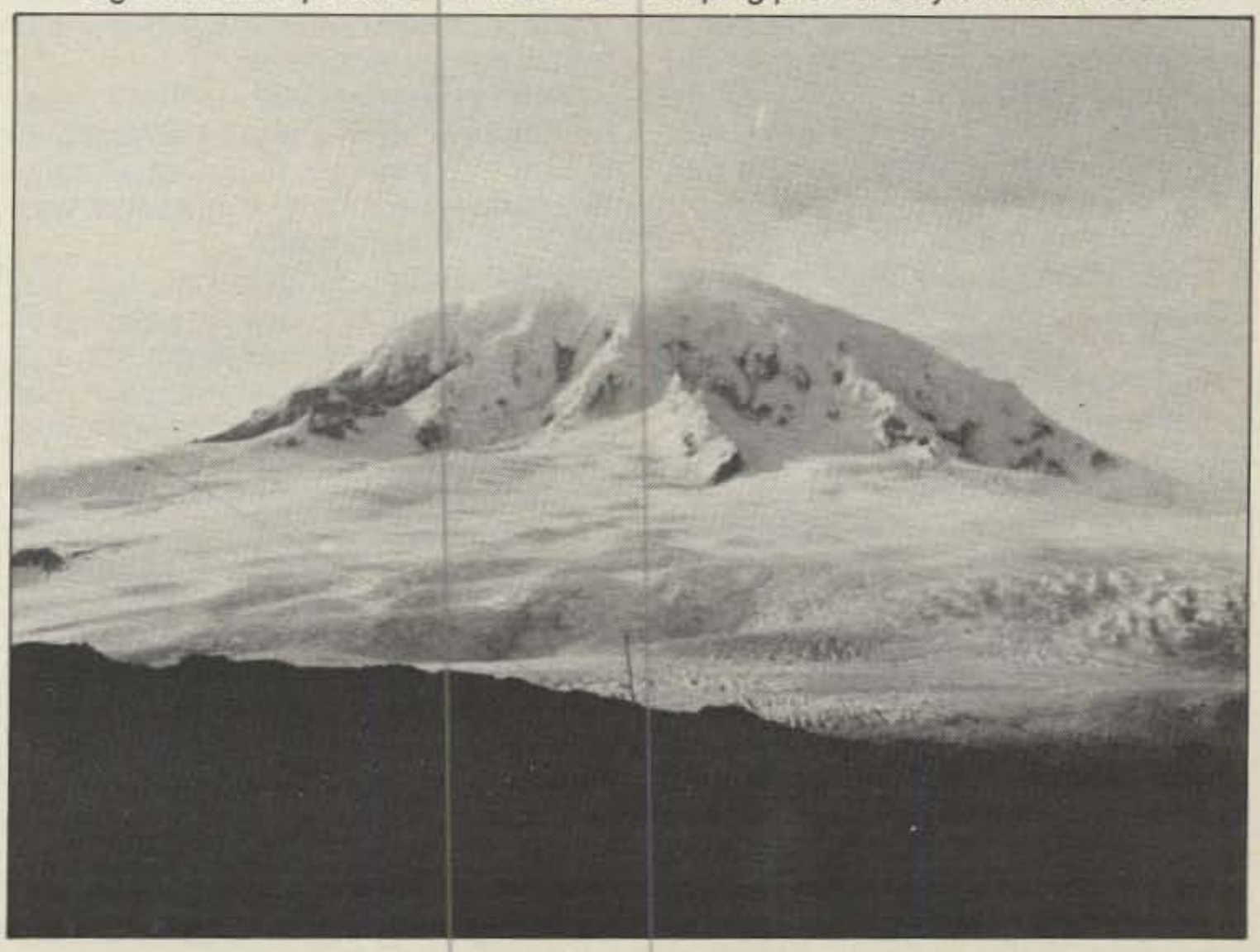
"I pointed out—in frustration, of course—that if the Northern California DX Foundation had offered me $10,000, or the International DX Foundation had offered me $10,000, or the Wireless Institute of Australia had offered me $7,000, I would have *gone* to Heard and *been back* already."

In the story Smith said that he was going to withdraw, that funds would be returned to contributors, "and in that way the indiviual can decide." Smith's Heard Island DX Association, HIDXA, would stand aside, he wrote, and "allow another group to activate Heard Island."

But after seeing the story in print, Smith changed his mind. Along with his comments were statements from members of a group calling themselves the VK6 DX Chasers Club. Not only was it made clear that Smith had been excluded, but they were pouring salt into his

Aboard the Cheynes II, *from left to right are Jim Smith, VKØJS, Kristi Smith, VKØNL, Walter Flor, OE1LO, Sjoerd Jongens, VKØSJ, and Bob Walsh, WA8MOA.*

Big Ben is an apt name for this cloud-scraping promontory on Heard Island.



The banner proclaims the official operating position of the Heard Island DX Association. Jim and Kristi Smith, VKØJS and VKØNL, operated from a prefab shelter.

These permanent residents of Heard Island tend to become unwelcome house guests during bad weather.

wounds as well. One such remark, unattributed : "Jim's planning wasn't all that advanced and he thus would not have had that much to offer anyway."

"Nobody telephoned me," Smith said at Visalia. "Nobody wrote me; nobody asked me anything. I don't own Heard Island, but I have in all honesty put a hell of a lot into it. I had no help from major organizations. My application for financial assistance on Heard Island had been on file with the Northern California DX Foundation since 1980, but they decided for reasons better known to themselves to now join forces with IDXF. These are donations we're talking about, and somebody has decided to put himself on high and choose which expedition to support. There's one-upmanship at work here, and it's putting DXing into a kind of spiral, a maelstrom. Maybe there are many good reasons for not supporting a Jim Smith effort. I simply feel that decisions must be *objective*, and I don't think they have been."

What finally pushed Jim Smith into making this costly trip to the United States were the scores of falsehoods that were heard on the bands about his Heard Island endeavors. "It takes a long time to build up a reputation, and a reputation can be ruined very quickly. I've seen various people come and go. I've seen the character assassination that takes place when things don't go right. I've also seen a lot of really good blokes go under due to situations they got themselves into. I'm not one of these people, and I came here to assure everyone of that. There are those putting out poison of a type I don't think I've come across in amateur radio. If they want to get at Jim Smith, fine—that's one thing—but not the 16 expeditioners who went to Heard. Not our scientists, or our four mountaineers who flew all the way from Austria. What I want to assure everyone is that we did not go to Heard in an irresponsible way. We did everything humanly possible to make sure the vessel was suitable. We paid a fee to an independent surveyor and master mariner to inspect *Cheynes II* and he found her to be, he said, 'adequate for the proposed voyage.' That's documented."

The worst of all, he said, was when he got back from Heard. "I was met by VK6MK, whom many of you know. He urged me to show him our logs immediately because the word was out that we'd lost our logs. What could be more terrible than a radio expedition that comes back with no logs? You might send them your card, but you wouldn't enclose a check, would you? Anyway, VK6MK authenticated our logs."

Their vessel encountered problems, especially on the return voyage when they had to resort to sailing to conserve their dwindling fuel supply and could only average 2.34 knots an hour. "We were going so slow at one point," he said, "that a penguin walked aboard. The albatross got bored with us. Instead of circling, they sat down on the water and waited for us."

What went wrong was very simple, he said. "The vessel consumed far too much fuel. But, not only that, it's a steamship and they didn't carry enough water. We only had power three hours a day. The whole ship was cold and dark."

The charter for the craft was $60,000. "The remaining funding was to fuel *Cheynes II*, and Kristi and I put up $23,000 for the fuel. We hope to get some of that back from philatelic covers we're selling for $5, and we also have a two-hour documentary on the expedition that should bring in something."

Smith asked the DXers to make a distinction between his expedition and that of IDXF: "We went to Heard as an amateur radio expedition. Our expedition was driven by amateur radio."

Those who made donations, he said, "got an expedition to Heard consisting of five radio amateurs, five scientists, and four mountaineers. Amateur radio was frustrating due to band conditions and the sharing of the bands with the other group, a situation never envisaged. But we set a few records. The scientific achievements on Heard were considerable, and the weather allowed activity for study and collecting of specimens on most days. However, the same weather frustrated our mountaineers, who pioneered a new route to the top of Big Ben, but spent four days—six hours from the top—waiting for a cold spell. The mountain was very treacherous with severe avalanche conditions. They were beaten by the weather, and now they say they want to go back next year. I think we'll help them with logistics and possibly send an operator with them."

Walter Marshall, W7SE, and Bob Walsh, WA8MOA, flank the Director of the Antartic Div. in Hobart prior to departure. Sjoerd, "Sojo," is on the right.

Smith was asked if he'd go again.

"If I did, and I'm not saying I would—but I might—I'd take a three or four-element phased vertical array on 40 meters, because that's the band where the work is going to be done. Forty is it—the right place."

Postscript

With regard to the questionable seaworthiness of the *Cheynes II*, as was brought up recently at the Dayton Hamvention, *CQ* is in receipt of a preliminary survey of the ship by Fred G. Christie (Capt.) Master Mariner and Surveyor. Reading through the four-page report one does come away with the feeling that we are not dealing with the newest and best-fitted ship. However, Capt. Christie did assure the HIDXA that the ship has sailed those waters for years, was in the midst of being refitted and would carry more than enough fuel and water to make a safe journey. Everything that would be required by maritime law would be provided. Obviously Capt. Christie was right, as the DXpeditioners made it there and back safely. —*K2EEK*

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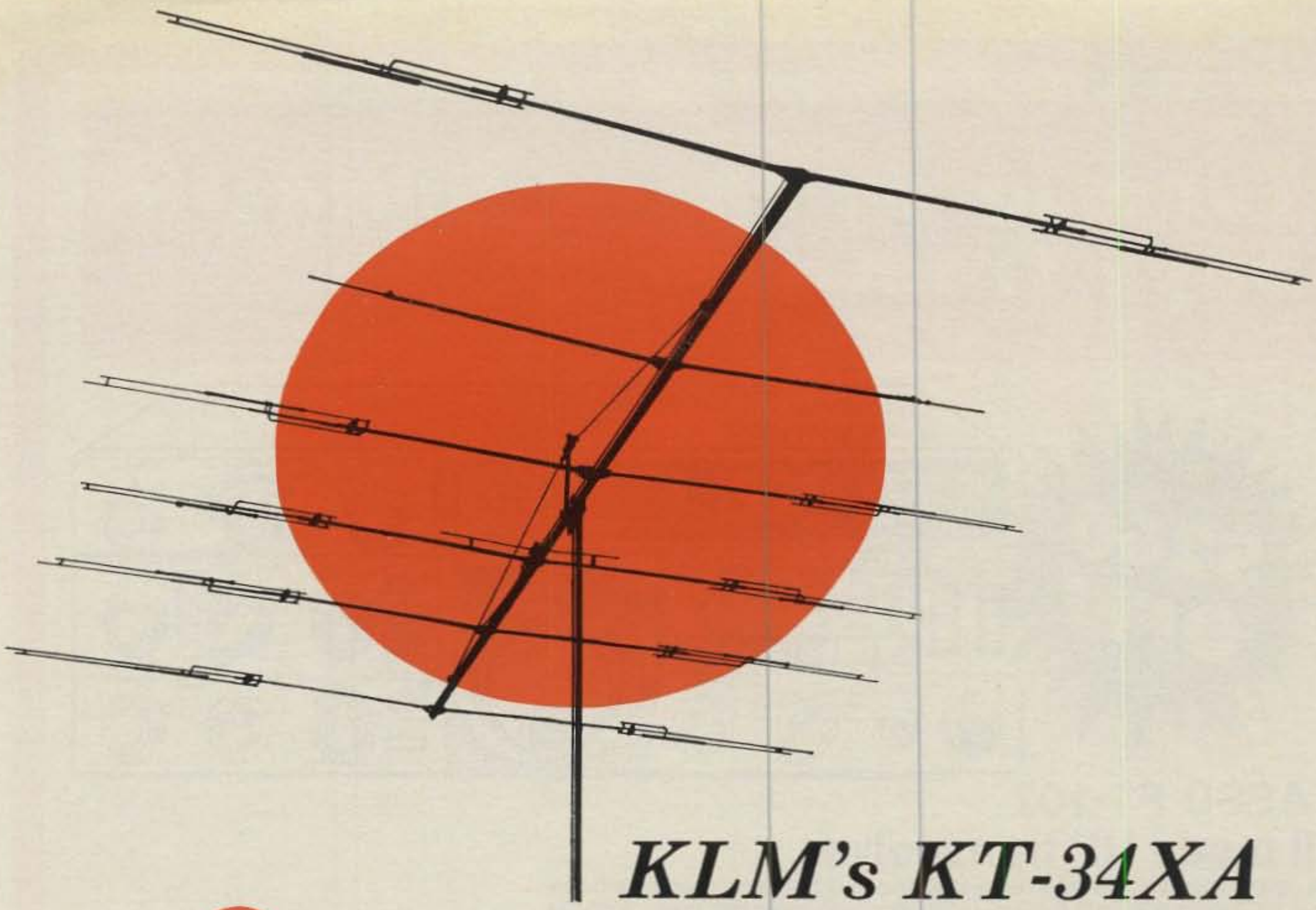

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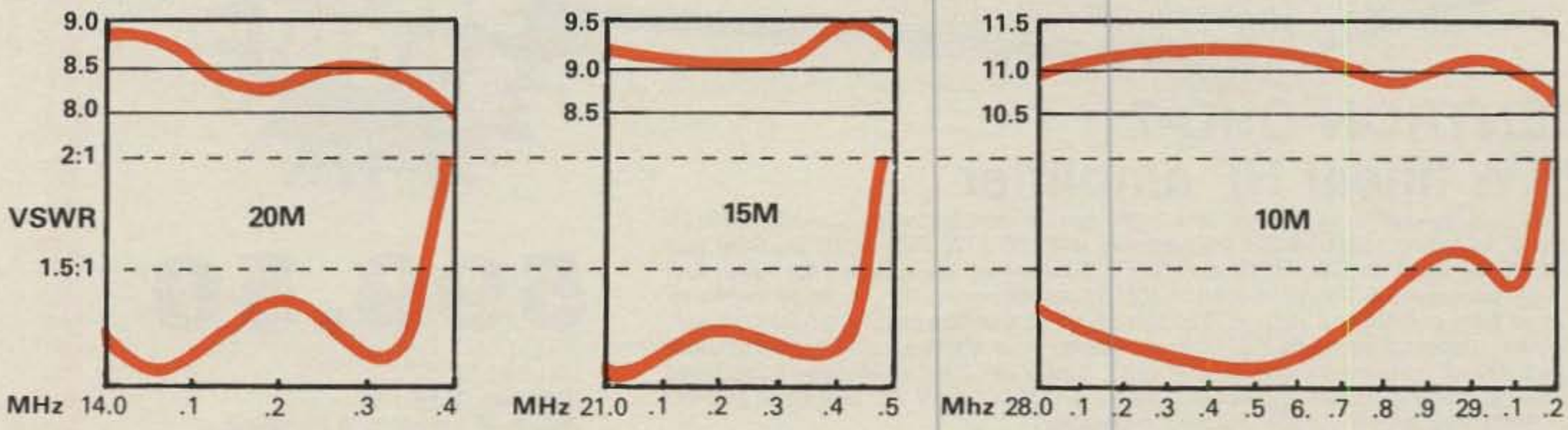

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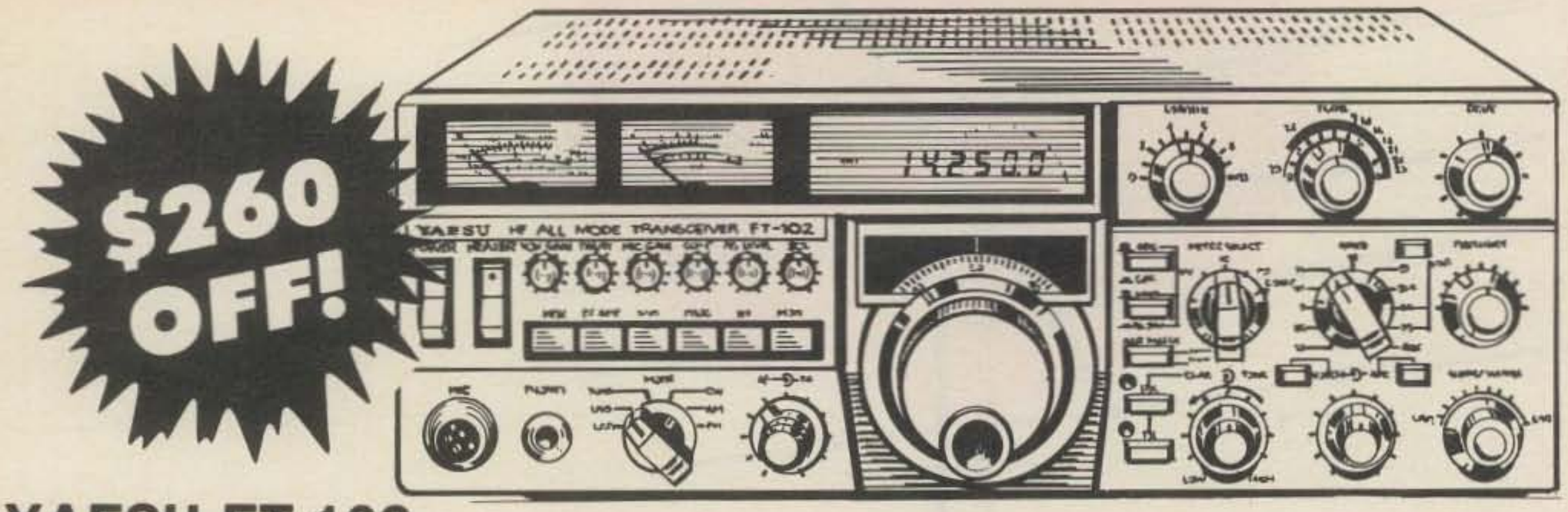

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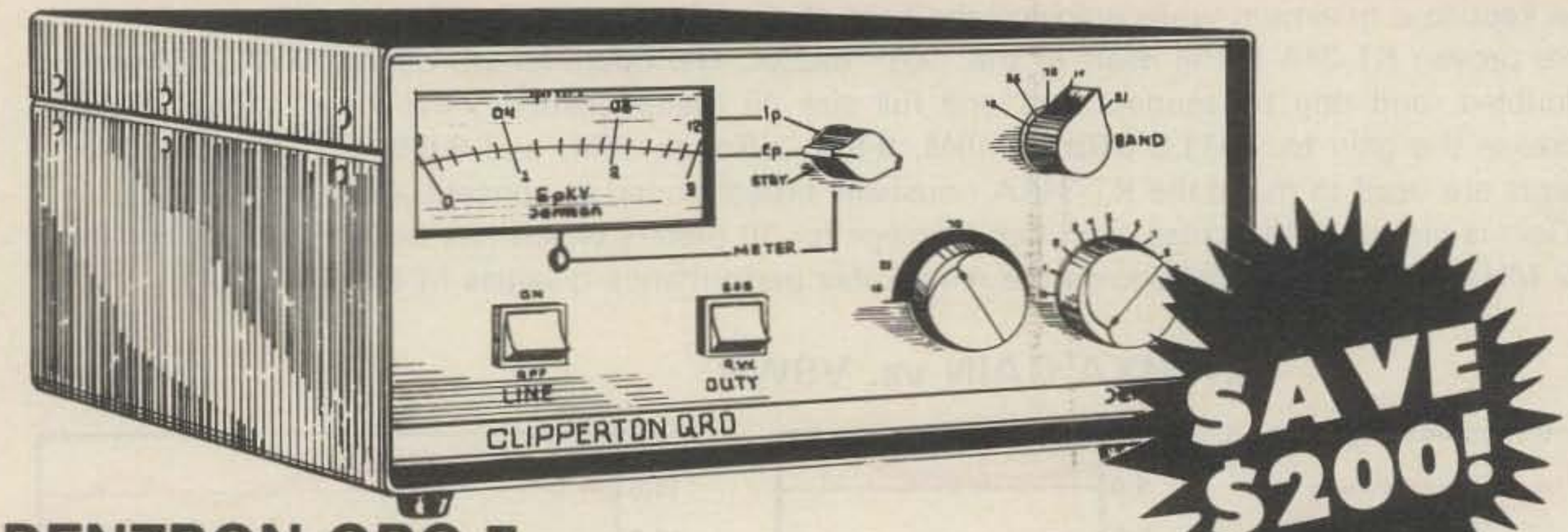

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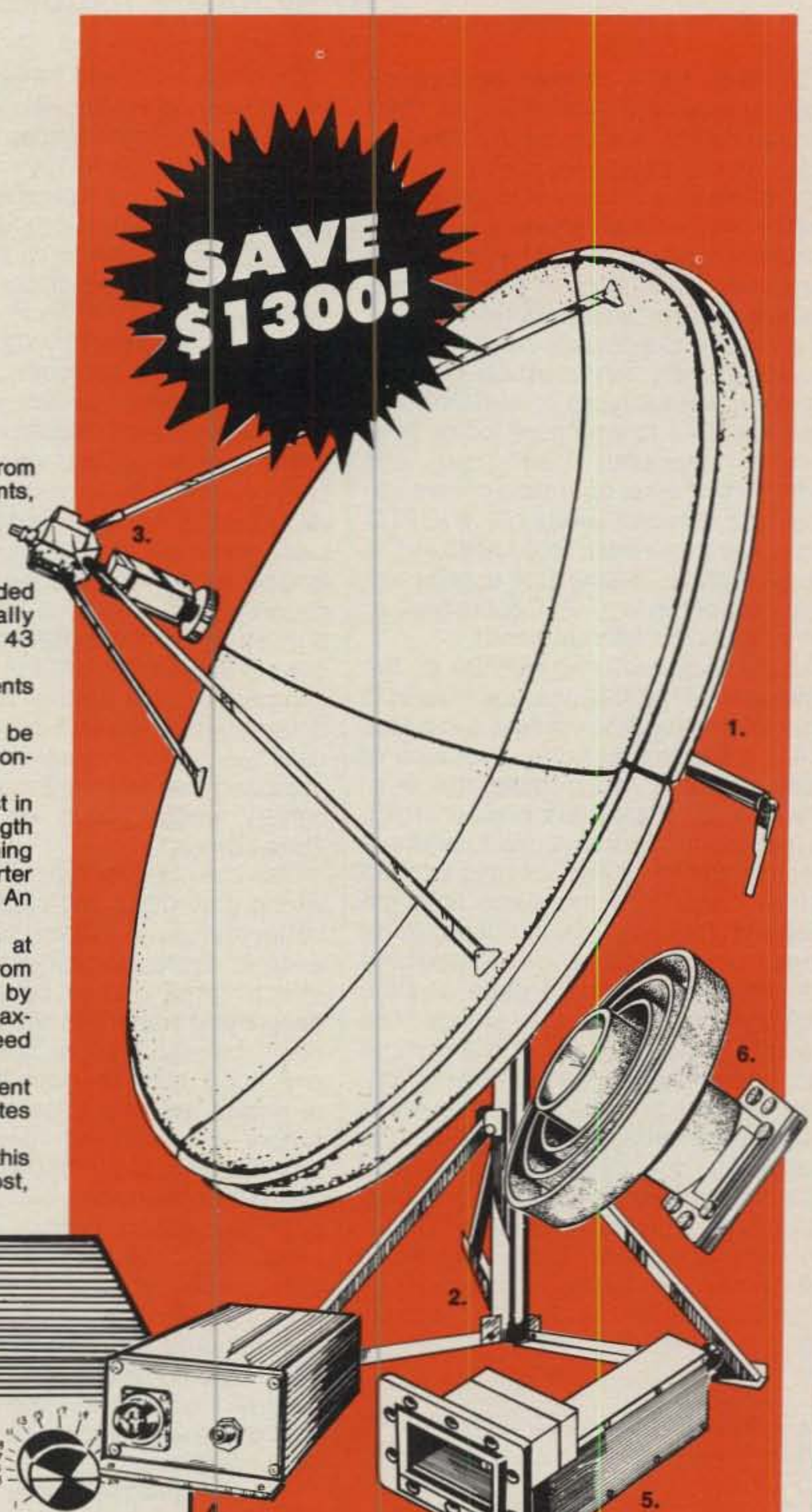

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We all use them and probably give very little thought as to how they work. WA1PZQ gives us the ins and outs of the lead-acid (car) battery and how to use one safely around the shack.

Living With The Lead-Acid Battery

BY MICHAEL S. DROOKER*, WA1PZQ

The need for a reliable emergency power supply, the availability of solid state radio gear, and the desirability of a ripple-free d.c. power source have combined to make storage batteries a reasonable choice for an amateur radio station power supply. The most readily available battery, and likely the most cost-effective one for amateurs (in terms of energy stored per dollar expended) is the lead-acid battery. In this article I will describe the various types of lead-acid batteries available to amateurs today, their operating principles, their "care and feeding," and other operating considerations I have found useful. At WA1PZQ lead-acid batteries are being used as the energy storage element of a solar-cell power supply in a U.S. Department of Energy demonstration project.[1]

All lead-acid batteries operate on the same principle. A fully-charged lead-acid battery contains plates of lead and plates of lead oxide immersed in a solution of strong sulphuric acid called the electrolyte. When the battery is discharged, the lead plates are converted to lead sulfate, and electrons are released into the external circuit. At the same time the electrons returning to the lead oxide plates from the external circuit combine with the material on the plate and the electrolyte to produce lead sulfate. The strength (concentration) of the sulfuric acid decreases as the battery is discharged. Charging the battery reverses the chemical reactions and increases the strength of the electrolyte. The total capacity of the battery in terms of energy stored is determined by the amount of active material present. The rate at which energy may be extracted from a battery is determined by its design and construction.

*RFD Witchtrot Road, Sanbornville, NH 03872

[1]This article was prepared with the support of the U.S. Department of Energy, Grant No. DE-FG41-80R110380. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author and do not necessarily reflect the views of DOE.

Common lead-acid batteries fall into two distinct categories according to their intended use. **Engine starting** batteries are designed to deliver a high current for a relatively brief period of time, after which they are immediately charged up to full capacity in preparation for the next starting cycle. This type of operation cycle typically uses only a fraction of the total energy stored in the battery, and the battery is designed and constructed to optimize the energy delivered during the brief, high-current starting load.

The second general type of lead-acid battery commonly available is the **deep cycle**, or motive, battery. It is designed to deliver moderate amounts of current for long periods of time. During this so-called deep cycle, in excess of 80% of the energy stored in the battery may be delivered to the load before the battery is recharged. Such a battery is constructed differently from a starting battery and usually has thicker, denser, stronger plates of active material than those of a starting battery whose plates are thinner and more porous.

The use of either type of battery in the wrong duty cycle will cause premature battery failure. A starting battery used in a deep cycle application will lose its effectiveness in about 50 cycles, while a deep cycle battery in the same service could be expected to operate well for over 200 cycles. The selection of the type of battery will therefore depend on the proposed use at the individual station. For example, at WA1PZQ, a small solar-cell panel charges a set of deep cycle batteries during periods of sunshine. Most of my operation is at night so that a considerable amount of energy may be extracted from the batteries before they are recharged the next day. This coupled with the fact that successive cloudy days may further increase the time between charges makes the deep cycle battery the appropriate choice for my station.

An appropriate-size deep cycle battery would be the proper choice for any station desiring to establish an emergency communication capability with storage batteries also. However, it is possible that a storage battery might be used as a substitute for a high-current d.c. supply at a station which uses an r.f. amplifier. In this use, a low-current d.c. supply would power the receiver while float charging the battery. When the transmitter is keyed, the high current required for the amplifier would be supplied from the battery. The low current supply would require appropriate current limitation and voltage regulation to be compatible with the battery. I have not worked out the details for this application, but it would be a case where the starting type of battery would be more suited to station operation than the deep cycle type.

The choice of which type of battery to use at an amateur station likely will depend as much on the economic realities as on the battery duty cycle. Anyone who is able to obtain good used automobile batteries at a nominal cost will be able to keep his station on d.c. power inexpensively, albeit by changing batteries often.

Battery capacity is rated in **ampere-hours** at a certain discharge rate — usually the 20 hour rate. This means that an 80 ampere-hour battery will deliver 4 amps for 20 hours if it is working to capacity. However, the energy delivered from a battery is determined by the rate of extraction: the faster you extract, the less is available. Consequently, the 80 ampere-hour battery will *not* deliver 80 amps for 1 hour, but it will deliver in excess of 2 amps for 40 hours.

Battery capacity is also a function of temperature. After a normal charge, a 75 ampere-hour battery rated at 70°F will perform like an 80 ampere-hour battery at 140°F and like a 30 ampere-hour battery at −40°F. This is of importance when designing battery systems for locations which suffer temperature extremes (such as mountaintop repeater sites). Battery manufacturers supply curves of capacity versus discharge rate and capacity versus temperature to aid in the design of power supplies suitable for their projected use and operating conditions.

Whatever the size and type of lead-acid battery used, its installation and care considerations are the same. Here is where some of the drawbacks of lead-acid batteries become apparent. *Batteries are hazardous.*

A fully-charged lead-acid battery may contain 38% of its weight in liquid electrolyte, sulphuric acid. This acid in the

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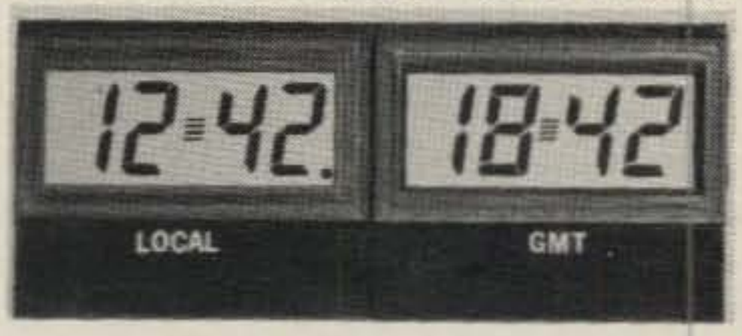

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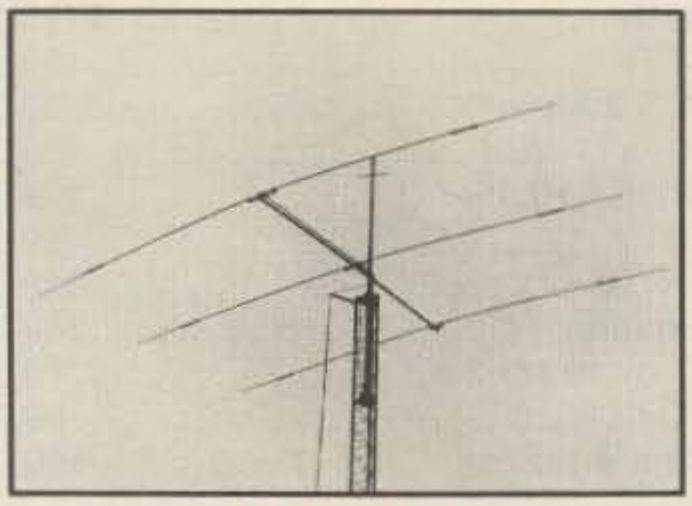

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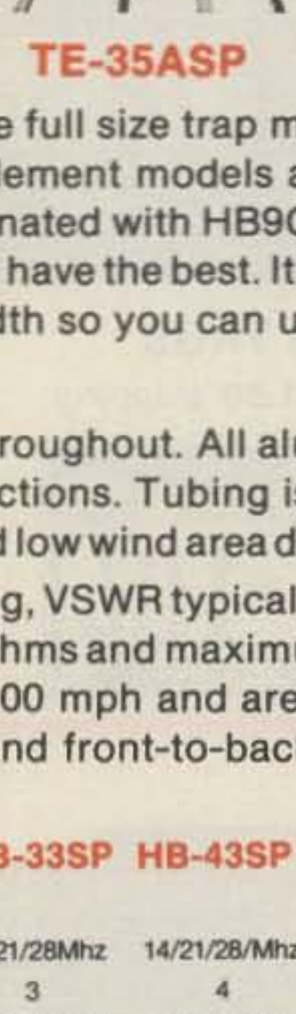
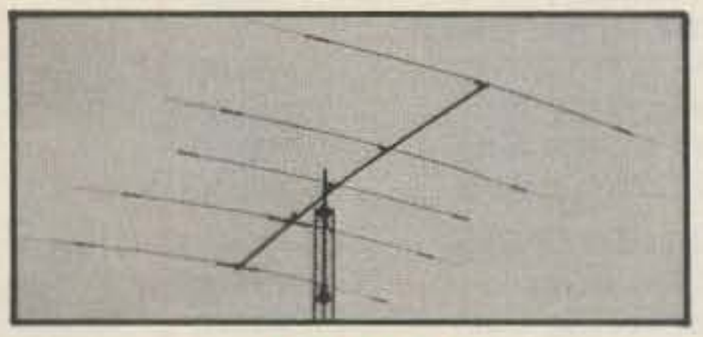


TE-35ASP



HB-35T

TET Antenna Systems presents three full size trap multiband beams to meet every amateur need. 5 element, 4 element, and 3 element models all with the exclusive TET dual phased drive. This famous drive system originated with HB9CV and was perfected by JA3MP. When you buy TET dual drive you know you have the best. It has more gain - just like adding another parasitic element. And wide bandwidth so you can use your solid-state transceiver on both phone and CW without a tuner.

Only the highest quality materials are used throughout. All aluminum tubing is 6061-T6 alloy. Stainless steel fasteners are provided for all electrical connections. Tubing is cut and predrilled to precision tolerances for easy one afternoon assembly. Light weight and low wind area designs permit use of simpler support structures.

All models feature full 3 Kw PEP power handling, VSWR typical 1.5 or less across *all* of 20, 15 and, on 10 meters, from 28.0 to 29.2 MNz. Drive impedance is 50 ohms and maximum element length 27'. They accomodate masts from 1½ to 2" diameter, withstand winds to 100 mph and are furnished complete with a low loss balun that easily withstands full rated power. For gain and front-to-back ratio specifications write or call the factory.

	AX-21ON	TE-214W	HB35T	HB-33SP	HB-43SP	SSL-218	MLA-4	SQ007	SQ22	SQ61
Band	144Mhz	144Mhz	14/21/28Mhz	14/21/28Mhz	14/21/28/Mhz	144Mhz	3.5/7/14/21/28Mhz	432Mhz	144Mhz	50Mhz
Element	10x2	14x2	4/5/5	3	4	9x2	1	2x2	2x2	2
Gain	14.6dB	22.5dB	10/13/12.5dB	8.5/8.5/10dB	10/10/11dB	16.5dB	—	16dB	16dB	12dB
F/B Ratio	26dB	24dB	23dB	20dB	22dB	22.5dB	—	20dB	20dB	20dB
V.S.W.R.	1.5	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Power R	500Wpep	1KWpep	2KWpep	2KWpep	2KWpep	1KWpep	250Wpep	250Wpep	250Wpep	250Wpep
Impedance	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm
Element L	1.07m	1.02m	8.4m	8.0m	8.0m	1.02m	1.8mx4	0.17m	0.57m	1.8/1.5m
Boom L	3.5m	5.7/2m	7.5m	4.0m	6.0m	3.5m	2.9m	0.54m	2.0m	1.8m
Turning Radius	1.79m	2..79m	5.56m	4.59m	5.08m	2.02m	—	0.43m	1.00m	0.90m
Wind Surface Area	0.23m²	0.60m²	0.75m²	0.46m³	0.62m²	0.32m²	0.05m²	0.03m²	0.15m²	0.22m²
Wind Load (EIA Std.80MPH)	23.0kg	59.5kg	75.0kg	46.0kg	62.0kg	32.0kg	5.2kg	3.0kg	15.0kg	22.0kg
Weight	4.6kg	13.7kg	24.4kg	14.1kg	19.4kg	8.6kg	3.7kg	2.1kg	3.1kg	4.7kg

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CIRCLE 41 ON READER SERVICE CARD

battery is strong enough to seriously burn skin and eyes. Protective clothing, rubber gloves, and eye protection are a must around batteries. If you have to handle battery acid, be sure to have available a plentiful supply of water to irrigate any part of the body which may accidentally come in contact with the acid. Large amounts of water are needed. Battery acid is so strong that a small amount of water may only spread the acid burn without sufficiently diluting the acid. To avoid the need to handle the very strong concentrated acids which require careful dilution, I recommend buying battery electrolyte in the standard strength obtainable from auto-parts stores. It is inexpensive and saves a good deal of handling hazard, but all the cautions given above apply to its use. One of the many advantages of the sealed, gelled electrolyte batteries available is that the handling of electrolyte is eliminated.

When a battery is being charged, it gives off hydrogen gas and oxygen gas from the dissociation of the water in its electrolyte. The rate of production of these gases is a function of temperature, voltage, and charging current. Hydrogen is a combustible gas which in a wide range of mixtures with oxygen or air is explosive. Consequently, a battery must be placed in a location which is ventilated to permit safe dissipation of the hydrogen gas. Because battery caps are vented to let the gas escape, it is usual to find that droplets of acid are carried out of the battery by the venting gases. This causes corrosion of battery terminals and other metal in the battery box and is one of the maintenance items to be attended to when servicing the battery.

There is a special battery cap available which is intended to overcome some of the above problems. It contains a catalyst to recombine the hydrogen and oxygen and return them to the cell as water along with the acid carryover. With these caps (one for each cell of the battery) you would reduce frequency of watering and clean up as well as be able to locate your battery safely indoors without an extensive ventilation arrangement.

The characteristic low internal resistance of lead-acid batteries, while contributing to their suitability as radio power supplies, leads to another battery hazard. A charged lead-acid battery is similar to a charged capacitor. It will release a lot of energy in a short period of time if a low resistance path is created between its terminals. A wrench or screwdriver accidentally dropped across the terminals of a charged battery rapidly will become too hot to handle and may cause enough heat to be released to cause the battery to explode. This is an extreme case, but it has happened. A lesser catastrophe can happen when a battery hot lead in the shack is accidentally grounded, in which case the battery acts like an arc welder on some prized piece of radio gear. It is prudent to estimate the maximum current draw for your station based on the combination of equipment likely to be operating simultaneously with the highest power demand and then to install a slightly larger fuse very close to the battery to prevent a serious accident.

When you install your battery power supply for your shack, take a tip from the installers of high-power mobile equipment and use adequate-size conductors between the battery and the load. A 1 volt drop in a 110 volt power supply is good regulation, but a 1 volt drop in a 12 volt power supply is bad news. The table below gives the resistance in ohms per 100 feet at 25°C of various sizes of copper wire.

AWG	Resistance
2	.0159
4	.0253
6	.0403
8	.0641
10	.102
12	.162
14	.258
16	.409
18	.651

As can be seen from the table, 30 amps through 33 feet of number 10 wire will drop 1 volt.

Low-voltage power supplies are degraded by poor connections, so good, clean mechanical connections are a must and soldered connections are recommended. A 1 ohm connection will drop 1 volt at 1 ampere, which is generally unacceptable in a 12 volt system.

Routine lead-acid battery maintenance consists of watering and cleaning as necessary, and the frequency of this routine will depend on the battery. Some sealed batteries require no such attention. If your battery needs to be watered, use only distilled or demineralized water. Nothing else should be added to a battery. To ensure long life, the materials in the battery are refined to a high degree of purity. This can be ruined by adding impure water to a battery. Some impurities — such as chlorides, which will cause chlorine gas to be generated in the battery — can be hazardous as well as lead to premature battery failure. If you want to maximize the life of your battery, follow the maintenance recommendations of the battery manufacturer with regard to periodic test discharges and equalizing charges.

At WA1PZQ, I have installed a d.c. power meter and distribution panel in one of my equipment racks. It contains d.c. ammeters to indicate battery charge and discharge rate, a voltmeter reading d.c. bus voltage, and because I have a solar panel for battery charging, a solar panel output ammeter. On the distribution panel are the individual fuses for all the d.c. loads, a connection for an a.c. battery charger, and isolation switches for the elements of the system. The main battery fuse is located at a fuse block on the battery box which is outside the house.

A desirable element lacking in this system is some kind of meter which tells the instantaneous state of battery charge. There are a couple of approaches to get this information. One is to read battery electrolyte specific gravity, correct it for temperature, and relate the corrected reading to the specific gravity of a fully-charged battery. A linear relation between temperature-corrected specific gravity and battery capacity can be assumed using the specific gravity of the discharged battery to represent zero capacity and the specific gravity of a fully-charged battery as 100%. A reading halfway between the two would indicate 50% capacity, etc. This method is quite accurate, but it is messy and involves handling battery acid.

A more satisfactory approach to capacity measurement is to install an integrating ampere-hour meter which increments when charge is put into the battery and subtracts off ampere-hours as the battery is discharged. I've left room on my monitoring panel for such an instrument, but haven't come up with one yet. Is there an amateur who has built one of these meters or who wants to try to build one? Who can come up with an inexpensive circuit, perhaps using a voltage to frequency converter feeding an integrating counter? If you have any ideas, let me know. CQ

World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Collecting, Restoring, and Using Vintage Gear

As we've pointed out many times, there are numerous areas of pursuit and enjoyment in the world of amateur radio. Some of these avenues are competitive and fast paced, some are experimental and/or technically oriented, and some are peacefully relaxing and self-expressive. While we can all feel a jubilant pride over fantastic innovations such as the new OSCAR 10 Satellite (a subject which was covered in our March and April columns), it's also quite exhilarating to occasionally reflect on past decades and revitalize various items from that now-classic era. There is a certain amount of this nostalgic interest in all of us, be it restoring a vintage auto or collecting and refurbishing early radio gear. The latter, however, has the advantage of requiring less physical room and financial investment. The returns of occasionally using that heritage-related gear might be compared to enjoying a classic auto—more so, in fact, as today's public lifespace seldom permits open enjoyment of personal interests without consequences. Fortunately, the world of amateur radio is a totally different ball game. Surely you'll agree that every amateur needs at least one relic . . . err . . . memory from the past in his shack.

While some amateurs maintain a full basement of collectible tubes, others maintain a few vintage "bottles" in their operating room. Items shown are part of the "natural decor" at K4TWJ.

One of the first questions that may come to mind is which era to consider for collectibles: the 1920s with its crystal rigs and spark gap transmitters, the Golden 30s with its ever classic tube rigs, the 40s and 50s, or even the 60s. Could there really be amateur radio collectibles from such recent decades? Sure! There are first-run s.s.b. transceivers, early 2 meter talkies, original SSTV gear—the list is so long that we'll simply devote next month's column to those areas! Meanwhile, let's look at one of the ever-popular eras of interest: the classic 30s. The areas of interest in this era include vintage broadcast receivers, amateur radio gear, tubes, hand keys, and magazines (along with numerous tales of actual use during related periods!). As a means of finding exactly which "collectibles" best suit your interest, we suggest merely keeping an open mind and following the way things naturally lead you. Should you emerge with a few hand keys and later prefer one or two c.w. transmitters, consider trading items via hamfests and flea-markets. The main idea involves preserving our past rather than letting it succumb to the trash man. In some ways this might be compared to saving an endangered species.

Before becoming hopelessly lost in the world of amateur radio collectibles, we suggest you read some magazines and books from various eras. Become familiar with equipment and trends of different periods. An often overlooked source of that information is the main-branch archives of a local library. A couple of years ago, for example, we checked our city's library for information on 1925 scanning disc TV and uncovered full volumes of *QST* from 1924 until the present day. Following several weeks of reading, we began hunting for parts to build our first vintage rig (which has since returned many hours of enjoyable operation).

Locating vintage radios, ham gear, parts, etc., can sometimes be a challenging situation. While such items aren't getting more plentiful with time's progression, they do continue to eclectically appear at hamfests, fleamarkets, older radio repair shops, garages, and attics. Stay alert—the most desirable items often surface in the most surprising places and at the most unexpected times. Like many other aspects in life, advertising is the key to success. No one will know of your collecting interest unless you tell them. Running ads in magazines, continuously querying local amateurs and neighbors, plus tacking notes on QSLs can bring good returns.

While you're chasing older gear, try also to find a source of parts. Senior amateurs with large basements and "retired" radio shops are good candidates. Remember that those spare parts can keep your selected prize operation many more years. If you succumb to collecting tubes, try to locate mating sockets. The combinations can be mounted on polished wood for producing beautiful displays, especially when their filaments are occasionally re-energized.

Vintage Broadcast Receivers

Collecting and resurrecting early a.m. band receivers has traditionally been a popular area of general interest. Some of these radios are absolutely beautiful, with their "Morning Glory" speakers, deep luster wood frames, and dome envelope tubes truly bringing the 30s back to life. Although we haven't uncovered any factual proof of properly restored vintage receivers still playing original

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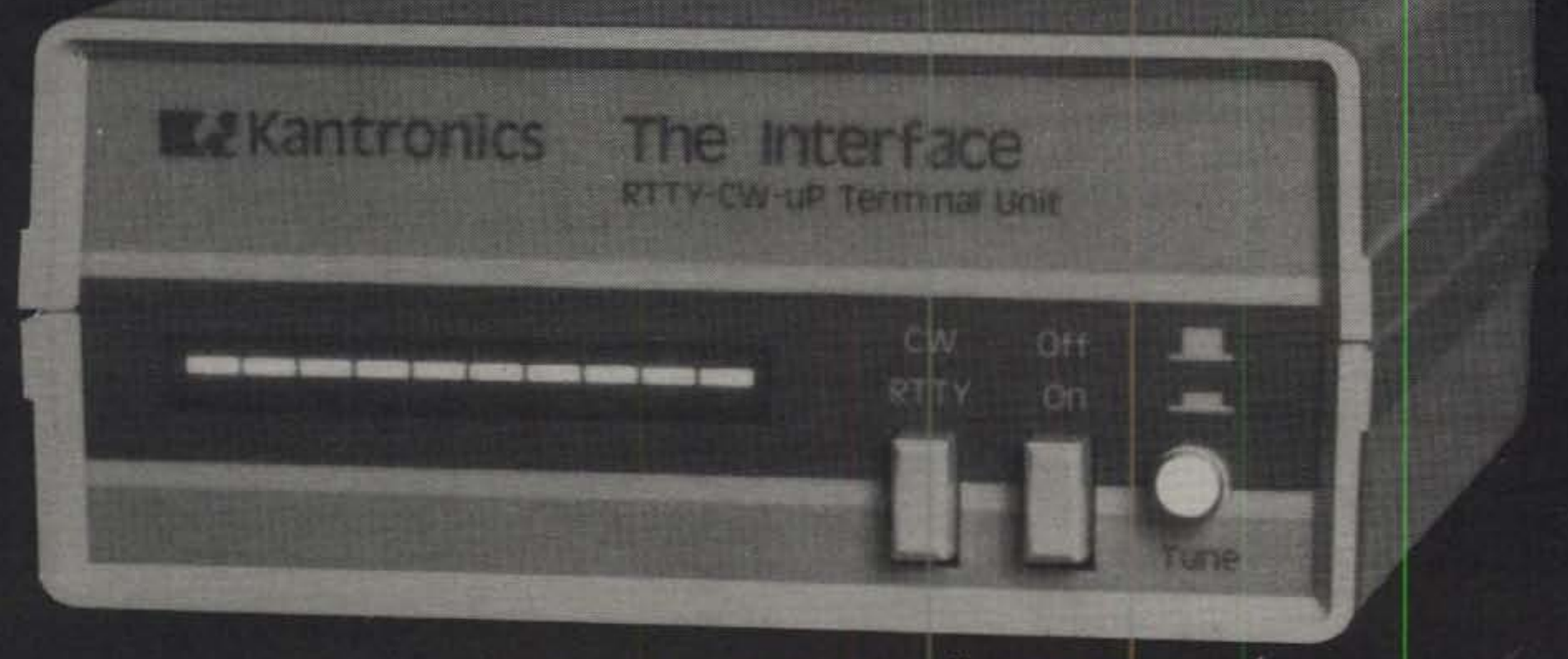

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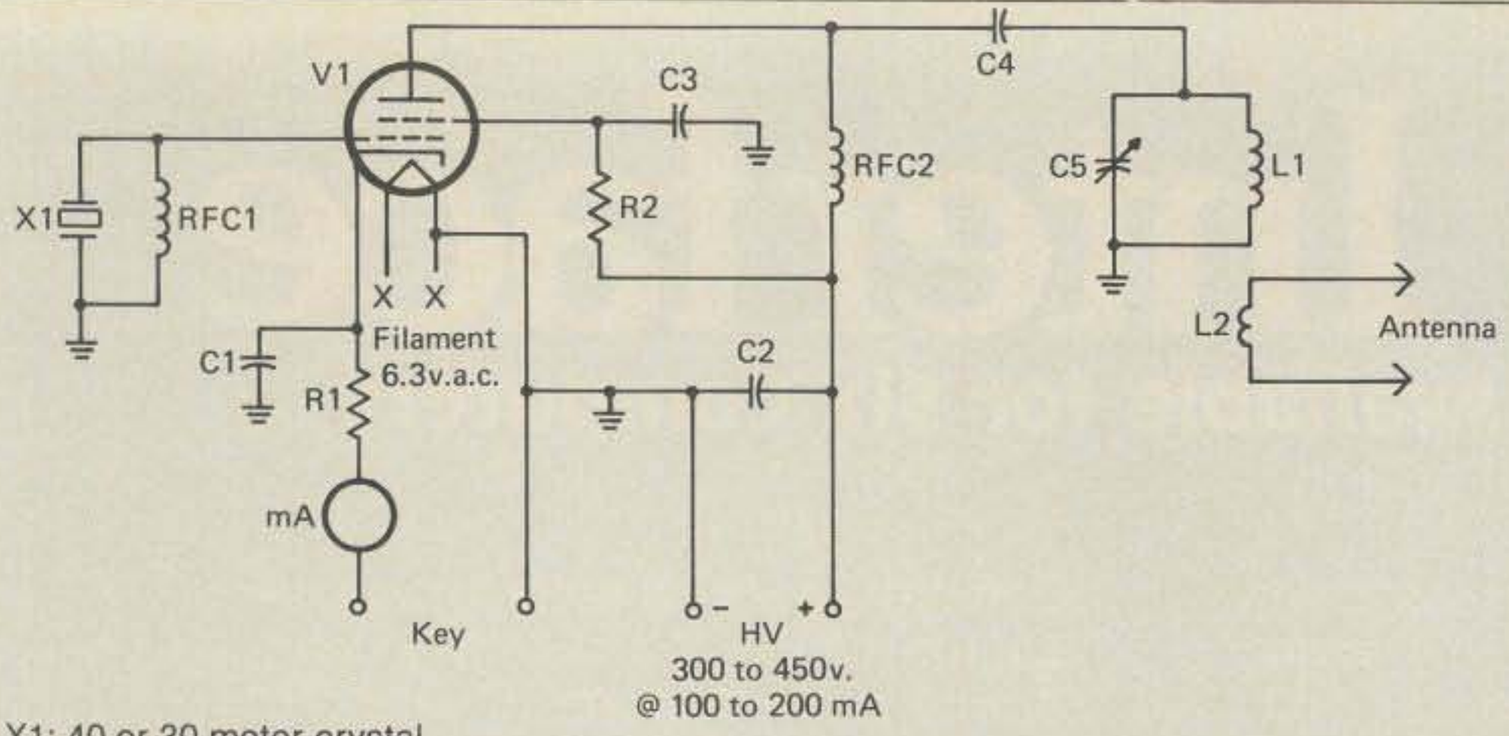


X1: 40 or 30 meter crystal
C1, C2, C3: .001 mFd paper
R1: 150 ohm, 2 watt
R2: 15K ohm, 2 watt
C4: .01 mFd mica
C5: 250 pFd variable
L1: 40 meters—17 turns No. 18 enamel
30 meters—12 turns No. 18 enamel
L2: 6 turns No. 18 enamel on cold end of L1
All coils wound on 2 inch form.
V1: 6L6G or 6V6G tube
RFC1, RFC2: 2.5 MHz 250 ma choke
Remember: use authentic parts and build on oak board!
ma: 0 to 200 d.c. ma meter

Fig. 1– Spurring your nostalgic interest for days of yesteryear, we present this classic QRP rig of the 40s. Build this little gem and enjoy some exciting c.w. activity.

"Big Band" and Dorsey-style music (or early European radios still speaking German), we must admit that their "Winchester Cathedral" sound when tuned to an "easy listening" station is phenomenal. Should you find this aspect of collecting like potato chips (can't stop with only one), consider adding a small "wireless phonograph" for in-room transmission of proper era music to each radio.

Some of the most sought radios today are Atwater Kents, Crosleys, and Cathedral-cased receivers. The price market for these units isn't clearly defined, but it mainly depends on buyers and sellers. Thirty to 250 dollar ranges are typical, depending on condition. Other highly desirable radios include wooden-cased table receivers and shock-prone metal-cased kitchen radios (those a.c./d.c. jobs that jangled your teeth when crossed with water pipes or refrigerator doors). As we said earlier, these radios are found anywhere from old repair shops to small country stores or hamfest fleamarkets.

A.m. radios are fairly easy to repair and restore, especially if an in-cabinet schematic is readable. If the unit is totally dead, check to ensure a.c. reaches the power supply and d.c. reaches the tubes. Suspect rectifier and audio output tubes next. Terrible hum regardless of volume setting? Replace filter capacitors. AC/DC set dead? Check the pilot lamp (it acts as a fuse). Clean tuning capacitor sections with an air gun; clean pots with Qwetrol. Add new grill cloth, along with several hand-rubbed coats of wood polish, and enjoy your new prize. Later you can replace those weak and hard-to-find tubes and paper capacitors.

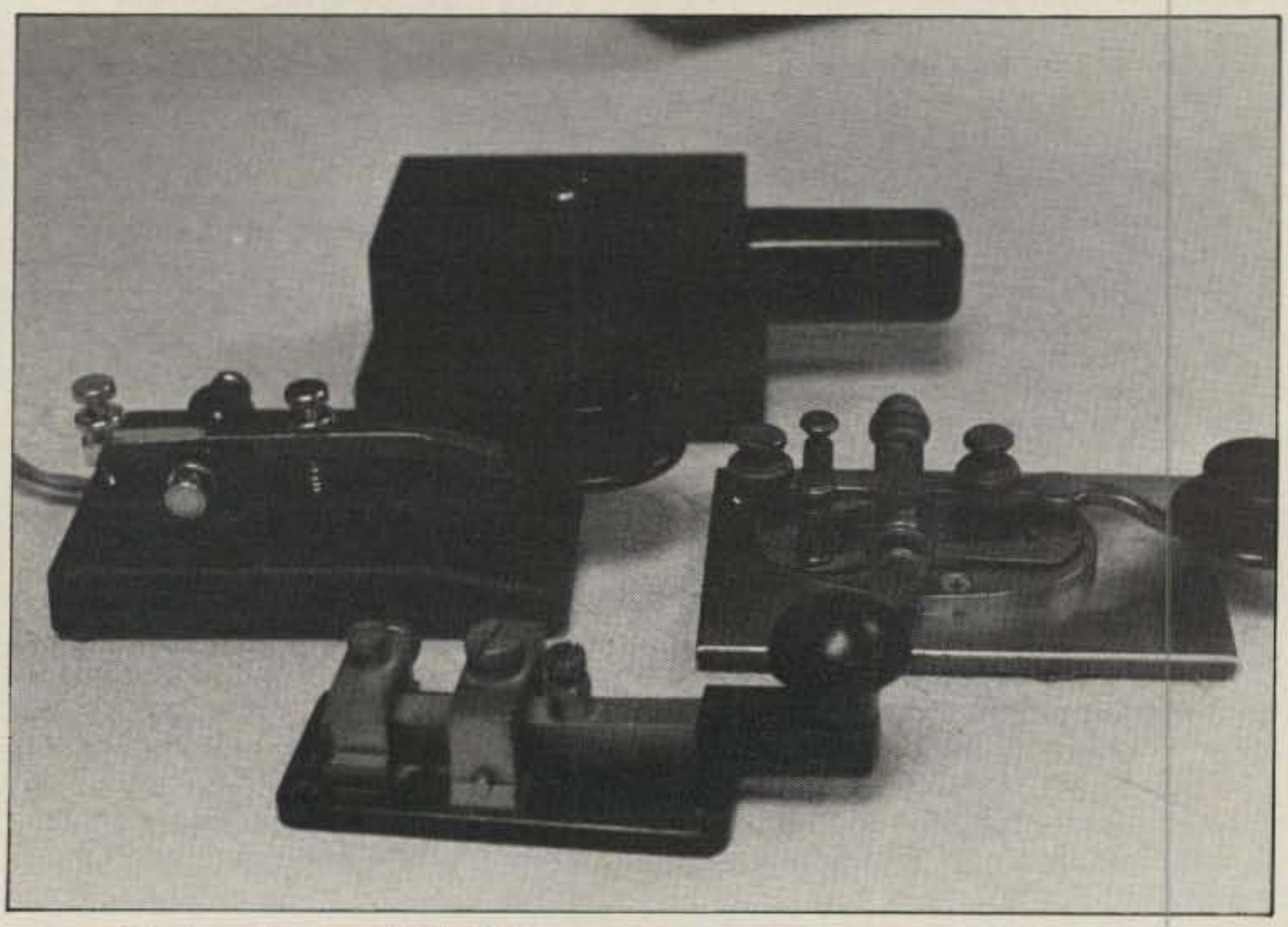
Vintage Amateur Gear

If you would like to enjoy some genuine old-fashioned fun and really get a charge from ham radio (no pun intended!), consider restoring and occasionally activating a full amateur setup from the past. Granted, early crystal sets aren't too spiffy for shortwave reception, and spark-gap transmitters are outlawed, but single-tube Hartley oscillators and SW-3 receivers of the 30s can still turn some good QSO's on 160 and 80 meters. If you can't locate assembled rigs, build them! Old handbooks are full of circuit ideas and parts suggestions. Read them closely! Substitute modern parts where you must, but keep watch for their vintage replacements. Brass screws, square buss wire, Farenstock clips, and Bakelite knobs might appear anywhere, but you'll have to flush them out. Recently, for example, we found brass screws in a hardware store and a pile of Farenstock clips in Long's Electronics' warehouse. Self-excited transmitters can tune to any frequency, and they're rich in harmonics. If used on the air, monitor their signal on a modern receiver and use a single-band tuned antenna, preferably with a selective tuner.

Vintage handkeys aren't as tricky to restore and use as transmitters. Possibly this attraction explains the many key collections. If you are a devoted phone buff, however, a special microphone collection may hold appeal. Refurbished mikes can be fitted with the new Heil HC-3 elements, and the results are great.

Due to possible stability and stray capacitance entanglements, refurbishing commercial receivers is more desirable than home-constructing those units. Although that might turn into a full reworking, you'll have the advantages of proven layouts and subassemblies. Should you elect to build from information in old

Classic amateur gear from the 1930s can be refurbished and used on c.w. for many exciting QSO's. Rig shown here is number 10 tube transmitter, vintage key, and National SW-3 receiver. Rig has turned many 80 meter contacts at K4TWJ.



Some of the hand keys at K4TWJ, illustrating no two collections are alike, nor do they cover similar eras of time. In fact, several specially-made hand keys are manufactured at this time by Nye-Viking and Daiwa.

handbooks and magazines, remember to add metal plates behind phenolic panels, and alter units for original appearance or modern performance as necessary (past ideas will become quite clear after you become involved in this game). There are few "cut and dried" prerequisites in the vintage rig game; feel free to mix eras or use classic transmitters with modern receivers. The only stipulations we'll add are to keep all transmitted signals clean, within amateur bands, and free of harmonics.

On The Air

Once a vintage transmitter reaches the operational status and passes clean signal checks, there's a natural tendency to put it on the air. Great! Although most of the popular vintage rigs run only a few watts output, they are quite capable of many exciting QSO's. Remember to continuously monitor your signal on a well-calibrated receiver, and watch for "spurs." A grid dip meter is handy here: while keying, check for "strange emissions," and then tune the (modern) receiver to the dipper's indicated frequency and check signals. Across-town amateurs can also help with these checks. Remember also to keep your hands out of "open air" transmitters when voltage is applied. Most amateurs know that and respect high voltages, but occasional shocks can still happen merely by hand slips (from a knob to a nearby coil) or when distracted by a noise while reaching around a rig.

Self-excited transmitters such as vintage 15 watt, one-tube Hartley oscillators shouldn't be operated above 3.8 MHz. Although old handbooks show coils for 40 and 20 meter use, drift and stability are poor and/or hard to handle.

Crystal-controlled transmitters are dandy for 40 meters, and also 30 meter use. In fact, the low power limit on 30 (250 watts) is especially attractive for vintage gear. Don't jeopardize our use of 10.1 MHz, however; use only crystal control, ensure your signal is pure, and watch band edges. Modifying 40 meter rigs for 30 meters usually involves merely unwinding a few coil turns: quick, easy, and simple. True nostalgia buffs can put (new) sealed crystals inside old Bliley crystal holders for authenticity. Enjoy!

Describing the full world of vintage gear and amateur collectibles in a single month's column is impossible. The areas of interest are limited only by one's imagination. Good hunting!

73, Dave, K4TWJ

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

When awards are handed out at conventions and forums, they almost always go to contest winners. The one who makes this activity successful usually goes home empty handed. Not so at the Contest Forum during the Dayton Hamvention last April. Here we see Al Dorhoffer, K2EEK, CQ Editor, presenting a plaque to Bernie Welch, W8IMZ, for his many years of dedicated service to the CQ contest program, the last ten of which he served as WPX Contest Director, building it up from just another contest to one of the leading world competitions. Although Bernie has stepped down as director, he is still very much involved in an advisory capacity. (WB4VQO photo)

Calendar of Events

*	Sep.	3-4	"Corona" 10 Meter RTTY
*	Sep.	4	Bulgarian C.W. Contest
*	Sep.	3-5	FOUR Land QSO Party
	Sep.	10-11	Cray Valley SWL Contest
	Sep.	10-11	G-QRP Club Activity
*	Sep.	10-11	DARC WAE Phone Contest
	Sep.	10-11	YLRL "Howdy Days"
	Sep.	10-11	ARRL VHF QSO Party
	Sep.	10-11	IARS/CHC C.W. Contest
	Sep.	17-18	IARS/CHC S.S.B. Contest
	Sep.	17-19	Wash. State QSO Party
	Sep.	17-19	Kansas State QSO Party
	Sep.	18	No. America C.W. "Sprint"
	Sep.	17-18	S.A.C. C.W. Contest
	Sep.	24-25	S.A.C. S.S.B. Contest
	Sep.	24-25	Delta QSO Party
	Sep.	24-25	Maine QSO Party
	Sep.	25	No. America S.S.B. "Sprint"
	Oct.	1-2	Oregon QSO Party
	Oct.	1-2	California QSO Party
	Oct.	8-9	GARTG SSTV Contest
	Oct.	8-9	ARRL C.W. QSO Party
	Oct.	9-10	ARRL Phone QSO Party
	Oct.	9	RSGB 21/28 MHz Phone
	Oct.	16	RSGB 21 MHz C.W. Contest
	Oct.	15-16	Maryland/D.C. QSO Party
	Oct.	15-16	Boy Scout "Jamboree"
	Oct.	22-23	Pennsylvania QSO Party
	Oct.	22-23	ARCI QRP QSO Party
	Oct.	22-23	CLARA AC/DC Contest
	Oct.	22-23	YLRL Anniv. C.W. Party
	Oct.	**29-30**	**CQ WW DX Phone Contest**
	Nov.	5-6	YLRL Anniv. Phone Party
	Nov.	12-13	DARC WAE RTTY Contest
	Nov.	**26-27**	**CQ WW DX C.W. Contest**

** Covered last month.*

We have been reviewing the 160 Contest rules format and at this time we do not anticipate making any changes in the new scoring system that was put in effect last year. We will, however, modify the requirements in the exchange. It will not be necessary for DX stations to spell out their QTH; their call will identify their country.

There has been some controversy regarding the dropping of the QSL serial number. We would like to extend the present exchange, minus the serial number, for another year and get some additional input from you fellows. Reception on 160 is by far the most difficult of any band, and we would rather not make it more difficult for the average station with limited facilities. Your opinions and suggestions are solicited, especially from you fellows with limited operating facilities.

The multi-operator category has been increasing in popularity, and at present we do not have a trophy for that classification. We extend an invitation for any possible donors. Contact me for details.

Final rules for the 1984 160 Contest in January will appear in the December issue of *CQ*.

The Southern Counties Amateur Teleprinter Society has organized a World-Wide RTTY Art Contest. The contest period is from Sept. 1st to Nov. 30th.

Rules and subject matter are quite detailed and lengthy and cannot be covered in the limited space of this column. Winners will be rewarded with plaques. The winning design will be published in *CQ*. Those of you who are interested can get more details from Norm Koch, K6ZDL, P.O. Box 1351, Torrance, CA 90505.

Too late to be included in last month's column was an announcement from the Keyman's Club of Japan of a c.w.-only contest on August 20–21. Activity was on all c.w. bands. If you worked any JA's during that period and they included two letters in the exchange identifying their area, you can send your entry to: Kikuo Takamitsu, JA9FT, 4-16-22 Izumino-machi, Kanazawa, Ishikawa 921, Japan.

No announcement has been received for the Can-Am Contest usually held in September. However, a note in *Long Skip*, the Canadian DX Association publication, indicated that they have decided to discontinue sponsorship of that event. Therefore, I would assume that we can scratch that one for this year.

That just about covers it for this month. Don't forget, deadline for material for the December issue is September 15th, and October 15th for the January issue. Send all contest announcements to my home address, please.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Cray Valley SWL Contest

1800Z Sat. to 1800Z Sun., Sept. 10-11

Sponsored by the Cray Valley Radio Society of Great Britain, this event is probably the biggest s.w.l. competition in the world. The results are tabulated by an extensive computer system, and are known in a relatively short time.

You can use up to 18 hours of the contest period. Multi-operator groups may log during the entire period.

There are two sections, phone and c.w., each with two categories, single operator and multi-operator. Use all bands 1.8 through 28 MHz.

Scoring should be compiled as follows: One point for each station heard, multiplied by the number of different countries heard on each band. The call areas of the U.S., Canada, and Australia will each count as separate countries.

CQ, QRZ, or similar calls do not count, and the practice of logging a series of contacts made by one station is not permitted. If points are claimed for both sides of a QSO, the call sign of both stations must appear in the log.

Countries will be determined by the official RSGB country list, which is similar to the ARRL DXCC list.

Although not requried, it is desirable that official log forms be used. A large s.a.s.e. (or IRC's) to G4DFI will get you a sample. If you make up your own, include the following information: date, time in GMT, band, station heard, station being worked. RS(T) at your location.

Certificates will be awarded at the discretion of the Society. Neatness of logging will be taken into consideration.

Entries must be received no later than November 1st and go to: Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF England.

G-QRP Club Activity

0001Z Sat. to 2400Z Sun., Sept. 10-11

This is the second of a series of three held by the G-QRP Group each year. The next one will be on Dec. 26-31. A full list of frequencies and times was given in the February Calendar.

This is not a contest, but an activity to promote QRP interest. Send all reports to: Chris J. Page, G4BUE, Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW, England.

YLRL "Howdy Days"

1800Z Sat. to 1800Z Sun., Sept. 10-11

This activity is for YL's, and scores will be based on contacts between YL's only. All licensed women operators throughout the world are invited to join the party.

All bands and modes may be used. (Frequencies?) Crossband and Net contacts do not count. Only one contact with the same station is permitted, regardless of the band.

Score 2 points for each YLRL member worked, and 1 point if it's with a non-member. Therefore, members should identify themselves in the exchange. There is no multiplier; just add the QSO points.

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

Submit your original log, no carbon copies. Indicate if you are a member, score your log, and sign the summary sheet. You are expected to delete all duplicate contacts. For each duplicate contact that is removed by the Committee, a penalty of 3 additional and equal contacts will be exacted.

Logs must be received by October 11th and go to: Rose Ellen Bills, N2RE, 17 Craig Place, Pennsville, NJ 08070.

IARS/CHC International Contest

C.W.: Sept. 10–11 S.S.B.: Sept. 17–18
0000Z Sat. to 2400Z Sun.

This is a joint venture by the International A.R.S. and the Certificate Hunters Club. Rules do not indicate if the contest is open to non-members. This should be clarified in the next contest announcement.

Exchange: RS(T), IARS and/or CHC number, and state, province, or country (i.e., 599 IARS 955 CHC 1404 CA).

Scoring: QSO's multiplied by (countries × IARS/CHC members worked). A member of both clubs will count as two multipliers. The same station may be worked once on each band.

Frequencies: C.W.—70 kHz up from bottom of each band. S.S.B.—3960, 7260, 14300, 21360, 28600.

Awards: Plaque to highest overall score. Certificates to top scores on each band and to the 10 runners-up.

Include a summary sheet with your log and a check sheet for logs with 100 or more QSO's. Include a large s.a.s.e. for a copy of the results. Mailing deadline is December 1st to: Ted Melinosky, K1BV, 525 Foster St., South Windsor, CT 06074.

Wash. State QSO Party

0100Z to 0700Z Sat., Sept. 17
1300Z to 0700Z Sat./Sun., Sept. 17-18
1300Z to 0100Z Sun./Mon., Sept. 18-19

This is the 17th annual party sponsored by the Boeing Employees ARS (BEARS). The same station may be worked on each band and mode for QSO and multiplier credit. Wash. stations may work other in-state stations for QSO points.

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

Scoring: Phone contacts are worth 2 points,c.w. contacts 3 points.

Wash. stations multiply total QSO points by number of states, VE provinces, and DX countries worked. Others use Wash. counties for their multiplier (maximum of 39). There is an additional multiplier of one (1) for each group of 8 contacts with the same Wash. county for non-Wash. stations.

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28160. Phone—1815, 3925, 7260, 14280, 21380, 28580. Novice—3725, 7125, 21150, 28160.

Awards: Certificates to the top scorers, both single and multi-operator, in each state, VE province, DX country, and Wash. county. Additional awards where warranted.

The World Five Bears Award is available to anyone working 5 club members before, during, or after the party. The Worked Three Cubs Award is available for working 3 Novice club members.

Include a check sheet with your entry if you made 200 or more contacts. Results will be mailed to all entrants, no s.a.s.e. required.

Mailing deadline is October 19th to: Boeing Employees ARS, Contest Committee, Att: Willes D. Propst, K7RS, 18415 38th Ave. S., Seattle, WA 98188.

Scandinavian Activity Contest

C.W.: Sept. 17-18 Phone: Sept. 24-25
Starts: 1500 GMT Saturday
Ends: 1800 GMT Sunday

It's the world working the Scandinavians in this the 24th SAC. The same station may be worked on each band for QSO and multiplier credit.

It is suggested that the following sections of the bands be used. C.W.—3505–3575, 7005–7040, 14010–14075, 21010–21120, 28010–28125. Phone—3600–3650, 3700–3790, 7050–7100, 14150–14300, 21200–21350, 28400–28700. Stations in regions 2 and 3 use their frequencies above 3790 and 7100.

The prefixes used in Scandinavia are: LA/LB/LG/LJ (Norway); JW (Svalbard and Bear IS.); JX (Jan Mayen); OF/OG/OH/OI (Finland); OH0 (Aland Is.); OJ0 (Market Reef); OX (Greenland); OY (Faroe Is.); OZ (Denmark); SJ/SK/SL/SM (Sweden); TF (Iceland).

Classes: Single operator and multi-operator, both single and multi-transmitter. Multi-single must remain on the same band at least 10 minutes. Multi-multi only one signal per band. Club stations are considered as multi-operator.

Exchange: RS(T) plus a QSO number starting with 001. Multi-multi stations use separate serial numbers on each band.

Points: Europeans score 1 point for each SAC contact. Non-Europeans score 1 point for each SAC contact on 14, 21, and 28 MHz, 3 points on 3.5 and 7 MHz.

Multiplier: Each call area in the above list of Scandinavian countries worked on each band (call areas, not prefixes).

Final Score: The sum of QSO points from all bands times the sum of the multiplier from each band.

Awards: Certificates to the winning station in each class, both c.w. and phone, in each country and U.S.A. call area. Additional awards depending on the returns. Plaques will be awarded to the top-scoring station in each continent.

The usual disqualification criteria will be observed. Include a summary sheet and a dupe sheet for logs with more than 200 QSO's.

Mailing deadline is October 30th, and this year logs go to: SRAL Contest Manager, OH2QV, P.O. Box 306, SF-00101, Helsinki 10, Finland.

Kansas State QSO Party

0100Z to 0700Z Sat., Sept. 17
1300Z Sat. to 0700 Sun., Sept. 17/18
1300Z Sun. to 0100Z Mon., Sept. 19

This is the second annual party sponsored by the Boeing Employees' A.R.S. of Wichita, Kansas. The same station may be worked on each band and each mode, and Kansas may work in-state stations for QSO and multiplier credit.

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

Scoring: Two points for phone QSO's, three points if on c.w. Kansas stations multiply total QSO points by the sum of different states, VE provinces, and DX countries worked.

Others will use sum of different Kansas counties worked for their multiplier (counted once only, maximum of 105). There is also a bonus multiplier of one for each group of 8 QSO's with the same Kansas county.

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28160. S.S.B.—1815, 3925, 7260, 14280, 21380, 28580. Novice—3725, 7125, 21150, 28160.

Awards: Certificates to the top-scoring station, both single and multi-operator, in

each state, VE province, DX country, and Kansas county. Work five club members and you will be eligible for the worked five Kansas Bears Award.

Include a summary sheet and a dupe sheet if your log shows more than 200 contacts. The usual signed declaration is also required. Logs and summary sheets are available; include a large s.a.s.e. with your request to address below.

Postmark for all entries is October 20th to: Boeing Employees' A.R.S., c/o Mike Thornton, WAØTAH, 1001 Munnell Ave., Wichita, KS 67213.

North American "Sprint"

C.W.: Sept. 18 S.S.B.: Sept. 25
Sun. 0100Z to 0459Z (Sat. night)

This is the fall section of this contest organized by the National Contest Journal. As the name implies it's a real shorty—only 4 hours. North Americans will be working other North Americans as well as other countries. Single operator only.

Exchange: Call, QSO no., name, and QTH (state, VE province, or country).

Scoring: Multiply total QSO's by the sum of states, VE provinces, and North American countries worked (U.S. and VE not countries, KH6 not a state).

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

Awards: A trophy to the highest scoring station on each mode. Certificates to the top station in each U.S. 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. Precontest 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. 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. to: Rick Niswander, K7GM, 1914 W. Cortez Circle, Chandler, AZ 85224.

Delta QSO Party

1800Z Sat. to 2400Z Sun., Sept. 24-25
(Rest period 0600Z to 1200Z Sun.)

This is the 14th annual QSO party sponsored by the Delta Div. of the ARRL.

Delta stations (Ark., La., Miss., Tenn.) may contact stations both inside and outside their boundaries. Others, only Delta stations. The same station may be worked on each band and each mode, portable and mobiles in each county change.

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

Scoring: *For Delta*—Total number of QSO's multiplied by the ARRL sections worked (maximum of 74).

Outside Delta—Total QSO's multiplied by the Delta counties worked (maximum of 316). DX stations may be worked, but for QSO points only.

Frequencies: C.W.—65 kHz up from low end of each band. S.S.B.—3990, 7290, 14290, 21390, 28590. Novice—3725, 7125, 21125, 28125.

Certificate Awards:

A. Achievement: To all stations contacting 5 or more stations in each of the 4 Delta states.

B. Delta: To the 3 highest scoring stations in each of the 4 Delta states; 4th and 5th place awards if warranted.

C. Others: To the highest scoring station in each ARRL section and country; 2nd and 3rd place awards if warranted.

D. Plaques: To the top scorers in and outside the Delta division. Top portable and mobile Delta stations. Highest scoring Delta Club station.

(For more detailed information and sample log forms send an s.a.s.e. to W5XX.)

Mailing deadline for logs is October 21st to: Malcolm P. Keown, W5XX, 14 Lake Park Estates, Vicksburg, MS 39180.

Maine QSO Party

2300Z Sat. to 2359Z Sun., Sept. 24-25

The Portland Amateur Wireless Assn. is again sponsoring this year's party. The same station can be worked on each band and each mode, and ME stations may work other ME stations for QSO and multiplier credit.

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

Scoring: Each contact is worth 3 points. ME stations multiply total by (ME counties + states, + VE provinces + DX countries) worked. All others use Maine counties for their multiplier (maximum of 16 possible).

Frequencies: C.W.—1805 and 60 kHz up from low edge on other bands. Phone—1815, 3930, 7280, 14280, 21380, 28580. Novice—3720, 7120, 21120, 28120.

Awards: Certificates to the top-scoring stations in each state, VE province, country, and ME county. Applications for the Worked All Maine Counties Award may also be sent to the address below.

Mailing deadline is December 1st to: Portland A.W.A., P.O. Box 1605, Portland, ME 04104.

Oregon QSO Party

1700Z Sat. to 0800Z Sun., Oct. 1–2
1500Z to 2400Z Sunday, Oct. 2

The Hermiston Amateur Radio Club of Oregon is sponsoring this one. The same station may be worked on each band and each mode, and Oregon may work other in-state stations for QSO and multiplier credit.

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

Scoring: One point per QSO. Oregon stations multiply total by number of OR counties, states, VE provinces, and countries worked. All others use OR counties for their multiplier (maximum of 36).

Frequencies: C.W.—60 kHz up from bottom of band. S.S.B.—1810, 3929, 7260, 14300, 21370, 28600. Novice—10 kHz up from bottom of Novice bands.

Awards: None were mentioned. Your entry may be mixed mode or c.w. only. There probably will be an appropriate certificate awarded.

Be sure to include a summary sheet with your log and a large s.a.s.e. for a copy of the results. All logs must be received by November 4th by Bob Franklin, KA7IXH, Rt. 3, Box 3783, Hermiston, OR 97838.

California QSO Party

1600Z Sat. to 2159Z Sun., Oct. 1–2

This year's party is again being sponsored by The Northern California Contest Club. Operating time is limited to 24 out of the 30-hour contest period for single operators; multi-operators can use the full 30 hours. Off times must be clearly indicated on the log and must be at least 15 minutes long. The same station may be worked on each band and each mode, and CA stations may contact in-state stations for QSO and multiplier credit. CA mobiles that change counties are considered new stations.

Exchange: QSO no. and QTH. County for CA stations; state, province, or DX countries for others.

Scoring: Two points for phone contacts, 3 points for c.w. QSO's.

The multiplier for CA is the number of states (50) and VE call areas (8) worked. Out-of-state stations use CA counties for their multiplier (maximum of 58).

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28060. S.S.B.—1815, 3895, 7230, 14280, 21365, 28560. Novice—3725, 7125, 21125, 28125. Try c.w. on the half hour, 160 at 0500Z.

Awards: Certificates to the highest scorers in each CA county, in each state, VE province, and DX country. Also to stations making 100 or more contacts.

There are four plaques: to the top scoring in CA and out-of-state, and to the highest scoring expedition, both single and multi-operator, to a CA county.

Indicate each new multiplier on your log as it is worked. Include a summary sheet showing the scoring and other information. Enclose a large s.a.s.e. for copy of the results.

Mailing deadline is November 1st to: NCCC, c/o Alan Brubaker, K6XO, 34456 Colville Place, Fremont, CA 94536. QSL cards for NCCC stations in the contest may be sent to U.S. QSL Service, P.O. Box 814, Mulino, OR 97042. An s.a.s.e. to USQS will provide more details.

You can't work what you can't hear. W2XQ shows us how to plot the optimum propagation conditions for working DX.

HOW COME I CAN'T HEAR ANYTHING?

BY THOMAS R. SUNDSTROM*, W2XQ

"Conditions on 20 meters are terrible!" "Where did everyone go?" "Did my antenna fall down?" "How come I can't hear anything?" Do these statements sound familiar? How often have you heard these complaints over the local 2 meter DX alert frequency?

During the week of July 12, 1982, many h.f. DXers were muttering to themselves. A major solar flare at 0914 GMT on July 12 caused the largest proton event on this planet since 1972. That three-day event, coupled with a geomagnetic storm commencing at 1618 GMT on July 13 and another major flare at 1746 GMT on July 14, caused havoc on the h.f. bands and shut them down. The v.h.f. DXers on 2 meter s.s.b., however, had a good time. Extremely rare double-hop E-skip between the New England/mid-Atlantic states and Wyoming attracted lots of attention. Aurora was visible as far south as Philadelphia and Indianapolis, and the Carolinas, Georgia, and Florida were worked via aurora on 2 meter c.w.

The business of propagation is difficult at best, and those who depend solely upon the printed word would not know of the events of July 12–16, 1982. Propagation forecasts for the print media have to be somewhat general only because of the 45 to 60 day lead time needed for magazines and the one or two weeks needed for the various DX newsletters.

A combination of long-range propagation forecasts (exemplified by the dean of the school, George Jacobs', work for *CQ* each month) and current, same day information is the best way to be knowledgeable about current conditions. There is a way to gather current data, although the source is not solely designed for radio amateur use.

The National Bureau of Standards' station WWV broadcasts on 2.5, 5, 10, and 15 MHz 7 days a week, 24 hours a day. A propagation bulletin, prepared by the National Oceanic and Atmospheric Administration, is aired every hour at 18 minutes past the hour.

The H + 18 bulletin contains four parts: (1) a report of yesterday's solar flux and A-index; (2) the current K-index, updated every three hours; (3) a statement of past solar and geomagnetic activity, with times of events, for the last 24 hours; and (4) a statement of expected solar and geomagnetic activity for the next 24 hours.

A	K	Classification
0	0	quiet
3	1	quiet
7	2	quiet
15	3	unsettled
27	4	unsettled-to-minor storm levels
48	5	minor storm level
80	6	major storm level
140	7	major storm level
240	8	major storm level
400	9	major storm level

Table I– A- and K-indicies relationship.

The solar flux is simply a measure of the intensity of solar electromagnetic radiation. A number of different frequencies are monitored by the Algonquin radio observatory in Ottawa. The measurement at 2695 MHz is normally reported. The solar flux has a range from about 60 to 400 units. There is a positive correlation to both the sunspot number and the maximum usable frequency. The solar flux is reported on a daily basis, updated at 1818 GMT.

The A-index, measured at Fredericksburg, Virginia, is a measurement of geomagnetic activity ranging from 0 (extremely quiet) to 400 (very disturbed) units. The A-index is also reported on a daily basis, updated at 1818 GMT.

There have been a few occasions when the solar flux and A counts have changed between 1818 GMT and three or six hours later. The updated counts seem to occur when there is extraordinary activity, and more analysis yields more accurate data.

The K-index is a quasi-logarithmic index of geomagnetic activity, ranging from zero to nine units, taken at Boulder. It is updated every three hours (at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 GMT). See Table I for the relationships between the A- and K-indicies and the terminology to describe geomagnetic activity.

And finally, solar activity is classified as very low, low, moderate, high, and very high. The terms relate to the regions on the solar disk capable of producing disruptive flares.

Comparisons of A's and K's over periods of time can show changes in the level of geomagnetic activity. A two- or three-point jump in the K-index from one three-hour block to another may well mean the beginning of some kind of solar-induced event. Comparisons of solar flux and A's over a few days can show short-term trends in propagation, or K's over several sequential three-hour blocks of time can show the onset or decline of a geomagnetic storm.

The information aired by WWV is most useful when some sort of record is kept. Slips of paper tend to get lost in the desk clutter. Fig. 1 illustrates the form used here at W2XQ. I punch it for a three-hole notebook and make daily entries, usually after supper. On the weekends, particularly during those with contests, the K-index gets logged several times a day to pick up any short-term changes. Additional entries for flares, sudden ionospheric disturbances, *et al*, with time(s) are made using the key at the lower right. (A friend also keeps records, and he and I fill in missing dates caused by being away from home on weekends, business, etc.)

To make effective use of this information, if you are not already familiar with the ins and outs of propagation, take a look at the reading materials referenced at the end of this article. In brief, as geomagnetic activity increases, signals passing through or near the polar regions are weakened or absorbed (depending upon the level of activity). With high levels of activity, h.f. DXing is poor at best, whereas v.h.f. DXers have a field day with aurora and sporadic-*E* (the latter tends to occur most often during the summer months in the northern hemisphere).

Using the information is a matter of developing correlations of solar and geomagnetic activity to the on-air results of DXing, given your equipment, antennas, and location. For example, I find a flux of 150 or so is necessary to be productive in chasing DX on 20 meters all night. An A-count of 30, or K of 4, means high-

*Box 175, Vincentown, NJ 08088-0175

Month/Year: 19_____

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Solar Flux																
A-Index																
K-Index 0000Z / 0300Z																
K-Index 0600Z / 0900Z																
K-Index 1200Z / 1500Z																
K-Index 1800Z / 2100Z																
Enter Key & Time of Events																

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solar Flux															
A-Index															
K-Index 0000Z / 0300Z															
K-Index 0600Z / 0900Z															
K-Index 1200Z / 1500Z															
K-Index 1800Z / 2100Z															
Enter Key & Time of Events															

A	K
0	0
3	1
7	2
15	3
27	4
48	5
80	6
140	7
240	8
400	9

Key	Event
F -	Flare start (GMT)
G -	Geomagnetic storm start (GMT)
P -	Satellite proton event start (GMT)
S -	Sudden commencement start (GMT)
C -	Polar cap absorption (PCA) start (GMT)

Fig. 1– Record the data as announced, watching the dates for the A and K numbers. The K's are current and the A's are for the day ending or the previous day. See the text for explanation.

latitude great-circle signal paths are in deep trouble, and time could be better spent chasing DX out of Central and South America. The station here is modest—dipoles and exciter power—but the better your antennas, the longer you can expect to get results despite worsening, marginal propagation conditions.

It is easy to use the form in fig. 1, and you'll start to see the correlation of the announced flux, A, and K to the collapsing band conditions once some numbers are put in. It's not necessary to get the information every day, although you may miss some short-term developments. Very quickly, however, you'll be able to see trends for hours and days ahead and know whether or not spending a weekend at the operating desk would be profitable. Then you'll be able to answer the question when your friends ask, "How come I can't hear anyone?"

A Homework Assignment

Familiar with statistics? Use the data collected each month to calculate the mean, median, mode, range, and standard deviation of the solar flux and A-index each month. Plus-and-minus one standard deviation takes in approximately two-thirds of all values for the month, centered on the mean. It's interesting to plot the values calculated for the standard deviation against the range (high and low) and examine the skewness of the distribution.

The sun rotates on an average of every 27 days. Another interesting assignment is to plot the flux and A-count on a sheet of graph paper, overlaying consecutive 27-day periods on the X-axis. Use different colors for each 27-day period. Scale the Y-axis to maximize the spread of the data points. If you plot three or four periods on one graph, the reoccurrence of the effects of sunspots as they rotate around almost a month later can be seen quite clearly.

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Leinwoll, Stanley. *Shortwave Propagation.* New York: John F. Rider Publisher Inc., 1959.

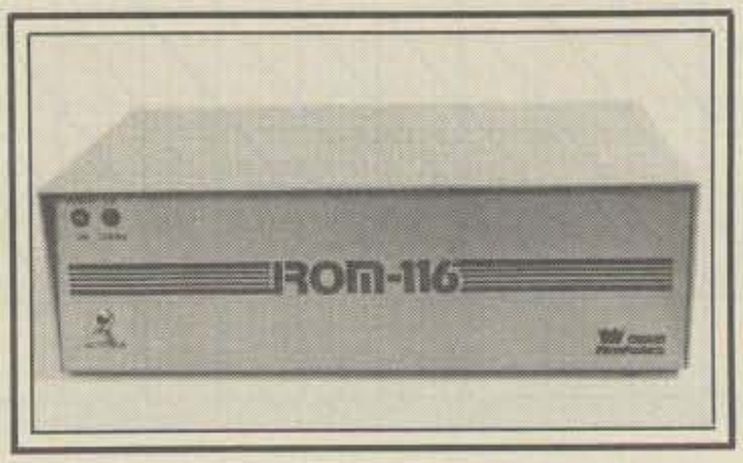
Sundstrom, Thomas. "Understanding and Using Propagation Information," *Ham Radio Horizons,* April 1979, p. 22.

Sundstrom, Thomas. "ART's Guide to Signal Propagation," *Amateur Radio Today,* 1979 edition, p. 25. New York: Davis Publications, Inc.

CQ SHOWCASE

ROM-116 Available From Flesher Corporation

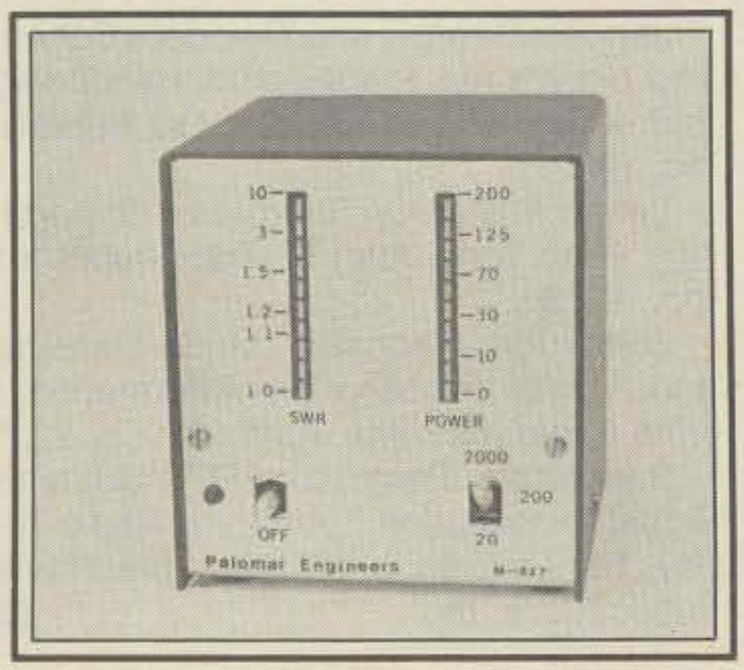
The ROM-116 interfaces the Radio Shack TRS-80® Models I, II, and IV 16K (min.) to send and receive c.w. and RTTY. Some of the features include: 2 serial ports, 14 buffers, split-screen formatted or unformatted, status displayed vertically, automatic c.w./ID, PTT control, error correction, text editor, 2 independent callsign buffers, receive/send RTTY art, all standard Baudot and ASCII baud rates up to 1200 baud, TTL compatible, c.w. receive/transmit with full break-in mode, c.w. preload, and much more. Several software packages are available.



Two versions of the ROM-116 are available, and prices range from $225 for the older units to $325 for the newer units. The ROM-116 is distributed and sold exclusively by Flesher Corp. For more information, contact Flesher Corp., P.O. Box 976, Topeka, KS 66601, or circle number 101 on the reader service card.

Palomar Engineers 220 Volt S.W.R./Power Meter

The Palomar Engineers Model M-827 S.W.R. and Power Meter is now available in 220 volt, 50/60 cycle. The meter automatically computes s.w.r. and displays it on an easy-to-read light bar. The sensitivity knob has been eliminated; s.w.r. is always correct regardless of power level.



Frequency range is 1–30 MHz. Power ranges are 20, 200, and 2000 watts. The light-bar display gives instant response so you see s.s.b. power peaks. The M-827 is 4″ × 4″ × 5″ with a brushed aluminum control panel and a black vinyl cover.

The M-827 for use with 220 volt sells for $119.95. It is also available for use with 115 volt. For more information, contact Palomar Engineers, 1924-F W. Mission Road, Escondido, CA 92025, or circle number 102 on the reader service card.

Hustler 6-Band H.F. Vertical

The 6-BTV six-band trap vertical for the h.f. amateur bands is based on the 4-BTV and offers full coverage on 10, 15, 20, 30, and 40 meters under 1.5:1 v.s.w.r. and more than 100 kHz bandwidth on 75 or 80 meters under 2:1 v.s.w.r. Fiberglass reinforced high-Q traps, extra strength aluminum components, and stainless steel hardware combine to make the 6-BTV a rugged, high-performance unit.

The price of the 6-BTV is $199.95. For more information, contact Hustler, Inc., 3275 North B Avenue, Kissimmee, FL 32741, or circle number 103 on the reader service card.

M.M. Newman Expandable Plastic Cable Wrap

A multipurpose plastic cable wrap that comes in handy packaged lengths for organizing and protecting wires, tubing, and hoses has been introduced by M.M. Newman Corp. This expandable polyethylene cable harness snugly grips, organizes, and protects wires, tubing, and

hoses. Applied like tape, the rugged spirally cut plastic wrap stays in place without sticky adhesives or glue.

Cable Wrap comes in 3 standard sizes: a ⅜" dia. × 10' black UV resistant ($2.49); a ¼" dia. × 10' black ($1.95); and an assortment pack of ⅛", ¼", and ⅜" sizes in 5' lengths ($2.95). For more information, contact M.M. Newman Corp., 7 Hawkes Street, Marblehead, MA 01945, or circle number 105 on the reader service card.

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

Dick Bolster, WBØMNE, at his station in Fairmont, MN.

The story of the month for September as told by Dick is:

R.D. "Dick" Bolster, WBØMNE All Counties #351 11-09-81

"Since high school I have been intrigued by amateur radio, but I did not know what it took nor how to become involved until I met a Minnesota state trooper who was a ham radio operator. He gave me some of the information I needed. Shortly thereafter, WAØIEF, the area Boy Scout Executive and an active amateur radio operator, moved into town. He gave me the help I needed to pass the Novice test. In 1971 I became WNØFET (Novice), but that call expired. In March of 1973 I passed my General class test and sat by waiting for my license. The license for WBØMNE arrived in April. It had been issued on my birthday, April 19th.

"My family consists of my wife, Marge, and our two children. Steve is a junior at Bemidji State University, and Cindi is a freshman at the University of Minnesota in Duluth. Our home was built in 1940. At that time a coal bin was built in the southeastern corner of the basement. By the time we bought the house in 1967, coal was no longer used in the furnace, but the 8 foot by 6 foot room was still there. The coal bin was converted into a radio room. The shack contains a Swan 700 CX, an Atlas 210X, and a Kenwood 820 bought at a sheriff's sale. My antenna is a TH3 Jr. at 50 feet. I use dipoles for 80 meters and 40 meters, and a Hustler antenna for mobile operation.

"In February of 1976 I called CQ on 20 meters and was answered by Larry, K6SLP/M6. We had a good QSO, and Larry talked about county hunting and told me the net frequency. After signing with Larry I tuned to 14.336 and listened. After a while I decided I would try working Douglas County, Nevada, and I gave the mobile there a 5 × 8 signal report. He returned a 5 × 9. I did not get seriously involved, but I did work a few other counties during the next three months. What I was really looking for was my 50th state, Hawaii. After getting Hawaii, I thought I would go to 14.336 again, listen, and attempt to figure out what the stations were really doing. I heard one of the stations move another off frequency and I went along. After a 'break' I told them that I was new and asked if there was any information I could get. It was suggested that I write to MARAC for the information packet. When the information arrived, I read it and decided that it would not be possible to work all counties, but it was a real challenge.

Marge Bolster and Dick, WBØMNE, preparing for a mobile trip.

"After I decided to really try to work all counties, the first station I worked on the County Hunter's net was Robie, K4RQX. That was on July 10, 1976, and he was mobile in White Pine County, Nevada. After that I was a confirmed County Hunter. During the five years that I worked for my USA-CA, we were able to attend three of the MARAC conventions: Rochester, MN in 1977; Denver, CO in 1980; and Des Moines, IA in 1981. It was most enjoyable to actually meet many of the county hunters and their families.

"As many of you know, I am a police officer. One of the stations looking out for me as I dropped down to less than 20 counties to go knew that there was a mobile in my 17th-from-last county. Since he did not want me to miss the county, he telephoned the police department and told the dispatcher to tell the chief to get on the air because one of his counties was coming up. I am not the chief. The dispatcher did as he was asked, called the chief (real), and was asked what that was supposed to mean. The dispatcher then remembered that I am an amateur radio operator and called me to ask if the message had any meaning for me. It did, and that is how I was able to work the 17th from the last. The big day and last county arrived on November 3, 1981 at 0206 when Chuck, NØBHO, went to Harding, South Dakota.

"I would like to thank all of the net controls, assistant net controls, and, of course, the operators of mobile stations. Without your help I would never have made it. The biggest thank you must go to my family for their patience when I appeared late at meals or had my meals in the shack while I was listening for counties I needed. And yes, with help you *can* work all counties."

Awards Issued

Fred Klein, KS7T (ex-K2UAR/W7JYW), completed all counties before sending for his award and qualified for USA-CA All Counties #423 Mixed dated 5-14-83.

Bob Sawinski, KD4DJ, completed his collection and had me send him USA-CA All Counties #424 Mixed dated 5-31-83.

Ron Sundsboe, WAØMQM, did a lot of paperwork and came up with USA-CA All Counties #425 Mixed dated 6-2-83.

USA-CA 3000 certificates went to Fred Klein, KS7T, #452; Bob Sawinski, KD4DJ, #453; and Ron Sundsboe, #454, all Mixed.

Jack Knapp, Jr., W3ARK, who already had USA-CA 500 through 2500 all A-1, had me send him an additional endorsement, USA-CA 500 through 2500, endorsed all 2 × S.S.B.

USA-CA 2500 endorsements also were sent to Fred Klein, KS7T, #510; John F. Kray, KA9CNG, #511; Bob Sawinski, KD4DJ, #512; and Ron Sundsboe, WAØMQM, #512. All of these endorsements were for Mixed band and mode.

Fred Klein, KS7T, and Ron Sundsboe, WAØMQM, claimed USA-CA 2000, #565 and #566, both Mixed.

Gari J. Berloit, K9PBV, qualified for USA-CA 1500, #632 Mixed. Fred Klein, KS7T, and Ron Sundsboe, WAØMQM, received USA-CA 1500, #633 and #634, respectively.

Robin U. Go, DU9RG/4D9RG, claimed USA-CA 1000 #777, all 2× S.S.B. Also qualifying for USA-CA 1000 were Gari J. Berloit, K9PBV, #778; Fred Klein, KS7T, #779; and Ron Sundsboe, WAØMQM, #780 Mixed.

USA-CA-500 Certificates went to:

Randy Tipton, WA5UFH, #1834, All 2×S.S.B., All 6M.

Calvin C. Ruggs, WA8KMK, #1835 Mixed.

Robin U. Go, DU9RG/4D9RG, #1836, All 2×S.S.B.

333 South Lincoln Ave., Mundelein, IL 60060

Robin U. Go, DU9RG/4D9RG, recipient of the first USA-CA Award to a station in the Philippines.

This is the first USA-CA Award to go to a station in the Philippines.

Shoetsu Saitoh, JA7BJS, #1837, All 2×S.S.B.

Fred Klein, KS7T, #1838 Mixed.

Jack Bruce, WA5UUD, #1839, All 2×S.S.B., 6M.

Ed Sanders, WA6VJP, #1840, All 2×C.W.

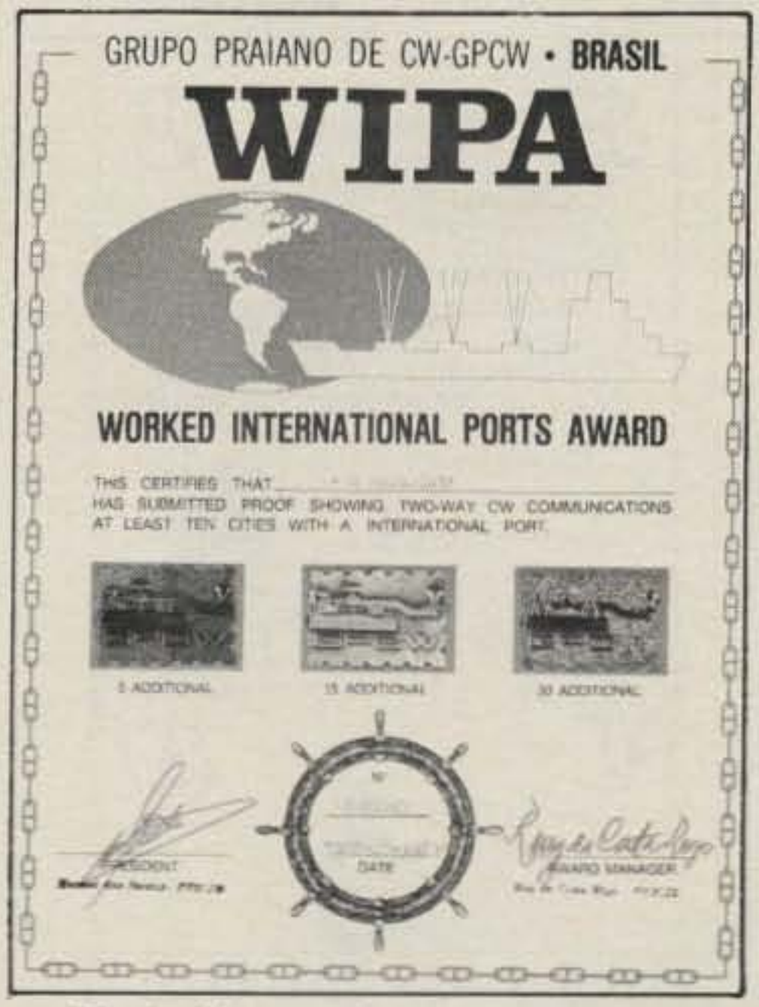
Deiter Pries, DK9QD, #1841 Mixed.

Wataru Hirose, JH8NYK, #1842 Mixed.

Ronald L. Sundsboe, WA0MQM, #1843 Mixed.

Special Honor Roll
All Counties

#423 Fred Klein, KS7T 5-14-83.
#424 Robert F. Sawinski, KD4DJ 5-31-83.
#425 Ronald L. Sundsboe, WA0MQM 6-2-83.



Worked International Ports Award.

Awards

Worked International Ports Award (WIPA). This is a new award sponsored by the Grupo Praiano de CW, Brazil to celebrate the 10th anniversary of the GPCW group. The award is available to all licensed amateurs and s.w.l.'s who can prove contacts with amateur radio stations in different cities with international ports. Stations must work 10 cities representing at least 3 continents. Only two QSO's with the country of the applicant may be used. Contacts on all h.f. bands since January 1, 1983—exclusively in c.w. mode—minimum report (RST) 338. Do not send QSL's; send only CR list (authenticated) and fee of 10 IRC's. The names of the international ports must be listed in alphabetical order on the application form.

Credit Seals. Special seals are available as follows:

"Copper"—5 additional contacts.
"Silver"—15 additional contacts.
"Gold"—30 additional contacts.

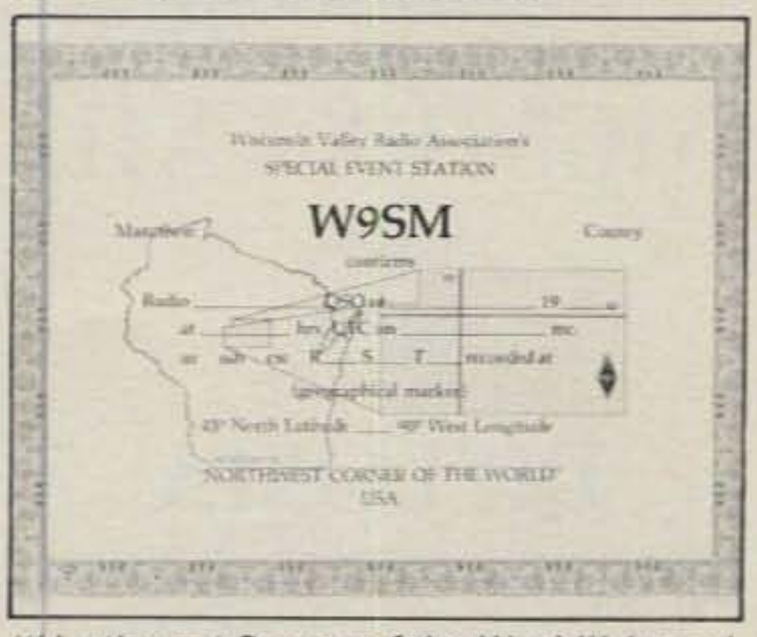
For the seals there are no restrictions about continents or cities from the applicant's country. The seals are free when requested with the WIPA; when requested later, send GCR list and 2 IRC's. The award is sponsored by CPCW, P.O. Box 556, 1100 Santos-SP, Brazil.

Second Annual "If the World is Round, Then How Come It Has Corners?" Special Event. Marathon County, Wisconsin, is located in north central Wisconsin. Besides being the largest county in Wisconsin, it also contains the intersection of the 45° North Parallel and the 90° West Meridian. This point occurs near the city of Wausau, Wisconsin. This places Wausau exactly halfway between the North Pole and the Equator, and halfway between the Zero Meridian at Greenwich, England, and the International Dateline. It is the "Northwest Corner of the World."

The other three 45°/90° "corners" are located as follows: in the Pacific Ocean west of Chile, in the Indian Ocean southwest of Australia, and in a remote northern area of the Chinese province of Sinkiang near the Mongolian border.

The Wisconsin Valley Radio Association will operate on the exact site of the 45° N/90° W intersection on September 18 using the Club station call sign, W9SM. Operation will be from 1200Z to 2400Z. Frequency of operation will depend on band conditions, but will be 25 kHz up from the bottom of the American General phone portion of whatever band is being used.

Send an s.a.s.e. for a QSL card. Send an s.a.s.e. and $1.00 for a certificate to: Wisconsin Valley Radio Association, Inc., Box 363, Wausau, WI 54401.



"Northwest Corner of the World" Award.

Anno Santo (Holy Year) Award. The Anno Santo Award is available to all radio amateur stations and s.w.l.'s as follows:

Europe: 15 QSO's any mode and any band with stations in Rome or 10 QSO's with stations in Rome and one QSO with the Vatican City.

Other Continents: 10 QSO's any mode and any band with stations in Rome or 7 QSO's with stations in Rome plus one QSO with the Vatican City.

Period: March 25, 1983 to April 30, 1984.

Applications with logs certified by officials of your association or by two other radio amateurs should be sent to: A.R.I.

1983 CQ World Wide DX S.S.B. Contest
October 29-30

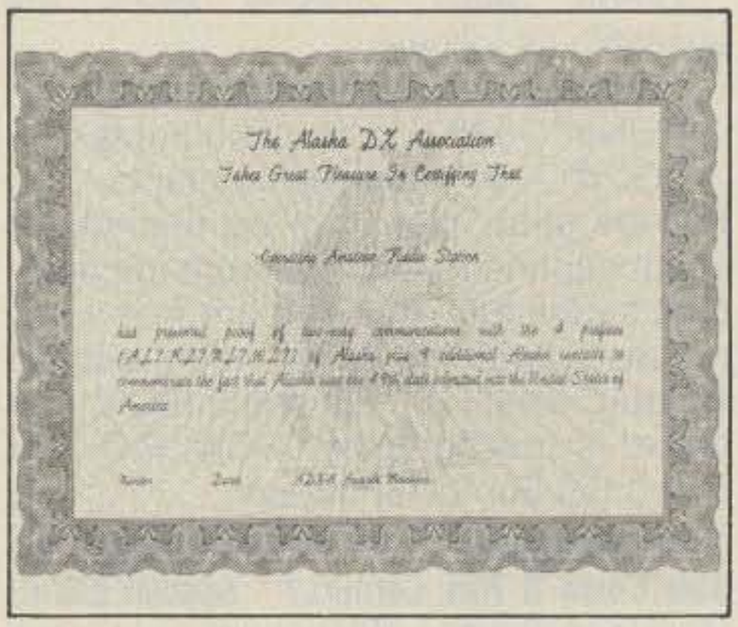
The Anno Santo (Holy Year) Award.

Sezione di Roma, P.O. Box 361, 00100 Rome, Italy. Fee: $8.00 U.S. or 20 IRC's.

Alaska 49er Award. The Alaska 49er Award is presented for proof of 2-way communications with the 4 prefixes of Alaska (AL7, KL7, NL7, WL7) plus 9 additional Alaska contacts.

USA-CA Honor Roll

3000		1500		500	
KS5T	452	K9PBV	632	WA5UFH	1834
KD4DJ	453	KS7T	633	WA8KMK	1835
WA0MQM	454	WA0MQM	634	DU9RG/4D9RG	1836
2500		**1000**		JA7BJS	1837
KS7T	510	DU9RG/4D9RG	777	KS7T	1838
KA9CNG	511	K9PBV	778	WA5UUD	1839
KD4DJ	512	KS7T	779	WA6VJP	1840
WA0MQM	513	WA0MQM	780	DK9QD	1841
2000				JH8NYK	1842
KS7T	565			WA0MQM	1843
WA0MQM	566				



Alaska 49er Award.

1. QSO's from September 1945 will count.

2. Mixed mode only. Special endorsement upon request.

3. GCR applies. Do not send QSL's unless sufficient postage for their safe return is provided.

4. Fee $2.00 U.S. or equivalent in IRC's or postage stamps. Send application to: Alaska DX Association, Awards/Contest Manager, P.O. Box 1614, Kodiak Island, AK 99615.

The AGCW Award Program. The AGCW was founded in 1971 and has more than 1000 members in over 33 countries. The particular aim of the AGCW is the promotion of the c.w. mode: c.w. activities on net frequencies, various kinds of contests on KW and UKW, QRP c.w. activities, and c.w. QTC's. They have devised a large awards program toward these ends. The full or associate membership is open to all licensed amateurs and s.w.l.'s the world over. Full members get the AGCW magazine *AGCW Info* twice a year. For more information, contact the AGCW Secretary, Else Muller, DL5MAI, Stoffelsberg 3, D-8860 Nordlingen, West Germany.

C.W. 1000: Applicants must have 1000 c.w. contacts during one calendar year. All QSO's in c.w. (contest, ZAP, etc.) will be accepted. There are no band restrictions. The same station can be worked as often as desired, but the time between the two QSO's must be at least 12 hours per band. To apply, make a list, giving the number of monthly c.w. contacts. Do not send QSL cards! Have the list verified by two amateurs or a radio club secretary.

C.W. 500: the same as for C.W. 1000.

QRP C.W. 250: This award is only available for c.w. contacts on KW (160M–10M) with TX input under 10 watts. (All other conditions see C.W. 1000.)

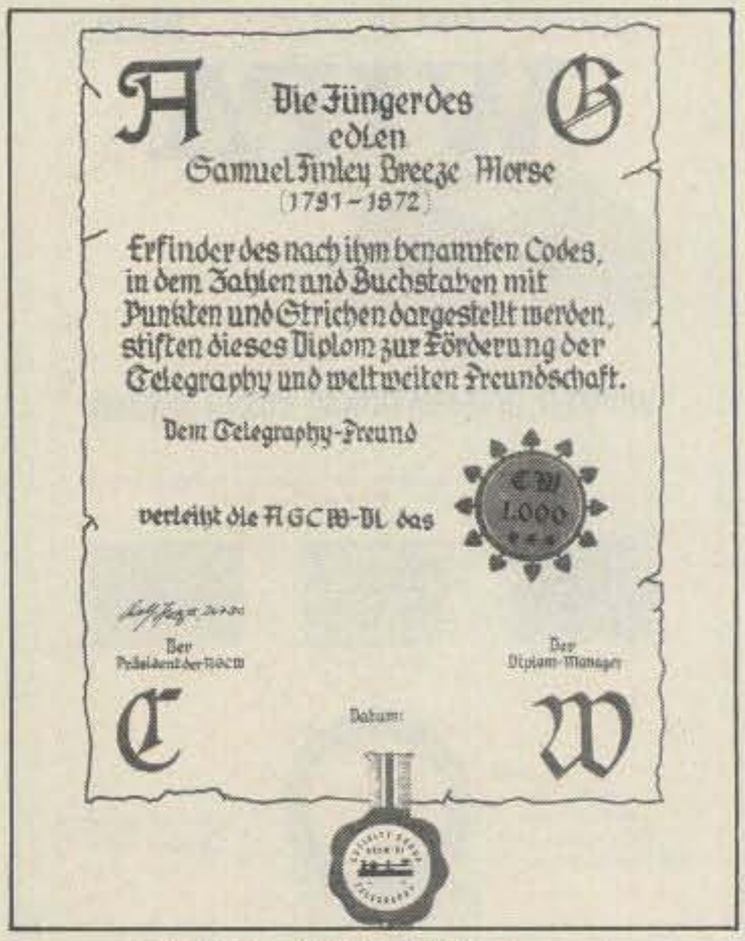
UKW C.W. 125: To qualify, applicants must have 125 c.w. QSO's (contest, EME, OSCAR, MS, TROPO, local, etc.) only on UKW bands. (All other conditions, see C.W. 1000.)

Fee for the award is $3.00 U.S. or 10 IRC's. Send applications and fee to Heinz Muller, DK4LP, Lubecker Landstr. 16a, D-2406 Stockelsdorf, West Germany.

W-AGCW-M: To encourage amateur radio telegraphy operating activities, AGCW-DL is sponsoring the "Worked all AGCW Members" award (in short, S-AGCW-M). Application for this award can be made by all licensed radio amateurs and s.w.l.'s. There are no limitations on bands used. C.w. QSL cards dated from Jan. 1, 1971 by AGCW members, as published in the membership list or by AGCW QTC's, are valid for this award. Each member QSL will usually count 1 point, QSL's by YL members will count 3 points, and the QSL for a confirmed QTC by one of the AGCW's QTC stations must not be listed more than once. Both QSO's on v.h.f. bands and foreign (non-DL) members will score double. The necessary total scores needed for the award application are as follows:

DL stations 300 points
EU stations 200 points
DX stations 100 points

A charge of DM 5,00, or 10 IRC's as an equivalent, must be sent with the award application. Both the application with GCR list as well as the QSL cards from the QTC stations are to be directed to: Klaus-Werner Heide, DK7DO, P.O. Box 1084, D-4782 Erwitte, West Germany.



AGCW—C.W. 1000 Award.

Notes

Here in midwest America, the summer holiday season is fast drawing to a close. The 1983 County Hunters Convention in Charleston, West Virginia, is a pleasant memory, and we are looking forward to our own fall vacation to the Rocky Mountains. Until October . . .

73, Dorothy, WB9RCY

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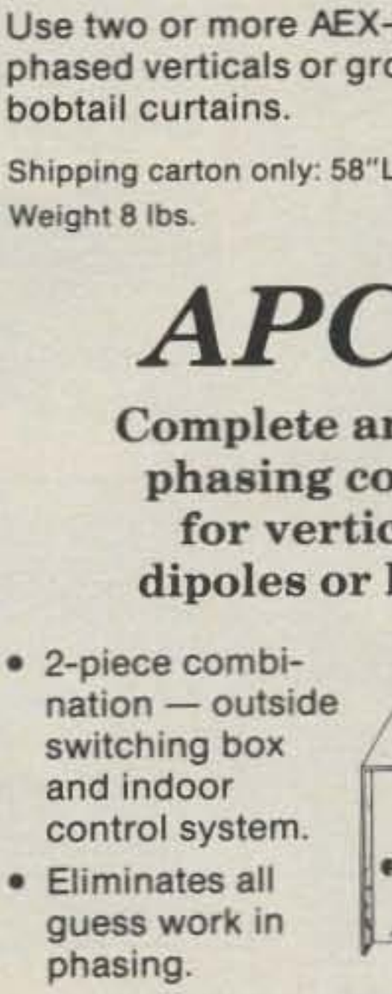

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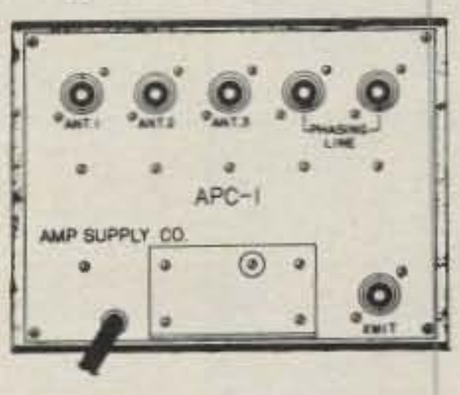

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6DJ8	2.75
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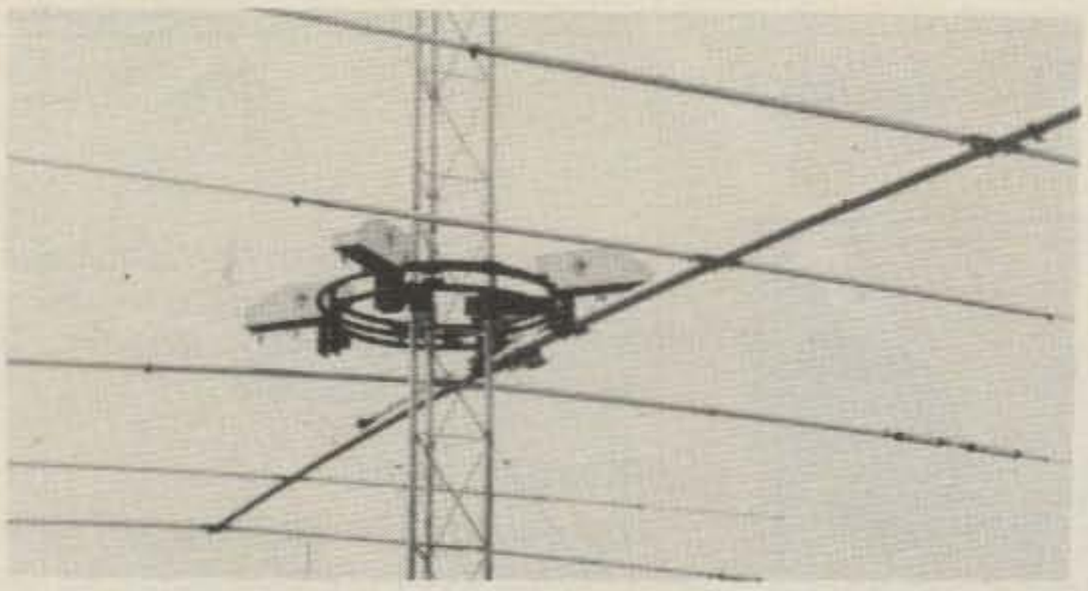

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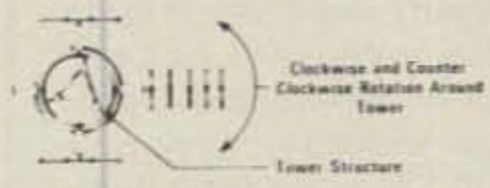

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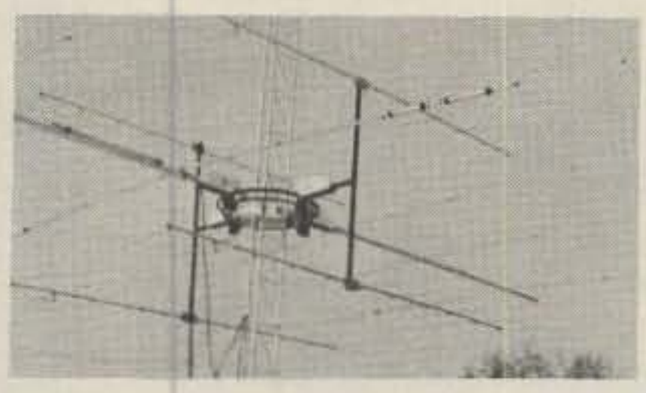

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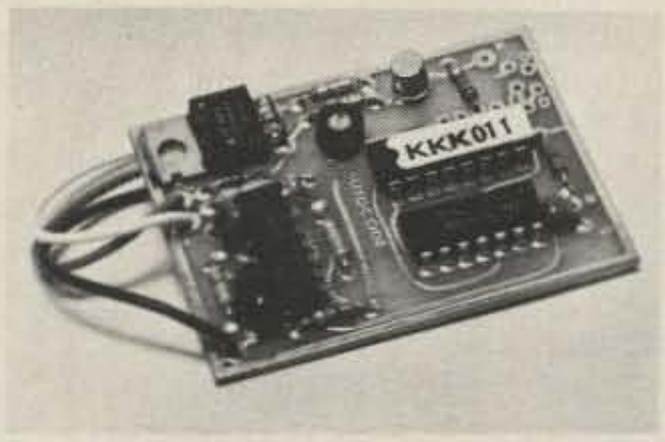

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CIRCLE 16 ON READER SERVICE CARD

DX

This month by
JOHN A. ATTAWAY, K4IIF

NEWS OF COMMUNICATIONS AROUND THE WORLD

When September comes can *The Contest* be far behind? *The Contest* is, of course, the *CQ* World-Wide Phone Contest scheduled for the weekend of October 29 and 30. See Frank's Contest Calendar elsewhere in this issue for full details, including instructions for obtaining official summary and log sheets.

The *CQ* World-Wide Phone Test in October and the *CQ* World-Wide C.W. Test in November provide the two best weekends of the entire year for working new countries and zones. Almost anyone who hasn't "worked them all" already can find a new one during the big contest weekends.

September is the month to get ready for the phone weekend. If you plan to operate from the home QTH, as most DXers and contesters will be doing, you should be checking out the rig and the antenna system. If you have been meaning to get a new beam up, or do some repairs on the old beam, now is the time. If a new exciter or linear is in the works, now is the time to move on that also, and don't forget to hurry a self-addressed, stamped envelope to *CQ* headquarters for log sheets.

Maybe you belong to a contest club, or a DX club with strong interest in contest operation, and will be going for a big multi-operator, multi-transmitter score. If so, you should be talking and planning and getting the gear together. How are things at the antenna farm? Is the new beam up yet? What is the condition of the towers? Those linears haven't seen much action since the last contest. Are they ready? Time is running out!

A hard-core group of W/K/N/VE DXers, the lucky few, will be operating from a DX location, either for pure recreation or in a serious attempt to win one of the several trophies. Popular spots for U.S. and Canadian amateurs include the Caribbean islands. Previous contests have featured activity from 9Y4, HH2, 6Y5, ZF2, VP5, 8P6, KV4/KP2, KP4, VP2V, VP2E, VP2M, FM7, C6A, VP9, PJ2, PJ8, FG7, HI8, and J3 through J8. Europeans favor spots such as C31, CT2, CT3, D4, EA8, HB0, OH0, and 4U1.

If you plan to operate from one of the Caribbean islands, you should be picking your spot and making your reservations, as the choicest locations will soon be taken. And of course your gear! When an operation involves the transportation of transceivers, linears, antennas, wire, fuses, tools, and what have you on a 2,000 mile trip to a strange QTH, it requires planning, planning, and more planning. Do you have your license in hand? Are you sure the hotel has no objection to that big beam hanging over the swimming pool? Has there been a change of management at the hotel since your last visit? A land-line call may be in order.

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

Larry Brockman, N6AR, (left) presenting the CQ DX Hall of Fame award to a surprised San Hutson, K5YY.

Do you have plenty of log sheets, a pencil sharpener, and pencils, pencils, and still more pencils? If you plan to score points in the hundreds of thousands or in the millions, you will need pencils by the dozens.

Perhaps you have hopes of winning a DXpedition trophy in the contest; then you had best direct your attention to the "3 point islands." When you are on an island where a contact with the U.S. or Canada counts only 2 points, it's very hard to compete with a guy knocking down 3 points for each such contact. The difference is the continental boundary. If your island is in North America, you get 2 points for U.S. and Canadian QSO's, but if you are in South America, you get 3 points per U.S. and VE QSO. The "3 point islands" include PJ2 and 9Y4, and stations on those islands figure high in the contest standings every year. Most Caribbean islands such as KP4, KV4/KP2, VP2, VP5, VP9, FM7, C6A, HH2, etc., are "2 pointers." You can have a lot of fun operating from these islands, but winning is extremely difficult. Herb, KV4FZ, and Pedro, NP4A (ex-KP4AST), are two who have done it by maintaining extensive antenna farms with large monoband beams and arrays. However, with a temporary station using dipoles and tribanders, it's pretty close to impossible.

Contesting Hints

Top contest operators N6AR, N6AV, and N6AW recently offered these suggestions to serious contesters through the pages of the *Southern California DX Club Bulletin:*

1. Keep a dupe sheet and a zone check sheet for each band. (A dupe sheet avoids claiming the same station twice on one band. (Excessive dupes will disqualify a log.)

2. Know when to expect band openings.

3. Make up a band operating plan and stick to it.

4. Know where to operate.

5. Don't waste more than 5 minutes in a pileup.

6. Don't waste any time in a Caribbean pileup unless propagation favors you.

7. Establish a tuning pattern, consistently up to down, or down to up.

8. Check frequency carefully before calling CQ. Don't call long CQ's.

9. Determine patterns in a pileup. He might be gradually tuning in one direction to listen, then jumping back. He could be alternating between two frequencies. Does he always take the strongest caller? The tailender?

10. Look around a lot in the higher parts of the band. Let the big guns fight it out down below.

11. For a couple of hours around noon local time the bands will get slow. Grab some sleep.

12. Stay up Friday night; sleep Saturday night.

These could be called the "Twelve Commandments of Contesting." They were written by experts with the *CQ* World-Wide Phone Contest in mind. Take heed!

De Extra

This month's De Extra editorial was written by K5NW and first appeared in *QRZ DX*, a weekly DX news bulletin edited by W5KNE. It was prompted by the deaths of Diethelm Mueller, DJ4EI, and Gero Band, DJ3NG, who were killed while attempting a DXpedition to the Spratly Islands. This is a matter of great interest and concern to DXers, and we would appreciate your views. Thoughtful, well-written letters may be published in a future issue.

"The loss of a fellow DXer is always a sad occasion, but especially so when it

The WPX Program

Mixed

1055	DF4FO	1057	N1AFC
1056	JH8TRP	1058	WB4GFO

S.S.B.

1590	WB4JBP	1597	LA9ML
1591	K6PKO	1598	DL4FV
1592	ISØQDV	1599	WI4K
1593	DF7RX	1600	SV1MO
1594	EA7AZJ	1601	JA8UUA
1595	W3IJT	1602	KG7A
1596	G4KIU		

C.W.

2209	JA9PBZ	2212	N9BKT
2210	EA3AQS	2213	ZL1BEK
2211	DF7TU	2214	G4MVA

VPX

230 ..... JA2-5168

WPNX

216 ..... WA2RRF 217 ..... KA7IZO

Endorsements

Mixed: 450 N1AFC. 650 NE4F. 700 PY6ABZ, WD4RAF, NE4F. 750 PY6ABZ, KSØZ, NE4F. 800 NE4F. 850 W6YMH. 950 K9UQN. 1100 CT1LN. 1150 I2DMK, JA1BN. 1350 K6DT, WA4QMQ, N7TT. 1400 K6DT. 1450 K6DT. 1500 K6DT. 1700 N2AC. 2000 N4MM.

S.S.B.: 350 Z21GJ, DF7RX, EA7AZJ, K9TI, W7KWI, DL4FV, I2EOW, G4KHF. 400 Z21GJ, DF7RX, EA7AZJ, JE1GBI, G4KHF. 450 Z21GJ, DF7RX, EA7AZJ. 500 Z21GJ, DF7RX, EA7AZJ. 550 WB4UBD, Z21GJ, DF7RX, EA7AZJ, KA3A. 600 WB4UBD, Z21GJ, DF7RX, EA7AZJ, K9BQL, JE1-23967, NE4F. 650 Z21GJ, DF7RX, EA7AZJ, NE4F, IT9YSW. 700 EA7AZJ, IT9YSW, NE4F. 750 IT9YSW. 850 AC2J, WB6GFJ. 950 N2AC. 1050 VE1YX. 1100 VE1YX, N7TT. 1150 W4BQY. 1200 W4BQY. 1250 W4BQY. 1300 WA4QMQ. 1650 N4MM. 1700 N4MM. 1750 N4MM, ZL3NS.

C.W.: 350 WØCON, EA3AQS, DF7TU, ZL1BEK. 400 W4DGX, EA3AQS, ZL1BEK. 450 K9AYK, EA3AQS, ZL1BEK. 500 K9AYK, EA3AQS. 550 WA2CNF, EA3AQS, I1QJC. 600 EA3AQS, PY2FK, I1QJC. 650 I1QJC. 750 OE1KJW. 800 DJ1YH. 900 I2DMK. 1000 N7TT. 1350 N4MM, K8MFO. 1400 K8MFO. 1650 DL1QT. 1700 N6JV.

VPX: 350 JA2-8764. 600 OE1-0140. 700 JA1-20781.

10 meters: DF9FM, DF7RX, NE4F, JA1-20784.
15 meters: DF9FM, JA5SIX, JA8UUA.
20 meters: WA3ZMY, ZL1BEK.
160 meters: W4BQY, 4Z4DX.

Asia: DF7RX, YBØACL, JA8UUA.
No. America: WB4JBP, DF7RX, JA1-20784.
Europe: YBØACL, ZL1BEK, Z21GJ, DF7RX, K9BQL.

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.

happens as did that with the ill-fated Spratly group. These people, in effect, gambled with their lives to give some of you a new country. Unfortunately they lost that gamble. Now one must question their judgment in going to such a dangerous part of the world for such a mundane reason as a DXpedition. The political situation around the Spratly group is well documented and should have been taken into consideration. Perhaps it was, and extenuating circumstances simply put them in an unwanted situation. It simply won't be known until the survivors relate the facts.

"This is certainly not the first group to experience misfortune on a DXpedition. Among the instances which come quickly to mind are the airplane crash on Palmyra by the group going to Kingman Reef, the pirate attack on the DXers enroute to Clipperton, the deaths of Chuck Swain and Ted Thorpe in a Pacific typhoon, and the close call by an earlier Spratly group. They will doubtless not be the last to experience such a fate.

"Or will they? Already there are rumbles and grumbles on the bands to the effect that Spratly and other such dangerous places should be deleted from the DXCC list. It has long been rumored that Newington keeps a secret countries criteria which is supposed to preclude any place becoming a new country if it involves personal danger to would-be DXpeditioners. These rumors indicate that this weighed heavily on deliberations involving Peter Island.

"Well, the mere existence of a so-called secret country criteria per se would be bad enough, but to have secret considerations other than geographic and political to determine what constitutes a DXCC country would be almost inexcusable. After all, the DXCC award is for working countries, not countries who are not at war, nor for working countries with easy ingress and egress. The DXCC award is for working some number of countries which should be determined by geopolitical criteria or boundaries! The elimination of countries, or potential countries, because of some arbitrary degree of personal risk which might be involved in putting them on the air would only serve to cheapen the award and strip some of the sense of thrill and exhilaration from potential DXpeditions.

"A past bulletin asked the question, 'At what cost DX?' I certainly can't answer that question for anyone except myself. It must be a personal decision by the potential DXpeditioner himself, and it would be wrong to attempt to answer it for him by deleting potentially dangerous countries. I daresay that more DXers have been killed or injured from high voltage or from tower-climbing accidents while trying to squeeze another half S-unit out of their stations than from Dxpeditions to so-called dangerous places. Yet I hear no hue and cry to outlaw tall towers and big linears."

This is a thought-provoking view from K5NW. What do you think?

Rare and Special Prefixes for WPX

This is shaping up as a great year for the prefix chaser, and special callsigns designated to commemorate World Communications Year (WCY) are playing a major role. On May 17 the Australians activated their AX prefix series, and on May 21 the New Zealand Amateur Radio Transmitting Society (NZART) operated 8 special stations, ZL1ACY–ZL9ACY. QSLs for the latter go to ZL2HE or via the ZL Bureau. San Marino club station T70A was active on April 20, and a QSL with a special World Communications Year theme is available by writing to A.R.R.S.M., P.O. Box 1, Republic of San Marino 47031.

Canada celebrated World Communications Year by authorizing the use of CY

F8RV (left) and Willi de Roos, VK9XR/MM (right). Willi is one of the world's foremost DXers, but this is our first picture, thanks to Franz, DJ9ZB.

The WAZ Program

10 Meter Phone

246	JA7HMZ	248	KØTLM
247	JA1AAT	249	N4KG

15 Meter Phone

163	JJ1KMP	167	G3SNN
164	JI1MNT	168	JH1MQC
165	JA8UUA	169	JJ1KTI
166	N4KG		

20 Meter Phone

455	I8ZTE	458	VE3BGX
456	N7ABJ	459	I1UJX
457	K6TMB		

10 Meter C.W.

47 ..... JI1QPU

20 Meter C.W.

196	JI1QPU	198	K1JA
197	N4KG		

40 Meter C.W.

42 ..... N4KE

All Band WAZ

S.S.B.

2683	EA3BDE	2698	ZL2AAV
2684	AA8G	2699	K8ZZO
2685	K5CON	2700	JA9GEK
2686	K2TK	2701	N3ANP
2687	IØJLX	2702	KC9EW
2688	IØNKN	2703	N4KG
2689	FG7BG	2704	EA8XS
2690	K4JW	2705	CE3TZ
2691	W5IUE	2706	N5AWS
2692	ZP5JAL	2707	KA2ELW
2693	CT4RH	2708	F6GUG
2694	LU4MEE	2709	YB2BOT
2695	KØTLM	2710	IK5ACO
2696	JE6WVU	2711	N6BLN
2697	WB3CJQ		

C.W. and Phone

5581	W7MCG	5596	W7AM
5582	GM4LHA	5597	DF5UT
5583	KO9Q	5598	KC9BQ
5584	KC3X	5599	KØTLM
5585	PY6ABZ	5600	WA4LBX
5586	K2TK	5601	K4GFH
5587	DL6RAI	5602	YU7NW
5588	JH1EDB	5603	N4KG
5589	OK3RC	5604	F6GXB
5590	JA2EGM	5605	F5KQ
5591	W4TL	5606	N6PE
5592	IV3JWR	5607	KR7G
5593	SV1NA	5608	KBØAG
5594	FC6FHX	5609	K6NAP
5595	JH7LVK		

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.

by VE stations, CI by VO stations, and CK1 by VY1 stations from May 17 through July 17. Finnish amateurs were allowed to substitute the special prefix OF in place of the usual OH, while the Netherlands issued special PF-WCY callsigns and allowed the use of PF and PG prefixes. Special WCY stations operating from the Sudan were 6U1WCY from Khartoum and 6U0WCY from the southern Sudan by Horst, DF7ZH. Japanese stations used the 8J1–8J0 prefix block, while Niue Island contributed to the festivities with the special call ZK9WCY.

While it is not a rare prefix, it is noteworthy that HCJB, the "Voice of the Andes," did its part for WCY with a special HC1JB operation June 11 and 12. They used the regular HCJB antenna system.

Special prefixes in last spring's *CQ* WPX Test included TO by the French stations, CR0 for CT1, HG5 and HG6 from Hungary, 4C5 and XF0 from Mexico, ZY from Brazil, P42 from Aruba, YT and YZ from Yugoslavia, and EC3 from Spain. Franz, DJ9ZB, a member of the DX Hall of Fame, used 3A3WPX from Monaco.

The A24 prefix is said to be reserved for Novice stations in Botswana, and KP5 has been assigned to Desecheo. (Now we need someone with the right connections to arrange a landing on Desecheo.) The unusual 4U8 prefix was used from Geneva in May as 4U8ITU with QSLs to go to F6EYS.

During the month of June, HW83 was substituted for the F prefix for five stations in Annonay, France, in celebration of the 200th anniversary of the first hot-air balloon flight, and members of L.C.R.A. were issued special 5J1 and 5K1 prefixes to mark the 50th anniversary of amateur radio in Columbia.

Designated callsigns for Liberian stations participating in a leprosy control project during 1983 include A81LC, A82LC, A85LC, A87LC, A88LC, and A89LC, with the LC suffix indicating Leprosy Center. The QSL Manager for these stations is SM4CWY, P.O. Box 134, 67101 Arvika, Sweden. Extra IRC's and cash represent donations to the Center.

The headquarters station for A.R.I. in Italy used the special call IR2ITU in May, and switched to II2A in June.

Some Facts About That Rare DX Country—Mount Athos

Mount Athos is *a land without women*, a land where no female animal—not even a cow or mare—has been allowed since the year 1060!

Mount Athos, or "holy mountain," is a theocratic state in northern Greece known officially as *Hagion Oros* or *Ayion Oros*. It is ruled by the holy community in Karie, which consists of one representative from each of 20 monasteries under the benevolent supervision of a Greek governor. The community has enjoyed autonomy under Byzantine emperors, Ottoman sultans, and the modern Greek government. In 1973, because of its distinctly separate administration, it became eligible as a DXCC country.

The current population of Athos is about 600 Basilian monks, which is considerably less than the 15th century population of 1000 monks in each of 40 monasteries. Of particular concern is the present lack of novices. The number of monks is steadily decreasing.

Athos may be reached either via boat, from Thessalonika to Dafni, or by road over mountainous terrain. Any ship with women on board is forbidden to approach within 500 yards.

In many respects, Athos is a Greek *Shangri-La*. According to *Fodor's Greece 1982*, "Stately buildings dot a well-watered valley, which slopes, lush and green, down to the sea." The monasteries and their churches contain a wealth of Byzantine art, icons, treasures, and a vast number of classical and medieval manuscripts.

First founded in the 10th century, Athos was originally the haven of hermits. The oldest monastery is Lavra, which was founded in the year 963. Lavra resembles a large, fortified hilltop village.

Athos occupies the easternmost of the three promontories of the Chalcidice Peninsula and projects into the Aegean Sea. The promontory is 30 miles long and 6½ miles wide at its widest point. The highest point is the marble peak of Athos, which reaches 6,600 feet above sea level. *(Thanks Bob Winn, W5KNE, and "QRZ DX" for this information.)*

5 Band WAZ

Standings as of June 1, 1983

All 200 zones worked:

1. ON4UN	22. I2ZGC	42. ZL1BIL
2. K4MQG	23. 4Z4DX	43. I4EAT
3. SM4CAN	24. N4KE	44. ZL1BQD
4. AA6AA	25. K5UR	45. TG9NX
5. W8AH	26. K9AJ	46. XE1J
6. W6KUT	27. SM3EVR	47. F5VU
7. EA8AK	28. LA5YJ	48. W3AP
8. LA7JO	29. DL3RK	49. YO3AC
9. EA3SF	30. N4WJ	50. K3TW
10. OH1XX	31. G3MCS	51. XE1OX
11. EA8OZ	32. SM5AQD	52. VE7IG
12. W0SD	33. W0MLY	53. OK1ADM
13. K0ZZ	34. I0RIZ	54. CT1FL
14. ON6OS	35. ON5NT	55. WA1AER
15. OK3TCA	36. OH6JW	56. N4RR
16. K6SSS	37. OK1AWZ	57. UW0MF
17. ZL3GQ	38. IV3PRK	58. W4DR
18. OK3CGP	39. DJ6RX	59. OK1MP
19. SM0AJU	40. OH3YI	60. W1NW
20. OZ3PZ	41. I4RYC	61. OE1ZJ
21. I3MAU		

The top 9 contenders for 5 Band WAZ:

1. JA3EMU, 199	6. K4CEB, 198
2. N4WW, 199	7. K1MEM, 197
3. W1NG, 199	8. K7UR, 196
4. W8UVZ, 198	9. F6DZU, 196
5. LA9GV, 198	

200 Stations have attained the 150 zone level

The WAZ Award

In addition to the ultimate DX operating award, 5-Band WAZ, *CQ* recognizes the following achievements in our Worked All Zones program:

1. C.W.-Phone—for a mixture of c.w., phone, and s.s.b. on the high-frequency bands, 80, 40, 20, 15, and 10 meters.

2. All C.W.—For contacts on 80–10 meters.

3. All S.S.B.—for contacts on 80–10 meters.

4. All phone—for mixed a.m. and s.s.b. contacts on 80–10 meters.

5. 80 meter single-band phone—all cards must indicate s.s.b. or phone operation and must be Jan. 1, 1973 or later.

6. 40 meter single-band phone—all phone or s.s.b. since 1973.

7. 20 meter single-band phone—all phone or s.s.b. since 1973.

8. 15 meter single-band phone—all phone or s.s.b. since 1973.

9. 10 meter single-band phone—all phone or s.s.b. since 1973.

10. 80 meter single-band c.w.—all c.w. since 1973.

11. 40 meter single-band c.w.—all c.w. since 1973.

12. 20 meter single-band c.w.—all c.w. since 1973.

13. 15 meter single-band c.w.—all c.w. since 1973.

14. 10 meter single-band c.w.—all c.w. since 1973.

For complete details regarding the WAZ awards, send a self-addressed, stamped envelope to the WAZ Manager, Leo Haijsman, W4KA, 1044 Southeast 43 Street, Cape Coral, FL 33904.

CQ DX Awards Program

S.S.B.

1253	JH1EDB	1257	G4KBX
1254	G4NJW	1258	WB4GFO
1255	G4GWB	1259	W4OHZ
1256	WA4PMF		

C.W.

584	JH1EDB	586	W6NLG
585	YU2RTW		

S.S.B. Endorsements

310	DL9OH/315	275	KB3OQ/286
310	OE3WWB/310	275	W6NLG/282
300	W0YDB/308	275	N5AWS/281
300	W8JXM/303	275	I5EFO/278
300	K9HQM/301	275	KZ2P/275
300	W7OM/301	250	VE6PW/273
300	W4OHZ/300	250	N3ARK/270
275	KB8DB/294	250	JH1EDB/265

C.W. Endorsements

300	K1MEM/301	250	JH1EDB/266
275	YU2RTW/277	1.8 MHz	WB4RUA

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

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NEW BT-1

The **BT-1 Basic Trainer** is a hand-held computerized unit which teaches the code one character at a time at 18 or 20 words per minute. The BT-1 contains a self-paced training program that allows serious students the possibility of learning Morse to 20 wpm in as little as one month! Each character represents a separate practice session in which the character is first introduced by itself, and then presented 50% of the time along with all previously learned characters. There are no tapes to memorize, wear out, or break. No programming skills are necessary; the BT-1 is very easy to use. The tone oscillator can also be keyed for sending practice. An earphone jack is provided for private listening. The BT-1 will go as high as 99 WPM in 1 WPM increments. A battery operated version, the BT-1P, is available with wall charger and internal NICAD batteries.

NEW KT-3

The **KT-3 Keyer-Trainer** unit uses the teaching program used in the BT-1 trainer. In addition, the KT-3 features a full function Morse automatic keyer for keying any modern transceiver, or for sending practice. Speed range is 18-99 wpm for transmitting and 1-99 wpm for training.

The **KT-2 Keyer-Trainer** is a computerized keyer with all the features shown above, plus a Morse proficiency trainer. It is designed to increase your existing code as quickly as possible. The unit can be set for beginning practice speed, ending practice speed, and duration of practice. The microcomputer does all the rest by gradually increasing the speed during the practice time selected. You can even select between fast code (Farnsworth) or slow code methods. The characters are sent in 5 letter groups, or random word lengths. Two levels of difficulty can be selected; common Morse characters or all English Morse characters. A 24,000 character answer book is provided for the 10 separate starting positions. There is also random practice mode for which no answers are available.

KT-2 Keyer Trainer

CK-2 Contester™

The **CK-2 Contester™ Keyer** is the lowest cost automatic keyer available featuring an automatic serial number generator for contesting. The CK-2 keyer features a large 500 character message memory that can be soft-partitioned into as many as 10 sections. An exclusive AEA edit mode makes it possible to correct mistakes made while entering messages or to insert words into previously established messages. Two different speeds can be set for fast recall in addition to a stepped variable speed control. The CK-2 features an automatic message repeat mode with variable delay-before-repeat for automatic CQ transmissions or TVI testing.

MM-2 MorseMatic™

The **MM-2 Morsematic Keyer** represents the most sophisticated paddle keyer ever designed and features two powerful microcomputers. The Morsematic incorporates virtually all the features (except the preset and stepped variable speeds) of both the CK-2 and KT-2 shown above. In addition, the MM-2 offers an exclusive automatic beacon mode which is invaluable for meteor scatter, moonbounce scheduling, or beacon operation.

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CIRCLE 57 ON READER SERVICE CARD

Here and There

Braille DX Service: Phil, AFØH, has started a Braille DX Service for blind DX-ers. This service provides a monthly cassette recording of current DX activities, DXpeditions, band conditions, and QSL information. Cost for the service is $2.00/month if the tapes are returned, or $10.00 if the subscriber wishes to keep the tapes. They are mailed in returnable mailing boxes. Phil has also put the *CQ* and ITU zone lists, the DXCC list, and a prefix list into Braille. The cost is $2.50. The Braille DX Service may be reached c/o Phil Scovell, AFØH, 8347 W. Sixth Ave., Lakewood, CO 80215.

Campbell Island: ZL3HI/A has been heard near 3800 kHz. He is only able to operate on 80 meters. QSL to ZL2QW.

Indonesia: For those needing YB on c.w., YB5AES has been worked on 28019 kHz. He is active daily from 0900–1500 and 2200–2400 GMT. Look for him on 40 meters between 7000 and 7005 kHz. QSL to W4BBP.

Jan Mayen: JX5DW should be active until mid-1984. He passes out c.w. contacts near 7025 from 0300 GMT and 14025 from 2300 GMT. QSL to him at 8013 Jan Mayen Island, Norway.

Kenya: 5Z4 has been activated on c.w. by Rolf, 5Z4MX, formerly 4S7MX. He will be there for three years. Reported frequencies include 21020, 3501, and 7004. QSL to SM3CXS.

Malpelo Island: A group of Columbia amateurs are scheduled to activate Malpelo for five days in October. Those involved include HK1QQ, HK3RQ, HK3BAU, HK3TF, and HKØBKX. The QSL Manager will be HK3DDD. The call is unknown at present, but HKØTU has been used previously from Malpelo.

San Marino: T77C was formerly M1C. He is active on 14020–030 c.w. from 2100 GMT. QSL to the *Callbook* address for M1C.

S.M.O.M.: The Rome amateurs hope to activate 1AØKM some time in October or November.

Taiwan: Tim, BV2A and BV2B, is the only ham in Taiwan. He uses the call BV2B for 20 meter s.s.b. only, and BV2A for other bands and modes.

Turkey: TA is active again on c.w. TA2WES was reported on 14030 kHz at 0330 GMT. QSL to Box 11, Baglbasi, Istanbul, Turkey.

Uganda: Two stations, 5X5BJ on 14186 kHz and 5X5FS on 14190 kHz, have been reported on from Uganda at 2000–2030 GMT. The political situation is fluid, and they may or may not be active now.

Willis Island: VK9ZS should be on the island until December. QSL to VK6YL.

Zone 23: Vic, UA7YAN, has been active regularly from Tuva on 14045–050 kHz. QSL to Box 88, Moscow. A new rotor was donated to JT1AN by the Kansas DX Association. It has arrived, and signals to the U.S. should be better. WAZ Award Manager W4KA reports that QSL's from the following stations are those most frequently submitted by DXers applying for WAZ. They are listed in order of frequency seen: UØY, JTØYT, JT1KAI, JT1YFU, JTØLAJ, JT1BF, JT1BG, JT1AN, JT1AO, JTØWA, JT1BM, JTØDJT, and UAØYAD.

CQ DX Honor Roll

C.W.

W6PT	315	N6AV	310	W2GT	301	DJ7CX	297	W7CNL	283
DL7AA	314	K4CEB	310	WA8DXA	301	N4MM	297	WØSR	282
ON4QX	314	K6JG	310	AA6AA	301	W6SN	295	K8PYD	281
W3GRS	314	N6CW	308	K6LEB	301	WØIZ	292	K7ZR	280
W9DWQ	313	W4BQY	307	K1MEM	301	AB4H	291	I5XIM	280
W8KPL	313	W1NG	306	SM3EVR	300	N5DX	291	W4BV	277
K6EC	312	DL3RK	306	K3FN	298	W1WLW	289	YU2RTW	277
N4PN	312	K4XO	305	OK1MP	298	SM6CST	286	WB4RUA	277
W6ID	311	W9BW	304	K9QVB	298	W9RY	283	K4SE	275
K9MM	311	W4OEL	303						

S.S.B.

K2FL	315	CT1FL	311	AA6AA	303	KB8DB	294	XE1OW	283
W6EUF	315	WØSFU	311	XE1J	303	AI5I	294	XE1OX	283
K6WR	315	I4LCK	311	ZL1BIL	303	K4SE	293	VE3CKP	283
W3GRS	315	K4CEB	311	XE1KS	303	WD8MOV	293	VE3MV	283
W3NKM	315	EA4LH	310	W8JXM	303	K9IW	293	AE5B	282
DL9OH	315	OE2EGL	310	LU1BAR/W3	302	I6PLN	292	CT1UA	282
W9DWQ	314	DK2BL	310	WA4WTG	302	WA4LOF	292	WB3DNA	282
IØAMU	314	WØSD	310	VK3JF	302	W8ILC/QRPp	292	AI9R	282
F9RM	314	K9RF	310	G4CHP	301	W9RY	291	TG9EP	281
VE3MR	314	N4MM	310	VE3FJE	301	WA4DAN	291	KB5FU	281
I8AA	314	OE3WWB	310	K9HQM	301	KV2S	291	SM4CTT	281
VE3MJ	314	VE3GCO	309	WB4NDX	301	VE3IPR	291	WB4KTG	281
W4UG	314	K8LJG	309	W7OM	301	KB5FU	291	N5AWS	281
W4EEE	314	W2SUA	309	WA3HUP	301	WD8MGQ	290	I2MQP	280
IØZV	314	W9SS	309	K8CMO	301	YU1DZ	290	W8IMZ	279
XE1AE	313	K5OVC	308	WA4JTI	300	W6SN	289	KKØC	279
I4ZSQ	313	VE7WJ	308	W4OHZ	300	JA5PUL	289	KA8T	279
I8KDB	313	K4XO	308	LA7JO	299	KM6B	289	W4JFE	279
W9KRU	313	I3LLD	308	AI8S	299	WDØBNC	289	EA3KW	279
ZL3NS	313	N6AW	308	N5FG	299	W9TA	289	W6NLG	279
VE3GMT	313	W1NG	308	VE3MRS	299	K4CXY	289	AI8M	278
YV1KZ	313	DL6KG	308	W8PCA	299	W7FP	288	K4BYK	278
W3AZD	313	YV5AIP	308	WAØTKJ	299	I3OBO	288	N9AMF	278
ZS6LW	313	K6XP	308	W6FET	298	KØGT	288	I5EFO	278
DJ9ZB	313	OK1MP	308	K9SM	298	I8KCI	288	VE3IUE	277
K6YRA	313	WØYDB	308	I8LEL	298	I5BDE	288	KB8O	277
ZL1AGO	313	N2SS	307	K8NA	298	N2ATD	288	KP4EQF	277
VE2WY	312	VE4SK	307	W6DN	298	EA9IE	287	K1VHS	277
K6JG	312	K8PYD	307	W2FGY	298	AB9E	287	WBØUFL	277
F2MO	312	OZ8BZ	307	HP1JC	297	KB9KD	287	ACØA	277
K9MM	312	N4KE	306	DJ7CX	297	KC8JH	287	K9TI	277
W3GG	312	N6AV	306	K5DUT	297	W4BQY	287	N7ASL	276
W4DPS	312	VK4VC	306	JH1VRQ	297	WB4UBD	286	WØULU	276
W9JT	312	4Z4DX	306	IØMBX	297	KB3OQ	286	WA6DTG	276
N4WF	312	K1UO	306	I8ACB	295	YU2RTW	285	I8INW	275
W9BW	312	YV5DFI	305	WB1DQC	295	WD9IIX	285	JH4PRU	275
I8YRK	312	W8ILC	305	IV3YRN	295	K8VFV	284	W8LKG	275
OZ3SK	312	W2CC	305	K9UAA	295	NA5W	284	W4UNP	275
K6EC	311	N4PN	305	K9QVB	295	WØKU	284	WB3CQN	275
W4SSU	311	WØSR	304	WA9PWN	295	WB3HAZ	283	WB1EAZ	275
K9LKA	311	9H4G	304	W1LQO	294	WB6GFJ	283	VE7BSM	275
K4MQG	311	K9BWQ	304	XE1NI	294	VP9CP	283	KZ2P	275

QSL Information

C6ABA to G3AMR
C31XS to F6CQU
CX7BY to WØIJN
FB8WH to F6BFH
FK8CE to K2ROR
FO8IW to K1CC
HC1BP to N4BPO
J3AVT to W8UVZ
J28DT to DF6AD
JD1ALN to JR8FOG
JT1AN to W7PHO
JX6RE to LA9RE
KA4EIN/TI8 to N5BQR
KC7UU/5N6 to K6EDV
K8ZBL/J6L to K8ZBY
LU2MM to K1MM
LU5ZA to LU2A
OH8BA to OH2BAZ
PA3ATA/LX to PA6RO
PA3AWW/LX to PA6RO
PP8ZAT to KC8YW
PY1ZFF to KA9KUH
R4ASB to UK4AAB
SV8AA to N2OO
SV7WD to WB4LFM
T2ETA, T2VEL, T30BF, & T30BG to OE2DYL
T30CH to W9SLT
T32AB to N7YL
TG9GI to IØWDX
TG9NX to N4FKZ
TG9RB to W1WLW
TG9XML to K5BDX
TI5EWL to AG1K
TJ1AF to N4IAM
TL8ER to F6GQK
TO5RV/FC to F5RV
TR8DX to WA4VDE
TR8JL to K6VNX
TR8MYA to JA8ATG
TU2GA to K9KXA
TY9NX to N4FKZ
UA8FCL to KB7SB
UD6BD & UD6BG to W7PHO
UJ8JCQ to WB2OHD
UK1PAC to UK1OAA
UK2FAA to KA6V
UK2RDX to W7PHO
UV8EX to W7PHO
V2AN to WB8SSR
VP2MCK to G2ACK
VP2VDG to W4KA
VP5LDX to WB8LDH
VP8AQU to K8JW
VS6YY to K5YY
WB3KBZ/VP9 to KG8U
XE2EBE to AA6DP
XF8MDX to XE1MDX
XL1WK to VE1WF
XT2AW to KN1DPS
YB8ACP to K6DLV
YB8AV to KB5AS
YB9VA to W5GZI
YJ8DX to JL1KDX
YN1BO to SK7HW
YS1LSR to VE3MFP
YS9HH to WB5GUV
ZD9YL to W4FRU
ZF2GW to W2HPF
ZK2EL to OE2DYL
ZK2TA to OE2DYL
ZP5CBL to W3HNK
ZP5CD to KE4UV
ZS3TP to NØCP
3D6AJ to WB3CQN
4N8ATC to YU2AKL
5W1AB to WA7LJU
6W8FZ to DJ7BG
9M2HB to N4FFN
9N1WW to JA8BMK
A22DC to Private Bag #10, Serowe, Botswana
C21BD to P.O. Box 225, Republic of Naura, Central Pacific
CP8HD to Box 322, Trinidad, Bolivia
CX7BY to James R. Wood, WØIJN, P.O. Box 549, Montevideo, MN 56265
D44BC to P.O. Box 36, Mindelo, Republic of Cape Verde
FG7BM to Box 1249, Pointe-a-Pitre, Guadeloupe
FY7AN to Boite Postal 746, 97305 Cayenne, French Guiana
GD4PTV to 13 Threshold, Jurby, Isle of Man, United Kingdom
HT5JAR to P.O. Box 122, Jinotepe, Nicaragua
KG4CC to Box 73, FPO Norfolk, VA 23593
KG4CD to Box 585, FPO Norfolk, VA 23593
OA4JR to P.O. Box 2473, Lima, Peru
ON8VV to P.O. Box 573, Gettysburg, PA 17325
P29JM to P.O. Box 1205, Arawa, Gougainville, New Guinea
PJ7ARI to Box 142, St. Maarten, West Indies
PZ1DT to Box 2163, Paramaribo, Surinam
PZ1DV to P.O. Box 9006, Paramaribo, Surinam
T3ØDB to Box 457, Betio, Tarawa, Kiribati, Central Pacific
TI2CF to P.O. Box 4300, San Jose, Costa Rica
TR8DC to P.O. Box 2125, Libreville, Gabon
TR8IG to Box 740, Libreville, Gabon
TR8JL and TR8JLD to P.O. Box 484, Libreville, Gabon
TU2JL to Box 1309, Abidjan 01, Ivory Coast
VK9WC to P.O. Box 27, Norfolk Island
VP8ANT to P.O Box 146, Cambridge, England
YJ8RG to Box 229, Port Vila, Vanuatu, Central Pacific
YS1LSR to Box 1493, San Salvador, El Salvador
Z21GB to Post Office, Colleen Bawn, Zimbabwe
Z21GO to 39 Coull Dr., Mt. Pleasant, Harare, Zimbabwe
ZB2GR to #19, Keuhley House, Gibraltar
ZD7BW to Isle of St. Helena, South Atlantic Ocean

QSL Manager Volunteer: Chris Vermote, ON1BXS, would like to offer his services as QSL Manager for any DX stations or DXpeditions. Chris can be reached at P.O. Box 44, 8900 Ypres, Belgium.

73, John, K4IIF

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50077	062	50	8	4.25
50078	032	33	1.5	1.31
50079	032	88.5	4	2.47
50080	032	175	8	4.57

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11303	16	.64	.58	.48
11304	18	.73	.66	.55
11305	20	.99	.90	.75
11306	22	1.12	1.02	.85
11307	24	1.25	1.14	.95
11308	28	1.52	1.38	1.15
11309	40	2.05	1.86	1.55

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11202	14	.14	.13	.12
11203	16	.16	.15	.14
11204	18	.18	.17	.15
11205	20	.20	.18	.16
11206	22	.22	.20	.18
11207	24	.24	.22	.20
11208	28	.28	.26	.25
11209	40	.40	.37	.33

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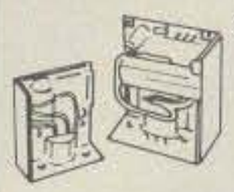
13826	CB3811	3.0-7.0	-12±0.6	0-25	.48x.51x3.05	7.95
13827	CB3802	3.0-7.0	15±0.7	0-20	.48x.51x3.05	7.95
13828	CB3812	3.0-7.0	-15±0.7	0-20	.48x.51x3.05	7.95
13829	CB3804	3.0-7.0	28±0.7	0-10	.48x.51x3.05	7.95
13830	CB3814	3.0-7.0	-28±0.7	0-10	.48x.51x3.05	7.95
1.5 W TYPE:						
13831	CL3801	4.0-7.0	12±0.6	125	.651x1.2x1.77	$24.95
13832	CL3811	4.0-7.0	-12±0.6	125	.651x1.2x1.77	24.95
13833	CL3802	4.0-7.0	15±0.7	100	.651x1.2x1.77	24.95
13834	CL3812	4.0-7.0	-15±0.7	100	.651x1.2x1.77	24.95
13835	CL3804	4.0-7.0	28±1.4	50	.651x1.2x1.77	24.95
13836	CL3814	4.0-7.0	-28±1.4	50	.651x1.2x1.77	24.95
13825-1	DATA SHEET FOR DC/DC CONVERTERS					.25

ELPAC POWER SUPPLIES – SOLV SERIES FULLY REGULATED



SINTEC Stock No.	ELPAC Part No.	Output Voltage	Output Current Rating	Dimensions (HxWxD) in Inches	OVP	Price
13802	SOLV15-5	5	3.0A	4-7/16x4x2	Fixed included	$39.95
13803	SOLV15-12	12	1.5A	4-7/16x4x2	Fixed included	39.95
13804	SOLV15-15	15	1.2A	4-7/16x4x2	Fixed included	39.95
13806	SOLV15-24	24	0.75A	4-7/16x4x2	Fixed included	39.95
13808	SOLV30-5	5	6.0A	5-5/8x4-7/8x3-3/16	OVP-4	59.95
13809	SOLV30-12	12	4.0A	5-5/8x4-7/8x3-3/16	OVP-4	59.95
13810	SOLV30-15	15	3.3A	5-5/8x4-7/8x3-3/16	OVP-4	59.95
13812	SOLV30-24	24	2.0A	5-5/8x4-7/8x3-3/16	OVP-4	59.95
13802-1	Data Sheet for SOLV Series					.25

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puts IC's on their true row to row spacing. One side is for .300 centers. Flip tool over for devices on .600 centers. Put device in tool and squeeze.

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Miniclamp AC Volt-Ammeter allows singling one conductor out of many without disarrangement.

SET of THREE **$99.00**

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13731	0-50A	39.50
13732	0-100A	39.50

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Stock No. 13735 **$14.95**

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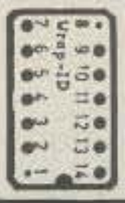
Stock No. 13729 **$13.95**

OK MACHINE AND TOOL

IC INSERTION/ EXTRACTION KIT
Includes DIP IC extractors and inserters to accommodate all ICs from 14 to 40 pins. Tools that engage conductive surfaces are CMOS safe and include grounding lugs. Stock No. 13309 **$37.74**



SOCKET WRAP ID
DIP socket-sized plastic panels with numbered holes in pin locations. Slip onto socket before wire wrapping to identify pins. Also write on them for location, IC part number, function, etc. Simplifies initial wire wrapping, troubleshooting and repair.

13295	14 pin
13296	16 pin
13297	18 pin
13298	20 pin
13299	22 pin
13300	24 pin
13301	28 pin
13302	40 pin
13303	96 pin

$1.82 per pack

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One-piece, spring steel construction. Will extract all LSI, MSI and SSL devices with 8 to 24 pins.

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CQ Magazine
76 North Broadway
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Announcing

● **Special Event Station WB4TAL** - Throughout September WB4TAL will operate from Clemmons, NC, in celebration of the 200th anniversary of the Clemmons United Methodist Church. Operation will be on the general portions of the h.f. phone bands and on 2 meter f.m. (c.w. available on request). Commemorative QSL card for s.a.s.e. to WB4TAL, P.O. Box 366, Clemmons, NC 27012.

● **Chelsea Fair Certificate** - A special certificate will be issued to anyone making contact with the Chelsea Communications Club from August 30th through September 3rd. Contact can be made with WD8IEL on 40 and 80 meter phone from 2300–0100Z. Send s.a.s.e. to 104 East Middle St., Chelsea, MI 48118.

● **KB7KZ From Tombstone, AZ** - On September 3–5 special event station KB7KZ will be on the air in conjunction with the Second Annual Rendezvous of Gunfighters. Operations will be from 1500 UTC on the 3rd through 2400 UTC on the 4th on s.s.b. 28680, 21380, 14280, and 7280, and on c.w. 21130 and 7130. Certificates will be awarded to amateurs and s.w.l.'s. Send large s.a.s.e. (40¢) to KB7KZ, P.O. Box 36032, Tucson, AZ 85740.

● **Special Event Station WA1RXA** - The Greater Norwalk ARC will operate WA1RXA from the Norwalk, CT Oyster Festival on Sept. 9th (2200–0100 GMT), 10th (1500–0200 GMT), and 11th (1500–0000 GMT) on phone (3890, 7240, 14305, 21385, 28600) and c.w. (3720, 7120, 14090, 21090, 28090). For a certificate send an s.a.s.e. to Joseph Beck, 26 Ambler Dr., Norwalk, CT 06851.

● **WAARS To Operate W4WYP** - The West Alabama ARS will operate this special event station to commemorate the birthday of football coach Paul "Bear" Bryant on Sept. 10th from 1300–2400Z on the bottom 25 kHz of the general 40–15 meter phone band (also Novices on the bottom 25 kHz of Novice band). Send $1.00 and large s.a.s.e. to the West Alabama ARS, P.O. Box 1741, Tuscaloosa, AL 35403 for a certificate.

● **"Railroad Mobile" Special Event Station** - The St. Paul Radio Club will operate KØAGF aboard a steam-powered train from Northfield, MN from 1400–2300 UTC on Sept. 10th and 11th. Frequencies: s.s.b. 3948, 7267, 14288, 21377; c.w. 3552, 7107, 14057, 21057. For certificate and QSL send 9 × 12 s.a.s.e. (37¢) and QSL to St. Paul RC, P.O. Box 30313, St. Paul, MN 55175-0313.

● **Northern New Mexico ARC Special Event** - This club will operate mobile from the Cumbres and Toltec Railroad on Sept. 17th from 10:30 a.m. to 4:30 p.m. MST. They will be on 14.260 and 21.360 MHz. A certificate will be available. For more information and QSL contact Tom Walker, N5ACP, 560 Bryce, Whiterock, NM 87544 (no s.a.s.e.; send QSL and 40¢).

● **W7NYW From Sumpter Valley Railroad, OR** - The Eastern Oregon ARS and amateurs from LeGrande, OR, will operate W7NYW from 1600 UTC Sept. 17th to 2300 UTC Sept. 18th on Novice bands plus 1.865, 3.965, 7.265, 14.265, 21.365, 29.000 MHz, and repeaters 147.66-.06, 147.86-.26, and 146.20-.80. For commemorative QSL send your QSL and s.a.s.e. to EARS, P.O. Box 124, Baker, OR 97814.

● **Special Event Station KB9PQ** - The Inland Steel Employees Repeater Assoc. (East Chicago, IN) will be on the air with the call KB9PQ from 1300–0000Z on Sept. 17–18 on all bands in the first 10–15 kHz of the general and Novice portions of the bands, plus 146.52 f.m. For certificate send s.a.s.e. to ARS KB9PQ, 7605 Southeastern, Hammond, IN 46324.

● **General Motors Anniversary Station** - The Fisher Body Lordstown ARC (Warren, OH) will operate W8KKZ from 1200Z–0300Z daily from Sept. 22–24 to commemorate the 75th anniversary of General Motors. Operation will be in the lower portion of the 20 and 40 meter general phone bands and lower portion of the 15 and 40 Novice c.w. bands. QSL information will be given on the air during the event.

● **N8CUX From Smithfield, OH** - N8CUX will operate from the Smithfield Apple Festival from 2300–0400 UTC on Sept. 23rd and 24th on s.s.b. 3.900 and Novice 7.110 both ±5 MHz. For a certificate send s.a.s.e. to Robert Carson, N8CUX, 259 Hill St., Smithfield, OH 43948.

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

Sept. 9–10, **Fourth Annual High Plains Ham Roundup,** Medicine Bow National Forest, east of Laramie, WY. Contact Mike Marchitelli, P.O. Box 731, Laramie, WY 82070.

Sept. 10, **4th Annual Grant County, IN, Hamfest,** Marion, IN. Contact Jerry Richards, KA9DLJ, P.O. Box 1146, Marion, IN 46952.

Sept. 10–11, **Mobile ARC Hospitality Hamfest,** Mobile, AL. Contact Jim Wilder, N4GUC, 424 Cody Rd. S., Mobile, AL 36609, phone 205-343-7365.

Sept. 10–11, **Windsor Hamfest,** Windsor, ME. Contact N1AZH, RFD #2 Box 3678, Greene, ME 04236, phone 207-946-7557.

Sept. 11, **Ozarks ARC Congress & Swapfest,** Monett, MO. Contact OARS, Box 327, Aurora, MO 65605.

Sept. 11, **Findlay Hamfest,** Findlay, OH. Contact Findlay Radio Club, P.O. Box 587, Findlay, OH 45840.

Sept. 13–17, **Miss America Pageant Special Event Station K2BR,** Atlantic City, NJ. Contact SCARA, K2BR, Box 121, Linwood, NJ 08221.

Sept. 17, **Sonoma County Radio Amateurs Fleamarket,** Sebastopol, CA. Contact SCRA, Box 116, Santa Rosa, CA 95404.

Sept. 17, **Grand Rapids ARA Swap & Shop,** Grand Rapids, MI. Contact Grand Rapids ARA, P.O. Box 1248, Grand Rapids, MI 49501.

Sept. 17, **31st Annual W9DXCC Convention,** Itasca, IL. Contact Howard Huntington, K9KM, 65 S. Burr Oak Dr., Lake Zurich, IL 60047.

Sept. 17–18, **Peoria Superfest '83,** Peoria, IL. Contact Superfest '83, 5808 N. Andover Ct., Peoria, IL 61615 (s.a.s.e.).

Sept. 18, **L'Anse Creuse ARC Swap & Shop**, Mt. Clemens, MI. Contact Wm. Chesney, N8CVC, 215 Elizabeth, Mt. Clemens, MI 48043 (s.a.s.e.), phone 1-313-463-1412.

Sept. 18, **Skyview Radio Society Hamfest,** New Kensington, PA. Contact Skyview Radio Society, Turkey Ridge Rd., New Kensington, PA 15068.

Sept. 18, **Cincinnati Hamfest,** Venice (Ross), OH. Contact W8ALW, 3965 Harmar Ct., Cincinnati, OH 45211.

Sept. 18, **Candlewood ARA Fleamarket,** Danbury, CT. Contact CARA, P.O. Box 188, Brookfield Center, CT 06850, phone KC2QF 914-533-2758.

Sept. 18, **South Jersey Radio Assn. Hamfest,** Pennsauken, NJ. Contact Fred Holler, W2EKB, 348 Bortons Mill Rd., Cherry Hill, NJ 08002, phone 609-795-0577.

Sept. 23–25, **ARRL Dakota Div. Convention,** Sioux Falls, SD. Contact Sioux Falls ARC, P.O. Box 91, Sioux Falls, SD 57101.

Sept. 24, **Elmira International Hamfest,** Horseheads, NY. Contact John Breese, 340 West Ave., Horseheads, NY 14845.

Sept. 24, **Seventh Annual Baldwin Hamfest,** Baldwin, WI. Contact Bruce Olson, N9BLU, Box 91, St. Croix Falls, WI 54024.

Sept. 24–25, **Radio Expo 83,** Grayslake, IL. Contact Radio Expo 83, Box 1532, Evanston, IL 60204 (s.a.s.e.), phone 312-582-6923.

Sept. 24–25, **Wichita ARS Hamfest,** Wichita Falls, TX. Contact WARS Hamfest, P.O. Box 4363, Wichita Falls, TX 76308.

Sept. 24–25, **Walla Walla Hamfest,** Walla Walla, WA. Contact Walla Walla Valley ARC, P.O. Box 321, Walla Walla, WA 99362.

Sept. 25, **Sandhills ARC Eyeball QSO Party,** Garden City, KS. Contact SHARC, P.O. Box 811, Garden City, KS 67846 (s.a.s.e.)

Sept. 25, **Boulder ARC Swapfest,** Boulder, CO. Contact Tim Groat, 1000 E. 10th Ave., Broomfield, CO 80020, phone 303-466-3733.

Sept. 25, **Natchaug ARA Hamfest & Fleamarket,** Willimantic, CT. Contact Edward C. Sadeski, KA1HYW, 268 Main St., Willimantic, CT 06226, phone 203-456-1432 after 4 p.m.

Sept. 25, **10th Annual Lanierland ARC Hamfest,** Gainesville, GA. Contact Phil Loveless, KC4UC, 3574 Thompson Bend, Gainesville, GA 30501, phone 404-532-9160.

Announcing:

The 1983 CQ World-Wide DX Contest

Phone: October 29–30 & C.W.: November 26–27
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.

II. BANDS: All bands, 1.8 through 28 MHz.

III. TYPE OF COMPETITION:

1. Single Operator (single band, and all band). Single operator stations are those at which one person performs all of the operating, logging, and spotting functions. The use of DX spotting nets or any other form of DX alerting assistance places the station in the Multi-Operator category.

2. Multi-Operator (all band operation only).

a. Single Transmitter, only one transmitter and one band permitted during the same time period (defined as 10 minutes). *Exception:* One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier. *Logs found in violation of the ten-minute rule will be automatically reclassified as multi-multi to reflect their actual status.*

b. Multi-Transmitter (no limit to transmitters but only one signal per band permitted).

c. *All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitter.*

3. QRPp (single operator only). Power must not exceed 5 watts output. Stations in this category will be competing only with other QRPp stations for awards.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e., 5705). C.W.: RST report plus zone (i.e., 57905).

A staton in a zone or country different than that indicated by its call sign is required to sign portable.

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The *CQ* Zone Map, DXCC country list, WAE country list and WAC boundaries are standards.

VI. POINTS: 1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multiplier.

Example: 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 1000,000 (final score).

VIII. AWARDS: First place certificates will be awarded in each category listed under Sec. III in every participating country and in each call area of the United States, Canada, Asiatic USSR, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award *only*. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

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

All certificates and plaques will be issued to the licensee of the station used.

IX. TROPHIES & PLAQUES (Donors)

PHONE

Single Operator, All Band
World - Bill Leonard, W2SKE
World - QRPp - Adrian Weiss, K8EEG/0
U.S.A. - Potomac Valley Radio Club
*Canada - Jack Baldwin, VE7RG
Carib./C.A. - Jim Neiger, N6TJ
Europe - Thomas J. Peruzzi, Jr., W4BVV
Africa - Gordon Marshall, W6RR
*Asia - Japan CQ Magazine
*Japan - Palm Garden Contest Club
Oceania - No. California DX Club
S. America - David Novoa, KP4AM

Single Operator, Single Band
World - K2HLB Memorial, No. Jersey DX Assoc.
*World - 21 MHz - Lee Wical, KH6BZF
World - 3.8 MHz - Fred Capossela, K6SSS
U.S.A. - 28 MHz - Donald Thomas, N6DT
U.S.A. - 3.8 MHz - Arnold Tamchin, W2HCW
U.S.A. - So. California DX Club
*Canada - Gene Krehbiel, VE7KB
Carib./C.A. - Pedro Piza, Jr., NP4A - KP4ES Memorial
Europe - 28 MHz Zone 14 - A. G. Anderson, GM3BCL
Japan - 21 MHz - DX Family Foundation
*So. America - Rafael Ponce de Leon, CX3BR

Multi-Operator, Single Transmitter
World - Don Wallace, W6AM
U.S.A. - Theodore Pauck, Jr., K8NA
*Canada - Calgary Amateur Radio Assoc.

Multi-Operator, Multi-Transmitter
World - Radio Club Venezolano
U.S.A. - Dale Hoppe, K6UA
Europe - Bob Cox, K3EST
Contest Expeditions
World - Single Opr. - Stuart Meyer, W2GHK
*World - Multi-Opr. - "The YASME Award."
Special - Single Operator, Phone/C.W.
World - All Band - John Knight, W6YY
World - Single Band - Yuri Blanarovich, VE3BMV

C.W.

Single Operator, All Band
World - Albert Kahn, K4FW - W2AB Memorial
World - QRPp - Gene Walsh, N2AA
U.S.A. - Frankford Radio Club
*Canada - Canadian DX Association
Carib./C.A. - Jim Neiger, N6TJ
Europe - Edward Bissell, W3AU
Africa - Gordon Marshall, W6RR
*Asia - Japan CQ Magazine
*Japan - Palm Garden Contest Club
Oceania - Maui Amateur Radio Club
Single Operator, Single Band
World - W2JT Memorial, No. Jersey DX Assoc.
World - 3.5 MHz - Fred Capossela, K6SSS
World - 1.8 MHz - Chip Margelli, K7JA - KP4ES Memorial
U.S.A. - No. Illinois DX Association
*Canada - Canadian Amateur Radio Federation
Carib./C.A. - DX Club of Puerto Rico
*Europe - 14 MHz - G2LB Memorial (From Friends)
*So. America - Rafael Ponce de Leon, CX3BR
Multi-Operator, Single Transmitter
World - Anthony Susen, W3AOH
U.S.A. - Douglas Zwiebel, KR2Q
Multi-Operator, Multi-Transmitter
World - Hazard Reeves, K2GL
U.S.A. - James Rafferty, N6RJ
Contest Expeditions
World - Single-Opr. - Yankee Clipper Contest Club
World - Multi-Opr. - Bill Schneider, K2TT
Clubs
World - Phone/C.W. - CQ Magazine
*Special - Phone/C.W. - Southeastern DX Club
Special—Single Operator—Most QSO's
World - All Band - KV4AA Memorial (From Friends)

**Trophy supplied by Donor.*

Trophy winners may win the same trophy only once within a three year period. (This does not apply to any of the Club or *CQ* Special Awards.)

A station winning a World Trophy will not be considered for a sub-area award. That Trophy will be awarded to the runner-up of that area.

The Canadian and Carib./C.A. awards are for residents *only*. **A resident is defined as one living in that country with an established Post Office address.

X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 Km radius from center of club area (except for DXpeditions especially organized for operation in the contest).

3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and c.w.

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

2. All sent and received exchanges are to be logged.

3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. Logs must be checked for duplicate contacts, correct QSO points and multipliers. Submitted logs must have duplicate contacts clearly shown. The *original* log may be requested by the Contest Committee if further cross-checking of the log is necessary.

5. Use a separate sheet for each band.

6. Each entry must be accompanied by a Summary sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

7. Sample log and summary sheets and zone maps are available from *CQ*. A *large* self-addressed envelope with sufficient postage or IRC's must accompany your request.

If official forms are not available, make up your own 80 contacts to the page on 8½" × 11" paper.

8. All entrants are required to submit cross-check sheets for each band on which 200 or more QSO's were made. All other entrants are encouraged to submit cross-check sheets.

9. For each duplicate contact that is removed from a log by the committee, a penalty of three additional contacts will be exacted.

10. QRPp stations must indicate same on their summary sheets and state the actual maximum power output used, with a signed declaration.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive duplicate contacts; unverifiable QSO's; or unverifiable multipliers will be deemed sufficient cause for disqualification. (Incorrectly logged calls will be counted as unverifiable contacts.)

An entrant whose log is deemed by the Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within 5 years, he will be ineligible for any *CQ* contest awards for 3 years.

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

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1983 for the Phone section and January 15, 1984 for the C.W. section. An extension may be given if requested. Indicate phone or c.w. on envelope.

Phone logs go to: Larry Brockman, N6AR, 7164 Rock Ridge Terrace, Canoga Park, CA 91307.

C.W. logs go to: Bob Cox, K3EST, 6548 Spring Valley Dr., Alexandria, VA 22312.

Logs may also be sent to *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801.

***Except the Jim Neiger, N6TJ, and Gordon Marshall, W6RR, awards.*

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Using Previous Novice Columns to Get Desired Information

I receive mail from Novices and prospective Novices seeking help. I answer most of these letters with brief explanations, plus references to prior Novice columns for more detailed explanations. This month's column gathers significant previous Novice columns under four headings and lists a sequence for reading articles within each heading. The four headings are Introduction, Radiotelegraphy, Station, and Operating. Previous issues of *CQ* or reprints of the column are usually available at $2.00 each from *CQ*, 76 N. Broadway, Hicksville, NY 11801.

Bruce Vaughan, KA5QJO, of Springdale, Arkansas, was licensed as W5HTX in the late 1930s, and he was very active on the air until family and business matters kept him so busy that he let his license lapse about 20 years ago. An old friend (Al, WØAWP) suggested they should both get back on the air, and they did. Bruce did not want to wait until the next FCC General examination conducted in Tulsa, so he took the Novice test with a local volunteer examiner. He was on the air within five minutes after his license was delivered by his mailman. Bruce enjoys working amateurs on the Novice bands. He contacted amateurs in all continents within one week after he got back on the air.

Introduction

"Advantages of Starting as a Novice" is in the June 1978 issue. "Sources of Aid for Prospective Amateurs" is in the December 1978 issue. "Getting Technical Help from Experts" is in the October 1977 issue. "How to Get Started in Amateur Radio" is split between the July and August 1978 issues. The last article to read in this group is "Amateur Radio Operator Examinations," which is in the March 1982 issue. If you know anyone who is teetering on the edge of taking the plunge to become an amateur, I hope you will advise her/him to read these introductory articles.

Radiotelegraphy

This sequence of articles is particularly useful to people who are learning the International Morse Code, or those who are increasing their code proficiency with on-the-air practice. If you are an inexperienced radiotelegraph operator, reading these items can help you become a better operator. The "Code" article in the June through August 1979 Novice columns is one of the two most useful ones in this sequence. "Code is not C.W." appears in the June 1981 issue, detailing why radiotelegraph should not be called c.w. "Code Practice" is in the January 1982 issue; it is a good lead-in to "On-The-Air Code Practice" (June 1981), "USAF MARS Bulletins" (September 1983), and "Worldwide Sources of Code Practice" (October and November 1980) articles. The second article of major importance in this group is "Code Operating Tips," which appeared in the January 1981 issue. If you are about to start operating code, or have just done so, this article can help you improve your procedures and on-the-air contacts. "Novice Band Code Nets" are listed in the December 1982 column. These are primarily slow-speed code nets intended to help you improve your operating skill. Some of these nets include traffic handling to provide much appreciated experience in this facet of amateur radio. The December 1980 issue article about "Worldwide Codes" provides an introduction to codes based on the alphabets of languages other than English.

2814 Empire Ave., Burbank, CA 91504

Station

This group of articles covers things new amateurs should know about selecting equipment and accessories, plus setting up stations. These articles also contain information that can be used to improve existing stations. "Amateur Radio Station Installation Tips" is printed in the November 1977 through March 1978 Novice columns, with supplemental data appearing in the "Station Installation Information" item in the December 1982 issue. "Amateur Radio Station Grounding" is detailed in the September through November 1978 columns, with "Electric Shock" printed in the April 1983 issue.

Most new amateurs use the dipole as their first antenna. The May through July 1983 issues contain a useful article entitled "Dipole Antennas." One of my students told me that it taught him more about dipole antennas than he thought he would ever learn. Naturally, Novice band dipoles are emphasized in this item, with dimensions and step-by-step construction details included.

The "Military Radio Frequency Transmission Lines" article in the August 1983 column is essential reading for amateurs selecting feedlines to interconnect their station equipment to their antennas. "Solar Cell Data Source" is included in the March 1983 issue for amateurs interested in using solar energy to power their stations. The last article in this group is the "Microphones and Headphones" item printed in the April 1982 Novice column.

Operating

One becomes a licensed amateur to gain authorization to operate. Many Novice column items are intended to encourage new operators to be active on the air. If you are about to start using the Novice bands, I advise you to read these items to learn what you need to know to operate intelligently. If you are already operating but are not satisfied with the results, these articles may help you become a better operator.

There is no better introduction to amateur radio than "Shortwave Listening," and that is the subject covered in the May through October 1982 issues. If you have not decided whether or not you want to become an amateur, give shortwave listening a try. If you are a licensed amateur, I urge you to do a bit of shortwave listening to supplement your amateur operations.

"Operating Tips" are detailed in the August through November 1981 Novice columns, with "Operating Etiquette" covered in the December 1982 issue. This is a very useful pair of articles for the beginning amateur. "Amateur Radio Frequency Segments" are listed in the June 1981 column, and the "Novice Bands" are covered in the July 1981 issue. "Amateur Radio Station Callsigns" are detailed in the April and May 1979 issues, showing callsign prefixes used by American amateurs, plus those which will be assigned in the future. This American callsign data is supplemented by the "Worldwide Amateur Radio Callsigns" item in the January 1980 column. This coverage includes both normal and special callsign prefixes used by foreign (DX) operators.

"Q-Signals for Amateur Radio Use"

Bill Peck, KA7LYW, of Seattle, Washington, is a 39-year-old longshore su-pervisor and a Navy veteran. Bill got his Novice ticket at the start of 1982. He has had about 300 contacts so far, and about 225 of them have been with DX (foreign) amateurs in 28 countries. His station includes a Kenwood TS-130S transceiver, Kenwood TS-430S transceiver, 80 meter inverted Vee antenna, 2-element 40 meter Mosley Yagi-Uda beam, and a 10/15/20 meter Hy-Gain TH7DXX Yagi-Uda beam. All three of these antennas are attached to a Rohn 45 tower. Bill likes to swap picture postcards, badges, and souvenir items with amateurs he has worked.

are detailed in the February 1980 column, including special Q-signals for net usage. Amateurs use a phonetic shorthand system when operating code, and it is loosely called the "Phillip's Code." This code is detailed in the November and December 1979 columns, and it is supplemented by the "Terms and Abbreviations" article in the February 1983 issue. This pair of articles is very helpful to new amateurs who are having trouble deciphering the "alphabet soup" they copy during on-the-air contacts.

"American Radio Relay League (ARRL) Divisions" are listed in the March 1982 issue, and ARRL sections are included in the January 1983 "Novice Roundup" article. There are many occasions when one needs to know their ARRL Section when operating. "QSL Cards" are discussed in detail in the January through March 1979 columns. This article tells how QSL cards should be filled in, how to display them, how to store them, how they are used, and how domestic (U.S.A.) and foreign (DX) QSL bureaus function. You can use this article to acquire a better knowledge of QSL cards than is common to many experienced amateurs. The February 1983 column entitled "Callbooks" is directly associated with the exchange of QSL (confirmation) cards. Two of the many operating awards that can be earned on the Novice bands are the "Rag Chewers' Club Award" (March 1982 issue) and the "Australian Award" (December 1982).

Amateur radio is an international activity, and every amateur should be aware of what can and cannot be done legally when one works (contacts) foreign amateurs. The April 1981 column includes a list of countries with which we have "Third-Party (traffic) Agreements," a list of countries with whom we share "Reciproca! Operating Agreements," and an item about "International Communications." The "H.F. (high frequency) Radio Wave Propagation Predictions" item in the March and April 1980 issues can help you gain a better understanding of long-range (DX) radio communications. That item is suppplemented by the "Novice Band DX Operating" article in the January 1981 column. The April 1982 issue of *CQ* tells about "Queen Mary Novice Band Operation," making it easier for those amateurs who want to contact this famous ship which is now a tourist attraction in Long Beach, California. "Low Power (QRP) Operation" is detailed in the May 1981 Novice column, whereas the January 1982 issue lists "Novice Band QRP Nets." Last, but not least, the November 1982 column tells "What To Do When You Hear a Radio Call for Help."

The four preceding groups of articles include answers to the majority of the questions I have received from readers. *CQ* is preparing to print my *Novice Bible.* It contains updated versions of previous Novice column articles, plus additional useful data.

Local amateurs and amateur radio clubs may be able to loan you the referenced *CQ* issues to enable you to read the specified articles and to make copies of the ones you find are most helpful. If this is the case, it is best to just borrow a few magazines at a time, return them promptly, and return them in good condition. Some licensing-course instructors

This is Lorne Morgan, VE5AGM, of Regina in Saskatchewan, Canada. He has been licensed since February 1983, and he has been the first Canadian contact for many American amateurs. Lorne operates on 40 meters, and he likes code operation very much. He holds the ARRL RCC (American Radio Relay League Rag Chewers' Club) certificate. His station includes a Yaesu FT-101 transceiver and a Hy-Gain 5-band vertical antenna.

have informed me that they have run copies of the most useful Novice columns, and they use these copies as printed handouts which they discuss with their students. I do this in my courses, and I have learned that it is an effective way to present important information.

I hope that this highlighting of previous Novice column subjects proves to be of interest and value to many readers. Suggested topics for future Novice columns are welcome. Most of my Novice columns are based on printed materials I have prepared for the use of students in the licensing courses I instruct.

U.S. Air Force Code Practice

The October and November 1980 Novice columns provide a list of worldwide sources of on-the-air code transmissions that may be used for code receiving practice. The June 1981 and January 1982 Novice columns include additional information on this subject. This item updates the USAF code practice data that was printed in the March 1982 Novice column. A good source of code practice is the U.S. Air Force weekly information bulletin and general data that are transmitted to USAF Military Affiliate Radio System (MARS) members.

AIR is the USAF headquarters station in Washington, D.C., and it transmits the plain-language material by tape. Their Thursday transmission starts at 0100 UTC (Wednesday evening, local time). This 15 w.p.m. transmission is sent simultaneously on 6995.5 and 13,997.5 kHz. The Saturday AIR transmissions start at 2100 and end at 2230 UTC, with simultaneous emissions on 4876.5 and 14,527 kHz. The first Saturday run is sent at 12 w.p.m., and the other two runs are sent at 20 and 25 w.p.m. Each run is about 30 minutes long.

AFA5NO is located in Ogden, Utah. The code is transmitted with a semi-automatic key (bug) at 10 w.p.m. from this station. Tune-in is aided by a series of V's transmitted from 0240 to 0245 UTC. Their MARS material transmission starts at 0245 UTC Thursday (Wednesday evening, USA time) with simultaneous transmissions on 4876.5 and 11,621 kHz.

Universal Time Coordinated (UTC) is 4, 5, 6, and 7 hours ahead of EDST, CDST, MDST, and PDST, respectively, when we are on daylight savings time. UTC is 5, 6, 7, and 8 hours ahead of EST, CST, MST, and PST, respectively, during the rest of the year. UTC is still commonly known as GMT (Greenwich Mean Time), Zebra time, and Zulu time; however, UTC has been the correct term for many years.

If you live in the Eastern time zone, the 0100 UTC Thursday AIR transmission is at 9 p.m. EDST or 8 p.m. EST Wednesday evening. This example should help all readers convert the stated UTC times to their local times. Many code-practice sources change their transmission times when daylight savings starts and ends, but these USAF starting times do not change during the year.

Operators' Yearbook

Lee Roy Kent, NØEMN, is seeking black-and-white photographs of active amateurs for inclusion in the *Amateur Radio Operators' Yearbook* he plans to have available for purchase before Christmas. If you send a picture to him, include your name, callsign, and appropriate information. The closing date for input for this year's book is October 1st, so you have to act swiftly to be included. The mailing address is AROY, P.O. Box 257, Malden, MO 63863. The book is expected to sell at $20 a copy. Lee Roy would appreciate your help in soliciting photographs.

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter *are* important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an s.a.s.e. if a picture must be returned. A free one-year *CQ* subscription or renewal is awarded to the amateur whose picture I select as the winner for the month. If you are a subscriber, enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs who frequently work the American Novice bands are also urged to submit photographs. I have never received pictures from Novices in Connecticut, Hawaii, Louisiana, New Hampshire, Oregon, Rhode Island, South Carolina, Tennessee, Utah, or Vermont.

73, Bill, W6DDB

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CIRCLE 113 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The Royal Observatory of Belgium reports a monthly mean sunspot count of 100.2 for May 1983. This results in a smoothed sunspot number of 94.2 centered on November 1982, as the present cycle continues to decline. A smoothed sunspot number of approximately 73 is forecast for September 1983.

Daily measurements of sunspot data were begun in 1848 by the Swiss astronomer Rudolf Wolf. His method, which is still in use today, counts the total number of spots visible on the face of the sun using a high-powered telescope, and the number of groups into which they cluster. Each observer today computes a daily sunspot number by multiplying the number of groups seen by ten and then adding to this product the total count of individual spots. The number is then corrected to take into account the telescope used. The number observed on any particular day can vary considerably from observer to observer and in different parts of the world. To compensate for this, the official or international daily number is computed at the Royal Observatory of Belgium as a weighted average of measurements made from a world-wide network of cooperating observatories.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for September 1983

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 5, 17, 20	**A**	**A**	**B**	**C**
High Normal: 3-4, 6, 8, 10, 18, 21	**A**	**B**	**C**	**C-D**
Low Normal: 2, 7, 9, 11-12, 16, 19, 22, 24-26, 30	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 1, 13, 15, 23, 27, 29	**B-C**	**C-D**	**D-E**	**E**
Disturbed: 14, 28	**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 fair-to-poor (C-D) on Sept. 1st, good-to-fair (B-C) on the 2nd, good (B) on the 3rd and 4th, excellent (A) on the 5th, etc.**

September Propagation

Propagation conditions are generally quite variable on the h.f. bands during September. This is usually a transitional month between typically summer and typically wintertime conditions. For this reason this month's column contains DX Propagation Charts for the one-month period September 15 to October 15, rather than the usual two-month span. This month's column also contains Short-Skip Propagation Charts for September and October.

During September and early October expect a noticeable increase in *10* meter DX openings during the daylight hours. A considerable improvement is also expected on *15* meters, with the band opening for DX shortly after sunrise, and remaining open to one area of the world or another until past sunset. It will probably be a toss-up between the *15* and *20* meter bands for DX honors during the daylight hours of September, with a slight edge in favor of *20* meters. Expect *20* meters to open for DX at sunrise and to remain open for a window of several hours, during which time it should be possible to work into most areas of the world. Conditions should dip a bit during the high noon hours, with another peak in world-wide openings expected during the late afternoon and early evening.

Once the sun has set, look for improved DX conditions on *40, 80,* and *160* meters. With increasing hours of darkness and decreasing static levels, openings should be more numerous on these bands, with stronger and quieter signals. Expect peak signals from a generally easterly direction at approximately midnight, and from the west at sunrise. Signals from other directions will generally remain strong during much of the nighttime period. While *40* meters is expected to be the best band for world-wide DX during this period, be sure to check *20* meters for some good DX openings during the hours of darkness. Openings should be possible towards the south and equatorial areas, towards the South Pacific, and to other areas as well.

For short-skip propagation during September and October, use *80* meters during the day for openings shorter than *250* miles, and either *80* or *160* meters at night over this range. For openings between *250* and *750* miles, try *40* meters during the day and *80* meters at night. For distances between *750* and *1300* miles, the best bet should be *20* meters by day, *40* meters from sundown to midnight, and *80* meters from midnight to sunrise. For openings beyond *1300* miles, try either *5* or *20* meters during the day, and *40* meters during the hours of darkness. Check *10* meters for some fairly good openings beyond *1300* miles during the afternoon hours, particularly when conditions are High Normal or better.

Equinoctial Propagation

September 22nd will mark the fall, or *autumnal, equinox.* On this day the sun will cross the plane of the earth's equator as it appears to travel from northern to southern skies, and the hours of daylight and darkness are equal in length throughout the world. Sunrise should take place at approximately 6 a.m. local time and sunset at about 6 p.m. local time, no matter where you are.

For a period of approximately two weeks before to about two weeks after the autumnal equinox, the characteristics of the ionosphere are similar over large areas of the world in comparison to the widely different characteristics that are observed during the summer and winter seasons. For this reason, the equinoctial periods (a similar period called the *spring equinox* occurs on March 21st) are generally considered to be the best times for DX openings between the temperate regions of the northern and southern hemispheres.

Gray-line DX conditions also peak during equinoctial periods. These are long openings that occur during the sunrise and sunset periods as signals appear to follow the day-night terminator. Over the pole DX and long-path openings are expected to increase considerably during late September, and stations along the terminator should provide strong signal openings.

From mid-September through mid-October look for a considerable improvement in openings between the USA and South America, to the South Pacific area and Australasia, to southern Asia, and to southern Africa and Antarctica. The improvement should take place on all h.f. bands, but it will be most noticeable on *15* and *20* meters during the day and on *40* meters at night.

V.H.F. Ionospheric Openings

Although summertime sporadic-*E* ionization should fall off considerably during September, an occasional *6* meter short-skip opening may still be possible over distances ranging between approximately 1000 and 1300 miles. The best time to

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check is before noon and again during the early evening. The present sunspot cycle has declined to a level where F-2 layer DX openings on 6 meters are now very unlikely.

There is usually an increase in auroral activity during equinoctial periods, and some fairly frequent 6 and 2 meter auroral-type openings are likely to take place during September and early October. The best times for such openings should coincide with periods of radio storminess on the h.f. bands. Check the Last Minute Forecast appearing at the beginning of this column for those days during September that are expected to be in the Below Normal or Disturbed categories.

Trans-equatorial (TE) scatter conditions usually improve during the equinoctial periods. Some 6 meter openings, and perhaps 2 meter as well, may be possible by the TE propagation mode between the southern tier states and deep South America. The best time to check for TE openings is between 8 and 11 p.m. local time. Openings, if they occur at all, usually last for a few minutes, with generally weak signals and heavy flutter fading.

No major meteor showers are expected during September, but some minor ones may permit meteor-scatter-type openings on the v.h.f. bands during the last two weeks of the month.

CQ DX Contest Special 1983

This year's *CQ* World-Wide DX Contest will be held on the following dates:

October 29–30, Phone Section

November 26–27, C.W. Section

Next month's propagation column will be devoted entirely to a special, comprehensive forecast which will focus on both sections of the contest.

73, George, W3ASK

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

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

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

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

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *daylight time* is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to covert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

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

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

CQ Short-Skip Propagation Chart
September & October 1983
Local Daylight Savings Time
At Path Mid-Point (24-Hour Time)

Band (Meters)	*Distance Between Stations (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	10-21 (0-1)	08-10 (1) 10-13 (1-2) 13-15 (1-3) 15-16 (1-2) 16-21 (0-1)	08-10 (1) 10-13 (2) 13-15 (3) 15-16 (2-3) 16-17 (1-2) 17-19 (1) 19-21 (1-0)
15	*Nil*	08-10 (0-1) 10-15 (0-2) 15-21 (0-1)	08-09 (1) 09-10 (1-2) 10-15 (2-4) 15-17 (1-4) 17-18 (1-3) 18-20 (1-2) 20-21 (1) 21-08 (0-1)	08-09(1) 09-10 (2-3) 10-11 (4-3) 11-17 (4) 17-18 (3) 18-19 (2-3) 19-20 (2) 20-21 (1) 21-08 (1-0)
20	12-14 (0-1) 14-16 (0-2) 16-22 (0-1)	08-09 (0-1) 09-10 (0-2) 10-11 (0-3) 11-12 (0-4) 12-14 (1-4) 14-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-22 (1-2) 22-08 (0-1)	06-08 (1-2) 08-09 (1-3) 09-10 (2-4) 10-11 (3-4) 11-18 (4) 18-19 (3-4) 19-22 (2-3) 22-00 (1-2) 00-06 (1)	06-08 (2) 08-09 (3) 09-14 (4-2) 14-16 (4-3) 16-19 (4) 19-21 (3-4) 21-22 (3) 22-23 (2-3) 23-00 (2) 00-06 (1)
40	08-10 (1-3) 10-12 (2-4) 12-18 (3-4) 18-19 (2-3) 19-21 (1-2) 21-06 (0-1) 06-08 (0-2)	08-10 (3-4) 10-12 (4-3) 12-16 (4-2) 16-18 (4-3) 18-19 (3-4) 19-21 (2-4) 21-23 (1-4) 23-03 (1-3) 03-06 (1-2) 06-08 (2-3)	08-10 (4-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-19 (4-2) 19-20 (4-3) 20-23 (4) 23-03 (3-4) 03-06 (2-3) 06-08 (3-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-19 (2) 19-20 (3) 20-21 (4-3) 21-03 (4) 03-05 (3-4) 05-06 (3) 06-08 (4-3)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-23 (4) 23-05 (3-4) 05-07 (2-3)	07-09 (4-2) 09-12 (4-1) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-05 (4) 05-06 (3-4) 06-07 (3)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-04 (4) 04-06 (4-3) 06-07 (3-2)	07-09 (1) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (3-2) 06-07 (2-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

ALASKA
September & October, 1983
Openings Given GMT

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

HAWAII
September & October 1983
Openings Given in
Hawaiian Standard Time

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern States	08-10 (1) 10-13 (2) 13-14 (1)	07-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-18 (3) 18-20 (2) 20-04 (1) 04-07 (2) 07-08 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 10-21 (1)* 21-00 (2)* 00-01 (1)*

Central States	08-10 (1) 10-14 (2) 14-16 (1)	07-10 (1) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	09-13 (1) 13-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-21 (2) 21-04 (1) 04-09 (2)	18-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-05 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Western States	08-09 (1) 09-10 (2) 10-15 (3) 15-16 (2) 16-17 (1)	07-09 (1) 09-10 (2) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-19 (1)	10-12 (2) 12-14 (3) 14-18 (4) 18-20 (3) 20-00 (2) 00-05 (1) 05-06 (2) 06-10 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-05 (1)*

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

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

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

September 15–October 15, 1983
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

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

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (3) 17-20 (2) 20-23 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern Europe & European USSR	09-11 (1)	08-10 (1) 10-12 (2) 12-14 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-18 (1) 22-01 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	10-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-18 (2) 18-21 (1) 21-23 (2) 23-00 (1)	20-23 (1) 21-23 (1)*
Western Africa	11-13 (1) 13-15 (2) 15-17 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	05-06 (1) 06-08 (2) 08-15 (3) 15-17 (2) 17-18 (3) 18-19 (4) 19-22 (3) 22-00 (2) 00-01 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	12-15 (1)	09-11 (1) 11-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	21-00 (1)
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 09-12 (2) 12-13 (3) 13-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-19 (3) 19-21 (2) 21-23 (1) 23-01 (2) 01-02 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 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.

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 Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

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

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

Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

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

Western & Central Africa	11-12 (1) 12-14 (2) 14-15 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	21-00 (1)
Eastern Africa	11-14 (1)	10-13 (1) 13-16 (2) 16-17 (1)	07-09 (1) 12-15 (1) 15-19 (2) 19-21 (1)	20-22 (1)
Southern Africa	10-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	05-07 (1) 07-09 (2) 09-10 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	19-22 (1)
Central & South Asia	17-19 (1)	08-11 (1) 16-17 (1) 17-19 (2) 19-21 (1)	07-08 (1) 08-11 (2) 11-13 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
Southeast Asia	16-19 (1)	10-11 (1) 11-13 (2) 13-16 (1) 16-18 (2) 18-21 (1)	05-07 (1) 07-09 (3) 09-11 (2) 11-12 (1) 21-23 (1) 23-01 (2) 01-02 (1)	01-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	16-17 (1) 17-18 (2) 18-19 (1)	14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-09 (2) 09-10 (4) 10-13 (3) 13-15 (2) 15-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	01-03 (1) 03-07 (2) 07-08 (3) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	09-11 (1) 11-13 (3) 13-17 (2) 17-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	13-19 (1) 19-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-05 (2) 05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1) 23-02 (1)* 02-06 (2)* 06-07 (1)*
Austral asia	14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	08-10 (1) 13-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	19-21 (1) 21-23 (2) 23-01 (4) 01-03 (3) 03-04 (2) 04-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-13 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries Of South America	09-10 (1) 10-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-08 (4) 08-10 (3) 10-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-03 (2) 03-05 (1) 05-06 (2)	19-21 (1) 21-02 (3) 02-04 (2) 04-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2)	07-08 (1) 08-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1)	06-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-01 (3) 01-06 (2)	21-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
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THE INS AND OUTS OF THE WASHINGTON SCENE

Final Report and Order of "No-Code" Not Expected Before January 1984

According to James McKinney, Chief, Private Radio Bureau (PRB), the Commission's decision on a proposed no-code class of amateur license won't be known until early 1984. Said McKinney: "This is a matter of great significance to both the Commission and the Amateur service. Accordingly, there will be "no rush to judgement.' "

McKinney also noted that a considerable amount of material had been received as a result of the Commission's no-code proceeding. "As expected, the majority of the comments that we've received," he said, "oppose the creation of a no-code license. However, numbers alone don't make a case. The material must be evaluated, and the suggestions made must be given deliberate consideration, before any action is taken in this matter."

ARRL Tells FCC It Will Not Coordinate Volunteer Examination Program Unless Changes Are Made

In a move that stunned Washington observers, the League, after months of work to convince the Commission that its plan for the Volunteer Examination Program was preferred, has now told the FCC that unless changes are implemented to compensate examination coordinators, it would not participate as such a coordinator! Further, the League proposed extensive changes to the rules that would guide the volunteer testing program.

When PL 97/259 was signed into law last year, it provided that the government "may accept and employ the voluntary and uncompensated services . . ." of amateurs in the administration of its license examinations. Shortly thereafter, the League submitted a petition (which was subsequently turned into RM-4229 by the FCC) which stressed the importance of using non-profit educational organizations for coordination of the program. Nothing was said about fees in the League's filing, and for all intents and purposes, it was the League's proposal that formed the basis for the Commission's Notice of Proposed Rule Making which was released on 20 January 1983.

It should be noted, however, that questions regarding the funding of the program were raised by a number of organizations (including *CQ* magazine, the Capitol Hill Amateur Radio Society [CHARS], and the *W5YI Report*). In particular, CHARS, under the direction of its president, David Siddall, K3ZJ, filed several comprehensive responses to the Commission's Notice in which it outlined a plan which "would insure the integrity and uniformity of the examination process while eliminating the (addition of another) bureaucratic layer."

As we go to press, the Commission is reviewing the Reply Comments to the proposed Rule-Making proceeding.

ARRL and NCS Sign Memorandum of Understanding

In June the ARRL and the National Communications System (NCS) signed a Memorandum of Understanding (MOU). Signing for the ARRL was League President Victor C. Clark, W4KFC, while NCS Deputy Manager John Grimes signed for the government.

The MOU provides for the following: "The NCS recognize that the ARRL is the principal organization serving more than 400,000 U.S. radio amateurs, and because of its organized emergency communications, training and resources, can be of valuable assistance in providing critical communications and restoration of government circuits during emergencies and disasters when normal lines of communication are disrupted."

In turn: "The ARRL recognizes that NCS is responsible for coordinating restoration of Federal government communications carried over the commercial carrier networks. The ARRL recognizes that because more than 95% of the Federal government's communications are provided by commercial carriers, there is a national requirement to assist in the transmission of critical messages and in the restoration of government communications."

The mission of the NCS (a confederation of federal agencies and departments) is to ensure that critical telecommunications needs of the Federal government can be met in any emergency. At the same time, the NCS is charged with achieving the most effective and economical fulfillment of the government's day-to-day communications requirements.

Commission To Initiate Dialogue with Amateurs on Net Operations

For years the battle between those who participate in nets and those who object to such activities has raged throughout the spectrum. Most recently the conflict has involved a number of h.f. nets, with alleged interference to WCARS among the problems that are now being addressed. Because of ongoing questions involving net operations, Ray Kowalski, Chief, Special Services Division, PRB, intends to open a dialogue between the Commission and the amateur community regarding the "rights and obligations" of nets. The matter, which will probably be released for comment later this year, will seek suggestions as to how the Commission can either clarify or amend Part 97 of its Rules and Regulations in order to specify the status of amateur nets on a formal basis (there currently is little mention of net activities in the Rules).

Issues to be addressed include, but are not limited to, the right of a net to "hold" a frequency for a specified period of time; the question of whether a band of frequencies around the net control frequency should be available for handling traffic; and the question as to whether domestic phone patching is a valid net function (the latter may appear to some as being an organized attempt to escape long-distance toll charges).

Kowalski stated that neither he nor others in the Commission have preconceived positions in this matter, and that the inquiry into net operations is meant as a sincere effort to take our views into consideration during the Commission's deliberations.

FCC To Issue Order On Business Use of Amateur Radio

The use of amateur frequencies for business-related matters is of increasing concern to the FCC. As such, it is likely that by the time this issue goes to press, the Commission will have issued an Or-

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der that defines better the permissible uses of amateur radio. The Order may actually represent a rearrangement of the Rules and Regulations which currently govern our service.

Once the Commission issues its Order on amateur-related business communications, it will tackle the question as to how PACSAT can be implemented. PACSAT is a computer-based, packet-switching satellite being developed by the Volunteers in Technical Assistance (VITA), a Washington, D.C. based organization dedicated to helping people in developing countries (*see May 1983 CQ for an in-depth interview with VITA officials—ed.).* The satellite, which will operate in a low-earth orbit, is intended to store and forward messages to and from VITA personnel around the world.

It was originally intended to operate PACSAT in an amateur band, which some view as being in conflict with the stated purpose of the Amateur Satellite service. However, the possibility exists that the FCC may permit PACSAT to be operated in this way on a temporary basis for the purpose of "demonstrating concept feasibility."

Details on PACSAT's operation will be published here as they become available.

Electronics Industry Begins Effort To Bring Products Into Voluntary Compliance with PL 97-259

Last year congress passed a bill (known as the "Goldwater Bill"), which the President signed into law, that gives the FCC the right to set r.f.i. susceptibility standards for electronic home-entertainment equipment. The new law, PL 79-259, sent tremors through the electronics industry, for now it was no longer possible to delay in responding to the r.f.i. complaints that have plagued the consumer, the amateur, and the Commission for decades.

Moving quickly to develop voluntary r.f.i. standards, lest the Commission move to impose its own requirements, the Electronics Industries Association has set up a Susceptibility Task Force to address the problem. In addition, the American National Standards Institute (ANSI), through Ad Hoc Committee C-63, is looking into the matter. This Committee will concentrate first on the susceptibility of television sets to interference from r.f. sources operated in the band 3–30 MHz. Representatives from the ARRL RFI Task Group as well as members of the ARRL's technical staff will participate in the deliberations of C-63.

Also monitoring the industry's activities is Frank Rose, Chief, Technical Standards Branch, Office of Science and Technology, FCC. Says Rose, "The Commission has pointed out the urgency of responding to the need for r.f.i. standards, and will assist the electronics industry to the extent possible." Further, Rose stated that he hopes Commission intervention is not required in this matter, but that he "would not hesitate to move" if progress was not forthcoming within a reasonable period of time.

FCC Raises Concerns Relative To Broadcaster's Use of Amateur Frequencies

Many amateurs took pride in the fact that a CBS newscast from the site of the Coalinga, California, earthquake earlier this year was relayed through an amateur repeater. Personnel within the Commission, however, are wondering whether it's wise for amateurs to permit others to use their frequencies in this way.

"It's unusual for users in one radio service to promote the use of its frequencies by users in another service," said John Johnston, Chief, Personal Radio Branch, Special Services Division, PRB.

What has some in Washington concerned is the fact that broadcasters already have a number of communication options available to them, and their use of amateur facilities and frequencies could weaken the arguments we use at national and international radio conferences to secure our frequency allocations.

Alleged Susceptibility of Pacemaker To R.F.I. Traced To Undiagnosed Case of Epilepsy

In May we printed a story in which a 10-year-old's pacemaker was alleged to have been susceptible to radiation from CB radios, police radios, and microwave ovens.

Further investigation into the problem by the IEEE's Committee on Man and Radiation (COMAR) indicates that the report was erroneous. According to Dr. John M. Osepchuk, who is a member of COMAR, the boy was found to have epilepsy, and doctors now believe that his previous episodes of dizziness and fainting were, in fact, the result of his having a mild form *(petit mal)* of the disorder. The boy is now taking medication, and hasn't had a seizure since early February.

CCIR Study Group 8E Discusses Issues of Importance to Amateur Services

At its May meeting CCIR Study Group 8E addressed several issues and documents of interest and importance to the Amateur services. Included were reviews of certain Radio Regulations applicable to both the Amateur and Amateur-Satellite services, and of a Report on the Technical Feasibility of Frequency Sharing by the Amateur-Satellite Service. This work was part of an ongoing effort to prepare for an Interim Meeting of Study Group 8 in Geneva early next year.

The CCIR (the abbreviation comes from the French name for the International Radio Consultative Committee) is the technical arm of the International Telecommunications Union (ITU). Through its deliberations, the CCIR provides the technical bases for the International Rules and Regulations which govern telecommunication operations worldwide.

If you are interested in participating in CCIR Study Group 8E, contact Mr. Frank L. Rose, W3OWU, Convenor, Ad Hoc 8E, Federal Communications Commission, Office of Science and Technology, 2025 M Street, NW, Washington, D.C. 20554; phone (202) 653-6288.

Plans Call For Astronaut Garriott To Work 500 Amateurs

At a meeting earlier this year at the Johnson Space Center, Houston, representatives from NASA, the ARRL, and AMSAT put forth plans for Dr. Owen Garriott's "Ham in Space" mission this fall. The mission is to be part of Shuttle flight STS-9.

According to *Amateur Satellite Report* (AMSAT's Newsletter for the Amateur Space Program), current plans call for Astronaut Garriott, W5LFL, to operate up to one hour per day using a 2 meter HT and a special antenna. The operation will take place between 145 and 146 MHz using a sophisticated, time-synchronized format. Because of limitations on Garriott's amateur operations, and because no operation is scheduled during the first three or four days of the Shuttle's mission, it is expected that only 500 amateurs will be able to communicate with him. However, s.w.l. cards will be sent to all who report reception. The ARRL will act as Garriott's QSL manager.

Monitor W1AW bulletins for late-breaking details of this historic operation.

Operators of Uncoordinated Repeaters the Subject of Commission Concern

According to *The ARRL Letter* (a newsletter for members only) and the FCC, the Commission will back repeater coordinators in disputes with operators of uncoordinated repeaters. In a letter to Steve Mendelsohn, WA2DHF, President of the Tri-State Amateur Repeater Council (New York City), James C. McKinney, Chief, PRB, indicated that "the Commission is pursuaded by . . . observation that . . . national frequency planning and coordination by amateur radio operators themselves can result in the best spectrum utilization appropriate to the service."

Continuing his comments, McKinney noted that amateurs who persist in operating an uncoordinated repeater that causes interference to the operations of coordinated repeaters may be cited for not observing "good amateur practices." He also cautioned that such operators may be cited for deliberate and malicious interference.

In addressing disputes involving coordinated and uncoordinated repeaters, the FCC apparently intends to take into

consideration documents such as nationally promulgated bandplans, and coordination records and correspondence. In the absence of any official documentation, the FCC, it appears, would draw information on coordination from the ARRL Repeater Directory.

U.S. Pushes Forward with Participation in WCY

As readers of *CQ* know, the United Nations has designated 1983 as World Communications Year, with the ITU being the principal agency responsible for the observance. The purpose of the WCY is to focus attention on communications and on helping the lesser-developed countries develop their communications infrastructures.

The U.S. formally entered the program last December in ceremonies held at the White House. Representing U.S. amateurs at these ceremonies was ARRL President Victor C. Clark, W4KFC. In the months that followed, an eight-member Board of Directors for the U.S. Council has been seated, a staff has been assembled, and a U.S. WCY office has been opened at 1835 K St., NW, in Washington, D.C. To date, membership in the Council stands at 108, with most of the members drawn from companies, associations, and universities.

The first meeting of the full Council was held in mid-May to review the WCY 83 Program Plan and a list of Program Initiatives. Among the 75 attendees were President Clark and Perry Williams, W1UED, Washington Area Coordinator for the League. One of the documents submitted to the Council by the ARRL, and distributed at the meeting, was a proposal to create a worldwide amateur radio tie-in for Olympians to their home nations and families. Material was also distributed describing communications projects for third-world countries.

FCC Review Board Denies Petition

Earlier this year, Administrative Law Judge Thomas B. Fitzpatrick revoked the license of Henry C. Armstrong, III, for radio station WA6CGI and suspended his Advanced Class Operator license for the remainder of its term. The actions were taken as a result of Armstrong's continued interference with the on-the-air operations of a repeater owned by a local DX club. Armstrong appealed the decision in a "petition for reconsideration," a move opposed by James McKinney, Chief, PRB.

In his petition, Armstrong maintained that he is being victimized by the DX club, that testimony presented against him by club members was inaccurate and biased, that his logs would substantiate his testimony, and that he could prove his interfering computer-based system exists and is a viable communications concept.

The FCC Review Board denied Armstrong's petition. They said "... Armstrong's substantive arguments ... are essentially rehashes of his exceptions, or new and conclusory snipes at the record evidence. We need not grant reconsideration merely to reargue matters previously considered and resolved."

The revocation and the suspension affirmed by the Board became effective on 22 June 1983.

FCC and ARRL Move To Test R.F.I. Filters

In a move sure to be welcomed by amateurs everywhere, the FCC and the ARRL are now working on a joint project to test the effectiveness of the more popular high-pass, low-pass, and line filters available today. According to *The ARRL Letter*, "FCC's Chief of the Regional Services Division, Joyce Davila, is in charge of the project."

The filters will be tested under the direction of Ralph Haller, Chief of the Experimental Engineering Branch at the FCC's Columbia, Maryland, laboratory, using special equipment which will not only perform the actual tests, but which will also record and collate the results. It is understood that ARRL personnel, including Paul Rinaldo, W4RI, Manager, ARRL Technical Department, will participate in this project.

Your Washington Editor and the entire staff at CQ congratulate Sen. Barry Goldwater, K7UGA, on the creation of a scholarship in his honor by the ARRL.

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In The Works

The Ham Radio Instructor's Guide (Vol. I) will instruct you how to teach ham classes. The first volume discusses the psychology of learning, lesson plans, course development, etc. What's more, an organization is being developed to certify ham radio instructors. Dick Bash - KL7IHP is almost finished with the book and plans to have it available in September. Price will be $14.95 (tentative) plus $2.50 S & H.

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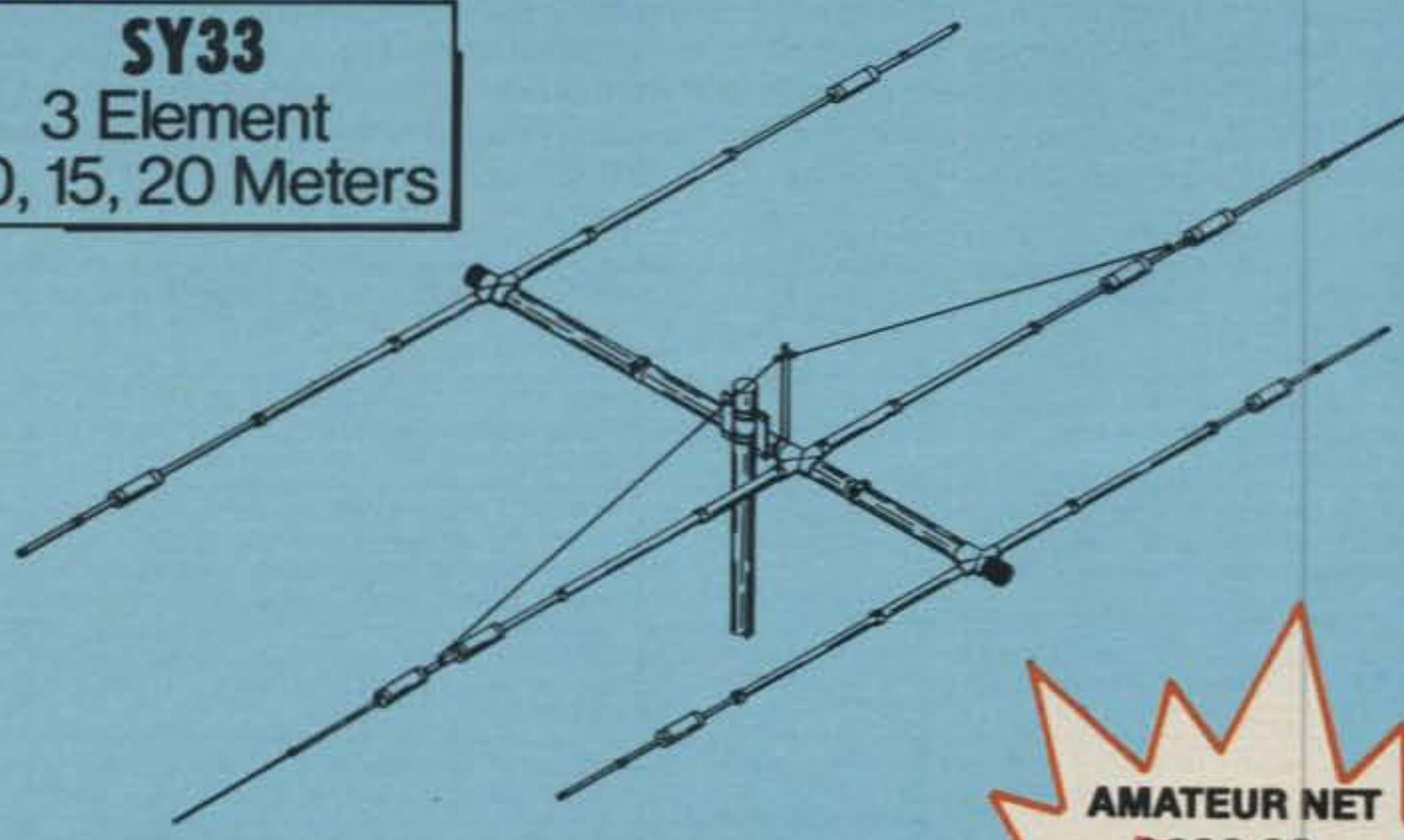

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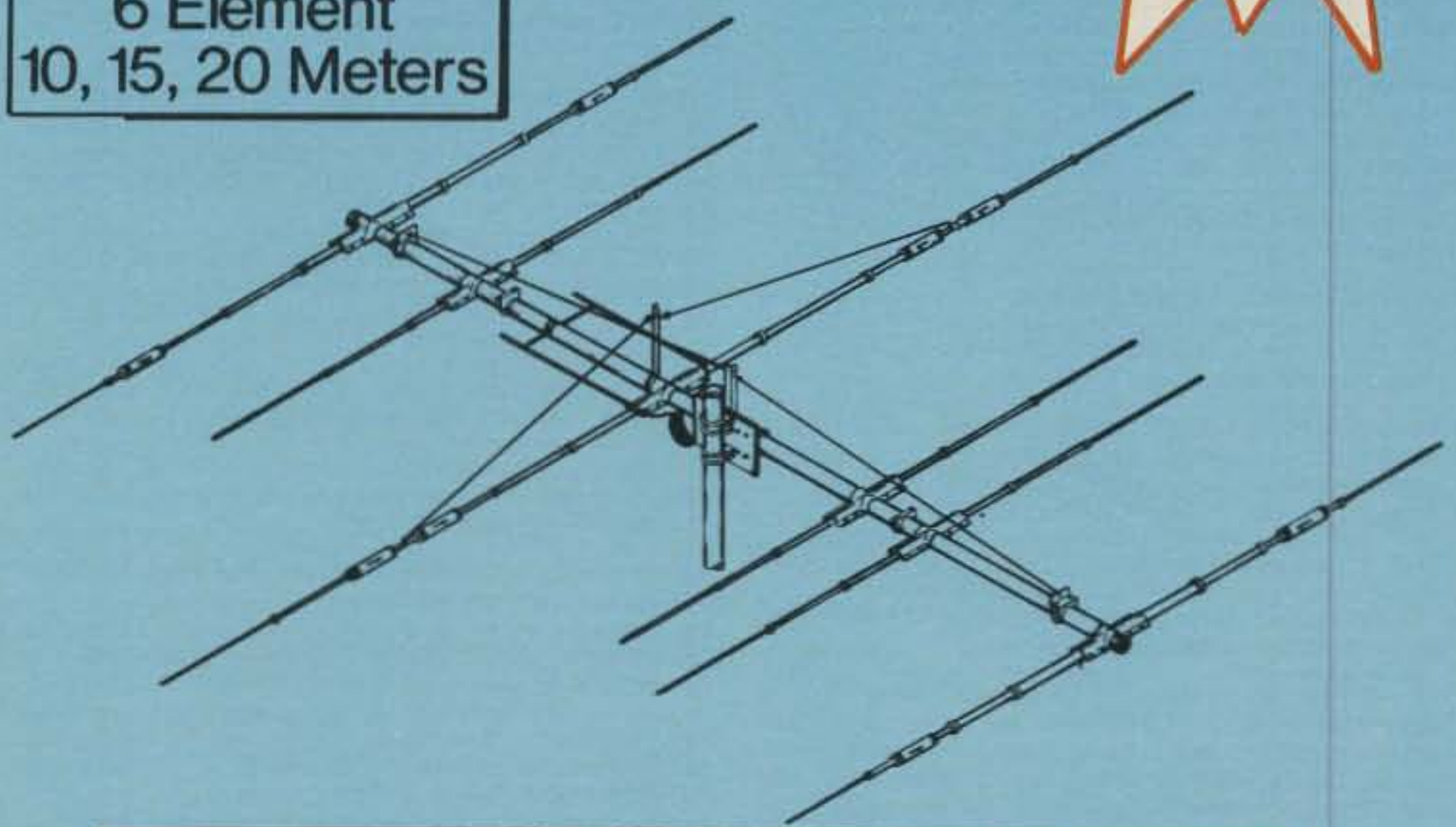

Band MHz	14-21-28	Longest Element:	29'6½"
Maximum power input	legal limit	Turning radius	19'1"
Gain (dBd)	up to 9 dB	Maximum mast diameter	2" O.D.
VSWR at resonance	1.1:1	Surface area	8.6 sq. ft.
Impedance	50 ohms	Wind loading at 80 mph	215 lbs.
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IBM PC/APPLE Aftermarket products; Hobbysts' Electronics Project Kits: $50.00 complete Modem Kit, Subscription/Satellite TV Decoder Kits, Eprom Programmer/Duplicator, Popular Memory IC Testers, Data Sheets, Application Notes, and more than 6000 parts in stock: Semiconductors, Discretes, Video Products, Tools, etc. Please write for your free literature/catalog. Independent Electronics, 6415-06 Airline Rd., Dallas, TX 75205.

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.

SINGLE PROFILE NEXUS creates a nationwide network of cultured singles. Box 7484-A Orlando, FL 32854.

SATELLITE, MICROWAVE, VIDEO, AUDIO Components and Equipment. Send $1 for 1983 Catalog. DSCo, Department A, 3110 Evelyn Street, Roseville, MN 55113.

HOW TO SPEAK AND UNDERSTAND SPANISH: Easy to learn. Cassette and book, only $9.95. PRINS, P.O. Box 6012, Des Moines, Iowa 50309.

TELEGRAPH INSTRUMENTS WANTED: Keys, sounders, relays, call boxes, meters, and related items. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

DX HEADING MAPS centered on Baltimore, Philadelphia, NYC, Boston, LA, Detroit, Dallas, St. Louis, New Orleans, Atlanta, Chicago. $5.95 pp. Specify city. W.A. Massey, P.O. Box 397, Hainesport, NJ 08036.

IBM-PC SOFTWARE. LOGGER/DUPER programmable any log format $39.95. QSLer for automatic QSL cards $19.95. DATA BASE DXCC bearings and records $49.95. For information write Micro Electronic Systems, 19 Annette Park Drive, Bozeman, MT 59715.

COMPUTER SOFTWARE for VIC-20, Commodore 64, and others; Ham and educational programs. Inquire: Electronic Put-Ons, 7805 N.E. 147th Ave., Vancouver, WA 98662.

"THE SWAP LIST": Buy, sell, or SWAP your radio equipment in the nation's biggest "SWAP LIST." For a FREE copy write: SWAP LIST, Box 988, Evergreen, CO 80439.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

COLLINS HAM RADIO EQUIPMENT FOR SALE: KWM-2A Transceiver; CP-1 Crystal Packet 3.4 tol 30.0 MGH; 637T-2 Adjustable Dipole Antenna; SM-3 Desk Top Mic; 516-F-2 AC Power Supply; 312B-3 Speaker; Drake Watt Meter Model W-4; Heavy-Duty Rotor Complete with CDE Transmit Receiver Direction Control; Tri-Band Antenna Dummy Load; Coax Switches; Cables; Manuals. Complete package, firm $2,500. Ken Dorkoski, 583 N. Oak St., Shamokin, PA 17872. Phone (717) 648-4193.

NEW! . . . REPAIR ANY TV . . . EASY. Write Research, Box 517R, Brea, CA 92621.

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CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504, brings data sheet.

SALE: KWM-2, PM-2, CC-1, 312B5, DX Engr. Speech Proc., WARC crystals inc., Extra Tubes, $800.00 pkg. HQ-170AC $100.00. HQ100 and speaker $75.00. Dave, K4EWC, 2091 59th St. No., Clearwater, FL 33520. Phone: 813-536-4316.

FOR SALE: B&K TEST EQUIP. Model # E-200D R.F. Sig Gen. $100; #1248 Dig. I.C. Color Gen. $75; #1470 Dual Trace Scope $400. Contact Mark Roode, KA@OJD, 325 10th Ave. N., Clinton, IA 52732. Phone (319) 242-4467 eve.

FOR SALE: HW-101 practically unused, CW filter, Mic., Spk., 12 V.P.S., AC PS, Mob. Mt., spare finals, $325. Genave GTX 200T two meter trans., TTP, 10 channel, 1W-25W, Mic., Mob. Mt., new ¼ Ant. T. Mnt., $125. W3FYC, 215-362-2119 after 6 p.m.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

TS-530S, as new in box, w/warranty card, $550. KD5ZE, 501-856-3784.

ZX81 USERS: Send SASE (37¢) for sample copy of QZX newsletter. W4GHV, 1967 Defiance, Las Cruces, NM 88001.

TS-520S, CW Filter, Owners and Service Manuals. Excellent, $450. Guaranteed. KD5ZE, 501-856-3784.

FOR SALE: Clegg Zeus/Interceptor 100W 6/2 Meter Am, SB, CW, & FM, $250. Teletype 28Kro plus Reperf, and Tape reader, $200. WB8PJP, Marion, OH 43302.

SELL: 400 Hz filter for TS-530S from Fuji-Svea $25. BC-453B Recvr 190/550 kHz unmodified $15 U ship. W@NYX, 1408 Denver, Waterloo, IA 50702.

NATIONAL RADIO COMPANY equipment manuals. SASE. Maximilian Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

NOSTALGIC Hi-Fi buff looking for Marantz Model 2 and Macintosh MC-40 or MC-30 tube-type amplifiers in cosmetically mint condition. Name your best fair price. WA1YIW, 1725 Terrace Dr., Minot, ND 58701. Phone 701-838-2721.

DX QRP STATION TS130V, AT130, VFO230, $799. Gerry, KC9IQ, Rt. 5 Box 1120, Rhinelander, WI 54501, evenings 715-369-3891.

WANTED: Antique furniture by G. Stickley. K8UR/1, 1-617-481-2091.

FOR SALE: Heathkit HW-16 and HG-10B VFO in excellent shape. Good Novice rig. First $95 takes it. Tom Balon, KB3XB, 1109 Pine St., Freeland, PA 18224.

HEATH SB230 linear unopened in original shipping box, $500 or trade for Dentron 2500. Paul, KA6CHJ, 707-448-1461.

WANTED: Manuals and schematics for a Gonset G-76 and Power Supply. Will pay for copies. My Elmer needs them! Everett Smith, P.O. Box 2403, Oroville, CA 95965.

MFJ 1040 preamp/preselector, mint condition, $55 firm, postpaid. KV5I, Eddie Hatcher, 840 Wixom, Dallas, TX 75217.

WANTED: Heath HW-18-3 160 Meter SSB Transceiver with manual. Frank Andrei, W3OEL, Mt. Rt. #1, Saltsburg, PA 15681.

HELP! Junior High School 180 needs donations of old magazines, books, equipment, and parts for ham radio program. Contact G. Skloot, KE2N, 2923 Mandalay Beach Road, Wantagh, NY 11793.

SELL KANTRONICS MINIREADER: Excellent Condition, $160. David Schwartz, 1183 Southeast St., Amherst, MA 01002.

HEATHKIT HW101, Power Supply HP23C, Hand Mike, Ham Key. New Condition. Best Offer. Richard Petrilli, KA5KHI, 15926 Whipple Tree Dr., Houston, TX 77070. Phone 713-376-6932.

Is there intelligent female life in Syracuse, NY? Single, dedicated, determined undergrads through recent postdocs in math, science, or eng. call N2AKV 637-3903.

WILSON HT 1405 1W/5W HT channeled up with charger and carrying case. Make offer. W70M via Callbook.

MOTOROLA MICOR T71 RTN: 1400A, 25 to 30 MHz, Extender, 100 watts, 4 channel, less elements, $450. Rick, KC5EJ, 915-598-2796.

ARGONAUT 515 WANTED for delivery to New York address. Price and details please by airmail letter to: G3NQU, "Bonacre," St. Gennys, Bude, Cornwall, England.

SELL: Classic Drake 1-A triple conversion receiver $100. Collins 75A4, 3 filters, $275. HT-37, $100. Drake Twins R4B, Satori Modified, $275, T4XC, $275. W5QJT, 314 N. Rescer Dr., El Paso, TX 79912. Call 915-581-2017.

WANTED: Heathkit HR-20 Receiver, Byron, WA5PLK, 401 Bayridge, League City, TX 77573.

WANTED: 10 meter FM amplifier to work with Azden 10 meter FM transceiver PCS 2800. K3BQZ.

DAU CFT 46243 Receiver Schematic Wanted. Blair Shaw, VE6AGH, 1726 18th Ave. So., Lethbridge, Alberta, Canada, T1K 1C3.

TRADE an Atwater Kent Model 20, good condition, for a complete, good vertical Vibroplex. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

FOR SALE: CW Transmitters for 220 and 432 MHz. 4 Band VHF-UHF Ham Band Receiver Converter System. SASE for details. E. Erickson, 343 Catherine St., South Amboy, NJ 08879.

HP-200B Audio Osc. $30, RCA WV-98B VTVM $35, B&K 440 CRT Tester $20, SASE for list. K6KZT, 2255 Alexander, Los Osos, CA 93402.

FT-202R Yaesu Handie w/desk charger, xtals $95; Yaesu 200R Sigmizer Synthesized 10W Mobile $125 FOB. Art Ford, 552 Hillside Ct., Melbourne, FL 32935.

SELL: 4 KW Electric-Start Gas Generator, 120' very strong Microwave Tower.TI-58 Calculator. WANT: HP-41 Calculator, any National equipment. T.N. Colbert, 13609 Colony, Burton, OH 44021.

Hallicrafters SX-111 10–80 bands, Receiver, manual. $125 & shipping. George J. Craddock, KA4JHX, 1378 Bailey Ct., Deltona, FL 32725. Phone 1-305-574-2135.

FOR SALE: Tempo I (blk-face), KDK 2016, Midland 13,500, IC-230 with P.S. & TTP, BC-250 Programmable Scanner. Send S.A.S.E. For more info. P.O. Box 518, White House, FL 32220.

SELL: Heath HR-10B Receiver $60. HRA-10-1 Calibrator $9 Trans Key Elect. Keyer $20. WANT: Solar panels or Photovoltaic Cells, Ten-Tec 160 meter Converter, Butternut 160 meter Base Coil, and Atari Video Game. Tom Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport CA 95453.

WANTED: NATIONAL SW-3 with coils and National power supply. Describe condition and state price to David I. Combs, W5VJW, 2000 Victory, Wichita Falls, TX 76301.

KENWOOD TWINS: T599, R599, S599, excellent condition, $400. W1FO, Break Water Road, RR 10, Wakefield, RI 02879. Phone (401) 783-7214.

HEATH HW-101, CW filter, PS, speaker, good shape, $250. Bob Rockwell, W3SYT, Box 508A, RD 5, Pittsburgh, PA 15205.

COLLINS: F455FA-31 $35. 75A ¾ vernier-drive (no knob) $50. F455J-15 $65. 75A4, KWS1 $1000. 75S3B, 32S3, 516F2, 312B4 (R/E) $1250. CE-20A $35. James Craig, 32 Birchwood Dr., Rye, NH 03801. Phone (603) 964-6658.

HELP: Junior High School 180 would appreciate any donations of old magazines, books, parts, and items related to Amateur Radio. Contact Mr. G. Skloot, KE2N, JHS 180 Q, 320 Beach 104 Street, Rockaway Park, NY 11694.

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.

VERY NICE YAESU FT107M/DMS w/int PS, CW fil., YM-38 mic, $849. FC-107 Tuner $80. SP-107P Patch $50. All w/dust cover in orig. boxes. KB1BX (617) 274-6260.

SELL: Mint Kantronics Mini-Reader $175. VHF Engineering 2mtr amp 1 in 20 out $35. D. Schwartz, W1GAJ, 1183 Southeast St., Amherst, MA 01002.

SELL: Ham & Test equipment, Power Grid Tubes, Misc. Send SASE for list. George M. Churpek, N6FL, 839 Cambon Circle, Ojai, CA 93023.

COMPLETE COLLECTION CQ's in binders except 1971 to date $450.00. Extra copies 1946 to 1975 $.25 plus postage. A. Jablonsky, 1022 N. Rockhill Rd., St. Louis, MO 63119. Send SASE.

FOR SALE: Dentron Model MLA 2500 Linear Amplifier $700.00. RCA-Master Color Bar Generator Type 515A $100.00. Wm. D. Shevtchuk, 1 Lois Ave., Clifton, NJ 07014. Phone: 201-471-3798.

WANTED: Heath GH-17 Soldering Iron, Heath MP-14 Power Inverter, Solar Panels or Photovoltaic Cells, Butternut 160 meter Base Resonator, Ten-Tec 160 meter Converter. Tom Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, CA 95453.

SELL: Older tubes, vibrators, electronic books, magazines, catalogs, call letter auto license plates. Send SASE for list. NJJ, Box 213, Hills, MN 56138.

WANTED: McIntosh & Marantz tube equipment. Will pay cash or swap mint Collins gear. 213/687-3395 (days). KA6NNR, P.O. Box 71703, Los Angeles, CA 90071.

WANTED: Heath SB610 Monitor Scope in good working condition. Ron Mendel, N9BPD, 38013 Academy Dr., Lake Villa, IL 60046.

HEAHTKIT VF-7401 2M FM Transceiver. Digital tuning, with 15 watt output. TTP Mike. $250. Joseph Lofreddo, K2PVB, 142 Norwalk Ave., Medford, NY 11763.

SWAP: Horace G. Martin Vibroplex bug, last patent date 1907, ser #11584, one set contacts for both dits & dahs, good condx, for ham gear. WA2PCL, 101-23 Lefferts, NYC 11419.

SUPER CQWW CONTEST programs. TRS-80 Model I, III (IV in III mode) completely machine language. Logs 3200+ contacts per BAND. AUTOMATIC identification of country and zone from call letters. DUPE SPEED 12,000+ contacts per SECOND. Screen displays zones still needed, total points, zones, countries, etc. Automatic CW generator with 2 buffers. Log Print programs prepare logs AND dupe sheets. Price $39.95. FREE fact sheet and sample printouts. K4SB, 3496 Velma Dr., Powder Springs, Georgia 30073.

QSL CARDS: Free Samples Custom or Stock cards. Write; Images Unlimited, Post Office Box 958, Evansville, Indiana 47706. Stamp Appreciated. 73's, KA9LQM.

*** COLOR COMPUTER OWNERS ***: Teach your CoCo Morse code, then let it teach you. MORSE CODE TEACHER teaches the letters and numbers and gives practice up to 5 wpm. $15.00/cass. MORSE CODE TUTOR gives code practice up to 27 wpm—a must for upgrades!!! $15.00/cass. HF ANTENNA DESIGN program calculates dimensions of quads, dipoles, and Yagis optimized for maximum gain. $10.00/cass ** MODEM RIOT ** 300 Baud RS232C modem $85.00. Also Osborne, TI, Atari, and IBM modems. Write or call: CYNWYN, 4791 Broadway, Suite 2F, Dept. C, New York, NY 10034. Phone (212) 567-8493.

SELL: Eico 324 sig. gen., 65 ft. new Belden 8448 8-wire rotor cable, 60 ft. used RG8 coax, Towtec mod. 102A elec. hoist-winch. Guy Carter, Route 1, Humboldt, IA 50548.

"CQ CONTEST": A new operating book from VE3GCO. $8.00 US postage paid. 100+ pages of rules; entry forms; log sheets; checklists, etc. Garry V. Hammond, VE3GCO, 5 McLaren Avenue, Listowel, Ontario, Canada N4W 3K1.

TEN METER AMATEUR 276 Channel mobile/base 12VDC/110VAC SSB Transceiver with clock-power supply & base station cabinet. Excellent condition, $125. Call Paul 1-219-932-2196.

VIC-20 HAM SOFTWARE: MUF Calculator, Coil Design, Beam Headings, Much More. SASE appreciated. Walt, KA9GLB, 4880 N. 49th St., Milwaukee, WI 53218.

"FANTASTIC DISCOUNTS" Kenwood R-2000 $509.95, R-1000 $414.95, R-600 $339.95. ICOM R70 $669.95. Yaesu FRG-7700 $439.95. Sony 2002 CALL! RF-3100 $266.95. Bearcat BC-100 $288.49. Also Regency, JIL, Fannon Scanners. Cordless Phones, Telephone Answering Systems, TV's, Antennas, Radar Detectors, Coax, Switches, Frequency Directories, Rotors, Microphones, Much More. FREE UPS SHIPPING AND INSURANCE to 48 states. Same day shipping with money order or certified check. Picture catalog $1.00 (REFUNDABLE 1st order). GALAXY ELECTRONICS, Box 1202, Akron, Ohio, 44309 (216-376-2402).

ALPHA "VAPOR" PA-70V Amp $1,100. Palomar PT2500A Tuner $175. Drake PS-75 TR7/TR5 Supply $75. Palomar P-310X Transceiver Preamp $60. KA9JKQ, 4615 Howard Ave., Western Springs, IL 60558. Phone (312) 246-7423.

WANTED: Collins 32S3 trans. with 516 pwr. supply, or 516 pwr. supply alone. W5FAY, 6201 Forest Lane, Dallas, TX 75230.

OHIO READERS: Wanted Ham Radio Net & VHF-UHF public service frequencies used in your area. J. Callam, 10 Avalon Rd., Mt. Vernon, Ohio 43050.

FOR SALE: Kenwood VFO-520, $100. Kantronics FD-2 CW/ASCII/TTY Reader, $250. MFJ-496 Super Kybd with AFSK, $200. (Make Offer) N6EGY, 805-964-8340.

WANTED: YAESU Antenna Tuner FC-107. Must be in excellent condx. Larry Mueller, 350 Stanley Way, Escondido, CA, 92027. Phone (619) 743-7093.

QST's 1945 to 1954 35 cents each. 1976 to date $4.00 per year plus postage. A.M. Jablonsky, 1022 N. Rockhill Rd., St. Louis, MO 63119.

ICOM IC-720A, W/PS-15, EX-2, BC-10, manual and hand microphone. Excellent condition, original cartons, $890. Call (404) 926-7726 days. Mr. Gilleland, KA4SEU, Atlanta.

FOR SALE: FM frequency & modulation monitor. Hewlett Packard 335B. Now tuned to 89.5 MHZ. Excellent, $200. W7QML, 1644 S. 132nd St., Seattle, WA 98168. Phone (206) 242-2508.

RTTY: Model 19 $100, Model 15 $65, Model 14 TYP Reperf $50, Model 14 TD $20, FXRD1 $40, Perry (203) 426-8041.

SELL: ICOM 701 W/ P.S. $550; ICOM 211 $250; Bearcat Scanner 250 $150. All mint condition. Prices firm. KB4XU (803) 766-2831.

FOR SALE: SB303 solid state rec., SB401 trans. with mike-$275. J. Wasiewicz, 229 Sarles Ln, Pleasantville, N.Y. 10570 (914-769-9331).

FOR SALE: Heathkit VHF DualWAttmeter HM-2141, with AC battery eliminator. KA9EWB, Ken Wolfe, Box 134, Buffalo, IN 47925.

WANTED: EICO 730 modulator unit for EICO 720 transmitter. W7KRW, 1137 West 10th Place, Mesa, AZ 85201.

DRAKE T4X-B, R4-B, AC-4, MS-4. Xtals for 160, WWV, 29 mc. Input for monitorscope. Plugs, cables, manuals. Excellent condx. Certified check for $545 includes shipping. E.D. Kling, W4NXH, 1800 Neva Dr., Largo, FL 33540.

OLD TELEGRAPH KEYS WANTED. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

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CERAMIC COFFEE MUGS: Your call and first name hand lettered and fired on in black for $7.95 or in gold for $11.95 postpaid. Olivia, 1812 Neihardt, Branson, MO 65616.

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, MILITARY SURPLUS RADIOS. We need Collins 618T, ARC-94, ARC-102, 718F-1/2, MRC-95, MRC-108, 671U, RT-980/GRC-171, RT-712/ARC-105, RT-804A/APN-171, ARC-114, ARC-115, RT-823/ARC-131 or FM-622, RT-857/ARC-134 or Wilcox 807A, ARC-159, ARC-164, RT-859/APX-72, APN-153, Antenna Couplers 490T, CU-1658A, CU-1669A, CU-1239/ARC-105, Sperry Rand 3226A1, 3226B1, 490B-1, 690D-1. 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.

APPLE COMPUTER OWNERS: Announcing "The Logger"—A very sophisticated, full-featured disk-based log book for ham radio operators. "The Logger" manages over 1900 log entries per standard DOS 3.3 diskette with SIXTEEN separate functions including PERSONALIZED QSL CARDS for less than 2 cents each! UNLOCKED program diskette and User's Guide $35 ppd. U.S. Large SASE for more information. Bob Jackson, Dept. CQ, Box 57304, Webster, TX 77598.

WANTED TO BUY: A radio that has space shuttle on it and outer space bands on it. Send price to Gene Perryman Box 1104, R.R.2, Kendrick, ID 83537.

6 METER AMP. 50 Watts in 500 Watts PEP out. Art Johnson, KA8PHE, 947 W. Broad Street, Newton Falls, OH 44444. Phone 216-872-1080.

MICROPHONES: Best prices. New and used Professional, Amateur, Commercial mics. Microphone Specialists, Box 1372, Burnsville, MN 55337.

TI-99/4A: DXCC LOG $8.50, 5 BWAS, 5B DXCC, 2/$17.00 or $9.75 each. TI BASIC on cassette. Leon, 2525 Avenido Del Pinar, Gautier, MS 39553.

WANTED: Pre-1950 TV sets and old TV GUIDE magazines. W3CRH, Box 90-C, Rockville, MD 20850.

FOR SALE: Tempo I (black face) 10-80 HF, KDK 2016, IC-230 with PS and TTP, Midland 500, scope, BC-250. Send SASE to P.O. Box 518, Whitehouse, FL 32220.

STANDARD SRC146A Talkie with charger, duckie, manual, Nicads. Best offer over $75. Tom Adams, WA5QZM, 11608 Broad Oaks, Austin, TX 78759.

FOR SALE: DX-100 mint, on air one time. DX20 mint, never used. SX42 rcvr, S42 matching speaker. Best offer. Charles Peterson, KC0NA, Rt. 1, Box 352, Deerwood, MN 56444.

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APPLIANCE OPERATORS AMALGAMATED? SASE. Timm, 2308 Garfield #304, Minneapolis, MN 55405.

WANTED: Used Rohn 25 tower sections, cheap. AA1K, 145 Farm House Lane, Bear, DE 19701. Phone 1-302-834-8323.

WANTED: Johnson 1 KW Matchbox for $150. Phone collect to W6AM, 213-377-4120 or 213-424-3459.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504 brings data sheet.

OLD TELEGRAPH KEYS and publications wanted. K6ARE, Dick Randall, 1263 Lakehurst, Livermore, CA 94550.

SALE: CUSHCRAFT 20 element DX beam for 432, never used outdoors, with coax balun, $40 postpaid. E. Erickson, W2CVW, 343 Catherine St., S. Amboy, NJ 08879.

WWV RECEIVER & VHF-FM Station Monitor $35, Heathkit test equipment. SASE for large list. K6KZT, 2255 Alexander, Los Osos, CA 93402.

CQ BUMPER STICKER reads dahdidahdit dahdahdidah, $1.00. D. Mollan, WB7FDE, 7805 NE 147th Ave., Vancouver, WA 98662.

WANTED: R-220/URR receiver and AN/URA—8A comparator unit (CM-22A). C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

NOVICE ALL-AMERICAN Certificate: Work a Novice in all 10 call areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

WANTED: Kenwood VFO-120, SP-120. SELL: 4kw heavy-duty 120–240 V electric start generator, 120' microwave tower. Pickup only. T.N. Colbert, 13609 Colony Lane, Burton, OH 44021.

WANTED: Gov't Technical Manual or a working BE-77 Switch Box (for RTTY TTY). DT RTTY Club, Box 9064, Newark, NJ 07104.

HAM HATS: 14 colors, SASE for information. Specialty Printing, Box 361, Duquesne, PA 15110.

COLORFUL QSL's: Woodgrains and Dayglows. Samples 50¢. Specialty Printing, Box 361, Duquesne, PA 15110.

ROSS $$$ NEW BARGAINS: AEA CP-1 $172.90, MBA-RC $309.90, ISOPOLE—144 $39.90, CK-2 $119.95, KT-2 $94.95. ROBOT RB-400 $389.90, RB-800 $429.90. ICOM IC-730 $634.90, IC-451A $729.90, IC-551D $569.90, IC-740 $929.90. Every day is ICOM day at Ross's. KENWOOD TS-430S $779.90, TS-930S $1349.90. Complete KENWOOD, YAESU, ICOM, DRAKE, ECT, lines in stock. YAESU FT-707 $579.90. USED YAESU FR101, FL101 $499.90, FT101E $479.90. Limited time offer. Mention this ad to receive these bargain prices. Send SASE & call letters for list of used equipment and current specials. All prices cash, FOB Preston. Closed Monday at 2:00. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263. Phone (208) 852-0830.

Silent Key W0NQM's R-4C, T-4XC, AC-4, MS-4, 4-NB. Mint Condition, $1581 new. Save $1000—only $518. W5UPZ, RR#1, Box 160, Plano, Texas 75074.

COMPUTER SOFTWARE: For Apple, Atari, C-64, IBM/PC, Timex-Sinclair, TRS-80, and VIC-20. Mark Electronics, 17589 Birch, Romulus, MI 48174.

8TH ANNUAL AMATEUR RADIO HAMFEST-COMPUTER CONVENTION ELECTRONIC FLEA MARKET Oct. 8 & 9 at the Virginia Beach, Va. PAVILLION. Dealers, special displays, forums, computers, satellites, XYL bingo. Free jitney bus to the beach. Also visit the specialty shops and restaurants at the new WATERSIDE MARKETPLACE in nearby Norfolk. Advance ticket drawings and valuable door prizes. Admission $4 both days. Flea market tables $5 one day, $8 both days. Commercial table space in exhibition area $15 both days; commercial booths $30 both days. Info and tickets, write Jim Harrison, N4NV, 1234 Little Bay, Norfolk, VA 23503. Phone 804-587-1695.

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.

WANTED: Heath frequency counter any model. Write Fred, Box 706, Orange City, FL 32763.

VIC-20 CW TRANSMIT PROGRAM: Wide speed range, accurate, automatic serial numbers & many features. Good for contests. Interface schematic included. Several other programs available. Joseph Holstein, 1515 Sashabaw, Ortonville, MI 48462.

HIPOTRONICS 100kv laboratory kilovolt meter in mint condition. Sell or trade for ham gear. N4HUL, 516 Ardmore Lane, Albany, GA 31707.

SALE: Seneca 6 & 2 mtr xmtr; HW-101 & power supply; Heath 10-18 scope; 60 watt, 432 MHz xmtr. SASE for info, 11325 Sugarpine Drive, Florissant, MO 63033.

HEATH RF Signal Generator $30, Audio Generator $25. SASE for test equipment list. K6KZT, 2255 Alexander, Los Osos, CA 93402.

FOR SALE: New LMB Style Cabinet, Panel, similar to Collins S-Line. $30 Postpaid. E. Erickson, W2CVW, 343 Catherine St., S. Amboy, NJ 08879.

HARK! Hear Amateur Radio (over) Proposed SWL group! SASE. Timm, 2308 Garfield #304, Minneapolis, MN 55405.

WANTED: Teletype LP109RN/AY or LP124YD/AJU typing units w/ LMU-21 motor. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

HAMS DO IT WITH FREQUENCY vinyl bumper sticker, $1.00. D. Mollan, WB7FDE, 7805 NE 147th Ave., Vancouver, WA 98662.

FREE ad when you subscribe! Get "The Radio Exchange"—the speedy and inexpensive newsletter for buy/sell/trade of radio & computer equipment. 24 issues (1 year) $8.00. The Radio Exchange, P.O. Box 486, Dept. B, Forest Lake, MN 55025.

FOR SALE: DX-160 Receiver, excellent condition in original carton, $110.00. Will ship. Willis B. Collier, Route 3, Box 4, Thomasville, GA 31792.

DXERS AND CONTESTERS: VIC-20 Ham Radio Software. All programs are expandable and Menu driven. Keep all logs and contest scores at your fingertips. Other Ham related programs available. Send SASE for FREE catalog. Pro-Com Software, 1450 Oak Ave., Los Altos, CA 94022.

FOR SALE: Yaesu FRG-7700 Communication Receiver, Gilfer modified selectivity filters. Six months old with Yaesu FRT-7700 antenna tuner. Both in perfect condition. Must sell. Price $530 for both, $470 for receiver only. Vasant Snridharani, 96 Cedar Dr., Plainview, NY 11803. (516) 935-0380.

WANTED: Basketcase Heath DX-40 CW XMTR. Looking for the Function switch. Jim Zimmerman, WB7DGU, 2316 W. Dallin St., Lancaster, CA 93534. Phone (805) 945-6539.

WANTED: Alpha 76 A. Will trade SB221 w. 10 mtrs. plus cash. Call N@AKZ Dennis, (612) 535-7189.

YAESU FT101ZD. Mint condition in original box. With Speaker/Patch—$700. Steven Udwin, N2CFC, business hours (201) 871-3710.

WANTED: Good SW Broadcast Receiver (FRG-7, etc.) & FC-301 Antenna Tuner for FT-301 series station. Equipment must be clean and no mods. Write: R.H. Arland, G5CSU, Box 1454, APO NY 09127.

WANTED: Hammarlund I.F. Transformers for HQ-145, T5 #26402, and T11 #33829. Good working order. Also Compactron tube manual. KA1JKD, R1 Box 382, Woodstock, CT 06281.

TIMEX/SINCLAIR DXCC-Organizer and 5BWAS Organizer Program, $14.95 each. SASE for more info. Michael Lynch, 504 S. Polk, Amarillo, TX 79101. Phone (806) 373-9451.

ATTENTION AMATEURS!!! BILAL COMPANY has relocated. We manufacture the ISOTRON ANTENNAS. Write to: BILAL COMPANY, S.R. 2, Eucha, OK 74342, or call (918) 253-4094.

OLD TIMERS: Collector looking for old bugs and spark keys. Vibroplex, McElroy, Marconi, DeForest, etc. Neal McEwen, K5RW, 1128 Midway, Richardson, TX 75081.

QSL CARDS: $17.50/500, ppd. Free catalogue. Bowman Printing, 743 Harvard, St. Louis, MO 63130.

SWAN 350D, excellent condition, $300.00. Mini Quad, excellent condition, $100.00. Bill, KA1HRZ, 24 Chester St., Pittsfield, Maine 04967, phone 207-487-5217.

FOR SALE: Drake R4B receiver, excellent condition, $249 prepaid in original carton including 10–10.5 MHz crystal. Claude Sweger, Box 1842, Ft. Stockton, TX 79735.

TRANSFORMERS: Specialist will rewind (rebuild) or replace your hard to find radio transformers, choke coils, reactor coils, etc. Any size. All applications. $100.00 minimum rewind charge. Send name and phone number to: TRANSFORMERS, P.O. Box 13773, Orlando, Florida 32859.

QUALITY TOWER ACCESSORIES TO SOLVE YOUR PROBLEMS: SO-1 standoff brackets for small 2 meter, Ringo, TV antennas, $34.50. SO-2 Heavy-duty standoffs for large 2 meter, beams, commercial, $59.50. MA-1 and MA-2 mast adapters put the top of your tower mast to good use, $22.50. GP81 and GP51S Ginpole Kits provide safety for your tower work, $129.50. BG-18 tower mast for those big beams, $249.50. These accessories work fine on all tubing-type towers. Special accessories can be custom made to order. Request our 1983 catalog. Visa, Mastercharge. IIX Equipment Ltd., P.O. Box 9, Oak Lawn, IL 60454. Phone 312-423-0605.

BUILD your own satellite dish. Complete system less than $800. Plans $20. KinSat, Box 18, Clearcreek, WV 25044.

TUBES: $2.49 each, large stock. SASE brings lists. E.D.N.F., 6690 Seven Mile, South Lyon, MI 48178.

EV621H DESK MIKE $30.00. Drake PS-7 $150.00, TR-7 service manual and extender card kit $40.00. Dentron RT-3000 with Drake TV-3300LP $180.00. Don, KA5FSN, 405-732-5650.

Advertiser's Index

We'd like to see your company listed here too. Contact Jack Gutzeit, W2LZX, or Herb Pressman, at 516-681-2922 to work out an advertising program tailored to suit your needs.

HF FAMILIES

FT-ONE

THE TOP OF THE LINE HF ALL MODE GENERAL COVERAGE TRANSCEIVER WITH COMMERCIAL-GRADE CONSTRUCTION, COMPETITION-GRADE DESIGN WITH UNEQUALLED RECEIVER FILTER PERFORMANCE.
TX: 100W 1.8–29.99 MHz
RX: 150 kHz–29.99 MHz

FT-980 CAT

NEW HF ALL MODE TRANSCEIVER WITH GENERAL COVERAGE RECEIVER, 8-BIT MICROPROCESSOR CONTROL, AND INTRODUCING YAESU'S NEW COMPUTER-AIDED TRANSCEIVER SYSTEM FOR COMPLETE EXTERNAL COMPUTER CONTROL.
TX: 100W 9 bands
RX: 150 kHz–29.99 MHz

FT-102 LINE

Designed for wide dynamic range and clean transmitter output—to give you that extra competitive edge. Three 6146B's give power to spare, while the ultra-modern features give you total operating flexibility and control.

FT-77 LINE

Simple, reliable and thrifty, the all solid-state rig that gives you everything you need for no-frills mobile HF, or base station with the optional FP-700 Power Supply.
100W: 9 bands, SSB and CW, w/FM optional

FRG-7700

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.

Specifications subject to change without notice or obligation.

CIRCLE 146 ON READER SERVICE CARD

V/UHF FAMILIES

FT-208R/708R

Feature-packed FM Handhelds that have proven their superior performance. Microprocessor control assures convenient operation while incorporating every worthwhile feature the serious operator needs.

FT-208R 2.5W/1W RF:
143.5–148.5 MHz

FT-708R 1W/200mW RF:
440–450 MHz

10 memories w/lithium backup
Full scanning features

FT-230R/730R

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.

FT-230R 25W RF: 143.5–148.5 MHz
FT-730R 10W RF: 440–450 MHz

FT-290R/690R/790R

All mode portables with full microprocessor control and all of the features needed for serious SSB, CW and FM field operation when powered by eight optional "C" cells. Options also available for mobile and base operation.

FT-690R 2.5/1W RF: 50–54 MHz
FT-290R 2.5W/1W RF: 143.5–148.5 MHz
FT-790R 1W/200 mW RF: 430–440 MHz

FT-480R/680R/780R

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.

FT-680R 10W RF: 50–54 MHz
FT-480R 10W RF: 143.5–148.5 MHz
FT-780R 10W RF: 430–440 MHz

CIRCLE 139 ON READER SERVICE CARD

YAESU *The radio.*

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
YAESU Cincinnati Service Center, 9070 Gold Park Drive, Hamilton, OH 45011 • (513) 874-3100

ANTENNA/TOWER SALE!

BUTTERNUT ELECTRONICS CO.

- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES . . .
- New Model HF6V $129.00
- New Model TBR-160HD (High Power 160 meter Base Resonator) $49.00.

Model RMK-11 (roof mount kit with multiband radial kit $39.00.
Model STR-2 (Stub Tuned Radial Kit) $20.00.

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)

UNARCO-ROHN Self Supporting Towers — On Sale!

Freight Prepaid

These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! How's that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
H8X40	40 ft	10 sq ft	164	BXB6	289	24	313
H8X48	48 ft	10 sq ft	303	BXB7	369	26	395
H8X56	56 ft	10 sq ft	385	BXB8	449	30	479
HDBX40	40 ft	18 sq ft	281	BXB7	339	26	365
HDBX48	48 ft	18 sq ft	363	BXB8	429	30	459

Tri-Ex®

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

Check these features:

- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
W-36	36 ft.	9 sq. ft., 50 mph	$549
W-51	51 ft.	9 sq. ft., 50 mph	$799
LM-354	54 ft.	16 sq. ft., 60 mph	$1499
LM-470D (Motorized)	70 ft.	16 sq. ft., 60 mph	$2999

Masts—Thrust Bearings—Other Accessories Available at Sale Prices—Call!

RG-213U

$.29/ft $279/1000 ft
Up to 400 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Non-contaminating Vinyl Jacket
- Low Loss Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft
½" LDF4-50 Andrew Heliax™	$1.49/ft
⅞" LDF5-50 Andrew Heliax™	$3.99/ft

select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax™	$22	$22	$22	$22
⅞" Heliax™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259	$1.25	Nickle PL259	$.90
UG21B N Male	$2.95	UG23D N Female	$2.95

ANTENNA WIRE & ACCESSORIES

12 Ga. Copperweld	$.12/ft	14 Ga. Copperweld	$.10/ft
14 Ga. Stranded	$.10/ft	18 Ga. Copperweld	¼mi$30
450 Ohm H.D. Line	$.16/ft	H.D. End Insulators	$2/ea
Van Gorden 1:1 Balun	$11		
Van Gorden Center Insulator	$6		

HUSTLER

4BTV 40-10 mtr Vert.	$79	5BTV 80-10 mtr Vert.	$99
G6-144B 2-mtr Base	$79	G7-144 2-mtr Base	$109

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$10	$10	$12	$15	$19
2KW Super	$14	$15	$19	$24	$33

Bumper Mounts - Springs - Folding Masts in Stock!

CUSHCRAFT

A3 3-el Tribander	$219	A4 4-el Tribander	$289
R3 20/15/10mtr Vert	$279	A743/A744 40mtr Kit	$75

103CD	$95	15-3CD	$115
20-3	$199	40-2CD	$289
A50-5	$79	A147-4	$29
214B	$79	3219	$95
228FB	$219	424B	$79
147	$63	144-20T	$75
14TMB	$29	AMS-147	$29
10-4CD	$109	15-4CD	$125
20-4CD	$279	AV5	$99
A50-6	$99	A147-11	$49
214FB	$79	220B	$95
416TB	$59	617B	$199
144-10T	$52	432-20T	$49
ARX2B	$39	PD-2	$25

Many other Cushcraft models in Stock—CALL!

HY-GAIN

The ALL NEW Broadband 3-el Triband Beam Explorer-14, In Stock—$289

30/40-mtr. Add-On-Kit	Call for price
V2S 2-mtr Base Vertical	$39
TH5MK2S Broad Band 5-el Triband Beam	$319
TH7DXS 7-el Triband Beam	$379
TH3JRS 3-el Triband Beam	$159
TH2MK3S 2-el Triband Beam	$139
HY-QUAD 2-el Triband Quad	$279
402BAS 2-el 40-mtr Beam	$199
205BAS 5-el 20-mtr Beam	$299
155BAS 5-el 15-mtr Beam	$179
105BAS 5-el 10-mtr Beam	$119
204BAS 4-el 20-mtr Beam	$229
203BAS 3-el 20-mtr Beam	$139
153BAS 3-el 15-mtr Beam	$79
103BAS 3-el 10-mtr Beam	$59
DB1015BAS 3-el 10/15 mtr Beam	$159
64BS 4-el 6-mtr Beam	$55
66BS 6-el 6-mtr Beam	$109
18HTS 80-10 mtr Hy-Tower Vertical	$339
LC-160 160-mtr Coil Kit for 18HTS	$39
214 14-el 2-mtr Beam	$35
2BDQ 80/40 mtr Trap Dipole	$49
5BDQ 80-10 mtr Trap Dipole	$99
BN86 80-10 mtr KW Balun W/Coax Seal	$19

MOSLEY

CL-33 3-el Triband Beam	$229
TA-33 3-el Triband Beam	$199
TA-33JR 3-el Triband Beam	$149
S-402 2-el 40-mtr Beam	$279

HYGAIN/TELEX CRANKUPS

ON SALE! FREIGHT PAID! SPECIAL PRICES! SAVES$!

Model	Height Up	Down	Wind Load	List	Sale
HG-37SS	37.0 ft	20.5 ft	9.0 sq ft	$777	$669
HG-52SS	52.0 ft	20.5 ft	9.0 sq ft	$1095	$949
HG-54HD	54.0 ft	21.0 ft	16 sq ft	$1818	$1499
HG-70HD	70.0 ft	23.0 ft	16 sq ft	$2850	$2399
HG-33MT2	33.0 ft	11.5 ft	8.5 sq ft	$898	$779

ALPHA DELTA COMMUNICATIONS

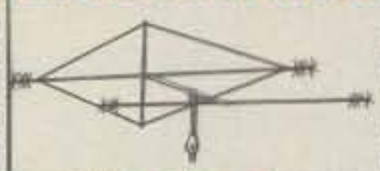
Transi-Trap™ Surge Protectors—In Stock Now!

Model LT 200W UHF Type	$19
Model HT 2KW UHF Type	$29
Model LT/N 200W N Type	$39
Model HT/N 2KW N Type	$44
Model R-T 200W Deluxe	$29
Model HV 2KW Deluxe	$32

KLM

KT34A 4-el Broad Band Triband Beam	$309
KT34XA 6-el Broad Band Triband Beam	$469
3.8-1 80-mtr Rotatable Dipole	$429
7.2-1 40-mtr Rotatable Dipole	$159
7.2-2 2-el 40-mtr Beam	$289
7.2-3 3-el 40-mtr Beam	$439
7.2-4A 4-el 40-mtr Beam	$599
6el-20mtr Big Stick Monoband Beam	$599
6el-15mtr Big Stick Monoband Beam	$389
6el-10mtr Big Stick Monoband Beam	$229
10-30-7LP Log Periodic Broad Band Beam	$599
144-148-13LBA 13-el 2-mtr Beam	$79
143-150-14C 14-el 2-mtr Satellite Antenna	$79
420-470-18C 435 MHz Satellite Antenna	$59
432-16LB 432 MHz Long Boom Antenna	$59

MINI-PRODUCTS HQ-1 only $139!



Wing Span - 11 ft
Boom - 54 in. long
Wind Area - 1.5 sq ft
1200W P.E.P. Input
6-10-15-20 mtrs

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating)	$99
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)	$439
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 $32.50 25G $43.50 45G $95.50

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$789
FK2558	58 ft	13.3 sq ft	$879
FK2568	68 ft	11.7 sq ft	$959
FK4544	44 ft	34.8 sq ft	$1099
FK4554	54 ft	29.1 sq ft	$1219
FK4564	64 ft	28.4 sq ft	$1329
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!

TOWER/GUY HARDWARE

3/16" EHS Guywire (3990 lb rating)	$.12/ft
1/4" EHS Guywire (6000 lb rating)	$.15/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	$1.79
1/4" Preformed Guy Grip	$1.99
6" Diam - 4 ft Long Earth Screw Anchor	$12.95
500D Guy Insulator (5/32" or 3/16" Cable)	$.95
502 Guy Insulator (1/4" Cable)	$1.95
5/8" Diam - 8 ft Copper Clad Ground Rod	$11

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)	$4.95
9902LD Cable End (for 6700 cable)	$6.95
Socketfast Potting Compound (does 6-8 ends)	$8.95

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

TEXAS TOWERS

DIV. OF TEXAS RF DISTRIBUTORS INC.

1108 Summit Ave., Suite 4 / Plano, Texas 75074

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Mon.-Fri.: 8:30 a.m. - 5:30 p.m. Sat. 9 a.m. - 1 p.m.

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CIRCLE 1 ON READER SERVICE CARD

COMMUNICATIONS EQUIPMENT SALE!

MIRAGE AMPLIFIER SALE!

B1016 2 Meter Dual Purpose $249
H.T. 1-2W In - 35-90W Out
or Transceiver 10W In - 160W Out

Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
B23	2M	No	2W	30W	5A	$ 79
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

RC-1 Remote Control for Mirage Amplifiers.....$24
MP-1 and MP-2 Peak-Reading Wattmeter.....$99

ASTRON POWER SUPPLIES

Heavy Duty - High Quality - Rugged - Reliable

- Input Voltage: 105-125 VAC Output: 13.8 VDC ± .05V
- Fully Electronically Regulated—5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series With Meter—A-Series Without Meter

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

MODEL RS-50A

HAL Communications Sale!

CWR6850 $849!

CT2200 KB2100 $959!

CWR6700 Receive Only Telereader	$439
CWR6750 Receive Only Telereader	629
DS3100ASR Deluxe RTTY Terminal	1699
MPT3100 Message Processor Terminal	2199
RS2100 1" Scope w/Loop Supply	289
ST5000 RTTY Demodulator	219
ST6000 Deluxe Demodulator/Keyer	649
DSK3100 Disc Storage Unit	829
ARQ1000 Amtor Error Correcting Terminal	649
KG-12 12" High Resolution Monitor	169

YAESU FT-230R

List $359
Call For Your Special Price

YAESU FT-726R

List TBA
Call For Your Special Price

KDK FM2030

SALE PRICE $269!

YAESU FT-707

List $699.95 Special Price $589

R.L. DRAKE

TR-7A Transceiver On Sale $1389!
Accessories In Stock - Call!
L7 HF Amplifier Only $969 (Less Tubes)
Eimac 3-500Z Tubes $199/pair

TEN-TEC SUPER SALE!

Corsair List $1,169
Your Special Price $1,029

Model 229...$259.00
Model 4229 Kit...$189.00

New Argosy
Digital Transceiver
List $599.95 Sale $539

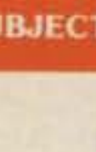
ALL ACCESSORIES IN STOCK—CALL!

SANTEC

ST144μP Handie Talkie ON SALE! Only $279

IN STOCK FOR IMMEDIATE DELIVERY

- 142-149.995 MHz
- 3.5W/1W/.1W Output
- 24 Hour Clock
- Liquid Crystal Display



OTHER SANTEC ITEMS

ST-440μP 440 MHz H.T.	$299
SM-3 Speaker Mic	33
ST-LC Leather Case	29
ST-6BC Base Charger	29
ST-500B3 Ni-Cad Battery	29

TOKYO HY-POWER LABS

Regular $69.95 SALE $59!

HL-30V 2 Meters, 2W In - 30W Out

OTHER TOKYO HY-POWER ITEMS

HL-82V 2 Mtr, 2-12W In - 35-85W Out	$139
HL-160V 2 Mtr, 1-15W In - 160W Out	299
HL-20U 440 MHz 1-3W In - 20W Out	99
HL-90U 440 MHz 10W In-80W Out w/Preamp	339
HC-200 HF Ant Tuner w/Wattmeter	89
HC-2000 Deluxe 2KW HF Antenna Tuner	299

AEA CP-1

Computer Patch Interface
List Price $239.95
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On All AEA Products.

RF POWER LABS AMPLIFIERS

A1000	160-15 Mtr. KW w/AC Supply	$1329
V76	6 Mtr. 8-15W In - 120W Out w/AC Supply	499
V360	6 Mtr. 5-10W In - 450W Out w/AC Supply	1189
V70	2 Mtr. 10-15W In - 90W Out w/AC Supply	499
V71	2 Mtr. 1-3W In - 90W Out w/AC Supply	519
V180	2 Mtr. 5-15W In - 200W Out w/AC Supply	599
V350	2 Mtr. 10-20W In - 400W Out w/AC Supply	1189

Fan Kits and Rack Adapters Also Available—CALL!

JANEL QSA5 PREAMP $39!

QSA-6	$41	432PL	$53
PS-30	$21	PS144	$21
PS-50	$21	PS220	$21

DAIWA CN-630B $111!
160/2 mtrs
20/200/2000 wts

BENCHER PADDLE
BY-1 Blackbase $39
BY-2 Chrome $49

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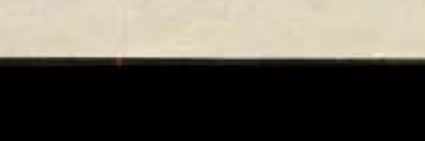
202B Noise Bridge	$54
250 2KW Dummy w/Oil	31
260 300W Dry Load	25
262 2KW Dry Load	59
422 Keyer w/Paddle	89
482 4 MSG Mem Keyer	89
484B 12 MSG Keyer	125
494 Keyboard	249
496 Keyboard	299
525B RF Processor	109
624 Phone Patch	59
901 300W Tuner	54
940B Tuner w/Meter	72
941C Tuner w/Meter	79
949B Deluxe Tuner	129
989 Deluxe 2KW Tuner	289

KANTRONICS



THE INTERFACE Reg. $169.95 SALE $149.00!

OTHER KANTRONICS ITEMS

Mini-Reader	$239	Hamtext VIC-20	99
Mini-Terminal	259	Hamtext Model-64	99
Apple Hamsoft	29	Atari Hamsoft	49
VIC-20 Hamsoft	49	TRS-80C Hamsoft	59

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CIRCLE 2 ON READER SERVICE CARD

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Memory Backup..$FREE	Installation.....$FREE

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CAT SYSTEM—Computer Aided Transceiver

- Wide Dynamic Range • Low Noise Front End
- General Coverage • 10Hz Digital Readout
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- Full Break-In CW • RF Speech Processor
- Variable Bandwidth • IF Shift • APF/Notch
- AC Power Supply • Adjustable Noise Blanker
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- Much, much more—call or write for info

Computer Interface now in development—
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160-10MTR WITH WARC BANDS TRANSCEIVER

- Digital Readout • Built-in AC Supply
- Variable Bandwidth • IF Shift
- CW/SSB/AM/FM Modes • RF Speech Processor
- Noise Blanker • Much, much more—

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New 80-10mtr Compact HF Transceiver

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FT-230R 2mtr FM.....$359
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- 10 Memories • Two VFO's
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- Memory or Up/Down Scan

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- 50-54 Mhz
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- 10 watts output on all bands
- 430-450 Mhz
- 21, 24.5 & 28 Mhz option available soon

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FT-790R 430Mhz	$399

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FRG-7700

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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FT-208R 2mtr HT.....$319
RF Out: 300mw/2.5W

FT-708R 440Mhz HT....$319
RF Out: 200mw/1.0W

- LCD Display • 10 Memories
- Up/Down and Memory Scanning
- Complete w/Nicad Battery, Charger and Rubber Duck Ant

Accessories Available:

LCC-8 Leather Case	$35
YM24A Spkr/Mic	$39
FNB-2 Nicad	$29
NC-8 Base Chgr	$99

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76PA $1699

ALPHA 78

ALPHA 374A

SPECIAL SALE PRICES

Model	List	Sale
77DX	$5450	*
78	$3495	*
374A	$2595	*
76A	$1985	*
76PA	$2395	*
76CA	$2695	*

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TOKYO HY-POWER HC-2000 Tuner

$339.95 List Price

SALE $289.00

- Heavy Duty 2 KW Construction
- 160-10 Meter Operation (including WARC Bands)
- Calibrated Vernier Dial
- Built-in SWR and Watt Meter
- Built-in 12 Position Antenna/By-pass Switch
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CIRCLE 137 ON READER SERVICE CARD

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 by-passed 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) (28-29.9 MHz)

SSB, CW	240W DC	160W DC
AM	80W DC	80W DC
FM		160W DC

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)

Spurious Radiation: Better than −40 dB

CIRCLE 48 ON READER SERVICE CARD

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

YAESU **ELECTRONICS CORPORATION** 6851 Walthall Way, Paramount, CA 90723 (213) 633-4007
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—World Radio TV Handbook 1983

With the IC-R70, ICOM continues its tradition of superior quality, high performance receiver design. Statements, such as the one above, are coming from shortwave listeners and equipment reviewers around the world.

What can a shortwave receiver do for you? The IC-R70 brings the news, music, and political opinions of other nations into your home or office. Enjoy music from the Near East, western Europe, South America; hear political opinion from Russia, Viet Nam, China; news from the BBC, Canada, Israel, Japan. Most countries broadcast in English as well as their national languages.

The IC-R70 is an easy-to-use comercial grade shortwave receiver, with features found only on the best receivers. The R70 out-performs receivers costing more than twice as much. And...

At a price well below $1,000, the ICOM R70 is the best performance value in a shortwave receiver today. See it at your authorized ICOM dealer, or contact ICOM for more information.

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ICOM IC-R70
World Communications Receiver

ICOM World Clock
Rotate globe to display time of illuminated location

ICOM
The World System

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