ICD 08241

Amateur Radio

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OCTOBER 1983 $2.00

Results of the 1982 CQ WW DX C.W. Contest

74820 08241 10

THE RADIO AMATEUR'S JOURNAL

Scan the World.

NEW

SSB, CW, AM, FM, digital VFO's, 10 memories, band and memory scan, optional 118-174 MHz coverage...

R-2000

The R-2000 is an innovative all-mode SSB, CW, AM, FM receiver that covers 150 kHz–30 MHz, with an optional VC-10 VHF converter unit to provide coverage of the 118-174 MHz frequency range. New microprocessor controlled operating features and an "UP" conversion PLL circuit assure maximum flexibility and ease of operation to enhance the excitement of listening to stations around the world.

R-2000 FEATURES:

- **Covers 150 kHz–30 MHz in 30 bands.** Uses innovative UP-conversion digitally controlled PLL circuit. UP/DOWN band switches (1-MHz step). VFO's continuously tuneable across the band and from band to band.
- **Optional 118-174 MHz coverage.** Through use of innovative microprocessor technology, frequency, band, and mode data of stations in the 118-174 MHz range may be tuned, displayed (full frequency, ie., 146.000.0), stored in memory, recalled, and scanned, using the R-2000 front panel controls and frequency display, allowing maximum convenience and ease of operation.

  The optional VC-10 VHF converter unit may be easily installed on the rear panel of the R-2000.
- **All mode: USB, LSB, CW, AM, FM.** Provides expanded flexibility in receiving various signal types. Front panel mode selector keys, with LED indicators.
- **Digital VFO's for best stability.** 50-Hz step, switchable to 500-Hz or 5-kHz. F. LOCK switch provided.
- **Ten memories store frequency, band, and mode data.** Complete information on frequency, band, and mode is stored in memory, assuring maximum ease of operation. Each memory may be tuned as a VFO. Original memory frequency may be recalled. AUTO. M switch for automatic storage of current operating data, or, when off, selective storage of data using M. IN switch.
- **Lithium battery memory back-up. (Est. 5 yr. life.)**
- **Programmable memory scan.** Scans all memories, or may be programmed to scan specific memories. HOLD switch interrupts scanning. Frequency, band, and mode are automatically selected in accordance with the memory channel being scanned. The scanning time is approximately 2 seconds per channel.
- **Programmable band scan.** Scans automatically within the programmed bandwidth. Memory channels 9 and 0 establish upper and lower scan limits. HOLD switch interrupts scanning. Frequency may be adjusted, using the tuning control, during scan HOLD.
- **Fluorescent tube digital display (100-Hz resolution).** Built-in 7 digit fluorescent tube digital display indicates frequency or time, plus memory channel number. DIM switch provided. The display may be switched to indicate CLOCK-2, FREQUENCY, CLOCK-1, and timer ON or OFF by the front panel FUNCTION switch.
- **Dual 24-hour quartz clocks, with timer.**
- **Three built-in IF filters with NARROW/WIDE selector switch. (CW filter opt.)** 6-kHz wide or 2.7-kHz narrow on AM. 2.7-kHz automatic on SSB. 2.7-kHz wide on CW, or, with optional YG-455C filter installed, 500-Hz narrow. 15-kHz automatic on FM.
- **Squelch circuit, all mode, built-in, with BUSY indicator.**
- **Noise blanker built-in.**
- **Large front mounted speaker.**
- **Tone control.**
- **RF step attenuator. (0-10-20-30 dB.)** Four step attenuator, plus antenna fuse.
- **AGC switch. (Slow-Fast.)**
- **"S" meter, with SINPO "S" scale.**
- **100/120/220/240 VAC, or 13.8 VDC operation** (with opt. DCK-1 cable kit).

Other features.

- RECORD output jack.
- Audible "beeper" (through speaker).
- Carrying handle.
- Headphone jack.
- External speaker jack.

Optional accessories:

- VC-10 118-174 MHz converter.
- HS-4, HS-5, HS-6, HS-7 headphones.
- DCK-1 DC cable kit.
- YG-455C 500-Hz CW filter.
- HC-10 World digital quartz clock.
- AL-2 Surge Shunt

VC-10 subject to FCC approval

More information on the R-2000 is available from all authorized dealers of Trio-Kenwood Communications
1111 West Walnut Street
Compton, California 90220.

KENWOOD

...pacesetter in amateur radio

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

TM-201A/TM-401A

Ultra-compact and lightweight, priority, memory and band scan, 25 watts/TM-201A & 12 watts/TM-401A.

The KENWOOD TM-201A 2- meter and TM-401A 70-cm FM mobile transceivers are the smallest and lightest units available, allowing maximum flexibility in automotive installation.

TM-201A/TM-401A FEATURES:

- **Ultra compact and lightweight**
  Measures 5.6 (141)W x 1.6 (39.5)H x 7.2 (183)D, inch(mm), weighs 2.8 lbs., (1.25 kg.).
- **25-watt output, with HI/LO power switch**
  Produces a powerful 25 watts RF output from a surprisingly compact design (TM-201A).
- **Dual digital VFO's built-in**
- **5 memories plus "COM" channel, with lithium battery back-up (est. 5 yr. life)**
- **Memory scan/programmable band scan**
- **Priority alert scan**
- **Highly visible yellow LED frequency display**
- **High performance receive/transmit**
  GaAs FET RF amplifier for high sensitivity with wide dynamic range. Transmit modulation characteristics selected for best sound and minimum distortion.
- **External high quality speaker supplied** (No internal speaker)
- **16-key autopatch UP/DOWN microphone**

Optional FC-10 frequency controller
May be easily connected to the TM-201A or TM-401A. Convenient control keys for frequency UP/DOWN. MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green, easy-to-read, back-lighted LCD display indicates transmit/receive frequencies, memory channel number, ALERT, and SCAN (with blinking MHz decimal). Size: 4.4 (112)W x 1.4 (35)H x 0.9 (22)D, inch(mm). Weight: 3.5 oz. (100 g).

- **Repeater offset switch (±600-kHz/TM-201A; ±5 MHz/TM-401A; and simplex) and reverse switch**
- **Audible "BEEPER" confirms operation**
- **Easy-to-install mobile mount**

TM-201A/TM-401A accessories:

- **TU-3** programmable two-frequency CTCSS encoder
- **KPS-7A** fixed station power supply

TM-401A subject to FCC approval

TW-4000A

FM "Dual-Bander"... 2-m & 70-cm in single compact package, LCD, 25 W, optional voice synthesizer.

KENWOOD's TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2-m and 70-cm FM functions in a single compact package.

TW-4000A FEATURES:

- **2-m and 70-cm FM in a Compact Package**
  Covers the 2-m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70-cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).
- **Large, Easy-to-Read LCD Display**
- **25 Watts RF Power on 2-m/70-cm.**
- **Opt. "Voice Synthesizer Unit"**
  Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Front Panel Illumination**
- **10 Memories with Offset Recall and Lithium Battery Backup**
- **Programmable Memory Scan**
- **Band Scan in Selected 1-MHz Segments**
- **Priority Watch Function**
- **Common Channel Scan**
- **Dual Digital VFO's**
- **16-Key Autopatch UP/DOWN Microphone**
- **Repeater Reverse Switch**
- **High Performance Receiver/Transmitter**
  GaAs FET RF amplifiers on both 2-m and 70-cm, high performance MCF's in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
- **Rugged Die-cast Chassis**
- **"BEEPER" sounds through speaker.**
- **Easy-to-Install mobile mount**

TW-4000A accessories:

- **VS-1** voice synthesizer
- **TU-4C** programmable two-frequency CTCSS encoder
- **KPS-7A** fixed station power supply
- **SP-40** compact mobile speaker
- **SP-50** high quality mobile speaker
- **MA-4000** dual-band mobile antenna with duplexor

KENWOOD

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

WELZ

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**

Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

WELZ

SP-250

SWR & POWER METERS

SP-250 Low-profile, economy 2kW wattmeter. 1.6-60MHz bandwidth. 3W SWR sensitivity. Three ranges. A Best Buy! **$75.00**

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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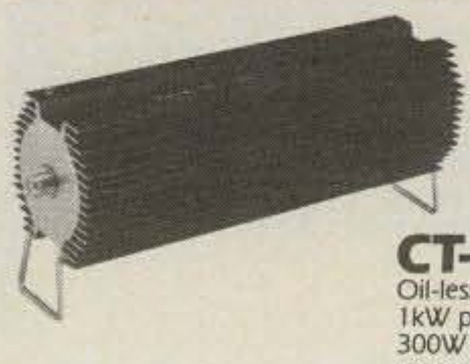
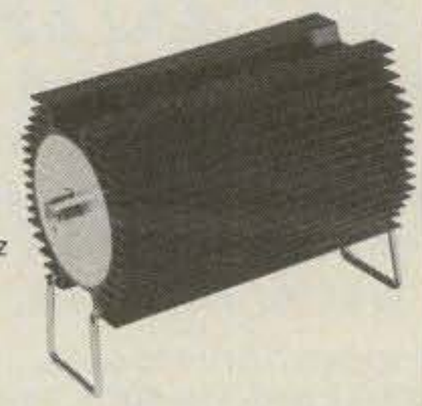
CIRCLE 4 ON READER SERVICE CARD

WELZ

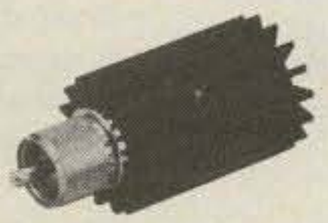
DUMMY LOADS



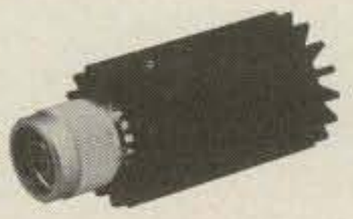
CT-300
Oil-less aircooled,
1kW peak for 3 min.,
300W avg. DC-250MHz
$68.00



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
50W peak, 15W avg.,
Type N Dummy Load.
DC-500MHz, VSWR <1:1.1
$21.00

SURGE SUPPRESSOR

CA-35A
Contains replaceable,
chip-type surge
voltage protector.
Low loss, low VSWR.
DC-500MHz, 350V breakdown.
$22.00

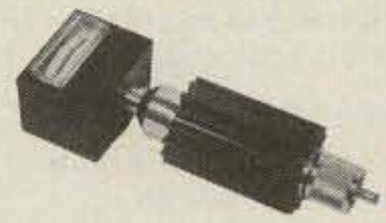
COAXIAL SWITCH

CH-20N
Two-way coaxial switch.
SO-239 type connector.
DC-900MHz, 1kW power.
$54.00

TERMINATION POWER METERS

TP-05X
BNC connector,
5W talkie checker.
Field calibratable,
3W avg. Dummy Load,
1W center. 50-500MHz.
$21.00

TP-25A
25 watt version of
TP-05X for mobile use.
Larger Dummy Load.
50-500MHz
$40.00



All prices are suggested retail and subject to change.

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CQ The Radio Amateur's Journal

ON THE COVER: Brian Wingard, N4DKD, successfully combines amateur radio, computers, and contesting with real-time dupe checking and automatic logging. Photo by Joe Veras, N4QB.

OCTOBER 1983 **VOL. 39, NO. 10**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

The big news out of Washington is the change of command within the Private Radio Bureau, the FCC Bureau that has jurisdiction over amateur radio. James C. McKinney, who had been Bureau Chief since July of last year, moved up to Chief of the Mass Media Bureau. Stepping into the PRB head position is Robert S. Foosaner, the PRB's Deputy Chief.

Mr. Foosaner is a career FCC employee with some 15 years of experience with the Broadcast Bureau, Office of General Council, and the Office of Science and Technology. He is an attorney and a member of the District of Columbia Bar. Originally from New Jersey, he resides with his family in Brookeville, Maryland.

Although Mr. Foosaner is not an amateur, he is extremely well versed in amateur radio. He started with a tour with the General Council's office in which he reviewed the PRB's policy-making decisions with regard to amateur radio, became a member of the FCC Steering Committee for WARC-79 (serving as Chief of a policy task force), and was selected as a U.S. delegate to two international conferences, the most recent being the 1983 Mobile WARC in Geneva, Switzerland.

CQ congratulates Mr. Foosaner on his new position, and we wish him every success. As Chief of the Private Radio Bureau he will administer over all radio services excluding military, federal government, and broadcast services. It's a big job, but one that can be made a little bit easier with our help and support.

James C. McKinney has moved from the Private Radio Bureau to become the new Chief of the Mass Media Bureau. During his tenure with the PRB he was a prime mover for deregulation of amateur radio regs and for modernization of the amateur radio service. A graduate engineer, McKinney is known as a problem solver and management pro, so it would appear that one of his tasks will be to shape up the Mass Media Bureau. He comes to this new position with several years of broadcasting experience (on both sides of the microphone) and is now a Senior Broadcast Engineer of the Society of Broadcast Engineers.

We also offer Mr. McKinney our congratulations on his promotion, and we extend our best wishes for his success in this new job. I've had the pleasure of knowing and working with Jim McKinney for several years on behalf of amateur radio, and I have always found him hard working, dedicated, and on top of every situation, a man who does his homework. I know that he will bring these same fine qualities to his new position.

We at *CQ* and amateur radio in general look forward to a continued excellent relationship with the FCC and the PRB. We welcome Mr. Foosaner and extend our help and cooperation to make both his job and amateur radio prosper and flourish.

What Price Fame?

As with everything else these days, the price of things continually rises. Due to cost increases by our suppliers, the price for the WPX Award of Excellence plaque will now be $50.00. This still includes postage and handling.

We've had a bit of a delay in processing some of our other plaques due to the untimely death of Bernie Laight of Surrey Originals who had single handedly turned out *CQ*'s plaques for about as long as I can remember. Bernie had helped in the design of our plaques and took a genuine interest in the winners and their achievements over the years, often going that extra bit to make sure the plaques were truly perfect and shipped properly all over the world. We will miss Bernie and offer our condolences to his wife, Pauline.

Gotcha!

There's a new book out by Electrolert, Inc. (they're the folks who make the radar detectors) called *Electrolert's Legal Index*. The four pound tome (which sells for $35.00) includes a complete compilation of radar case law with all recent court decisions. The book is designed to help you or your attorney prepare a defense against a radar-backed ticket. This, of course, presumes that you weren't going 90 m.p.h. in a 25 m.p.h. zone. However, if you or someone you know seems to have been caught up in "electronic warfare," then this book apparently is for you. If you would like more information on the book write to Electrolert, Inc., 4949 South 25A, Tipp City, Ohio 45371 and ask for a brochure.

Travels With CQ

The summer months are usually slow with regard to travel, but several of the *CQ* staffers hit the trail and beat the drum on behalf of *CQ*. Karl Thurber, W8FX, our Antenna Editor, did us proud at the Montgomery, Alabama Hamfest in late August, and Lew McCoy, W1ICP, and his wife, Martha, graced the *CQ* booth at the annual Flagstaff, Arizona Hamfest. Bernie Welch, W8IMZ, managed to get to several Ohio shows, including Lima and Findley. Bernie also managed to come east to visit with Frank Anzalone, W1WY, and the both of them came down to the office for a day.

I'll be leaving for HAMCON 83 in Anaheim, California, in about two weeks, so the *CQ* Team will be on the road again.

Travels To CQ

We've had some interesting guests stop by the *CQ* offices this summer. Recently Mike Lamb, N7ML, and George Buxton, N7EZJ, of AEA were in New York on business, and they came out for a visit. Before they left, I had Mike working on an article for our November RTTY Special issue. Another new writer for *CQ* came through New York, Bob Locher, W9KNI, of Bencher. Bob called to let us know he was in the city, and Dick and I drove in to have dinner with him. You can expect to see Bob's article on DX coming up this year.

A few weeks ago George Diehl, W2IHA, the ARRL Hudson Division Director, and his Vice Director, Steve Mendelsohn, WA2DHF (Steve already writes for *CQ*), trekked from New Jersey to Hicksville to pay a call on their constituents. We had an enjoyable lunch and spent the afternoon exchanging ideas and viewpoints on amateur radio. I think we all thought it was a productive meeting and a good way to sort out our common goals, which in effect are all for the betterment of amateur radio.

Most recently we had a visit from one of the most energetic people I know, Felix Koerner, DL1CU. Felix used to publish the German magazine *QRV* and the *Ham's Interpreter*, a very useful book of common phrases in several languages. Felix is retired now, and so he has more time for visiting family and friends, for amateur radio, and for sightseeing, all of which he does with great enthusiasm.

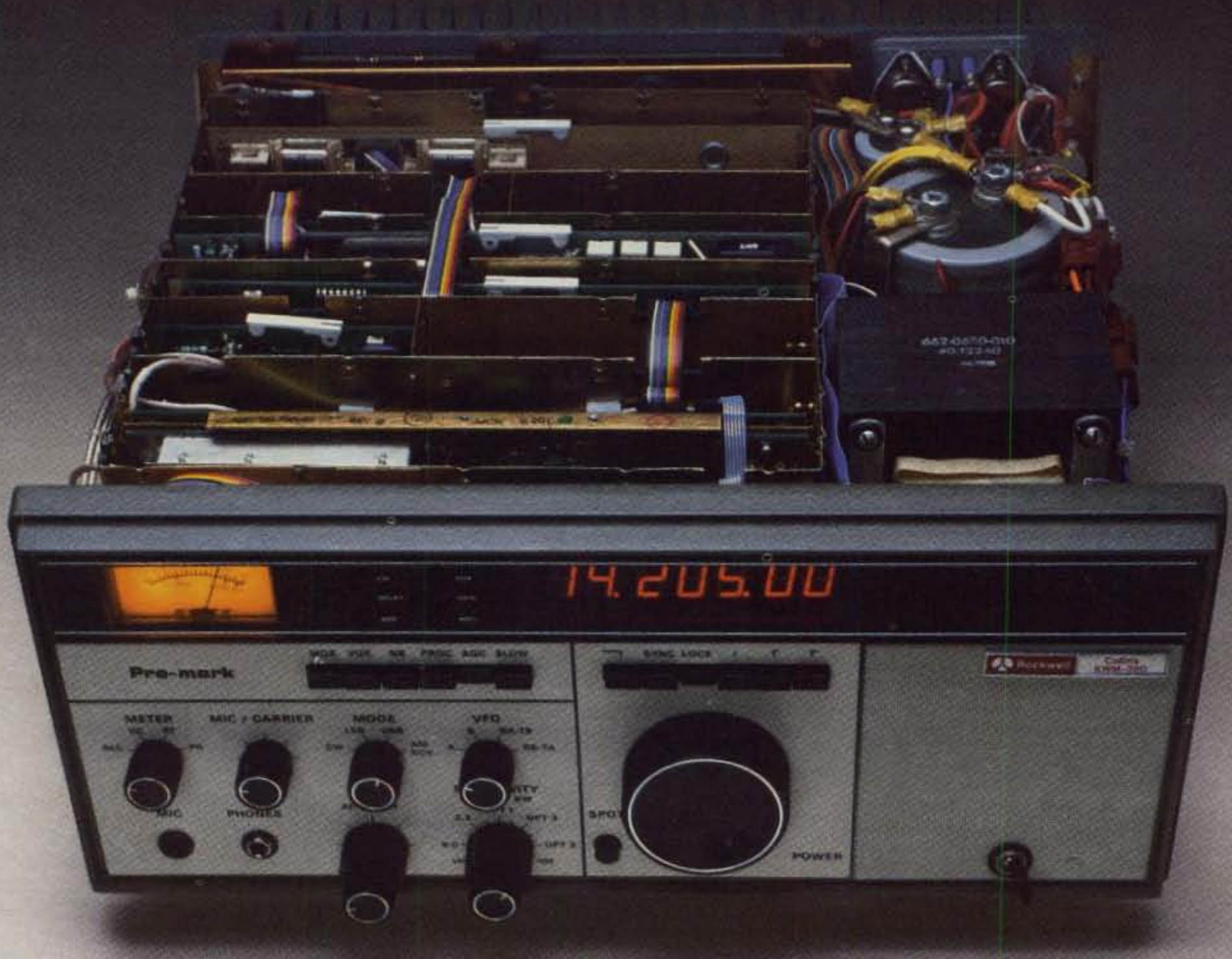
Next Month

Remember, November has become our annual RTTY Special issue. This year we have some truly great material from some of the most recognized experts in the field. We have articles on theory, dedicated RTTY, computer-generated RTTY, and most importantly, we have tried to have all of them tailored so that they can easily be understood and the information applied. RTTY is a fun mode that you can add to your existing station or personal computer (or both). Some of the exciting breakthroughs in technology can be found here today. Whether you want to operate on RTTY or just s.w.l. the amateur and commercial frequencies, it's all there waiting for you.

The Contest

I'd like to believe that NASA held up the STS-9 mission and the historic flight of Owen Garriott, W5LFL, just to herald the start of the 1983 *CQ* WW DX Contest on the following day, but some how I doubt it. While Owen may be extremely rare DX, he doesn't count as a multiplier, and 2 meters doesn't count in the DX Contest. Good luck to Owen and all of you contesters. There will be a lot of records broken this weekend. 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.

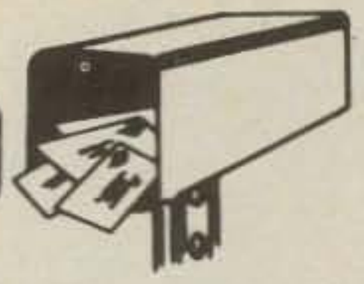
Add some real beauty to your station. See the KWM-380 at your nearest authorized dealer. Collins Telecommunications Products Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, IA 52498. Phone (319) 395-5963. Telex: 464-435.

Rockwell International

...where science gets down to business

CIRCLE 50 ON READER SERVICE CARD

Our Readers Say



Morse Is Everywhere!

Editor, *CQ:*

I just wanted to drop you a line to tell you and all other amateurs that Morse code can be found everywhere. I recently bought the rock group Missing Persons' new album "Spring Session M," and right there on the cover was the album's title written clearly in our "old friend" Morse code. I thought it was real neat and I've told all my ham buddies about it.

Last summer I heard a song on the radio which had Morse code in it. The word "stranger" was spelled out in Morse code several times. I think that any ham would find it very exciting to hear a song with our code in it. Unfortunately, I never found out who sang the song nor the title of it, but I'm sure that it must be called "Stranger." Maybe someone out there reading this has heard the song and can tell us the name of it and who sang it! Thank you in advance for printing this.

Robert Hanley Magro, KA2EGO
Milford, NJ

In Appreciation

Editor, *CQ:*

The Hiawatha Amateur Radio Association of Marquette County celebrated their 50th Anniversary by sponsoring the 35th Annual Upper Peninsula Hamfest. It was a fantastic success. Thanks to you and your active support.

We would like to acknowledge receipt of your donation, your publishing the announcement prior to the Hamfest, and for the interest you have demonstrated in the Radio Amateurs of Michigan's Upper Peninsula and surrounding area. We will continue to encourage our members to say "thanks" throughout the year by patronizing your magazine.

Stephen Paull, N4SP
President, Hiawatha ARA
Marquette County, MI

A School For DX Net Controls?

Editor, *CQ:*

I've just been listening to a very popular 20 meter DX net, and it has provided me with the best laugh I've had in weeks!

There is an unwritten rule among net controls that they must hear both signal reports to verify a correct and good contact. Fine, when that's all that's going on on the net. However, in this case a fairly rare DX station came up on the net, spoke with the NCS to tell him that he couldn't stay, and asked for permission to make one call on a previously arranged schedule to pick up one of his last for WAS. Net naturally told him to go ahead, and he made his sked and even managed to hold a letter-perfect 5 minute ragchew there on the net frequency. After the two had signed, the net called the "W" operator and asked him to *repeat* the report so he could verify the contact! This after a perfect 5X9 ragchew. Maybe we need a school for DX net control stations!

Al Kaiser, N1API
Meriden, CT

You Don't Need A Degree In Engineering

Editor, *CQ*

Just thought I would drop you a line to let you know how much I enjoyed your June 1983 issue of *CQ*. I especially enjoyed your construction projects (you didn't need an engineering degree to build them). I have read *CQ* for several years now and your magazine is getting better with each issue. Keep up the good work and thanks for putting out the best ham magazine around.

Larry A. Hejduk, KA5QKU
DeQueen, AR

Resonance Detector Correction

Editor, *CQ:*

I recently built the resonance detector ("Build a Resonance Detector," *CQ*, August 1983 issue), and I have found an error in the schematic. The schematic shows a connection between pins 6 and 7 of the 741 op amp. This results in voltage from the supply being applied directly to the meter. This, in turn, results in the meter not zeroing with the null pot. Once this connection is removed, the unit works perfectly.

Mike McConnell, KA4ZEU
Lebanon, TN

PS: Please print more construction articles on QRP equipment. I build most of my own equipment. (I saw the articles in the June 1983 issue. I stole a VFO from one of them!)

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

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

COMPARE TENNESSEE TECHNOLOGY WITH THE OTHERS...

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

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

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

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

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

THE TEN-TEC 2591 HAS ALL THE RIGHT FEATURES...

• **Memory Scanner scans only programmed channels** and has user selectable HOLD or SKIP • **Selectable 2.5 Watts or 300 Milliwatts power,** top panel switched • **Extended Frequency Coverage—143.5 to 148.995 MHz.** Covers full Amateur Band plus some CAP and MARS frequencies. • **4-Digit LCD Readout with Switchable Back Light** —large, easy-to-read digits, selectable for frequency or memory channel number. • **Key-Pad Frequency and Function Control** —16 key dual tone encoder • **Dual Function LED**—shows battery status and transmit mode. • **Electret Microphone** plus separate speaker for superior audio. • **Compact, Lightweight, Complete**—easy to handle and rugged. Standard equipment includes flexible antenna with BNC connector, AC charger, belt clip, connectors for mike and speaker. Options include: adaptor pack for +12 VDC mobile operation, speaker/mike, 25 watt power amplifier, leather case, desk charger, subaudible tone module, and spare NI-CAD pack.

TEN-TEC

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

Announcing

● **Jackson ARC Special-Event Station**–The Jackson ARC will operate K4EP from the Casey Jones' Railroad Museum, Jackson, TN, on Oct. 1 on the lower 25 kHz of the General class phone bands on 80, 40, 20, and 15 meters. All QSL's will be answered with a commemorative card (s.a.s.e. appreciated). For information listen on 147.21, up 600. QSL to K4EP.

● **Garden State Mini-DXpedition**–The Garden State ARA (W2GSA) will hold their 4th annual mini-DXpedition on Treasure Island, located in Monmouth County, NJ, on Oct. 1–2 from 1600–1600 GMT on 3.910, 7.235, 14.235, 21.360, and 28.550. QSL to WA2SSH, Lou Eloe, 7 Carol Ave., Neptune, NJ 07753 (donation of $1.00 appreciated).

● **KN5D From 12th Annual International Hot-Air Balloon Fiesta**–Special-event station KN5D will operate from Oct. 1–9 from Albuquerque, NM, for this event from 1400–1800 UTC daily. Frequencies will be 15–25 kHz above the low end of the General class phone bands. A special QSL will be available from KN5D, P.O. Box 997, Corrales, NM 87048.

● **Columbus Day Special Event** – On Oct. 8–9 W8TO will be on the air from Columbus, OH. Columbus hams are to work non-Columbus hams, and vice versa. Time and frequencies are : Oct. 8 1400–2400Z on 10 meters phone @ 28.6 MHz ±10 kHz; Oct. 9 1400–2400Z on 15 meters phone @ 21.4 MHz ±10 kHz. Certificates will be available for s.a.s.e. We suggest you contact the following for more complete information on scoring, etc., for the mini-contest to be held at the same time: Radio Station W8TO, Att. Special Event Coordinator, 280 East Broad St., Columbus, OH 43215.

● **KB3QV From Delmarva Folklife Festival** – The Peninsula Radio Operator's Society will operate from 1600–2100Z on both Oct. 8 and 9 using the call KB3QV. Frequencies will be 10–80 meters on the General class phone bands. QSL to PROS, KB3QV, P.O. Box 2315, Salisbury, MD 21801 (s.a.s.e.).

● **WD4KOW From Sunbelt Expo** – The Colquitt County Ham Radio Society will operate WD4KOW from the Sunbelt Expo near Moultrie, GA, on Oct. 11–13 from 0900–1700 EDST each day. Operation will be on the General portion of the h.f. bands and on repeater 146.19/79. Visiting hams are invited to visit the amateur booth at the expo to operate. A special QSL will be available for an s.a.s.e. QSL to CC Ham Radio Society, P.O. Box 813, Moultrie, GA 31768.

● **Minnesota QSO Party** – Sponsored by the Paul Bunyan Wireless Assoc., this event will take place from 1800Z Oct. 15 to 2300Z Oct. 16. Suggested frequencies are: c.w.—40 kHz up from low end; phone—3890, 7230, 14280, 21375, 28675; Novice—25 kHz up from low end of band. Points: 1 point for phone, 2 for c.w. For more information on scoring, etc., contact PBWA/KCØUJ, Steve Scott, 801 6th St., Staples, MN 56479. Logs must be mailed by Nov. 1, 1983.

● **Second Annual Mt. Sunflower, Kansas, DXpedition** – The Mt. Sunflower DXpedition will be undertaken by the Western Kansas DX Association from the highest point in the state of Kansas, at 4025.5 feet; Mt. Sunflower is located in Wallace County. KØEQH will be operational on Oct. 22 and 23 from 1800Z Saturday to 1800Z Sunday on s.s.b., c.w., RTTY, and f.m., 160 through 2 meters, 60 kHz up from the bottom of the respective h.f. bands. (There will also be operations on the Novice bands.) RTTY will be on 14095 kHz, and v.h.f. on 6 meter 50160 kHz, 2 meter 144210 kHz s.s.b., and 144520 kHz f.m. To set up skeds, contact the Western Kansas DX Association, P.O. Box 811, Garden City, KS 67846.

● **Suffolk County's W2DQ** – The Suffolk County Radio Club will operate W2DQ from 0000Z Oct. 28 to 2400Z Oct. 30 in celebration of Suffolk County's 300th birthday. Frequencies: phone—15 kHz up from lower 40–15 meter General class band edges; Novice 21.135. Special certificate for large s.a.s.e. to AC2P.

● **Special-Event Station From Belgium** – From Oct. 28 to Nov. 2 the OH6HC club shack will be located in the Town Hall of Knokke, Belgium. They have asked for a special callsign (probably OS1NOV), and an award will be available for contacts made. Frequencies: u.s.b. 14.141, 21.212, 28.282 kHz; c.w. 14.025, 21.025, 28.025 kHz. They want to contact all amateurs, and in particular veterans who held the Colours of Freedom in their region. For more information, contact Victor Claeys, ON4UM, Koningslaan 116, 8300 Knokke-Heist, Belgium.

● **Daytona Beach ARA K4BV** – In celebration of the centennial of the Ponce de Leon Lighthouse, the Daytona Beach (FL) ARA will operate K4BV on Oct. 29–30, 1400–2100Z. Frequencies: phone—7275, 14275, 21375; c.w. and Novice—7125–21125. For certificate send QSL and large s.a.s.e. to DBARA, P.O. Box 9852, Daytona Beach, FL 32020.

● **Navy Week Special-Event Station** – The Laurel, MD, ARC will operate K3LDE on board the *USF Constellation* from 1200–2200 UTC on Oct. 30. Frequency: 7225 with QSY to 14225 and 21400. For certificate send three first-class stamps to Box 259, Annapolis Junction, MD 20701.

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

Oct. 1, **Radio Amateurs of Greater Syracuse Hamfest & Computer Display,** Syracuse, NY. Contact RAGS, Box 88, Liverpool, NY 13088.

Oct. 1, **De Vry Technical Institute ARC Fleamarket,** Woodbridge, NJ. Contact WB2JKU.

Oct. 1, **7th Annual Mid-Atlantic VHF Conference,** Warrington, PA. Contact Hamarama 83, P.O. Box 311, Southampton, PA, or call K3MXM (215) 635-4942.

Oct. 2, **CVARC 9th Annual Hamfest,** Cedar Rapids, IA. Contact CVARC Hamfest, P.O. Box 994, Cedar Rapids, IA 52406.

Oct. 2, **Yonkers, NY, Electronics Fair & Fleamarket,** Yonkers, NY. Contact Yonkers ARC, 53 Hayward St., Yonkers, NY 10704, or call (914) 969-1053.

Oct. 2, **32nd Annual Rock Hill Hamfest,** Rock Hill, SC. Contact YCARS, Box 4141 CRS, Rock Hill, SC 29730.

Oct. 2, **Rome, GA, Hamfest,** Rome, GA. Contact WD4PTE, 18 Poplar St., Rome, GA 30161, or call (404) 291-4658.

Oct. 8–9, **Tidewater Hamfest, Computer Convention, Electronic Fleamarket,** Virginia Beach, VA. Contact Jim Harrison, N4NV, 1234 Little Bay, Norfolk, VA 23503, or call (804) 587-1695.

Oct. 9, **Central Michigan ARC & Lansing Civil Defense Repeater Assoc. Ham Fair,** Grand Ledge, MI. Contact Rowena Elrod, KA8OBS, 111 Lancelot Place, Lansing, MI 48906, or call (517) 372-5462.

Oct. 9, **Lima Hamfest,** Lima, OH. Contact NOARC, Box 211, Lima, OH 45802.

Oct. 9, **22nd Annual Hoosier Hills Hamfest,** Lawrence County Fairgrounds, southwest of Bedford, IN. Contact KA9JTZ, Hoosier Hills Ham Club, Box 891, Bedford, IN 47421.

Oct. 15, **Irwin Area ARA Swap & Shop,** Circleville, VFD, off US Rt. 30, 3.5 miles west of PA Tpk., exit 7. Contact Rick Jackson, N3DAA, 39-D Lower Boone Dr., Turtle Creek, PA 15145, or call (412) 829-1953.

Oct. 22–23, **Hamfest Chattanooga,** Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404, or call N4DON (404) 820-2065.

Oct. 23, **Kalamazoo, MI, Hamfest & Electronic Fleamarket,** Kalamazoo, MI. Contact Ham 10 Club of Kalamazoo, KA8RUA, 2825 Lake St., Kalamazoo, MI 49001.

Oct. 23, **Columbia ARA 7th Annual Hamfest,** Howard County Fairgrounds west of Baltimore, MD. Contact Ed Wallace, K3EF, 9905 Carillon Dr., Ellicott City, MD 21043.

Oct. 23, **Red Rose Computerfest,** Guernsey Sales Pavilion east of Lancaster, PA. Contact The Computerfest Committee, P.O. Box 5029, Lancaster, PA 17601.

Oct. 29, **Tri-City ARC Auction,** Poquetanuck, CT. Call WA2RYV at 203-848-9670.

Oct. 30, **Heart of Ohio Ham Fiesta,** Marion, OH. Contact Paul Kilzer, W8GAX, 393 Pole Lane Rd., Marion, OH 43302, or call (614) 389-5573.

Oct. 30, **Framingham ARA 9th Annual Flea market,** Framingham, MA. Contact Ron Egalka, K1YHM, 3 Driscoll Dr., Framingham, MA 01701.

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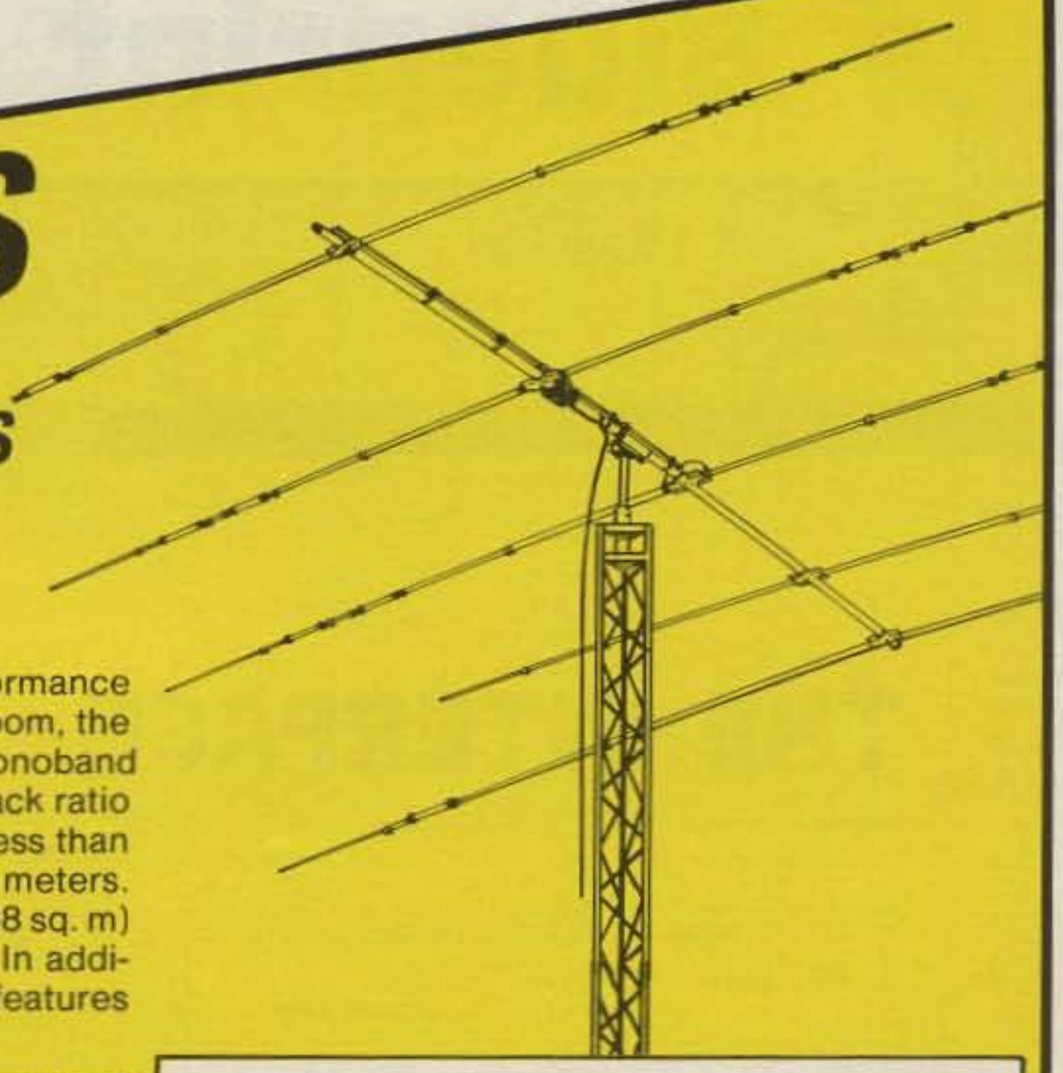

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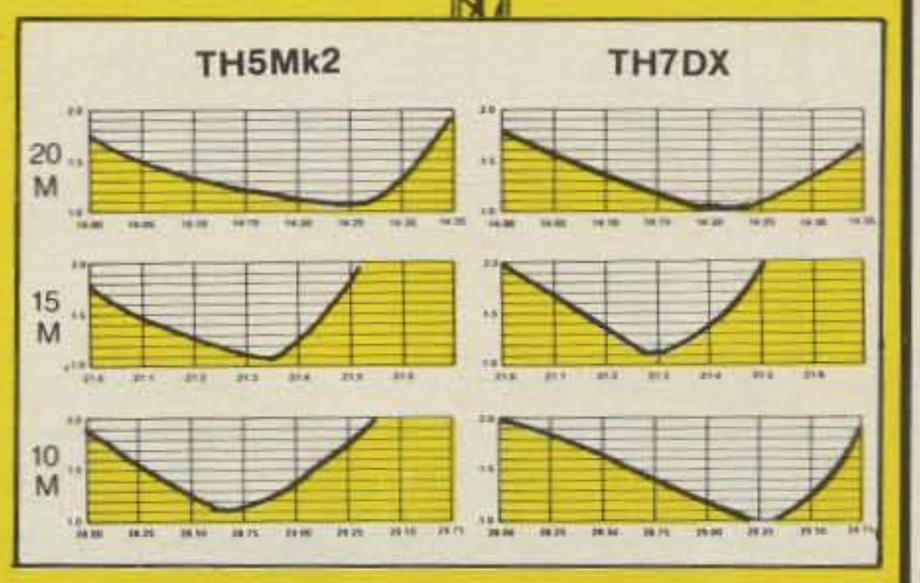

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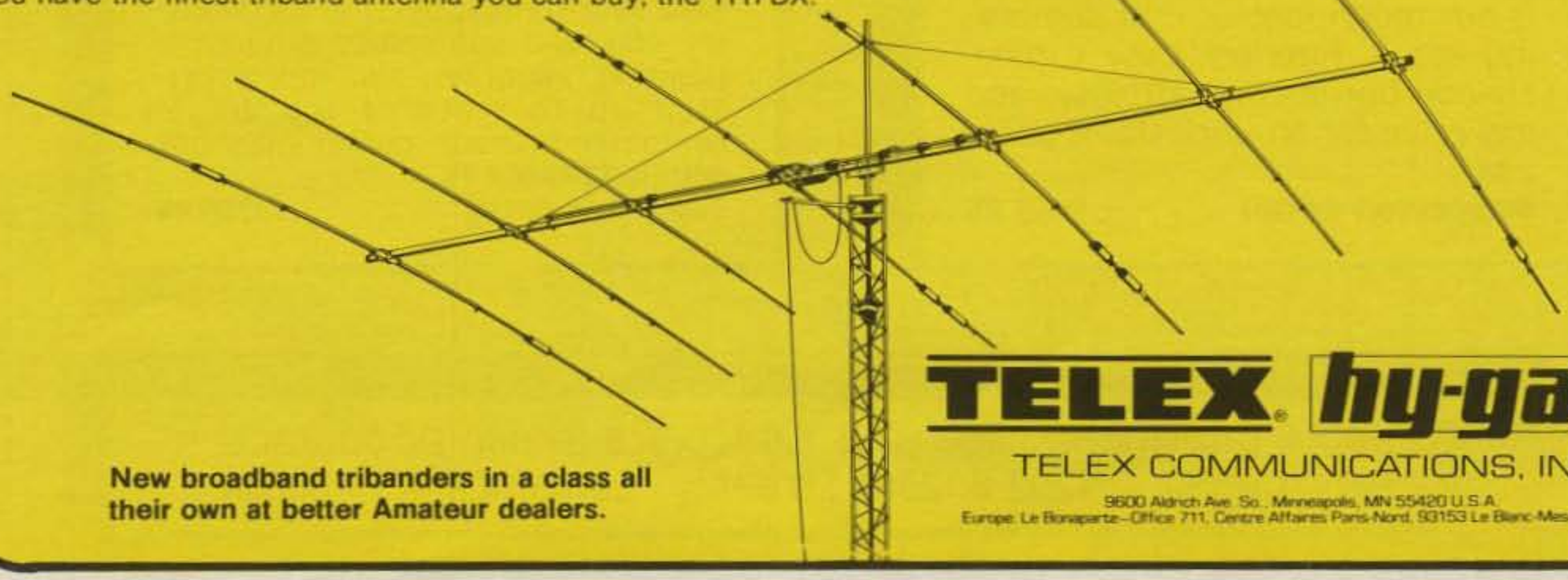

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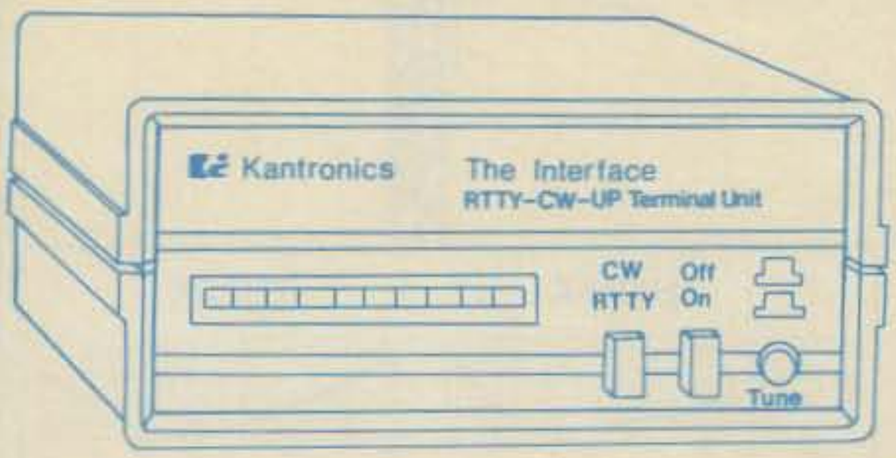

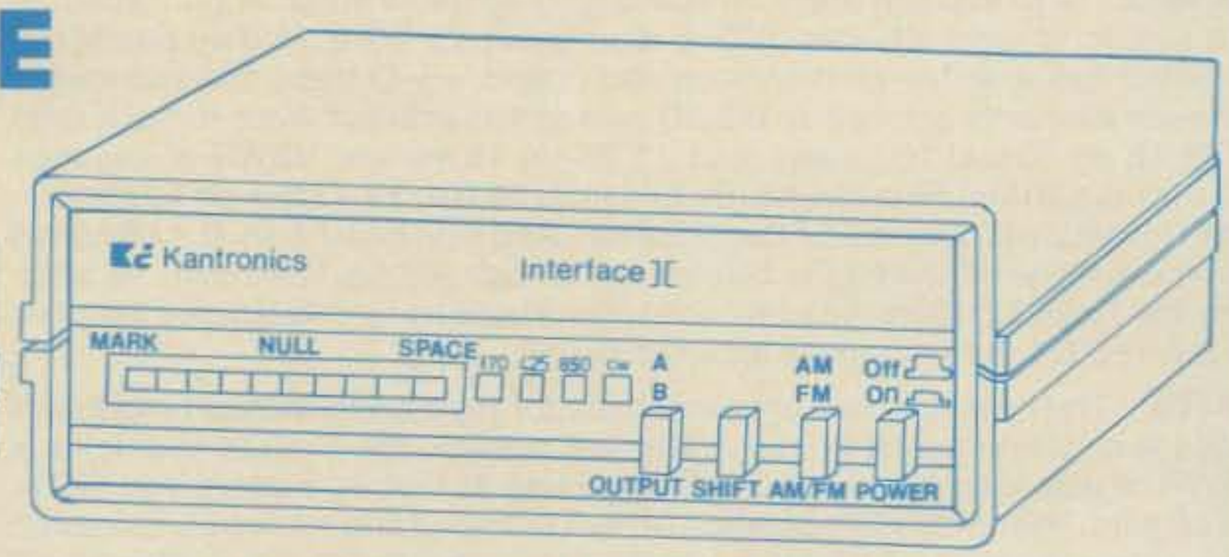

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```
MORSE                    00:00:00
TRANSMIT SPEED   25
RECEIVE SPEED    28
-------------------------------
ENJOY YOUR MEAL AND
WE'LL TALK TO YOU
REAL SOON . . . 73'S . . .
WA5RGU
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WEATHER HERE IS WARM TODAY
WITH LOTS OF SUN. . .XYL SAYS
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```
                         00:00:00
        PROGRAM OPTIONS
A. RETURN TO BASIC
B. EDIT MESSAGE PORTS
C. SAVE MESSAGE PORTS
D. LOAD MESSAGE PORTS
E. SET XMIT BUFF SIZE
F. EDIT HOLDING BUFFER
G. SAVE HOLDING BUFFER
H. LOAD HOLDING BUFFER
 I. SET TIME
```

```
                         00:00:00
KANTRONICS AMTORSOFT
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CHOOSE
  S (AMTOR SLAVE)
  M (AMTOR MASTER)
  L (AMTOR LISTENER)
  P (PROGRAM OPTIONS)
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JA1BK is shown here at the blackboard at BY1PK instructing the BY gang on "how to operate, log, and score the CQ WW Contest." JA1MIN and JR1HHL, seated in the front, are ready to assist. One of 10 BY operators in attendance is shown seated. The Chinese are anxious for the CQ WW '83 test!

1982 CQ WORLD-WIDE DX CONTEST C.W. RESULTS

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

It was early in the evening of the second day of the contest and the JA's were really pounding into California on 15. So, I hunted around for an open spot—no easy choice these days—and started a JA pile-up. What's that—"JA1KSO"! Quickly I checked my dupe sheet, and sure enough, Nob was a dupe. Well, a few "B4, B4's" will give him the message. But hold on; JA1KSO is calling again. Lucky me, there are a couple of other JA's in there. So, we'll give him one more "B4" and pick up one of the other JA's. On the edge of my mind I'm hearing JA1KSO say something else, but shucks, I've been up for 32 hours now and copying two guys at once is not that easy anymore. Oh well, if it's important he'll break in.

It is five months later now, and the place is the Visalia DX Convention. Kan, JA1BK, walks up to me. "Hello Larry," he says, and proceeds to tell me all about his trip to China during the C.W. section of the *CQ* World-Wide DX Contest. "Sure wish I could have worked you," I said. Then he tells me that he asked his good friend Nob, JA1KSO, to find me during the second day of the contest on 15 and get me to go up on 21.130 to work him at BY1PK! Oh no. "Didn't you hear Nob?" he asks. Oh no, oh no!

Yes indeed, BY1PK *was* active in the CQ WW for a little while, and a host of W6's worked him. But listen to this next part. The BY operators were confused by the rules, and put the nix on any real serious operation in 1982. As shown in the photograph, however, our good friend Kan, JA1BK, kindly lectured the BY operators (ten of them) for over three hours on the details of the *CQ* contest rules and how to operate. You can count on one or more BY operations next year, honest! What great news that will be for all of us. Just in case, though, listen very carefully when you think a JA is calling you.

The All-Band Results

Well, the sunspots took their toll as evidenced by scores in general (see the club results). However, the spirit of competition just could not be suppressed. All told, 25 records fell this year, mostly all-band and low-band records.

In what has to be the clean sweep of his career, Dick Norton, N6AA, managed to capture the all-time single operator, all-band record at 9Y4VT with a whopping 6.9 million points—about 800K better than his 2-year-old 6.1M mark. Although a lot of rhetoric has surfaced about what a difference the point rule makes for the North American competitor, that simply didn't matter this year. Guess what: 9Y4VT would have run away with it even without the advantage. Although 8P6J had 5049 QSOs, Dick amassed nearly the same (4927), but had a tremendous 73 multiplier advantage. Dick now holds both Phone and C.W. records, and he ran away with World high in both those categories this year. A most deserved congratulations, Dick.

Second in the all-band category was Glen, K6NA, with a fine 6.2M score from CN8CX, a new African continental record. A third member of the Southern California Contest Club, N6TJ, finished third at his 8P6J location with 4.6M. With incredible consistency, UF6CR finished fourth, only 300 points out of 4M above his own Asian record of last year.

The glory of the West coast operators ended with their expeditionary efforts, as nine out of the top ten stateside high scores this year were located East of the Mississippi River. Heading a close group of four was John, K1AR, at 2.7M, followed by W1KM (2.67M), N2LT (2.49M), and K1JX (2.42M). It was the bread and butter bands (15 and 20) where John built up a

*7164 Rock Ridge Terrace, Canoga Park, CA 91307
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- Digital Two-VFO System
- 10 Hz Resolution
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The JST-100 is a new all mode transceiver which incorporates the most advanced radio technology. It employs an 8 Bit Microprocessor to control all of the sophisticated functions. The 11-channel memory can store and recall VFO frequencies, as well as working frequency bands and modes. The unit features three PLL circuits with a highly stable 10MHz standard crystal oscillator. The ALC is unique in that it will take either a positive or negative voltage input. No need to be concerned whether or not your amplifier has the correct voltage polarity. Frequency Data Output including Bands is available in TTL form from the connector on the rear panel. This can be used for automatic antenna switching, external frequency display or output to a microcomputer. The digital two-VFO system is controlled in 10Hz steps by a microprocessor, permitting independent selection of frequency bands and modes, an unlimited difference between two VFO frequencies and instantaneous frequency switching. Further, this two-VFO system allows simple cross-mode operation on a same frequency for transmission and reception and split frequency operation within the same band in the same mode of emission, ensuring efficient communication in a pile-up condition and effective communication even in case of different interference frequencies at both station sites.

SPECIFICATIONS

Frequency Range:	1.8-2.0 MHz, 3.5-4.0 MHz, 7.0-7.3 MHz, 10.1-10.15 MHz, 14.0-14.350 MHz, 18.068-18.168 MHz* 21.0-21.45 MHz, 24.89-24.99 MHz*, 28.0-29.7 MHz *Receive only
MODES:	A1, A3J, F1 (RTTY) 170 Hz shift
Frequency Increment	- 10 Hz. steps.
Power Supply Requirement:	13.8 VDC, 2A. receive 20 A. transmit
Power Output:	100 W.
Carrier Suppression:	50 db or more
Undesired Sideband Suppression:	60 db or more
Frequency Stability:	Within ± 10 ppm for 5 - 60 min. after power on. Within ± 2 ppm thereafter.
Image & IF Rejection:	each 70 db or more
Optional:	Supply NBD-500 G/U Antenna Tuner NFG-97 Speaker NVA-88 4 ohms Filters 600 and 230 hertz Desk Microphone CHG-43 Hand Microphone CHG-44 Headphones ST-3 Key KY-3A

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CIRCLE 136 ON READER SERVICE CARD

This year's super QTH award goes to all-time World-High C.W. record holder for Multi-Multi, P42E, located at the Coral Cliff Hotel (left). Wow! (Right) Here's the P42E crew. Kneeling, AA4S (Ron); left to right N6TU (Bud), WB6SHD (Rob), AA6RX (David), KC8C (Mike), WD4AXM (Dave), N4RV (Jack), K2BA (Bert), N4MM (John), WA2SPL (Joe), W8LRL (Wally), N8II (Jeff).

contact edge that proved too much for his challengers.

In the multi-single arena, the gang at NP4A rolled up a fantastic 11.65M to set new World and North American records, shattering the old 1980 mark of 9.7M by RG6G. The RG6G contingent, manned by the Lithuanian Contest Group, returned this year and came in a close second at 10.4M. NP4A's stateside 10 and 15 meter QSOs proved to be the difference. Tom Taormina's crew at K5RC took the top U.S.A. honors with 3.77M, a scant 20K higher than rival Steve, W3BGN.

The boys at P42E (formerly PJ2CC) returned to set a new World and South American record for multi-multi with 23.3M, amassing over 3300 contacts on 15M alone. A quick look at the photo of their cliffside QTH, and you'll know why they were so loud. Great teams at EW6V (14.7M) and OHØW (14.3M) grabbed second and third in a real horse race, setting new continental records on the way. Stateside, Gene Walsh and the N2AA crowd piled up 9.7M to run away from the others this year.

The Single-Band Results

Activity on the low bands picked up considerably this year. On 160 meters, Fernando, EA8AK, racked up a massive 75.6 K to set a new World and African standard. He was followed by EA9EU and YU3EF, both in the 30K region. The U.S.A. 160 meter winner was Scotty, AE6U, at 5600. Stateside 160 meter conditions were meager pickings at best, and that 5600 represents many hours of just listening to the receiver hiss. That's patience and endurance for you!

On 80 it was Inaki, EA2IA, with just under 200K (and a new European high mark). UL7LCZ took second place at 150K, a new Asian record. K1PT's 73.2K did the trick on 80 stateside.

The big single-band story this year was on 40 meters, where records were set on all continents except Africa. Only N2AA's old 5A1TW African record (the oldest in our record book from way back in 1964) remains. Herb, KV4FZ, led the field with 536.6K for a new World and North American mark. Tom, N6BT, returned for a second shot in Saipan as AHØC and came in second despite the Woodpecker with a fine 404K (a new Oceania record). He was followed by Frank, 9Y4VU, at 400K (tops in South America). UB5JMR set the new mark for Europe with 398K, while JA5BJC's 288K is the new best for Asia. K1XM led a close field of three W1's with 213K for stateside high. On 20 meters, Yuri, VE3BMV, captured World high at 662K, while Tom, K1KI, was best in the States and fourth worldwide with 545K. Yuri was going after his own trophy—highest combined phone and C.W. single band. But Joel, KG6DX, and his 15 meter efforts on both phone and C.W. spoiled his plan.

Speaking of 15 and 10, they were considerably less lucrative this year and the scores showed it. World high 10 meter honors went to V3TV with 519K. That was about half of last year's winning score, and mostly the effects of propagation. N4WW's 395K was tops Stateside and third World-wide. Despite conditions, that was a new U.S.A. record, one of only two set this year.

On 15, W1RM, a perenial 15 meter enthusiast, established a new Stateside record with a great 483K score, while Daniel, CX7CO, took the World high with 771K.

Other Highlights

The QRP category seems to be gaining steam. This year Salius, UP2BIM, topped a field of 40 all-band entrants with just under 990K, a tremendous QRP feat. Our congratulations!

Beginning this year, we have added a table of high scores by zones. Those of you who are planning for next year will note the need for activity from nine of those zones. Indeed, some zone totals were noticeably down this year due to lack of activity in zones 2, 10, 12, 22, 24, 26, 35, 36, and 40. A welcome addition was the great all-band effort by Walt, UV3GM, at JTØGM. Walt says he will be back in 1983 as well, excellent news for all of us.

In the club category, the YCCC has taken the club top honors from the NCCC with 20M to spare. Most improved this year was the Southern California Contest Club. Unable to muster the necessary three entrants in 1981 (only two were submitted), this year the SCCC wracked up nearly 70M. The FRC kept reasonably close to YCCC this year, but all club scores were down as a rule—sure signs of the declining sunspots.

Other Comments

Some of you may have noticed that your printed scores are lower than your high-claimed scores. That's not at all unusual. Typically, one third of all competitive scores are reduced for one reason or another. Dupes and busted calls are generally the reason. Duplicates are just inexcusable, and we ask all of you to use dupe (cross-check) sheets. It is best to do over your dupe sheets *after* the contest. We tax you three good contacts for every duplicate we find in the log. That's pretty stiff. Busted calls are a little easier to understand. They are a result of the fact that none of us is perfect. They can be avoided by taking more time and care to copy calls correctly in the first place, and by reviewing the log after the contest. One good technique for those of you who are really serious is to tape the contest and check doubtful calls after the fact. Sometimes the margin between victory and a second-place finish is just a few contacts or multipliers. Therefore, be sure to work on your accuracy; failure to do so could really be costly.

A comment on club scores: At least three submittals are required from a club in order to make the listings. Entries *must*

be marked with the name of the club, and a letter must be received from the club giving a list of the eligible club members. In the future we plan to delete a club listing if we find that the club has listed someone as eligible when he or she doesn't meet the new 275 km requirement. The burden will be on the clubs to get the eligibility straight, so be careful.

Proper Credit

We all should be thankful to our hard working committee for the many hours of time they spent processing the results. New to the committee this year is Jan Perkins, N6AW. The veterans are N6CW (Terry Baxter), K6NA (Glenn Rattmann), N6SV (Reg Toumi), AD6C (Fred Morris), W7EJ (Jim Sullivan), K9DX (John Battin), N2AA (Gene Walsh), K2SS (Dave Donnelly), KR2Q (Doug Zwiebel), N3ED (Ed Moody), K2VV (John Yodis), and K1AR (John Dorr). Thanks to all of you for a job well done. By the way, these are also some excellent contacts for the contest community as a whole to communicate their feelings on the contest.

Well, the phone section of the contest for 1983 is just a few weeks off, so sharpen the pencils, check out the gear, and stand by for the best DX contest going. See you in the pileups!

73, Larry, N6AR, and Bob, K3EST

OH0W used this great gear for their highest ever MM effort on c.w. That's Marty Laine, OH2BH, on the right.

Walt, UV3GM (right), put the rarest of the zones (zone 23) on with a bang this year at JT0GM. On the left is station owner Dambi, JT1AG.

TOP SCORES

WORLD

Single Op All Band

9Y4VT	6,929,450
CN8CX	6,234,664
8P6J	4,636,763
UF6CR	4,613,680
4M3BRF	4,232,956
DK3GI	2,924,215
K1AR	2,762,383
5Z4CS	2,703,085
W1KM	2,668,030
9K2DX	2,560,005

Single Op Single Band 28 MHz

V3TV	519,048
DJ4AX	400,147
N4WW	394,940
YU7ECD	340,360
K1ZZ	325,130
SV0CT	311,738

21 MHz

CX7CO	771,776
KG6DX	658,728
W1RM	483,560
KR2N	459,249
K1TO	417,628
LZ2KTS	391,500

14 MHz

VE3BMV	662,454
YU4GD	598,533
CX7BY	562,650
K1KI	545,930
OH5TQ	484,824
YT3C	464,464

7 MHz

KV4FZ	536,616
AH0C	404,457
9Y4VU	400,851
UB5JMR	397,578
YV5ANT	322,844
JA5BJC	287,850

3.5 MHz

EA2IA	199,872
UL7LCZ	151,840
UA9TS	133,725
LZ2PP	106,088
VY5OO	96,664
YU4EJC	91,035

1.8 MHz

EA8AK	75,768
EA9EU	38,220
YU3EF	34,860
UA9SAX	30,615
4X4NJ	27,850
DJ8WL	27,216

Multi-Op Single Transmitter

NP4A	11,648,565
RG6G	10,394,658
UK9AAN	5,639,792
UK2RDX	4,164,075
F3TV	3,997,892
L8D/X	3,922,075

Multi-Op Multi-Transmitter

P42E	23,295,408
EW6V	14,702,688
OH0W	14,371,840
N2AA	9,724,050
K1OX	7,682,416
4N1U	7,329,525

USA

Single Op All Band

K1AR	2,762,383
W1KM	2,668,030
N2LT	2,494,710
K1JX	2,417,034
K3LR	2,141,775
K9DX	2,100,372
K4PQL/8	2,081,820
N5AU	2,019,855
N3RD	1,988,415
WA8YVR	1,962,849

Single Op Single Band 28 MHz

N4WW	394,940
K1ZZ	325,130
K1RM	307,060
N4ZC	295,320
KT4W	261,030
WB4TDH	213,909

21 MHz

W1RM	483,560
KR2N	459,249
K1TO	417,628
W0ZV	296,545
K8CX	269,280
N4ZZ	248,372

14 MHz

K1KI	545,930
AE2A	316,336
N2PP	314,874
N5CR	296,805
KJ9D	292,352
N4EA	286,982

7 MHz

K1XM	213,192
K1UO	189,774
K1NA	150,111
K4CG	137,400
W6AM	127,009
K2EK	122,734

3.5 MHz

K1PT	73,186
K0RF	40,079
WA4SVO	33,136
K4PI	22,656
N7RM	13,889
N4TZ	10,808

1.8 MHz

AE6U	5,004
N4SU	3,600
N4IN	2,848
K5GO	2,552
K1MEM	2,430
K6SE	2,376

Multi-Op Single Transmitter

K5RC	3,768,871
W3BGN	3,748,580
N4AR	3,266,068
N4RJ	2,840,260
N1AC	2,807,951
KA4S	2,748,675

Multi-Op Multi-Transmitter

N2AA	9,724,050
K1OX	7,682,416
K2UA	6,066,906
W3LPL	5,849,192
N9MM	5,496,425
AB0I	4,206,005

U.S.A. QRM

Finally snagged HZ1AB on 40 long-path . . . *K7DZ*. The flu bug kept me from a full effort . . . *KD7DH*. Too many W's calling CQ . . . *W7QK*. Conditions not terrific, but fun anyway! . . . *KC7EY*. Goodbye 10 meters . . . *KR7L*. The Woodpecker tried to set up shop on 15, but the hordes of strong signals just drove him away for the weekend . . . *K7FC*. With my vertical on 40 I found out why the W7's need beams . . . *KT7G* (ex-K5JZN). We could hear Europe on 80 long path, but couldn't work them . . . *N7RM*. With poorer conditions this year it was obvious the gang east and south of me had the advantage . . . *WA8YVR*. Had to fix the rotor on Saturday—b-r-r-r! . . . *N8BJQ*. Even my new computer can't understand these calls. What *is* an L8D/X anyway? . . . *WA8UQK*. RFI with neighbors kept me off 10 . . . *W8GOC*. Went out and bought a tower that day after the test; hope to do better next year! . . . *WD8IXE*. Built new phased verticals just for the contest . . . *WD8LLD*. For 160 I tied together my 80 meter wire and a trapped vertical—yup, it didn't work . . . *KK9G*. After 31 years of hamming I finally tried the *CQ* WW! . . . *W9CA*. Busted ear drums—bad noise—bad coffee—as usual had a ball . . . *WD9BBI*. How about a senior citizen category like in golf tournaments? . . . *K4VX/Ø*. Each year without an amp gets tougher . . . *AKØM*. Great to hear the SP's again . . . *WØZV*.

Amazing what a tribander at 25 ft. and 100 watts can do . . . *WC4E*. What was that call in zone 13? L8XEX? L8DKX? It would be interesting to see what everyone copied . . . *KT4W*. Sure picked bad year to single band 40 meters . . . *K4CG (Opr. K7SV)*. 3V8AL called CQ on 7001 with 10 mins to go. No one called him except me . . . *W4XJ*. There seemed to be a secondary contest: "who could send their call the most during a pileup" . . . *K4PI*. Working P42E on 160 was as big of a thrill as my three new ones . . . *WB6JMS*. I operated last year as a big gun, this year as a little gun. Don't let anyone kid you—"QRO is the way to go" . . . *AA4M/6*. Most unusual QSO during test was with BY1PK . . . *W6YA*. Happiness is *not* 150 watts plus a 4:1 VSWR on 160 . . . *W6US*.

I worked "RG8AU—Zone 16" . . . *K2IGW*. Think the beam was too high for European runs . . . *K1NA*. Split headset with two rigs very successful . . . *KØDQ/1*. Nice to have a contest where conditions actually improved during the contest . . . *W1END*. Terrible conditions from the West Coast . . . *N6AR*. Wish CE's worked CW . . . *KF20*. Still burned out from the phone weekend . . . K2VV. CW is fun, but wish more multipliers would show up . . . *N2MR*. This year more operators ID'd fairly often . . . *KT2D*. To those considerate hams who took time to get my call correct—thank you . . . *W6YMH/QRP*. You didn't print my comments last year, so I'm not going to make any this year . . . *KBØHA*. 6E5EBE should get an award for the most dits transmitted in a 48 hour period . . . *KI3L*. *CQ* WW is the best and only reason I'd turn into a basket case by staying up 48 hours . . . *W1KM*. Two days after the contest a storm took down 20 and 40 meter beams . . . *K6XO*. Where was BY1PK? . . . *N4RJ*. Worked BY1PK! . . . *NI6W*. Fantastic 20 meter opening to Europe at 1030Z . . . *W6BIP*. First effort at M/S. Be back bigger next year . . . *KA1RC*.

DX QRM

We were very angry about the power blackout . . . *JA3YKC*. Very sleepy and cold at night . . . *JA1YXP*. One amplifier lasted 10 minutes. The other didn't work at all. Operated the whole contest barefoot . . . *5W5EE*. What a difference one year can make . . . *VE3IY*. Duping by computer is OK until the "puter" decides to glitch . . . *VE3PCA*. Despite working 150 USA stations on 80 meters, thought conditions were generally rough . . . *G4BUE*. Super contest as usual. . . . *G3SZA*. CW, just dashes and dots. What a splendid sport . . . *SM7ERC*. Conditions were fairly good, but it was difficult to pick out the rare ones on 80 meters due to the European QRM . . . *SM6CPY*. It's difficult being on the other end; UD6's are loud and KH6's are nonexistent! . . . *G5CFJ/K6PU*. Tried to make 12 hour WAC on 160 but no success . . . *DJ8WL*. The advantage of a new rig allowing quick band changes gave me the surprise of the highest multiplier ever in the contest . . . *OZ1LO*.

Nice to hear the SP stations again . . . *SM6KQK*. I wish I had room to erect a beverage antenna . . . *G4CNY*. I was not very active in *CQ* contests over the past year owing to the fact that I suffered lightning strikes on my aerials . . . *G4CNY*. I really wonder how all the people managed to pick up my little signals on 20m, and especially all the guys from stateside on 40m . . . *DL8MBS*. We like *CQ* WW . . . *UK2PAD*. Thanks for the interesting contest . . . *UK5LCX*. Peace and friendship . . . *UK3XAB*. According to Murphy's Law, we had poor propagation to the states and Japan . . . *UR2RMC*.

The band (160m) was fantastic the first night and extremely poor thereafter! . . . *4X4NJ*. Attempting to work Central America through stateside KW pileups very difficult . . . *ZS2RM*. Was a change to operate in the contest from home QTH . . . *ZL1AMO*. First time ever in *CQ* WW Contest . . . *ZL1BXW*. Unfortunate that 3.5 MHz conditions were so poor . . . *ZL1AZE*. Electronic keyer went, so used "pump handle." After 420 QSOs arthritis in keying finger caused QRT . . . *Z23JO*. At 46 I learned the code, and this contest was my first time on the air on CW. Nobody wanted to QSO because of my slow speed. Sometimes I called for more than 30 minutes with nobody answering . . . *YK1AO*. Indonesian CB stations were a nuisance . . . *VK6AJ*. Very difficult to contact Europe and Asia . . . *VK5AFX*. I'm Polish refugee; in SSB part I was operating as SP5IXI/OE6 . . . *VK3DXI*. 5H3BH country #247 on 7 MHz for me! . . . *VE3ICR*. Wish more of the (40m) BC stations could be moved . . . *VE1CEG*.

Poor conditions to Europe throughout test . . . *VE6CNV*. 160m band a complete washout second night . . . *VE5XU*. Outstanding 160m sigs from P42E . . . *VE7BS*. Can't hack it like I used to; must be getting old! . . . *VE3BMV*. Hurricane Iwa wiped out most antennas on Hawaii . . . N6HR/KH6. No Europeans to speak of on 21 MHz . . . *KH6JWK*. Zone 23 wasn't so hard this time—BY8AA and UAØYAE . . . *KG6DX*. A pleasure to operate the *CQ* Contest from a rare spot . . . *JTØGM (Opr. UV3GM)*. No conditions to W and VE on 160m—sri . . . *EA9EU*. New 160m contribution of Europe and USSR produced a fantastic increase in score and, of course, a different strategy . . . *EA8AK*. Hopes of African 15m record disappeared early on Sunday with lack of multipliers . . . *CN8CY*. I made a new QRP transmitter especially for the *CQ* WW, and I want to thank all amateurs who heard my 5 watts in the KW battle . . . *UP2BFE*. We *hate* the aurora . . . *OH8AV*. Nice pileups at 150 QSO's per hour on 28 MHz . . . *F3TV*. What propagation on 40m—Great fun! . . . *IO2UIY*.

STATION OPERATORS
Multi-Operator Single Transmitter

AA3B & WB3DJE. **AD8I** & K8ND, KA8HUK, KA8IFC, KU8E, WB8YSD. **DFØBV:** DL7MAE, DJØUJ, DL6QW. **DFØTW:** DF7FH, DJ5HL, DL4FF. **DK9PY** & DK5PD, DL6WT. **DL8ER:** DF5JT, DL3CU, DF5EN, DJ2LA, DJ5GN, DL9XY. **DL8CM** & DL1VJ, DL8AN, DL8CH, DL8FR, DL8HA. **EA3VY** & EA3AIR, EA3AW, EA3KU, EA3LL, EC3AEF. **ED3CNY:** DJ2YE, DK3KD, EA3CNY, EA3CTI. **F3TV:** F6ARC, F6BEE, F9IE. **F5IN** & F6KIW. **G3RRS:** G4CEB, G3SJK, G3VPW. **G3SSO:** G3FXA, G3MZV, G3NKS, G5EBU, G3SNN. **GB2MM:** G3RZI, G4DSE, G3XVR, G4GCG, G8IUY, Tom, Derrick. GU3TXF: G3TXF, G3SXW, GW3WVG. **GW4BRS:** GW4DZE, GW4MOZ, GW4JOG, GW3ZIY, GW8NVN, GW4LFV, GW6IOA.

HA1KZZ: HA1ZZ, HA1XO, HA1ZN, HA1XD, Horveth. **HA2KMG:** Gyula, Arpad. **HA2KMR:** Kiss, Ivan, Harvath. **HA3KNA:** Judanik, Ferencz, HA3OC, HA3NS, HA3NU. **HA5KFV:** Szabo, Matzon. **HA5KFZ:** Janos, Miklos, Tibor. **HA5KKL:** HA5MA, HA5LV, HA5MD, HA5OG, HA5VM, HA5MO. **HA6KNB:** HA6ND, HA6NF, HA6NQ, HA6NN, HA6NY. **HA6KNX:** HA6OD, HA6NO, HA6OZ, HA6YO. **HA6KOA:** Defany, Lokatos, Molnai, Kovacs. **HA7KLF:** Bonitz, Buggi, Mizsei, Szaloki. **HA7KLG:** Tihanyi, Tuza, Batho, Batho, Tajti. **HA7KSR:** Bocsik, HA7UG, Kovesdi, HA5OV. **HA8KCK:** HA8EK, HA8DZ, HA8DE, HA8DT. **HA8KUC:** Matyas, Sandor, Jeno, Tibor, Janos.

HA8KVK: Magyar, Lukacz, Nanai. **HA9KOL:** HA9OL, HA9PG, Kassay. **HAØKHW:** HAØHW, HAØIF, HAØIG, HAØIR. **HB9AJ:** HB9AQF, HB9BAQ, HB9BKW, HB9BWN, HB9CCT, HB9CMJ. **HG1Z:** Fersztl, Biczo, Borsai, Tarsoly, Gosztocai, Tiszaletiu. **HG5A:** HA5GN, HA5FM, HA5GF, HA5OM, HA5ML, HA5JI, HA5WE, HA5UA, HA5HO, HA7RY, HA7SU. **HG6V:** Simon, Suszter, Varga, Laki, Macsuga, Makrai. **I2WDB** & I2RVW, I2QEA. **IK1BAE** & I1ZYR, I1XHV, IK1AUS, I1NXO. **IO2UIY:** I2UIY, I2ZZZ. **IO3EVK:** I3NOP, I3XFY, I3EVK. **JA6YCU:** JH6TUQ, JH6XYR, JR6IQI, JE6IGP. **JA6YDH:** JA4JYL, JE6SAY, JH6RAD, JR6GHN, JR6SWF, JG1TAW, **JA7YAB:** JE2DQC, JH7DUU, JH7IHR, JH7SSJ, JR7CDI. **JA7YAI:** JR7VEU, JK1CYV, JM1LWY, JO1QNO, JO1CJJ, JF2ITH, JE6JAO, JR7LVZ, JR7EDI. **JH7YJF:** JH1EAQ, JE1CKA, JM1RFT, JR2BNF, JAØJCJ. **JA9YBA:** JA9LJI, JA9LNJ, JA9OTX, JA9QCE, JA9UAD, JA9UBW, JHØCAZ, JHØHHU. **JAØYAK:** JH7QXJ, JAØOGH, JRØAZF, JH7ISE, JA8RAW.

K1RU & K1YR. **KA1RC** & K1OXD, KG1F, KJ1F, KK1K, W1ICW. **KM1C** & KB1T, W1PH. **K2BK** & KQ2O. **K2FL** & W3SOH. **K3QMR** & W3YQ, N8EKE, WB8PAV. **KB3MM** & N3ARK. **KC3Z** & KA3IJY. **KD3H** & KA1CQM. **KA4S** & K3AO, K3KG, K4FJ, KU4W, N4TX, W4NL. **K4JLD/3** & AF3T. **K5EE** & KJ5W, KV5Y, N5WS. **K5FUV** & K5MM, KM5K, KM5X. **K5RC** & K5GA, K5GN, K5LZO, KN5H, N5JJ, NA5R. **K6HIH** & K6AUC. **K6SG** & KV6H. **K6TQ** & WA6TBO. **KS7T** & KA6VI. **KS8S** & AD8C, AD8P, KJ8M, WA8SAR. **K9RF** & K9UIY, KB9OF, KB9RM, W9OF, W9YYG, WA9EKA. **K9ZO** & AG9E, K9MFI, KE9Y, KG9N, KM9L, N9AGM, N9CDE, WB9GYJ, WB9JKI. **KBØFP** & KØINR. **KBØQE** & KAØDRC, KAØGPU.

L8D/X: LU2XTA, LU3DWB, LU4XS, LU7XP, LU8DQ, LU9EIE. **LA1K:** LA6MP, LA6ZT, LA7VV, LA9MW, LA9UX. **LA4O:** LA4DCA, LA8XAI, LA9HW, LAØBS. **LZ1KCC:** Boris, Wassil, Menko. **LZ1KDP:** LZ2VU, LZ2F166. **LZ1KSN:** LZ1XS, LZ1QD, LZ1ZL, LZ1QV, LZ1L38, LZ1M290, LZ1M270. **LZ1KSZ:** Vladimir, Slavi, Stoyan. **LZ2KDR:** Pencho, Rosen. **LZ2KKK:** Emil, Peter, Dian. **N1AC** & W1IHN. **N2RM** & KB3TN. **N2MA/3 &** K3GT, K3LEV, K3RN, AD8J. **N3RS** & WA3LRO. **N4AR** & N1GL, K8CC, W8KIC, WA8TBO. **N4RJ** & AA4GA, KC4GR, N4HI, N4PN, N4OL. **N4UM** & N4BP. **N6ND** & N6ZI, W6UQF, WA6DBC. **NI6W** & W6KUT. **N6OJ** & AF6F, K6ANP, K6ZUF, KD6GC, WB6NBN. **N8CC** & KA8P, W8CNL, WA6DGX. **NP4A** & KP4CC, KP4FI, N4TO, K1ZM, KC1F, N2NT, K3UA.

OH5AD: OH5LK, OH5LW. **OH6AC:** OH6CS, OH6SM, OH6WZ. **OH6AM:** OH6DH, OH6EI, OH6LK. **OH8AV:** OH6CI, OH6CT, OH8PF, OH8VJ. **OH9AB:** OH9UW, OH9PH, OH9TD, OH9NV, OH9SS. **OK1KIX:** OK1MEY, OK1AID, OK1AFN. **OK1KPA:** OK1AFC, OK1MHI, OK1-20991. **OK1KPU:** OK1AES, OK1FCW, OK1JAX, OK1AXA, OK1ARI, OK1JDX. **OK1KPX:** OK1DTM, OK8ACW. **OK1KQJ:** OK1BY, OK1AYP, OK1AZG, OK1ICM, OK3AXZ, OK1DLE, OK1IMR, OK1IMP. **OK1KRG:** OK1ADS, OK1ALW, OK1DIM, OK1DWA, ex-OK1PD. **OK1KRQ:** OK1DLF, OK1-19973, OK1-23139. **OK2KYC:** OK2SMO, OK2BUC, OK2BSK. **OK3KEX:** OK3ZAZ, OK3CYW, OK3-26928, OK3-17780. **OK3RJB:** OK3CQD, OK3CQR, OK3TCN, OK3CPG, OK3CKW, OK3CSB. **OK3RKA:** OK3TAM, OK3TDP, OK3CPC, OK3-26016, OK3-27254, OK3-27256. **OK5MIR:** OK1AEZ, OK1WT, OK1AAU, OK1JCW, OK1JWA, OK1JJB, OK1TA, OK1TN, OK2RN, OK2RU, OK2RZ.

OZ1GAX & OZ2PG. **OZ5EDR:** OZ1HET, OZ3QN, OZ4UN, OZ8WD. **OZ7DEN:** OZ1DXX, OZ1DKG, OZ7LZ. **PA3AQL:** PA3AAE, PA3AQL, PA3AUW, PAØPCB. **PAØIP:** PA2AWU, PA2OHH, PA3BHS, PAØALE, PAØJMH, PAØKBN, PAØKDV. **PY2SLS** & PY2EXD, **RG6G:** UP2OX, UP2BAW, UP2BHC, UP2BIG, UP2BIL, UP2PAJ, UQ2ON, UQ2GFN. **SK7AX:** SM7AVN, SM7BVO, SM7FEJ, SM7FDO, SM7FPZ, SM7FNN, SM7FWZ, SM7HCW, SM7MQC, SM7NAN, SM7NDX, SM7DJJ, SM7NOW, SM7NSX. **SKØLM:** SMØFSK, SMØDRD. **SP2KFX:** Irek, Zygmunt, Marek. **SP3KCL:** SP3FHV, SP3HLM, SP3JHT, Robert, **SP3KRF:** SP3IVL, SP3LPR. **SP5KCR:** SP5ZA, SP5ANJ, SP5ELA. **SP5KUT:** SP5LGQ, SP5LGN.

UK1AFA: UA1AAF, UA1-169-2026, UA1-2028. **UK1NAD:** UA1NBF, UA1NBO, UN1CC. **UK1NAP:** Club. **UK1TAR:** UA1TAI, UA1TDO, UA1-144-350, UA1-144-344. **UK2AAP:** Club. **UK2AAW:** UC2ACF, UC2ACU, UC2AFE, UC2CFG. **UK2ABM:** Club, **UK2BBB:** UP2BIJ, UP2BKW, UP2-038-892, UP2-038-1052, UP2-038-1053. **UK2BBF:** UP2BIY, UP2BJD. **UK2BBQ:** Club. **UK2BBX:** UP2BCO, UP2BCW, UP2-038-1643. **UK2BCC:** UP2BDV, UP2BDW, UP2-038-346, UP2-038-1656. **UK2BCM:** UP2BHY, UP2BIZ. **UK2BCO:** UP2BZ, UP2-038-1049. **UK2BCR:** UP2BIC, UP2PAQ, UP2-038-1634, UP2-038-1636. **UK2FAA:** RA2FDE, UA2FCW, UA2FCZ, UA2FEM, UA2FEW, UA2FFD. **UK2FAH:** UA2-125-717, UA2-125-767, UA2-125-787. **UK2LAN:** Club. **UK2OAA:** CLub. **UKOBB:** Club.

5H3BH operators SMØDJZ (front) and SMØAJU (rear) are shown at the operating position. A fine MS effort from zone 37.

UK2PAD: RC2ICC, UP2BCR, UP2BFI, UP2-038-1541, UP2-038-1600. **UK2PRC:** UP2BBM, UP2BDM, UP2BLA, UP2MB. **UK2RAC:** Club. **UK2RDX:** UR2CW, UR2RCN, UR2RCU, UR2RNA, UR2RNJ, UR2RNX, UR2RHF, UR2RRJ, UR2RRR, UR2QD, UR2-083-186. **UK2WAF:** UC2WAZ, UC2WBI, UC2XW, UC2-006-17, UC2-006-27. **UK3PBV:** UA3DFO, UA3-142-1762, UA3-142-1770. **UK3TAG:** UA3TDR, UA3TEU, UA3TFO, UV3TA, UV3TB. **UK3TBF:** Andrei, Serge. **UK3WAF:** Club. **UK3XAB:** RA3XBS, UA3XAC, UA3-127-200, UA3-127-216, UA3-127-204. **UK4ACE:** Edvin, Ernst, Vlad. **UK4FAV:** UA4FAZ, UA4FBL, UA4FCD, UA4FCO, UA4FCM, UA4FCZ, UA4FDE, UA4FDY, UA4FER, **UK4FAX:** UA4FEM, UA4-148-284, UA4-148-414. **UK4HAL:** Club. **UK4HCR:** UA4HLX, UA4HLY, UA4SBZ, UA9SHO.

UK4NAA: UA4NAX, UA4NBY, UA4-134-602. **UK4PNZ:** UA4PME, UA4PMF, UA4PMW, UA4PML, UA4PNP, UA4PNW, UA4-094-768, UA4-094-786. **UK4WAA:** Club. **UK4WAB:** Club. **UK5ECT:** Club. **UK5FAD:** UB5FDG, UB5-070-462, UB5-070-466, UB5-070-467. **UK5GKW:** Club. **UK5IAI:** EZ5IJS, EZ5IUK, UB5INT. **UK5IBB:** UB5IJK, UB5IML, UB5IOK, UB5IQS, UB5IRM. **UK5IBM:** Club. **UK5ICX:** Club. **UK5LAP:** Club. **UK5LCX:** RB5LLG, UB5-077-1231. **UK5MAF:** UB5MEI, UB5MNX, UB5MNY, UB5MOA, UB5MUV, UY5LK. **UK5MBQ:** Club. **UK5MCO:** UB5ICI, UB5MPN, UB5MRN, UB5MRO, UB5MTS. **UK5MCP:** RB5MST, UB5MCV, UB5MOF, UB5MSW. **UK5MDI:** UB5MBM, UB5MJS, UB5VIC, Alex. **UK5PAA:** Club.

UK5QBE: UB5QBG, UB5QKG, UB5-064-1362. **UK5QCI:** UB5QHW, UB5-064-1435, UB5-064-1468. **UK5UDX:** UB5RCA, UB5UAL, UB5XCM, UB5-065-2. **UK5WBG:** Club. **UK5YAA:** UB5YAE, UB5YAR, UB5YAW, UB5YBX, UB5-082-298. **UK6APA:** UA6APP, UA6APW, UA6AQJ, UA6ARA, UA6-101-693. **UK6FGZ:** UA6FCZ, UF6FHL, UF6-012-301. **UK6GAA:** Sofi, Karen. **UK6HAA: Club, UK6HDP:** UA6HNH, UA6HPG, UA6HPV. **UK6LAA:** UA6LBQ, UA6LDX, UA6LED, UA6LFA, UA6LEW, UA6LIK, UA6LD, UW6NV, UW6LZ. **UK6LDN:** UA6LJU, UA6LTA, UW6OE. **UK6QAA:** Club. **UK7FAP:** UL7FAF, UL7-027-267, UL7-027-268. **UK7GAA:** UL7GDN, UL7-018-343, UL7-018-345, **UK8NAA:** UM8NAL, UM8-034-1, UM8-034-6. **UK9AAN:** UA9ACZ, UA9AIS, UA9AJD, UA9AKI, UA9ALP, UA9AMU, UA9AOA, UW9BY, UA9-165-938.

UK9ACP: Club. **UK9ADY:** EZ9ADE, UA9ADH, UA9AFZ, UA9AJA, UW9AT, UA9-165-1655. **UK9OAE:** Club. **UK9OAZ:** UA9OBL, UA9OCI, UA9-145-823, Mike. **UK9UBL:** UA9UAR, UA9ULL, VA9-130-421. **UK0AMM:** UA9LAS, UA0AAK, UA0WAM, UA0-103-2. **UK0FAD:** UA0FEV, UA0FEX, UA0-153-252. **UK0LAB:** UA0LEI, UA0LEJ, UA0-107-529. **UK0LAD:** UA0-107-398, UA0-107-541, UA0-107-607, UA0-107-609. **UK0QAA:** UA0QAS, UA0QBB, UA0-098-073. **UK0SBB:** UA0SFD, UA0-124-210, UA0-124-610. **VE2UMS:** VE2GAT, VE2FFE, VE2BLX, VE2FTU, VE2GFH. **VE3IY** & VE3EEW, VE4DW. **VE3PCA:** VE3CRG, VE3KKB, VE3MHI, VE2ZP. **VE6AO** & VE6AMR, VE6XX, VE6CHW, VE6CCY. **VE7ZZZ:** VE7ENF, VE7ENI, VE7SK.

W2UI & N3KR. **W3BGN** & K2BMI, N2BA, WA2ZKY. **W3GU** & K3CY, W3KV. **WB3JRU** & Net. **W4LN:** WB1HIX, KA4TAY, KD4U, KK4Q, N4DUF, N4DUH, N4XM, NF4R, NO4R. **WG4S** & KA5APB. **WB5HHM** & N5EZN. **W6BH** & WA6IQM. **W6BIP** & WA6DJI. **W6OAT** & Net. **W6SX** & KA6SHB, NE6I. **WL7E** & NL7P, KL7Y, AL7DN, W8LU. **WB9ZGY** & KA9LLJ. **W0FF** & KI0K, N0AX, W0WYJ. **XQ3AA:** CE3IW, WB4ACI/CE3,CE3DW, CE3ZW. **YU7AJD:** YU7ORS, Sasa, Voja, Pred. **ZL2SQ** & ZL2OM. **ZY1RR:** PY1BSD, PY1DFF, PY1JF, PY1VOY. **3V8AL: DL5MBY, DK3QJ. 4K1D:** UA1AFM, UA1PAM. **4N6HN:** Lecic, Milosevic, Krnic. **4U1VIC:** OE1ETA, OE2VEL, WA4EWN. **5H3BH:** SM0AJU, SM0DJZ. **5W5EE:** WA6OET, K6JG, W6OUL, W7CB. **6E5EBE:** AA6DP, W6TSE, NF6H. **K1XA/6Y5:** K1XA, W1GNC.

STATION OPERATORS
Multi-Operator Multi-Transmitter

AB0I & W0FI, K0UAA, WA0TKJ, N7DF, KJ0U, KD0Q, K0LUZ, KJ0D, N4RR, K0RWL, W0JLC, K0FPC, WD0EWD, KF0H, KM0L, K0VBU, KB0G, KJ0Q, WA0QMU, KB0U, KC0CL. **AI6V** & W6SZN, NB6G, K6KLY. **DL0KF:** DJ3UL, DF5UZ, DJ4FZ, DK8LE, DJ6TN, DJ7SW, DJ4SO, DF3LZ, DF6LH, DJ2BV, DJ8FR, DL2NF, DK9AV, DL3HB. **EA1KC** & EA1EV, EA1FK, EA1FP, EA1HG, EA1LD, EA1MH, EA1MQ, EA1NQ, EA1VH, EA1OW, EA1QX, EA1VG, EA1WY, EA1XD, EA1XG, EA1XI, EA1YX, EA1ABN, EA1BCK, EA1BEZ. **EW6V:** UP2BFL, UP2BFN, UP2BEY, UP2BJK, UP2BKT, UP2PAV, UP2PCI, UP2PBW, UP2NK, UP2-038-1050, RP2BFU. **HZ1AB:** W7KJJ, WA8MOA, K0SV, N6OL, K0JJ, W7SE, N2BXB. **JA1YHA:** JE3MLS, JL1HXF, JH0EGT, JF3SCK, JH4TJS, JA4OYR, JJ1UEJ.

JA1YNE: JA1CG, JA1BAL, JA1VNA, JA1QXY, JR1QQG, JE1TSD, JA2UGX, JA4WWO, JR2BJE, JR1FIG. **JA1YXP:** JL1ROT, JJ1OHJ, JE6IGU, JH0NPR, JR6NJD, JH4OWG. **JA2YEF:** JH9CTW, JE2FRT, JH4XKV, JR2PVI, JR2TPD, JR2UWZ, JE1KIH, JE2RDI, JE2RWP, JE2VGT, JE2WBH, JF2ACB, JF2ERH, JF2NFC, JF2NTV, JF2QHC, JF2SFF, JF2VRV, JF2WMP, JF3EIT, JA9QNC, JA9XDR. **JA2YKA:** JG1GIF, JJ1BTA, JJ1BTC, JH2QXG, JR2GMC, JE2RQT, JE2SRB, JE2TEM, JE2VYM, JF2DQJ, JG2BFR, JA4UDP, JH4VBQ, JH6RPZ, JE6GTX, JA9NFO, JA9SSY, JA9XXS, Tamura-San.

JA3YBF: JF3KKO, JF3PGA, JG3GKK, JG3IUG, JG3LZG, JI3KWZ, JI3XBE, JJ3MIZ, JJ3PYI, JH4CES, JR4AGT, JA9TAF, JA9TOZ, JA9VIZ, JA9RYU. **JA3YKC:** JA3ODC, JH3PRR, JA3VCT, JR3FRR, JR3KEG, JR3RIU, JR3XGK, JE3BLA, JE3MAS, JE3MXQ, JF3PMM, JF3RAL, JF3SFP, JF3UNQ, JG3LLB, JH4PAM, JH4RHF, JH4UIM, JH4WER, JR4BSM, JA5GZB, JA5MOU, JA5TDH, JA5XUQ, JH5EML, JR6JNF. **JA6YAI:** JH6VLF, JR6EZE, JE6MQW, JE6UWI. **JA7YAA:** JH7CUO, JH7GFO, JH7HWR, JH7UJN, JH5WTC, JR7OMD, JR7SEI, JR7UVL, JE7IQE, JE7IVP, JJ1MUV. **JA7YFB:** JR7JVO, JH7XMO, JJ1GXY. **JF1ZRQ:** JH1CNT, JH1QXP, JR1RNC, JG1GGU. **JH1YDT:** JF1EAL, JG1XLZ, JF1CUJ, JI1MYH, JK1CQG, JK1DLQ, JK1FLU, JK1RJU, JL1PGO, JP1AIE, JF3HBS, JH4UTP, JE6CEK, JE6HIC, JA0VSH, JH0HNI, JH6VJZ.

K1OX & WB8BTH, W1FV, K1GQ, K1EA, K1UR, K1DG, KC1Q, KA1R, KI1R. **K2TR** & K2XA. **K2UA** & KD2T, WA2HGM, N2MM, K3JLT, K2BU, K2TD. **K6XO** & AA4KB, WB6DSV, N6AUV, AA6G. **K6ZM** & AK6T, N6OP, NB6L. **LZ2KAD:** LZ2LT, LZ2RS, LZ2VX, LZ2LL, LZ2HC, LZ1OP, LZ2EV, LZ2VE. **N2AA** & K2BQ, K2SS, K2NG, K2TT, K2TW, K2GM, K2GL, K3EST, KR2Q, KR2J, KC2X, KA4MDR, KU2M, N2CTV, KR2W, W2RQ. **N3LR** & N3CSG, N3DAY. **N4KE** & K4UTE. **N6RO** & WA6DIL, N6XI, KT7W, NI6D, N6DA, K6KM, N6NE. **N6TV** & K6HNZ, KC6D, N6QW. **N6VV** & K6XV, K6PJY. **N9MM** & K9UWA, KA9A, W9LF, K9NN, W9ZRX, KM9D, N9NS, K9JF, W9LT, WB9PDH, W9RE, WB9LTY.

OH0W: OH1MA, OH1XX, OH1EH, OH2BNP, OH2BQS, OH2JA, OH2BBM, OH2BU, OH2MM, OH2BH, OH2FS, OH2BAD, OH2KI, OH2QV, OH2BAZ, OH3XT, OH3YI, OH3ZE, OH3UU, OH7JR, OH6DX, OH8SR, OH5XJ, OH5LF, OH6UM, OH6JW, OH5KS, OH7JT, OH5UX. **OH1AA:** OH1CI, OH1CQ, OH1CX, OH1DL, OH1JX, OH1KO, OH1LF, OH1MD, OH1RM, OH1SV, OH1SW, OH1WR, OH3OM. **P42E:** W8LRL, K2BA, WA2SPL, AA4S, K4BAI, N4MM, N4RV, WD4AXM, AA6RX, N6TU, WB6SHD, KC8C, N8II. **PA0ZA:** PA0NZH, PA0MS, PA0MSM, PA0PFW, PA3AFF, PA3AUC, PA3BAS, ON6NL. **SK2IV:** SM2IVR, SM2JDN, SM2CDF. **T32AL:** KN6Q, AA6DX.

W1YN & AG1C, AK1A, KA1O. **W3GM** & K3ND, K3GM, K3OA, K3FD, KI3V, N3VV, KB3YY, W3FV, W2NM. **W3LPL** & W3ABC, K3DI, K3KU, K3RV, N3CW, AI3M, KI3P, WA3KCY. **W3NX** & N8NA, AD3V. **YU3DBC:** YU3ZV, YU3EW. **YU9W:** YU1IW, YU7AU, YU7BB, YU7KW, YU7PFR, YU7QFX. **ZK2RU:** K6RU, ZL3BA. **4N1U:** YU1EW, YU1FD, YU1PAU, YU1PAW, YU1PKC, YU1RL, YU1UU, YU3TCA, Sile.

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	109/9/13	499/19/50	784/20/59	1098/29/72	1068/28/76	1368/25/72
CN8CX	—	488/17/53	880/22/66	1152/27/84	632/28/85	1202/27/70
8P6J	31/7/13	403/14/28	473/18/45	1191/25/61	1513/25/70	1438/25/70
UF6CR	47/6/17	552/13/50	1007/18/67	850/22/60	749/19/63	777/14/55
4M3BRF	47/5/10	250/16/35	588/20/60	511/23/62	890/23/62	1227/22/68
DK3GI	70/7/26	455/13/48	196/14/56	542/26/73	642/25/69	854/30/82
K1AR	4/3/4	93/16/45	228/23/65	654/29/82	564/32/84	433/25/74
5Z4CS	3/2/3	53/8/11	165/18/38	791/29/74	602/29/71	753/26/76
W1KM	7/5/6	145/17/51	312/23/69	472/26/76	471/27/78	503/28/73
9K2DX	3/1/3	83/8/26	402/16/52	783/30/85	490/26/70	606/17/54

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
K1AR	4/3/4	93/16/45	228/22/65	654/29/82	564/32/84	433/25/74
W1KM	7/5/6	145/17/51	312/23/69	472/26/76	471/27/78	503/28/73
N2LT	10/6/8	94/15/40	278/27/70	406/31/78	500/26/73	552/25/78
K1JX	7/5/7	127/15/54	357/26/75	337/28/77	456/25/70	446/24/72
K3LR	13/6/9	76/15/37	136/25/60	350/30/80	452/28/78	545/29/78
K9DX	10/5/5	50/16/30	202/25/64	520/31/86	494/31/75	319/23/66
K4POL/8	7/4/6	62/16/36	151/25/66	490/29/85	418/29/76	391/23/76
N5AU	13/9/10	92/15/27	231/28/64	430/30/84	336/26/63	484/26/63
N3RD	16/6/12	63/16/39	128/26/66	356/31/86	417/29/93	358/27/84
WA8YVR	15/6/8	70/17/38	196/23/65	619/31/91	299/24/64	306/20/66

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

NP4A	172/15/35	589/23/73	1342/28/92	1270/36/108	1547/34/106	1961/32/101
RG6G	238/18/57	733/24/75	1047/27/90	1350/33/96	705/35/104	1282/30/90
UK9AAN	115/8/37	257/15/54	659/25/75	1302/32/86	740/25/80	599/25/74
UK2RDX	212/9/48	346/16/58	496/27/91	1184/32/87	640/29/87	503/27/88
F3TV	77/6/32	609/13/51	597/19/70	625/27/83	750/29/77	930/28/79
L8D/X	11/5/4	147/14/18	434/22/48	1009/26/67	832/23/47	1287/24/61

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

K5RC	18/9/6	113/22/45	485/32/82	440/37/113	443/32/96	688/31/86
W3BGN	15/7/14	77/21/56	306/27/86	603/37/106	536/34/97	609/30/90
N4AR	18/10/17	63/23/59	274/30/88	658/35/107	450/29/84	446/28/82
N4RJ	15/10/12	52/18/49	254/32/86	439/34/100	746/32/98	247/27/82
N1AC	5/4/5	62/15/47	207/24/63	898/29/85	472/25/70	447/23/71
KA4S	16/9/15	126/18/50	173/25/71	405/34/99	364/29/87	674/27/83

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

P42E	390/12/28	1083/22/60	1995/29/81	2965/36/112	3351/32/103	2531/30/91
EW6V	522/14/50	905/22/69	1735/27/86	1646/33/100	1666/32/100	1524/31/99
OH0W	585/14/54	1180/24/88	1920/34/103	2532/39/131	1968/37/124	1330/36/118
N2AA	43/10/21	305/25/67	931/33/104	1304/37/119	1193/35/104	1087/30/99
K1OX	62/11/21	256/24/68	700/31/99	1037/36/108	1086/34/104	925/28/92
4N1U	141/7/33	854/15/62	1146/26/78	1478/28/101	1313/27/81	1403/29/88

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

N2AA	43/10/21	305/25/67	931/33/104	1304/37/119	1193/35/104	1087/30/99
K1OX	62/11/21	256/24/68	700/31/99	1037/36/108	1086/34/104	925/28/92
K2UA	33/8/21	207/21/59	797/33/89	807/36/99	955/32/98	661/29/93
W3LPL	46/11/24	148/17/47	519/34/94	839/32/109	822/32/101	839/32/99
N9MM	45/10/18	112/20/46	394/30/89	1082/35/106	831/33/98	750/29/91
AB0I	26/9/10	116/22/37	422/31/80	1072/33/92	793/28/78	489/25/70

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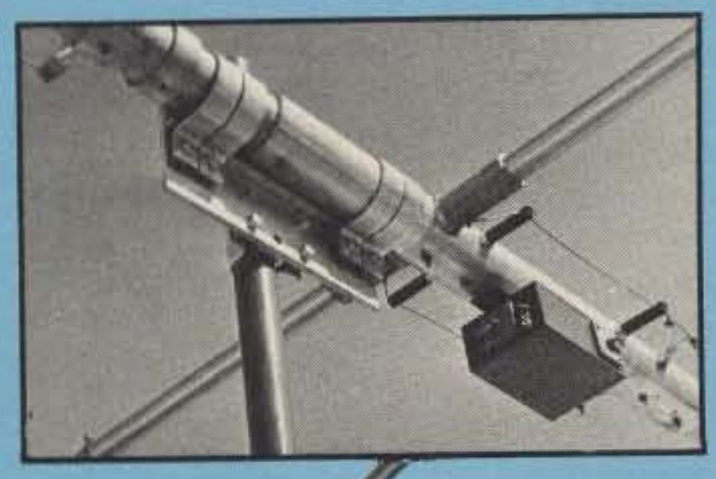
Only Telrex provides!

- Easy assembly **(within 2 hrs)**
- **100 mph** wind rating.
- **Heavy wall** tubing.
- **Stainless Steel** electrical hardware.
- **Exceptional** Gain and F/B ratio.

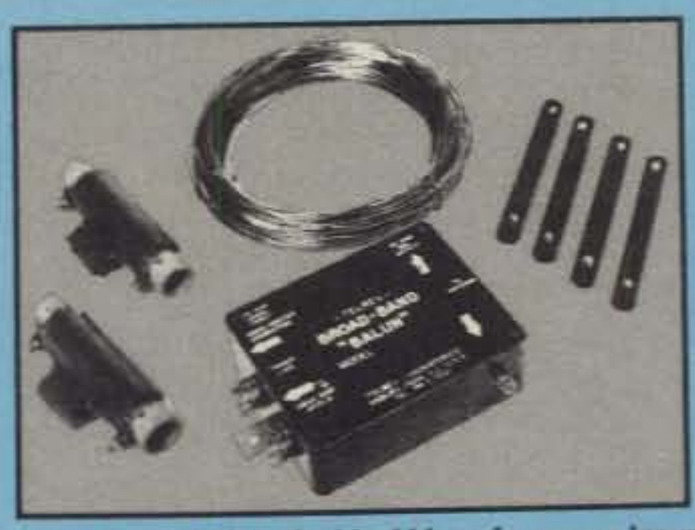
YOUR PRICE
$445.00
Value $535.00

By the only test that means anything . . . on the air comparison . . . Telrex Tri-Bands continue to support the fact that they are designed to out-perform all competition . . . as they have for over 3 decades. Here's why . . . Telrex uses a unique trap design employing Hi-Q 7500 V ceramic condensers, 3 optimum-tuned reflectors to provide maximum gain and true F/B Tri-Band performance.

40M346
$1650.00
Value $1975.00

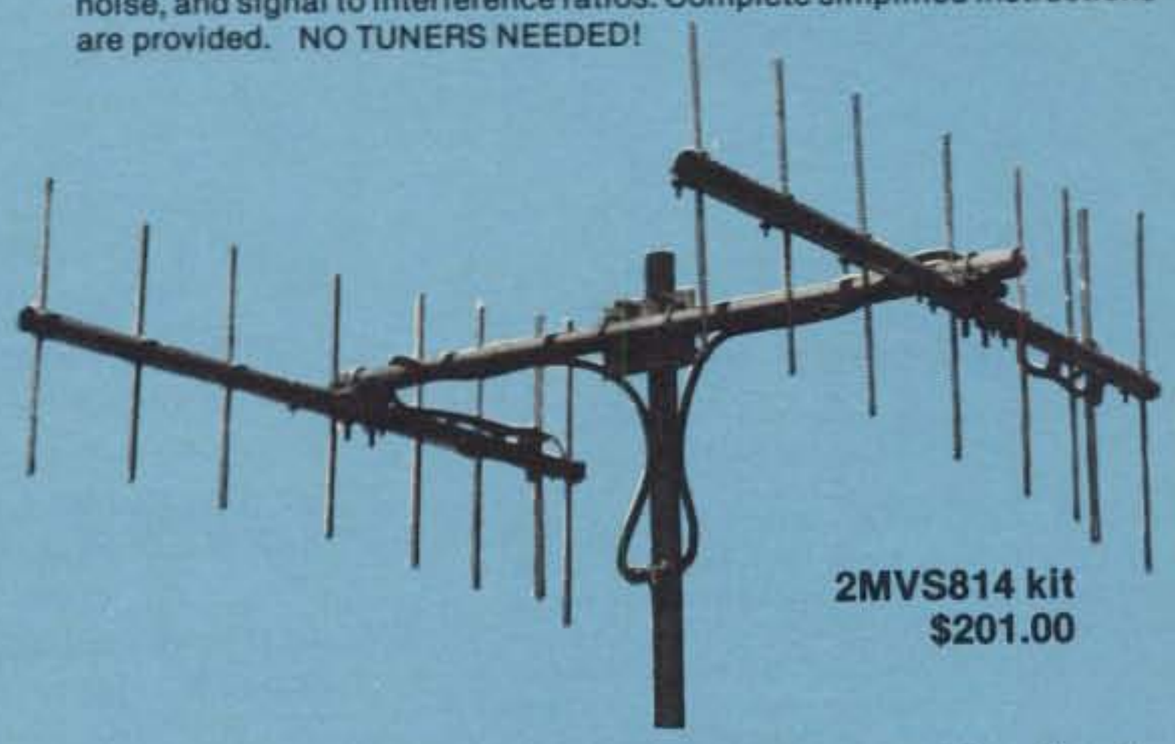


MIVD/2 frequencies
$84.50 Post Paid (U.S.)



A Telrex "Balun" fed "Inverted-Vee" kit is the ideal hi-performance inexpensive and practical to install low-frequency mono or multiple band, 52 ohm antenna system.

Better than optimum full sized Dipole performance in an antenna which can be set up within the hour, needing a minimal support structure (existing tower, house, tree, etc.). The "Inverted-Vee" produces a low-angle "Balanced" Omni-Directional pattern, which increases the signal to noise, and signal to interference ratios. Complete simplified instructions are provided. NO TUNERS NEEDED!



2MVS814 kit
$201.00

Special N-type coaxial connectors, solid rod elements (driven thru the boom), tinned connecting lugs, and s/s electrical hardware provide you with peace of mind for many years!

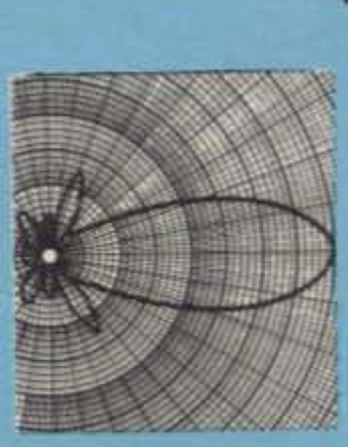
If top 2 Meter performance is your requirement, the 2MVS814 kit consisting of 2 ea. phased 2 Meter "Balun" fed precision tuned 8 element Arrays outperform even quad stacked antennas of other makes.

A FEW OF THE WORLD'S FINEST!

MODEL	Description	GAIN	Value	PRICE
2M1528C	2 Meter 15 element	(17 DBD)	160.00	**131.00**
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**

Phone . . . 201-775-7252 (nights, weekends, holidays and leave your address) or write Telrex - P.O. Box 879, Asbury Park, N.J. 07712, for your free copy of the latest Telrex UHF, VHF, HF Antenna, and Rotator Catalog.

TLI



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CIRCLE 117 ON READER SERVICE CARD

C.W. TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

World
CN8CX (Opr. Glenn Rattmann, K6NA)
Donor: Albert Kahn, K4FW–W2AB Memorial

World QRPp
Saulius V. Zalmeravskas, UP2BIM
Donor: Gene Walsh, N2AA

U.S.A.
John Dorr, K1AR
Donor: Frankford Radio Club

Canada
R. Nash, VE3KZ
Donor: Canadian DX Association

Carib./C.A.
Richard L. King, K5NA/KP2
Donor: Jim Neiger, N6TJ

Europe
Roland Mensch, DK3GI
Donor: Ed Bissell, W3AU

Africa
5Z4CS (Opr. Saty Nakamura, JE1JKL)
Donor: Gordon S. Marshall, W6RR

Asia
9K2DX (Operated by Tom Hoyne, N6NI)
Donor: Japan CQ Magazine

Japan
JA4YFH, Tottori University A.R.C.
Donor: Palm Garden Contest Club

Oceania
Michael Gibson, KH6ND
Donor: Maui Amateur Radio Club

Most QSOs
Jim Neiger, 8P6J (5049)
Donor: KV4AA Memorial (From Friends)

SINGLE OPERATOR, SINGLE BAND

World—21 MHz
Daniel S. Arroqui, CX7CO
Donor: W2JT Memorial (No. Jersey DX Assn.)

World—3.5 MHz
Inaki Alcorta, EA2IA
Donor: Fred Capossela, K6SSS

World—1.8 MHz
Fernando M. Fernandez, EA8AK
Donor: Chip Margelli, K7JA (KP4ES Memorial)

USA—14 MHz
Tom Frenaye, K1KI
Donor: No. Illinois DX Association

Canada—14 MHz
Yuri Blanarovich, VE3BMV
Donor: Canadian Amateur Radio Federation

Carib/C.A.—7 MHz
Herb Schoembohm, KV4FZ
Donor: DX Club of Puerto Rico

Europe—14 MHz
Rajko Mackic, YU4GD
Donor: G2LB Memorial (From Friends)

South America—14 MHz
Raul Roji, CX7BY
Donor: Rafael Ponce de Leon, CX3BR

MULTI-OPERATOR SINGLE TRANSMITTER

World
NP4A (Oprs. NP4A, KP4CC, KP4FI, N4TO, K1ZM, KC1F, N2NT, K3UA)
Donor: Anthony Susen, W3AOH

U.S.A.
K5RC (Oprs. K5RC, K5GA, K5GN, K5LZO, KN5H, N5JJ, NA5R)
Donor: Doug Zwiebel, KR2Q

MULTI-OPERATOR MULTI-TRANSMITTER

World
P42E (Oprs. W8LRL, K2BA, WA2SPL, AA4S, K4BAI, N4MM, N4RV, WD4AXM, AA6RX, N6TU, WB6SHD, KC8C, N8II)
Donor: Hazzard Reeves, K2GL

U.S.A.
N2AA (Oprs. N2AA, K2BQ, K2SS, K2NG, K2TT, K2TW, K2GM, K2GL, K3EST, KR2Q, KR2J, KC2X, KA4MDR, KU2M, N2CTV, KR2W, W2RQ)
Donor: James Rafferty, N6RJ

CONTEST EXPEDITIONS

World—Single Operator
4M3BRF (Opr. Richard J. Assarabowski, K1CC)
Donor: Yankee Clipper Contest Club

World—Multi-Operator
EW6V (Oprs. UP2BFL, UP2BFN, UP2BEY, UP2BJK, UP2BKT, UP2PAV, UP2PCI, UP2PBW, UP2NK, UP2-038-1050, RP2BFU)
Donor: Bill Schneider, K2TT

COMBINED PHONE/CW, SINGLE OPERATOR

World—All Band
9Y4VT (Opr. Richard J. Norton, N6AA)
Donor: John Knight, W6YY

World—Single Band
Joel E. Chalmers, KG6DX
Donor: Yuri Blanarovich, VE3BMV

CLUB TROPHIES

World
Yankee Clipper Contest Club (117,228,900)
Donor: CQ Magazine

World—Most Improved
Southern California Contest Club (68,224,180)
Donor: Southeastern DX Club

NEW PRODUCTS

TINY 2 M POWER AMP MOUNTS ON HANDHELD

7 to 20 watts out for 0.1 to 3 watts in. Carrier operated T-R switch. MFJ-2040, 144-148 MHz, $79.95. MFJ-2045, 430-440 MHz, $99.95. MFJ-2041, Portable Power Pack, $89.95.

This tiny MFJ-2040 2 meter power amplifier mounts on your handheld between your antenna and HT. You can also mount it separately with a cable.

It provides 7 to 20 watts output for .1 to 3 watts input. T-R switching is carrier operated. Covers 144-148 MHz.

Die cast aluminum body is 1½x3¾ inches. Weighs about 6 oz. BNC connectors.

Requires 12 to 13.8 VDC at 50 ma. for receive and 1 to 2 amps for transmit.

MFJ-2045, $99.95. Like MFJ-2041 but for 430 to 440 MHz. 4 to 15 watts output for .1 to 3 watts input.

MFJ-2041, $89.95. Portable Power Pack Batteries provides 120 minutes operation of MFJ-2040 or MFJ-2045 at 10 watts output. Has battery check meter. Has carrying case with belt loop and shoulder strap. 1½x2¼x7½ inches. Weighs 2 pounds.

2 Meter Handheld Wattmeter

MFJ-840
$19.95

MFJ-840 lets you accurately check the output of your 2 meter handheld transceiver. 5 watts full scale. 50 ohm load. BNC connector. 2x2¼x1½ inches. Black.

2 Meter Handheld SWR/ Wattmeter

MFJ-841
$39.95

MFJ-841. Connects in line with your 2 meter HT. Read SWR from 1:1 to 6:1 and forward power to 5 watts. Expanded scale. 50 ohm impedance. BNC connectors. 2x2¼x1½ inches. Black.

Cross Needle SWR/ Wattmeter

MFJ-815
$59.95

New MFJ-815 Cross Needle SWR/ Wattmeter lets you monitor SWR, forward and reflected power at a single glance in 3 ranges (20/200/2000 watts forward and 2/20/200 watts reflected) and SWR from 1:1 to 6:1 on a 2 color scale. Works from 1.8 to 60 MHz. Accuracy is ±10% full scale. Mechanical zero adjustment, push button range selection. All aluminum, black w/ brushed front panel. 6½x3¼x4¼. SO-239 connectors.

Antenna/Transmitter Switch

MFJ-1700
$69.95

If you have several coax feedlines and more than one rig, this MFJ-1700 gives instant selection of 1 of 6 antennas and 1 of 6 transceivers in any combination. Also plug in an antenna tuner, SWR/wattmeter, linear, etc., so that they are always in the circuit for any antenna/transceiver combination. Handles up to the full legal limit of 2 KW PEP for 50-75 ohm loads. SO-239 connectors. All aluminum, black with brushed aluminum front. 8x2x6.

MFJ-1620 All Band Doublet

MFJ-1620
$39.95

Operate all bands 160 thru 10 meters including the new WARC bands with this new MFJ-1620 All Band Doublet. Use as doublet, sloper, inverted-V or as V-beam. Completely assembled. 130 ft.(hard drawn stranded copper antenna wire) but can be trimmed to fit your lot. Center fed with 100 feet of low loss 450 ohm balanced transmission line. You need only add rope to the ends and pull into position. Antenna tuner with balanced output required.

New Antenna Isolators

New MFJ-782 HF/2 Meter Antenna Isolator lets you use a single coax line to feed a 2 meter antenna and any antenna below 30 MHz. **The new MFJ-780 Antenna Isolator** feeds separate 10,15,20 meter antennas (tri bander, etc.) Both isolators handle 2 KW PEP at 50/75 ohms. Negligible insertion loss. Completely automatic with no relays, switches or other moving parts. Easy outdoor mounting (includes hardware). SO-239 connectors.

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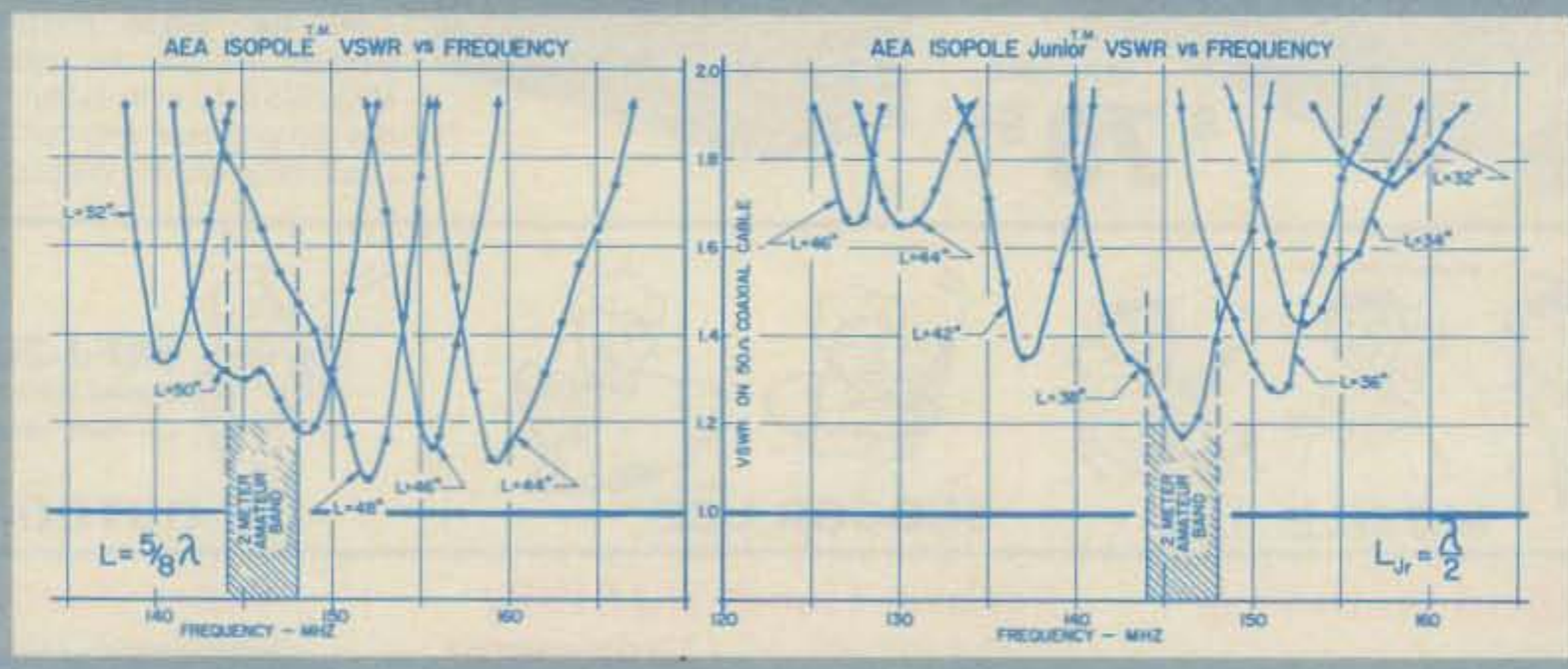
DO YOU? STUDY THE FACTS . . .

ISOPOLE 144
ISOPOLE 220
MAST NOT SUPPLIED

The IsoPole antenna is building a strong reputation for quality in design and superior performance. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

All IsoPole antennas yield the **maximum gain attainable** for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other when used with SWR protected solid state transceivers.



Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard Amphenol 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. All IsoPole antennas are D.C. grounded. The insulating material offers superb strength and dielectric properties, plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is **not supplied**).

IsoPole antennas have also become the new standard for repeater applications. They all offer low angle of radiation, low maintenance, easy installation, and low cost with gain comparable to units costing several times as much. Some repeater installations have even eliminated the expense of a duplexer by using two IsoPole antennas separated vertically by about twenty feet. This is possible because of the superior decoupling offered by the IsoPole antennas.

The IsoPole antenna is now available in a 440 MHz version which is fully assembled and tuned.

ISOPOLE 440

ISOPOLE 144JR
ISOPOLE 220JR
MAST NOT SUPPLIED

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CIRCLE 145 ON READER SERVICE CARD

U.S.A. Club Scores

Yankee Clipper Contest Club	117,228,900
Frankford Radio Club	100,074,060
Northern California Contest Club	94,834,409
Southern California Contest Club	68,224,180
Potomac Valley Radio Club	56,468,762
North Texas Contest Club	37,188,341
North Florida DX Association	17,036,357
Mad River Radio Club	15,635,736
Rubber Circle Contest Club	14,314,385
Southeastern DX Club	13,935,713
Dixie DXers	13,510,243
Murphy's Marauders	11,846,383
Kansas City DX Club	9,584,561
Texas DX Society	8,950,302
Southern California DX Club	7,298,009
Eastern Iowa DX Association	5,449,694
Greater Milwaukee DX Association	5,303,952
Carolina DX Association	3,953,922
Sheboygan County A.R.C.	3,835,721
Fraser Valley DX Club	3,732,233
Boiled Owls of New York	3,552,017
Mile-High DX Club	3,503,132
Mississippi Valley DX & Contest Club	3,496,719
Williamette Valley DX Club	3,474,708
Northern Illinois DX Association	3,139,353
Western Washington DX Club	3,046,392
Northern Ohio Amateur Radio Society	3,016,111
Meriden A.R.C.	2,710,809
Colorado Contest Conspiracy	2,618,979
Rochester DX Association	2,272,758
South Florida DX Association	2,265,321
Redwood Empire DX Association	2,052,456
Alamo DX Amigos	1,643,026
Neenah-Menasha A.R.C.	1,326,726
Garden State Amateur Radio Association	1,287,259
Northern California DX Club	1,210,409
Central Arizona DX Association	1,170,822
Gloucester County A.R.A.	1,135,847
San Diego DX Club	1,035,402
Michigan DX Association	887,940
Southwest Ohio DX Association	868,314
Delta DX Association	807,234
DX Association of Connecticut	771,407
Four Lakes A.R.C.	637,170
Ill Wind Contesters	537,436
Eastern Michigan A.R.C.	447,169
Fort Wayne Radio Club	415,765
Metro DX Club of Chicago	338,151
Kansas DX Association	258,035
Grand Mesa Contesters	245,097
Desert Rats DX Club	213,755
Lynchburg A.R.C.	211,445
Long Island DX Association	203,270
Megahertz Manor Maniacs	185,846
Vulcan DX Club	137,639
Sturdy Memorial Hospital A.R.A.	107,309
Hamfesters Radio Club	54,886

DX CLUB SCORES

Lithuanian Contest Group	38,360,256
Kaunas Polytechnic Institute	37,446,560
Voroshilovgrad Radio Club	16,077,901
Ontario DX Club	12,513,798
South German DX Group	12,285,098
Rhein/Ruhr DX Association	10,619,834
Tallinn Radio Club	10,110,958
Chelyabinsk Region Radio Club	9,944,693
German Democratic Republic Radio Club	6,537,600
Alaska DX Association	5,570,817
The Bullmertz	5,239,579
Gauchos Argentina CW	4,922,868
Riga Radio Club	4,763,143
Moscow University Radio Club	4,566,992
Danish DX Group	2,938,318
Israel DX Club	2,283,854
Association Filaret DX	1,290,905
Northern Lithuania DX Group	943,903
Big Island A.R.C.	615,895

WORLD TOP 10 QRPp
(5w input)
All Band

1.	UP2BIM	899,932
2.	YU3BC	742,560
3.	UB5UCJ	452,505
4.	K8IA	400,064
5.	W9KNI	345,417
6.	UA3QGO	297,937
7.	YU3DRW	258,530
8.	OH5WH	247,299
9.	UP2BFE	198,720
10.	OE3RE	198,656

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

C.W. RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1AR	**A**	**2,762,383**	**1976**	**127**	**354**
W1KM	"	**2,668,030**	**1910**	**126**	**353**
K1JX	"	**2,417,034**	**1730**	**124**	**355**
W1RR	"	1,949,020	1525	117	324
AK1A	"	1,836,320	1341	129	370
KØDQ/1	"	1,833,535	1599	108	299
K1GQ	"	1,490,426	1274	108	298
			(Opr. AA2Z)		
K2LE/1	"	1,451,670	1213	113	302
W1WEF	"	1,224,932	1188	106	267
W100	"	1,185,114	1016	115	291
W1DA	"	1,031,751	959	101	270
W1FJ	"	971,640	946	98	262
K1SA	"	936,156	940	101	252
W1BIH	"	877,176	831	107	265
KG1E	"	747,840	826	86	234
KB1W	"	686,996	860	83	201
KA1FGH	"	513,792	621	86	202
K1WJL	"	473,044	576	77	209
W1GG	"	447,888	608	78	180
AB1U	"	340,272	456	85	187
W1CWW	"	262,305	309	78	183
K1BV	"	224,235	472	47	118
W1CNU	"	156,818	306	57	121
W1UA	"	142,868	283	65	126
W1AX	"	130,910	200	75	172
W1END	"	119,886	250	60	114
K1JYM	"	63,349	173	50	93
KB1U	"	57,240	151	48	87
KA1CLV	"	51,612	146	54	84
N1AU	"	40,832	126	44	72
KA1GHR	"	19,380	80	36	59
K1ZZJ	"	17,459	80	29	50
KA1HCQ	"	8,321	64	17	36
W1PLJ	"	5,250	45	14	28
KA1GQ	"	2,040	25	9	21
K1ZZ	**28**	**325,130**	**930**	**28**	**94**
K1RM	"	307,060	803	31	99
W1WY	"	8,001	47	19	44
W1RM	**21**	**483,560**	**1196**	**33**	**107**
K1TO	"	417,628	1088	29	102
WA1FCN	"	159,330	485	27	86
K1IK	"	33,880	247	19	51
W1BET	"	2,550	41	9	21
K1KI	**14**	**545,930**	**1208**	**36**	**118**
KA1UE	"	14,160	93	21	38
K1VHS	"	12,792	61	23	55
K1XM	**7**	**213,192**	**684**	**27**	**81**
K1UO	"	189,774	565	28	89
K1NA	"	150,111	443	29	88
AA1M	"	24,570	128	18	52
K1PT	**3.5**	**73,186**	**303**	**23**	**63**
KE1F	"	2,759	35	9	22
K1MEM	**1.8**	**2,430**	**38**	**11**	**19**
N2LT	**A**	**2,494,710**	**1840**	**130**	**347**
W2REH	"	**1,605,258**	**1136**	**142**	**344**
K2VV	"	**1,557,010**	**1326**	**113**	**293**
W2VJN	"	1,534,680	1062	136	368
K2DM	"	1,469,136	1359	109	272
K2SX	"	1,345,110	1220	112	278
K2RD	"	1,038,530	898	119	291
K2OY	"	1,031,377	1021	107	254
			(Opr. N1EE)		
W2YC	"	804,419	844	96	245
N2JJ	"	693,564	734	107	241
KF2O	"	660,576	708	96	240
W2GGE	"	657,458	711	83	234
K2QF	"	650,905	695	103	232
WØVU/2	"	642,215	724	94	217
W2TZ	"	630,058	846	86	200
K2SB	"	446,532	549	87	206
KB2CR	"	445,770	587	82	188
			(Opr. KA2MNJ)		
N2MR	"	421,686	551	89	185
K2QIL	"	290,815	423	69	176
W2FTY	"	285,670	411	73	172
KB2XZ	"	276,144	390	84	180
W2NC	"	267,064	379	82	169
W1GD/2	"	195,552	311	71	153
W2DW	"	94,864	208	60	116
W2GUP	"	89,209	212	52	94
N2AIF	"	76,302	186	55	102
KW2J	"	70,366	177	55	96
W2PHT	"	59,410	161	45	85
KC2FV	"	57,645	197	34	71
K2MN	"	49,644	140	43	83
W2AK	"	38,824	144	25	67
KT2D	"	22,464	85	39	65
N2BK	"	21,560	113	24	53
WA2UDT	"	15,554	77	27	50
KB2NU	"	12,224	66	25	39
KC2KK	"	8,789	77	27	44
WA2WVU	"	100	6	5	5
K2MFY	**28**	**98,294**	**350**	**24**	**74**
KA2AEV	"	76,258	295	24	67
KQ2N	"	16,962	92	20	46
KR2N	**21**	**459,249**	**1190**	**32**	**101**
			(Opr. KQ2M)		
W2GMT	"	236,880	788	31	74
			(Opr. N2DTW)		
W2AZO	"	190,080	610	28	80
K2NJ	"	164,220	486	32	83
W2ZZ	"	73,038	265	25	69
W2AYJ	"	61,659	265	23	70
K2FE	"	45,741	205	22	57
WB2SZY	"	13,455	195	21	48
WA2IFS	"	3,612	31	20	23
AE2A	**14**	**316,336**	**796**	**34**	**102**
N2PP	"	314,874	881	32	94
WA2LOG	"	36,080	164	25	55
K2EK	**7**	**122,734**	**389**	**26**	**83**
N2UN	"	27,120	127	23	57
W2HG	"	20,976	113	20	49
W2KHQ	"	10,927	87	15	34
K2IGW	**3.5**	**7,849**	**67**	**15**	**33**
K3LR	**A**	**2,141,775**	**1573**	**133**	**342**
N3RD	"	**1,988,415**	**1338**	**135**	**380**
N3AD	"	**1,919,962**	**1525**	**121**	**322**
N2FB/3	"	1,917,950	1543	118	315
N3BB	"	1,776,348	1299	130	347
W3GRF	"	1,340,272	1109	114	308
K3OO	"	1,333,125	1188	112	283
K3SA	"	1,250,074	1035	114	292
K3NZ	"	1,037,001	1094	101	238
W3AP	"	991,230	935	109	261
K3ZZ	"	975,036	961	110	276
W8FJ/3	"	922,148	875	107	275
K3II	"	839,742	860	97	249
K3VW	"	824,496	813	107	249
K3TC	"	739,680	763	96	249
K3WJV	"	700,700	724	106	244
KI3L	"	645,460	780	89	206
W3NZ	"	580,027	631	95	234
N3AM	"	532,120	706	83	182
K3FN	"	503,540	555	103	237
W3UJ	"	447,741	511	89	220
N3NA	"	440,368	567	83	189
W3OV	"	427,476	527	89	205
N3HW	"	425,280	633	78	162
W3ARK	"	398,083	557	73	186
W3ICM	"	304,997	509	80	153
W3EVW	"	279,312	386	88	180
W3GRS	"	219,748	299	92	182
W3HDH	"	217,936	370	68	144
W3GL	"	201,750	305	85	165
K3NCO	"	199,581	345	69	144
K3NL	"	181,940	298	73	147
W3AA	"	179,292	317	66	135
W3GG	"	173,852	319	66	130
K3JGJ	"	166,961	298	66	133
WA3IMY	"	136,612	252	68	128
WA3SZV	"	114,399	231	48	123
K3KNH	"	110,596	256	59	113
WB3CAC	"	104,828	215	53	93
W9KTP/3	"	97,461	218	46	107
W2GKZ/3	"	94,224	225	47	104
W3GN	"	90,630	200	54	105
K3MBF	"	79,250	217	39	86
K2ITG/3	"	62,400	141	56	104
W3YFV	"	44,870	163	51	83
AI3E	"	28,548	120	45	52
N3AW	"	25,063	121	20	51
W3QIR	"	23,108	79	41	68
W3PN	"	22,770	93	34	56
W3FQE	"	9,164	55	21	37
W3EAN	"	7,611	65	19	24
K3IE	"	6,400	50	23	27
N3DAU	"	2,730	26	18	21
WA3DMH	28	6,665	49	11	32
W3AZ	**21**	**145,188**	**462**	**28**	**81**
K3TW	**14**	**92,082**	**324**	**28**	**75**
WB3KKX	"	77,595	265	27	78
N3BJ	**7**	**108,891**	**366**	**28**	**81**
AA1K/3	**1.8**	**1,254**	**32**	**8**	**14**
K4CEF	**A**	**964,224**	**828**	**128**	**305**
W3VT/4	"	**915,948**	**837**	**111**	**285**
NQ4I	"	**912,060**	**1022**	**102**	**222**
WB4BVY	"	855,834	1026	89	205
K4AMC	"	642,408	730	95	217
W4YE	"	540,592	632	88	211
N6AV/4	"	509,712	543	103	233
KØCMF/4	"	467,313	571	87	202
K4XO	"	369,054	453	97	206
N4AA	"	353,113	464	85	186
W4BV	"	314,455	383	97	208
W4RW	"	306,552	456	74	167
K4OD	"	299,200	405	92	183
WA4DRU	"	262,386	373	86	172
KA2DIV/4	"	256,734	303	102	204
WC4E	"	235,904	441	71	123
WB4MAI	"	164,862	230	83	175
WB5YMS/4	"	130,560	253	62	130
W5OG/4	"	122,360	191	82	148
K4FPF	"	107,793	227	62	115
KA4MNS	"	71,610	179	64	91
AA4CM	"	66,608	134	66	115
W4FDA	"	65,856	161	51	96
K4VHC	"	59,432	182	50	86
WB4GNT	"	40,449	106	57	82
W1OR/4	"	27,354	112	33	64
KD4PP	"	26,000	107	42	62
W4YN	"	23,343	92	35	58
W4WJ	"	22,470	74	49	56
K4PB	"	20,586	79	31	63
WA4AHD	"	19,068	84	32	52
WB4SFX	"	16,660	75	35	50
W4JMS	"	12,375	58	27	48
W4DGJ	"	9,000	51	30	42
W4ZR	"	7,812	48	25	38
N4RA	"	4,914	35	22	32
W400	"	2,838	30	19	24
W4WJJ	"	1,300	24	10	15
N4WW	**28**	**394,940**	**1064**	**33**	**97**
N4ZC	"	295,320	890	30	85
KT4W	"	261,030	807	30	83

WB4TDH	"	213,909	655	29	84
W4JD	"	84,134	254	26	92
AA4AK	"	61,952	249	23	65
K4JSI	"	44,436	187	23	61
KC4HN	"	6,324	47	17	34
N4ZZ	**21**	**248,372**	**720**	**33**	**91**
N4BU	"	219,317	659	31	88
N4RG	"	201,708	613	31	86
N4EA	**14**	**286,982**	**713**	**35**	**107**
W4AAV	"	200,343	485	34	109
W4KFC	"	3,840	30	18	30
K4JPD	"	2,565	40	11	16
KA4KMH	"	6	1	1	1
K4CG	**7**	**137,400**	**397**	**32**	**88**
			(Opr. K7SV)		
N4UA	"	100,700	378	26	74
W4XJ	"	89,385	318	25	76
W4VQ	"	73,424	251	26	78
KN4B	"	52,345	208	27	68
N4EUU	"	23,265	153	17	38
K4KUZ	"	12,376	81	16	40
WA4SVO	**3.5**	**33,136**	**167**	**20**	**56**
K4PI	"	22,656	142	19	45
N4TZ	"	10,808	75	16	40
W4MGX	"	2,442	33	12	21
N4SU	**1.8**	**3,600**	**44**	**11**	**25**
N4IN	"	2,848	40	11	21
N5AU	**A**	**2,019,855**	**1586**	**134**	**311**
			(Opr. K5ZD)		
W5XZ	"	**1,330,398**	**1101**	**120**	**306**
N5RM	"	764,556	796	107	241
K5LP	"	549,432	641	99	213
K5BDX	"	340,170	521	69	161
K5NW	"	222,132	374	66	148
W5OSJ	"	213,400	396	68	132
KM5G	"	160,680	365	45	111
N5HB	"	151,755	282	80	121
AC5K	"	131,400	269	72	128
W5JC	"	122,324	230	81	131
W5OB	"	120,528	247	68	118
K5MA	"	114,723	232	77	112
WB5ZKR	"	100,606	204	69	118
KT5Q	"	95,535	237	68	97
W5ODD	"	82,836	182	69	108
N5CFU	"	69,154	172	52	87
W5LJT	"	34,013	124	41	72
N5FG	"	31,598	99	46	76
W5NJ	"	28,392	72	35	69
K3ZMI/5	"	25,781	82	55	72
K2SCU/5	"	17,820	83	37	44
W5AH	"	14,946	61	41	53
K5RSG	"	3,528	22	15	27
W5VX	**28**	**202,048**	**618**	**30**	**82**
N5TP	"	158,426	493	28	85
AD5Q	"	124,542	469	26	73
K5RX	**21**	**173,511**	**519**	**32**	**85**
K5TSQ	"	158,596	450	34	90
W5LKP	"	16,616	94	21	41
KB5FU	"	13,684	128	19	25
W5EIJ	"	7,280	53	20	32
W5KCR	"	4,608	46	13	23
AC5R	"	836	35	10	12
N5CR	**14**	**296,805**	**725**	**36**	**105**
W5FO	"	235,060	691	37	109
KU5E	"	76,544	273	29	75
KW5P	"	19,162	108	24	43
KZ5J	"	14,840	97	21	35
K5RR	**7**	**116,938**	**353**	**31**	**87**
			(Opr. K5MR)		
N5JB	"	112,068	399	30	69
W5JW	"	92,340	343	29	66
W5AS	3.5	3,535	41	12	23
K5GO	**1.8**	**2,552**	**109**	**10**	**19**
K5YY	"	512	21	7	9
N6BV	**A**	**1,338,820**	**1288**	**123**	**242**
N6QR	"	**1,212,775**	**1254**	**120**	**229**
N6DHV	"	**791,820**	**911**	**109**	**209**
N6AR	"	758,212	752	123	241
N6RZ	"	719,952	807	111	207
N6GG	"	719,180	832	100	208
W6TMD	"	428,652	616	87	156
W6FSJ	"	424,704	598	94	162
KR6Q	"	397,919	551	93	170
W5FL/6	"	336,685	533	94	139
KA6IYE	"	316,516	545	78	134
W6ISQ	"	297,728	419	97	159
W6YKM	"	266,640	540	64	112
WB6JMS	"	255,219	400	95	146
K6DR	"	253,385	505	76	111
N6AN	"	246,848	446	80	123
AG6D	"	240,366	449	81	113
W2KVA/6	"	239,736	515	76	92
KF6R	"	232,638	478	71	103
W6WB	"	222,049	370	88	145
AD6D	"	174,765	355	76	107
K6MSK	"	163,248	330	60	119
KE6PQ	"	126,096	326	59	89
W6CS	"	121,511	264	67	102
K6LAN	"	100,674	262	61	80
N6NF	"	98,298	282	56	71
W6BYH	"	97,110	218	68	98
WA6TKT	"	92,158	235	58	84
N6UW	"	89,646	249	56	78
KS6H	"	86,762	239	55	87
K6EID	"	78,300	203	63	82
NG6W	"	65,610	177	57	78
K6TMB	"	52,635	142	63	82
WB9HRO/6	"	51,884	174	45	64
W6NKR	"	46,624	137	46	78
W6OVO	"	42,900	144	49	61
AA6EE	"	40,400	155	44	57
W6OKK	"	32,373	123	44	55
K6CSL	"	21,866	160	30	28
N6BT	"	20,361	210	17	16
			(Opr. WA6VEF)		
W6NNV	"	19,200	84	34	46
N6KW	"	13,944	63	33	51
AA4M/6	"	13,554	96	26	28
N6ADK	"	9,570	65	29	29
K6QS	"	6,992	111	23	23
N6JM	"	5,043	42	20	21
N6TR	"	3,780	40	20	22
N6MU	**28**	**122,760**	**462**	**25**	**68**
K6RR	"	97,612	389	25	67
			(Opr. WA6OTU)		
AB6R	"	41,300	210	23	47
N6MG	"	39,416	266	19	33
W6YA	**21**	**230,702**	**674**	**35**	**87**
W6BSY	"	81,607	380	24	55
W6DN	"	35,350	188	24	46
NN60	"	19,110	176	16	23
K6OZL	**14**	**92,760**	**275**	**32**	**88**
W6HJ	"	17,733	91	27	42
W6AM	**7**	**127,009**	**412**	**34**	**73**
			(Opr. N6AW)		
N6RJ	"	99,082	322	37	70
N6OC	"	7,198	43	21	40
N6VR	3.5	4,884	55	14	19
W6TFO	"	1,457	20	16	15
AE6U	**1.8**	**5,004**	**102**	**16**	**20**
K6SE	"	2,376	37	10	14
W6US	"	182	19	7	6
W6RR/7	**A**	**1,311,924**	**1297**	**119**	**235**
W7IR	"	**942,158**	**859**	**123**	**266**
N7TT	"	481,806	901	82	131
K7ZA	"	432,080	684	76	144
K7DZ	"	429,461	624	90	161
KU7M	"	287,040	532	84	111
W7AYY	"	190,213	414	61	106
W7IIT	"	158,920	387	54	91
W7FGT	"	152,586	377	60	87
K7NF	"	103,428	313	44	73
W7KKR	"	88,836	254	53	79
WB2WEO/7	"	77,952	346	25	62
W7EKM	"	60,270	206	44	61
W7IEU	"	56,000	190	45	55
K7UU	"	53,663	201	46	57
KD7DH	"	22,059	144	28	29
W7JKA	"	21,586	94	35	51
KC7V	"	19,783	102	31	42
W7QK	"	18,444	74	36	51
K7WA	"	11,050	76	20	30
N7AM	"	7,595	55	20	29
KC7EY	**28**	**71,390**	**418**	**21**	**38**
KO7G	"	38,133	251	21	36
KR7L	"	3,586	57	9	13
N7RO	**21**	**120,472**	**487**	**26**	**62**
W7KSA	"	32,096	166	22	46
K7FC	"	7,268	61	17	29
WB7FAR	**14**	**109,620**	**494**	**24**	**63**
			(Opr. KS7V)		
K7IDX	"	13,728	123	26	40
K7TTZ	"	10,149	73	17	34
W7XN	**7**	**18,559**	**102**	**24**	**43**
WB7FDO	"	16,632	114	23	40
KT7G	"	16,380	124	18	34
K7ABV	"	12,871	87	24	37
N7RM	**3.5**	**13,889**	**128**	**16**	**27**
K7UR	"	6,528	91	13	19
N7EA	"	5,580	64	13	23
K4POL/8	**A**	**2,081,820**	**1519**	**126**	**345**
WA8YVR	"	**1,962,849**	**1505**	**121**	**332**
K8NZ	"	**1,853,805**	**1569**	**117**	**298**
N8BJQ	"	378,603	525	90	189
AC8W	"	322,048	438	85	187
KE8M	"	301,254	467	73	149
K8DU	"	262,614	389	85	168
N8TN	"	220,880	375	73	147
WA8UQK	"	196,560	304	79	161
K8SS	"	181,216	298	79	145
K8MNG	"	180,616	329	76	138
W8TWA	"	180,600	321	73	137
W8UPH	"	159,027	320	62	121
K8OQL	"	156,078	281	70	137
K8MR	"	147,420	258	70	140
W8GOC	"	135,360	267	67	121
K8LJG	"	117,768	250	63	105
W8YGR	"	80,560	162	71	119
K8CV	"	72,668	176	56	92
K8QWY	"	67,990	189	46	84
K8BA	"	59,041	158	56	95
W8EX	"	45,684	120	54	87
N8EKM	"	20,184	86	31	56
WD8MOV	"	15,792	68	27	57
KA8IIN	"	15,023	72	29	54
K8HF	"	8,184	58	31	31
WB6NYR/8	"	5,223	43	19	29
KA8HJG	"	660	20	11	11
W8UVZ	**28**	**198,924**	**584**	**32**	**89**
W8WVU	"	56,334	249	23	59
K8CX	**21**	**269,280**	**772**	**30**	**90**
N8UM	"	242,000	694	34	87
WB8JBM	"	184,709	564	31	81
			(Opr. WD8IJP)		
W8QID	"	118,340	423	26	71
WD8IXE	"	58,982	275	22	55
KM8L	"	49,329	216	24	57
WD8AUB	**14**	**218,397**	**622**	**33**	**96**
K8CW	"	109,365	336	33	82
WA8DXB	"	93,856	295	29	83
N8CXX	"	11,577	80	17	34
KO8T	**7**	**55,384**	**229**	**27**	**65**
N8BKO	"	48,906	181	26	73
WD8LLD	"	38,263	161	22	61
KV8Q	"	2,666	42	12	19
WB8KKI	**3.5**	**7,098**	**67**	**13**	**29**
K8AQM	"	3,131	48	12	19
K8MN	**1.8**	**1,320**	**51**	**8**	**14**
K9DX	**A**	**2,100,372**	**1595**	**131**	**326**
W9SU	"	**986,974**	**961**	**110**	**251**
K9BGL	"	**854,672**	**871**	**106**	**258**
W9OP	"	659,792	786	94	207
W9NA	"	360,728	477	90	178
KE9A	"	358,940	487	93	181
K9TUS	"	256,059	449	75	132
AK9Z	"	245,271	373	76	171
K9AB	"	212,688	356	70	141
KB9XG	"	207,260	333	73	142
KK9G	"	189,200	267	74	201
W9GIL	"	182,016	343	60	132
K9BQL	"	156,106	315	65	113
WD9DBC	"	107,008	233	64	112
W9GXR	"	102,872	250	55	99
K9BIL	"	76,368	163	63	109
W9RY	"	77,384	202	48	88
N9AFV	"	68,060	157	70	94
W9QWM	"	67,536	178	50	94
K9IW	"	49,419	125	62	91
KA9ACS	"	44,330	144	56	54
W9CA	"	34,572	100	45	84
K9LWT	"	32,276	108	44	70
W9TNZ	"	30,495	107	42	65
K9VAL	"	20,580	76	38	60
W9LNQ	"	19,264	85	37	75
K9GDF	"	6,534	50	29	37
KF9U	"	4,554	37	18	28
WA9MRU	"	2,074	25	14	20
WD9IIX	"	1,050	14	12	13
KC9T	**21**	**135,720**	**423**	**32**	**85**
W9OA	"	122,815	361	30	91
K9CLO	"	114,741	417	27	72
WA9MAG	"	97,743	366	27	66
W9WAQ	"	96,768	317	29	79
W9XT	"	88,173	325	27	70
KJ9D	**14**	**292,352**	**798**	**31**	**97**
K9BG	"	200,037	544	31	100
W9OPD	**7**	**24,648**	**118**	**24**	**55**
K9FW	**3.5**	**5,160**	**56**	**15**	**28**
WD9BBI	"	2,160	32	10	17
W8FR/9	1.8	171	11	5	4
K4VX/8	**A**	**1,242,150**	**1132**	**118**	**272**
W8WP	"	**969,813**	**973**	**103**	**248**
WA2CNF/8	"	165,784	342	63	121
W6FN/8	"	161,802	290	68	134
AK8M	"	150,300	253	80	145
N8ZA	"	110,490	232	65	109
KS8T	"	70,179	182	63	94
W8IYR	"	69,784	177	57	86
KM8R	"	68,911	195	54	83
AK8P	"	65,331	161	54	99
W8YBV	"	53,339	143	55	88
W8IZ	"	51,128	128	66	88
W8SR	"	49,536	144	59	85
KC8Q	"	41,850	120	50	85
K8TLM	"	40,986	112	57	81
K9AYK/8	"	38,610	138	41	69
W8RXL	"	38,552	138	46	76
KN8O	"	31,824	114	38	64
W8ANZ	"	27,972	101	43	65
KE8Y	"	27,825	100	42	63
WA2HFI/8	"	16,617	87	43	44
W8EKS	"	14,352	66	31	47
KA8KAN	"	1,007	23	10	9
W8YK	**28**	**175,200**	**629**	**27**	**69**
K8UK	"	20,550	137	15	35
K8LCI	"	7,380	71	16	25
W8ZV	**21**	**296,545**	**807**	**34**	**93**
N8BCN	"	93,217	330	26	71
KN8Q	"	38,064	171	25	53
KA8INV	"	21,412	141	18	35
N8CNV	"	6,956	55	16	31
K8ZX	**14**	**244,530**	**699**	**35**	**95**
AC8S	"	46,992	191	28	60
W8KEA	**7**	**115,350**	**429**	**31**	**55**
K8RF	**3.5**	**40,079**	**247**	**26**	**43**
W8JU	"	5,985	70	12	23
W8RSG	"	3,591	53	10	17
W8VX	"	405	14	7	8
KV8Q	**1.8**	**1,029**	**35**	**8**	**13**

ALASKA

AL7H	**A**	**1,240,624**	**1972**	**97**	**169**
KL7RA	"	1,205,688	1892	88	176
AL7CQ	**21**	**177,951**	**1060**	**25**	**44**
KL7AF	"	59,176	462	22	30

BAHAMAS

WB4OSN/C6A	**28**	**220,387**	**1309**	**21**	**52**
C6ADV	21	4212	160	6	7
K4LQ/C6A	**14**	**192,882**	**971**	**29**	**64**

BARBADOS

8P6J	**A**	**4,636,763**	**5049**	**114**	**287**
			(Opr. N6TJ)		

BELIZE

V3MS	**A**	**2,393,100**	**3715**	**92**	**208**
			(Opr. W8CP)		
V3TV	**28**	**519,048**	**2430**	**25**	**64**

BERMUDA

VP9LB	**14**	**14,280**	**216**	**8**	**22**

CANADA

VE1AIH	**A**	**650,679**	**1042**	**76**	**191**
VO1KO	"	226,570	740	43	96
VE1CCM	"	11,904	207	15	9
VO1AW	"	3,526	31	16	25
VE1CAN	**14**	**42,420**	**255**	**19**	**51**
VE1AJJ	"	35,336	271	18	38
VE1BSL	"	9,282	126	11	23
VE1CEG	**7**	**44,265**	**288**	**17**	**48**
VE2DPO	**A**	**268,736**	**825**	**54**	**98**
VE2FTU	"	6,876	89	18	18
VE2FJR	"	4,690	66	19	16
VO2CW	**28**	**143,780**	**724**	**22**	**69**
VE3KZ	**A**	**1,484,280**	**1693**	**106**	**254**
VE3NBE	"	96,465	371	41	68
VE3MKJ	"	13,566	126	24	27
VE3GWM	"	5,215	63	15	20
VE3LQJ	**28**	**35,032**	**246**	**16**	**42**
VE3BMV	**14**	**662,454**	**1730**	**36**	**113**
VE3BVD	**7**	**114,896**	**606**	**25**	**61**
VE3ICR	"	50,775	295	25	50
VE3CKR	**3.5**	**6,030**	**169**	**8**	**10**
VE3INQ	**1.8**	**5,205**	**174**	**6**	**9**
VE5AE	**14**	**22,368**	**353**	**14**	**18**
VE5AAB	7	700	73	3	2
VE5XU	**1.8**	**1,029**	**76**	**4**	**3**
VE6CNV	**A**	**76,838**	**301**	**42**	**61**
VE6OU	**7**	**42,284**	**458**	**17**	**27**
VE7AAQ	**A**	**544,500**	**854**	**88**	**154**
VE7BS	**1.8**	**1,888**	**58**	**7**	**9**

COSTA RICA

TI5BGA	**A**	**120,015**	**424**	**51**	**76**

DOMINICAN REPUBLIC

HI8LC	21	11,340	140	11	25

HAITI

HH2VP	**A**	**2,399,617**	**3140**	**96**	**243**

HONDURAS

W5BE/HR6	**A**	**269,664**	**1380**	**47**	**49**
HR1AT	"	40,734	306	28	34

JAMAICA

6Y5HN	**A**	**654,890**	**1386**	**70**	**145**

MEXICO

XE1VV	**A**	**676,079**	**1639**	**70**	**123**

MONTSERRAT

VP2MM	3.5	12,464	325	7	12

PANAMA

HP1AC	A	39,248	187	29	59
HP1XAT	**21**	**133,196**	**889**	**21**	**46**

PUERTO RICO

K6BR/KP4	**A**	**151,630**	**598**	**42**	**76**

ST. MAARTEN

P47E	**A**	**819,030**	**1540**	**71**	**159**
			(Opr. W4UY)		

U.S. VIRGIN ISLANDS

K5NA/KP2	**A**	**2,503,522**	**3546**	**94**	**220**
KV4FZ	**7**	**536,616**	**1800**	**28**	**88**

AFRICA

CANARY ISLANDS

EA8AGH	**A**	**91,800**	**342**	**26**	**64**
EA8ZZ	**28**	**50,760**	**236**	**19**	**53**
EA8AK	**1.8**	**75,768**	**385**	**15**	**51**
EA8QL	"	7,800	69	9	31

CEUTA AND MELILLA

EA9GK	**7**	**48,762**	**301**	**12**	**42**
EA9EU	**1.8**	**38,220**	**247**	**10**	**42**

DJIBOUTI

J28DM	**A**	**349,806**	**681**	**50**	**123**

KENYA

5Z4CS	**A**	**2,703,085**	**2367**	**112**	**273**
			(Opr. JE1JKL)		
5Z4DE	"	995,400	1411	73	164
			(Opr. N4VV)		
5Z4JR	"	84,240	324	23	67
			(Opr. OH2BAH)		

MADIERA ISLANDS

CT3DJ	**A**	**64,020**	**198**	**40**	**70**

MOROCCO

CN8CX	**A**	**6,234,664**	**4354**	**121**	**358**
			(Opr. K6NA)		
CN8CO	"	154,842	269	53	144
CN8CY	**21**	**345,800**	**1307**	**22**	**69**

REUNION ISLAND

FR8GGL	**A**	**1,217,749**	**1474**	**85**	**198**

SOUTH AFRICA

ZS4SP	**A**	**260,528**	**585**	**51**	**101**
ZS2RM	**14**	**70,810**	**249**	**26**	**71**

SWAZILAND

3D6AK	**28**	**88,080**	**492**	**17**	**43**

ZIMBABWE

Z23JO	**A**	**123,849**	**420**	**32**	**67**

ASIA

ISRAEL

4Z4KX	**21**	**239,100**	**804**	**30**	**70**
4X4JO	"	142,800	596	26	58
4X4NJ	**1.8**	**27,850**	**208**	**11**	**39**

JAPAN

JG1ILF	**A**	**1,712,139**	**1926**	**109**	**198**
JH1OGC	"	**1,118,319**	**1245**	**114**	**199**
JA1IDY	"	1,004,367	1245	97	186
JJ1ITS	"	663,871	1018	84	145
JK1HAM	"	464,694	661	83	163
JA1CJQ	"	422,926	639	95	143
JA1JKG	"	382,761	624	85	128
JA1NLX	"	333,822	652	69	108
JF1SEK	"	312,430	618	72	111
JH1MTR	"	240,240	428	81	127
JJ1SOE	"	196,840	467	67	85
JI1PCN	"	183,996	385	70	101
JR1ZTT	"	183,701	428	63	100
JR1XFS	"	180,550	411	66	91
JI1KUV	"	48,984	176	48	56
JR1TLA	"	40,456	149	41	63
JF1EEK	"	40,454	144	51	62
JL1DBI	"	31,328	130	33	55
JA1YCL	"	31,080	142	40	44
JM1NKT	"	31,008	153	36	40
JK1OEO	"	16,610	108	23	32
JA1LG	"	12,337	169	28	45
JA1ERW	"	10,160	95	14	26
JA1ALX	"	4,059	35	18	23
JA1OYB	"	3,904	47	18	14
JH1RNZ	**28**	**268,109**	**920**	**31**	**72**
JJ1NUB	"	222,950	851	29	62
JE1QIY	"	90,036	394	29	53
JA1OP	"	36,134	223	23	35
JJ1OSP	"	20,868	156	20	27
JA1EMQ	"	15,463	119	19	28
JN1ENK	"	7,038	78	16	18
JH1CNN	"	5,590	75	12	14
JH1KRC	"	2,480	43	8	8
JA1KEG	"	2,208	34	11	12
JA1DCL	"	2,178	26	15	18
JA1AJA	"	567	27	4	3
JR1AHH	"	75	5	3	2
JE1AYU	**21**	**299,310**	**948**	**32**	**78**
JF1PUW	"	225,008	786	28	70
JF1EQA	"	203,400	696	30	70
JF1EZH	"	146,500	506	28	72
JA1PS	"	52,725	254	24	51
JK1MZT	"	29,824	167	23	41
JO1LZX	"	22,080	140	22	38
JH1NRN	"	20,941	168	18	25
JL1XMN	"	20,736	151	17	31
JI1QLB	"	19,552	135	20	32
JA1CKE	"	13,380	156	14	16
JA1JXU	"	9,000	80	10	14
JL1EJO	"	5,070	58	10	20
JN1WFF	"	4,950	58	17	16
JA1BUI	"	2,575	38	13	12
JA1JQY	**14**	**80,216**	**392**	**24**	**50**
JG1GGF	"	46,784	244	25	43
JG1QGQ	"	7,912	67	18	25
JG1VOT	"	3,330	29	18	27
JK1LUY	"	782	17	7	10
JI1QQI	**7**	**87,920**	**403**	**25**	**55**
JE1QDQ	"	29,325	200	22	47
JA1BOK	"	756	20	7	6
JG1IMM	3.5	1,300	28	11	9
JA1GTF	**1.8**	**672**	**23**	**8**	**8**
JA1PPH	"	144	9	5	4
JE1SPY	"	140	11	4	3
JF2CCN	**A**	**188,272**	**410**	**60**	**104**
JA2APA	"	143,763	302	73	100
JA2BNN	"	44,187	162	44	59
JH2XTV	"	6,370	64	15	20
JA2YKD	"	1,254	24	10	9
			(Opr. JF2NXS)		
JF2VDY	**28**	**107,864**	**409**	**30**	**67**
JH2CJW	"	92,414	411	24	58
JE2SOY	"	39,600	225	24	42
JR2NTC	"	36,046	185	24	43
JA2APH	"	9,964	74	17	30
JR2GCS	"	6,912	54	18	30

Single Op All Band Zone Winners

Zone	Leader (Score)	Zone	Leader (Score)
1.	AL7H (1,240,624)	21.	UF6CR (4,613,680)
2.	VO2CW (143,780)	22.	No Entrant
3.	N6BV (1,338,820)	23.	JTØGM (1,415,418)
4.	K9DX (2,100,372)	24.	No Entrant
5.	K1AR (2,762,383)	25.	JA4YFH (2,281,915)
6.	XE1VV (676,079)	26.	No Entrant
7.	V3MS (2,393,100)	27.	KG6DX (658,728)
8.	8P6J (4,636,763)	28.	9V1VP (341,712)
9.	9Y4VT (6,929,450)	29.	VK6ANE (204,640)
10.	HC1SK (456,624)	30.	VK2GW (142,002)
11.	PY5XFR (232,112)	31.	KH6ND (1,430,020)
12.	CE1ADG (38,657)	32.	ZL1AMO (168,636)
13.	CX7CO (771,776)	33.	CN8CX (6,234,664)
14.	DK3GI (2,924,215)	34.	No Entrant
15.	OK2BLG (1,433,890)	35.	No Entrant
16.	UB5EC (2,018,320)	36.	No Entrant
17.	UV9AX (2,390,710)	37.	5Z4CS (2,703,085)
18.	UAØUBA (523,400)	38.	ZS4SP (260,528)
19.	UAØZBF (230,580)	39.	FRØGGL (1,217,749)
20.	LZ2AB (1,545,611)	40.	JW5VAA (10,325)

JF2EZA	**21**	**170,850**	**580**	**29**	**73**
JA2FXV	"	68,484	307	27	51
JE3IGA/2	"	33,012	185	22	41
JH2HPO	"	14,092	98	20	32
JA2KPV	"	10,908	105	15	21
JA2DHL	"	9,472	101	14	18
JG2LGM	7	871	25	7	6
JA3YEE	**A**	**348,085**	**595**	**79**	**136**
JR3XEX	"	183,212	420	65	98
JR3WXA	"	124,128	313	61	83
JH3CON	"	1,328	31	12	12
JR3RWB	**28**	**108,962**	**460**	**26**	**60**
JA3EQC	"	83,370	426	22	48
JA3BLN	"	31,424	190	24	40
JR3SPV	"	29,145	163	23	44
JH3CXL	**21**	**162,630**	**630**	**27**	**63**
JR3MKT	"	1,525	23	12	13
JA3YQP	**14**	**238,095**	**842**	**29**	**70**
JA3HTT	"	58,546	291	26	47
JH3JYS	"	37,740	200	25	43
JR3BOT	"	22,176	140	20	36
JG3RPL	7	3,500	48	15	13
JH3BGG	**3.5**	**28,920**	**186**	**23**	**37**
JA3AA	"	864	30	9	9
JA4YFH	**A**	**2,281,915**	**2020**	**121**	**274**
JA4ESR	"	191,317	389	82	99
JR4IQI	"	6,346	60	18	20
JA4AQR	28	10,215	80	16	29
JR4ISK	**21**	**60,751**	**274**	**26**	**53**
JA4BFL	14	6,762	67	19	23
JH4JLZ	**7**	**107,424**	**400**	**28**	**68**
JH4IFF	"	67,311	313	26	55
JA4LQB	**1.8**	**442**	**23**	**6**	**7**
JH4ELP	"	187	14	6	5
JA5SIX	**A**	**509,040**	**720**	**89**	**163**
JA5AF	"	23,205	110	36	49
JH5MVR	**28**	**37,448**	**215**	**22**	**40**
JA5BJC	**7**	**287,850**	**890**	**33**	**81**
JA5DQH	**1.8**	**990**	**34**	**9**	**9**
JA6BIF	**A**	**337,935**	**630**	**76**	**119**
JA6LDD	"	187,860	364	77	109
JA6JNG	"	135,936	358	64	80
JA6IP	"	68,080	215	51	64
JA6ABG	"	57,024	201	44	64
JR6LP	"	6,916	51	22	30
JA6CM	28	3,248	42	14	15
JR6VRY	"	1,120	22	11	9
JH6TNH	**21**	**41,517**	**230**	**22**	**41**
JA6VZB	"	33,408	189	24	40
JA6AKV	"	12,852	87	23	31
JF6DRR	"	1,210	22	10	12
JA6GCE	**14**	**30,075**	**150**	**25**	**50**
JA6IEF	**3.5**	**23,895**	**164**	**22**	**37**
JA7YCQ	**A**	**509,250**	**860**	**85**	**125**
JA7JWF	"	339,680	564	94	126
JA7JND	"	300,618	613	70	101
JE7BIZ	"	149,242	383	57	85
JA7EC	"	106,743	313	49	70
JA7CPW	"	75,300	269	50	50
JA7KM	"	44,055	161	42	57
JR7SZJ	"	43,659	186	34	47
JA7BAL	"	33,916	110	55	67
JA7TJ	"	21,010	139	24	31
JH7YFR	"	11,616	94	25	19
JA7HMZ	**28**	**141,300**	**547**	**29**	**61**
JH7UJU	"	91,542	463	23	50
JA7UFZ	"	46,860	376	19	36
JH7RKT	"	17,625	137	21	26
JA7FMZ	"	2,760	42	10	13
JR7NFW	**21**	**175,667**	**626**	**28**	**69**
JA7BIJ	"	70,965	421	20	37
JA7DOT	"	40,383	225	25	38
JA7EDZ	"	1,239	23	10	11
JH7BRG	**14**	**22,880**	**145**	**21**	**37**
JH7WKQ	"	21,122	135	20	39
JA7ECT	7	1,313	35	8	5
JA7KAC	3.5	1,854	52	10	8
JA8AQ	A	11,520	52	39	41
JA8CAQ	"	6,713	51	23	26
JA8CJY	**21**	**64,575**	**304**	**23**	**52**
JA8KSD	**14**	**76,110**	**311**	**24**	**62**
JH8JYV	7	12,173	95	20	27
JA9JFO	**A**	**391,230**	**593**	**90**	**153**
JA9FT	"	62,239	203	52	57
JA9PBZ	"	2,143	66	8	9
JA9FAI	**28**	**116,440**	**505**	**28**	**54**
JA9BAB	"	21,440	129	23	41
JA9YE	"	8,450	67	21	29
JA9CWJ	**21**	**94,054**	**442**	**22**	**52**
JA9LJS	**14**	**154,878**	**643**	**26**	**57**
JH9GGH	"	1,392	22	10	14
JA9AGX	3.5	5,550	63	16	21
JA9BOH	"	130	14	6	4
JH8LFE	**A**	**834,768**	**1080**	**104**	**174**
JAØDAI	"	630,819	808	105	174
JAØCGJ	"	385,992	652	77	139
JAØVUJ	**21**	**30,420**	**174**	**20**	**40**
JAØGZ	"	240	10	4	4
JAØMOQ	14	10,816	81	19	33
JAØVHI	7	48	4	2	2
JAØDXG	**3.5**	**25,281**	**207**	**21**	**32**

KUWAIT

9K2DX	**A**	**2,560,005**	**2343**	**98**	**289**
					(Opr. N6NI)
9K2BE	14	8,288	77	11	26
					(Opr. G4BWP)

MONGOLIA

JTØGM	**A**	**1,415,418**	**2044**	**93**	**225**
					(Opr. UV3GM)

QATAR

A71AE	**7**	**103,425**	**549**	**20**	**55**

SAUDI ARABIA

HZ1HZ	**A**	**768,128**	**781**	**99**	**254**

SINGAPORE

9V1VP	**A**	**341,712**	**885**	**83**	**143**
9V1TL	"	234,927	731	72	117

SYRIA

YK1AO	A	8,190	71	13	26

ASIATIC U.S.S.R.

ARMENIA

UG6GDS	**A**	**185,858**	**469**	**40**	**106**
UG6GAI	**7**	**69,564**	**375**	**15**	**53**
UG6GBD	**3.5**	**49,000**	**359**	**9**	**40**

ASIATIC RUSSIA

UV9AX	**A**	**2,390,710**	**2028**	**104**	**306**
UAØUBA	"	523,400	1064	62	128
UAØACM	"	520,655	827	76	169
UA9AEH	"	483,720	752	58	174
UA9CBR	"	406,296	674	51	177
UA9MR	"	369,672	556	83	209
UA9OO	"	335,587	514	61	190
UA9MI	"	145,200	504	30	80
UA9AHP	"	130,249	323	38	123
UA9AFG	"	114,015	263	51	114
UAØLCZ	"	52,470	207	43	67
UAØCCR	"	40,967	159	32	49
UAØFAY	"	38,766	475	14	29
UA9WFU	"	35,555	298	20	45
UA9FKM	"	33,614	141	31	75
UAØSKF	"	17,024	117	22	42
UAØCDM	"	13,090	188	11	24
UA9CKC	**28**	**159,852**	**705**	**24**	**70**
UA9QBT	"	131,595	565	24	69
UAØAG	"	125,413	680	22	61
UA9FAR	"	52,185	318	16	71
UA9ULC	"	46,893	253	19	58
UA9OBS	"	6,125	115	10	25
UAØZBF	**21**	**230,580**	**1024**	**26**	**58**
UAØSGN	"	179,520	813	25	63
UAØSLN	"	57,424	332	19	55
UA9ADQ	**14**	**413,328**	**1362**	**28**	**81**
UAØSAU	"	326,180	1245	27	67
UA9LAL	"	317,700	1170	27	73
UAØABC	"	114,560	592	23	57
UAØJDX	"	62,216	463	21	35
UAØZDE	"	56,782	456	21	37
UVØBB	"	31,516	448	21	29
UA9CAX	"	30,562	195	16	43
UAØKBV	"	7,808	96	15	17
UAØSGL	**7**	**31,955**	**381**	**19**	**36**
UAØJAD	"	15,162	233	18	24
UA9TS	**3.5**	**133,725**	**651**	**17**	**58**
UA9CBM	"	71,244	377	15	53
UA9YFG	"	47,763	348	17	44
UAØZBP	"	14,010	280	14	16
UAØSE	"	6,160	158	10	18
UA9AHR	"	3,570	90	10	32
UA9SAX	**1.8**	**30,015**	**253**	**11**	**34**
UA9SJL	"	15,910	166	9	28
UA9CBO	"	3,360	46	8	23
UAØSGJ	"	663	50	6	7
UAØFER	"	25	25	1	1

AZERBAIJAN

UD6DKW	**A**	**737,940**	**1069**	**61**	**190**
UD6CN	**14**	**98,040**	**414**	**21**	**65**

GEORGIA

UF6CR	**A**	**4,613,680**	**3982**	**92**	**312**
UF6QAH	"	128,030	442	34	84
UF6FER	**28**	**67,840**	**563**	**12**	**41**
UF6DA	"	7,878	74	11	28
UF6FIF	"	126	11	2	4
UF6FFJ	**14**	**120,267**	**665**	**20**	**49**
UF6QAP	"	27,852	227	9	35
UF6QAN	"	7,992	80	13	24
UF6FDR	**7**	**56,430**	**381**	**11**	**43**

KAZAKH

UL7LAW	**A**	**798,868**	**1027**	**70**	**207**
UL7GAA	"	495,627	815	71	182
UL7LDR	"	36,180	193	20	47
UL7CBM	**28**	**82,840**	**347**	**22**	**73**
UL7XE	**21**	**223,944**	**919**	**24**	**69**
UL7CAL	**14**	**125,034**	**480**	**24**	**67**
UL7GDJ	"	81,780	416	25	62
UL7CBP	"	74,830	394	17	53
UL7EAR	"	39,988	187	19	57
UL7LCZ	**3.5**	**151,840**	**822**	**17**	**56**
UL7GAV	"	39,266	350	13	45
UL7CAD	**1.8**	**14,820**	**156**	**11**	**27**

KIRGHIZ

UM8MBA	**A**	**742,400**	**1086**	**79**	**211**
UM8MCY	**21**	**24,544**	**220**	**15**	**37**
UM8MDX	**14**	**56,486**	**331**	**16**	**45**
UM8MBI	3.5	592	37	6	10
UM8MAZ	**1.8**	**22,261**	**52**	**6**	**15**

TADZHIK

UJ8JAS	**21**	**145,827**	**524**	**27**	**72**
UJ8JCE	**14**	**15,996**	**147**	**14**	**29**
UJ8AW	3.5	6,206	109	8	21

TURKOMAN

UH8DC	**A**	**1,210,860**	**1458**	**86**	**224**
UH8HCN	"	34,340	297	22	46

UZBEK

UI8BI	**A**	**852,962**	**1235**	**79**	**204**
UI8TAA	"	88,494	402	28	70
UI8ADR	**28**	**76,722**	**607**	**13**	**44**

EUROPE

AUSTRIA

OE1ZES	A	9960	87	26	57
OE1NPW	**28**	**206,403**	**805**	**30**	**77**
OE7SHI	**14**	**45,446**	**505**	**15**	**47**

AZORES ISLANDS

CT2QN	**14**	**71,214**	**457**	**20**	**63**

BELGIUM

ON4FD	**A**	**1,176,855**	**1775**	**83**	**253**
ON4ALC	**21**	**97,980**	**668**	**50**	**69**
ON4XG	**14**	**49,800**	**363**	**23**	**60**
ON7JC	"	19,095	234	14	43
ON5WL	**3.5**	**32,188**	**551**	**9**	**43**

BULGARIA

LZ2AB	**A**	**1,545,611**	**1988**	**105**	**304**
LZ1AG	"	311,860	549	77	233
LZ2BR	"	120,589	421	49	112
LZ1YJ	"	114,310	581	41	120
LZ1GZ	"	92,132	577	33	91
LZ1NP	"	79,080	409	32	88
LZ1IF	"	38,882	291	28	85
LZ2AG	"	27,192	170	28	75
LZ1WY	"	2,778	82	20	44
LZ1NJ	"	2,484	57	11	25
LZ2KTS	**21**	**391,500**	**1352**	**32**	**93**
LZ2IH	**14**	**43,392**	**470**	**25**	**48**
LZ2JG	"	15,912	236	14	37
LZ1FM	"	4,260	96	11	19
LZ2ZZ	**7**	**188,846**	**1116**	**25**	**73**
LZ1KAB	"	73,062	644	20	61
LZ1KAA	"	5,805	129	13	32
LZ2PP	**3.5**	**106,088**	**993**	**21**	**68**
LZ1HY	"	1,196	46	6	17
LZ2BE	**1.8**	**16,500**	**292**	**7**	**43**

CZECHOSLOVAKIA

OK2BLG	**A**	**1,433,890**	**1603**	**110**	**336**
OK2BHV	"	**1,209,162**	**1692**	**94**	**317**
OK3OM	"	**1,075,830**	**1616**	**83**	**244**
OK1AVD	"	984,940	1515	93	277
OK3KEE	"	925,750	1385	82	268
OK3SIH/P	"	564,050	1098	75	215
OK3PQ	"	560,048	1039	72	212
OK1AJN	"	383,863	735	72	197
OK3FON	"	378,226	627	75	206
OK1ZP	"	338,074	857	65	177
OK1KZ	"	271,575	686	55	158
OK2BJU	"	245,046	503	60	164
OK1AWF	"	234,513	575	59	154
OK3YCA	"	163,008	452	58	134
OK3IF	"	160,524	425	47	149
OK2BWH	"	159,983	516	44	113
OK2PCF	"	125,388	501	43	129
OK1MKU	"	123,286	328	56	141
OK1DVK	"	118,215	372	55	158
OK1AXB	"	117,782	377	44	135
OK1BB	"	108,832	357	48	104
OK3BA	"	81,640	309	45	112
OK3DT	"	72,000	231	40	85
OK2QR	"	65,700	296	34	66
OK1AOR	"	58,940	210	44	96
OK2TBC	"	58,438	259	40	82
OK1MWN	"	51,125	223	40	85
OK1MIZ	"	50,662	288	31	87
OK1MAA	"	48,633	285	36	93
OK2EC	"	47,700	239	34	66
OK1AJY	"	44,744	258	26	93
OK2PBG	"	40,602	167	34	67
OK1FCA	"	29,884	128	45	79
OK1MZO	"	29,040	167	35	85
OK2BBQ	"	28,569	271	17	72
OK2YN	"	22,496	109	33	43
OK2KHS	"	17,776	157	19	69
OK2LN	"	14,778	101	9	18
OK3CAQ	"	14,532	67	21	63
OK2BCI	"	13,860	58	33	51
OK2BQL	"	12,201	96	28	147
OK1FM	"	10,986	122	55	122
OK3KFO	"	8,810	92	18	47
OK3TFY	"	8,052	85	19	47
OK2SWD	"	6,786	111	14	44
OK3ZAB	"	5,612	80	10	43
OK1DMM	"	3,672	52	9	18
OK1DXW	"	1,001	60	49	58
OK2BSG	**28**	**83,512**	**313**	**27**	**77**
OK1TW	"	39,072	210	21	53
OK1PN	"	28,275	169	20	45
OK1AVG	"	17,220	148	17	25
OK2KRT	"	16,238	139	14	32
OK2ABU	"	6,615	71	14	31
OK1ALQ	"	4,154	99	21	41
OK3CEM	**21**	**196,627**	**820**	**24**	**79**
OK3KAG	"	170,342	755	26	80
OK1JIM	"	133,632	628	22	65
OK1ABP	"	100,485	505	25	74
OK1FV	"	81,180	377	27	72
OK1ASS	"	77,854	395	22	61
OK3CNP	"	34,776	307	21	51
OK1EV	"	30,780	248	17	40
OK1DHJ	"	19,894	150	17	41
OK2BLD	"	7,285	105	7	24
OK2PFP	"	3,136	100	5	9
OK2BQZ	"	910	27	7	65
OK2PDL	**14**	**205,848**	**954**	**26**	**82**
OK2BGR	"	61,830	370	23	67
OK3CHE	"	38,624	382	16	55
OK1AKU	"	33,930	286	18	60
OK3CMF	"	29,230	244	18	56
OK1DMJ	"	20,550	301	12	38
OK2SLL	"	20,286	179	19	50
OK3CFS	"	17,752	217	10	46
OK2JK	"	14,310	180	13	41
OK1JPH	"	13,727	125	16	67
OK2BRJ	"	12,122	120	16	42
OK3CDN	"	7,380	126	9	36
OK1JRW	"	6,149	74	14	49
OK2BFN	**7**	**157,069**	**801**	**26**	**83**
OK1MAW	"	9,845	145	13	42
OK1AYN	"	2,312	30	9	24
OK2QX	"	1,682	57	5	24
OK3ZBU	**3.5**	**33,516**	**287**	**16**	**41**
OK3CEL	"	**30,800**	**476**	**10**	**45**
OK1DKR	"	27,962	398	12	50
OK2HI	"	11,417	193	14	35
OK3CPW	"	11,169	201	10	41
OK3TDO	"	10,864	153	10	46
OK2BUD	"	10,373	251	6	35
OK1DCN	"	10,035	199	7	38
OK2BWZ	"	8,214	219	6	31
OK1MKI	"	8,066	186	9	18
OK3COK	"	6,968	97	2	5
OK1OZK	"	3,441	107	5	26
OK2BTK	"	2,233	76	5	24
OK2PFX	"	2,139	65	6	25
OK2BTC	"	1,242	54	4	19
OK1DEC	"	782	35	3	20
OK2BFX	"	224	16	3	11
OK2BJG	"	187	17	3	8
OK3CXF	**1.8**	**19,650**	**366**	**8**	**42**
OK1DFW/P	"	**18,975**	**337**	**9**	**46**
OL4BEV	"	7,257	175	7	34
OL2BCC	"	6,615	125	9	40
OL1BBR	"	6,300	140	8	37
OK1DTN	"	6,174	131	7	35
OK1STU	"	6,063	137	8	35
OK1MWN	"	4,370	105	6	32
OK1DJK	"	3,441	85	8	29
OL7BAY	"	3,196	52	4	17
OL9COL/P	"	3,053	75	6	16
OL5AZY	"	2,695	72	7	28
OK2BWM	"	2,380	72	7	28
OL7BEH	"	1,976	54	4	19
OL6BCS	"	1,810	73	5	21
OL2VAG	"	1,716	58	9	17
OK1ADU	"	1,431	55	5	22
OK3CPS	"	1,404	48	6	21
OL5BCV	"	1,372	49	4	24
OK2BQU	"	1,353	40	10	23
OK2BVG	"	1,323	49	5	22
OL1BCB	"	924	51	4	17
OK1DLE	"	897	41	6	17
OK1DWC	"	836	48	3	16
OLØCLB	"	740	41	7	13
OK1AEH	"	736	32	4	19
OL8COJ	"	456	26	5	14

DENMARK

OZ1LO	**A**	**2,064,762**	**2335**	**105**	**336**
OZ5WQ	"	439,116	707	64	194
OZ5BG	"	307,133	522	78	203
OZ1EXZ	"	284,032	688	60	164
OZ7JZ	"	235,340	515	63	142
OZ3LF	"	201,554	594	54	125
OZ5KU	"	191,152	428	63	145
OZ5MJ	"	183,083	350	62	161
OZ8AE	"	159,027	391	57	180
OZ1FFG	"	60,098	240	36	115
OZ2NU	"	47,840	241	40	64
OZ2E	"	6,860	47	27	43
OZ1HMA	"	5,985	67	18	39
OZ5QU	**28**	**70,488**	**317**	**24**	**64**
OZ1FAO	"	18,602	117	21	50
OZ6XR	"	4,648	82	10	18
OZ6KS	"	1,554	29	10	11
OZ1DTF	**14**	**129,996**	**867**	**25**	**67**
OZ1W	**1.8**	**11,997**	**267**	**8**	**35**
OZ9MM	"	6	2	1	2

ENGLAND

G5CFJ	**A**	**1,778,480**	**2286**	**98**	**246**
G3MXJ	"	1,630,280	1558	100	324
G3XTT	"	808,353	1023	88	263
G3MVA	"	164,604	504	44	128
G3AJB	"	146,828	455	49	139
G3OLU	"	59,598	245	40	89
G4OKN	"	21,087	166	22	49
G4BUO	**28**	**222,905**	**847**	**27**	**82**
G3UFY	"	113,040	510	24	66
G3XQX	"	19,366	226	13	33
G3PVA	**14**	**154,850**	**814**	**25**	**70**
G4KRS	"	39,060	323	16	54
G3FXB	**7**	**207,480**	**1026**	**24**	**80**
G3IGW	"	86,184	593	18	64
G3BUE	**3.5**	**84,561**	**806**	**14**	**57**
G4CNY	"	77,004	712	14	55
G4KPY	"	76,380	782	17	59
G3SZA	**1.8**	**18,821**	**250**	**11**	**48**
G3XWZ/A	"	17,232	169	9	39
G3BDQ	"	4,560	128	8	32

FINLAND

OH2PM	**A**	**1,036,602**	**1150**	**105**	**328**
OH3TY	"	407,008	567	84	238
OH2AQ	"	286,524	804	63	189
OH7XI	"	223,492	617	60	176
OH2LP	"	192,920	455	63	197
OH1RZ	"	170,595	433	61	162
OH2ZAR	"	121,273	401	44	129
OH2BJG	"	111,936	333	51	141
OH7NW	"	98,000	272	51	149
OH5PT	"	95,693	250	62	159
OH3BI	"	93,852	347	49	149
OH6HI	"	73,287	290	45	108
OH2BQG	"	48,513	195	46	111
OH2BFV	"	48,379	301	26	75
OH7EU	"	37,698	165	12	32
OH9TD	"	35,224	140	42	106
OH5JJ	"	24,024	122	38	94
OH2VZ	"	16,560	78	31	59
OH7BX	"	15,300	149	13	38
OH6DZ	"	11,778	111	24	54
OH3AC	"	6,262	87	18	44
OH2DN	"	4,263	37	23	26

OH7KA	"	4,047	45	21	36
OH5PA	"	3,726	33	21	25
OH2BYD	"	2,623	59	11	32
OH1UR	"	2,040	35	13	21
OH7LP/2	"	912	25	7	15
OH5OU	"	96	6	6	6
OH2FS	**28**	**158,640**	**602**	**27**	**93**
OH1FM	"	84,864	412	22	82
OH6RC	"	42,925	245	25	76
OH5UO	"	35,752	218	21	61
OH6QU	"	33,781	261	18	65
OH5BM	**21**	**324,384**	**1347**	**29**	**80**
OH3IQ	"	250,992	991	28	80
OH3RF	"	192,780	781	27	78
OH1VR	"	151,866	713	27	72
OH5OZ	"	71,345	359	26	69
OH6MM	"	64,680	436	21	67
OH1PE	"	28,480	240	17	47
OH6LJ	"	7,540	97	16	36
OH6LL	"	6,192	101	12	31
OH1FQ	"	6,012	103	8	28
OH3EM	"	4,988	72	12	31
OH5TQ	**14**	**484,824**	**1716**	**30**	**92**
OH3AA	"	231,462	1072	27	72
			(Opr. OH6DO)		
OH6CD	"	31,437	349	16	47
OH8TU	"	25,311	287	15	44
OH7YN	"	20,140	233	14	39
OH3NM	"	18,526	169	14	45
OH7KD	"	10,878	139	14	35
OH5RZ	"	187	15	4	7
OH3XS	**7**	**152,646**	**820**	**24**	**79**
OH4ML	"	133,650	825	26	73
OH6RE	"	14,649	202	13	44
OH3DC	"	9,282	157	13	38
OH2BSA	"	5,764	109	10	34
OH2BWL	"	2,484	53	7	29
OH2BCI	**3.5**	**52,268**	**695**	**16**	**57**
OH3NE	"	43,848	646	11	52
OH2VY	"	41,884	423	18	56
OH2BAK	"	15	3	2	2
OH5NG	**1.8**	**1,296**	**32**	**7**	**20**
OH3TQ	"	1,100	34	7	18

FRANCE

F9BB	**A**	**69,660**	**243**	**43**	**92**
F9DK	"	32,216	167	29	53
F3BC	"	30,668	162	27	50
F6CXJ	"	21,804	135	23	46
F6CCI	"	17,290	122	23	42
F6ENO	"	3,840	33	20	28
F6EQV	**28**	**35,188**	**348**	**12**	**26**
F5AH	**21**	**29,394**	**287**	**20**	**26**
F9IQ	"	21,850	197	17	33
F6DKV	**14**	**100,720**	**730**	**21**	**59**
F6GNC	"	27,813	216	19	54
F6BBJ	**7**	**18,966**	**240**	**13**	**45**
F3AT	**1.8**	**4,360**	**104**	**8**	**32**
F8TQ	"	2,250	79	5	25

GERMANY (FRG)

DK3GI	**A**	**2,924,215**	**2759**	**115**	**354**
DJ8YI	"	**644,544**	**1292**	**72**	**181**
DJ2TI	"	594,780	909	87	258
DJ6BW	"	533,484	971	66	186
DJ9MH	"	507,200	891	82	235
DL1JF	"	475,092	715	85	233
DL3LU	"	415,055	629	87	193
DF0AFZ	"	401,128	800	73	193
DK5AD	"	317,848	584	76	192
DJ1YH	"	315,744	600	68	196
DL8MBS	"	291,730	672	64	158
DL7CF	"	272,950	500	71	194
DL9EY	"	245,700	573	58	152
DJ7IK	"	239,072	528	59	189
DK5WQ	"	212,496	699	73	231
DL1TH	"	161,304	464	52	136
DL3YBM	"	140,454	498	47	106
DK7QB	"	119,190	440	40	105
DK1YK	"	54,366	203	42	60
DK7HP	"	41,652	209	39	78
DJ2UU	"	31,866	158	36	77
DK4HD	"	24,168	108	37	69
DL7YS	"	20,482	201	32	45
DJ5JH	"	14,678	69	39	43
DL4AAE	"	13,578	123	22	40
DK0BO	"	13,575	105	25	50
DK9BR	"	8,400	110	18	52
DF3QN	"	598	26	6	17
DJ4AX	**28**	**400,147**	**1304**	**33**	**88**
DH2FAW	"	109,900	506	29	71
DL1RB	"	93,411	388	25	72
DL1AM	"	55,040	271	22	64
DK9MB	"	16,384	100	21	43
DJ6TK	"	13,750	125	19	36
DF2RG	"	9,028	86	13	24
DJ8UJ	**21**	**314,150**	**1046**	**32**	**90**
DL6PE	"	90,060	390	26	69
DF4ZL	"	73,128	370	24	64
DL1EAL	"	43,072	305	17	47
DL8KJ	"	30,855	237	13	42
DF4QW	"	27,471	150	20	39
DL8BU	"	21,148	143	21	43
DL6RAI	**7**	**86,528**	**518**	**24**	**80**
DL6QW	"	1,980	30	10	20
DJ8WL	**1.8**	**27,216**	**389**	**13**	**50**
DL7HU	"	7,788	165	7	37
DJ2YA	"	5,715	112	8	37

GREECE

SV1NA	**A**	**120,304**	**565**	**36**	**110**
SV8CT	**28**	**311,738**	**1570**	**26**	**72**
SV8AU	"	21,888	199	15	49

HUNGARY

HA8IT	**A**	**831,716**	**1358**	**85**	**252**
HA1ZG	"	391,690	708	71	191
HA3HZ	"	383,019	749	67	206
HA3NU	"	237,015	545	57	150
HA5TI	"	126,378	504	48	129
HA5BA	"	118,260	439	45	117
HA7KLJ	"	80,376	317	43	93
HA9PB	"	9,120	108	16	60
HA3GA	28	5,390	68	12	23
HA8VB	**21**	**178,965**	**781**	**25**	**72**
HA4ZZ	"	167,414	785	27	67
HA4XX	"	120,365	582	25	70
HA5GU	"	82,708	429	24	68
HA7UJ	"	11,424	113	15	33
HA3MQ	**14**	**132,664**	**682**	**24**	**79**
HA7LM	"	95,325	633	22	71
HA6NW	"	67,322	493	20	62
HA8KAZ	"	26,738	292	14	44
HA8UH	"	8,235	119	13	32
HA8BE	**7**	**71,900**	**409**	**24**	**76**
HA5LZ	"	28,626	200	18	60
HA8KQX	**3.5**	**84,888**	**891**	**17**	**64**
HA7RO	"	59,906	701	16	61
HA6NL	"	46,116	658	11	52
HA9PP	"	23,980	409	10	45
HA3OD	"	13,727	241	10	43

IRELAND

EI4DW	A	15,840	106	25	47
EI1DH	**28**	**187,920**	**1029**	**24**	**63**

ITALY

I2UBI	**A**	**1,197,858**	**1629**	**95**	**267**
I0ZUT	"	21,093	176	23	56
I8XXR	**28**	**265,896**	**1018**	**30**	**78**
IK1AAW	"	216,420	836	29	83
IO6POY	"	158,592	781	22	62
I2JIN	"	18,644	142	16	43
I4DVT	**21**	**188,800**	**851**	**26**	**74**
I8SKK	"	137,760	435	25	71
I1IKT	"	17,088	178	14	34
I7PXV	**7**	**33,116**	**365**	**14**	**54**
I1OOQ	"	14,994	182	14	38
I1XPQ	**3.5**	**18,639**	**268**	**10**	**47**

ITU GENEVA

4U1ITU	**A**	**1,475,100**	**2124**	**94**	**302**
			(Opr. K3NA)		

NETHERLANDS

PA8GN	**A**	**956,158**	**2196**	**87**	**239**
PA0VDV	"	154,336	339	63	149
PA0WRS	"	71,048	250	39	127
PA3BTH	"	65,780	361	39	104
PA8GT	"	64,554	215	48	111
PA3BDK	"	62,160	250	28	120
PA3BWQ	"	33,580	172	33	59
PA3BLU	"	32,785	145	30	53
PA8INA	"	19,090	100	18	28
PA0YN	"	5,832	67	13	23
PA0PHK	21	6,975	73	16	29
PA8RRS	**7**	**12,240**	**110**	**13**	**47**
PA8TS	**3.5**	**9,504**	**143**	**10**	**44**
PI1PT	"	8,866	89	11	51
PA8DIN	"	8,802	130	10	44

NORWAY

LA7JO	**A**	**1,588,633**	**2358**	**100**	**291**
LA6ZV	"	28,458	182	34	68
LA7SI	"	24,521	140	34	79
LA8LA	"	11,319	79	28	49
LA1IE	"	4,510	38	21	34
LA1VL	**14**	**11,858**	**155**	**11**	**38**
LA2EG	**3.5**	**35,035**	**130**	**7**	**35**
LA4LN	1.8	280	20	3	11

POLAND

SP9PT	**A**	**598,794**	**935**	**76**	**242**
SP2JS	"	366,064	751	75	199
SP3AUZ	"	361,400	772	71	207
SP9JA	"	236,915	520	65	180
SP9AKD	"	235,098	509	64	158
SP7AWA	"	140,800	468	52	148
SP7AW	"	57,459	301	51	128
SP6CZ	"	33,040	224	29	83
SP3CB	"	11,088	81	22	34
SP9AID	"	5,412	63	19	22
SP6DB	"	115,430	351	48	122
SP5LM	"	111,108	340	51	137
SP7HT	"	83,764	233	42	130
SP5AD	**28**	**142,857**	**513**	**29**	**82**
SP3AGE	"	80,855	341	24	79
SP6AYP	"	52,089	225	24	73
SP4AWE	**21**	**73,528**	**369**	**23**	**68**
SP4BGR	"	24,115	205	18	47
SP5ES	**3.5**	**30,140**	**480**	**9**	**46**
SP2KBA	"	3,875	131	5	26
SP9KIA	"	1,767	93	4	15
SP1ADM	**1.8**	**24,336**	**484**	**7**	**41**

PORTUGAL

CT1YH	**A**	**198,916**	**370**	**62**	**163**

ROMANIA

YO6VZ	**A**	**457,418**	**1184**	**70**	**154**
YO8FR	"	281,925	875	69	156
YO8DD	"	155,039	425	55	142
YO6XA	"	43,995	240	31	56
YO4BEX	"	38,065	258	42	73
YO6EX	"	16,247	95	29	48
YO2CHT	"	12,906	104	18	36
YO8CMB	"	10,857	219	12	35
YO7ARY	"	8,680	88	12	44
YO4BXX	"	2,050	43	8	33
YO4KRF	**28**	**104,380**	**556**	**21**	**64**
			(Opr. YO4CEM)		
YO6UO	**21**	**20,944**	**195**	**15**	**41**
YO8BSE	"	7,296	120	11	27
YO2GZ	"	4,268	51	12	32
YO4BEW	**14**	**38,556**	**438**	**16**	**47**
YO9YE	"	20,800	186	19	61
YO4FM	**7**	**122,320**	**927**	**23**	**65**
YO5ALI	"	17,856	149	15	49
YO6BHN	"	2,574	50	13	20
YO6BTY	3.5	574	43	3	11
YO8KGH	"	544	27	5	12
YO5CCX	"	542	59	4	5

SARDINIA

IS0OMH	**A**	**191,312**	**670**	**53**	**123**
IS0QDV	28	9,760	175	10	22
IS0FPH	**14**	**119,938**	**857**	**24**	**67**

SCOTLAND

GM5EMM	**A**	**200,796**	**612**	**47**	**127**
GM4LHA	**28**	**34,188**	**366**	**17**	**49**
GM4FDM	**21**	**128,466**	**793**	**21**	**60**
GM3RAD	"	121,948	752	23	63
GM3ITN	**14**	**138,690**	**680**	**30**	**85**
GM3YOR	**7**	**36,630**	**350**	**15**	**59**

SPAIN

EA7XQ	**A**	**782,340**	**1451**	**65**	**171**
EA3BOW	"	184,620	488	52	129
EA4CDE	"	143,220	449	42	90
EA2APU	"	116,472	432	41	97
EA5EV	"	97,440	340	45	129
EA1NZ	"	19,780	85	37	78
EA7ZN	"	19,224	170	17	55
EC4API	"	10,008	85	21	51
EA3GF	28	3,862	62	9	23
EA3CSX	21	3,906	67	9	22
EA2ALW	**14**	**89,475**	**475**	**21**	**54**
EA3CVD	"	22,350	300	13	37
EA2IA	**3.5**	**199,872**	**1253**	**23**	**73**
EA7AIN	"	24,214	434	11	42
EA2DP	**1.8**	**22,880**	**378**	**10**	**45**

SVALBARD ISLAND

JW5VAA	A	10,325	150	13	12

SWEDEN

SM5ADE	**A**	**1,195,810**	**1545**	**94**	**291**
SM5AD	"	348,930	593	74	241
SM6ID	"	213,306	516	56	163
SM0COP	"	199,206	625	52	137
SM7KIL	"	165,126	405	60	114
SM7WT	"	130,732	292	54	149
SM7BYV	"	97,528	385	41	126
SM2DIR	"	96,824	300	38	114
SM7LSU	"	90,825	256	50	125
SM5RE	"	63,726	251	43	86
SM5AFE	"	51,194	165	52	91
SM7CNA	"	30,348	110	39	69
SM6BLE	"	28,322	100	47	72
SM4AZD	"	26,680	173	29	86
SM0CGO	"	25,200	120	30	75
SM6DUA	"	8,272	60	24	64
SM7HEC	"	8,272	41	34	35
SM4NGI	"	4,674	56	22	35
SM6INC	**28**	**127,280**	**615**	**23**	**71**
SM0BDS	"	93,808	414	23	81
SM0TW	"	63,944	292	24	74
SM6KQK	"	17,613	131	17	40
SM5EQW	"	13,224	167	17	40
SM4CMG	"	2,240	40	7	13
SM4DHF	**21**	**202,044**	**727**	**28**	**85**
SM0KV/0	"	186,923	671	28	79
SM2JUR	"	26,880	299	17	43
SM7TV	"	18,676	164	17	41
SM6NJK	"	9,460	144	11	32
SM7MNQ	"	6,369	127	11	22
SM7ERC	**14**	**22,920**	**330**	**17**	**43**
SM6JY	"	17,784	215	14	43
SM5CBM	"	12,208	92	16	40
SM0LPO	"	11,895	200	9	30
SM5UQ	"	9,216	135	12	36
SM6BGA	7	8,750	74	16	34
SM6CPY	**3.5**	**56,240**	**650**	**16**	**58**
SM4BNZ	"	49,528	506	18	64
SM7PI	"	4,212	107	6	36
SM0MLL	"	2,871	98	5	24

SWITZERLAND

HB9AGA	**A**	**440,000**	**553**	**101**	**299**
HB9AJY	"	417,300	649	82	243
HB9APJ	"	262,504	742	52	157
HB9DX	21	15,974	76	25	73
HB9AIJ	**14**	**56,576**	**255**	**26**	**77**
HB9BPP	"	10,492	64	22	64

WALES

GW3JI	**A**	**42,210**	**203**	**33**	**72**
GW3MPB	**14**	**35,154**	**261**	**21**	**60**
GW3GWX	**1.8**	**1,058**	**43**	**4**	**19**

YUGOSLAVIA

YU3EA	**A**	**1,231,650**	**1311**	**92**	**322**
YU20B	"	1,067,622	1375	91	275
YU4WW	"	323,203	587	76	195
YU7NGO	"	284,771	603	61	162
YU1NZW	"	242,088	501	62	169
YU3TE	"	223,920	510	68	172
YU2QU	"	217,210	524	56	158
YU7NZR	"	82,944	247	54	108
YU2COL	"	51,212	502	18	41
YU6GAH	"	48,000	194	42	83
YU4CBC	"	46,973	264	32	75
YU3JS	"	45,714	217	41	78
YU10FP	"	18,244	122	32	55
YU7ECD	**28**	**340,360**	**1027**	**33**	**94**
YU3C	"	284,368	991	30	82
			(Opr. YU3RM)		
YU7AF	"	116,280	586	22	68
YU4WEU	"	72,714	550	23	64
YU2CQ	**21**	**300,465**	**1262**	**25**	**74**
YU1DW	"	296,888	1127	28	90
YU3TUX	"	211,420	907	27	83
YU7MAT	"	131,600	654	26	68
YU3TOK	"	54,990	327	17	61
YU7ADA	"	17,052	192	12	30
YU7ORQ	"	12,667	117	15	38
YU4GD	**14**	**598,533**	**1811**	**35**	**114**
YT3C	"	464,464	1564	35	108
YT3A	"	450,499	1508	33	106
YU3TWT	"	349,350	1212	33	104
YU7BJ	"	292,500	1229	29	88
YU1KQ	"	228,096	1041	26	82
YU2UE	"	106,970	644	21	74
YU3TMF	"	75,951	341	25	72
YU7FN	"	66,080	600	15	55
YU3VM	**7**	**233,571**	**1051**	**27**	**86**
YU4WMM	"	208,544	1050	24	74
YU2SD	"	171,701	771	23	80
YU7QDT	"	20,286	174	13	50
YU1RA	"	11,918	202	13	46
YU4EJC	**3.5**	**91,035**	**783**	**18**	**67**
YU4BR	"	72,930	722	15	63
YU7SF	"	34,620	500	12	48
YU3QI	"	19,028	284	12	55
YU2AKL	"	16,146	333	7	39
YU4DIJ	"	10,368	242	9	39
YU10VU	"	5,180	133	6	31
YU3EF	**1.8**	**34,860**	**535**	**11**	**49**

EUROPEAN U.S.S.R.

BYELO-RUSSIA

UC20BA	**A**	**511,936**	**1082**	**78**	**226**
UC2WAZ	"	505,239	878	78	265
UC2SE	"	254,020	596	68	192
UC2SLL	"	60,247	239	47	102
UC2ACL	"	47,784	301	37	95
UC2AHQ	"	33,120	349	34	56
UC2WBL	21	9,812	141	13	31
UC20BB	**3.5**	**15,170**	**331**	**7**	**34**
UC2AAD	"	10,752	220	7	35
UC20CZ	"	6,793	189	8	26
UC2AFB	**1.8**	**12,382**	**264**	**7**	**34**

ESTONIA

UR2RKS	**A**	**555,056**	**1081**	**72**	**235**
UR2AW	"	27,904	167	32	96
UR2RBQ	"	22,010	173	22	49
UR2RNG	"	15,622	198	13	60
UR2RSA	"	12,136	90	30	52
UR2RIY	"	2,632	72	8	30
UR2RND	"	1,591	63	10	35
UR2RKX	"	1,424	81	14	36
UR2HB	"	1,406	41	10	27
UR2RMC	**28**	**57,600**	**327**	**24**	**66**
UR2RKG	"	29,337	230	19	35
UR20I	"	18,785	181	15	50
UR2JW	**21**	**82,917**	**632**	**25**	**58**
UR2NP	"	29,904	283	14	42
UR2CR	"	27,336	237	16	48
UR2REC	"	17,066	169	16	37
UR2REE	**14**	**389,310**	**1552**	**29**	**85**
UR2RHO	"	81,825	569	19	56
UR2MX	"	4,107	80	12	25
UR2REN	**7**	**142,034**	**890**	**22**	**72**
UR2FU	"	105,708	687	23	69
UR2RGN	**3.5**	**57,420**	**744**	**15**	**51**
UR2AO	**1.8**	**5,310**	**174**	**6**	**24**

EUROPEAN RUSSIA

UW3HV	**A**	**1,786,650**	**1951**	**107**	**323**
UA3APF	"	**320,824**	**835**	**59**	**179**
UA3AGF	"	**286,875**	**814**	**67**	**188**
UA3AGL	"	282,924	580	81	190
UA4QM	"	264,410	566	69	205
UA4WBJ	"	262,290	710	55	155
UV3FL	"	239,400	587	61	191
UA3RDH	"	235,460	436	73	132
UA4CDL	"	182,590	568	47	143
UA3ALS	"	152,280	491	43	119
UA3DCG	"	142,086	355	59	140
UW3GL	"	124,168	407	53	134
UA4UBG	"	115,177	421	49	100
UA3DRT	"	110,980	377	77	102
UA6AJG	"	100,164	294	58	146
UA6ALV	"	94,848	411	37	115
UA3QLC	"	92,568	338	53	99
UW3NE	"	81,780	276	39	106
UA1AUA	"	69,972	318	32	87
UA3DIN	"	52,214	200	38	84
UA4CDY	"	49,020	382	31	98
UA1CGE	"	42,957	185	40	71
UA1CAQ	"	39,064	287	20	56
UA3GEA	"	30,600	199	18	57
UA3TAM	"	27,819	200	25	74
UA3AGW	"	23,617	136	31	82
UA6AJF	"	22,752	185	20	59
UA4WAU	"	21,716	195	23	63
UA6LFQ	"	20,855	142	24	73
UA3GO	"	19,760	116	28	67
UA4QK	"	17,472	134	20	59
UA3RFV	"	15,884	163	19	57
UA6HNJ	"	12,300	114	27	55
UA1DF	"	12,060	80	25	42
UA3RCT	"	6,825	85	9	11
UA3LCC	"	6,363	47	14	27
UA3IAK	"	4,295	73	13	40
UA4NCI	"	3,608	32	17	24
UA4ACA	"	2,673	63	11	22
UA3MDE	"	1,302	28	10	21
UA6ARX	**28**	**86,025**	**635**	**18**	**57**
UA4AIS	"	24,360	218	14	44
UA3DNV	"	11,210	113	17	42
UV3FL	"	7,420	110	4	30
UA3AAJ	"	1,862	36	7	12
UA3DUF	**21**	**204,120**	**757**	**29**	**81**
UW3UO	"	187,872	903	26	77
UA1CAI	"	45,820	397	19	60
UA3GD	**14**	**336,020**	**1372**	**26**	**80**
UA4PNX	"	158,340	780	24	67
UA4LM	"	71,904	518	20	64
UA1AUF	"	69,012	493	22	59
UA3ECR	"	68,724	567	17	52
UA6AUT	"	60,800	587	19	46
UA4CH	"	43,364	352	16	58
UA6LXI	"	35,711	290	22	45
UA6AXX	"	21,105	249	17	46
UA1QBV	"	10,260	105	15	39
UA3QBC	"	232	19	3	5
UA6AYX	**7**	**16,320**	**175**	**13**	**47**
UA3LAR	"	11,102	112	14	47
UA3LBE	"	10,125	149	9	36
UA3YAO	"	3,774	87	8	26
UA3GDJ	"	2,407	73	6	83
UA3SED	**3.5**	**68,809**	**666**	**14**	**65**
UA3DFK	"	39,990	517	12	50
UA3UAC	"	39,690	478	13	50
UA3EZ	"	31,111	560	11	42
UA3TGB	"	16,080	245	9	39
UA3VAQ	"	13,800	242	8	38
UA1SW	"	6,825	118	9	30
UA3LED	**1.8**	**16,215**	**298**	**8**	**39**
UA3ABI	"	966	42	6	17

KALININGRADSK

UA2FFD	**A**	**39,911**	**305**	**33**	**74**
UA2EC	**7**	**38,000**	**361**	**17**	**59**
UA2FDG	**3.5**	**6,080**	**250**	**5**	**19**
RA2FDE	**1.8**	**972**	**56**	**4**	**14**

KARELIA-FINNISH

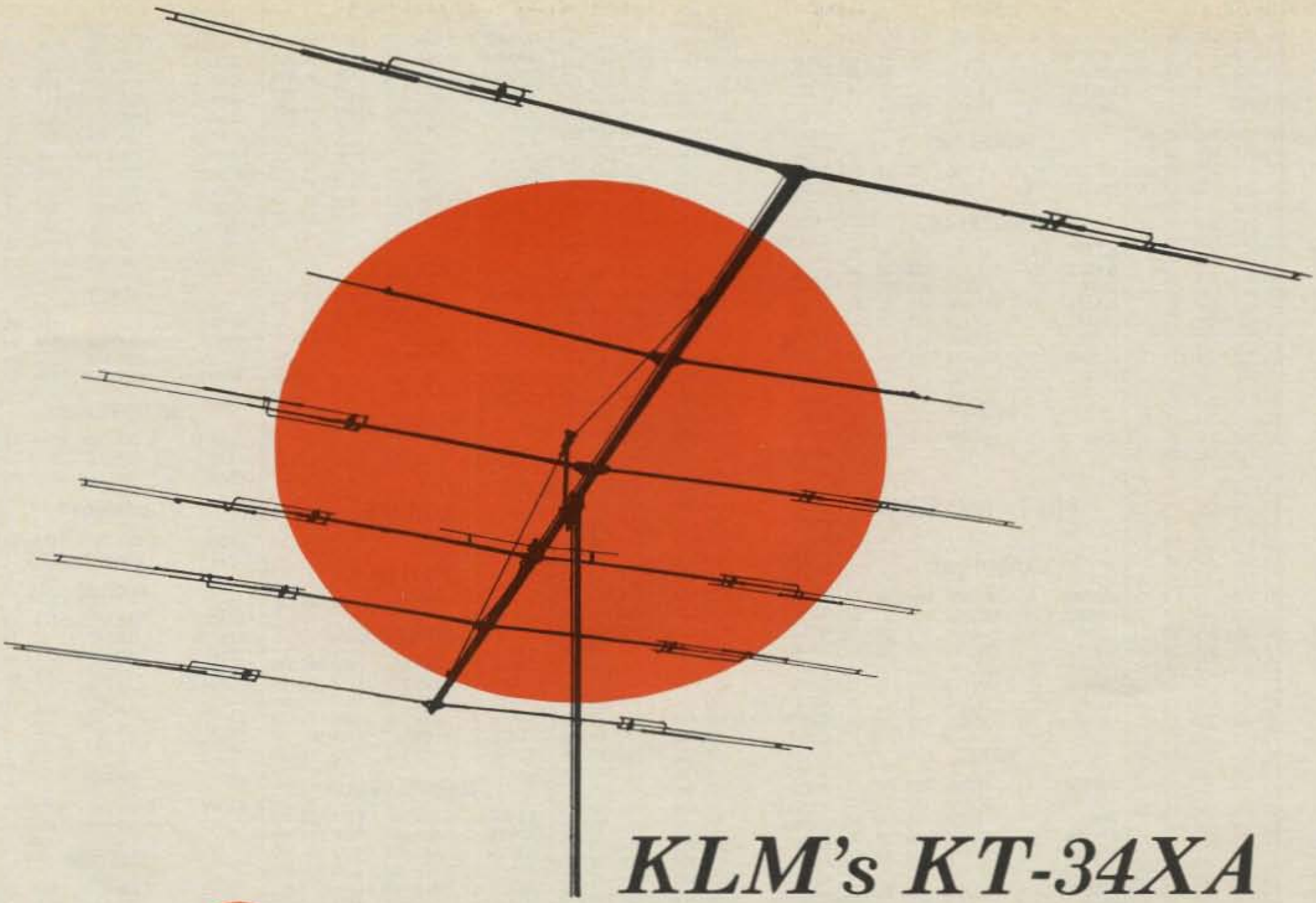
UA1NAY	**A**	**86,010**	**319**	**38**	**84**

LATVIA

UQ2GKM	**A**	**281,796**	**721**	**73**	**203**
UQ2GLW	"	41,600	239	31	97
UQ2GDQ	**14**	**477,904**	**1989**	**30**	**89**

LITHUANIA

UP2BAO	**A**	**1,162,880**	**1610**	**91**	**304**
UP2BAS	"	**694,830**	**1337**	**79**	**266**
UP2PAW	"	674,784	1253	74	190
UP2NA	"	591,056	1000	75	196
UP2OU	"	343,068	750	67	209
UP2PCB	"	338,832	905	46	135
UP2BEG	"	243,295	586	56	191
UP2OQ	"	239,094	622	54	168
UP2BFC	"	194,304	477	66	198
UP2PBZ	"	193,802	419	57	161
UP2BBF	"	186,504	579	62	166
UP2BAT	"	136,890	455	49	146
UP2BDO	"	118,448	384	44	132
UP2BB	"	110,220	407	46	119
UP2NX	"	81,249	341	42	117
UP2PBM	"	79,323	427	34	103
UP2PCX	"	57,784	311	31	93
UP2BDX	"	41,230	214	38	95
UP2BIO	"	27,499	229	25	82
UP2BBX	"	18,020	214	17	51
UP2BFU	"	8,260	111	16	43
UP2BJQ	"	444	13	6	6
UP2BAU	"	318	49	3	3
UP2BEL	**28**	**110,800**	**458**	**24**	**76**
UP2BEI	**14**	**171,855**	**897**	**24**	**71**
UP2BLE	**7**	**16,646**	**236**	**12**	**46**
UP2BGE	"	11,904	104	13	49
UP2BAL	**3.5**	**86,071**	**891**	**16**	**67**
UP2CT	"	20,548	403	12	32
UP2BJM	"	14,319	304	8	35
UP2BEN	"	13,161	297	7	34
UP2BIP	"	3,842	103	6	22
UP2BCG	**1.8**	**9,748**	**224**	**7**	**34**



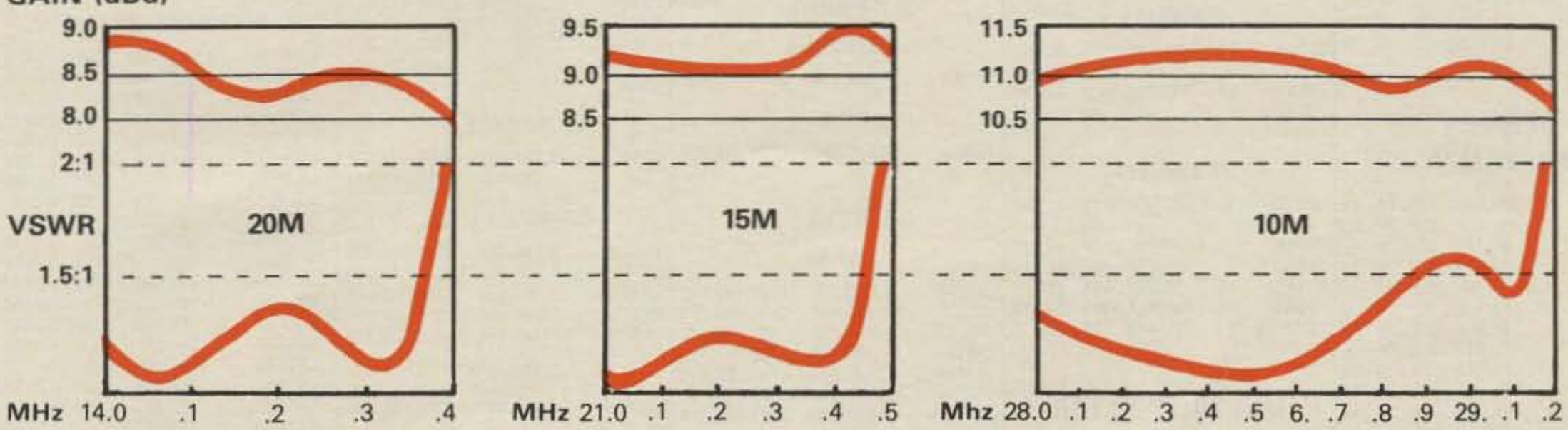
KLM's KT-34XA

Outperforms ALL commercially available tribanders and many monobanders, too!

KLM's KT-34XA TRIBANDER is the 2nd generation of a unique new series of antennas designed to provide superior **broadband** coverage on 20, 15, and 10 meters. The combination of lossless linear loading and hi-Q air capacitors enables the KT-34XA to outperform **all** commercial available tribanders and meet or exceed the performance of a conventional stacked monoband system. The lower weight and windload of a single antenna mean reduced tower and rotator requirements. Thus, overall system costs can be kept to a minimum while enjoying the best of monobander-type performance.

KLM's field proven KT-34A is the heart of the "XA" model. The boom length of the "XA", however, has been doubled, and one tri-resonant and one full size 10 meter element have been added. These changes increase the gain to **11-11.3 dBd** on 10M, **9-9.5 dBd** on 15M, and **8.5-9 dBd** on 20M. Two driven elements are used to make the KT-34XA unusually broadbanded (a concept applied to many KLM antennas). Gain is virtually flat across each band except for 10 meters which has been optimized for the DX'er, 28-29 MHz. The chart below shows the remarkable performance qualities of the KT-34XA.

KT-34XA GAIN vs. VSWR



KLM

P.O. Box 816, Morgan Hill, CA 95037

(408)779-7363

Please send all reader inquiries directly.

MOLDAVIA

UO5OWN	**A**	**405,362**	**1199**	**66**	**175**
UO5OWC	"	265,740	731	56	150
UO5OGU	**14**	**99,603**	**711**	**24**	**69**

UKRAINE

UB5EC	**A**	**2,018,320**	**2555**	**103**	**317**
UB5MFY	"	**479,816**	**974**	**69**	**227**
UB5ICS	"	408,576	728	78	226
UB5IAN	"	245,841	707	56	171
UB5UBI	"	227,156	584	57	161
UB5UKO	"	207,244	345	78	185
UB5CBA	"	185,250	603	49	141
UY5TE	"	158,508	559	46	158
UB5IF	"	148,987	696	48	133
UB5LJD	"	140,085	513	42	123
UB5VK	"	77,736	421	31	127
UB5EU	"	75,330	200	48	107
UT5GR	"	67,628	321	35	101
UB5IIQ	"	67,620	275	38	109
UB5SG	"	48,576	206	41	97
UB5LR	"	48,034	153	47	99
UB5ENI	"	40,125	241	27	80
UB5UKJ	"	40,002	233	32	86
UB5IPJ	"	25,725	147	30	75
UB5TR	"	24,521	147	31	82
UB5DAV	"	18,490	221	18	68
UT5NN	"	16,302	159	25	53
UB5VAW	"	14,337	130	23	58
UB5MLV	"	9,918	129	16	42
UT5HP	"	6,540	57	19	41
UB5QIP	"	3,476	47	15	29
UB5ZBF	"	1,056	26	9	23
UB5YU	"	660	15	8	12
UB5ZAB	**28**	**122,661**	**576**	**25**	**64**
UB5MMM	"	105,696	526	26	70
UY5WE	"	69,144	374	25	61
UB5ECQ	"	55,426	749	20	54
UB5ENV	"	47,175	278	19	56
UB5IET	"	43,470	230	19	50
UB5QDU	"	33,201	232	18	45
UB5UKH	"	20,544	192	18	46
UB5FDT	"	5,508	88	10	34
UB5UAU	"	2,552	40	8	21
UB5MBP	**21**	**208,670**	**934**	**30**	**80**
UB5EM	"	80,684	459	25	67
UB5MLP	"	28,416	214	19	55
UB5DW	"	21,080	140	18	44
UY5DV	"	14,840	181	13	40
UT5BX	"	7,175	94	12	29
UB5UKW	**14**	**151,025**	**734**	**28**	**81**
UB5NQ	"	118,104	604	27	84
UB5BZ	"	68,292	459	23	61
UB5RS	"	51,332	353	20	62
UB5KAU	"	32,695	325	18	47
UB5QBC	"	32,631	302	21	50
UY5CJ	"	24,552	209	17	55
UB5WCV	"	19,252	213	13	44
UB5EEP	"	18,483	206	17	44
UT5BW	"	5,600	75	12	38
UB5JMR	**7**	**397,578**	**1608**	**30**	**99**
UB5UCR	"	141,900	701	26	74
UB5CE	"	47,964	323	19	65
UB5UEG	"	44,608	350	22	60
UB5WCJ	"	39,176	258	16	67
UB5MEG	"	19,437	216	15	42
UB5AEM	"	12,880	173	17	39
UB5QHF	"	6,930	170	9	36
UY5OO	**3.5**	**96,664**	**717**	**18**	**68**
UB5BAT	"	70,384	700	16	67
UY5XE	"	57,753	614	13	56
UB5WAB	"	42,053	548	11	55
UB5EJU	"	32,269	470	12	49
UB5IFN	"	24,076	380	12	40
UB5DCW	"	17,212	293	11	41
UB5ULP	"	12,341	305	14	30
UB5CN	"	9,272	200	7	31
UB5UCF	"	7,254	185	7	32
UB5AER	"	6,120	151	9	25
UB5PBA	**1.8**	**10,878**	**243**	**7**	**35**
UB5WCQ	"	6,462	197	6	26
UB5ZAL	"	6,192	158	7	29
UB5IEP	"	5,236	130	7	27
UB5IOI	"	1,633	66	6	17

OCEANIA

AUSTRALIA

VK6ANE	**A**	**204,640**	**437**	**63**	**97**
VK2GW	"	142,002	410	57	69
VK5AFX	"	99,176	382	38	50
VK3DXI	"	74,533	343	26	47
VK5GZ	"	67,704	255	43	48
VK2DID	"	13,572	87	24	28
VK4XA	**28**	**141,008**	**877**	**19**	**37**
VK6AJ	"	133,458	573	20	58
VK3RJ	21	1,984	26	15	16
VK3MR	**7**	**75,174**	**375**	**25**	**42**
VK6AKK	3.5	2,000	45	9	7

EAST KIRIBATI

T32AF	**3.5**	**83,000**	**714**	**16**	**24**
			(Opr. KH6UR)		

GUAM

KG6DX	**21**	**658,728**	**1775**	**36**	**90**

HAWAII

KH6ND	**A**	**1,430,020**	**1910**	**112**	**142**
N6HR/KH6	"	378,276	1097	54	62
KH6IJ	"	17,628	113	29	23
AH6J	"	4,375	44	16	19
KH6JWK	**21**	**56,224**	**340**	**24**	**32**

INDONESIA

YB5AES	A	5,750	47	22	24
YB2BOT	14	1,210	21	11	11

NEW ZEALAND

ZL1AIZ	**A**	**84,255**	**245**	**53**	**70**
ZL1BXW	**28**	**109,736**	**633**	**20**	**38**
ZL2RY	"	70,218	503	17	30
ZL1AXQ	**14**	**123,450**	**556**	**23**	**52**
ZL3AGI	"	46,168	277	22	36
ZL1RN	"	41,496	156	30	61
ZL1AMO	**7**	**168,636**	**761**	**28**	**50**
ZL1AZE	3.5	4,496	42	12	12

SAIPAN

AH8C	**7**	**404,457**	**1468**	**31**	**62**

SOUTH AMERICA

ARGENTINA

LU1EWL	**A**	**165,984**	**506**	**44**	**70**
LU4DTJ	**21**	**307,200**	**1291**	**27**	**53**
LU6EF	"	218,544	847	26	61
LU5FGG	"	150,780	726	22	48
LU4IAB	"	68,390	331	25	45
LU5EIO	"	48,778	290	19	39
LU7JI	"	8,316	65	16	28
LU6HAA	**14**	**32,806**	**236**	**18**	**29**

BRAZIL

PY2CAR	**A**	**55,926**	**164**	**46**	**71**
PY2FRW	"	20,020	130	21	31
PT2ACZ	"	1,450	18	13	16
PY1ZFO	**28**	**106,110**	**440**	**22**	**59**
PY5XFR	**21**	**232,112**	**892**	**29**	**60**
PY2RAN	"	167,713	591	27	70
PY2DRP	"	79,692	311	25	62
PT2AQ	"	54,810	350	16	38
PY1MGH/4	"	3,000	34	14	16
PY1BVY	**14**	**30,090**	**200**	**17**	**34**

CHILE

CE1ADG	A	38,657	310	21	22

COLUMBIA

HK1AMW	**A**	**374,448**	**1063**	**47**	**69**
HK3NBB	"	112,714	407	41	56

EASTER ISLAND

CE0AE	A	1,302	24	11	10

ECUADOR

HC1SK	**A**	**456,624**	**1043**	**56**	**95**

FRENCH GUYANA

FY7CG	**A**	**379,304**	**923**	**55**	**81**

NETHERLAND ANTILLES

K3UOC/ PJ3	**A**	**516,342**	**1229**	**51**	**90**

TRINIDAD

9Y4VT	**A**	**6,929,450**	**4927**	**131**	**342**
			(Opr. N6AA)		
9Y4VU	**7**	**400,851**	**1361**	**24**	**75**

URUGUAY

CX7CO	**21**	**771,776**	**2095**	**31**	**93**
			(Opr. CX8BBH)		
CX7BY	**14**	**562,650**	**1570**	**31**	**90**
CX6CV	"	2,052	44	7	6
CX8DT	3.5	2,277	41	11	12

VENEZUELA

4M3BRF	**A**	**4,232,956**	**3513**	**109**	**297**
			(Opr. K1CC)		
YV1NX	"	1,691,204	1810	94	220
YV4BOU	"	460,556	872	68	124
YV4ABR	**21**	**35,022**	**308**	**18**	**21**
YV5ANT	**7.0**	**322,844**	**1294**	**24**	**62**
YV2IF	**1.8**	**468**	**19**	**4**	**5**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES

N1AC	**2,807,951**	**2091**	**120**	**341**
K1RU	**2,087,385**	**1573**	**122**	**343**
KM1C	1,536,678	1358	109	289
K1RX	1,431,931	1163	125	308
KA1RC	620,455	683	93	226
N2RM	**2,042,191**	**1513**	**119**	**348**
K2BK	1,030,254	943	104	278
K2FL	778,688	764	107	261
W2UI	564,960	626	99	222
W3BGN	**3,748,580**	**2146**	**156**	**449**
W3GU	1,653,900	1358	120	327
N3RS	1,643,649	1223	131	352
K3WW	1,227,849	1038	120	293
K3QMR	1,101,410	939	115	300
AA3B	720,003	790	93	228
KB3MM	550,689	596	104	243
K3ZUF	509,520	476	115	271
N3RR	501,622	605	94	208
K4JLD/3	365,960	475	87	193
KF3R	300,886	499	64	147
KD3H	213,004	371	65	141
WB3JRU	124,574	232	65	134
KC3Z	94,540	229	48	97
N2MA/3	53,099	316	81	176
N4AR	**3,266,064**	**1909**	**155**	**437**
N4RJ	**2,840,260**	**1753**	**153**	**427**
KA4S	**2,748,675**	**1758**	**142**	**405**
N4UM	1,635,720	1340	119	311
W4CN	698,100	711	102	256
N4DW	670,070	669	113	257
WG4S	117,500	403	67	121
K5RC	**3,768,871**	**2187**	**163**	**438**
K5EE	1,114,221	948	126	285
K5FUV	1,069,805	1021	113	252
WB5HHM	40,200	134	53	67
N6ND	**1,895,440**	**1533**	**140**	**290**
NI6W	1,252,900	1190	119	255
W6SX	919,800	1095	104	196
W6GO	712,236	705	122	244
K6SG	635,013	870	94	167
W6BH	592,128	748	93	195
N6OJ	557,664	676	105	191
W6BIP	556,444	614	109	225
K6HIH	536,060	776	90	155
AJ6V	490,230	754	82	152
K6TQ	184,756	337	83	126
W6OAT	151,548	250	82	137
WB6EXW	54,825	160	52	77
K6SMH	21,164	112	27	47
KS7T	**250,614**	**501**	**70**	**112**
AD8I	**2,452,870**	**1636**	**138**	**385**
KS8S	**2,052,420**	**1543**	**129**	**345**
N8CC	980,373	857	120	289
K9RF	**1,508,386**	**1067**	**136**	**372**
K9ZO	1,037,188	970	117	281
WB9ZGY	11,224	65	25	36
W0FF	**543,898**	**665**	**81**	**208**
KB0QE	45,396	156	50	67
KB0FP	392	10	7	9

ALASKA

WL7E	**1,059,036**	**1963**	**83**	**143**

CANADA

VE3PCA	**2,759,838**	**2632**	**121**	**317**
VE3IY	**2,118,368**	**2435**	**115**	**277**
VE7ZZZ	1,020,759	2020	86	133
VE2AYU	718,272	1032	83	205
VE2HMS	349,056	1077	47	97
VE6AO	336,670	1119	54	77

JAMAICA

K1XA/6Y5	**3,641,430**	**4030**	**105**	**285**

MEXICO

6E5EBE	**1,459,282**	**3116**	**89**	**137**

PUERTO RICO

NP4A	**11,648,565**	**6881**	**168**	**515**

AFRICA

TANZANIA

5H3BH	**3,808,170**	**3264**	**113**	**280**

TUNISIA

3V8AL	**1,517,943**	**1774**	**69**	**218**

ASIA

JAPAN

JA9YBA	**2,685,812**	**2120**	**143**	**303**
JH7YJF	2,559,216	2182	132	275
JA6YCU	631,944	881	96	166
JA0YAK	429,780	788	75	120
JA7YAB	409,542	730	82	117
JA7YAI	322,944	606	77	115
JA6YDH	200,008	398	69	115

ASIATIC U.S.S.R.

ARMENIA

RG6G	**10,394,658**	**5355**	**166**	**511**
UK6GAA	10,584	90	14	28

ASIATIC S.S.R.

UK9AAN	**5,639,792**	**3672**	**130**	**406**
UK0AMM	**2,864,284**	**2543**	**119**	**300**
UK9OAZ	1,975,743	2206	96	257
UK9ADY	1,571,238	1527	85	281
UK0QAA	1,516,864	2477	95	179
UK9ACP	1,441,979	1675	66	241
UK9OAE	532,229	1726	55	122
UK0SBB	510,532	1401	50	114
UK9UBL	318,222	877	41	125
UK0LAD	299,690	491	81	149
UK0LAB	76,505	222	33	70
UK0FAD	810	83	2	4

GEORGIA

UK6FGZ	**482,715**	**781**	**75**	**180**
UK6QAA	14,360	86	21	41

KAZAKH

UK7GAA	**1,150,503**	**1635**	**69**	**198**
UK7FAP	22,626	257	15	50

KIRGHIZ

UK8NAA	98,440	383	37	70

EUROPE

AUSTRIA

4U1VIC	**257,936**	**833**	**55**	**141**

BULGARIA

LZ1KDP	**1,415,925**	**1688**	**105**	**330**
LZ1KSN	1,294,981	1797	99	290
LZ1KSZ	339,866	823	75	204
LZ1KCC	124,245	404	36	129
LZ2KDR	67,332	453	36	88
LZ2KKK	22,616	223	19	69

CZECHOSLOVAKIA

OK5MIR	**3,470,700**	**2737**	**139**	**436**
OK1KRG	**2,521,036**	**2438**	**115**	**388**
OK3KCM	**1,493,434**	**1822**	**104**	**282**
OK1KPU	1,323,350	1500	103	295
OK1KQJ	1,188,768	1511	100	327
OK3RJB	781,148	2504	78	234
OK1KPX	706,920	1364	72	186
OK1KRQ	565,920	968	64	224
OK3RKA	494,847	835	72	199
OK1KUR	480,867	1027	72	195
OK1OPT	349,752	915	60	187
OK3KAP	330,372	665	68	184
OK1KZD	284,445	709	59	186
OK3KEX	184,552	532	52	132
OK1KPA	137,616	362	55	133
OK2KYC	136,224	498	49	127
OK3RMW	76,956	385	44	115
OK1KIX	30,250	144	45	76
OK1KJP	11,475	90	28	47
OK1KYS	11,256	66	31	53
OK1KTW	7,052	113	11	30
OK1ORA	6,273	63	18	23
OK1KGU	4,788	84	16	41

DENMARK

OZ5EDR	**621,544**	**1161**	**84**	**224**
OZ7DEN	121,407	546	39	104
OZ1GAX	5,460	84	12	14

ENGLAND

GB2MM	**2,143,198**	**2341**	**102**	**337**
G3SSO	1,994,448	2308	106	338
G3RRS	1,619,215	2047	99	278

FINLAND

OH8AV	**2,473,380**	**2,593**	**113**	**340**
OH6AC	1,525,167	1778	91	296
OH6AM	1,446,471	1922	91	260
OH9AB	637,487	1005	74	243
OH5AD	1,178	18	13	18

FRANCE

F3TV	**3,997,892**	**3588**	**122**	**392**
F5IN	1,452,100	2299	83	242

GERMANY (FRG)

DL8CM	**2,060,604**	**2095**	**106**	**338**
DK9PY	1,551,312	2251	90	252
DF0BV	904,540	1284	90	274
DL0ER	348,719	658	66	151
DF0TW	185,496	379	63	173

GUERNSEY

GU3TXF	**2,828,504**	**3324**	**97**	**327**

HUNGARY

HG5A	**3,030,678**	**3193**	**126**	**343**
HA6KNB	**2,425,260**	**2541**	**103**	**312**
HG6V	**1,972,257**	**2454**	**102**	**297**
HG1Z	1,901,746	2500	95	276
HA1KZZ	1,473,550	2012	80	245
HA5KKC	1,006,080	1998	69	193
HA3KNA	857,703	1340	83	246
HA7KSR	805,387	1337	87	260
HA0KWH	682,066	1170	80	221
HA6KOA	610,425	1729	51	174
HA8KCK	570,880	959	78	242
HA7KLG	536,364	1044	73	209
HA5KFZ	420,024	838	75	189
HA8KVK	320,960	831	59	177
HA7KLF	229,554	596	59	159
HA8KUC	210,177	588	52	141
HA6KNX	209,064	648	56	130
HA2KMR	207,638	659	52	145
HA9KOL	81,528	322	40	118
HA5KFV	36,828	280	25	83
HA2KMG	21,280	154	24	71

ITALY

I02UIY	**535,846**	**1280**	**63**	**163**
I03EVK	466,528	974	67	177
I2WDB	397,118	972	49	145
IK1BAE	329,004	697	62	185

NETHERLANDS

PA3BFM	**1,487,430**	**2179**	**92**	**286**
PA0IP	307,517	815	63	160
PA3AQL	34,020	324	35	70

NORWAY

LA1K	**851,753**	**1493**	**78**	**193**
LA4O	769,280	1491	74	246

POLAND

SP3KCL	**653,679**	**1248**	**80**	**253**
SP5KCR	458,080	1126	75	205
SP2KFX	98,643	511	36	95
SP5KVW	74,550	249	46	84
SP5KUT	58,088	343	34	103
SP3KRF	19,278	246	15	48
SP2KFV	4,500	72	15	35
SP9PDG	2,639	89	6	23

SPAIN

EA3VY	**3,734,860**	**3593**	**115**	**359**
ED3CNY	1,749,240	2326	95	292

SWEDEN

SK7AK	**358,820**	**968**	**66**	**167**
SK0LM	288,025	669	54	151

SWITZERLAND

HB9AJ	99,280	512	47	99

WALES

GW4BRS	**1,071,640**	**1812**	**76**	**216**

YUGOSLAVIA

4N6HN	**321,062**	**1349**	**73**	**165**
YU7AJD	262,064	788	55	174

EUROPEAN U.S.S.R.

BYELO-RUSSIA

UK2AAW	**952,072**	**1554**	**109**	**232**
UK2QAA	845,196	1581	83	254
UK2WAF	798,660	1396	79	261
UK2ABM	165,960	582	50	130
UK2QBB	84,700	440	53	101
UK2AAP	83,230	452	35	110
UK2LAN	4,613	91	17	35

ESTONIA

UK2RDX	**4,164,075**	**3381**	**140**	**457**
UK2RAC	6,435	84	18	37

EUROPEAN RUSSIA

UK4FAV	**3,278,720**	**3351**	**135**	**410**
UK3XAB	**1,842,939**	**2177**	**102**	**339**
UK6LAA	1,798,249	2584	105	328
UK4WAB	1,577,094	1945	101	316
UK6APA	1,474,020	2042	96	284
UK4PNZ	1,402,466	1561	102	340
UK4WAA	1,196,715	1865	84	239
UK1AFA	1,029,665	1752	85	280
UK6LAZ	889,018	1202	105	298
UK3WAF	622,334	1243	78	248
UK4ACE	596,096	763	90	279
UK4HCR	320,960	1003	80	240
UK4HAL	205,368	670	55	144
UK6LDN	181,886	519	52	147
UK6HAA	156,022	663	61	120
UK3TAG	120,139	305	64	127
UK1TAR	87,696	269	42	84
UK3DBV	83,375	368	35	90
UK4NAA	74,340	334	37	89
UK4FAX	29,913	307	22	37
UK3TBF	17,226	137	20	38
UK6HDP	12,816	238	24	65

KALININGRADSK

UK2FAA	**2,560,548**	**2803**	**117**	**357**
UK2FAH	552	17	9	15

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Jorge, LU8DQ, sent this photo of the location behind the most confusing call in this year's C.W. test—L8D/X. The QTH was Isla de los Estados, way down on the southern tip of Argentina.

A lot of racket was made from the Pacific last year by T32AL, manned by Ted, T32AL (also KN6Q), on the left, and Mark, AA6DX (T32AM), on the right. In the background is the Captain Cook Hotel with the 30 foot mast that held all the antennas.

This year's top USA Multi-Single crew was K5RC. Shown left to right are K5GA, K5GN, N5JJ, and KN5H. Not shown are K5RC, K5LZO, and NA5R.

KARELIA-FINNISH

UK1NAD	18,584	138	29	63
UK1NAP	10,597	198	22	50

LITHUANIA

UK2PAD	**2,880,249**	**2612**	**119**	**382**
UK2BBB	**2,172,138**	**2300**	**112**	**377**
UK2BCR	1,513,296	1956	90	282
UK2PRC	729,472	1369	82	246
UK2BCC	613,712	1246	67	250
UK2BBX	413,612	1209	48	164
UK2BCM	218,360	704	54	158
UK2BBF	214,592	715	52	172
UK2BCO	184,092	781	38	136
UK2BBQ	56,484	366	27	81

UKRAINE

UK5IBB	**3,021,012**	**2884**	**137**	**421**
UK5YAA	**2,368,318**	**2890**	**105**	**353**
UK5MCO	2,268,612	2662	115	362
UK5MAF	2,144,408	2362	121	357
UK5WBG	1,408,992	1745	103	313
UK5QBE	1,276,144	1954	90	286
UK5GKW	1,033,890	1527	91	299
UK5IBM	928,315	1491	102	299
UK5UDX	562,420	1104	69	175
UK5FAD	544,187	1158	67	222
UK5MCP	195,426	547	59	139
UK5MBQ	162,806	581	52	151
UK5MDI	138,105	507	39	126
UK5QCI	117,176	465	39	112
UK5IAI	92,409	901	22	52
UK5ICX	46,110	254	28	78
UK5ECT	26,136	297	23	65
UK5LCX	10,836	172	14	49
UK5LAP	6,148	85	17	41
UK5PAA	1,632	40	8	16

OCEANIA

NEW ZEALAND

ZL2SQ	**1,718,946**	**2153**	**86**	**175**

WESTERN SAMOA

5W5EE	**2,010,850**	**2654**	**107**	**155**

SOUTH AMERICA

ANTARCTICA

4K1D	**292,623**	**1021**	**33**	**70**

ARGENTINA

L8D/X	**3,922,075**	**3738**	**114**	**215**

BRAZIL

ZY1RR	**1,163,340**	**1439**	**87**	**189**
PY2SLS	599,872	986	76	130

CHILE

XQ3AA	**337,664**	**969**	**56**	**72**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

N2AA	**9,724,050**	**4863**	**170**	**516**
K1OY	**7,582,416**	**4066**	**164**	**492**
K2UA	**6,066,906**	**3460**	**159**	**459**
W3LPL	**5,849,192**	**3213**	**158**	**470**
N9MM	**5,496,425**	**3214**	**157**	**448**
AB8I	**4,206,005**	**2918**	**148**	**367**
W3GM	4,110,120	2434	152	436
N6RO	**4,049,674**	**2789**	**160**	**366**
W1YN	3,252,321	2381	130	363
K6XO	2,542,826	2033	131	311
N6TV	2,479,080	2013	144	294
AI6V	2,447,704	2009	133	303
N6VV	1,786,590	1617	121	269
K2TR	1,618,452	1402	117	285
K6ZM	1,424,256	1292	121	263
W2GD	1,412,670	1092	126	339
W3NX	1,048,615	925	113	288
N3LR	973,896	1023	99	242
N4KE	244,800	293	99	201

ASIA

GEORGIA

EW6V	**14,702,688**	**8001**	**159**	**504**

JAPAN

JA2YKA	**5,933,413**	**4102**	**152**	**357**
JA3YBF	**4,713,478**	**3449**	**147**	**335**
JA7YAA	3,201,776	2962	130	258
JA3YKC	3,073,210	2546	142	288
JF1ZRQ	2,588,604	2648	116	223
JA1YNE	1,501,946	1669	113	204
JH1YDT	1,177,740	1553	96	174
JA1YXP	1,118,208	1559	95	161
JA2YEF	931,425	1216	102	173
JA6YAI	607,440	905	84	156
JA7YFB	375,436	712	85	103
JA1YHA	135,247	350	59	80

SAUDI ARABIA

HZ1AB	**4,706,566**	**4113**	**113**	**309**

EUROPE

AALAND ISLANDS

OH0W	**14,371,840**	**9515**	**184**	**618**

BULGARIA

LZ2KAD	**1,498,039**	**2275**	**75**	**314**

FINLAND

OH1AA	**4,651,488**	**4213**	**135**	**423**

GERMANY

DL0KF	**3,954,994**	**4016**	**130**	**396**

THE NETHERLANDS

PA0ZA	**314,960**	**778**	**70**	**184**

SPAIN

EA1KC	**1,191,938**	**1750**	**92**	**282**

SWEDEN

SK2IV	**104,854**	**334**	**46**	**160**

YUGOSLAVIA

4N1U	**7,329,525**	**6335**	**132**	**443**
YU9W	**6,679,775**	**5736**	**140**	**435**
YU3DBC	2,684,748	2481	117	356

OCEANIA

EAST KIRIBATI

T32AL	**1,684,697**	**2814**	**92**	**111**

NIUE

ZK2RU	**2,463,291**	**2973**	**107**	**172**

SOUTH AMERICA

NETHERLANDS ANTILLES

P42E	**23,295,408**	**12315**	**161**	**475**

QRP

UP2BIM	**A**	**899,932**	**1351**	**83**	**279**
YU3BC	"	**742,560**	**1029**	**86**	**254**
UB5UCJ	"	**452,505**	**656**	**81**	**230**
K8IA	"	**400,064**	**539**	**80**	**186**
W9KNI	"	345,417	441	91	200
UA3QGO	"	**297,937**	**710**	**67**	**184**
YU3DRW	"	258,530	556	58	148
OH5WH	"	**247,299**	**635**	**51**	**170**
UP2BFE	"	198,720	594	59	181
OE3RE	"	**198,656**	**536**	**57**	**137**
YV2BE	"	**176,400**	**492**	**51**	**69**
HA5KD	"	**154,424**	**484**	**55**	**139**
KI9A	"	133,131	271	70	129
SM5CCT	"	**127,764**	**439**	**47**	**142**
JA1HGY	"	**108,936**	**427**	**28**	**61**
W9PNE	"	107,706	243	65	109
KB0HA	"	86,858	241	54	83
JA1KFX	"	84,870	257	56	67
KW2J	"	70,366	177	55	96
UB5IIA	"	65,988	228	40	112
G5DEH	"	**62,832**	**233**	**35**	**97**
UB5WAR	"	55,226	254	29	77
KH6CP/3	"	51,471	170	45	84
N8CQA	"	49,408	149	49	79
KA1CZF	"	42,435	146	43	72
KJ6F	"	40,362	167	42	51
KG0A	"	34,884	114	38	64
EA8EY	"	**30,449**	**188**	**24**	**59**
KF0T	"	26,028	111	46	62
AD1C	"	23,959	106	36	61
OK2SBJ	"	**16,132**	**125**	**27**	**82**
VE4RF	"	**15,824**	**82**	**34**	**52**
PA3BVT	"	**10,250**	**102**	**16**	**25**
PA0ADT	"	8,685	80	18	27
YO4BQV	"	7,128	86	20	46
LB5RB	"	6,314	111	18	36
VK4SF	"	4,140	94	7	11
KA9LUB	"	1,092	28	12	9
SM4KL	"	560	18	12	16
W2JEK	"	320	12	10	10
JG1WRN	"	294	9	7	7
YU1NR	**28**	**69,338**	**381**	**22**	**52**
W5VGX	"	**57,975**	**276**	**21**	**54**
KA3CRC	"	34,009	171	21	50
WA0VBW	"	21,576	128	21	41
G3VMY	"	**17,343**	**193**	**14**	**27**
N1BEY	"	15,925	90	18	47
EA2CR	"	**14,850**	**124**	**16**	**38**
VE2AEJ/3	"	**13,936**	**104**	**15**	**37**
JH7RZW	"	**12,705**	**130**	**16**	**19**
PY2TU	"	**10,878**	**79**	**18**	**31**
UR2TBG	"	176	6	5	6
OK3CFK	"	120	5	3	5
JA1ZLO	**21**	**93,366**	**375**	**29**	**62**
JA1TLK	"	60,358	268	25	53
I8HCJ	"	**38,241**	**274**	**19**	**44**
N1AFC	"	**19,008**	**129**	**16**	**38**
G3CWL	"	**8,820**	**131**	**10**	**25**
W6YMH	"	6,552	83	12	16
OK1DAV	"	6,157	64	15	47
OH1JD	"	6,042	133	12	26
DJ5QK	"	4,455	135	11	22
OH7KU	"	1,575	63	6	19
SM7BNG	"	285	19	2	3
SM6MIS	"	255	15	5	12
JM1NMB	"	100	10	2	3
N4IJ	**14**	**24,411**	**109**	**21**	**58**
OK2BMA	"	**24,192**	**233**	**13**	**51**
HA4YG	"	**24,064**	**290**	**15**	**49**
SP8AWL	"	**18,696**	**175**	**18**	**39**
UT5GP	"	**17,930**	**209**	**13**	**42**
LA9PCA	"	17,732	260	12	50
YU3TMJ	"	**14,036**	**172**	**13**	**45**
OK1AYQ	"	**12,870**	**181**	**12**	**13**
I4KRF	"	**10,712**	**167**	**13**	**39**
UA6LIG	"	**7,701**	**125**	**9**	**51**
YO6HQ	"	6,440	159	12	21
LA8WG	"	5,735	123	8	29
JH3LCU/1	"	5,635	64	14	21
OK1DMP	"	3,560	44	11	29
JA2DN	"	2,400	29	13	19
JE2JIL/9	"	1,976	35	12	14
G3DOP	"	1,104	30	6	18
OK3CAA	"	975	40	5	20
OK1DCP	**7**	**21,184**	**249**	**14**	**50**
YU5JQR	"	**1,204**	**40**	**8**	**20**
OK2PAW	"	1,200	37	7	18
YU5FAA	"	851	43	5	18
EA1KC	"	759	27	6	17
UB5AAL	**3.5**	**16,356**	**316**	**7**	**40**
UB5WBJ	"	10,200	254	6	34
UB5WDU	"	9,589	202	10	33
UB5VBY	"	2,945	80	6	25
UR2RLQ	"	**2,492**	**84**	**5**	**23**
OK1MNV	"	1,884	64	4	27
UP2BHA	"	**1,771**	**74**	**5**	**18**
UO5ODB	**1.8**	**11,960**	**274**	**7**	**33**
UA3DTD	"	**4,488**	**107**	**7**	**27**
UB5ABZ	"	**2,912**	**78**	**7**	**25**
OK1KIR	"	**2,560**	**120**	**5**	**27**
EZ4CCB	"	2,492	67	6	22
EZ6ADW	"	1,140	43	6	14
OL1AZM	"	748	39	5	17
OL8COS	"	600	34	4	16

CHECK LOGS

Our thanks to the following stations who sent in check logs:

DK3OI, DK6US, DL6PE, EA3AVX, EA6FD, EK9C/0, G3ATH, HA1KVB, HA1UB, HA2MG, HA2NI, HA3MJ, HA5HF, HA5ZE, HA0LG, HI8RPD, HK3YH, KA1EMQ, K5UA, K6FM, K6GNX, K6VL, KC7YE, K8UNP/4, LA1FW, LA1H, LA1HCA, LA2UD, LA3DB, LA4IAA, LA4XX, LA5BS, LA7SP, LA7XB, LA8XM, LA9XG, LU2CN, LZ1IA, LZ1KAU, LZ1KVF, LZ1RU, LZ2DB, LZ2KAF, LZ2KKZ, N2RS, NA6T, OH1AF, OH2FQ, OH2NL, OH2NM, OH2VB, OH5LJ, OH5NZ, OH5YX, OH6GD, OH6RE, OH6TA, OH7YG, OK1AD, OK1AMS, OK1DGN, OK1DKU, OK1FAI, OK1JDJ, OK1JST, OK1PCL, OK1US, OK2BHQ, OK2BUY, OK2PDN, OK3COO, OK3KKQ/P, ON5CW, OY7ML, PA3ADI, PA3BNI, PA0LRK, PA0RRS, PA0UV, PI1PT, PT7AQ, PYZRRO, PY2SLS, PY6ABZ, RA9AMH, SM2COR, SM4ASI, SM5APS, SM5BDV, SM5DUT, SM5FUG, SM5IL, SM6AIM, SM6CPO, SM6LWH, SM7DNG, SM7KNW, SM7LMX, SM7NJJ, SM7NSX, SM0CMH, SM0IFX, SP2DVH, SP2KFY, SP4AWE, SP4BGR, SP5CFD, SP5CM, SP5ENA, SP5KCR, SP6KLA, TF3YH, UA1OCT, UA1ODP, UA1QBE, UA1QCM, UA1WEA, UA1ZCZ, UA1ZDW, UA1ZEF, UA2FCB, UA3AAG, UA3ACJ, UA3AEL, UA3AIF, UA3AJU, UA3BE, UA3DAT, UA3DB, UA3DCY, UA3DEV, UA3DFV, UA3DIW, UA3DJN, UA3DL, UA3DNK, UA3EAL, UA3ECJ, UA3ESN, UA3ET, UA3IAH, UA3ICF, UA3MDX, UA3NG, UA3PAE, UA3RDH, UA3TAG, UA3VAN, UA3VDO, UA4ADL, UA4CCB, UA4CDC, UA4FDO, UA4HAN, UA4HDV, UA4HFK, UA4NDJ, UA4YAQ, UA6AVX, UA6JAY, UA6PCH, UA6WBZ, UA6XAE, UA6YCK, UA9AHS, UA9AMF, UA9CES, UA9CHQ, UA9COJ, UA9COT, UA9FDW, UA9FHK, UA9HCG, UA9KAF, UA9KAI, UA9MQ, UA9ND, UA9PP, UA9SFR, UA9SHU, UA9UBM, UA9UCK, UA9UOZ, UA9WFB, UA9XAB, UA9XED, UA9XS, UA0ABB, UA0AGI, UA0LCD, UA0JDX, UA0LFK, UA0WAE, UB5CCP, UB5ECB, UB5EF, UB5FDM, UB5FFZ, UB5GBW, UB5IMD, UB5IPI, UB5JCW, UB5JLJ, UB5JNW, UB5JQS, UB5KAK, UB5KAY, UB5LEE, UB5MNR, UB5MVJ, UB5NCF, UB5QEB, UB5QFS, UB5QGD, UB5QJA, UB5QKN, UB5UBU, UB5UCE, UB5UCH, UB5UDG, UB5UWM, UB5UWZ, UB5WDD, UB5WDV, UB5ZBG, UC2LBE, UC20AJ, UF6FIT, UG6GAE, UH8EAD, UK1AAW, UK1OAP, UK1OAZ, UK3ABT, UK4ABW, UK4NBM, UK5HAB, UK5OAR, UK5WAZ, UK6FAA, UK7TAA, UK9SBI, UK0AAB, UK0DAA, UK0LBG, UL7AAS, UL7EAH, UL7EAJ, UL7GBD, UL7GDH, UL7TAY, UO5OBD, UO5ODA, UP2BKP, UQ2GBJ, UR2RRR, UR2ZN, UT5QG, UV3DN, UW3EG, UW4NP, UY5GG, UY5XB, VE2UN, VE3MFA, W4MAF, W6DNY, W6JTA, W6MFZ, W8RV, WA0AGM, YO2ADQ, YO2BFO, YO2QY, YO4PX, YO8FZ, 4T10, 5H3LB.

Disqualified: 4Z4DX—Unverifiable QSO's.

What is the ultimate contest accessory? An electronic keyer, a computerized logger, an automatic signal tracker, the latest transceiver with 2,000,000 memories? A resounding no. The ultimate contest accessory is the VODD built by N1II.

The Ultimate Contest Accessory The VODD

The Voice-Operated Drink Dispenser

BY PAUL M. DANZER*, N1II

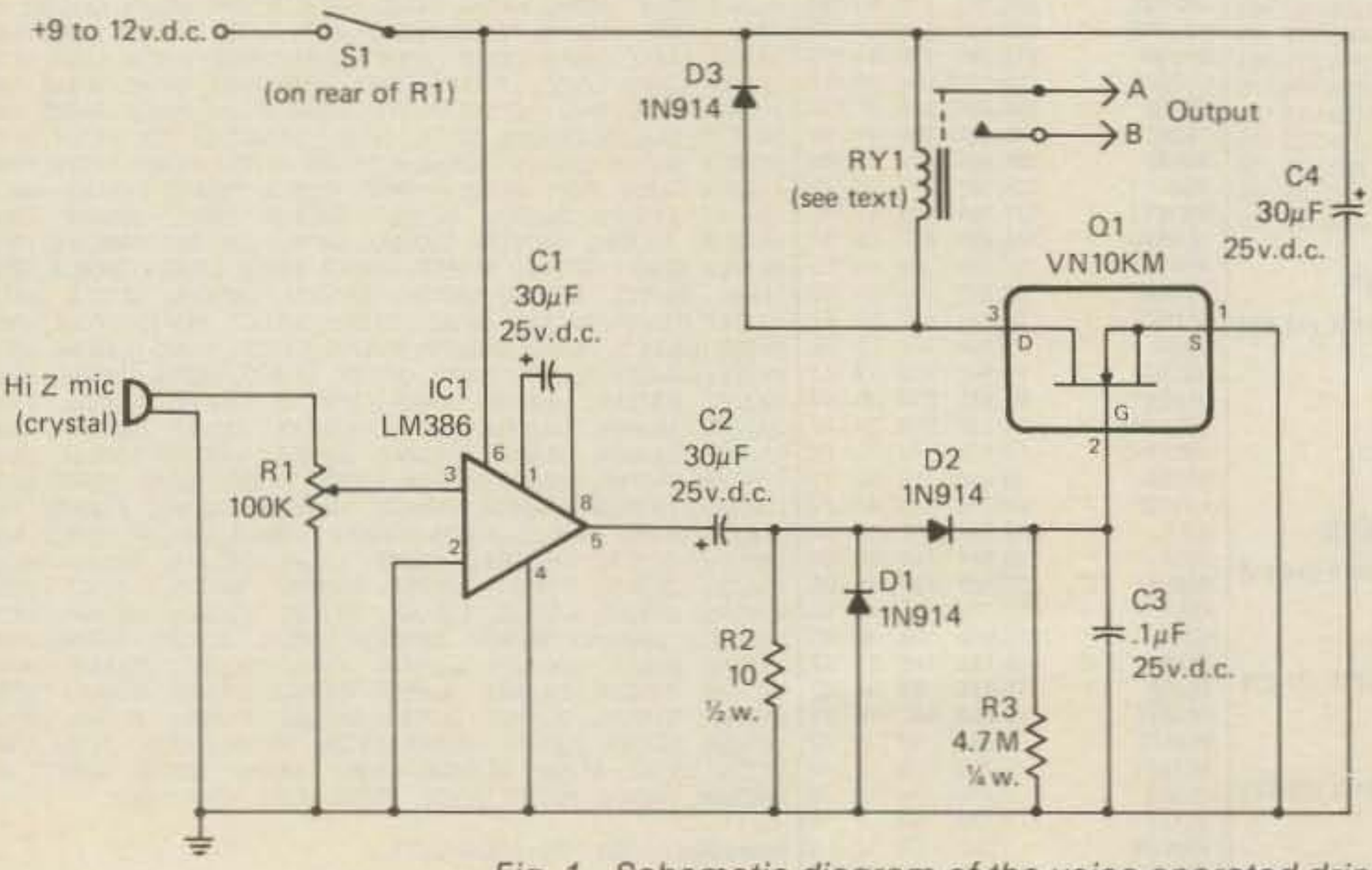
While Neiman-Marcus probably won't be offering this item in their new Christmas catalog, it is a bit of luxury that can benefit the contester caught up in the throws of long hours of operating. As amateurs, we pride ourselves on our electronic wizardry and sophisticated hardware. Why not use some of that technology to make our contesting and everyday operating more pleasurable?

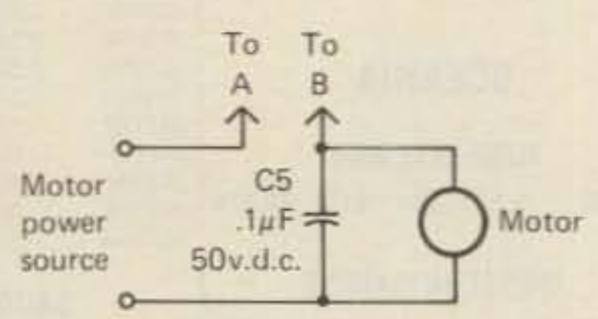
Pick up the microphone, speak a few words, and out comes water, soda, or whatever beverage you loaded into the reservoir behind the front panel. Constructed on a universal pc board, the VODD requires a minimum of skill and no special tools to construct. All parts are readily available and parts substitution is quite simple due to the matrix layout of the pc board.

The circuit shown in fig. 1 consists of a high-impedance (crystal) microphone

*2 Dawn Road, Norwalk, CT 06851

Front view of the voice-operated drink dispenser. The choice of cup is optional.





NOTE:
Motor power supply should be isolated from circuit power supply.

LEGEND:
IC1 = National LM386
Radio Shack 276-1931
Q1 = VN10KM, 1w, .5a. power FET
Radio Shack 276-2070

Fig. 1– Schematic diagram of the voice-operated drink dispenser.

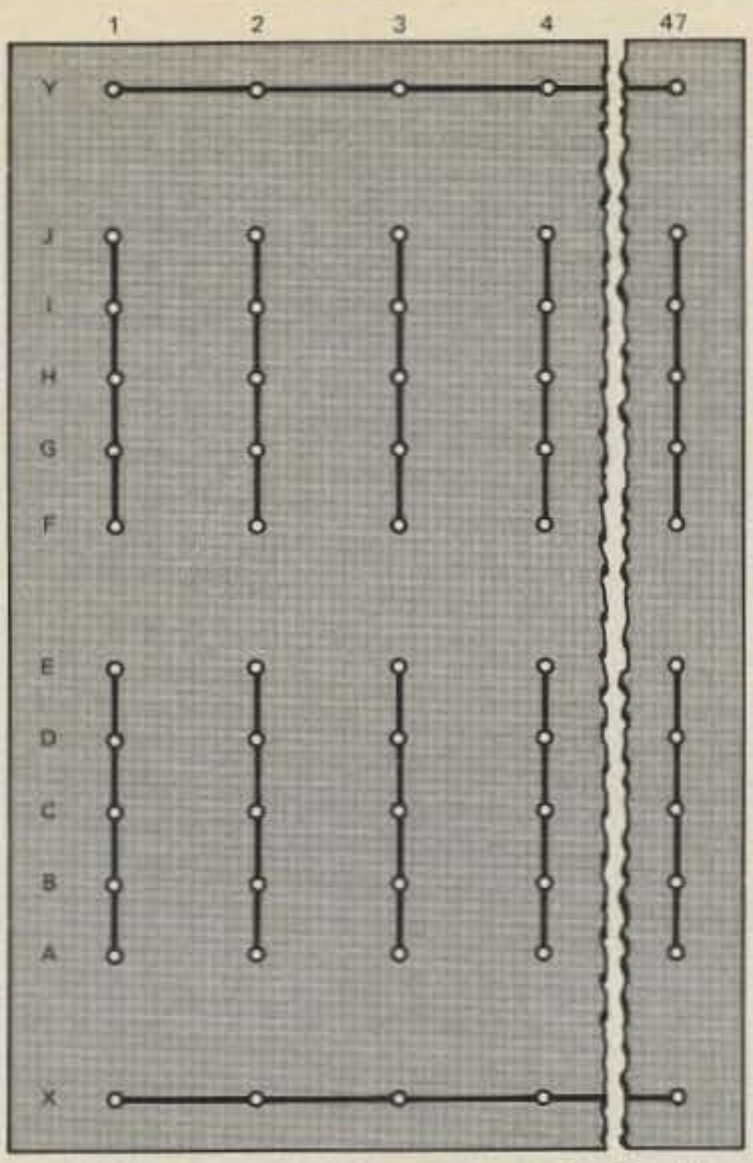


Fig. 2– A pictorial diagram of the Radio Shack experimenter's pc board.

driving an LM-386 audio amplifier integrated circuit. Potentiometer R1 is set so that only your voice near the mike, and not background noise, triggers the circuit. The audio amplifier output is rectified and filtered into d.c. by the combination of D1, D2, R3, and C3. R3 can be changed to a higher value if you want the system to stay on longer when you talk.

Q1 is a 1 watt power FET, used since it provides a high-input impedance and considerable current drive. When Q1 is turned on, it energizes sensitive relay RY1, which has a 500 ohm coil and requires 10–12 ma to close the contacts. The contacts are wired in series with a 12 volt d.c. pump which was purchased as a universal windshield-washer replacement pump. Capacitor C5 is optional and was added to reduce the electrical noise generated by the motor.

Two power sources are used. A stan-

pc board: experimenter's pc board (276-170)
9 volt battery connector (220-325)
Insulated clips for lantern batteries (270-378)
R1: 100K pot with switch (271-216)
R2: 10Ω, ½ watt
R3: 4.7 meg, ¼ watt
C1, C2, C3, C4: 30 μF, 25 v.d.c. (any value greater than 10 μF could be used)
D1, D2, D3: IN914 (276-1620)
IC1: LM-386 (276-1731)
Q1: VN10KM, 1 watt FET, .5a I_D (276-2070)
RY1: SPDT sensitive relay, 500Ω coil, 6–9 v.d.c., 10–12 ma (275-004)
12 v.d.c. replacement windshield-washer pump (usually supplied with 12–18 inches of matching hose or tubing)
C5: optional, .1 μF, 50 v.d.c.

Table I– VODD parts list (all part numbers are Radio Shack stock numbers).

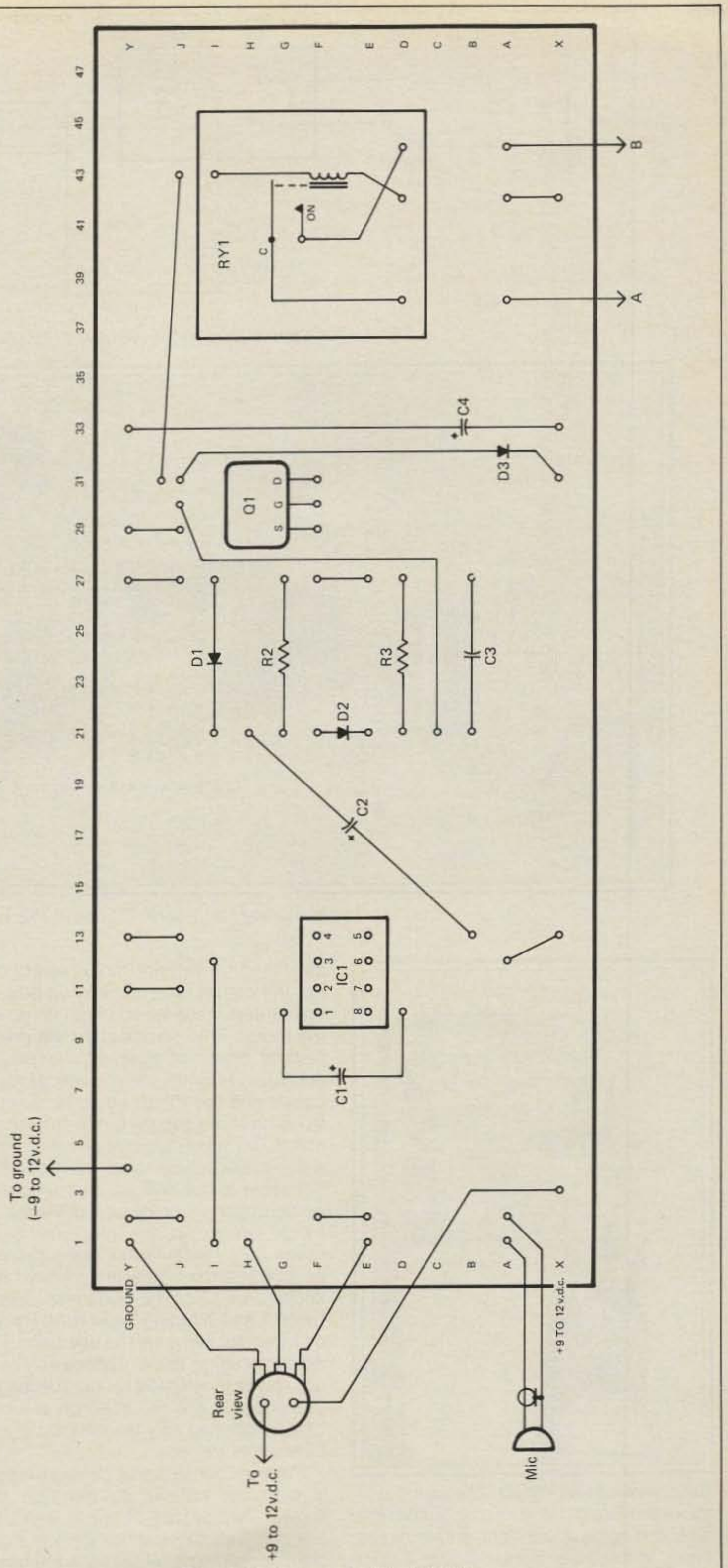


Fig. 3– Parts layout of the VODD.

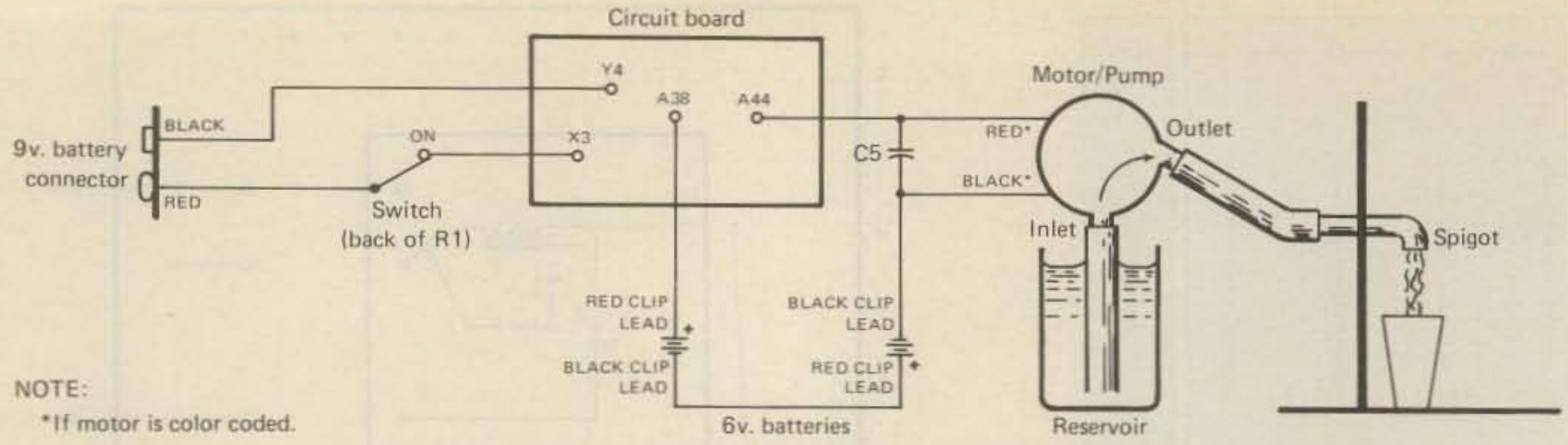
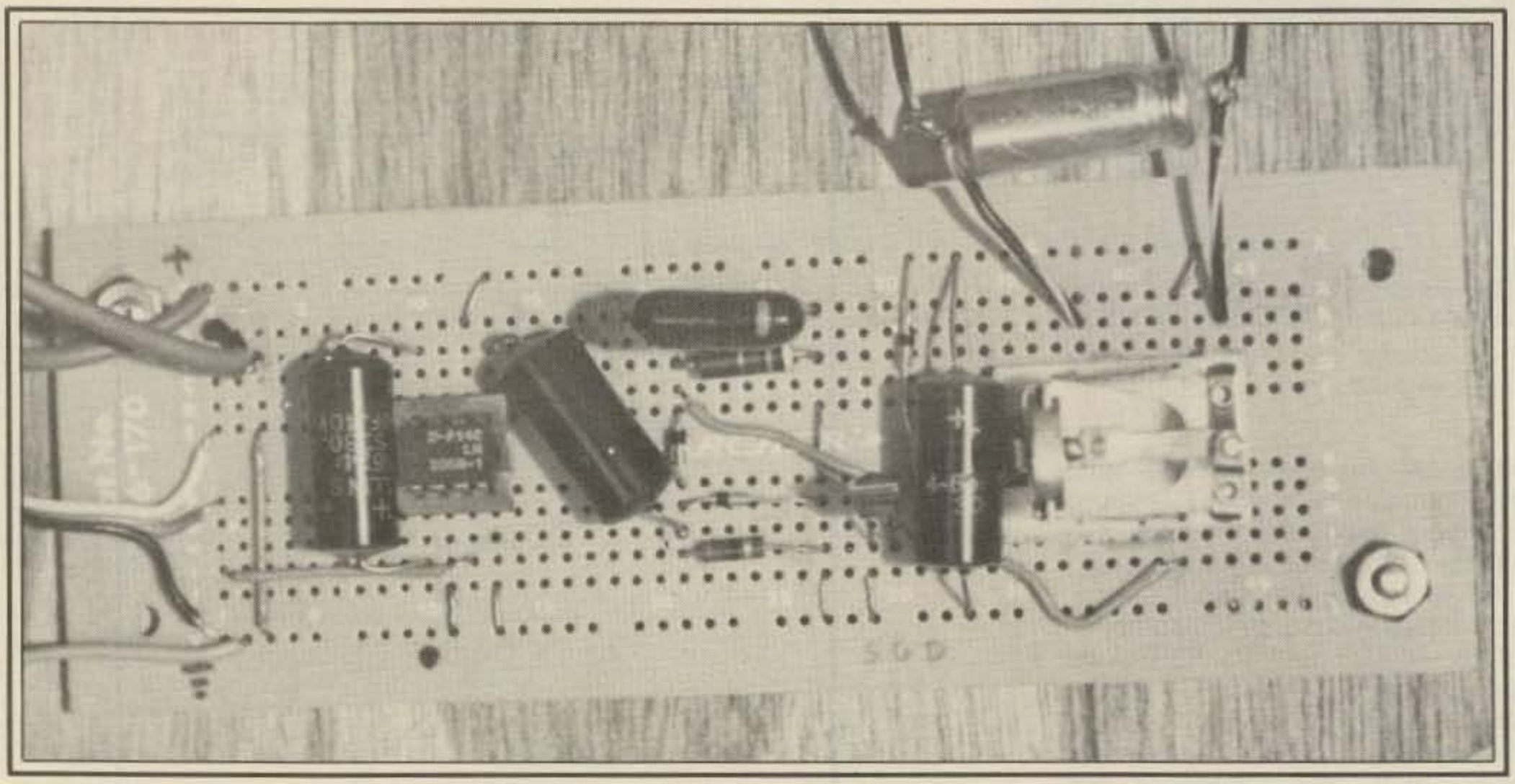
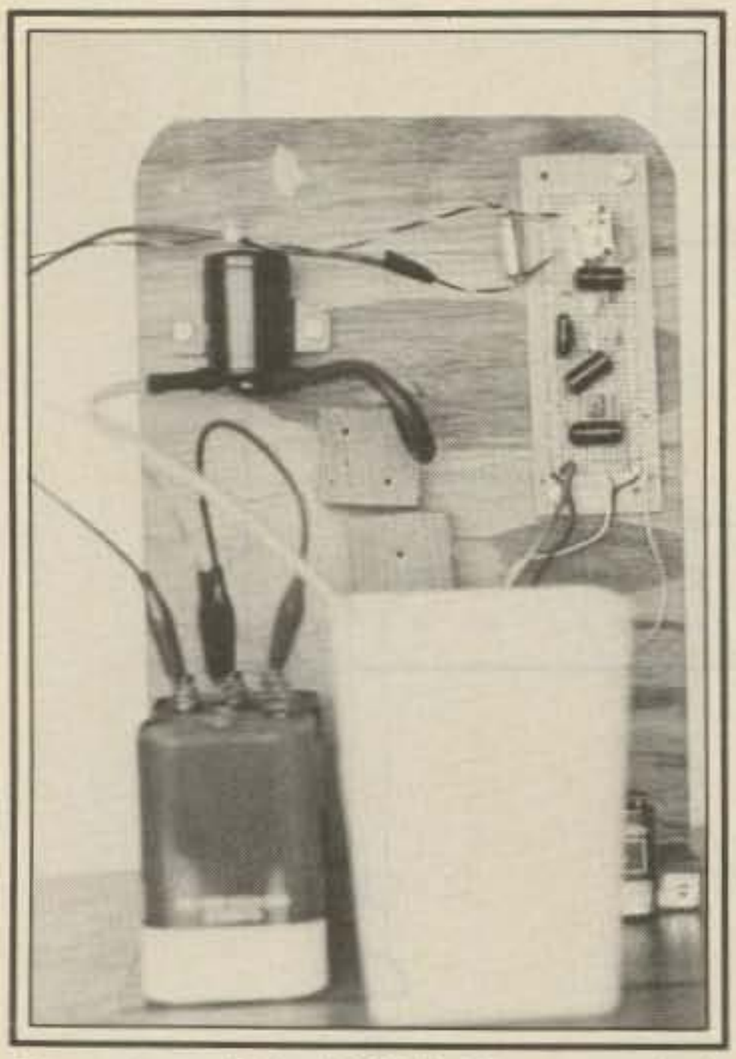


Fig. 4– The simple interconnections for the drink dispenser.



The completed pc board. Compare this with fig. 3.



Rear view of the VODD. The pump is in the upper left, batteries at the bottom left, pc board at the upper right, and drink reservoir at the lower right. Perhaps a drink cooling mod could be added.

dard 9 volt transistor-radio battery powers the circuit, and an isolated pair of 6 volt lantern cells wired in series powers the motor. This combination will provide several hours of operation, depending upon just how thirsty you are. Both the circuit and the motor could be powered from the same supply, but the motor generates so much electrical noise that it was simpler to use two battery sources.

Layout is not critical, and almost any construction technique can be used. The model shown in the illustrations was made on a Radio Shack experimenter's pc board, which has the matrix layout shown in fig. 2. The horizontal lines labeled **X** and **Y** provide power and ground distribution. Fig. 3 can be used as a guide to layout using this breadboard. The figure shows the printed wiring side, and the components are mounted on the blank side, which has only the letters and numbers on its surface.

Physical construction behind the panel is also not critical, as the rear view shows. Two pieces of scrap wall panel are screwed together to form the drink dispenser. The panel sections are braced by two short lengths of ¾ " × 1½ " wood fastened with ⅜ inch wood screws.

The beverage outlet was made by taking a piece of scrap-metal tubing and running the rubber hose from the pump outlet through the tubing. The rear of the tubing is held by a cable clamp screwed to the upper wood block. The windshield-washer pump shown has both an input and output hose connection. Other models on the market are designed to screw directly into the side of the fluid reservoir. These can be used by cutting a matching hole in the side of a half-gallon plastic milk container near the bottom and screwing in the pump using the washer supplied with the pump.

Fig. 4 is a pictorial of the electrical and mechanical interconnections. Many replacement washer pumps come complete with matching tubing. If yours does not you will need 12 to 18 inches of tubing to complete the project.

One note of simple sanitation is in order. You might want to run a few ounces of a soap solution followed by fresh water through the system before and after each use.

Thirsty? Put a glass under the outlet and just speak up! CQ

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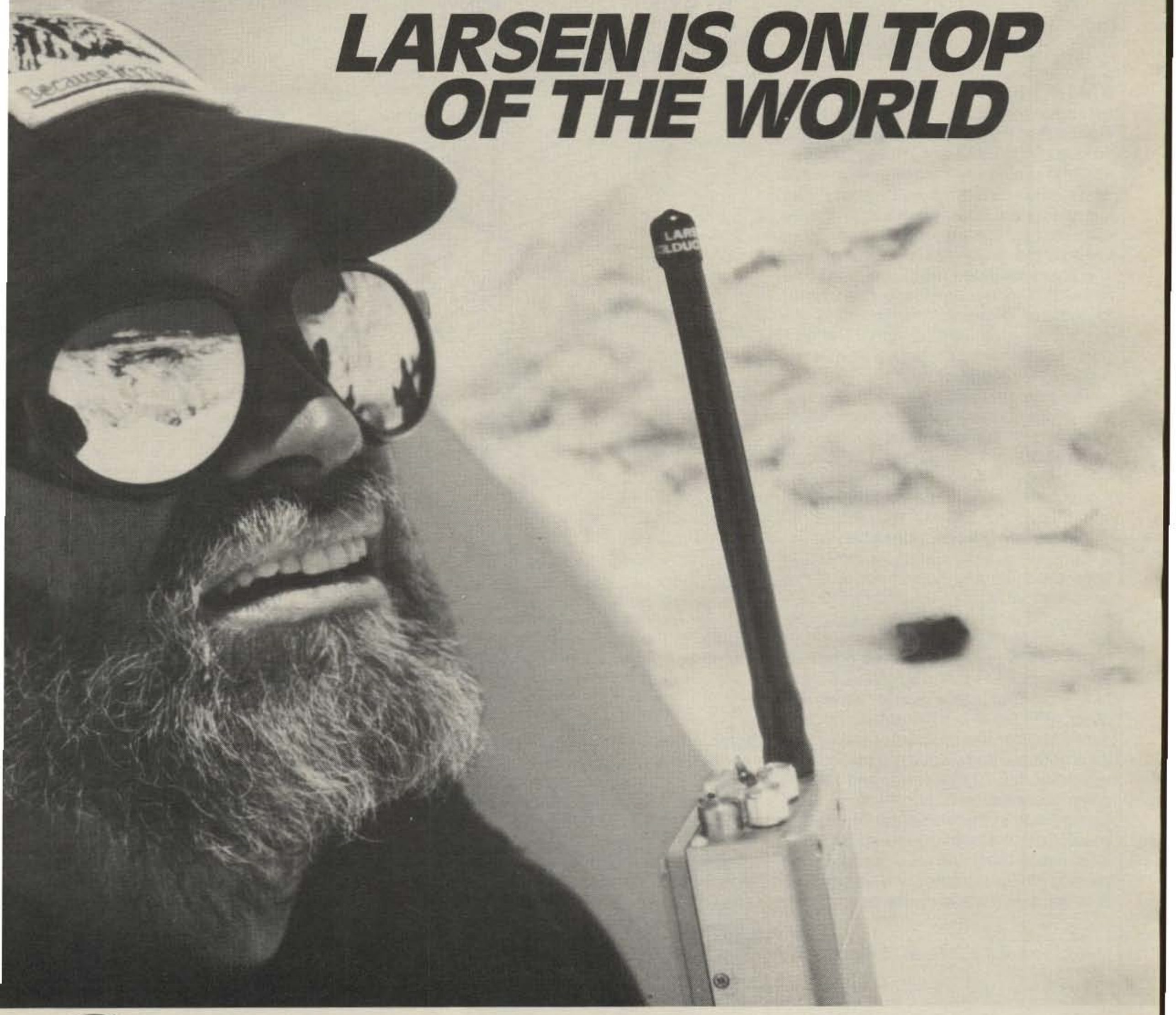

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CIRCLE 35 ON READER SERVICE CARD

K2NY takes us from theory to practice in the development of a triband sloper antenna.

The Quarter-Wave Sloper Antenna

The Development of a Triband Sloper Antenna

BY DICK PITZERUSE*, K2NY

Having read almost everything there is to read on the quarter-wave sloper, I concluded that these could be great antennas for 160, 80, and/or 40 meter DX work. For the uninitiated, the quarter-wave sloper, also called the half sloper, is an approximate quarter wavelength of wire run from near the top of one's tower down towards the ground at an angle of 45°. The top is insulated from its support and fed with 50 ohm coax, center conductor to radiator element, and shield to the electrically grounded support. (The support must be metal, or else a wire must be run from the top to ground.)

The thing that intrigued me most about this antenna was that the current maximum was at the top of the support, up high, where mom always said it should be. This coupled with predominant vertical polarization should make the half sloper ideal for DX on 160, 80, or 40 within the confines of a suburban lot.

Conflicting information seemed to abound concerning the half sloper. Some people reported the antennas very simple to tune with v.s.w.r.'s of 1:1 easily obtained, while others reported v.s.w.r.'s as high as 6:1 at resonance. Some observed the antennas needed to be as much as 15 to 20% longer than a quarter wave, and others needed to cut the antenna significantly shorter than a quarter wave. One local amateur had placed five of these antennas on his 70 foot tower and had excellent success on 75 and 40 meter s.s.b. (using traps in the elements). He had no problem tuning them to resonance. Other information that I had read indicated that placing multiple quarter-wave slopers on a single tower would cause tuning problems virtually impossible to overcome. It appeared that everyone who tried half slopers had the highest praise for them. However, an article by VE2CV[1] had nothing good to say about the antenna; the author had modeled it at 200 MHz, found it theoretically unsound, and did not recommend its installation, although he admittedly never tried a full-size one! Indeed, everything about the antenna seemed a paradox.

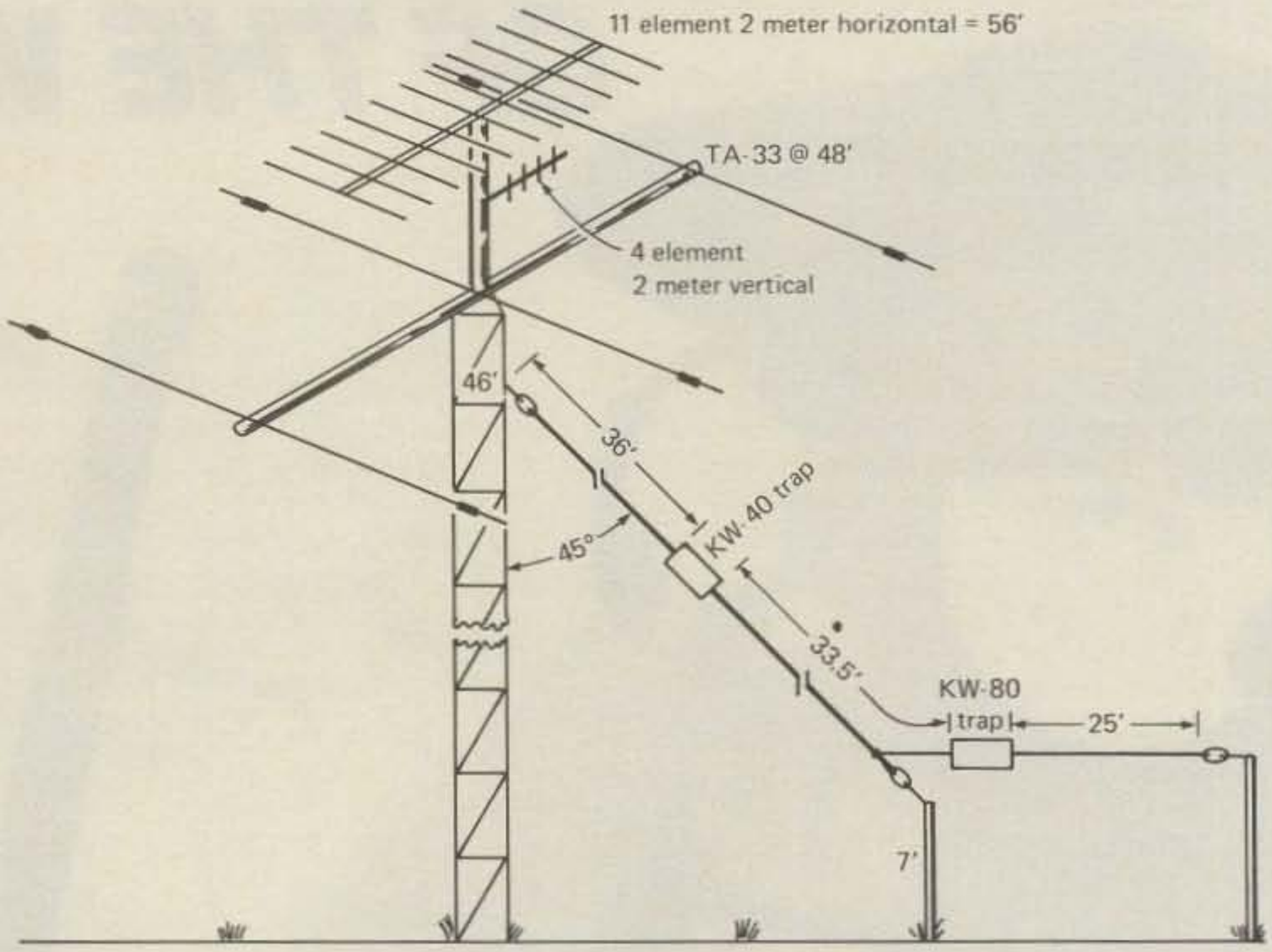
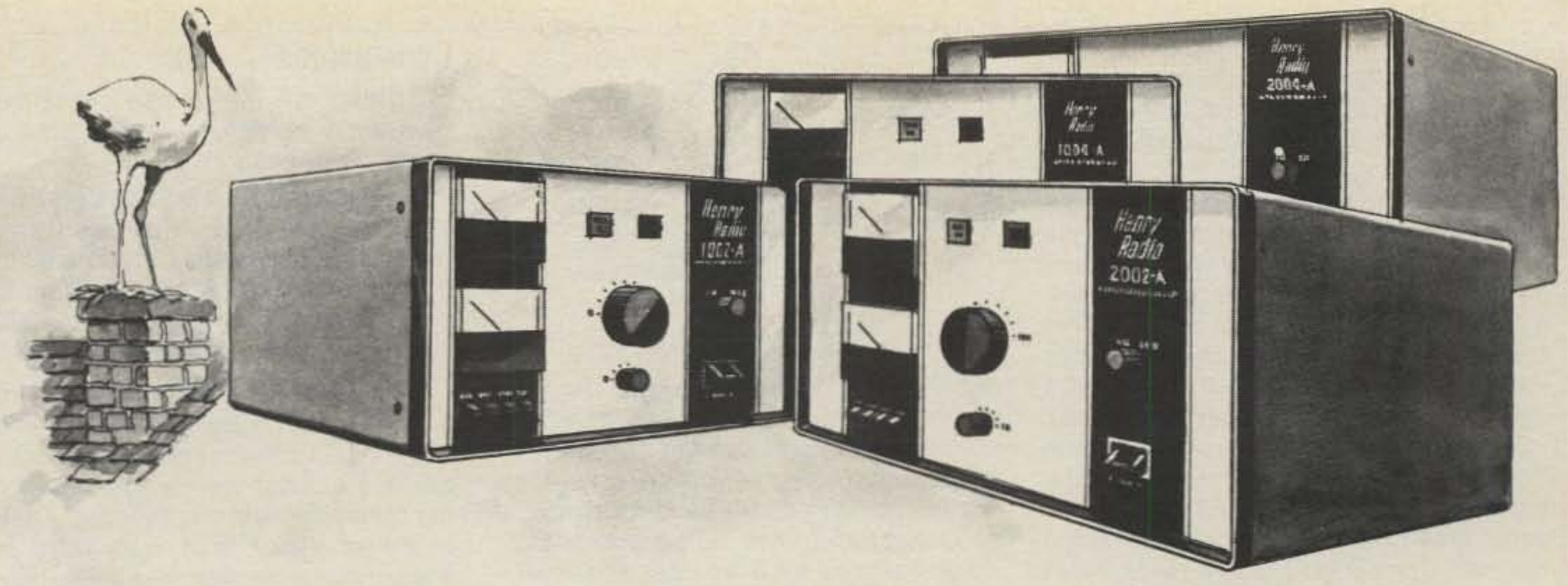


Fig. 1– The overall installation of the triband half sloper. The end of the sloper runs parallel to the ground in order to maintain an approximate 45° angle between the upper portion of the radiator (the part that does most of the radiating) and the tower. Final dimensions will vary slightly from installation to installation.

Undaunted and oblivious to consequence, I went ahead with the first half sloper. This would be for 40 meters, sloping towards the northeast with the top fastened at 46 feet on my tower. (My tower is 48 feet of Rohn 25G with 8 feet of mast sticking out of the top. On the mast is a 3-element tribander just above the tower, a 4-element vertically polarized 2 meter beam 4 feet above that, and an 11-element horizontally polarized 2 meter beam at the top. Overall height above ground is 56 feet. The tower is guyed in three directions at 22 and 42 feet with wire insulated from the tower and broken up into non-resonant lengths.) The antenna needed to be 36 feet long to resonate at 7025 kHz, about 10% longer than a quarter wave. The best v.s.w.r. I could obtain was 2:1 at resonance. Adjusting the angle between the radiator and the tower had only a slight effect on the v.s.w.r. Measurements taken with an impedance

*4043 Howlett Hill Road, Syracuse, NY 13215

[1] *Belrose, "The Half Sloper—Successful Deployment is an Enigma," QST, May 1980, pp. 31–33.*



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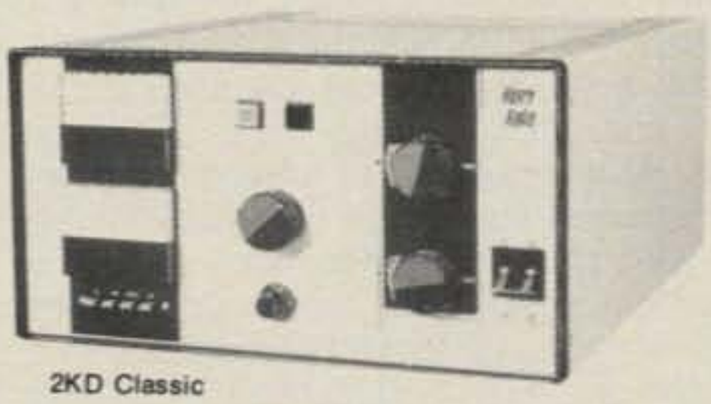

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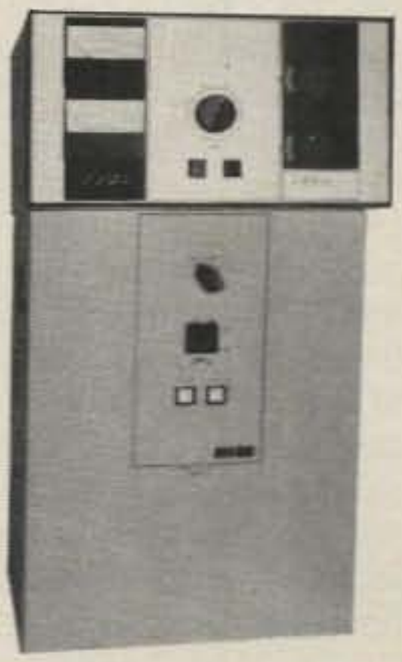

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bridge at the transmitter end of the feedline showed the antenna had a resistive component of about 27 ohms after factoring in the feedline length using a Smith Chart.

Although the v.s.w.r. did not bottom out as low as I would like to have seen it, the antenna seemed relatively broadbanded, as the v.s.w.r. did not rise to more than 3:1 at the top of the phone band. As my transmitter was able to deal with this v.s.w.r., I decided to leave it and install a second 40 meter half sloper to the west.

This sloper was hung from the same height as the first one. The v.s.w.r. bottomed out at 1.3:1 on 7020 kHz. At the same time it reduced the v.s.w.r. on the northeast sloper to 1.5:1 at resonance! Measurements with the impedance bridge showed feed impedances of 40 and 35 ohms on the west and northeast antennas respectively. The two antennas were obviously interacting. Using ⅜-wavelength feeders on each antenna and floating the unused feeder should effectively lengthen the unused antenna by about 5%[2], causing it to act as a reflector for the driven antenna. A front to back of about 10 dB was realized on some signals using this scheme.

It seemed like a good time to try an 80 meter version, so a third half sloper was put out to the north-northwest, this one carefully pruned for 3510 kHz. Again I found the antenna needed to be about 10% longer; 73 feet was required to bring it to resonance. The v.s.w.r. bottomed out at about 2:1. However, measurements with the impedance bridge indicated a feed resistance of 100 ohms, much higher than the two 40 meter units. I can only attribute this to the fact that all three units were hung from 46 feet on the tower—less than a quarter wave on 80, and greater than a quarter wave on 40. Although I have not tried it, I suspect an antenna hung at exactly a quarter wave would be very close to 50 ohms. The presence of this antenna had very little impact on the two 40 meter slopers.

By this time I was really rolling, so I decided to erect a fourth sloper for 160 meters. The antenna was strung out from the same 46 foot height to the south. It was resonant on 1810 kHz at a length of 105 feet, about 20% short! Minimum v.s.w.r. obtainable was 4:1, and the feed impedance at resonance was 200 ohms resistive. This seemed to confirm my suspicions of significantly increased feed resistances at lower heights. Furthermore, the deployment of this antenna changed the v.s.w.r. on the 80 half sloper to 2.7:1 at resonance. The 40 meter elements seemed virtually unaffected. Performance of the 40 and 80 meter antennas did not seem to suffer, and the 160 meter antenna worked better than anything else I had used on that band.

[2]ARRL Antenna Handbook, *14th edition, chapter 8, pp. 12–13.*

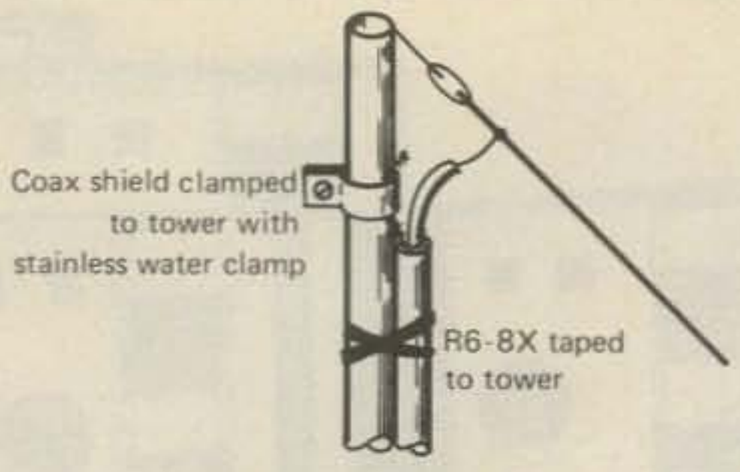

Fig. 2– Method of installing the half sloper to the tower. A stainless steel hose clamp is used to fasten the shield to the tower leg. Penetrox, or an equivalent compound, should be used to ensure a good electrical joint. Be sure to seal or tape the coax for a weather-tight seal.

Now I was beginning to receive the evil eye from my XYL as our yard was beginning to look more and more like the underside of a giant spider. It occurred to me that traps might be the answer. WA2QKU at Unadilla-Reyco here in town told me that traps resonant for 80 and 40 meters were available, but that stock traps were tuned for 3625 and 7150 kHz and operation at a kw was not recommended further than 100 kHz from the resonant frequency. However, specially wound units were available at a slight increase in price. I ordered one for 7050 kHz and another for 3550 kHz.

I removed the 160 and 80 meter slopers from the tower and simply installed the 40 meter trap at the end of the northeast sloper 36 feet from the feedpoint. I assumed an additional length of 36 feet would be required for the 80 meter section, and a length of 30 feet for the 160 meter end section. The v.s.w.r. was first checked on 40 meters and found to be just slightly changed. I then tuned the 80 meter section. The length worked out to be 33.5 feet for resonance at 3520 kHz. Finally, the 160 meter section was trimmed and a length of 25 feet was required for resonance at 1815 kHz. The v.s.w.r. bottoms out at 1.3:1 on 40, 1.5:1 on 80, and 1:1 on 160 meters. Bandwidth between the 2:1 v.s.w.r. points is 100 kHz on 40, 80 kHz on 80, and 30 kHz on 160 meters. Fig. 1 shows the final dimensions which were empirically determined for resonance at 1815, 3530, and 7030 kHz. I should point out that this determination was made with the western 40 meter sloper in place. I wanted to keep that antenna up because the front-to-back ratio that the two 40 meter slopers exhibited was very useful chasing Europeans when the midwest signals were coming through at the same time. Temporary removal of this sloper did have some impact on the bottoming out of the v.s.w.r. on all three bands, but not on the resonant frequency. Without the west sloper in place, the best v.s.w.r.'s which could be obtained were 1.3:1 on 160, 2.2:1 on 80, and 2:1 on 40 meters. That western sloper is obviously acting as some sort of tuning stub.

Conclusions

Throughout the course of the experimentation several things became clear to me. They include:

1. The length of the sloper will be longer than a quarter wave if the end does not remain near the ground for a significant portion of its length. For a single-band sloper a length of 260/F(MHz) will give you a good point from which to start.

2. If the end of the antenna is low to the ground for a significant portion of its length, or if the antenna is substantially below a quarter wavelength in height at the feed point, start out long, but the antenna will more than likely have to be shortened by as much as 25% below a quarter wavelength.

3. Any wire, resonant or not, hanging from the tower supporting the sloper may impact upon the feed impedance of the sloper. With some experimentation this can be used to advantage if desired.

4. As long as your line losses are low (as they would be with reasonable lengths of foam dielectric RG-8U on frequencies up to 40 meters), v.s.w.r.'s as high as 3 or 4 to 1 are of no particular consequence if the antenna is resonant and the transmitter can be convinced to load. However, unless the transmitter can match a wide range of impedances by itself, before you start out you must resign yourself to the possible need for a tuner to match this antenna to the rig.

5. A good ground system, although desirable, does not seem to have anywhere near the effect it does for a base-fed vertical radiator. Going from a simple ground rod to 16 quarter-wave radials under the sloper had no effect on v.s.w.r. and no noticeable effect on performance. Such a radial system with a vertical has a significant impact on both.

6. Within reason, the higher the antenna is mounted with respect to a quarter wave the lower the feed impedance appears to be. Adjusting the angle of the wire with respect to the tower from 30 to 60 degrees seems to have only a slight effect on feed impedance.

7. The antenna appears omni-directional. Although in theory the antenna may be slightly directional in the direction of the slope, in practical operation this is not apparent.

8. At this point most antenna articles tell you how you will be the loudest thing on your side of the Rockies. I make no such claims, but the antenna does perform well. I have worked a lot of DX with it and it holds its own. Best of all, it just may provide you with a very respectable signal on yet another band on a small lot.

I wish to acknowledge the assistance of N2MF in the installation of the slopers, that of WA2QKU of Unadilla-Reyco in obtaining the traps, and that of W2SY and K2PZ in providing me with information concerning their prior experiences with similar antennas.

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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.

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KT-2 Keyer Trainer

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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.

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CQ REVIEWS:

BY JOHN J. SCHULTZ*, W4FA

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

We conclude our review of the Yaesu FT-One this month by starting with bench checks, an in-depth look at what the unit actually does and did. The complexity and sophistication of current amateur radio equipment can be truly amazing when one stops to consider the physical size of the gear being described. It wasn't too long ago, for example, that to duplicate the functions (if possible) of the FT-One would in effect require a couple of 6 foot racks and many thousands of discrete components. —K2EEK

The Yaesu FT-One transceiver.

Some very early model FT-One's were reputed to have problems with synthesizer noise and miscellaneous audio problems. Of course, especially noise, if not held low enough, means that the full potential of the steep-skirted i.f. filters cannot be realized and that very weak signals will be masked. Therefore, one of the first checks made was for synthesizer noise output. As far as could be determined, synthesizer noise was greater than 100 dB down, which is certainly state of the art. Apparently, if there was ever a problem in this area (as well as others) Yaesu has taken care of it.

On the receive side, the FT-One deserves very high marks with one exception: The sensitivity below 1.8 MHz is very poor, making the receive capability on LW/MW usable for only local reception, unless possibly one has a mile-long Beverage antenna available for such reception. However, above 1.8 MHz receive performance glows. Throughout the range s.s.b. sensitivity was less than 0.5 microvolt and a.m. sensitivity was less than 2.0 microvolt (both for 10 dB S + N/N ratio) at s.s.b./a.m. bandwidths. The noise floor was in the order of −130 dB (s.s.b. bandwidth). The third-order intercept point plotted out as about + 14 dBm. The dynamic range was an excellent 95 dB using s.s.b. bandwidth and correspondingly higher using c.w. bandwidths.

The s.s.b. selectivity varied from 2.3 kHz at − 6 dB to 4.0 kHz at −60 dB for a shape factor of about 1.7. Using the variable bandwidth feature, the bandwidth could be reduced to 400 Hz. The optional c.w. filters are very sharp, and using the 300 Hz c.w. filter and the variable-bandwidth feature, one can bring the overall selectivity down to 80 Hz or less. The a.f. peak/notch filter is almost a bit too sharp (about 10 Hz at −6 dB), but it does a good job. Most operators who use c.w. just occasionally will probably find that the combination of the s.s.b. filter and the a.f. peak/notch filter will provide all the selectivity they need, while real c.w. or FSK buffs will certainly not be able to resist having one of the c.w. filters because of the versatility they provide with the variable-bandwidth tuning feature. The optional a.m. and f.m. i.f. filters were installed in the FT-One tested, but their characteristics were not measured. Operational results would indicate that they easily meet their specifications. I.f. and image rejection were exceptional, measuring out at −80 to −90 dB.

Rather than seek out any spurious responses on receive in the conventional manner, the FT-One was set up to "self-destruct." As will be covered later, the FT-One can be set up to frequency scan with the scanning action automatically halting when a signal is detected which exceeds a threshold level established by the setting of the r.f. gain control. In its most sensitive position setting, this translates to a signal of less than S1. Therefore, the FT-One was set up to scan 150 kHz to 30 MHz in a slow-scan mode, which took a total of 48 minutes! Not once did the FT-One stop on any spurious signal as it dutifully covered the entire range continuously in 100 Hz steps—an outstanding bit of performance.

On the transmit side, all the usual measurements for spurious radiation, carrier

*c/o CQ Magazine

Power output into 50 ohm dummy load vs frequency

1.8 MHz	100 watts
3.0 MHz	108 watts
5.0 MHz	110 watts
7.0 MHz	110 watts
8.0 MHz	110 watts
11 MHz	100 watts
16 MHz	107 watts
21 MHz	106 watts
27 MHz	100 watts
29 MHz	95 watts
29.9 MHz	95 watts

Typical power output for complex impedance loads

	X1 = 0	X1 = 25	Xc = 0	Xc = 25
R = 50	100	67	100	87
R = 100	92	94	92	100
R = 25	98	67	98	93

Table II– Power output measurements.

suppression, frequency stability, and sideband suppression showed the FT-One to be well within its specifications. The third-order IMD products measured on s.s.b. were better than claimed, usually varying from −36 to −39 dB below peak output. The harmonic radiation measured was significantly better than claimed at an almost uniform −70 dB from 160–10 meters. Power output measurements are shown in Table II. The transmitter was tested over the entire 1.8–30 MHz transmit range, and as can be seen, there is remarkedly little variation from the nominal output of 100 watts. Table II also shows power output variation with the FT-One working into various reactive loads to simulate different s.w.r.'s. The various loads listed simulate both theoretical s.w.r.'s of up to 1:2 derived from resistive loads and "real world" s.w.r.'s up to 1:1.5 derived from resistive/reactive loads. As can be seen from the table, in the worst-case situation the power output reduced itself to 67 watts.

Operating Impressions

The FT-One is a very sophisticated transceiver with a wide range of tuning and selectivity possibilities. However, it is basically easy to learn to operate if one approaches the situation step by step.

The transceiver is completely "no-tune" except for the main frequency setting. Such setting can be done either via the main tuning knob or via keyboard entries. Taking the main tuning knob alternative first, one can depress various pushbuttons such that one full rotation of the knob spans either 2 kHz, 20 kHz, or 10 MHz. In the latter mode, the knob acts essentially as a bandswitch. The tuning is absolutely continuous between 150 kHz and 30 MHz on receive. There are no strange ambiguities as one tunes throughout the entire range. As one tunes from 4,000.0 MHz to 4,000.1 MHz, for instance, one will hear a slight mechanical click, since internal relays have selected a different low-pass filter but reception is

continuous. The digital frequency display is absolutely stable and flicker-free.

The RIT function (clarify) has the rather wide range of ±9.9 kHz. At first it was thought that such a wide range would produce tuning difficulties especially when using a narrow bandwidth c.w. i.f. filter. However, in reality that is not the case because of the variable main tuning rates which can be selected. In fact, the clarify function can be used as a short-term frequency memory, especially on c.w., since by manipulating the **CLAR** pushbutton, one can either recall the main frequency which is displayed or the offset frequency which one has tuned. One can also select to use the offset frequency for receive-only or transceive operation. The tuning "feel" of the main tuning knob is very smooth, although I would rate it a slight step below that on the FT-107. The analog scale coupled to the tuning knob shaft does not provide any absolute frequency readout, but nonetheless, there are some very useful relative tuning indications if one is tuning between two closely located stations (frequency-wise). For instance, if one uses the slowest tuning rate of 2 kHz per knob revolution, the approximate ⅜ inch distance between markings on the analog scale represents a quite accurate 100 Hz! It can be a useful aid in deciding which filter options to select.

The filter options themselves are all quite wide-ranging. The FT-One tested included all the available options, and I couldn't find any reasonable QRM situation on s.s.b, c.w., or RTTY which could not be handled using the filter options plus the standard variable bandwidth/shift tuning. The versatility of the latter feature is best illustrated by fig. 6. Two concentric tuning controls are arranged with a skirt masking arrangement such that one can visually see what relative bandwidth has been set and whether the i.f. passband has been shifted higher or lower than the nominal i.f. frequency. The arrangement works very well indeed!

The a.f. peak/notch filter is essentially the same one used on the FT-107. The notch is so sharp, however, that one has to use the same tuning procedure as on the FT-107. That is, if one wants to notch out an interfering tone, one first peaks it and then sets the peak/notch switch to notch. Once one gets used to it, the filter proves to be quite helpful. The various other controls—a.g.c. selection, separate r.f. and a.f. gain controls, noise blanker threshold adjustment, etc.—provide all the flexibility one could need. The noise blanker is very effective against pulse interference such as that produced by the "woodpecker."

Overall, the receive performance of the FT-One can be rated as excellent. Even under the worst of weekend QRM conditions, I never found it necessary to use the r.f. attenuator to prevent overload. Signals appear to pop out of a quiet background. The S-meter action is very smooth with S9, representing 50 microvolts almost exactly throughout the 1.8–30 MHz range. The only thing that deters the receive performance from getting an absolute top rating is blower noise. The blower runs continuously, and although one tends to forget it when listening to a station, its noise is annoying when one is searching out a very weak station. An optional modification kit (Fan-One) converts the fan to a demand-type. This kit is now available and should cost less than $10.

On the transmit side, the FT-One leaves nothing to be desired. There is, of course, no tuning. The dual metering system is very handy and does away with the need for any external metering on, for example, an antenna tuner. One can use the multi-function meter to read reflected power in order to adjust a tuner, and the meter dedicated to read a.l.c. on transmit allows one to very accurately adjust the drive, microphone gain, and r.f. speech compressor controls. One can monitor the microphone signal via a sidetone circuit, but only before the speech-processing action. The processing is of the same excellent type previously used by Yaesu, so at least they didn't try to improve what already had been perfected.

The first station worked with the FT-One was an SKØ in the middle of a deep pileup. He gave an S9 report to the bare-

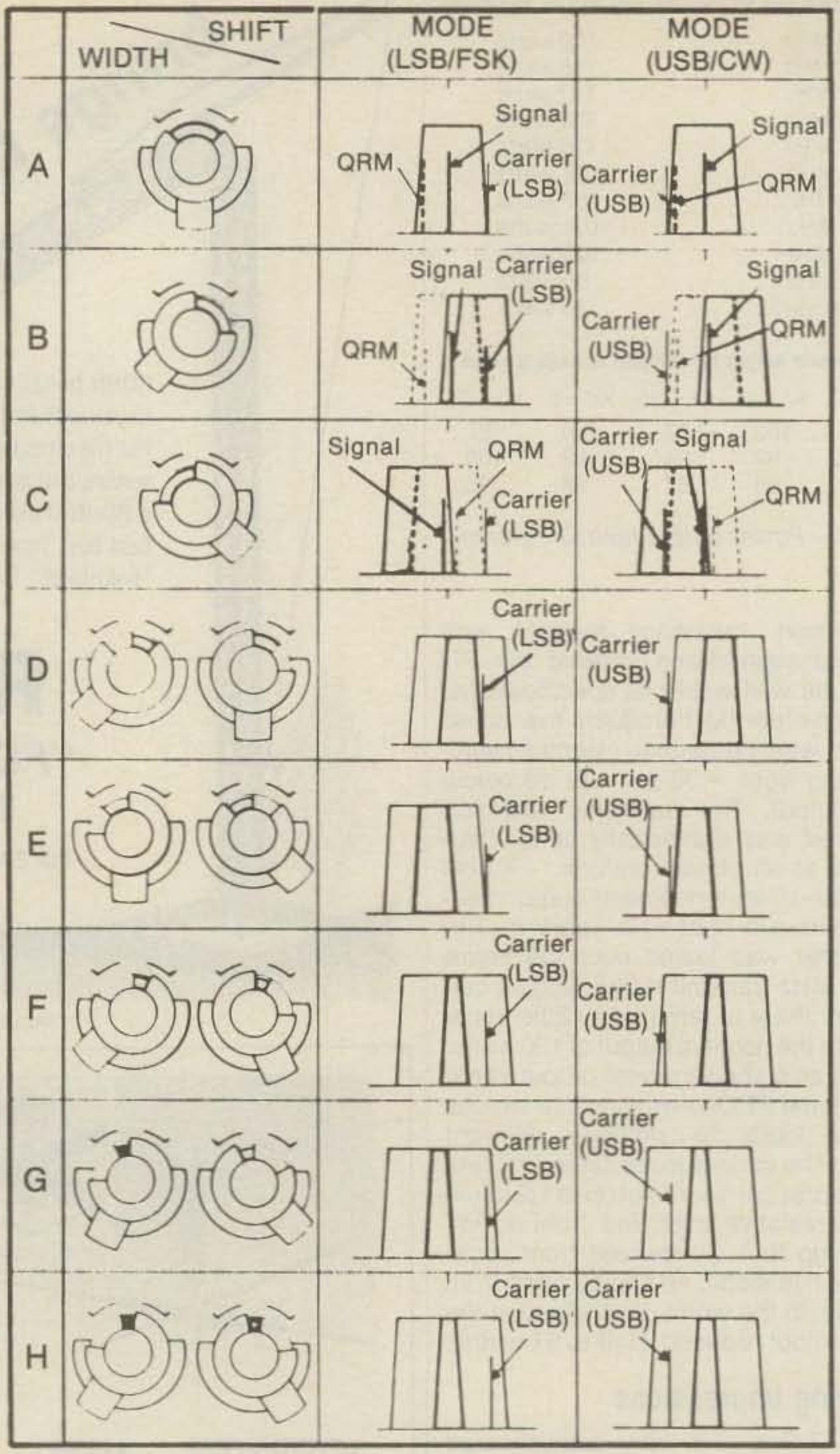

Fig. 6– All of the basic possibilities offered by the variable bandwidth, variable i.f. shift controls are illustrated by this diagram.

foot FT-One being used with a dipole and even commented on the good speech quality of the processor! Talk about wanting to shut down rather than try to follow that act. However, many other stations did indeed comment on the good modulation produced by the FT-One. The microphone used was one of the new Heil Sound HC-5 types. VOX operation is very smooth. The VOX time delay control is front-panel mounted but the other VOX controls have to be accessed under the top cover.

The FT-One does have true full break-in operation on c.w. which does operate very smoothly. Apparently, the start of a keyed character is buffered and stored for a very brief period of time to allow the transceiver to switch between receive and transmit. The keying waveform has rather sharp rise and fall times of about 1.5 milliseconds, which provides a slightly hard keying characteristic. In any case, at the speeds I could manage, there was absolutely no hint of the start of any transmitted character being lost. The FT-One does have a built-in sidetone oscillator which can be adjusted both as to volume and pitch. The optional built-in keyer, which is built around a Curtis 8044 IC as shown in fig. 7, is a very handy convenience item, and a front-panel control allows for continuous adjustment of the keying speed from roughly a few wpm to 30 + wpm.

The basic receive and transmit performance of the FT-One is remarkable enough, but the versatility of the transceiver really becomes evident when one exercises the frequency control possibilities. In essence, the FT-One incorporates the equivalent of 10 fully independent v.f.o.'s which can be set on any receive frequency from 150 kHz to 30 MHz and/or any transmit frequency from 1.8 to 30 MHz (in the case of a transceiver that has been modified for its full transmit range). The operation of the 10 v.f.o.'s is easy enough in practice, but a bit difficult to describe since one tends to associate the v.f.o. possibilities with "memory" channels rather than with true, independent v.f.o.'s. Perhaps the best way to visualize the v.f.o. scheme is to imagine 10 v.f.o. boxes, each with its own tuning knob, sitting on top of the FT-One and then a selector switch which can choose any v.f.o., and then further switching which determines if one selected v.f.o. will be used for receive and another selected v.f.o. used for transmit (or vice versa).

There are two v.f.o. selector switches labeled **VFO A** and **VFO B** and each switch has 10 positions. To provide a simple example, one has to imagine that a further switch is set to select **VFO A.** If the **VFO A** switch is set to "**1**," it will automatically store in **VFO** "**1**" memory whatever frequency is selected by the main tuning knob (remember that the main tuning knob can tune at any one of three frequency rates). There is no need to press any sort of "memory" store switch. In a similar manner, if the **VFO A** switch is moved to any other v.f.o. number, that v.f.o. is set at the frequency last set by the main tuning knob when that particular v.f.o. number was last selected. The v.f.o. number selected is also displayed on a small digital "channel" readout. Therefore, one can set any of the 10 v.f.o.'s to any desired frequencies, and by a simple rotation of the **VFO A** knob one can scan each v.f.o. frequency. Frequencies set by the **VFO A** switch are also automatically duplicated by the **VFO B** selector switch. If one, for instance, sets the **VFO A** switch to "**1**" and "records" a frequency of 3.505 MHz, and "records" a frequency of 28.625 MHz with the **VFO A** switch set to "**2**," these frequencies will be duplicated in the **VFO B** switch positions "**1**" and "**2**." The fun starts when one realizes that the **VFO A** and/or **VFO B** switch can set the transceive frequency or independent receive/transmit or independent transmit/receive frequencies. Full crossband operation, even using break-in on c.w., is possible.

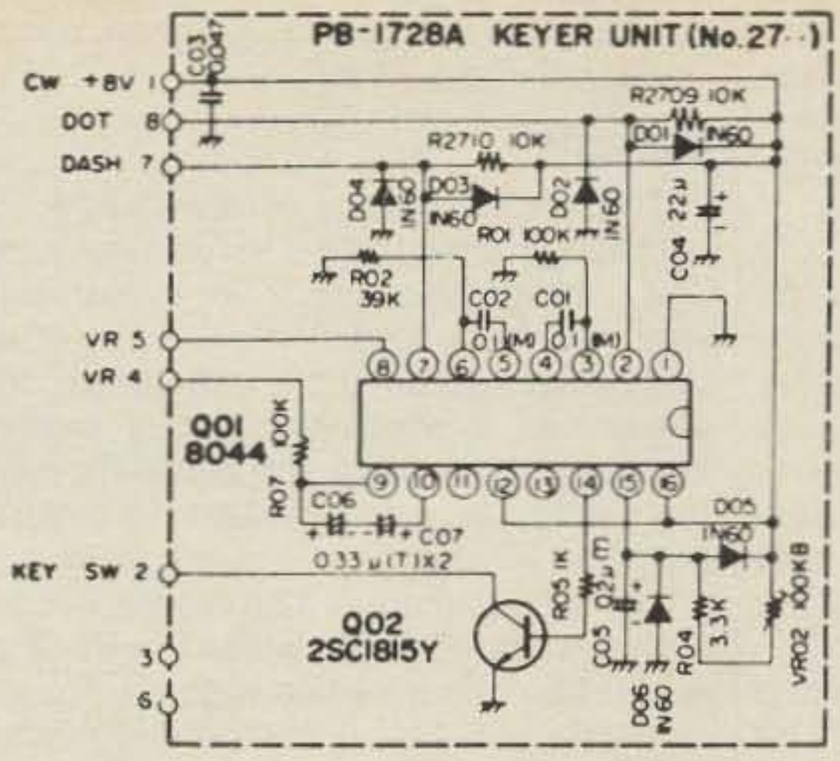

Fig. 7– The very neat, small optional keyer board available for the FT-One. The circuit is based on a Curtis 8044 Keyer IC.

Why should the FT-One provide this capability? In reality, not many of us are likely to crossband from 80 to 10 meters. In reality, the FT-One provides an extremely good base for h.f. enthusiasts to get involved in v.h.f. operation with a fair minimum of additional equipment. The transverter provisions incorporated in the FT-One, f.m. modulation possibility, frequency scanning, crossband receive/transmit operation, etc., all point to an excellent basis for expansion into sophisticated base-station v.h.f. operation. The scanning capability, for instance, is a convenience feature on h.f., but really comes into its own when one wishes to quickly scan a v.h.f. band for activity.

The keyboard entry features of the FT-One deserve special mention. In essence, complete frequency control is possible via keyboard commands, and it is pure operating pleasure to use them. To switch to keyboard command a rotary selector switch is used. The **VFO A** and **VFO B** switches are then disabled. One can set the transceiver on any desired frequency by keyboard entries for any one of the 10 v.f.o. channels. For instance, to set v.f.o. channel 1 on 14.206.5 MHz, one enters a key sequence of **1 MR 1 4 MHz 2 0 6 5 DIAL.** Subsequent changes do not require a full keyboard entry but just basic corrections. If the frequency were to be changed to 14.020.0 MHz, one would simply enter **0 2 0 0 DIAL.** To switch between memories, one enters the number of the memory (0 to 9) and depresses the **MR** button. The small, red digital display will indicate the memory channel (0–9) which has been recalled and the clarifier offset, if any, which had been chosen for that v.f.o. memory setting. The latter simply avoids confusion since it alerts the operator that the frequency displayed on the main display has to be modified by a frequency offset which was chosen. A transceive pushbutton (marked **TRCV)** allows one to command which memory v.f.o. will be used for receive and which one will be used for transmit or to choose transceive operation for each v.f.o. memory.

The scanning pushbuttons are divided into a group for fast up/down scan or slow up/down scan. Using fast scan one can cover about 2 MHz in about 10 seconds (100 kHz steps). Using slow scan one can cover about 100 kHz in 10 seconds (100 Hz steps). If one selects slow scan, one can also select an automatic mode whereby the scanning action will stop when a signal is encountered that exceeds a signal-level threshold established by the r.f. gain control. Translated a bit, all that means is that if automatic scan is selected and the r.f. gain run "open," scanning will stop at less than S1 level signals; if the r.f. gain is backed off about a third, scanning will stop when an S9 is encountered.

The flexibility provided by the 10 memory v.f.o.'s is a bit difficult to describe. One can, of course, use some memories for fixed frequencies of interest, other memories for split frequency operation within a band, other memories for trans-

ceive **VFO A/B** operation within a band, etc. About the only feature I could find lacking with the keyboard operation was a memory carry-forward frequency transfer. That is, if one were using v.f.o. memory 5, for instance, and found a station of interest on 21.030.0 MHz in QSO, it would be handy to have a button to press which would store 21.030.0 in both memory 5 and 6 and then use memory 6 to continue tuning. This would avoid having both to switch to memory 6 and enter the frequency information in memory 6. I suspect a few hours at the drawing board and a handful of IC's would provide the solution.

Memory frequencies can be retained when the transceiver is turned off by means of a small built-in power supply (back panel switched in or out). An optional RAM board provides for frequency retention if one lives in an area that has frequent power interruptions or if one would like to retain memory frequencies while transporting the FT-One.

Manuals

The FT-One comes complete with an operating manual and a service manual. The operating manual is very clear and very well illustrated. There is very little that can be said about the operating manual except to suggest that one should take the time to read and digest its contents if one is to get maximum pleasure out of an FT-One.

The service manual also deserves high marks. Each PC board within the FT-One is carefully described as regards circuitry details, PC board component placements, voltage measurements, alignment instructions, transistor/IC lead identities, etc. In fact, I was about to hail the manual as some sort of standard until I discovered that there was no harness wiring diagram in the manual! There was no way to trace the interconnections between the PC boards. A quick letter to Yaesu did produce the interconnection diagram with a note that later manuals had been corrected.

The service manual clearly describes how to modify the FT-One for 1.8 to 30 MHz continuous transmit as well as receive coverage. Nothing more is involved other than the placement of a few wire jumpers.

Accessories

There are not many accessories available for the FT-One simply because they are not needed. Nonetheless, as was mentioned before, I would recommend the keyer option for convenience and one or more of the c.w. bandwidth crystal filters if one is particularly interested in that mode. The f.m. option allows for 10 meter f.m. operation as well as v.h.f. f.m. operation. The RAM option would only be advisable when power outages are common or when one frequently has to move the transceiver.

Summary

The FT-One is a tremendously interesting, extremely high-performance transceiver with all sorts of advanced features. In fact, after many hours of using it and studying its circuitry, I'm still not sure that I haven't missed some feature related to its tremendous versatility. It is not inexpensive, but then again, one cannot imagine any transceiver being available in the near future which will incorporate any really significant advances over the FT-One except perhaps for a few more dB here or there of improved receive and/or transmit performance. For all practical intentions, however, the FT-One, like the Collins KWM-380, probably represents a plateau in transceiver development until the next generation of transceivers having no analog controls appears.

From a straight dollars and cents viewpoint, the only thing one might want to debate when considering the purchase of an FT-One is whether there is any possible advantage to going to an alternative separate amateur-band-only transceiver plus general-coverage receiver configuration. The latter approach provides a bit more operating flexibility, but station size and wiring complexity are increased, and the cost of good, optional c.w. filters for both the transceiver and general-coverage receiver can be expensive.

Hopefully, a follow-up article can be developed which will describe in greater detail practical operating experiences with the FT-One and which will expand on the tremendous versatility of the FT-One transceiver, particularly as regards its foundation as a full-featured h.f. transceiver which can be expanded for direct v.h.f. communications and/or v.h.f./u.h.f. satellite communications.

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If you can let your imagination soar for a bit while putting aside some of the practical aspects that reality forces upon us, then you too can plan a magical DXpedition. However, OH2BH and crew took it one step further and made it happen.

"Hello, It's OHØW From The Aland Islands"

The Story Behind The 1982 CQ WW DX Phone Contest Multi-Multi Winners

BY MARTTI LAINE*, OH2BH

What you are about to read represents the biggest contest DXpedition effort ever that I can recall. Martti calls it magic throughout the story, but it really is amateur radio fantasy in its highest form. Sixty experienced DXers plus commercial and industrial cooperation made a dream possible. Although I am not privy to the economics involved, I can guess that it had to be a staggering amount. The urge to win coupled with an abundance of logistical support pushed OHØW over the top. The group certainly has style.

Considering the exuberance of the group and the pressures involved, it should be noted that OHØW complied with the rules of the contest to the letter.
—K2EEK

The local QRPer went up the hill to see his buddies, and it turned out that 60 of them were ready for action—60 highly experienced operators hailing from a small country. Sixty were invited, and none refused. Setting European records, both on s.s.b. and c.w., with a comfortable margin from the worst operating area in Europe was the target outlined for OHØW. It turned out to be the biggest multi-multi contest station in the history of amateur radio.

Assigning operators to their tasks was not a question of selecting the best. Giving each of them the most suitable assignment was the name of the game. It probably was disappointing to some of them, but they all agreed in the interest of maximizing the result. The magic lay in charging the most experienced operators (we call them "old hounds") with chasing multipliers while letting the fresh guys do the pileups—just the opposite of what you see at most of the other multi-multi's.

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Publicity

Multi-multi's run out of business in the *CQ* WW very quickly, at least in conditions of marginal propagation. The magic was getting the OHØW message across to each and every house in the world to wake people up to look for us. Mailing lists were prepared for continuous publicity for a two-month period prior to the contest season. Also, specially designed cards with frequency and sunrise data, etc., were sent out to prospective multipliers. Hey guys, come on and talk to us! You'll be in the vehicle of the winners. Are you the one we didn't reach in the campaign?

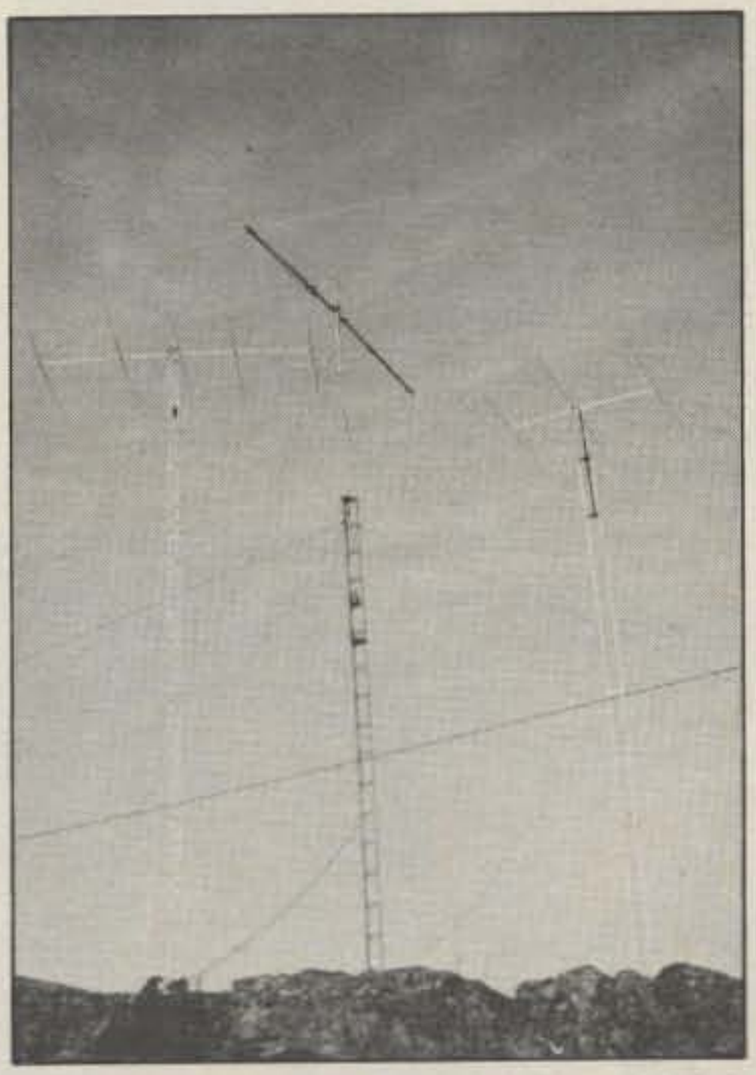
The Location

We were fortunate enough to have a small island out in the Alands, OHØ, devoted just to DX. The problem was that everything had to be built up from scratch on that remote island which took two ferries to reach. The magic was that in a place afflicted with the world's most annoying TVI problems, the islanders went fishing when the action was there. They didn't complain. We rented all the houses inside a 500 meter radius and connected them together via intercomms, which required some 2 pounds of ferrite rods for filters.

OH2BAZ and OH2BH, co-organizers of the OH0W effort. They managed to create everything except the propagation.

The tower group did a remarkable job, since they had to come all the way from the mainland and perform regardless of the weather. Left to right are OH2BAZ, OH2BGS, OH2BWB, OH3ZE.

The intercomm was very handy along the 2 meter network, and it was used for band-to-band communication. The 2 meter gear was used for continuous talking between the multiplier and pileup groups that were located far apart.



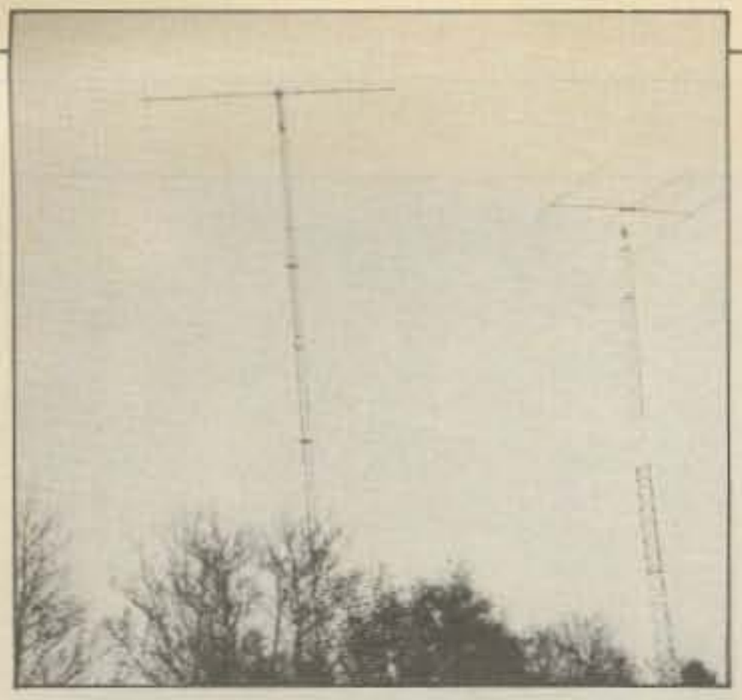
The antenna density was extremely high around the multiplier spotting area. These are the Hy-Gain 5-element monobanders.

The Antennas

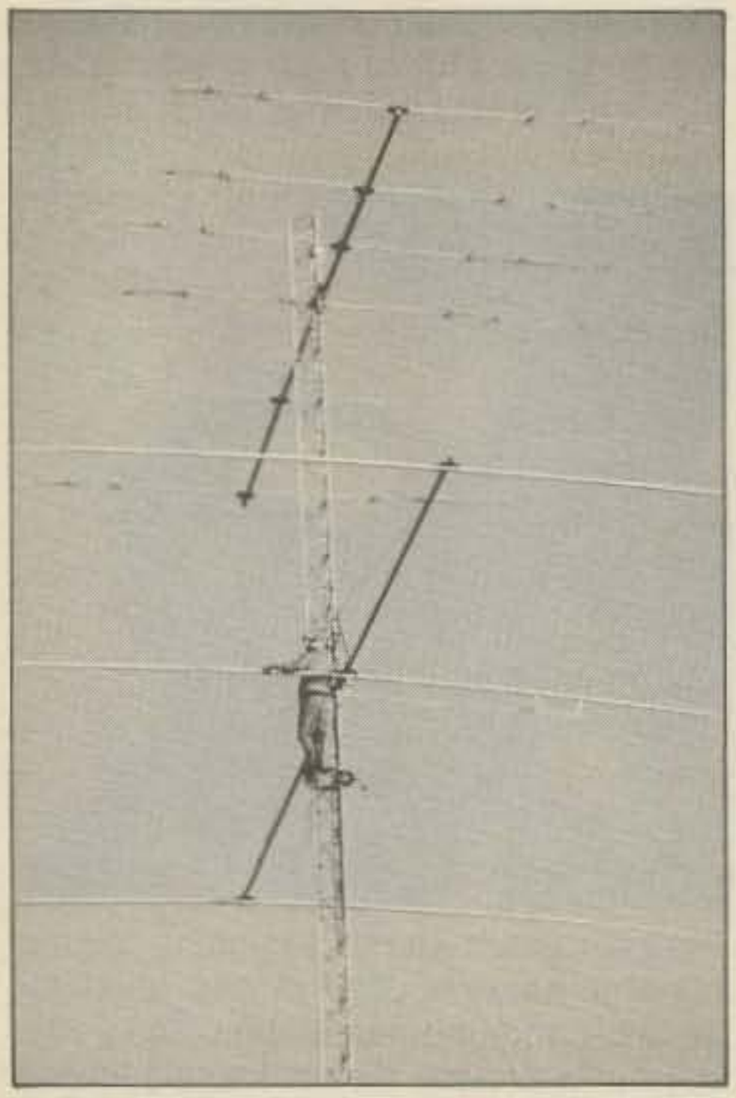
We ordered seven 100 foot towers from a local DX enterprise run by OH8QD, who promised to put them up at his expense and participate in the joint venture. KLM and HRO were very cooperative and gave us favorable terms on the 1,000 pounds of aluminum tubing loaded aboard an ocean freighter in July, some 6 months before the planned action.

A locally made 7 MHz beam treated us to a myriad of problems, and right after the contest we found it entangled and married to the tower. The Aland Islands are located on the same latitude as Anchorage, Alaska, so there is no better environment for serious antenna testing.

Here is the rotator construction at OH0W. It was the only way to secure the massive beams at the stormy ocean location. From left OH3ZE, OH6DX, OH2BAZ, and Olli.



This is a KLM Bigsticker at 120 feet with a spotting beam in the foreground.



The 40 meter beam at 100 feet and another KT34XA 20 feet above it used for general monitoring purposes.

The low-band guys just went wild with their multiple loop designs and wires. It turned out that the 10 meter station was operating inside one of the most effective 80 meter loops, and we have every reason to hope that the reproductive powers of the 10 meter operators were not adversely affected. The 160 meter band is quite poor here. A vertical was mounted on the little island out in the sea and it performed rather nicely. The top section was lost four times, calling for a bit of boating in the rough sea.

The Gear

We all mistrust radios that we are not familiar with. The question was, should everyone take his own gear to the island? This would have resulted in the biggest fleamarket in the Aland archipelago. Our approach was to select one type of gear most suited to our needs and give all key people a chance to become familiar with it. We opted for the Yaesu FT-102 because of its good receiver characteristics, clean output, and high drive power. Therefore, all the runners were cast in the same mold, which also ensured changeability in case of failure.

We also checked out all the new radios on the market for our choice of multiplier pick-up gear, using their ability to cope with strong same-band signals as a criterion. Nothing was found to be even remotely as good as the old Drake R4C. Thus, everybody had to go back to their garage to polish up the old Twins. The search ended with 12 Drake C-Lines and a lot of dim dial lights. Henry 3KA's were chosen as PA's for their cleanness and reliability. What was the magic? Not a single rig failure was reported. The gear emergency channel remained silent on the 2 meter network throughout the whole exercise.

The Targets

MBO—**M**anaging **B**y **O**bjectives (i.e., establishing clear-cut and achievable targets and working on them)—was used right here. QSO and multiplier targets were spelled out with new European records in mind, and a reasonable margin was built in. Special bonus and glory incentives were used to pay off extraordinary performance. The main concern was not to let any valuable multipliers slip through the pileups on any band. The magic was that we worked our way to the targets, with hardly any margin, though. The s.s.b. tally climbed to 20 million and c.w. to 15 million.

The Backup Guys

The amount of food you need for 60 guys is incredible. We didn't go for multi-course menus, but the chow was luxurious. Both OH2BTX and OH2CX did a truly remarkable job. The Multiplier Center provided an up-to-the-minute multiplier listing every hour, covering all bands, and relayed the data right to the stations. The amount of mileage they did walking from house to house was quite a strain on their legs. Shining or coaching they came. They ran their copying machine dry, but what the heck, they continued by hand. We'll never forget OH2BVI, who was managing the service. There were also a multitude of other backup functions all performed by DX types with 300-plus country totals; they were working night and day and made no QSO's. That was backup magic!

Be Safe—Get a Helicopter

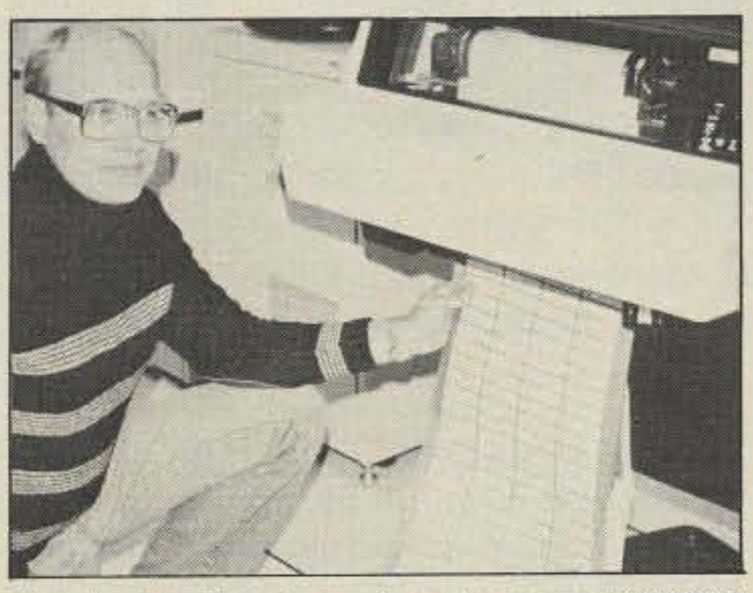
Honestly, messing around on a remote rocky island coated with thin ice at night is pretty dangerous. There was no hospital or other medical care in the vicinity and no access to the mainland except

The Henry 3KA's are not exactly portable. They were certainly worthy of that carrying effort, since they were reliable work horses on very shaky power outlets. From left OH2BEN, OH5KS, OH2BQS.

It was time to hang loose prior to starting the contest. Here the band representatives share the happiness. From left 15/OH6UM, 160/OH2BM, 80/OH1XX, 10/OH6JW, 20/OH3YI, and 40/OH2BU.

In spite of delivering the multiplier listing to the stations, the multiplier group also kept the master scoreboard updated at the central facilities. From left OH2BEN and OH2BVI.

These are the operating panels for satellite telephones—one for going out and another for incoming calls. In front, OH2BNP, professional in this field, and OH2BH managing the exciting exercise.



Producing the dupe-free logs and 30,000 QSL's was a lot of work. Olli, OH2BBM/OH0XX, computer expert at DEC, managed that activity, and the QSL's were on their way shortly after the operation.

Youngest and oldest operators teamed up for 80 meter multipliers and daylight activity. From left OH1NM, and OH7JR at the good age of 16.

once a day. We took our hats off to one of the leading commercial banks in Finland when we saw our helicopter landing at the contest site. The bank provided the chopper, pilot, and gas so we could feel comfortable and commute to the mainland for missing hardware.

Did we do it only for safety's sake? Hah. Market Reef, OJ0, was situated only 60 minutes' flying distance from our island. That meant six multipliers. We enlisted OH3JR, a well-known sea bird, and on Saturday we waved goodbye to safety; off they went to give us the multipliers.

But to protect the pilot and spare you a laugh, I'm not going to tell you how it ended up. However, we didn't see them anymore, and we didn't work OJ0 for multiplier points.

Automatic Dialing Worldwide

Calling by phone from a remote island is no magic. However, we didn't have a phone. Northern Europe boasts the world's most advanced mobile telephone system with direct dialing worldwide. They will put you through to any country in the world without delay. The magic was that we failed to reach the mainland base stations in Finland from the DX site. It was a happy day when a group from MOBIRA, Finnish manufacturers of radio telephones, arrived on the island and installed an elaborate system, providing us with a true communications link to the world outside. We really got a kick out of waking up our friends around the world and zeroing them in on OH0W. We certainly owe our apologies to many, many people, including TF3YH, VS6DO, HS1SD, TI2CF, OA40S, KH6XX, ST2SA, VO2CW, and others whom we roused from their beauty sleep. Hey guys, that's where the world is going. You'd better be unlisted!

The Conditions

Here we had real contest magic. There were no conditions for us at all. The only choice was to fire up the 3KA's into the KLM Big Stickers and holler into the ether nonstop. You simply had to make your own propagation. Thank God we got replies—no pileups, but enough to meet the target. We knew we were late—at least two years—but we also understood that a lot of magic would be seen around the fireworks.

Murphy's Account

Nothing much to report here. I will only mention one thing, and it's very educational. The language spoken in OH0 is different from what you hear on the mainland. Even though we spent three weeks on the island prior to the contest, we hadn't bothered to read the local newspapers in that odd language. Pity, because they carried an announcement of repair

Ten meter multipliers were in the hands of OH2QV (left) and OH2BCV better known as OH3UU. They are the co-contest managers for the Finnish League and the administrative body behind the high contest activity out of Finland.

work on the island's power plant scheduled for Sunday morning just at sunrise. Fortunately, power was cut off for only 30 minutes, but those were very long minutes. We estimate that we lost 200,000 points right there. We physically moved a repairman out of his cozy bed and had him fix the island fuses. It was no fun, as there was no juice on the entire island. "Didn't you read about it?", he said. "I didn't bother to tell you because you seemed to have generators all over the place," he added. Surely we had, but they would hardly have been able to run the exciters, not to mention the 3KA's.

No Booze

There were absolutely no physiological problems other than the fact that 60 ladies were probably going mad on the mainland. Beer and related drinks were banned for all operators. We knew there would be enough champagne reserved for Monday morning if we made the target.

The Outcome

Why do we do these things? Good question. We are certainly amateurs and, more specifically, Finns inhabiting a small country. We wanted to prove something, I guess. It is like ski-jumping where one can jump into the world's headlines although coming from a small country. We call it an ego trip, as do you. Winning the world from the north of Europe, that's what OHØW was all about. It was 30,000 QSO's over 3 weekends and 5BDXCC in just 96 hours.

Winning the world is no easy task. Was it really worth all that effort? Yes, for at the very least we have all the stories of magic to tell.

OH2BU (also OH7RF) was responsible for the high 40 meter multiplier count. He is one of the most active OH DXers and was always around for odd openings and impossible QSO's.

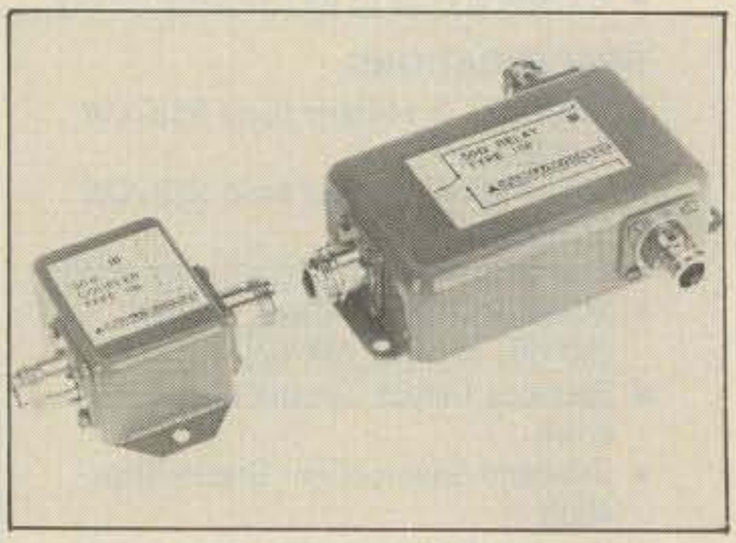
OH6DX in front and OH2BBM were responsible for the high 2138 QSO count on 40 meter c.w. OH6DX sat down on Friday and only rested on Monday after the contest. It was a world-record performance on 40 meters.

CQ SHOWCASE

Ten-Tec H.F./V.H.F. Antenna Line

Ten-Tec, Inc. has announced acquisition of the Bassett antenna line. The new Ten-Tec antenna line includes both multi-band fixed station and single-band mobile antennas.

The fixed station trapped dipole antennas are offered in 13 models of 2, 3, 4, and 5 band systems covering 10 through 75 meters. All models use helium filled traps and baluns, stainless steel hardware, and "Copperweld" wire. Each model operates as a fundamental broadside dipole, band change is automatic, and no tuner is required to achieve v.s.w.r. of 1:5/1 or less. Power ratings are 2 kw PEP. The single-band mobile whip antennas feature helical inductors sealed in helium-filled lower sections with stainless steel top whips. Models are available for all bands from 2 through 75 meters. Average weight is 6 oz. Power ratings are 750 watts PEP. For more information, contact Ten-Tec, Inc., Highway 411 East, Sevierville, TN 37862, or circle number 106 on the reader service card.



Microwave Filter Coaxial Relays

The Unadilla/Reyco/Inline coaxial relays mount on virtually any surface to switch two or more antennas using a single coaxial cable. Both wired and "wireless" styles are available. The wired style requires single conductor in addition to coaxial feedline. "Wireless" requires single coax feed and coupler. Twelve v.d.c. at 55 ma energizes the relay. SO239 and UG58U (N) connectors are available. The "wireless" style coupler combines r.f. signal and energizing voltage, allowing the coaxial cable to carry both simultaneously and independently. Remote relays have a built-in coupler that separates the r.f. signal and energizing voltage. Insertion loss is negligible.

Relay life expectancy is of at least 10,000,000 transfer operations. Six models are available covering DC-950 MHz. For more information, contact Microwave Filter Co., Inc., 6743 Kinne St., East Syracuse, NY 13057, or circle number 109 on the reader service card.

Trio-Kenwood AT-250 Automatic Antenna Tuner

Trio-Kenwood Communications has announced the all-new AT-250 Automatic Antenna Tuner. While this new antenna tuner has been specifically designed to be a match for Kenwood's popular TS-430S h.f. transceiver in size, color, and general appearance, it is functionally compatible with any h.f. transceiver of 200 watts PEP, or lower. When used with the TS-430S, its ABC (Automatic Band Change) system handles all switching from band to band. If the transceiver is other than the TS-430S, manual switching from band to band is required.

The unit covers 160–10 meters, including WARC, has a front-panel s.w.r./power meter, features four separate antenna terminals, and comes complete with a built-in a.c. power supply. For more information, contact Trio-Kenwood Communications, 1111 West Walnut St., Compton, CA 90220, or circle number 101 on the reader service card.

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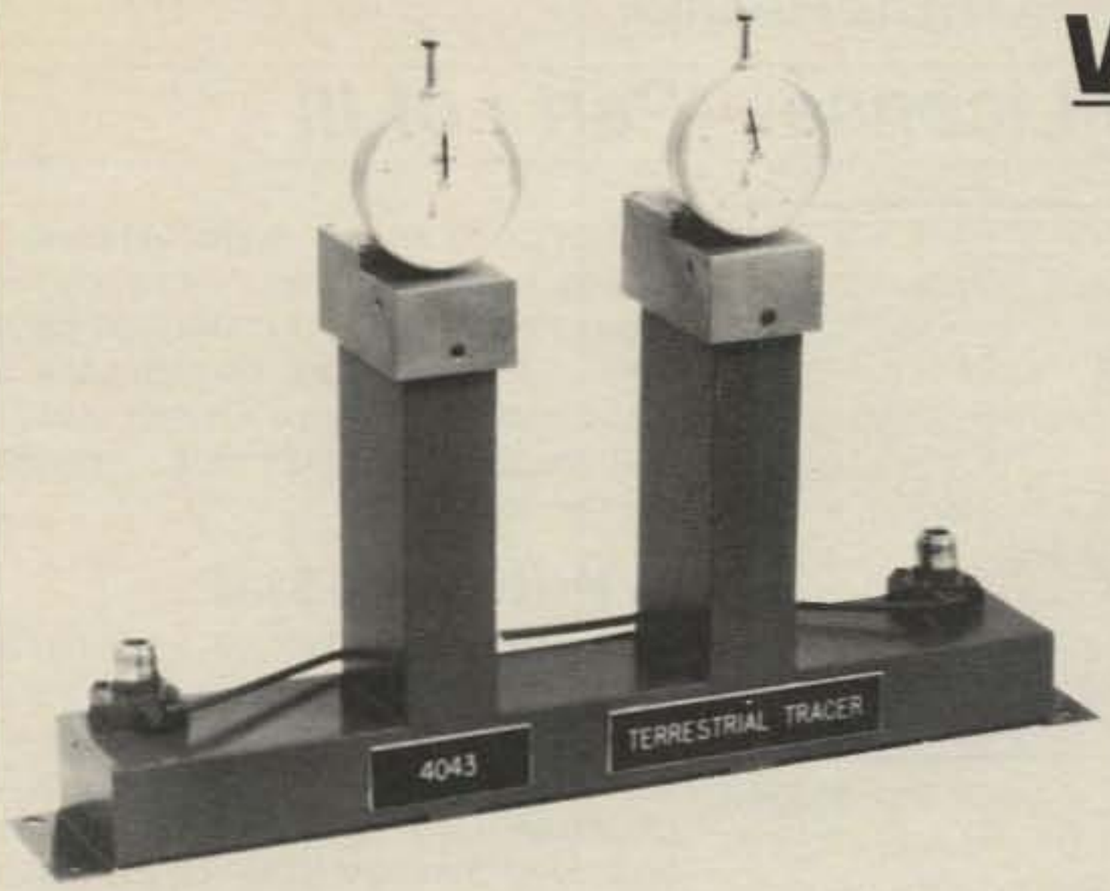

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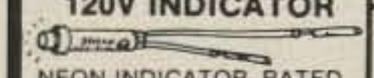

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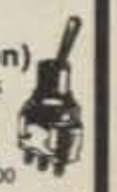

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Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

History of the Novice License—Part I of III

This article chronicles the history of the American Novice license from its 1 July 1951 inception to the present time. Major changes are summarized to provide you with a better understanding of the Novice license. Headings have been included to help you locate desired information.

Current Status

Novice privileges have improved a lot since this license class was established. Problems still exist and improvements are still needed, but today's Novices are given better opportunities to upgrade in license than their predecessors enjoyed.

Purposes of the Novice License

The major purposes of the Novice license are to provide a reasonably easy entry into amateur radio and to enable Novices to increase code proficiency to pass the 13 words per minute General/Advanced code test requirement. This license has fulfilled these major purposes during the past 32-plus years. In addition, Novices have learned how to use equipment, antennas, and station accessories to obtain good communications results. They learn operating procedures, including the use of Q-signals (international system of asking questions and making statements), the RST (radiotelegraph signal reporting) system, Phillip's Code (a phonetic abbreviation system used to minimize radiotelegraph sending time and effort), calling sequences, and contact ending signals. Most Novices earn a few operating awards, and some become avid contest or DX (long-range communications) operators. All of these things are done on four bands (frequency segments) that attract the most patient experienced amateurs. Mistakes are expected and tolerated in the Novice bands because Novices are inexperienced operators. Mistakes are corrected by experienced amateurs, and improvement suggestions are usually offered in a genuinely friendly manner. Anyone who misses the Novice operating experience loses out on a very enjoyable part of amateur radio.

Many higher class licensees will volunteer the comment that they greatly enjoyed Novice band contacts, and a lot of them still work the Novice bands to help new operators, as they themselves were previously aided. My students are not pushed to upgrade in a hurry, but they are strongly urged to operate as much as possible. I want our Novices to make at least 300 contacts before upgrading in license class. It takes about that many contacts to acquire reasonable operating proficiency. I do not teach licensing courses to just produce licensees; I run courses to produce good operators.

2814 Empire Ave., Burbank, CA 91504

Bill Hobbs, KB4BAS, lives in Oak Ridge, Tennessee. He is a 67-year-old retired laboratory worker, and he has been licensed since June 1982. His son-in-law is Fred Treasure, KA5NJY, of Silver City, New Mexico. Fred got Bill interested in amateur radio, and Bill really enjoys it. Bill is an active member of the Oak Ridge Amateur Radio Club and he worked in their most recent hamfest. He has also helped instruct their Novice classes. His station includes a Hallicrafters SX-140 receiver, Hallicrafters HT-37 transmitter, and a three-band ladder-line dipole in a Vee configuration.

2 Meter Novice Band

Novices were allowed to make voice and code transmissions on this band until their voice privileges were dropped 22 November 1968. Beginning operators find it easier to use voice than code; consequently, during the 17 years Novices were allowed to use voice transmissions, many of them failed to get enough on-the-air code experience to increase their code speed to the 13 wpm General/Advanced requirement. Many of these people picked up the Technician licenses when their Novice licenses expired. However, their on-the-air code operating opportunities were practically nonexistent then, since Technicians had no operating privileges in the high-frequency (h.f., 3–30 MHz) range.

Two meters ceased to be an active Novice band (145–147 MHz) when Novice voice privileges were eliminated in 1968. The 22 November 1972 elimination of Novice 2 meter code (A1 and A2 modes, code and modulated code) privileges had almost no impact on Novice operation. Proposals occasionally are made to permit Novice 2 meter voice operation, but their prospects of passage are not bright.

10 Meter Novice Band

The 28.1–28.2 MHz Novice band was established 22 November 1972. I am one of several people who proposed this Novice band many years before it came into existence. This band is superb for daytime long-distance (DX) contacts during peak sunspot activity years. However, we are on the downslope of the present 11.2 year sunspot cycle, and the usefulness of this band will continue to decline until the 1987 low point has been passed. Nevertheless, this band offers long-distance communications on many days. Ten meters is just useful for ground-wave contacts when the band is closed each night, and that limits one to a maximum range of about 20 miles.

Ten meter antennas are small and light compared to equivalent antennas for use on the other Novice bands; they are also less expensive and do not require heavy-duty rotators or towers. Both 10 and 15 meter directional antennas (Yagi-Uda or quad, usually) are light enough to be mounted atop an inexpensive push-up, telescoping, TV-type mast and to be turned with a light-duty rotator. Reception and transmission capabilities of receivers, transmitters, and transceivers are usually lowest on 10 meters; this is especially true in regard to most pre-1970 amateur equipment. A directional antenna is a requirement for consistently good 10 meter operating results. If a Novice has a good setup for operating on 10 meters, she/he should operate exclusively on this band whenever it is open.

15 Meter Novice Band

The 21.1–21.25 MHz Novice band was established 28 March 1953 when the 26.96–27.23 MHz 11 meter Novice band was eliminated. As of 22 November 1972 this Novice band was shortened to 21.1–21.2 MHz. Fifty kHz was chopped off the top end of the original 15 meter Novice band to eliminate any possibility of low-level Novice code activity interfering with relatively heavy voice operation in this spectrum by foreign (DX) amateurs. This band has served as the primary Novice gateway to worldwide (DX) contacts during the past 30 years.

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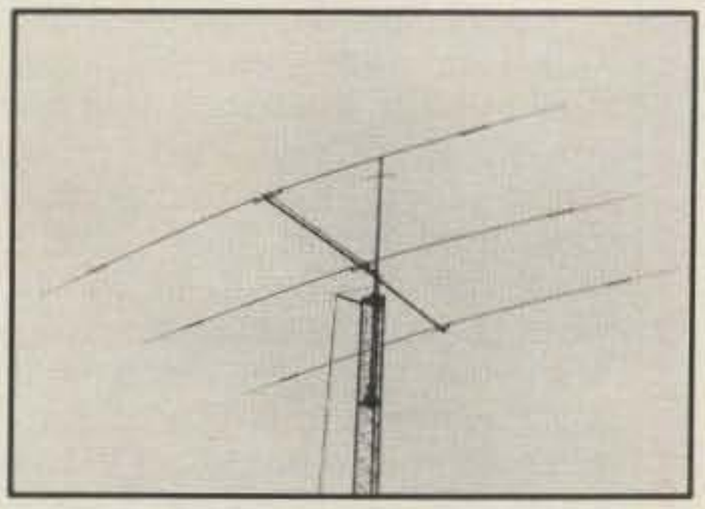
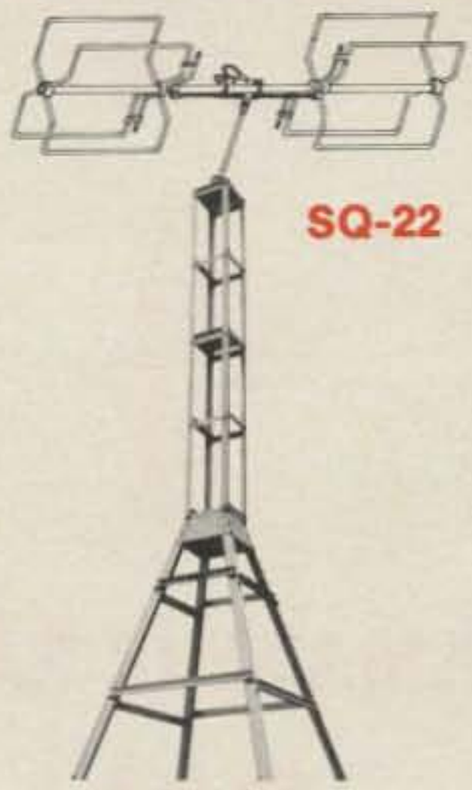
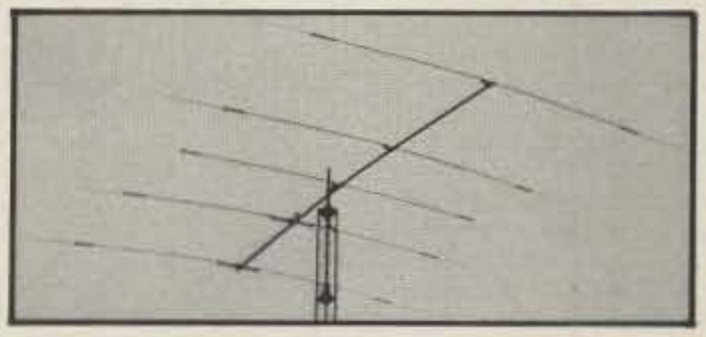


HB-33SP



SQ-22

TE-35ASP



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	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	0.46m²	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
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Naturally, results are best during the peak sunspot years, but communications possibilities are good on this band even at the lowest points of sunspot cycles. Ten and fifteen meters remain open longer to long-distance communications in the summer than during the winter; this is because the essential ionosphere layers are activated longer by the sun during the longer days of summer. Like 10 meters, 15 meters becomes useful for just short-range (ground-wave) contacts during each night.

20 Meter Novice Band

Novices need a 20 meter band to provide long-range communication opportunities when the 10 and 15 meter bands are closed to everything but ground-wave (short range) communications. The exclusive domain of foreign (DX) amateur voice operation has long been 14.1–14.2 MHz. The 22 May 1983 expansion of American voice privileges made 14.15–14.20 MHz available to U.S. amateurs. I have often submitted proposals to have 14.1–14.15 MHz established as a Novice band, and I know this change is long overdue.

The total frequency spectrum in the amateur 80–10 meter bands is 3350 kHz. Novices and Technicians comprise about one-third of the entire American amateur radio operator population, but they just have access to 300 kHz in these high-frequency (3–30 MHz) bands. It is reasonable to assume that one-third of the American operators deserve more than 9 percent of the amateur radio h.f. spectrum. Furthermore, Novices and Technicians need 20 meter spectrum to have long-distance communication opportunities during prime evening operating times. The 15 meter Novice band dies (closes) soon after 10 meters closes. When the 10 and 15 meter bands are closed, the next band to open up for DX contact opportunities is the 40 meter band. However, American Novices have to contend with powerful international shortwave broadcast stations when this band is open, since 7.0–7.1 MHz is the entire 40 meter amateur band in the other two ITU (International Telecommunications Union) regions of the world. In just ITU Region II, which is North, Central, and South America, 7.1–7.3 MHz is exclusively for amateur use. In other words, the possibilities of having satisfactory long-range contacts on the 40 meter Novice band are poor. Note that it is impossible for Novices to contact foreign amateurs in ITU Regions I and III, since those amateurs are not allowed to operate in the 7100 to 7150 kHz American Novice band.

The 14.1–14.15 MHz spectrum should become a Novice band as soon as possible to help keep operating interest high, which reduces the dropout rate. This frequency segment has always been legally available for code operation by American amateurs; it will be nice to have

the FCC make this spectrum available to active code operators—Novices and Technicians.

30 Meter Novice Band

Sections of the 10.1 to 10.15 MHz amateur band became available 28 October 1982, with a 250 watt power limitation. It should be made available to American Novices and Technicians as an additional Novice band. The 30 meter band provides coast-to-coast communication opportunities in the daytime, and it opens up to long-range use after 15 meters closes. I have proposed that the entire 30 meter band be established as another Novice band.

40 Meter Novice Band

When the Novice license was established, there was no 40 meter Novice band. The first 40 meter Novice band was established as 7175–7200 kHz on 20 February 1953. The 40 meter Novice band was expanded to 7150–7200 kHz on 22 June 1955. It was shifted down 50 kHz to 7100–7150 kHz on 22 November 1972. This is the most congested Novice band, but it can be used for contacts day and night. One can reach the nearest one-sixth of the country almost every day, and coast-to-coast contacts are possible most evenings. Unfortunately for American amateurs, 7100–7300 kHz is the international shortwave broadcast 41 meter band in all parts of the world except the Americas.

When the 40 meter Novice band is open to long-range communications, extremely powerful broadcast stations boom in every 5 kHz throughout the band; they can be heard on 7105, 7110, 7115 (etc.) kHz. This band is most useful in the late afternoon and early evening hours. When working distant stations on this band at other times of the day, it is advisable to keep information exchanges brief. The 40 meter Novice band should be expanded an additional 25 kHz to become 7075–7150 kHz; this would permit DX contacts with amateurs in all parts of the world, without having to work through the strong interference created by international broadcast stations.

80 Meter Novice Band

This is the only Novice band that has remained unchanged since 1951. The 3700–3750 kHz spectrum is subject to a lot of storm-related interference during the summer, particularly during the evening hours.

The major reason why most new Novices do not operate on 80 meters is the fact that a lot of space is needed to erect a full-size 80 meter antenna, and many of us do not have enough room to do this. To make this point clear, please be advised that a simple full-length copper-wire dipole cut for resonance at the center of this 3700–3750 kHz Novice band is 125 feet 5 inches long.

George Furtado, VE7EIK, lives in Penticton, British Columbia. He has been an amateur since July 1982, and he often works American Novices in the 15 meter band. His high-frequency (3–30 MHz) station includes an ICOM 720A transceiver, Datong Morse keyboard, and an inverted Vee antenna used on 10–40 meters. He uses a Kenwood TR-9130 transceiver with a TET beam on 2 meters. George is 25 years old and he works for Atco Industries building mobile homes. He has already contacted amateurs on all continents and in 65 countries.

When band conditions are good in the early morning and late evening, foreign voice-operation interference is common at the high end of this band. Despite these problems, the 80 meter Novice band is better than the 40 meter Novice band as far as interference is concerned; there are far less operators on 80 meters and long, complete contacts are normal for the fewer Novices who operate in this band. Communication range hits a low of about 50 miles at noon, but it stretches out to where it is coast-to-coast late at night and early in the morning.

If you can get an 80 meter antenna up at your station, it is advisable to do so. This band is much less subject to man-made interference, and it provides better on-the-air code practice contacts than one usually can get on 40 meters. The low-frequency end of this band should be moved down 25 kHz to make this band 3675–3750 kHz. This additional frequency spectrum would further reduce interference and should attract more Novices and Technicians to 80 meters.

Part I Summary

This concludes the first part of this three-part article. The second part covers frequency control, logging, station identification, licensing, and license availability. Each segment of this article contains information that is of interest, but the entire article should be read to derive maximum benefit from it.

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 issue of *CQ*. 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 not received pictures from Novices in Connecticut, Hawaii, Louisiana, New Hampshire, Oregon, Rhode Island, South Carolina, Utah, and Vermont.

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It was originated by Peter Martinez, G3PLX (see June 1981 QST, p. 25). He first interpreted the international marine CCIR 476-1 specification for amateur use. Virtually all of the 400+ stations presently on AMTOR world wide are using software/hardware designs originated by Peter. The AMT-1 is a proven product which represents his latest and most highly refined design. It represents the culmination of over three years of development and on the air testing, and sets the standard against which all future AMTOR implementations will be judged.

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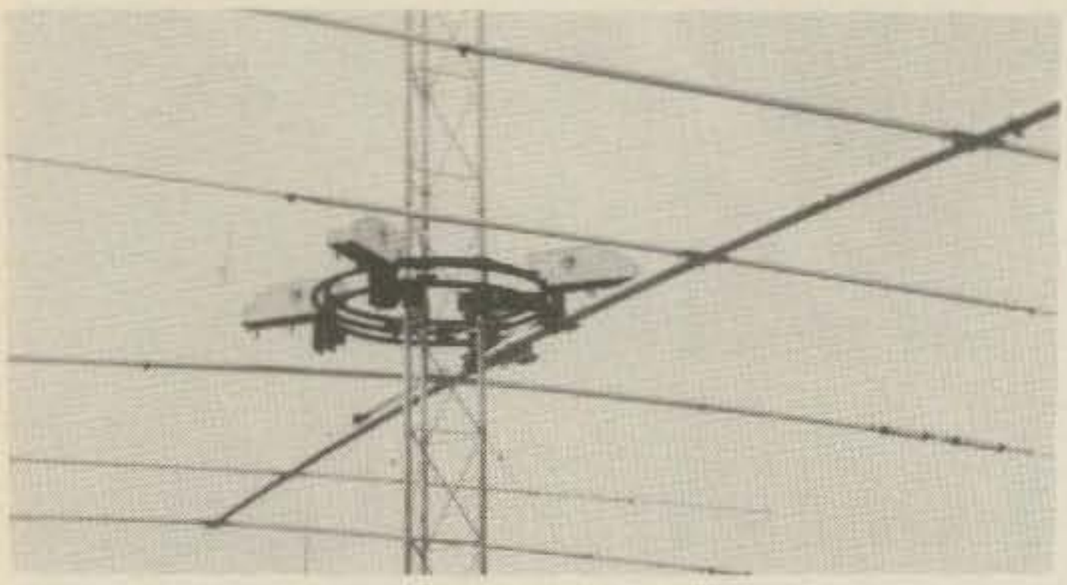

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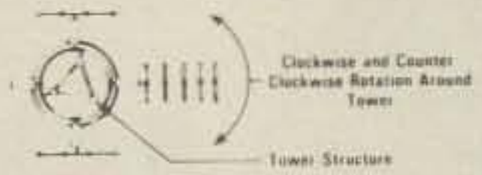

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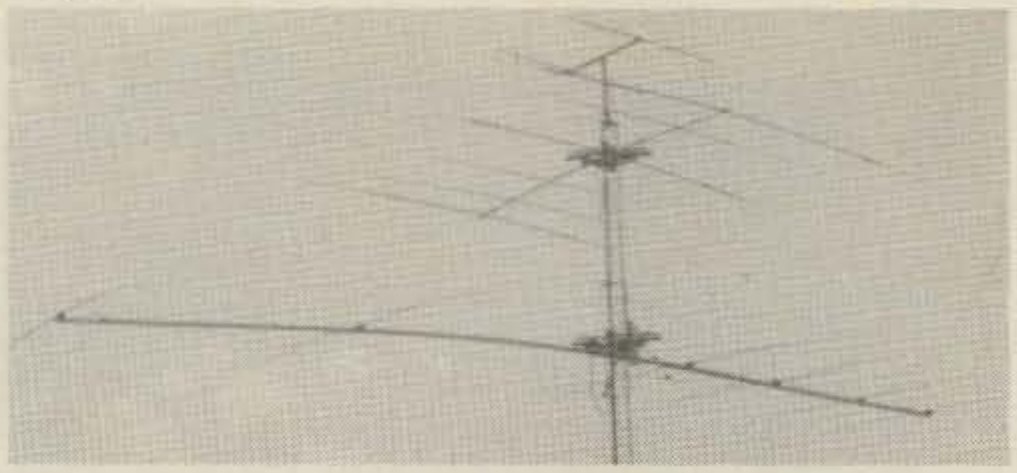

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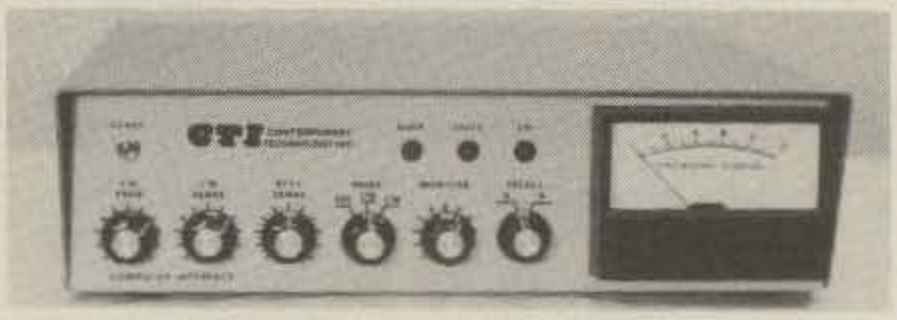

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CIRCLE 104 ON READER SERVICE CARD

World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Highlighting: New Frequencies and New Capabilities

As you've probably noticed, this column has covered a large number of subjects during recent months. One of the reasons for instigating this new format involved our desire to share with you some unique areas of amateur radio enjoyment. Another reason was inspired by this year, 1983, being designated World Communications Year. Originally proclaimed by the United Nations General Assembly in late 1981, the basic WCY objectives center around all countries expanding international communications, and inspiring each to analyze their policies on communications developments. This recognition of significant contributions to communications technology and international friendship by radio amateurs is reflected in several ways: opening of the new 30 meter band, expansion of 20 meter phone privileges, authorization to use AMTOR data/teletype concepts, and the birth of an exciting new era in OSCAR satellite activities. Our chance to reflect and extend our heritage has never been so opportune and so enjoyable! Yes, we've been trying to entice you to learn more about amateur radio—to try 30 meters, RTTY, OSCAR, or some of our other challenging areas—and this month's column will be no exception. Don't just read our words and yawn. Get cracking on some new band or mode! Join the fun and renew your interest in our exciting amateur world!

The 30 Meter Band

Almost a year's time has passed since the first 1979 WARC-acquired h.f. band, 30 meters, was opened to use by U.S. amateurs. Activity thus far has been quite outstanding, with this 10.1 MHz range boasting some unique communications capabilities. If you haven't yet joined the 30 meter excitement, we invite you to cut those WARC band-protecting diodes (or modify your older rig with a few new capacitors and another crystal), string up a simple antenna, and join the fun. There's a good possibility that 30 meters could become your favorite h.f. band, especially if you enjoy truly meaningful communications rather than mere signal reports and QTH exchanges. All of the popular contests and awards programs (DXCC, WAS, WPX, etc.) exclude 30 meter operations. This "low key" profile produces a relaxed and gentlemanly air which could easily become a haven for pileup-weary DXers or amateurs seeking genuine ham radio enjoyment.

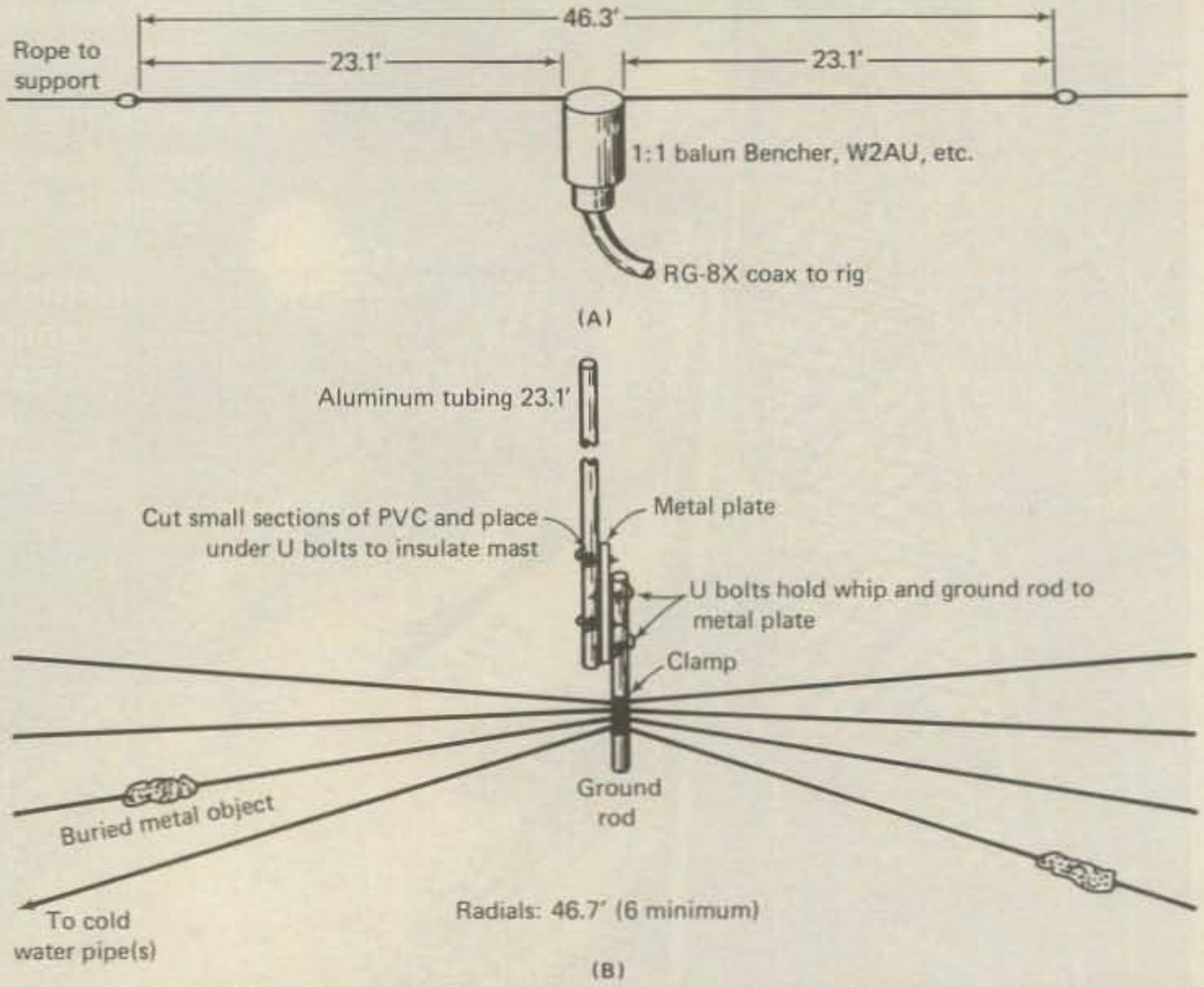

Fig. 1– General dimensions for popular 30 meter radiators. Note use of balun and dipole and half-wave radials on vertical for improved performance.

As this column is being written, 30 meters is still divided into two segments: 10.100 to 10.109 and 10.115 to 10.150 MHz. *U.S. amateurs must still avoid transmitting in the range of 10.110 to 10.115 MHz.* Power limitation on 30 meters is 250 watts, and the operating modes are c.w. and RTTY: a "barefoot rig" haven!

If you like experimenting with various antenna designs and ideas, you'll love 30 meters. Since most of the gang runs roughly the same power, antenna performance generally "speaks for itself." Dipoles, inverted Vee's, verticals, and ground planes give good results on 30 meters. Some typical dimensions are shown in fig. 1. I strongly suggest adding a center balun to dipoles; their improved performance is definitely worth the cost. Both homebrew and commercially manufactured verticals need a fairly clear "horizon view" plus an effective ground system (the more radials, the better!). There is also a theoretical 3 dB improvement available by using ½- rather than ¼-wavelength radials. Remember also to use every asset at your disposal. Connect some radials to cold-water pipes and old metal objects (maybe buried a few inches), along with discarded TV antennas lying on the ground, etc.

Specialized antennas for 30 meters can take a variety of styles, ranging from phased vertical arrays to Vee beams and mini rhombics. The quickest and easiest way to plan one of these arrays is to find an appealing design in an antenna book or magazine and scale dimensions for 30 meters. The vast amount of man-made noises heard while tuning 10.1 MHz around cities also indicates beverage antennas would be useful for improved reception.

Doug, WA4YMV, reports his 8JK array originally cut for 40 meters performs like a champ on 10.1 MHz (see fig. 2). Both transmitted and received signals are consistently 3 to 5 dB higher than his dipole at the same height.

Being one to enjoy the unusual, we personally rigged a 30 meter c.w. mobile setup with an Icom 730, our QRP 30 transceiver (see June 1983 *CQ* magazine for details) and a new Hustler RM30 resonator. The results were so encouraging that we then assembled a knock-down rotary dipole consisting of two 54 inch lengths of

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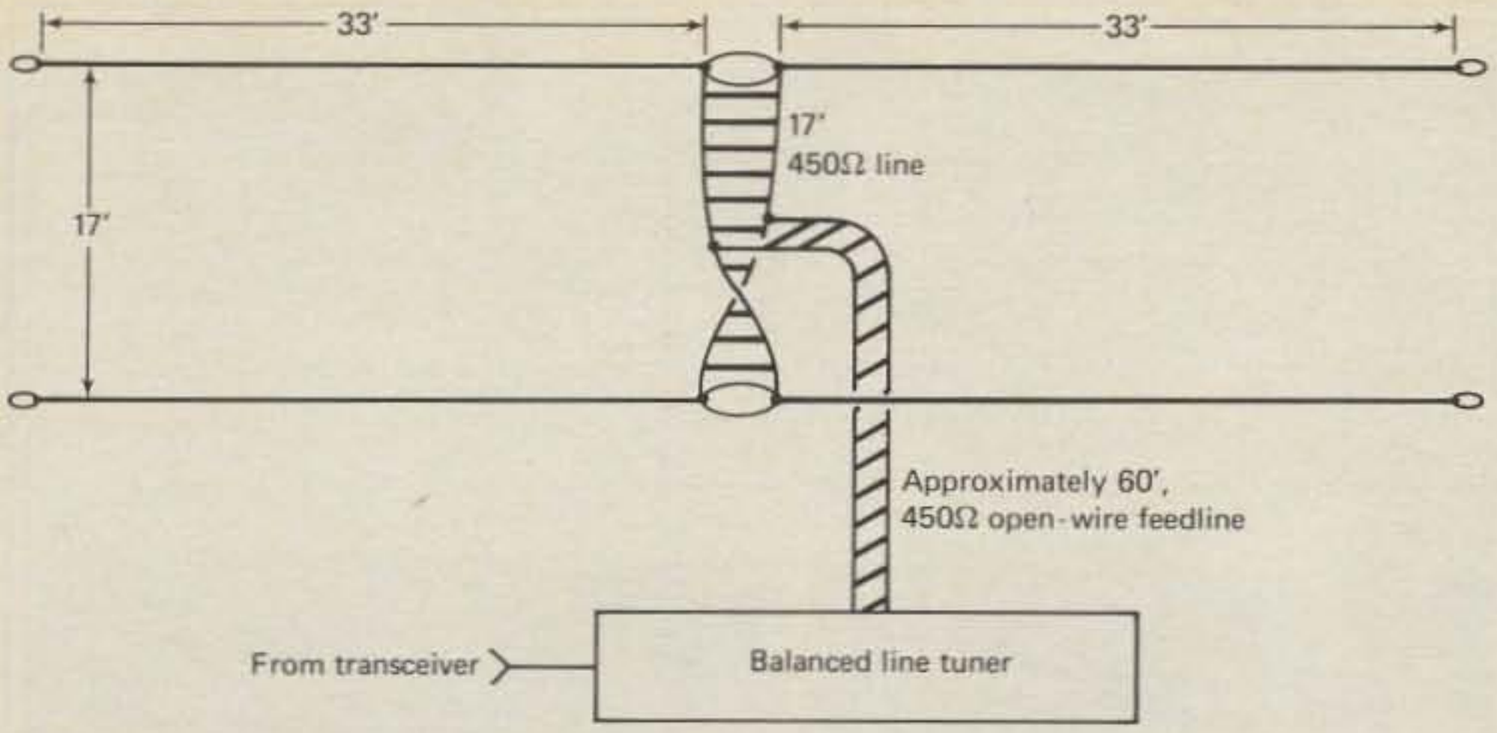


Fig. 2– The 8JK array of Doug, WA4YMV. This configuration works like a champ on 30 meters. The middle phasing section is made of 17 feet of 450 ohm open-wire feedline crossed one-half turn and fed in the middle with similar open wire. Radiation is bidirectional broadside to the array.

aluminum tubing fitted with short sections of screw stock and mounted an RM30 resonator on each end (see photo and fig. 3). This "single element rotary" was tuned to a 1.1. to 1 s.w.r. by alternately adjusting tip rods. The antenna was used exclusively during an extended weekend's operation from the Gulf Coast, and performance equalled a full-size dipole. If you would like to expand this mini-antenna idea, try adding a second element approximately 12 feet "in front" of the driven element to create a Yagi beam. A reflector might perform best, but unwieldy appearances lead us toward a director. This "4 percent shorter" element should resonate around 10.520 MHz (468/F [MHz] = half wavelength of antenna; 468/10.1 = 46.33 ft. electrical length; 4 percent shorter = 44.48 ft.; reinserting that length, we find director frequency: 468/44.48 ft. = 10.52 MHz). The director's RM30's should be capable of tuning to this frequency. However, a capacitor can be added between "sides" if problems arise. The end result will be a 14 foot by 12 foot 30 meter beam which can be knocked down for rapid transportation.

30 Meter Gear

If you own one of the late-model transceivers which include WARC band reception, you're in luck. Transmitter enabling usually involves merely cutting a diode or jumper lead. See our 30 meter article in February 1983 *CQ* for full details.

Converting older transceivers to 30 meters may be a simple or complex matter, depending on the particular unit. If the rig is straightforward in design and you're willing to sacrifice 40 meter operation, few entanglements should be encountered. Trace the rig's block diagram to determine how 7.0 to 7.4 or 7.5 MHz is "front-end mixed" with the v.f.o. signal to produce an i.f. signal. Next calculate the v.f.o.'s new tuning range for heterodyning "front-end" 30 meter signals, and add a new crystal for that coverage. The receiver's "front end" can then be modified for maximum 30 meter sensitivity by replacing the 40 meter input coil's capacitor with another approximately one-third its value (experiment for best results/sensitivity, and then retune the coil's slug). Extreme cases may also require removing a few turns from the 40 meter coil. This "front-end" conversion should result in 10.0 to 10.4 or 10.5 MHz signals being downconverted to the rig's i.f.; from that point, subsequent receiver stages will function as usual. If the same v.f.o. scheme is used for transmit, you're in luck; otherwise, another new crystal may be necessary. Again, you should check the unit's block diagram and its schematic to determine how the transmit

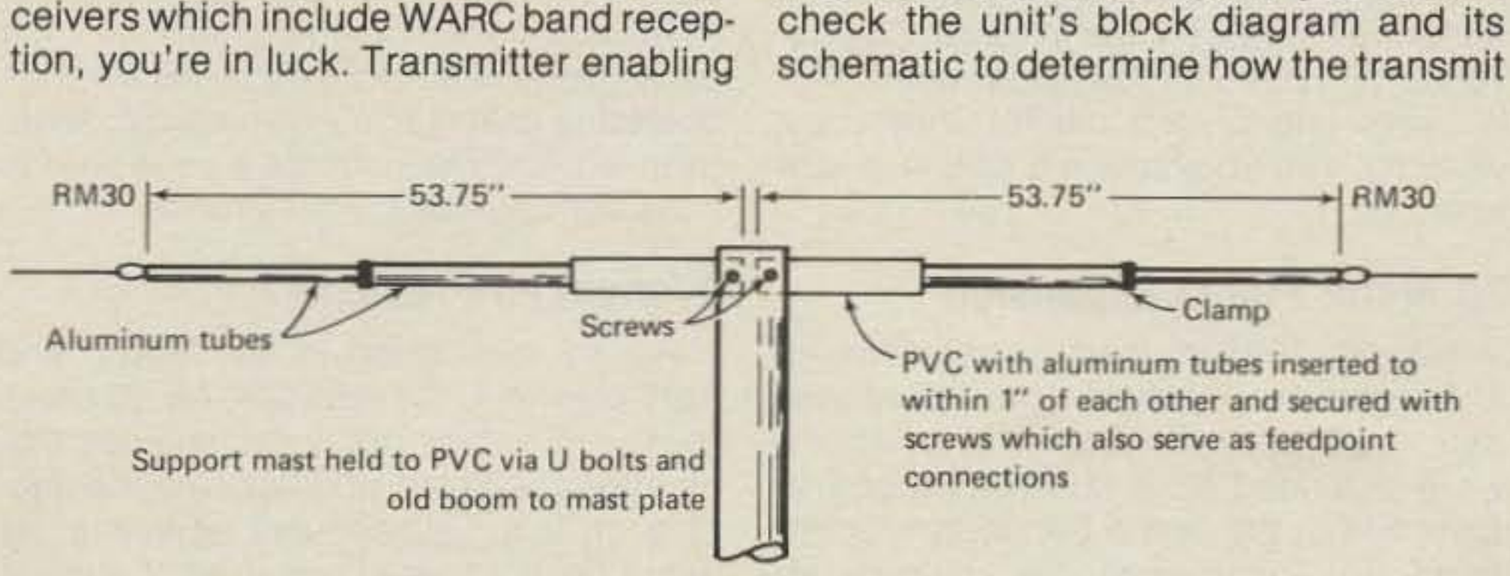
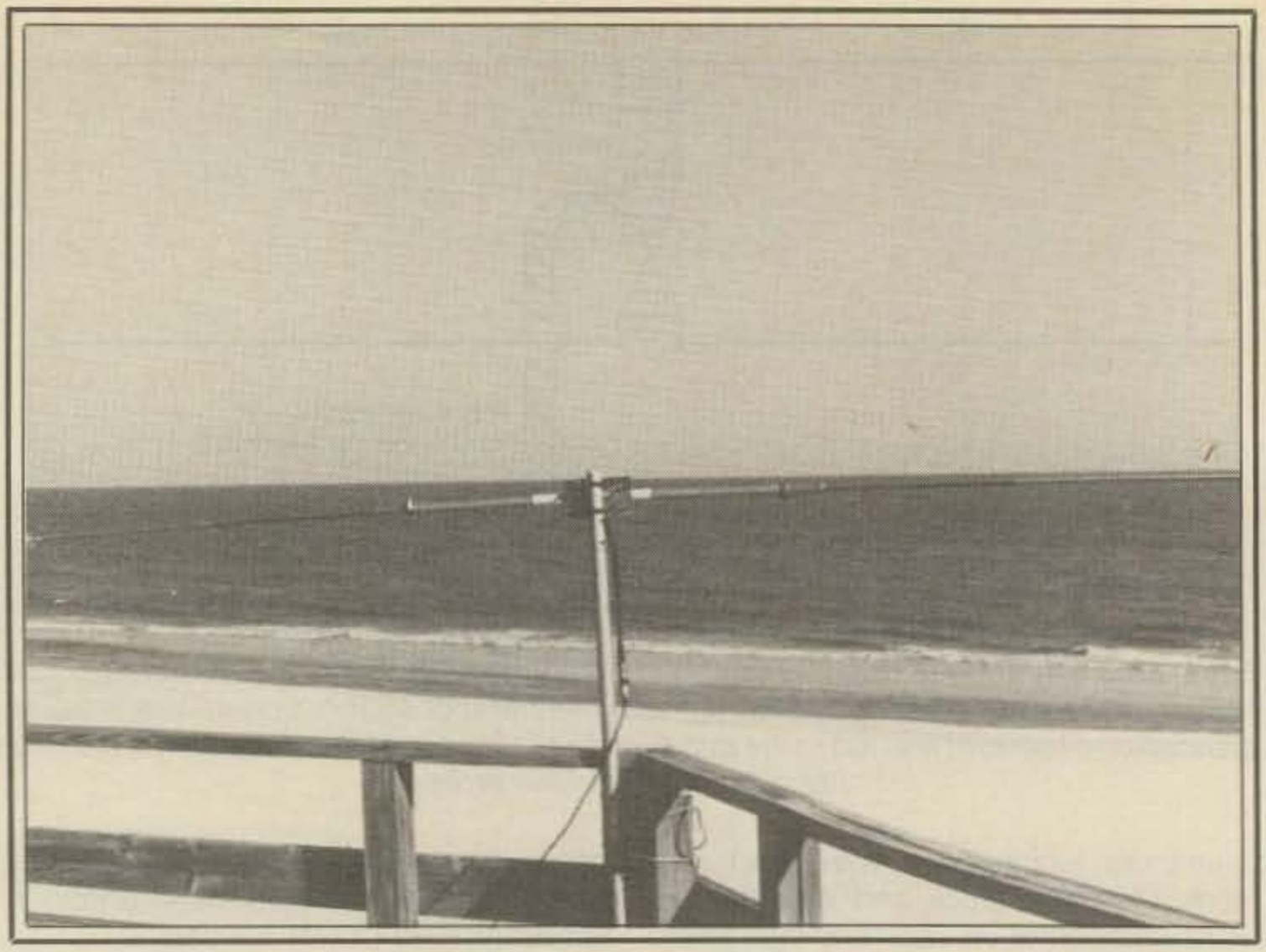


Fig. 3– General outline for a 30 meter rotatable mini-dipole using two Hustler RM30 resonators and short lengths of aluminum tubing. The antenna's performance equals or surpasses full-size dipoles. Rotation capability is an extra benefit.

NOV-71-72



The 30 meter Hustler rotary dipole in use from a beach cottage on the Gulf Coast. The antenna performed like its full-size counterpart at a height of 50 or 60 feet, yet it was only lashed to a sun deck.

mixer signal is obtained. Many tube rigs include large-value tank capacitance, allowing direct tune-up on 10.1 MHz from their 40 meter coils. If resonance can't be achieved, however, move the final's tap approximately one-third the number of turns between 40 and 20 meter points. "Tweak" all remaining coils, and you should be ready for 30 meter action.

As an easy but effective way to get rolling on 30 meters, consider reactivating an older receiver and transmitter (this can also become an exciting and nostalgic venture). General-coverage units such as the SX99, SX100, HQ100, HRO60, etc., tune 30 meters with fairly good sensitivity (a nice, low frequency). Most older transmitters such as Heath's DX35 or DX40, Johnson's Challenger, etc., are easily converted from 40 to 30 meters. The driver and final stages boast a wide tuning range, permitting direct tune-up after installation of a 10.104 MHz crystal. If tuning problems arise, simply move 40 meter coil taps a couple of turns. Place a 100 to 250 pFd variable capacitor in series with one crystal pin for frequency warping, and you have a 5 or 6 kHz tunable rig.

20 Meter Phone Expansion

May 22, 1983 marked the beginning of a new era for 20 meter phone enthusiasts. S.s.b. allocations for U.S. amateurs were extended 50 kHz, allowing operations within the prime DX portion of the band. This spectrum thus is now separated as follows: 14.150–14.175 MHz—amateur Extra class only; 14.175–14.225 MHz—Extra and Advanced class licensees; and 14.225–14.350 MHz—General class and above licensees (all classes can finally join the SSTV activity around 14.230 MHz). This particular band "addition," within itself, may be one of the most exciting moves for which we could ask. As this column is being written, only slightly before that spectrum is opened, I only hope I'm not premature in expectations and visions. If we handle these frequencies with the same respect and humbleness we've shown 30 meters, great! If we turn this into more "stomping ground" for pure muscle flexers, we stand a chance of losing that allocation. Living the golden rule will return enjoyment for all.

Most triband beams are sufficiently broadbanded to allow at least 150 kHz coverage on 20 meters with a low s.w.r. If your array is resonant between 14.200 and 14.225 kHz, you should thus be "sitting good" for the new frequencies (assuming you have an Advanced or Extra class license); otherwise, you may want to shorten driven element tips ½ inch each. There is an extra 3 to 6 dB worth of operating gain in this less-crowded spectrum, so now may also be a good time to consider upgrading your license.

Overlooked Problems?

As we mentioned in the March and April columns, the new OSCAR 10 satellite will introduce many exciting communications horizons and become the flagship craft for subsequent satellites. As years pass, greater amounts of serious amateur communications will depend on these satellites. H.f. communications will become secondary activities.

73, Dave, K4TWJ

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATIONS AROUND THE WORLD

Ere the darkness falls around me,
I would fain lay down and rest.
Call me early, mother darling,
For the CQ World-Wide Test . . . .

Though it is now late summer and the new contest season is at hand, for the DXer the present time is always the difficult time; the eternal questions which have always nagged the thoughtful DXer are still with us. Last week one of the local QRPers was up the hill to seek the answers to some of the Eternal Enigmas. His was a question often heard, his a faith that may waver but never dims.

He quickly got going. "It's this idea about calling 'CQ DX,' he told us. "At the last club meeting there were some who were not in agreement with the idea, one even saying that while it may not be proper for a newer DXer to call 'CQ DX,' it certainly should not apply to a fellow who has been around the track a couple of times—maybe something like 25 years or so. This fellow said that anyone who has been licensed for 25 or more years must be considered a true-blue DXer, and it is okay for him to call 'CQ DX.' What do you think of that?"

Son of a gun! What could we say? Certainly one comes up against fine distinctions, these perhaps a bit difficult for some to appreciate, but they are easily understood by someone who has been licensed for a quarter of a century. Sometimes such beliefs, while perfectly logical to those expounding upon them, might be difficult to accept by others. But one must remember that DXers operate in many dimensions, and sometimes one's own dimensions are larger than those of other DXers. We had to know more and urged the QRP type to continue.

"Well," he continued, "a bunch of us were standing around talking about the DX we needed and how long we had been needing it. Some wondered if they would ever hear some of the needed countries such as Albania, and Bouvet, places like S2-Bangladesh and XZ and such. When we got to talking about calling 'CQ DX' and how it is hardly worth the trouble when you are up around the 300 country mark, one fellow noted that if no one on the DX bands called 'CQ DX' and a really rare one was on the air, it would be a case of everyone listening and no one calling, not even the rare XZ type. Of course another fellow jumped right in to argue that he had been licensed for 25 years and

77 Coleman Dr., San Rafael, CA 94901

DXers are always turning up where the action is. Here are some well-known OH amateurs at the installation of the NCDXF 10 meter beacon at Helsinki University. From the left: Axel Tigerstedt, OH5NW; Kauko Rahko, OH2PZ; Arto Harjula, OH6GJ; and Martti Laine, OH2BH. DXers will recognize the calls, and every DXer knows Martti Laine personally, as they say. But surprisingly, Martti seems to know every DXer going. Listen sometime and note his recall of names.

was a true-blue DXer, and he had never found the bands open without someone calling, and especially someone calling 'CQ DX.' But it was a possibility, and we soon found others in the group had been thinking along the same lines."

This was becoming interesting, and the QRPer was getting all our attention. Obviously this was appreciated, and he needed little urging to continue. "After awhile with all the arguments about whether or not a really true-blue DXer ever calls 'CQ DX,' this one fellow got to looking so smug and smiling so broadly that before long he had almost everyone's attention as they waited for him to speak. We should have known that he was waiting for the moment." The QRPer paused to work his shoulders a bit, and it was apparent that all of this was a heavy burden. Apparently he had run into something that he did not fully understand—maybe even something he could not believe.

"This fellow," the QRPer continued, "asked the group whether we had ever considered that calling directional CQ's might be okay when calling just 'CQ DX' might not be. That sure got everybody's attention." It was also starting to get our attention.

"It turned out that in the last couple of months this fellow had had a lot of success calling directional CQ's. As he explained, he needed Bangladesh, and late one evening he fired up the rig, ran a handful of dots and dashes through the keyer, and called 'CQ Bangladesh.' Said he had hardly called it more than four times, when back came a good signal and a good fist, and the fellow signed S21AAA, just like that. He said he was in downtown Dacca. So this fellow at the meeting said he got a QSO for a new one, and the S21 said his QSL manager was in all the bulletins or would be in another month or so. That was it! The worst part of it all is that this fellow just has over a hundred countries and has only been in the club for a couple of months. What do you think of that?"

What could we say? After all, it might just have been true. But we thought that maybe we'd like a bit more information, a bit more background to fill in the dark corners. "Was that the only time the fellow said he tried this routine?" we asked, and the QRPer shook his head.

"Heck no!" This fellow said that once a week or so he calls a directional CQ for a country he needs. He says it works better than 50 percent of the time. He just had to tell us about another one he got that way, this one a CE0X on San Felix. Says he wound up the rig one late evening when he had come in from a trip out of town, aimed the beam south, and called 'CQ San Felix.' Nothing happened for awhile, but after a bit he realized that there was a weak signal down in the mud and his callsign was being sent. When he copied the station it was signing CE0XXX and said it was in a penal colony on San Felix. The operator said he had put together a little c.w. rig in his cell and was using the bedsprings as a directional antenna. Said that it loaded up better at high tide than at low tide, but he had to be careful that the authorities did not catch him, so he operated only late at night. He promised to QSL when he got out and back to the mainland, but he had been on San Felix ever since Allende was overthrown, and it might be another month or two before he got his cards from the printers." The QRPer was now leaning close to hold our attention. "Remember," he emphasized by waving a pointing finger at us, "that this fellow was calling 'CQ DX,' only he was telling what he wanted to work. What do you think of that?"

What could we say? One learns the futility of arguing with success. If it works, it has to be good! And although we still had some doubts, there is always difficulty in trying to refute fact with your own version of fancy. Certainly there was no obvious crevice in the assured armor of this QRPer. He had heard the truth and was a believer. But there was still a faint echo of something that did not ring just right.

We thought of other days in other times, as we seem to do more and more when confronted witha puzzling DX matter, possibly even one of the Eternal Enigmas. We thought of one recently returned

The WPX Program

Mixed

1059	KJ6E	1061	VE3LAJ
1060	KØUKO		

S.S.B.

1603	KT5F	1607	LA2Y
1604	NØBZE	1608	KD2Q
1605	PA3AUA	1609	CT4UW
1606	KE3A	1610	W8HFK

C.W.

2215	PY2VW	2217	JH3CNM

VPX

231	JT1-103

Endorsements

Mixed: 450 JH8NYK, KØUKO, VE2LAJ. 500 JH8NYK, NE6I, VE3LAJ. 550 JH8NYK, K2POF, VE3LAJ. 850 WA3GNW, KO8T. 900 KO8T. 1000 WB8ZRL. 1150 W2CC. 2200 W2NC.

S.S.B.: 350 WI4K, KT5F, PA3AUA, LA2Y, W8HFK, WØIJN. 400 W8HFK, WØIJN. 450 WØIJN. 500 WØIJN. 550 WØIJN. 600 WO4L, W6YMH, WØIJN. 650 KC9DS, DF9FM, WØIJN. 700 DF9FM. 800 W3GXK, CT4NH. 850 WB8ZRL.

C.W.: 400 VE2PT, K6UXO. 450 WB8ZRL. 500 WA6VJP, AK2H. 550 AK2H. 600 VE1ACK, AK2H, JA5SIX.

VPX: 650 OE1-0140.

10 meters: AK2H, AK9Z.
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Dr. Vince Thompson, K5VT, was recently voted a life membership in the Southern California DX Club for his DX activities. While at UCLA's medical school, Dr. Thompson was sent to many African nations to teach surgical procedures. Each stop was a chance to put the country on the air; each time it was a good operation, often from a rare and needed country.

from foreign strands and with whom we had discussed the activities of Slim. This one had laughed at our puzzlement over one peculiar callsign.

"Why that one you are talking about was Jerry stationed in—, and he will be there for another year or more. They don't allow foreign licenses to operate in that country, so Jerry just gets on the air and signs any call that sounds right, or maybe even something that someone needs. You call it and he'll answer it. And he always promises to QSL. Jerry says it makes them happy to work him and they live in anticipation of the expected QSL. According to his thinking, he's just bringing some sunshine into the drab lives of needy DXers. He says it's a noble effort."

Maybe this is just something that many have suspected but seldom confirmed. We recalled the time when a young amateur in Texas heard an unusual call and worked 1Z4NG for a new one. This one even offered his services as QSL manager, and the offer quickly was accepted over the air. Part of the reasoning behind the offer was that it would assure a quick QSL as well as more information to verify the DXCC status of the country. A month or so later a bundle came in the mail containing printed QSL cards, log sheets, but nothing else. This came from a European APO address. So the young Texan sent out the QSLs and that was it. He never again heard from the station, never learned from where the cards came. Even after a couple of decades there are still some clutching their 1Z4NG QSL and hoping that some fine day the good word will come. It probably never will, but we still had the QRP type on our hands.

"Anything else said there that was interesting?" we asked, and realized that we hardly had to. This one had been saving something for a big impact.

"Well," the QRPer continued with his always original opening, "this fellow who calls the directional CQ's says that he's on to something big. He says that it will really shake up things when it breaks and he is on the inside. Says it all came from him calling 'CQ DX' late in the evenings." Though we still had a good measure of skepticism, we were hardly ready to argue or even drop the subject at this point. Hardly a DXer lives who is not ready to listen to the inside track of some earth-shaking information. This was one we had to hear out.

"Well," the QRPer said, "this directional CQ fellow says that he was talking with a fellow who is close to that Whitebread around the world yacht race. The story is that when running across the Southern Ocean from New Zealand to Cape Horn one of the yachts got north of the usual track and came across an island that was not on their chart. But in fact, it was one that has been on and off the charts for a number of years. This time with satellite navigation they nailed it down. When this one breaks there will be a lot of shaking going on. An awful lot of shaking."

We admitted it. This one had us hooked, and we were turning into believers. Quickly we ran through a number of alternatives, and the startling possibility came.

"Maria?. . ." we started to say, and there was a quick motion of a finger to his lips to quiet us.

"Careful," he said, "this one should not get out. Maybe I should not have even hinted to you. But it is shaping up, and before long there are going to be a lot of surprises. Maybe the island isn't where they thought it was, but it is there, and someone must have seen it a hundred years or so back. It's just in an area where ships seldom travel. It's not high, and even 10 miles off you can't see it. But just you wait!"

Wait! How can one wait when something such as this is ready to blow things open. Ever since we found Maria on a *National Geographic* map years back we have wondered. Now there may be something to it. And now we are the ones seeking advice from the QRPer. Each day we call, and each day he advises: "It's coming. Just be a believer!"

Of course we believe, but with some reservations. We even talked to the Old Timer about it, naturally first swearing him to secrecy. DXers are always known to keep close the inside information. What we expected was not what we got.

"All this comes from a fellow who calls 'CQ DX,' " he said, "and who recently has worked Burma, San Felix, and a couple of others." We had to admit that all of it was true. "But this one might be legit," we said, "there might be something to it, don't you think?"

Sometimes the Old Timer is a bit difficult to convince even when things are just about obvious. "If you believe that you'll believe anything," he told us and would not talk further. Of course the Old

The WAZ Program

10 Meter Phone

250	DJ8NK/A	252	JH1BSE
251	JF1SEK	253	W8NDJ

15 Meter Phone

170	EA1RT

20 Meter Phone

460	N4KG	464	I2TZK
461	W6TGI	465	KB8MR
462	JA4CPY/1	466	AB1U
463	W1WLW		

15 Meter C.W.

90	K1JA	92	DK8CM
91	JA1BN		

40 Meter C.W.

43	JA1BN	44	N4KE

All Band WAZ

S.S.B.

2712	KD7FW	2719	EI8EK
2713	W7OAX	2720	WB3LSY
2714	KCØCU	2721	KB8MR
2715	N2AMS	2722	DL4GAD
2716	WØLSD	2723	JA3UCO
2717	KCØUJ	2724	VK2AYK
2718	WB5ROW	2725	AB1U

C.W. and Phone

5610	LZ1XZ	5613	KØUKO
5611	NY4H	5614	KR9U
5612	JA3WHG		

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Timer is right for he is never known to be wrong—as far as we know. But just supposing . . . Ah Maria! We listen for your call every dawn, every midnight.

Malpelo

The last operation from Malpelo was by the Liga Colombiana de Radioaficionados in March 1977; the time before that was in 1969. If you are looking for HKØ Malpelo, this is the month to be alert.

No matter how you approach Malpelo, it comes right up out of the Pacific. On most sides there are sheer cliffs dropping into the ocean, one end of the island being a peak. The landing site is not much more than a steeply sloping shelf alongside the sea. Usually the first thing done on landing is to rig an A-frame to reach out over the water and lift the gear and supplies ashore. Rowing up and daintily stepping ashore is hardly recommended with the constant surge of the ocean against the rocky shores.

Located at 3°59'N and 81°34'W, previous efforts have been full-fledged logistical exercises with the Colombian Navy giving the essential support to the efforts. Four operating positions are planned with study being giving to airlifting or mountaineering one or two operating stations to the top of the island's pinnacle so that the Deserving DXers blocked from HKØTU in previous efforts have a chance to work Malpelo.

Early on those reported as going on the effort were HK3TF, HK3RQ, HK3BAU, HK1QQ, and HKØBKX. QSLs will be handled by HK3DDD, Edilberto Rojas M., Apto 25827, Bogota, Colombia (s.a.s.e. or s.a.e./IRC needed).

Plans are to work 10 through 80 and probably 160, both s.s.b. and c.w. For c.w. look for them 5 kHz above the lower band edge on 80 and 40 meters, 25 kHz up on 160, 20, 15, 10 meters. On s.s.b. look around 1825, 3795, 7085, 14185, 21295, 28595 kHz. Generally they will operate close to these frequencies, but they may shift one way or another. If you've worked them on every band and every mode listed above, you might try listening at 146.460 MHz where they'll be trying some experiments (possibly some satellite work).

They will plan to operate for five days. The above should give you just about everything you need to line them up. Everything, that is, but the dates. At the time this was written, the dates had not come through. But just listen; you'll know when they are around, possibly well before they even sight the island. There will be a lot of noise, that's for sure. Malpelo has been well up in the needed lists for a number of years; for some deserving W6's and W7's, it has been there forever. This year may be different, hopefully.

Space Shuttle #9

This is the one that will carry a 2 meter station to be operated by Owen Garriott, W5LFL. A waiver to allow an Advanced Class licensee to operate where the FCC regulations specify Extra country has been given. The shuttle was due to be launched in late September.

Uplink should be in the 144.910–145.970 MHz area with 20 kHz increments. Downlink will be 145.510–145.770 MHz, also with 20 kHz increments. The operating time may be limited, or even nonexistent, the first couple of days into the flight, possibly only one hour a day during W5LFL's free time. Some have estimated that 500 QSOs a day would be a good figure to expect. Some others with baser thoughts have wondered how many of the QSOs will be duplicates to test propagation and similar scientific aspirations.

The ARRL will handle the QSLs and s.w.l. reports. This space communication effort by amateurs will undoubtedly draw a lot of attention from the media.

Mod of Clyde

GB2MOD will be on the air from October 8–14 just about continuously as they celebrate the National Mod of Scotland at Motherwell in the Clyde Valley. Work GB2MOD and you can QSL via the GM Bureau or to the Mid Lanark ARS, Wrangholm Hall, New Stevenson, Motherwell, Scotland. They promise a card printed both in English and Gaelic. Look for the special station on c.w. about 7 kHz up; 75 it will be 3.57 MHz. On s.s.b. try 28.51, 21.31, 14.21, 7.06, 3.67 MHz. As they say in downtown Motherwell, "Cued Mile Failte," or a hundred thousand welcomes, to the Deserving.

Belize

A large group of amateurs from the Western Reaches will be again with V3DX, V3CQ, and possibly even a few more calls during the great *CQ* WW DX Phone Test October 29–30. The group is going loaded for points, lots of points, and several of the operators have operated previously in contests from Belize. Included in the eager crew will be AK6A, N6ADI, WA6VNR, W6SID, K7CI, W7MAP, KA7EST, WD5JEA, and possibly even K9ZO. While the V3DX and V3CQ calls are set, the group is looking to come up with some surprises in callsigns and prefixes. This will be one to listen for to get the whole story.

Frequencies will cover everything from 6 through 160, the 6 meter frequency being coordinated on the 10 meter frequency. You can look for the Belize action at or about 28505 kHz, 21305 kHz, 14205 kHz, 7205 kHz, and 3805 kHz. If you are looking for other bands or frequencies, just listen; they'll be there.

Actually the group will gather in the V3 area starting about October 23, and they will be there until November 2. Last time out they ran up over 15,000 QSOs in 10 days of operating. There will be c.w. operating as well as phone before and after the contest, and they will even listen if you want to rack up Belize on a number of bands. How? Simply phone 011-501-0262071. Before you rush to the telephone, that is the number for the operating position in Belize, and direct dialing will cost just under $2.00 per minute for first minute and just under $1.00 for each additional minute if you call between 11:00 p.m. and 5:00 p.m. Higher rates are set from 5:00 p.m. to 11:00 p.m. When you read this there should still be time to write Ski Brozowsky, N6ADI, Box 379, Ojai, CA 93023 and outline your good intentions.

Last year the '82 effort was from Ambergris Cay 35 miles off the eastern Yucatan peninsula in the Caribbean. At one point they worked JA's almost exclusively for 10 hours running on 20 meters. This may not sound notable, but to the JA's it was, as the Caribbean is usually a difficult place for them to work.

New England DXCC Dinner

The 31st gathering of the Southern New England DX and Scrod Bitten Society will be on November 5th this year. Jim

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5 Band WAZ

Standings as of July 1, 1983

All 200 zones worked:

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

The top 10 contenders for 5 Band WAZ:

1. N4KG, 199
2. JA3EMU, 199
3. N4WW, 199
4. W1NG, 199
5. F6DZU, 199
6. W8UVZ, 198
7. LA9GV, 198
8. K4CEB, 198
9. K1MEM, 197
10. K7UR, 196

223 Stations have attained the 150 zone level

CQ DX Awards Program

S.S.B.

1260	WB3DWH	1263	WA0DCQ
1261	VK6PY	1264	YU1OXW
1262	JA8UUA		

C.W.

587	VK6PY	588	N8MC

S.S.B. Endorsements

310	I3LLD/310	275	WD9IIX/292
300	K5OVC/309	275	K1VHS/287
300	4Z4DX/307	275	W6NLG/283
300	AA6AA/304	275	K9TI/280
275	YU1DZ/299	250	WB3DWH/257
275	WA0DCQ/296	200	VE2ANE/218
275	K9IW/296	28 MHz	WA0DCQ

C.W. Endorsements

300	AA6AA/303	250	K9TI/254
275	K9IW/279	200	K1VHS/249
275	N8MC/277	200	I5BDE/223
250	WD9IIX/274		

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.

Dionne, K1MEM, is handling all the advance sales. The group will hear K8CW report on the recent Heard Island effort. WB4ZNH and XYL, Martha, will report on their Africa efforts, and W3AZD will be there from the ARRL DXCC desk. Always an enjoyable affair with a lot of old-time DXers showing regularly, drop a line to Jim Dionne, 31 DeMarco Road, Sudbury, MA 01776 if you are going to be in the area. You may have worked Jim from some of his DX spots; he has operated as VP2EAF, VP2EEM in Anguilla, K1MEM/PJ6 St. Maarten, and F0KK.

Saba

A year back we advertised that Mike Manafo, K3UOC, would be operating from three of the Dutch islands in the lower Caribbean. Mike says that as a result of the information he found DXers following him from island to island and band to band. Mike will again be in the Lesser Antilles next month for the November *CQ* WW C.W. Test. This will be over the last weekend next month, November 26–27. He will be at Saba possibly signing K3UOC/PJ6, but also hoping for a special contest call for which he made application some months back. Mike finds Saba a delightful spot—few tourists, no sandy beaches, but tremendous scenery and friendly and hospitable natives. We may have a bit more information next month on the c.w. planning for Saba, but Mike surely will be there for the *CQ* WW C.W. Test.

Anguilla

Some years back, maybe even a couple of decades or so, Anguilla was a difficult one to work. It was somewhat of a surprise to find DXers with high totals for DXCC thirsting for an Anguilla QSL. But times change, and what once was difficult becomes a bit easier, and vice versa.

The Anguilla Contest Club will be in the Leeward Islands next month, planning a long stay on Anguilla from November 21 to December 14. They will be signing VP2E and possibly a few more variations. This will be the fourth year of Anguilla effort by the group. Over 46,000 QSOs have been made by the group since 1980. This may explain why Anguilla is not as rare as it once was. In 1980 the group operated multi-operator single transmitter in the *CQ* WPX S.S.B. Test. They operated in the *CQ* 160 meter S.S.B. Test in 1981 and 1982, the ARRL S.S.B. DX Test in 1981 and 1982, and the ARRL DX C.W. Test in 1982.

In the *CQ* World-Wide C.W. DX Test this year they will have several single-operator single-band efforts signing VP2E and some other calls which they hope to acquire prior to the test. They will be full kw stations to monobander Yagis on 40 through 10 meters and verticals on 80 and 160. The plan is to operate around 20 to 30 kHz above the lower band edge.

Jeff Maass, K8ND, will be working 40 meters with the VP2E call using two 2-element Yagis at 46 and 60 feet. For those looking for the twilight paths, Jeff notes that on Anguilla sunrise is at about 0950Z and sunset at 2110Z. Should anyone be looking for an Anguilla contact on 160 or 80/75 meters, Jeff says to write to him before November 20 at 4410 Norwell Drive, Columbus, OH 43220. Elsewhere in the QSL column you will find listings for the QSL route for VP2E and a handful of other VP2E's who were out in 1980/81/82 efforts. Note that contact with a station signing VP2E prior to 1979 does not go with this group, but rather should go to K2FJ. VP2E 1979 QSLs go to WA4MAV.

Guantanamo Bay

KG4DX is being heard from Guantanamo Bay and is looking to be active on 160 to 10 meters. This is Garry Murphy, whose home call is KF4S. His XYL, Kathy, KG4KM, will also be heard, she being a nurse at the naval hospital there.

Occasionally Garry may be found on the W7PHO family hour. He is looking to be active during his stay there, often working the Deserving DX types in Europe and the Far East. At times he also checks into the Pacific Caribbean Net and the Maritime Mobile Net.

QSLs go to WB2CPV, Bill Crews, 5561 Gable Lane, Jacksonville, FL 32211. Bill would like an s.a.s.e. to speed up things. KG4DX is using a Kenwood 820, an IC-740, an SB-200 into a KLM KT34XA linear, all going to a beam on a 50 foot tower. If you need more information, drop a line to WB2CPV, who maintains a weekly schedule with the KG4 operation.

Slim in the Antilles

N8II, Jeff Hartley, says that PJ8II and PJ0II are none other than the ubiquitous Slim being heard a bit back on 20 and 15 c.w. Jeff notes that at the time of his writing the only valid PJ8 calls are PJ8UQ and PJ8YL. Also, there is little chance of any PJ8 calls being issued in the foreseeable future. Visiting U.S. DX types will sign their home calls PJ. During contests special P4- calls may be issued. No PJ0 has been active for years.

In this instance Slim gives N8II as the QSL route. 'Tis not so, says Jeff, not for PJ0II, PJ8II, nor any other station. Some swinging of beams and other methods indicate that the Slim operation is far from Dutch territory.

Since first showing in 1968, Slim has surfaced in many rare spots, seldom on any mode but c.w., and usually from a spot where no operation has been for a long time or a spot where an up-coming operation is nearing. He always sounds good, is very accommodating, and definitely follows the DX scene through the various DX bulletins. After you've worked Slim a couple of times, you will learn the marks of a Slim operation. Unfortunately, there is nothing like experience to speed education. On the other hand, there are some so afraid of working Slim and possibly losing some self-esteem that they'll not work a strange or unusual callsign. This is only sliding off the other side of the chair. Always work them; you can worry later. You will learn to expect to worry, and you will be delighted when you find that you need not have. Work 'em now, worry later! Every DXer eventually learns just that.

Bouvet

With it turning towards winter in the northern hemisphere, it is blooming spring in the southern hemisphere, and DXers may be looking for some action as the snow melts. There has been a report that Norway will be sending an expedition south to visit some of its antarctic areas or sub-antarctic areas, and these include Bouvet and Peter I islands.

All this may come starting next month, but a more likely possibility might be a month or so later, as spring does not come on with a rush in those climes. All of that may warm the DXer's interest. However, early reports are that no amateur operations are planned. Don't give up hope yet. Something always turns up. Maybe even 3Y-Bouvet.

Pribilof Islands

Turning in the other direction, the Alaska DX Assn. planned to visit the Pribilofs in late September, making a visit there as winter is close at hand in the Arctic. There has been activity before from these islands in the Bering Sea, but DXCC country status has not been given. The main reason is a feeling that the islands are

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00, with no fees required for up-dates.

MIXED

2400	YU2DX	1649	N2AC	1287	SM3EVR	1005	WB8ZRL	800	YU2CQ
2361	YU4HA	1604	N9AF	1263	N6AW	995	LA7JO	783	JA9FAI
2311	F9RM	1538	YU7AW	1204	DA2DC	987	EA9IE	768	EA1JO
2201	K6JG	1520	I6SF	1204	K8LJG	975	KC8CC	757	AI8M
2173	W2NC	1520	4Z4DX	1204	JH1VRQ	958	YU2CBK	747	VE2FOU
2136	K2VV	1488	SM7TV	1189	W8RSW	942	KA3A	732	N2AIF
2121	K6XP	1481	W8CNL	1180	W7CB	937	N4IB	722	K7CU
2075	VE3GCO	1451	I2PHN	1164	N6JM	928	NO8T	718	W6OUL
1978	N4MM	1415	K6ZDL	1108	DJ2UU	859	WD9IIC	697	KC8JH
1869	W4BQY	1422	K6DT	1100	KL7AF	852	WØJIE	695	KJ7N
1866	YU7BCD	1379	N6FX	1026	N3ED	846	YU1DZ	690	WD4RAF
1738	N6JV	1364	K9BG	1023	K2QF	825	W6YMH	658	K8HF
1726	N4NO	1347	WØSFU	1014	NN4Q	822	G3ZRH	656	K9TI
1703	W7LLC	1339	KF20	1013	W8ILC	817	N8BJQ	651	OE1KJW
1690	PAØSNG	1312	IN3ANE	1011	I2MQP	814	G4FAM	635	VE2PD
1685	K5UR								

S.S.B.

2227	F9RM	1506	OZ5EV	1158	PY3BXW	1005	G4CHP	746	W3GXK
2148	IØZV	1458	WØYDB	1107	KF2O	997	ZP5RS	732	VK6YL
1970	IØAMU	1446	PAØSNG	1099	I6NOA	973	WB8ZRL	702	IØSGF
1901	K6JG	1441	K5UR	1098	F2MO	945	N2AC	670	JH5FQD
1888	K6XP	1399	IØMBX	1091	VE1YX	933	KC8CC	665	DK4AP
1865	K2POA	1391	W9DWQ	1089	W2CC	924	WB6GFJ	649	OE8MOK
1812	K2VV	1369	CT1UA	1070	CT1FL	922	TG4NX	646	KB2DE
1781	N4MM	1301	WA4QMQ	1034	JH1VRQ	903	KL7AF	638	I1POR
1757	ZL3NS	1300	WD8MGQ	1033	KC4OV	846	AC2J	616	WN5MBS
1687	N6CW	1294	YU7AW	1032	N6FX	842	WA2FKF	615	VE2PD
1642	I4ZSQ	1289	N2SS	1029	W6YMV	832	K8LJG	612	YBØACL
1568	I8YRK	1271	I6ZJC	1029	WA4OIB	805	W8ILC	607	KC8YM
1557	I8KDB	1247	N4NO	1028	W2NC	771	N3ED	604	W8RSW
1530	KB9AAA	1243	W4BQY	1027	WF4V	768	W6LQC	603	KBØC
1510	YU7BCD	1238	I2PHN	1009	I2MQP	750	N4IB		

C.W.

1959	W8RSW	1562	K6XP	1373	N4MM	1105	N6FX	787	DJ1YH
1948	W2NC	1509	N4NO	1344	WA1JMP	1101	YU3NP	719	KA3A
1776	W8KPL	1508	YU7BCD	1323	K5UR	1045	JE1JKL	695	AG5C
1700	N6JV	1486	W9DWQ	1295	W9FD	925	N4YB	656	VE2FOU
1674	WA2ZHR	1485	VK4SS	1281	I6SF	876	K8LJG	644	EA1JO
1656	ON4QX	1472	N2AC	1245	VO1AW	861	YU7SF	616	W8ILC
1630	K6JG	1447	G2GM	1197	K6ZDL	848	KL7AF	612	G4FAM
1621	K2VV	1432	W3ARK	1195	VE7CNE	801	N3ED	605	N2AIF
1621	DL1QT	1401	W4BQY	1182	YU7AW	798	KF2O		

part of the Aleutian chain, thus not meeting the 500 mile separation requirement. The Alaskan group is said to be considering filing a new request for DXCC status, the basis of this being that the Pribilofs are not part of the Aleutian chain, but are a separate group only needing 250 miles separation from the mainland.

While the argument might rage, any canny Dxer will work them in the meantime. Work everything! Sooner or later it may be worth something, and at the minimum it is a pleasant memory of DX gained, whether it counts or not.

Jersey

GJ6UW will be on the air from the island of Jersey during the *CQ* WW DX Test the last weekend of October. The operation will be by the Cambridge University Wireless Society, and early on those who will be heard include G3XTT, GJ3YHU, G3ZAY, G4BUO, and G4FAM. The group will arrive on Jersey the Monday preceding the test (October 24) and will quickly be heard on the air, one day of the pretest operating being devoted to c.w. work.

The contest site will be at the TV station on the northwest tip of the island, a 500 foot power perched on top of a 400 foot cliff. Sloping dipoles will be used on 160, 80, and 40, and no antenna will be less than 100 feet above ground. There will also be two tribander beams.

All bands including the new amateur bands will be used, especially 10 MHz. QSLs for GJ6UW go to POB 146, Cambridge, England. QSLs for any of the other calls go to their callbook addresses. It might be noted that G3XTT and G3ZAY are Don Field and Martin Atherton respectively, these two now putting out the *DX News Sheet*.

Some Relative DX Items

ZL3AFH, who may be remembered for his action in the North Cooks as ZK1WL, will be out again soon on another assignment and should be heard before long signing ZL3AFH/K from the weather station in the Kermedecs. He was due there in September but may not get on the air right away.

In July 1AØKM made a brief appearance from the country of the Sovereign Military Order of Malta. Operation was not as long as some may have desired, but mention has been made of more operating this month and November. Possible action will be at 3D2 Fiji, T31 Central Kiribati, and KH5 Jarvis during October. Jarvis is another one that at times has

Frank Turek, DL7FT, and Bahri, DJ0UJ, have been working on an ZA Albania effort and hope that the moment is near. Last year Frank thought he had things lined up but it did not work. This year he and Bahri are trying again. Bahri is an Albanian living in Germany. Frank put ZA2RPS on the air in the early seventies.

been questioned for DXCC status. The status of 1S1CK by DU1CK in the Spratlys has ebbed and flowed, and the IARU Director of Region III was reported a month or so back urging DXCC credit. If it does get the seal of approval, DU1CK may return for another go-around later this year. One question being pondered was whether the island from which operation took place was actually part of the Spratlys. The operation took place from Pantana Cay.

DL7FT and DJ0UJ are looking for some financial help to put ZA on the air. Frank tried in 1982, arriving with rig under his arm, but things just did not jell. DJ0UJ, Bahri, is an Albanian living in Germany. Both DL7FT and DJ0UJ have been at the California International DX meetings. Frank says it will only take a couple of hundred dollars to mount a ZA effort. He did it in 1970 with ZA2RPS and thinks that conditions are favorable now for another try to this always difficult one. ZK2PJM or ZK2PM may currently be heard from Niue and should be there for a couple of years. Should you run into a ZK9 prefix, this has been authorized for Niue until the end of this year.

Dave Patton, KJ9W, and N7DZE will be heard in the *CQ* WW DX Tests this month and next signing KJ9W/DU2. Actually they intend to do a lot of operating before, after, and in between DX tests and are planning some activities elsewhere such as KH2. They are contemplating some DXpeditions to CR9, VS6, VQ9, 9V1, and KC6. They also will work any of the KH1-0's along the way. Most action will be 75% c.w. and 25% phone. QSLs for all the efforts go to K9XR.

A large number of TA pirates disappeared from the scene this last April, a wireless law in Turkey passed in 1937 forbidding amateur activity. However, back in April there was a new wireless law passed, and in 1984 regular licensing and callsign allocations will be in effect. All this information is from TA1UA, Dr. Unal Akbal, Secretary-General of the Turkish Amateur Radio Society.

We are looking for photos of DXers, needing more faces than pictures of rigs and towers. We also would like information on planned operations three months in advance, as that is our deadline. As more than one DXpeditioner has found to his everlasting joy, it pays to advertise, and you can avoid the futility of going to Kampuchea and having to call "CQ DX" because no one knows you are there.

Check Frank Anzalone's column for late information on the *CQ* WW DX Test this month for s.s.b., next month for c.w. W1WY has been covering the contest scene for so long that some suspect he invented contests, mostly to bring joy to the Deserving!

73, Cass, WA6AUD

QSL Information

While most DXers quickly learn what is meant by an s.a.s.e., sometimes overlooked is the fact that a self-addressed envelope can ensure a needed QSL. There are times when a QSL Manager cannot correctly decipher the handwriting of an applicant, and the self-addressed envelope avoids this pitfall. While most everyone can read or make a rough guess at his own handwriting, try it on someone else and you will realize that unfortunate things can happen.

Down in the Great Smokies not too far from Knoxville there is a dedicated DXer who wants to help the QSL flow by volunteering as a QSL Manager. John Dolan, WC4M, Rt. 13, Box 65A, Greenville, TN 37743, says he is ready. Drop him a line if you need help.

CE3DNP to WB6WOD
CE0AZD to WB5WOD
CE0EUG/CE0Z to WB6WOD
CE0ERY to WB6WOD
W1BWS/CT2 to W1BWS
CX7BY to W0IJN
EI8EK to WA9AEA
EK9D/1 to N8ACA
EH3ITU to EA3AOC
FG0HVL/FS7 to F6AJA
FY7ESE to DJ5KQ
FK8CE to K2ROR
FY7RKU to DK4VW
GB2MOD to GM3PXK
GU5E00 to DK9ZL
HI3RST to WB6WOD
HL4XM to HL-Bureau
HP1XEK to DL1HH
HR1JSH to WB6WOD
HW8BFI to F6BFI
IJ60NU to I6FLD
J37AH to W2GHK
K8ZBY/J8 to K8ZBY
KH0AC to K7ZM
K9JW/DU2 to K9XR
NF5V/DU2 to K0LST
PJ9EE to WA2SPL
K3U0C/PJ to K3U0C
OH0BA to OH2BAZ
PP0ZAT to KC8YW
ON5UM/LX to ON5UM
T08-T0# to Special FO6 calls
T30AB to W7YL
T77C to M1C
TL8DR to W2PD
VE8YQ to WA9AEA
VP2E (from 1980) to K8ND
VP2E (1979 only) to WA4MAV
VP2E (before 1979) to K2FJ
VP2EAA to W0RLX
VP2EB to K8WN
VP2ED to AD8J/3
VP2EE to AA4NC
VP2EEW to KU8E
VP2ES to K8CV
VP2ESE to WB4QBB
VP2EU to K8MR
VP2EV to K8ND
VP2EX to WB8VPA
VP2EZ to AA4GA
VP2MRA to VE5RA
VP5MIX to W0IJN
YB5AES to W4BBP
YB5ASO to W4BBP
ZD7WT to ZD8TM
ZL0AGS to K7RDG
ZV2ADV to LABRE
ZV2ACZ to LABRE
ZY1JF to PY1DOQ
W3KHQ/ZD to W3KHQ
4N7M to YU7GST
5B4MN to VE7DLM
5Z4MX to SM3CXS
9Y4IH to WB3AKI
EA5YU/EA8 to POB 789, Las Palmas, Canary Islands
EL2FB to U.S. Embassy, APO 09155, NY
CT3DJ to POB 742, Funchal, Madeira Islands
J73YB to POB 266, Roseau, Dominica
KG4DX to Bill Crews, 5561 Gable Lane, Jacksonville, FL 32211
K3U0C/YV to Mike Manafo, Colegio Internacional, Apartado 103, Valencia, Venezuela
T78A to POB 1, San Marino
TR8JLD to POB 484, Libreville, Gabon Republic
TZ6BMA to A. Povin, B.P. 198, Bamako, Mali
YB8ARC to POB 63, Jakarta, Indonesia
ZL1WCY to NZART QSL Bureau (all WCY suffixes)
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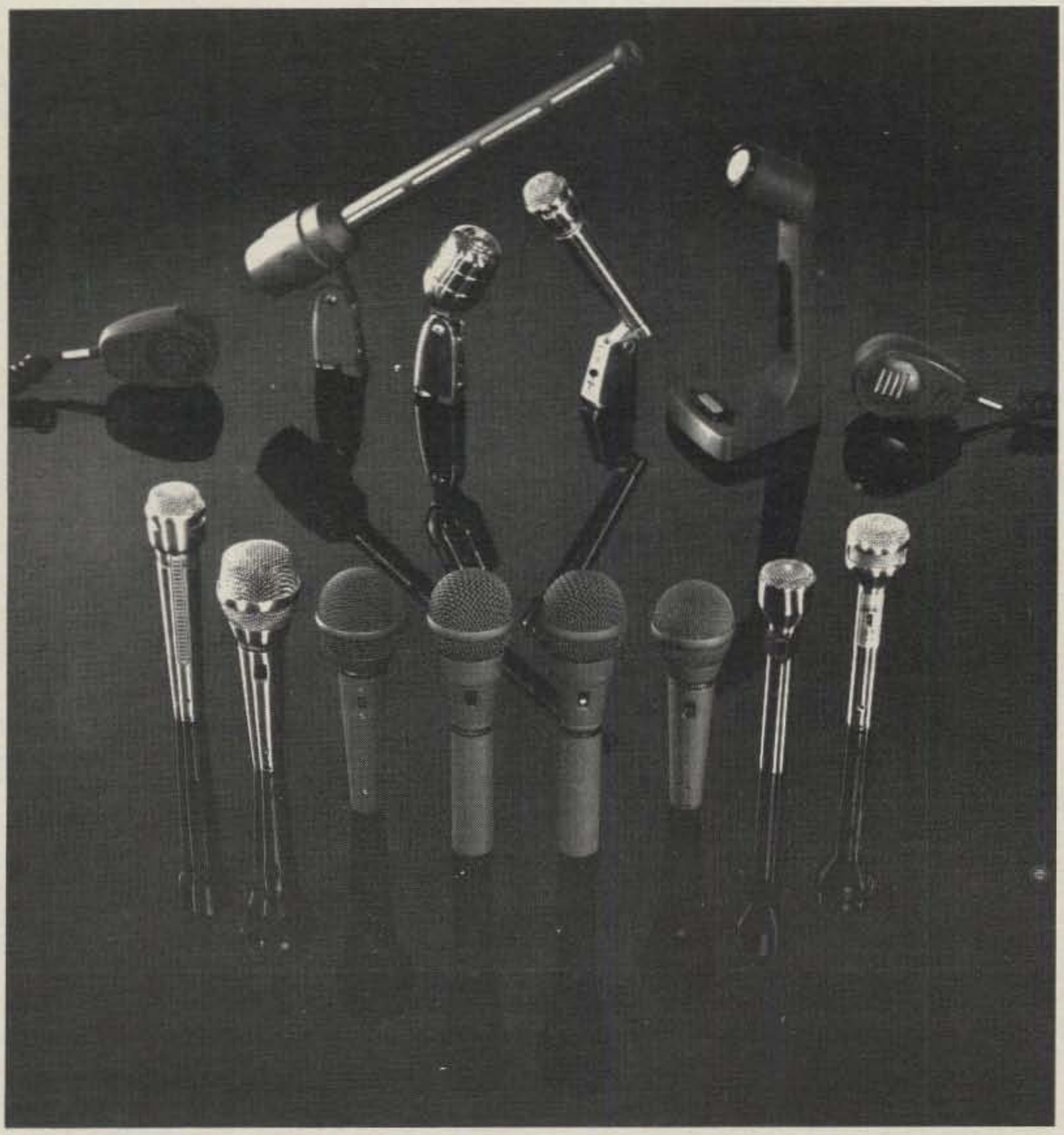

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THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

Goldwater Rejects No-Code License

In addition to the multitude of negative comments reaching the Commission on the proposal to create a so-called "no-code" amateur license (Docket 83-28), it has been learned that Senator Barry Goldwater has added his support to the effort to kill the measure. In a personal letter to FCC Chairman Mark Fowler, Goldwater told the Chairman that he agrees completely with the ARRL's comments in the matter, and that he recommends against the creation of a no-code license.

It also seems likely that the National Communications System (NCS) and the Air Force will file Reply Comments with the Commission in the matter of a no-code license. In both cases, the comments will advise against its creation. The NCS is expected to cite concerns relative to future discipline in the amateur service; the Air Force, on the other hand, will focus on the fact that it once again requires Morse code capabilities on the part of its radio operators. Regardless of the FCC's action on a no-code license, the Air Force will, in all probability, require amateurs who participate in Air Force MARS to have demonstrated Morse code skills.

FCC Clarifies Prohibition Against Business Communications in Amateur Service

According to James McKinney, then Chief, Private Radio Bureau (McKinney is now Chief of the Mass Media Bureau), the Commission, on 29 June 1983, moved to amend Part 97 of the rules to clarify the prohibition against business communications by amateurs. "Business communications" are defined to mean communications intended to further the regular business or commercial affairs of any party, individual, or organization, whether for profit or not, whether charitable or non-charitable, and whether government or non-government.

While the International Radio Regulations and various sections of Part 97 clearly establish the personal and non-pecuniary nature of the Amateur service, noted McKinney, there was no explicit prohibition on business communications (save for Section 97.114, which applies only to third-party traffic).

In amending the rules, the Commission added a new section (97.110) which explicitly prohibits amateurs from transmitting business communications. A new section (97.111) was also added to make clearer the fact that international communications must be confined to personal remarks or technical discussions relating to tests. Finally, the definition of the term "business communications" was moved from Section 97.114 to Section 97.3.

These changes, commented McKinney, make it clear that the prohibition against business communications by amateurs applies to both third-party and non-third-party communications.

AFCEA Ham Radio Luncheon Bigger and Better Than Ever

The Ham Radio Luncheon held as part of the Armed Forces Communications and Electronics Association (AFCEA) 37th Annual Convention in Washington, DC, was, according to everyone present, "the biggest and best ever!"

Attended by 170 amateurs and their friends, the luncheon drew together people from the government, military, and commercial sectors for over three hours of good food, an enjoyable exchange of views and opinions, and a drawing for door prizes that placed gifts in the hands of over 30 attendees.

Following an excellent hot lunch prepared by the Sheraton Washington's professional staff, representatives from the FCC, the ARRL, and *CQ* reviewed a number of items which are currently of interest to the U.S. amateur community. Speaking to issues such as the "no-code" license, the Voluntary Examination Program, radio frequency interference (r.f.i.), and deregulation of the Amateur service were:

- Mr. James McKinney, then Chief, Private Radio Bureau;
- Mr. Richard Smith, Chief, Field Operations Bureau;
- Dr. Michael Marcus, Chief, Technical Analysis Division, Office of Science and Technology; and
- Mr. Ed Minkle, Managing Director of the Commission.

Following the FCC's comments, Messrs. Vic Clark (W4KFC, President, ARRL), Alan Dorhoffer (K2EEK, Editor of *CQ* magazine), and Perry Williams (W1UED, Washington Area Coordinator, ARRL) briefly discussed some of the national and international activities in which they are involved.

Prior to the drawing for prizes, Stu Meyer (W2GHK/Forever) presented checks from the Quarter Century Wireless Association to AMSAT and to the Foundation for Amateur Radio (FAR), and from the Radio Club of America to FAR, to assist these organizations in furthering their technical and educational programs.

Door prizes, which included an ICOM handheld transceiver and two EIMAC 8874 tubes, were contributed by the following merchants, corporations, and organizations: *CQ* magazine, ICOM America, the American Radio Relay League, The Comm Center (Laurel, MD), The Electronic Equipment Bank (Vienna, VA), Varian/EIMAC Division, and Ventana Sciences, Inc.

Finally, your Editor takes this opportunity to thank Col. "Bud" Deem and his AFCEA convention staff (Pat Bomkamp, Barbara Dorsey, and Fran Sanchez) for making all of the arrangements for this year's Ham Radio Luncheon. See you at next year's luncheon!

FCC Adopts New Procedure For Novice Class Exams

On 29 June 1983, the Commission adopted new procedures for the giving of Novice class examinations. According to John Johnston, Chief, Personal Radio Branch, Special Services Division, PRB, the new procedure eliminates the mail-back procedure in certifying applicants for the Novice class operator license. Now, the examiner who administers the telegraphy examination (Element 1 [A]) to applicants will create written examinations from Commission-prepared questions, administer and grade these tests, and send the applications of applicants who passed the examinations to the FCC for issuance of licenses. The new procedure, in short, permits the entire Novice examination to be taken in one sitting.

As before, the examiner must be 18 years old, must hold a General class or higher class license, and must not be related to the applicant. In addition, the new regulations require that there be no employer-employee or employee-employee relationship between the applicant and the examiner.

Johnston estimates that the new procedure will eliminate eight weeks of processing time for Novice class licenses.

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The Commission-prepared list of questions from which the examiners will make up their tests is available from FCC field offices (request PR Bulletin 1035A).

Judge Affirms Suspension of Amateur's Technician Operator License

FCC Administrative Law Judge Edward J. Kuhlmann has affirmed the Private Radio Bureau's suspension of the amateur Technician class operator license of Roberto A. Pietri, Catano, P.R., for 180 days. As noted by Raymond Kowalski, Chief, Special Services Division, PRB, Pietri, KP4BKC, violated the Commission's rules by fraudulently altering his license to indicate he had General rather than technician class operator privileges. In addition, Pietri had submitted the altered license for renewal. While the renewal was granted, the PRB, nevertheless, suspended the license for 180 days.

Pietri stated that in his view, vandals may have altered his license. The judge, however, said that Pietri had the license under his control and that he sent it to the Commission in its altered condition without any explanation.

Commission Cracks Down On Computer R.F.I. Problems

In a move to strengthen adherence to the FCC's regulations on incidental r.f. emissions from computers, the commission recently fined Commodore Business Machines $4,000 for willful and repeated violations of these regulations. Commodore, which manufactures the VIC-20 and VIC-64 personal computers, incurred the fine when FCC investigators found a Commodore P500 computer and an 8023 printer which did not display the required FCC certification label. It is interesting to note that Commodore had been warned in 1982 that its printer must display the required approval sticker, but the company failed to take corrective action. The fines follow on the heals of last year's $2,000 levy against Coleco, which had failed to certify one of its computer games before putting the device on the market.

The move by the Commission to strengthen compliance with its r.f.i. regulations stems from a recent survey by FCC investigators which showed that 30 percent of the microcomputer equipment on dealers' shelves today do not meet emission standards. Regulations requiring such compliance went into effect over a year ago.

Although not widely known, both dealers and manufacturers are required to comply with the FCC r.f.i. guidelines. Failure to do so can result in fines, imprisonment, and inventory seizure.

Oscar 10 in Orbit

The Amateur Radio Satellite Corporation (AMSAT) has proudly announced that the latest Oscar, AO-10, was successfully launched into orbit on the morning of 16 June 1983. As highlighted in "Amateur Satellite Report," the Phase IIIB satellite lifted off from Kourou, French Guiana, aboard an Ariane launch vehicle, and with all systems "GO," it became the most advanced amateur spacecraft ever to be placed in orbit. The successful launch came almost three years after the tragic end to the Phase IIIA satellite when that bird's Ariane launch vehicle failed on launch.

Oscar 10's Mode B General Beacon transmits on 145.810 MHz from 0000 to 0029 UTC each day (it is silent for the remainder of the day to conserve power). An Engineering Beacon can be heard on 145.987 MHz. Uplink frequencies are in the band 435.025–435.175 MHz, while downlink frequencies are in the range 145.975–145.825 MHz.

The Mode L General Beacon operates on 436.020 MHz, with the Engineering Beacon on 436.040 MHz. For this mode, the uplink band is 1269.050–1269.850 MHz, and the downlink frequencies are in the range 436.950–436.150 MHz.

For more information on AO-10 and on how you can participate in amateur space activities, contact "Amateur Satellite Report," AMSAT's Newsletter for the Amateur Space Program, 221 Long Swamp Road, Wolcott, CT 06716.

The staff of *CQ* joins your Washington Editor in congratulating AMSAT President Tom Clark, W3IWI, and the entire AMSAT team responsible for this crowning achievement!

Plans For 1984 Olympic Games Move Ahead

"The Westlink Report," an amateur radio newsletter, has noted that the Los Angeles Olympic Organizing Committee has made the following appointments:

- Overall Frequency Coordinator: Fried Heyn, WA6WZO, ARRL Southwest Division Vice Director;
- Assistant to the Overall Frequency Coordinator: Karl Pagel, N6BVU, of the Southern California Two Meter Area Spectrum Management Association; and
- Olympic Village Station Coordinator: Irv Emig, W6GC.

All amateur radio volunteers, says "Westlink," will operate under the direct supervision of Olympics '84 Amateur Radio Coordinator Tom Rothwell, K6ZT.

If you would like to participate in Olympic-related amateur radio activities, contact Mr. Tom Rothwell, K6ZT, 3621 Fenley Drive, Los Alamitos, CA 90720.

Cablevision of Chicago Fined $15,000 For Violating Commission Rules

The FCC has fined Cablevision of Chicago $15,000 for its knowing unauthorized use of aeronautical frequencies in violation of the Commission's rules. The action stems from Cablevision's use of the frequency bands 108–136 MHz and 225–400 MHz without prior FCC authorization. According to Richard Smith, Chief, Field Operations Bureau, these frequency bands are used for air navigation, and for communications in the aeronautical and marine emergency radio services. Prior to permitting cable systems to use the bands, therefore, the Commission must ensure that cable operations do not pose the possibility of interference to safety-of-life radio services.

Cablevision had notified the Commission that it proposed to use the bands in question in August 1980—eight months after it actually had begun to use the bands! And despite the fact that the FCC advised Cablevision that operation of these frequencies would conflict with aeronautical use in parts of Illinois, Indiana, and Wisconsin, Cablevision proceeded to operate in violation of the rules for 2½ years.

The Commission pointed out that when a cable system such as Cablevision not only violates a rule designed to preserve the life and safety of the public, but also repeatedly misleads the Commission as to the system's unauthorized use of aeronautical frequencies, that cable system prolongs the attendant dangers to the public. Said the Commission: "Such conduct demonstrates a disregard not just for the Commission's rules but for the stated and evident concern for the public safety underlying these rules."

CQ BOOK SHOP

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Setting Up and Using Your Own Ham Shack
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World Press Services Frequencies
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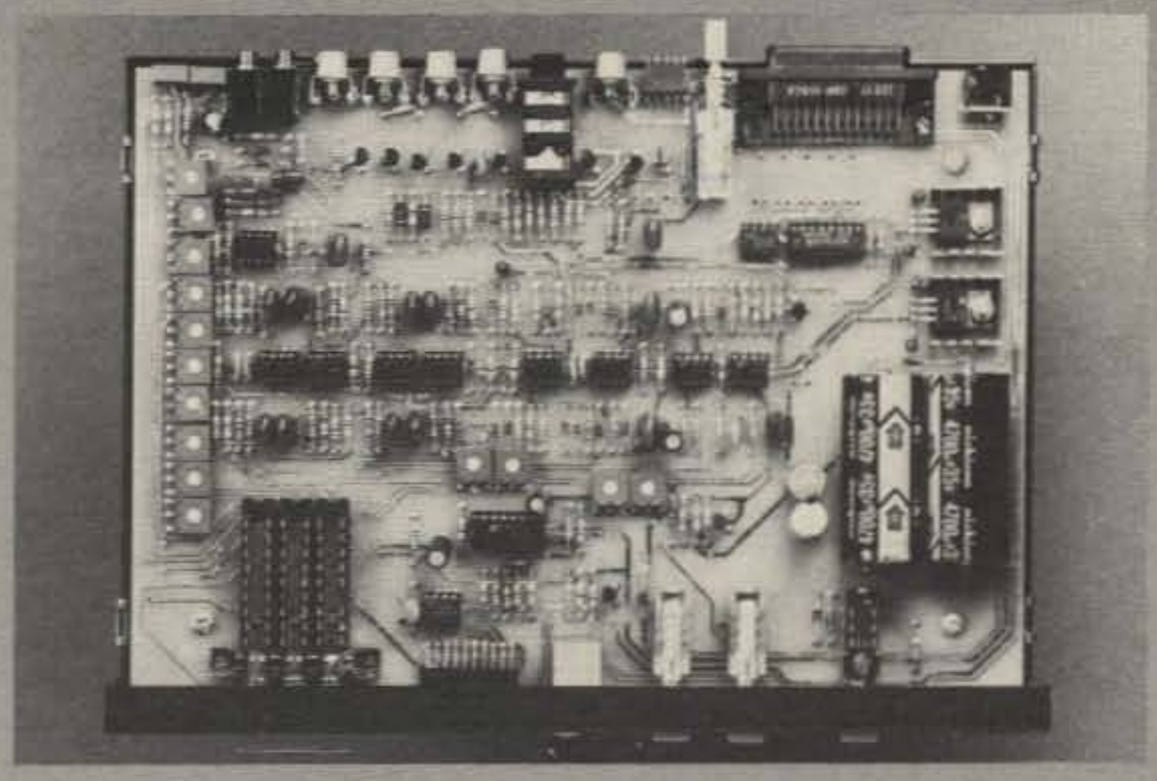

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CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	KV4FZ('76) 37,584	380	11	37
3.5	KV4FZ('75) 275,319	1,297	23	80
7.0	YV3BRF('82) 528,193	1,403	31	96
14	VP2KAA('81) 2,011,185	4,186	37	150
21	AHØAB('82) ..... 1,923,840 (Opr. JA3DOC)	4,509	36	108
28	YV2AMM('82) 1,839,004	3,700	37	130

AFRICA

1.8	EA8AK('82) 34,220	201	12	46
3.5	CT3BZ('79) 235,113	772	22	87
7.0	EA8CR('74) 253,528	639	31	103
14	CR6WW('74) 1,058,446	2,152	35	132
21	EL2AV('81) 1,404,936	3,087	35	117
28	OH2MM/CT3('79) .. 1,827,150	4,068	37	113

ASIA

1.8	4X4NJ('82) 6,417	77	6	25
3.5	VE3MR/4X('71) 197,106	742	22	69
7.0	4Z4DX('81) 241,368	721	26	87
14	N2BZQ/4X('82) 1,142,964	2,347	36	135
21	4S7AAG('81) ..... 918,925 (Opr. OH2BCP)	2,897	38	137
28	4XØU('80) ..... 1,187,200 (Opr. 4X4UH)	2,555	37	123

EUROPE

1.8	YU3EF('82) 27,956	383	12	46
3.5	YT3A('82) ..... 154,972 (Opr. YU3DM)	806	28	84
7.0	I6NOA('81) 292,152	1,042	35	113
14	I5NPH('80) 1,062,936	2,429	37	134
21	YU3TU('81) ..... 1,312,793 (Opr. YU3ZV)	2,644	40	141
28	9H1EL('81) 1,355,760	3,662	36	132

NORTH AMERICA

1.8	KV4FZ('76) 37,584	380	11	37
3.5	KV4FZ('75) 275,319	1,297	23	80
7.0	VP2KAE('81) 432,942	1,600	27	91
14	VP2KAA('81) 2,011,185	4,186	37	150
21	VP2KAC('81) 1,783,500	3,941	37	137
28	KV4FZ('79) 1,482,525	4,079	39	126

OCEANIA

1.8	KH6CC('79) 2,975	63	9	8
3.5	KH6XX('82) 161,622	773	27	46
7.0	ZL1BIL('81) 443,646	1,245	33	90
14	KG6DX('81) 923,510	1,909	39	128
21	AHØAB('82) ..... 1,923,840 (Opr. JA3DOC)	4,509	36	108
28	AHØB ('82) ..... 1,788,430 (Opr. JA2VUP)	4,173	36	109

SOUTH AMERICA

1.8	HK4EB('76) 3,672	34	4	9
3.5	4M3AZC('82) 203,280	780	21	67
7.0	YV3BRF('82) 528,193	1,403	31	96
14	FY7AK('76) ..... 1,415,329 (Opr. F5QQ)	2,950	36	127
21	CX4CR('82) 1,602,120	3,519	36	120
28	YV2AMM('82) 1,839,004	3,700	37	130

Single Operator/All Band

AF	EA8AK('81) 9,974,811	5,506	152	457
AS	UF6CR('82) 5,898,240	4,466	109	371
EU	YU3EY('82) 4,913,574	3,170	136	455
NA	HI8PGG('81) ..... 9,009,721 (Opr. N1GL)	7,190	131	392
O	KH6XX('81) 5,713,434	4,912	131	262
SA	9Y4VT('82) ..... 11,954,696 (Opr. N6AA)	7,082	146	422
QRP	TG9GI('82) 1,035,693	1,747	75	192

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	39	7	9
9Y4VT	3.5	404	17	57
(1982)	7.0	748	25	78
11,954,696	14.0	1,620	32	89
	21.0	1,476	34	96
	28.0	2,795	31	93
	Total	7,082	146	422

Multi-Operator/Single Xmtr.

AF	CN8CX('82) 9,958,425	5,816	126	449
AS	RG6G('82) 12,276,352	6,012	156	558
EU	I4RYC('80) 9,918,368	5,997	139	453
NA	NP4A('82) 14,953,818	8,772	174	585
O	KC6ZR('80) 7,605,360	6,197	137	283
SA	9Y4W('82) 16,775,034	8,097	158	540

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	124	8	25
9Y4W	3.5	296	17	59
(1982)	7.0	594	27	86
16,775,034	14.0	1,953	35	127
	21.0	2,104	35	121
	28.0	3,026	36	122
	Total	8,097	158	540

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77) 21,351,898	10,290	153	544
AS	EW6V('82) 18,746,136	10,100	142	544
EU	OHØW('82) 19,030,501	10,773	188	729
NA	VP2KC('79) 37,770,012	17,767	175	677
O	KH6XX('79) 21,990,252	10,989	184	494
SA	P41C('81) 41,957,244	17,718	173	625

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	261	9	21
P41C	3.5	861	22	69
(1981)	7.0	1,752	30	98
41,957,244	14.0	4,837	38	156
	21.0	5,790	39	143
	28.0	4,813	35	138
	Total	17,718	173	625

Club record: Frankford Radio Club ('79) 173,821,640

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

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	EA8AK('82) 75,768	385	15	51
3.5	CT3/OH1TV('77) 223,364	1,066	19	57
7.0	KV4FZ('82) 536,616	1,800	28	88
14	VP2KAA('80) 1,244,782	3,111	37	117
	(Opr. N4PN)			
21	LU8DQ('81) 1,359,711	2,993	37	116
28	LU8DQ('79) 1,033,399	2,775	34	93

AFRICA

1.8	EA8AK('82) 75,768	385	15	51
3.5	CT3/OH1TV('77) 223,364	1,066	19	57
7.0	5A1TW('64) 227,814	918	22	64
	(Opr. N2AA)			
14	CR6IK('74) 925,386	2,021	38	116
21	TJ1AW('70) 549,888	1,447	35	93
28	FR0MM('79) 978,012	2,590	36	90

ASIA

1.8	4X4NJ('82) 27,850	208	11	39
3.5	UL7LCZ('82) 151,840	822	17	56
7.0	JA5BJC('82) 287,850	890	33	81
14	UA9ADQ('81) 447,874	1,412	34	88
21	4Z4NUT('80) 519,831	1,500	34	83
28	4X4UH('80) 554,645	1,772	32	83

EUROPE

1.8	DJ8WL('82) 27,216	389	13	50
3.5	EA2IA('82) 199,872	1,253	23	73
7.0	UB5JMR('82) 397,578	1,608	30	99
14	OH8SR('81) 672,600	2,151	34	86
21	YU3ZV('81) 732,096	1,957	37	107
28	DK3GI('79) 592,848	1,584	31	101

NORTH AMERICA

1.8	KV4FZ('76) 42,800	390	13	37
3.5	KV4FZ('75) 190,082	789	24	77
7.0	KV4FZ('82) 536,616	1,800	28	88
14	VP2KAA('80) 1,244,782	3,111	37	117
	(Opr. N4PN)			
21	VP2KAC('80) 1,075,407	2,955	36	105
	(Opr. N4RJ)			
28	KV4FZ('79) 653,072	2,384	32	87

OCEANIA

1.8	VR3AH('78) 20,310	238	12	18
3.5	VR3AH('76) 178,560	956	24	40
7.0	AH0C('82) 404,457	1,468	31	62
	(Opr. N6BT)			
14	KG6DX('81) 525,420	1,289	37	102
21	KH6XX('78) 816,102	2,311	38	81
	(Opr. K7SS)			
28	KG6DX('80) 801,876	2,367	35	79

SOUTH AMERICA

1.8	YV1OB('81) 25,806	258	11	23
3.5	N4JI/HC1('77) 77,748	463	21	36
7.0	9Y4VU('82) 400,851	1,361	24	75
14	PJ9CC('80) 1,209,022	2,914	34	105
	(Opr. K4BAI)			
21	LU8DQ('81) 1,359,711	2,993	37	116
28	LU8DQ('79) 1,033,399	2,775	34	93

Single Operator/All Band

AF	CN8CX('82) 6,234,664	4,354	121	358
	(Opr. K6NA)			
AS	UF6CR('82) 4,613,680	3,982	92	312
EU	EA2IA('81) 3,057,204	3,078	110	318
NA	KP4RF('78) 4,908,186	3,797	135	379
	(Opr. N6CJ)			
O	N6BT/AH0('81) 4,241,746	4,083	121	228
SA	9Y4VT('82) 6,929,450	4,927	131	342
	(Opr. N6AA)			
QRP	UP2BIM('82) 899,932	1,351	83	279

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	109	9	13
9Y4VT	3.5	499	19	50
(1982)	7.0	784	20	59
6,929,450	14.0	1,098	29	72
	21.0	1,068	28	76
	28.0	1,368	25	72
	Total	4,927	131	342

Multi-Operator/Single Xmtr.

AF	EA9EU('80) 5,077,696	3,884	116	326
AS	RG6G('82) 10,394,658	5,355	166	511
EU	YU3EY('81) 7,674,190	4,051	150	345
NA	NP4A('82) 11,648,565	6,881	168	515
O	5W1AZ('76) 2,534,416	3,043	108	176
SA	P41E('81) 8,059,296	5,055	148	388

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	172	15	35
NP4A	3.5	589	23	73
(1982)	7.0	1,342	28	92
10,394,658	14.0	1,270	36	108
	21.0	1,547	34	106
	28.0	1,961	32	101
	Total	6,881	168	515

Multi-Operator/Multi-Xmtr.

AF	EA8CR('78) 17,734,970	9,799	142	463
AS	EW6V('82) 14,702,688	8,001	159	504
EU	OH0W('82) 14,371,840	9,515	184	618
NA	NP4A('80) 17,627,820	10,846	171	487
O	ZK2RU('81) 5,191,542	4,646	123	256
SA	P42E('82) 23,295,408	12,315	161	475

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	390	12	28
P42E	3.5	1,083	22	60
(1982)	7.0	1,995	29	81
23,295,408	14.0	2,965	36	112
	21.0	3,351	32	103
	28.0	2,531	30	91
	Total	12,315	161	475

CQ World-Wide DX Contest
All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	W8LRL('82)	16,191	154	18	54
3.5	W1CF('78) (Opr. K8UR)	114,227	435	23	80
7.0	K0GU('82)	195,624	587	32	82
14	K1KI('82)	695,453	1,287	39	148
21	N7DD('81)	923,945	1,998	36	121
28	N7DD('80)	754,536	1,730	36	113

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	5	2	3
K1AR	3.5	55	13	33
(1981)	7.0	80	20	50
3,554,880	14.0	487	35	111
	21.0	590	34	107
	28.0	977	36	116
	Total	2,194	140	420

QRP WB2ULI('81) 505,997 560 93 218

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	23	11	20
W4QAW	3.5	105	21	65
(1982)	7.0	197	28	80
4,455,190	14.0	438	38	135
	21.0	1,001	37	122
	28.0	394	32	129
	Total	2,158	167	551

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	109	8	16
N2AA	3.5	406	24	79
(1979)	7.0	366	28	84
13,299,750	14.0	1,646	40	152
	21.0	2,198	40	144
	28.0	1,354	36	120
	Total	6,079	176	595

CW

Single Operator/Single Band

1.8	K1PBW('76)	22,626	157	15	39
3.5	W1ZM('81) (Opr. K1ZM)	151,497	610	22	71
7.0	K0RF('81)	337,280	949	31	93
14	N7UA('80)	626,400	1,634	34	101
21	W1RM('82)	483,560	1,196	33	107
28	N4WW('82)	394,940	1,064	33	97

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	8	7	8
K1GQ	3.5	208	18	61
(1981)	7.0	425	24	76
3,276,768	14.0	576	32	85
	21.0	428	31	80
	28.0	473	26	80
	Total	2,111	138	390

QRP AC2U('81) 591,856 728 84 200

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	17	9	16
N4AR	3.5	67	16	62
(1981)	7.0	461	28	92
4,564,350	14.0	755	34	110
	21.0	499	33	101
	28.0	686	32	97
	Total	2,485	152	478

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	72	14	27
W2PV	3.5	427	18	70
(1981)	7.0	1,101	30	103
10,431,729	14.0	1,389	35	118
	21.0	1,228	35	103
	28.0	1,050	34	106
	Total	5,267	166	527

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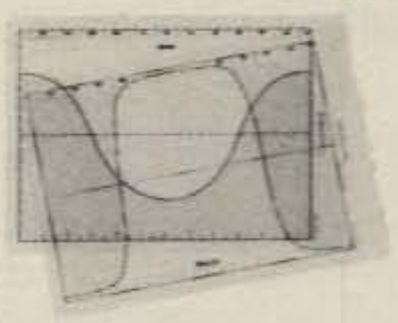

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CIRCLE 107 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

It's DX time again! The 1983 World-Wide DX Contest will be held on the following dates:

Phone Section: 0000 GMT Sat. Oct. 29 to 2400 GMT Sun. Oct. 30
C.W. Section: 0000 GMT Sat. Nov. 26 to 2400 GMT Sun. Nov. 27

For the 33rd consecutive year, this month's propagation column will be devoted to a special comprehensive forecast for use during the Contest sections, both Phone and C.W.

Conditions Look Good

The Royal Observatory of Belgium, the world's official keeper of sunspot numbers, reports a monthly mean sunspot number of 91 for June 1983. This results in a 12-month running smoothed sunspot number of 94 centered on December 1982. For the 1983 Contest period, a smoothed sunspot number of 73 is forecast for October, dropping to 72 for November. This would be the lowest level of solar activity for any *CQ* World-Wide DX Contest held since 1977.

Despite decreasing solar activity, the level expected during the 1983 Contest still should be high enough to ensure generally good DX conditions on all of the amateur h.f. bands, barring the development of a sudden radio storm.

Compared to last year's Contest, when solar activity was in the 95–96 range, expect somewhat shorter periods for daytime openings this year on *10* and *15* meters, and shorter periods for nighttime openings on *20* meters. Otherwise, conditions during the 1983 Contest should follow closely those observed last year.

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions expected from mid-October through mid-December and centered on the 1983 Contest period.

10 Meters: Good, solid openings are expected to just about every corner of the world during the daylight hours, and the band may remain open to southern and tropical regions into the early evening. Openings towards Europe and in a generally easterly direction should peak an hour or two *before* noon, while those towards South America and Africa are expected to peak during the *early afternoon* hours. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., are forecast for the late afternoon and early evening hours.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1983

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 3, 12, 21, 27	**A**	**A**	**B**	**C**
High Normal: 2, 4, 11, 13-14, 20, 26, 29-30	**A**	**B**	**C**	**C-D**
Low Normal: 1, 5-6, 10, 15-17, 19, 22, 28, 31	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 7, 9, 18, 23, 25	**B-C**	**C-D**	**D-E**	**E**
Disturbed: 8, 24	**C-E**	**D-E**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on Oct. 1st, good (B) on the 2nd, excellent (A) on the 3rd, good (B) on the 4th, etc. *Good conditions (B) are expected for the Contest period Oct. 29–30.***

15 Meters: Excellent DX propagation conditions are expected from shortly after sunrise through the early evening hours. Look for a peak on 15 meters towards a particular geographical area about an hour or so after the peak has occurred to the same geographical area on *10* meters. Openings are expected to all areas of the world, and exceptionally strong signals should be possible most of the time. *Fifteen* meters should be the best DX band during the daytime hours.

20 Meters: Expect good-to-excellent openings almost around the clock. DX conditions should peak an hour or two after sunrise, and again during the late afternoon and early evenings hours. It should be possible to work into most areas of the world between sunrise and sunset. Excellent openings are expected to many southern and tropical areas well into the hours of darkness, and when conditions are High Normal, or better, the band should remain open for DX during most of the night. Expect exceptionally strong signal levels during peak periods, with openings possible in almost all directions. Look for *long-path* openings for about an hour or so *after* sunrise and again for an hour or so *before* local sunset. If you plan to operate on a *single* band during the Contest, this should be it!

40 Meters: DX openings towards Europe and the east should first be possible during the late afternoon hours and should steadily improve towards evening. Good openings are forecast to all areas of the world during the hours of darkness. Expect a peak in signals from an easterly direction about midnight, and from a westerly direction just after sunrise. Excellent conditions towards the south should exist throughout most of the nighttime period. *Forty* meters should be the best DX band during the night, but when conditions are High Normal, or better, it may be nip and tuck with *20* meters for this honor.

80 Meters: Good DX openings are forecast to most areas of the world during the hours of darkness and into the sunrise period. For openings towards Europe and the east, peak conditions, often with very strong signals, are expected around midnight. For openings in a westerly direction, check for a peak just before sunrise. The band should remain open most of the night towards the north and south. Propagation on this band is similar to that expected on 40 meters, except signals will be a bit weaker, noise levels will be somewhat higher, and the period for band openings in a particular direction will be a bit shorter.

160 Meters: Considerably decreased static levels and longer hours of darkness in the Northern Hemisphere should welcome back DX openings in this band during the hours of darkness and into the sunrise period. Because of relatively high signal absorption and the lower power levels used in this band, openings will often be weak and noisy, but some fairly good ones should be possible. Best bets are for openings towards Europe and towards the Caribbean and Latin America from the eastern half of the country, and towards the Far East, Australasia, the South Pacific, and Latin America from the western half of the country. DX openings to other areas of the world may also be possible. The best propagation aid for this band (and for *40* and *80* meters as well) is a set of sunrise and sunset tables, since DX signals tend to peak when it is *local sunrise* at the *easternmost* point of a path.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band from *10* through *160* meters is expected to open from each time zone area in the continental USA to the major DX areas of the world. The information contained in the charts, while useful during the Contest period in their present

Time EST	Optimum Band Meters	Areas To Which Band Is Expected To Be Open
00–02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antarctica.
02–04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04–06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian area. Possibly Antarctica.
06–08	20	Most of Europe. South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08–10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand, and Australasia. A few Asian areas.
10–12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12–14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of South Pacific, New Zealand, and Australasia.
14–16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16–18	20	Most of Europe, Eastern Mediterranean, and the Middle East. All of Africa, and Central and South America. A few Australasian areas.
18–20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20–22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22–00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

Table I– Sample multi-band work plan for Eastern USA QTH.

Time PST	Areas To Which Openings Should Be Possible
00–03	South Pacific, New Zealand, Australasia, Antarctica.
03–06	About the same as previous period, with some South Americans as well. Good time to catch some sleep.
06–09	All of Europe, Eastern Mediterranean and Middle East, Far East and Asia, South Pacific, New Zealand, Australasia, and northern and central South America.
09–12	Some European, Far East and northern South Americans, as well as some South Pacific, New Zealand and Australasians.
12–15	Most of Europe, Eastern Mediterranean, and Middle East. Most of Africa. Northern and Central South America and a sprinkling from the Far East.
15–18	All of Africa, all of South America, and some European and a few Far Eastern.
18–21	Most of Africa. All of South America, South Pacific, and New Zealand. Most of the Far East and Asia. A few Europeans.
21–00	Most of the South Pacific, New Zealand, and Australasia. Antarctica and most of deep South America. A few Europeans.

Table II– Sample single-band operating plan 20 meters, western USA QTH.

format, can easily be reorganized into more convenient formats to meet specific operational work plans or schedules. Experience gained during previous Contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table I is an example of one of several types of plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

Table II is another sample work chart for single-band operation, in this case *20* meters. The chart is intended for the PST zone, but similar charts can be devised for other bands and for other time zones.

Radio Storm

If Mother Nature should play a trick and produce a radio storm during the Contest periods, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending upon the storm's severity. The storm's influence will generally extend outwards from the polar regions, the more severe the storm becomes. Under storm conditions expect considerably fewer openings on *10, 15,* and *20* meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Geomagnetic Activity Range	Geomagnetic Level K	A	Solar Flux Range & Expected Propagation 90-130	130+
Quiet	0–2	0–7	Above/High Normal	Above Normal
Unsettled	2–3	7–15	High/Low Normal	High Normal
Active	3–4	15–30	Low/Below Normal	Low Normal
Minor Storm	4–5	30–50	Below Normal/Disturbed	Below Normal
Major Storm	5+	50+	Disturbed	Disturbed

Table III– Relationship between geomagnetic conditions and solar flux. For example, solar flux is 100 and A-index is 6, expect Above or High Normal conditions, etc.

Conditions on *40, 80,* and *160* meters are likely to become erratic as well. During certain types of storms, conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on *40, 80,* and *160* meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on *10, 15,* and *20* meters during the daylight hours. Check the *40, 80,* and *160* meter bands for possible openings to some areas of the world during the hours of darkness.

A Last-Minute Forecast made at press time for the Phone section of the Contest appears at the beginning of this column. A similar forecast for the C.W. section will appear in next month's column. For updated geomagnetic and solar data during the Contest period, check the National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts (transmitted simultaneously on 2.5, 5.0, 10.0, 15.0, and 20.0 MHz) contain the latest available geomagnetic K-figure and the level of 10.7 cm solar flux. They also contain a short-term forecast of geomagnetic and solar conditions given in subjective terms. Table III can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected h.f. ionospheric conditions. The hourly forecasts broadcast on WWV, along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning 303-497-3235 at any time. This is a service provided by the NOAA Space Environment Services Center, but the call is not toll-free. Direct inquiries to the duty forecaster at the Center can also be made 24 hours a day, 7 days a week by calling 303-497-3171 (collect calls will not be accepted).

V.H.F. Ionospheric Propagation

The present solar cycle has dropped to a point where the world-wide *6* meter openings of the past several years will no longer be possible. Solar activity is still high enough, however, for an occasional *6* meter DX opening still to be possible during October. The best chances are for openings towards South America, southern Africa, and the South Pacific areas. Generally speaking, openings from the eastern half of the US towards the east and south should peak before noon. The best time to look for *6* meter openings towards the Caribbean and Central and South America from all areas of the USA should be from an hour or two before noon through the early afternoon hours. In the western half of the country look for openings towards the South Pacific during the late afternoon hours. Don't be disappointed if *6* meter DX openings are few and far between during October.

Trans-continental and *6* meter openings over shorter distances are also expected during October and the fall and winter months. Check for such openings during the early afternoon hours.

Orionoids, a major meteor shower, is expected to begin around October 21st and to last for about two days. Expect as many as 25 meteors an hour to enter the earth's atmosphere during the peak of this shower. This should make possible some fairly good meteor-type ionospheric openings on the v.h.f. bands.

There is usually a seasonal increase in auroral activity during October. This should result in an increased number of auroral-scatter-type openings on the v.h.f. bands. There are also increased chances for short-skip sporadic-*E* propagation during periods of auroral activity, particularly on *10* and *6* meters. Check the Last-Minute Forecast appearing at the beginning of this column for the days that are expected to be Below Normal or Disturbed. These are the days upon which auroral activity is most likely to occur during the month.

C.W. Contest Forecast

This month's DX Propagation Charts are valid for *both* the Phone and C.W. sections of the 1983 Contest. *Be sure to keep them handy for use during next month's C.W. section as well.* Short-Skip Propagation Charts for use during October appeared in last month's column.

More radio amateur activity in more areas of the world takes place during the *CQ* World-Wide DX Contest than at any other time. For this reason, the Contest offers an excellent opportunity to verify the accuracy or inaccuracy of the *CQ* Contest predictions and forecasts. Reports received from participants in previous Contests have contributed significantly to improving these predictions during the past 32 years. Comments or observations concerning this year's Contest would be appreciated, and should be sent directly to me, W3ASK. Good luck in the 1983 Contest!

73, George, W3ASK

HOW TO USE THE DX PROPAGATION CHARTS

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

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

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

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

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

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

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

October 15 - December 15, 1983
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-11 (4) 11-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-12 (4) 12-14 (2) 14-15 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-21 (2) 21-00 (1) 00-02 (2) 02-04 (1) 04-06 (2)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-12 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-13 (1)	03-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-14 (2) 14-20 (1) 20-22 (2) 22-00 (1)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterreanean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-19 (3) 19-21 (2) 21-23 (1) 23-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	07-10 (1) 10-12 (2) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	07-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-22 (3) 22-00 (2) 00-02 (1)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	07-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-21 (3) 21-01 (2) 01-03 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*

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

October 15 - December 15, 1983
Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

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

October 15 - December 15, 1983
Time Zone: PST (24-Hour Time)
WESTERN USA TO:

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

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

Bill, KM4W, with his plaque and award for All Counties #392.

The story of the month for October as told by Bill is:

William E. (Bill) Bell, KM4W
All Counties #392 7-31-82

"I have always been interested in radio communication, but never really found the time for it until we moved to our present location, Manchester, Tennessee (Coffee County). There are quite a few hams in this area due to the Air Force project, Wind Tunnel, which employs several electrical and electronic engineers. Also, there is an active radio club which maintains two repeaters. So it is natural that some of my friends are hams. I found my 'Elmer' in Jim, WB4ZMC. He helped me prepare for my Novice ticket, and in January 1977 I was on the air as WD4DAI.

"I decided immediately that I didn't want to wind up with a Technician ticket, so I studied hard, and with the help of Will, W4LHJ (another Elmer) I received my General ticket in August of 1977. Will kept prodding me into studying for the Advanced ticket, and I upgraded in February 1978. My Extra Class came a little harder. No problem with the code, because I learned that in the Navy during WW II, but the theory, that was something else. My friend Will kept after me to study until I finally made it and upgraded in May of 1979. I am a journeyman machinist working for a contractor with the United States Air Force at Arnold Air Force Station, Tennessee, and I do not have an extensive electronic background.

"After getting my Extra Class ticket, I looked around for a particular interest in amateur radio. I had worked WAS, had worked over 100 countries with only 92 confirmed, and belonged to the 10/10 international net.

"In March 1980 while recuperating from surgery, I had my ham radio to help

333 South Lincoln Ave., Mundelein, IL 60060

KM4W on a county line in Tennessee. Lincoln County was #3075 for N8BLO.

Bill, KM4W, operating his mobile station.

pass the time. One day I stumbled across 14.336, heard the County Hunters Net, started working mobiles, and was bitten by the 'bug.' I thought this was something I would enjoy. I did not return to work for three months, so those three months were spent collecting counties. After going back to work, my county hunting slowed down considerably, since I could only work contacts at night and on weekends. With a lot of help from all the mobilers and net controls and everyone calling me when they knew I needed a county, I finished up on July 28, 1982 at 0230 a.m. local time.

"There are so many people who helped me get the USA-CA Award that I can't begin to thank them all. However, I would like to thank Jim, WB5YDH, who gave me my last one for the 'Whole Ball of Wax,' which was Limestone, Alabama. I also worked Jim in 154 other counties across the United States. My special thanks goes to my XYL, 'Jimmie,' who did not really understand why it was so important for me to work all counties. After I explained to her that it is a small number of hams who finally work them all, I think maybe she does understand after all.

"Again, thanks to all! I think you are a very special kind of people. See you on 14.336."

Special Honor Roll
All Counties
#426 James W. Lucht, K7XN 6-11-83.
#427 Grady Lewis, W5QLD 6-18-83.

CT4NH at his station near Lisbon. Luis has just received USA-CA #1849.

Awards Issued

James W. Lucht, K7XN, completed them all and added USA-CA 3000 #455 and All Counties #426 Mixed to his collection.

Grady Lewis, W5QLD, waited until he had finished working all the counties and then claimed USA-CA 500 through All Counties #427 Mixed.

Dr. Richard Tornatore, KA2K, was issued USA-CA 3000 #457 Mixed.

Paul Edmonds, W8RYP, received USA-CA 500 through USA-CA 2000 All C.W.

Alfredo Pauker, CP6EL, obtained USA-CA 1000 #781. Alfredo also has USA-CA 500 #1459, the first USA-CA award issued to a station in Bolivia.

Eddie Scholes, G4KHG, qualified for USA-CA 500 through 1000 Mixed.

USA-CA 500 certificates went to:

Rev. Richard F. Johnson, WD4ONZ, #1844, All C.W.

Paul Edmonds, W8RYP, #1845, All C.W.

Orebro Sendareamatorer (Radio Club of Orebro), SK4BX, #1846 Mixed.

James Brownlee, KA5IAT, #1847 Mixed.

Grady Lewis, W5QLD, #1848 Mixed.

Luis Sutil Teixeira, CT4NH, #1849 All S.S.B.

Eddie Scholes, G4KHG, #1850 Mixed.

Awards

LOK 35th Anniversary Award—Poland. This award is available to any radio amateur or s.w.l. who can prove contacts with 5 club stations between the dates of 1 January 1979 and 31 December 1983. The stations contacted must have three letters in the suffix and the first letter must be "K" (for example, SP5KMB, SP7KTE, SP8KDF).

Send log extract and 5 IRCs to: Stu-

dents Radio Club, SP7KTE, P.O. Box 19, 25-950 Kielce 10, Poland.

"VDXA" Virgilian DX Award. The Virgilian DX Group of Mantova, Italy, issues the VDXA Virgilian DX Award. The award is available to all radio amateurs and s.w.l's. The award is obtainable for QSOs made beginning from September 1982 in every band and mode allowed as follows.

HF/S.S.B.: 7 contacts with Virgilian DX Group Members, of which at least 3 contacts must be with 3 life members of the group. Virgilian DX Group's life members are the following: I2CXI, I2KKL, I2KUW, I2YJO, I2UGT. These stations will operate from Mantova, Italy. Contacts with the same member will be allowed only once on each band.

HF/C.W.: The same regulations as for HF/S.S.B.

VHF: 6 contacts with Virgilian DX Group members. No contact with VDXG's life members is required. Contacts on repeaters are not allowed.

S.W.L.: 7 QSO/HRDs of Virgilian DX Group Members, of which at least 3 HRDs with life members of the same group.

Everyone will receive the Virgilian Award "VDXA" and automatically will become a member of the group and receive a characteristic number (the same as the award). Send the following: log extracts reporting contacts, date, band, mode, GMT; $5.00 U.S., or 15 IRCs; complete and clear address. Award requests should be addressed to: Virgilian DX Group, Award Manager, P.O. Box 184, 46100 Mantova MN, Italy.

Region Parisienne Award. This award is available to licensed amateurs and s.w.l.'s. Contacts dating from 1 January 1970 may be used. There are three classes as follows:

Class 1—Worked or heard 5 stations in each of the 7 Parisian region departments; postcodes beginning with 77, 78, 91, 92, 93, 94, 95. Total 35 stations.

Class 2—Work only 3 stations in each department. Total 21 stations.

Class 3—Work only 1 station in each department. Total 7 stations.

All c.w., all RTTY, all phone, or mixed. HF or VHF special mention. Send certified list (GCR list), no QSLs, and 20 F Fr or 8 IRCs to: Georges Houy, FE 6377, 16 Rue Alfred Bossu, 93700 Drancy, France.

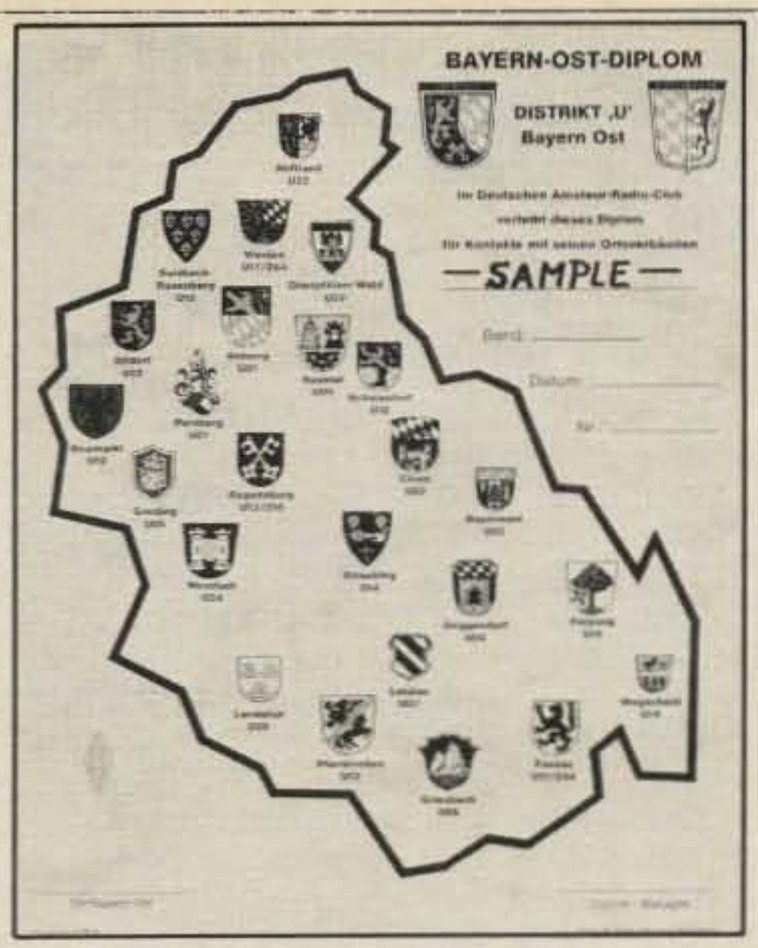
Bayern-Ost-Diplom (BOD). The "BOD" is available to all licensed radio amateurs and s.w.l.'s who can prove contacts with stations in East Bavaria, DOK district "U" in the DARC. (DOK's are, for example, U 01, U 02, U 03 . . .). You may use every "U"-DOK once for the award. All contacts on or after September 1, 1973 count for this award. Contacts are counted as follows:

1 point: every amateur radio station in the district "U."

2 points: every club station.

3 points: every X (YL).

4 points: every c.w. contact.



Bayern-Ost-Diplom.

5 points: every UHF/SHF contact.

Shortwave: The diploma is available for German stations, who need at least 30 points; Europeans need 15 points and DX stations need 5 points.

HF/UHF/SHF: The diploma is available for radio amateurs in the district "U" itself, who need 30 points; other Germans need 20 points, and stations outside DL need 10 points.

The diploma is printed on heavy parchment in four colors. Please send only GCR list and DM 5.-, or $3.00 U.S., or 10 IRC's to the Diploma Manager, Ernst Nosner, DJ5VH, DIG 787, Spitalgasse 35, D-8458 Sulzbach-Rosenberg, West Germany. (Information and sample award for the "Bayern-Ost-Diplom" were sent by Wolfgang Wessely, DJ3TF.)

Grupo Morse Paranaense Award.

GMPR Award. The GMPR (Grupo Morse Paranaense) Award is issued by the GMPR Group of CW for all licensed amateurs who have worked 6 different members of the Group (mode: c.w. only) and have valid QSO's after 30 July 1982.

Logs: Call, date, time, band, and RST.

S.W.L.: Same rules.

Endorsements: For 2, 3, 4, 5 stations from Parana (PY5).

Fee: 10 IRC's. Do not send QSL's, only GCR. A personal QSL is requested. Send applications to: GMPR, P.O. Box n. 4143, 80.000 Curtiba, Parana, Brazil.

GMPR Members: PY5AFC, AFD, AGX, AIO, AIW, AKX, AKW, ALF, AVR, BYC, CIG, CL, CMS, FI, GJ, IG, IJ, JL, LA, NGA, OE, PMR, AJE, RT, VX, XFR, ZW, PY1BVY.

USA-CA Honor Roll

3000		1500		500	
K7XN	455	W8RYP	635	WD4ONZ	1844
W5QLD	456	W5QLD	636	W8YRP	1845
KA2K	457			SK4BX	1846
2500		**1000**		KA5IAT	1847
W5QLD	514	CP6EL	781	W5QLD	1848
2000		W8YRP	782	CT4NH	1849
W8RYP	567	W5QLD	783	G4KHG	1850
W5QLD	568	G4KHG	784		

NJDXA Silver Jubilee Award Winner Announced. Ed, W2MIG, of the North Jersey DX Association, has sent word that the winner of the NJDXA Silver Jubilee Award is Jay O'Brien, W6GO (FOØJO), while on his French Polynesian DXpedition. Congratulations, Jay!

Notes

Ed Hopper, W2GT, has asked me to convey his thanks to everyone for all the kind letters, notes, and phone calls. He greatly appreciates them.

The new *County Hunters Handbook*, eleventh edition, and the new *County Hunters Directory*, eighth edition, are now available. Send an s.a.s.e. to B & B Shop, 1348 Pinewood Drive, Woodbury, MN 55125 for further information.

A revised county outline map book is completed and is available through the Mobile QSL Bureau, P.O. Box 146, Lakeside, CA 92040. Send an s.a.s.e. for details.

73, Dorothy, WB9RCY

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Last month I indicated that there probably would be no Can-Am contest this September because the Canadian DX Association has announced in their publication *Long Skip* that they were not sponsoring the contest this year. However, a later communication from VE3BMV, much too late to make the September issue, indicated that there would be a contest on Sept. 17–18 Phone, and Sept. 24–25 C.W. The Ontario Contest Club is continuing the sponsorship, and rules are the same as last year's. If you did get involved on these very busy weekends, you can send your entries to the Contest Chairman, VE3BMV, Box 65, Don Mills, Ontario, Canada M3C 2R6.

Another activity that did not make the September issue was the fall edition of the Classic Radio Exchange on Sept. 25–26. Those of you who took your old, classic equipment out of storage and participated in these events in the past know what it's all about. Logs still go to Stu Stephens, K8SJ, 1407 Hollyrood Road, Sandusky, OH 44870. *(Sorry Yuri and Stu. Watch those deadlines!—ed.)*

Each October the Cayman Islands have a celebration known as "Pirates Week." This year the event will also be celebrated by amateur radio. Special calls have been authorized: ZF1 becomes ZF1**0**, and ZF2 will be ZF2**0**. The radio portion of the celebration runs from 0500Z Oct. 22nd to 0500Z Oct. 30th. All bands will be activated, both c.w. and s.s.b., so there should be no problem picking up Cayman country multipliers. The event is open to residents and non-residents, and many visitors are expected there for the contest weekend.

For those of you not contest minded, your efforts will be rewarded with an attractive Pirates Week Certificate. Work five ZF1**0**'s or ZF2**0**'s and send your five QSL's with three IRC's to: Pirates Week, P.O. Box 1029, Grand Caymans, B.W.I.

A group from the 8th District is planning a full-scale operation from the island of Anguilla on all bands, 160 through 6 meters, from Nov. 21 to Dec. 14. A big multi-operation is planned for the WW C.W. weekend. Check the DX Column for more details.

Again reminding you, the deadline for material for the January issue is October 15th and November 15th for the February issue. All communications should be sent to my home address.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Oct.	1-2	California QSO Party
*	Oct.	1-2	Oregon QSO Party
	Oct.	1-2	VK/ZL/Oceania Phone Contest
	Oct.	8-9	VK/ZL/Oceania C.W. Contest
	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 Ph. Contest
	Oct.	16	RSGB 21 MHz C.W. Contest
	Oct.	15-16	Maryland/DC QSO Party
	Oct.	15-16	Boy Scout Jamboree
†	Oct.	15-16	East Germany Y2 Contest
	Oct.	22-23	Pennsylvania QSO Party
	Oct.	22-23	ARCI ARP QSO Party
	Oct.	22-23	CLARA AC/DC Contest
	Oct.	22-23	YLRL Anniv. CW Party
	Oct.	**29-30**	**CQ WW DX Phone Contest**
	Nov.	5-6	YLRL Anniv. Phone Party
	Nov.	5-6	ARRL C.W. Sweepstakes
	Nov.	6	Czechoslovakian Contest
	Nov.	12-13	DARC WAE RTTY Contest
	Nov.	19-20	ARRL Phone Sweepstakes
	Nov.	**26-27**	**CQ WW DX C.W. Contest**
	Dec.	3-7	ARRL 160 Meter Contest
	Dec.	10-11	ARRL 10 Meter Contest

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

VK/ZL DX Contest

Phone: Oct. 1–2 C.W.: Oct. 8–9
1000 GMT Saturday to 1000 GMT Sunday

Stations in the rest of the world will be concentrating on working the VK's and ZL's. No mention was made of other Oceania areas this year. The following rules apply to areas other than VK/ZL.

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

Scoring: Two points for each VK/ZL contact. Single-band score—QSO points multiplied by total number of VK/ZL call areas worked on that band. All-band score—total QSO points from all bands multiplied by sum of VK/ZL call areas worked on all bands.

Awards: Attractive color certificates to the top scorers, both phone and c.w., in each country and each call area of Japan, U.S.A., and U.S.S.R. Additional awards if returns warrant.

Logs: Date/time in GMT, the station worked, number sent/received, band and QSO points. Underline each new VK/ZL call area worked on each band. Use a separate sheet for each band. Include a summary sheet showing the scoring, name and address in block letters, and a signed declaration that all rules and regulations have been observed.

S.W.L. Section: Log VK and ZL stations only. Include call of station being worked and RS(T) and serial number of VK/ZL station being logged. Log and scoring are the same as indicated for transmitting stations. Phone and c.w. scores are combined for the final score.

Logs must be in the hands of the committee by January 31, 1984. This year they go to: WIA VK/ZL Contest Mgr., Greg Williams, VK3BGW, 1 Noorabil Court, Greensborough, Victoria 3088, Australia.

GARTG SSTV Contest

0600 to 0600 UTC, Sat.-Sun., Oct. 8–9

This is the fourth world-wide SSTV contest sponsored by the German Amateur Radio Teleprinter Group.

Use all bands, 3.5 through 28 MHz, in that portion of the band reserved for SSTV. A 6-hour off time must be taken at any time during the contest.

Exchange: Call sign, RST, message number (001, etc.). GARTG members will also include their membership number. Exchange must be made exclusively in the SSTV mode.

Scoring: Contacts on 80, 40, and 20 meters, 1 point; on 15 meters, 2 points; and on 10 meters, 5 points. Add 50 bonus points for each contact with a GARTG member station. Same station may be worked on each band.

Multiplier: Each country (WAE and ARRL list) and each call area in JA, PY, VE/VO, VK, W/K worked on each band.

Final Score: QSO points × countries × continents plus bonus points.

There is also an s.w.l. division with the same scoring as outlined above. S.w.l. logs must contain both the report sent and received by the station logged.

Awards: Free one-year subscription to "RTTY," official organ of the GARTG, to the three top scorers.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc. All entries must be received by December 10th and go to Contest Manager, Wolfgang Punjer, DL8VX, P.O. Box 90 11 30, D-2100 Hamburg 90, Fed. Rep. of Germany.

Scouts Jamboree On The Air

Starts: 0001 Local Time Sat., Oct. 15
Ends: 2359 Local Time Sun., Oct. 16

This is the 26th annual Jamboree sponsored by the World Bureau of Scouts. Activity is world wide and includes not only Scout units, but Girl Scouts and Guides, too. This is not a contest, but an opportunity for Scouts or anyone interested in Scouting to get together on the air and exchange greetings. Amateurs can invite

members of Scout units or individuals to visit their stations or clubs and see how ham radio operates.

No specific exchange, no scoring, and no logs are required. However, participating post-card-size certificates issued by the World Scout Bureau are available from the JOTA Coordinator, W2GND/K2BSA. They may be requested before the JOTA weekend for distribution and included with your QSL's of JOTA contacts. Send a large s.a.s.e. to W2GND; 20¢ postage for 8 cards, 17¢ for each additional 8.

Suggested Frequencies: Phone—3940, 7240, 14290, 21360, 28990. C.W.—3590, 7030, 14070, 21140, 28190. Also Novice bands, SSTV, and RTTY.

I suggest you write to W2GND for additional details. Stateside participants send reports to Harry A. Harchar, W2GND, 216 Maxwell Ave., Hightstown, NJ 08520.

ARRL QSO Party

C.W.: Oct. 8–9 Phone: Oct. 9–10
C.W.: 1800Z Saturday to 0600Z Sunday
Phone: 1800Z Sunday to 0600Z Monday

This event is similar to the annual Open CD Party, which has been phased out, and it is open to *all* ARRL members. Operate a maximum of 10 hours out of the 12-hour period. Off times must be at least 30 minutes and must be clearly indicated in the log.

Exchange: Your "status" and ARRL section (MBR member, ORS official relay station, etc.).

Scoring: Total QSO's from all bands times number of ARRL sections worked (maximum of 74). Phone and c.w. are separate and require separate logs. A dupe sheet is also required if you make more than 200 contacts.

Refering you to a current issue of *QST* for more details is academic, since all members of course receive *QST*. Anyway, be sure to get your entry to the ARRL, 225 Main Street, Newington, CT 06111 within a month of the above dates.

RSGB 21/28 MHz Phone Contest

0700 to 1900 GMT Sunday, Oct. 9

It's the world working the British Isles on 21 and 28 MHz. There has been a slight change in this year's rules; multi-operator has been added, and awards are to the winners in each overseas *country*.

The same station may be worked on each band for QSO and multiplier credit. There are a total of 42 prefixes available on each band. Following are the rules for areas other than the British Isles.

Sections: Single operator and multi-operator, both bands only, and s.w.l.

Exchange: RS report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of B.I. prefixes worked on each band (maximum of 42 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

There is also an s.w.l. section. Only B.I. stations are to be logged. Scoring is the same as indicated above. The same call sign may appear once only in every three contacts, except when the logged station is a new multiplier.

Awards: Overseas stations will be awarded certificates to the leading station in each country and the leading station in the multi-operator section, and to the s.w.l. winner in each country.

Separate log sheets are required for each band. Include a summary sheet showing the scoring, prefixes worked, and a signed declaration that rules and regulations have been observed. Logs must be received by December 1st. This year they go to: RSGB HF Contest Committee, c/o P. Miles, P.O. Box 73, Lichfield, Staffs, England.

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, Oct. 16

Like the 21/28 MHz Phone Contest, the activity in this one is between the British Isles and the rest of the world. Competition is limited to single operator stations only. There is a separate QRP section in which power input must not exceed 10 watts, and there is also an s.w.l. section.

The following rules are for areas other than the British Isles.

Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth three points. Multiply total QSO points by the number of B.I. prefixes worked (G2, G3, GD3, etc.). A maximum of 42 is possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized ten times the points claimed. Logs containing more than five unmarked duplicates will be disqualified.

Only British Isles stations are to be logged by overseas s.w.l.'s. The same call may be reported only once in every three contacts, unless the logged station is a new multiplier. Scoring is the same as above.

Awards: Certificates to the leading station in each overseas country, in each section, both transmitting and s.w.l.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters. Logs from overseas must be received by December 31st and go to: RSGB HF Contests Committee, c/o D. S. Booty, G3KKQ, 139 Petersfield Avenue, Staines, Middlesex, TW18 1DH England.

Maryland/D.C. QSO Party

1800Z Sat. to 2100Z Sun., Oct. 15–16

This year's party is again being sponsored by the Columbia A.R.A. of Maryland. The same station may be worked on each band and mode for QSO credit, and MD/DC stations can work other in-state stations.

Exchange: QSO no., RS(T), and QTH. County for MD/DC; state, province, or country for others. (Baltimore and Wash. are independent cities.)

Scoring: MD/DC stations multiply total QSO's by sum of MD counties, states, provinces, and DX countries worked. Others multiply total MD/DC QSO's by MD counties and independent cities worked (maximum of 25).

Multiply your final score by 1.5 if you run 200 watts or less.

Frequencies: C.W.—60 kHz up from low end of band. Phone—3950, 7250, 14290, 21390, 28590. Novice—3720, 7120, 21120, 28120.

Awards: Certificates to winners in each category.

Dupe sheets are required for entries with over 200 contacts. Maintain a continuous log for phone and c.w., and indicate which category on your entry—phone, c.w., or mixed mode—you are entering.

Mailing deadline is November 30th to Columbia A.R.A., Att: Robert K. Nauman, WA3VUQ, 4017 Font Hill Drive, Ellicott City, MD 21043.

WA-Y2 DX Contest

Starts: 1500Z Sat., October 15
Ends: 1500Z Sun., October 16

This activity is usually held the third full weekend of October each year to commemorate the anniversary of the founding of the German Democratic Republic. All bands can be used, 3.5 through 28 MHz, both phone and c.w. However, the first 10 and last 25 kHz of all bands are to be kept free of contest operation. The same station may be worked once on each band and each mode for QSO and multiplier credit. There are three classes: single operator, multi-operator, and s.w.l.

Exchange: RS(T) plus a 3-figure QSO number starting with 001. The Y2 stations will also include 2 figures identifying their district (Kreiskenner).

Scoring: Each Y2-Y9 contacted is worth 3 points.

Multiplier: Number of different districts worked on each band (maximum of 15 per band). A district is identified by the last letter in the call, A through O, not by the number in the call.

Final Score: Sum of QSO points multiplied by sum of different districts worked on each band.

S.W.I.'s get one point for each Y2-Y9 reported, including the RS(T), district, and call of station being worked. Rest of scoring same as above.

1983 Contest Results U.S.A. and Canada

Dutch "PACC"

*K1KI	5,934
KA1CY	3,400
W1END	1,944
W1FJ	1,250
KA1UE	1,113
K1GZM	620
W1WY	204
*WA2UDT	558
KM2X	198
K2SX	176
WB2TKO	132
*W3ARK	1,890
*W4VQ	3,922
K4FPF	275
W4KO	275
N4MM	200
KF4GL	54
*KN6O	40
*N6ZX/7	77
*WD8MGQ	560
K8PYD	518
*W9OA	893
W9QWM	160
*WØKZV	288
*VO1AW	3,708
*VE3JPP	1,612
VE3FGL	900
VE3FAT	176

*Certificate Winners.

BARTG RTTY

W3FV	243,212
W2IUC	225,792
KB2VO	195,506
K4AGC	158,796
W3FIZ	154,100
WB3HAZ	141,858
KØJH	126,852
K6WZ	119,048
WD5ELJ	118,320
W6JOX	101,332
VE2AXO	87,710
KB9DM	62,968
WB4UBD	60,104
WB3IGR	56,160
VE8CM	55,020
N7AKQ	50,928
VE7VP	47,740
W2KHQ	45,954
WA6WGL	38,760
WA3ZKZ	37,590
W3AOH	27,360
W7CBY	16,586
K2TY	8,736
W8TCO	720

Multi-Opr.

KD4RT	73,950
KL7RS	25,116

W3FV was #9 and W2IUC #10 out of 103 worldwide.

Awards: Certificates to the top-scoring stations in each section of each country.

Use a separate log sheet for each band and include a summary sheet showing the scoring, a list of districts worked, the usual signed declaration that all rules and regulations were observed, and your name and address in block letters.

Entries must be postmarked no later than 30 days after the contest. They go to Y2 Contest Bureau, RKDDR, Hosemannstr. 14, DDR 1055 Berlin, German Democratic Republic.

Pennsylvania QSO Party

1600–0500Z Sat.–Sun., Oct. 22–23
1300–2200Z Sun., Oct. 23

This is the 26th annual party sponsored by the Nittany A.R.C. of State College, PA. The same station may be worked on each band and mode for QSO points. Penn. stations may also work other Penn. stations for QSO and multiplier credit. Mobiles may be worked in each county change.

Exchange: RS(T), 3 digit QSO number, and QTH. County for Penn.; ARRL section for others.

Scoring: One point for s.s.b. contacts, 1.5 points for c.w., 2 points for c.w. on 80 and 160.

Penn. stations multiply total by ARRL sections + Penn. counties + 1 DX country worked. Others use Penn. counties for their multiplier (maximum of 67).

Penn. mobiles calculate their total score from each county and add totals for their final score. Stations on county lines will give out one number, but the two counties count as separate multipliers.

Frequencies: C.W.—40 kHz up from bottom of each c.w. band. S.S.B.—3980, 7280, 14280, 21380, 28580. Novice—10 kHz from bottom of each Novice band.

Awards: Certificates to section winners and to each Penn. county (minimum of 20 QSO's). Plaques to winners in both eastern and western Penn., out-of-state and mobile stations, and multi-operator entry (also top club).

Include a summary sheet with your entry showing the scoring, check list of counties or sections worked, and any interesting comments. A dupe sheet is required if you make 100 or more contacts. Also, enclose 37¢ in stamps for a copy of the results.

Mailing deadline is November 15th to Douglas R. Maddox, W3HDH, 1187 S. Garner Street, State College, PA 16801.

ARCI QRP Contest

Starts: 1200Z Sat., October 22
Ends: 2400Z Sun., October 23

This is the fall edition and 22nd anniversary of the QRP Amateur Radio Club International. The contest is open to members and non-members. Participants may operate a maximum of 24 hours.

Exchange: RS(T) and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with a member count 5 points, with a non-member 2 points, with stations other than W/VE 4 points.

The same station may be worked on each band for QSO and multiplier credit.

There is a power multiplier for c.w. Use appropriate p.e.p. power for s.s.b.

4 to 5 watts output—× 2.
3 to 4 watts output—× 4.
2 to 3 watts output—× 6.
1 to 2 watts output—× 8.
Less than 1 watt—× 10.

The following bonus multipliers are also available: ×2 is using solar or wind power, ×1.5 for battery power. Must be used for duration of contest.

Final Score: Total per band score. QSO points × (states + provinces + countries) × power multiplier × bonus multiplier if any. Add totals from each band worked for final score.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50360. Novice—3710, 7110, 21110, 28110. VHF/UHF contacts must be made direct.

Awards: Certificates to the highest scoring stations in each state, province, and country.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information, and a large s.a.s.e. for copy of the results.

Logs must be received by November 20th and go to William Dickerson, WA2JOC, 230 Mill St., Monroe, MI 48161.

YLRL Anniversary Party

C.W.: Oct. 22–23 Phone: Nov. 5–6
1800 to 1800 GMT Sat./Sun.

This is the 44th annual party run by the YL Radio League, and it is open to all YL's around the world. All bands may be used. Phone and c.w. are separate contests and require separate logs.

Exchange: QSO no., RS(T), and ARRL section. DX stations indicate country.

Scoring: One point per QSO between stations within an ARRL section and between DX stations. Two points if QSO is between a DX and ARRL section station. The same station may be worked once only regardless of the band.

Multiplier: Derived from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if power input is 150 watts or less on c.w., 300 watts p.e.p. on s.s.b.

Final Score: Total QSO points times ARRL sections and DX countries worked, times the power multiplier.

For each duplicate contact that is removed from the log in the course of checking, a penalty of three additional and equal contacts will be exacted.

Awards: Only YLRL members are eligible for the Cup and the Corcoran and Hager Awards. Non-members will receive certificates.

Logs must be postmarked no later than November 14 and received by December 15th. This year they go to: Rose Ellen Bills, N2RE, 17 Craig Place, Pennsville, NJ 08070.

CLARA AC/DC Contest

1800Z Sat. to 1800Z Sun., Oct. 22–23

Sponsored by the Canadian Ladies Amateur Radio Association, this contest is open to both YL's and OM's.

Each station may be worked twice, once on c.w. and again on phone, or on two different bands.

Exchange: RS(T), QTH, and name.

Scoring: For CLARA members, 1 point per contact with non-members, 2 points with members, and 3 points if with a bonus station. C.w. contacts are worth double the above point value. Non-member scoring is the same as above, except only CLARA member contacts are to be counted.

YL bonus stations will identify in their exchange.

Multiply total QSO points by the number of Canadian provinces/territories worked for final score.

Frequencies: Phone—3775, 3900, 7150, 14160, 14280, 21300, 28488, 28588. C.W.—3690, 7035, 14035, 21035, 28035.

Awards: Plaques to 1st place winners, both members and non-members, and 2nd and 3rd certificates. All entries are eligible for the mini prize drawing.

Mailing deadline for all entries is December 15th, and they go to: Muriel Foisy, VE3LQH, P.O. Box 122, Janetville, Ontario, Canada L0B 1K0.

CQ World-Wide DX Contest

Phone: Oct. 29–30 C.W.: Nov. 26–27
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue and are the same as those used these past many years. A few questionable areas have been clarified as follows:

Par. II Bands: All bands may be used, 1.8 through 28 MHz, but *not* the new 10 MHz band.

Par. III Type of Competition: The guidelines for single operator are clearly spelled out. No spotting nets or other such assistance is permitted. The 10-minute rule for multi-single operation is also clearly indicated.

Par. IX Awards: The N6TJ Carib./C.A. and W6RR African Awards are open to all comers and are not confined to residents only (not contest expeditions, however).

Also note the new Dick Spenceley, KV4AA Memorial Award that has been added to the C.W. Contest. It's for the most QSO's made on all bands by a single operator.

Par. XI Log Instructions and **Par. XII** Disqualification: It is recommended that both these items be read carefully and studied. Considerable space has been used to spell out in detail all the requirements.

This year logs to to the same addresses as last year, but in reverse order. N6AR is handling the Phone section and K3EST the C.W. Mailing deadline is December 1st for the Phone section and January 15th for the C.W. Phone logs go to Larry Brockman, N6AR, 7164 Rock Ridge Terrace, Canoga Park, CA 91307; C.W. to Bob Cox, K3EST, 6548 Spring Valley Dr., Alexandria, VA 22312. Logs can also go to *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801. *Be sure to indicate Phone or C.W. on the envelope.*

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Astron Power Supplies
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Bencher Paddles
Callbooks
CDE (Telex) Rotors
Daiwa/MCM/J.W. Miller
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Tokyo Hy-Power Amplifiers
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CIRCLE 71 ON READER SERVICE CARD

Antennas

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

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

More Random Headings: Part VI

Last month, author Thurber presented a variety of antenna topics. This month, he continues this series with a look at two interesting antennas, one v.h.f. and the other h.f., catches up on reader mail, and highlights personal computer topics.

Last month in the Antennas column we discussed several topics. These included a simple antenna for the new 30 meter band; a modification of a computer program for radiated power level determination; and a new product, the Ameritron RCS-8 coaxial switch. This time we will catch up on reader mail and will examine two new antenna products, the Butternut 2MCV-5 Super Trombone v.h.f. collinear vertical and the W2BN "BN Cage." We will also highlight some personal computer related topics of interest, including a sample listing of amateur radio, antenna, and electronics software sources. Let's first unzip the mailbag.

Opening the Mailbag

We open on an historical theme with a note received from longstanding, prolific electronics author Carl C. Drumeller, W5JJ, of Warr Acres, Oklahoma. OM W5JJ gently takes us to task for an oversight in Part IV of the Antenna Accessories for the Hamshack series, which appeared in the Antennas column for March 1983. He writes:

"On page 76 of March *CQ* you say the first reference in amateur radio magazines of use of the grid dip meter was in *CQ*, in May 1947. Please take a look at page 41 of the July 1928 issue of *QST*."

"I've followed and admired your series in *CQ*, a magazine that's recovering some of its old excellence. Looking through old amateur radio magazines and very old books on early wireless impresses one as to what very few truly new ideas have been introduced in the past 50 (or so) years!"

Thanks to an outstanding local library, we were in fact able to peruse the July 1928 issue of *QST*, which, incidentally, also contained classic articles by Hiram Percy Maxim and Ross Hull. We found the article by A.E. Teachman "A Resonance Testing Method." This article described the problem of determining whether or not the condition of resonance was satisfied in the single-dial, multiple-ganged, tuning-control broadcast receivers of the day. The apparatus described was called a "grid meter driver." The device had a range of 200 to 550 meters, was battery operated, and made use of a UX199 vacuum tube (fig. 1). The application of this instrument was not unlike that of the grid dip meter of present popularity.

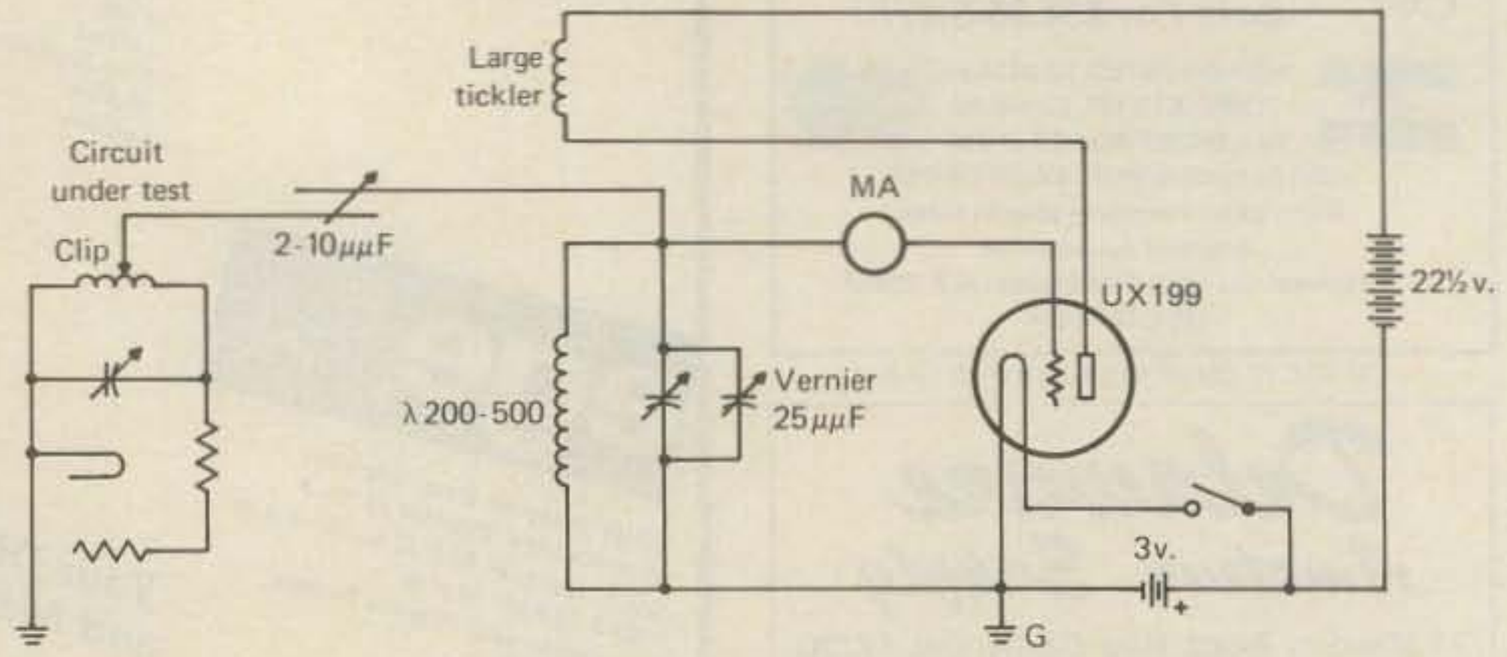


Fig. 1– Shown here is an early version of the grid dip meter. The oscillator depicted above was described as a "grid meter driver." It covered the frequency range of 200 to 550 meters. (From QST, July 1928.)

We stand corrected, although we would not be surprised to find an even earlier reference if one took the time and trouble to research even further the instrument and its antecedents in history. Perhaps one will discover that grid dip meters have actually been in existence almost as long as there were tubes containing grids!

Incidentally, we make an effort to answer all reader mail. We do ask that questions be as specific and discrete as possible. For obvious reasons, it is not practical for us to offer comprehensive technical advice or to present complex designs for antenna systems. Writing to our home QTH, rather than to the magazine, will help speed your reply. S.a.s.e.'s or IRCs are much appreciated, as we, not *CQ*, foot the bill for postage.

Computer Lines

The dramatically increasing range of applications for the personal computer in the home and hamshack will undoubtedly have a considerable impact on amateur radio. This impact is already being felt, notably in the use of personal computers such as the TRS-80, Apple, various Commodores, TI-99/4As, and others being harnessed to RTTY and c.w. hardware and software, with a growing use of computers in SSTV and station control. Other uses for the hamshack computer include various cataloging and recordkeeping activities, traffic handling, DXing, awards tracking, beam pointing, satellite tracking, Morse practice, electronic formula computation, antenna design, and the like.

We are on the lookout for information on various homebrew computer programs, particularly those relating to antenna formulation and design, beam heading, and related areas that might be suitable for mention, or if short and in the public domain, possible listing in the Antennas column. Although your column editor settled on the Commodore computer line (VIC-20 and Commodore 64), we recognize that there are many ardent enthusiasts for other brands of computers, so we'll give equal mention to all comers in the column.

For example, if you have developed an interesting distance calculating program and wish to share it freely with others, and if it is short, you might send it in for possible listing in the column. Or if it is a long one, you might offer to place the program on cassette or disk and supply it to other hams for copying costs and postage. Either way, you should let us know exactly which computer the program runs on and any special configuration used that might limit the program's application. Also, if you have developed a whiz-bang program, whether it be for antennas or another useful amateur radio application, and have the inclination to work it up into a full-fledged article, by all means do so. In this case, send your program article directly to the Editor at *CQ* in New York, rather than to me.

This month I will list a few of the amateur radio, antenna, and general elec-

317 Poplar Drive, Millbrook, AL 36054

Pet/VIC/CBM-64
Baker Enterprises
15 Windsor Drive
Atco, NJ 08004

Apple
A.B. Buscaglia K2NV
2497 W. River Rd.
Grand Island, NY 14072

TRS/80 & Apple
Computer Applications
3628-A Court
Oxnard, CA 93033

VIC & SWTPC 8K
Eagle Software
P.O. Box 982
King of Prussia, PA 19406

TRS-80/Apple/PET
Instant Software
Rte. 101 and Elm St.
Peterborough, NH 03458

TRS-80 Color
J.C. Software
214 South St.
Battle Creek, MI 49015

Apple/Atari/VIC/TRS-80/CBM-64
Kantronics
1202 E. 23rd St.
Lawrence, KS 66044

TRS-80
Micro-80
2665 Busby
Oak Harbor, WA 98277

PET/VIC/CBM-64
Public Domain, Inc.
5025 S. Rangeline Rd.
West Milton, OH 45383

Apple
RCIS, Inc.
2701-C W. 15th St., Suite 228
Plano, TX 75075

PET/VIC/CBM-64
Toronto PET Users Group
381 Lawrence Ave. W.
Toronto, Ontario
Canada M5M 1B9

VIC/CBM-64/ZX-81
RAK Electronics
P.O. Box 1585
Orange Park, FL 32067

VIC
vicCOMM
Box 5491
Duke Station
Durham, NC 27706

VIC/CMB-64
Ham Data Co.
3331 Bybrook Lane
Woodbridge, VA 22192

PET/VIC/CBM-64
Jini Micro-Systems Inc.
Box 274 Kingsbridge Station
Riverdale, NY 10463

VIC
Pro-Com Software
1450 Oak Avenue
Los Altos, CA 94022

VIC/CBM-64
Russ Software Ltd.
P.O. Box 378
Northwest Station
Chesapeake, VA 23322

Apple
C.H. Galfo, WB4JMD
6252 Camino Verde
San Jose, CA 95119

VIC
Walt Grosch, KA9GLB
4880 N. 49th St.
Milwaukee, WI 53218

VIC
Microfish Software Products
P.O. Box 902342
Norcross, GA 30092

TRS-80/CBM-64
Sunderland Software
39256 Sunderland Dr.
Mt. Clemens, MI 48044

Fig. 2– Amateur software sources. Our apologies to any ham software source we did not include. This is a sampling only, and represents the type of list that is likely obsolete as soon as it is printed. However, we hope it will be useful to you.

tronics software sources which I have come across. The list shown in fig. 2 is by no means complete, and no recommendations can be offered. But it may be worthwhile to follow up on those sources of interest for the price of a couple of postage stamps.

In addition to the firms listed, there is at least one magazine devoted to the interface between computers and amateur radio. Not unexpectedly, it is dubbed *Computers and Amateur Radio*, and it is associated with the Kantronics organization. The magazine attempts to bridge the gap between general computer interests and specific amateur radio applications. A one-year subscription (six issues) is $6. The magazine's address is 1202 E. 23rd St., Lawrence, KS 66044.

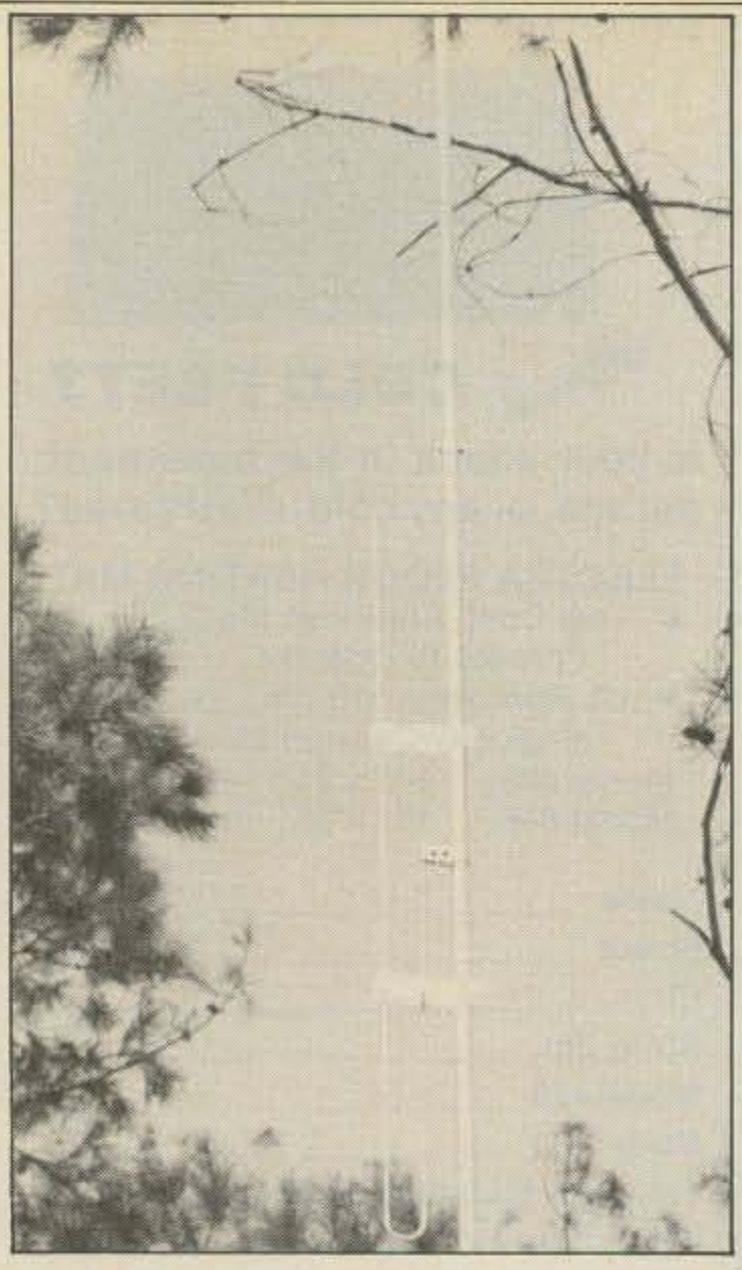
Computer Trader caters to sources of computer and ham equipment, supplies, and software. A permanent subscription is offered for $10 by Computer Trader, Chet Lambert, W4WDR, 1704 Sam Drive, Birmingham, AL 35235. *Nuts and Volts* is a similar publication. A one-year subscription costs $7 from *Nuts and Volts Magazine*, P.O. Box 1111, Placentia, CA 92670.

The Butternut 2MCV-5 Super Trombone

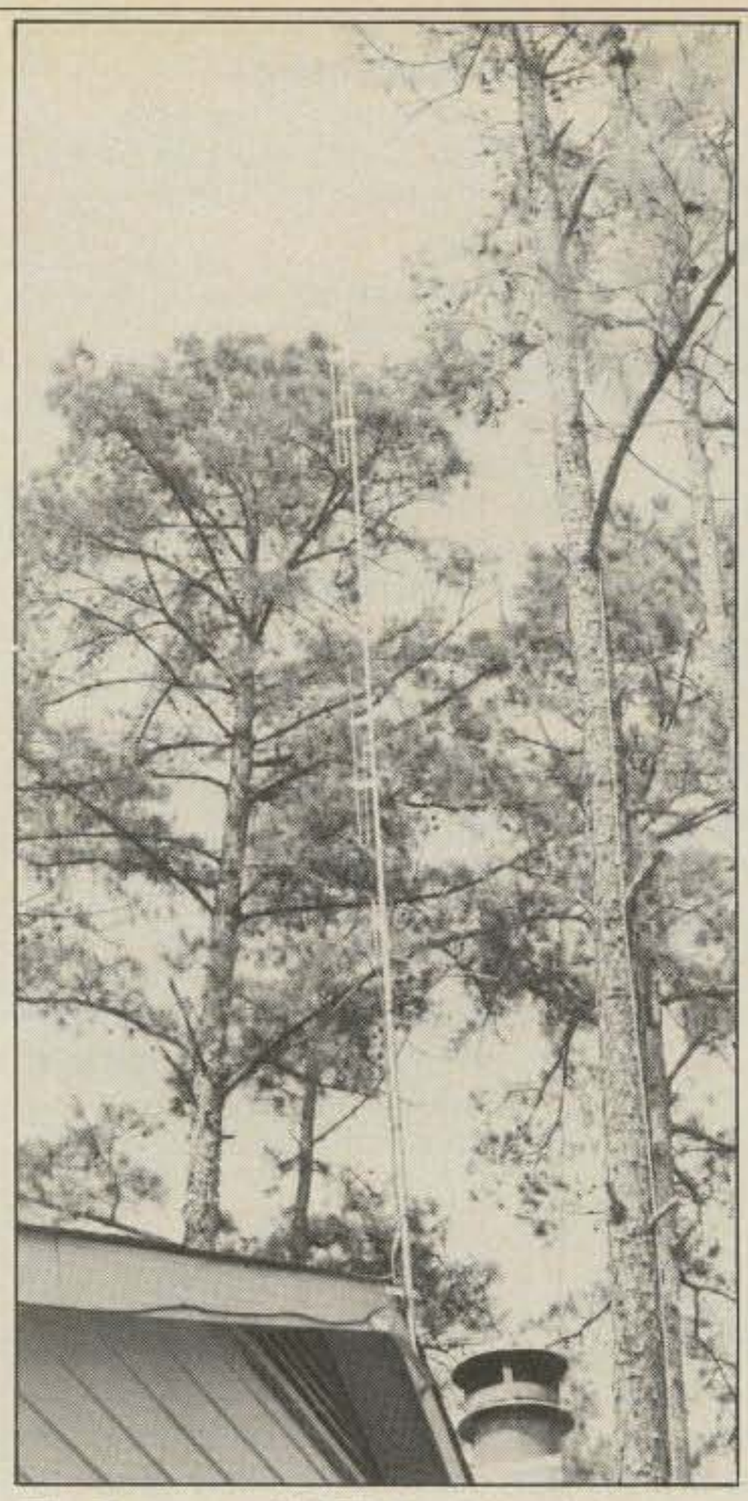
The world of commercially produced gain-type verticals for 2 meters has largely been dominated by makers such as Cushcraft and AEA in recent years, with offerings such as the Ringo Ranger series and the AEA Isopoles. Another up and comer is the Butternut 2MCV-5 Super Trombone, an omnidirectional antenna that provides gain in the vertical plane through phasing of the antenna sections. It is designed to fill the gap between the smaller Trombone and commercial stacked dipole arrays.

Butternut came up with the original Trombone design about five years ago in a search for a product that would hold its own against the Ringo Ranger and other comparable gain-type verticals. The feed chosen was originally a series feed, but this was later dropped in favor of a gamma assembly for the twin advantages of d.c. grounding and ease of s.w.r. adjustment. The result was the 2MCV Trombone and later the 2MCV-5 Super Trombone, which we highlight this month.

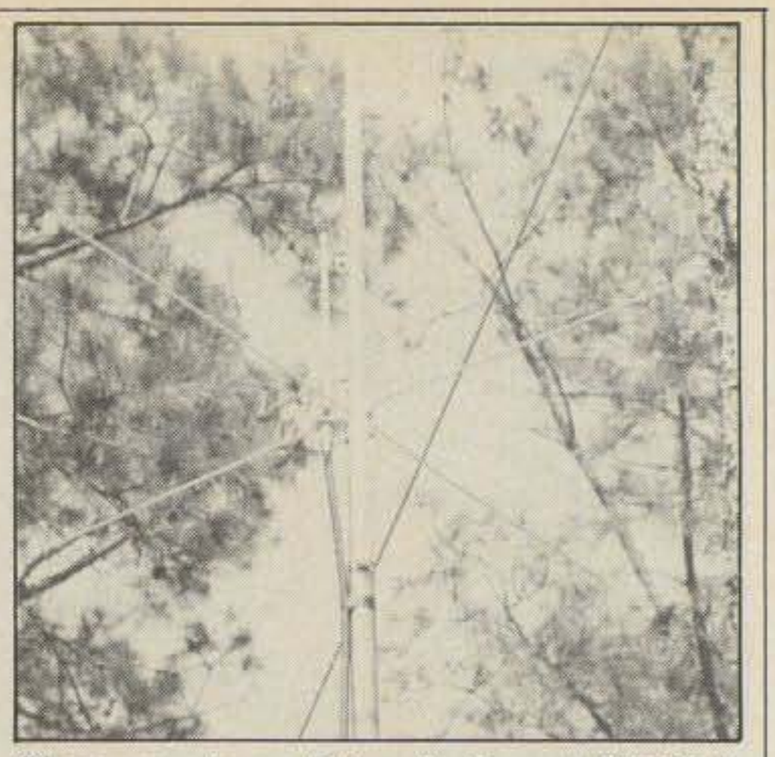
From a technical standpoint, a look at the Trombone design (fig. 3) shows that it is a version of the basic coaxial antenna. The Trombone relies on halfwave, in-phase radiating elements, with end-to-end separation of about one-half wavelength, for its collinear gain. A basic assumption inherent in the design is that there is no significant radiation from the Trombone sections themselves, and also that the discrete half-wave radiating sections plus the quarter-wave ground plane at the base produce about the same gain as a greater number of half-wave in-phase sections compressed into the same vertical space.



One of the two "trombone" sections of the Butternut 2MCV-5 "Super Trombone" 2 meter gain antenna, as shown in the author's installation. Note that the section does not require that the antenna radiating element be broken by an insulator, which would reduce overall strength of the antenna.



The Butternut 2MCV-5 as installed on the peak of author's home. Total antenna length is 185.5 inches, or 4.71 meters.



Close-up view of the Butternut 2MCV-5 antenna's ground plane and gamma match. Although adjustable by the user, the gamma match is factory preset and normally needs no adjustment; it did not in the author's installation.

"Bottoms-up" photo of the lower trombone section and the ground-plane radial assembly. The antenna is gamma matched for 50 ohm coaxial cable.

As with regular coaxial designs, the structure's height could be increased by adding additional Trombone and half-wave radiating sections for a further increase in gain. However, the Super Trombone's overall length of 185.5 inches, with its two Trombone sections, probably represents something close to the point of diminishing returns, where further addition of Trombone and half-wave radiating sections would extract a heavy price in terms of more massive construction and overall cost, not to mention increased susceptibility to storm damage and other possible mechanical problems. Interestingly, Don Newcomb, W0DN, Butternut's President, believes that it probably would be feasible to add another Trombone and its associated half-wave radiating section to produce a "2MCV-7" (consisting of three Trombone sections and four radiators), but on the other hand, a "2MCV-9" might not yield significantly better performance.

This past winter your column editor obtained one of the Super Trombones to replace another 2 meter antenna that had become damaged when hit by a tree limb propelled by strong winter winds. I found that the 4 pound Butternut antenna was quite easy to install per the detailed two-page instructions supplied; the instructions included a large sketch showing all parts and dimensions. The only problem encountered was a mismatch in the hardware set provided, which was actually for a previous version of the antenna. Butternut caught the error and shipped the correct hardware set almost immediately, without even being asked to do so, so construction and installation were not delayed.

All materials furnished were of high quality, and the hardware was of the stainless steel type. The antenna is sturdy, so it should stand up well in use, especially since the main part of the five-element antenna consists of telescoping aluminum tubing which is unbroken by insulators. The continuous-length design does not require the usual "sheath" of fiberglass to provide structural rigidity and to protect the various interconnections. I mounted the antenna on a short length of 1 inch O.D. mast, the length of which is not critical and does not have any significant effect on antenna performance.

The gamma match at the base of the antenna provides a d.c. ground. It is factory preset for a reasonably low s.w.r. over the 146 to 148 MHz range, so normally no adjustment is required. Adjustment was not required in the author's installation, where an approximate 1.1:1 s.w.r. was encountered over nearly the entire 2 meter band. However, if the lowest possible s.w.r. at some particular frequency is required, adjustment can be made by slightly loosening the outer portion of the gamma clamp so that the small capped tube is free to slide along the insulated wire coming from the SO-239 connector. The amount of overlap between this tube and the wire determines the amount of capacitance in the gamma circuit. By varying the overlap in small increments, a low s.w.r. should be attained. If further adjustment is required, the position of the gamma clamp along the larger tube can be changed. Actually, it is usually not worthwhile to make adjustments unless the s.w.r. is above, say, 1.5 to 1, since line losses from the lower s.w.r.'s are not much greater than losses in the

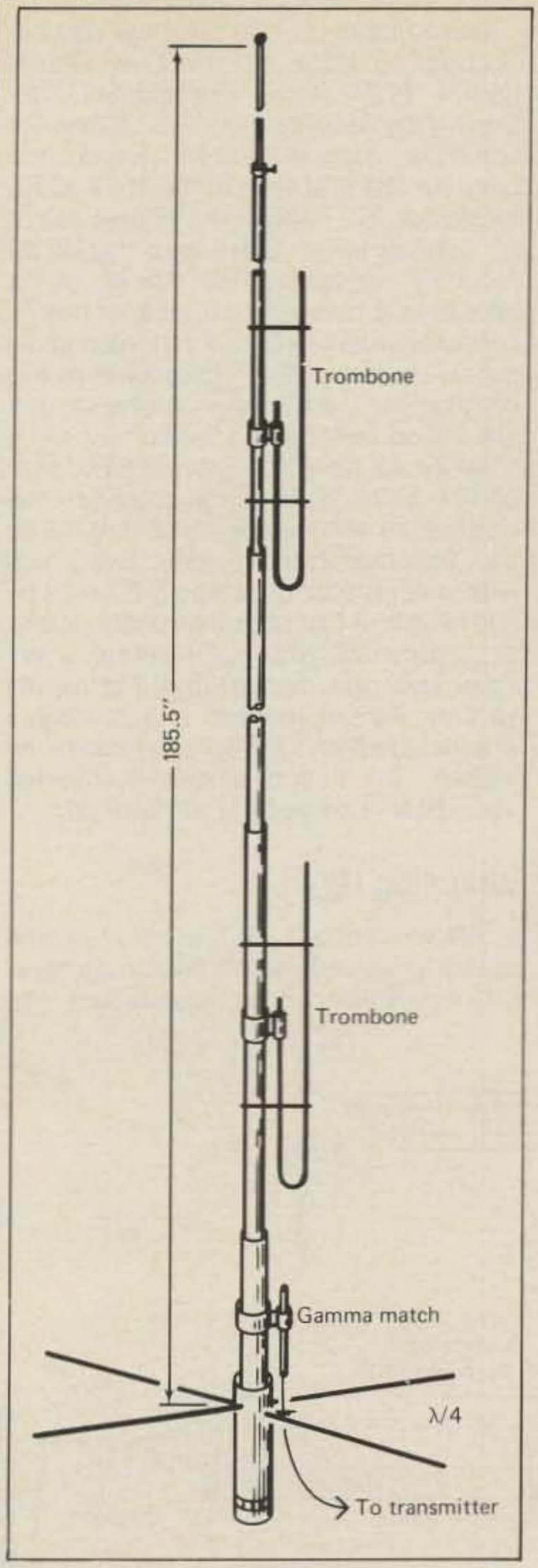
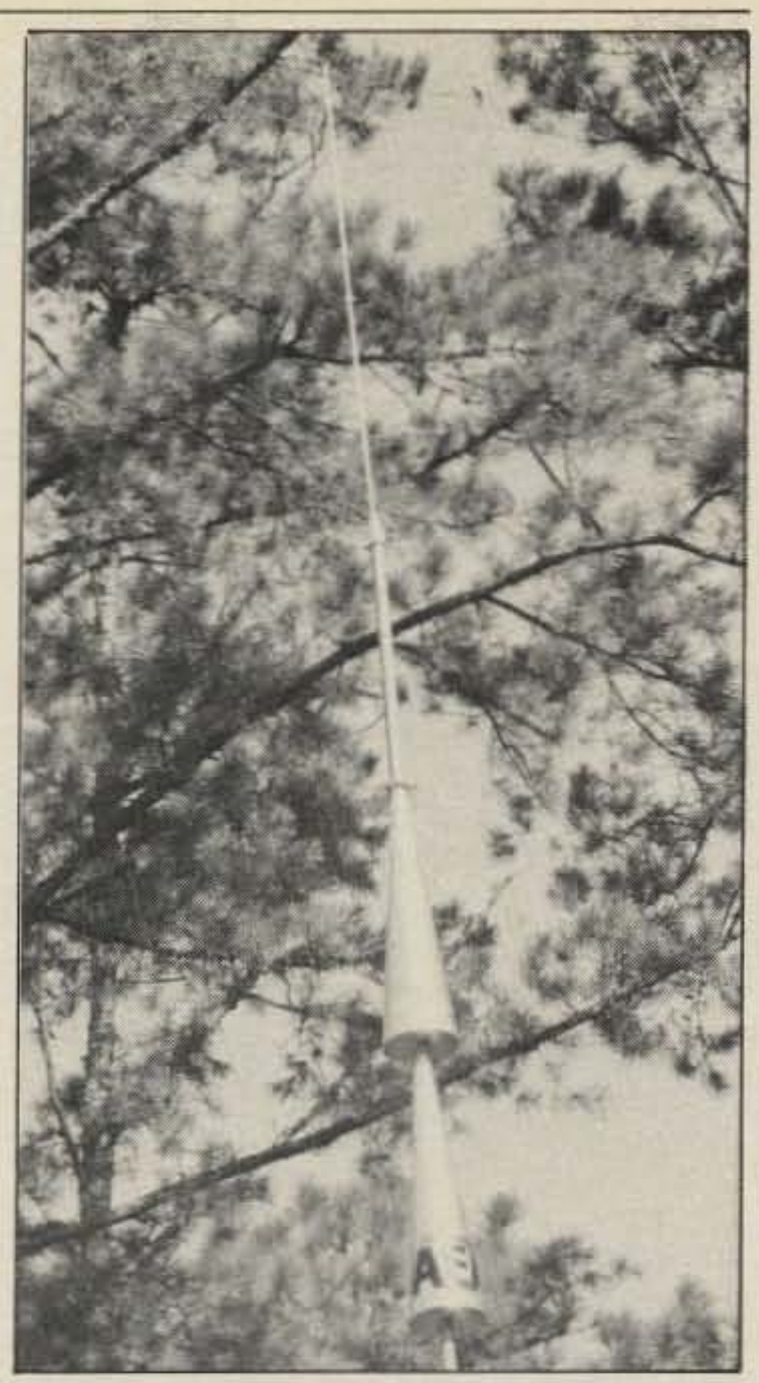


Fig. 3– The Butternut 2MCV-5 v.h.f. collinear is shown here (not to scale). The 2 meter antenna consists of three half-wave radiating sections, two "Trombones," and a quarter-wave ground radial assembly. See the accompanying text for details. Also see the April 1983 issue of CQ for John J. Schultz's comprehensive review of the earlier 2MCV collinear.

same line when perfectly matched. Still, RG-8/U or similar low-loss cable should be used. I used the relatively new low-loss RG-8X small diameter coax, which is easy to handle.

How did the antenna work? Quite well, to be sure. While a 5 dB gain figure over a quarter-wave antenna is specified by the manufacturer, no attempt was made to measure actual gain; Butternut does not "pitch" gain as a primary selling point. Also, although the Butternut unit does not



A close competitor to the Butternut Trombone is AEA's IsoPole, shown here in the author's installation. Line decoupling is a major design feature of the AEA vertical. (W8FX photo)

make a point of advertising line decoupling, no untoward effects of "r.f. on the feedline" were noticed. I expect that line coupling problems should not be a concern in most hamshacks.

Something to consider in certain installations is the overall length of the 2MCV-5, which at 185.5 inches is substantial—certainly not a short antenna when considering that the band is 2 meters. Thus, it may not be the antenna to install where extremely high winds are encountered, or where the antenna is subjected to possible "hits" from nearby tree limbs and branches. Nevertheless, the wind survival of the antenna is rated at 90 mph by the manufacturer.

The WJCP Cage

Not long ago an interesting "reinvention" came to our attention: the "BN Cage," offered in a 1980s-style version by David C. Johnson, W2BN, of West Jersey Communications Products. His antenna, shown in fig. 4, is a modification of the old cage of the early years in radio (fig. 5). This was a classic antenna which was quite popular for its great bandwidth, but was normally designed for use with open-wire feeders and required an antenna tuner for proper operation. The antenna was formed by several parallel conductors spaced around the edge of a frame or circle hub and connected together at their ends.

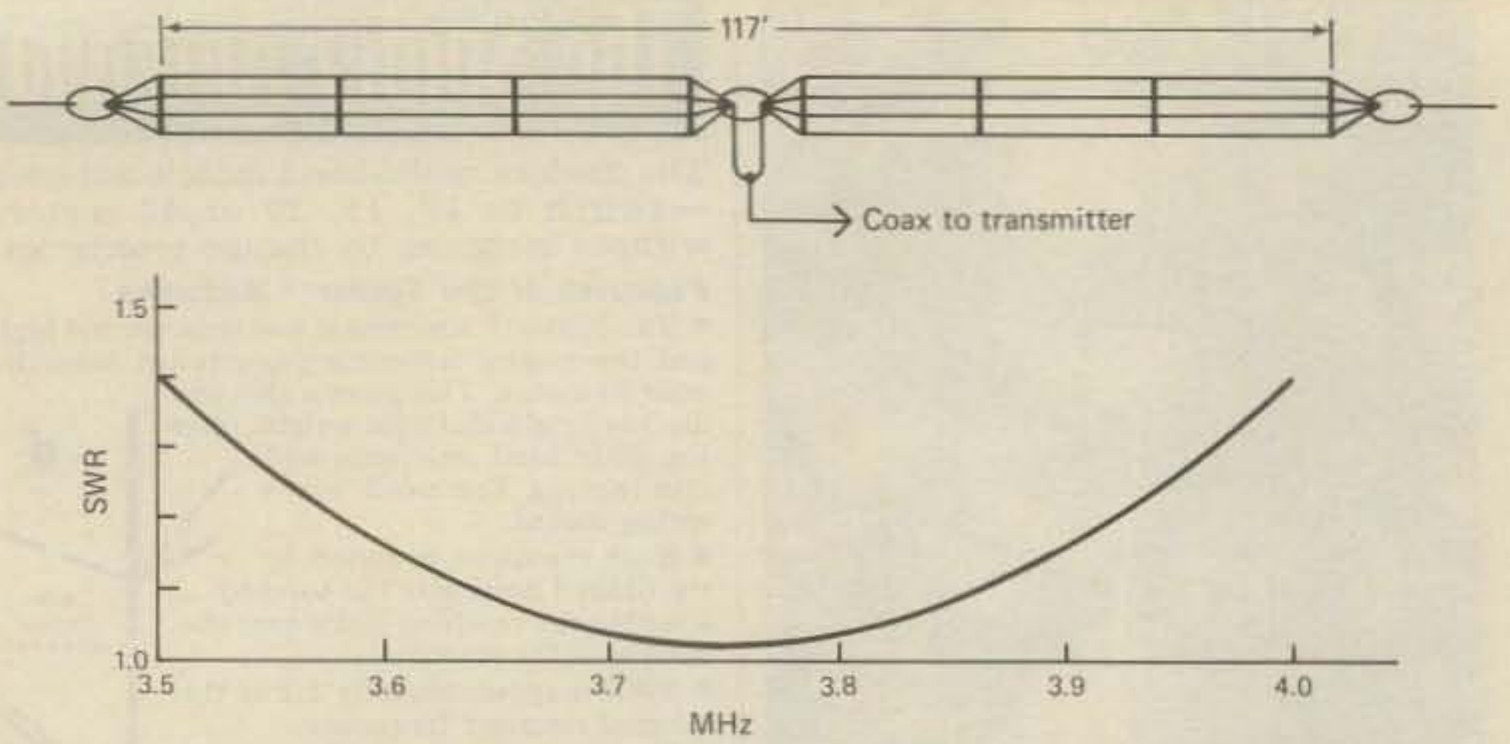


Fig. 4– The sketch shows the WJCP BN Cage, which makes use of six wires in each dipole leg (for clarity only four are illustrated), and eight molded spreaders to provide proper separation for the wires. The 80 meter version (Model 8075) uses nearly 800 feet of #14 coated wire and is approximately 117 feet in overall length, somewhat shorter than a conventional half-wave dipole. The manufacturer recommends installation at a height of at least 36 feet and spacing of at least 10 feet from other antennas. Typical s.w.r. figures are claimed to be 1.4:1 or less over the entire 3.5 to 4.0 MHz band, as indicated in the figure. (From WJCP product literature, ©1982 WJCP.)

Dave Points out that the cage was described as early as 1927 in Gernsback's *1927 Radio Encyclopedia,* although the antenna had been in use for some time even at that point. He saw the cage for the first time in the 1947 ARRL handbook, but relegated it to the back of his mind at the time. He feels that he effectively reinvented the wheel, so to speak, as it pertains to the cage; from a patent search he learned that the original patent ran out in 1931. Thus, patents are pending for new design formulas, the special spreaders, and feeds.

While we have not assembled or tested one of the W2BN cage antennas, the design has been simplified so that the kit can be assembled in about 3½ hours with one person, or in about 2 hours by two people. A five-page instruction manual is provided with each antenna. We have seen the manual and it is clearly written. ABS spreaders and insulators are included, and the antenna can be installed as a flattop, sloper, or inverted vee. It can also be bent as required.

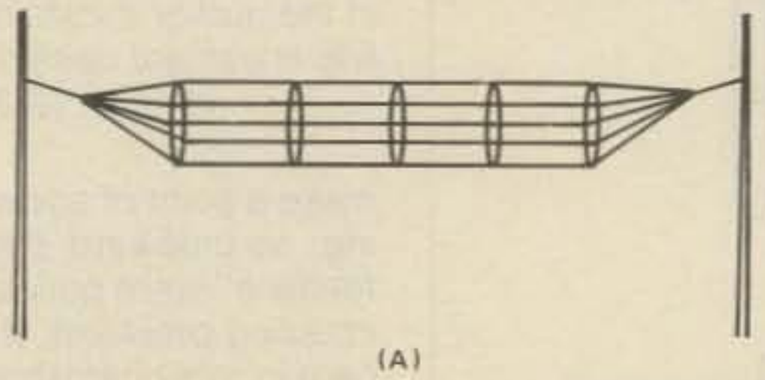
According to Dave, W2BN, his objective was to come up with a good broadband antenna for 160, 80, or 40 meters that would solve the perennial problem of effectively covering an entire h.f. band (160, 80, or 40) with a low s.w.r. (say, under 1.5:1), and that would require no balun or antenna tuner. What resulted was the coax-fed "BN Cage," a refinement of the classic cage mentioned above. The W2BN version is designed for 50 to 75 ohm direct coax feed and is at least 10% shorter than a standard dipole. Three standard models are available: one for 80/30/10 meters (making use of well-known odd harmonic relationships for three-band operation), one for 40/15 meters, and one for 160 meters only. Government, MARS, and special frequencies are available on request.

From a technical standpoint, the rate of change of reactance with frequency for a center-fed horizontal halfwave dipole is much greater than the rate of change of resistance with frequency. For this reason, any practical means that will reduce the reactance variation rate will increase the inherent bandwidth of the antenna. The use of large-diameter conductors or a cage of small conductors will provide increased bandwidth. The cage configuration is a very practical means of dipole broadbanding that has been adapted by W2BN in his design. As indicated, the overall length of the antenna is shortened somewhat as the diameter is increased, owing primarily to end effects.

The big advantage of the cage, of course, is that the use of multiple wires for each element of the dipole simulates a very thick effective conductor size, thus broadening the antenna's bandwidth. The effect noticed is very similar to that of vertical antennas made of large-diameter aluminum tubing or pipe, where bandwidth is markedly increased over that of a single, thin-diameter conductor. It is more pronounced than in the folded dipole antenna, which is actually an elementary cage.

Wrapping Up

We've run out of available column space this month, so it's time to lay down the typewriter, er, wordprocessor. We



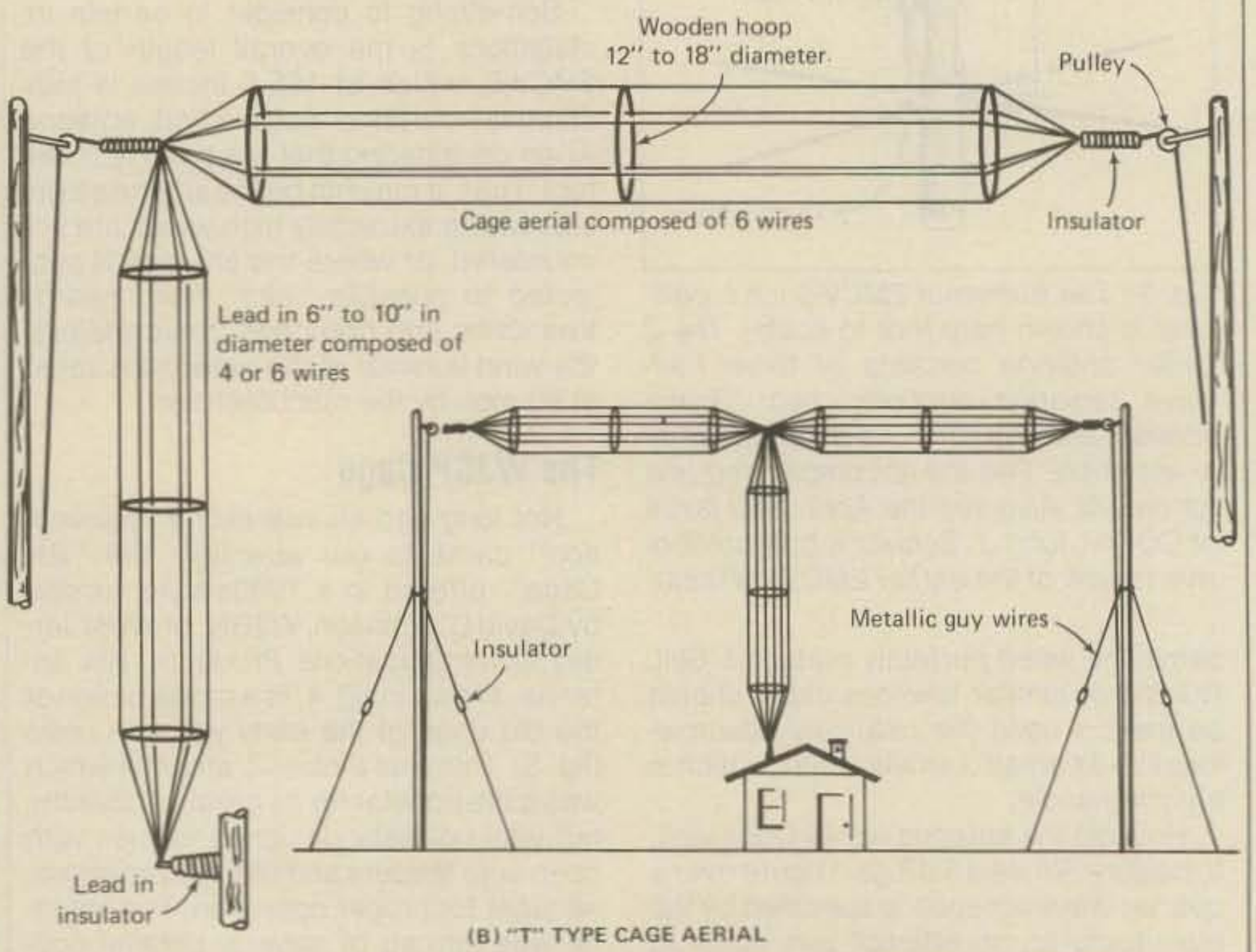


Fig. 5– The sketch (A) above represents the basic cage of classic design. Cages were usually configured as inverted L and T types, as shown in the lower sketch from Gernsback's 1927 Radio Encyclopedia.

ICOM IC-751

The New Standard of Comparison

NEW Competition Grade Transceiver!

ICOM is proud to announce the most advanced amateur transceiver in communications history. Based on ICOM's proven high technology and wide dynamic range HF receiver designs, the IC-751 is a competition grade ham receiver, a 100KHz to 30 MHz continuous tuning general coverage receiver, and a full featured all mode solid state ham band transmitter, that covers all the new WARC bands. And with the optional internal AC power supply, it becomes one compact, portable/field day package.

Receiver. Utilizing an ICOM developed J-FET DBM, the IC-751 has a 105dB dynamic range. The 70.4515MHz first IF virtually eliminates spurious responses, and a high gain 9.0115MHz second IF, with ICOM's PBT selectivity. A deep IF notch filter, adjustable AGC and noise blanker (can be adjusted to eliminate the woodpecker), audio tone control, plus RIT with separate readout provides easy-to-adjust, clear reception even in the presence of strong QRM or high noise levels. A low noise receiver preamp provides exceptional reception sensitivity as required.

Transmitter. The transmitter features high reliability 2SC2097 transistors in a low IMD (-32dB @ 100W), full 100% duty cycle (internal cooling fan standard), 12 volt DC design. Quiet relay selection of transmitter LPF's, transmit audio tone control, monitor circuit (to monitor your own CW or SSB signal), XIT, and a high performance speech processor enhance the IC-751 transmitter's operation. For the CW operator, semi break-in or full QSK is provided for smooth, fast break-in keying.

Dual VFO. Dual VFO's controlled by a large tuning knob provide easy access to split frequencies used in DX operation. Normal tuning rate is in 10Hz increments and increasing the speed of rotation of the main tuning knob shifts the tuning to 100Hz increments automatically. Pushing the tuning speed button gives 1KHz tuning. Digital outputs are available for computer control of the transceiver frequency and functions, and for a synthesized voice frequency readout.

32 Memories. Thirty two tunable memories are provided to store mode, VFO, and frequency, and the CPU is backed by an internal lithium memory backup battery to maintain the memories for up to seven years. Scanning of frequencies, memories and bands are possible from the unit, or from the HM 12 scanning microphone. In the Mode-S mode, only those memories with a particular mode are scanned; others are bypassed. Data may be transferred between VFO's, from VFO to memories, or from memories to VFO.

Features. All of the above features plus full function metering, SSB and FM squelch, convenient large controls, FM option, a large selection of plug-in filters, and a new high visibility multi-color flourescent display that shows frequency in white, and other functions in white or red, make the IC-751 your best choice for a superior grade HF base transceiver.

Options. External frequency controller, external PS-15 power supply, internal power supply, high stability reference crystal (less than 100Hz, −10°C to +60°C), HM12 hand mic, desk mic, filter options:

SSB: FL70
CWN: FL52A, FL53A, FL32
AM: FL33

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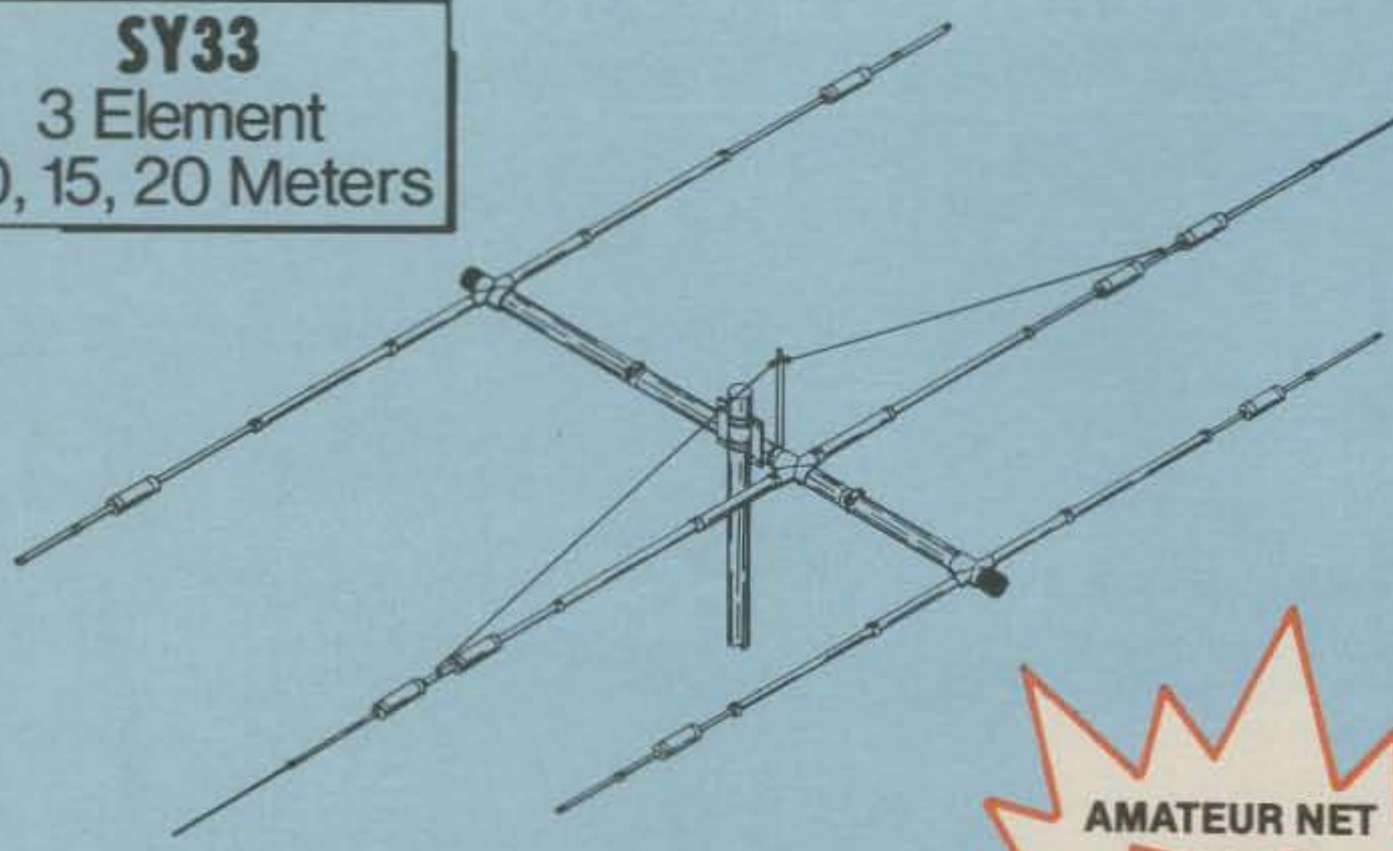
3 Element
10, 15, 20 Meters



Band MHz:	14-21-28	Longest element:	27'4"
Maximum power input:	legal limit	Turning radius:	15'9"
Gain (dBd):	up to 8 dB	Maximum mast diameter:	2" O.D.
VSWR at resonance:	1.3:1	Surface area:	5.7 sq. ft.
Impedance:	50 ohms	Wind loading at 80 mph:	114 lbs.
F/B ratio:	up to 20 dB	Assembled weight (approx.):	37 lbs.
Boom (O.D. x length):	2" x 14'4"	Shipping weight (approx.):	42 lbs.
No. elements:	3	Direct 52 ohm feed no balun required	
		Maximum wind survival:	100 mph

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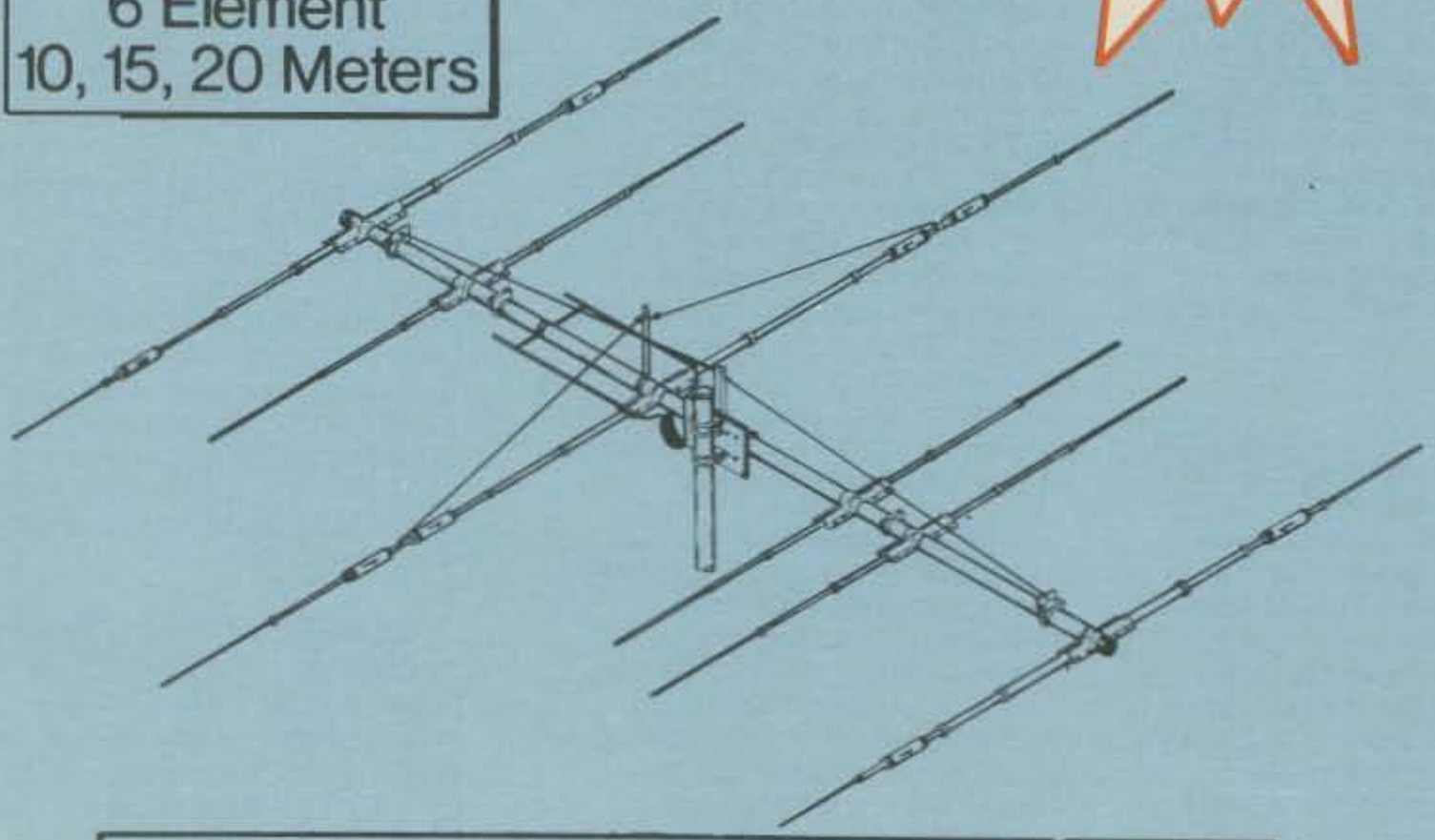
SY36
6 Element
10, 15, 20 Meters



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.
F/B ratio	up to 20 dB	Assembled weight (approx.)	53 lbs.
Boom (O.D. x length)	2" x 24'2½"	Shipping weight (approx.)	62 lbs.
No. elements	6	Maximum wind survival	100 mph

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(10 - 40 METERS)
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- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
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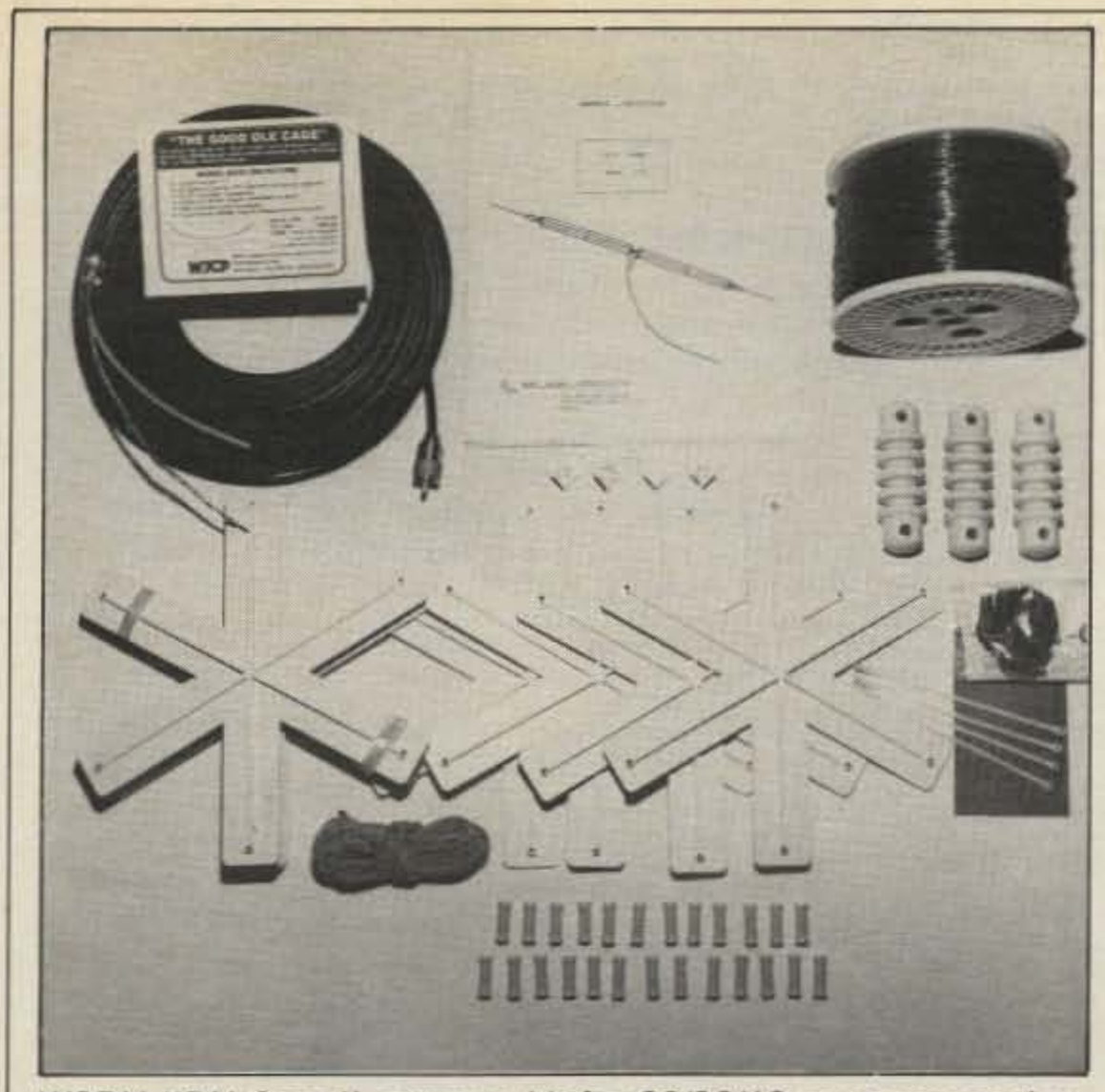
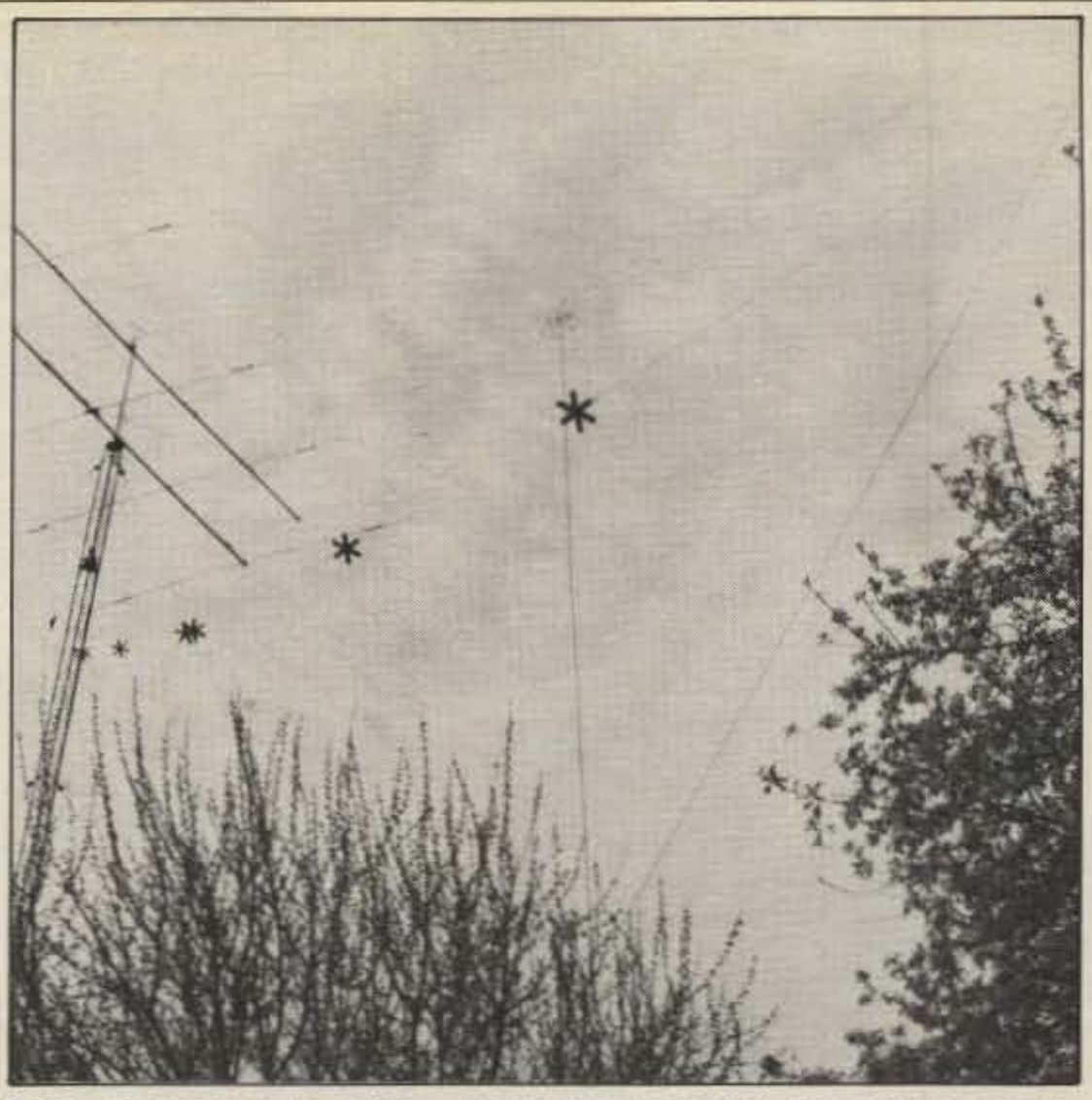


W2BN "BN Cage" antenna kit for 80/30/10 meter operation. The antenna is something of a reincarnation of a very popular aerial from the earliest days of radio. (Photo courtesy W2BN)



Cage antennas in place. Note the special spreaders used. The antennas are designed to cover a certain band, or harmonically related bands, with a very low s.w.r. across the entire band. (Photo courtesy W2BN)

have caught up on some reader mail and examined two new antenna products: a commercial v.h.f. collinear and a modern-day version of the classic h.f. cage. We've also highlighted some personal computer and amateur radio software sources. Next month, we will examine several additional antenna topics of timely interest. See you then.

73, Karl, W8FX

Bibliography

Gernsback, S. *1927 Radio Encyclopedia.*

LaPort, Edmund A. *Radio Antenna Engineering,* First Edition, McGraw-Hill Book Company, Inc., New York, 1952.

Product literature, 2MCV-5 Super Trombone Antenna, Butternut Electronics Co., Rte. 2, Box 356E, San Marcos, TX 78666.

Product literature, BN Cage Antenna, West Jersey Communications Products, 932 Oakland Avenue, Burlington, NJ 08016.

Teachman, A.E. "A Reasonance Testing Method," *QST,* July 1928.

Thurber, Karl T., Jr., W8FX. "Antenna Accessories for the Hamshack: Part IV," *CQ,* March 1983.

July Column Correction

In the July Antennas column on page 72 we made an error in the first formula of the text. We omitted parentheses, thereby changing the entire meaning of the formula. It should have appeared as follows:

$$\% \text{ Reflected power} = \frac{Pr}{Pf} = \left(\frac{SWR - 1}{SWR + 1}\right)^2$$

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2N6083	(s)	30W	130-175	9.75
2N6084	(s)	40W	130-175	12.00
2SC1955	—	1W	130-175	15.00
2SC2289	—	5W	130-175	20.00
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BC-221 FREQUENCY METER A/C supply $35, Hickock M/C Tube Tester $30. SASE for T/E List. K6KZT, 2255 Alexander, Los Osos, CA 93402.

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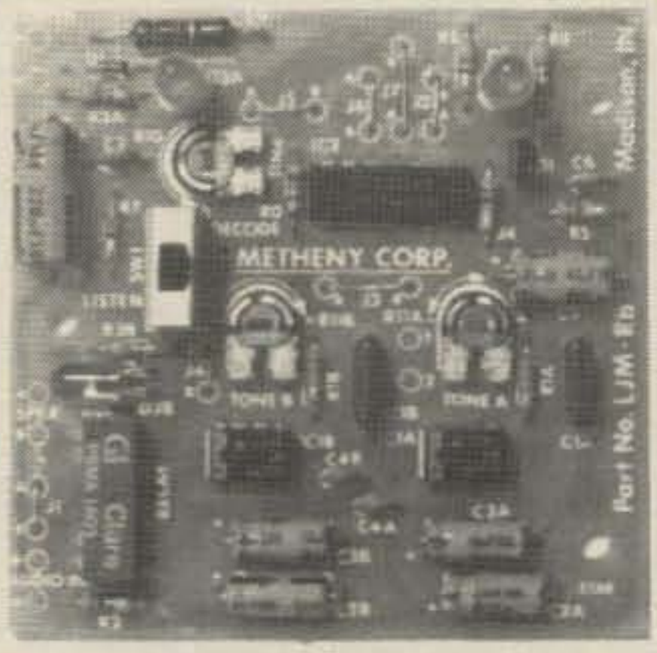

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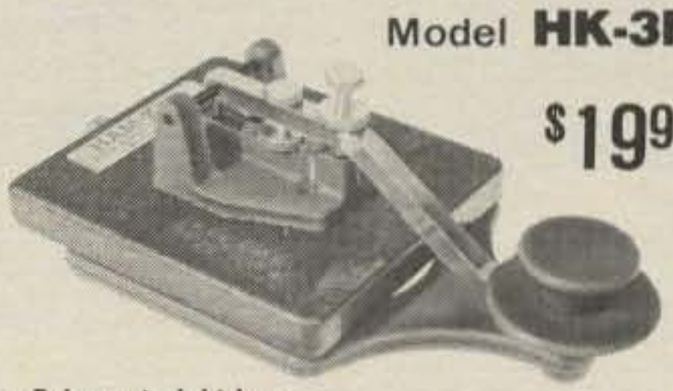

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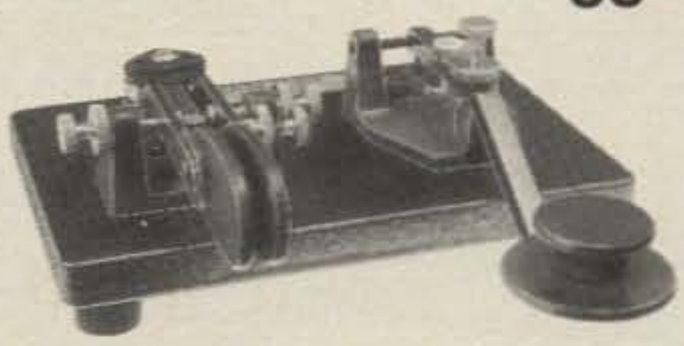

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NICAD'S AA's 50¢, Sub C's $1.00 2/3A's 50¢, 1/3A's 25¢, cells removed from part working battery packs. Write Howard Weintraub, 1059 2nd Ave., N.Y., N.Y. 10022. Call (212) 223-0757.

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.

COMMODORE 64 CW INSTRUCTOR PROGRAM. Generates C.W. on TV speaker. Random code, keyboard input, or prerecorded "CW Tests." Character speed and spacing set independently. Designed for classes and increasing code speed. $15.00—diskette or cassette (specify). N7BCU, Dennis Olver, 20909 S. Ferguson Rd., Oregon City, OR 97045.

WANTED: Old Radio Transcription Discs. Any size, speed. W7FIZ, Box 724, Redmond, WA 98052-0724.

SPARK KEYS wanted for my collection. Also large or unusual radiotelegraph keys, sideswipers, military/spy keys, foreign keys, and pre-1950 bugs. K5RW, 1128 Midway, Richardson, TX 75081.

BEAM HEADINGS AND TRUE NORTH TABLES FOR YOUR QTH. Three Lists: DXCC Countries, States, True North Tables. $6.00. K1WB, 460 Hale St., Suffield, CT 06078.

YAESU 901DM w/ lopass fltr in mint cond, $650 or best offer. Must sell. W6EHW 213-553-1185, or write to Steve Kanne, 2029 Century Park East, #3750, Los Angeles, CA 90067.

COMPUTER SOFTWARE for VIC-20, Commodore 64; Ham and educational programs from $6.95. Write ELECTRONIC PUT-ONS; 7805 N.E. 147th Ave., Vancouver, WA 98662.

AMATEUR RADIO SOFTWARE our specialty at RAK Electronics. "HAM ANTENNAS" available for your VIC-20, COMMODORE 64, PET, ATARI, and SINCLAIR for a low $5.95. SWL RTTY/MORSE lets your Commodore 64 or VIC-20 "listen in" on the world of Radioteletype and Morse Code (receive only)—$19.95. VIC MORSE/RTTY II send/receive for your VIC-20—$34.95. C64 MORSE—$17.95. Free catalog by writing or calling RAK Electronics, Box 1585, Orange Park, Florida 32067-1585 (Phone 904-264-6777). Please add $2.00 shipping per order.

BADGE ENGRAVING. Call, name, and state silhouette. Popular colors. Engraving, 1005 W. Strub, Sandusky, OH 44870.

FOR SALE: New Kenwood TS-930S HF Transceiver, New Kenwood Speaker SP-930, New Kenwood Microphone MC-60, Swan Mark-I 2000 watt Linear Amplifier, Heathkit SB-634 Station Console, Heathkit SB-614 Station Monitor, Heathkit SB-604 Speaker, new Power Scanner Model PDC-700 multi-function meter. All for $2500.00. Leaving area, must sell. Call Tom at 412-728-3249.

SATELLITE TRACKER: Tape program for VIC-20 or C-64 (specify). Find orbits accessible from your QTH for OS8, RS5/6/7/8. SASE for information. Check or MO for $10.95 to USEFUL Software, P.O. Box 115, Lake Elmo, MN 55042.

H*A*R*K: Nonprofit SWL group forming. SASE. TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

NEIGHBORHOOD BROADCASTING LTD.? $1.00. TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

AAA WANTED: Old Western Electric Equipment (Tubes, Amps, Mixers, Consoles, Receivers, Drivers, Tweeters, Horns, Speakers, Parts, Others), RCA Tubes (45, 50, 245, 250, 211, 845), McIntosh or Marantz Tube-Type Components. Tel.: 213/576-2642, David Yo, POB 832, Monterey Pk., CA 91754.

MFJ-721 SSB/CW Filter, A.C. Adaptor, Mint, $30.00. R.C.W., 3534 Edison Rd., Cleveland, Ohio 44121.

YAESU FT-102 TRANSCEIVER, bought May 1983, like new condition, with mic and all packing material. Will demo on air. Pick-up preferred. $649.00. WB2MQK (212) 263-3365 eves.

SALE: Waters B.P. Filters, 50 and 144 MHz, $12 each. E. Erickson, W2CVW, 343 Catherine St., So. Amboy, NJ 08879.

HELP: Junior High School 180 would appreciate donations of books, equipment, magazines, parts, etc., for Amateur Radio Program. G. Skloot, KE2N, JHS 180, 320 B. 104 Street, Rockaway Park, N.Y. 11694.

COMMODORE-64/VIC-20 Amateur log and dupe check. $11 cassette, $13 disk. G. Delano, 2400 Hubert, Bakersfield, CA 93308.

BURGLAR ALARM BUSINESS BOOMING. Learn now. Information package $2.00 postpaid. SECURITY ELECTRONICS INTERNATIONAL, P.O.B. 1456-TQ, Grand Rapids, Michigan 49501.

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FOR SALE: DRAKE TR4C, MS4, AC4, clean, $500.00. Call John, anytime (215) 476-6094.

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OLD TIMERS: Collector looking for old bugs. Vibroplex, McElroy, Martin, Bunnell, etc. Neal McEwen, K5RW, 1128 Midway, Richardson, TX 75081.

10 METER QRP: Palomar SSB-500 conversion. 40 channel USB/LSB/AM, wide range VXO with channel overlap. Mobile mount, mic, & manual. $100 or trade for? N4ATM.

FOR SALE: B&W T-R switch, $15; B&W 750A inductor, $65; Heathkit CM-1050 Engine Analyzer, $85. Don Bishop, NØEA, 561 Geneva #100, Aurora, CO 80010. Phone (303) 363-8070.

FOR SALE: Complete Apple II system hardware and software. Will sell as package or separately. Write or call for complete list. M.W. Babb, N4PF, 506 Westwood Drive, Louisville, KY 40243. Phone (502) 245-3660.

TI99/4A COMPUTER SOFTWARE: Cassette & disk programs available. For complete software list send sase to WA3RSK, 5720 East Pine Drive, Riverdale, MD 20737.

MINT TS-120S plus mobile mount $485, H.B. 2-M 8877 w/o p.s. $500, or unopened Alliance HD-73 $95. All postpaid in 48. W8TN, 104 Henrietta St., Ravenswood, WV 26164.

AUTEK QF1A Active Audio Filter, CW, SSB, excellent condition, $45 firm, I ship. Ron Mendel, 38013 Academy Dr., Lake Villa, IL 60046.

HEATHKIT SB-102, P.S., SP-600, C.W. filter, $275, you ship. Other ham gear, SASE. WA2YGU, 12 Madaline Drive, Edison, NJ 08820. Phone (201) 753-5298.

SELL: LAFAYETTE HE50A 10M Xcvr with VFO, $35, excellent. R. Sever, 424 Browning Ave., No. Canton, OH 44720.

COLLINS 51S-1 and 55G-1 L.F. Tuner. Extra mint condition, always covered, w/ manuals, $1700. H. Marhoff, 980 7th St. NW, Largo, FL 33540. Phone (813) 584-2988.

QSL PRINTING: High tone, engraved from your "shack photo" or anything else! 100 up, low cost, photo, call, SASE to: QSLs, Box 9064cq, Newark, NJ 07104.

FOR SALE: HD-15 Phone Patch $35; Leader LBO-511 Oscilloscope $80; National NC-57 General Coverage RCVR $60. Plus shipping. KC4HN (804) 336-5918.

FOR SALE: TS130V $425. VFO 230 $225. Phone Gerry (715) 369-3891.

FOR SALE: Midland 13-882C CB converted to 10 mtr., MOONRAKER 4 four-element beam (makes excellent 10 mtr. ant.). WANTED: external VFO for KENWOOD 520S. KBØWM, Rt. 2, Box 75, Trenton, MO 64683.

KENWOOD 830-S, SM-220 Scope with BS-8 plus Rohn HDBX 48, TH6 DXX with Balun, Ham III Rotor. All mint. ½ price $1,200. WB7SOH, (503) 523-3212.

FOR SALE: Kenwood TS820S with CW filter, SP820, VFO820, and MC50 mike. $700 you ship. KEØC, (612) 459-3701.

WANTED: Dumont Model 330 electronic switch. Michael Stasiak, 3819 White Ave., Baltimore, MD 21206. Phone (301) 426-5810.

ELECTRONIC AVOCATIONS CARD! SASE TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

WANTED: Wilson WE-800 in good shape w/all accessories. Have some gear will trade if interested. A.E. Brown, P.O. Drawer EE, Stafford, TX 77477.

HT-220 MOTOROLA 450 MHz Walkie with Rapid Charger, 2 Antennas for sale, $225. Call Bob, W5XC, At (713) 498-8300.

SELL: Four brand new unopened 4PR400A Eimac Tubes. Cartons have the original seals from Eimac factory. Price $80.00 each. Call Irv (216) 371-2513.

FOR SALE: Parks Model 144-1 2-meter converter (26–30 MHz IF) $30; Gonset 2-meter Communicator IV $75; Gonset Model 3357 VFO for 50-144-220 MHz w/built-in FM mod. $35; Ameco Model CMA 12 v. mobile solid state converter 80–2 meters w/crystals for 6 & 2 (600–1600 kc IF) $35. All of above MINT. U pay UPS. E. Taylor, W7BYF, 2921 Loyola Dr., Davis, CA 95616 (1-916-756-7372).

FED UP WITH CONTEST QRM? SPLIT-FREQUENCY DX QRM? Express your disgust in writing to Wireless Institute of New Orleans, Box 6541, New Orleans, LA 70174.

WANTED: Heath HG-10B VFO. Dale, WA7SIF, (702) 871-5865, 3955 Belhaven St., Las Vegas, NV 89117.

WANTED: Rohde Schwarz Network Analyzer ZWA with manual or just manual VE3BVX, 58 Albert N., Lindsay, Ontario K9V 4J8 Canada.

ANYBODY OUT THERE willing to donate printed QSLs? Surely somebody prints them and it would not hurt to donate a batch. Gary Mitchell, KH8AC (Samoa), c/o Box 1536, Hilo, HI 96720.

WANTED: Old RCA & Western Electric Tubes, also Western Electric speakers, Amplifiers. Call 713-728-4343. Maury Corb, 11122 Atwell, Houston, Texas 77096.

FOR SALE: FRG-7, 4 kHz filter (Gilfer), Mint, $260. RCW, 3534 Edison Rd, Cleveland, Ohio 44121, Phone 216-291-3950.

"SPECTACULAR DISCOUNTS" Kenwood R-2000 $509.95, R-1000 $414.95, R-600 $339.95, FRG-7700 $439.95, RF-3100 $266.95. Bearcat BC-100 $288.49. Regency D810 $259.95. ICOM R70 $669.95. Frequency Directories, Cordless Phones, Radar Detectors, TV's, CB's, Antennas, Marine Radios, 2-way Headsets, SONY 2002 CALL!! Much, Much More. FREE UPS SHIPPING To 48 STATES. Picture Catalog $1.00 (REFUNDABLE 1st ORDER). GALAXY ELECTRONICS, Box 1202, Akron, OH 44309. Phone (216) 376-2402.

MICROPHONES: Best prices—new and used Amateur, Professional, Commercial mics. Microphone Specialists, Box 1372, Burnsville, MN 55337.

TIMEX SINCLAIR RTTY: Connect your TU to this interface, load the included tape, and you're on the air. Full-feature ML software for 2K TS 1000—split screen, 288 character type ahead buffer, auto CR & LF, etc. Specify two baud rates (45 to 300) and formats (Baudot or ASCII); e.g., 45 Baudot and 110 ASCII. TTL model $60.00, RS232C model $70.00. Thomas R. Strohl KA1VW, Rt. 1 Box 123, Hope Valley, RI 02832.

RG303/U and Ferrite beads for W2DU's balun (*QST* Mar. 83) HF $8, VHF $6 ppd.; COPPERWELD (tm) 30%-18 ga 3*, 14ga 6*; all amateur wire and cable (Belden & generic); LARSEN ANTENNAS; UNADILLA; JANEL; Custom QSL's; Crystals . . . . All from CERTIFIED COMMUNICATIONS, "the CB to 10 meter people," 4138 So. Ferris, Fremont, MI 49412.

FREE CATALOG. Sophisticated IC's and Quality components. Best prices on Tantalum and Electrolytic Capacitors. GOLDSMITH SCIENTIFIC, Box 318A, Commack, New York 11725.

SINCLAIR/TIMEX: Software for dupe sheet, log, antenna design, WAS, DXCC, $4.95 ea. SASE for information. Kentronics, P.O. Box 586, Vernon, AL 35592.

SELL-TRADE: Heath HW100 xceiver, $100. HP23A P.S. for HW100, $25. Isotron 80, 40M mini ants., like new, $75 both, $40 each. Heath IM-5218 VTVM w/probes, like new, $75. Will trade for ?? Card to KA7HRE, Box 3218, Polson, MT 59860. Call (406) 883-5079.

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.

"IN BAND" Gated Sync Jerrold Type Descrambler for Cable Ready Television Sets (except Zenith) $139.95. Kit $99.95. Info? S.A.S.E. ALLSEN Electronics, Box 2125, Vero Beach, FL 32960.

MUST SELL: ELDICO 10 to 80 mtrs with special (MARS) mode. XMTR T102, RCVR R104, Control unit M-135 (phone patch), power supply P109, rel type S119 amateur special SSB. communication system. Excellent condition with manual $300.00. Will ship. Ernie Hawran, 2909 West Hazelwood St., Phoenix, AZ 85017. Phone 602-249-3118.

DRAKE TR-7, NB, four filters, FA-7; PS-7, FA-7; SP-75; MS-7; 7077; R-7, NB, four filters; MS-7; TR-7 service manual; TR-7/R-7 service kit; 1548 R-7/TR-7 cable interface. Original factory boxes and manuals, like new condition, no modifications, no service work has been required. $1,695. W4TYC, Russ, 703-297-5263.

FT-707 OWNERS: FV-707DM Memory VFO used 2 hours. Mint, like new, in box. U.P.S. $169. FT-707 service manual $15. Drake C-4 station console, antenna switch, Powermaster. Like new with manual, U.P.S. $269. Ken Diaz, VMFAT-101 Radar, MCAS, Yuma, AZ 85369. Phone 602-726-2013, Midnite PST only.

FOR SALE: Vic-20 accessories. Super Expander, Heswriter, Programmers Aid, and 8K Memory Expander cartridges. Also Cardco Cardboard/3 expansion board and miscellaneous items. Karl Thurber, W8FX, 317 Poplar Drive, Millbrook, AL 36054.

CQ DX'er—SAVE MONEY—4 Rare antique maps: the World, Europe, the Americas, Africa. Full-color reproductions, each suitable for framing, and lend visual excitement when mounted. Printed on heavy, luxurious 17"x 24" antique stock. Looks great on ham shack wall. $10.95, + $2.40 shipping and handling. D. Wyatt, 30 East 54 St., Brooklyn, NY 11203.

ANTIQUE RADIO CATALOG: 16 pages of tubes, parts, literature, and more. Send $1.00 to Antique Electronic Supply, 1725 W. University, Suite #2, Tempe, AZ 85281.

ROSS $$$ NEW BARGAINS: MFJ-1224 $89.90, 941C $89.95, 313 $33.95, 250 $29.95. ROBOT RB-800 $439.90. ICOM IC-751 $1,254.65, IC-451A $729.90, IC-551D $569.90, IC-471 $799.90. Every day is ICOM day at Ross's. KENWOOD TS-430S $779.90, TS-930S $1349.90, TW-4000A $539.90, TM-201A $329.90. YAESU FT-708 $259.90, FT-726R $709.90, FT-ONE $2,149.00. Complete KENWOOD, YAESU, ICOM, DRAKE, etc., lines in stock. USED KENWOOD TS-130S $499.90, TS-120S $449.90, TS-520 $429.90. 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.

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If there is one place in your station where you cannot risk uncertain results it is in your antenna.

The Palomar Engineers R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. All this in one measurement reading. And it works just as well with ham-band-only receivers as with general coverage equipment because it gives perfect null readings even when the antenna is not resonant. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals. No station is complete without this up-to-date instrument.

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NOW YOU CAN MEET THE NEW FCC RULES!

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And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! How's that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BX86	289	24	313
HBX48	48 ft	10 sq ft	303	BX87	369	26	395
HBX56	56 ft	10 sq ft	385	BX88	449	30	479
HDBX40	40 ft	18 sq ft	281	BX87	339	26	365
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Check these features:

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Up to 400 ft via UPS

- RG-213/U—95% Bare Copper Shield
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- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

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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

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Cable Type	UHF FML	UHF MALE	N FML	N MALE
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Silver PL259 . . . . $1.25 Nickle PL259 . . . . $.90
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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
28DQ 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

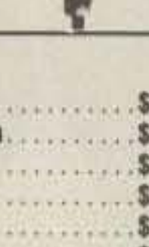
HYGAIN/TELEX CRANKUPS

ON SALE! FREIGHT PAID! SPECIAL PRICES! SAVE$$!

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!

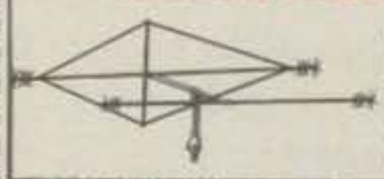


- Model LT 200W UHF Type . . $19
- Model HT 2KW UHF Type . . $29
- Model LT/N 200W N Type . . $39
- Model HT/N 2KW N Type . . $44
- Model R-T 200W Deluxe . . . $29
- Model HV 2KW Deluxe $32

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

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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
Call For Special Price
On All AEA Products.

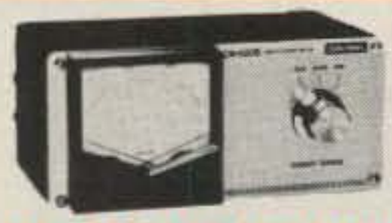
RF POWER LABS AMPLIFIERS

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
PB-30	$21	PB144	$21
PB-50	$21	PB220	$21



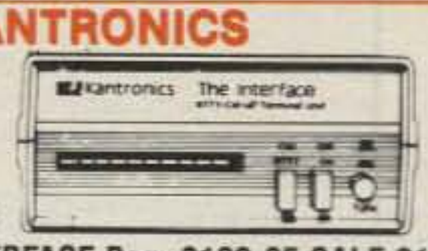
DAIWA CN-620B $111!
160/2 mtrs
20/200/2000 wts

BENCHER PADDLE
BY-1 Blackbase $39
BY-2 Chrome $49

MFJ MODEL 104 On SALE For Only $33!

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
9408 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

YAESU SALE!

FT-ONE

GENERAL COVERAGE—ALL MODE DELUXE SOLID STATE TRANSCEIVER

Buy Now and Receive These Accessories Free:

300Hz CW Filter..$FREE	600Hz CW Filter..$FREE
800Hz CW Filter..$FREE	6Khz AM Filter..$FREE
Memory Backup..$FREE	Installation.....$FREE

List Price $3074. CALL FOR YOUR SPECIAL PRICE!
Quantities Limited — Hurry!

FT-980

CAT SYSTEM—Computer Aided Transceiver

- Wide Dynamic Range • Low Noise Front End
- General Coverage • 10Hz Digital Readout
- All Mode Transceive—CW/SSB/AM/FM/FSK!
- Full Break-in CW • RF Speech Processor
- Variable Bandwidth • IF Shift • APF/Notch
- AC Power Supply • Adjustable Noise Blanker
- 12 Internal Digital VFO's with Memories
- Much, much more—call or write for info

Computer Interface now in development—
Own Tomorrow's HF Transceiver—Today!!
Manufacturer's Suggested List Price $1499
Call For Your Special Price Today!!

FT-102

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—

List Price $1149—Call for Special Low Texas Towers Discount Price and Save $$$

FT-77

New 80-10mtr Compact HF Transceiver

- Digital Readout • Adj Noise Blanker
- CW/SSB/FM Modes • CW Wide/Narrow
- Optional AC Supply, CW Filter, FM Unit External VFO, Antenna Tuner Available

List Price $599—Call for Special Low Texas Towers Discount Price and Save $$

FT-230R 2mtr FM.....$359
FT-730R 440Mhz FM.....$399

- 10 Memories • Two VFO's
- LCD Readout • 25W Out
- Memory or Up/Down Scan

Call today for Special Discount Price & Save $$

FT-726R VHF/UHF
All Mode Tri-Band Transceiver

- 50-54 Mhz
- 144-148 Mhz
- 10 watts output on all bands
- 430-450 Mhz
- 21, 24.5 & 28 Mhz option available soon

Please Call For Price & Delivery Information

VHF/UHF Multimode Portables

FT-690R 50Mhz.....$379
FT-290R 144Mhz.....$399
FT-790R 430Mhz.....$399

Call today for Special Discount Price & Save $$

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!

Manufacturer's List $499—Call today for Your Special Discount Price!!

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

Call for Special Yaesu Discount Prices!!

IMPORTANT — Prices shown are suggested by the Manufacturer.
You can Save Money with a Big Texas Towers Discount!
Call today for our Special Yaesu Sale Prices and Save $$$!!

ETO ALPHA

76PA $1699

ALPHA 78

ALPHA 374A

SPECIAL SALE PRICES

Model	List	Sale
77DX	$5450	*
78	$3495	*
374A	$2595	*
76A	$1985	*
76PA	$2395	*
76CA	$2695	*

***Sale Prices Too Low To Print!!**
Call For Your Special Prices!!

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
- Built-in Balun for Balanced Feedline

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