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Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

DECEMBER 1997

Season's Greetings

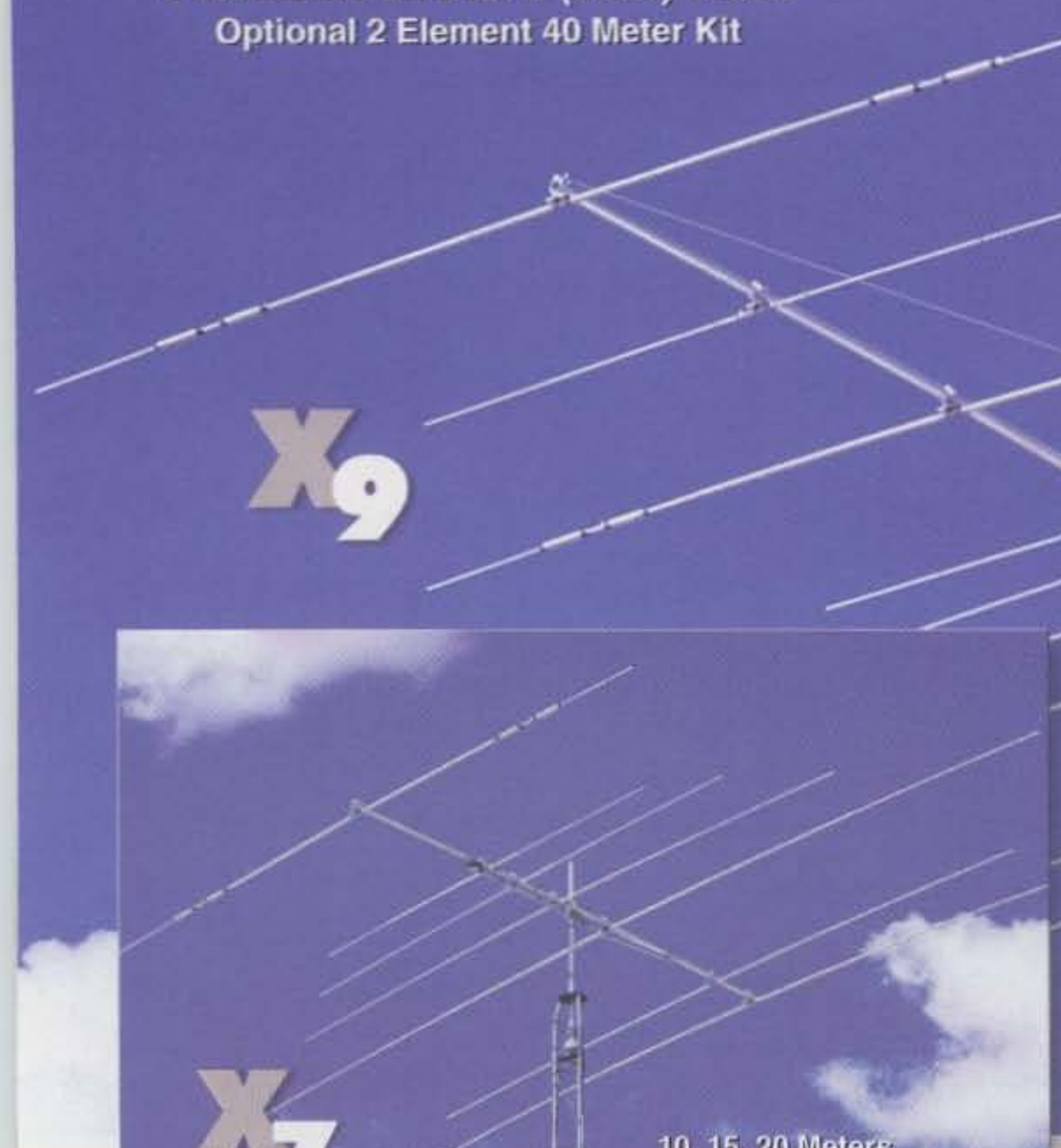
the Kachina 505DSP
ntrolled HF transceiver

RADIO AMATEUR'S JOURNAL

10, 15, 20 Meters
9 Elements on a 28 ft (8.6m) Boom
Optional 2 Element 40 Meter Kit

BIG THUNDER SERIES

X9



X7

10, 15, 20 Meters
7 Elements on an 18 ft (5.5m) Boom
Optional Driven Element for 40 M

Boom to Mast Clamp

Element to Boom Mounting

The Performance Tribander for the DX Years Just Ahead

- **New High Efficiency Computer Optimized Design for Maximum Gain and Ultra Clean Radiating Pattern**
- **100+ MPH Construction for Best Reliability and Long Life**
- **NEW *4L Log Cell* Driven Elements for better VSWR Bandwidth**
- **Trapless Driven Elements and Reflectors for Reliable Power Handling**
- **Interleaved Element Design for Mono-Band Performance**
- **Add-on kits available for 40 Meters**

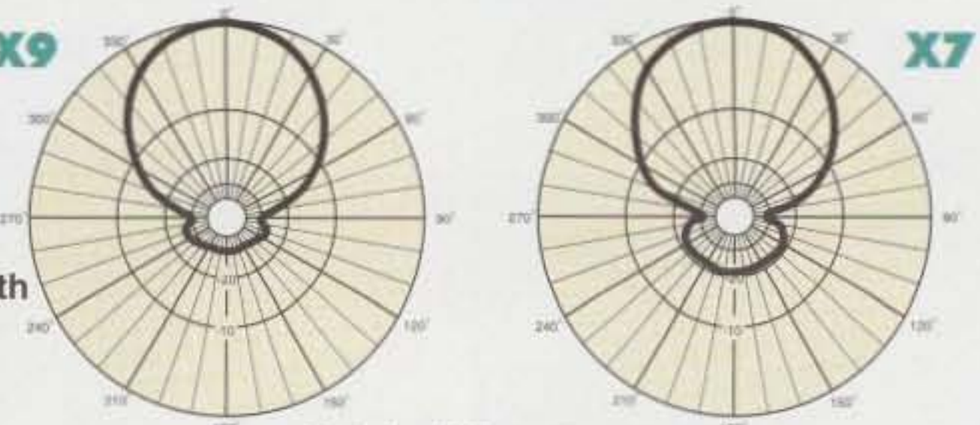
The new X9 and X7 Triband Yagis are geared to set new standards in both radiating performance and mechanical reliability. Cushcraft's product development team has employed the latest computer modeling technology to achieve a superior electrical design as well as elegant new mechanical hardware and assembly techniques.

Each mechanical component was designed to 100+ MPH wind survival with a 1.25 safety factor. Traps were eliminated from the high current driven elements and reflectors using the new *4L Log Cell* design, which yields virtual monoband performance and maximum power handling capability. Traps are employed only in the lower current directors for increased gain and sharper pattern. The result is a truly high performance antenna family which will easily handle the legal limit.

SPECIFICATIONS		X9	X7
Frequency Coverage (Meters)		10, 15, 20	10, 15, 20
Total number of Elements		9	7
Maximum Gain (dB)	20M	13.0 @ 14 deg	12.5 @ 14 deg
@ One Wavelength	15M	13.9 @ 12 deg	13.0 @ 12 deg
	10M	14.0 @ 15 deg	12.9 @ 14 deg
Maximum Front to Back Ratio (dB)		30	30
Number of Elements per Band		4	3
VSWR Minimum		1.1:1	1.1:1
VSWR 1.5:1 Bandwidth (KHz)	20M	350	600
	15M	450	750
	10M	1500	1700
Longest Element, ft (m)		36.5 (11.12)	37.2 (11.33)
Turning Radius, ft (m)		21.7 (6.61)	20.0 (6.09)
Boom Length, ft (m)		28 (8.53)	18 (5.49)
Boom Diameter, in (cm)		2-1/2 (6.35)	2-1/2 (6.35)
Maximum Mast Diameter OD, in (cm)		2-1/2 (6.35)	2-1/2 (6.35)
Maximum Wind Survival, mph (kph)		>100 (>161)	>100 (>161)
Maximum Wind Surface Area, ft² (m²)		9.9 (.92)	7.9 (.73)
Windload @ 80 mph, lb (kg)		255 (116)	202 (92)
Maximum Power Handling (KW)		2	2
Weight, lb. (kg)		85 (38.5)	60 (27.2)
List Price		$995	$675

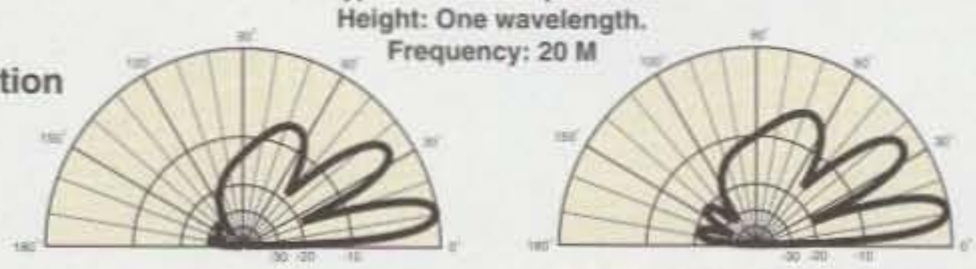
X9 X7

Azimuth



Typical radiation patterns.
Height: One wavelength.
Frequency: 20 M

Elevation



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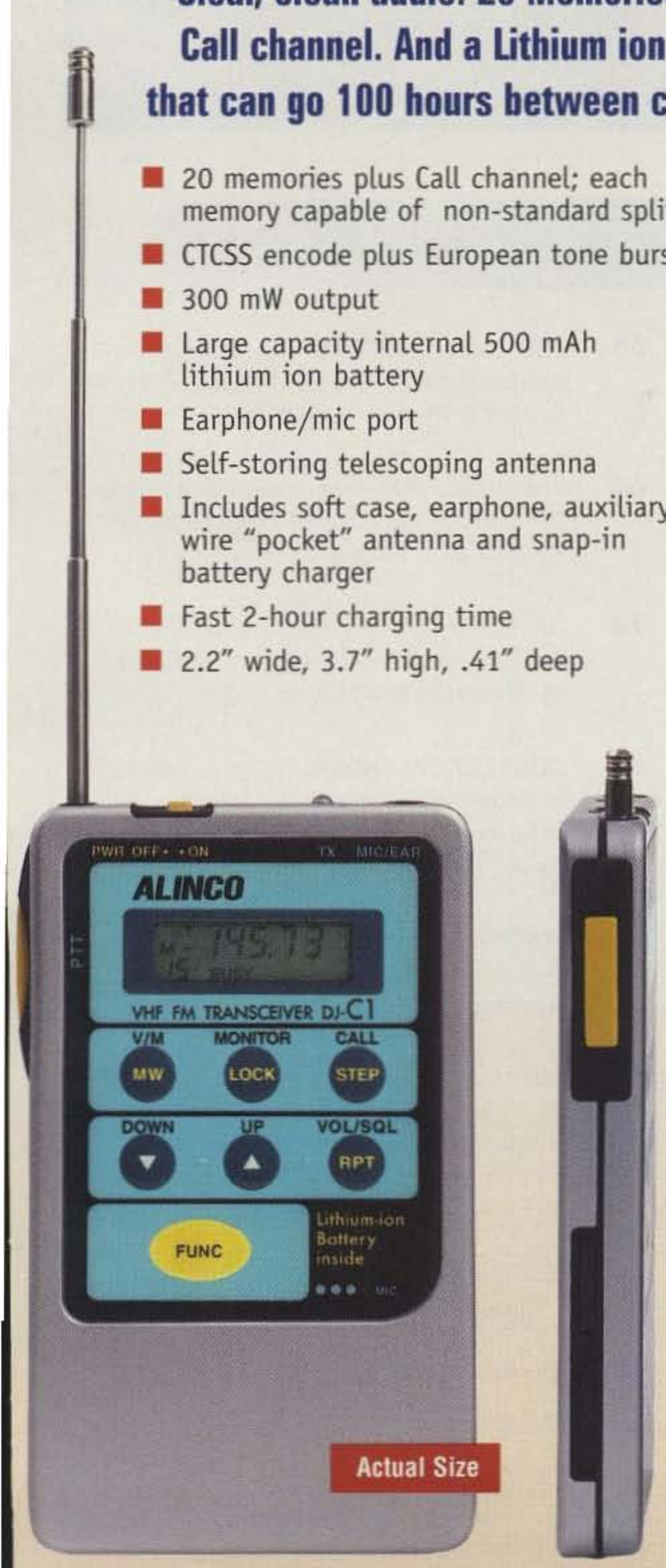
"Beyond Amazing"
Alinco Presents The Mini HT

So slim, *it hides in a shirt pocket.*
Power to work repeaters many miles away.
Clear, clean audio. 20 Memories plus a Call channel. And a Lithium ion battery that can go 100 hours between charges!

- 20 memories plus Call channel; each memory capable of non-standard splits
- CTCSS encode plus European tone burst
- 300 mW output
- Large capacity internal 500 mAh lithium ion battery
- Earphone/mic port
- Self-storing telescoping antenna
- Includes soft case, earphone, auxiliary wire "pocket" antenna and snap-in battery charger
- Fast 2-hour charging time
- 2.2" wide, 3.7" high, .41" deep



Actual Size

Alinco DJ-C1T 2 Meter (144 Mhz) Mini HT

- 144 ~ 147.995 MHz transmit range
- Extended receive 118 ~174 MHz including air band (AM)

Alinco DJ-C4T 70 cm (440 Mhz) Mini HT

- 420 ~ 449.995 MHz transmit range

The Alinco DJ-C1T and DJ-C4T represent breakthroughs in mini-radio technology. About the size of a credit card, one can be carried in pocket or purse. With it, you're ready to communicate anytime. Whether you're in business attire or running a marathon, these small, lightweight radios are easy to carry and easier to operate. You'll be amazed at the clean, crisp audio. The lithium ion battery is a revolution in power technology, going as long as 100 hours between charges. Be prepared to answer questions from other hams who see your DJ-C1T or DJ-C4T - even seasoned "veterans" have termed these radios "beyond amazing." The only thing we can add to that, is the low Alinco price!

Accessories Available

EDS-7 Adaptor Cable for use with speaker mics and headsets
EDC-36 Mobile charger
EMS-9Z speaker mic (requires EDS-7)
EMS-41 speaker mic (requires EDS-7)

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CQ Amateur Radio

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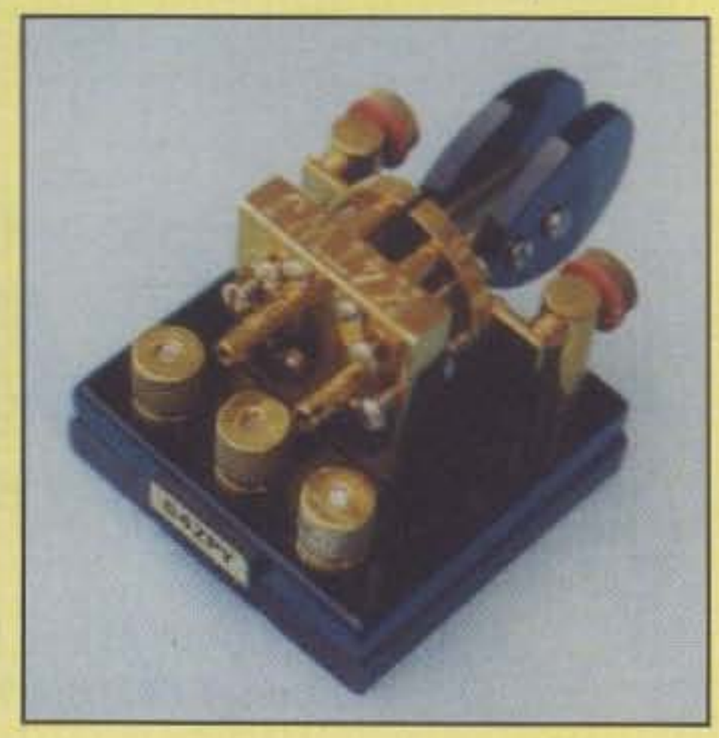

ON THE COVER: Santa has received his gift for Christmas: a Kachina 505DSP computer-controlled HF transceiver. We at *CQ* hope that you, too, have your wishes come true at this holiday season. (Photo by Larry Mulvehill, WB2ZPI)

DSP solution with easy operation.

Kenwood's TS-570D/S HF Transceiver gives you high-end digital performance in an easy-to-use package for any home, mobile or DX-pedition.

TS-570D HF TRANSCEIVER
TS-570S HF + 6M TRANSCEIVER

Cruise the upper reaches of elegant HF performance in a compact, affordable transceiver incorporating advanced **AF-stage DSP** for crystal-clear TX and RX audio, digital filtering for sophisticated signal isolation and extraction, **Central Frequency Control System** for high stability, and a full range of enhanced operator features.

The DSP filters and extracts signals utilizing computer algorithms that would be impossible to match with standard analog circuits. The DSP also provides **CD-class transmit and receive audio quality** that can be shaped at will, and two powerful noise reduction systems: **Line Enhancer Method** for SSB/AM modes, and **Speech Processing** by **Auto Correlation** (SPAC) for CW mode. DSP also enables the **CW-Auto Tune** feature that automatically zero-beats CW signals.

The **Extensive Memory Functions** provide a bank of 100 memory positions split into 90 standard channels for general operation and 10 for programmable VFO, programmable scan and long-term memory. You can scroll memory contents, copy from one memory to another, and lock out specific memory channels. In addition there are **5 quick memories** for storing frequencies and modes on the fly, perfect for the busy DX contester.

The new easy-to-use **Menu System** incorporates **46 menu features** plus an **on-line guide** so you'll never have to drag your owner's manual around again. The **large amber backlit LCD display** provides 4 light levels for clear, concise operational information display under any lighting conditions.

The TS-570D/S exhibits no compromises when it comes to construction and performance. The **continuous-duty 100 watt transmitter** features a large heavy-duty heat sink with integrated cooling fan for non-stop operation even in extreme environmental conditions. The **wide-band receiver** delivers stable coverage from 500 kHz through 30 MHz with dual **pre-amps** and **dual bandpass filters** for exceptional selectivity and sensitivity.

With the features and performance of a high-end radio integrated into an affordable mobile-size package, the TS-570D/S is the perfect choice for the field or to build a full station around at home.

- **Channel scan, program band scan, memory scan with channel lock-out and group channel scan, all with TO (time operated) or CO (carrier operated) resume modes**
- **Compact 10 5/8 inch by 3 3/4 inch front panel size for any mobile installation**
- **Preset auto antenna tuner with 18 sub-bands**
- **Variable electronic keyer with speed settings between 0 and 100 wpm**
- **Packet and FSK features**
- **RCP-2 software for PC-based display and memory configurations**
- **57.6 kbps PC control option via 9-pin D-SUB and RS-232C interface**
- **Memory data transfer between radios (optional IF-232C required)**
- **Full functionality on 6M (TS-570S) including DSP, 100 watts output and preset Auto Antenna Tuner**
- **CW message memories**
- **10-key direct frequency entry**
- **Optional VS-3 voice synthesizer**
- **Optional DRU-3A digital recording unit**

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ZERO BIAS

AN EDITORIAL

I don't know about you, but for me the holiday season is no time for naysayers, malcontents, or conspiratorial junkies. It's a time for fun, family, friends, and yes, fantasy. Somehow, when I think of the holiday season I always think of families, large dinners with friends and relatives, gifts being exchanged, and a warm, comfortable feeling of well being. Over the years I've learned these expectations from radio, books, TV, and classic films such as *It's A Wonderful Life.* While these expectations might be universal, the reality may not always measure up. It's the stuff dreams are made of. Amateur radio is pretty much in the same genre. However, during the course of the year enough dreams do come true, and that keeps the process going for most of us.

This is the emotional time of year when we set aside the subtle differences between want and need and become the poster children for rationalization. Sure, socks are great and you really need them, especially in cold weather, but a new XP50 Zoomer would be a heck of a lot better in the long run. The infinite possibility of breaking a pile-up .27 nanoseconds faster has it all over warm, dry feet. Think about it. We usually buy gifts for loved ones based on the same principles—not necessarily what they need, but what we envision will make their lives happier and better. While this might evoke strange looks from the recipient, trust me; it's a lot wiser and more prudent than giving your significant other another household appliance. An XP50 Zoomer conjures up all sorts of magical fantasy, while a washing machine only bespeaks piles of dirty laundry. It's not quite the same thing.

Over the years, I've suggested that you actually go out and buy your own XP50 Zoomer rather than having to explain why you need it and where to find it at the right price. This has a twofold effect. First, it doesn't embarrass someone who didn't plan to spend "that much" on you or didn't think you were particularly worthy enough. Second, and sometimes more important, it doesn't draw attention to how much money you really have socked into that station. After all, you can only "lose" so many receipts or "win" so many hamfest prizes. This is a good plan that always assures you of getting exactly what you want as long as social conditions don't change.

This year, while I was preparing my own list of "good stuff" that I thought I absolutely should add to my station now that sunspots are on the rise, it dawned on me that things had changed, and maybe not for the better. No, I don't mean any bad news or a catastrophic change had occurred. It's simply that amateur radio has grown up, become somewhat respectable and mainstream. We've evolved, or become almost "so what?" Many years ago, when we were young and real radios glowed in the dark, we were the nerds, the techno-geeks, those who understood and had mastered the secrets of the electron. We communicated to the far-flung reaches of the globe, manipulating strange and exotic equipment that made weird noises. We were the neighborhood wiz-kids, called on to fix things or explain the unexplainable. We reveled in the aura of mystery that we ourselves found simple, as simple as cannibalizing a 630 chassis in less than an hour.

Well, it occurred to me that in recent years we've been surpassed little by little, almost effortlessly, by the new nerds and techno-geeks who are strictly involved with computers. Yes, I know that we as amateurs helped to pioneer the science, and we as amateurs utilize computer technology on a daily basis. But what we do now, for the most part, are practical, useful functions that are not too hard to explain. The new nerd does things which basically are ephemeral, hard to explain in layman's terms, and offer little that most people can relate to. Now that's exciting, cutting-edge, and must be important. Most parents would agree that we should fill our schools with more computers, because whatever it is and does, we want our kids to be able to do it, too. Even during the fabulous fifties, I don't remember parents clamoring with the same vigor to fill the schools with 6L6 rigs.

Now I realize that we face the 1997 holiday season with two distinct mindsets. If it's computer equipment, parents and other gift-givers will spend whatever it takes to get what they perceive as the latest and best stuff available, even though everyone knows that in six months or less the stuff will be obsolete and must be replaced. Part of the joy of ownership is the bragging rights to the money spent on keeping up. With amateur radio it's always been the opposite. For the most part, we'd rather keep hidden what we have and have the acquisition price remain a secret. Maybe we're all ashamed of how little amateur radio costs overall in relation to other pastimes, although for some of us even this amount is too much. Perhaps to a non-amateur, amateur radio has become too prosaic, and we'd better be prepared to buy our own XP50 Zoomer before we're put out to pasture. In any event, the awe and techno-geek image is long gone, so we don't have to explain anymore why we must have a new whatever.

So while we're still left with the last few vestiges of nerddom, we can relax and enjoy the holidays. We can get what we want basically because it's far cheaper and lasts a lot longer than the other stuff. Enjoy your family, enjoy your friends, and look forward to a new and wonderful year. Most of all, take comfort in the fact that no matter what, Bill Gates doesn't have 5 Band WAZ, so there.

New in 1998

There will be a new USA-CA Award Custodian and "Awards" column editor starting with the January issue. Norm Van Raay, WA3RTY, will be stepping down due to a move from Pleasant Mount, PA to Lebanon, PA. Norm's new QTH makes it almost impossible to remain active on the air, so he decided it was time to pass the helm on. We'd like to thank Norm for his devotion and hard work on behalf of all County Hunters. The new USA-CA Award Custodian and "Awards" column editor will be Ted Melinosky, K1BV, a familiar name to many of you who chase achievement awards. Ted has been active in the USA-CA program and has written awards columns in other publications. He also publishes *The K1BV DX Awards Directory,* which lists the requirements for 2250 various operating awards. Incidentally, *QST* in their November issue just gave the book a rave review.

1997

With the CQ World-Wide behind us for another year, the new year offers a tremendous amount of operating excitement as the sunspot numbers continue to increase. While cycles come and go, some things, such as our heroes, are slow to be replenished, or never are. Several of amateur radio's heroes passed away this year, people you assumed, because of their stature, would be around forever. I remember growing up reading their work in both *CQ* and *QST* and being impressed by the clarity of their writing, the unique turn of mind, and mostly the enthusiasm they all brought to their chosen work.

In late September, within a week of each other, we lost Doug DeMaw, W1FB, who came to *CQ* after an illustrious career at *QST,* and Byron Kretzman, W2JTP. Byron was *CQ*'s RTTY Editor for many years and the author of *The New RTTY Handbook,* a terrific book on machines during the green key era. Byron was a consummate builder and was instrumental in the early days of 2 meter FM development.

Another hero who passed away earlier in the year was Ed Tilton, W1HDQ. Ed, who was known as "Mr. VHF," had a long and productive career with the ARRL and was a prolific writer in *QST.* Back in the days when I was KN2EEK, I hung on his every word and probably built everything he described in his column.

Doug, Byron, and Ed all shared a methodical quality to their work and created things that had never been, but seemed simple and logical once you saw them. An amazing gift.

As we enter a new year, let's try to be a little kinder to ourselves and our fellow amateurs. The three heroes above wrote for everyone, not just those they felt were "real." We all contribute to the hobby in some way as it moves through time. These three saw the hobby as a continuum, with change as a natural progression with state-of-the-art technology. We move on and try to embrace what's ahead.

Maybe you don't need or want an XP50 Zoomer or anything else this year, but you can have our best wishes for a very happy holiday season and a bright and wonderful New Year.

73, Alan, K2EEK

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Limited time only

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FEATURES

- Stores 400 Frequencies in memory
- Records up to 255 hits per frequency
- 10 digit LCD display with 16 segment RF bargraph
- Reaction Tune with AR8000, ICOM R7000, R7100, R8500, R9000, ICR10, Optoelectronics New R11 Test Receiver, and the Radio Shack Pro 2005/6 with the OS456 or OS456Lite installed or the Radio Shack Pro 2035/42 with the OS535 installed
- Download recorded frequencies to a PC using the optional OPTOLINX
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Reaction Tune with the AR8000

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ANNOUNCEMENTS

• Clube CB Costa Verde is on the Internet. Their home-page <http://www.terravista.pt/enseada/1429/> allows those who access it the possibility of getting updated information about the club, its activities, and its opinions. Also published on their page are news items, contest information and rules, information on the club's award program, photos of members, and QSLs. They have also included links to other radio hobby internet sites, including the Near-Real Time Propagation Conditions. As of August the page was available only in Portuguese, but by now it may alsobe available in English.

• The following Special Events are scheduled for December:

WX3MAS, from the Bethlehem/Nazareth area of Pennsylvania; The Christmas City ARC and Delaware-Lehigh ARC; December 13–14; 1400Z–0200Z each day; operation on 3965, 7265, 14265, 28365 kHz and 45 kHz from band edge on 80, 40, and 20 CW. For certificate, send QSO information and SASE to DLARC-WX3MAS, RR4 Greystone Bldg., Nazareth, PA 18064-9211.

KC5OUR, from Bethlehem, New Mexico, for the Christmas season; Valencia County ARA; 1400Z Dec. 20 to 2359Z Dec. 28; 75 kHz down from top of each amateur band. For special QSL send QSL to VCARA, P.O. Box 268, Peralta, NM 87042. For more info contact N5PR.

WA7USA, from Mesa, Arizona; East Valley Amateur Radio Group; to commemorate the battleship *USS Arizona*; Dec. 6 and 7; 1500Z–2400Z; operation on 14.240 and 21.340 MHz. For certificate, send QSL and 9 × 12 SASE to EVARG, 3264 E. Carol Ave., Mesa, AZ 85204-3245.

N9LTA, from the Todd Wehr Center at Carthage College, Kenosha, Wisconsin; The Lakeshore Repeater Association in conjunction with Carthage College; to commemorate the college's sesquicentennial; Dec. 13; 1500–2100Z; operation on 7.125, 28.445, 50.150, and 146.520 MHz. A special certificate will be available for a QSL. Contact Randal Reusser, N9LTA, Carthage College Computer Center, 2001 Alford Park Drive, Kenosha, WI 53140-1994 (e-mail <n9lta@carthage.edu>).

W9MKS, from Seneca, Illinois; Starved Rock Radio Club; to celebrate the 55th anniversary of the launching of the first LST from Seneca's Prairie Shipyard; 1400Z Dec. 13 to 0400 Dec. 15; operation on CW 3555, 7055, 14055; SSB 14330, 21355, and 28555 if open. For QSL, send SASE to SRRC, P.O. Box 198, Leonore, IL 61332.

W9WWI, from Bethlehem, Indiana; Clark County ARC; to celebrate the Christmas season; 1500 Z Dec. 12 to 2200Z Dec. 13; operation on General 75, 40, and 20. For certificate, send QSL to CCARC, 1805 E. Eighth St., Jeffersonville, IN 47130.

WØIO, from Iowa City, Iowa; Iowa City ARC and the University of Iowa ARC; to celebrate the 150th anniversary of the founding of the university; 1400–2300Z Dec. 6; operation within 20 kHz of 7.250, 14.250, 21.300, and 28.400 MHz. For certificate, send QSL and 9 × 12 SASE to Jon Poulton, 729 Alpine Dr., Iowa City, IA 52245.

• The following hamfests, etc., are scheduled for late Nov., Dec., and early Jan.:

Nov. 29, **5th Annual E.A.R.S. Evansville Winter Hamfest**, Vanderburgh County Fairgrounds, Evansville, Indiana. For more information, contact Neil, WB9VPG, at 812-479-5741; e-mail <EARSHAM@aol.com>; or check the hamfest Website at <http://members.aol.com/earsham/>.

Dec. 6, **4th Annual Central Illinois Winter Superfest**, Turner Junior High School, Jacksonville, Illinois. For more information, contact Tim Childers, KB9FBI, 773 E. College, Jacksonville, IL 62650 (217-245-2061). (Exams by preregistration.)

Dec. 7, **32nd Annual Swap & Shop**, Hazel Park High School, Hazel Park, Michigan. For further information, contact HPARC, Box 368, Hazel Park, MI 48030.

Dec. 13, **Third Annual Columbia County Hamfest & Computer Show**, National Guard Armory, Lake City, Florida. Contact Colin Boutwell, WA5RKR, 904-755-7969 or 1-800-752-7969, e-mail <wa5rkr@isgroup.net>.

Jan. 3, **Lakeway ARC Hamfest & Computer Show**, Talley Ward Recreation Center, Morristown, Tennessee. For more information, contact Perry Hensley, N4PH, at 423-828-4848; or Kemp Lawson, KF4AGB, at 423-587-3320; or Lakeway ARC, P.O. Box 895, Talbott, TN 37877-0895.

"Our IC-756 hit the ground running – in large part because the steep learning curve encountered with some new transceivers simply didn't exist with the IC-756."

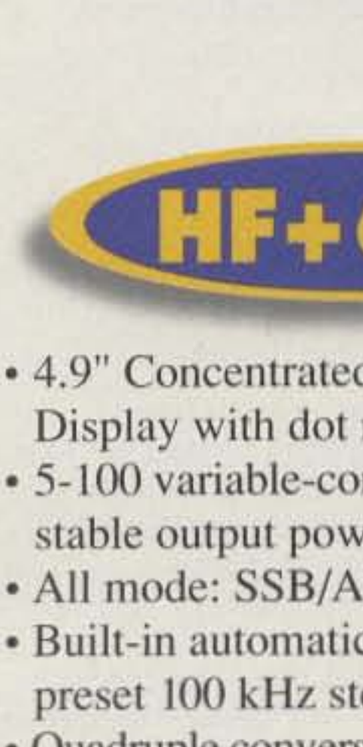
– *QST*, May 1997

ICOM's IC-756: See and HEAR the Performance

Advanced features, in the spirit of the IC-781.
But at a real down-to-Earth price.

HF+6M!

- 4.9" Concentrated Information LCD Display with dot matrix characters
- 5-100 variable-control watts of 100% stable output power (5-40 W on AM)
- All mode: SSB/AM/FM/CW/RTTY
- Built-in automatic antenna tuner with preset 100 kHz steps – RX and TX
- Quadruple conversion superheterodyne (triple conversion on FM)



- **True** dual watch (2 signal simultaneous reception)
- Twin passband tuning
- 2 slots for optional filters
- 101 memory channels
- High performance memory keyer
- Voice synthesizer (opt. UT-102 req.)

- Noise Reduction (NR)
- Auto DSP controlled notch filter
- Selectable Audio Peak Filter (APF)
- Phase Shift Network (PSN) modulation/demodulation

IF-DSP

"(Our IC-756) even worked on atmospheric noise, and it did not exhibit that annoying hollow sound we've noticed on some other DSP NR systems.

The ability to tweak transmit audio to taste was a real plus. Everyone's voice is different, and this DSP feature bursts through the old 'one size fits all' mentality...."

– *QST*, May 1997

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OUR READERS SAY

More Than Food For Thought

Editor, *CQ:*

Multi-modulation as described by Irwin Math in the July issue of *CQ* ("Math's Notes" page 42) is more than just food for thought. Some early AM stereo schemes used amplitude modulation to transmit the left plus right mono information and frequency or phase modulation to transmit the left minus right stereo information. Inserting a constant 90 degree phase shift between the AM and FM audio information results in an independent sideband signal with one channel on the upper sideband and the other channel on the lower. This is yet another old AM stereo system. Passing the AM and FM detector outputs through an appropriate matrix at the receiver will recover the left and right channels. These systems are simple and work well.

Today AM stereo is transmitted by a system called compatible quadrature amplitude modulation. It uses a modified form of quadrature AM that is compatible with older AM receivers and can be installed on existing transmitters. This system is slightly more complicated but has become the accepted standard in this and other countries.

I've been playing around with a couple of these systems on some of my old AM rigs for some time with good success. Wonder if there's anybody else out there interested in experimenting?

Jerry Mehrab, WA2FNQ
Northport, NY

It's The Magic That Counts

Editor, *CQ:*

I didn't like W5YI's article in your July issue ("Washington Readout," page 104), but grudgingly admit that he is probably right. I wonder if WZ8C had any brighter viewpoints about CW? It might have been nice to have included a short "guest" column by her for rebuttal.

Like you, I suppose that many of us see the end of CW as a requirement. As (another) one who enjoys CW, I have a concern that I've not heard too much about. If CW as a requirement goes, then how secure are the CW sub-bands? I guess I don't mind that most folks won't be using CW. I would mind, I think, if I had to operate with some of the stuff that goes on in the voice modes. I know that there are some in all areas who misuse their privileges, but it seems that misuse of the voice modes is the most difficult to ignore.

The real problem with amateur radio is pointed up in your statement: "Today new wireless and wireline technologies have removed the magic from amateur radio." It doesn't matter (really) what a person does in amateur radio, as long as it holds "magic" for him or her. It is that sense of "magic" that defines or describes most amateurs I know. (When one is asked about his or her hobby, you'll hear about DXing, County Hunting, Ragchewing, Contesting, Transmitter Hunting, Traffic Handling, Weather Spotting, QRP, Homebrewing, Emergency Operations, RTTY, Slow-Scan TV, CW, etc.). It is that sense of "magic" that keeps me working, playing, and growing in my chosen hobby. Nothing in your article seemed to touch on how to honor the "awe" and "magic" of doing what we are doing. If such magic is lost, then the end is indeed here, not just for CW, but for all of amateur radio.

Your article clearly defined what you do not like, or are against. I would like to hear more of what you feel is the "magic" of amateur radio for yourself, and what you think the magic is for those who are entering the ranks of amateurs (most without CW).

By the way, I am and have been an active VE (ARRL and W5YI). I try to encourage folks to become amateurs and to help new amateurs to upgrade, to explore the possibilities of amateur radio, and to have fun. I am also a member of the local club, made up of mostly newer licensees.

Dan Fletcher, AA5HV
Atoka, OK

What A Joy!

Editor, CQ:

I would like to thank *CQ* magazine and Lew Ozimek, N2OZ, for the fine article on the curve tracer in the July issue ("Build and Quick and Easy Curve Tracer To Test Components," p. 9). I finished building this tester and found it works just as described—what a joy! I used a small metal enclosure with banana plugs. This has to be one of the simplest projects I have seen in *CQ*, yet one of the most useful. Keep up the good work of a fine publication.

Fred Metcalfe, N6FME
Arcata, CA

Into The Notebook

Editor, *CQ:*

Thanks for the wonderful article by K1XT in the August issue ("Narrowing the Debate—A Brief Look at Replication Requirements for Building Yagi and Quad Antennas," by William Thomas, K1XT, p. 40). How rare it is to see such a concise, economical use of language to illuminate the necessity for attention to detail and the odd effects caused by substitutions in parts and hardware.

Please require K1XT to write another article for us. This one goes into the notebook.

C. W. Nelson, WA6FOO
Nipomo, CA

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Results of The 1997 CQ WW DX 160 Meter Contests

BY DAVID L. THOMPSON*, K4JRB

A second year for CW million point scores was overshadowed by a new champ and the weather/QRN in the USA. The first surprise was the top score. While P4ØWA, P49I, and ON4UN (OT7T) battled for the top spot, OH2MM hopped over to EA8EA and won by just over 200K. He worked almost as many states and provinces as the Aruba operators and beat them in both QSOs (most 10 pointers) and DXCC counters. He was slightly off the world mark set by P4ØWA last year.

The second top story in North America was the washout due to storms from California to Virginia. W4WA had to shut down early and only had 160 QSOs by 1200Z Saturday morning. KØEJ in Tennessee had tornadoes nearby. Almost all USA contestants called the first night a washout.

CW activity increased slightly, with 4443 stations on the master log. SSB activity stayed almost the same, with 5069 stations. Overall, this again is a slight increase over 1996 with frequency allocations still limiting operators in many parts of the world. The hardest hit was Japan, where they have a 5 kHz segment on CW and no SSB privileges. Hopefully, amateurs will get more frequencies at one of the upcoming WRC conferences. Support your national IARU body to speed this along.

The number of contestants working the 48 continental states passed 200 for both modes, and several stations caught up with 75 or more DXCC countries. One day someone will put DXCC in the contest log! Even stateside contestants are reaching impressive DXCC counts. WW2Y was not far behind the Europeans with a record 72 DXCC counters. This is the first time anyone in North America passed the 70 country mark! On SSB one contestant hit the half DXCC mark with 50. Some have called these contests another sweepstakes, but the country counts by serious competitors prove these are truly international affairs.

The DX window worked well on CW, was but stepped on at both edges on SSB. This generated five letters and one major score reduction. Please stay clear of the 5 kHz window (1830 to 1835 kHz) in 1998. Since we all operate lower sideband, this means at least 1 kHz on the bottom and 2.5 kHz on the high side. And please, Europeans should only work transcontinental stations, too—no European-to-European QSOs.

There were 131 countries on CW (XU, XV, JT, and PYØ, among the rarer) and 122 countries on SSB (including YCØ, H44, 5X4, and KH8). Officially there were 801 CW and 518 SSB logs received. Adding check logs, this increases to 823 logs on CW and 531 logs on SSB. Just three years ago I thought activity had hit a maximum with 600 CW and 300 SSB logs. Boy, was I wrong!

North America CW plaque winner FM5BH.

With the advent of the computer age, I finally agreed to accept e-mail logs. I was not prepared for the effort required, and certainly did not have the computer resources, so I had to scramble. K4UJ came to the rescue, and now we're set for 1998. More contestants are tying together the transceiver, PC, and logging software. This does not come without some glitches, as several reported lost logs and lost QSOs. Pity poor Larry, N7DD. His laptop died after the CW contest, and his fine 222K effort was lost. Larry says he will be back in 1998 on both modes. One additional advance is the rise of the two transceiver station. One keeps a run on a frequency, while the second scans for new multipliers. Several have complained about two transmitters sending at the same time. This is hard to do in single operator, but can happen at the multi-operator level. Remember there are only two levels of operation allowed in the CQ WW 160 Contests—single operator and multi-operator, single transmitter. **Please stick to the rules and don't work a station while still allowing the run transceiver to send CD!**

I usually list a number of logging errors I note each year. The errors have dropped dramatically, which I attribute to the increased use of computers. Every contestant should check their logs for errors (10 points for MM, KL7/W8) or some obvious keying error. Losing a multiplier or mistyping the call can cost several thousand points above 200K, and might cost you a plaque or certificate. If you print the long, make sure that you can read it, that it's not wavy, and that dupes don't run off the page. On e-mail logs and diskettes make sure I get the summary sheet, a dupe list, and the log in ASCII text format. When sending the diskette, make sure you send along the summary sheet. You can send the .bin file, but I probably won't use it, as I would need multiple versions of CT, NA, and other popular logging programs to decode them, and I don't have the time. Also, thanks to AD1C for his aid in rescuing several logs. If this computer talk is gibberish to you, I accept hand-written logs, too. Some of them are a beauty to behold and cross-check. Again, make sure the log is readable, has a summary page up front, and has a complete dupe list for logs over 200 QSOs.

One final point: For 1998 the SSB section of the contest has been moved to avoid running into the ARRL CW DX Contest. **The 1998 SSB 160 Meter Contest will be 2200Z February**

*4166 Mill Stone Court, Norcross, GA 30092

PLAQUE WINNERS AND DONORS

SINGLE OPERATOR
CW

WORLD BY K5AAD (W5MBB Memorial): Winner Villi Hiilesmaa, EA8EA (OH2MM).
USA BY K4TEA: Winner Frank Donovan, W3LPL (W4ZV Operator).
CANADA BY K2UFT: Winner John Sluymer, VE3EJ.
ZONE 3 BY (TBA): Winner Robert S Wruble, W7GG.
ZONE 4 BY K4WA: Winner David A. Pruett, K8CC.
ZONE 5 BY WA4CUG: Winner Jon Zaimes, AA1K.
AFRICA BY K4MZW: Winner Ivan Gombos, 7X2RO (OM3CGN).
ASIA BY K4SX: Winner Robert V. Grigorian, EK6GC.
EUROPE BY (TBA): Winner John Devoldere, OT7T (ON4UN).
OCEANIA BY K9UWA: Winner Jack Wheeler, KH6CC.
SOUTH AMERICA BY K4JAG**: Winner John Goller, P40WA (K9UWA).
JAPAN BY W4ZV: Winner Tatsuro Yamasaki, JA5BJC.
NORTH AMERICA* BY CQ Magazine (N4IN Memorial): Winner Laurent Bellay, FM5BH.

SSB

WORLD BY K5AAD (W5MBB Memorial): Winner John Sluymer, CF3EJ (VE3EJ).
USA BY K4JRB: Winner Jerry Rosalius, WB9Z.
CANADA BY W0ETC: Winner Garry V. Hammond, VE3XN.
ZONE 3 BY N4TMW: Winner Duane L. Walker, KE7BT.
ZONE 4 BY W4UCK: Winner Jon A. Barclay, N5JA.
ZONE 5 BY K4ODL: Winner Ron Hooper, W4WA.
AFRICA BY WB4ZNH: not awarded this year.
ASIA BY AH2BE: Winner Robert V. Grigorian, EK6GC.
EUROPE BY N4NX: Winner R. J. Stinson, GI0UJG.
OCEANIA BY K4IS: Winner Jack Wheeler, KH6CC.
SOUTH AMERICA BY AE6E: Winner Carl Cook, P40V (AI6V).
NORTH AMERICA* BY CQ Magazine (N4IN Memorial): Winner Alexander A. Aimette, V47KP (W2OX).

MULTI-OPERATOR
CW

WORLD BY N4RJ: Winner Peter Hutter, WW2Y.
USA BY W8UVZ, W0CD, K8GG: Winner John M. Crovelli, W2GD.
Zone 3 BY 4X4NJ: Jim Wilson, N7JW.

SSB

WORLD BY SOUTHEASTERN DX CLUB: Winner John M. Crovelli, W2GD.
USA BY WB9Z: Winner Steve Kane, Sr., WR8C.
ZONE 3 BY 4X4NJ: Winner Scott A. Tuthill, K7ZO.

**North America outside USA and Canada.*
***Roy V. Brewer Memorial, W4UUH.*

27 to 1600Z March 1, 1998. Please mark your calendar accordingly.

CW Contest January

The top single operator score came from EA8EA operated by OH2MM. His score bettered last year's winner, P40WA, by just over 200K. Both broke the one million mark, with P49I again missing the million mark by a few QSOs or mults in third. ON4UN came in fourth despite complaining about noise from a nearby plant. GW4VEQ made his first run a winner, coming in fifth at 828K. Europeans GM3YOR, EA3KU, UA2FJ, and OZ7YY placed sixth through ninth, and FM5BH made North American high by placing tenth. Missing was Carlos, TI2CF, at some special TI call, and K4TEA operating KP2A. CW scores stayed high due to the high multiplier count. Ten single operator stations, led by W3LPL with W4ZV at the helm, did break the 1000 QSO mark. Six of the ten stations were in the USA and Canada. DXCC pumps up the European score with ON4UN (operating OT7T) leading with 76 countries. All ten leaders were from Europe, with eight putting 70 or more countries in the log. A tip of the hat to Bob, EK6GC, who turned in fine scores on both modes. He tucked away 74 countries and 13 states/provinces, but said he was too far away to log the extra QSOs necessary for a run at the top ten. Bob also reports difficulty receiving your QSL cards. Please send along the card via overnight mail to assure receipt. He has been urged to get a stateside or European manager, too. There were many close races on CW, with Massachusetts, Belarus, and Russia the closest. Races for second, third, and fourth places were also close, coming down to a short QSO run or an extra multiplier making the difference.

The number of low power and QRP (5 watts or under) contestants continues to increase. UX0IX led the way, beating WK3I by nearly 10K. The Ukraine is the place to be on QRP, as three of the top five scores came from there. 9A7V led YU7BJ by 25K to place as the world high low power station. It was good to see 7X2RO operated by OM3CGN break the top ten. Top USA/VE was WA1LNP by a wide margin over always-lurking K1HTV. The top QRP QSO count came from WK3I with 439 QSOs. UX0IX worked 52 countries, and WK3I put 51 states and provinces in the log. WA1LNP led in low power QSOs with 844. He also led in states/provinces with 56. YU7BJ logged 65 countries for low power high. He also made the top 25 overall single op DXCC list. Congratulations to all the fine QRP and low power efforts.

The CW multi-operators were led by a pair of New Jersey groups. WW2Y was the winner by coming up with four more multipliers, offsetting the slight QSO lead by W2GD. The 72 DXCC counters at WW2Y is a new USA record. The rest of the multi-op top ten were from Europe, with N1BB slipping in ninth. A tip of the hat goes to OH2HE, as the OH gang is always at a disadvantage, being so far north. Other shootouts for first place occurred in Pennsylvania, Belarus, Hungary, and Sweden. Six multi-ops made more than 1000 QSOs, led by W2GD's 1391. RW2F worked the most DXCC countries with 77. Multi-operator is a great place to train new contest operators under a watchful eye. Get a group together, and you'll be surprised at the score in 1998.

SSB Contest February

John, VE3EJ, keeps telling me he will retire from CQ 160 competition, but he keeps winning the SSB section by a wide margin. W2OX at V47KP came in second (he also had a fine CW single operator score). GI0UJG switched from low power to high power and placed third with 504K. He worked 36 states and provinces, even making a few west coast contacts. Bob, EK6GC, came in fourth without the aid of a single USA/VE contact. WB9Z recovered from an injury that kept him out of the CW section and led the USA while placing fifth worldwide. Ron, W4WA (ex-AB4RU), did a rare single operator stint, coming in second USA and sixth worldwide. The surprise was UA9MA breaking the top ten from Asia. UA9 is considered too far away from multiplier-rich Europe or the USA. He did it in style, coming in fourth. NX0I again had an outstanding score from the middle of the country. Twelve SSB single operators made more than 1000 QSOs. WB9Z led both modes with 1728 QSOs. The others were VE3EJ 1501, W4WA 1423, NX0I 1378, N5JA 1330, K3CR 1317, W3GH 1209, UA9MA 1169, K4JYO 1045, KG8CW 1023, WA4ZXA 1014 (low power), and K8LN 1006. Several more were knocking on the door wth 900-plus QSOs. DXCC was again mostly a European affair, with GI0UJG logging 67. V47KP 60 and EK6GC 57 did break into the party. Top USA single op W4WA logged 49. Close races occurred in Connecticut, Kentucky, California, Germany, Slovenia, and Colombia. N5JA continues to score well from Texas, and its good to see increased South American activity.

QRP and low power activity is also increasing on SSB. N1TM slipped by S59D for top worldwide QRP score. He also logged 240 QSOs for top place in that category. The Ukrainians (US5MPS and US8ICA) were third and fourth, and Axel, N8XA, made the fifth spot. WA4ZXA led a USA sweep of the top three

TOP 10 SCORES

SINGLE OPERATOR

USA CW		USA SSB	
W3LPL	513,798	WB9Z	403,845
K8CC	445,280	W4WA	389,760
N5JA	402,042	N5JA	331,488
AA1K	385,110	K3CR	321,167
W3BGN	378,620	NXØI	289,160
N2NT	369,304	W3GH	244,630
K3UA	351,780	K4JYO	221,241
W9RE	279,908	KG8CW	194,419
K2WK	267,618	N3HBX	169,504
WS9V	266,272	W2RE	184,353

VE CW (Top 5)		VE SSB (Top 5)	
VE3EJ	780,156	VE3EJ	724,978
VE9AA	449,700	VE3XN	128,538
VE3KP	320,247	VE7NS	85,550
VE3PN	262,392	VE6JY	78,324
VE1PZ	246,960	VE6SV	35,045

DX CW		DX SSB	
EA8EA	1,243,224	V47KP	507,725
P4ØWA	1,035,776	GIØUJG	504,391
P49I	970,680	EK6GC	478,458
OT7T	933,250	UA9MA	396,096
GW4VEQ	828,240	P4ØV	378,572
GM3YOR	739,584	UA2FJ	317,629
EA3KU	678,720	CU2CE	248,800
UA2FJ	650,624	OT7T	245,836
OZ7YY	596,128	LY3BS	213,136
FM5BH	551,348	KH6CC	211,960

MULTI-OPERATOR

CW (WW)		SSB (WW)	
WW2Y	797,607	W2GD	438,264
W2GD	696,000	XE2/ WA7UQV	388,800
9A1A	666,813	VE1PZ	385,529
RW2F	653,072	WR8C	353,529
OH2HE	621,161	N8TR	325,898
I4JMY	604,173	IK4IEE	323,910
SN3A	597,480	OT7A	307,440
DK1NO	594,550	LX9UN	302,254
N1BB	555,960	WØSD	272,080
OM7A	552,183	XE1RCS	257,720

TOP 5 CW QRP		TOP 5 SSB QRP	
UXØIX	69,368	N1TM	22,532
WK3I	59,885	S59D	21,918
S59D	41,448	US5MPS	19,550
UT8IT	38,950	US8ICA	11,725
UY5ZA	35,217	N8XA	11,676

LOW POWER

Top 10 World CW Low Power		Top 10 World SSB Low Power	
9A7V	356,575	WA4ZXA	184,149
YU7BJ	321,768	K1PX	158,004
TA2DS	273,904	WA1LNP	157,014
HA8BE	265,842	TA2DS	145,900
WA1LNP	257,280	RA4NW	129,792
7X2RO	251,250	N5IA	128,180
HA8FM	221,701	UY1HY	124,344
S53G	197,750	UN2O	117,863
SP5ZIM	196,846	RA3WA	95,128
DJ6TK	188,838	CO2GG	84,018

Top 5 CW USA Low Power			
WA1LNP	257,280	K5KG	130,720
K1HTV	166,605	N8II	118,734
K3BU	149,130		

SSB entrant PY3CEJ. Al says it's summer in south Brazil in January and February.

places on low power. His QSO count topped 1000 at 1014, and he logged a strong 23 DXCC markers. K1PX was second and WA1LNP third. Rare TA2DS was fourth, and RA4NW worked hard for fifth place. N5IA made sixth from New Mexico in spite of losing his transceiver at 0800Z on Sunday. CO2GG was a welcome multiplier, placing tenth. Keep up the good work and let's see some outstanding QRP and low power scores in 1998.

Outside of the fine score by W2GD, the top North American multi-op scores came from Ohio, Mexico, Nova Scotia, and South Dakota. The gang at XE2/WA7UQV switched to SSB in 1997 and placed second worldwide. VE1PZ finally turned in a log that placed third, and WR8C and N8TR tussled to fourth and fifth place. WØSD (W7XU in 1996) again made many happy with a South Dakota contact. If you operate 160 in North America and did not work them, you did not turn on your rig that weekend. XE1RCS, led by XE1VIC, made a strong showing from Mexico City. Europeans IK4IEE, OT7A, and LX9UN should not be overlooked with their fine top ten scores. Close races in Pennsylvania, Oregon (the tightest of both contests), Ohio, and Cuba made for an interesting weekend. A tip of the hat to great scores by NØNI (Iowa), WBØZLV (Kansas), and the two Oregon contestants (K7ZO and W7GG).

Six SSB multi-operator stations made over 1000 QSOs, and all were stateside. 9A1A just missed at 981 QSOs. IK4IEE worked a world high 69 countries as SSB multi-operator, with RW2F 11 behind in second place. W2GD barely made the top ten with 50 countries for highest from the USA. VE1PZ with 45 was next in North America.

Club Competition

The Frankford Radio Club maintained its first-place position with a score of just over 8.5 million. The Southeast DX Club again placed second with 4.4 million. Contest Club Finland made third place as a new entry and without any SSB entries. They beat out the Slovenian Contest Club by 150K. Fifth was the Society of Midwest Contesters boosted by P4ØWA's score on CW and WB9Z on SSB. The best points by entry (by a large margin) goes to the UA2 Contest Club. Their two million points came from just six entries. That equates to over 334K per station.

THe number of clubs passing 1 million is again impressive, with the Ukrainian Contest Club just making 1 million by 135 points. Congratulations to all the top clubs, those which improved and those which worked hard. Set you sites on improving the score in 1998. Set up a club contest to win a state or country, reward improvement in score from last year, and get out the inactives to show the world what your club can really do.

Club competition is a "for fun" competition that fosters higher scores and more entries. Remember that three logs are required for a club to be listed. Please try to keep the club name or abbreviation the same for all entries. If the clubs send me a list of members, I'll make sure they get every possible credit (unless the competitor has clearly marked another club). Make sure the club is noted under Club Competition or the score may not be included. Logs with a club or group preprinted at the top is not sufficient for entry in the club score.

Helpers

Thanks to Joe (not a ham) for improving my log checker/fuzzy logic engine. Much of the work is done on my old 386 laptop and Pentium 100 desktop. Thanks to my XYL Jean for her support, K4UJ, NK4U, and W4GTS for their efforts, and to Gail at *CQ* for pushing me to get out the rules and results on schedule. One last note: Please don't send logs to N4IN's location. His XYL faithfully passes them on to me, but I can assume it's painful for her, as he has been gone for several years now. It is down to less than ten logs, but what hurts is they come from North

AGGREGATE CW AND SSB CLUB SCORES

Minimum of three entries required for listing.

CLUB	SCORE	CW	SSB	CLUB	SCORE	CW	SSB
FRANKFORD RADIO CLUB	8,568,548	WW2Y	W2GD	LITHUANIAN DX GROUP	354,640	LY1DR	LY1DT
SOUTHEASTERN DX CLUB	4,434,105	P49I	W4WA	SP CONTEST CLUB	347,611	SP2QCH	SP2FAX
CONTEST CLUB FINLAND	3,702,211	EA8EA	—	HUDSON VALLEY CONTESTERS	345,978	N2NFG	W2RE
SLOVENIA CONTEST CLUB	3,584,745	S58MC	S57M	CENTRAL ARIZONA DX ASSN.	340,683	VQ9SS	KE7GH
SOCIETY MIDWEST CONTESTERS	3,513,618	P4ØWA	WB9Z	TENNESSEE CONTEST GROUP	318,313	N4ZZ	KQ4HC
NORTH COAST CONTESTERS	3,405,061	VE3EJ	VE3EJ	DARC (GERMANY)	305,461	DKØIW	DLØMI
YANKEE CLIPPER CONTEST CLUB	3,344,817	N1BB	N1VW	PZK (POLAND)	267,739	SP5VYI	SP5ZIM
POTOMAC VALLEY RADIO CLUB	2,747,588	W3LPL	N3HBX	NO. SHENANDOAH DX ASSN.	245,092	K2UOP/8	W9LT
BAVARIAN CONTEST CLUB	2,743,954	DK1NO	OE9MON	SO. CALIF. CONTEST CLUB	194,561	—	N7UE
RHEIN RUHR DX ASSN.	2,616,875	OT7T	OT7A	ARI (ITALY)	175,923	IK2HDG	IK3PQG
MAD RIVER RADIO CLUB	2,405,487	K8CC	WR8C	OKLAHOMA DX ASSN.	173,996	K5TT	N5OHL
UA2 CONTEST CLUB	2,073,076	RW2F	UA2FJ	SALT CITY DX ASSN.	171,939	NA2Q	NA2A
KTU RADIO CLUB	1,773,095	LY3BS	LY3BS	LNDX (FRANCE)	154,965	F6FGZ	—
MARCONI CONTEST CLUB	1,288,412	I4JMY	IK4IEE	GRVARS	149,413	KEØFT	—
SP DX CLUB	1,100,466	SN3A	SP3JHY	UARL (UKRAINE)	142,004	UR5U	UR4UZA
UKRAINIAN CONTEST CLUB	1,000,135	UT4UZ	UTØZZ	TEXAS DX SOCIETY	137,459	N5LZ	N5LZ
HA DX CLUB	957,600	HG1S	—	NO. ARIZONA DX ASSN.	134,548	NN7A	NF7E
NORTH TEXAS CONTEST CLUB	780,405	N5JA	N5JA	WVDXC (WASHINGTON)	129,466	XE2DV	XE2DV
LOW COUNTRY CONTEST CLUB	613,761	PI4COM	—	SOUTH JERSEY RADIO ASSN.	121,679	—	KD2KS
NORTHERN CALIF. CONTEST CLUB	478,909	K6MO	P4ØV	KDXC (RUSSIA)	116,598	RK1OWZ	—
KENTUCKY CONTEST GROUP	569,038	K4TO	AA4NU	VERON (NETHERLANDS)	110,775	PAØXAW	PA3GKE
KANSAS CITY DX CLUB	467,993	NØTT	NXØI	WEST PARK RADIO OPS	88,711	W8IDN	N8WS
BAVARIAN DX GROUP	456,882	DL7MAE	DL7MAE	ROCHESTER DX ASSN.	85,202	N2UM	KA2PHQ
MINNESOTA WIRELESS ASSN.	383,328	WØAIH	WØAIH	GLOBUS (UKRAINE)	79,437	U5MZ	US5MPS
CAROLINA DX ASSN.	379,687	AA4V	K4YYL	SARA (NEW YORK)	68,308	K2UF	K2UF

America or Europe. I plan to send notes to every log she receives this time, so pass the word!

Errata

There was a big discussion over moving the contests to May, as several said this is a 160 meter version of the ARRL Sweepstakes. I feel the DX activity proves this view wrong. I do wish that each mode did not take over the band on the contest weekends, but since 160 is not a worldwide band yet and there are no mode restrictions in most countries, this is unavoidable. The ARRL was asked to look into volunteer band segments, but passed on the issue, as there needs to be a worldwide, consistent band first. Several prominent contesters/DXers told me that we are only tying up two weekends a season, and for many this is an excellent chance to work new states or DXCC countries. Sorry more cannot be done from the CQ 160 committee's end, but let's work the contests and have fun.

Remember that Washington, DC counts as another USA multiplier starting this year. Hopefully there will be activity in both contests so we can log the new mult! Several options regarding reports sent by DX are under study. In the meantime, please try to standardize an abbreviation to keep things consistent and to cut down on errors.

Nine stations were sent warnings covering areas such as unverified contacts, not scoring their logs, operating on the DX window borders, and unsportsmanlike conduct. Only one major score reduction was doled out this year. Have fun, but operate as a gentleman or gentlewoman on the gentlemen's band.

Next Time

The 160 Meter CW Contest will be held the last full weekend in January 1998 (January 23 to 25). Please note the special dates of the SSB Contest—February 27 to March 1, 1998 to avoid the ARRL CW Contest. Times for both contests are 2200Z Friday start and 1600Z Sunday end. You penalize yourself if you miss the 2200Z start, as up to 60% of the winning scores are made in the first 6 to 9 hours. Contacts made after 1600Z on Sunday carry a double penalty.

If you need log or summary sheets, send a business-size SASE or SAE with 1 IRC to CQ 160 Meter Contests, *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801 USA. Make sure your computer log program puts 40 or 50 QSOs per page and provides totals for QSOs, points, and multipliers on *each page!* Every contact should include a location such as 599GA or 59GW. Multi-operators should either list the operator on each page or provide a summary of operator/hours. There are only two classifications—single operator and multi-operator. Using packet or a spotting net puts an entry in the multi-operator class. Low power and QRP will be noted as per the complete rules. Multi-operator stations are all listed as high power!

CW mailing deadline is February 28, 1998 and the SSB deadline is March 31, 1998. The only exception is both logs can be sent at the same time to arrive no later than the SSB deadline. Logs with postmarks after the deadline or that arrive after May 1, 1998 are subject to being labeled "checklogs." I prefer a self-addressed envelope or postcard or SAE with an IRC if you want a confirmation. I will also confirm via e-mail if you list your address. To save time and paper I accept diskettes (I prefer the 3½ inch size) or e-mail your logs to <cq160@contesting.com>. On diskette or e-mail logs I need the log (ASCII text), the full dupe sheet, and the summary sheet. On diskettes I need the summary and dupe sheets printed out. Paper logs should be readable and have a summary sheet on the front. Send all logs to 160 Contest Director David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, Georgia 30092 USA. Please indicate CW, SSB, or both on the envelope and send photos (even if you e-mail the logs). Good luck to all!

73, Dave, K4JRB

Soapbox CW DX

Worked USA this time . . . *UY1HY.* Surprise: the 160 meter antenna was still up and work-

Always present CU2CE—Mr. Azores 160!

MIRAGE...100 Watts...$199

Boost your 2 Meter handheld or multimode (like ICOM 706) to a super powerful 100 watts . . . All modes: FM, SSB, CW . . . 15 dB GaAsFET receive preamp . . . Reverse polarity protection . . . Silent cooling fan . . . Free HT-to-amp coax and mobile bracket

In Stock at ham dealers everywhere!

Call your dealer for your best price

$199

B-310-G Suggested Retail

NEW!

MIRAGE RUGGED!

Power Curve -- typical B-310-G output power							
Watts Out	25	50	75	95	100	100+	100+
Watts In	¼	½	1	2	4	6	8

For an incredibly low $199, you can boost your 2 Meter handheld to a super powerful 100 watt mobile or base!

Turn "You're breaking up . . . Can't copy" into "Solid Copy . . . Go ahead."

Talk further . . . Reach distant repeaters . . . Log onto faraway packet bulletin boards.

This rugged Mirage B-310-G amplifier operates *all modes*: FM, SSB and CW. It's perfect for *all* handhelds up to 8 watts *and* multi-mode SSB/CW/FM 2 Meter rigs.

It's great for the ICOM IC-706 -- you'll get 100 blockbuster watts on 2 Meters!

Low noise GaAsFET pre-amp

A built-in *low noise* GaAsFET receive pre-amp gives you 15 dB gain -- lets you dig out weak signals.

Fully Protected

***SWR** Protection* prevents damage from antennas whipping in the wind. *Reverse Polarity Protection* can save your amp if you connect power backwards.

Compact but Powerful

Mirage's integrated *HeatsinkCabinet™* and whisper quiet fan gets heat out fast!

The results? An *ultra-compact* 4¾x1¾x7¾ inch 2½ pound amplifier that delivers a *super powerful* 100 watts.

Free Accessories

Free 3 foot handheld to B-310-G coax cable -- just plug and play! ***Free*** mobile bracket! ***Free*** rubber mounting feet for home use!

Plus more . . .

Automatic RF sense Transmit/Receive switch. Remote keying jack. LEDs monitor "On Air", high SWR, pre-amp, power. Push buttons select SSB/FM, pre-amp, power. Draws 15 amps at 12-15 VDC.

Full one year MIRAGE warranty

With Mirage's legendary ruggedness, you may never need our superb warranty.

Dual Band 144/440 MHz Amp

$159.95 BD-35 Suggested Retail

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

Add this Mirage dual band amp and boost your handheld to 45 watts on 2 Meters or 35 watts on 440 MHz!

Works with all FM handhelds up to 7 watts. Power Curve chart shows typical output power.

Full Duplex Operation

Mirage's exclusive *FullDuplexAmp™* lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation!* (Requires compatible HT)

Mirage is the Best! Here's why . . .

- ***Automatic frequency band selection*** --you'll never forget to switch bands
- ***Single input connector and single output connector for both bands*** -- easy to use with dual band radios and antennas
- ***First-class strip-line techniques*** -- superb RF performance and reliability
- ***Custom wrap-around heatsink*** -- runs cool
- ***Reverse Polarity Protection*** -- saves your amp if you connect power backward
- ***Automatic RF sense Transmit/Receive switch*** -- makes operation easy
- ***Low input SWR*** -- keeps your handheld safe from overheating
- ***"On Air" LEDs*** -- for each band
- ***Free mobile mounting bracket***
- ***Free 3 foot handheld-to-BD-35 coax cable***
- ***Small size:*** just 5x1¾x5 inches
- ***Full one year MIRAGE warranty***
- ***Legendary MIRAGE ruggedness***

Call your dealer today for your best price!

35 Watts for 2 Meter HTs

B-34-G

$89.95

Suggested Retail

Power Curve -- typical B-34-G output power								
Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
- ***Custom heatsink, runs cool***
- ***Works with handhelds up to 8 watts***
- ***One year MIRAGE warranty***

MIRAGE RUGGED!

35 watts, FM only . . . $69.95

B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

160 Watts on 2 Meters!

B-5016-G

$299

Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power								
Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard™*.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1, $45, Remote Control. On/Off, pre-amp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5½ in.

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT *or* mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

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CIRCLE 143 ON READER SERVICE CARD

GUEST/VISITING OPERATORS

CW

Call	Guest/Visiting Op
4U1ITU	K7TD
7X2RO	OM3CGN
8P9DX	VA3DX
CT8T	CT1BQH
DF9ZP	DK8ZB
DLØBUB	DJ4DY
DU1KK	WN7S
EA7EZ	OH2BAZ
EA8EA	OH2MM
HG6V	HA6IAB
JK3ZQJ/QRP	JG1EIQ
K4VX	N9JF
K8CC	W8MJ
KC6VW	JA6VZB
LY2ZZ	LY2BTA
N2NT	W2RQ
OT7T	ON4UN
P4ØWA	K9UWA
P49I	K4PI
PI4ALK	PA3CVY
PJ5AA	K3UOC
SN5W	RW1AC
UX3M	UR3MP
V47KP	W2OX
VE3EJ	G4VXE/VE3
VE6ARC	VE6TUR
WØAIH	NØAXL
W3LPL	W4ZV
W5OT	WA5TWL
XX9TR	OH2PM

SSB

Call	Guest/Visiting Op
8P9CK	AA1M
EW5PBO	EW8DX
H44MS	DL2GAC
HB9FAX	LY2WJ
K3CR	KB3AFT
K7BG	AA7BG
KC8CPY	KI8AW
KH6RS	K6GSS
KY4DX	K4TXJ
N2EE	K3BU
OT7T	ON4MA
P40V	AI6V
PJ9JT	W1BIH
UTØD	UT7DX
V47KP	W2OX
VE6IM	VE6LDX
WØAIH	NØAXL
W1AA	K1VV
W5OT	WA5TWL
YU1AST	YZ1EA

Shown here is Cuba's T48RAC (SSB, Mulit-Op) with CO8OT at the microphone and CO8KL operating.

ing, but after 30 hours it was back to normal—all twisted by ice and snow . . . *OH2HE*. DX was tough with my low antenna . . . *S56A*. QRM from Europe strong . . . *OK2HI*. I have big problem from a local 50 KW broadcast station on 603 kHz and 1809 harmonic . . . YO8FR. Pleased to use YO2V as contest call from YO2KJJ VideoColor club station . . . *YO2V (Op. YO2BP)*. Finally able to put in a complete effort . . . *EA3KU*. Hard to make a DXpedition in snow and cold weather . . . *OHØAM (Op. OH6YF)*. Again no W during contest . . . *4K9W*. Three-element sloper system worked modestly . . . *OH1HS*. Satisfied with propagation to the East but not to USA . . . YU7KW. Working new ones on top band much more interesting that participating seriously in the contest . . . *DK5MV*. Finally 1 KW ouput legal in OZ . . . *OZ7NB*.

Many QRN, but I send in my log to help those I work . . . *PY1BVY*. Best 160 contest for me, although static was heavy . . . *VK3IO*. QSL via OH2PM, my home call . . . *XX9TR*. Pleased to enter in low power category . . . *EW8OS*. Participated from a small tent on top of the hill to avoid QRM to my neighbors. Highlight was VQ9 contact . . . *JH3AIU*. Antenna was 240 foot wire up 40 ft. fed with open wire to antenna tuner . . . *5X4F*. With QTH in middle of the city I would give a kingdom for a beverage . . . *DL2OBF*. Stateside propagation on 160 from northern Europe is like gambling and usually we are cheated . . . *ES5MC*. After hearing lots of stations that did not come back, I will concentrate on improving transmitted signal . . . *4X4NJ*. Sorry delay in sending log. Ended up with a heart attack. Now okay . . . *LA2KD*. Could not reach T77C in pileup so must improve my antenna . . . *PA3AFF*.

Used R5 vertical as mast for my 128 foot end-fed wire . . . *G6QQ*. Felled by the flu so limited entry . . . *PAØLOU*. Back next year with more effort . . . *F2AR*. Next year I will have a 160 meter antenna . . . *9A3QK/QRP*. Too far from North America for 160 . . . *UT9IR*. Heard contacts between US stations for the first time . . . *OZ5WQ*. Had fun this year . . . *IK2HDG (Op. IK2QCC)*. Hard to work DX with power limitation in Germany (75 watts output) . . . *DL7ANQ*. Did not go hunting this year . . . *OZ7YY*.

Soapbox CW W/VE

Sure was a close race with W7GG for West Coast multi honors . . . *K7ZO*. Many thanks to the many stations that worked real hard to get their calls through to my poor ears (1442 of them) . . . *N8TR*. We would again like to thank the US Coast Guard for their hospitality . . . *W2GD*. A good time in spite of Murphy living nearby . . . *N1BB*. Low power with high-angle radiator is tough. Nice to know I have about three S units of improvement with a linear and vertical . . . *VE3KZ*. Great conditions although I missed the JA opening . . . *VE3EJ (Op. G4VXE/VE3)*. I can only imagine my score if the first night had not been ruined by QRN . . . *N5JA*. Tornados nearby made Friday night impossible . . . *KØEJ (TN)*. You had to be a diehard to stick with this weekend. Why is it Europe peaks just as I am finally running USA West Coast? . . . *N8II*. My best rate was 106 QSOs in one hour . . . *K2WK*.

Rig was a boat-anchor Johnson Viking II (80 watts) and either a Hammarlund HQ170 or Collins 75A3 into a full-wave loop at 30 ft. . . . *K9TR*. Hope conditions better in the SSB section . . . *VE6JY*. Have not been on 160 in years. Thanks to those who struggled with my pip-squeak signal . . . *VE7XF*. Put antenna up the night of the contest. Amazing it worked . . . *K5RA*. Twenty dB over 9 noise Friday night . . . *W5ASP*. Friday night was a wash-out, but surprised by the DX worked Saturday night with 100 watts . . . *K2UOP/8*. Low dipole just was not working very well so loaded up my R5 for better results . . . *WK5K*. Could not believe the noise level for the middle of winter . . . *W1WEF*. Worked most of my DX outside the window although the window worked quite well . . . *KA2CDJ*. 100W and low dipole worked well the second night . . . *K9OSH*. First time in this contest; missed only KL7 and KH6 for WAS . . . *K9MMS*. Second night better for Europe . . . *K3ND*.

Was it too cold to play radio in South Dakota? . . . *KG6AO*. Working stations on 160 was a thrill for me . . . *AC5AA*. Not much time to work. Busy with social engagements . . . *N4MM*. Sure picked the wrong night to operate . . . *NG7M*. Used a full-size dipole at the amazing height of 30 feet . . . *KW9KW*.

Soapbox SSB DX

Enforce the DX window or forget it . . . *VP5JP (K8JP)*. S9+ static and 6 inches of rain in 2 hours . . . *KH6CC*. Will be back for a bigger effort next time . . . *CS1A*. The amplifier blew up just as we got a good opening to Europe . . . *XE1RCS*. The stations from NA booming in Europe, but they don't hear me . . . *4N7ZZ*. Conditions not the best but new antennas improved the score. Gunning for 400K now . . . *IK4IEE*. Sorry score not higher but only ran 5 to 7 watts input . . . *IKØXBX*. My computer crashed during the contest so continued with

AMERITRON's *four* 572B tubes ... 1300 Watts ... $1395!

AMERITRON creates new class of* Near Legal Limit™ *amplifiers with the AL-572 . . . You get nearly full legal SSB power output for 65% of the price of a full legal limit amplifier . . . No one will ever know the difference . . .

Ameritron's* new *class of* Near Legal Limit™ *amplifiers give you nearly full legal SSB power output for 65% of the price of a full legal limit amplifier . . . and no one will ever know the difference!

You get 1300 Watts PEP SSB nominal power out on amateur bands 160 - 15 Meters.

Four rugged Svetlana Russian 572B tubes give you near legal limit power and instant 3 second warm-up time.

This whisper quiet, desktop linear plugs into your nearest 120 VAC outlet -- no special wiring needed.

You get . . . Ameritron's exclusive Instantaneous RF Bias™, Dynamic ALC™, ParasiticKiller™, Step-Start Inrush Protection™. . . heavy duty power supply . . . fully neutralized tubes . . .Pi/Pi-L network . . . tuned input . . . pressurized ventilation . . . dual lighted Cross-Needle meters . . . multi-voltage power transformer . . . front panel ALC control . . . 6:1 vernier reduction drives . . . much more!

AL-572
$1395
Suggested Retail

Four rugged Svetlana 572B Tubes

The AL-572 uses four rugged *fully neutralized* Svetlana Russian 572B tubes. Each tube has a heavy duty Graphite Anode, low loss white Ceramic Base, superior Titanium Getter and legendary Russian quality and ruggedness.

Ameritron's exclusive *ParasiticKiller™* effectively suppresses all parasitic oscillations.

Near Legal Limit™ Power Output

You'll typically get 1300 Watts PEP SSB, 1000 Watts CW continuous, 1000 Watts 1/2 hour PEP two-tone test on all amateur bands from 160 through 15 Meters (WARC bands and 10 Meters with reduced performance -- user modified for 10 /12 Meters with license).

Instantaneous RF Bias™ eliminates heat

Ameritron's exclusive *Instantaneous RF Bias™* completely turns off the 572B tubes between words and dots and dashes. It eliminates hundreds of watts wasted as heat to give you cooler operation and longer component life.

Dynamic ALC™ doubles average SSB power

Ameritron's exclusive *Dynamic ALC™* gives you high level, low distortion RF processing. It can more than double your *average* SSB power.

Front panel control lets you adjust output power.

Heavy duty Power Supply

A heavy duty power supply using a high silicon steel transformer delivers 2500 volts at 0.7 amps with good regulation.

The plate supply uses a full wave doubler, 200 amp peak surge current diodes, 7 watt, 50 K ohm wire wound bleeder resistors and a bank of high quality computer grade capacitors totaling 26 ufd.

Step-Start Inrush Protection™

When you turn on your amplifier, a massive inrush current flows. Eventually this current will damage your amplifier.

Ameritron's *Step-Start Inrush Protection™* limits damaging inrush current to your power supply and tube filament. This greatly extends the life of your amplifier components and tubes.

Pi/Pi-L Output Network

The AL-572 Pi/Pi-L output network gives you exceptionally smooth tuning, wide matching range, full band coverage and peak performance at all power levels.

Ball bearing vernier reduction drives on plate and load controls make tuning precise and easy. Detailed logging scales let you quickly return to your favorite frequency.

Tuned Input lets your rig deliver full output

A Pi-Network *tuned input* using slug tuned coils provides a good 50 ohm load for your rig. Even the fussiest solid state rig will deliver full power to your AL-572.

Whisper Quiet pressurized cooling

A whisper quiet internal fan draws in cool air over power supply components and pressurizes the tube compartment to remove heat for longest life.

Two lighted Cross-Needle Meters

Grid current, plate current and forward PEP output power are *continuously* monitored to tell you of improper loading and abnormal conditions.

A fourth scale switches among peak reflected power (and SWR), high voltage, ALC threshold and ALC output voltage.

Multi-Voltage Power Transformer

Ameritron's *Multi-Voltage Power Transformer* has a unique buck-boost winding. It lets you select from 14 primary voltages centered on 115 and 230 VAC.

You can match your AL-572 to your AC line voltage so you'll get peak performance and long component life -- regardless of your line voltage.

QSK Compatible

For *lightning fast* QSK operation use the optional Ameritron *electronic PIN diode* QSK switch. Use the external QSK unit, QSK-5, $349, or install the internal QSK-5PC board. Contact Ameritron.

Plus More!

An Operate/Standby switch lets you run barefoot, but you can instantly switch to full power if you need it.

Transmit LED; 12 VDC, 200 mA accessory jack; 12 VDC keying relay for solid state/tube rigs; tough, nearly indestructable Lexan-over-aluminum front panel.

Shipped with transformer installed and wired for 120 VAC. Draws 16 amps at 120 VAC. Compact 8½"Hx15½"Dx14½"W.

Ameritron Warranty

In the unlikely event that there are defects in materials or workmanship, Ameritron will repair your AL-572 *free* for a full year. The Svetlana 572B tubes are covered by Svetlana's warranty.

Made in U.S.A.

***Ameritron** . . . we build quality in the U.S.A.*

Call your dealer for your best price

Enjoy 1300 Watts of near legal limit power and the best value for your money.

Order your AL-572 today!

AMERITRON

. . . the high power specialists

116 Willow Road • Starkville, MS 39759
(601) 323-8211 • **FAX:** (601) 323-6551
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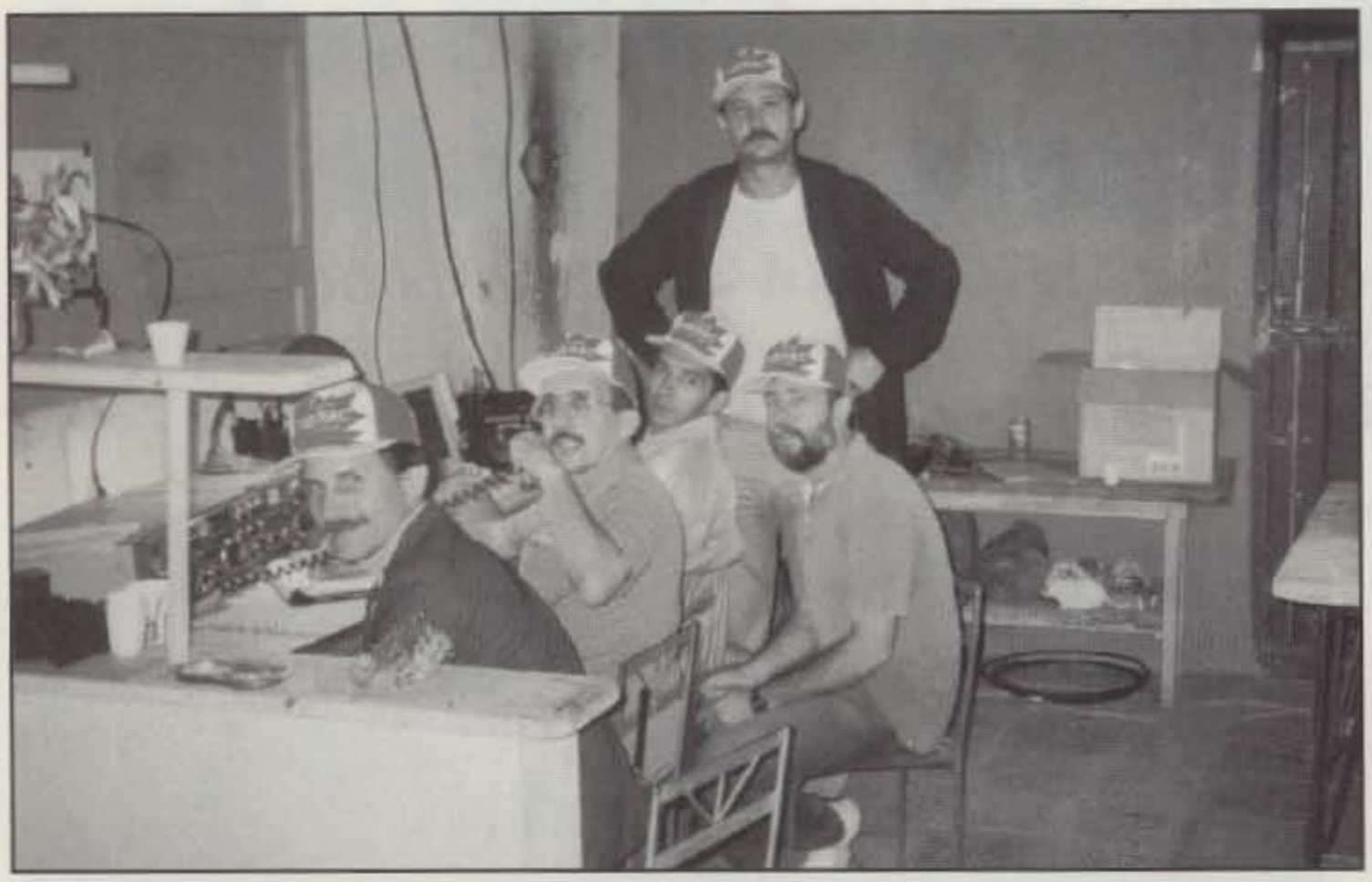
CIRCLE 133 ON READER SERVICE CARD



The operating location for T48RAC with CO8HF standing and seated (left to right) CO8PA, CO2JA, CO8KK, and CO8UW.

manual logging . . . *5B4MF*. Poor conditions and problems with antennas but there is always next time . . . *M7G*.

I heard IK4IEE very loud . . . *YCØLOW*. No W9 not even WB9Z . . . *OT7T*. We only have 1810 to 1850 kHz to operate in . . . *PAØIJM*. Went from 10 to 44 QSOs as was able to run 300 watts . . . *H44MS (DL2GAC)*. Sorry bad weather and QRN. It's summer in Brazil . . . *PY3CEJ*. Balloon vertical is the only way to get high *(all the way to number 2 World High Multi-Op—ed.)* . . . *XE2/WA7UQV (Say that one fast three times!—ed.)*. WOW, 35 states and all USA districts . . . *CU2CE*. Delayed starting the contest as no wind for the balloon . . . *OE9MON*. Didn't expect to work USA/VE with 100 watts . . . *OE9MON*. Where were the HA and G stations? . . . *TA2DS*. Difficult to work NA stations . . . *DL8PC*. Operated from an industrial building 55 meters high . . . *9A2VR*.

Soapbox SSB W/VE

Astounded to do so well with 5 watts . . . *W4DEC*. Good to hear all the familiar calls . . . *WØCEM*. Excellent conditions and best score in years . . . *W7JXU*. New location, new home, and 35 knot winds for three days . . . *K4LDR*. UAØZAZ called me . . . *N7WWQ*. Got tired of QRM and quit early Sunday morning . . . *AA4MM*. Stayed home and did this one from the N9VVV squirt gun station . . . *N9VVV*. Pleased with station performance *(so were the 563 contestants who logged Wyoming—ed.)* . . . *WA7KYM*. Don't usually do phone contests . . . *WK3I*. My first 160 contest. Never able to sustain a good run from my modest station *(Hey, he is Arkansas—ed.)* . . . *AB5SE*. Hard, frustrating, fun . . . *WD9IAB/QRP*. We need the DX Window and it was QRMed this year . . . *AA1BU*. Why does CT put in CW when I enter SSB in the set up? . . . *NX5M*. First time as multi-op and had a great time . . . *VE1PZ*.

Saturday night was slow after a great Friday . . . *K4JYO*. Wind took down some antennas and line noise made operating very tiring . . . *KA2CDJ*. Able to work only three hours due to two power outages . . . *VE2UMS*. Only attempted contacts with S9+ stations with my Index Labs QRP+ rig . . . *AF7E*. Strongly object to contestants using voice keyers with less than two seconds between repeats . . . *VE7XF*. First time ever to work all 48 continental states . . . *NE3F*. Great contest, just need to hear better . . . *NN5Z*. Missed only three VE provinces and Alaska for a NA sweep . . . *VE3DC*. Wonderful training for two new contest operators . . . *W9LT*. Worked AH2CZ/AM over Guam. Too bad he did not land and give out a nice multiplier . . . *KBØWY*. Adding a snake antenna added an additional 100 QSOS over the weekend *(Now explain snake antenna for those who don't know.—ed.)* . . . *K2UOP/8*.

First single op effort in several years. Tried to set a new 4 land record . . . *W4WA (ex-AB4RU)*. Entered this contest the old-fashioned way—no voice keyers, no packet, and no special prefixes . . . *VE3XN*. First VK on 160. Work nights until midnight so only able to enter part time . . . *KO5D*. Gentlemen's band? Don't believe everything you read . . . K3CR *(Op. KB3AFT)*. You gotta love pain to stay up all night listening to noise . . . *K6SE*. Everything worked this time . . . *KG8CW*. Best effort for me . . . *N9ITX*. Some big signals out of Europe. Worked KH6CC 20 minutes after sunrise, but still no KL7 . . . *K3IXD*. New call helped (was W7XU in 1996) . . . *WØSD (yes, South Dakota!—ed.)*. Murphy hit at 0702Z second night as transceiver power transformer went up in smoke . . . *N5IA*.

Station Operators
CW Multi-Op

9A1A: 9A5W, 9A3GW, 9A3NR, 9A2R, 9A7R, 9A4OM, 9A9A. **AA2MF** & NT2X, WJ1R. **AA3B** & Packet. **AA4V &** N4SF. **AB5SE** & Packet. **AC5HF** & Packet. **AJ2U** & Packet. **DFØDFA**: DL7VDX, DL7UVO. **DFØRU**: DL7URH, DL7IO, DL7UBA. **DFØWD**: DJ2QV, DL1YAY. **DJ5CL** & DL6RAI. **DKØEE:** DF4IJ, DL4MCF, DL4MDO, DL4MEH. **DKØFFO**: DL2BWM, DL2BQJ, DL7UGN. **DKØSU**: DL1CW, DL2CC, DL5OBZ, DL9SEV, DK2ZO. **DK1NO** & DL1IAO. **DK5MV** & OM9AME. **DLØKF**: DF4PA, DJ3UL, DJ6TN, DJ7SW, DK8LV. **DL2MDZ** & Packet. **EA4ML**: EA4AFA, EA4EKR, EA4ET, EA4UA. **EU5F**: EU6DX, EW6AW, EW6MM, EW6EW. **EW5P**: EW8DX, EW8CM. **F5GHP** & F6HKA. **G3VGG/P**: G3ITH, G3KWK, G3RLF, G4AHK. **GU3HFN**: G3KHZ, GU3MBS, GU4WRP. **HB9LCW** & HB9HAW. **HG1S**: HA1TJ, HG1DAI, HA1DAE. **HG5A**: HA5IW, HA5GF, HA6GK, HA7VB, HA5FM, HA5OM, HA5CCC, HG6CNC. **I4IKW** & IK2NCJ. **I4JMY** & I4UFH, I4YSS, IK4IEE, I2VXJ, IK2QEI, IK2HDG, I2FGT, IK2QCC. **IK2MMF** & IZ2AVK. **J45T**: SV5TH, SV5DZS, SV5/KB4PMS. **JA1YXP**: JM1UWB, Packet.

KØLIR: NØIS, AAØA, NØLIK, WD9HTC, NØZZ, NØKFE, WBØIUN. **KØUK** & KØCL. **K1RV** & Packet. **K2BM** & Packet. **K2BX** & Packet. **K2FK** & Packet. **K2QMF** & Packet. **K2SB** & Packet. **K2UFT** & Packet. **K2WS** & Packet. **K3AR** & Packet. **K3ATO** & Packet. **K3CP** & Packet. **K3CR** & KB3AFT, WA3HAE, WA3FET, NW3Z. **K3II** & Packet. **K3JGJ** & Packet. **K3KO** & Packet. **K3MM** & Packet. **K3ND** & Packet. **K3WW** & Packet. **K4OY** & Packet. **K6GNX** & Packet. **K7VS** & AB7OD, K7XI. **K9BG** & Packet. **KB3TS** & Packet. **KB7N** & N7VMV. **KEØFT** & KG9IE. **KO7X** & W7CT. **KP4/K4UJ**: K4UJ, K4WA. **LA8SDA** & LA4DCA. **LY2BWJ**: LY2NLL, A. Toleikis. **LY3AV**: LY1CX, LY1CQ. **LY3BS** & LY4AA, LYR 728. **LY7A**: LY2BMX, LY2KZ, LYR 346. **NØNI** & NØAC, WØFLS. **N1BB** & W1FJ, W1KM, NB1B, WT1O. **N2VW** & Packet. **N3MKZ** & Packet. **N3OC** & KE3Q, WV3B. **N6KI** & KM6SN, KM3G, WB6NBU, N2MAU. **N7JW** & K7CA. **N8TR** & WB8K. **NE1I** & WA1Z. **NE3F** & N3JLL, KS3F. **NJ8M** & ABØS, KGØGC. **NM9H** & KX9X. **NQ4I** & K2UFT, K4BAI.

NS7K & K7OA. **NU8Z** & N8CC, K8AQM, KG8CO, K8KS, K8AEM, W8MC. **NY3Y** & Packet. **NZ9R** & K9HIA, WA2KVX, KG9AP, K9TFP. **OE1E**: OE1TKW, OE1JNB. **OE6U**: OE6PN, OE6ASG, OE6EFG, OE6PTG. **OHØAM**: OH1EH, OH1MDR, OH6EI, OH6YF. **OH2HE** & OH1JT, OH2IW, OH2JA, OH2KVH, OH6DD, OH2OT, OH2MNI. **OH4AB**: OH4EA, OH4KEC, OH4MFA. **OK1KJA**: OK1IR, OK1JN, OK1DNR. **OK1KUO**: OK1FFC, OK1UG. **OK1OKE**: OK1DXW, OK1DUT, OK1FUT, OK1VBA. **OK1RAK**: OK1HRA, OK1FFU, OK1FLC, OK1AYE. **OK5TOP**: OK1CW, OK1DF, OK1AUT. **OK5W**: OK1AEZ, OK1CF, OK1WF. **OM3KII**: OM1ATE, OM2AWW, OM2DX, OM2ZZ. **OM7A**: OM8AA, OM3BH, OM3GI, OM8AU, OM6MW. **OM7M:** OM5ZW, OM5RW, OM5RM, OM3PA, OM3TZQ, OM5NU, OM3TPF. **PA3BAS** & PA3AUC, PA3BPL, PA3CLH, PA3DSB, PAØPFW, PAØMUN. **PI4COM**: PA3BBP, PA3ERC. **PI4ZLD**: PA3BTH, PA3EOB, PA3GCU. **RK1OWZ**: UA1OZ, UA1-113-619, UA1-113-244, UA1-113-640. **RK6AYN**: RN6BP, RW6ACM, UA6AH, RV6ARU. **RW2F**: RA2FA, RN2FA, UA2FB, UA2FF, UA2FM, UA2FX, UA2FZ.

RW6AWT: RN6BN, UA6NP. **RX3RXX**: RA3RFA, RA3RIK, UA3-157-611. **S53X** & Operators. **S57Q** & S57C, S52CO, S51QA. **SK1BL**: SM1ALH, SM1IRS, SM1OII, SM1TDR. **SK6NL**: SM5HRR, SM6EWX. **SK6NP**: SM6FUD, SM6BUV, SM6MKH. **SK6QW**: SM6NJK, SM8PXJ. **SL3ZV**: SM3BDZ, SM3CVM, SM3JLA, SM3OJR, SM3VDX. **SM5HJZ** & SMØAJV, SMØGNS, SMØTXT. **SN3A**: SP3GEM, DJØIF, SP8NR, SP3RBI. **TA2FE** & Packet. **TF3IRA**: TF3EJ, TF3GB. **URØI**: UR6IM, UR7ICT, UR8IF. **UR4EYT** & UR5ECW, Club. **UT4UXW** & UT5URF, UT5UFO. **VE3DC**: VE3SS, VE3OCY, VE3OZY, VE3OZO, VE3STT, VE3VMO. **VE6AO**: VE6KZ, VE6AMR, VE6NJK, VE6CIZ, VE6KC, VE6IC, VE6DMD, VE6ZE. **WØCD** & W8UVZ, K8GG. **WØJH**: NØMR, K9NJ, WØSEI, KBØRCS, KBØRDA. **W1OP**: W1GS, W1IUX, K1JNJ. **W2GD** & K2SQ, KU2C, K2TW, N2AA, W2NO. **W2XN** & Packet. **W2YC** & Packet. **W3FV** & Packet. **W3GH** & W9XR. **W3MM** & Packet. **W4CN**: KT4GC, K4WW. **W4WA** & AA4GA, KB4GID. **W6TER** & Packet. **W8BAR** & AA4VV, W1TO, W8WEJ, W8VVE. **W8FT**: N8ET, AD8P, K5ZG. **W8WA** & N4AR, K8FX. **WC7M** & W7GS, WU7Y, N7VWV. **WT3W** & Packet. **WW2Y** & K1ZM, K2WI, N2NC, N2NT, N2NU, W2REH. **WY3T** & WA3BFP, KA3DSX, KA3PVA, KA3HNM, WR3H, N3KGL. **YO2V**: YO2GL, YO2ABN, YO2BP. **YU7KW** & YU7NU.

Station Operators
SSB Multi-Op

5K3SB: HK3MKQ, HK3QNU, HK3JJH. **AA1BU** & Packet. **AA2MF** & NT2X. **AA3B** & Packet. **AA4S** & K4ZA. **AJ2U** & Packet. **CO3JA** & CO2KK, CO2KG. **CS1A**: CT1DXQ, CT1ESQ, CT1FAC, CT2FUN, CT2GDF. **DFØID**: DL2FDK, DL3FEH, DL3KBM, DH9FAX, DK5FJ, DD7ZT. **DFØRU**: DL7VRO, DL7IO, DL7UBA. **DLØABT/P**: DL7VRO, DL7IO. **DLØMI**: DL2YBW, DL5YDD, DG6YHA, DG6YHT, DG2YIC, DJ3HW, DG5YHA. **EA8ZS**: EA3ALD, EA5BY, EA8ZS. **F5GTR** & F5GHP. **HB9CXZ** & HB9OCR, HB9FAN, HB9BLQ, HB9FBA. **HK6LRP**: HJ6PPN, HK6PSG, HJ6VKH, HK6ISX. **IK4IEE** & I4JMY, I4UFH, IV3TAN, I4YSS. **K1OW** & NY1E, K1MV, N1RJ. **K1RV** & Packet. **K2FL** & Packet. **K2OWE** & N2NRD. **K2UFT** & Packet. **K2YR** & WA4VKD. **K3ANS** & Packet. **K3ATO** & Packet. **K3IXD** & Packet. **K3MD** & N3PUR. **K3MM** & Packet. **K3UA** & Packet. **K3WW** & Packet. **K7ZO** & W7ZRC. **KBØWY** & Packet. **KB1BQZ**: KB1LN, KA1VMG. **KB3TS** & Packet. **KD2KS** & Packet. **KH7R** & KH6IFN, AH6MZ, NH6UY, WH6T. **KQ4HC** & WA4LJU. **LX9UN**: LX1UN, LX1AQ, LX1KC.

LY2WJ: LY2NLL, LY3DA, LY-B-26, A. Toleikis. **LY7A**: LY3NIT, LYR 728, LYR 346. **M7G**: GØUZF, GØWTD, GØWTM, G7SUR, G1AHM. **NØNI** & NØAC, WAØETC. **N1HMJ** & N1HOQ, N1SYB. **N2VW** & Packet. **N2XHD** & Packet. **N3MLV** & Packet. **N4EHJ** & KF4CRD. **N4TL** & Packet. **N6MZ/7** & KG7GA, KI7PP. **N7UE** & N2UE, N6LL. **N7WWQ** & Spot Net. **N8TR** & WB8K, KF8UN, K8YSE, WA8BIN, N8DMM. **NE3F** & KS3F, KT3T. **NN5Z**: NA5B, W5AO, K5PX. **NX5M** & N5NMY, KB5ZFO, GØAFH. **OK1KNC/P** & Operators. **OK1KUO**: OK1FFC, OK1UG. **OL5Q**: OK1HRA, OK1FFU, OK1FLC. **OL5T**: OK1MUJ, OK1FLM, OK1HSK, OK1TVA. **OM2I**: OM3TA, OM1KW, OM2KW, OM1MW, OM1RW. **OT7A**: DL3EBM, ON4AJW, ON4AUC, ON4CDC, ON4DB, ON4MV, ON4AID, ON4AWU, ON5OT, ON5UM, ON7NB, ON7SF. **RK3ZZZ**: RX3ZZ, UA3ZVM. **RW2F**: RN2FA, UA2FB, UA2FF, UA2FM, UA2FX, UA2FZ. **S53M**: S51ZO, S55HH. **T48RAC**: CO2JA, CO8DD, CO8HF, CO8KL, CO8OT, CO8PA, CO8UW, VE3ESE. **UA4PWW**: RW4PL, RA4PPA, RA4PPB. **UR4E**: UR5EDX, CLUB. **UR4UZA**: UR5UW, UR7UL, UR5UCW, UR4UCP, US-U-089.

VE1PZ & VE9AA. **VE2UMS**: VE2FAB, VA2FRU. **VE3DC**: VE3SS, VE3OCY, VE3OZY, VE3OZO, VE3FBQ, VE3VMO. **VE4ZK/VE4** & VE4KR, VE4KQ, N2BSA, VE4SY, VE4KU. **WØJH**: NØMR, W3FAF, NØPEY, WB5EMX, WØSEI, KBØRCS, KBØROA, KBØRGS. **WØSD** & WØDB, WDØT. **W2GD** & N3ADL, W2CG, N2NC, N2AA, WA2VUY, NO2R, KE2HG, N2UYV, N2NU. **W2KA** & Packet. **W3MM** & Packet. **W4CN**: K4WW, N4UL, NK4P, KT4CC. **W4IZ**: WA4B, KD4UJK, KE4YQR, KF4DGK, N4KE, W4USA, KE4IOL, NN2S, NU4Y, KC4ZGH, KF4FGP. **W7GG** & N7KG. **W9LT** & KT4CB, KB8UUE. **WA4QDM** & Packet. **WBØZLV** & WBØSRP, NØUJQ, NØKOV, NØRWB. **WB7VVD** & KC7AED, N7VUB, KB7VCO, KC7PCV. **WR8C** & K8LR, K8ZD, K8MK. **WT3W** & Packet. **WY3T** & WA3BFP, N3KGL, N3NQS, KA3DSX, KA3PVA, WR3H. **XE1RCS**: XE1ME, XE1JG, XE1VIC, XE1YJY, XE1YAW, XE1KK. **XE2/WA7UQV** & N7NC, Stephen.

The New Approach to HF Radio!

PC not included

The Kachina 505DSP Computer Controlled Transceiver

Features:

- Works with any Computer Running Windows 3.1, 95 or NT
- Covers all Amateur HF Bands plus General Coverage Receiver
- IF Stage 16/24 Bit Digital Signal Processing (DSP)
- II DSP Bandpass Filter Widths from 100 Hz to 3.5 kHz (6 kHz in AM Mode)
- Band Activity Display with "Point and Click" Frequency Tuning
- On-screen Antenna "Smith" Chart, Logging Software and Help Menus
- Automatic Frequency Calibration from WWV or Other External Standard
- "Snapshot" Keys for Instant Recall of Frequencies and Settings
- Optional Internal Antenna Tuner

The Kachina 505DSP Computer Controlled HF Transceiver After twenty years of building commercial transceivers in Arizona, Kachina has decided the time is right for a new approach to amateur radio. The Kachina 505DSP is nothing short of a revolution in HF transceivers.

Why Use Knobs if You Have Windows? The old-fashioned front panel has become too cluttered to be useful. Too many knobs, too many buttons. Kachina's 505DSP transceiver connects to your computer's serial port and is completely controlled under Windows™. With optional cables, the radio may be remotely located up to 75 feet away from your computer. Imagine combining a state-of-the-art DSP transceiver with the processing power and graphics capabilities of your PC and you'll soon wonder why all radios aren't designed this way. Why settle for a tiny LCD display when your computer monitor can simultaneously show band activity, antenna impedance, heat sink temperature, SWR, forward and/or reflected power and a host of other information?

16/24 Bit DSP/DDS Performance In addition to 100% computer control, the Kachina 505DSP offers exceptional 16/24 bit DSP/DDS performance. IF stage DSP, "brick-wall" digital filtering, adaptive notch filters and digital noise reduction, combined with low in-band IMD and high signal-to-noise ratio, produce an excellent sounding receiver. Sophisticated DSP technology achieves performance levels unimaginable in the analog world. The transmitter also benefits from precise 16/24 bit processing. Excellent carrier and opposite-sideband suppression is obtained using superior phasing-method algorithms. The RF compressor will add *lots* of punch to your transmitted signal without adding lots of bandwidth, and the TX equalizer will allow you to tailor your transmitted audio for more highs or lows.

Seeing is Believing American-made and designed, and able to stand on its own against the world's best, the 505DSP is bound to set the standard for all that follow. But don't take our word for it. Visit our website at http://www.kachina-az.com for detailed specifications, to download a demo version of our control software, or to see a current list of Kachina dealers displaying demonstration models in their showrooms.

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KACHINA COMMUNICATIONS, INC.

P.O. Box 1949, Cottonwood, Arizona 86326, U.S.A.
Fax: (520) 634-8053. Tel: (520) 634-7828
E-Mail: sales@kachina-az.com

CIRCLE 4 ON READER SERVICE CARD

Number groups after calls denote score, total QSOs, W/VE multiplier, countries worked. Total multiplier is the addition of the W/VE and countries. Multi-op scores follow single-op listings. An asterisk (*) denotes low power. State, province, and country certificate winners are listed in boldface.

CW RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

CONNECTICUT

KQ2M	**237,408**	**676**	**54**	**42**
K1VW	**181,056**	**640**	**53**	**39**
K1ZZ	128,054	362	47	39
W1WEF	126,400	502	44	35
***AB1U**	**80,676**	**314**	**49**	**32**
N4XR	72,688	311	47	30
*K1PX	71,213	506	46	13
WD5T	32,724	230	40	14
*WV1C	28,560	300	37	5
N1TM/QRP	**19,240**	**230**	**34**	**3**
N1HRA	6,528	85	30	2

MASSACHUSETTS

K5ZD	**246,574**	**590**	**52**	**45**
KM3T	**243,168**	**701**	**54**	**42**
AA1ON	83,068	369	47	29
***WO1N**	**62,766**	**350**	**45**	**21**
*W1TE	57,743	268	47	26
W1CSM	57,368	293	48	23
KA1DWX	25,652	140	33	20
K1DC	23,904	151	34	14
*WF1L	10,304	126	26	6
W1MK	8,034	141	26	0
WR1P	7,920	103	31	2
*K1EP	3,703	76	23	0

MAINE

N1CGP	**50,250**	**298**	**50**	**17**
***K1JB**	**11,682**	**173**	**32**	**1**
*W1CEK	800	18	14	2

NEW HAMPSHIRE

***WA1LNP**	**257,280**	**844**	**56**	**40**
W1JCC	75,862	240	43	40
KC1F	29,150	172	34	16
K1BV	6,786	119	25	1
WQ1H	1,605	49	15	0

RHODE ISLAND

***N1QME**	**19,096**	**183**	**37**	**7**
KD1IA	4,368	74	25	1
*K2MN	1,691	37	19	0

VERMONT

K1IK	**146,943**	**442**	**50**	**37**

NEW JERSEY

N2NT	**369,304**	**1011**	**56**	**48**
K2WK	**267,500**	**631**	**52**	**48**
***K3BU**	**149,130**	**550**	**52**	**38**
W2EN	133,500	756	56	19
*K5KG	130,720	567	55	31
*K2AZ	92,274	368	46	32
*WK2G	84,480	555	46	18
WA2VYA	76,983	450	48	19
N2MM	74,370	294	42	32
*K1NK	56,225	331	46	19
W1GD	31,620	135	40	22
*N2KJM	20,010	190	40	6
*N2BIM	18,081	198	40	1
N7UN/2	16,848	101	40	14
W2HCA	7,936	116	31	0
*K2OWE	6,864	119	25	1
*WA2ZGO	4,200	83	24	0
*NA2U	2,499	69	17	0
AJ2U	2,244	48	22	0
*W2UL	400	20	10	0

NEW YORK

K2FU	**133,856**	**509**	**54**	**35**
***K2KQ**	**78,408**	**412**	**51**	**21**
*KA2CDJ	76,111	279	52	31
*W4AA	72,372	358	52	22
*KW2J	69,483	380	48	21
K2ONP	59,283	281	43	20
K2XA	49,038	175	34	32
*WØVU/2	36,240	317	41	7
W2SF	35,748	280	41	13
*K2UF	33,135	316	41	6
*W2KTF	11,550	153	35	0
N2UM	10,064	112	32	5
*NA2Q	10,030	117	34	0
*K2YR	9,316	110	30	4
*AA2YW	8,136	100	34	2
WJ2O	6,188	78	33	1
*WB2DLA	2,772	62	21	0

DELAWARE

AA1K	**385,110**	**1032**	**57**	**53**
*N9GG	1,196	43	13	0
*N3MTU	341	14	11	0

MARYLAND

W3LPL	**513,798**	**1182**	**56**	**58**
***K1HTV**	**166,605**	**726**	**56**	**31**
W3GN	61,040	335	50	20
WK3I/QRP	**59,885**	**439**	**51**	**8**
*W3CP	17,466	193	39	2
W3DAD	16,520	165	33	7
*W3AZ	16,029	171	38	1
*N3II	13,135	160	35	2
K3ZO	4,368	50	20	8

PENNSYLVANIA

W3BGN	**378,620**	**838**	**53**	**57**
K3UA	**351,780**	**739**	**55**	**55**
W3TS	225,711	793	58	35
WF3T	175,648	677	56	32
K3SV	116,366	499	50	33
K3TEJ	75,140	464	45	20
K3IPK	68,925	301	46	29
K4JLD	48,930	213	43	27
NN3Q	45,568	243	42	22
W3UM	45,198	300	47	15
W2TN	37,937	249	43	16
W3OV	34,270	306	38	8
W3TDF	34,200	258	34	16
K3BSY	32,010	259	47	8
N3ZA	17,100	151	38	7
***W3EHZ**	**15,561**	**186**	**35**	**4**
KA3AVB	10,745	139	34	1
*W3MF	7,744	112	32	0
*W3UHP	6,526	118	26	0
K3WWP/QRP	**6,300**	**117**	**25**	**0**
*K3SWZ	930	27	14	1

ALABAMA

W4NTI	**39,150**	**294**	**50**	**8**
***W4DEC**	**27,825**	**226**	**44**	**9**
*K4JYO	27,183	235	42	9

FLORIDA

N4PN	**129,420**	**504**	**53**	**37**
N4BP	57,980	376	54	11

GEORGIA

***K9AY**	**74,796**	**439**	**50**	**19**
*NN4S	35,700	243	46	14
K4ODL	33,240	162	35	25
*KN4QV	25,200	183	45	11
*N4HI	20,433	184	42	7
K4BI	15,974	116	38	11
W4NZJ	12,760	116	38	6
K4TEA	8,064	79	31	5
W4DMB	4,340	63	29	2
N4XMX	3,375	51	23	2

KENTUCKY

***K4TO**	**90,048**	**382**	**53**	**31**
N4XM	6,840	69	32	6

NORTH CAROLINA

AA4S	**134,070**	**641**	**53**	**29**
***N2NFG**	**77,286**	**506**	**51**	**15**
W4TMR/QRP	**28,469**	**290**	**45**	**4**
N4AF	19,024	209	39	2
N4UH	11,234	114	36	5

SOUTH CAROLINA

***K4DB**	**11,160**	**129**	**36**	**4**

TENNESSEE

N4ZZ	**113,072**	**598**	**53**	**21**
***K4AMC**	**15,918**	**175**	**41**	**1**
N4CM/QRP	**13,024**	**160**	**34**	**3**
*KØEJ	8,224	121	31	1
VE7CPN/W4	6,438	105	29	0

VIRGINIA

W4DF	**64,588**	**411**	**55**	**12**
***AD4TJ**	**50,648**	**438**	**43**	**9**
N3JB	36,335	210	48	17
K4ZW	34,506	231	36	18
N4ROA/QRP	**33,605**	**327**	**41**	**6**
W4XD	32,715	326	41	4
K4VV	27,666	220	43	10
*WB4PJW	16,200	209	35	1
*K4UK	9,141	124	31	2
*KC4GIA	5,450	100	25	0
N4MM	4,082	68	23	3
*W4VC	3,068	56	26	0
*N3RC	2,530	52	23	0

ARKANSAS

***KJ5WX**	**28,896**	**206**	**45**	**11**
W5KL	6,634	107	31	0

LOUISIANA

***W5OT**	**31,080**	**205**	**48**	**12**
*AA5FJ	832	26	16	0

NEW MEXICO

***N5IA**	**105,151**	**580**	**54**	**17**
N5UL	87,825	462	54	21

OKLAHOMA

K5TT	**102,804**	**490**	**53**	**25**
K5YAA	57,200	379	53	12
***WD5CSK**	**10,678**	**136**	**37**	**1**

TEXAS

N5JA	**402,042**	**1052**	**57**	**54**
N6ZZ	**131,887**	**567**	**54**	**29**
***N5LZ**	**51,430**	**223**	**51**	**23**
*N5WS	46,079	215	52	19
K5NA	10,620	90	36	9
W5ASP	6,176	86	27	5
*WK5K	3,072	64	24	0
AC5AA	1,886	38	23	0
*K5RA	1,235	31	19	0

CALIFORNIA

K6SE	**89,886**	**434**	**52**	**19**
K6XT	61,248	366	50	16
W7CB	46,784	282	52	12
***W6JTI**	**41,400**	**280**	**50**	**10**
N6LL	31,570	234	48	7
KG6AO	22,308	172	45	7
*WA6FGV	21,168	189	44	5
WA5VGI	16,728	122	45	6
W6AQ	13,230	128	34	8
K6MO	12,617	126	33	4
*N6NR	6,825	78	32	3
*KØINT	6,748	102	26	2
*N6HC	5,945	101	28	1
AC6HF	4,464	80	22	2
*N6NF	3,542	66	21	2
*KO6WQ	2,222	46	21	1
K6SG	2,057	52	15	2
*K6HRT	1,960	67	13	1
K6MI/QRP	**1,209**	**38**	**12**	**1**
*KQ6ES	1,068	43	11	1
*N6TW	639	34	8	1
KI6PG	363	15	11	0
*AA6EE	48	8	3	0

ARIZONA

WA7LNW	**89,838**	**526**	**55**	**14**
***WA2DFI**	**49,029**	**353**	**53**	**6**
KC7V	48,709	262	48	19
K7OX	32,648	238	46	10
*NN7A	20,100	175	46	4
W7YS	10,040	117	38	2

MONTANA

W7LR	**57,159**	**262**	**53**	**20**

OREGON

W7GG	**135,050**	**614**	**55**	**18**
***W7YAQ**	**12,250**	**101**	**43**	**7**
*KI7Y	1,185	35	14	1

UTAH

W7HS	**28,037**	**214**	**46**	**7**

WASHINGTON

N7EX	**61,860**	**278**	**47**	**13**
K9JF/7	41,540	259	50	12
*W7UB	5,404	95	27	1
*W7DRA	781	31	11	0

MICHIGAN

K8CC	**445,280**	**1116**	**56**	**54**
AA8U	**248,038**	**813**	**56**	**42**
***K8PG**	**95,849**	**556**	**53**	**20**
N8EA	90,885	255	51	32
*AA8R	56,854	376	49	13
ND5S	51,094	367	49	10
*KT8Y	37,689	226	46	5
*K8SIA	30,576	253	46	6
*KB8YI	29,870	159	39	19
K8JM	21,168	226	38	4
K8CV	20,900	217	42	2
K8VT	19,530	192	41	4
KG8CW	13,005	74	25	20
W8ROS	11,985	100	42	5
*K8GVK	8,697	89	35	4
K8DD	8,120	103	34	1

OHIO

W8CAR	**160,689**	**695**	**55**	**32**
N8AA	86,742	384	51	28
K8DI	69,426	458	49	14
***WA8YRS**	**45,468**	**389**	**49**	**5**
*W8IDM	40,020	283	45	13
*K8MR	37,352	272	48	10
*KF8TM	25,376	140	45	16
*W8PN	22,050	178	42	8
*K8AB	20,482	177	43	6
*WT8P	17,024	209	38	0
*W8FDN	13,431	168	37	0
K8LN	11,520	121	35	5
N8AXA/QRP	**7,000**	**109**	**35**	**0**
*NW8F	882	30	14	0

WEST VIRGINIA

W9LT	**216,398**	**729**	**55**	**36**
K3JT	**122,580**	**457**	**55**	**35**
***N8II**	**118,734**	**622**	**55**	**22**
K8OQL	88,704	474	51	21
*K8UC	44,785	385	46	7
*K2UOP/8	42,900	332	45	10
*WA3HQK	31,212	262	42	9
*W8JWX	8,120	110	35	0

ILLINOIS

WS9V	**266,272**	**798**	**57**	**49**
K9NR	**152,240**	**626**	**56**	**32**
KW9KW	146,700	611	57	33
W9OF	84,864	404	52	26
***K9QVB**	**65,120**	**332**	**52**	**22**
*WO9S	46,172	275	54	14
*NN9K	44,880	335	53	7
*K9MMS	43,432	311	55	6
*WB8BHN	40,576	269	54	10
*K9WA	40,533	290	49	10
*K9TR	30,940	274	50	2
*W9LNQ	8,463	100	35	4

INDIANA

W9RE	**280,908**	**902**	**57**	**45**
***KJ9C**	**48,739**	**339**	**49**	**12**

WISCONSIN

WØAIH	**167,270**	**734**	**55**	**31**
WI9WI	**122,213**	**607**	**56**	**23**
K9MA	81,510	352	51	27
***WA1UJU**	**66,670**	**510**	**57**	**2**
W9GIL	23,838	160	49	9
*K9OSH	21,479	210	42	5
WE9V	19,431	126	38	13
WD9IAB/QRP	**6,386**	**103**	**31**	**0**
AJ9K	6,105	82	33	0

COLORADO

W2FCR	**40,734**	**275**	**53**	**9**
AAØYX	35,152	313	49	3
***NØHF**	**21,372**	**177**	**46**	**6**
*WØMU	705	24	15	0

IOWA

NRØX	**152,444**	**513**	**54**	**38**
***NØBB**	**52,394**	**328**	**56**	**11**

KANSAS

WØUY	**40,310**	**285**	**49**	**9**
KCØEI	24,240	235	46	2
WIØR	6,052	83	34	0

MINNESOTA

WØPI	**141,349**	**651**	**56**	**27**
KJØB	80,262	373	55	23
WØHW	47,275	336	54	7
***K9WIE**	**45,506**	**305**	**51**	**10**
KØKX	40,200	185	42	25

MISSOURI

K4VX	**256,526**	**984**	**57**	**37**
NØTT	163,593	800	57	26
***KØJPL**	**61,446**	**406**	**55**	**11**
*WAØX	33,609	310	51	0
KØIFL	17,664	149	39	9

NEBRASKA

***W5VTS**	**16,236**	**171**	**44**	**0**

CANADA

NEW BRUNSWICK

VE9AA	**449,700**	**782**	**54**	**46**

NOVA SCOTIA

VE1PZ	**246,960**	**341**	**50**	**48**
VE1AI	122,969	272	47	30
***VE1CZ**	**36,464**	**162**	**45**	**8**

QUEBEC

***VE2AWR**	**32,904**	**192**	**35**	**1**
VA2AM	31,550	116	31	19
*VE2BWL	24,710	144	30	5
*VE2FFE	4,541	52	19	0

ONTARIO

VE3EJ	**780,156**	**1148**	**57**	**60**
VE3KP	**320,247**	**699**	**56**	**31**
VE3PN	262,392	516	48	39
VA3NN	209,304	542	55	21
***VE3CSK**	**153,846**	**388**	**51**	**26**
*VE3KZ	133,980	380	53	17
*VE3OSZ	54,366	99	50	32
*VE3UZ	28,249	140	38	3
*VA3TEE	12,296	89	29	0
*VA3ZC	11,736	102	24	0
VE3ZTH	7,930	64	26	0
*VA3HL	4,980	51	20	0

MANITOBA

VE4JB	**59,624**	**213**	**50**	**8**

SASKATCHEWAN

VE5RA	**208,598**	**605**	**55**	**16**
***VE5SF**	**13,764**	**81**	**37**	**0**

ALBERTA

VE6JY	**5,157**	**38**	**24**	**3**
VE6ARC	357	12	7	0

BRITISH COLUMBIA

VE7XF	**14,190**	**101**	**28**	**2**

BARBADOS

8P9DX	**465,405**	**673**	**56**	**59**

MARTINQUE

FM5BH	**551,348**	**763**	**54**	**62**

MEXICO

***XE2DV**	**78,728**	**304**	**50**	**2**

PANAMA

HP1AC	**3,150**	**33**	**13**	**5**

PUERTO RICO

WP4LNY/QRP	**44**	**3**	**0**	**2**

ST. MAARTEN

PJ5AA	**42,120**	**118**	**29**	**23**

ST. KITTS

V47KP	**312,825**	**524**	**51**	**46**

AFRICA

ALGERIA

***7X2RO**	**251,250**	**503**	**1**	**49**

CANARY ISLANDS

EA8EA	**1,243,224**	**1007**	**49**	**75**

CHAGOS

VQ9SS	**168,448**	**269**	**4**	**60**

UGANDA

5X4F	**2,550**	**43**	**1**	**5**

ASIA

ARMENIA

EK6GC	**494,073**	**657**	**13**	**74**

ASIA RUSSIA

UA9WZ	**155,553**	**298**	**1**	**56**
***UA9MR**	**109,480**	**232**	**0**	**56**
*RW9JO	104,604	264	0	46
RA9JX	76,406	194	0	46
*RW9MM	33,330	121	0	33
*RK9AZZ	23,569	84	0	37
*RW9QA	18,694	85	0	26

AZERBAIJAN

***4K9W**	**70,092**	**205**	**0**	**36**

HONG KONG

VS97BG	**828**	**16**	**0**	**9**

ISRAEL

4X4NJ	**436,548**	**561**	**21**	**63**

JAPAN

JA5BJC	**261,990**	**325**	**35**	**55**
JH5FXP	**233,184**	**307**	**33**	**51**
JR6PGB	50,208	140	15	33
***JI3KDH/3**	**14,751**	**91**	**9**	**24**
*JH2QMT	13,560	78	11	19
*JE1SPY	2,028	34	6	7
*JH3AIU	1,768	23	6	7
*JH7XGN	1,017	24	5	4
*JS1UMQ	608	18	1	7
JA9XBW/QRP	**294**	**7**	**0**	**7**
*JR6CF	140	4	1	3
JK3ZQJ/QRP	132	8	0	4
*JK2VOC	93	10	0	3
JH6SQI/QRP	14	2	0	2

JORDAN

JY9QJ	**193,050**	**392**	**2**	**52**

KAZAKH REPUBLIC

***UN2O**	**113,608**	**281**	**0**	**44**
UN6P	69,564	200	0	44

KUWAIT

***9K2/YO9HP**	**6,534**	**33**	**0**	**22**

(Continued on page 96)

THE VECTRONICS VC-300DLP . . .
300 WATT ANTENNA TUNER

- *Multi48™ Inductor*
- *Cross-Needle Meter*
- *8 Position Antenna Switch*
- *Built-in Dummy Load*
- *1.8 to 30 MHz Coverage*

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The VC-300DLP backlit Cross-Needle meter displays SWR, forward and reflected power simultaneously. Reads both peak and average power on 30/300 watt scales. Meter lamp has front panel switch and uses 12 VDC or 110 VAC with AC-12 adaptor, $12.95.

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The VC-300DLP eight position antenna switch lets you select two coax fed antennas, random wire/balanced line or built-in dummy load for use through your tuner or direct to your transceiver. Bypass position bypasses your tuner but keeps your SWR Power meter in line.

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Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8-30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz.). 7.25x8.75x3.6 in. Weighs 3.4 lbs.

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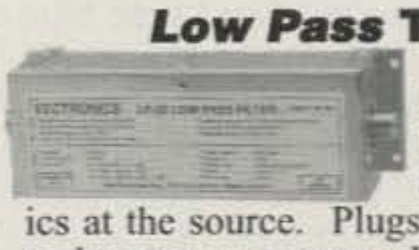

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CIRCLE 157 ON READER SERVICE CARD

Your local hardware store or home supply outlet may have an amateur radio department without your even knowing it. Some commonly found items can easily be transformed into a new antenna.

How To Build A Super Slinky Stealth Antenna

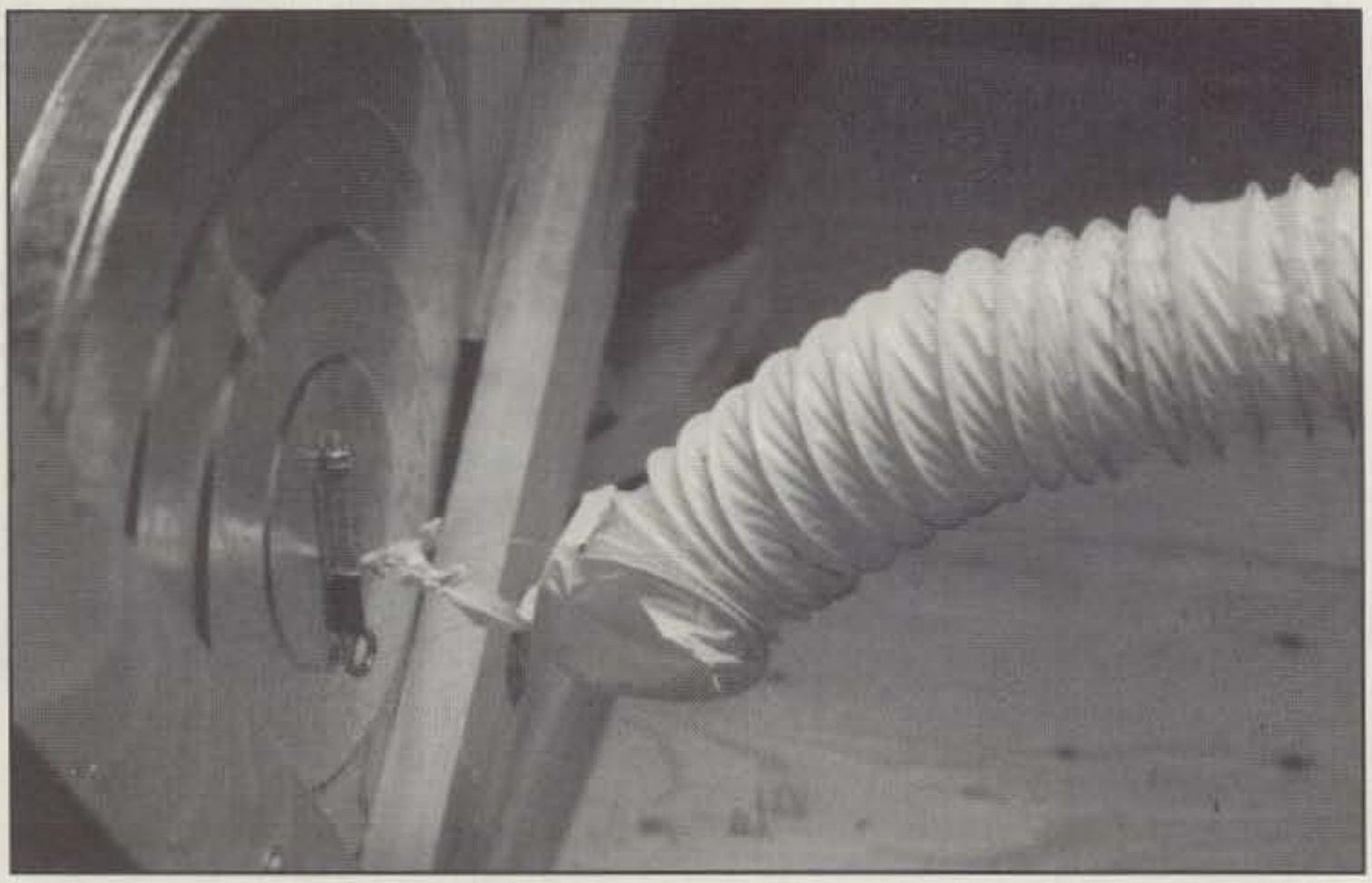
BY BERNIE COLER*, KC7CP, AND FRANK KING, AA7XA

In the world of high-tech antennas, my super slinky can be classified as strictly super low-tech. It's simple, and it works. You can buy the materials for this antenna just about anywhere, from discount outlets to your neighborhood hardware store. The primary low-tech elements are lengths of flexible clothes-dryer vent coils and trash-can lids.

Nearly 18 years ago when we bought our lot on the beautiful Oregon coast, we thought it would be our retirement paradise. I dreamed of super amateur radio time and lots of antennas. Our choice Oregon coast land had just what we needed. It was 500 feet from the Pacific Ocean atop a 100 foot cliff with no power lines or other utility cables in sight, and it was over a half mile from the state highway. We bought the lot, waited for retirement, and dreamed our dreams.

When construction started in 1993, the big blow hit. Ours was a private residential community with strict CC&R antenna prohibitions. No wonder there were no utility cables showing! We hadn't read the fine print. No amount of pleading and vividly describing the value of amateur radio could budge the management. They did allow a small chimney-mounted stinger for 2 meters, but what about an antenna for the high-frequency bands? There had to be a way.

How about disguised antennas such as a vertical inside a flagpole? The management had thought about that one, too. Flagpoles could not be over 8 feet long and had to be attached, at an angle, to the side of the house. Fine wire of 26 gauge or less hung on trees? We have plenty of



A close-up view of the dryer vent coil attached to the garbage can lid. The lid makes a great capacitance hat. Monofilament fishing line anchors the antenna to a firm support.

those over 50 feet high, but the fine wire wouldn't withstand frequent gale-force winds. We are on a headland with over 180 degree ocean horizon. I tried the fine-wire thing and it broke after one week.

How about driving my roof gutters? Sorry. They're vinyl. Frustrated, I decided it was time to hit the books: the *ARRL Handbook;* the antenna handbooks; and loads of other material, including stuff on mobile units and literature from AEA, MFJ, and all the usual sources.

The antenna had to fit through my small attic hatch into a space 4 feet high and 31.5 feet long. Meanwhile, I was doing everything I could to make my new QTH near perfect with a good RF ground. My system is a three leg star of 8 foot long ground rods with one in the center. All are connected and soldered at the top to 3/4 inch copper tubing. One leg of the star is right at the house foundation, so that with a suitable hole in the basement wall, a 5 foot long piece of braided copper terminates at a flat copper plate on which sits my new ICOM IC-737 with an automatic antenna tuner. Our builder installed a 2 inch OD PVC pipe running from the basement to the attic.

I had done everything I'd read or been told to do to ensure success—except for the antenna. By then I was leaning to-

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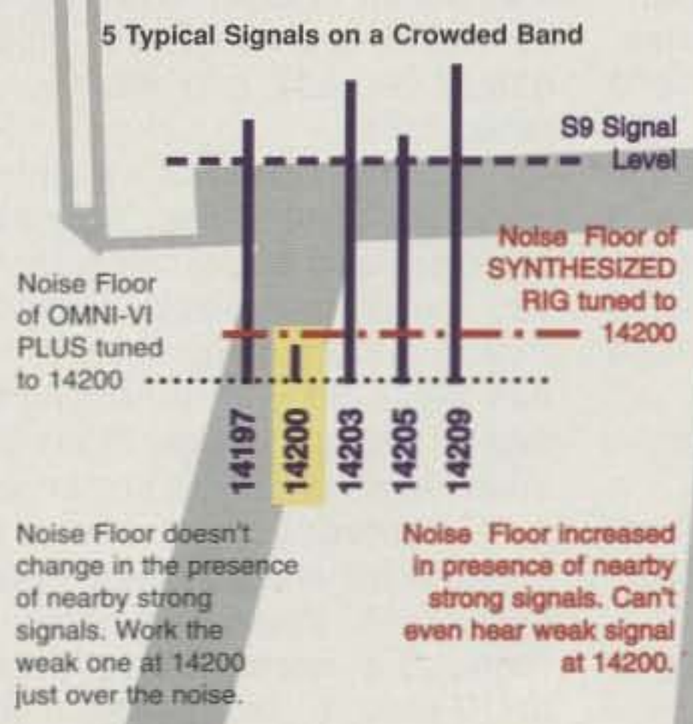

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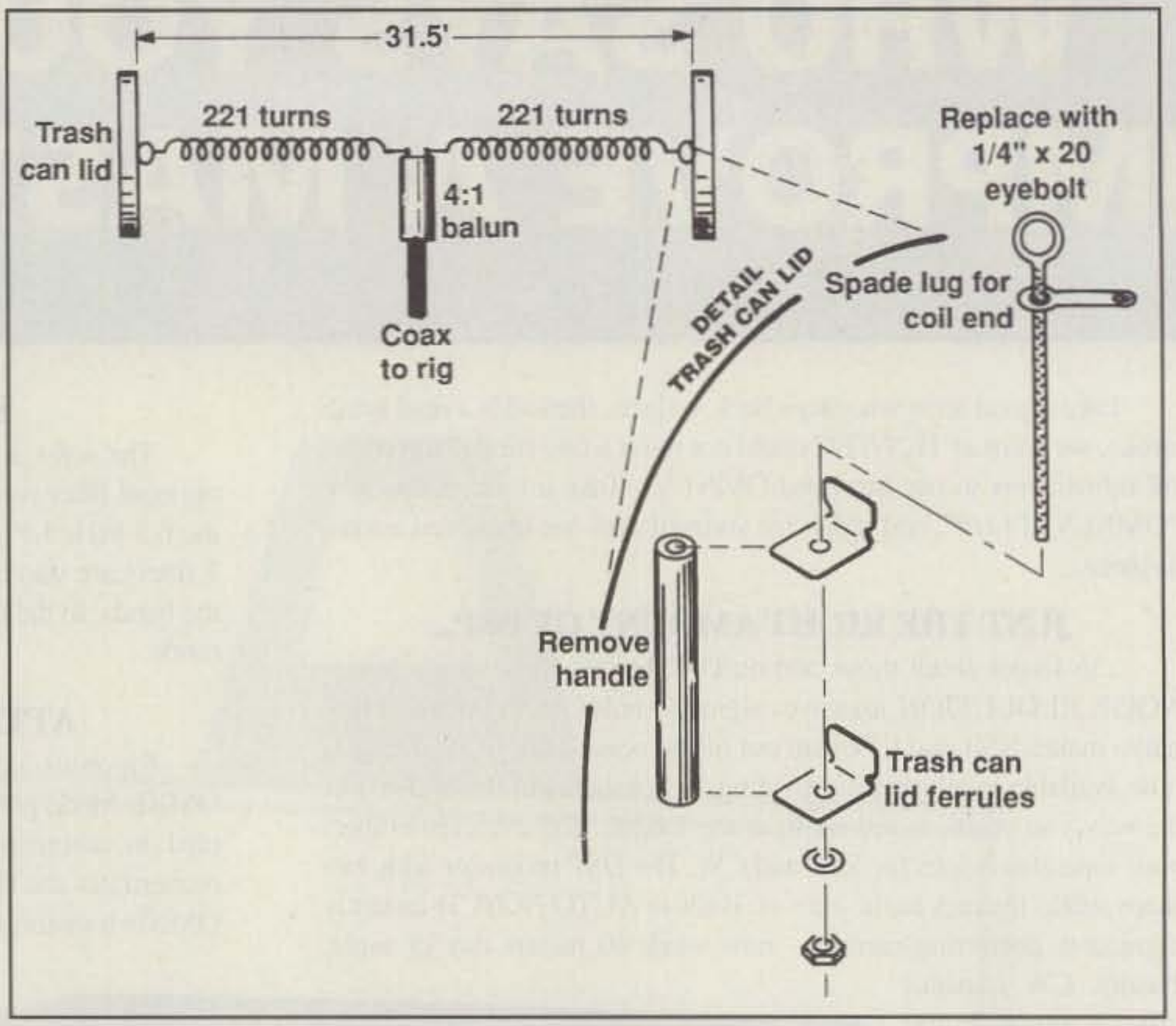

Fig. 1– The basic diagram for the Super Slinky Stealth Antenna.

wards some form of linear loading. I got a copy of Antennas West's "Slinky Helical Antennas for Portable and Small Space Use." It wasn't very encouraging. It was a bad day on the Oregon Coast.

I was in a foul mood when I charged into our local hardware store to buy something I needed. There it was. Lightning flashed, thunder rolled, trumpets blared, and bells rang. I knew this was what I was after.

At the rear of the store, in housewares, one of the salesmen was cutting a piece of dryer vent, a coiled metal spring covered in thin white vinyl and used to vent a clothes dryer. In a shaking voice I asked the salesman if he had a full box of the coil. He did. I dashed out to the car for my volt-ohmmeter, a magnet, and a tape measure. My readings showed:

• End-to-end coil resistance 3.8 ohms—a continuous coil.

• Coil material—magnetic, some form of spring steel; corrosion resistance is poor, but vinyl coating helps.

• Coil diameter—4 inches, wire length, 453 turns by painful hand count, × PI = 474 feet.

What a slinky! The slinky article referred to performance limitations of the much shorter 2 inch diameter child's toy, including problems with connecting several together end to end. The authors hadn't looked at dryer venting. I almost kissed the salesman.

As I was putting the coil back in the box, I spotted a display of large, galvanized-metal trash cans and lids. Yes, this was my day!

Don't we know the need for capacitance hats at the ends of a dipole both for bandwidth enhancement and to reduce problems of high end-of-antenna RF flash over? The trash-can lids were round and had rolled edges and a ferrule in the middle for the handle. The 24 inch diameter lid would fit through my attic hatch. I bought two lids, and with the vent coil I raced home.

From one corner of my garage to my workshop I had a clear 38 foot long run. I could set up the antenna before going up into the cramped attic. Cutting the coil exactly in the middle, I spliced in an Antennas West 4:1 current forcing balun, attached a length of coax to my MFJ Model 204B Antenna Bridge, and began to measure. Removing only five turns from each coil and adjusting the coil to as uniform spacing as I could, I was able to achieve readings in each amateur band from 80 to 10 meters. Everything, including the WARC bands, was between 18 and 143 ohms. And my ICOM Auto-Tuner could handle a 3:1 mismatch.

I then prayed that it would work as well in that cramped hell hole of an attic. I crept and tip-toed around that attic, being oh so careful to step only on the ceiling joists. My XYL would not have appreciated feet crashing through our brand-new ceilings.

The antenna works. How well? Not as well as a beam, long wire, or other well-known variety, but a 31.5 foot by 4 foot attic has its limits. The antenna is very good on receive. I have to turn off all my fluorescent lamps in order to hear well. However, if you can't hear 'em you can't work 'em.

Construction Hints

Lesson one was learned at the hardware store when I took out the coil to count turns. It was like a kid's toy, only ten times worse. Just like a snake, the coil comes alive when free. To control the thing you need about 5 feet of heavy stick. I used a broom shoved through the middle of the entire coil before cutting in the middle. Save the broom for lesson number two.

Lesson two deals with supporting the helix. I used 50 pound test monofilament fishing line. This is fine stuff, provided you use special care. The entire coil weighs only 4.25 pounds, but if you try to remove the sag from the line while it does its job of supporting the helix, you will break the line. That happened three times before I got smart and supported the coil with the broom stick. Then, using my fisherman's scale I applied a 40 pound pull on the fishing line. That gave less than one foot of sag—good enough. Also be careful to use fisherman-type knots, which will jam properly but not cut the line. I used the improved blood knot, a drawing of which can be found in any fishing bible. Finally, to avoid breaking the line (which would necessitate another trip to the attic) I carefully rounded off and cushioned any area around which I wrapped the line for support. I also avoided sharp corners to keep the line from breaking.

Lesson three can be ignored by those who have a bigger attic with a fully planked floor. Get in good physical shape. I recommend lots of duck-walking. See your local, friendly football coach.

Construction details are shown in fig. 1. The diagram shows how the antenna is installed in my attic.

Additional Slinky Information

Although I made antenna bridge measurements, I am not providing the details because this is a very flexible form of antenna. You can stretch it longer, alter coil spacing for possible special performance in a particular band of interest, and so on. Happily, when the antenna was mounted in my attic, my measurements were not changed significantly by the loading of adjacent house-wiring, shingle nails (lots of those nearby), and other assorted builder's hardware. Who knows? Maybe that's why the Super Slinky works as it does.

I used the impedance calculations from the *ARRL Handbook* for the helix coil inductance, giving a lumped value for the entire coil of nearly 227 microHenrys, and for the trash can lids a capacitance of nearly 0.2 picoFarad. Then from the same handbook the self-resonance of the combination is at a frequency of 31 MHz. My QTH is so hilly, rocky, and full of trees that there is no way to make a measurement of my antenna pattern. I do know from our house plan that the peak of the roof is 26.5 feet above grade, so the probable average antenna height is 24 feet. Coax cable length from my transceiver up through the installed PVC pipe is 30 feet of double-shielded RG/8U.

If you have any questions, send an SASE to me at P.O. Box 508, Gleneden Beach, Oregon 97388, and you will get a speedy response, unless, of course, the fish are biting.

How much did I spend for this nearly all-band kludge? At our Ace Hardware emporium I paid $19.95 for the dryer venting and $3.75 each for the trash-can lids. The fishing line came out of my tackle box, and the coax cable came from the junk box. The balun is a 4:1 current forcing unit from Antennas West, also the source of the Slinky article. For the blood, sweat, and tears shed in the attic, there's no charge. I'm enjoying the antenna, which, the same as the house, is oriented from northeast to southwest.

When it's late at night, only a few lights show from houses here and there. Our little settlement is very quiet. Those are the nights when you will find me working my rig. So far I have worked most of the eastern seaboard states (including Maine and Florida), Texas, and the Midwest. I have gotten as far north as Alaska, but I haven't worked Hawaii yet. However, my contacts on the slinky include New Zealand, Japan, Portugal, and Sweden. All were worked barefoot with less than 100 watts.

If the managers of our development only knew. You can't foil hams. ■

Our peripatetic traveler, WB2AQC, takes us on another journey, this time to Hungary, where we get a chance to see some of the locals.

Amateur Radio Families In Hungary

BY GEORGE PATAKI*, WB2AQC

During a recent trip to Hungary I visited many radio amateurs in various cities and villages. Because I speak the language, it was easy for me to gather information about their amateur radio activities and their lives in general.

Since 1989, when they switched from a socialist to a free-market economy, they've gone through a difficult transition period. Some individuals succeeded better than others. The nation has gained more political, cultural, and economic freedom and new opportunities have opened up, but the people have to work longer hours and harder than before. Lots of people have two jobs—usually one as an employee in a state-owned or private enterprise and another working for themselves. On the other hand, enterprising, hard-working people with good skills have achieved high standards of living.

As a general rule, women have the same education and work opportunities as men, and in most families both husband and wife have jobs. Women have achieved equal status with men, and they often participate in the same activities, both in professions and recreation.

During my visit I found many families of radio amateurs in which both husband and wife, or parents and children, were enjoying the same hobby. The level of involvement in amateur radio differed from one individual to another, depending on the person's love of the hobby and other obligations he or she may have had.

Following are some examples of amateur radio families. There are many more I did not have a chance to see.

Imre, HA4YD, the secretary of the Hungarian Radio Amateur Association, is married to Ani, HA5YA. Both of their callsigns are displayed on the back window of their car.

I had several QSOs with a father-daughter team in Budapest, and I received cards from both Geza, HA5XW, and his daughter Orsi, HG5BXW.

Also in Budapest is the husband and wife team of Imre, HA5DZ, and Emma, HG5APP; they use one QSL with both callsigns. A similar card is used by Erika, HA5LD, and her husband Kari, HA5EH.

Simon, HA5IW, an active member of the HA5KDX group, is married to Vali, HG5BIW. HA is the prefix of a Hungarian amateur licensed to operate on all bands, while HG is assigned to those who are restricted to VHF and UHF. In this case, Simon, HA5IW, has a higher class license than his wife Vali, HG5BIW.

Edit, HA3LP, and her sister Betty, HA3KX, of Siofok, are champions in high-speed telegraphy. They were trained by Joska, HA3GJ.

Marta, HA5FQ, and Tibi, HA5RE, are on the same level. However, because Tibi is retired and Marta is still employed and has a household to take care of, Tibi has more time for building, experimenting, and traffic than Marta.

Gizi, HA5BAM, is Marta's mother and the widow of the late Janos, HA5AM, who was very active both on the air and as an Elmer to many newcomers.

Joska, HA5CEC, is a retired radio operator and navigator for Malev, the Hungarian airline. His wife Lonci, HA5CSL, is a retired airport radio operator. Their daughter Agnes, HA5CXC, an office worker, is the third member of this amateur family. Joska is the bravest; in 1995 he operated on 2 meters from a hot-air balloon.

Kari, HA1ZU/5, is a Lt. Colonel and professor at Bolyai Technical Military Academy. His wife Ila is HG1RH/5, so Kari pulls rank over Ila, at least on the matter of license.

I met Janos, HA5ZA, and his wife Agi, HG5ZB, at an HA2KSD contest station on Hajag plateau, where there was a small hamfest. At the same place I also met Laci, HA4YH, and his wife Ani, HA4YN.

Jenci, HA5FA, a contester and DXer with 320 countries confirmed, is the secretary of BURABU, the Budapest section of the Hungarian Radio Amateur Association. His wife Erzsebet is HG5YFA and has a license equivalent to our Technician Plus. Both have nice QSL cards.

Laci, HA4XW, and his wife Marika, HA4WX, equal in rank, own and run "A & B Trade," the largest radio equipment store in Budapest. They share a very nice color photo QSL card.

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Csaty, HA3IU, and his wife Erzsi, HG3JO, use a Yaesu FT-757GX, a ground plane for 10-15-20 meters, and a 9-element Yagi for 2 meters.

In Nyekladhaza, about 90 miles east of Budapest, I visited Laci, HG9ON, and his wife Zsoka, HG9EL. Both are on 2 meters and are also on packet.

In Miskolc, about 8 miles farther north, I saw Gyu, HA9OA, and his son Robee, HG9MOA. They share a TS-820 with a 600 watt amplifier and a 4-element Yagi for 10-15-20 meters installed on the roof of a 10 story building. They are also on 2 meters, work SSB and the digital modes, and are on color SSTV. The father has QSL cards, but the son does not.

In the same city live Fred, HG9MDA, and his wife Jutka, HG9DMJ. Both are computer teachers and consultants. Fred has QSLs, while Jutka does not.

Erd is a small town very close to the capital city. There live the father and son team of Tibi,

This family from the village of Som operates on 2 meters, participates in contests, and has been the winner of several national championships. They are (left to right) Iren, HG3FLG; Tibor, HG3FLJ; Andrea, HG3FMS; and Tibi, HG3FMT.

Sr., HA7TM, and Tibi, Jr., HA7JHN. They work together in their own burglar-alarm business. They share not only a first name, but also a well-equipped station with a 95 foot tower, 6-element Yagi for 10 meters, a 3-element Yagi for 20 meters and one for 15 meters, an 8 element Quagi (Quad and Yagi combination) for 2 meters, an inverted Vee for 40 meters, and a delta loop for 80 and 160 meters. Both have nice QSL cards.

In Szent Endre, 12 miles north of Budapest, there is an active couple: Sanyi, HA7VK, a radio communications engineer, and his wife Judith, HA7RJ, an economist. From 1991 to 1995 they worked in Cambodia ,where Sanyi, who was licensed as XU7VK, made 28,000 QSOs. In 1995 Sanyi and Judith shared the XU95HA call and made another 7000 contacts.

Laci, HA2RI, in Szentgal, is a very good builder; his converters for 2 meters and 23 and 70 cm, his linear amplifier, and many other pieces of homemade equipment look and work just like the commercial ones. His brother Kalman, HG2EPQ, lives in Balatonalmadi.

Tatabanya was formerly a mining town, and once was rich in coal. These days only the town's name (*banya* means mine in Hungarian) reminds people of the good old days. Here I met Peter, Jr., HG2EBC, a computer technician. His father, Peter, Sr., is HG2EBP.

In the same city I saw Laci, HA2EBO, an electrician, and his wife Timi, HA2ECY, a computer programmer. Both are active on 2 meters, and on packet they use a German program called "Graphic Packet."

From Tatabanya I headed south to Siofok, on the shores of Lake Balaton, the Hungarian "ocean." At the railway station Joska, HA3GJ, was waiting for me. His wife Susan is HA3GQ and his son Thomas is HA3GI. They have a very well-equipped station with several transceivers and amplifiers, a 40 foot tower with a 6-element German-made Yagi for 10-15-20 meters, and several antennas for 2 meters and 70 and 23 cm. All three have several types of QSLs, individual and common family cards.

Joska, HA3GJ, trained scores of children and they became champions in high-speed telegraphy. Among them are Edit, HA3LP, and her sister Betty, HA3KX. Vera, HA3FRV, is another young girl trained by Joska. She operates the YL club station HA3XYL and also her home station, and has a nice QSL card. Her grandfather, Pali, is HG7JIT.

Also in Siofok I saw the station of Imre, HA3HE, a carpenter and furniture salesman, and his wife Rozsa, HG3IQ. Their daughter is Erika, HA3FRH. They have a very nice station with a 5-element Yagi for 10, 15, and 20 meters, a 10-element Yagi for 2 meters, and a wire antenna for 40 and 80 meters.

In the same town I visited Ali, HA3LI, a businessman, and his Ukrainian-born wife Lena, HA3LY, a translator. They are active on SSB, RTTY, and packet with an IC-738, a 1 KW amplifier, a 72 foot tower, and scores of antennas. Both have nice QSL cards.

Csaty, HA3IU, who is retired from an oil company, his wife Erzsi, HG3JO, a retired librarian, and their daughter Agi, HG3JP, a computer science student, form another amateur radio family in Siofok. They use a Yaesu FT-757GX, a ground plane for the 10, 15, and 20 meter bands, and 9-element Yagi for 2 meters. Csaty compiled an updated HA amateur list which I sent to the publisher of the *Callbook*.

About 10 miles from Siofok is the village of

In Debrecen live Steve, HAØDU, and his wife Ildi, HAØUZ. Steve has been on several DX-peditions, has 349 countries confirmed, over 2700 US counties, over 700 IOTA islands, and over 3000 prefixes for WPX. He made DXCC on nine bands and was the first HA amateur on the DXCC Honor Roll.

Som, where all four members of a family are amateur operators: father Tibor, HG3FLJ, runs a hardware store; mother Iren, HG3FLG, is a preschool educator; son Tibi, HG3FMT, is an automechanic; and finally daughter Andrea, HG3FMS, is a kindergarten teacher. They operate on 2 meters, participate in contests, and are winners of several national championships.

In Siofok I met Jani, HA4YV. He has a summer house with a nice little station. He is from Dunaujvaros, where he is the president of the HA3KYV radio club. Jani's daughter Andrea, HG4YI, an economist, operates in contests, and his wife Gabi, HG4YI, is a silent key.

In Dunaujvaros I visited a family of four amateurs: father Gyuri, HG4GAR, is a paraplegic due to an accident; mother Marika, HG4GDS, is a civil defense coordinator; son Attila, HG4DGR, works for a cigarette distributing company; and daughter HG4GDU is a housewife. All four operate on 2 meters.

In the same city is Janos, HA4ZF, a radio and TV repairman. He operates mostly on SSB. His son Jani, HG4GHQ, is a gardener.

Also in Dunaujvaros lives Gyula, HA4ZM, a computer technician, who was licensed in 1983. He operates on SSB, CW, and via satellites. His son Zoli, HA4GIT, still in high school, is a contester, participates in fox hunts, and operates mostly on CW. He has won several national high-speed telegraphy championships.

In Urhida, near Szekesfehervar, is the home of Gyula, HA4ZZ, an electronic technician employed by the military, his wife Teri, HA4ZL, a tailor, and several children, one of whom just passed the licensing examination. Gyula buys surplus equipment from the army and resells it at amateur radio fleamarkets.

In Pecs, way down south close to the Croatian border, live Laci, HG3FBE, and his wife Klara, HG3TM. They use a common QSL with both callsigns. Berci, HA3FH, and his wife Marika, HG3FMK, live in nearby Kaposvar and also have one card for both of them.

In Nyiregyhaza, Gyozi, HAØMM, is a well-known contester and DXpeditioner; he operated as JTØDX, TA5KA, TA5MM, and YM5KA, as ZA1QA and ZAØRS, and from a bunch of European countries. He is the co-owner of Anico, a radio equipment dealership. His wife is Marika, HAØVV.

In Debrecen lives another big gun, Steve, HAØDU, who was licensed in 1974. He and his wife Ildi, HAØUZ, run a consulting company for small businesses. Steve went on several DX-peditions, has 349 countries confirmed, over 2700 US counties, over 700 IOTA islands, and over 3000 prefixes for WPX. He made DXCC on 9 bands and was the first HA amateur on the DXCC Honor Roll.

Obviously, there are many more amateur radio families in Hungary. I saw only some of them. I noticed that in most of these families the husband or father has a more advanced license than the rest in the household. However, the support, interest, understanding, and in many cases, the contribution of wives and children to the common hobby create stronger family ties. ■

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The MFJ-1796 Half-Wave Vertical Antenna

BY PAUL CARR*, N4PC

Did you ever stop to think that your antenna and its feed line are the only components of your station that are located outside your home? As a result, this is the one part of your station that is subject to public scrutiny. Depending on your particular conditions, there may be a need for a low-profile or stealth installation. Other applications include a portable antenna for field or vacation use.

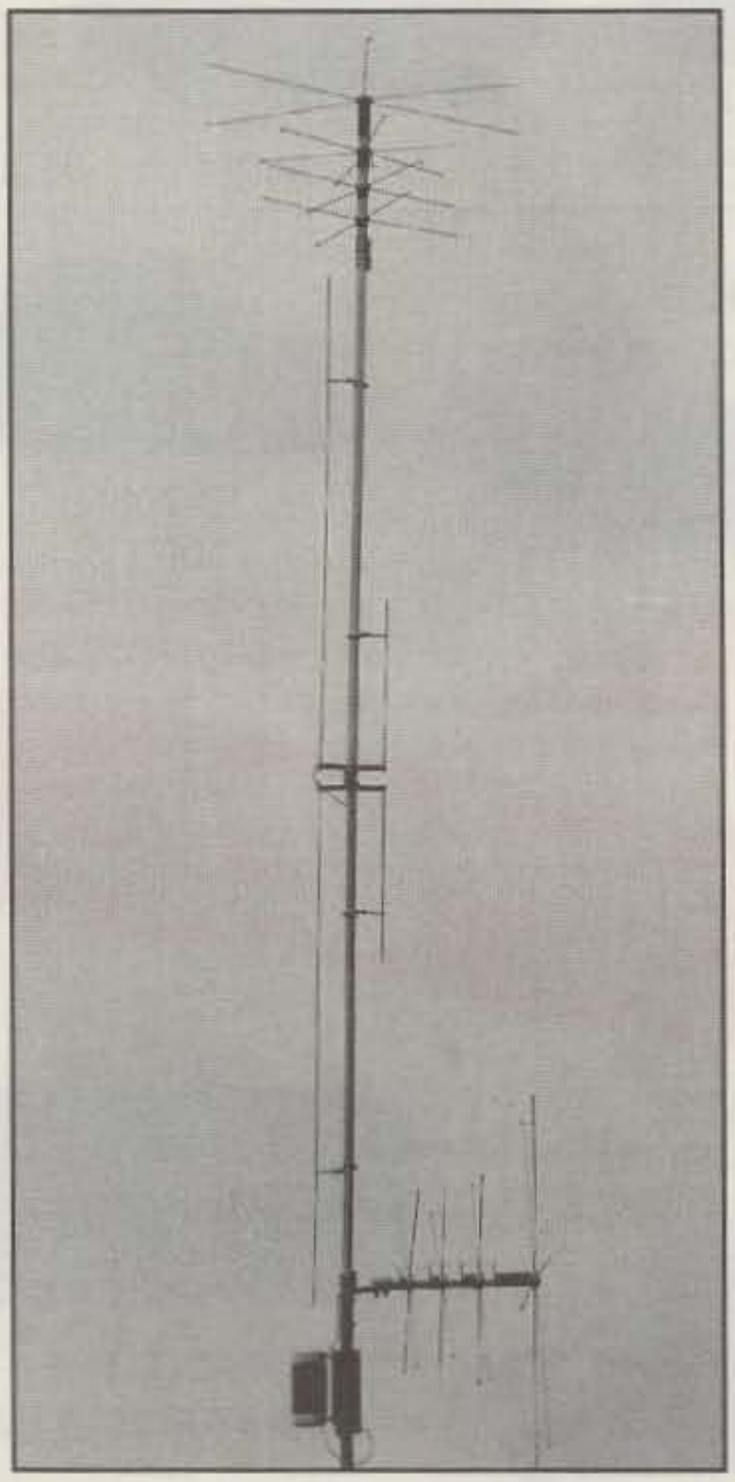
The MFJ-1796 may be just the antenna you've been looking for. It covers six bands (40, 20, 15, 10, 6, and 2 meters). I was delighted to get my hands on one for evaluation. Here are the results of my tests.

Background

Two things normally come to mind when you think of vertical antennas for the low bands: The vertical element is physically long for low frequencies (33 feet for a quarter-wave radiator for 40 meters), and there is always the consideration of a radial system. If we consider reducing the radial system by using a half-wave vertical, then the antenna length has grown to 66 feet! Both of these requirements can greatly be reduced with careful engineering, and this is the approach the engineers at MFJ have taken.

The problems of length and radial system have been addressed by using end loading on *both* ends of the antenna. Yes, I did say both ends of the antenna. The MFJ-1796 is a center-fed, electrical half-wave antenna. It can be shown mathematically that if you assume sinusoidal current distribution on a half-wave antenna, the majority of the current is concentrated in the middle of the conductor. This means that the conductor can be shortened if you can find a way to electrically replace the missing part of the conductor. MFJ has accomplished this by using two capacity hats, one at each end of the antenna. Capacity-hat loading yields lower loss than other forms of lumped loading, and it makes the system "happy" from an impedance point of view. Of course, you can't get something for nothing. There are losses associated with this technique, but they are smaller than with other forms of loading. Another penalty that you must accept is that the bandwidth will be restricted. On the positive side of the ledger, the antenna length has greatly been reduced (to about 12 feet, with a 2 foot footprint), and the antenna currents are closely balanced in both halves of the dipole, which makes the system more independent of local ground conditions.

*97 West Point Road, Jacksonville, AL 36265



The MFJ-1796 half-wave vertical antenna stands about 12 feet tall and has a 2 foot footprint.

Assembly

The antenna comes packaged in a box about 6 feet in length. When you are ready to begin assembly, I recommend that you choose a flat surface with plenty of room for the initial inventory. The instruction book has a parts list with convenient check-off boxes to aid in your inventory. There is also a list of basic tools that will be required for assembly. Additionally, you will need a short, rigid mast, connecting coax, and SWR analysis equipment.

I chose the concrete driveway in front of my garage for final assembly. I also found that it was helpful to cover the area with a ground cover so that if small parts were dropped, they did not run halfway across the county. (MFJ's engineers are compassionate; they include a few extra pieces of the small hardware just in case.)

Final assembly is very straight-forward. The manual is well written, and there are convenient check-off boxes that allow you to keep up with where you are in case your work session is interrupted. Remember, any time you are working with hand tools, it is a good idea to wear safety glasses. Also remember that the material with which you are working is metal and will conduct electricity. **Always keep the antenna away from any utility lines!**

The assembly time will range from two to three hours, depending on the individual. After you complete the final assembly, take a few minutes to thoroughly review your work and correct any mistakes that may have crept in. It is easier to find mistakes now than it is during the tune-up procedure.

Frequency & SWR Adjustment

As the frequency increases, the bandwidth of the antenna increases. (I always think of the bandwidth of an antenna in terms of a percentage of the resonate frequency.) This means 40 meters will have the most restricted bandwidth (approximately 40 kHz), and as a result it will be the most critical to tune. The entire antenna must be accessible during initial course tuning and testing. I chose a 6 foot section of an old TV mast I had available. I mounted the antenna on this mast and found a small vice-type workbench that provided a perfect mount for the antenna during the tune-up procedure. During the

adjustment of the antenna I called on my XYL for assistance. Through the years she has gained valuable experience in the adjustment of antennas, and she is a definite asset!

For adjustment of the antenna I chose one of the most valuable pieces of equipment in my inventory—the MFJ-259 SWR Analyzer. This small, self-contained device will cover all of the frequencies of the antenna, and will provide readings on SWR and radiation resistance. The tune-up requires making modifications to the capacity hats on both ends of the antenna, so it is most easily accomplished with the base of the antenna at about a 6 foot level.

Tuning the antenna requires that you trim the "spokes" of the capacity hats to the proper length. In the manual is a chart which gives a very accurate estimate of increase in frequency for a specific length of a spoke removed. Since this is a balanced antenna, the spokes on both ends must be trimmed the same amount. The manual recommends that you set your target frequency slightly lower than your final desired frequency. Slight changes in frequency can be made by trimming a spoke on the bottom capacity hat after the antenna is mounted in its final location. The estimated bandwidths range from 40 kHz on 40 meters and 250 kHz on 20 meters to 7 MHz on 2 meters. The only place I found that I wanted a bit more bandwidth was on 40 meters, and a transmatch provided the necessary breathing room there.

On The Air

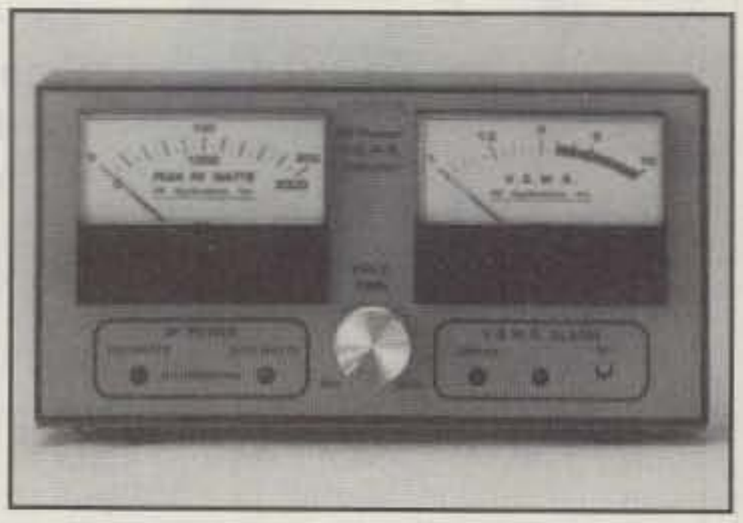
I must admit that I spent most of my time on 40 and 20 meters in the CW sub-band. I made a further restriction on my operating conditions: All the tests were made using QRP CW. I'm pleased to report that I was totally satisfied with the results I obtained. Even with the self-imposed restrictions, I was able to work all over the "lower 48" with signal reports of 549 to 589.

I must tell you about one call I made on 40 meters when I was *not* successful. One night I was casually tuning around 7035 and I heard a 3B8 calling CQ. Needless to say, I almost broke my key from pounding so hard! No one was answering that great DX on 40 meters. Finally after what seemed to be almost 5 minutes, some of the "high power" stations began to call, and the pile-up began to build. I smiled to myself. At least I had heard him first.

Availability

The MFJ-1796 is manufactured by MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762. It is available either from the factory or their distributors. Suggested retail price is $199.95 FOB the factory.

CQ SHOWCASE



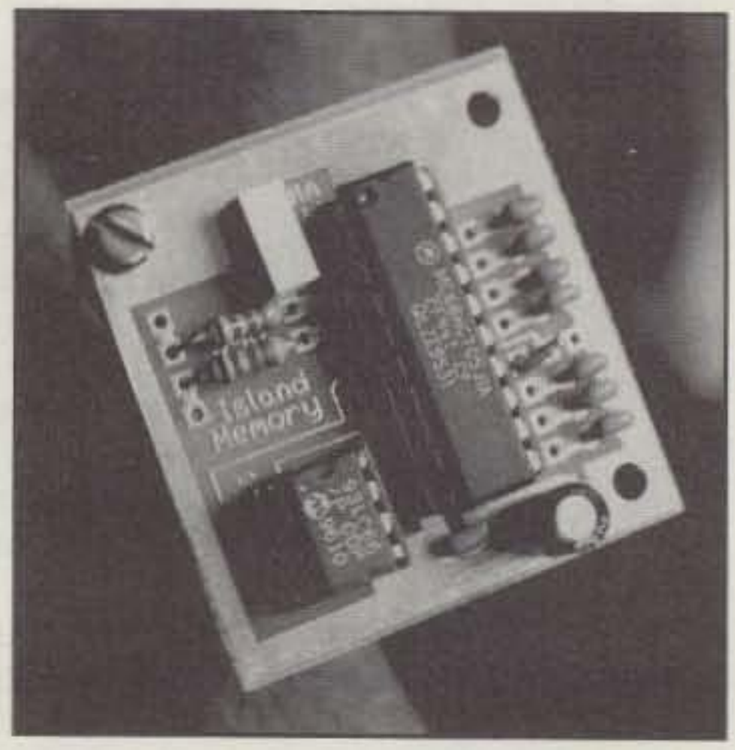
RF Applications
RF Power/VSWR Indicator

RF Applications, Inc. offers a unique combination of microprocessor and analog meter technology in the new P-2000A. The P-2000A offers both RF power and VSWR measurement using the power of advanced microprocessor technology with the familiar readout of analog panel meters. Two hundred times a second, an 11 MHz microprocessor monitors the forward and reflected voltage on the transmission line, and then computes the forward peak power and VSWR. These values are used to actively drive the panel meters using pulse width modulation. The result is an easy-to-read display with no bouncing needles. The amount of hold time is adjustable from continuous up to approximately 3 seconds. The P-2000A analyzes the forward power to automatically determine the power range, either 200 W or 2000 W. The unit monitors the VSWR whenever RF is present. The microprocessor computes the VSWR without the need for calibration, and 50% of the meter is used for displaying VSWR from 1.0:1 to 2.0:1. A front-panel accessible control allows you to set an alarm to be triggered when the VSWR measured exceeds the predefined limit (which can range from 1.1:1 up to 10:1). Response time is less than 300 milliseconds, and the alarm resets automatically when RF is removed. The unit is list priced at $299.

For more information, contact RF Applications, Inc., 7345 Production Drive, Mentor, OH 44060 (telephone 440-974-1961; fax 440-974-9506; e-mail <sales@rfapps.com>; or visit their website at <http://www.rfapps.com>), or circle number 106 on the reader service card.

Jackson Harbor Press
Island Memory Kit

Jackson Harbor Press has released their third kit, the Island Memory Kit. The Island Memory is an add-on memory keying circuit board for many of the popular Morse code keyers used today. It connects to your compatible keyer via 5 wires: power, ground, keyer output, dit, and dah



paddles. The Island Memory board has a Motorola microcontroller that controls a separate Electrically Erasable Programmable Read Only Memory (EEPROM). It keys your keyer the way you do; it actuates the dit or dah input of the keyer and then "listens" for the keyer output. The Island Memory records messages as you send them with your keyer. The Island Memory does nothing standalone. You need to connect it to a compatible keyer for it to record and send Morse code messages.It has four user programmable 60 character message memories. The messages are retained when the power is turned off. Message playback can be paused manually or by embedding a pause character when recording. Power consumption is 5 ua standby, 3 ma active at 5V so the Island Memory can be powered from the keyer power supply or battery. The unit is 1.5 inches square.

The kit includes instructions, circuit board, and all other necessary board-mounted components. The builder will need to add four momentary switches to actuate the messaging. The builder can also add optional status LEDs and a memory recording mode select jumper.

The Island Memory is compatible with any keyer that has the following features: supply voltage of the keyer chips is in the 3 to 6 volt range, dits and dahs are generated by a switch closure to ground, and the keyer chip outputs a positive voltage (digital 1) when sending a dit or dah. For further information, contact Jackson Harbor Press, N21W1418 Foss Rd, Washington Island, WI 54246 (<jacksonharbor@worldnet.att.net>; or circle number 101 on the reader service card.

Bird Electronic Corp.
T-Series RF Loads

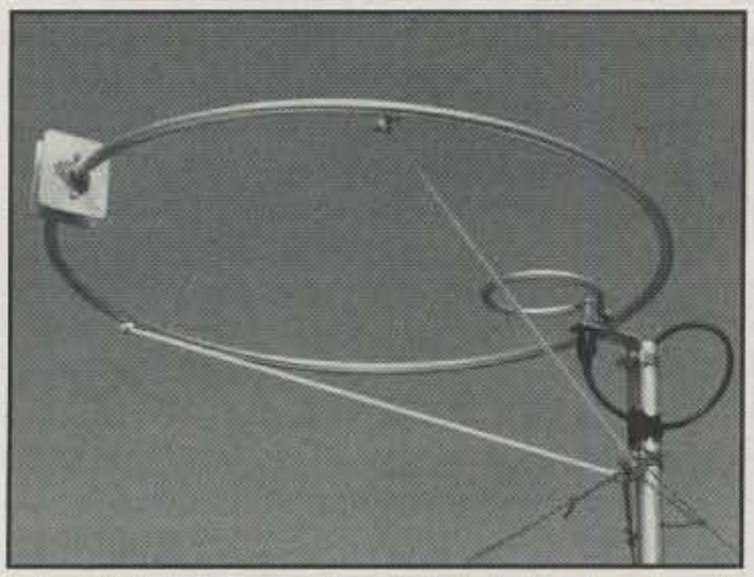
Bird Electronic Corporation has introduced a line of 50 ohm, air-cooled RF loads, including new 2 and 5 watt models.

These "T-series" loads are conservatively rated with specified power handling at 40°C. At 25°C power ratings are 2.4W and 6W, respectively. Connector options include male or female N, BNC, and TNC. VSWR is 1.10 or better from DC to 1 GHz for all models. With N connector, maximum VSWR is 1.25:1 at 1 GHz to 6 GHz (1 GHz to 4 GHz for BNC and TNC connectors). The loads are manufactured with non-magnetic materials throughout and are finished in silver or tri-alloy plating.

For more information, contact Bird Electronic Corporation, Denise Tiearney, Bird Technologies Group, 30303 Aurora Rd., Cleveland, OH 44139 (telephone 216-248-1200; fax 216-248-5426; e-mail <sales@bird-electronic.com>), or circle number 104 on the reader service card.

KB6KQ Loop Antennas

KB6KQ is offering Halo type antennas for 6 meters, 2 meters, 222 MHz and 432 MHz. These antennas have been available for approximately three years and are suited to operators who want horizontal polarization, omnidirectional quality, and small size. The 6 meter version is 24 inches in diameter and the 432 model is 3 1/2 inches. Current antenna applications in-



clude net, roundtable, mobile, and rover operation. Single antennas have tested at 2.5 dBd and stacked pairs are running 4.5 dBd gain. The antennas are priced as follows: 6 meter $95; and 2 meter and 222 and 432 MHz antennas are $50. A phasing harness, making it possible to stack two antennas, is available for $40.

For more information, contact KB6KQ Antennas, Norm Pedersen, 70 Arrowhead Dr., Carson City, NV 89706 (phone 702-885-7885; fax 702-841-1880; e-mail <KB6KQNORM@aol.com>; or circle 107 on the reader service card.

CES Wireless Technologies Repeater Maker *plus*

CES Wireless Technologies Corp. has developed an enhanced version of the Repeater Maker, called the Repeater Maker *plus*, Model RM-20. This device allows users to make a repeater out of two

transceivers or separate transmitter and receiver modules. The new RM-20 provides a built-in four user CTCSS tone panel, supporting any four of fifty CTCSS tones as well as cross-tone encoding. Among many standard features are "Morse Code" CW ID with programmable "send" states, and an "auxiliary relay" for remote control.

The RM-20 is programmed using a DTMF telephone locally or remotely "over the air." This unit accepts the optional CES Voice Delay module for customization of application timing.The RM-20 features compact size, rugged metal housing, and "plug and play" compatible with the CES 4700VP telephone interconnect. List price of the RM-20 is $310.

For more information, contact CES Wireless Technologies Corp., 925-122 S. Semoran Blvd., Winter Park, FL 32792 (phone 407-679-9440, e-mail <sales@cesusa.com>, web <www.ceswireless.com>; or circle number 110 on the reader service card.

RF Applications P-3000 Range Lock Option

RF Applications, Inc. has announced the availability of an option for the P-3000 HF Digital Wattmeter that allows manual resetting of the autoranging bargraph. This feature is useful to operators who use the P-3000 for peaking power amplifier output. During normal operation the P-3000 automatically sets the power range covered by the ten-LED bargraph. When tuning an amplifier, some operators prefer that the unit not automatically range down. Firmware version 1.1RL will only autorange up. To reset the bargraph range to its lowest level, the operator need only press and hold the display mode switch for about one-half second. Version 1.1RL can also be retrofitted to existing units by replacing the microprocessor.

For more information, contact RF Applications, Inc., 9310 Little Mountain Rd., Kirtland Hills, OH 44060 (telephone 216-974-1961; fax 216-974-9506; e-mail <sales@rfapps.com>; or visit their website at <http://www.rfapps.com>; or circle number 105 on the reader service card.

BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

RFI—A Case History and Some Observations

As regular readers of this column are aware, I am deeply involved with the design and development of fiber-optic communications. As a result, I am usually "pulled" into situations that involve strange or unusual problems that occur with our equipment. Usually these problems are related to interface matches, customer inexperience with optical transmission techniques, and the like. Lately, however, there is a new type of problem rearing its head—RFI!

Just a few weeks ago a customer of ours who had installed a fiber-optic video/ pan-tilt mount control system complained that everything worked perfectly until he keyed a low-power, 2 watt "business band" HT 10 to 15 feet from our equipment. Whenever he pressed the transmit button on the HT, the picture disappeared and the mount control stopped controlling. When the button was released, everything went back to normal operation. To make the situation even more bizarre, the problem only seemed to occur at 464.5 MHz, the primary frequency at which the customer's HT network operates. A 154 MHz HT, which the customer uses as a backup, did not produce the slightest "blip" in the video picture even though the 154 MHz HT had more than twice the power output of the UHF unit. Furthermore, a competitor's equipment did not exhibit the RFI problem at either of the two frequencies.

Well, we got back the equipment from the customer and quickly determined that everything was indeed well within the specifications—until I keyed my dual-band HT. Sure enough, at 147.95 MHz (as close to 154 MHz as we could get) nothing happened, even a foot from the equipment. At 449.95 MHz, however (as close to 464.5 MHz as we could get), all hell broke loose. What was going on?

Probing through our equipment revealed several interesting factors. The front end of most fiber-optic receivers consists of a high-gain current-to-voltage converter circuit similar to the one shown in fig. 1. This type of configuration converts a tiny current from the photodiode into a larger output voltage for the succeeding stages. In the example shown, the current-to-voltage "transfer gain" is actually 220,000. Needless to say, such a circuit has to be well bypassed in order to work properly at all, and in our design it certainly looked like it was.

After scratching our heads for a while, we found that the lead length (including the PC board trace) from the 0.1 µF bypass capacitor was just long enough to nicely resonate with the capacitor itself, turning the bypass into a high-impedance at 465 MHz. Remember, it doesn't take much inductance to resonate a 0.1 µF capacitor at 465 MHz. The 1/8 inch (total) lead lengths were enough! To make matters even worse, the turns of foil inside the 10 µF electrolytic (the low-frequency portion of the bypass) became a good choke coil at UHF, thereby completely eliminating any "help" the capacitor might have provided. Paralleling the 0.1 µF capacitor with a 100 pF ceramic was the answer. This

c/o CQ magazine

eliminated the RFI problem caused by the bypassing combination, but still did not solve the problem completely. Additional probing showed that the output of the stage was still being effected by RF even though the op-amp itself had a maximum frequency cutoff of only 10 MHz.

The next culprit turned out to be the length of the input leads to the op-amp. The high impedance from the reverse biased photodiode, coupled with the stray capacitance of the input lead, was apparently roughly resonant in the 465 MHz region, and RF induced on this lead was being rectified directly by the input stage of the op-amp, producing a DC offset component at the input. After amplification, the results were overloading the signal. A ferrite bead in series with the input, as shown in fig. 2, finally cured the problem completely both to our satisfaction and to the satisfaction of the customer. By the way, the competitor's unit had no such provisions. The layout of his equipment (by luck) was not effected by either 154 or 465 MHz. On the other hand, a quick check with a 1 watt Citizen's Band HT (at 27 MHz) did show plenty of undesirable interference in his video signal at that frequency, but not in the video of our "RFI suppressed" unit.

What all of this has to do with amateurs, experimenters, and equipment designers is that the problems of susceptibility to RF fields are becoming more and more an issue today. VHF and UHF HTs abound for all sorts of applications, not to mention cordless telephones, cellular telephones, and RF-generating remote-control devices from garage-door openers to automotive burglar alarms. With the continued onset of even more RF-based services, somewhere along the line you're sure to encounter a problem of this nature. We at the company, with a history of hundreds of thousands of systems over the past 15 years, previously had not had this type of problem. In 1997 alone, however, we have experienced it on at least four different occasions. The handwriting, as they say, is on the wall!

To order to minimize such problems in equipment you build, it is very good practice to make sure that all critical bypass points have a small ceramic capacitor of about 100 pF or so for UHF, a mid-range value of 0.1 μF or so for the HF to VHF region, and an electrolytic of several microFarads for low frequencies. In addition, all lead lengths (inductance) from all of the capacitors and traces on the PC board should be as short as possible. Obviously, all ground planes should also occupy as large an area as possible.

After you have provided proper bypassing, the next step is to assure that all inputs to amplifying stages are made as short as possible, and in severe cases of RFI, that ferrite beads are placed on the inputs themselves. While these steps will not necessarily guarantee total immunity from the effects of RFI, they will not significantly hurt, nor significantly increase, the costs of your designs.

There are many additional precautions that one must take to truly prevent the effects of RFI, including component placement, the actual running of the traces on the PC boards, and the effectiveness on the shielding factor of the equipment enclosure. A systematic discussion of these is beyond the intent of this particular column. Additional details can be obtained from texts that specifically address RFI shielding techniques. An entire chapter has been devoted to this subject in the ARRL's *Radio Amateur's Handbook*. All I am trying to say is that you should be aware of a situation that almost certainly will have an impact on your future designs.

At this time of year I would like to once again wish all of my readers a happy and healthy holiday season, and as I have been saying for the last 25 years or so, "I sincerely hope that all of your wishes and dreams come true in the coming months."

73, Irwin, WA2NDM

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Holiday Happiness for Hams!

Happy Holiday Greetings, friends! Here's hoping this festive time of year finds you in good health, in an upbeat mood, and as always enjoying some of life's special treats—such as amateur radio. In light of those cheerful wishes, this month's column once again makes its traditional diversion to spotlight some exciting yet low-cost goodies for making this holiday season one of the most delightful yet. In changing with the times, our main focus is on "downsized hamming"—getting maximum returns for low expenditures. Details on some real gems with proven track records of success are lined up to share with you. Information and photos are overflowing available space, so I will add just one brief note before getting started.

Remember featured items are available from their respective manufacturers or dealers, and address/ordering information is included for your convenience. I am simply your guide on this "printed page tour." Also remember that supplies drop quickly during the holidays, so ordering early sidesteps being left empty handed. Now on to the views!

A Kit For The Holidays

Leading our parade of goodies is Ten-Tec's new "1300 Series" of kit QRP transceivers such as that shown in photos 1 and 2. A number of readers have been asking about this little tyke, so I checked it out, went bananas over it, and can now report it is a gem and well worth its cost of $95. The kit is available in a 20, 30, 40, or 80 meter version and comes complete with all parts, including a professionally finished enclosure measuring 2.7"H × 6"W × 6"D. Its receiver is super hot and quite selective, its transmitter pumps out a solid 3 to 4 watt signal, and its full break-in operation is classic Ten-Tec—silky smooth. The VFO is variactor tuned for exceptional stability and covers any desired 50 kHz range in a related CW subband. Nice! I have the 30 meter version. It performs just like a "big rig," and I work almost every station I call—stateside and DX—with it. Now that's big-time QRP at its best!

Technically speaking, the receiver section is single conversion with a 4-pole crystal filter and approximately 1 kHz bandwidth. There is enough reserve audio for the internal speaker to blow you out of the room or rattle headphones, if desired. Thanks to a very large heatsink, the transmitter's output transistor runs stone cold under the most intensive use. It is a terrific rig for both home and vacation use. The only idiosyncrasy I found is some front end overloading from a local shortwave broadcast "superstation" (WEWN), which also overloads many name-brand fancy transceivers used in this vicinity. I could almost completely eliminate the overload by increasing the Ten-Tec's sidetone to an above-normal level (audio-derived AGC is used), but instead I added a 10K pot from the "hot side" of the receiver's RF input coil and ground to act as an attenuator. I mention this idea because other amateurs near international shortwave broadcast stations can use the same approach for minimizing interference to almost any type of HF transceiver.

The Ten-Tec QRP transceiver kit consists of 216 parts, which I would estimate equals five or six days of "on and off" building to complete. Assembly is simplified by building and checking out the rig in seven small steps. Clever! If you want to put some real fun and excitement into your hamming life, at home or while vacationing, Ten-Tec's 1300 Series QRP transceivers are the ticket. They are available from the T-Kit division of Ten-Tec, Inc., 1185 Dolly Parton Parkway, Sevierville, TN 37862 (telephone 423-453-7172; orders only 1-800-833-73737).

Next up is another kit that makes the Ten-Tec transceiver (or any other HF rig with up to 15 watts output) a total delight to operate and a care-free station: LDG Electronics QRP Automatic Antenna Tuner (photos 3 and 4). The tuner's design is based on the 100 watt AT-11 version described in January '96 *QST* and uses an on-board microprocessor for selecting up to 131,000 combinations of inductance and capacitance to tune any type of coax-fed antenna. LED metering of SWR is

4941 Scenic View Dr., Birmingham, AL 35210

Photo 1– Ten-Tec's new kit QRP transceiver fits into any cubbyhole or small space, works like a champ, and is a great spare-time project you will enjoy for many years to come. What a terrific gift idea!

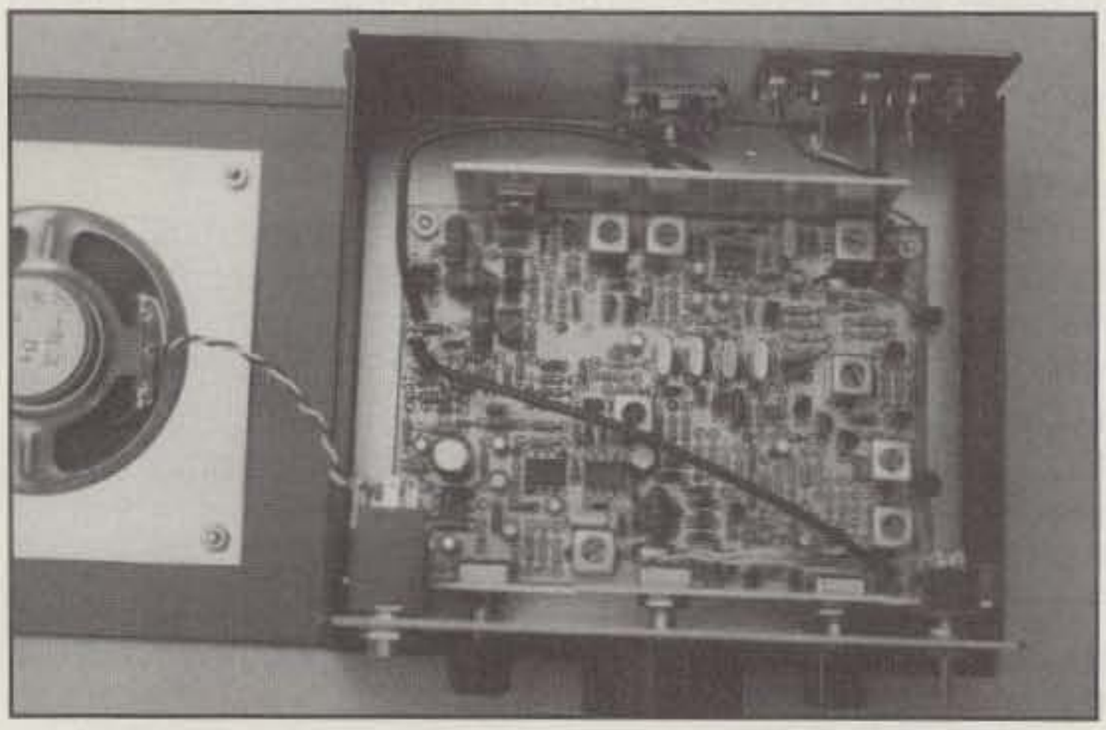


Photo 2– Interior view of the Ten-Tec kit QRP transceiver reveals a single PC board concept for easy assembly. The subpanel mounted to the board's front adds physical strength to the controls, and the subpanel on the rear is a heat sink for the output transistor.

Photo 3– This ultra-compact Automatic Antenna Tuner from LDG Electronics is available in kit or preassembled form and in QRP or 100 watt versions. The tuner uses a switched "L" network, has a built-in SWR bridge, and is ideal for home, portable, and/or mobile operation.

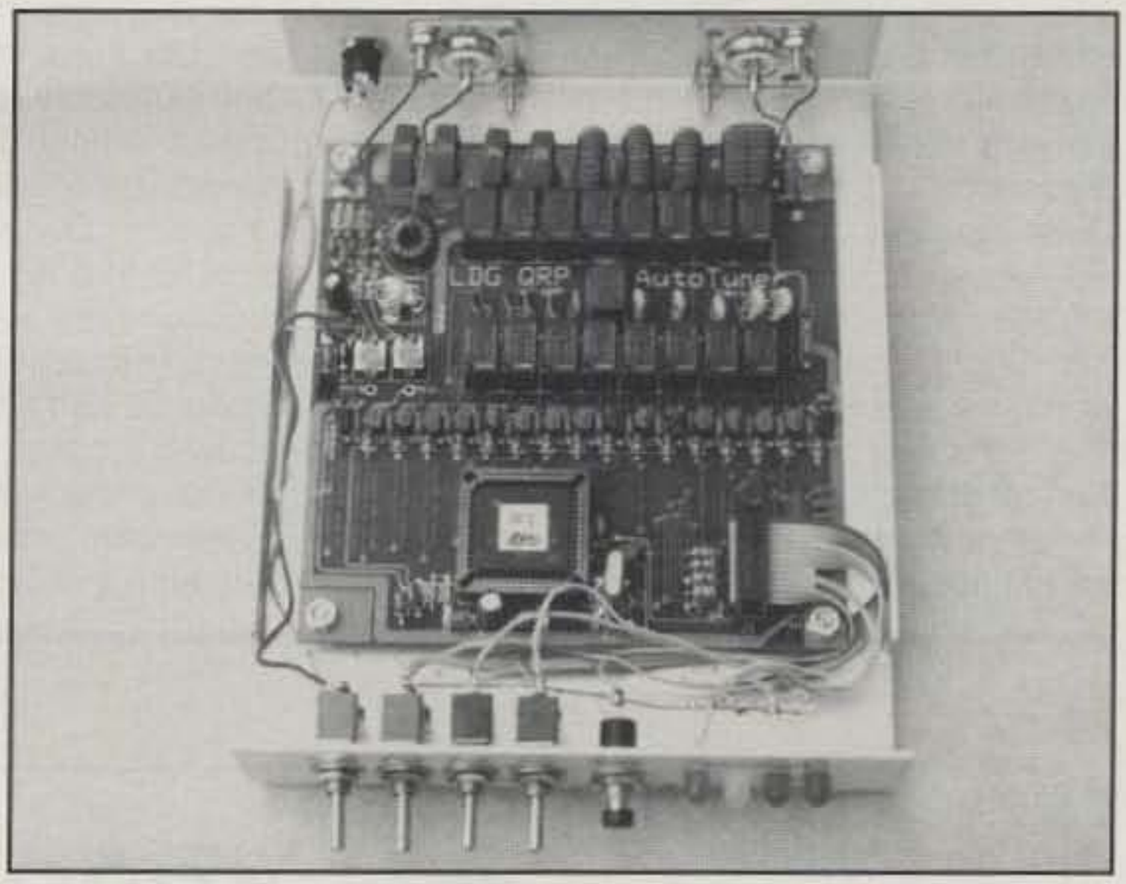


Photo 4– Inside view of the LDG Electronics Automatic Antenna Tuner. This unit also utilizes single PC board construction and goes together in only a few hours.

included on the front panel, so you actually get two units in one trim package (1.2"H × 6.1"W × 4.7"D, to be exact).

Specifically, the LDG tuner covers 1.8 to 30 MHz, matches impedances from 6 to 800 ohms, has an input power range of 100 milliwatts to 10 watts continuous duty, and can handle up to 30 watts at a 50% duty cycle. The tuner requires 11 to 14 volts at 75 ma for operation, and auto-tune time is 0.5 to 2 seconds. Notice the special attraction of this tuner, gang: You just connect it in line with the antenna cable to your rig—that's all. No extra control cables for band select, etc., are necessary. The tuner senses impedance and goes for a perfect match when you click its function switch to the "auto" position. If it is left in "auto," it also continuously monitors impedance and readjusts to maintain an SWR below 1.5:1. If desired, you can also

select semi-auto or manual tuning and fine-tweak L/C values with front-mounted momentary switches. In "semi" mode it seeks a match when the "tune" button is pressed and "holds it" until reactivated. Outstanding!

I began using the LDG Automatic Antenna Tuner with my 38 Special and Ten-Tec QRP rig, and then gave it a good workout test with various rigs and antennas for other bands. In each case it worked like a champ. It is also a real rig saver when using those quickly erected antennas with unpredictable SWRs for portable and impromptu operations.

The LDG tuner is another "200 parts" kit, but assembly is simplified because groups of similar-type components are installed on the PC board in a sort of repetitive manner. Once "on a roll," you can build the kit in a few hours. Three convenient options are also available. You can purchase the basic kit less enclosure for $100 plus $6 s&h and mount it inside your transceiver's case, or you can purchase the kit complete with its custom case for $125. No spare time for building kits? The tuner is also available wired, tested, and ready to use for $159 plus $8 s&h. It is a vital accessory for any low-power setup, and it works great. You can order the tuner from LDG Electronics, 1445 Parran Road, St. Leonard, MD 20685 (410-586-2177).

Say you have some spare time left to build one more kit? Check out Ten-Tec's just-announced multimode shortwave receiver shown in photo 5. This is a hot item for home, travel, SWLing, and monitoring world affairs, and it will serve you well for many years after assembly. It covers 100 kHz to 30 MHz, uses a microprocessor-controlled frequency synthesizer and double conversion design, and sports 15 memories. The receiver operates from any 12 to 14 volt DC source or via a supplied wall adapter, and makes a good communications receiver for field or emergency use. The kit is another big-timer with 200 parts, but again, Ten-Tec simplifies construction by separating assembly into six separate no-miss steps. This model 1254 is brand new, so contact Ten-Tec directly for more details.

DI-DA Delight!

Our spotlight now falls on the ideal topping for any mini rig or CW setup: the miniature "3-in-1" QRP paddle handmade by G4ZPY and shown in photo 6. This intricately detailed masterpiece has dual levers with separate gap/tension adjustments and a marvelous feel during use. Its highly polished brass mechanism sits on a black base fitted with magnets, so you can stick it right to your rig's case for on-the-spot hamming. G4ZPY also engraves an owner's call letters on the paddle's yoke for a personal touch. The paddle's price varies with dollar-to-pound exchange rates, so write or ring up Gordon Crowhurst, G4ZPY, 41 Mill Dam Lane, Burscough, Ormskirk, Lancs, L40 7TG, England (telephone 011-44-1704-894-299) for more details and ordering. Tip: Telephoning between 6 and 7 AM U.S. time is surprisingly economical).

The palm-size G4ZPY paddle in photo 6, incidentally, is only one of several hundred keys featured in my new self-published *Keys II: The Emporium* book, which is available from select dealers or direct from me (K4TWJ, 4941 Scenic View Dr., Birmingham, AL 35210) for $15 plus $2 s&h. The book is loaded with ultra-sharp photos and details on the world's most admired, sought-after, and exotic keys, bugs, and paddles, new, old, and many rarely seen outside closed collections. It also has photos, info, and pricing notes on all Vibroplexes since "day one." If you like keys and CW, you'll love *Keys II*.

Terrific Timekeepers

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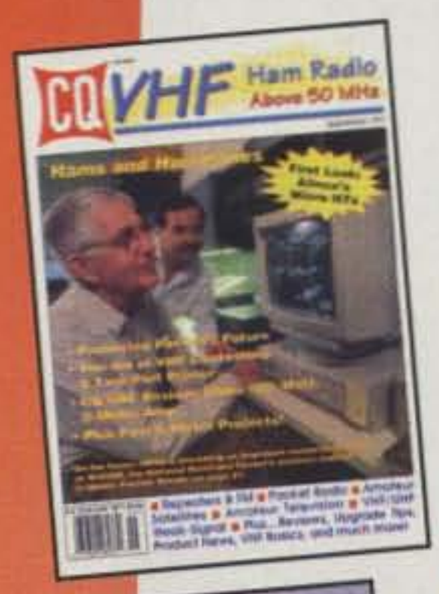

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CQ Communications, Inc. 76 North Broadway, Hicksville, NY 11801, Phone:516-681-2922/Fax: 516-681-2926

Photo 5– Ten-Tec's new 1254 multimode shortwave receiver kit is 2.75"H × 6.5"W × 6.5"D, a professional looking gem, and a fairly easy to build item for home and travel. It's sharp!

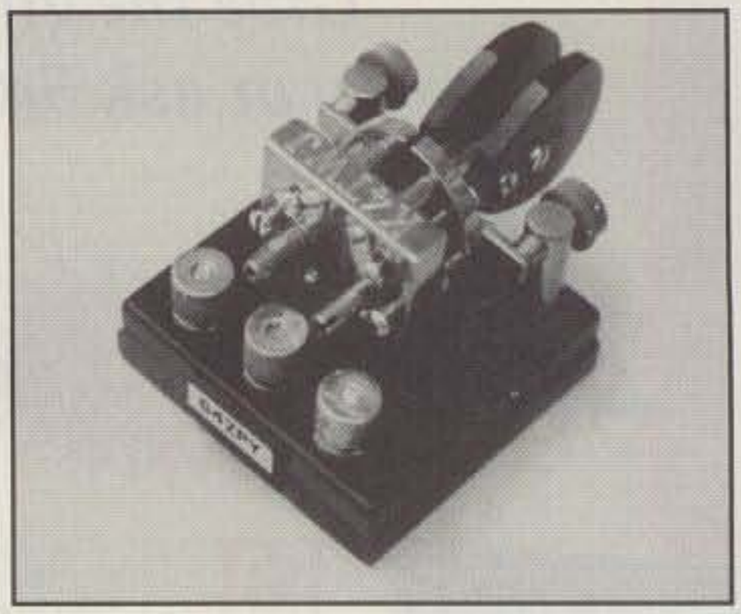

Photo 6– Determining whether this miniature QRP paddle produced by G4ZPY is amateur radio gear or jewelry is a tough call. Either way, it makes CW operations a treat!

versions are shown in photo 7. These heartthrobs are wall-plaque replicas of two highly sought-after and collectable favorites from the late 1940s: the Fada Bullet radio and the Addison tabletop radio. Both versions measure 6.5"H × 10.5"W × 1.1"D, and each has a modern quartz clock fitted into its classic dial face. Black-and-white photos cannot fully convey the dazzling glamour of these wall clocks. The Fada has a catlin yellow case with bright red knobs and dial escutcheon. Just like the original, its dial/clock face is marked in KC on the upper half and meters on the lower half. The Addison sports a dark maroon cabinet with bright orange speaker grill and trim. What a neat way to spice up a den or office! Both "radio replica" clocks are available for $54.95 (plus shipping) from Antique Electronic Supply, 6221 South Maple Avenue, Tempe, AZ 85283 (telephone 602-820-5411; fax 1-800-706-6789). Supplies may be limited, so order soon!

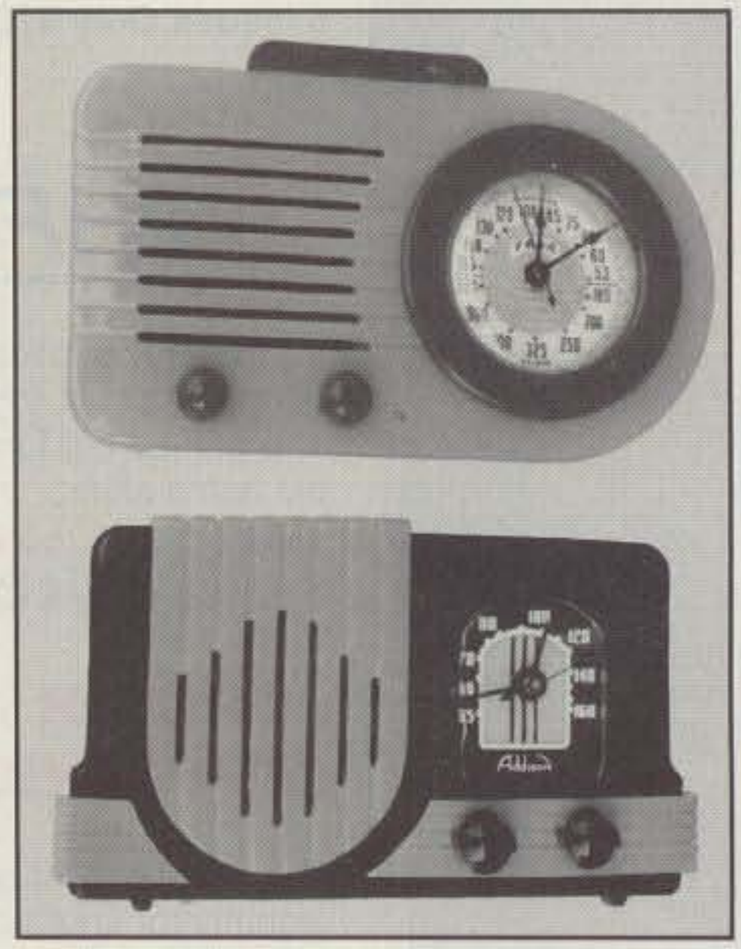

Photo 7– Nostalgic beauty supreme! These full-size replicas of the famous Fada and Addison AM radios are wall plaques. Each sports a modern quartz clock fitted into its kilocycles-calibrated dial. Fada is yellow with red trim. Addison is maroon with orange trim. Both are real attention grabbers.

If your timekeeping interests are more technically and space-age oriented, then check out the new Arcron Zeit automatic referencing and digital displaying clock shown in photo 8. This unusual timepiece receives digitally coded radio time signals from the official U.S. atomic clock in Colorado and uses them to synchronize a built-in calibration system for split-second accuracy. The display shows hours, minutes, and seconds, plus date. It is backlit and also has a dual alarm function. More details are available from Arcron-Zeit, 1010 Jorie Blvd., Suite 324, Oak Brook, IL 60521, or you can order a clock ($99.95 plus s&h) by phoning 1-800-985-8463.

Photo 8– Shown here is the high-tech Arcron-Zeit desk clock. The item has a built-in receiver and automatically recalibrates itself by signals from the U.S. atomic clock in Colorado.

Tee Tiny Talkie

Remember the two-way wrist radio used by comic strip character Dick Tracy during eras past? Did you ever wish for or dream of such small gear becoming reality? Well, cast your peepers on Alinco's new DJ-C1 shown in photo 9. This 2 meter FM handheld transceiver, the world's smallest, is the size of a regular charge card—and only "three charge cards" thick!

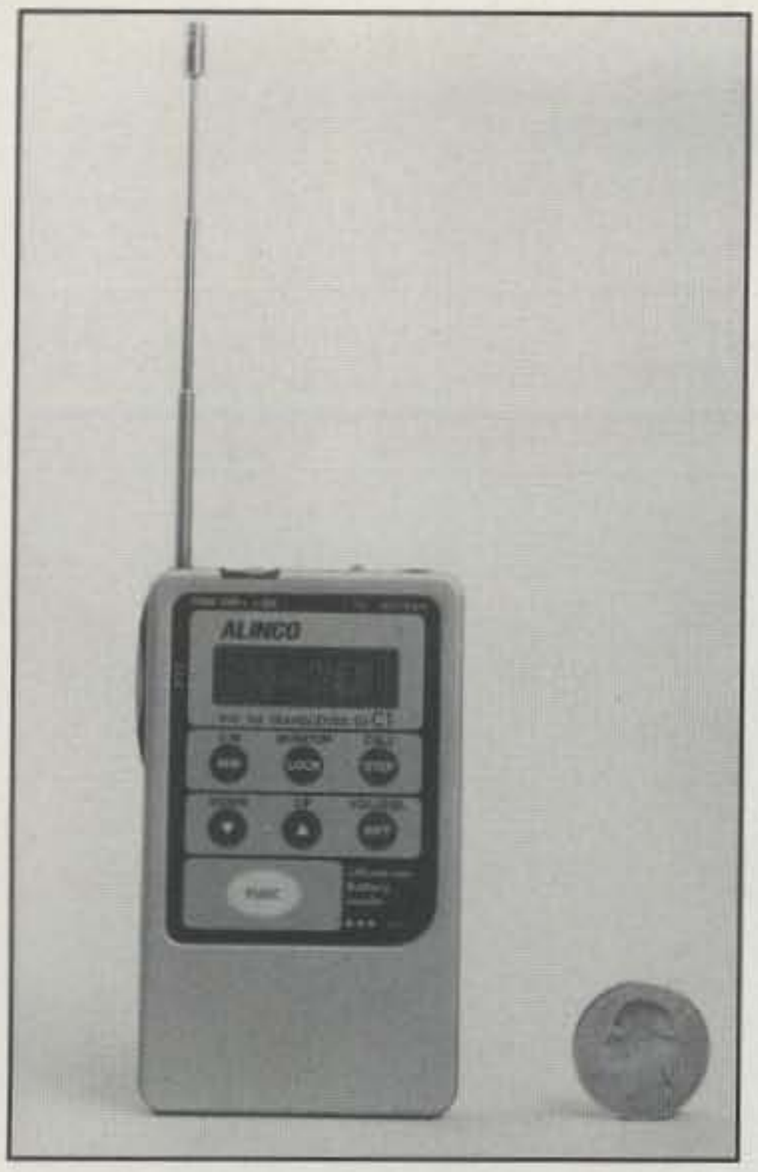

Photo 9– Possibly the hottest item of the year is Alinco's DJ-C1 microminiature 2 meter FM handheld transceiver. This talkie measures only 3.6"H × 2"W × .3"D. Even James Bond would envy this gem!

It has plenty of big-rig fun features to boot: 20 memories, CTCSS encoder, scanning, extended receive, and more. The DJ-C1 pumps out a 300 milliwatt signal, which is comparable to many larger talkies operating on their lower power setting to extend battery life. Both frequency and volume selections are via front pushbuttons, and the case is silver with a blue inset rather than black. The DJ-C1 comes complete with a rechargeable lithium-ion battery, drop-in desktop charger, and clear vinyl carrying case—and it's QRP priced! DJ-C1s/2m and DJ-C4s/70cm are available from amateur dealers nationwide. Contact Alinco, Inc., 438 Amapola Ave., Suite 130, Torrance, CA 90501 (telephone 310-618-8616) for more details.

A Stein and A Sub

Photo 10 offers two special suggestions for keeping you well-tanked on both drink and knowledge throughout the coming year: a stein and a subscription to every ham's favorite magazine—*CQ*. The stein is pure class with twin *CQ* logos and holds 19 ounces of jolly good beverage (one fill-up will carry you through two dozen pile-ups!). At $9.95 it's a bargain!

Every issue of *CQ* in 1998 will be hotter than ever. Why trek to the newsstand when you can get every issue at your door—at a savings! Order the magazine and/or the stein (add $4 s&h) from *CQ* at (orders only) 1-800-853-9797 or fax 516-681-2926).

Finale

Specifics have not been finalized as of this writing, but I am planning another on-the-air Christmas party December 20 and 21 between 2000 and 2100 GMT around 14.210 kHz (±QRM). We look forward to exchanging greetings with you and maybe meeting in person at a hamfest during 1998. Happy Holidays, and may the force of good signals always be with you.

73, Dave, K4TWJ

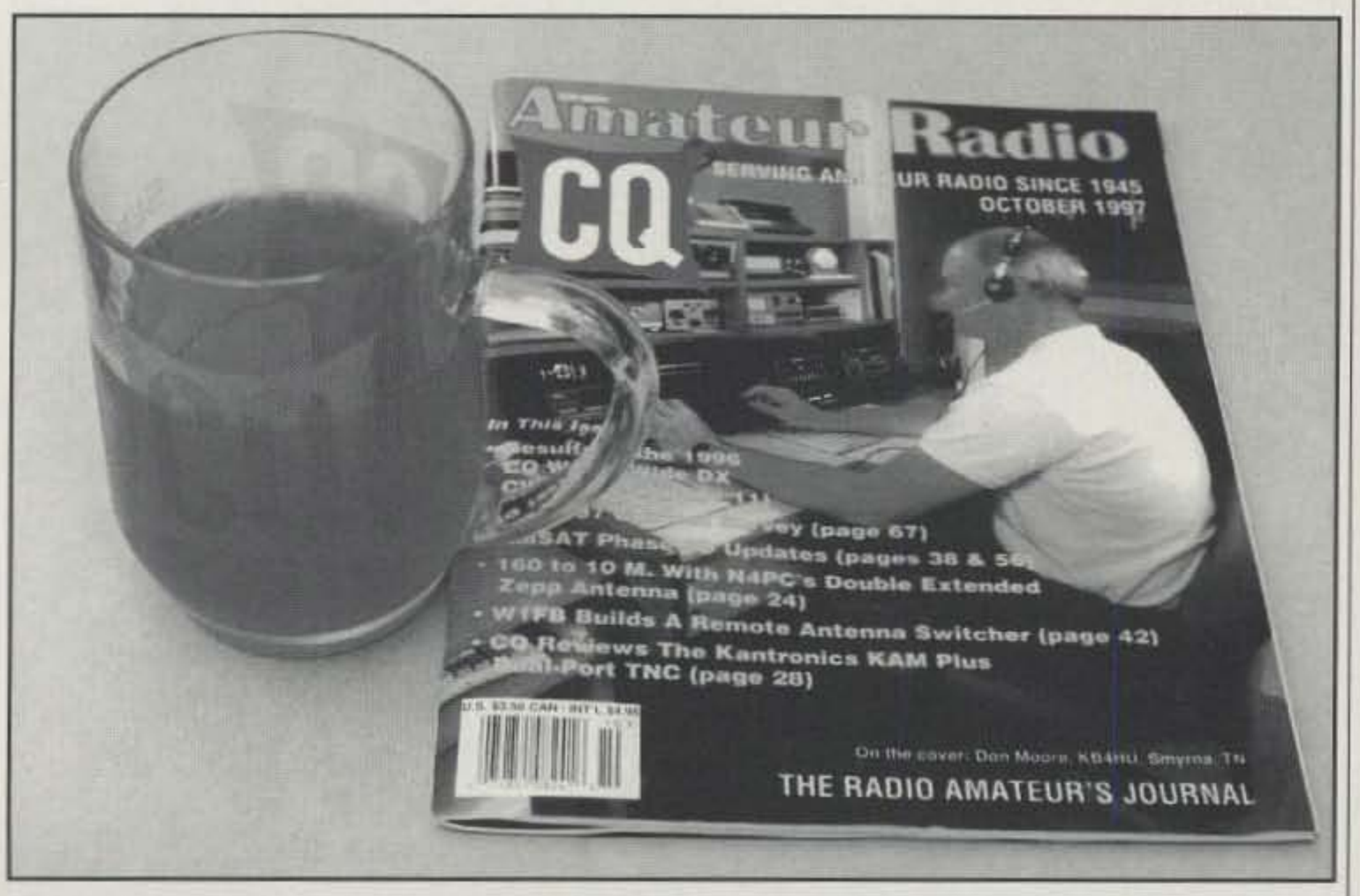

Photo 10– Enjoy a hearty serving of good drink and knowledge month after month and year after year with this collectible CQ stein and a subscription to everyone's favorite amateur radio magazine—CQ.

BY BILL ORR, W6SAI

RADIO FUNdamentals

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

They Do It Right In California!

The northern peninsula of San Francisco is known not only for its famous vineyards, but also for its antenna farms. Right now I'm talking about *really big* 80 meter DX antennas. After you read this, you'll know why you get beat out in a pile-up over some rare DX on that band.

The modesty of the owner of these fine antennas restricts me from mentioning his call and real name. I'll call him "Paul." Paul's big gun is a 3-element 80 meter Yagi interlaced with a 4-element 40 meter Yagi on a 120 foot tower (photo A). Above this edifice is a C3 Force 12 multiband Yagi for the higher bands. If you look closely at the photos, you can see Paul astride the tip end of the boom adjusting a guy wire. Photo B, taken near the base of the tower, shows Paul sitting on the boom, safety-belted into position, leaving his hands free.

Paul took photo C from the end of the 80 meter boom, looking back towards the tower. In the distance are vineyards and his "shot" toward Europe. Notice the double guying on the tower to absorb torque when the antenna is rotated.

A refreshing glass of North Coast chilled Chardonnay awaits Paul at the foot of the tower. Look for Paul's signal on 80 or 40 meters. I'm sure you'll have no difficulty hearing him!

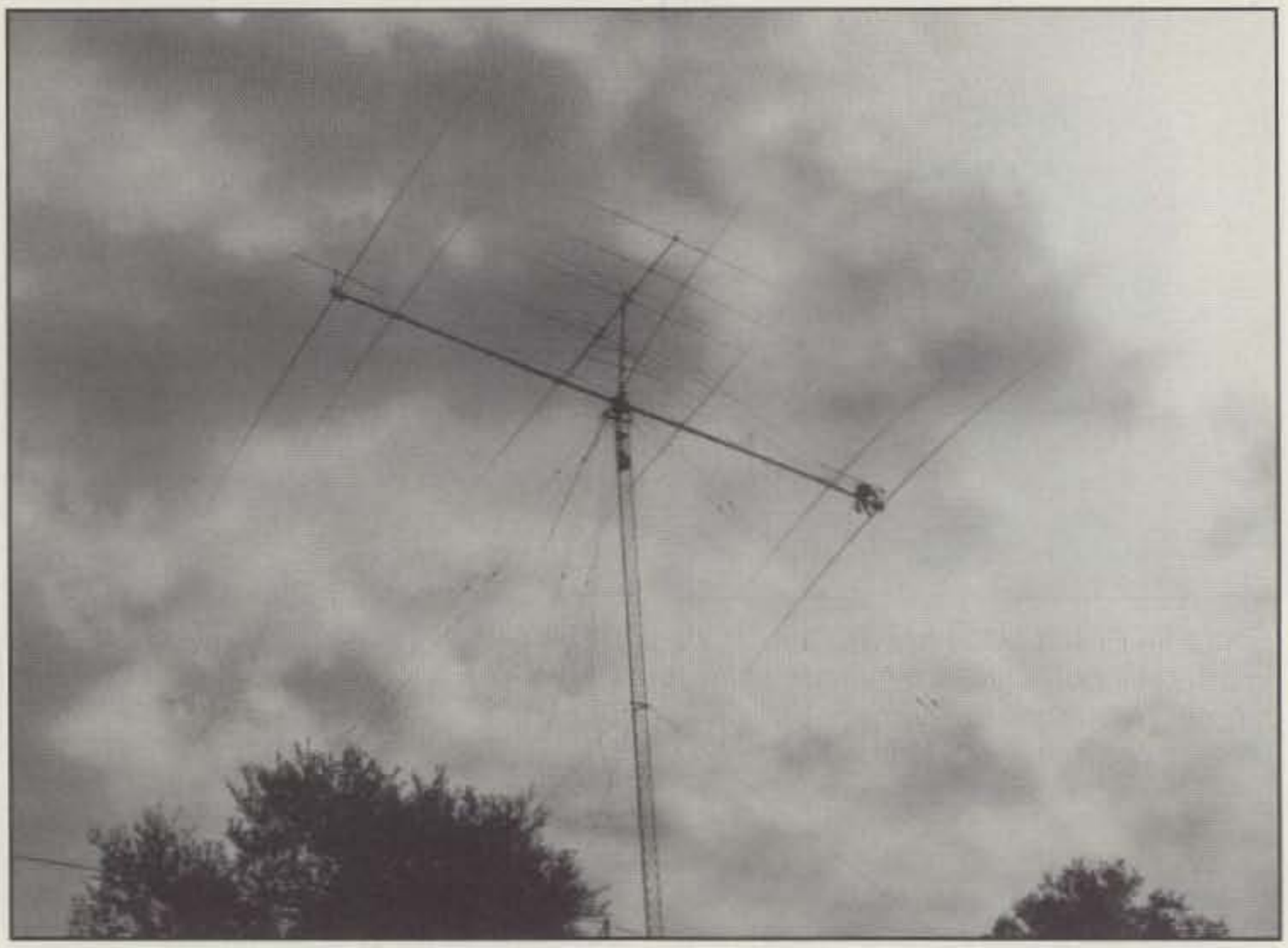

Photo A– Shown here is Paul's 120 foot tower sporting a 3-element 80 meter Yagi interlaced with a 4-element 40 meter Yagi. Atop that is a C3 Force 12 multiband Yagi for the higher bands. If you look closely, you can see Paul on the left astride the tip of the boom adjusting a guy wire.

A Beam for 21 MHz

As for the rest of us poor unfortunates, we'll have to make do with something simpler—say, a 3-element Yagi for 21 MHz. In my last column I discussed simple antennas for this band, plus data on "store-bought" Yagis. That's all well and good, but how about the fellow who wants to build his own antenna from scratch?

The sunspot count is gradually rising, and nifty DX is coming through on 15 meters. The band will really be swinging by the time this article is in print. (I just worked ZD7CTO on St. Helena Island on 15, by the way.)

A 15 meter beam is not hard to build. The elements are less than 24 feet long, which means that a center section of 12 foot tubing plus end tips, each about 6 feet long (plus overlap), will do the job. The beam I have used to break DX pile-ups is shown in fig. 1. It is built on a 12 foot boom made of 2 inch diameter aluminum tubing.

48 Campbell Lane, Menlo Park, CA 94025

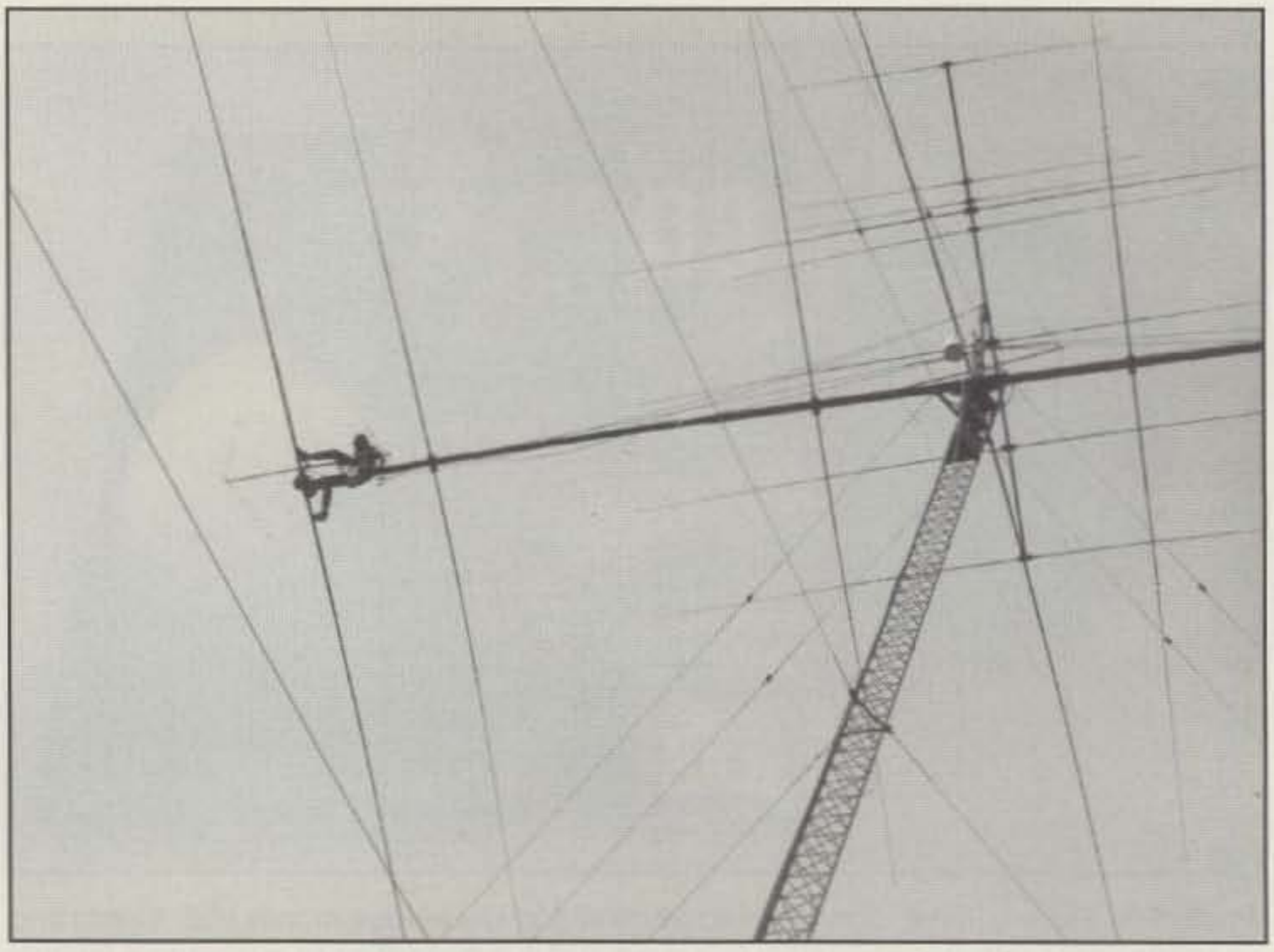

Photo B– A closer view of Paul, safety-belted into position, sitting on the boom.

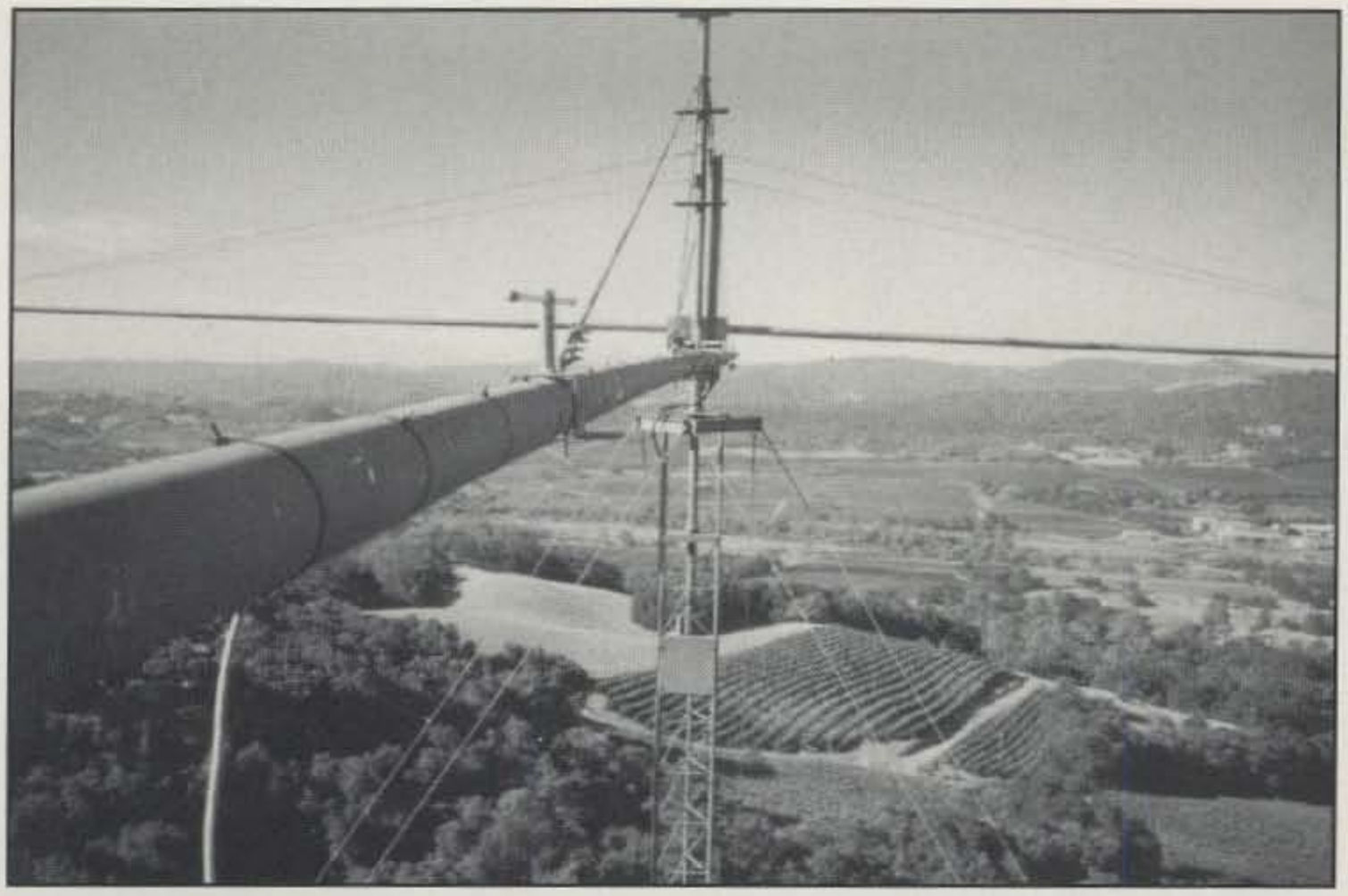

Photo C– Paul took this photo from the end of the 80 meter boom, looking back toward the tower.

This can be made up of two 6 foot sections spliced together, if your local metal supply house doesn't have longer lengths. The center sections of the elements are made of 12 foot lengths of 7/8 inch diameter tubing; the tip sections are 3/4 inch diameter material. You can get plenty of construction information from my book, *The W6SAI HF Antenna Handbook*, published by CQ Communications. Read it!

The feed system is up to you. If you use a gamma match, you won't have to split the driven element. That makes construction a lot easier. When you finish, you'll end up with a beam that provides a nice polar plot (fig. 2) and the general characteristics shown in fig. 3. You can't do much better than that!

Adjusting the Matching System

It is comforting to adjust a gamma match for best SWR, but who wants to hang by his heels from the top of a tower? Maybe Paul doesn't mind, but I get nervous when I'm only a few feet above ground. However, you can adjust the match and even play with element lengths with the beam near ground level! How? Merely point the beam straight up, with the reflector about four feet above ground. I tried this stunt using a tall step ladder as a bracing struc-

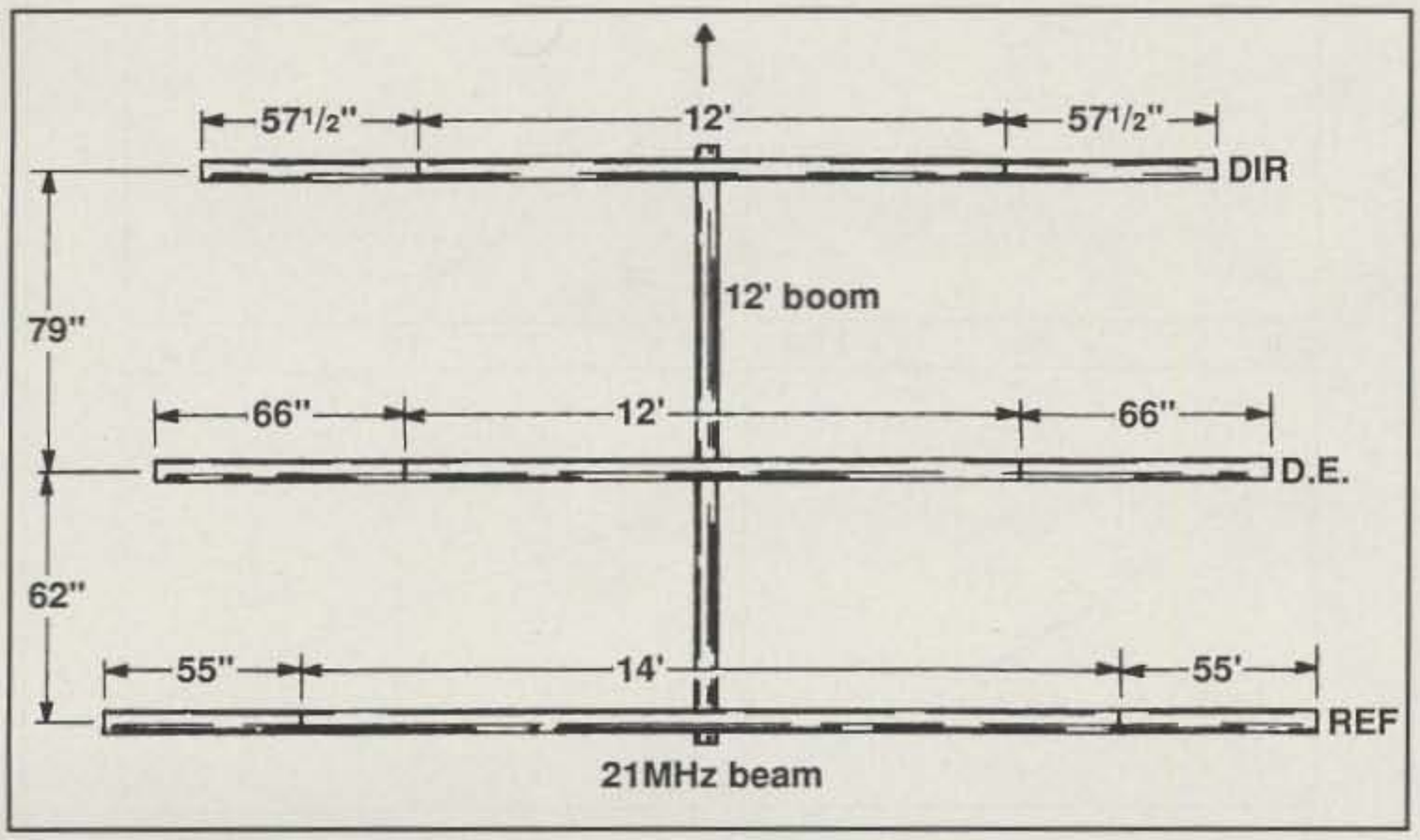

Fig. 1– Center sections of the 21 MHz beam are made of 0.875 inch diameter tubing; tip sections are made of 0.75 inch diameter tubing; and 12 foot boom is made of 2 inch diameter tubing.

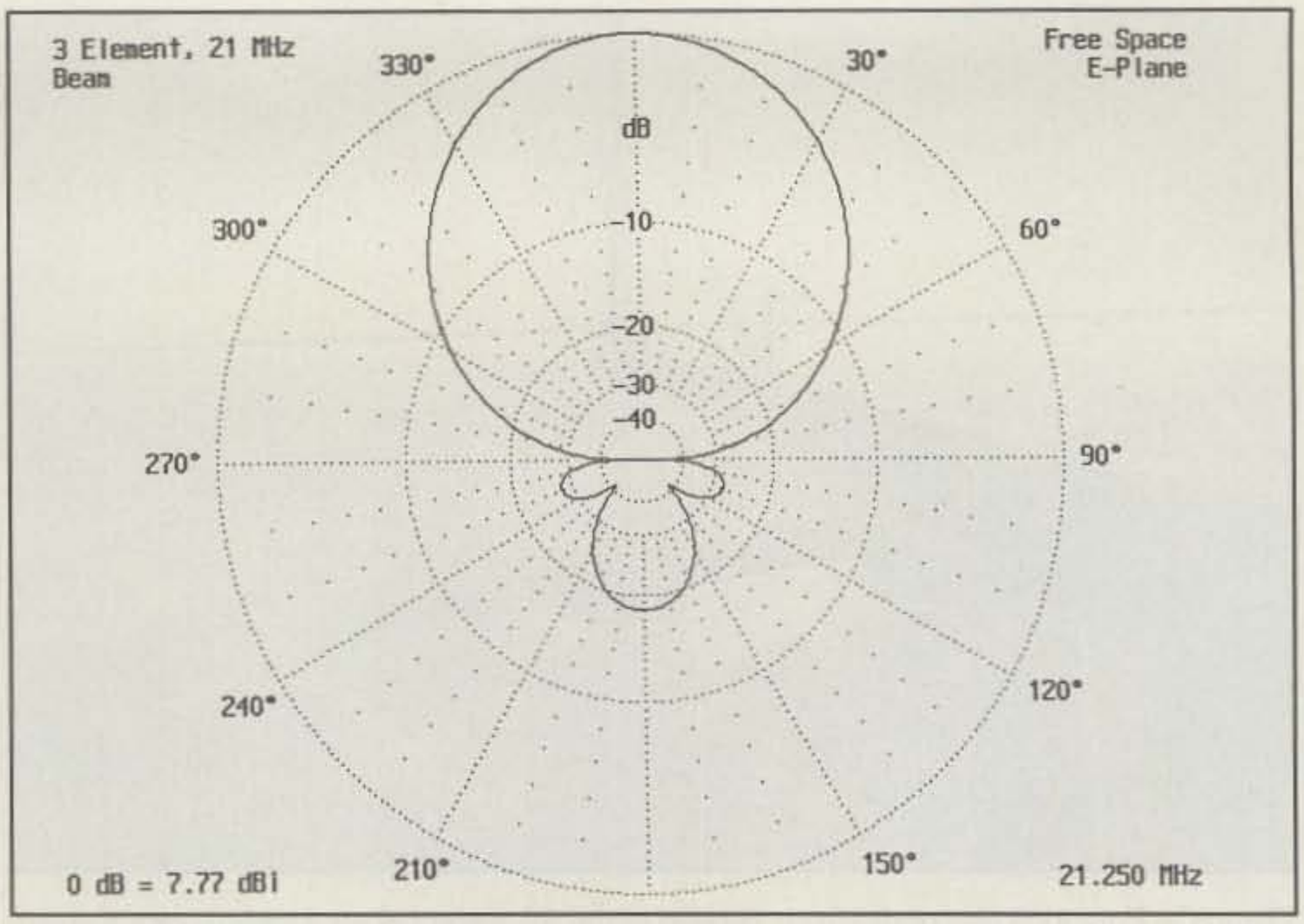

Fig. 2– Polar plot of the 21 MHz beam.

ture. After a few false starts, and finally with the help of a local amateur, I got the beam lashed in a near-vertical position. I admit it was a little wobbly, so I added two 2 × 4 wood braces near the middle of the reflector to stabilize things. I next fiddled with the gamma match while standing on a short ladder.

Using the nifty MFJ-259 SWR Analyzer, I could eyeball the readouts while I adjusting the gamma match. At the point of lowest SWR, in the middle of the band, I tightened the gamma-match clamps and that completed the job. Atop the tower the frequency of minimum SWR was very close to the point I picked at ground level.

If you get the element dimensions approximately correct to begin with, the process is quick and easy. Pencil and paper work before you start will pay big dividends in the long run.

A Simple One-Tube Receiver

Judging from reader feedback (via e-mail, if you please), there's a lot of interest in simple, home-built receivers. I've discussed one or two in past columns. Here's

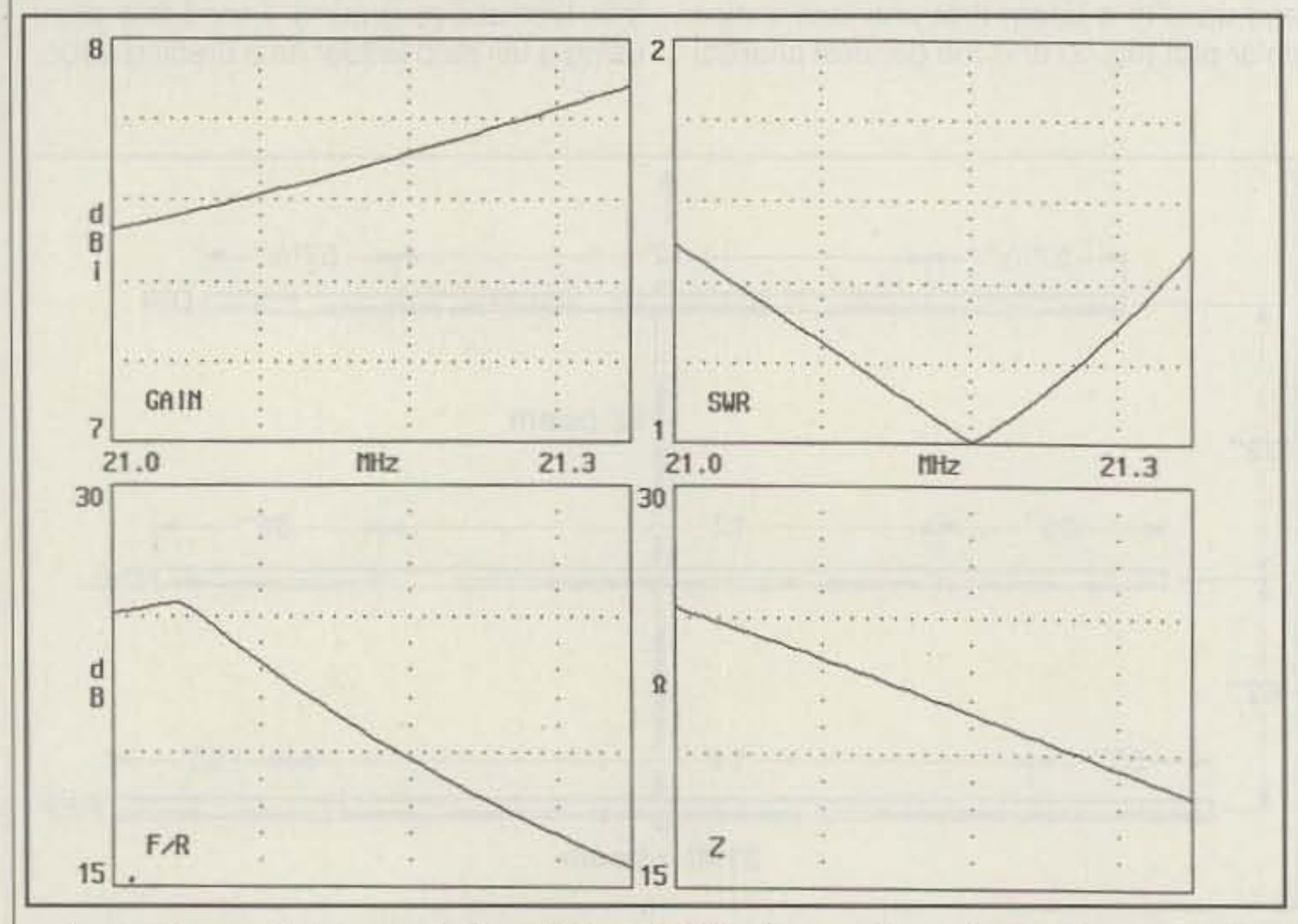

Fig. 3– General characteristics of the 21 MHz beam. Upper left: gain across band. Upper right: SWR vs. frequency. Lower left: front-to-back ratio. Lower right: feed-point impedance.

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2 MOSFET POWER AMPLIFIER • Final PA utilizes RF MOSFETs to achieve low distortion and high durability. Rated output is 10 to 150 watts on all bands including 6 meters.

3 AUTOMATIC ANTENNA TUNER • Auto tuner included as standard equipment. Tuner settings are automatically stored in memory for fast QSY.

4 MULTIPLE ANTENNA SELECTION • Three antenna connections are user selectable from front panel. Antenna selection can be stored in memory.

5 GENERAL COVERAGE RECEIVER • 100 kHz-30 MHz, plus 48-54 MHz receiver. Electronically tuned front-end filtering, quad-FET mixer and quadruple conversion system (triple conversion for FM) results in excellent dynamic range (>100dB) and 3rd order ICP of +20dBm.

6 IF BANDWIDTH FLEXIBILITY • Standard 2.4 kHz filter can be narrowed continuously to 800 Hz with variable Bandwidth Control (BWC). Narrow SSB and CW filters for 2nd and 3rd IF optional.

7 QRM SUPPRESSION • Other interference rejection features include Passband Shift (PBS), dual noise blanker, 3-step RF attenuation, IF notch filter, selectable AGC and all-mode squelch.

8 NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (±10 Khz) if the VFO frequency is changed.

9 DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.

10 CW FEATURES • Full break-in operation, variable CW pitch. built in electronic keyer up to 60 wpm.

11 DUAL VFOs • Two separate VFOs for split-frequency operation. Memory registers store most recent VFO frequency, mode, bandwidth and other important parameters for each band.

12 200 MEMORIES • Memory capacity of 200 channels, each of which store frequency, mode, AGC and bandwidth.

13 COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.

14 ERGONOMIC LAYOUT • Front panel features easy to read color LCD display and thoughtful placement of controls for ease of operation.

15 HEAVY-DUTY POWER SUPPLY • Built-in switching power supply and a cooling system designed for continuous transmission at maximum output.

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COIL DATA FOR THE ONE-TUBE RECEIVER

	Total No. Turns	*Total Winding Length*	*No. Turns Between Tap and Ground*
1.75 Mc. band	110	Turns close-wound	12
3.5 Mc. band	45	Turns close-wound	6
7 Mc. band	14	Turns close-wound	2
14 Mc. band	7	3/4 inch	2
28 Mc. band	5	3/4 inch	2

All coils are wound of No. 30 d.s.c. wire on ribbed 5-prong forms, 1 1/4 inch diameter by 2 inch winding length.

Table I– Coil data for receiver coil forms from Antique Electronic Supply, 6221 South Maple Avenue, Tempe, AZ 85283.

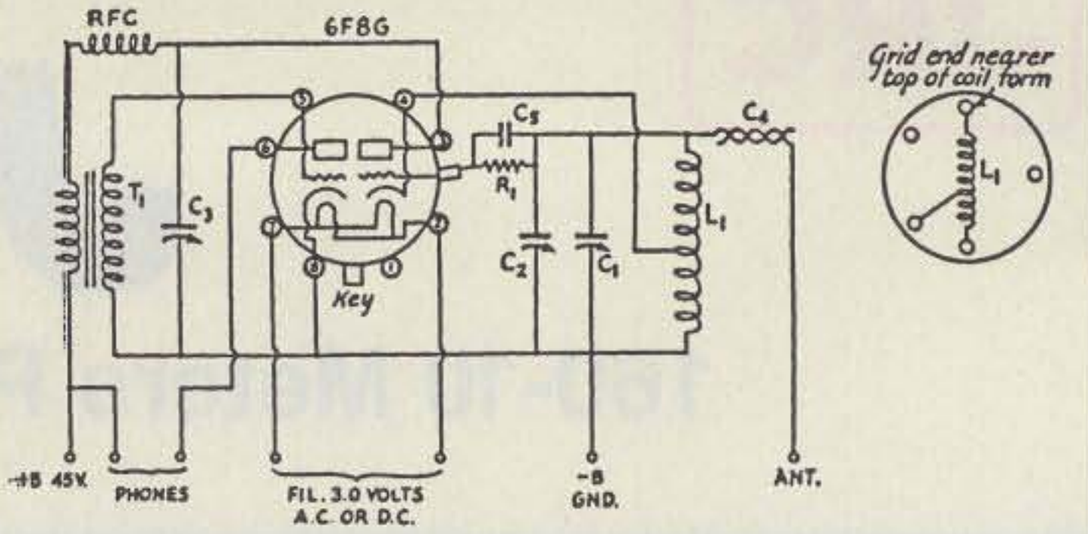

Fig. 802 – Circuit diagram of the one-tube receiver.
C_1—75 µµfd. band-setting midget condenser (Cardwell ZU75AS).
C_2—10 µµfd. band-spread midget tuning condenser (Cardwell ZR10AS).
C_3—75 µµfd. midget regeneration control condenser (Cardwell ZU75AS).
C_4—Insulated wire-ends, twisted (see text).
C_5—0.0001 µfd. fixed mica condenser (Aerovox).
R_1—2 megohm, 1/2 watt resistor (IRC).
RFC—2.5 millihenry choke (National R-100).
T_1—3:1 audio transformer (Thordarson T-13A34).

Fig. 4– One-tube regenerative receiver (from The Radio Amateur's Handbook, *1939 ed., published by the ARRL).*

a one-tube affair that's a real winner. It was featured in the 1939 edition of *The Radio Amateur's Handbook* published by the ARRL (see fig. 4).

The little set is built breadboard fashion with an aluminum panel (grounded) to eliminate hand capacity. A Vernier dial is used for easy tuning. A double triode (6F8G) is used, but you can substitute a 6SN7 or a 12AU7, each of which is easier to locate. Power requirements are 6.3 volts for the filament and 45 volts plate potential. The set works well with 2000 ohm headphones. You can use a sheet of plywood about 7 inches long by 5 1/2 inches deep. The panel is 7 inches high. Parts are tastefully laid out, with the tube centered behind the main tuning control (C2). The bandset capacitor C1 is to one side, and the regeneration control C3 to the opposite side of the main dial.

A wire antenna from 20 to 40 feet long is required, and antenna coupling is adjusted by C4, which consists of insulated wires twisted together. Capacity is adjusted by the number of twists. Start out with three. Too many turns will cause signal overload and regeneration will be unstable.

Coil data is given in Table I. To tune the receiver, the main tuning capacitor is set to zero, and the bandset capacitor is set at the high-frequency edge of the band. With the regeneration control capacitor C3 advanced, both CW and SSB signals may be copied. You will be amazed at the sensitivity of this tiny set. Good listening!

Solar Terrestrial Activity Report

If you want a complete summary of radio propagation, you'll want to read *The New Shortwave Propagation Handbook,* by my friends Jacobs (W3ASK), Cohen (N4XX), and Rose (K6KGU). It is published by CQ Communications. If you want monthly updates on propagation, read W3ASK's "Propagation" column in this magazine. If you want real-time, daily information on ionospheric conditions, you can go to the web and read the daily solar report at <www.dxlc.com/solar>. This report is updated each day and presented in the form of a graph showing solar flux, sunspot number, and planetary A-index (fig. 5). Additional data is presented, including forecast of the geomagnetic field, and a monthly tally of solar flux, international sunspot number, and smoothed sunspot number. All this information is of great help if you like to follow the vagaries of the sun's radiation and its daily effect upon radio propagation.

73, Bill, W6SAI

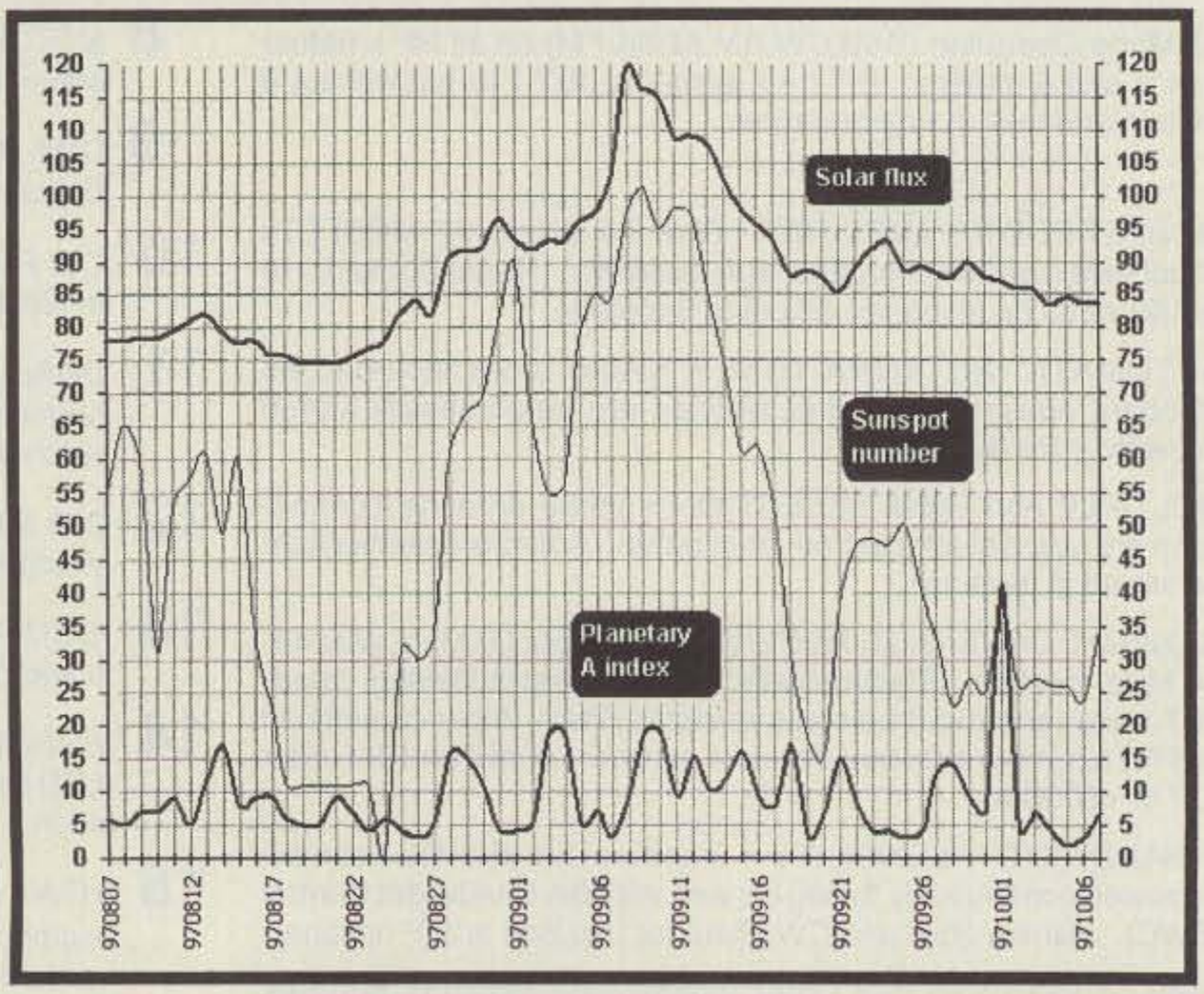

Fig. 5– For real-time daily information on atmospheric conditions, you can go to the web and read the solar report at <www.dxlc.com/solar>. The report is updated each day and presented in the form of a graph showing solar flux, sunspot number, and planetary A-index, as shown here.

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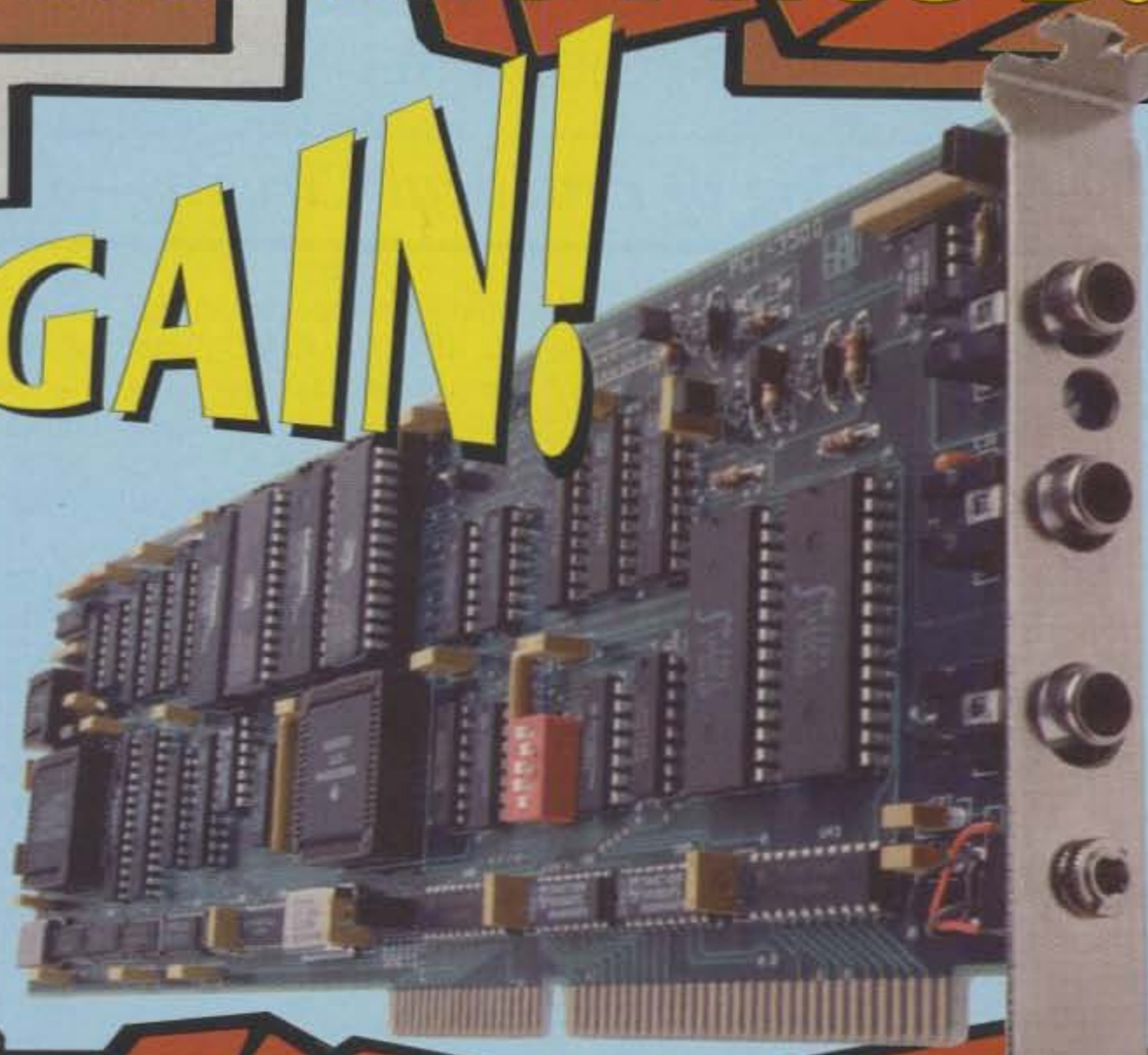

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DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

A Catalog of Practical Circuits—Part II

This, the last installment of "Doug's Desk," was submitted barely two weeks before Doug passed away. While his life and this new series were cut all too short, Doug left a rich legacy of writing, caring, and friendship. —K2EEK

In Part I of this series we discussed a number of simple, basic audio circuits that could be saved in a notebook and used as reference material for those who like to build amateur equipment. Practical component values were assigned in each circuit to serve as "ball park" values. NTE equivalents were specified for each semiconductor used in the circuits. This month we continue with two audio power amplifiers and four small-signal RF amplifiers. NTE equivalents are listed in each circuit diagram for convenience of procurement. NTE devices are available from Mouser Electronics (958 N. Main St., Mansfield, TX 76063-4827 [800-346-6873]). See Part I for information about ordering an NTE cross-reference book from Mouser.

Audio Amplifiers for Speakers

Fig. 1(A) shows a popular audio amplifier used by experimenters. The National Semiconductor LM386 provides ample output power (roughly 300 mw) for most receiver applications. However, when driven with too much signal, it produces distorted audio output. I limit my use of this IC to receivers that are designed for low current consumption and portable work.

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A better audio chip for home-station use is specified in fig. 1(B). The LM388 produces up to 1.5 watts of output power. This is more than ample for comfortable room volume. Both circuits in fig. 1 are simple to build and easy to make operate. Should there be a tendency toward audio self-oscillation, it can usually be cured by connecting a 0.002 to 0.005 µF disc capacitor from the IC input terminal to ground. The larger the capacitor value the fewer the high-frequency audio components you will hear in the speaker. In fig. 1(A) the capacitor would go from pin 3 to ground, near U1. In fig. 1(B) the capacitor would be bridged from pin 8 to ground.

Practical RF Amplifiers

Four small signal RF amplifiers are seen in fig. 2. One of the simplest ones is shown at (A). The grounded-gate JFET is very stable and generally needs no special attention to keep it that way. The tradeoff associated with grounded- or common-gate operation is reduced gain. The fig. 1(A) circuit yields roughly 10 dB of gain. The secondary of T1 and the primary of T2 (largest windings) are wound to provide resonance at the chosen operating frequency with C1 and C2 at mid-range capacitance. For the lower part of the HF band it may be necessary to add C3 and C4 (fig. 2[B]) to ensure resonance without the transformer windings being awkward to place on the cores (less inductance needed). All four circuits in fig. 2 are designed for a 50 ohm input and output impedance. In order to realize this condition you should use 10 percent of the main winding turns for the smaller winding. Experimenting with the exact number of smaller winding turns (adding or subtracting) will optimize the circuit for maximum gain. The source impedance of the grounded-gate JFET amplifier in fig. 2(A) is 200 ohms. This is determined by $10^6/g_m$ where g_m is in micromhos. The same rule applies for source follower FETs. Thus, if the transconductance of a JFET is 5000 µmhos (pardon me for not using micro Siemens!), the source impedance is 200 ohms for a grounded-gate or source-follower RF amplifier.

The tap on T1 is made at approximately one eighth of the total winding turns. Place the tap nearest the grounded end of the T1 secondary. Although the tuned circuits in fig. 2 are shown with toroid cores, they may be air wound at the high end of the HF spectrum, and at VHF. Amidon Associates No. 2 cores are fine for use from 1.8 to 10 MHz. Use No. 6 cores from 10 to 50 MHz.

Although an MPF102 can be used at Q1 of fig. 2(A), the 2N4416 will provide better performance in terms of gain, noise figure, and pinch-off characteristics. An MPF102 should be okay for the lower end of the HF spectrum, except for the most demanding circuit performance.

More RF Amplifiers

Bipolar junction transistors (BJTs) are used as RF small-signal amplifiers in many circuits. Fig. 2(B) shows a typical circuit that uses a BJT. The base of Q1 is tapped down on the secondary of T1 to provide an impedance match. The base impedance in this circuit is on the order of

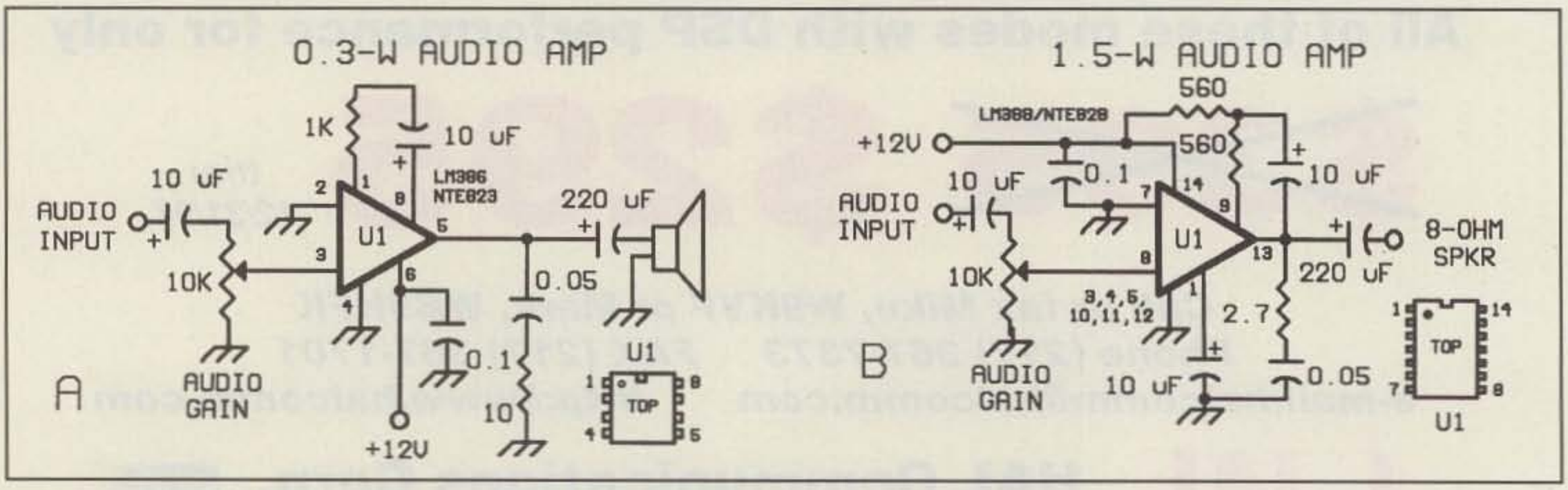

Fig. 1– Practical IC audio amplifiers for operating a speaker. Decimal value capacitors are disc ceramic. Polarized capacitors are electrolytic or tantalum. Resistors are 1/4 watt carbon.

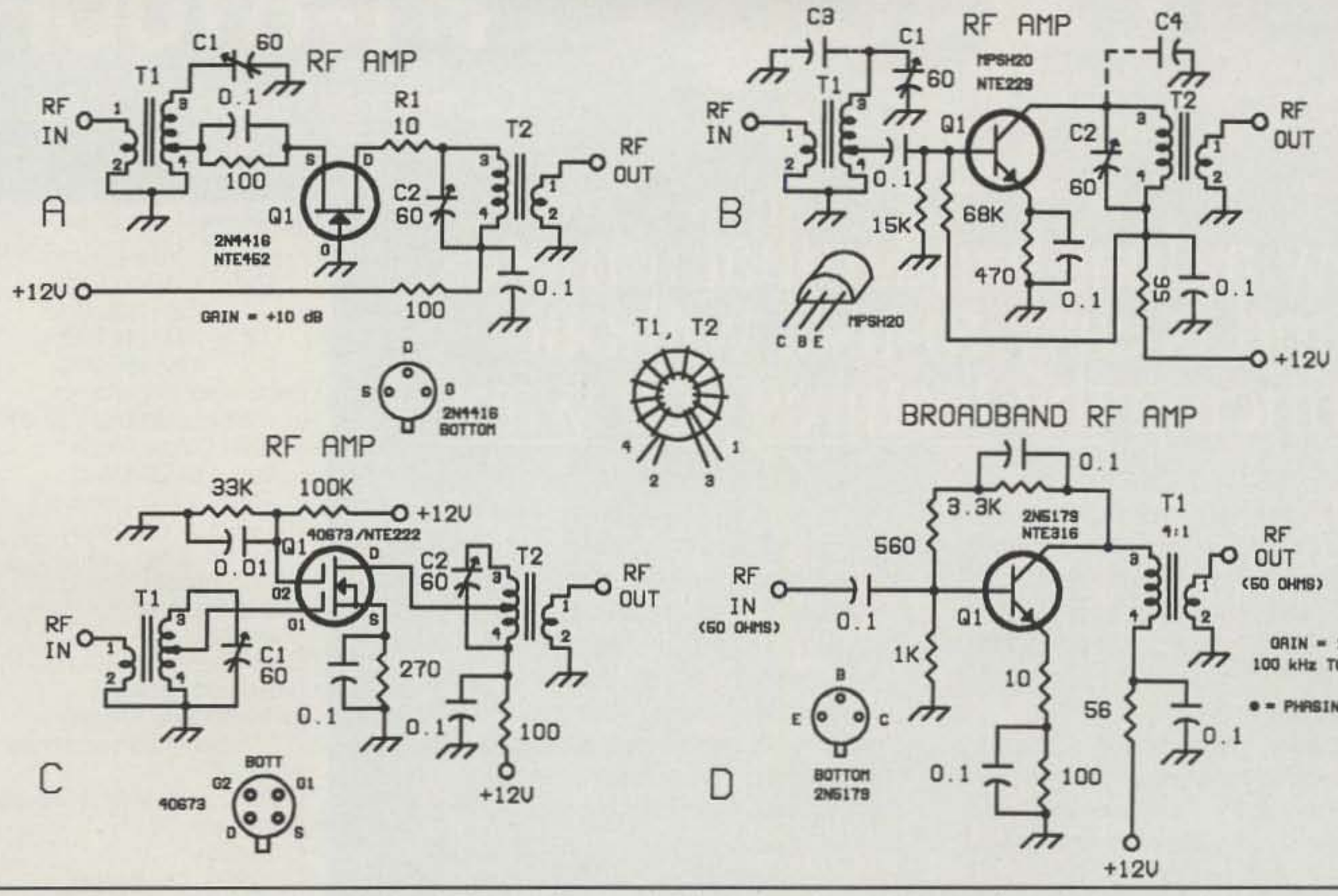

Fig. 2– Practical examples of small-signal RF amplifiers suitable for use in receivers and transmitters and as preamplifiers. See text for circuit explanations. Fixed value capacitors are disc ceramic. Variable capacitors are ceramic or plastic trimmers. Resistors are 1/4 watt carbon. NTE equivalents are given for the transistors specified.

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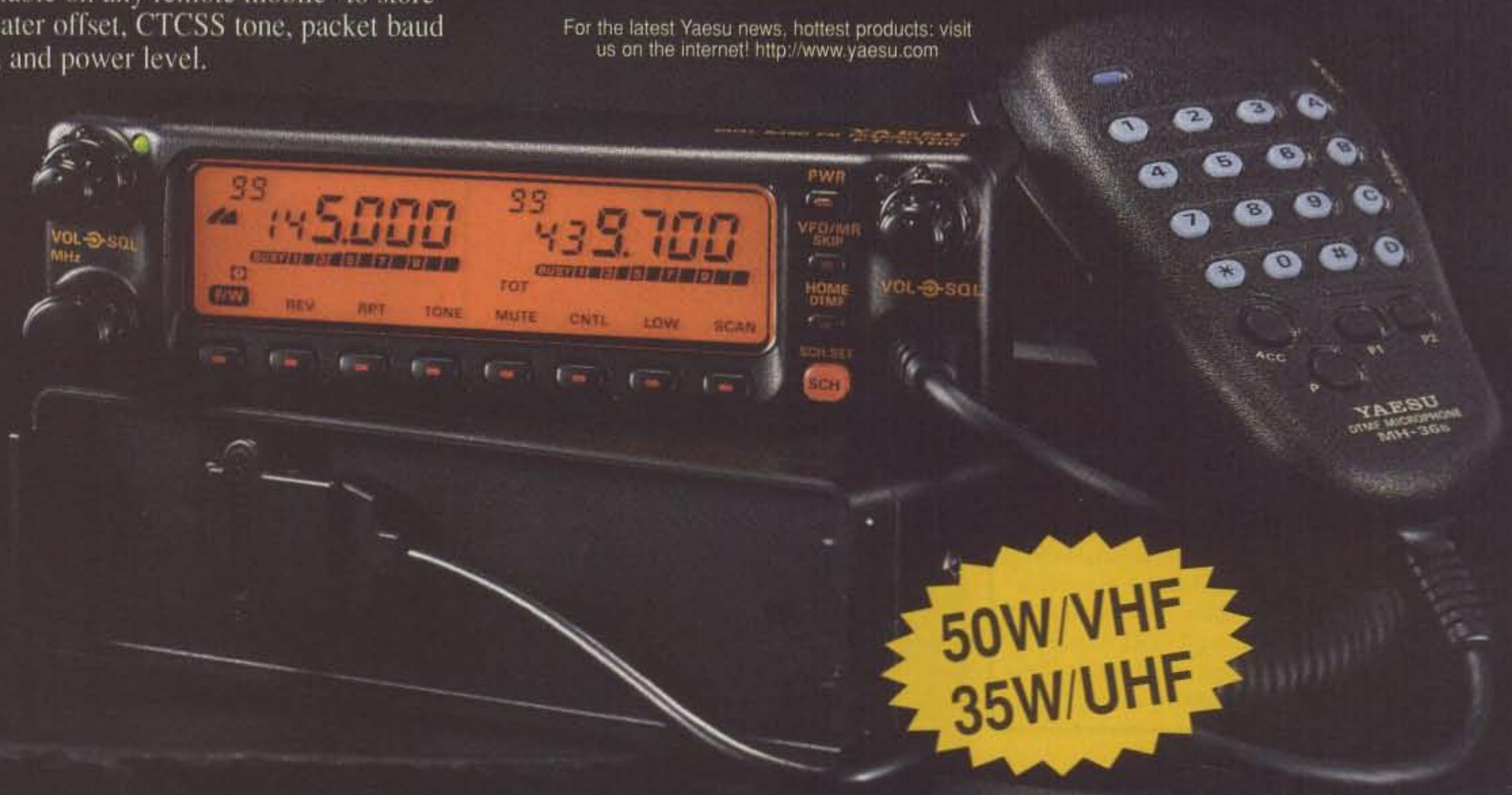

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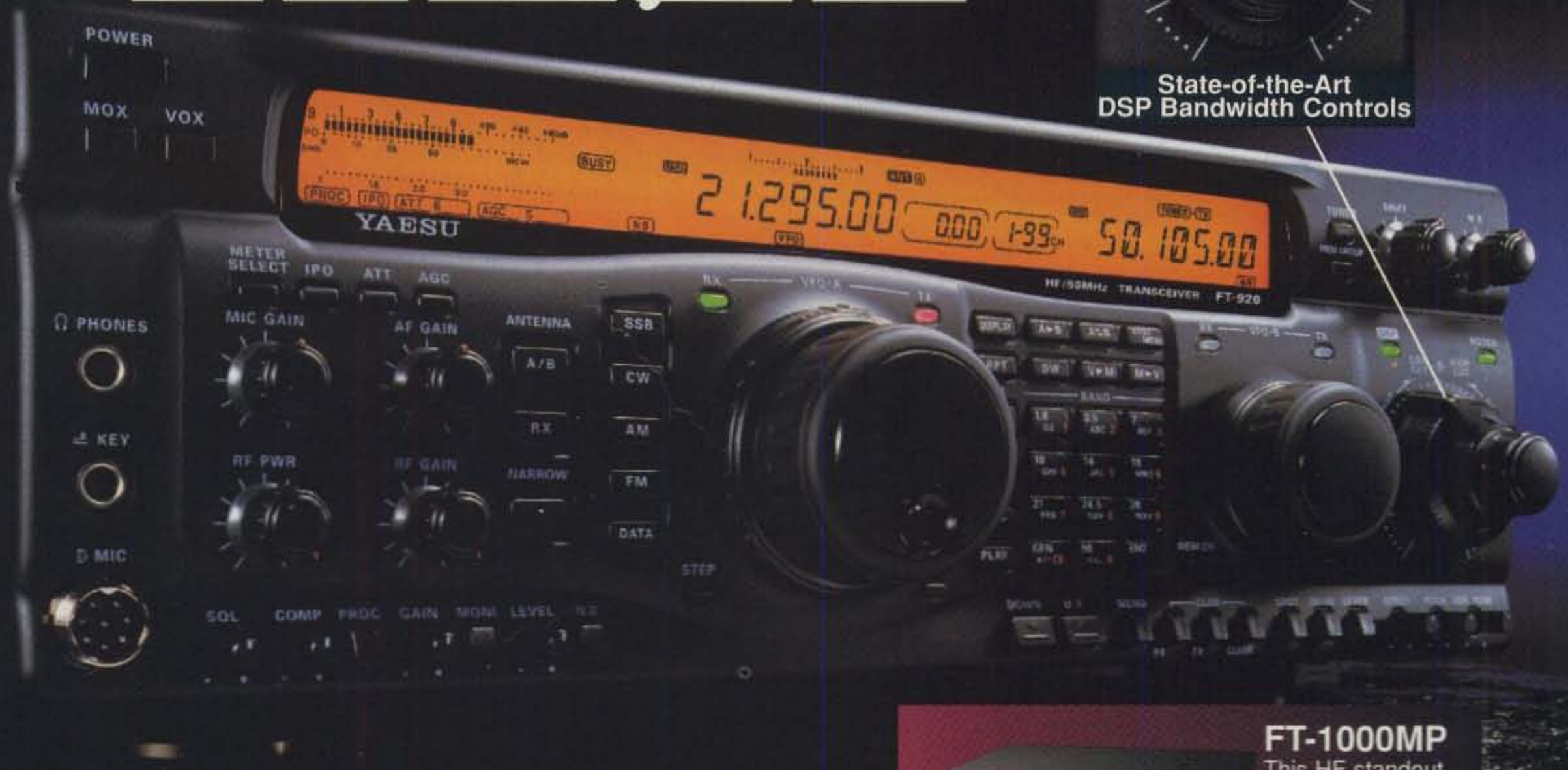

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details. Collins is a trademark of Rockwell International Corporation.

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600 ohms. The T1 tap is made near the grounded end of the secondary at one fourth the total secondary turns. Thus, if the secondary has 12 turns of wire, the tap is made 3 turns above the grounded end of the secondary winding.

The Motorola MPSH20 transistor specified for Q1 at fig. 2(B) is suitable through UHF. It has a low noise figure. However, for operation below 14 MHz it is okay to use devices such as the 2N3904, 2N2222A, and 2N4401. The noise factor below 14 MHz is usually determined by antenna noise rather than noise generated within the transistor. A 2N5179 is a good transistor for operation through VHF. The smaller windings on T1 and T2 are 10 percent of the number of turns used for the larger windings. C3 and C4 are additions that may be needed for operation at the low end of the HF range, as discussed earlier.

Fig. 2(C) shows how to use a dual gate MOSFET as an RF amplifier. The user must exercise caution when handling the 40673 or other MOSFETs (such as the 3N211) to prevent static charges from puncturing the gate insulation. MOSFETs are fragile in this respect. I usually twist all four transistor leads together until I am ready to install the device. It goes into the circuit only after all of the related components are in place.

Taps are used on T1 and T2 in the fig. 2(C) circuit. This is not for impedance matching. In fact, it causes an intentional mismatch. Q1 is tapped down on the tuned circuits in order to prevent unwanted self-oscillation. The taps are made at relatively low-impedance points of the tuned circuits. This helps prevent instability. A good starting point when placing the taps is midway down the larger windings of the tuned circuits. Experimentation with the taps may show that they can be made closer to the upper ends of the windings without encountering instability. The higher the tap points the greater the amplifier gain. Q1, as shown, has a gain of approximately 15 dB.

The RF amplifiers we thus far have discussed are called "narrow-band amplifiers." There are situations that require a broadband response where there are no tuned circuits to adjust. The circuit at (D) of fig. 2 is an example of a small-signal broadband amplifier. It has a reasonably flat (constant) frequency response from 100 kHz to 45 MHz. It is unconditionally stable. The input impedance is 50 ohms because of the biasing and the degeneration caused by the 10 ohm emitter resistor. The Q1 output impedance is 200 ohms. Therefore, T1 is used to provide a 4:1 step down to 50 ohms. T1 has 14 primary turns of No. 28 enamel wire on an Amidon FT-37-43 ferrite toroid. The secondary has 7 turns of No. 28 enamel wire. A 2N5179 CATV transistor is specified for Q1. However, for operation from 100 kHz to 28 MHz it is practical to use a 2N3904 or 2N2222A transistor in this circuit. I found when using a 2N2222A that maximum gain occurred when the 10 ohm emitter resistor was changed to 15 ohms. Modeling this circuit with NOVA software confirmed the 15 ohm value, respective to maximum gain.

In Summary

The circuits presented in Part II may be saved in a notebook as "recipes" for experimenters. It is important to remember that all RF circuits must have short, direct leads in order to discourage instability and loss of gain. Keep the pigtails of capacitors and resistors as short as practicable when assembling a project. Determining the proper number of transformer turns for a specified inductance and operating frequency is covered in *The ARRL Handbook* and *The ARRL Electronics Data Book*. I have tried to combine basic theory with the practical examples given in this article.

73, Doug, W1FB

—30—

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FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Season's Greetings '97

Where has the year gone? It's already December, the snow is on the ground in many places of the country (although fortunately, not here in sunny central Alabama), and the holiday season is upon us. We'd better say it first, lest we forget: The very best of Season's Greetings to all our readers.

That being said, in this holiday month we'll again "ramble on" with our customary formula of antenna, software, and book notes. We'll begin just where we should, with antennas. Stay with us. There's lots to come this month.

Antenna Notes

Ernst F. W. Alexanderson and the Grimeton Station. If you thought amateur spark transmissions of the early 20th century were really something, take a look at the high-power communications station using the so-called "Alexanderson Alternator" that the Swedes established in 1924. It was, and still is, known as Grimeton Station, or as it often was called, the "great radio station."

The Alexanderson Alternator, a rudimentary wireless transmitter, was developed during the early 1900s by Ernst F. W. Alexanderson (1878–1975) for very long-distance communications. Following his engineering studies in Sweden and Germany, Alexanderson went to America in 1901 and became an employee of General Electric. There he developed many electrical inventions, including a single-phase motor for locomotives and rail cars.

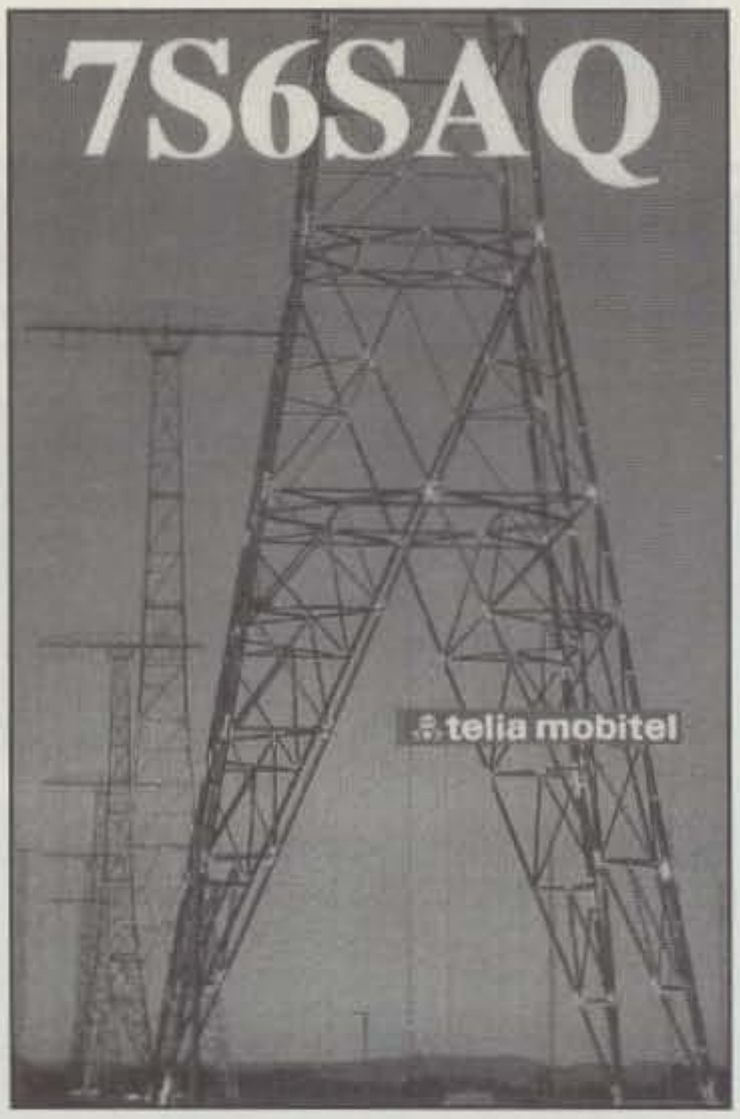
Of far greater importance to us was his pioneering work in radio engineering. From 1904 he worked to develop special alternators for low-frequency (LF) and very low-frequency (VLF) radio communications, using frequencies as high as 100 kHz; this type of radio transmitter was widely used for transatlantic radio communications during and after World War I.

The Alexanderson Alternator was a large, electromechanical HF sender with a high-speed rotor connected *directly* to the antenna. GE and RCA built 20 units in all for worldwide coverage, one of which was located on Long Island, New York. Today only Grimeton, in Sweden, exists. It initially cranked up in 1924 on 16.7 kHz using the callsign SAQ. The receiving station was located at Kungsbacka, some 50 kilometers (31 miles) north of Grimeton.

This oldest VLF station broadcasts without using any tubes or solid-state devices. The frequency is generated by an alternator somewhat akin to an automotive unit, but thousands of times bigger, feeding a huge antenna system. The large antenna towers associated with the alternator are depicted in the accompanying photo. The antenna system has six 127 meter high towers, spaced 380 meters. On the top of each tower is a 50 meter long T-arm, used to carry the twelve wires feeding the six vertical antennas. Power to the antenna system is about 200 KW.

Now the alternator is part of a museum complex. It operates on ceremonial occasions (typically once a year) on 17.2 kHz, today using the callsign 7S6SAQ. The site, complete with six antenna towers and the 200 KW transmitter, is managed by Telia Mobitel (Telia AB), a Swedish mobile telephone company, and the radio museum of the Radio Historical Society of West Sweden. The station also operates a Web page which is found at <http://www.telemuseum.se/Grimeton/Grimeen.HTML>; e-mail: <grimeton@mobile.telia.se>.

Our thanks to Telia Mobitel's Inger Andersson for her assistance and for furnishing photos of the station.



The 7S6SAQ Grimeton station QSL card. The Grimeton radio station, described in the text, is situated on Sweden's west coast. In the mid-1920s it started regular radio transmissions to Long Island, New York, on a frequency of 16.7 kHz using the callsign SAQ. Today the station operates on ceremonial occasions, typically once a year, on 17.2 kHz, using the callsign 7S6SAQ. The site, complete with six antenna towers and a 200 KW transmitter, is managed by Telia Mobitel (Telia AB), a Swedish mobile telephone company, and the radio museum of the Radio Historical Society of West Sweden.
(QSL card courtesy Telia AB, Sweden)

T.G.M. Communications Miniature Hybrid Quads. An Ontario firm, T.G.M. Communications offers a unique, miniature, four-band Hybrid Quad antenna, the MQ-1. According to the firm's advertising literature, the antenna is a high-performance, loaded, two-element design with reflector. Its philosophy of operation is fairly conventional: It uses the principle of loading, simply by reducing the element length—eliminating the least-useful portion, the ends, and retaining the center, the primary current or radiating portion. The hi-Q reflector is formed in a diamond shape for maximum signal capture.

The manufacturer claims low SWR, low radiation angle, broadband gain characteristics, and a front-to-back (F/B) ratio better than most two-element beams on the market today. The four-band MQ-1 antenna ($229.95 U.S. plus s/h) mounts using standard TV-type hardware and can be turned with a lightweight TV rotor.

The MQ-1 antenna covers 6, 10, 15, and 20 meters, and it boasts a gain of from 4.4–6.5 dBd, depending on band. F/B ratio is 12 to 17 dB. The 16 lb. antenna has a turning radius of 6 ft. 2 in. and handles 1200 watts PEP. A similar six-band antenna ($298.95 U.S.) is available; the MQ-2 adds 12 and 17 meter coverage.

Both antennas have an adjustable "tuning spoke" to make tune-up easier (fig. 1). By loosening the top 4-40 screw, you can lengthen the spoke by up to $1^{5}/_{16}$ inch to lower the frequency. If you need to raise the frequency, you push the spoke back into the adjuster.

If the spoke is already all the way in the adjuster, you'll have to cut the spoke shorter according to a chart in the antenna's assembly manual. The adjustable spokes can be placed along the buss bar on the same side of all four loading coils to make them easy to locate.

For more information, contact T.G.M. Communications, 121 Devon Street, Stratford, ON Canada N5A2Z8 (519-271-5928).

Force 12 Antenna Products Update. As we mentioned in the January 1994 and March 1995 columns, Force 12™ is the trade name for the antenna systems designed and produced by Tom Schiller, N6BT. Several HF directional beam product lines, each bearing military-type names (such as Strike Force, Elite Force, Magnum Force, and Nomad) are available; these include both multiband and monoband systems.

Force 12's general goals include producing systems for the amateur who would like to have a competitive signal even while living in an urban setting. Specific design goals for the antennas include keeping parts and assembly simple; having good appearance and a "low profile"; possessing high strength with minimal weight; offering minimal wind load; and delivering high performance in gain, pattern, and SWR.

Since our previous column coverage, several product improvements have been made and several new products have been introduced. For example, the firm's linear loading system is the subject of a new patent. Force 12 always has used a unique V-shaped linear

289 Poplar Drive, Millbrook, AL 36054-1674

loading system, but this system now has been improved significantly to achieve a broader frequency range.

Another patent application deals with a Yagi design dubbed the "Unequal Z-axis Yagi," or "Zagi." The concept is based on the assumption that a Yagi essentially thinks its height above ground is where the driver element resides. Some Force 12 antennas have been redesigned to place an additional driver above the boom; this gives the array increased height above ground and an overall improvement of at least 1.5 dB in gain, a marked improvement for DX. Doing so reportedly increases the load on the tower only by the driver element, which represents less of an increase in load than moving the entire array up the mast would entail.

New products include the ZR antenna series for HF, VHF, and UHF. The ZR is a low-profile, efficient half-wavelength antenna somewhat resembling a halo, one which consists of a center radiator, where the feedline attaches, and upper and lower rings. The rings look something like capacity hats, but actually they are end linear loading elements.

The antenna's unique features make it a true vertical dipole, with an omnidirectional pattern and a takeoff angle about 14 degrees above average ground. Several models are available. The ZR-3 ($449) is for 20, 15, and 10 meters, while the ZR-2m ($74.95) and ZR-2m/440 ($89.95) dual-band "Blue Line" versions cover VHF and UHF. The "Blue Line" ZRs are blue anodized, and they feature very broadband operation and an integrated balun.

Other new products include high-efficiency, single- and multi-band HF verticals; commercial and custom antennas for AM broadcast through 6 GHz; several 1:1 baluns; and other antennas and accessories. For an interesting and educational catalog that explains antenna operation in some detail, contact Force 12 Antennas and Systems, 3015-B Copper Road, Santa Clara, CA 95051 (telephone 1-800-248-1985; on the Web <http://www.QTH.com/ force12>).

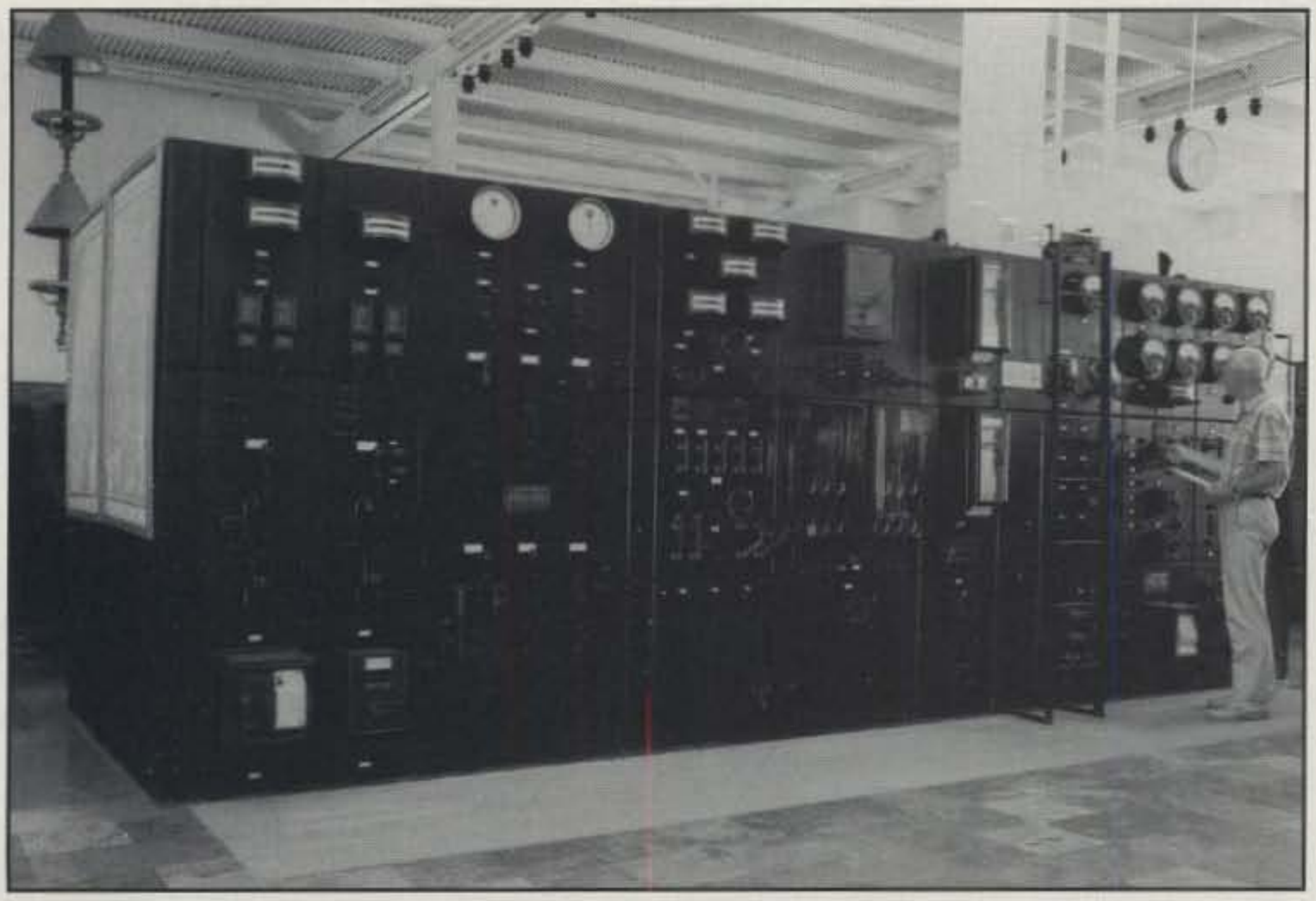
New from Aztec RF™. In April 1992 we highlighted Aztec RF Products baluns. As we mentioned, Glenn Rattmann, K6NA, offers the DXB series of External Ferrite Bead Antenna Baluns. These high-quality, current-type baluns provide for proper connection of an unbalanced coaxial transmission line to a balanced antenna such as a dipole, Yagi, quad, or loop.

The rugged Aztec baluns eliminate stray radiation, which otherwise could degrade the antenna pattern and cause radio frequency interference (RFI). They also provide a weatherproof, solid connection between the feedline and antenna, and they boast a coreless, true current-type design that won't saturate. The baluns also feature an integrated "shield hood" on the Teflon connector for excellent coaxial isolation of shield-current paths, a feature not found on many "cheapie" baluns.

The DXB series baluns, which we originally highlighted, presently are available in six different models; prices range from $24.95 to $54.95, depending on model. Most cover 1.8–30 MHz, but the DXB-2V ($42.95) covers 40–220 MHz, instead of HF. Also, the new DXB-3-100 ($32.95), which covers 1.8–30 MHz, is a non-potted, common-mode choke and line isolator for especially good 160 meter performance, in that it uses 100 rather than 50 beads. Glenn notes that the DXB-3-100 is particularly suitable for use on the W3LPL 160 meter elevated four-square antenna.

For more information and data sheets, contact Aztec RF, P.O. Box 1625, Valley Center, CA 92082 (619-751-8610).

Lakeview Company Mobile Antennas Update. On several occasions we've mentioned the inexpensive, high-quality, and good-performing fixed station and mobile antennas and accessories made by the Lakeview Company of Anderson, South Carolina. The Lakeview Company product line now is offered by many dealers, but they still sell direct (an eight-page flyer covers their products). The line includes



The fabled Alexanderson Alternators—some 20 of them—were built by GE and RCA in the 1920s. They were very large and powerful electromechanical HF AC alternators with their high-speed rotors connected directly to the antenna. The only working station today, situated at Grimeton, Sweden, broadcasts on ceremonial occasions on 17.2 kHz. (Photo courtesy Telia AB, Sweden)

The station building at Grimeton, shown in the foreground, was built in a neo-classical style. More amazing than the main building, however, are the antennas. The large antenna towers, in the background, still are standing and usable today. The antenna system has six 127 meter high towers spaced 380 meters. On the top of each tower is a 50 meter long T-arm used to carry the 12 wires feeding the six vertical antennas. (Photo courtesy Telia AB, Sweden)

the popular Carolina Bug Katcher; the single-band Ham Sticks®, for mobile operation; the effective but inexpensive ($12.95) WD4BUM Inducti-Match for 80–15 meter mobile; the popular Tri-Magnetic, Quad, and Super Quad magnet mounts; and a wide variety of HF, VHF, and UHF mobile antenna accessories and mounts.

A relatively new product of interest to scanner buffs is the Discone Scanner Antenna. The compact, made-in-the-U.S.A. antenna, which was designed primarily for receiving purposes, now features a significant 800–900 MHz performance enhancement. The antenna consists of eight cone and eight disk elements, reportedly the same as other Discones selling for much more. You also can use the Lakeview Discone for transmitting on the 146, 220, and 440 MHz bands at moderate power levels, making it an attractive, low-cost ($36.95) multiband VHF/UHF amateur antenna as well.

For a flyer, contact the Lakeview Co., Inc., 3620-9A Whitehall Rd., Anderson, SC 29624 (telephone 864-226-6990; e-mail: <hamstick@hamstick.com>.

Soft Stuff

Symantec AntiVirus Center (SARC) Interesting Facts. Most readers are familiar with the outstanding series of PC utility and application programs offered by Symantec Corporation. Not the least of these are the various antivirus programs Symantec offers. In that developing effective protections against computer viruses and similar PC "afflictions" requires a great deal of technical research, several years ago the firm established the Symantec AntiVirus Research Center (SARC). SARC is committed to providing swift, global response to computer virus threats, researching and developing technologies that eliminate such threats, and educating the public on safe computing practices.

We don't hear much on a day-to-day basis about computer viruses—at least unless our PCs are stricken—but according to SARC, viruses are alive and well, thank you. In fact, six to nine new computer viruses (programs which adversely affect your PC by altering the way it works without your knowledge and consent) are discovered every day. Of these, there are an alarming number of so-called "macro viruses" associated with productivity programs such as Microsoft Word™ and Microsoft Excel™. Today there are more than 500 macro viruses, and the list is growing.

SARC also keeps track of so-called "Trojan Horses," malicious programs that typically masquerade as something desirable—such as a destructive "program" like aol4free.com, to purportedly let you obtain free America Online (AOL) access. SARC also keeps tabs on computer virus hoaxes that prey especially on beginners. These are panic-style prank messages or alerts about viruses that don't exist.

In a recent fact sheet and "SAC Antivirus News Update" newsletter, SARC offers some interesting stats. For example, virus writers typically are male; no female virus writers have been documented so far. The general age category for a virus writer is 14–24 years old, with the average age on the rise.

Deliberately destructive viruses are on the upswing. Approximately 10% of all viruses were deliberately destructive in 1993, while in 1996 approximately 20% were of this nature. The virus writing hot spots currently include India, New Zealand, and Australia, in addition to the USA. Just a few years ago, you may recall, the major trouble spots were Russia and several other former Soviet bloc countries.

According to SARC, in the future viruses will be moving away from "platform dependence" (programs that affect only a certain operating system or hardware configuration). The first platform- independent viruses were the macro

MIRACLE BABY CH-32 COMET ANTENNA

CH-32
Miracle Baby
146/446MHz
HT Antenna
Gain: 0dBi
Length: 1.75"
Conn: BNC

NEW Z750 • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: Gold-plated PL-259 • Max Pwr: 200W

NEW Z780 • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
146MHz 6/8 wave 4.5dBi • 446MHz 5/8 wave x 3 7.2dBi • Length: 62" • Conn: Gold-plated PL-259 • Max Pwr: 150W

NEW SBB-15 • Tri-band 52/146/446MHz w/fold-over **NEW BLACK COLOR**
Gain & Wave: 52MHz 0dBi 1/4 wave • 146MHz 4.5 dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

NEW SBB-7/SBB-7NMO • Dual-band 146/446MHz w/fold-over **NEW BLACK COLOR**
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: SBB-7 PL-259/SBB-7NMO NMO • Max Pwr: 70W

NEW SBB-5/SBB-5NMO • Dual-band 146/446MHz w/fold-over **NEW BLACK COLOR**
Gain & Wave: 146MHz 2.5dBi1/2 wave • 446MHz 5.5dBi 5/8 wave x 3 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W

CX-224/CX-224NMO • Tri-band 146/220/446MHz w/fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 220MHz 3.5dBi 5/8 wave • 446MHz 6.0dBi 5/8 wave x 2 • Length: 36" • Conn: CX-224 PL-259, CX-224NMO NMO • Max Pwr: 100W

B-20/B-20NMO • Dual-band 146/446MHz w/fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.0dBi 5/8 wave x 2 • Length: 30" • Conn: B-20 PL-259/B-20NMO NMO • Max Pwr: 50W

SH-55 • Super Flexible 146/446MHz HT Antenna
Gain: 146MHz 1.5dBi • 446MHz 3.2dBi • Length: 15.5" • Conn: BNC • Max Pwr: 10W

B-10/B-10NMO • Dual-band 146/446MHz cellular look-a-like • Gain & Wave: 146MHz 0dBi 1/4 wave • 446MHz 2.15dBi 1/2 wave • Length: 12" • Conn: B-10 PL-259/B-10NMO NMO • Max Pwr: 50W

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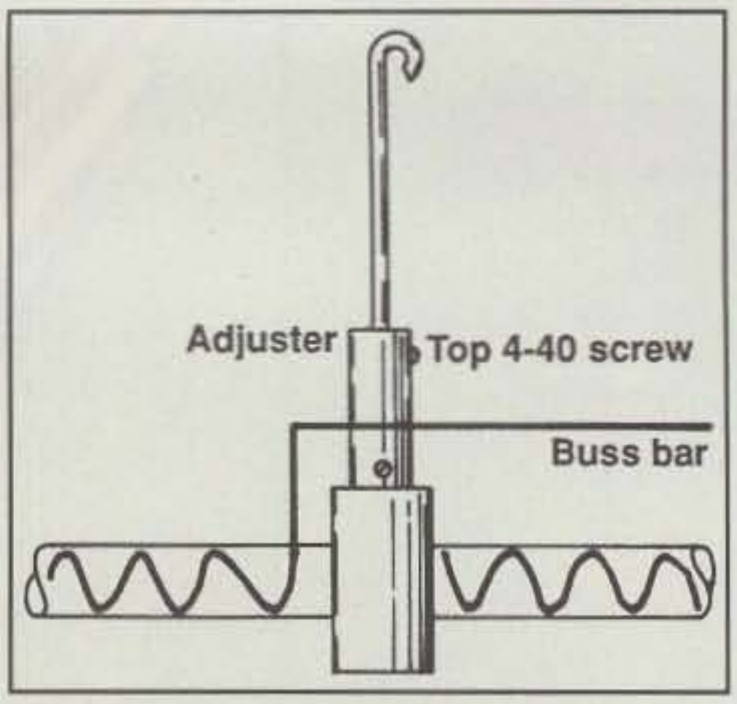

Fig. 1– Both T.G.M. Communications Hybrid Quad antennas, the MQ-1 and MQ-2 mentioned in the text, have an adjustable "tuning spoke" to make tune-up easier. By loosening the top 4-40 screw, you can lengthen the spoke by up to 15/16 inches to lower the frequency. On the other hand, if you need to raise the frequency, you push the spoke back into the adjuster. If the spoke is already all the way in the adjuster, you have to cut the spoke shorter according to a chart in the antenna's assembly manual. The adjustable spokes can be placed along the buss bar on the same side of all four loading coils to make them easy to locate. (Source: T.G.M. Communications Hybrid Quad antenna product literature)

viruses; now we're seeing "Internet agents" using JAVA and ActiveX programming to wreak havoc on people's PCs. Technology-wise, we are seeing a blending of antivirus and security technology to cope with the problem.

SARC is sponsored by Symantec Corporation, 2500 Broadway, Suite 200, Santa Monica, CA 90404-3063. SARC's Web site is at <http://www.SARC.com>; archives of "SARC AntiVirus News Update" are available at <http://www.symantec.com/avcenter/refa.html>.

Mom 'N' Pop's Software Offerings. As the name suggests, Mom 'N' Pop's Software is a small, two-person firm whose principals have personally checked out the more than 50,000 programs in their library, ensuring that they work and are virus-free. The firm's extensive offerings run the software gamut and include database, spreadsheet, education, finance, graphics, hobby, programming, health, cooking, engineering and science, and other types of Windows and DOS programs. An extensive range of amateur radio shareware and freeware also is offered. Some attractively priced CD-ROM software collections are available,too.

The proprietors stress that they believe in the shareware concept and want to make it work; they're an approved shareware vendor and associate member of the Association of Shareware Professionals (ASP). To this end, if you register a program they'll give you two free disk programs. The refund policy also is simple, in that they'll refund the cost of any disk you get from them that doesn't work on your system. Most 5.25 inch program disks are $2, while 3.5 inch disks are $2.50.

A free catalog diskette is available; it lists the firm's offerings. It also includes current clearance disks and CD-ROMs, as well as a large file showing additional amateur listings outside

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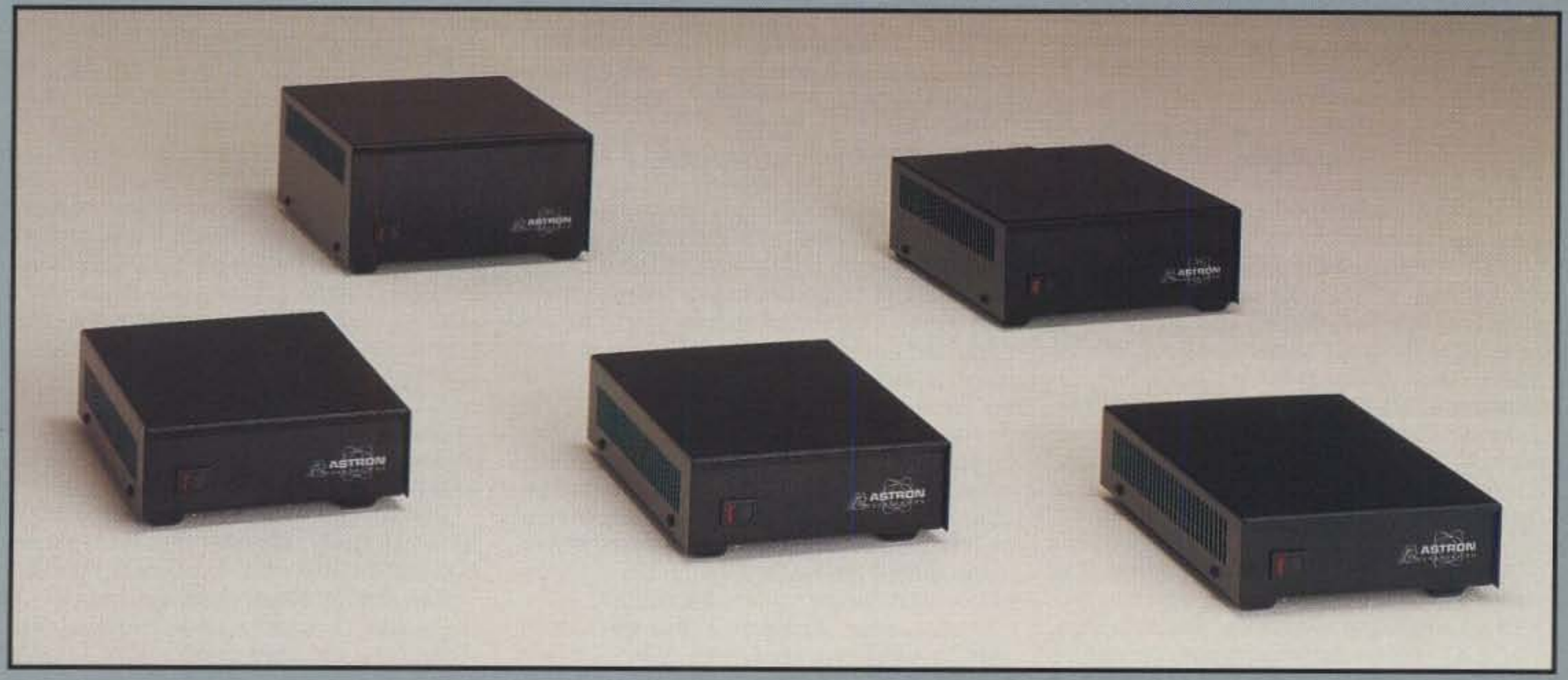

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SS-12	10	12	2.3 x 6 x 9	3.4
SS-18	15	18	2.3 x 6 x 9	3.6
SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5
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the regular catalog. For a copy, contact Mom 'N' Pop's Software, P.O. Box 15003, Spring Hill, FL 34609 (352-688-9108).

From the Bookshelf

SGC Publications and Manuals. We've mentioned SGC in several columns, providing thumbnail profiles of their antenna systems, antenna tuners, and accessories, as well as their other HF communications equipment. SGC has become a leading global supplier of "ruggedized" communications products, including commercial and military-quality SSB mobile and base-station transceivers and RF accessories. Recently SGC has made efforts to increase sales in the amateur market.

SGC maintains that "educated consumers" choose their HF communications equipment with care, whether it be for use on their RV, automobile, boat, or airplane—or to install in their amateur station at home. To this end, the company offers three useful, free publications and manuals of special interest to radio amateurs. All three pubs combine elements of specialized tutorials with catalog descriptions of specific SGC products.

First up is the 193-page *HF SSB User's Guide & Professional Products Catalog.* The *User's Guide* is a comprehensive guide to HF SSB operation and installation. The 193-page, 8 1/2" × 11" book includes chapters on various HF communications modes; HF transceivers; HF antennas, feedlines, and grounds; equipment installation; amateur radio and marine operations; SGC HF communications equipment and accessories; and a glossary.

Second is the "SGC Go Mobile at 500 Watts" booklet. The 82-page, 5" × 7" booklet tells all you need to know to install a medium- or high-power HF mobile communications system. There are chapters on basic mobile installation requirements, 150 and 500 watt installation considerations, power-supply systems, antennas and grounds, noise suppression, and equipment selection.

Third is the "Digital Signal Processing: Fact and Equipment" booklet. The 48-page, 5" × 7" booklet is a good tutorial on DSP technology and applications. Chapters include analog filtering, DSP concepts, DSP in HF communications, available SGC DSP equipment, and the future of DSP, including new possibilities.

Quantities are limited. For copies contact SGC, Inc., Box 3526, 13737 S.E. 26th St., Bellevue, WA 98009 (phone 1-800-259-7331; e-mail <SGCMKTG@aol.com>; on the Web <http://www.sgcworld.com>).

Allied Electronics, Inc. Catalog. It's been a long time since I've seen an electronics catalog as massive as the "Allied Electronics Engineering Manual and Purchasing Guide." The 1072-page catalog, free to industry professionals, is divided into 19 separate, individually indexed sections that cover practically any parts and components one might need, from fuses to tools to LEDs to semiconductors to transformers—and then some.

There's also a large manufacturer's index and a list of Allied's local offices. It's the kind of resource you rarely see published today because of its massive size and the expense of publication. The only drawback I see is that minimum orders are rather high at $25–$50, depending on the way orders are placed.

A nice "plus," however, is that the catalog also is available on a free Windows and Macintosh CD-ROM that lets you electronically search for parts. Too, Allied is on the Internet with a Web page at <http://www.allied.avnet.com>. Using the Web page, you can check stock availability, enter orders electronically, find technical information, see product spotlights, communicate with sales personnel, and track shipments.

Contact Allied Electronics, Inc., 7410 Pebble Drive, Fort Worth, TX 76118 (1-800-433-5700).

***CQ* on Microfilm.** Buckmaster Publishing is familiar to most readers as the publisher of the popular HamCall™ CD-ROM. They also offer the complete run of *CQ* from 1945 to the present. With the set you can access the classic treasures of *CQ* without storing hundreds of pounds of back issues.

The Buckmaster "Microfilmed Magazines" include a complete set of every issue. Each page, from front cover to back, is included. (Several other magazines, including *QST, Ham Radio/Ham Radio Horizons,* and *73 Amateur Radio,* also are available.)

Produced on high-quality diazo film, each fiche has a standard 24× reduction with 98 frames (pages) each, which fits in a desk cardfile. Each set is produced in chronological order for quick access. Headers are large and clear, and they're complete with the magazine's name and issue date. There's only one issue per fiche, which makes the sets easy to use.

Buckmaster's "Microfilmed Magazines" are relatively inexpensive, considering the quantity of information they contain. The complete set of *CQ* is $395, arguably a low price if you compare this with the cost of collecting magazines "the old way." Yearly updates are $10 plus $3 shipping, and the publisher will replace any lost or stolen fiche for free.

Contact Buckmaster Publishing, 6196 Jefferson Highway, Mineral, VA 23117 (phone 1-800-282-5628; e-mail <info@buck.com>).

Fair Radio Sales Catalog Update. Over the years the radio and electronics surplus market has changed considerably as military surplus decreases in availability and usability, and much of the market is conducted by mail-order. As we've noted, a mail-order firm that still carries on with "classic" military and industrial radio surplus is Fair Radio Sales. Most of the firm's 24-page catalog is devoted to, and literally crammed with, military, government, and commercial radio surplus—a real old-fashioned gem I look forward to receiving in the mail.

A surprising percentage of the items in the catalog are not of the "boat anchor" type that often defines the surplus market today. For example, some interesting, definitely non-boat anchor items in a recent catalog include some rather sophisticated radios gracing the catalog's front cover. They are the RF-550 and R-1051B HF receivers, along with the RF-551 preselector; the three units each cover 2–29.9999 MHz. Several other modern HF, VHF, and UHF transceivers are available.

Antennas and accessories are well-represented in the catalog. They include the PRC-70 HF doublet, Trivec Avant AV-455-3 multiband whip, TN-612/G preselector/RF amplifier, IL-4/GRA-4 doublet insulator, BG-56 canvas antenna roll bag, and many other interesting and often unique items.

For a catalog, contact Fair Radio Sales Co., Inc., 1016 E. Eureka St., P.O. Box 1105, Lima, OH 45802 (telephone 419-223-2196; e-mail <fairadio@alpha.wcoil.com>; on the Web at <http://alpha.wcoil.com/~fairadio>. Catalogs are free.

Wrap-Up

That's all for this time, gang. Next time more Digital Dipole topics of interest. See you then.

Overheard: One thing I've learned is that using a dollar's worth of gas to save 25 cents on a crosstown purchase of a radio part (or anything else, for that matter) is false economy.

73, Karl, W8FX

Force 12, "THE ORIGINAL"

This is the 4th Birthday of the *C-3*.

In October, 1993, during the California QSO Party, the *C-3* was delivered by 'Dr. Tom', (N6BT). It was a long awaited delivery, as it had taken 2 years of development and invention. It was a beautiful, new arrival and changed the world of antennas forever.

The C-3 became the World's First TRAPLESS TRIBANDER.

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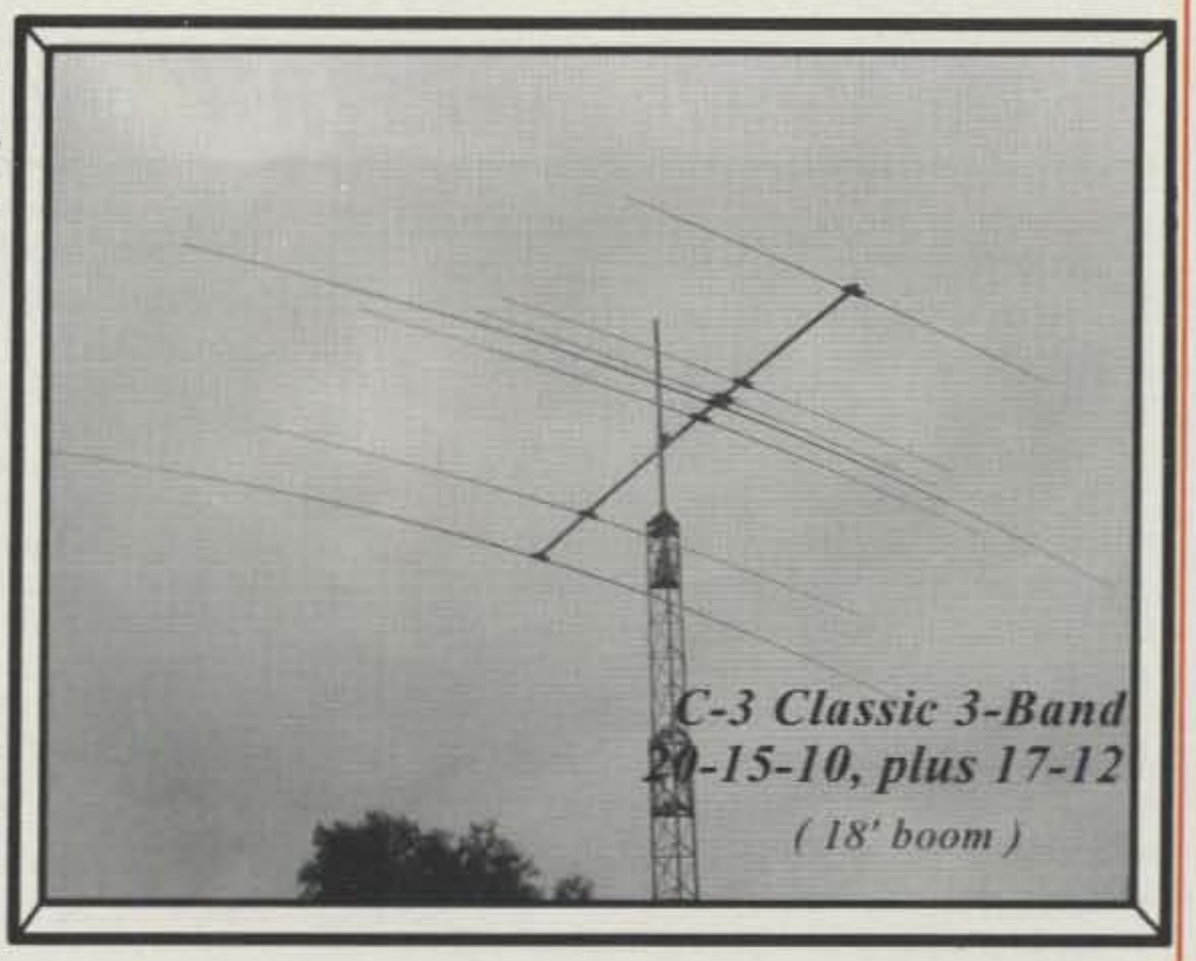
Not only does the *C-3* provide outstanding performance on 20-15-10, it also has real gain on the 17 & 12 mtr WARC bands, making a great 5-band beam. After delivering several hundred *C-3*'s and receiving scores of unsolicited testimonials, Force 12 wants **you** to share in the excitement of the *C-3* and the entire *C-Series* line.



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C-3S	20-10, 12' boom	450	385	420
C-4S	40, 20-10, 12' boom	595	500	550
C-4SXL	2el40, 20-10, 23' boom	849	725	800
C-3XL/D	320, 315, 410, 32' boom	1190		1000
B-1 Balun	3KW 1:1 Force 12 balun	40	35	

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BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

The Most Popular VHF+ Awards and How To Achieve Them

It's the end of the year, and at this time we often think about tying up loose ends. One of the loose ends that never seems to get tied up is applying for all those different awards available for us in the VHF+ world. Often we are so busy in other aspects of the hobby that we seem to forget that these wallpapers are nice additions to the shack. Below are descriptions of some of the more popular awards and strategies on how to achieve them.

Completing the requirements for any amateur radio awards involves goal setting. The VHF+ frequencies are no different. Once you've made a decision to go to these bands, you must decide whether or not to pursue specific goals. If you do, there's a principal difference between HF and VHF—*time*. While as you'll see some of the requirements for popular VHF+ awards can be met in as short a time as a weekend, some aren't met for decades.

The most popular award for VHF is VUCC. The next most popular is WAS. Quite a ways down the list is DXCC. We'll start off with the VUCC award.

VUCC

The award requirements for VUCC are as follows: For 6 and 2 meters, you must work 100 grid locators; for 135 and 70 cm, the requirement is 50; for 33 and 23 cm, you must work 25 grids; for 13 cm, the requirement is 10; and for all other bands the requirement is 5.

Six meter operators from most parts of the country should have no difficulty obtaining VUCC. The regular existence of sporadic-*E* allows for fairly easy completion of contacts in distant grid locators. In fact, contest stations and other operators often contact stations in 100 different grid locators in one contest weekend.

The task is a bit more difficult on 2 meters. With a little luck, if you live in the center of a rather highly populated area and are also surrounded by highly populated areas, you should reach your goal pretty quickly. Here again, contest stations, and others, have been known to work stations in the required 100 grid locators in one weekend. However, if you live outside, or even on the fringe, of these high population areas, the task becomes exponentially more difficult. For example, if you live in the west you're probably surrounded by vast expanses of land containing few amateur radio operators, let alone VHF+ operators. Under these conditions you must use extended forms of propagation to meet your goal. Meteor showers, sporadic-*E*, aurora, tropo, and EME become very important here. Of all of these modes of propagation, meteor showers are probably the most predictable. You can look on a calendar, note the time of the next shower, and plan accordingly.

Those of you on a limited budget are probably least likely to choose EME as a way to meet your goal, but don't rule it out. In the past, San Hutson, K5YY, and Ray Soifer, W2RS, each presented excellent papers on EME made easy and relatively inexpensive at Central States VHF conferences. Both of these papers unlock some of the mystique of EME operation for the "little guy." Sam's paper appeared in the 1990 *Proceedings* and Ray's in the 1992 *Proceedings*. If they are still available, they can be purchased from the ARRL for $12, plus $3.50 shipping. If not, try contacting the CSVHF Society via their home page <www.csvhfs.org>.

But I digress, as we were talking about meteor showers. It's possible to make their predictability work for you. All you need to know is when the various meteor showers occur and what type of showers they are. Meteor showers are pretty well documented. In this column I list the current shower(s) for the month in the "VHF Plus Calendar" sidebar. Also, there are many home pages that list predictions of when showers will occur.

An understanding of meteor shower types will unlock two more aspects of meteor shower propagation. These are how far you can work and in what direction?

First let's look at how far you can work. Remember, meteor burn up ionizes the *E*-layer. This means that you're limited to distances ranging from 700 to 1300 miles. Get a grid-square map and draw a circle around your QTH that extends out to the 1000 mile mark. Add two more circles at the 700 and 1300 mile marks. These two additional circles represent the inner and outer limits for this mode. In other words, within these two circles lie most of the possible grid locators you can work via meteor scatter. You'll notice, however, that there aren't 100 grid locators within these two circles. More on that later.

How do you make meteor scatter work for you? Look at the *Lyrids*, which peaks around April 21–22, as an example. For this shower, the average height of ionization is around 65 miles. This means that the probability of completing a meteor contact drops off significantly at distances over 1200 miles, and contacts between 800 and 1000 miles enjoy a high probability of completion.

What about direction? The *Lyrids* is a good north-south shower. Therefore, plan to work stations to your north or south. Now you know two facets of operation, so find stations located within your circle and within the directions encompassing a high probability of completion.

How can you contact the remaining grid locators? The next most reliable mode of propagation is tropo. On any day you can make contact between 100 and 150 miles with a modest station containing a 150 watt brick and a 15- to 17-element long boom beam between 25 and 30 feet in the air. You can increase your distance out to about 350 miles or so by what some call "brute force." However, it's necessary that both your station and the distant station are optimized for low noise and efficient power transfer to the antenna. It also helps if the other station is running high power. This is important not only so you can locate the station, but also so you know the precise direction in which to aim your antenna and return a signal back to the station to complete the contact.

Additional tropo contacts can be made in excess of 350 miles when the conditions are "just right." These conditions exist when a weather front is strategically located and causes the air to stabilize for several hours to several days, "trapping" the signals in a tropo "zone" over

VHF Plus Calendar

Dec. 7	First quarter Moon. Good EME conditions.
Dec. 10	Moon perigee.
Dec. 13	Full Moon. *Geminids* meteor shower predicted peak.
Dec. 14	Poor EME conditions.
Dec. 15	Highest Moon declination.
Dec. 21	Last quarter Moon. Moderate EME conditions.
Dec. 22	Moon apogee. *Ursids* meteor shower peak.
Dec. 28	Very poor EME conditions.
Dec. 29	Lowest Moon declination.

**EME conditions courtesy W5LUU.*

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land or "duct" over water. Under the right conditions, distances nearing 1000 miles can be reached over land, and in excess of 2500 miles over water.

With the exception of the over-water path, however, long-haul tropo only replicates the area already covered by meteor scatter. Therefore, the principal area of concentration to increase the number of grid locators worked remains the close-in grids "skipped over" by meteor scatter.

Neither of the other forms of propagatio-—sporadic-*E* and aurora—are predictable with any kind of degree of reliability. Sporadic-*E* openings on 2 meters are most likely to occur during the months of May through July, with June being the peak. Some rare openings also occur during December and January. The only way to determine when sporadic-*E* is occurring is to observe the lower bands, such as 6 meters, commercial FM radio, or low VHF TV frequencies. It's then a matter of tracking the MUF (maximum usable frequency) until it reaches 2 meters and hoping that someone is on the air in the direction of the opening. However, sporadic-*E*, like long-haul tropo, only replicates the area already covered by meteor scatter.

Aurora has its own limitations. It's a form of propagation that, when it occurs, tends to favor only the higher latitudes. On rare occasions it may track lower in the (northern) hemisphere. However, this may occur just once every couple of years. If you're trying to work your 100 grids within a limited time frame, especially if you live in the lower latitudes, don't even consider working via aurora. However, aurora can and should be considered as a way of filling in some of those blanks on the grid square map by those who live in the northern latitudes.

This discussion brings us back to the Moon. Although it takes more sophisticated equipment to get "on the Moon," the terrestrial distance is limited only to your common lunar window with the station you wish to work. Some who are close to their goal of working 100 grids have resorted to EME to get the last few. And, according to Ray Sofier, W2RS, there are plenty of high-power stations with good receivers who can complete a contact with your station.

How about VUCC on 135 cm? In the past this band has been neglected. Uncertainty has kept people off in droves. However, in recent years we have had a protected segment, the bottom 150 kHz. Because of this, 135 cm can experience a resurgence in popularity.

The lower requirement of 50 grid locators for 135 cm reflects the lack of activity on the band, not the lack of propagation. Insofar as propagation is concerned, this band enjoys the best of both worlds: It shares propagation traits with its neighbors, 2 meters and 70 cm. Meteor scatter, albeit harder to work, does appear regularly on this band. EME exists, with slightly better conditions than 2 meters. Sporadic-*E* has been documented on very rare occasions. Tropo is considered by some to be better on this band, and aurora occasionally makes an appearance. The variety of propagation modes provides all the ingredients you need to work 50 grid locators.

Owing to its higher popularity, 70 cm presents a unique opportunity to achieve VUCC. Because more stations are on the air, some operators find that the 50 grid square requirement is actually easier to attain than the 100 grid square requirement for 2 meters, despite the reduced propagation opportunities on this band.

Let's look at what's available. First, meteor scatter does exist, although it takes considerably more patience to complete a contact. Unfortunately, many of the so-called "lesser showers" just don't produce the propagation on this band that they do on 2 meters. Also, owing to the dynamics of meteor scatter propagation, contacts in excess of 1000 miles are very rare indeed!

On 70 cm, tropo is the most popular way to fill in the blanks on the grid square map. As with 2 meters, tropo conditions exist regularly out to 150 miles. Brute-force tropo can extend that to 350 to 400 miles.

And when the band opens, tropo conditions can extend to more than double that range. Because of the nature of enhancement, tropo conditions often appear on 70 cm ahead of the lower bands.

EME can also be used to work additional grid locators. However it's unnecessary to use this mode, because at least 50 grid locators fall within tropo limits.

As we go higher in the spectrum it becomes more difficult to complete VUCC for the respective bands. The requirements for 33 and 23 cm are the same—25 grid locators.

Tropo is the chief form of propagation on both of these bands. There are more than enough grid locators within the tropo limitations. However, owing to the lack of population on the 33 cm band, ability to garner the necessary grid locators is much more difficult. It becomes necessary to work a station on another band and bring it with you to 33 cm. This is sometimes accomplished by working the station first on 23 cm!

Getting VUCC on all of the other higher bands involves soliciting help from your friends. Tropo is the chief form of propagation on these bands, and enough grids lie within average tropo limits for you to reach your goal. Unfortunately, however, not enough amateurs operate regularly from these grids on the required bands. Consequently, the *only* way to complete the requirements is to get others to activate the grids that you need.

The Worked All States Award

The Worked All States Award has been issued to operators on 6 and 2 meters and 135 and 70 cm. On 6 meters, depending on where you're located in the country and where we are in the solar cycle, it may take you between one summer and ten years to garner all the states. The most difficult to snag are Alaska and Hawaii. Those who live in the southeast will most likely have to wait until an F_2 propagation mode peak to work Alaska. However, it is possible to work Alaska *and* Hawaii on multi-hop sporadic-*E*. Nevertheless, these events are rare and you must watch for them.

On 2 meters you *must* rely on the Moon. Only if you live within a circle that includes the eastern halves of Nebraska, Kansas, and Oklahoma and the western halves of Missouri and Arkansas can you work all of the "lower 48." Even so, you still have to rely on EME for your Hawaiian and Alaskan contacts.

For the other two bands that have WAS awards, all of the recipients had to work several states via the Moon.

DXCC Achievement

DXCC is not an award for the casual operator, even though the previous sunspot cycle saw a number of DXCC awards issued for 6 meters. If you are *very* fortunate, you can work 50 countries via sporadic-*E*. The rest must be via some extended form of propagation, such as TE or F_2. A QTH in the right part of the country is a must, once again. Fortunately, there's a DXCC rule that states you can count contacts made from anywhere in your home country. Therefore, if you like to travel, you can work all you can from the southwest, move to Maine and work all the Europeans you can, then move to the west coast and work all the Asians you can. Theoretically, it's possible to achieve DXCC on the move! Here again, though, you must have quite a bit of luck. Nevertheless, if this is your plan, it will still probably take you at least ten years to reach your goal.

Two meters is the only other band on which anyone has accomplished DXCC. Only a handful of operators have achieved this milestone, and then only after investing thousands of dollars in their station and many years on the air.

There are other lesser known awards available from organizations such as SMIRK and SWOTT, and there are localized awards such as working all grid locators in California. Information on these awards can be obtained from their sponsors, who are listed on home pages throughout the world wide web. Some of the awards available are also covered in my *VHF "How To" Book* available from *CQ* for $15.95 plus s&h.

It's TE Propagation Time Again!

In the past couple of months the 6 meter band has been showing some life, particularly via transequatorial, or TE, propagation. TE propagation is related to F_2 propagation in that its signal is refracted by the F-layer. TE also seems to occur most often during the peak of the sunspot cycle. TE propagation additionally seems to occur more often in the spring, during the late afternoon or evening.

To take advantage of TE propagation, both you and the station you're trying to work must each be the same distance from the equator. Unfortunately, this rules out all but the southern tips of Florida and Texas and the southern west coast of the continental United States. Nevertheless, it does include stations on the opposite end of South America, southern Africa, and in the Pacific.

Although it has yet to be reported, propagation up to 432 MHz is possible. With sporadic-*E* link-ups, occasional contacts to more northern QTHs on the continent can occur on 6 meters. More rare are meteor-burst links with TE propagation. One such event is believed to be the cause of the contact that Larry Lambert, NØLL, had with Nob, VR6JJ. Larry reported that he could barely hear Nob, until all of a sudden he burst through. They quick-

ly completed the contact, then Nob was gone. Larry attributes that sudden burst to ionization caused by a meteor burn.

How Does Transequatorial Propagation Work?

Most of the time the southbound signal travels outward to an F_2 layer north of the equator, is refracted back to Earth at the equator, bounces outward to another F_2 layer south of the equator, and is finally refracted back to Earth. However, sometimes these two layers break up into ionized clouds and traverse the equator. When this happens, the signal appears to become trapped below these clouds and is continuously refracted until it lands on the surface at the distant location. It is this breakup, which seems to be what occurs during an auroral event, that creates the transequatorial opening on 6 meters.

Signals sent and received via F_2 and TE propagation are usually weak, but are sometimes quite loud and intense. I once watched my S-meter for half an hour while a station from Australia kept the needle at the 20+ dB mark.

While F_2 has never been reported on 2 meters, TE propagation has been documented on very rare occasions. Signals are extremely weak, and sophisticated equipment is necessary to work this mode of propagation.

Transequatorial contacts have been documented on the 135 cm band, but only on very rare occasions. Transequatorial contacts also have been documented on the 70 cm band, but are also very rare.

Current Meteor Showers

Two showers occur this month. The first, the *Geminids,* is predicted to peak between 1900 and 2230 UTC, 13 December. It has a broad peak and is a good north-south shower, producing an average of 100–110 meteors per hour at its peak.

The second, the *Ursids,* is predicted to peak around 1145 and 1250 UTC, 22 December. It is an east-west shower, producing an average of more than 12 meteors per hour, with upwards of 90 at its peak possible.

Doug DeMaw, W1FB, SK

Undoubtedly you knew it before you got to this spot in my column. Amateur radio lost one of its pioneers when Doug DeMaw, W1FB, became a Silent Key in October. I only met Doug once, and that was when Lew McCoy, W1ICP, introduced me to him at Dayton. I am very grateful to Lew for having done so, because without that introduction I would never have had the opportunity to meet one of the pioneers in our hobby.

Too often today we have no one to emulate. All the giants of the hobby are becoming Silent Keys. And strangely, there are not the heroes coming in behind them to replace them. Doug seemed to be one of the last of those heroes. Doug contributed so very much to the hobby, from HF to VHF and above. His construction projects were always easy to understand and build. Often, I found myself perusing his projects and trying them out (when I had more time on my hands, hi!).

To Doug, I say a fond 73 and thank you very much for all you contributed to the hobby of amateur radio. I hope that others will emulate the example you set by your dedication to the hobby.

And Finally . . .

Those of you who regularly read this column may remember my mentioning my friend, Humberto, CM6HH. As I prepare this column, I have learned that Humberto and his family, who lived in Cifuentes, Cuba, have been able to emigrate to the U.S. via the visa lottery. Incredible as it may seem, my friends won the lottery, which permits only a limited number of Cubans to enter the U.S. now. For the past month they have been getting settled in to their new home in New Jersey.

I remember when I first met Humberto in February 1994. When he showed me around his shack, which was in a storage room behind his small house, he had a low-power Canadian radio that barely got out around the country and into Puerto Rico and some of the other surrounding countries. Occasionally, he would get a bit of DX into the U.S., but it was rare with that radio.

Thanks to a gift from a foreign amateur, Humberto upgraded to a TS-520. He has used that radio for the past couple of years. Now that he has left Cifuentes, I imagine that radio has gone to the Cifuentes Amateur Radio Club.

Even when he had his small radio, however, Humberto was a big dreamer. He once pointed to an advertisement of Yaesu's top-of-the-line radio and said that someday he would own one. Knowing the economic conditions in Cuba, I wondered to myself at the time how he would be able to do so. Now I know how.

My best wishes go to Humberto, Dasi, his wonderful wife, and their two daughters as they adjust to living in the U.S. I know for them, this emigration was an early Christmas present that they will never forget.

My best wishes also go to you, my friends who read this column. I hope that you too will have a wonderful holiday season and a prosperous New Year.

73, Joe, N6CL

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Modifying The Micor For 1200 and 9600 Baud Operation

For the past two years we have written about and modified several commercial two-way radios for use in high-speed packet radio service at 9600 baud. Some of the radios we discussed run at speeds greater than 9600 baud. We've covered the modification of the Ericsson/GE Ranger II's™ and II Plus, the GE MVP, and the Phoenix. Last month we covered the modification and conversion of the Motorola Mitrek™. In this month's "Packet User's Notebook" we will modify the predecessor to the Mitrek, the Micor.

While modifying these radios and writing about them in this column, I've received a lot of mail asking me to include ways to use them as 1200 baud radios. The point is well taken, as often when a radio has been converted, modified, or configured to work at 9600 baud, it will *not* work well when used at 1200 baud. With this point in mind, we'll do just that: We'll build this conversion in both directions. We'll modify the radio for 1200 baud operation and then include mods to make it into a 9600 baud ready transceiver. We'll fill in the gaps by including information and illustrations to provide the reader with instructions to implement the use of 9600 baud using this same radio.

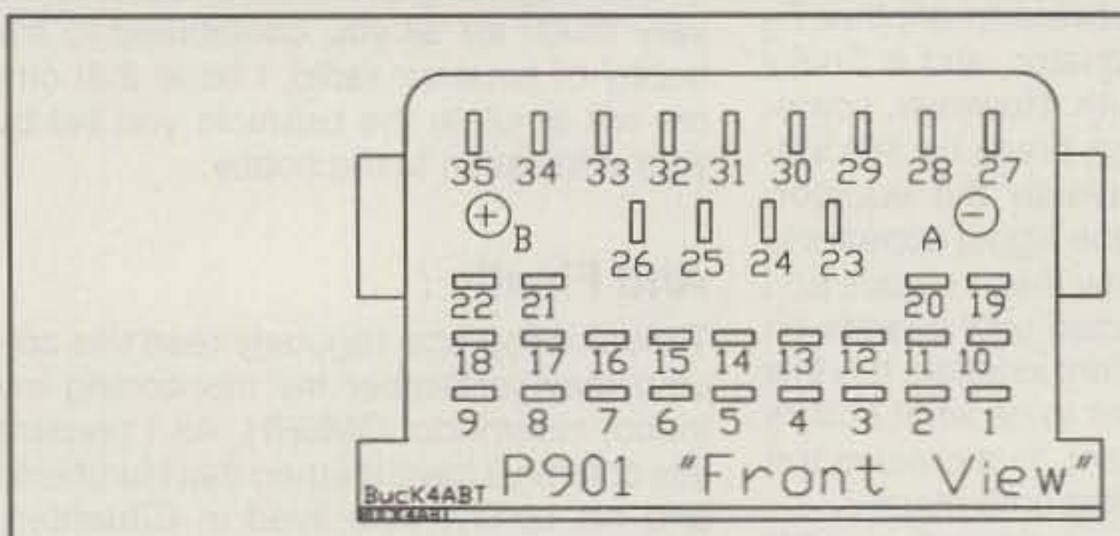
If you have any mastery of soldering techniques and can understand a picture, drawing, or illustration, you can make these changes to the Micor and have it perform well as a packet radio.

A Bargain At This Price

The Micor can be found at just about any hamfest you attend these days. They're "coming out of the woodwork," so to speak. The cost of these clunkers can run anywhere from $15 to $50 each.

When considering the purchase of one of these units, pop the top (and bottom) and look for any obvious burns, scorches, or trace separation(s). If the radio appears to be in good condition, then consider the unit for use in the project we are about to undertake. There is no real issue if the seller of the Micor has no control head and cable harness for the Micor—with one exception. When you get the Micor back to the shack and wish to test it before you begin the "cut and paste" procedures outlined in this month's column, you may need the cable harness and control head.

211 Luenburg Drive, Evington, VA 24550
e-mail: buck4abt@inmind.com



1	CHASSI	9	CHASSI	17	SPEAKER AUDIO
2	VOLUME	10	"PL" ON/OFF	18	NOT USED
3	A+ BATT+ SW	11	CHASSI	19	SQUELCH
4	F1	12	EXTENDER SELECT	20	DISC (buff) OUT
5	F4	13	F3	21	SPEAKER AUDIO
6	NC	14	F2	22	A+ (batt) SW
7	NC	15	MIC AUDIO "IN"	"A"	-12 VDC
8	BATT HOT SW	16	Push-To-Talk	"B"	+12 Volts DC

Fig. 1– Front view of the P901 control board, including pinouts. The pin numbers correspond to the solder pad numbering of the control board as shown in fig. 2.

It's not a great necessity for the mods, however, as you easily can make the solder mods to test it another way. You won't be using it with this mod anyway.

Before you begin the modification, test the radio to be sure it is in good operating/working condition. If you test it with the crystals that came in the radio, just to be on the safe side perform your tests with the radio coupled into a dummy load. It is a good idea to have the manual for the Micor nearby. If you don't have a manual, the level of difficulty in performing the modification rises a bit.

Most of the mods will be made directly to the control (interconnect) board, located at the front of the radio, on the solder side of the control board. Now if you are about to get lost because you don't know which PC board is the control board, we'll make your life easy. The control PC board is the long, narrow PC board in the center portion of the Micor that runs from the front to the rear.

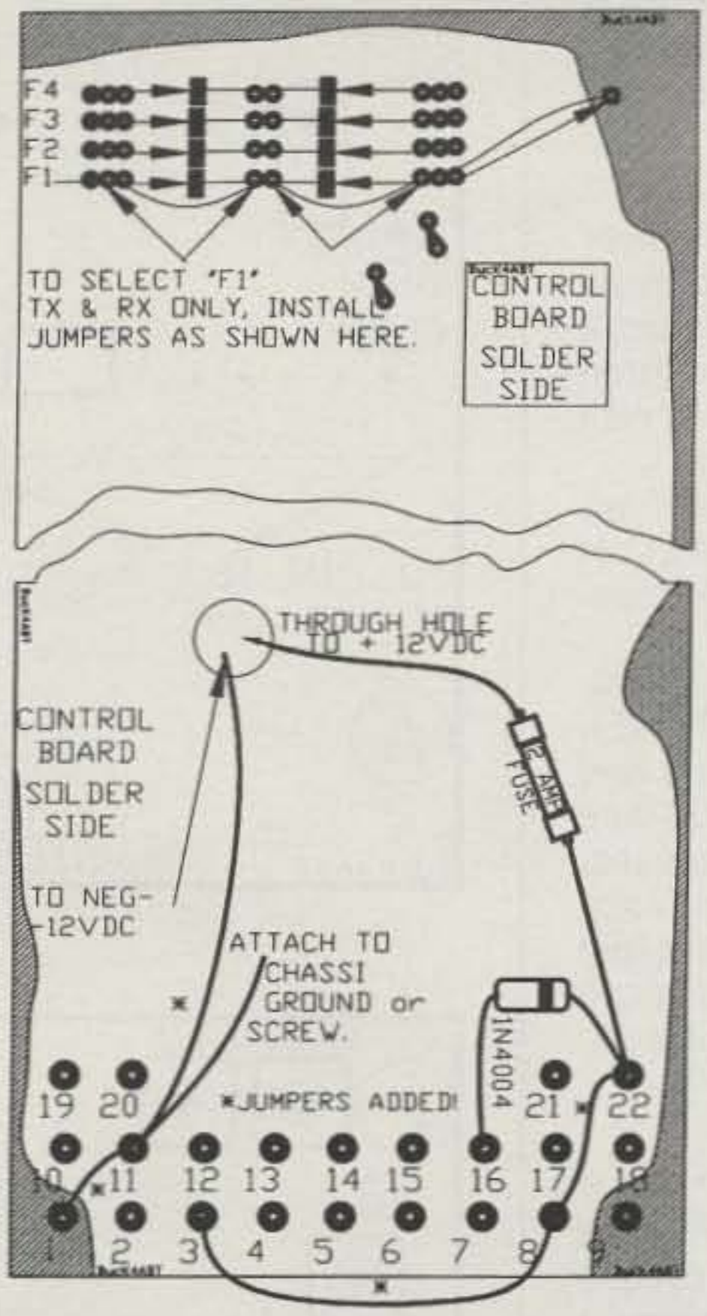
Let's Begin

Earlier I said we would be making most of the mods at the front, solder side, of the "control board." Just in case someone wishes to make use of or attach a connector to (P901) the outside of the radio, I have included the pinouts for P901 at fig. 1. The pin numbers of P901 correspond to the solder pad numbering of the control board as shown in fig. 2.

Power for the radio is fed to the large pins on P901 on the front of the Micor. Pin B is the (+12 VDC) positive post and pin A is the negative (–) post (see fig. 1).

I soldered No. 12 stranded, insulated wire directly to these large pins. Use caution so as not to damage the connection within the radio. *Be sure you include* the appropriate "in-line" fuse in the (red) positive lead. For the 30 watt radio that I converted I used a 20 amp fuse. Common sense dictates that more powerful radios require a larger fuse.

In either case, jump control board or P901 pins 3, 8, and 22 together (see fig. 2). Add a fused (2 amp) line from pad 22 on the control board through the hole in the control board as shown, to the hot (red) wire attached to the feedthrough cap which powers the transmitter power amplifier. These two feedthrough caps are near the control board on the bottom side of the radio. One will have a red wire, and the other a black wire. Jump from the feedthrough with the red wire to the "A+" trace on the control board. Jump from the feedthrough with the black wire to the ground trace on the control board. Next jump the



1	CHASSI	9	CHASSI	17	SPEAKER AUDIO
2	VOLUME	10	'PL' ON/OFF	18	NOT USED
3	A+ BATT+ SW	11	CHASSI	19	SQUELCH
4	F1	12	EXTENDER SELECT	20	DISC (buff) OUT
5	F4	13	F3	21	SPEAKER AUDIO
6	NC	14	F2	22	A+ (batt) SW
7	NC	15	MIC AUDIO 'IN'	'A'	-12 VDC
8	BATT HOT SW	16	Push-To-Talk	'B'	+12 Volts DC

Fig. 2– The solder side of the control board.

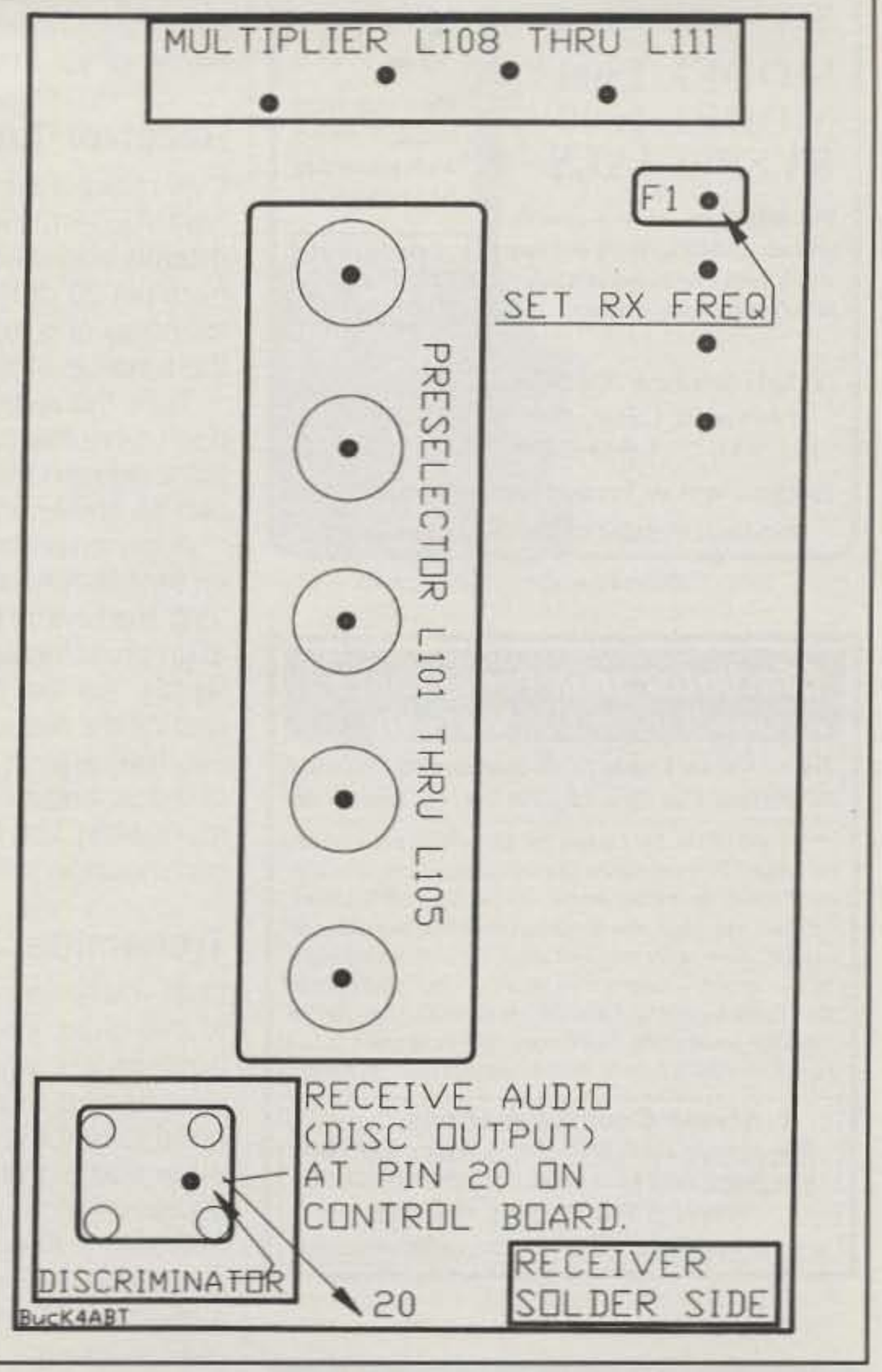


Fig. 3– The receiver section, solder side.

F1 channel elements viewed on the back portion of the control (interconnect) board to ground as illustrated in the break-a-way section of fig. 2.

Since this radio is going to be used at a node site, it will get a lot of push-to-talk action. As a precaution, I added a 1N4004 diode as a "spike suppressor" across the PTT line between solder pads 22 and 16 of the control (interconnect) board. Note the position of the "banded" end (attached to pad 22) of the diode. It is absolutely necessary that the diode be installed as shown in fig. 2.

Attach either solder pad 1 or 9 to pad 11 of the control (interconnect) board and route a wire from pad 11 to the ground side (–12 V, black wire) at the PA feedthrough cap. Route as shown in fig. 2.

Rock Bound

A couple of items necessary when making these mods are the crystal elements. This is another reason why earlier I suggested that you pop the top and check out the "innards" to see if the crystal "holders/elements" are in the radio. If they are not, try to locate a set (transmit and receive) of crystal elements at the same time you purchase the VHF Micor.

Be sure you obtain the VHF Micor element for both the transmit and receive crystals. In this mod we will use the radio as a single frequency, simplex radio. Unless you have more than one radio, there should only be the need for one set of crystal elements. The type of crystal that will be installed in the crystal holder is an "HC-6."

You must have the crystals on hand to make this combo work. As a source of crystals you can try JAN Crystals, 2341 Crystal Drive, P.O. Box 60017, Ft. Myers, FL 33906-6017 (phone 941-936-2397; fax 941-936-3750). Ask for Sue Brick. When ordering the crystals from JAN Crystals, be sure to let Sue know that the radio is the *VHF* Micor. You should provide her with the transmit and receive frequency on which the radio will be operating at VHF (144 to 148 MHz). Sue has the rest of the VHF Micor information in a database at JAN Crystals. The HC-6 crystals from JAN Crystals are $15.00 each. You will need a transmit and a receive crystal; therefore the set will cost $30.00 plus shipping. I received my crystals in about two weeks, and the priority postage was around $3.00.

Once you have the crystals, install them into the element, noting that the transmit and receive elements are different. **Do not** interchange them in the radio (kind of hard to do, but given a big enough hammer . . .). It is also important that you install the *transmit* crystal into the *transmit* element and the *receive* crystal into the *receive* element. I'm not responsible if you make the mistake of switching the rocks! As a matter of fact, I'm not responsible for mistakes, oversights, and/or ommissions.

When soldering the crystals into the element, **do not** overheat the heavy metal pins of the crystal(s). Clear any excess solder from the pin seats, and then nest the crystal pins into position before finally soldering the pins in place.

Using the frequency counter and/or the centering meter, set (net) the radio to the center of your transmit frequency.

Receiver Tune-Up

If you have a test jig or a small test-bench-type AF amplifier, connect it to chassis ground and discriminator (buffer) output from pin 20 of P901. Turn it on and listen for noise or a signal as you proceed with the tune-up of the receiver section.

Tune the radio per the manual, or if you don't have the manual, you can take a shot in the dark and begin with the receiver section as shown in fig. 3.

Apply an on-frequency signal (modulated tone is optional, but I prefer NO TONE), "net" the crystal F1 to frequency, tune, and align preselector L101 through L105 (see fig. 3). As the receive signal increases, reduce the output of the on-frequency signal (generator) to a level where slight noise is heard. Continue with the alignment with L108 through 111. Note the discriminator location.

Transmitter Tune-Up

Until you have the TNC or node interfaced to this radio, you will have to improvise a push-to-talk enable line by attaching a jumper wire to pin 16 of P901. When we need to test the transmitter, we touch the other end of this PTT test jumper to chassis ground.

Connect the coax output into a dummy load (or the IFR internal 150 watt load) and activate PTT. "Net" the transmit crystal (set to center frequency) using T1 as shown in fig. 4(A). At fig. 4(B) align L401 through L408 as per the manual, or maximize RF output if no manual is available to you. (With this last statement, you're on your own.)

Near the front of the Micor there is a *power level set* control. Set the power level pot to the power output for which your VHF Micor is designed.

If this radio is to be used at 1200 baud, interface a TNC as follows:

- AFSK (from TNC to radio) to P901, pin 15
- Push-To-Talk (PTT) to (P901) pin 16
- Receive audio (to TNC from radio) (P901) pin 20
- Ground/shield (P901) pin 1

I use the MFJ-1270C TNC configured as an X-1J4 node with this radio. Here is good reason to use an "open-squelch" TNC. This radio modification does not use a volume or squelch control. Similarly, the PacComm Tiny II and Kantronics KPC-9612 Plus will work with this radio.

With the TNC (or node) ready and on, set the TNC for a LONG TXDelay (120) and issue a bogus connect. Set the IDC (deviation) level at 3 to 3.3 kHz deviation. If no deviation meter is available, listen on another receiver tuned to the frequency being used and set to a comparable level of other 1200 baud signals being heard. As soon as you can, set the deviation to the desired or precise deviation adjustment.

Remember: Where packet data is concerned, more is not better! For 1200 baud use 3 to 3.5 kHz maximum. For 9600 baud set the deviation to 3.0 kHz—no more, no less!

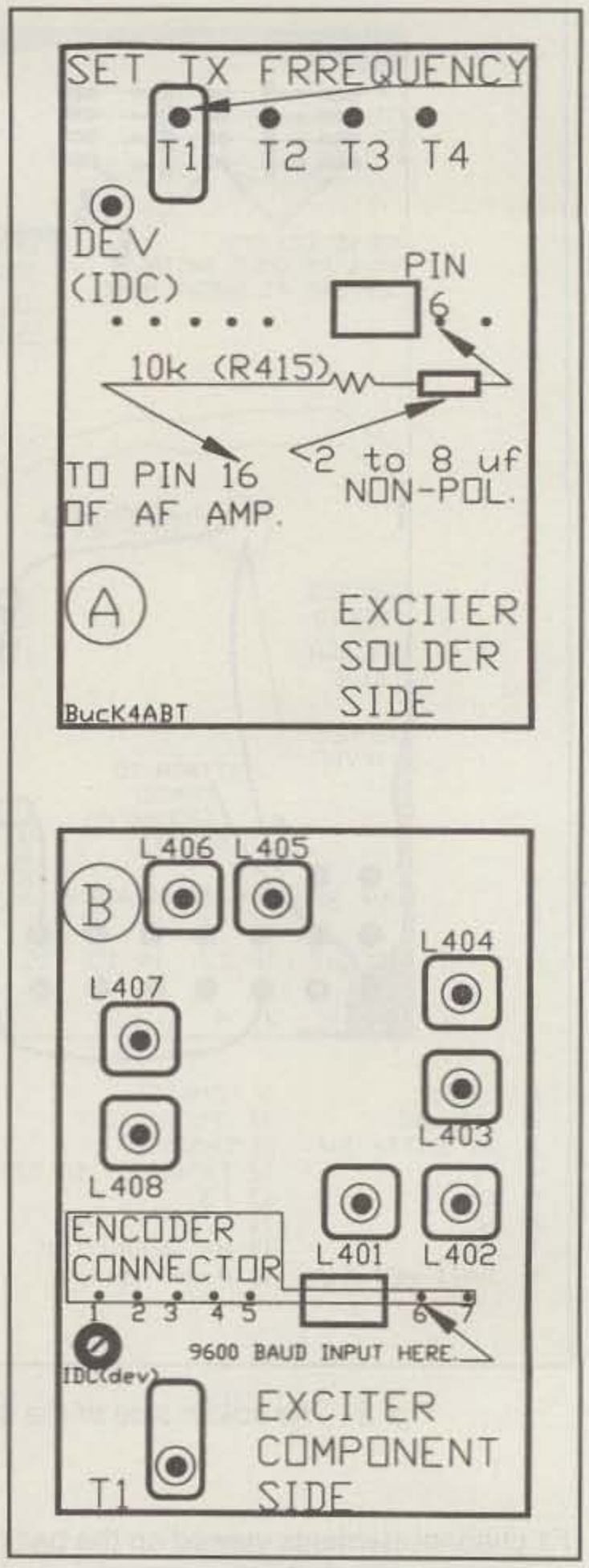


Fig. 4– (A) Solder side of the exciter. (B) Component side of the exciter.

Addendum for 9600 Baud Operation of The Micor

If your radio has a CTCSS encode board plugged into the exciter, toss it away. Install jumper 304, located near the first of seven (stakes) encoder connectors on the exciter board (see fig. 4[A]). If your Micor does *not* have the CTCSS encode PC board, the jumper will already be in place.

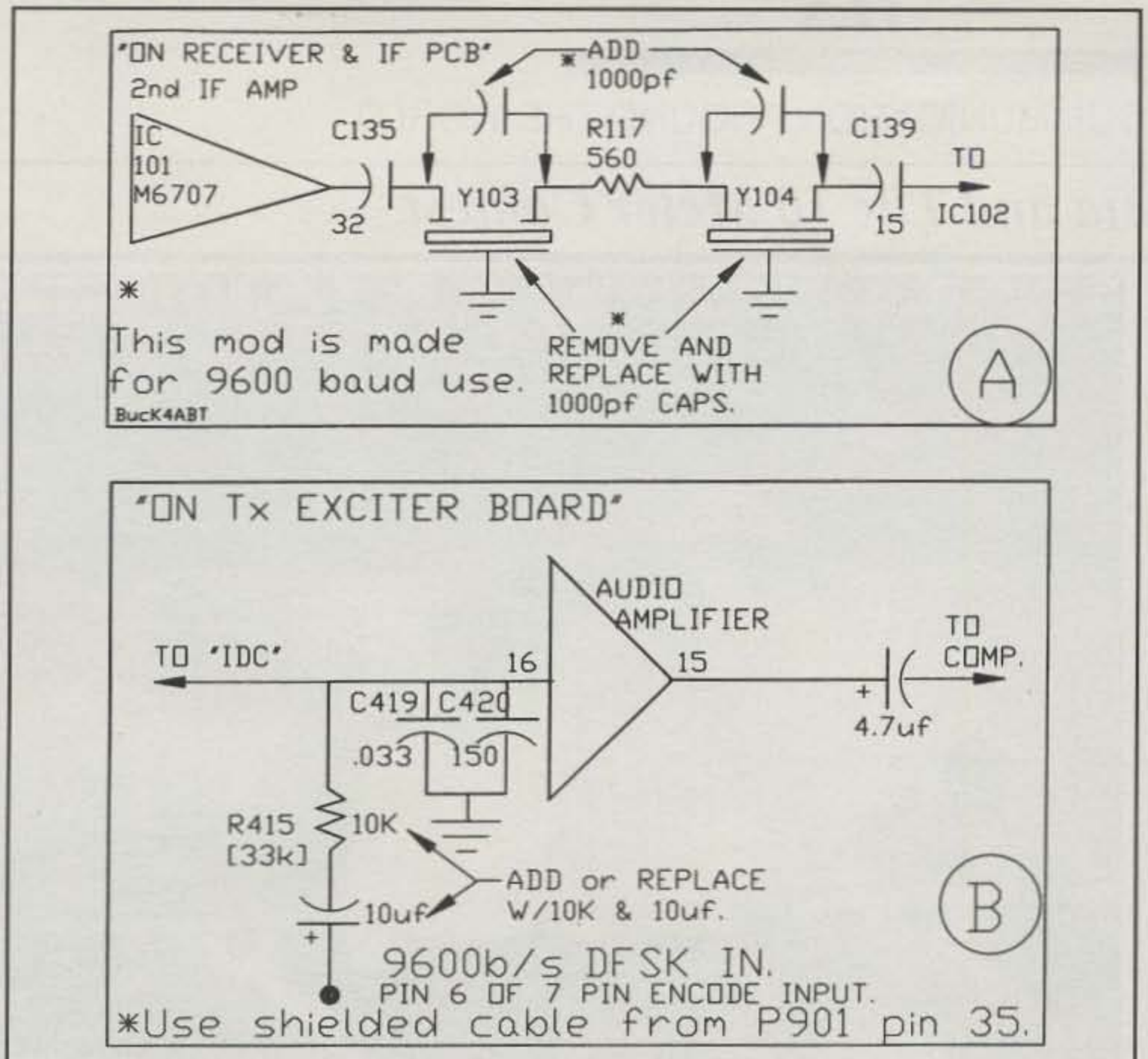


Fig. 5– Modifying the Micor for 9600 baud use (see text addendum).

The input connecting point for our 9600 baud DFSK signal is made to encoder staking pin 6 (see fig. 4[B]). Connect a shielded lead from this pin to the TNC DFSK (normally pin 1 of most 5-pin DIN TNCs). The shield for the 9600 baud DFSK signal from the 9600 baud TNC/node will attach to a nearby ground point.

To more closely identify the point (pin) where you will inject the transmit audio, note that it is the staking pin nearest the large rectangle hole, closer to the outer edge of the Micor.

On the exciter PC board follow the trace from the staking pin 6 where the DFSK is connected to a 33k resistor (R415). Replace this resistor with a 10k resistor and a 2 to 8 µF non-polarized capacitor in series (see fig. 5[B]).

On the receiver RF/IF board, remove the two crystal filter "cans" that come after the IF amp IC (Y103 and Y104) and replace them with 750 to 1000 pF disc caps (see fig. 5[A]). Make sure each leg of the caps goes into the two outside holes from where the 3-pin crystal filters were removed. There will *not* be a connection to the center hole at these locations.

Having Fun Already!

I'll not trouble you with the TNC setup or interface, as that was covered in last month's (November '97) issue. That issue would be good for you to have around anyway, since it has the companion article to this month's column.

Don't forget to visit the SEDAN Packet Networking Pages at <http://www.sedan.org>. Happy Holidays to all, and Have Fun Packeting!

73 de BucK4ABT

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Armenia and The 10 Meter Contest

The Voice of Armenia, the national shortwave broadcasting service of Armenia, will celebrate its 50th anniversary this month. To commemorate the anniversary, the Voice of Armenia will set up a Special Event station from Radio House in Yerevan, operating all month under the unusual callsign of **EK6R50**. The station will air three rigs into two amplifiers. The antenna farm includes a 20 meter monobander; tribander for 10, 15, and 20 meters; and dipoles for the lower bands. Watch 1830, 3530, 7030, 10105, 14030, 18073, 21030, 24895, and 28030 kHz on CW; and 1930, 3740/3840, 7060/7230, 14195, 18140, 21330, 24930, and 28470 kHz on SSB. They'll try RTTY in the usual digital subbands. QSL cards will be available from manager Harold Rosenberg, VE2HRP, direct only. Do not send cards via the VE2 nor the EK bureau. A commemorative certificate is available for US$5 to SWLs who hear EK6R50 on the air. The Voice of Armenia beams toward the US on 9965 and 7480 kHz with an English-language session at 2030–2100Z.

Joel Kornreich, K2QBV (on the left), meets with Albert, XX9AS, at the hydrofoil terminal in Macau.

As with many other countries in Middle East, Armenia has had a long and troubled history. Historically, Armenia included a significant empire stretching from the Mediterranean to the Black and Caspian seas, under the emperor Tigranes in the 70 BC era. Over the next 19 centuries Armenia fell under the influence of the changing powers in the region, including Romans, Saint Gregory, Arabs, Byzantines, Seljuks, Egyptians, and Turks. The Russians dominated Persian Armenia in the mid-19th century, while the Turks held sway over much of the rest of the once-expansive empire. The Armenians fought with their Turkish occupiers, leading to bloody massacres of the Armenians in the late 19th century and especially in 1915, when a half-million Armenians perished. Following the Turkish defeat in WW I, the Armenians declared themselves to be an independent state in 1918, only to lose to the Soviet army in 1920, becoming the Armenian SSR. Armenia won independence once again in 1991, with the disintegration of the Soviet Union.

Armenia and neighboring Azerbaijan remain under the scrutiny of New Country watchers. A large Armenian enclave called Nagorno-Karabakh lies in western Azerbaijan, while the Azerbaijan autonomous region of Nakhichevan sits on Armenia's western border with Iran. The latter lies less than 75 miles from Azerbaijan, and it thus is probably *not* a potential DXCC country under DXCC Country Criterion Point 3: Separation by another DXCC country. The Armenian enclave in Azerbaijan is even less likely to count as a separate DXCC country. Not only does it lie less than 75 miles from the home country, it is directly connected to Armenia via an Armenian-controlled highway.

Armenia has always been a relatively difficult country to work from the US. The primary cause of this difficulty is a small number of licensed amateurs. The 1995 International *Callbook* lists a grand total of four stations, two of them club stations, with a third with a Moscow address. Armenia ranked 70th on *The DX Magazine*'s 1996 Most Wanted Countries list, with 15% of those surveyed still needing an EK QSL card.

Another reason stateside DXers have trouble working EK stations is that the short path between the US and EK is a high-latitude path, passing through polar and auroral regions. The disturbed magnetic fields, QRN, and high absorption on these paths make contacts difficult. DXers on the east coast should look for EK6R50 on 30 meters 13–1430Z and 40 meters 04–0600Z and again 20–2130Z. MiniProp Plus says there should be an 80 meter path between the two points during most of the mutual darkness—2130–0430Z.

West-coast DXers will find EK contacts even scarcer, as the short path between EK and W6 passes almost directly over the North Pole. These DXers should try 40 meters around local sunset (about 00–0100Z) and again around local sunrise (15–1600Z). On 80 meters try 0130–0430Z and 1300–1530Z. Stations in the middle of the US should have a look at 30 meters around local sunrise (13–1400Z) and 40 meters around 2200Z+ and 0530Z. Good hunting!

These predictions are based on a solar flux of 80. Should the sun grant us a period of extended solar activity, maximum usable frequencies may well be higher, extending the strength and duration of the above openings, and perhaps providing openings on higher bands.

There is good reason to expect higher solar activity, as such, and solar flux definitely turned upward this past fall. We are now in the rapid-rise portion of sunspot

P.O. Box 50, Fulton, CA 95439
e-mail: chod@compuserve.com

The WPX Program

SSB

2654.....CP6EB

CW

2968.....4X0/G3WQU

Mixed

1790.....KM4A

CW: 750 K3WWP. 800 K3WWP. 1350 W4TYU. 1400 W4TYU.
SSB: 350 CP6EB. 400 CP6EB. 450 CP6EB. 500 JE1VJT, SM5DAC, CP6EB. 550 SM5DAC. 750 ON4CAS. 900 AA1KS. 1600 KC9DS.
Mixed: 500 JE1VJT, GØKRL. 550 GØKRL. 600 GØKRL. 950 JA3BKP. 1000 JA3BKP. 1300 OE1-0140.

80 meters: VR2UW, IK5TSS
160 meters: VR2UW

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS. I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, YU2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD. IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J, EA8BM, DL1EY, KU0A.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

Cycle 23. We have been predicting this for the past three years, and it is finally here. Look for the solar flux, on average, to increase significantly month to month over the next 12–18 months. With an occasional stumble, DXing on the higher bands will improve on a week-to-week basis. For DXers new to the bands, you are in for a real treat over the next two years.

It's official! An international team of solar-cycle experts met in appropriately named Sunspot, New Mexico on September 8, 1997. They agreed that sunspot Cycle 22 bottomed out, and Cycle 23 started, in May 1996. (I further refined this date at the DX Forum at the Dayton Hamvention this year, but the scientists settled on the month.)

The scientists further predicted that Cycle 23 would reach its peak around

Peter Casier, ON6TT, operating as AH1A from the Baker, Howland Islands.

March 2000 with a range of June 1999 to January 2001. The predicted smoothed monthly sunspot number maximum is 160, with a range of 130–190. (The record holder, Cycle 19 in the late 1950s, peaked at 201.) This corresponds to a smooth monthly solar flux of about 205. This is very similar to Cycle 22, which gave us those great band conditions of the late 1980s and early 1990s. This means that DXers will have to master (or relearn) the propagation subtleties of the higher bands in order to stay ahead of the PacketCluster crowd in the coming years.

The 10 Meter Contest

Stateside DXers probably won't make any contacts with Armenia this month on 10 meters. However, the ARRL 10 Meter Contest is a great training ground for new (and rusty) DXers, especially at this point in the sunspot cycle. Even weak-signal VHF DXers can find fertile training ground here. Let's look at some of the propagation modes you might encounter in the contest, how to recognize them, and how best to work stations using those modes.

The 10 meter band lies at the upper edge of the high-frequency (HF) band and at the lower edge of the very-high-frequency band (VHF). Thus, 10 meters shares propagation modes with both VHF and HF bands. This is what makes the 10 meter contest so interesting to DXers. At this stage in the sunspot cycle we will see some regular F_2 propagation on 10 meters, the standard mode of long-distance communication. However, F_2 contacts will not dominate the band as they will at higher sunspot levels. There will be plenty of need for weak-signal work. The simplest form of propagation on 10 meters is direct, via ground wave. These signals will be local, with strength varying with their distance. No special technique is needed to work these local stations. One warning: If the other station is working a lot of DX that you don't even hear, he won't be very interested in working a weak local; wait until he's not getting answers to every CQ before calling.

The middle of December is one of the times of the year when one can expect sporadic-E propagation. This mode is used mainly on VHF for distance work, especially on 6 and 2 meters. However, DXers should be able to make some e-skip contacts in the 10 meter contest. E-skip signals are strong—sometimes unbelievably strong—with a distance of about 800 miles. The geographic spread of the stations heard will be small, limited to a single state or part of a state.

Two tricks to working stations via e-skip: First, keep contacts short. E-skip tends to disappear on a given path very rapidly, within seconds, so exchange the minimum as quickly as possible. Second, once you have an idea of the geographic spread of the contacts, make specific calls for neighboring multipliers. If you're working several stations in Pennsylvania, for example, call for Ohio, West Virginia, Delaware, etc.

Also, watch for multiple e-skip. Under the right conditions, signals can hop 1500-2000 miles or more with multiple skips off the E region of the ionosphere. These signals are significantly weaker than single-hop e-skip signals, so listen for the weak ones during any e-skip opening. Some may be new multipliers. DXers on the east coast may even have some multi-hop into Europe.

DXers in low latitudes enjoy the best of transequatorial propagation. Since the ionosphere above the equator receives the maximum amount of solar radiation, its ion density is the highest, and maximum usable frequencies on paths that refract through the ionosphere at the

The WAZ Program

Single Band WAZ

10 Meter SSB

489 ..... IK5EKB

15 Meter SSB

507 ..... DF7HX 508 ..... JH8CFZ

20 Meter SSB

1012 ..... N4XX 1013 ..... N4CH

20 Meter CW

477 ..... JH8CFZ

40 Meter CW

195 ..... JH8CFZ

160 Meter WAZ

118 ..... W7KW, 31 Zones New
65 ..... K3UA, 35 Zones Endorsement

Phone

627 ..... W7KW

All CW

105 ..... IKØTUG 106 ..... IK5XWA

All Band WAZ

SSB

4396 ..... W7KW 4399 ..... JA6FD
4397 ..... CT1ZS 4400 ..... N4XX
4398 ..... LA2PA 4401 ..... DF1ZN

CW/Phone

7755 ..... W7KW 7759 ..... RA6AAW
7756 ..... W2YE 7760 ..... F3PZ
7757 ..... YU1AAV 7761 ..... UA9SG
7758 ..... JA2ANA (CW)

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

5 Band WAZ

As of August 31, 1997, 466 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

none

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
AA4KT, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199 (34, 40m)
K1ST, 199 (26)
ABØP, 199 (23)
KL7Y, 199 (34)
UY5XE, 199 (27)
NN7X, 199 (34)
OE6MKG, 199 (31)
HA8IB, 199 (2 on 15)
OH2DB, 199 (1)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
W6SR, 199 (37)
S57J, 199 (2)
W3UR, 199 (23)
KC7V, 199 (34)
GM3YOR, 199 (31)
KZ4V, 199 (26)
UA3AGW, 198 (1, 12)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
K4PI, 198 (22, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
KG9N, 198 (18, 22)
KM2P, 198 (22, 26)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
K3NW, 198 (23, 26)
UA4PO, 198 (1, 2)
K5RT, 198 (22, 23)
JA1DM, 198 (2, 40)
OE1ZL, 198 (1, 31)
9A5I, 198 (1, 16)
KE9A, 198 (18, 23)

The following have qualified for the basic 5 Band WAZ Award:

HK5LEX, 179 zones
W7KW, 174 zones

Endorsements:

WO2N, 171 zones

1058 Stations have attained the 150 Zone level as of August 31, 1997.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

Bob Schmieder, KK6EK, assists Scott Jones, KD6ISY, in erecting a vertical antenna on Guadalupe Island (NA-179).

Let's say the direct path between the US east coast and Europe is not open; the maximum usable frequency (MUF) on that path is less than 28 MHz. However, DXers can still work Europe on 10 meters by pointing their beams to the southeast. By refracting through the higher levels of ionization around the equator, the signals can be bounced back up to Europe. This technique requires the cooperation of operators on both ends of the path. If the stations in Europe are not also pointing at the equator (in their case to the southwest), they won't hear the US stations.

There is an extreme case of this, called back-scatter. We've mentioned the higher MUF on north-south paths. Now drag out your globe and look directly south of the US. What do you see? Nothing but water. All of South America is to the east of all of the US. This means tthe MUF on a path from your station, off the intense ionization above the equator, off the waters of the Pacific, and back to the US may well be higher than on the direct path between the two stations. This means you can work relatively nearby stations by bouncing signals thousands of miles away.

There are two problems with back-scatter propagation. First, the signals are *weak*. Not only is the signal path long, but the part you care about is what little is scattered back in your direction off the waves of the Pacific—puny-weak signals, we equator are higher than comparable paths elsewhere. This means that DXers can make north-south contacts even when the band isn't open in any other direction. In the 10 meter contest, stateside DXers will probably make some South American contacts via trans-eq. (In the pre-volcano days of Montserrat, we could talk to Argentina and Uruguay every night on 6 meters via trans-eq.) Again, no special tricks are needed to work trans-eq. signals; just point your beam south. You might try directional CQs to stir up additional multipliers.

A propagation mode that does require some skill at both ends of the contact is back- and side-scatter. While signals must refract through an ionized portion of the atmosphere to travel significant distances, that area of ionization does not necessarily have to be located on the direct path between two stations. You can bounce signals off ionization to the side of or behind a given station. The trick is to point your antenna toward the area of maximum ionization.

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 the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4773 F9RM	3413 VE3XN	2990 WA8YTM	2631 I2MQP	2358 S51NU	2039 YU7JDE	1656 I2EAY	1371 F6HMJ	1116 N4PYD
4684 9A2AA	3285 N4MM	2990 HA8XX	2572 4N7ZZ	2185 K2XF	2019 G4OBK	1628 JN3SAC	1356 NG9L	1100 KB5OHT
4136 IT9TQH	3258 N9AF	2952 PAØSNG	2512 JH8GOE	2168 N6JM	1919 SM6CST	1625 K0NL	1313 KS0Z	1098 VE6FR
3858 W2FXA	3253 I2PJA	2899 YU7SF	2503 S53EO	2165 S58MU	1765 K5IID	1607 OZ1ACB	1299 Z32KV	1064 WB2PCF
3740 EA2IA	3251 SM3EVR	2880 YU7BCD	2500 HA5NK	2128 W4UW	1739 HA9PP	1587 AE5B	1299 N3ED	1006 W2EZ
3675 UA3FT	3248 N4UU	2848 K9BG	2464 K8LJG	2126 9A4RU	1732 LU8DY	1533 W7CB	1254 WØIZV	927 VE7CBH
3585 W1CU	3183 YU1AB	2831 KF2O	2452 I2EOW	2116 W6OUL	1701 IØAOF	1490 CT1EEB	1212 WT3W	829 EA5BHK
3566 K6JG	3154 N5JR	2789 IT9QDS	2419 IK2ILH	2111 W9IL	1696 PY2DBU	1431 VE4ACY	1151 VE6BMX	
3523 N4NO	3114 9A2NA	2678 N2AC	2396 KØDEQ	2088 W8UMR	1691 EA5BM	1431 I1-21171	1125 AA1KS	
3454 N6JV	3103 I1EEW	2640 WB2YQH	2376 HAØIT	2087 KS4S	1673 CT1QF	1396 YU1ZD	1123 S52QM	

SSB

4688 F9RM	2855 EA2IA	2390 EA3AQC	2189 KF7RU	1664 N6FX	1485 CT1BWW	1273 NG9L	999 WT3W	836 EA3EQT
4141 IT9TQH	2745 OZ5EV	2385 I2MQP	2184 I2EOW	1653 K8LJG	1480 W6OUL	1240 I3UBL	965 DJ4GJ	804 AG4W
4056 IØZV	2731 HA8XX	2378 KF2O	2169 WF4V	1651 YU7SF	1464 K8MDU	1243 DF7HX	966 KI7AD	768 N3DRO
3743 VE1YX	2728 I4CSP	2349 UA3FT	2124 KD9OT	1649 EA5CGU	1454 DK5WQ	1229 YC2OK	954 EA1AX	740 JN3SAC
3607 ZL3NS	2725 I1EEW	2342 WA8YTM	2063 CX6BZ	1639 K2XF	1437 K2EEK	1196 KØNL	933 DF1IC	674 VE6BMX
3311 F6DZU	2707 N4NO	2296 I8KCI	2014, EA1JG	1590 KS4S	1415 IKØEIM	1189 SV3AQR	924 EA1MK	
3309 K6JG	2638 N5JR	2274 EA5AT	1958 IN3QCI	1587 KBØC	1398 IK2AEQ	1175 LU5EWO	912 LU3HBO	
3246 I2PJA	2552 PAØSNG	2267 YV7BCD	1881 SM6DHU	1636 HA5NK	1396 I3ZSX	1155 WA2FXF	873 I2EAY	
2913 CT4NH	2510 I3ZJK	2265 PY4OY	1809 LU8DY	1494 CT1EEB	1353 K5IID	1127 EA8AG	869 N3ED	
2892 N4MM	2411 9A2NA	2251 4X6DK	1760 HAØIT	1490 AE5B	1346 W9IL	1063 N4PYD	866 HA9PP	
2855 F2VX	2404 LU8ESU	2230 CT1AHU	1716 OE2EGL	1489 K3IXD	1336 G4OBK	1038 S51NU	837 N1RT	

CW

4081 IT9TQH	2614 YU7SF	2104 9A2NA	1904 VR2UW	1755 K5UR	1527 EA6BD	1317 N1IA	1066 N3ED	890 KB5OHT
3746 WA2HZR	2600 K9QVB	2074 S51NU	1876 HAØIT	1695 K2XF	1510 KS4S	1293 IK5TSS	1032 W4UW	884 I2EOW
3439 N6JV	2337 N5JR	2058 JA9CWJ	1867 S58M7	1687 I7PXV	1454 EA5YU	1280 ZB2EO	1017 LU3DSI	884 PY4WS
3073 N4NO	2326 G4UOL	2046 HA8XX	1857 G4SSH	1641 G4OBK	1416 9A3SM	1270 K5IID	984 I2MQP	820 K3WWP
3011 VE7CNE	2314 YU7BCD	2035 HA5NK	1854 TI4SU	1594 W6OUL	1411 SM5DAC	1268 DJ4GJ	982 LU7EAR	755 VE6BMX
2992 YU7LS	2288 N4MM	1997 KA7T	1816 SM6CST	1594 I1EEW	1389 I2EAY	1230 EA6AA	927 9A3UF	725 KØNL
2881 N4UU	2286 WA8YTM	1982 KF2O	1804 N6FX	1588 W2YE	1347 IK2ECP	1133 EA2CIN	911 HA9PP	690 WT3W
2832 K6JG	2247 LZ1XL	1927 K8LJG	1795 W1WAI	1548 DJ1YH	1346 9A2HF	1123 AC5K	906 YU1TR	623 LY3BY
2824 EA2IA	2145 W8IQ	1927 SM6DHU	1777 OZ5UR	1538 IK3GER	1341 EA7AAW	1074 W9IL	894 DF6SW	604 AC6DD

used to call them. Second, *both* stations must be pointing their antennas due south for this to work. The natural tendency when you hear a weak station is to turn your antenna directly toward that station. If the propagation mode you are using is back-scatter, however, turning the antenna away from due south will make the signal disappear. This can be frustrating until *both* operators figure out what's happening and return their antennas to the south.

In addition to the primarily HF modes, there are some other propagation modes one might encounter in the contest, modes used primarily by VHF operators. We may be unlucky enough to experience some aurora. While wiping out most ordinary HF propagation modes, the intense ionization of the aurora can be used to refract radio signals. As with side-scatter, the trick is to point along a line grazing the aurora. This will take some experimentation. Next, be ready for weak and fluttery signals. Auroral distortion often renders SSB communication impossible, but CW is usually copiable. Keep your antenna moving, looking for maximum signal strengths.

You may also experience some tropospheric propagation. Here we are bouncing signals off the low-altitude ionization associated with a weather front. With proper geometry, DXers can work some nearby stations by this mode, which is characterized by very heavy fading, 60 dB or more, and rapid movement of contact areas, as the weather front moves. This mode disappears quickly, without warning.

Perhaps the most difficult propagation mode we meet in the 10 meter contest is via meteor trails. The meteor trail is intensely ionized, enough to refract radio signals. Unfortunately, at the low levels of the atmosphere where meteors exist, the ionization quickly dissipates, within seconds. Such signals are easily recognized, as they come and go at random and last for but a few seconds.

The key to working stations via meteor scatter is speed and repetition. Try to get as much information over to the other station as quickly as possible. With a large meteor trail you might be able to complete a two-way contact before the signal disappears. The good news is that there are enough meteors that the same path will likely open again for a short time in the next few minutes. Thus, if both stations persist, the full contest exchange is not only possible but probable. Keep repeating the information in very short bursts, listening between transmissions for the other station doing the same thing. Fortunately, meteor-scatter signals tend to be strong, so you will seldom need a repeat.

By learning to recognize propagation modes, the intelligent DXer can keep a step ahead of the hordes who rely solely on PacketCluster for their DX spotting. This skill will be extremely useful over the next two years as Cycle 23 takes off.

DX News and Events

The Argentines are returning to the Antarctic. Look for Ernie, LU4AXV, and Hector, LU6UO, operating as **LU1ZC** from Deception Island in the South Shetlands (IOTA AN-010) from mid-December to late February. They will be most active on CW. Argentina claims a large hunk of Antarctica and neighboring islands, as well as those islands it fought for in the Malvinas war (aka Falkland war). To maintain this claim, the Argentines set up a temporary scientific station on various of the islands during the southern hemisphere summer. These stations usually include an amateur radio operation.

This month another South Shetlands station should be on the air. Dan, LZ2UU, will again operate the **LZØA** club station from St. Kliment Ohridski base on Livingston Island (AN-010). QSL via LZ2KDP.

CQ DX Awards Program

SSB

2233	4Z5FL	2236	V21AK
2234	LU3DFJ	2237	8P9HA
2235	CO3ZD		

CW

965 ..... F3AT

SSB Endorsements

320	DL9OH/328	320	4N7ZZ/326
320	ZL1AGO/328	310	N6RJY/315
320	K5TVC/327	300	YC2OK/303

CW Endorsements

320	K2OWE/328	300	HB9DDZ/307
320	W7CNL/325	275	W4UW/282
320	K2JLA/323	250	IKØTUG/254

RTTY Endorsement

275 ..... YC2OK/281

Total number of active countries is 328. 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 SASE 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 airmail reply. Please make all checks payable to the awards manager.

Alex C. J. van Eijk, PA3DZN, is on an extended work assignment in Bujumbura, Burundi. He'll be staying at least through mid-January, and probably considerably longer. He has applied for the callsign of **9U2L**; QSL via PA3DMH. Alex has a DSP-4100 modem from Hal Communications and the latest WF1B RTTY software, operating with a Kenwood TS-570S and a Ten-Tec Centaur amplifier, with a Force 12 C4 beam, which covers 40–10 meters. Space permitting, he'll also put up some low-band antennas.

Phil, VR2CT, will operate from Thailand as **HS/G4JMB** Nov. 17–Dec. 10. (DX information thanks to The Daily DX, a daily e-mail DX newsletter. For more information on The Daily DX, contact W3UR at <bernie.mcclenny@mail.wdn.com> or fax to 301-854-5105.)

Vladimir Kovaceski, Z32KV, reports on the continuing QSL bureau problems in the Republic of Macedonia. Vlado notes that Macedonia is ranked tenth most needed on the ARRL's DXCC list. Since Z3 stations are not at all rare, the problem is outgoing QSL cards. However, the Macedonia outgoing QSL service is not working. While many cards were hand-delivered to the Friedrichshafen convention over the past few years for entry into the bureau system, many Z3 DXers can answer only direct QSL requests. Even at that, sending out cards for less than 10% of the contacts Vlado has made over the past few years would cost more than a month's entire family budget. Until the Macedonia outgoing QSL bureau starts

QSL INFORMATION

3B9/3B8DL to JA1ELY
3F1P to HP2CWB
4KØJL to KA5GRP
4X5ØVB to 4Z4DX
4Z8DX to 4Z4DX
5X1S to DF2RG
6W/K3IPK to K3IPK
7S2AT to SK2AT
7Z5OO to N2AU
8Q7PV to RU3FM
8Q7XX to EA4DX
9A/DL1AUJ to DL1AUJ
9A/DL3RDN to DL3DRN
9A/HA3JB to HA3JB
9H3XV to DL8GCL
9MØC to *G3SWH
9M2OM/P to GØCMM
9M6CW to JR1CHX
9M6OO to N2OO
9M6PO to OH2BH
9M8TG to JH3GAH
9U5W to VE2MNS
9XØA to RW3AH
9Y4/PA3EWP to *PA3ERC
A35DE to KC6RDE
A45XR to SP5EXA
AB5MF/KH2 to KHØBDK
AH2BE/KH9 to AC7DX
BXØYL to BV4YB
C5DI to GØUCT
C91JM to W7MAE
CN18DKH to CN8MK
CO2OJ to N6CL
CQ1I to CT1FMX
CV1F to CX6FP
DL5CW/P to DL5CW
DU3NXE to W4NXE
E22AAA to HS1CHB
EA8/DL7AU to DL7VRO
EA9/DL6RAI to DL5DX
ED5HQ to EA5HQ
ED6EIM to EA6VC
EL/K3KN to KB3U
ERØPC to K4PC
F5KBF/OY to F5NZO
FP5KE to FP5CJ
FW5XX to ON4QM
HO6V to HP2CWB
HR6XX to CX3CE
IBØ/DL6MDG to DL6MDG
IL3CII to IV3CII
IT9HBT/IF9 to IT9FXY
J41WCA to SV1BSX
J6/PA3BBP to *PA3ERC
J6/PA3EWP to *PA3ERC
JW/DJ3KR to DJ3KR
JW6VJA to LA6VJA
JX6RHA to LA6RHA
JY8RP to DK1RP
JY8WA to DK3GI
K4M to KE7LZ
K7IL/KH6 to JF3PLF
K7K to KE7LZ
KC9HP to KB9GMN
NN5ØCIA to KB4EFP
OHØTA to OH2TA
P40DC to K3LP
P4ØTT to WF1B
PY4/PA3BBP to PA3ERC
R0MIR-1 to N6CO
S92AF to HB9AFH
SM7CNS/4S7 to SM7CNS
SM7CNS/DU7 to SM7CNS
TØØRM to DL2JRM
T94CQ to VK4EXA
T95A to K2PF
TL8DX to 4Z4DX
TL8MR to *F6FNU
TMØCC to F5MCC
TM7RL to F5LVL
TT8JWM to WA4KKY
TT8KM to F6FNU
UA2FM/MM to DK4VW
UEØFFF to N6FF
UPØF to *W3HNK
UR8LV to DL6ZFG
US9D to UT4UZ
UXØUN to VK4FW
V47DD to N6PEQ
V51MA to NN9K
V63CG to N6PEQ
V73AR to JA3OIN
V73NH to JA3OIN
V73UB to K1ZUT
V85AH to VK4FW
V8EA to JH7FQK
VA/K8JP to *K8JP
VE7/GW3NYY to *G3NYY
VE8/VO1XA to WB2YQH
VIØANARE to VK4AAR
VI3PES to VK3CRP
VKØWM to VK4FW
VK4CRR to VK4FW
VK9CE to VK4FW
VK9LD to VK4FW
VK9MM to VK4FW
VK9WO to VK4FW
VK9XO to VK4FW
VP2EXM to DL3XM
VP5/W2OF to K2SB
VP9/KD2QE to WB2YQH
VP9/N4ZDA to WB2YQH
VQ9AI to *WBØBNR
VR6CT to JA6CT
VR98GO to *KU9C
VU2AU/5Ø to VU2AU
VU2JBS to VK9NS
W5ODD/KP2 to W5ODD
W8B to KA8UEU
WH6BZF to KH6BZF
XF3M to VK4FW
XL2MJS to VA2MJS
XL3AEA to VE3AEA
YB1AQT to DL2SDS
YB52RI to YB0BEH
YE3Q to YB8QD
YE8Q to YB8QD
YI1SK to HAØHW
YJØAVH to VK4FW
YM3SV to TA3YJ
YM4WAG to TA1KB
ZC4DX to 4Z4DX
ZD8T to AC4IV
ZD9IL to ZS5BBO
ZF2BV to K7DBV
ZF2IB to 4Z4DX
ZF2RV to WJ7R
ZK1AAT to KQ2I
ZK1PEQ to N6PEQ
ZK1SSB to N4RF
ZK1XXP to WA4YBV
ZL7AA to ZL2AL
ZM7A to ZL2AL
ZP592AL to ZP5YAL
ZS1AFZ to *KU9C
ZS6F to KK3S
ZW1A to PY1OB
ZW2E to PY2YW
ZYOSG to PT7AA
ZZ2Z to *AC7DX

**Updated information.*

The table of QSL managers is courtesy of John Shelton K1XN, editor of The GOLIST, P.O. Box 3071, Paris, TN 38242 (telephone 901-641-0109; e-mail <golist@iswt.com>).

up again, Z3 QSL cards will be difficult to obtain. QSL Vlado's operations as **ZA1MH, ZA/Z32KV, Z30SVP, Z350KV, Z32AU, 4N5KV**, and **YU5KV** direct to him at Box 10, Struga 96330, Republic of Macedonia.

I have a new easy-to-remember e-mail address. In addition to the old address, which will continue to work, readers can correspond with me via at **<chod@compuserve.com>.** I'm always interested in news of upcoming operations and DX-peditions, but remember the three-month lead time for publication. Photos may still be sent to P.O. Box 50, Fulton, CA 95439 for possible publication.

QSL Notes

WP2Z, the Windwood Contest Station on St. Croix, USVI, has a new QSL manager: Steve Wheatley, KU9C, P.O. Box 5953, Parsippany, NJ 07054.

ZS6IR has a new QSL address: Uli von Aswegen, Westpreussenstr 2, 53119 Bonn, Germany. Bureau cards for Uli may be sent via DL4EBA (*not* DL4JZ).

QSL **RAØFF, EXØV,** and **NH6D/KH4** via N6FF (ex-KL7H/W6).

The address of the **VK3 QSL bureau** has changed. The new address is WIA Victoria, Inwards QSL bureau, 40G Victory Boulevard, Ashburton VIC 3147, Australia.

QSL **ZF2FT** via K5RV (ex-N5OCD).

QSL Donald Simensen, **LAØHI,** via the Vancouver Mountain Radio Club, P.O. Box 1622, Vancouver, WA 98668.

73, Chod, VP2ML

HOME PAGE: www.hamboree.org

38th ANNUAL

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E-MAIL: edg@elink.net

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ON-SITE EARLY-BIRD EVENTS

FEBRUARY 5 – NOVICE/TECHNICIAN EXAM THEORY REVIEW BY GORDON WEST
WITH LIVE DEMONSTRATIONS AND WORKING EQUIPMENT
9:00 A.M. - 5:00 P.M. (One Hour Lunch Break) $25.00

FIVE WPM CODE TEST PREPARATION REVIEW – 6 P.M. - 9 P.M. – $10.00

FEBRUARY 6 – GENERAL TEST CODE AND THEORY REVIEW BY GORDON WEST
9:00 A.M. - 5:00 P.M. (One Hour Lunch Break) $25.00

These will be Mr. West's only Southeast Coast classes, so sign up now and begin your home-study with ARRL or West materials. Contact Hamboree Chairman for full details.

FEBRUARY 6 – ARRL RF SAFETY WORKSHOP by Ed Hare W1RFI, ARRL Laboratory Supervisor
$20.00 ARRL Members, $25.00 Non-Members. Sign up with ARRL Education Dept., 225 Main St. Newington, CT 06111

FEBRUARY 7 - 8
RFI PRESENTATION • INTRODUCTION TO AMATEUR RADIO DISPLAY • LEGAL & FREQUENCY CHALLENGES • AMATEUR RADIO FOR THE HANDICAPPED • APRS • VHF TRANSMITTER HUNT • YOUTH FORUM • PROGRAMS BY AMSAT, ARRL, DXPEDITIONS, AND MORE • COMMERCIAL EXHIBITS • THREE SWAP AREAS • TWO ON-SITE EXAM SESSIONS • FIELD CHECKING FOR DXCC AND CQ AWARDS • NEW CRAFT SECTION & ALTERNATIVE INTEREST PROGRAMS

AIR-CONDITIONED FACILITY • ON-SITE CAMPING FOR 300 RVs • FREE PARKING FOR 15,000 VEHICLES • ATM IN MAIN BUILDING • WHEELCHAIR & STROLLER RENTALS • ADDITIONAL REFRESHMENT AREAS

Registration: $5.00 Advance (deadline Feb. 3) – Door: $7.00
Campsites: 3 days (Fri., Sat., Sun.) $45.00 • 4 days (Thur., Fri., Sat., Sun.) $60.00
Swap Tables: $28.00 each* plus reg. ticket • Power: $10.00 per user.

HEADQUARTERS HOTELS: (All at same location/facilities & rates to meet your needs)
1201 N.W. LeJuene Road (N.W. 42nd Avenue)
MIAMI AIRPORT MARRIOTT: $140 single, double - plus tax – Tel: 800-228-9290
COURTYARD AIRPORT SOUTH: $105 single, double - plus tax – Tel: 800-321-2211
AIRPORT FAIRFIELD INN SOUTH: $72 single, double - plus tax – Tel: 800-228-2800
Mention "Tropical Hamboree" Cutoff date is January 22, 1998

TICKET, CAMP, TABLE PAYMENTS **PAYABLE TO: DADE RADIO CLUB OF MIAMI, INC.**
Mail to: Evelyn Gauzens, W4WYR, 2780 N.W. 3 St., Miami, FL 33125-5059
BOOTH & TABLE INQUIRIES: email: edg@elink.net, Tel: 305-642-4139, Fax: 305-642-1648
HOMEPAGE: www.hamboree.org

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

QRZ, Is This Frequency in Use?

December's Contest Tip

Do you suffer from a perpetual lack of organization? If so, you're like most of us. A tip learned from one of my contesting mentors, Jim Lawson, W2PV, is to document your station. Do you know what size wrenches you need when you go up the tower next time? What are the resistance readings of your rotator between pins? How is that 4 over 4 relay box constructed? The list goes on, yet a little attention to administrivia will go a long way toward making you a better contester (tnx W1WEF and YCCC Scuttlebutt).

Do you recall what the title of this month's column means in contesting terms? "QRZ, is this frequency is use?" can be easily translated to mean, "Watch out. I'm about to call CQ in less than 4 nanoseconds!"

Well, it's 2359Z and the anticipation of the start of another exciting contest is at its peak. You may not have the biggest station in the world, but you've become as prepared as humanly possible. For once, you've actually tested your computer software ahead of time. You even took the time to make sure a tree branch hasn't turned your beverage into a 35 foot longwire. After careful consideration, you've decided to enter the single operator, assisted category. Packet messages are flying across your computer screen. The coffee is brewing along with a steaming crock pot filled with beef stew (We appreciate your decision to pass on the chili!). This, my friends, is the sport of contesting!

Suddenly the clock turns over to 0000Z; the contest has begun. As a smaller station, you choose a strategy that begins by searching and pouncing for stations. This is probably the approach taken by most participants in a major contest. And, it can be quite effective. Careful tuning combined with judicious use of packet spots can really maximize your start in any contest—especially from a smaller station.

What I have characterized so far is missing one key descriptive. Starting at 14150.2 and moving up as much as 150 kHz is more often than not filled with station after station calling CQ. Some of them are DX stations in South America or the Caribbean working guys at incredible rates. Others are North American operators endlessly calling CQ with only an occasional answer. This issue of CQing is my topic for this month, so let's get into it.

2 Mitchell Pond Road, Windham, NH 03087
e-mail: K1AR@contesting.com

Calendar of Events

Nov.	**29-30**	**CQ WW CW DX Contest**
Dec.	5-7	ARRL 160 Meter Contest
Dec.	6-7	TARA RTTY Sprint
Dec.	6-7	FAIRS HF DX Data Contest
Dec.	6-7	EA DX Contest
Dec	6-7	TOPS Activity 80m Contest
Dec.	13-14	ARRL 10 Meter Contest
Dec.	13-14	TARA RTTY Sprint
Dec.	20-21	Croatian CW Contest
Dec.	21	Internet CW Sprint Contest
Dec.	27-28	Stew Perry Topband Distance Challenge
Dec.	28	RAC Canada Winter Contest
Jan.	1	ARRL Straight Key Night
Jan.	3-4	Hunting Lions on Air CW Contest
Jan.	3-4	ARRL RTTY Roundup
Jan.	9-11	Japan Int'l Low Band CW Contest
Jan.	10-11	Hunting Lions on Air SSB Contest
Jan.	10-11	North Amer. CW QSO Party
Jan.	17-18	YL-ISSB CW QSO Party
Jan.	17-18	North Amer. SSB QSO Party
Jan.	18	HA DX Contest
Jan.	**23-25**	**CQ WW 160 Meter SSB Contest**
Jan.	24-25	REF CW Contest
Jan.	24-25	UBA SSB Contest

Unless I've missed something, there are no contest rules that disallow discretionary CQing. If you want to park your VFO on 29100 kHz for 48 hours of a DX contest, calling CQ the entire time, it's your prerogative. Lately, however, there seems to be increasing debate about excessive CQing in contests, so let's unpack the topic a little more.

Who are the predominant CQers these days? Well, it used to be an exclusive club that included mostly the large multi-multi and multi-single stations from around the world. However, over the past five years or so something has changed dramatically. It seems that more and more operators have become increasingly aggressive with their use of the CQing operating tool. Why is that? Well, for starters there are simply more stations to work. From a USA perspective (especially the East Coast), the number of European participants in a contest such as the CQ WW is at an all-time high. I'd own a big station indeed if I added another antenna element for every time I've commented about the "bottomless pit" of G, DL, I, EA, and other countries that call me during a European opening. From this perspective, assertive use of CQs is usually a sensible operating strategy.

Second, while the top tier of stations has maintained its leadership in antenna hardware, the second tier has been hard at work, too. It used to be that only the very elite had use of stacked high-band beams. Now while it's hardly everyone, it's simply not that uncommon to run into station after station—especially in the U.S.—using this kind of antenna hardware. The point is that while station "X" may still be 15 dB weaker than W3LPL or KC1XX, it is still transmitting a dominant signal that can take good advantage of an energetic CQing operating strategy.

The third contributor to this proliferation of CQers in contests is the advent of the second radio by single operators. In the "old days" you had to make some tough decisions about band choices, as most single operators only used a single radio. For example, "Should I call CQ on 20 meters with the intent of establishing a good clear frequency at the beginning of an opening to Europe/Japan?" Or, "Should I stay on the low bands for another 20 minutes and pick up some of those juicy 5W, VK6, FK8, CE, UAØ multipliers on 40 and 80 meters?" Now with the use of a second radio, as has often been discussed recently, you can have the best of both worlds. After all, as a single operator you don't have the limitation of the 10-minute rule multi-single operations have to contend with. You can CQ to your heart's content on 20 meters, working stations at 20 to 30 QSOs per hour while mounting a determined multiplier search on the second radio. The result is maximized scoring with yet another tier of CQers on the band.

Last (and I'm sure there are even more examples), competitors outside of North America have jumped on the CQing bandwagon as well. For at least the past 25 years the bands have always been filled with the louder overseas stations running W's at a feverish clip. In recent years they have been joined by a new second-level of stations who have found CQing to be an effective operating strategy by virtue of (1) improved station hardware, (2) increased contesting experience, and (3) rising participation by North Americans. This is especially noticeable with the JAs and some European areas.

So what is the point of all of this rhetoric? I think a fair question to consider is: Is

there too much CQing in today's world of contesting and is there anything we should do about it? While thinking about this topic, my first reaction was to put much of the blame on the level of sunspot activity. It's only natural that this topic becomes an issue of contention with some, when everyone is crammed into a 300+ kHz frequency slice on 20 meters. But if you think about it, we were dealing with this issue even at the last sunspot cycle peak. I can still vividly recall operating on 10 meters above 28850—not because I wanted to be there, but because the band was so crowded that it was simply the first usable spot I could find. And the issue of CQing is not simply limited to SSB either. A little introspective thought will yield similar comparisons on CW, too.

Well, just to set your mind at ease (if it even needed to be), I'm hardly suggesting that we need to change contest rules to put a governor on the use of CQing in contests. Now if we did something like that, excluding perhaps K1AR and perhaps your callsign, then we may have something, but I won't hold my breath on that one. What I am suggesting this month is the need to continue to keep this topic at the forefront of our minds and think about it in a little more depth as we operate. Remember, excessive CQing has implications beyond the contest community. A non-contester listening to a station calling CQ ineffectually can build a pretty strong case for spectrum misuse if you look at it from their perspective. We need to continually be sensitive, as contesters, to that point.

A Few Operating Scenarios

There are a number of operating scenarios that paint a picture for this month's topic. Let me summarize a few you'll probably relate to from your own experience or what you've heard others do:

• Situating yourself on the lower end of a band, 30 to 60 minutes before the band opens to Europe/USA/Japan in an attempt to establish a clear running frequency. An obvious moral violation (if not outright breaking of the rules) is to do this with a different callsign so as to not use valuable on-time during non-48 hour events.

• Allowing yourself to go beyond what is reasonable and sensible and continuing to call CQ, even when rates fall below 10 to 15 QSOs/hour.

• Being overly inflexible and continuing to call CQ when the frequency you are using clearly is not yours (i.e., nets, ragchewers, other modes, etc.). Another variation on this is the typical "frequency battles" where two stations may choose to "duke it out" for upwards of 15 to 30 minutes, both calling endless CQs and neither working anyone.

• Transmitting with an endless CQ loop while you leave the station temporarily (i.e., "potty break") in order to hold a run frequency.

I'm sure you can think of a myriad of other examples along these lines. Let's face it: CQing as an operating strategy has been with us for decades and will be an element of contesting for a very long time into the future. I'm personally opposed to putting artificial limits on the practice through rule changes. This, unfortunately, smacks of the old days of QSO quotas by country, which hopefully will never see the light of day again. Some suggestions I've heard to deal with this issue include taking advantage of the computerization of logs—especially in the area of frequency reporting. By looking at the reported frequencies in a log you obviously can determine when someone is CQing rather than searching. By giving increased point credit to the "searched QSOs," you may encourage less CQing and more searching on the bands. While this idea may have some merit, the idea needs to be somehow developed to accommodate the "non-computerized" operator before it can go further. There's plenty of opportunity to develop ideas in this area. Send me your thoughts!

Final Comments

That's it for another month. What follows is a subject I cover every year, but, as

always, it comes from the heart. We're entering yet another holiday season. It's a time of reflection for some. For others, it's that one time of year when we look back and consider what we've accomplished and how our priorities stack up. However you view this time of year, I hope 1997 turned out to be what you wanted it to be for yourself and your family. Best wishes for the upcoming holidays, and please share in my wish that 1998 will be the best year ever for you and yours.

If you haven't taken the time yet, please check out the 1997 CQ Contest Survey found in October *CQ*. I've received quite a volume of responses, but your input is important, too. Don't miss out; be one of the participants and voice your views.

As usual, please submit your contest announcements to me no later March 1st for inclusion in the March 1998 issue.

73, John, K1AR

ARRL 160 Meter CW Contest

2200Z Fri. to 1600Z Sun., Dec. 5–7

This is the 27th year for this "Top Band" activity. QSOs are between US, VE, and DX stations. DX-to-DX QSOs are not permitted for contest credit.

Classes: Single operator, high- and low-power, QRP; and multi-operator, single transmitter.

Exchange: RST and ARRL section for W/VE. DX stations send RST only. ITU Region to be sent by maritime and aeronautical mobiles.

Scoring: Contacts between stations in ARRL sections count 2 points, with DX stations 5 points.

Multiplier: Determined by number of ARRL sections and DXCC countries worked (for W/VE). DX use ARRL sections only (maximum 78).

Final Score: Total QSO points times the ARRL section and DX country multiplier.

Awards: Certificates to the top-scoring single operator station in each ARRL section and DXCC country. Awards also available for the top-scoring multi-operator station in each ARRL Division and continent.

You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM compatible, MS-DOS formatted, 3½ or 5¼ inch (40 or 80 track). The log information must be in an ASCII file, following the ARRL Suggested Standard File Format, and contain all log exchange information (band, mode, date, time in UTC, call of station worked, exchange sent, exchange received, multipliers [marked the first time worked], and QSO points). One entry per diskette. An official summary sheet or reasonable facsimile with signed contest participation disclaimer is required with all entries. Additionally, you may submit your contest entry via the ARRL BBS (860-594-0306), via Internet to <contest@arrl.org>, or anonymous FTP to <ftp.arrl.org>.

Official log forms are recommended and are available from the ARRL. A large SASE and 45 cents postage or 2 IRCs will get you a supply for more than 300 contacts.

The usual grounds for disqualification (violation of established rules, excessive duplicate contacts, etc.) will prevail. Mailing deadline for logs is January 7, 1998 to: ARRL Communications Dept., 160 Contest, 225 Main Street, Newington, CT 06111.

1997 TARA RTTY Sprint

1800Z Sat. to 0200Z Sun., Dec.6–7

This is the sixth running of the TARA RTTY Sprint sponsored by the Troy Amateur Radio Association, Inc. Contacts are encouraged with as many stations as possible using RTTY only on 80–10 meters (no WARC bands). Any station may work any other station.

Classes: (A) *Single Operator, multiband*—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc.) is not permitted. Single operator stations are allowed only one transmitted signal at any given time. (1) less than 150 watts output or (2) 150 watts output or more.

(B) *Multi-operator, single-transmitter, only*—More than one person operates, checks for duplicates, keeps the log, etc. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multi-operator stations are allowed only one transmitted signal at any given time.

Exchange: US-stations—signal report and state. Canadian stations—signal report and province. DX stations—Signal report and seri-

al number starting with 001. Both stations must receive and acknowledge the complete exchange for the contact to count.

Scoring: (A) *QSO Points*—Count one point for each completed QSO (anyone can work anyone). A station may be worked once per band for QSO credit (but not for additional multipliers).

(B) *Multiplier*—Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and VY1), and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The U.S. and Canada do not count as DXCC countries.

Awards: Certificates will be awarded to the top three stations in the low power and high power categories, worldwide.

Entries must be postmarked no later than 41 days after the end of the contest. Any entrant making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). No late entries will be accepted. Use the ARRL RTTY Roundup forms or a reasonable facsimile. Entries may be submitted on disk or via e-mail to: <MRBILL1953@AOL.COM>. Paper entries should be mailed to: William J. Eddy, NY2U, 2404 22nd Street, Troy, New York 12180-1901. Check out the new TARA web page for more information at <http://generators.com/tara/rtty.html.>

ARRL 10 Meter Contest

0000Z Sat. to 2400Z Sun., Dec. 13–14

This is the 25th annual 10 Meter Contest organized by the ARRL. It's an extremely active competition (even with low solar activity) in which stations can work each other within their own country as well as around the world.

A maximum of 36 hours operating time is permitted out of the 48-hour contest period for all stations (listening time counts as operating time). The same station can be worked on SSB and again on CW for QSO points.

Categories: Single operator, mixed mode, SSB only and CW only. Additionally, there are three power categories: QRP (5 watts output or less); low power (150 watts output or less); and high power (more than 150 watts output). Finally, there is a multi-operator, single transmitter, mixed mode only category.

Exchange: W/VE stations (including KH6 and KL7) send RS(T) and state or province. DX stations (including KH2, KP4, etc.) send RS(T) and QSO number starting with 001. Maritime or aeronautical mobile stations use RS(T) and ITU region. Novice/Tech stations must identify themselves with a /N or /T designator.

Scoring: SSB QSOs 2 points; CW 4 points; Novice/Tech CW QSOs 8 points.

Multiplier: U.S. states (50 plus District of Columbia), Canadian provinces (NB, PEI, NS, VE2–8, VY1, VO1, VO2), DXCC countries, and ITU regions (1, 2, 3).

Final Score: Total QSO points times the sum of U.S. states, Canadian provinces, DX countries, and ITU regions, per mode.

Awards: Certificates will be awarded to the top-scoring single operator station in each category (including /N and /T) for each ARRL section and DXCC country. Also, the top-scoring multi-operator station in each ARRL division and each continent will receive a certificate.

Indicate a new multiplier only the first time it is worked. Dupe sheets are required for logs with 500 or more QSOs. *Note:* The frequencies

Corrections/Additions
1996 CQ WW DX Contest Results

SSB

1. W6XR was /2 and first place in the 2nd call area, High Power, All Band.

2. KW4T was really Low Power 7 MHz (not High Power All Band). He will receive a certificate as #1.

3. ES2RJ's SSB log was misdirected and included in the CW results. His entry was 14 MHz Low Power (Score 467,116, QSOs 1571, Zones 35, Countries 134), and he is a certificate winner.

4. The #6 Multi-Single log in Europe was SN2B (not OK5W) with 6,990,816 points.

5. KF2ET's fine USA Multi-Single win was attributed to the wrong club in the SSB write-up. Mike's team belongs to the YCCC.

6. WB2NQT/4 #1 in the 4th call area SOA should have been indicated as a certificate winner.

7. The ops of HC8N (Multi-Single) were WN4KKN, HC1OT, VE3EJ, and WX3N.

8. IG9/IK4MGO was Low Power All Band, not 1.8 MHz.

9. The operator of K5XI was KE5FI. His credit was left off the trophy list.

10. TIØC's (Opr. TI2CF) 3.5 MHz score was mistakenly included in the CW results. Carlos set a new North American record.

CW

1. JM4UQM (Listed as 14 MHz, Score 360,764, QSOs 113, Zones 31, Countries 85) should have been listed as 1130 QSOs.

2. K1ZZ should have been listed as the #2 position in USA Multi-Single. K8AZ was third.

3. K5NA was the #2 finisher in the 5th call area, 5th in Zone 4. Richard's call was mistakenly listed as K5MA. He is a certificate winner.

4. KØRF was incorrectly shown as Multi-Single. Chuck's station was Multi-Multi.

5. KVØQ was the Multi-Single winner for the 0 (zero) call area.

6. The #6 Multi-Single log in Europe was SN2B (not OK5W) with 6,990,816 points.

7. K1OZ moves into #6 position in the USA after KØRF's correct classification.

9. AB4RX was listed as High Power. He was 7 MHz Low Power, Single Op with a score of 98,550 and was the US #1 in his category.

10. The operator of the #4 USA 14 MHz score, KB1SO, was K1ZR.

11. The winner of the USA Single Operator 7 MHz trophy was WØUN operated by WØUA, not K1ZM as listed.

12. K1ZM was incorrectly listed as Unassisted. Jeff operated in the 7 MHz Assisted category as shown on his cover sheet.

13. TIØC was an SSB log and was mistakenly included among the CW logs.

14. The winner of the Carib./C.A. trophy for high Single Band was HI3JH for his efforts on 7 MHz.

15. G3ZEM was Assisted All Band and set a new G record.

from 28.3 through 28.35 MHz are designated as a non-contest window. (This means stations may not call CQ contest in this window.) The usual disqualification criteria will be enforced. A large SASE will get you log and instruction forms. The standard ARRL policy for electronic logs applies to this contest (contact the ARRL Contest Branch if you have any questions).

Mailing deadline for all entries is January 14th to: The ARRL 10 Meter Contest, 225 Main Street, Newington, CT 06111.

Croatian CW Contest

1400Z Sat. to 1400Z Sun., Dec. 20–21

This is another new one for December, sponsored by Hrvatski Radio Amaterski Savez of Croatia. December is typically a slow contest month, so this should add some excitement to the end of the year for many.

Classes: Single-operator and multi-single; CW only on 160–10 meters.

Exchange: RST and ITU Zone.

Scoring: 10 points for QSOs with 9A stations (160–40 meters), 6 points on 20–10 meters; 6 points for QSOs in other continents (160–40 meters), 3 points on 20–10 meters; 2 points for QSOs in your own continent, including your own country (160–40 meters), 1 point for QSOs on 20–10 meters. Multipliers are DXCC and WAE countries per band. Final score is total QSO points times the sum of multipliers worked on each band.

Awards: Certificates will be sent to the highest scoring station per category/DXCC country. Plaques will be awarded to the first, second, and third highest scoring station in each category.

Logs must be mailed within 30 days of the contest's end and should be sent to: Hrvatski Radio Amaterski Savez, Croatian CW Contest, Dalmatinska 12, 10000 Zagreb, Croatia.

Stew Perry Topband Distance Challenge

1500Z Sat. to 1500Z Sun., Dec. 27–28

This is the second edition of this new one and another fine example of "grass roots" contesting. The idea, spawned by N6TR and W4AN (among others), was conceived to take advantage of winter activity on 160 meters, to honor one of the band's heroes—W1BB, and most important to have fun! Future sponsorship of this event will depend on interest and participation in this year's contest.

Operation is limited to 160 meters CW only. A maximum of 14 hours of operating time is permitted. Only one break may be taken between your first and last QSO and must be at least 30 minutes in duration.

Classes: Single- or multi-operator. Only one signal shall be transmitted at a time. Remote or packet spotting is not permitted.

Exchange: Four-digit grid square only. A RST report may be given, but it is not required for a complete QSO.

Scoring: There are no multipliers. QSO points are based on the distance between the two stations. Credit a minimum of one point per QSO and an additional point for every 500 km

between you and the other station worked. Note that all of the major contest logging programs will support this calculation automatically (i.e., NA, TR, CT). Final score equals the total number of QSO points. Stations using less than 100 watts may multiply their score by 2. QRP stations (less than 5 watts) may multiply their score by 4.

Your log may be sent via the internet to <TBDC@CONTESTING.COM> or via diskette in MS-DOS/Windows format and must be sent by January 28, 1998. Entries submitted by mail should be sent to: Boring Amateur Radio Club, P.O. Box 1357, Boring, OR 97009 USA. Logs must be in ASCII format. A summary sheet may be sent, but is not necessary.

RAC Canada Winter Contest

0000Z to 2359Z, Sun., Dec. 28

This is a popular year-end affair sponsored by the Radio Amateurs of Canada. Amateurs all over the world are invited to participate.

Classes: Single Operator (all bands, low power, single-band) and Multi-Operator. Multi-operator stations may operate on multiple bands simultaneously.

Exchange: Canadians send RS(T) and province/territory. All others send RS(T) and serial number.

Frequencies: QSOs may take place on 160–2 meters (no WARC activity). Suggested operating frequencies are: CW—25 kHz up from the lower band edge; SSB—1850, 3775, 7075, 7225, 14175, 21250, 28500 kHz. Check for CW activity on the half-hour.

Scoring: QSOs with Canadian stations are worth 10 points. Contacts with stations outside of Canada are worth 2 points. QSOs with official RAC stations (i.e., VE3RAC) are worth 20 points. You may work stations once per band and mode. Multipliers are Canadian provinces/territories and may be counted once per band/mode. Final score is total QSOs points times your multiplier count from all bands.

Awards: A number of plaques will be awarded to winners of each category, including the top foreign entry, who will win the Jorge Bozzo, LU8DQ, memorial plaque sponsored by Alan Goodacre, VE3HX/VE2AEJ.

All entries must be postmarked by January 31st and should be sent to: RAC, 720 Belfast Rd., #217, Ottawa, ON K1G 0Z5 Canada. Final results will be published in "The Canadian Amateur," which will be sent to certificate winners.

ARRL Straight Key Night

0000Z to 2359Z, Jan. 1
(7 PM Tues. to 7 PM Wed., EST)

This is a friendly meeting on the air using a straight key only. Suggested frequencies on 80, 40, and 20 meters are 60 to 80 kHz up from lower band edges, 10 kHz from lower edge of Novice bands.

Use SKN instead of RST in the exchange to "clue-in" other stations. Include a list of stations worked plus your vote for the best fist heard during that period (not necessarily one you've worked).

This is not a contest, so any additional chatter is encouraged. Send your report and vote for "best fist" and "most interesting QSO" to ARRL SKN, 225 Main Street, Newington, CT 06111 by January 10, 1998.

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

Letters From Readers

This month let's dip into the mailbag and try to answer some questions on the Vanity Call Sign System, the Morse code licensing requirement, and those fancy, new 1×1 station callsigns. In the interest of brevity, we have reworded and combined your questions.

Another popular topic in amateur radio right now concerns the new RF Safety evaluation rules which go into effect in the Amateur Service on January 1, 1998. As I write this column, the FCC's Office of Engineering and Technology is in the process of issuing an Amateur Radio supplement to their RF Compliance Bulletin No. 65. Since this is being written in October, we do not yet have the new supplement. We have been assured, however, that we will have it shortly, so we are deferring all of the RF Safety questions (and we have gotten a lot of them!) until the January 1998 column. Next month we will tell you everything you need to know about RF safety and its impact on amateur radio. Stay tuned.

When will the FCC be opening Gate No. 4? I want to get a 1×3 callsign.

This is a very frequently asked question indeed! At this writing it is anyone's guess! Gate No. 4 is the final gate which makes all amateurs eligible for a station callsign of their choice. It adds the Novice, Technician, Tech Plus, and General Class to the Vanity Call Sign System. By far, this will open station callsign selection to the largest number of amateurs. Seventy-five percent (nearly 600,000) of all amateurs hold General Class and below tickets.

Even though the FCC opened Gate No. 3 on August 6, 1997 so that Advanced Class amateurs could acquire a new callsign, the FCC did not begin processing them until the end of September. The reason given was the FCC wanted to complete processing the remainder of the Extra Class vanity callsign requests before starting on the Advanced Class.

The length of time that passed between the opening of Gate No. 2 and Gate No. 3 was nearly a year, so it could be a while before Gate No. 4 opens. However, particularly be aware of two new regulations concerning vanity callsigns that took effect in mid-September.

1. The regulatory cost of a vanity callsign is now $50 instead of $30.

2. You must also file the newly updated FCC Form 159 (Remittance Advice) along with your FCC Form 610-V (Vanity Call Sign Application).

Both the new Form 159 and Form 610-V are available from the W5YI Group, Inc., P.O. Box 565101, Dallas, TX 75356 (enclose a self-addressed, stamped envelope with your request). Both forms are also downloadable from the Internet at <http://fcc.gov/formpage.html>.

The new Form 159 allows the FCC to capture your taxpayer identification number (Social Security number), which they will be using for identification purposes rather than your birth date.

The FCC is working on integrating each of its many licensee databases—one for each radio service—into a single one. The Universal Licensing System is due to get underway next year. Down the road the Amateur Service will get a newly designed FCC Form 610 application that also asks for your Social Security number.

How long will it be before the Morse Code licensing requirement is abolished?

This debate continues to rage within amateur radio. Everyone seems to have a firm opinion on the matter. The campaign to end telegraphy knowledge as an international prerequisite to amateur HF operation began in 1994. That is when a group of amateurs from New Zealand convinced their government that manual telegraphy proficiency treaty requirements were unnecessary.

At WRC-95, an international telecommunications conference held in Geneva, New Zealand proposed to eliminate the requirement by abolishing the regulation which requires the ability "... to send correctly by hand and to receive correctly by ear, texts in Morse code signals" when the amateur radio operation is below 30 MHz.

That left only the next regulation to guide countries on the licensing of their amateur radio operators. It simply reads, "Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station." That wording still would permit administrations to require manual telegraphy proficiency if they felt it necessary.

At WRC-95 it was decided to defer the amateur radio operator qualifications question until WRC-99, which will be held in the fall of 1999—most likely in mid-October.

The International Amateur Radio Union, a federation of national amateur radio societies around the world, quickly formed a committee to look into the qualifications issue. Their first action was to issue a discussion paper to stimulate comments from their three IARU Regions. Surprisingly, the committee took a preliminary view that the telegraphy licensing requirement should indeed be eliminated. Their argument was that it would be abolished eventually, and since it would be many years before the ITU would be looking at amateur radio again, it should be done now. It appears to me that what the IARU was saying is that they were receptive to change and they wanted support for their proposal from their regional organizations.

Well, it did not go over well at all with the amateur radio troops. Both the Region 1 Conference (Tel Aviv, Israel, Sept. 1996) and the recently completed Region 3 Conference (Beijing, China, Sept. 1997) strongly supported retention of the Morse treaty requirement. I was not surprised.

The IARU is now backing off from their initial position and is saying that they merely "floated" their proposal that manual telegraphy proficiency be discontinued. Clearly, they have not been successful in convincing the rank-and-file amateur radio operator that CW is no longer needed as a licensing requirement.

The IARU Region 2 Conference will be held next year, and with the ARRL already on record as favoring retention of the Morse Code requirement, it appears certain that all three IARU Regions will agree to "no change."

But does that mean that manual telegraphy proficiency will remain an amateur radio HF requirement? No, it does not! Contrary to what you may think, neither the IARU nor the ARRL is really that powerful in international telecommunications circles. The IARU only has "observer status" at international conferences, and it is national governments, not hobby groups, that make the decisions! There is reason

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to believe that both our FCC and State Department will not go along with the wishes of the ARRL.

An interesting parallel is the abolishing of manual telegraphy on the high seas. The International Maritime Organization is the global body that oversees maritime safety. Like the International Telecommunications Union, nearly all nations are members of the IMO, and both operate under the auspices of the United Nations. The ITU is headquartered in Geneva; the IMO in London. I had the privilege of touring the IMO several years ago. It is on the banks of the Thames River, a short distance from downtown London and across the river from the British Parliament.

Back in the 1980s worldwide unions representing commercial radiotelegraph operators were fiercely opposed to abolishing manual code. After the ITU nations voted (in 1983 and 1987) to provide new maritime mobile frequencies, the IMO nations voted (in 1988) to abolish manual telegraphy in favor of more modern and reliable digital and satellite communications. The Global Maritime Distress and Safety System (GMDSS) transmits and receives automatically, so CW, which is tied to on-duty operators and ionospheric propagation, was determined to no longer be required. Commercial radiotelegraphers even today say CW is needed, but it clearly is not.

Maritime manual telegraphy communications is now being phased out. The transition period began in 1993 and ends in February 1999, when maritime CW goes the way of the horse and buggy. Even today, the Coast Guard does not monitor 500 kHz, for 70 years the keystone of long-distance maritime communications. I thoroughly expect that the ITU nations will follow the same path at WRC-99. CW, of course, will still be used for recreational radio contacts. Demonstrated proficiency in the mode just won't be required as a prerequisite to working HF.

The Military Affiliate Radio System, which uses amateur radio operators to man its circuits, not only has eliminated CW, but specifically forbids its use. So much for maritime and military use of Morse code! MARS, which is supervised by the U.S. Department of Defense, exists to provide a reservoir of trained radio operators and to pass military-related traffic.

Another reason that I believe the amateur manual telegraphy treaty requirement will be eliminated is its impact on technical experimentation and disaster communications. Both activities have long been cornerstones of amateur radio communications, and both pursuits are hampered by the CW treaty requirement. It seems birdbrained to me to require manual Morse Code proficiency when today's communications technology is automated and highly sophisticated. To preclude an HF amateur radio operator without CW knowledge from assisting during an emergency is ridiculous.

It seems certain to me that the ITU will abolish the manual CW requirement—with or without the support of the IARU, the ARRL, or anybody else. And a couple of years later, amateur radio in the U.S. will be restructured. The code requirement can't be dropped immediately, since it still must go though FCC rulemaking, which takes time. My guess is that amateur radio in 2002 will bear little resemblance to amateur radio today.

I also believe that the IARU (and the ARRL) is thoroughly aware that this is coming, but is powerless to do anything about it. I am not even sure they *really* want to. It is their short-sighted membership that is pushing the issue. As in the case of the maritime radio operator, they are fighting a lost cause on behalf of today's "retain the status quo" radio amateurs. These organizations must side with the thinking of their members, since as membership organizations they must represent the views of the members. In short, they are between the proverbial "rock and a hard place."

The FCC shortly will be establishing WRC-99 Working Groups to advise the FCC and the State Department. I intend to be a member.

Not all amateur radio operators favor retaining the CW requirement. I am one who does not. A group has been formed on the Internet called "No Code International," which will lobby for change. They are at <http://www.nocode.org>.

How do I get to use one of those snazzy, new 1×1 format callsigns?

Amateurs of many countries get to use unique station callsigns during special events. Some countries allow different prefixes during certain holidays or commemorative occasions, while others permit special amateur callsigns that in some way relate to the event. Our FCC has decided to permit the use of 1×1 format callsigns for special events. A 1×1 callsign consists of a single letter (K, N, or W), a numeral 0 through 9, and one suffix letter (A to W and Y to Z). Government regulations do not permit 1×1 callsigns with the suffix letter "X." An example of a 1×1 call sign is K1A.

When transmitting in conjunction with an event of special significance, an amateur station ("special event station") may transmit the identification announcement using a 1×1 callsign, providing they ad-

here to the special guidelines set up by the FCC and the amateur community.

Substituting a special event callsign for its assigned callsign may help a special event station call attention "on the air" to its participation in the special event and to the unique opportunity for the amateur service community to exchange greetings with the station. The special event station must also transmit its assigned callsign at least once per hour during such operation.

We have written about the Special Event Call Sign System before, and you might refer to our September 1997 column for the background history. When we wrote that column, the issuance of 1×1 callsigns had not yet begun. They are now being issued. Here is an update on what has happened since then.

In early September the FCC approved five different 1×1 callsign administrators. Anyone wishing to use a 1×1 callsign must obtain coordination for the use of a special event callsign through one of the organizations listed below. These coordinators are maintaining and disseminating a common worldwide data base for the day-to-day usage of the 1×1 format callsigns.

Upon completing the coordination process, the special event station may substitute the 1×1 format callsign for its assigned callsign during the period of the special event.

The following five volunteer entities have been certified by the FCC as special event callsign coordinators:

1. The American Radio Relay League, Inc. VEC Dept. 225, Main Street, Newington, CT 06111-1494 (telephone 860-594-0300; e-mail <vec@arrl.org>).

2. The W5YI Group, Inc., 2000 E. Randol Mill Road, Suite 608-A, Arlington, TX 76011 (telephone 817-461-6443; e-mail <W5YI@W5YI.org>).

3. Laurel Amateur Radio Club, Inc., P.O. Box 3039, Laurel, MD 20709-3039 (telephone 301-317-7819; e-mail <rbusch@eros.com>).

4. W4VEC, 3504 Stonehurst Place, High Point, NC 27265 (telephone 919-841-7576; e-mail <w4vec@aol.com>).

5. WCARS-VEC, 5833 Clinton Highway, Suite 203, Knoxville, TN 37912-2500 (telephone 423-688-7771; e-mail <wcars@korrnet.org>).

Here is the information they need in order to set you up with a 1×1 callsign:

•1×1 callsign requested (and alternates in the event the one you requested is not available).

•The beginning and ending date of your special event operation, which may not exceed 15 days.

•The name of your "special event," such as your city's anniversary or whatever.

•Your name, station callsign, and current mailing address.

•Your e-mail address (if you have one) and your daytime telephone number.

The W5YI Group has a special online form set up on the Internet where you can simply key-in this information. The form is located on the World Wide Web at <http://www2.spindle.net/w5yi/request/>. Once you "submit" the information (by clicking on a box), your request is sent to the coordinator, who will immediately post your reservation. Once your callsign is reserved, no one else will be able to reserve that 1×1 callsign during the same time period.

The program is already in operation and seems to be working well. There are some ground rules, however, of which you should be aware.

Anyone may reserve a special event 1×1 callsign. Unlike the other vanity callsign program, there is no "pecking order." A No Code Tech has just as much right to reserve a 1×1 callsign as an amateur Extra Class. You may reserve a 1×1 callsign up to one year in advance of your special event. All reservations will remain posted for one year past the operation to provide an address for QSL (and FCC enforcement) purposes.

Callsigns may only be reserved when a legitimate special event is taking place. One-by-one callsigns may not be reserved just to have a short callsign during an amateur radio operating contest.

You are notified that your request has been approved by checking the 1×1 database located on the Internet at <http://ncvec.spindle.net>. If it is posted, then it has been approved.

An event of "special significance to the amateur community" is whatever a radio amateur thinks is important to him, his community, or his state or country. It is very hard to define. The Special Event Call Sign Coordinators have very wide latitude in the acceptance, rejection, or cancellation of 1×1 call reservations.

So there you have it: The rules behind 1×1 callsigns. If there is an event you want to publicize via amateur radio, just contact one of the coordinators and you will be on the air with a 1×1 callsign which you get to choose. You can even choose your 1×1 callsign the day before it is needed.

See you next month. 73, Fred, W5YI
e-mail: <fmaia@internetMCI.com>

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

There is Agreement—Cycle 23 Began During May 1996

CQ WW DX CW Contest Bulletin

This issue of *CQ* should reach most readers in time for the CW weekend of the CQ World-Wide DX Contest, November 29 and 30. Here is an updated day-to-day propagation forecast for the weekend made at press time.

Conditions are likely to be as reported last month. Expect solar flux readings near 100, and with geomagnetic K-indices in the teens. This should result in mostly Low Normal conditions on both days, increasing at times to High Normal for openings towards southern and equatorial regions. There is still a chance for some radio storminess, particularly on the 30th, which could drop conditions to Below Normal at times for paths passing through the auroral zones and the higher latitudes.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for December 1997

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 9, 14-15, 20, 24	A	A	B	C
High Normal: 1, 6-7, 10, 13, 16, 19, 23, 28	A	B	C	C-D
Low Normal: 2-3, 8, 12, 17-18, 21-22, 25, 29-31	B	C-B	C-D	D-E
Below Normal: 4, 11, 26-27	C	C-D	D-E	E
Disturbed: 5	C-D	D	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 S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the 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 path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be good (B) on Dec. 1st, fair-to-good (C-B) on the 2nd and 3rd, fair-to-poor on the 4th, poor (D) on the 5th, etc. Fair-to-good conditions (C-B) are expected during the CQ WW DX CW Contest weekend of Nov. 29–30.

Based upon the smoothed sunspot counts of the past 18 months, there is now general agreement among the world's solar scientists that sunspot Cycle 22 ended and Cycle 23 began during May 1996 with a count of 8.1. Table I lists the smoothed sunspot numbers, rounded off to the nearest whole number, recorded during the last stage of Cycle 22 and the early stage of Cycle 23 through February 1997. Estimates are given for the remainder of 1997.

Last year we asked some of the world's leading solar scientists to give us their opinion of when Cycle 23 would begin. The experts at NOAA's Space Environment Center in Boulder, Colorado came closest to the actual date with their estimate of "May or June 1996."

1997 in Review

Referring to Table I, 1997 began with a smoothed sunspot count of 11. Solar activity increased very slowly, which is typical for the beginning of a new cycle. It is estimated to have reached a level of 36 by the end of the year. This was still a year of low solar activity, but a noticeable improvement in HF propagation began to take place during late August and continued to improve for the remainder of the year. The past several years of low solar activity are behind us now, and the new year should see a more rapid increase in the intensity of the new cycle. We will have a more in-depth analysis of Cycle 23, and specifically the range of sunspot numbers expected during 1998, next month.

The Royal Observatory of Belgium reports a mean sunspot number of 25 for August 1997, with daily values ranging from 0 on the 24th to 53 on the 31st. This mean level for August results in a 12-month smoothed sunspot number of 11 centered on February 1997. A smoothed sunspot number of approximately 36 is forecast for December 1997 as the new Cycle 23 continues to climb upward.

A corresponding 10.7 cm mean solar flux level of 79 was reported for August 1997 by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 74 centered on February 1997. A smoothed 10.7 cm flux level of approximately 90 is expected during December 1997.

December Conditions

The new sunspot cycle has already risen to a level where daytime DX conditions on 10, 12, 15, and 17 meters should be noticeably better than they were during the past three winter seasons. An increasing number of 10 and 12 meter DX openings should be possible during the daylight hours, mainly to southern and tropical areas, but to other areas as well.

Much improved 15 and 17 meter DX openings are expected to most areas of the world during the daylight hours. These bands may also occasionally remain open towards the west during the early evening.

Twenty meters should open for DX in almost all directions for an hour or two after sunrise, and remain open to one area of the world or another through the daylight hours and into the early evening. When conditions are High Normal or better, 20 meters may remain open towards the south and the west during the hours of darkness to about midnight, or later.

With static levels at seasonally low values in the northern hemisphere, and the hours of darkness at a maximum, a considerable seasonal improvement is expected in DX conditions on the 30, 40, 80, and 160 meter bands during December. Thirty and 40 meters should open for DX during the late afternoon hours, with the first signals coming from Europe and other areas in a northeasterly direction from the USA. During the hours of darkness DX should be possible to many areas of the

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1996	10	10	10	9	8*	9	9	9	9	9	10	11
1997	11	11	*13*	*14*	*16*	*18*	*21*	*23*	*26*	*30*	*33*	*36*

Table 1– Smoothed sunspot numbers reported for the last stage of Cycle 22 and the early stage of Cycle 23. The new cycle began during May 1996, shown with an asterisk (*). Estimated 1997 smoothed sunspot numbers are shown in italics.

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HOW TO USE THE DX PROPAGATION CHARTS

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

2. The predicted times of openings are found under the appropriate meter band column (15 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. An ** indicates best time to check for 10 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 CW, or 1 kw, PEP 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.

December 1997 to February 1998
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

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

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

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

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

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	07-08 (1) 08-10 (2) 10-11 (1)	05-06 (1) 06-09 (2) 09-11 (3) 11-13 (2) 13-15 (1) 00-03 (1)	18-20 (1) 20-23 (2) 23-01 (1) 19-23 (1)*

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

*Indicates best time for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.
** Former European USSR.

world. The bands should peak shortly before sunrise to Oceania and to other areas in generally southerly and westerly directions.

Fairly good DX conditions are also expected on 80 meters. Openings with relatively strong signals should be possible from many areas of the world during the hours of darkness, with conditions expected to peak as the sun rises at the easternmost terminal of a DX path. Even the 160 meter band is expected to have its share of DX during December. Some openings are likely to take place when the transmission path is entirely in darkness, or when part of the path is in darkness and the other either in twilight or dawn.

For short-skip openings of less than 250 miles, try 80 meters during the day and 160 meters at night. Between 250 and 750 miles, the best bet is 30 and 40 meters during the day and 80 at night. Between 750 and 1300 miles, try 20 during the day, 30 and 40 during the evening, and 80 later in the evening and until sunrise. For openings between 1300 and 2300 miles, 20 meters looks best during the day, 30 and 40 during the evening to about midnight, and 80 for the remainder of the darkness hours and until sunrise. Short-skip openings should also be possible on 15 and 17 meters between distances of 1300 and 2300 miles during much of the daylight period. An increasing number of 10 and 12 meter openings should also be possible over these distances during the afternoon hours.

This month's column contains DX Propagation Charts valid through mid-February 1998. Short-Skip Propagation Charts for December 1997 appeared last month.

VHF Ionospheric Openings

Some auroral-type VHF ionospheric openings are very likely to occur during December, especially during periods of radio storminess, when HF conditions are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for days that are expected to be in these categories during December.

Expect quite a bit of meteor ionospheric activity during the month. *Geminids,* classified as a major meteor shower, should begin on December 13 with a meteor rate of about one a minute. Ionization produced by these meteors entering the Earth's atmosphere should make possible meteor-type openings on 6 and 2 meters. A second, somewhat less intense shower period is expected later in the month. Called *Ursids,* it should last from December 22–23, peaking on the 22nd. A meteor rate of approximately 15 per hour is expected during this shower.

A secondary seasonal peak in sporadic-*E* propagation usually takes place during December (the major peak occurs during the summer months). This could result in some fairly good ionospheric short-skip openings on 6 meters between distances of approximately 800 and 1400 miles. Conditions should peak during the early evening hours, but some openings may occur at other times as well.

Season's Greetings!

I would like to take this opportunity to extend my warmest wishes to all for the Holiday Season, and my best wishes for improved propagation conditions in 1998.

73, George, W3ASK

MACAO
XX9TR	57,375	204	2	43

QATAR
A71CW	229,350	382	7	59

TURKEY
*TA2DS	273,904	533	0	53

VIETNAM
XV7SW	5,320	60	0	14

EUROPE

AUSTRIA
OE9SLH	40,086	140	9	42

BALAERIC ISLANDS
EA6ACC	167,969	473	13	54

BELARUS
*EW8UN	68,502	314	0	42
EU7SD	66,992	233	3	50
*EW6BL	54,327	272	0	39
*EU4AA	50,175	214	2	43
*EW8OS	31,960	160	0	40
*EW7DX	8,900	71	0	25

BELGIUM
OT7T	933,250	1118	49	76
*ON4AEK	161,944	483	11	51
*ON4ON	118,889	372	10	51

BOSNIA
T93M	134,028	437	3	51
*T93Y	68,757	311	2	41

BULGARIA
*LZ2UZ	12,180	79	0	29

CROATIA
9A2VR	388,461	671	32	61
*9A7V	356,575	721	23	62
9A2TW	346,775	597	29	68
*9A2OO	31,120	155	0	40
*9A4RU	9,360	75	0	26
*9A3QK	7,260	67	0	22

CZECH REPUBLIC
OK1DX	424,896	800	26	70
*OK1KUW	154,971	440	12	55
*OK1DRU	144,012	422	12	54
*OK2HI	95,247	343	7	50
*OK2PCN	82,671	328	2	49
*OK2PMN	79,806	354	1	46
*OK1HGM	68,832	301	2	46
*OK1NG	45,908	214	2	44
*OK1AYY	45,724	206	1	45
*OK1DSZ	43,785	201	2	43
*OK2PWJ	40,650	159	5	45
*OK2BEJ	34,188	196	0	37
OK1DWC	33,332	122	5	47
*OK2BOB	25,124	113	4	40
*OK2PLK	24,375	129	0	39
*OK1DOL	20,910	130	1	33
*OK2BMV	20,708	138	0	31
*OK1YM	12,090	84	0	31
*OK2PGB	11,900	71	0	34

DENMARK
OZ7YY	596,128	941	36	68
OZ9Y	84,711	308	11	40
OZ5WQ	50,029	189	8	41
OZ7NB	36,621	185	2	37

ENGLAND
GØIVZ	508,434	812	43	58
G4BYG	451,878	677	38	68
G2QT	67,893	179	15	46
*GØKRL	44,010	182	9	36
*G3IGW	27,196	90	10	42
*G3ESF	20,448	127	0	32
*G6QQ	15,444	94	1	32
*G3KKQ	9,576	67	0	28

ESTONIA
ES5MC	354,312	750	16	68
*ES1CW	58,784	261	1	43
*ES5RY	5,764	51	0	22
ES1QD	4,800	40	3	17

FINLAND
OH1NOR	490,800	839	28	72
OH2BCI	241,704	506	14	67
OH8LAE	206,386	511	14	60
OH1NSJ	206,112	506	15	61
OH5VT	137,636	304	15	61
*OH1TN	137,618	382	10	57
OH1HS	113,448	371	9	49
OH2BR	92,876	273	5	57
OH1AJ	62,544	259	1	47
OH8BQT	22,866	132	0	37
*OH4LJL	16,016	76	0	44
OH3JR	13,689	62	0	39
*OH1BV	8,425	74	0	25
*OH6RC	2,565	39	0	15
OH1NOA	1,859	34	0	13

FRANCE
F6BEE	113,058	285	20	46
F6FGZ	58,320	246	1	44
*F6IRA	50,592	205	4	44
*F5PRH	46,053	210	1	42
*F3AT	33,572	142	7	37
F6HWU	32,850	140	3	42
*F2AR	14,260	90	4	27

GERMANY
DF9ZP	459,472	721	38	66
DK6WL	379,000	705	32	68
DL9YX	264,422	498	30	67
DL7MAE	190,269	463	17	64
*DJ6TK	188,838	479	21	57
*DL2OBF	181,368	516	15	57
DJ6QT	159,818	367	21	61
DK7ZT	156,002	406	19	58
DL3OI	148,866	288	27	59
DL5YM	89,889	334	6	51
*DL1JF	88,980	294	14	46
*DJ3RA	56,964	268	1	46
*DF3OL	51,360	148	7	53
*DL7ALW	50,985	250	0	45
*DK3YD	43,173	237	0	41
DJ3XD	41,830	189	7	40
*DJ2ZS	39,001	202	1	42
DL8CM	36,300	131	6	44
*DK2JP	32,120	153	1	43
*DF2IAX	32,076	210	0	36
*DL7ANQ	28,446	194	1	32
*DL1AQU/P	25,493	149	1	36
*DL3DRN	20,748	121	0	38
*DL6UKL	20,480	151	0	32
*DK7FP	17,136	111	0	34
DLØBUB	13,407	64	0	41
*DL6UAM	13,224	102	0	29
DL2GBB	13,108	100	0	29
*DJ5NN	12,510	94	0	30
*DL1IA	10,170	72	0	30
*DK6CQ	9,250	86	0	25
*DL3BZZ	8,775	77	0	27
*DL6UAA	7,968	69	0	24
*DL2AWA	7,056	75	0	21
DJ2IA	5,880	42	0	30
*DL2DRM	4,536	45	0	21
DL5RBW	4,040	22	9	11
*DL4AMA	2,147	25	0	19
DL4KUG/QRP	1,694	26	0	14
*DL2JRM	1,386	21	0	14
*DK9KW	972	18	0	12

GREECE
*SV1NA	16,456	94	0	34

HUNGARY
*HA8BE	265,842	590	18	63
*HA8FM	221,701	539	13	60
*HA8XX	70,928	285	2	50
*HG6V	52,871	201	7	42
*HA8AT	40,033	186	0	43
*HAØHW	29,358	142	0	42

ICELAND
*TF3KX	15,542	82	5	33

ITALY
*IK2VUE	181,962	535	8	58
*IØZUT	100,254	301	10	52
*IKØSHF	72,750	290	2	48
I3VHO	23,575	103	8	33
*I4JEE	3,486	35	0	21
IK2VJF	2,720	34	0	17
*IØKHP	1,008	15	3	9

ITU GENEVA
4U1ITU	3,600	45	0	16

KALININGRAD
UA2FJ	650,624	1050	34	70
*RA2FZ	131,761	519	1	48

LATVIA
YL2SM	244,368	630	12	60
*YL2UZ	16,957	105	0	31
YL1ZF/QRP	8,600	70	0	25

LITHUANIA
LY2ZZ	500,388	854	31	67
LY3AV	155,776	452	7	57
*LY3ID	123,684	343	13	53
*LY2FN	118,446	398	4	53
LY1DR	100,968	322	2	54
LY3BU	86,245	361	3	44
*LY3JY	71,939	360	0	43
*LY3BA	67,252	284	2	44
LY2TX	46,998	225	1	41
*LY2OU	27,056	141	0	38
LY2CX	20,460	140	0	30
LY1DS	15,925	87	3	32
LY1FW	2,064	24	0	16

MACEDONIA
Z31RQ	270,618	647	18	56
*Z31GX	80,704	292	1	51

MOLDAVA
ER5DX	112,761	419	1	50
ER5GB	90,117	292	3	54
ER2GR	42,312	190	1	42

NETHERLANDS
PA3DMH	67,536	222	8	48
*PA3FNE	45,570	215	1	41
*PAØXAW	30,624	130	7	37
PAØLOU	21,372	108	1	38
PA3BUD	20,163	100	1	38
*PAØCYW	17,034	100	0	34
*PA3AFF	15,606	91	0	34
PA3BBP	15,260	78	4	31
*PI4ALK	7,152	62	0	24
*PA3ASC	6,417	57	0	23
*PAØINA	1,305	18	0	15

NORWAY
LA9VDA	451,141	863	28	61
LA6MP	96,390	278	8	55
*LA2O	58,604	247	3	43
LA7AK	36,564	153	7	37
*LA5LJA	30,870	128	4	41
*LA8WG	29,232	112	4	44
LA2KD	25,493	80	6	47
*LA4EJ	3,230	34	0	19

POLAND
SN5W	497,490	808	33	70
SP7GIQ	461,340	790	31	68
SP5CJQ	208,320	462	19	61
*SP5ZIM	196,846	556	12	55
*SP2QCH	141,904	494	2	54
*SP2EWQ	121,940	329	15	52
*SP5GH	48,000	155	9	51
*SP3IOE	39,444	202	5	33
*SP3NX	30,780	124	5	40
*SP6MLX	15,244	82	0	37
SP9AGS	14,896	111	0	28
*SP1MHV	13,612	62	0	41
*SP8TDE	10,640	79	0	28
*SP4KSY	8,225	62	0	25
*SP7GAQ	950	12	0	10

PORTUGAL
CT8T	353,556	586	37	55

ROMANIA
YO3AC	94,449	304	6	51
YO8FR	68,130	252	0	45
*YO3APJ	66,493	203	9	50
*YO6BHN	45,675	197	0	45
*YO4BBH	29,964	180	0	33
YO4FRF/QRP	22,134	125	1	33
YO2CJX/QRP	4,968	40	0	24

RUSSIA
*RV1CC	146,112	426	6	58
UA6AF	140,306	346	8	65
RX3APM	127,167	423	2	55
RA4NW	125,904	331	4	57
*RA1QA	106,535	364	2	53
RW4PL	104,252	263	3	64
*UA1QV	93,170	325	2	53
*RU1AO	85,965	298	1	54
RX6LMK	77,571	292	1	50
UA4SO	73,083	228	2	49
*UA4FAO	69,420	254	1	51
*UA1TGA	44,748	292	1	32
UA1ODN	4,239	27	0	27
*UA4ANZ	2,412	40	0	12
RA1OHU	1,644	26	0	12

SCOTLAND
GM3YOR	739,584	985	47	61

SLOVAKIA
OM5DX	371,735	689	28	63
OMØWR	220,710	590	12	58
OM8FF	208,556	573	10	58
*OM3TLO	103,936	346	7	51
*OM3WQQ	33,759	212	0	33
OM7PY/QRP	12,256	78	0	32

SLOVENIA
S58MC	455,712	745	35	66
S5ØA	342,366	730	19	67
S53R	317,610	614	23	67
S57M	279,774	629	25	56
S59AA	266,172	586	22	60
*S53G	197,750	542	15	55
*S57DX	150,085	443	12	53
S57J	122,326	381	9	53
*S51F	120,441	420	7	50
S57W	115,245	335	15	50
S54X	110,936	386	4	52
*S5ØU	96,606	362	0	54
*S5ØQ	94,824	352	4	50
*S53O	81,224	315	1	51
S59L	63,090	288	0	45
*S56A	54,537	231	0	49
S53EA	47,880	219	2	43
S59D/QRP	41,448	197	1	43
S55A	36,630	169	1	44
*S57U	31,040	168	0	40

SPAIN
EA3KU	678,720	900	46	66
*EA7EZ	109,368	233	25	47
*EA3ALN	17,714	99	3	31
*EA5FID	5,658	50	0	23
*EA5AAJ	2,235	30	0	15

SWEDEN
SM4HCM	429,800	719	31	69
*SM6CTQ	164,388	365	18	58
SM3LGO	78,360	239	10	50
SM5COP	10,050	69	0	30
*SM7BZV	3,280	34	0	20

SWITZERLAND
HB9DCM	55,230	114	22	48
HB9FAX	31,140	207	0	30
*HB9ARF	29,561	142	1	40
*HB9CRV	28,770	166	0	35

UKRAINE
UT4UZ	251,600	638	11	63
UUØJM	206,042	559	2	69
*UY1HY	124,344	353	8	58
*UR7QC	104,274	371	1	53
UYØZG	98,056	343	1	55
*UT1FA	93,554	315	3	55
UX2MF	91,112	318	3	53
*UT7I	89,305	324	0	53
*UY2ZA	82,885	291	0	55
UX8IX/QRP	69,368	257	0	52
UX3ZW	69,050	279	0	50
*UU2JA	61,003	221	0	53
UT8IM	58,788	255	2	44
UX7IA	55,909	223	2	47
UR5U	55,692	222	1	51
*UX5EF	50,355	233	0	45
*UX3M	48,117	228	0	43
UR5NMM	46,992	187	1	47
*UR5IBG	39,732	190	0	43
UT8IT/QRP	38,950	183	0	41
*UT5JAJ	38,832	159	0	48
UY5VA/QRP	35,217	164	0	39
*UT4PR	31,201	156	0	41
*UY5TE	29,906	166	0	38
UT9IR	27,048	125	0	42
U5MZ/QRP	23,834	146	0	34
*UR5ZCL	12,015	102	0	45
*UR5MB	10,935	84	0	27
*UR5EIT	7,632	60	0	24
*UR4MWU	7,480	73	0	22

WALES
GW4VEQ	828,240	1102	49	70

YUGOSLAVIA
*YU7BJ	321,768	701	17	65
YU1GN/QRP	28,527	151	0	37
YU1EA/QRP	4,140	42	0	20
*YU7SF	1,062	26	0	9

OCEANIA

AUSTRALIA
VK3IO	26,048	75	19	18

HAWAII
KH6CC	238,206	426	50	8

INDONESIA
*YCØLOW	40	2	0	2

PHILIPPINES
DU1KK	1,232	13	0	11

WESTERN CAROLINES
KC6VW	112,710	295	5	34

SOUTH AMERICA

ARUBA
P4ØWA	1,035,776	874	55	64
P49I	970,680	814	55	65

BRAZIL
*PY1BVY	200	5	2	3

NETHERLANDS ANTILLES
PJ9JT	205,450	295	48	22

CW
MULTI-OPERATOR
NORTH AMERICA
UNITED STATES

MASSACHUSETTS
N1BB	555,960	1080	54	59
K1RV	11,234	121	38	3

NEW HAMPSHIRE
NE1I	38,338	237	41	17

RHODE ISLAND
W1OP	76,176	414	43	26

NEW JERSEY
WW2Y	797,607	1360	57	72
W2GD	696,000	1391	57	68
K2WS	182,528	573	49	43
W2YC	75,686	313	52	30
K2BM	56,137	225	43	30
K2FL	54,036	226	50	26
W2XN	28,795	127	40	25
K3JGJ	19,910	122	43	12
K2SB	10,582	118	30	7
N2VW	6,336	93	32	0
AJ2U	2,244	48	22	0

NEW YORK
AA2MF	53,625	310	46	19
K2QMF	18,045	107	22	23
W6TER	16,676	153	36	8
K2BX	8,316	105	36	0

MARYLAND
N3OC	356,400	988	57	53
K3MM	92,655	309	51	36

PENNSYLVANIA
K3WW	406,336	1045	56	56
K3CR	365,505	1087	56	49
W3GH	249,736	827	60	46
AA3B	142,506	626	55	32
WY3T	114,683	672	55	18
W3MM	110,075	465	53	32
W3FV	102,984	352	50	34
NE3F	90,464	273	48	40
N3MKZ	73,073	201	49	42
K3ATO	49,280	386	46	9
WT3W	32,640	160	44	20
K3ND	31,842	133	34	27
K3II	19,812	140	41	11
K3ANS	15,800	172	35	5
K3CP	15,330	162	38	4
KB3TS	8,474	86	33	5
NY3Y	1,148	41	14	0
K3AR	154	11	7	0

GEORGIA
W4WA	321,860	936	57	53
NQ4I	241,800	820	57	43
K4OY	188,734	720	52	39
K2UFT	3,075	46	21	4

KENTUCKY
W4CN	18,737	214	38	3

NORTH CAROLINA
K3KO	80,656	434	45	26

SOUTH CAROLINA
AA4V	197,703	709	57	42

ARKANSAS
AB5SE	51,420	383	52	8

TEXAS
AC5HF	38,285	230	51	14

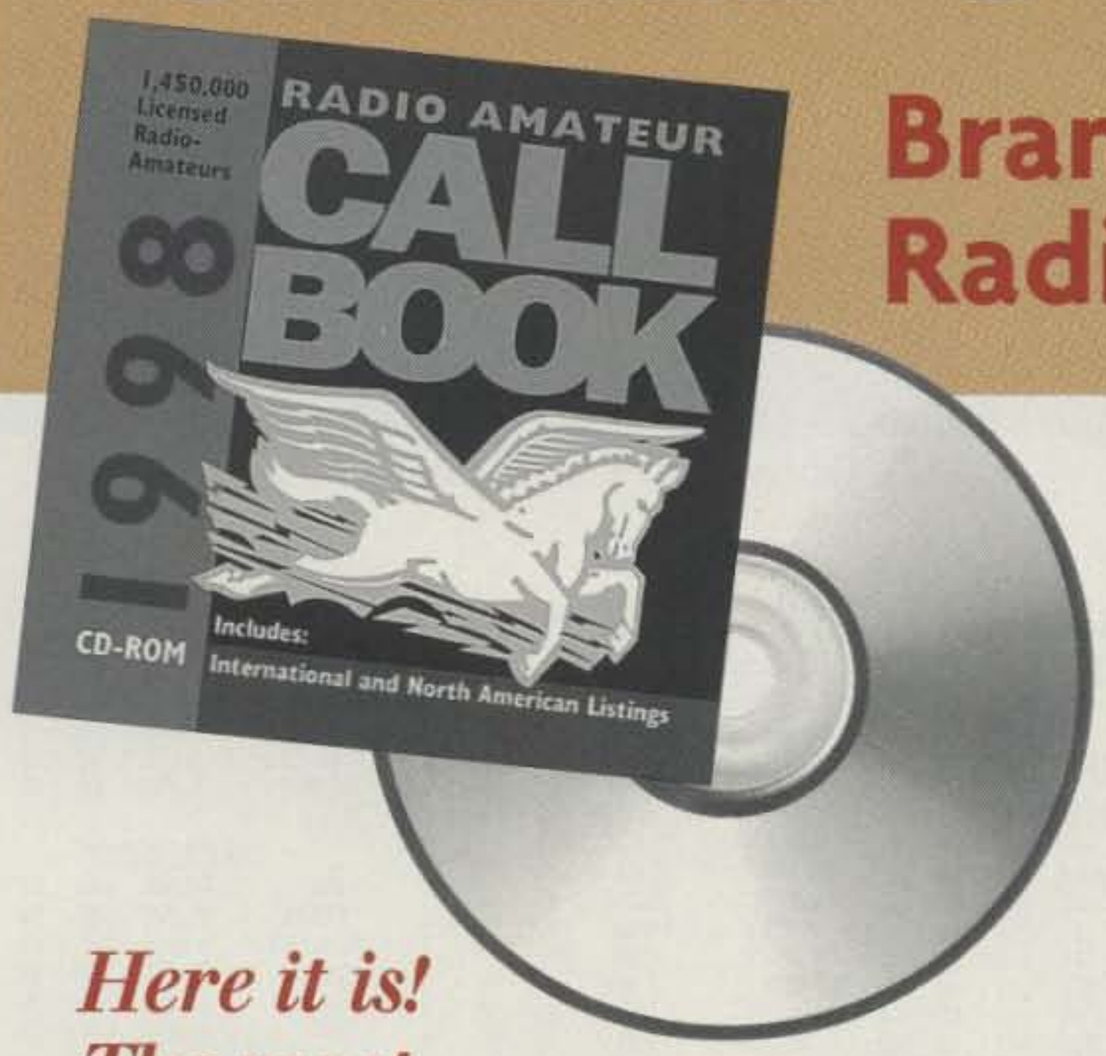
CALIFORNIA
N6KI	68,864	428	52	12

NEVADA
K6GNX	71,264	361	51	17

OREGON
K7VS	61,366	401	50	11

UTAH
N7JW	239,372	852	56	27
KO7X	71,568	481	53	10
NS7K	48,556	341	53	8
NG7M	35,904	311	46	5

RADIO AMATEUR
CALLBOOK 1998



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- Search international data by callsign or text search by name, street, city, province or region after selection of country
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CIRCLE 137 ON READER SERVICE CARD

WASHINGTON

K87N	**78,474**	**463**	**54**	**12**

WYOMING

WC7M	**135,100**	**813**	**55**	**15**

MICHIGAN

NU8Z	**370,682**	**1054**	**57**	**49**
WØCD	294,528	927	57	47
W8WA	233,632	739	54	44

OHIO

W8FT	**169,400**	**724**	**57**	**31**
N8TR	71,400	218	46	38

WEST VIRGINIA

W8BAR	**78,810**	**404**	**52**	**22**

ILLINOIS

NM9H	**230,454**	**859**	**57**	**36**
K9BG	175,376	560	57	40

INDIANA

NZ9R	**62,756**	**489**	**51**	**7**

COLORADO

KØUK	**56,576**	**361**	**52**	**12**

IOWA

NØNI	**248,736**	**949**	**57**	**39**
KEØFT	60,000	458	55	5

KANSAS

NJ8M	**83,766**	**523**	**55**	**14**
KØTQ	44,658	370	51	3

MINNESOTA

WØJH	**31,428**	**250**	**50**	**4**

MISSOURI

KØLIR	**94,815**	**670**	**52**	**11**

CANADA

ONTARIO

VE3DC	**154,972**	**457**	**53**	**15**

ALBERTA

VE6AO	**79,288**	**314**	**51**	**2**

PUERTO RICO

KP4/K4UJ	**298,015**	**512**	**52**	**43**

ASIA

JAPAN

JA1YXP	**64,125**	**163**	**25**	**32**

TURKEY

TA2FE	**164,824**	**387**	**0**	**44**

EUROPE

ALAND ISLANDS

OHØAM	**359,640**	**913**	**14**	**60**

AUSTRIA

OE5X	**316,224**	**708**	**14**	**57**
OE6U	104,900	407	9	41
OE1W	8,976	76	0	24

BELARUS

EU5F	**202,419**	**591**	**7**	**56**
EW5P	195,558	568	8	58

CROATIA

9A1A	**666,813**	**981**	**39**	**74**

CZECH REPUBLIC

OK5W	**525,852**	**818**	**38**	**70**
OK1RAK	377,022	737	31	62
OK5TOP	355,725	682	25	68
OK1KJA	117,174	404	7	52
OK1KUO	107,590	375	6	52
OK1OKE	100,874	319	10	52

ENGLAND

G3VGG/P	**180,257**	**420**	**19**	**58**

FINLAND

OH2HE	**621,161**	**927**	**40**	**73**
OH4AB	197,271	528	11	58
OH2OT	100,435	381	2	51

FRANCE

F5GHP	**287,718**	**602**	**27**	**52**

GERMANY

DK1NO	**594,550**	**890**	**40**	**70**
DKØSU	**315,270**	**647**	**30**	**63**
DKØE	274,120	623	25	64
DLØKF	272,700	589	28	62
DJ5CL	266,679	611	24	59
DKØIW	205,321	488	22	57
DK5MV	183,384	426	18	63
DFØRU	111,048	447	7	49
DL2MDZ	110,538	306	7	62
DFØWD	106,370	428	6	49
DKØFFO	55,212	279	1	42
DFØDFA	53,606	236	5	44

GUERNSEY

GU3HFN	**380,234**	**847**	**27**	**55**

HUNGARY

HG1S	**457,928**	**827**	**29**	**68**
HG5A	396,768	737	25	71

ICELAND

TF3IRA	**61,241**	**255**	**4**	**43**

ITALY

I4JMY	**604,173**	**884**	**42**	**69**
I4IKW	257,210	551	21	64
IK2MMF	219,527	537	17	60
IK2HDG	150,348	402	14	54

KALININGRAD

RW2F	**653,072**	**975**	**35**	**77**

LITHUANIA

LY3BS	**335,665**	**695**	**18**	**67**
LY7A	199,124	556	7	60
LY3AV	155,776	452	10	54
LY2BWJ	2,754	36	0	17

NETHERLANDS

PI4COM	**304,024**	**591**	**27**	**62**
PI4ZLD	206,778	594	12	54
PA3BAS	159,040	320	28	52

NORWAY

LA8SDA	**281,556**	**648**	**19**	**60**

POLAND

SN3A	**597,480**	**976**	**36**	**68**

RHODES

J45T	**181,012**	**564**	**4**	**55**

ROMANIA

YO2V	**141,858**	**518**	**1**	**53**

RUSSIA

RW6AWT	**210,156**	**446**	**14**	**69**
RK1OWZ	110,715	365	0	55
RX3RXX	83,500	327	0	50
RK6AYN	74,952	260	0	54

SLOVAKIA

OM7A	**552,183**	**897**	**33**	**70**
OM7M	496,288	771	33	71
OM3KII	112,148	421	1	52

SLOVENIA

S53X	**205,874**	**471**	**21**	**58**
S57Q	191,310	526	11	59

SPAIN

EA4ML	**126,208**	**336**	**19**	**49**

SWEDEN

SL3ZV	**464,530**	**774**	**31**	**72**
SM5HJZ	446,046	758	32	70
SK1BL	392,673	877	20	63
SK6QW	255,719	637	20	53
SK6NP	51,114	241	2	40
SK6NL	18,180	98	2	34

SWITZERLAND

HB9LCW	**105,456**	**439**	**0**	**48**

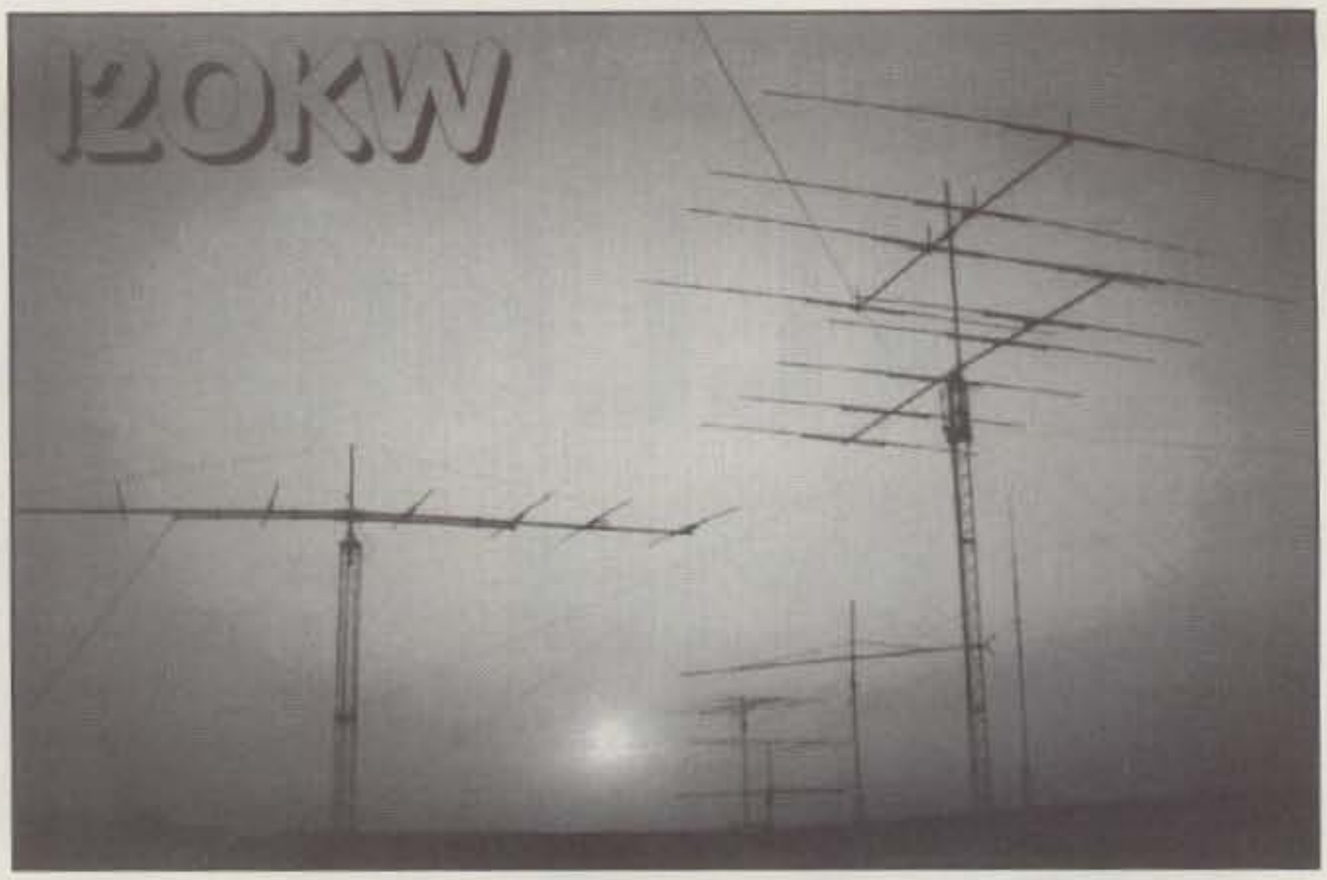
UKRAINE

URØI	**192,089**	**466**	**8**	**59**
UR4EYT	101,964	336	3	55
UT4UXW	2,091	21	0	17

YUGOSLAVIA

YU7KW	**251,407**	**534**	**16**	**67**

CW CHECK LOGS: Thanks to the following stations for their valuable check logs for CW: DK5RK, DL5SVB, DL6AXI, EA5OT, G8PW, GW3SYL, HA7PW, LA4NE, LA5QC, LZ3AB, N2AKZ, N6HC, OH1XX, OH5PT, OH6RC, OZ5PA, PAØUV, RX3DRU, SM5BFJ, SP6DMJ, VE3BR, YO6LV.



Sunset at I2OKW, Low Power SSB winner for Italy.

SSB RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

CONNECTICUT

K1VW	**179,960**	**809**	**55**	**33**
***K1PX**	**158,004**	**911**	**56**	**20**
N1HRA	81,863	491	56	15
*WA1UUD	51,180	387	51	9
WA1LJD	42,174	348	47	7
*AB1U	35,868	247	49	12
*WV1C	30,160	265	48	4
N1TM/QRP	**22,532**	**240**	**38**	**5**

MASSACHUSETTS

K5ZD	**64,972**	**287**	**47**	**27**
***WG1Z**	**37,072**	**292**	**49**	**7**
KA1DWX	27,657	142	45	18
*WO1N	25,599	208	44	9
*W1TE	24,700	218	42	8
W1AA	12,987	156	35	2
*N1IO	11,895	135	36	3
K1DX	5,278	82	26	3
AA1ON	4,114	79	20	2
KA1VY	3,297	77	20	1
N1BB	938	32	14	0

MAINE

W1CER	**23,036**	**166**	**45**	**7**
N1CGP	17,904	163	42	6
N1AFC/QRP	477	25	9	0
*N1IME	50	5	5	0

NEW HAMPSHIRE

***WA1LNP**	**157,014**	**866**	**57**	**21**
K1HAP	72,144	390	51	21
WQ1H	6,479	97	28	3

RHODE ISLAND

K1MFZ	**103,017**	**655**	**53**	**16**
***K2MN**	**11,316**	**129**	**39**	**2**
KD1IA	6,358	79	30	4

NEW JERSEY

N2EE	**117,093**	**746**	**53**	**16**
KD2KS	58,058	451	50	8
KB2BF	39,788	301	48	10
***K1NK**	**31,088**	**227**	**48**	**10**
N7UN/2	26,406	211	47	7
N2KJM	26,214	229	45	6
WA2VYA	22,000	222	38	6
*K2SZ	21,165	180	45	6
W1GD	20,776	140	43	13
*N2NYR	10,440	116	37	3
W2EN	10,320	150	28	2
*K2JLA	5,516	91	27	1
*W5KI	4,525	86	25	0
*WA2QZQ	3,542	74	23	0
*NA2U	2,592	69	18	0
N2TTT	2,001	42	22	1
*K2WB	1,159	29	19	0
*W2ORA	1,152	29	18	0
*W2UL	256	16	8	0

NEW YORK

W2RE	**184,353**	**871**	**56**	**31**
WA2IZL	**100,650**	**549**	**53**	**22**
NA2A	94,016	657	54	10
KA2PHQ	63,684	499	52	6
***KA2CDJ**	**55,242**	**378**	**50**	**12**
W2SF	41,259	366	44	7
NA2Q	41,075	350	48	5
*KG2AU	28,028	239	46	6
*K2UF	25,857	216	45	6
*AA2GS	24,728	257	41	3
W2UD	23,856	228	45	3
WR2V	16,318	187	40	1
*KF2EY	10,500	131	33	2
*N2LQQ	8,880	105	39	1
*KQ2U	7,936	114	31	1
*K2CS	5,518	80	30	1
*N2VAH	3,915	66	29	0
*W2XL	1,133	50	11	0

DELAWARE

NW3Y	**73,150**	**432**	**51**	**19**
AA1K	58,575	302	52	19
***NY3C**	**13,608**	**173**	**35**	**1**
*W3DA	12,987	150	36	3

MARYLAND

N3HBX	**189,504**	**42**	**56**	**28**
***WK3I**	**36,888**	**290**	**51**	**7**
*W3UR	29,400	271	42	7
*W3CP	12,246	145	36	3
K3VY	6,840	109	30	0

PENNSYLVANIA

K3CR	**321,167**	**1317**	**58**	**39**
W3GH	**244,630**	**1209**	**57**	**28**
W3TS	164,410	826	57	25
N3MKZ	151,060	744	55	28
W3BGN	55,488	315	46	22
***NY3Y**	**51,060**	**378**	**54**	**6**
K4JLD	27,440	203	47	9
*KA3SDP	25,620	278	39	3
*K3SWZ	25,502	292	38	3
*W3UHP	15,390	159	43	2
N3GSC	11,362	102	39	7
W3MF	10,824	110	40	4
K3TEJ	10,480	118	35	5
*W3EHZ	8,460	116	36	0
*W3ZA	5,022	75	31	0
K3ND	3,807	60	24	3

ALABAMA

K4JYO	**221,241**	**1045**	**57**	**30**
W4NTI	38,369	265	51	10
W4DEC/QRP	**4,920**	**72**	**28**	**2**

FLORIDA

AA4MM	**132,388**	**501**	**55**	**37**
K9HUY	28,202	196	50	9
K4LM	26,550	186	49	10
N8PR	25,620	173	49	12
KB1HC	14,363	99	38	15
***K4LDR**	**11,704**	**113**	**39**	**5**
N4EK	9,976	107	39	4
*KK4RV	1,264	38	16	0

GEORGIA

W4WA	**389,760**	**1423**	**56**	**49**
K4PI	**104,566**	**486**	**54**	**23**
K4UJ	98,739	616	54	15
K4WA	72,556	468	53	15
WD4JRA	35,784	166	50	21
K4ODL	30,561	191	46	15
KE4LDJ	17,850	146	39	11
W4DMB	12,480	117	45	3
W4GTS	8,772	93	39	4
N4XMX	3,360	50	28	2

KENTUCKY

K4UZ	**74,340**	**535**	**57**	**6**
***KT4ZX**	**72,275**	**555**	**54**	**5**
KC4DWT	61,929	442	53	10
N1PUW	48,849	390	50	7
*W4LC	31,458	300	45	4
KY4DX	4,410	65	28	2

NORTH CAROLINA

***WA4ZXA**	**184,149**	**1014**	**56**	**23**
*N2NFG	55,696	423	50	9
KC4YM	31,860	231	47	12
KO4MM	20,064	183	41	7
N4UH	10,710	114	38	4
*KS4XG	4,582	76	29	0

SOUTH CAROLINA

K4YYL	**119,350**	**765**	**54**	**16**

TENNESSEE

AA4NU	**167,166**	**986**	**56**	**18**
***KF4ZR**	**45,430**	**395**	**46**	**9**
N4ZZ	28,035	285	42	3
KØEJ	26,743	262	46	1
*N5OR	24,528	238	47	1

VIRGINIA

K4ZW	**78,848**	**540**	**53**	**11**
W4JVN	69,345	436	50	17
***K4PK**	**15,678**	**186**	**34**	**5**
K3OSX	13,038	133	34	7
*K4UK	7,986	115	32	1
K4VV	7,067	80	34	3
N4MM	5,950	76	33	2
*WB4DNL	2,208	43	24	0

ARKANSAS

***AB5SE**	**27,348**	**235**	**49**	**4**
*KG5NE	17,914	147	48	5

LOUISIANA

AE5T	**80,642**	**601**	**53**	**8**
***N5MYH**	**12,060**	**118**	**43**	**2**
W5OT	11,817	136	35	4

NEW MEXICO

***N5IA**	**128,180**	**822**	**55**	**13**

OKLAHOMA

***WD5CSK**	**17,350**	**163**	**49**	**1**
N5OHL	13,992	147	43	1

TEXAS

N5JA	**331,488**	**1330**	**57**	**39**
N5LZ	59,841	448	50	11
***KO5D**	**51,805**	**338**	**54**	**11**
*N5HRG	33,611	231	52	9
*KF5YZ	31,080	212	52	8

W5ASP	18,576	200	40	3
*K5EM	12,690	107	41	6
*WK5K	11,088	126	40	2
K5UO	7,612	76	40	4
*K5UCV	5,920	74	36	1
*KC5WJM	1,425	36	18	1
*K5RA	950	22	18	1

CALIFORNIA

K6SE	**61,566**	**411**	**52**	**10**
K6HNZ	59,086	367	53	9
W7CB/6	54,168	372	52	9
***N6CMF**	**32,775**	**244**	**51**	**6**
KG6AO	29,288	218	51	5
N5KO/6	22,100	157	42	8
*WA6FGV	21,200	202	47	3
*W6CN	10,780	100	41	3
K6MO	6,534	78	30	3
*N6NF	6,222	67	31	3
WA5VGI	4,624	58	31	3
W6HG	3,800	43	39	1
*WB6NFO	3,161	53	28	1
*KI6PG	3,132	44	26	3
*N6HY	3,132	51	28	1
*KU6T	2,323	45	21	2
*AA6EE	60	6	3	1

ARIZONA

W7AH	**58,056**	**440**	**51**	**8**
NF7E	48,124	406	51	2
K6TIM	29,700	243	52	3
W7YS	17,800	155	48	2
KA7TDH	8,784	113	35	1
KE7GH	1,040	28	15	1

IDAHO

KE7BT	**115,709**	**733**	**56**	**11**

MONTANA

N9ITX	**146,454**	**977**	**56**	**10**
K7BG	53,741	369	55	6

OREGON

W7AT	**101,036**	**581**	**54**	**13**
***W7JXU**	**15,796**	**149**	**41**	**3**
*W7YAQ	2,678	40	23	3

UTAH

KO7X	**52,687**	**381**	**52**	**7**
W7HS	22,589	204	47	2
***NS7K**	**13,132**	**116**	**48**	**1**

WASHINGTON

***WA7STA**	**3,096**	**50**	**22**	**2**

WYOMING

WA7KYM	**80,896**	**563**	**53**	**11**
N7JT	9,900	95	35	10
AF7E/QRP	**6,948**	**95**	**35**	**1**
NQ7Q/QRP	3,096	60	23	1

MICHIGAN

KG8CW	**194,419**	**1023**	**57**	**22**
***AA8R**	**73,600**	**516**	**56**	**8**
*W8MJ	73,080	504	51	12
*KG8HD	27,280	227	51	4
*K8GVK	7,632	100	36	0
*KB8IBS	5,053	77	31	0
*KT8X	2,775	51	25	0

OHIO

K8LN	**177,947**	**1006**	**55**	**22**
***WD8SDL**	**43,416**	**364**	**49**	**5**
K8MR	38,718	329	49	5
*K8SVT	31,460	254	50	5
K8DI	30,816	295	44	4
*W8OS	26,509	250	46	3
*NA8W	18,768	160	44	7
N8XA/QRP	**11,676**	**133**	**42**	**0**
*KC8CPY	8,400	117	35	0
*N8WS	3,996	71	27	0
*W8IDM	2,163	50	21	0

WEST VIRGINIA

WA3HQK	**67,851**	**513**	**54**	**9**
***K2UOP/8**	**53,360**	**416**	**47**	**11**
*N8II	16,264	196	36	2

ILLINOIS

WB9Z	**403,845**	**1728**	**57**	**38**
K9NR	95,427	586	54	15
***N9VVV**	**69,052**	**513**	**54**	**7**
N2BJ	51,388	434	53	5
*WO9S	25,650	207	48	6
*K9LUW	23,504	205	50	2
*AA9DM	18,432	179	46	2
KW9KW	18,309	155	45	6
*K9MMS	13,377	120	47	2
K9ZZE	8,840	105	38	2
*KA9AGS	2,581	43	29	0
*KA9RTV	2,256	44	24	0

INDIANA

***KBØC**	**47,574**	**418**	**52**	**2**
W9RE	16,368	150	43	5
*KJ9C	15,975	167	43	2
WA2KVX	7,844	100	37	0
*WB9NOO	451	19	11	0

WISCONSIN

WØAIH	**158,838**	**994**	**54**	**15**
WE9V	72,933	430	53	16
***WA1UJU**	**45,686**	**401**	**52**	**1**
*K9OSH	9,540	100	44	1
WD9IAB/QRP	**2,688**	**56**	**24**	**0**

COLORADO

W2FCR	**40,077**	**275**	**53**	**8**
***KØUK**	**27,738**	**266**	**44**	**2**
KØZA	17,952	158	45	3
NØRUV	4,544	62	31	1

IOWA

***AAØMQ**	**43,092**	**348**	**54**	**3**
KØXD	9,990	105	44	1

KANSAS

WØCEM	**29,150**	**247**	**49**	**4**
NIØS	11,280	110	46	2
WØSPF	4,061	61	30	1

MINNESOTA

***KCØZC**	**54,093**	**441**	**54**	**3**
KGØJP	14,076	144	45	1
WØHW	9,945	100	44	1
*K9WIE	8,446	91	40	1

MISSOURI

NXØI	**280,160**	**1378**	**58**	**27**
***KØJPL**	**14,899**	**151**	**46**	**1**

CANADA

NEW BRUNSWICK

VE9ZL	**12,384**	**108**	**23**	**1**

QUEBEC

***VE2AWR**	**14,268**	**102**	**29**	**0**

ONTARIO

VE3EJ	**724,978**	**1501**	**58**	**39**
VE3XN	128,538	351	56	18
VE3ZTH	6,554	47	28	1
*VE3BFM	3,654	36	21	0

SASKATCHEWAN

***VE5VL**	**26,144**	**128**	**40**	**3**
*VE5SF	13,490	74	37	1

ALBERTA

VE6JY	**78,324**	**273**	**53**	**8**
VE6SV	35,045	175	38	5
***VE6IM**	**24,192**	**131**	**38**	**4**
*VE6CKG	22,425	119	37	2
*VE6NTT	14,110	89	33	1
VE6ARC	390	16	6	0

BRITISH COLUMBIA

VE7NS	**85,550**	**304**	**52**	**7**
***VE7XF**	**13,685**	**81**	**32**	**3**

ALASKA

KL7Y	**36,800**	**147**	**36**	**10**

BARBADOS

***8P9CK**	**60**	**3**	**1**	**2**

BRITISH VIRGIN ISLANDS

***VP2V/KK9A**	**2,667**	**25**	**14**	**7**
*VP2V/K1DW	570	11	1	9

CUBA

***CO2GG**	**84,018**	**296**	**47**	**10**

MEXICO

***XE2DV**	**48,060**	**215**	**43**	**2**

PUERTO RICO

***WP4LNY**	**768**	**16**	**12**	**4**

ST. KITTS

V47KP	**507,725**	**732**	**55**	**60**

TURKS AND CAICOS

VP5JP	**187,760**	**450**	**52**	**28**

AFRICA

UGANDA

5X4F	**300**	**6**	**2**	**3**

ASIA

ARMENIA

EK6GC	**478,458**	**944**	**0**	**57**

ASIATIC RUSSIA

UA9MA	**396,096**	**1169**	**0**	**48**
***UA9MR**	**30,432**	**119**	**0**	**32**
UAØZAZ	9,450	58	10	8

CYPRUS

5B4MF	**150,124**	**298**	**1**	**51**

KAZAKH REPUBLIC

***UN2O**	**117,863**	**311**	**0**	**43**

TURKEY

***TA2DS**	**145,900**	**306**	**2**	**48**
TA3W	17,181	79	0	23

EUROPE

AUSTRIA

OE9MON	**68,832**	**285**	**2**	**46**

AZORES

CU2CE	**248,800**	**409**	**35**	**45**

BELARUS

EW4MM	**82,560**	**363**	**0**	**43**
***EW5P**	**47,880**	**210**	**0**	**45**
*EU4AE	45,474	227	0	39
*EW7DX	7,725	61	0	25

BELGIUM

OT7T	**245,836**	**516**	**23**	**59**
***ON4BR**	**24,467**	**104**	**10**	**33**

CROATIA

9A2VR	**204,516**	**544**	**14**	**55**
9A2TW	89,420	230	16	52
*9A4RU	3,258	38	0	18

CZECH REPUBLIC

OK1CM	**131,936**	**411**	**10**	**52**
***OK1NG**	**50,955**	**246**	**3**	**40**
OK2PCN	11,313	86	0	27
OK1FF	8,875	73	0	25
*OK1DOL	4,199	57	0	17

DENMARK

OZ3SK	**105,846**	**340**	**10**	**49**
OZ5EV	31,863	142	1	42

ESTONIA

***ES5RY**	**43,852**	**220**	**0**	**38**
ES6MO/QRP	**7,656**	**43**	**0**	**33**

FRANCE

F5BBD	**30,788**	**131**	**5**	**38**
***F5BEG**	**13,143**	**77**	**9**	**30**

CIRCLE 43 ON READER SERVICE CARD

(Left to right) Yuri, N2EE/K3BU, New Jersey Low Power CW winner, with Jack, VE1ZZ.

GERMANY

DJ6QT	**127,530**	**405**	**12**	**53**
DL8PC	**112,667**	**382**	**12**	**49**
DL7MAE	69,939	246	10	47
DL6RAI	39,270	200	0	42
***DL1SWB**	**27,729**	**170**	**0**	**39**
*DL2HX	23,946	139	5	34
*DK5VO	21,774	126	0	38
*DJ6TK	9,492	71	5	23
DJ2YE	6,750	60	0	25
*DL3DRN	4,620	45	0	22

GREECE

SV1CER/QRP	**10,416**	**64**	**0**	**31**

ITALY

IØSNY	**95,727**	**394**	**3**	**48**
IK4MTK	66,144	283	1	47
***I2OKW**	**33,435**	**150**	**1**	**44**
*IØKHP	21,600	92	5	40
IK8JVU	12,896	87	0	31
IKØX8X/QRP	**8,190**	**53**	**2**	**28**
*IK2ANI	7,618	40	0	26
*IK3OII	2,850	32	0	19
*IK3PQG	2,000	28	0	16
IK2VJF	145	7	0	5

KALININGRAD

UA2FJ	**317,623**	**804**	**13**	**60**
***RA2FZ**	**30,384**	**165**	**0**	**36**

LATVIA

YL2SM	**67,528**	**282**	**0**	**46**

LITHUANIA

LY3BS	**213,136**	**721**	**2**	**54**
LY1DT	**115,003**	**453**	**2**	**47**
LY3CI	41,457	209	1	38
LY1FW	38,184	203	0	37
***LY2OU**	**24,282**	**131**	**1**	**37**
*LY2FN	19,158	126	0	31
*LY2TX	16,802	114	0	31
*LY3BA	14,070	95	0	30
LY1DS	10,557	81	0	27
LY3DA	6,615	49	0	27
LY2CX	6,072	52	0	24

MOLDAVA

ER5DX	**68,256**	**271**	**0**	**48**
ER2GR	31,794	140	1	41

NORTHERN IRELAND

GIØUJG	**504,391**	**805**	**36**	**67**

NETHERLANDS

PAØIJM	**57,078**	**267**	**1**	**41**
*PA3GKE	4,240	43	0	20

NORWAY

***LA5LJA**	**6,480**	**48**	**0**	**27**
LA5YV	3,440	35	0	20

POLAND

SP2FAX	**181,805**	**527**	**11**	**54**
SP5VYI	62,550	276	0	45
***SP2QCH**	**23,902**	**121**	**0**	**38**
*SP3JHY	11,310	76	0	30
*SP2EWQ	8,343	61	0	27
*SP9HZF	8,000	65	0	25
*SP4SAF	4,074	38	0	21
*SP2BOQ	3,781	47	0	19

PORTUGAL

***CT1AVR**	**1,515**	**20**	**0**	**15**

RUSSIA

***RA4NW**	**129,792**	**515**	**0**	**48**
*RA3WA	95,128	431	0	47
*RV1CC	68,130	309	0	45
*UA4FAO	29,193	154	0	37
*UA1OMX	19,569	117	0	33
RA4CC	16,302	97	0	33
*RU1AO	14,110	82	0	34
UA3LGJ/QRP	**6,816**	**61**	**0**	**24**
*UA3RCM	3,419	58	0	13

SARDINIA

ISØQDV	**52,515**	**226**	**0**	**45**

SICILY

IT9EQO	**41,952**	**156**	**9**	**39**

SLOVAKIA

OMØWR	**54,243**	**258**	**0**	**41**

SLOVENIA

S57M	**151,360**	**451**	**13**	**51**
S54E	**138,474**	**422**	**11**	**52**
***S51F**	**65,136**	**274**	**2**	**46**
S59AA	54,635	221	4	45
*S57DX	51,336	227	2	44
S55A	45,600	189	4	44
S53W	41,976	190	3	41
*S57J	30,960	161	0	40
S59D/QRP	**21,918**	**116**	**1**	**38**
*S51TA	19,142	118	0	34
*S5ØU	14,415	101	0	31
*S53G	7,560	56	0	28
*S57U	4,746	53	0	21

SPAIN

EA4KD	**100,396**	**214**	**25**	**51**
***EA3GHQ**	**45,633**	**157**	**9**	**44**
&EA1DVY	25,056	92	10	38
EA1DDO	7,409	45	2	29
*EA1BCK	1,392	16	0	16
*EA5AAJ	984	15	0	12
*EA3DNC	322	11	0	7
*EA7EWX	116	5	0	4

SWEDEN

***SM6CTQ**	**6,425**	**50**	**0**	**25**

SWITZERLAND

HB9FAX	**73,414**	**313**	**1**	**46**

UKRAINE

***UY1HY**	**124,344**	**353**	**2**	**64**
*UU4JMG	79,101	412	0	47
*UTØZZ	62,544	272	1	47
UTØD	40,287	239	3	36
*UX2MF	31,902	169	0	39
US5MPS /QRP	**19,550**	**124**	**0**	**34**
*UR5SCN	16,764	101	0	33
*UR4MS	14,560	101	0	32
*UB5IBG	13,770	92	0	30
US8ICA/QRP	11,725	99	0	25
*UR7IHD	11,704	87	0	28
US8IBS/QRP	5,984	52	0	22
UR4MWU	3,078	37	0	18

WALES

GWØGEI	**159,253**	**397**	**24**	**47**

YUGOSLAVIA

4N7ZZ	**150,452**	**495**	**6**	**52**
***YU1AST**	**23,902**	**129**	**0**	**37**

OCEANIA

AMERICAN SOMOA

KH8/N5OLS	**6,405**	**35**	**12**	**9**

AUSTRALIA

VK3EW	**9,591**	**45**	**15**	**8**
VK3IO	1,776	33	4	8
VK5GN	1,584	14	11	1

HAWAII

KH6CC	**211,960**	**385**	**45**	**11**
*KH6RS	1,062	15	7	2

INDONESIA

YCØLOW	**8**	**4**	**0**	**1**

SOLOMON ISLANDS

H44MS	**7,480**	**44**	**10**	**10**

SOUTH AMERICA

ARUBA

P4ØV	**378,572**	**450**	**54**	**32**

BOLIVIA

CP6PL	**1,960**	**18**	**3**	**11**

BRAZIL

PY3CEJ	**1,254**	**19**	**6**	**5**
PP5JR	890	16	5	5

COLOMBIA

HK6ISX	**66,024**	**128**	**37**	**19**
HJ6VKH	51,192	101	35	19
HJ6RQW	4,009	25	5	14

ECUADOR

HC1HC	**8,694**	**37**	**12**	**15**

NETHERLANDS ANTILLES/CURACAO

PJ9JT	**92,340**	**168**	**39**	**18**

SSB MULTI-OPERATOR

NORTH AMERICA

UNITED STATES

CONNECTICUT

KB1BOZ	**41,296**	**314**	**49**	**9**

MASSACHUSETTS

AA1BU	**129,648**	**745**	**54**	**20**
N1HMJ	13,950	127	37	8
K1RV	11,234	121	38	3

MAINE

K1OW	**166,320**	**713**	**55**	**33**

NEW JERSEY

W2GD	**438,264**	**1511**	**58**	**50**
K2OWE	102,904	556	56	20
KD2KS	57,768	452	50	8
K2FL	27,480	204	51	9
N2XHD	25,811	223	47	6
N2VW	17,101	147	42	7
AJ2U	2,240	53	20	0

NEW YORK

AA2MF	**160,470**	**699**	**57**	**33**
K2YR	130,500	745	53	22
W2KA	8,732	112	36	1

MARYLAND

K3IXD	**109,512**	**550**	**56**	**25**
K3MM	63,936	338	55	17

PENNSYLVANIA

NE3F	**194,880**	**925**	**56**	**31**
K3ANS	**157,818**	**703**	**54**	**33**
WY3T	128,772	763	54	19
K3MD	123,075	711	57	18
W3MM	69,483	428	53	16
K3WW	60,732	416	50	13
N3MLV	59,940	312	54	20
K3UA	57,050	327	53	17
K3ATO	43,615	351	48	7
AA3B	36,057	323	46	5
WT3W	27,387	220	42	9
KB3TS	15,582	137	42	7

FLORIDA

W4IZ	**182,961**	**876**	**56**	**31**

GEORGIA

KQ4HC	**113,297**	**753**	**55**	**12**
K2UFT	2,632	44	27	1

KENTUCKY

W4CN	**98,784**	**724**	**53**	**10**

NORTH CAROLINA

AA4S	**224,814**	**1047**	**56**	**33**
N4TL	17,232	161	43	5

VIRGINIA

N4EHJ	**153,769**	**858**	**53**	**24**
WA4QDM	7,854	114	33	1

OKLAHOMA

NN5Z	**221,516**	**1204**	**57**	**22**

TEXAS

NX5M	**177,940**	**904**	**56**	**26**

CALIFORNIA

N7UE	**119,193**	**754**	**54**	**13**

ARIZONA

WB7VVD	**43,896**	**325**	**53**	**6**

NEVADA

N7WWQ	**89,019**	**600**	**54**	**9**

OREGON

K7ZO	**151,656**	**897**	**56**	**15**
W7GG	150,150	876	55	15

WASHINGTON

N6MZ/7	**115,990**	**676**	**56**	**14**

OHIO

WR8C	**353,529**	**1405**	**57**	**42**
N8TR	**325,898**	**1442**	**57**	**37**

WEST VIRGINIA

W9LT	**133,350**	**770**	**55**	**20**

IOWA

NØNI	**207,150**	**1213**	**56**	**19**

KANSAS

WBØZLV	**161,460**	**1030**	**54**	**15**

MINNESOTA

KBØWY	**117,000**	**792**	**55**	**10**
WØJH	69,845	502	54	7

SOUTH DAKOTA

WØSD	**272,080**	**1422**	**56**	**24**

CANADA

NOVA SCOTIA

VE1PZ	**385,416**	**684**	**56**	**45**

QUEBEC

VE2UMS	**5,020**	**52**	**20**	**0**

ONTARIO

VE3DC	**244,370**	**722**	**58**	**12**
VE4ZK/VE4	**109,285**	**410**	**53**	**2**

CUBA

CO3JA	**95,587**	**306**	**48**	**13**
T48RAC	88,508	300	45	13

MEXICO

XE2 /WA7UOV	**388,800**	**945**	**58**	**23**
XE1RCS	257,720	582	54	31

AFRICA

CANARY ISLANDS

EA8ZS	**219,385**	**261**	**37**	**48**

EUROPE

BELGIUM

OT7A	**307,440**	**693**	**25**	**55**

CZECH REPUBLIC

OL5Q	**135,228**	**467**	**8**	**51**
OL5T	88,837	379	3	46
OK1KUO	36,720	190	0	40
OK1KNC/P	4,620	46	0	21

DENMARK

OZ9KY	**250,755**	**637**	**17**	**56**

ENGLAND

M7G	**11,744**	**76**	**0**	**32**

FRANCE

F5GTR	**185,025**	**439**	**21**	**54**

GERMANY

DFØRU	**111,378**	**439**	**7**	**50**
DLØMI	60,096	292	2	46
DFØID	34,440	193	4	36
DLØABT/P	1,792	31	0	14

ITALY

IK4IEE	**323,910**	**650**	**21**	**69**

KALININGRAD

RW2F	**289,612**	**784**	**10**	**58**

LITHUANIA

LY7A	**101,036**	**376**	**2**	**50**
LY2WJ	59,220	262	0	45

LUXEMBOURG

LX9UN	**382,254**	**705**	**22**	**57**

PORTUGAL

CS1A	**21,520**	**97**	**9**	**31**

RUSSIA

UA4PWW	**85,800**	**358**	**0**	**50**
RK3ZZZ	10,261	71	0	31

SLOVAKIA

OM2I	**78,208**	**326**	**3**	**44**

SLOVENIA

S53M	**113,212**	**340**	**10**	**52**

SWITZERLAND

HB9CXZ	**170,380**	**459**	**18**	**52**

UKRAINE

UR4E	**80,550**	**335**	**0**	**50**
UR4UZA	35,957	187	0	41

OCEANIA

HAWAII

KH7R	**52,052**	**124**	**35**	**9**

SOUTH AMERICA

COLOMBIA

HK6LRP	**67,222**	**126**	**38**	**20**
5K3SB	32,384	84	22	24

SSB CHECK LOGS: Thanks to the following stations for their valuable check logs for SSB: A71CW, DL1ASF, EA7KN, ED5EE, F-16322, K1AU, KB4ZVM, LA4OGA, OK2QU, RA4UF, VE3BR, VQ9SS, W7LR.

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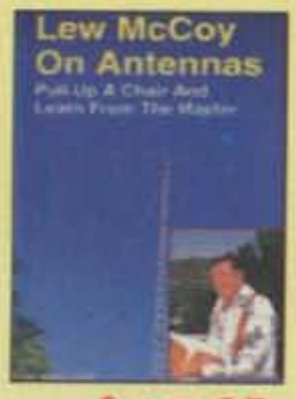

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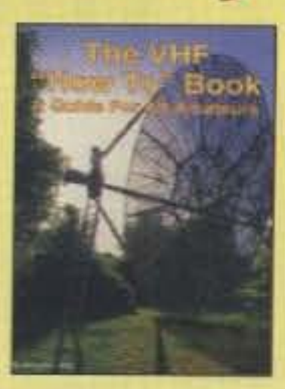

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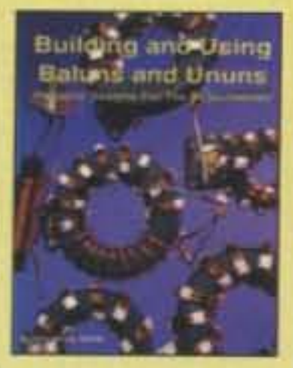

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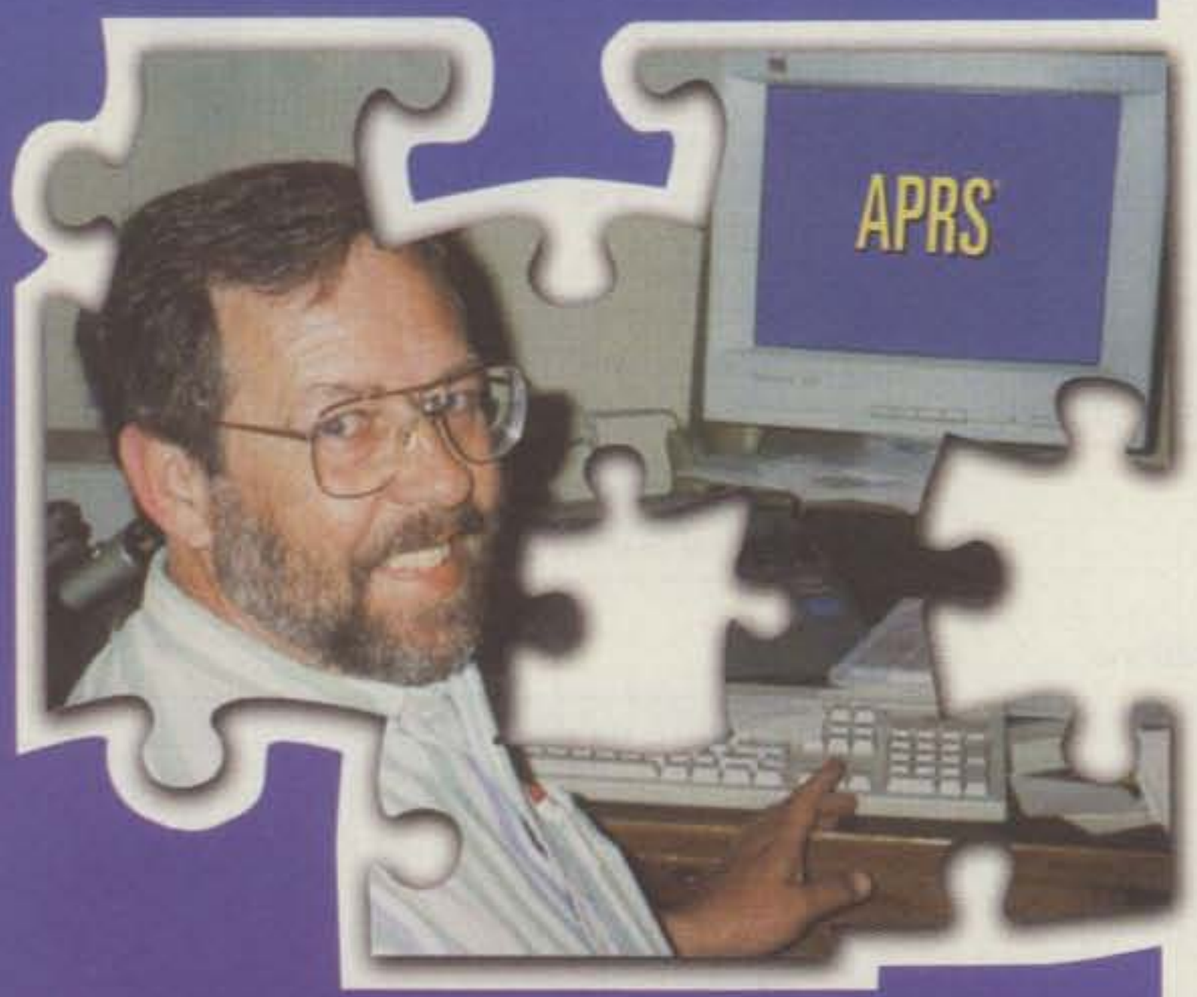

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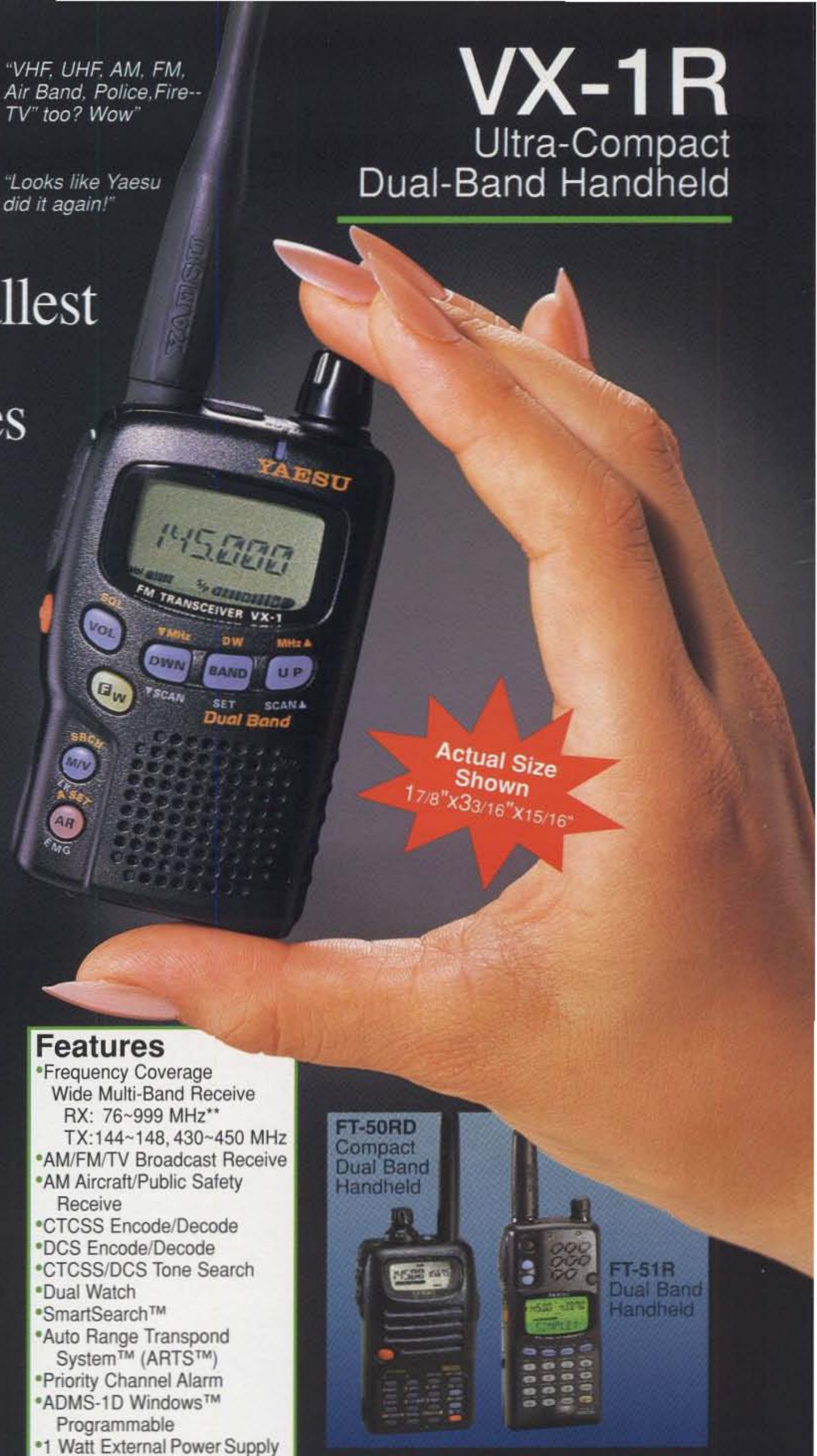

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- Flexible Antenna, Belt Clip, Hand Strap

**Cellular blocked

*Battery Life: 5-5-90 duty cycle.

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FREE OPC-581 Separation Cable

When you purchase a new IC-706MKII from an authorized ICOM dealer between September 15, 1997 through December 31, 1997. See your dealer for complete details.

ICOM IC-706MKII

Base station performance with mobile-sized versatility

The ICOM IC-706MKII HF/VHF all mode transceiver is a powerful combination of next generation technology and ICOM's time-tested craftsmanship. Whether you use the IC-706MKII for base station activity, for mobile operations or on DX'peditions you can't go wrong.

Compact Design

Extremely small and compact, this radio packs all of the features of a top class HF rig in a mobile-sized unit.

- Dimensions: 167(w) x 58(h) x 200(d)mm (6-9/16 x 2-9/32 x 7-7/8 inches)
- 2.5 kg (5.5 lbs)

HF+6M+2M

Cover all modes (SSB,CW,RTTY,AM and FM) from HF to 6 meters AND 2 meters. A powerful 100 watts of output power on HF and 6 meters with 20 watts on 2 meters.

Easy Operation

Switch bands with the touch of a button. The individual band change keys provide quick and easy QSY – the SUB DIAL for easy second VFO operation and RIT adjustment control. Each band stores pre-amp/attenuator and tuner ON/OFF settings.

Other Great Features:

- Enhanced 0.03-200 MHz broadband all mode receive
- Slots for 2 optional crystal filters
- Quiet, Thermally Controlled Cooling Fan
- Crossband Split Operation
- Superior Transmit Audio Characteristics
- Large Speaker
- Tone Squelch (option UT-86 required)
- New 350 Hz RTTY Filter (opt.FL-232)

- Detachable Front Panel (Option OPC-581 required)
- "S" menu for quick access to 3 bands
- Built-in CI-V serial communications port
- Spectrum Scope
- IF Shift
- Narrow-FM
- 102 Memory Channels with Alphanumeric Display
- Large Dot-Matrix Display
- Optional UT-102 Voice Synthesizer
- Optional AT-180 Antenna Tuner
- Optional PS-85 DC Power Supply
- And Much More!

PC Ready! optional CT-17 required

See your ICOM dealer or call 425-450-6088 for a brochure

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