ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

OCTOBER 1997

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On the cover: Don Moore, KB4HU, Smyrna, TN

THE 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**

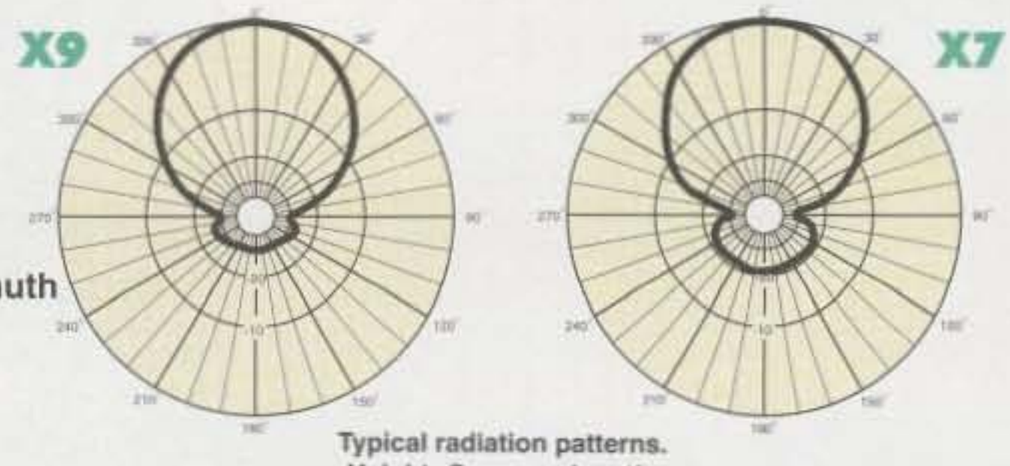
The new X9 and X7 Triband Yagis are geared to set new standards in both radiating performance and mechanical reliability. Cushcraft's product development team has employed the latest computer modeling technology to achieve a superior electrical design as well as elegant new mechanical hardware and assembly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

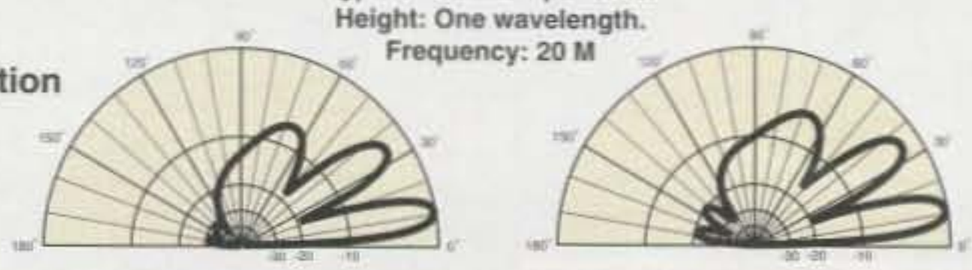
X9 X7

Azimuth



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

Elevation



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Email: hamsales@cushcraft.com

POWER & PERFORMANCE

Power...

Powerful, **affordable** and adjustable to suit your needs, the new Alinco **DM-340MVT** power supply is a functional, compact and attractive addition to your ham shack or workbench.

- **Adjustable voltage output, 0 ~ 15 volts DC**
- **Compact size and weight**
- **Up to 35 amps surge output, 30 amps continuous**
- **Dual meters included at no extra cost**
- **Convenient front-panel connectors and controls, including binding posts, spring clips and cigar lighter terminal, on-off switch and front panel fuse access**
- **Use for HF, VHF-UHF mobile/base transceivers, TNC, HT, laptop computer, cellular phone or workbench projects, including those that require 5 VDC or any other voltage within the range of the adjustable output.**
- **Affordable Quality - A great performer at an Alinco price, backed by a 1 year warranty.**

EDX-2 Auto Antenna Tuner

- Tunes 160-10 Meters (40 foot wire antenna required for 160M, 9.8 foot minimum for others)
- Fully integrated with Alinco DX-70 radios
- Weather resistant housing, can be mounted outdoors
- Comes with 16 feet of coax and control cable (cables may be extended)
- Maximum input: 200 watts
- Perfect for mobile, marine, home or portable use
- MSRP under $350

HF + 6 Meter Performance

The Alinco DX-70T and DX-70TH continue to earn solid reviews from operators around the world. In the "shack", on the road, in the field or on the water, DX-70 radios deliver terrific performance *at a price that puts a quality radio within your reach*. The DX-70 stands alone as the value leader in HF + 6 Meter mobile radios!

- **100 memories**
- **General coverage receiver 150KHz ~ 30 MHz and 50 MHz ~54 MHz**
- **Detachable faceplate, remote mounting kit available**
- **SSB, CW, AM, FM and Digital Modes, including 6 Meters**
- **Speech Processor, standard**
- **Separate antenna terminals for HF and 6M**
- **Selectable RF Gain and AGC**
- **CTCSS encode for 10M and 6M FM repeaters**
- **Narrow Filter, standard**
- **Selectable scan Modes**
- **Auto Power Off**
- **Multi-function control simplifies operation**

- **Full QSK, semi or automatic break in**
- **Quick offset for "split" operations**
- **DX-70TH features 100 watts output on HF and 6M**
- **DX-70T outputs 100 watts HF, 10 watts on 6M, MSRP under $1000!**

Simple ▪ Clean ▪ Dependable

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Internet: http: //www.alinco.com

CIRCLE 3 ON READER SERVICE CARD

Specifications are subject to change without notice or obligation. Performance specifications only apply to amateur bands. Permits required for MARS/CAP use. Prices mentioned are MSRP. Dealer prices may vary.

Ask your dealer about Alinco's 2-year extended warranty program

CQ Amateur Radio

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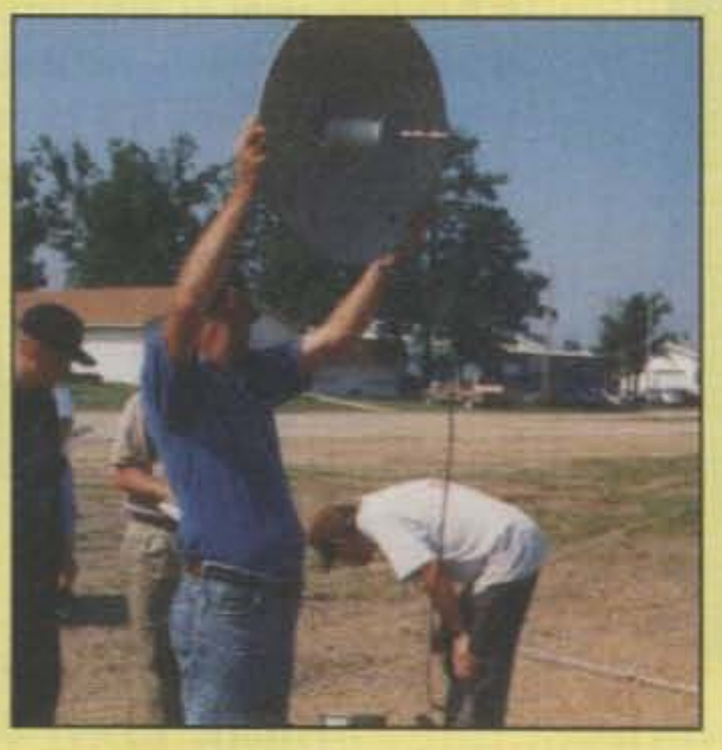

ON THE COVER: Don Moore, KB4HU, Smyrna, TN. (Photo by Larry Mulvehill, WB2ZPI)

Best Performance... Best Size...Best Price!

NEW! Sky Command Operating System (See your dealer for details)

Kenwood makes Digital Signal Processing technology available to everyone with the all-new TS-570D and TS-570S. Imagine a DSP radio that you can operate in the shack, the car, or on a remote DX island. These are the first DSP rigs that meet the needs of today's HF operator within a budget. From the first moment that you hear the incredibly clear and powerful audio and operate the new, common-sense ergonomic design, you will realize the TS-570D or TS-570S is the HF rig built for you.

The TS-570D and TS-570S offer the world's first CW AUTO TUNE feature which enables automatic zero-beating for CW operation. Advanced Kenwood design and features coupled with traditional Kenwood HF performance make the TS-570D/570S a masterpiece that you can proudly operate. If you have been waiting for a new DSP HF radio with performance at an affordable price, wait no more.

- **The RCP-2 Radio Control Program also allows the HF operator to design and program multiple radios with custom settings while conveniently saving them to a PC file for future use.**
- **Kenwood's Sky Command System option allows you to operate your TS-570D, TS-570S or TS-870S remotely with special version Kenwood TH-79ADH handhelds.**

Large LCD display features a 4-stage dimmer while the **7-digit alphanumeric sub-display** provides menu mode guidance, split frequency display and digital filter selection options. Easy-to-read **S/PWR/COMP/SWR/ALC** meters and an operating guidance feature help to greatly simplify operation.

16-bit DSP technology delivers superb audio quality on both transmit and receive. **Noise reduction** (line enhancer method and SPAC), **audio equalization** (voice/transmit equalizer and speech processor), **slope tuning** and **automatic IF filter bandwidth selections** can be operated with a touch of a button.

Power output can be set between 5 ~ 100 watts in 5 watt increments. 5 watt setting is ideal for QRP operation.

Preset auto antenna tuner with 22 sub-bands from 1.8 MHz - 30 MHz including 6M and memory for both antenna ports.

10-key direct frequency entry

World's first CW Auto Tune enables automatic zero-beating for CW operation.

Quick memory provides five channels for on-the-fly frequency control: **M.IN** stores data, **MR** recalls it.

Electronic keyer provides speed settings of between 0 and 100 wpm and dual key inputs on the back – one for the paddle and one for the key.

Menu system offers 46 types of functions to assist novice thru extra class operators.

A wealth of scanning capabilities enhance operability. Scan speed is variable and can be set for time-based or carrier-based resume. Scanning can work across channels, groups of 10 channels, all except locked out channels, or it can be programmed to scan a frequency range between two channels.

• Mobile/fixed station size (10-5/8 x 3-3/4 x 10-11/16 in) • Heavy-duty design • CW message memories
• CW reverse mode • Full break-in and semi break-in • High-speed 57600 bps PC control • Dedicated packet port

TS-570D / TS-570S

HF Transceiver **HF + 6M Transceiver**

With a half century of engineering and design experience to draw upon, Kenwood is changing the future of HF communications technology. High quality TX-RX audio reproduction with extremely effective DSP interference reduction delivers pleasing performance to your ear and over the air. You will also enjoy the large, easy-to-read LCD display with a built-in on-screen operator guidance system for simple operation. Features like 10-key direct frequency entry with new "soft-touch" keys, auto-antenna tuner, 100 to 5 watt for QRP operation, variable scanning speed, built-in CW keyer, ANT 1-ANT 2 ports, IF shift control, RS-232C com-port, 100 memory channels, CW reverse, optional VS-3 voice synthesizer and DRU-3A digital recording unit make the TS-570D or TS-570S the radio for you.

ISO 9001
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ZERO BIAS

AN EDITORIAL

Working DX is sort of like eating potato chips. Some folks can open a bag, smell the contents, and only eat one or two chips before closing the bag and putting it away. Others see satisfaction in devouring the entire contents and looking for more. Contesting can be just as "consuming." It all depends on your hunger and desire at the time.

To non-DXers and non-contesters all of the ensuing frenetic activity seems pointless, impersonal, and a potential waste of time, taking away from the pursuit of "real" amateur radio. As with many other forms of amateur radio expression, DXing and contesting are not intellectualizations. They are emotional reactions that generate a personal satisfaction from a given activity. Since it is emotional, there's really no point in asking why someone gets so excited over the activity or the possible (if any) benefit derived from spending hours (if not days) trying to exchange a simple signal report, or thousands of them. It really makes no sense unless you are part of the action or activity.

Making emotional sense out of contesting or DXing requires a leap of faith and diving in. It doesn't matter if you are any good at it; no one is at the beginning. It does matter that you listen for a while just to get the hang of it and a semblance of what's going on. Other than that, it's one big party, and the more the merrier. What you'll find in short order is that your adrenaline level is increasing, you're moving faster, and your excitement level is way up there. It's this strange, tingly, euphoric feeling that a lot of us call fun. There is no why; it just is. It's the same with potato chips.

Now before some of you one- or two-chip nibblers come back at me saying that this is nothing but a dalliance and a waste of time, energy, and especially spectrum, think about the skills developed as part of the process. Obviously, reaction time and cognition have to speed up. A person has to hear, interpret, and respond extremely fast. It doesn't take too long to go from a neophyte, wondering what's happening under all that noise, to having ears that even a bat would envy. Suddenly you realize that you can discern your call through a multi-layered signal stew, and somehow you instinctively know from a scrimpet of information what country, zone, and multiplier value it has. We're talking about acuity with a capital "A." Your family, friends, and neighbors are somewhat amazed as you glibly talk about countries that neither they nor some post offices have ever heard of. In fact, you may even get the urge to subscribe to *National Geographic* just to find out how big the world really is. The magazine also has great maps and atlases, which might help you learn a bit more about the planet we all inhabit.

Just as those potato chips quickly disappear from the bag (they're quite addictive, too), you may find that as time goes by several typical amateur radio phrases trip off your tongue in a few foreign languages. It's not particularly sneaky; it's just playing the game—especially to win. Most of the time you don't even realize it's happening, but it all becomes a learning experience and motivates you to learn more. No, it's not the end all and be all of life, or something that even remotely puts food on your table, but it sure beats spending a half hour listening to someone describe what shape their prostate is in.

At the end of this month you have a chance to find out for yourself what contesting and DXing are all about in the 1997 CQ World-Wide DX Contest. It doesn't really matter what shape the solar cycle is in. We're all in the same boat, playing with the same conditions. Trust me; you won't either be ignored or bored. It doesn't matter if you are slow and halting at first as you get your feet wet. Yours is a new and unique call that everyone from the biggest gun to the littlest pistol would like to have in their log. Contests have been won or lost over a handful of contacts, so every one is important. Take a bit of time and dig out last month's issue and read through the CQ WW rules on page 110. This will give you a general idea of how the contest works. Some of it may be a bit confusing, as you may not have anything to relate it to, but enough will stick with you to see you through. In this month's "Propagation" column George Jacobs, W3ASK, gives a band-by-band breakdown of what to expect in the way of contest conditions. You might want to keep both the September and October issues nearby during the contest so you can refer to them as the time goes by. The rest is just listening, operating, and perseverance. Skill and expertise come with time and motivation.

You also might bear in mind that all of these activities are not restricted to just HF. There are plenty of other activities during the year, including many DX opportunities, that generate the same excitement on just about every piece of spectrum above 30 MHz. The fun, excitement, and satisfaction are in the doing, not in the grumbling about the way things should be, used to be, and could be. Whatever your license class may be, there are plenty of activities from which to choose. In each and every one of them your participation is just as "real" as the next guy's, and certainly welcome.

The main ingredient in contesting and DXing is enthusiasm. You know, the same feeling you had when you first heard about amateur radio and simply had to get that license. Most of us even remember that same feeling in the pit of our stomachs when we attempted our first contacts and wondered what we would ever talk about. It was us, in a sense, against the elements. Well, basically that's still what the hobby is all about. We all have come a very long way since it was befitting to simply call amateur radio a service, a noble calling to altruism. Amateur radio is something you do, not something you reflect on. It's not like an old jacket we pull from the closet once a year and then put away after a bit of use. We may own the jacket and do with it as we see fit, but amateur radio involves very valuable spectrum space—a commodity—and we certainly don't own it. We just have the privilege of using it.

After all these years I really understand that a number of people do not like contests, DXpeditions, operating events, special event stations, and probably Field Day as well. Their normal phlegmatic lives are upset by tens of thousands of people suddenly descending on the bands, apparently all of them having a good time. This good time is at the expense of some smaller number of people who expect to always have open spectrum to do or not do something, thereby giving them a good time. Well, the tens of thousands are expressing and demonstrating enthusiasm, which may be hard to understand for some. Probably the only way to begin to understand it is to jump in and try it at least once.

We're coming out of the sunspot doldrums, and for most of us good times are ahead. Each new cycle has brought about changes in our technology, new business opportunities for the amateur radio industry, and a new crop of eager amateurs who want it all. I've seen four cycles come and go, and I eagerly anticipate my fifth. Over the years I've heard from numbers of naysayers who with trepidation say that all of this change is not "real" amateur radio and that the end is near. Well, through at least four cycles they've been consistently wrong. Amateur radio today, in 1997, is by far better and absolutely more fun than it was in 1953 when I started. The technology obviously is better, the challenges are bigger and more interesting, and the pace is infinitely faster. Maybe that doesn't go with being blase or having a torpid life style, but it most definitely is "real" amateur radio. The long litany of things that were supposed to kill amateur radio, including SSB, has served to make it stronger instead.

So, at the end of this month when those tens of thousands of happy, enthusiastic amateurs are taking part in the CQ World-Wide DX Contest, think about joining in and having some fun yourself. Think about all of the amateurs who have taken part in this event for the past 49 years, and remember the excitement that brought you to amateur radio in the first place. Most of all, remember that bag of potato chips and how good they taste. You can go for the gusto, or you can have a couple of chips and put the bag away. You can spend your life grumbling about why people do this or that activity, or you can find out for yourself. All you risk is the time you'll spend wondering why you didn't do it years ago. Lighten up and enjoy yourselves.

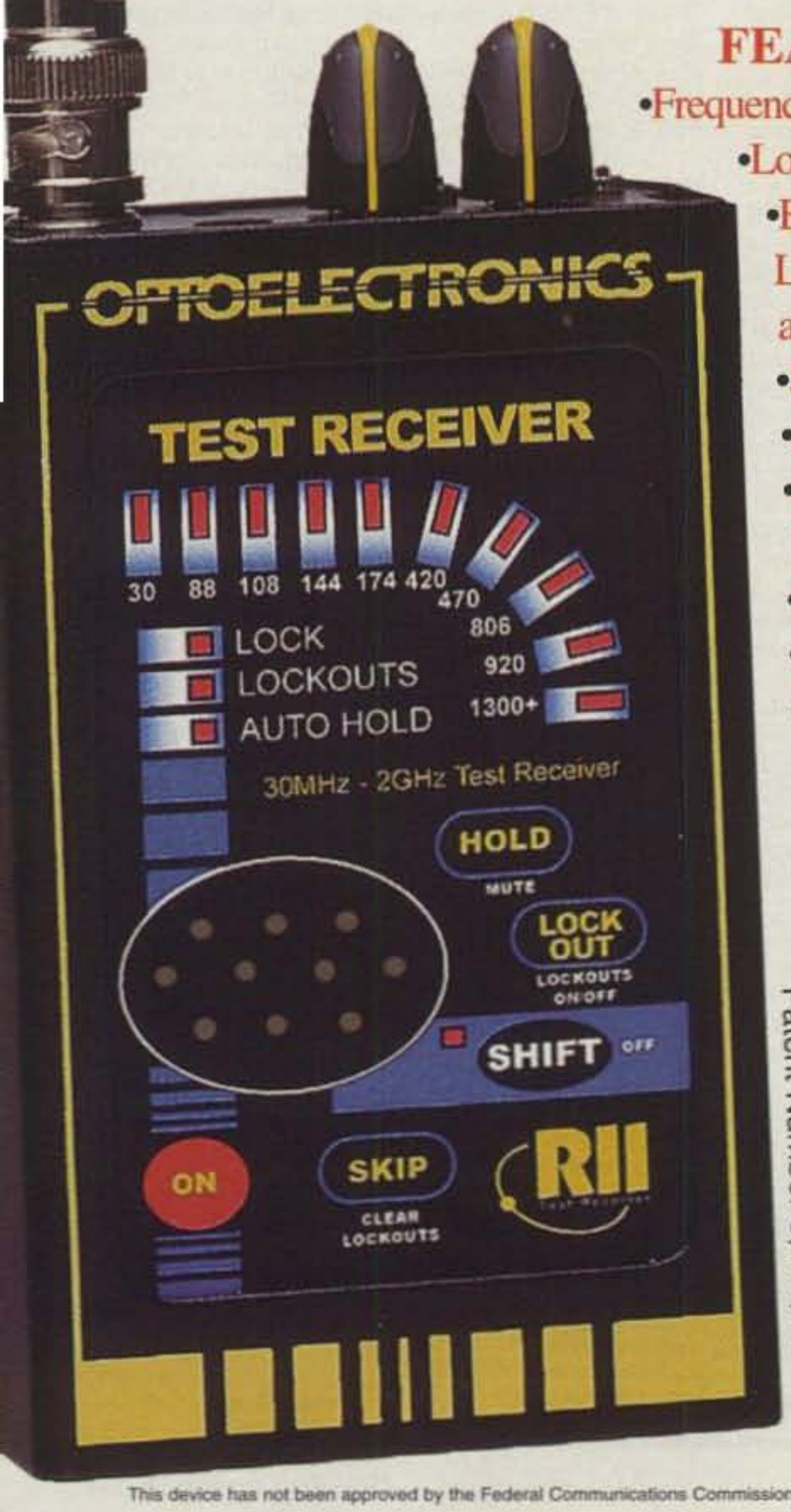
73, Alan, K2EEK

Built for Speed

The new R11 Test Receiver...

...If there's RF, you'll catch it!

The **NEW** R11 is a Nearfield FM Test Receiver capable of sweeping **30MHz - 2GHz** in less than one second. The R11 can lock onto a **5 watt UHF signal** as far away as **500 feet** and demodulate the signal through its built-in speaker. A unique feature of the R11 is its ability to determine what band the frequency is transmitting in and display it on its LED indicator. When speed is an issue, reach for the R11 Test Receiver, **You won't find a faster nearfield FM test receiver anywhere.**



Patent Number 5,471,408

FEATURES

- Frequency Range: Analog FM, 30MHz - 2GHz (Cellular frequencies blocked)
- Locks onto 5 watt UHF signals as far away as 500 feet
- Easy to use keypad functions: Frequency Hold, Frequency Skip, Frequency Lockout, and the Shift key feature for Audio Mute, Enable/Disable Lockouts, and Lockout Clear
- Squelch and Volume control knobs
- LED frequency range indication display
- Built-in speaker for instant frequency demodulation and headphone jack for earphone audio
- Interface with the Scout for Reaction Tune
- TA100S Telescoping whip antenna included
- Built-in NiCad batteries (4 hour discharge) and power supply included

Reaction Tune with Scout using optional CB-RT ($9)

Introductory Price

$399.

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ANNOUNCEMENTS

• Amateur Radio News Service (ARNS) Publication Contest. ARNS will be conducting a publications contest aimed at recognizing superior performance in amateur radio journalism and evaluating club newsletters with suggestions for improvement. The contest is open to all amateur radio organizations. Membership in ARNS is not required. General circulation magazines and professional journals are not eligible. For application, write to Lee Knirko, W9MOL, Pres., ARNS, 11 S. La Salle St., Ste. 2100, Chicago, IL 60603-1302. Deadline for entry receipt is Dec. 31, 1997.

• VE3ACK Ontario DX Assn. Meteor Tests – The ODXA will conduct tests fpr sporadic meteor detection on 10 meters (29.050 MHz) each Saturday and Sunday morning in October at 0900–1100Z mainly CW. They are seeking signal reports from anyone who hears the signal. They will use standard meteor scatter procedure: 15 seconds transmit followed by 15 seconds receive. They will transmit on the first 15 seconds of each minute. Callsign: VE3ACK. Send reports to Philip Gebhardt, VA3ACK, P.O. Box 52, Greenbank, ON Canada L0C 1B0 or <pgebhardt@compuserve.com>. For more information or updates on the experiment check the ODXA web site at <http://www.grove.net/~odxa/>.

• The following Special Events are scheduled for late September and October:

W2GLQ, from the Nutley Red Cross Building, Nutley, New Jersey; Nutley ARS; celebrating "Annie Oakley Day"; 1400Z Oct. 18 to 2300Z Oct. 19; on 3.940, 7.240, 14.240, 21.375, and 28.375. For certificate, send QSL and 9 × 12 SASE to NARS, c/o Nutley Red Cross Building, 165 Chestnut St., Nutley, NJ 07110.

W3XX, from submarine *U.S.S. Requin,* docked at the Carnegie Science Center, Pittsburgh, Pennsylvania; Breezeshooters ARC; 1400–2100Z Oct. 5; 40 meter Novice band, Novice portion of 10 and 15 meters, General 20 and 40 meters. For certificate and QSL, send QSL and 8½ × 11 SASE to Jack Buzon, KA3HPM, 47 Grubbs Rd., Cheswick, PA 15024.

K4PNS, from Santa Rosa Island (IOTA-NA142); Serious Hams ARC of Pensacola, Florida; 1200–2000Z Oct. 11; operation on 40, 20, 15, 10 meters. QSL via N4MAD.

K4GSO, from Ocala, Florida; Silver Springs Radio Club; 50th anniversary of club founding; 1300Z Oct. 4 to 0100Z Oct. 5; on 3.930, 7.245, 14.270, and 21.370. For QSL, send QSL to Silver Springs Radio Club, P.O. Box 787, Silver Springs, FL 34489.

KE4ZIS, from Devil's Courthouse, Brevard, North Carolina; Transylvania County ARC; celebrating the 9th annual Halloween Fest; 1800Z Oct. 31 to 0200Z Nov. 1; on 7.237, 14.295, 21.305, 28.335, 146.25 MHz (±10 kHz). For certificate, send large SASE to TCARC, P.O. Box 643, Brevard, NC 28712.

K4OZK, from Ozark, Alabama; Dale County Emergency Management Agency; 24th Claybank Jamboree; 1600–2100Z Oct. 4; operation on all bands. For certificate, send SASE to Dale County Emergency Management Station, Box 817, Ozark, AL 36361.

NN4CIA, from CIA facilities in northern Virginia; 50th anniversary of the U.S. Central Intelligence Agency; the month of *September*; operation on frequencies 50 kHz above lower band edge on CW and SSB. Special QSL cards will be available. Check DX bulletins for further information.

N9FWM, from 150th year of Unity Lodge #48 AF & AM, St. Charles, Illinois; 0100Z Oct. 28 to 2300Z Nov. 2; SSB alternately 28.400, 14.250, 7.150, 3.980. For certificate send QSL and 9 × 12 SASE (for unfolded) or business-size (folded) to N9FWM, 38W248 Joan Dr., St. Charles, IL 60175.

WØFUN, from Nowhere, Illinois; Iowa RadioSport Society; 1400–2100Z Oct. 18 ; on the lower General phone bands 40 and 20 meters. For QSL, send SASE to Iowa RadioSport Society, P.O. Box 68, Burlington, IA 52601-0068.

WØUK, from Nowhere, Kansas, Maple Leaf Festival and Midland Historical Railway Assn. train; 1400–2100Z Oct. 18; on 7.040, 7.240, 14.040, 14.240. For certificate send 9×12 SASE and QSL to Bob Drake, NØTFU, 3020 Rimrock Dr., Lawrence, KS 66047.

OS4CLM, Belgium; BAFARA (Belgian Airforce ARA), BMARS (Belgian Maritime ARS), BYLC (Belgian YL Club) and IPA (International Police Association); to commemorate the liberation of the town of Knokke on Nov. 1, 1944; Oct. 31 to Nov. 7; operation on SSB 3.685, 7.045, 14.145, 18.150, 21.245, 28.545, 144.250; CW 3.515, 7.012, 10.118, 14.020, 18.087, 21.020, 24.897, 28.020, 144.020; FM 145.475; packet OS4CLM@ON1CED. The OS4CLM award QSL is available for $5 (US) or 10 IRCs. For more information, contact Bob Dyserinck, ON1DKE (N1TBH), Vuurtorenstraat 12, B-8301 Heist aan Zee, Belgium.

• The following hamfests, etc., are slated for late September and October:

Sept. 28, **BARCFest**, Boulder County Fairgrounds, Longmont, Colorado. For further information, call 303-673-0289 or e-mail <n0nls@aol.com>.

Oct. 3–4, **NWAARC Hamfest '97**, Jones Center for Families, Springdale, Arkansas. Contact Northwest Arkansas ARC, P.O. Box 24, Farmington, AR 72730; or call Bryan Spain, 501-789-2690. (Exams.)

Oct. 4, **North Central Indiana Hamfest**, Miami Co. Indiana Fairgrounds, near Peru, Indiana. Contact North Central Indiana Hamfest, c/o Cass Co. ARC, P.O. Box 1092, Logansport, IN 46947, or e-mail to <ccarc@netusa1.net>.

Oct. 4, **Bergen ARA Fall Hamfest**, Fairleigh Dickinson University, Teaneck, New Jersey. Call Jim Joyce, K2ZO, 201-664-6725 (before 10 PM). (Exams.)

Oct. 4, **York County ARS Hamfest**, Knights Stadium, Fort Mill, South Carolina. Contact YCARS Hamfest, 2129 Squire Rd., Rock Hill, SC 29730; or call George Trunk, AB4BG, 803-327-4344. (Exams.)

Oct. 4, **1997 Mid-Atlantic States VHF Conference**, Horsham Days Inn, 1/2 mi. above Willow Grove Exit 27, PA Turnpike, Pennsylvania. For more information, contact John Sortor, KB3XG, 1214 N. Trooper Rd., Norristown, PA 19403; e-mail <johnkb3xg@aol.com; phone 610-878-5674.

Oct. 4–5, **4th Annual Bahia Shrine Amateur Radio Unit Hamfest & Computer Show**, Bahia Shrine Auditorium, Maitland (Orlando), Florida. Contact Gerry Skinner, K4LVZ, 3311 Ellwood Ct., Winter Park, FL 32792 (407-679-4244).

Oct. 5, **Mt. Airy VHF Radio Club Hamarama**, Bucks County Drive-In, Warrington, Pennsylvania. For more information, contact Brian Taylor, 215-257-6303 (between 7 PM and 9 PM).

Oct. 5, **9th Annual Huntington County ARS Hamfest**, Police Athletic League Club, Huntington, Indiana. Contact Ray Tackett, P.O. Box 284, Huntington, IN 46750 (219-786-0057). (Exams.)

Oct. 5, **Chicago ARC Hamfest**, Oakbrook Terrace, Illinois. Call George at 773-545-3622; or Dean at 708-331-7764; or write to CARC, 5631 W. Irving Park Rd., Chicago, IL 60634.

Oct. 5, **Southeast Iowa Hamfest**, Muscatine County Fairgrounds, West Liberty, Iowa. Contact Rob Boorman, KBØMRZ, at 319-351-3399; or Bud Pitt, WBØMEW, at 319-264-1788; on Web <http://soli.inav.net/~icarc/>. (Handicapped accessible; exams.)

Oct. 5, **The Hall of Science ARC Hamfest**, New York Hall of Science parking lot, Flushing Meadow Park, Queens, New York. Call Arnie Schiffman, WB2YXB, at 718-343-0172 (eves. only).

Oct. 11, **North Color Tour Hamfest & Computer Fair**, Hinks Elementary School, Alpena, Michigan. For info send SASE to TBARC, P.O. Box 764, Alpena, MI 49707; or call Bill, N8YKG, at 517-354-8867.

Oct. 11, **Augusta Hamfest**, Evans Middle School, Evans, Georgia. For further information, contact Frank, KS4OC; or Rhonda, KE4DIM, 706-560-9600; or write to P.O. Box 3072, Augusta, GA 30914.

Oct. 11, **North Kitsap ARC Hamfest**, President's Hall, Kitsap County Fairgrounds, Bremerton, Washington. For more information, contact Susan Johnson, AB7MD, P.O. Box 1226, Poulsbo, WA 98370; packet: AB7MD@N7WE.#WWA.USA.NOAM; or e-mail: <sujohnso@linknet.kitsap.lib.wa.us>.

Oct. 11, **Egypt Temple ARA Hamfest**, Egypt Temple Unit Building, Tampa, Florida. Contact J.F. Strom, K9BSL, 813-822-9107; or send SASE to 233 34th Ave., N., St. Petersburg, FL 33704-2241.

Oct. 11–12, **MemFest '97, Greater Memphis Amateur Radio & Computer Show**, Big One Expo Center, Memphis, Tennessee. Contact John Lovett, KD4EUH, at 901-388-8745; or fax 901-937-8660; or send SASE to 1997 MemFest, P.O. Box 751841, Memphis, TN 38175-1841. (Exams.)

Oct. 12, **Maysville Hamfest**, Maysville, North Carolina. For more information, contact Jo Ann Taylor, WD4JYR, at 919-393-2120.

Oct. 12, **1997 Nutmeg Hamfest & Computer Show**, Durham Fairgrounds, Durham, Connecticut. For info packet: W1KKF@W1NRG.CT.USA.NA; e-mail <sbicycle@connix.com>; for exam information, call Joel Curneal, N1JEO at 203-235-6932. (Exams.)

Oct. 12, **LCDRA & CMARC HamFair**, Ingham County Fairgrounds, Mason, Michigan. For more information, contact Chuck, N8CM, or Linda McNease, KC8DPZ, 517-694-2757; or LCDRA, P.O. Box 80106, Lansing, MI 48908. (Handicapped accessible.)

Oct. 12, **LIMARC Fall HamFair**, Briarcliffe College grounds, Bethpage, Long Island, New York. Call the LIMARC 24-hour infoline at 516-520-9311; or write to LIMARC, P.O. Box 392, Levittown, NY 11756; or e-mail <LIMARC73@aol.com>; or on the Web: <http://www.aol.com/RaySk/LIMARC1.HTML>. (Exams.)

Oct. 17–19, **Pacificon '97**, Concord Hilton Hotel, Concord, California. Call 510-932-6123; e-mail at <pacificon@designlink.com>; or on the web <www.mdarc.org>.

Oct. 18, **14th Annual Tri-Cities Hamfest**, Appalachian Fairgrounds, Gray, Tennessee. For more information, send SASE to P.O. Box 3682 CRS, Johnson City, TN 37602.

Oct. 19, **Penn Wireless ARC Hamfest/Tradefest 1997**, Buck County Community College, Newtown, Pennsylvania. Call Steve at 215-752-1202; or e-mail <sewall@erols.com>; or SASE to PWA Tradefest '97, P.O. Box L-734, Langhorne, PA 19047. (Exams.)

Oct. 19, **MIT/Harvard Fleamarket**, Albany and Main St., Cambridge, Massachusetts. For more information, call 617-253-3776.

Oct. 19, **Centralia Wireless Assn. Annual Hamfest**, Salem Community Activity Center, Salem, Illinois. Contact Daisy King, AA9EK, 618-532-6606.

Oct. 19, **15th Annual Kalamazoo Hamfest**, Hazel Grey Bldg., Kalamazoo County Fairgrounds, Michigan. Call 616-657-4482; or send SASE to Al McNeil, K8CRH, 816 E. Michigan, Suite 102, Paw Paw, MI 49079-1215; or e-mail <amcneil@net-link.net>.

Oct. 19, **Foothills ARC Hamfest**, Hose Company No. 1, Greensburg, Pennsylvania. Contact Al Compton, N3LQX, 555 Agnew Road, Greensburg, PA 15601; phone 523-3727; or check their Web site at <http://dns.pulsenet.com:80/~ares/>.

Oct. 25, **Hamfest Minnesota & Computer Expo**, St. Paul Civic Center, St. Paul, Minnesota. For more information, contact Hamfest Minnesota & Computer Expo, P.O. Box 5598, Hopkins, MN 55343; or call the Hamfest Hot-line at 612-535-0637. (Exams.)

Oct. 25, **Sumter ARA 11th Annual Hamfest, Computer Fair & ARRL State Convention**, Sumter County Exhibition Center, Sumter, South Carolina. For further information, contact Steve Bregger, KD4HTS, P.O. Box 52302, Shaw AFB, SC 29152-0302; phone 803-983-4251; or Dee Brown, NØZTV, P.O. Box 52141, Shaw AFB, SC 29152-0141; e-mail <deebrown@sumter.net>; or phone 803-499-6315.

Oct. 25, **Swap-Toberfest ARES/ RACES Convention**, Polk County Fairgrounds, Rickreall, Oregon. Contact Gary Zinn, KC7BSX, 503-838-2008; web <http://www.teleport.com/~n7ifj/swaptobe.htm>. (Handicapped accessible.)

Oct. 26, **RH Hill ARC Hamfest**, Sellersville Fire House, Sellersville, Pennsylvania. Contact Linda Erdman at 215-679-5764; or write to her at 2220 Hill Rd., Perkiomenville, PA 18074. (Exams.)

Oct. 26, **24th Annual HamFiesta and Computer Show**, Marion County Fairgrounds Coliseum, Marion, Ohio. Contact Karen Eckard, N8KE, 6583 South Street, Meeker (Marion), OH 43302 (614-499-3565); or Betty Krist, N8UDT, 132 N. Seffner Ave., Marion OH 43302 (614-387-3533 after 5 PM).

Oct. 26, **Hamfest Iowa '97**, 4H Building, Iowa State Fairgrounds, Des Moines, Iowa. For more information, contact Randal Lees, NØLMS, 1575 Northwest 78th Street, Clive, IA 50325-1255; phone 515-279-4241; e-mail <rclees@raccoon.com>. (Exams.)

Oct. 28, **St. Peters ARC SwapFest**, St. Charles County Community College, St. Peters, Missouri. Contact Allen Underdown, NØGOM, 4136 Towers Rd., St. Charles, MO 63304 (314-939-9444); e-mail <wbrco@valuenet.net>; or SwapFest Homepage: <http://lakers.cybercon.com/wurmborn/swap.html>.

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OUR READERS SAY

Does Your Station Conform?

Editor, *CQ:*

As I perused W5YI's June "Washington Readout" column on RFI, it is obvious to the few "old timers" out here in the "boonies" that our old field strength meters, etc, probably will not suffice to monitor the final radiation limits proposed by the FCC. However, FCC publication OST/OET Bulletin 65 was mentioned. Also on page 116 he mentioned the three ways amateur stations may determine compliance. The article indicated that type 3 will be the ones most hams will use. Will W5YI be extracting/publishing the FCC tabular charts, etc., mentioned on page 115 of the article? If not, can you supply me with the exact address/person, telephone number of the respective office of the FCC where I can order the information? Then I can share the data through a discussion group with members of our local amateur radio club (The Buzzard Roost ARC). Thanks.

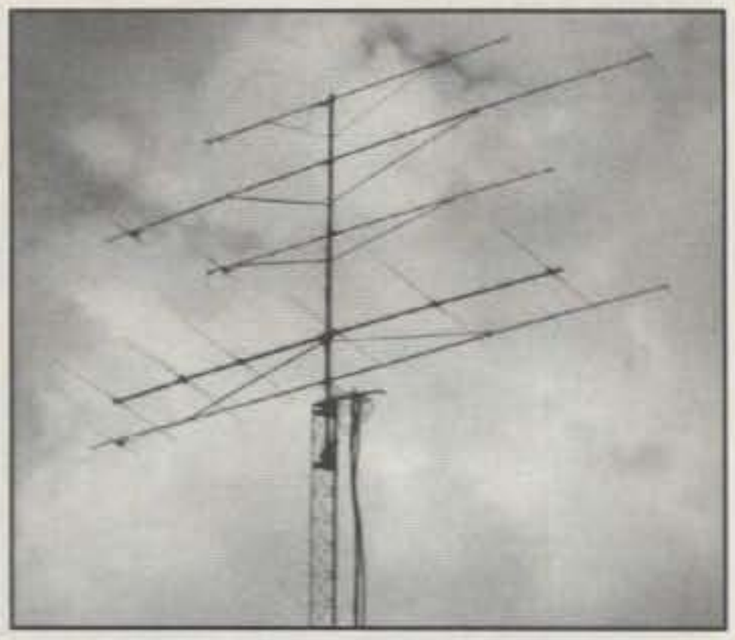
Fred Hoofer, WØBMT
Neligh, NE

W5YI's response:

Thanks for your inquiry on RF Safety. I have gotten quite a few of them! As of May 24, as this is being written, the FCC has not yet released OET No. 65. I spoke to the Office of Engineering and Technology last week and was told that the new bulletin and a supplement for amateur radio operators was in the works.

Actual measurement of RF in the environment and working the complex formulas are somewhat difficult and unnecessary. Wayne Overbeck, N5NB (a Ph.D.), has worked up a computer program by which (answering just four questions) you can determine if your station is in compliance. Another amateur (Ken Harker, KM5FA, a student working on his Ph.D. in computer science at the University of Texas, and who is president of their ham club) has put that computer program on the Internet. You can call it up from the following URL with any browser: <http://www.cs.utexas.edu/users/kharker/rfsafety>. It is a neat program and *extremely* easy to use. You merely type in antenna power (in watts), antenna gain (in dBi), distance (to area of interest), and frequency (in MHz). The program returns the calculation results and whether the station conforms to the Controlled and Uncontrolled RF guidelines.

The charts and booklets will be available shortly from the FCC. *(They probably will be out by the time you read this--ed.)*—73, Fred, W5YI



The antennas of Dave Kosh, W3ZR.

Florida Gulf Coast USB Net To Reactivate

Editor, *CQ:*

Enclosed is a photo of the antennas of Dave Kosh, W3ZR, Ft. Myers, Florida (EL96). Dave is active mobile in Ft. Myers. I talk to him practically every morning on 144.2 USB while he is going to work. He is active as an engineer at TV station 20—WBBH, and for over 12 years he was an operator of 144.2 USB, the West Coast Florida Net. The net ran from 1980 until about 1993. Up and down the coast there were about 80 check-ins, and it ran from the center of Georgia to the end of the Florida Keys. Dave says he intends to reactivate running the Gulf Coast USB Net soon. He just moved and all antennas are set to go, so I'm trying to generate enough interest to make this possible. Dave is an ardent fisherman and has a fairly large boat in the gulf from which he operates a little mobile. He also operates from home. He is a deacon in a Ft. Myers church and so is fairly busy.

Me, I'm Hank Huth, WA4WKO (EL87), and I'm 10 miles north of St. Petersburg, 30 miles west of Tampa, at the end of the Lake Seminole area. I'm on 144.2 USB. I had been on ATV color and black and white, but there was so little going on. Hams either died, moved, or became disinterested in the low turn-out of this mode. I still have some stuff, though, and maybe enough to start again. Will let you know!

Am 88 years old and have had a few operations after falling from the ham tower. I enjoy *CQ* and used to be an active builder. I retired from the Army after 22 years. As an electronics civilian I ran up and down the coast servicing radar and missile sites, etc. I retired at the age of 60 and decided to enjoy the good life. 73, and thanks for a good magazine.

Hank Huth, WA4WKO
Seminole, FL

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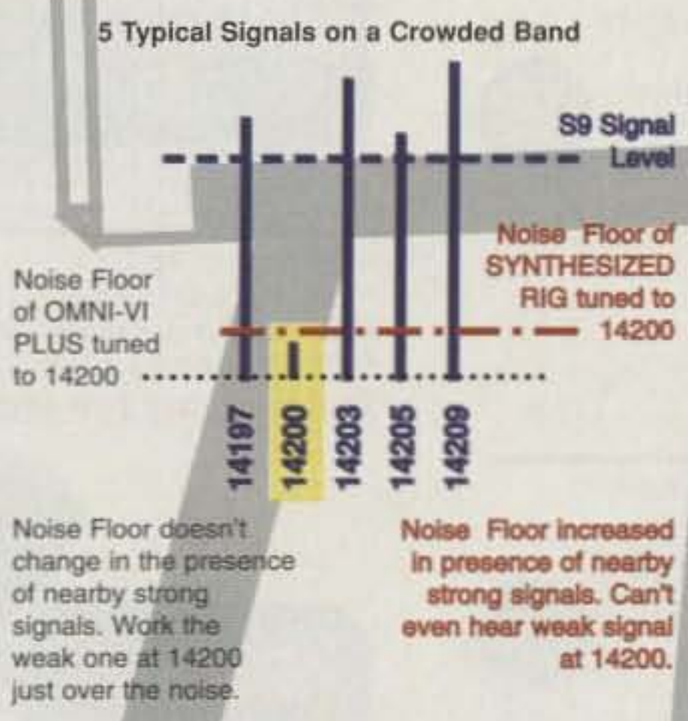
Let's compare OMNI to any competitor's synthesized rig with both tuned to the same frequency.



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Results of the 1996 CQ World-Wide DX CW Contest

BY BOB COX*, K3EST

If you looked at the sun during the 1996 CQ WW CW contest, your face probably felt a little warmer. The sun, a CQ WW enthusiast, emitted a solar flux of over 100 for the contest. As of this writing that was near the high for the last year! What a terrific contest. Except for 10 meters, sparks were really flying on all bands. After looking at the database, we can say with confidence that there were about 20,000 CW contesters who have mastered the code.

Many contesters decided that if the sun was not going to *bring* better conditions, they would *go* to better conditions. They packed their bags and headed to exotic lands. Their activity made for more fun for everyone. Just some of these travelers were VP2EEB, V26LN, C6A/N4RP, C6A/AA6EW, 8P9Z, TI1C, 3E1DX, J87GU, V47KP, VP5EA, KP2A, WP2Z, IG9/IT9GSF, IG9/AC6WE, IG9/I2VXJ, 7X2RO, EA8EA, EA8/DJ1OJ, ED9EA, CT9U, CT3FN, CT9H, FH/F6HWU, 6W1AE, 3V8BB, YM2ZW, XX9X, XZ1N, A61AJ, GU/F5SHQ, CT8T, GIØKOW, KC6VW, V85HG, 9M6NA, P40W, CP6AA, HC8N, 8R1K, 9Y4H, PYØFF, C6A/K3TEJ, C6A/KM9D, ZF2RF, J6DX, V47VJ, FS5PL, 9U5DX, D44BC, 3C5A, CT3/DL5YM, JY8B, HSØAC, LX/DFØBK, KHØDQ, J39A, HH2B, 5V7A, J45T, and C21BH.

An active QRPer, Rogerio, CT1ETT, helped hand out the CT multiplier.

Single Operator High Power

The competition for the number one position in the highly contested high power all band category was fierce. All but two of the top ten finishers were DXpeditions. All the hard work of building a station on Aruba paid off for John, W2GD, the operator at P40W. John managed to find more multipliers than his rivals while maintaining a high QSO rate. The result was the coveted single op crown. Over on the Galapagos Islands Trey, HC8N (N5KO), finished in second place, while Jose, CT1BOH, keyed 9Y4H to third place. A very noteworthy accomplishment was the top ten finish of four zone 7 or 8 stations: 8P9Z (K4BAI), TI1C (N6TJ), 4V2A (9A3A), and 3E1DX (DL5XX).

In hockey you have the hat trick, while in the CQ WW you have the gold microphone/key trick. Repeating his win on SSB, Randy, K5ZD/1, took the USA top slot on CW. This double win has only occurred a few times in the history of the CQ WW. Randy was followed by another YCCCer, W1KM, while N2NT edged out fellow FRCer N2LT for third place.

The competition in Europe was real tough. After the smoke had settled, Dick, N6AA, operating at CT8T edged out fellow zone 14 operator GIØNWG, who was keying GIØKOW to second place. With each having selective propagational advantages, it was the number of QSOs that won out in the end. Third place (and first place in zone 15) went to OM8A with OM3RM at the key.

*1816 Poplar Lane, Davis, CA 95616

Single Operator Low Power

Setting a new world record, Uli, DL2HBX, put 3V8BB on the air in big style. Traveling to 3V8 and offering encouragement to the radio club reflects what amateur radio is all about. Thanks to the leadership of the Tunisian ops at 3V8, activity has been outstanding.

The battle for second through fourth place took place in the NE Caribbean. AA3B racked up the number two position from VP2EEB, while VP5EA (WD5N) and WP2Z (KØDEQ) finished third and fourth, respectively.

In Europe, Franc, S59AA, who is always among the top QRP or low power finishers, ran away from the rest of the pack from his QTH in the suburbs of Ljubljana. And almost due north in zone 15, SP4EEZ edged out G4KIV for second place.

For the third year in a row, it was K2SG on top of the single op, all band, low power USA entries. Tony, with 2.1 meg, edged out N2BA, who had 1.9 meg, by leading Brook in QSOs, Zones, and Mults. Also noteworthy is that in 1995 K2SG had only 1% unique/bad calls in his log—quite an impressive figure. In 1996, however, Tony did even better, cutting his rate almost in half!

All contesters can learn that it really pays to be accurate. As Tony and others have shown, it does not limit your ability to have the most QSOs in your category. Also, if you have any doubt about what a winning formula is in almost any category, you should look at all the low power results. KN4T, who placed third, had 27 more mults than K2SG, but was short about 350 QSOs. Fourth place went to KM1X (1073 QSOs and 378 mults), while fifth place went to K7SV/4 (898 QSOs and 427 mults). The same pattern continued with WT1O in sixth place (1022 QSOs and 365 mults) and NA2U in seventh place (845 QSOs and 386 mults). Clearly, if you're going to spend time doing something during the contest, it had better be making QSOs instead of chasing mults! It's also interesting to note W6JTI (ninth place SOABLP) had the most zones in the category (126).

QRP

In the QRP category it was ZX2X (PY2OU op.) taking world top honors. Jose had a clean log with only 1% unique/bad calls, which yielded a

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
World All Band
P4ØW (Opr. John Crovelli, W2GD)
Donor: Albert Kahn, K4FW—W9IOP Memorial

World Low Power
3V8BB (Opr. Ulrich Ann, DL2HBX)
Donor: Slovenia Contest Club

World Assisted
PYØFF (Opr. Ville Hiilesmaa, OH2MM)
Donor: Snake River Contest Club

World QRPp
ZX2X (Opr. Jose G. Damello, PY2OU)
Donor: Gene Walsh, N2AA

U.S.A.
Randall Thompson, K5ZD
Donor: Frankford Radio Club

U.S.A. Low Power
Anthony De Biasi, K2SG
Donor: North Coast Contesters

U.S.A. Zone 3
Kenneth Widelitz, K6LA
Donor: Bill Fisher, W4AN

U.S.A. Zone 4
David K. McCarty, K5GN
Donor: Dennis O'Connor, K8DO

Canada
Augustus Thomas Samuelson, VO1MP
Donor: Canadian DX Association

Caribbean/C.A.
8P9Z (Opr. John Laney III, K4BAI)
Donor: Chuck Shinn, W7MAP

Europe
CT8T (Opr. Richard Norton, N6AA)
Donor: Edward Bissell, W3AU

Europe Low Power
Franc Bogataj, S59AA
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Africa
3DAØNX (Opr. Koji Tahara, JM1CAX)
Donor: Gordon Marshall, W6RR

Asia
Krysztof Darbrowski, A71CW
Donor: Chuck Shinn, W7MAP

Japan
Satoshi Hara, JH5FXP
Donor: Japan Crazy Contesters Club

Oceania
Joerg Puchstein, YB1AQS
Donor: Peahi Contest Club

South America
HC8N (Opr. Trey Garlough, N5KO)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND
World—28 MHz
Matias Vanni, LU9AUY
Donor: Joel Chalmers, KG6DX

World—21 MHz
Arturo Gargarella, LU6ETB
Donor: Don Busick, K5AAD—N5JJ Memorial

World—14 MHz
ED9EA
(Opr. Juan Lucas Heredia Del Valle, EA7TL)
Donor: North Jersey DX Assn.—W2JT Memorial

World—7 MHz
IG9/AC6WE (Opr. Andy Melanyin, UA3DPX)
Donor: Alex M. Kasevich, VP2MM/4

World—3.5 MHz
EA8EA (Opr. Jorma Saloranta, OH2KI)
Donor: Fred Capossela, K6SSS

World—1.8 MHz
CG1ZZ (Opr. Yuri Blanarovich, VE3BMV)
Donor: Kenneth Byers, Jr., K4TEA

U.S.A.—28 MHz
Melvin Brafford, W4YV
Donor: CQ Magazine

U.S.A.—21 MHz
Steve Sacco, Jr., KC2X
Donor: Wayne Carroll, W4MPY

U.S.A.—14 MHz
Scott Detloff, NI8L
Donor: Northern Illinois DX Association

U.S.A.—7 MHz
Jeffery Briggs, K1ZM
Donor: Jan Perkins, N6AW—W6AM Memorial

U.S.A.—3.5 MHz
Robye L. Lahlum, W1MK
Donor: Bill Feidt, NG3K

U.S.A.—1.8 MHz
K8MK (Opr. James Hurt, K8LR)
Donor: Peter Hutter, WW2Y

Canada (14 MHz)
VA7A (Opr. Ronald Kaye, VE7XR)
Donor: Radio Amateurs of Canada

Carib./C.A. (7 MHz)
TIØC (Opr. Carlos Fonseca, TI2CF)
Donor: Snake River Contest Club

Europe—28 MHz
Arpad Berke, S51AY
Donor: John Pryor, K4OGG

Europe—21 MHz
Nigel Cawthorne, G3TXF
Donor: Robert Naumann, N5NJ

Europe—14 MHz
Jiri Pesta, OK1RF
Donor: Maud Slater—G3FXB Memorial

Europe—7 MHz
YT7A (Opr. Laslo Palfi, YU7GO)
Donor: Ivo Pezer, T93A

Europe—3.5 MHz
N. S. Shirko, UA2FJ
Donor: Frankford Radio Club—K3VW Memorial

Europe—1.8 MHz
Zbigniew Leszcynski, SP5GRM
Donor: Pat Barkey, N9RV & Terry Zivney, N4TZ

Japan—21 MHz
Akito Nagi, JA5DQH
Donor: DX Family Foundation

Japan—14 MHz
JA8YBY (Opr. Masaki Ohta, JO1DFG)
Donor: Mitsuhiro Nishimura, JA7WME

MULTI-OPERATOR, SINGLE TRANSMITTER
World
J6DX (Oprs. ACØS, K9JE, N8SM, N8NR, W9UI, W8QID, N9AG)
Donor: Anthony Susen, W3AOH

U.S.A.
K1AR (Oprs. K1AR, K1EA, K1GQ, K1MM, K5ZD)
Donor: Douglas Zwiebel, KR2Q

Canada
VE3EJ (Oprs. VE3EJ, VA3DX, VE3KZ, VE3IY, G4VXE)
Donor: Eastern Canadian DX Assn.

Carib./C.A.
NP4Z (Oprs. AA5DX, K5GO, KP4BZ, KP3L, NP3A, NP3J)
Donor: North Nevada DX Contest Club

Africa
D44BC (Oprs. D44BC, DK7YY, DL2OAP, DL2OBF, DL3DXX)
Donor: CQ Magazine

Asia
EX9A (Oprs. EX2M, EXØM, EX8W)
Donor: Steve Merchant, K6AW

Europe
OT6T (Oprs. ON5UK, DJ4AX, RA3AUU, UT4UZ, RW1AC, RV1AW, ON4UN, ON4MA, ON4JO, ON4AFZ, ON4PO)
Donor: K3AO Memorial (Friends of K3AO)

Oceania
KHØDQ (Oprs. KHØDQ, JF1SQC, JI3ERV, JK3GAD, JR7OMD)
Donor: Junichi Tanaka, JH4RHF

South America
LU4DRC (Oprs. LU7EE, LW9ETY, LW6EFP, LW1EXU)
Donor: Tyler Stewart, K3MM

MULTI-OPERATOR, MULTI-TRANSMITTER
World
5V7A (Oprs. KC7V, N7BG, K5VT, K7PN, K7GE, W6RGG, N7MB, G3SXW, GM3YTS, G4FAM)
Donor: Doug Zwiebel, KR2Q—K2GL Memorial

World—SSB/CW Combined
9A1A: 30,238,989
Donor: Alpha/Power, Inc.

U.S.A.
N2RM (Oprs.N2RM, WW2Y, K2WI, N2NC, N2AA, W2REH, WH2Z, N2NU, K2BM)
Donor: Bob Ferrero, W6RJ—N6RJ Memorial

Europe
9A1A (Oprs. 9A5W, 9A2DQ, 9A9A, 9A6D, 9A3GW, 9A2SD, 9A2TS, 9A2EU, 9A3NR, 9A2R, 9A7R, 9A6A, S51R, 9A9AA, 9A3ZA)
Donor: Finnish Amateur Radio League

Japan
JH5ZJS (Oprs. JA5BJC, JA5FDJ, JA5JCC, JH5RXS, JR5JAQ, JR5VHU)
Donor: Ryozo Goto, JH3JYS

CONTEST EXPEDITIONS
World Single Operator
XX9X: (Opr. Pertti Simovaara, OH2PM)
Donor: Yankee Clipper Contest Club

WORLD MULTI-OPERATOR
3C5A: (Oprs. N5AW, N6ZZ)
Donor: Bill Schneider, K2TT

SPECIAL—SINGLE OPERATOR AWARD
World SSB/CW Combined
P4ØW (Opr. John Crovelli, W2GD)
Donor: Hrane Milosevic, YT1AD

WORLD ALL BAND: UNDER 21 YEARS OLD
Kim Ostman, OI6KZP
Donor: Chuck Shin, W7MAP

CLUB
World SSB/CW
Frankford Radio Club: 328,583,151
Donor: CQ Magazine—W1WY Memorial

NON-USA SSB/CW
Bavarian Contest Club: 117,269,123
Donor: Northern Calif. Contest Club
N6AUV Memorial

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!

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TOP SCORES

WORLD

SINGLE OPERATOR
HIGH POWER
All Band

P4ØW 12,742,731
HC8N.....11,116,880
9Y4H 10,691,370
8P9Z.....8,650,620
TI1C.....7,346,856
4V2A.....7,007,128
3E1DX 5,922,267
8R1K 5,902,848
A71CW 5,895,043
CT8T 5,716,916

28 MHz

LU9AUY 98,280
LU3HIP.....86,268
S51AY 19,500
W4YV 12,285
GØAEV 7,150
K9OM 5,781

21 MHz

LU6ETB.....1,554,092
CX6VM 724,200
TU2MA 469,860
G3TXF.....444,050
JA5DQH 431,210
KC2X/4 391,572

14 MHz

ED9EA.....1,429,673
IG9/IT9GSF ..1,096,200
9Y4VU 1,009,849
CT9U 946,656
CE3F 885,360
YM2ZW 783,432

7 MHz

IG9/AC6WE..1,234,317
YW1A 1,060,355
ZS6P 909,200
RZ9UA.....867,680
LZ5W.....858,960
YT7A 875,716

3.5 MHz

EA8EA.....1,175,550
IG9/I2VXJ 791,633
TIØC 791,208
CT3FN.....500,220
UA2FJ 471,585
TK5NN.....438,684

1.8 MHz

CG1ZZ.....218,715
KP2A 203,300
SP5GRM 183,396
4X4NJ.....158,916
EI7M 123,214
F6EZV 122,706

LOW POWER
All Band

3V8BB 5,489,376
VP2EEB 4,921,360
VP5EA.....3,094,236
WP2Z 2,951,910
S59AA 2,281,884
K2SG.....2,158,728
4X7A.....2,101,878
N2BA 1,919,598
6W1AE 1,908,253
UAØJB 1,725,705

28 MHz

LU5UL 256,520
LW4DYI.....256,305
LU6MFD 105,450
VK4XA.....54,372
PY1KS.....53,680
EA6ZY 27,306

21 MHz

LU7FJ.....657,850
PY1KN.....396,845
ON4RU.....335,832
PU2MHB 321,152
N8II.....314,440
ZC4EE.....268,488

14 MHz

LU3FSP 558,846
XO7A.....547,575
Z39M 417,534
VK2APK 392,448
YU7BJ 369,600
OL7Z 369,264

7 MHz

LU1IV 916,776
EA8CN 540,870
VK6VZ.....407,365
HI3JH 406,461
PA3AAV 292,410
Z32XX 264,550

3.5 MHz

Z31JA 186,030
IK4WMG.....169,440
HA8PG 168,700
OHØMMF.....151,619
9A4RU.....148,798
ER3DX 125,672

1.8 MHz

HA8BE.....121,408
OH4JLV.....102,600
UA9CI.....86,156
US7ZM 65,780
OM3OM.....65,160
UN5J 61,172

QRP
All Band

ZX2X 753,255
AA2U 549,450
K1RC.....419,661
UT5UN 419,497
LY3BA 332,514
F6OIE 311,769
LY2FE 301,392
DL3KVR 298,718
K3DI 297,920
DLØQW 288,392

ASSISTED
All Band

PYØFF 9,462,960
K1NG.....4,979,632
W2UP 4,643,950
K3WW 4,541,412
W2XX 4,026,978
K2WK 3,719,668
K3MM 3,677,170
AA1K/3 3,613,776
K2TW 3,442,373
DK3GI.....3,287,692

MULTI-OPERATOR
SINGLE TRANSMITTER

J6DX.....11,493,255
D44BC.....9,865,736
NP4Z 9,687,744
OT6T 8,765,744
K1AR.....8,688,340
EA6IB 8,301,228

MULTI-OPERATOR
MULTI-TRANSMITTER

5V7A 26,916,240
9A1A.....15,513,544
J39A 15,028,500
N2RM 14,563,269
W3LPL.....13,941,174
K3LR 12,317,374

USA

SINGLE OPERATOR
HIGH POWER
All Band

K5ZD/1 5,461,830
W1KM.....5,307,693
N2NT 4,794,086
N2LT.....4,344,384
K4AAA.....4,286,150
W2RQ.....4,119,903
K3ZO 4,096,170
N6BV/1 4,045,252
KQ2M/1 3,717,277
W1WEF 3,673,972

28 MHz

W4YV 12,285
K9OM 5,781
W6KFV.....5,002
W7USA.....3,780
N2AU.....2,088
K4JYO.....1,563

21 MHz

KC2X/4 391,572
N5KA.....318,360
N4BP 239,140
K6AW 209,430
W6YA 197,370
K7QQ 169,932

14 MHz

NI8L.....639,816
W4PA 570,564
K2KW/6 501,384
KB1SO 439,698
NU6S.....425,941
W2II.....425,858

7 MHz

K1ZM/2.....593,850
WØUN.....540,640
W7GG 493,570
N7DD.....348,198
NX7K.....273,420
K5TR 255,438

3.5 MHz

W1MK.....329,278
K9DX.....148,717
K4PI.....137,124
N6AR/4.....133,548
K8MFO.....93,600
K2PS 91,584

1.8 MHz

K8MK.....46,440
W4DR.....36,757
K1UO.....32,320
WB9Z 22,357
W2VO.....20,382
K4TEA.....19,856

LOW POWER
All Band

K2SG.....2,158,728
N2BA.....1,919,598
KN4T 1,625,600
KM1X.....1,065,582
K7SV/4 1,017,968
WT1O.....963,600
NA2U.....860,394
WS1E 799,890
W6JTI 762,010
WO4O 599,872

28 MHz

W3EP/1 2,752

21 MHz

N8II.....314,440
WB4TDH 163,064
WA1FCN 85,239
AI2C/4 60,604
W5ZO 51,146
KD4FAZ.....41,040

14 MHz

N4MO 243,165
K2MFY 163,240
K7ZA 120,448
KI7DM 102,569
WB2ZMK.....49,197
W6QJI 26,242

7 MHz

AA2SZ.....88,689
W4HM 70,566
KØOD 68,655
N9AU.....44,240
WW3S.....42,925
K8UC.....32,508

3.5 MHz

W1UK.....46,729
N4TZ/9 35,200
W2ESX.....16,500
WV1C 7,395
KO6IG 855

1.8 MHz

W4ONO.....1,269

QRP
All Band

AA2U 549,450
K1RC.....419,661
K3DI 297,920
KA1CZF.....259,831
K2PH/3 238,392
K5IID/8 211,641
KV8S 193,584
N1AFC.....171,402
W8ILC 121,179
W4DEC 60,760

ASSISTED
All Band

K1NG.....4,979,632
W2UP 4,643,950
K3WW 4,541,412
W2XX 4,026,978
K2WK 3,719,668
K3MM 3,677,170
AA1K/3 3,613,776
K2TW 3,442,373
K2SX/1 3,129,628
N3AD.....3,128,832

MULTI-OPERATOR
SINGLE TRANSMITTER

K1AR 8,688,340
K8AZ 6,127,915
K1ZZ.....5,903,541
KØRF 5,225,584
W4WA 5,092,857
K8LX.....4,301,868

MULTI-OPERATOR
MULTI-TRANSMITTER

N2RM 14,563,269
W3LPL.....13,941,174
K3LR 12,317,374
KC1XX.....12,295,033
K1KI.....11,424,560
N3RS.....11,182,599

EUROPE

SINGLE OPERATOR
HIGH POWER
All Band

CT8T 5,716,916
GIØKOW.....5,652,738
OM8A 4,601,610
G4BUO.....4,405,296
YT1AD.....3,786,432
DJ6QT 3,064,320
G3ZEM 3,062,514
S53R 2,938,908
RN6BY 2,835,726
YU7AV.....2,818,645

28 MHz

S51AY 19,500
GØAEV 7,150
UR7VA 3,078
UT1IA 2,665
OK1TW.....1,925

21 MHz

G3TXF 444,050
9H0A 331,420
OI1AF 278,460
S5ØR 276,115
SP9HWN 208,299
RZ3BW.....199,068

14 MHz

OK1RF 780,912
OM5M.....722,936
S57DX.....670,170
G3WVG 651,168
YU1ZZ 585,837
SL3ZV 537,000

7 MHz

YT7A 875,716
LZ5W.....858,960
S5ØA 847,299
SP7GIQ 831,198
IR4T.....780,057
9A4D 772,375

3.5 MHz

UA2FJ 471,585
TK5NN.....438,684
OK2RZ 419,368
ES6DO 398,398
YTØT 384,970
LA9VDA.....378,998

1.8 MHz

SP5GRM 183,396
EI7M 123,214
F6EZV 122,706
HA6NY 120,772
OM5ZW 117,393
9A2VR 116,667

LOW POWER
All Band

S59AA 2,281,884
SP4EEZ.....1,699,320
G4KIV.....1,649,056
S51EA 1,527,532
OHØJJS.....1,472,640
OH4YR 1,283,789
S51FA 1,278,870
DL8OBC 1,088,934
EA3CA.....1,065,016
SP9XCN 1,035,948

28 MHz

EA6ZY 27,306
LZ2GS 21,080
EA3AFW.....7,000
EA7BJV 5,676
T99T 4,752
YU1HA 3,192

21 MHz

ON4RU.....335,832
F5PGP.....268,380
Z31JA 249,232
S57J 230,971
EA1AK/7.....204,525
EA7GTF 198,170

14 MHz

Z39M 417,534
YU7BJ 369,600
OL7Z 369,264
ES2RJ 358,028
EA2CLU 349,110
S58AL.....317,687

7 MHz

PA3AAV 292,410
Z32XX 264,550
UR5FEL.....260,311
S54A.....210,826
S52SK 188,340
DKØMM 169,092

3.5 MHz

Z31JA 186,030
IK4WMG.....169,440
HA8PG 168,700
OHØMMF.....151,619
9A4RU.....148,798
ER3DX 125,672

1.8 MHz

HA8BE.....121,408
OH4JLV.....102,600
US7ZM 65,780
OM3OM.....65,160
ON6YH 57,096
UA2FT 49,664

QRP
All Band

UT5UN 419,497
F6OIE 387,564
LY3BA 332,514
LY2FE 301,392
DL3KVR 298,718
DLØQW 288,392
UR5MTA.....266,409
I3BBK 235,879
YU1LM 231,075
UA4YJ 216,814

ASSISTED
All Band

DK3GI.....3,287,692
M6T 2,586,104
DJ2YA 1,976,923
HA1AG 1,697,876
SM3EVR.....1,195,897
DL3KDV 1,176,912
DFØDF.....1,087,488
DL1GGT 1,010,080
DF4RD 1,002,952
DJ9MH 818,662

MULTI-OPERATOR
SINGLE TRANSMITTER

OT6T 8,765,744
EA6IB 8,301,224
HG1G 7,999,292
IQ4A 7,601,784
TM2Y 7,546,648
OK5W.....6,462,775

MULTI-OPERATOR
MULTI-TRANSMITTER

9A1A 15,513,544
DFØHQ 11,248,125
LY5A.....10,041,980
EA4ML.....8,611,812
PI4COM.....7,949,568
S53M 7,605,548

BAND-BY BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
P4ØW	380/15/60	1068/22/84	981/29/93	1475/36/111	1803/34/111	608/23/65
HC8N	334/16/50	711/26/81	1325/34/93	1234/31/101	1855/29/100	485/20/51
9Y4H	218/12/36	768/22/70	1884/32/97	1198/29/82	1870/31/95	484/17/40
8P9Z	311/14/46	751/19/76	1534/26/87	1663/31/101	1396/26/82	479/16/37
TI1C	170/15/44	494/24/63	1488/27/84	1100/30/90	1796/33/100	383/16/35
4V2A	229/11/37	534/21/68	1561/33/94	1128/30/91	1651/25/77	190/14/35
3E1DX	153/12/33	317/18/57	1339/25/75	1156/33/99	1790/26/90	105/13/26
8R1K	103/13/34	426/18/68	1118/30/84	966/26/84	1077/25/76	209/16/38
A71CW	272/10/54	434/18/53	966/31/84	1216/31/99	1037/32/101	18/12/14
CT8T	283/16/52	714/21/75	818/24/75	1327/33/101	1356/28/92	86/16/44

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K5ZD/1	166/16/56	335/22/81	712/33/112	1102/34/109	721/27/95	25/12/16
W1KM	166/15/56	574/26/83	630/31/96	1040/32/104	729/26/89	14/8/13
N2NT	123/14/52	282/19/75	681/28/98	881/37/111	766/28/113	30/11/21
N2LT	64/12/43	208/18/72	530/32/101	1008/34/102	849/29/103	14/7/8
K4AAA	39/13/29	269/21/67	607/31/81	988/33/109	756/27/100	33/13/26
W2RQ	62/11/35	250/18/72	769/31/97	1041/33/102	663/23/85	6/3/3
K3ZO	51/11/35	399/25/84	620/33/100	953/35/113	429/28/95	25/8/18
N6BV/1	70/12/38	208/21/65	637/29/103	913/29/102	836/25/88	8/7/8
KQ2M	144/15/55	205/20/77	610/30/107	793/29/101	511/24/90	14/8/13
W1WEF	79/15/43	256/19/73	531/28/102	851/35/103	577/25/88	22/10/16

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

J6DX	94/14/57	646/21/82	2118/31/100	1676/32/110	2399/31/107	227/20/40
D44BC	154/13/52	732/20/70	706/24/77	1491/34/108	2245/28/102	156/20/56
NP4Z	84/9/36	776/27/94	1794/36/112	1264/35/118	1374/32/117	183/24/64
OT6T	219/32/101	763/32/116	1154/40/150	1363/38/139	873/36/127	69/14/46
K1AR	70/17/64	406/26/104	1071/39/147	1372/38/151	906/34/126	36/16/34
EA6IB	167/18/70	870/26/102	1517/34/127	1355/33/121	1374/36/126	78/18/51

USA MULTI-OPERATOR SINGLE TRANSMITTER

K1AR	70/17/64	406/26/104	1071/39/147	1372/38/151	906/34/126	36/16/34
K1ZZ	109/14/63	256/21/86	638/36/131	1063/39/146	663/32/124	47/17/38
K8AZ	45/14/42	309/29/100	502/37/134	1163/39/148	737/31/124	41/16/39
KØRF	59/16/28	324/29/83	1033/38/132	1166/38/143	350/31/97	69/14/30
W4WA	65/16/55	228/24/89	680/33/112	1231/36/129	480/31/116	37/17/35
K8LX	61/17/49	147/24/73	679/33/111	992/38/128	617/28/105	18/11/16

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

5V7A	507/18/60	1078/21/77	2528/33/109	4254/39/148	3260/37/140	442/19/79
9A1A	1043/22/83	1995/38/127	2598/38/148	2355/40/151	1436/39/140	168/19/59
J39A	313/13/59	1243/23/84	2222/31/106	2366/37/130	2202/33/110	866/20/53
DFØHQ	796/23/93	1518/35/121	2167/39/150	1650/39/132	686/37/125	150/16/47
VE9DH	577/17/63	1108/24/94	1305/32/114	1944/32/126	1420/28/112	61/8/18
LY5A	878/22/83	1776/35/126	1542/35/141	1512/39/136	1043/37/132	241/14/45

USA MULTI-OPERATOR MULTI-TRANSMITTER

N2RM	368/18/80	803/30/108	1494/40/151	2035/40/155	1412/33/137	137/19/42
W3LPL	313/21/82	953/32/116	1314/39/150	2023/40/158	1134/34/138	135/19/45
K3LR	332/20/75	706/32/111	1251/39/153	1827/40/155	1186/31/134	109/19/46
KC1XX	313/19/77	790/27/102	1119/39/144	1987/39/151	1349/34/131	104/17/37
N3RS	148/18/70	503/27/99	1280/39/148	1979/39/154	1045/31/132	65/16/34
K1KI	306/20/75	541/24/97	1364/37/145	1639/40/155	1120/33/128	61/16/35

final score of just over 750k. Jose used the Index Lab's QRP-Plus hooked to 2 elements on 40; 7 elements on 20, 15, and 10; and a second 4-element Yagi on 10, all mounted on top of an 8 story building.

First place USA (and second place world) again went to AA2U. This was Randy's seventh consecutive USA win on CW—quite an amazing achievement. As usual, Randy had zero (0.0) percent unique/bad calls in his log! Second place USA (and third place world) went to K1RC, while first place Europe and fourth place world QRP honors were taken by UT5UN.

Assisted

What can you say about assisted from PYØ? Ville, OH2MM, traveled down to Brazil to visit his relatives and took in the CQ WW CW from the QTH of PYØFF. He took away the world trophy for assisted. The rest of the battles were in the States to see who could not look at their packet screens. As you have learned, QSOs are a big key to a high score. K1NG was piloted by KI1G into second place world and the top score in the US. The power axis of YCCC-FRC-PVRC sure placed a lot of scores in the assisted category.

Roland, DK3GI, really has learned how to do it. He keyed his way to first place in Europe over G4PIQ, who definitely made good use of his special M6T callsign.

Multi-Single

What a job the crew at J6DX did! They not only took top honors in the highly competitive multi-single category, but set a new North American record in doing so. They sure were in the right spot, as their QSO total demonstrates.

Second place in the world went to the joint DXpedition team from the RRDXA and BCC. They joined forces to activate D44BC. Third world went to the new contest call of the Puerto Rico Contest Club, NP4Z.

Over in Europe first place was captured by OT6T operating from the QTH of ON4UN. John's team edged out the increasingly potent EA6IB group.

Here in the USA clearly the winner was K1AR operating from K1EA's QTH. They not only won for the US, but finished in the top six world box! That's a real accomplishment. The main competition was for second place. It went to K8AZ. Tom's crew outdid themselves with a terrific effort. Third place went to K1ZZ. Dave's crew must have been influenced by his normally *very* low unique rate, since theirs was less than 2%.

Multi-Multi

The VooDoo Contest Club continued to put the rest of the world in a trance. They have settled on a "sort of" permanent QTH in 5V7. Their 20 meter QSO total was absolutely outstanding at over 4100 QSOs. The plan is to put 5V7A in many logs again this year.

The second place position went to 9A1A

TEAM CONTESTING

1. **Neiger's Tigers:** 49,912,140. By CT8T (N6AA), P40W (W2GD), 9Y4H (CT1BOH), HC8N (N5KO), TI1C (N6TJ).
2. **Contest Club Finland:** 26,681,235. By 8R1K (AB6NJ), CP6AA (OHØXX), PYØFF (OH2MM), OI6YF, XX9X (OH2PM).
3. **Team Handkey South:** 20,933,295. By K4AAA, 8P9Z (K4BAI), AA4S, N2IC, K5GN.
4. **Team Handkey East:** 19,072,101. By W1KM, K5ZD, N6BV, W9RE, J3/WJ2O.
5. **EU-MIX Team:** 19,319,351. By 3E1DX (DL5XX), 3V8BB (DL2HBX), 4V2A (9A3A).
6. **Team Nippon:** 14,533,501. By 9M6NA (JE1JKL), JH7PKU, V85HG (JO1RUR), 3DAØNX (JM1CAX), 6Y6A (JE3MAS).
7. **Yugoslavian Contest Team #1:** 11,805,886. By YU7AV, YT1AD, YU7BW, YU7CB.
8. **SCC #1:** 10,563,613. By S50A, S51BO, S51FA, S53R, S59AA.
9. **Team International:** 4,163,874. By OH8BQT, VE1GN, K6LA, ZX2X (PY2OU).
10. **Team Tennebama:** 3,831,180. By K4NO, W4PA, KØEJ, K4RO, WO4O.
11. **SCC #2:** 3,497,207. By S50R, S51EA, S57AL, S57U.
12. **Yugoslavian Single Band Team:** 2,363,017. By YU1ZZ, YT1BB, YU7BJ, YT7A.
13. **OH1AF'S Single Band Headbangers:** 1,464,587. By OH1EH, OH1NSJ, OI1AB (OH1NOA), OI1HS, OI1AF (OH1MDR).
14. **Birzai Region Team:** 650,807. By LY3BA, LY3BU, LY3IW, LY3KB, LY3NJM.
15. **Yugoslavian QRP Contest Team:** 526,424. By YU1KN, YU1EA, YU1LM.
16. **Team Monobanders:** 401,661. By K6AW, GM6Z.
17. **SCC #3** 293,083. By S51AY, S57J, S59L.

CLUB SCORES

USA

Frankford Radio Club	328,583,151
Yankee Clipper Contest Club	276,565,298
Potomac Valley Radio Club	130,778,491
Northern California Contest Club	49,382,025
Southern California Contest Club	43,712,359
North Coast Contesters	43,667,801
Society Midwest Contesters	42,302,523
Central Arizona DX Association	32,765,536
Southeast DX Association	30,861,712
Southwest Ohio DX Association	25,330,097
North Texas Contest Club	25,113,734
Willamette Valley DX Club (W7)	21,720,534
Mile High DX Association (WØ)	15,402,845
Mad River Contesters	14,442,302
Oklahoma DX Association	11,191,897
Northern Alabama DX Club	10,654,992
Rochester DX Association	10,197,872
Central Texas DX/Contest Club	9,826,059
Carolina DX Association	9,142,023
Western Washington DX Club	8,739,752
North Florida DX Association	8,451,345
Minnesota Wireless	7,512,389
Clay County DX Association (W4)	7,065,307
Florida Contest Group	6,648,169
Southern California DX Club	5,866,046
Tennessee Contest Group	5,808,768
Texas DX Society	5,501,619
San Diego DX Club	4,564,027
Woodbridge Wireless (W4)	4,207,451
Kansas City DX Club	3,617,813
Kentucky Contest Group	3,495,192
Mother Lode DX/Contest (W6)	3,056,802
Hudson Valley Contest & DX (W2)	2,810,638
Western NY DX Association	2,364,873
Order of Boiled Owls NY	2,257,480
Eastern Iowa DX Association	1,863,247
Northern Illinois Dx Association	1,722,403
Grand Mesa Contesters	1,211,717
South Florida DX Association	1,106,658
Glouchester ARC (W2)	1,103,755
Redwood Empire Dx Association	1,043,147
Salt City DX Association (W2)	950,685
Mississippi Valley DX/contest	893,510
Hicks (W9)	875,166
No Dot Dxers (W9)	792,778
Northern Shenandoah DX Association	651,367
Schenectady ARA	623,647
Hanging Judge Contesters	589,370
Ca Central Coast DX Club	550,744
Northern Arizona DX Association	478,231
Roanoke Valley RC (W4)	402,343
Central Florida DX Association	291,948
Sturdy Mem Hospital (W1)	255,886
ARCECS	247,007
West Park Radio Ops (W8)	246,371
Northrop-Grumman RC (W6)	196,644
South Jersey Radio Association	152,130
Metro DX Club (W9)	149,559
Dayton Area Radio Association	73,168

DX

Bavarian Contest Club	117,269,123
Rhein-Ruhr DX Association	104,072,682
Contest Club Finland	69,055,808
Ukraine Contest Club	42,319,177
Marconi Contest Club (I)	39,203,250
SP DX Club	35,251,700
Croatian DX Club	35,010,784
LNDX (F)	34,960,092
Slovenian Contest Club	33,163,664
YU DX Club	31,312,526
Croatian CW Group	24,501,770
LYNX (EA)	23,852,062
HA DX Club	21,758,488
Chiltern DX Club (G)	20,718,283
Lithuanian DX Group	18,874,920
Low Land Crazy Contesters (PA)	18,794,225
Kaunas Technical University (LY)	17,138,458
LZ Contest Club	14,705,876
GPDX (CT)	12,839,453
Rosario (LU)	11,039,180
Crimea Contest Club	10,570,639
Japan Crazy Contesters	10,039,991
Pretoria DX Club	8,882,771
Kaliningrad Contest Club	7,168,518
Northern Lithuania DX Group	6,766,942
East Bavarian DX Association	6,205,487
Sao Paolo Contest Group	6,150,500
Sarejvo Contest Group	6,065,499
Kiel Canal Activity Group (DL)	5,679,805
Top of Europe Contesters (SM)	5,576,422
Cordoba (LU)	5,208,594
Taganrog Contest Club (UA6)	5,000,914
Kiev Contest Group	4,372,953
OZ9EDR: Club	4,294,496
Danish DX Group	3,757,383
Bavarian DX Group	3,371,759
Lyon DX Group (F)	3,101,800
Saone et Loire Contest Club (F)	3,009,805
Vojvidina Contest Club (YU)	2,989,363
British Columbia DX Club	2,804,434
GADX (LU)	2,794,701
French CQ Gang	2,723,532
East Canadian DXA	2,497,568
Shizuoka DX Club (JA2)	2,497,379
TuPY DX Gang (PY2)	2,496,866
Fox Contest Club (YU1)	2,244,276
Magic Island Contest Group (PY5)	2,112,422
Saipan ARC	1,447,712
QRL Kantou (JA1)	1,436,940
Koryazhama DX Company (UA1O)	1,427,778
SP Contest Club	1,413,965
Rostov on Don RC (UA6)	1,375,866
Radio Club Uruguay	1,261,764
OH3NE: Club	1,153,404
RCL (CT)	1,085,539
Puerto Rico DX Club	1,055,835
Perugia DX Club (I)	916,420
UFT (F)	899,122
SV2TSL:Club	897,795
Cadiz (EA7)	864,862
YO4KCA: Club	710,661
Southern Germany DX Group	663,123
Granada (EA7)	644,712
Globus Contest Club (UR5M)	614,008
Vologna (UA1Q)	598,907
Fukuoka DXA (JA6)	503,766
Czech Contest Club	495,584
Beemster Contest Club (PAØ)	495,228
Alicante (EA5)	436,794
LU4AA: Club	423,013
Sudaca's Contest Gang (LU)	410,137
Geo DX Group (DL)	373,996
Hamilton ARC (VE3)	268,324
SN6O: Club	249,590
Amsterdam DX & Contest Group	235,556

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 VECTRONICS VC-300DLP is the world's most versatile 300 Watt antenna tuner!

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You can tune any real antenna from 1.8 to 30 MHz, including all MARS and WARC bands. Use verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc.

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Peak Reading Cross-Needle Meter

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.

Versatile Antenna Switch

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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A built-in 50 Ohm dummy load makes tuning up your rig easy! Use it for testing and repairing your rig, setting power level, adjusting your mic gain and more.

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The finest components available and the highest quality construction gives you the *best* 300 Watt antenna tuner that you can buy.

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You can tune any real antenna from 1.8 to 30 MHz for absolute minimum SWR.

The HFT-1500 is crafted of the finest components available . . . two *heavy duty* 4.5 kV transmitting variable capacitors and a *high current* roller inductor with a precision 5 digit *gear* driven turns counter. Gives you arc-free operation up to 2 kW PEP SSB.

Has backlit, peak-reading Cross-Needle SWR/Power meter, *SSB✻Analyzer Bargraph™*, 6 position *ceramic* antenna switch, 4:1 Ruthroff balun for balanced line. Scratch-proof Lexan front panel. 5.5x12.5x12 inches.

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It's compatible with *any* mobile antenna and *any* mobile HF transceiver and is compact enough to fit in the most compact car.

It can also be used at home with dipoles, vees, verticals, beams or quads fed by coax.

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.

SWR/Power Meters

PM-30
$79.95
PM-30UV
$89.95

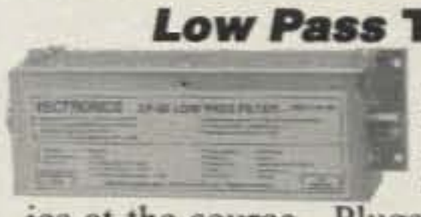
PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultaneously on dual movement Cross-Needle Meter. True *shielded* directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.

For 144/220/440 MHz, 30/300 Watt ranges. PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load

DL-650M, $64.95. Handles 100 watts continuous, 1500 Watts for 10 seconds to 650 MHz. Ceramic resistor. SWR < 1.3. SO-239 connector. **DL-650MN, $69.95** has N connector.

Low Pass TVI Filter



LP-30, $69.95. Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1500 watts.

High Pass TVI Filter

HPF-2, $24.95. Installs between VCR/TV and cable TV or antenna lead-in cable. Eliminates or reduces interference caused by nearby HF transmitters.

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TOP SCORES IN MOST ACTIVE ZONES

Zone 3

K6LA	1,731,660
WZ6Z	1,276,626
N7TT	1,077,359
XK7SZ	877,924
*WA7BNM/6	593,280
K6XX	514,048
W7SE	427,141
K6VX	402,052
WA5VGI/6	337,108
W7ZMD	307,560

Zone 4

K5GN	3,156,737
W9RE	2,975,280
N2IC/Ø	2,958,168
K4AB	1,956,864
K5MA	1,928,595
K5YA	1,888,952
K5YAA	1,764,447
KØEJ/4	1,593,651
W4XJ	1,432,698
K9AN	1,342,320

Zone 5

K5ZD/1	5,461,830
W1KM	5,307,695
N2NT	4,794,086
N2LT	4,344,384
K4AAA	4,286,150
W2RQ	4,119,903
K3ZO	4,096,170
N6BV/1	4,045,252
KQ2M/1	3,717,277
W1WEF	3,673,972

Zone 14

CT8T	5,716,916
GIØKOW	5,652,738
G4BUO	4,405,296
DJ6QT	3,064,320
G3ZEM	3,062,514
GØIVZ	2,646,140
DK8ZB	2,615,620
OZ1LO	2,195,564
EA2IA	1,918,008
OY1CT	1,813,686

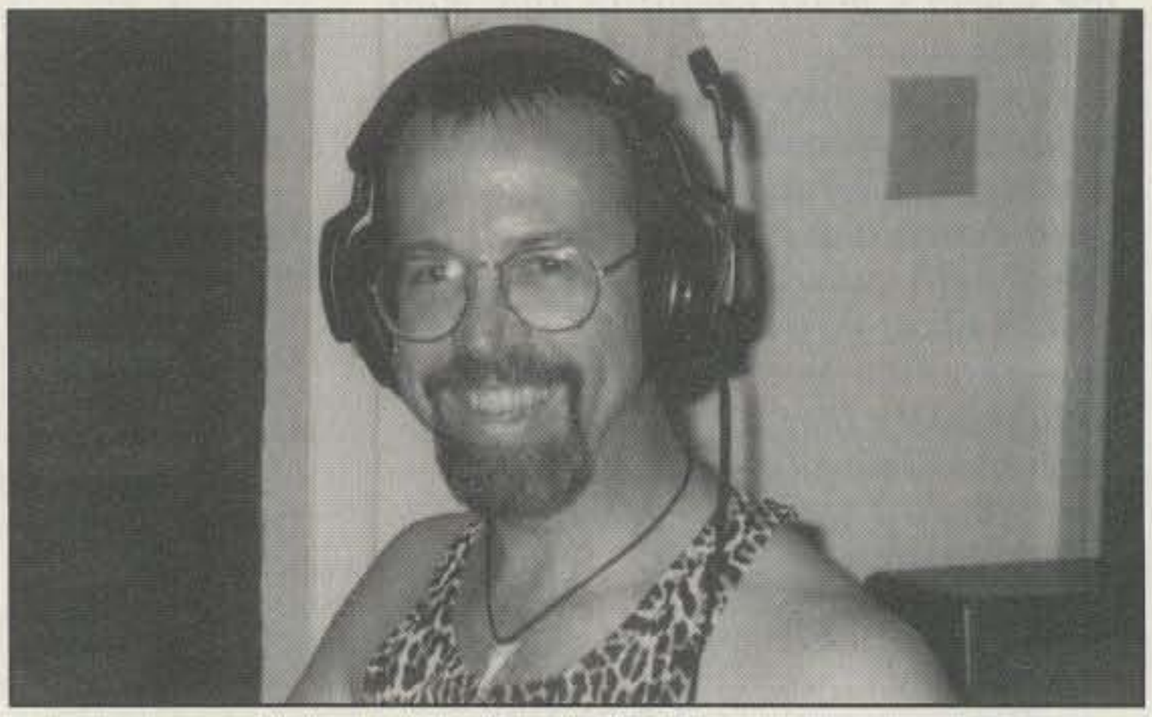
Zone 15

OM8A	4,601,610
YT1AD	3,786,432
S53R	2,938,908
YU7AV	2,818,645
OH1NOR	2,780,160
S51BO	2,696,872
YU7BW	2,653,717
YL8M	2,486,938
*S59AA	2,281,884
OI6YF	1,927,074

Zone 25

JH5FXP	2,917,488
JH7WKQ	2,203,248
JH7XGN	1,566,291
JA1IDY	1,417,687
JHØFUW	1,323,645
*JEØUXR	960,160
JA1JKG	934,929
JA9CWJ	856,654
*JE3HDD	734,080

Julio, HI3JH, put HI on the map.



VP5EA operated by David, WD5N.

from around the city of Zagreb. The ops of 9A1A are very dedicated to contesting and their score shows it. Third place went to the Yankee Clipper Contest Club DXpedition to J39A.

In Europe the top spot went to the already mentioned 9A1A. Second place was found at the quad farm of DFØHQ located in southeastern Germany. Club station LY5A finished a close third.

The boys from the FRC operating at N2RM's summer cottage took advantage of their skill and QTH to win first in the US. Second place went to Frank's crew at W3LPL, while third traveled out to western PA to the QTH of K3LR.

Team Contesting

Once again the team organized by Jim, N6TJ, took first place. Look at the scores and you can see that each team member averaged just under 10 million points! Since the overall all band winner had 12+meg points, it is a remarkable job. Well done! However, if Neiger's Tigers had looked over their shoulders, they would have seen a real battle for second through fourth place. Contest Club Finland in its debut took second place honors. An interesting battle took place for third and fourth between two east coast USA teams. Team Handkey South just beat out their brethren from the Team Handkey East.

You don't have to make 10 million points to go for a team. The object is to have fun creating a competition in which the members can come from anywhere on Earth. Some of the teams choose to operate single band, while others are QRP only. The goal is to interest others to form a competitive team. Find five contesters and join in!

Yuri, VE3BMV (left), and Jack, VE1ZZ.

Clubs

The battle of the clubs was especially competitive this year. The Frankford Radio Club held on to their crown over stiff competition from the Yankee Clipper Contest Club and a surging Potomac Valley Radio Club. In Europe the see-saw battle between the northern Rhein-Ruhr DX Assn. and the southern Bavarian Contest Club tipped to the south. The BCC took the DX trophy. They were followed by a club that every-one will be watching in the future—the Contest Club of Finland. These six clubs accounted for over 1 billion points! Quite astounding.

The battle of clubs just below the giants was also quite interesting, with the NCCC edging out the SCCC.

New Records, Special Mention

The following stations set new world or continental all-time records:

World 3.5 EA8EA (OH2KI); LA 3V8BB (DL2HBX); L7 LU1IV (LW9EUJ); L3.5 Z31JA; Q1.8 ES1CW; A1.8 TK5EP.

USA LA K2SG; L14 N4MO; L3.5 W1UK; Q7 WØKEA; A14 K4AMC; A1.8 N2QT/4.

North America 1.8 CG1ZZ (VE3BMV); LA VP2EEB (AA3B); L14 XO7A (VE7SV); L7 HI3JH; L3.5 W1UK; Q7 WØKEA; A14 K4AMC; A1.8 N2QT/4; MS J6DX.

Africa 7 IG9/AC6WE (UA3DPX); 3.5 EA8EA (OH2KI); 1.8 EA8ZS; LA 3V8BB (DL2HBX); L7 EA8CN.

Asia L1.8 UA9CI; A1.8 JH4UYB.

Europe L14 Z39M (Z31CN); L3.5 Z31JA; L1.8 HA8BE; Q1.8 ES1CW; A21 EA5WU; A14 C31LJ; A1.8 TK5EP.

Oceania 3.5 9M6NA (JE1JKL); L14 VK2APK; L3.5 VK6LW; MS KHØDQ.

South America All P40W (W2GD); L21 LU7FJ; L7 LU1IV (LW9EUJ); QA ZX2X (PY2OU); Q28 LU9HUP; A14 PY2NQ.

A special mention must be made of the outstanding job done by the multi-multi effort of CYØXX. Their efforts made a lot of people happy. Way over in Myanmar, the single band

efforts of the XZ1N operators (see results) was a great idea. Each took a band and handed out the elusive XZ and zone 26 multipliers.

At the same time as the contest was occurring, another event was happening on C21. OH2BH had invited operators to this remote island for his 50th birthday party and to join in the contest fun. Martti has always been a promoter of ham radio, and he is to be congratulated for the fine score of the C21BH effort.

Thanks to the radio operators on ships. They recently have become more active in the contest. They provided the rare zone 34 in the 1996 contest. If you are on a ship, you can get in the contest. You count for QSO points and the zone through which your ship is sailing.

Comments

Get It Right! This year we ran across an ever-increasing phenomenon: incorrect packet postings. I operated as a member of the K3LR team last year on CW. On Sunday I had fun as a secondary contest watching people spot *wrong* calls and the band map fill up with bogus callsigns. During the log-checking procedure several of the log checkers noticed that bad callsigns were attracting many people who just worked what they saw on their packet screens —that is, they *never* heard the callsigns they worked. For example, the very active MM 5V7A was spotted as HV7A. Fifteen guys all on the same packet cluster put HV7A in their logs! So not only did they get the call wrong, they gave themselves a good multiplier on top of it.

If there is any lesson to be learned from such information, it is that guessing is no way to work a QSO. The bad call/mults can easily be found by the computer and your score will be reduced. If you have any doubt, make sure *you* copy the call you have worked. Sometimes you have to stick around for a minute or more to get the call, but then you're sure of it.

Electronic log submission: This year we received 1056 electronic submissions on CW (disks or e-mails). Although we mentioned the following in the SSB write-up, it bears repeating: Even with that many submissions there were that many again computer paper logs with *no* disk or e-mail log! If you use a computer to generate your log, *please* take the time to send a disk plus a paper summary sheet or e-mail your log. It is cheaper for you to mail a disk than your whole log. E-mailing your log is the cheapest of all! Refer to Rule XI.5 for directions on how to submit a disk.

CW e-mail log submission <cw@cqww.com>: You can submit your log via the Internet. E-mail is easier for you and us. For e-mail we require **two files** to be included in your message: (1) A **summary sheet** in plain-text ASCII, and (2) Your **log**, which should be sent in one of two ways—as a plain-text ASCII file (for the most popular programs submit your CT: yourcall.ALL file, TR: yourcall.DAT; other fixed-column ASCII formats are acceptable) or as a binary file (acceptable examples for submission of files for the most popular contest programs; acceptable binary formats are NA: yourcall.QDF; OH2BQS). If you send a binary file, it will have to be encoded for transmission via e-mail. All popular encoding schemes are acceptable, including UUencode, Base64, and BinHex. Your software may automatically encode your log as an attachment.

If you must send the files in separate messages, be sure to put the **mode** and the station

callsign in the Subject: line of each message. When you send your log, it should automatically be acknowledged by the server. If we eventually have trouble with reading your file, we may ask you to send a disk. Submit your 1997 CQ WW CW log to <cw@cqww.com>.

Therefore, the e-mail addresses that you should be aware of for the CQ WW are (1) SSB Internet submissions <ssb@cqww.com>; (2) CW Internet submissions <cw@cqww.com>; (3) Non-award questions about the CQ WW <questions@cqww.com>; and (4) If you are missing a WW award <awards@cqww.com>.

Thanks

Thanks to the CQ WW log checkers who make sure that the CQ WW remains on the leading edge of log validation. Give a warm round of applause for K1DG, K3UA, K3ZO, K6NA, KR2Q, N2AA, N2NC, N3ED, N3RA, N5NJ, N5TJ, N6ZZ, N8BJQ, N9RV, W2RQ, W7EJ, and W9RE. Our DX advisors were very helpful in offering advice, providing information, and sorting out potential problems: CT1BOH, DL6RAI, EA3DU, G3SXW, I2UIY, JE1CKA, OH2KI, OH2MM, OK2FD, ON6TT, PY5EG, S50A, SM3SGP, UA9BA, and VE3EJ.

A special thanks to Dick, N6AA, who between trips to VK-land put in countless hours to make the CQ WW database the best in contesting. The CQ WW uses the software developed by N6TR to create the database. John, K2MM, set up and managed the CQWW.com internet site, and Larry, N6TW, was valuable in retrieving data from e-mail submissions. Thanks to the "voice," Gene, W3ZZ, for his efforts to decode problem disks. Thanks to Jim, N6TJ, for his editorial advice. And finally, thanks again to John, K1AR, for his advice and hard work to make the CQ WW so successful.

Congratulations to all the winners. Go to a club meeting, get a friend to join in the fun, or try a DXpedition. To participate is what contesting is all about!

73 and CU in '97, Bob, K3EST

DX QRM

Worked three "new ones" on 160! Unfortunately, I can no longer participate full time—doctor's orders!. . . *PAØLOU*. Good openings to Africa and Caribbean on 160. Heard HC8N . . . *LA8WG*. I have gotten DXCC this October and CQ WW DX contest was very helpful. Thank you *CQ* magazine . . . *7K1EQG*. Would never had expected to work XZ in a 160 meter effort! . . . *G3XTT*. I operated from shed in the garden, -3 degrees, 3 inches of snow, wrapped in blankets and sleeping bag. Of course I enjoyed it! First time in CW. This is becoming addictive . . . *G4KIV*. What a difference between two years ago and this year. Did 40 as single band both years, and this year I more than doubled my QSO and scoring. Good condx to NA first night, but at the second morning I got so tired at sunrise that I had to go to bed earlier than planned (we're all getting one year older every contest!) . . . *EA8CN*.

I chose to do single band 10 so I could sleep normal hours (am an old timer, age 77). You had to be quick when the band did open . . . *EA6ZY*. Tks to OM LA7SL, Peter for QTH and hospitality . . . *LA9VDA*. An enjoyable event as usual. In fact, I haven't enjoyed a contest as much for ages. CQ WW brings out the rare ones—at least three all time new countries for me . . . *G3WRR*. Twenty years ago I was starting in CQ WW (1976) for the first time! . . . *UA6NZ*. Halfway through the first night my keyer battery went flat. 4:30 AM found me frantically searching for a spare! Conditions seemed quite good. I'll be back next year! . . . *VK6VZ*. Enjoyed the contest. Did not find XE or VE (zone 2) again this year . . . *RW4AA*. Had a weekend of very heavy gales and storms which made 80 hard going. It should be a rule that all "W" stations that are not in their call areas sign /current call area. It must be a nightmare for the judges checking through the logs to get the zones right . . . *VK2AYD*.

I have been QRVing on 160 meters in this contest for 15 years. The propagation between JA-EU is very, very good. Fantastic and mysterious! Even at 13z we JA can hear many EU stations on 1825-30 kHz. At this time we hear also many USA stations who were calling XZ1N. But they did not hear on 1910 kHz. So I strongly say to EU and USA stations: Please call "CQ Contest QSX 1910 kHz" many many times . . . *JE1SPY*. I am very joyful in this contest because I got a new country . . . *JA1WHG*. My second CQ WW CW entry. Last year I had my license only two days. This year I could multiply last year's score by 3.5! Great boost for my DXCC . . . *ON4CAS*. Sometimes the QRM was so strong, I couldn't hear my own signals through the QRK. Propagation was good for a sunspot minimum . . . *PA3ASC*.

The last time I sent my log was 1964. I enjoyed this 96 contest even much more . . . *OE3TL*. Very pleased to participate for the first time in this contest! It is a great contest! . . . *CN8GB*. Condx was very hard on 28 MHz. The noise changed into live Morse code! . . . *JH6SQI*. I love this contest! Thank you! . . . *EU4AA*. I'm excited for my first African on 160! . . . *JI3KDH/3*. I was on an 870 foot oil tanker returning to Valdez, AK having been to BY and HL land. For me the CQ WW CW test is the greatest of all contests. It is truly amazing how simple it is to break pile-ups when propagation is good . . . *W7SW/MM (Zone 19)*. Next year I will be QRV from Central America . . . *JA6WFM*. I felt that 5 watts was not QRP! But I think I had weak signal. Thank you very, very much to all stations . . . *JR9OPJ*.

I would like to thank Fred (G4BWP) for letting me use his station and his XYL, Mandy, for putting up with yet another radio fanatic in the house! . . . *GØKRL*. It was my first attempt to work DX stations on top band. I enjoyed big pile-ups from EU stations . . . *JH4UYB*. Bands were overcrowded, making it difficult to get through. Who says that CW is dying! . . . *G4ZME*. Poor condx on 10/15 but lots of DX to work on the other bands. It was a great contest . . . *F5MWW*. We come to Lampedusa again and this year the propagation on 40 meters was not as good as in the previous year. See you all next year, from where? Do not know yet but maybe . . . *IG9/AC6EW (Opr. UA3DPX)*. Forty meters was boiling. Enjoyed very much but east coast and West Indies did not come in . . . *JA2NNF*.

Not very many requests to change bands. Guess KL7's had Zone 1 covered . . . *VY1JA*. Better than SSB. My voice was OK on Monday! . . . *SV1DET*. Nice to be on again. Working HL3 and YB1 on 7 MHz with only two calls (25W) was great. It seems that search and pounce can bring in nice stations. Compliments to all the W's who managed to get my signals on 14 MHz . . . *PAØMIR*. Called all day, both days for contest stations finding none. In the evenings the overflow came to me . . . *2EØAOK*. Operated from field-day location on the coast in Devon with good sea take-off to US, but also with the attendant typical late November gales that buffered the 80 ft. trailer-mounted 15 meter beam around somewhat . . . *G3TXF*. Many thanks for my first and FB WW DX. I'm on the air for 20 years and invalid for 2 years. Radio amateurs and contests are a good hobby! . . . *LZ4RV*.

Also with simple antennas (dipole and sloping dipoles) and 100 watts CQ WW CW is every year a great pleasure. Propagation is not so poor as numbers say . . . *IK4EWX*. Working Vietnam for the first time ever! . . . *ZC4EE*. I operated from superb seaside QTH. Great location, big signal, good conditions, but a shame about the operator! . . . *G3WVG*. This year's contest was extra tough, as I found the LF bands in poor condition. I only spent 32 hrs on the air but managed to produce good pile-ups in the last 8 hours . . . *GD4UOL*. It was very exciting working with only 5 watts and a simple wire antenna . . . *F6CRP*. This the best of the contests in the world . . . *LU3DSI*. Congratulations to the 5V7A group. Tks for 160 QSO! . . . *ZD8DEZ*. Worked Haiti for only the second time in 43 years! . . . *GW3JSV*. Great contest! Propagation was very poor until I had a 5 hour long JA opening Saturday night on 10 meters! First time I worked Antarctica and zone 39 on 10 meters . . . *LU3HIP*.

Terrific condx on all bands except 10 meters. What an enjoyable contest . . . *EI4DW*. I don't know how you do it, but condx are usually good for contest weekends, and this one was by no means an exception. 21 MHz was the best of the year! . . . *VE3ST*. All my QSOs were with hand key . . . *BY4SZ (Opr. BZ4SCT)*. I still give meaningful reports; seems 9J2BO is the only other who does so! . . . *G3JKY*. I felt that band condx are going better. Nice contest as usual. I like it. N6TR program help me so much . . . *OK1ABP*. The St. Lucia DXpeditionary Force, a tiny division of the Southwest Ohio DXA. We started planning this year's trip in March, started packing in October, traveled 18 hours. After all that the contest lasted only 48 hours. Next year how about at least a week-long contest? . . . *J6DX*.

I had much fun! More than 10,000 points for the first time and 53 contacts with the USA . . . *DL4OBJ*. Excellent condx during last night! Thank you for new one, World-Wide Contest! . . . *UAØSR*. After seven airports and six airplanes, just being in the Bahamas at Treasure Cay on Abaco Is. was great . . . *AA6EW/C6A*. New callsign had to be repeated quite often. Hard work getting through in pile-ups . . . *M6C (Opr. G3KKQ)*. Sixty-eight years old, ex-"Sparks" bit tired at end but still great fun. Cannot say no to this fine contest . . . *PA3GNO*. Excellent through North Pole conditions just before the end of the contest. Got many important double multipliers . . . *ES2RJ*. I am 16 years old and here in Sierra Leone with my Dad for the year. Power is somewhat unreliable and sometimes goes off in the middle of a pile-up. We do not mean to be rude but that is life here . . . *9L1MA*.

Enjoyed the contest and pleased to make the highest ever G score at the bottom of the cycle . . . *G4BUO*. I contacted many stations because many GREAT stations attended in the contest . . . *JH2NWP*. I started contesting in 1954 with the call I1YCZ from Trieste, a country separate from Italy. Forty meters is always open, not many QSOs but still fun . . . *IK2AIT*. For me it was a very first WW DX on top band after 50 years of my ham activity! Hmmm—a noisy item! . . . *ES1CW*. Station was set up at friend's house on South Bimini. WWV sent flux 104 on Sunday and 10 turned to gold! . . . *C6A/N4RP*. Many USA ops could not believe my call. They kept asking for another letter . . . *G6T (Opr. G3NYY)*. Operation limited this year but my CW skills are still improving. Another ten years practice and I might be good! . . . *VK5GN*.

Thanks to AH6NJ for calling in as only zone 31! . . . *OI6KZP*. Took part in the contest to commemorate being in amateur radio for 40 years! . . . *TA2BK*. LW 12 meters long from balcony above the sea . . . *EA8/DJ1OJ*. I operated fully with N6TR for the first time and liked it very much . . . *LY2OX*. I tried to put up 80 meter antenna just before the contest but failed to do so. I wish I had because low band conditions were fantastic. CQ WW DX Contest is always great . . . *JL7PVR/1*. First time active from my new QTH. Used to be fairly active at my OH6VR QTH in the past few years . . . *OH2NQS*. Not one USA station heard on 160 except for KL7 and KH6 . . . *VK3IO*. I'm a med doctor and spent part of the contest in emergency service . . . *HA8XX*.

No opening on 10. Excellent condx on 40. Hard job on 80 with 100 watts. I enjoyed it and I'll try better next time . . . *DL2HQ*. I used a GAP Titan DX vertical mounted 5 feet above ground and QRP. US east coast no problem. I was able to QSO US west coast, CW, JA, and V85 . . . *HB9CBR*. Thrilling 7 MHz condx! Who needs sunspots! . . . *G3IGW*. We had two ops for the last eight hrs due to a severe snow storm which had the rest of the crew heading home early. Some had to drive 200+ miles! . . . *G6D*. This is fifth time I worked all the 40 zones during CQ WW. Great Fun! . . . *IG9/IT9GSF*. I have never been asked to QSY to other bands so much in my life! . . . *VQ9IE*. Bad QRM on 40 meters here in Europe. By the second day two cases of beer and one bottle of whiskey were not enough! . . . *DAØRP*.

What we will remember from CQ WW CW 96 are XX9X, XZ1N, 5V7A, CP6AA, PYØFF, and those new K's, N's, and W's. Conditions were fairly good considering our location at 60 degrees N and the sunspot cycle . . . *OI5N*. Great contest! Looking forward to the next CQ WW with our MS . . . *YBØZBB*. First time to try low power. Nice to make DXCC on a single band! . . . *EI6FR*. It was difficult to reach the QTH on 4000

JI3KDH/3 surrounded by ten radials in the field for 160.

ft. asl in a heavy snow and wind, but then I enjoyed the contest very much. It was a plan to put the winter view of the location on the cover of *CQ Contest* magazine . . . *S5ØR*. Sorry my score is little but I am a new participant on your contest. Tnx Cu agn in 97 . . . *YC3UUQ*. My first entry into any major international contest. Great fun but many stations mis-read my call as G3VYO . . . *G3VQO*.

This is my 38th CQ WW and my 1881 contest log entry in all! . . . *YU7SF*. I am very happy. My second CQ WW CW and my score was doubled. I lost 2 hours due to loss of power from wind . . . *CE3F (Opr. CE3FIP)*. Wow! XZ1N called me on 20! . . . *VE7AV*. I made my first QSO on 160 during the contest . . . *LU1EWL*. You can have a good result just with a vertical and 100 watts. How? Without sleeping! CQ WW is too short for sleeping! . . . *IKØYVV*. What great fun I had this year running a true pop-gun station! A lot of DX just doesn't get worked or even heard without a beam. But that just makes the magic moments even more special. 3C5A answered my CQ! . . . *XE1/AA6RX*. This time no opening to JA. Only 13 QSOs. But quite nice to NA. Both days K3LR was the last station to come through! . . . *OI1AF (Opr. OH1MDR)*.

Thanks to all the talented and patient ops who made 160 QRP possible . . . *VA3JFF*. For some reason, folks seemed very happy to work us! . . . *3C5A*. DISASTER struck when after not even 2.5 hours contest some shortening occurred in the antenna. Something that could not be fixed before the *real* end of the contest. That was the shortest WW CW ever for me! . . . *D25L*. As always, I was very late in completing the antennas. This time got it running at 0330Z Saturday morning! This 4-element quad was the biggest antenna I ever operated with and sure liked it. On the other hand, still heard many stations that were louder. Thanks for all the work with the contest. I like the e-mail submitting. Saves a lot of work and money . . . *DF4SA*.

Thoroughly enjoyed it and glad it kept going. Next year maybe all bands. This is the first GW3YDX entry in the CQ WW Contest! Yes, this boy is a novice entrant! . . . *GW3YDX*. Last morning of the contest we had a big opening to North America. I really enjoyed the high rate QSO . . . *JM4UQM*. This was my very first activity on 160 meters. I was not really prepared to make such a good score. I was connected to our "local" DXcluster in Sardinia which did not help me a lot, 160 meter spots were rare, and our connection to the European net is poor. A real pity, because it seems that my score is not bad. I evaluate the numbers of DX worked thanks to the DXcluster about five to ten. Many DXs called me on my CQ frequency. As it was my first experience on 160, I can't say if condx were good or not, but I had great fun working nearly a DXCC in one weekend. I hope I could help a lot of DXers with a new country on this band. I will be back on the top band! . . . *TK5EP*.

Had a great time again this year. Improved on my personal best by more than 700 QSOs. Would have made more contacts if I hadn't spent so much time in S&P looking for African DX and Zone 35 in particular . . . *VK1FF*. Enjoyed single band again, on 80 this time. The band was not as good as expected. Heard no Zone 5. Called many strong Zone 20 without success . . . *9M6NA (Opr. JE1JKL)*. We have to say many thanks to Julio for the use of his fine station. Although we had no beam on 10 and 40 meters and rotor of 15 and 20 meter beams were broken we had a lot of fun on all bands and made a surprising result. This was a cooperation between RRDXA and BCC . . . *D44BC*. QRM: Putting up three Beverages in the forest just for the contest is one thing. Realizing at 0200Z that your U.S. rate is very slow because your sloper has been removed by some very cold winter storm is another thing . . . *DL1SBR*.

My first attempt at the Single OP Low Power category was a lot of fun! I'd like to thank DJ5BA, DL1OCB, DL2HBX, and DL4OCL, who made this event possible for me. I could not possibly think of a better way of spending my 26th birthday, which was on the first day of the contest, than participating in the CQ WW Contest! . . . *DL8OBC*. Nice to have XZ1N bust through 40 meter pile-up! Bring on those sunspots! . . . *FS5PL*. This was a great contest. Propagation was pretty good, and all went as planned. Exceptions (aren't there always a few?): (1) The guy giving me a lift to the club managed to ditch his car in the snow, giving me an hour of wasted time with the adrenaline on top. (2) Suddenly on Sunday evening I found the band crowded. The only problem was that for almost two hours I couldn't find one single station that wasn't a dupe or a Swede! Meanwhile, I managed to QSY to 80 and play around for 80 min. and submit a single band entry (with a puny score, but still better than wasting precious contest time) . . . *SL3ZV (Opr. SM3OJR)*.

USA QRM

Good conditions! Lots of activity! Terrible weather . . . *W5CWQ*. Signals were very good to excellent. Participation was great. Even little pistols could CQ on the second day! . . . *N4MO*. Most interesting event was working XZ1N on 160 without any pile-up . . . *KV0Q*. Managed to work 9Y4H on six bands, lots of

(Continued on page 92)

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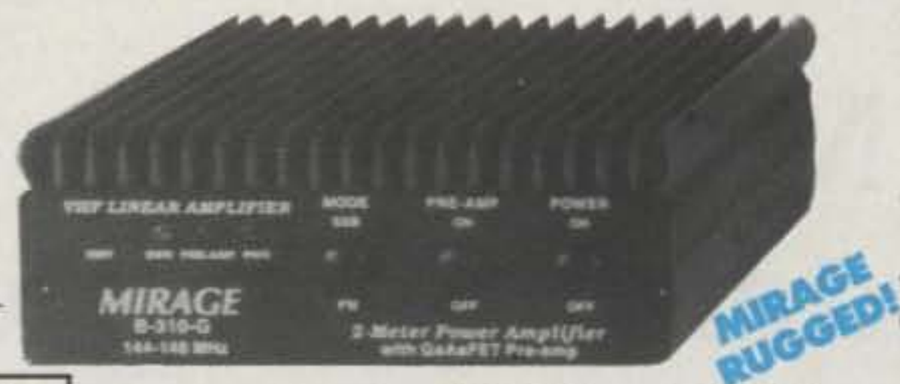

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35 Watts for 2 Meter HTs

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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

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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.

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Versatility is the key word in this article. N4PC shows us how to really "increase the mileage" out of a 40 meter antenna.

My 40 Meter Double-Extended-Zepp Antenna Shows Its Versatility

BY PAUL CARR*, N4PC

It is not unusual to receive a telephone call from one of my readers with an antenna question. I enjoy talking to these people, and hopefully I am able to provide answers to some of their questions.

One often-asked question lately is what kind of antenna will work on the 160 meter band and will provide good results through 10 meters? I have also heard readers comment that they have tried a 160 meter dipole, but had trouble tuning the antenna on some of the higher bands.

Well, there is a fairly simple solution to this problem: Use a 40 meter antenna! Let me explain. The 40 meter extended double Zepp is the antenna to try. It is slightly shorter than a half-wave 160 meter antenna, and it eliminates some of the tune- up problems you may have encountered in the past.

Fig. 1– Basic antenna configuration.

Background

You don't have to listen on the bands very long to find out that one of the most popular wire antennas in use today is the G5RV. That antenna is designed to be a three half-wave dipole cut for 20 meters. This makes the antenna 102 feet long, and the antenna is useful from 80 through 10 meters.

In recent years the double G5RV has made an appearance. It is 204 feet long and is useful from 160 to 10 meters. This was the starting point for my research on this antenna project.

Although the double G5RV was about the physical length that I was looking for, a computer analysis showed the antenna produced

*97 West Point Road, Jacksonville, AL 36265

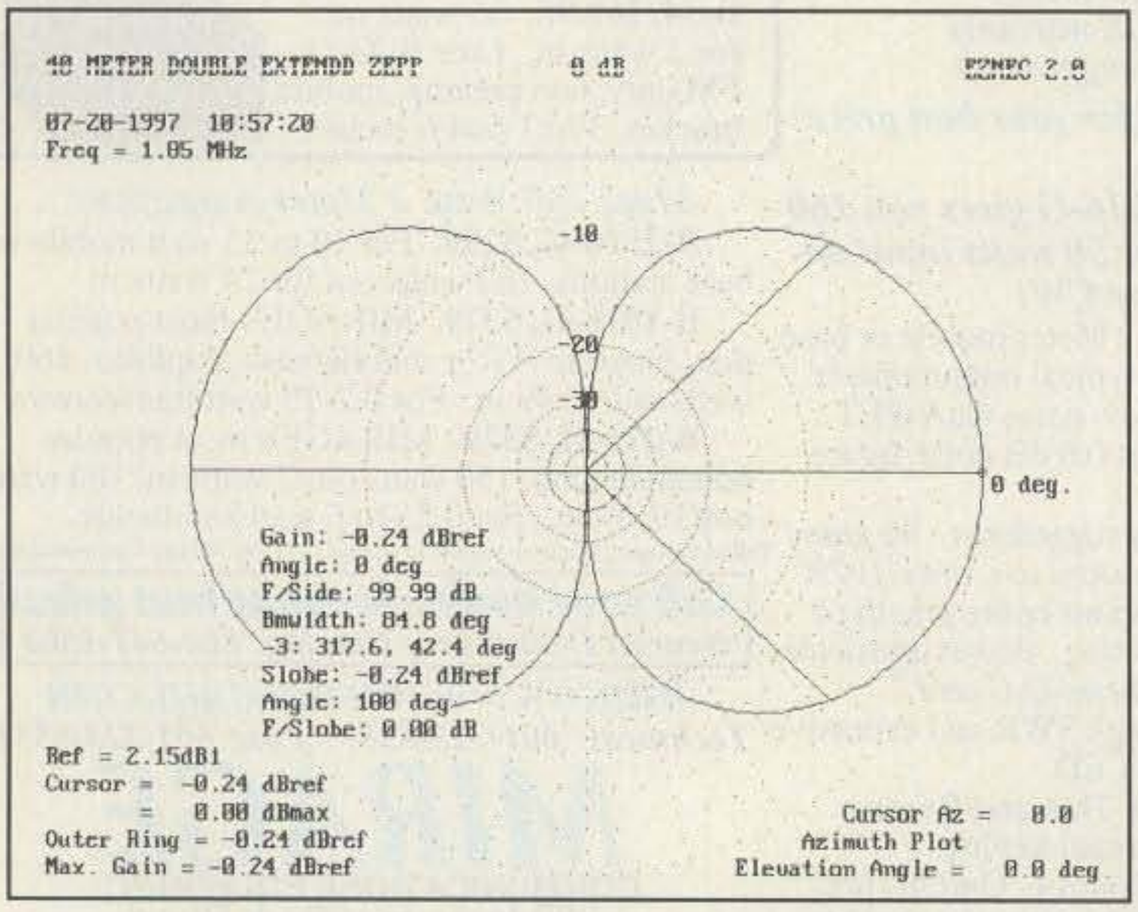


Fig. 2– Computer analysis of the antenna pattern on 160 meters.

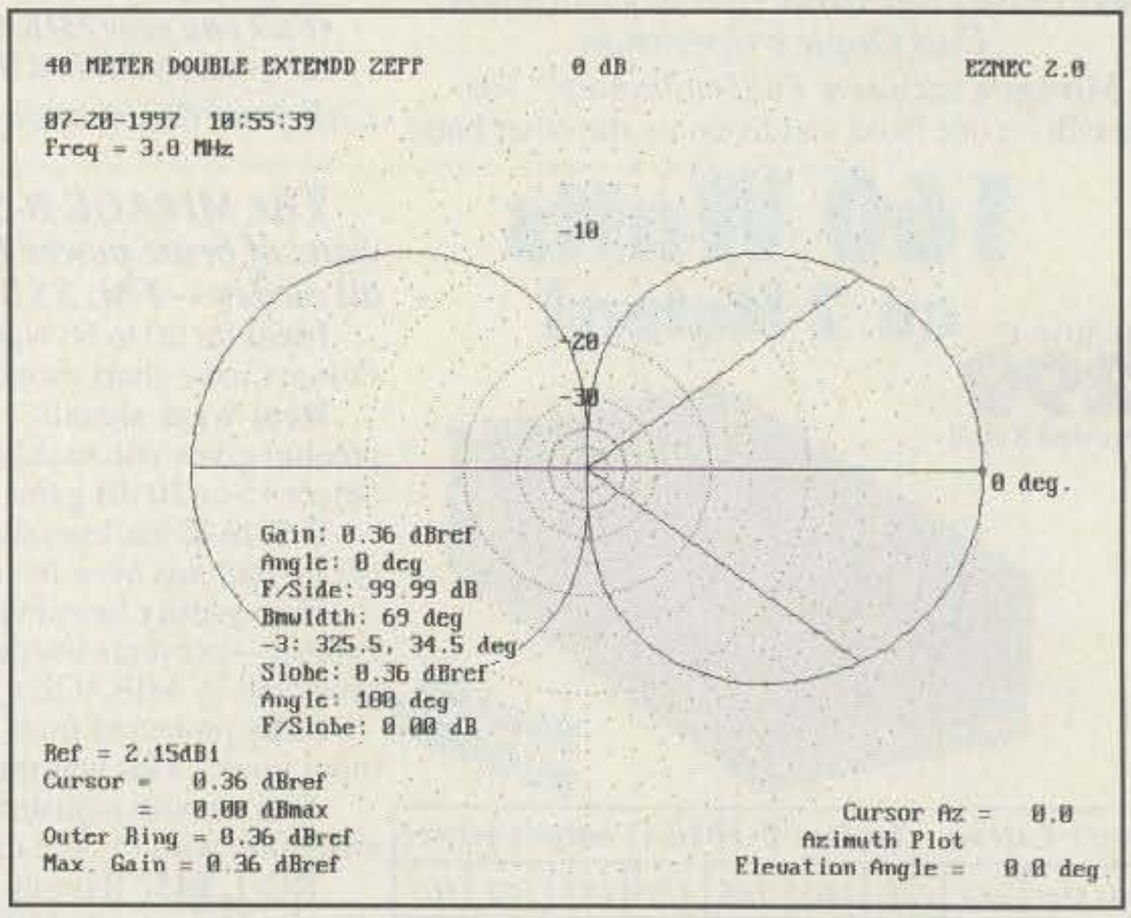


Fig. 3– Computer analysis of the antenna pattern on 75 meters.

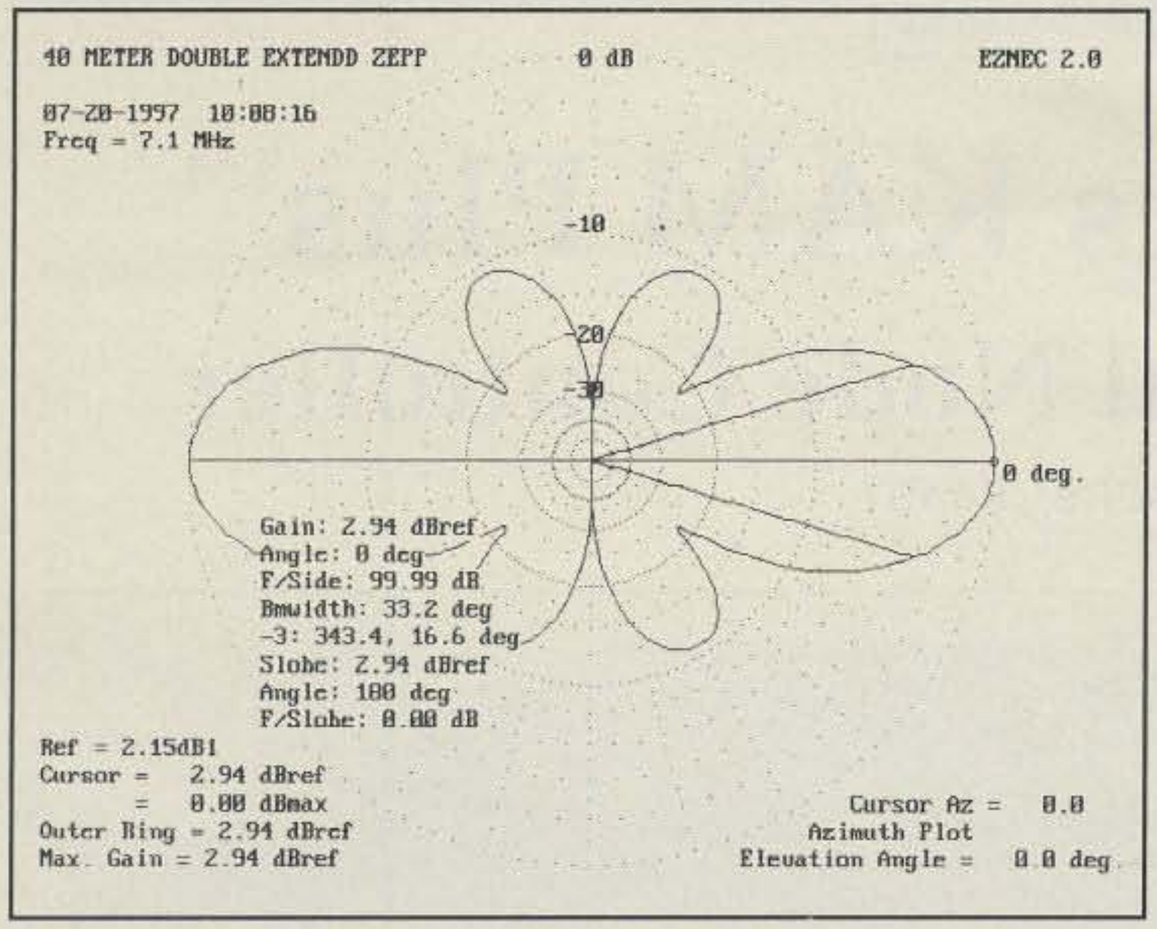


Fig. 4– Computer analysis of the antenna pattern on 40 meters.

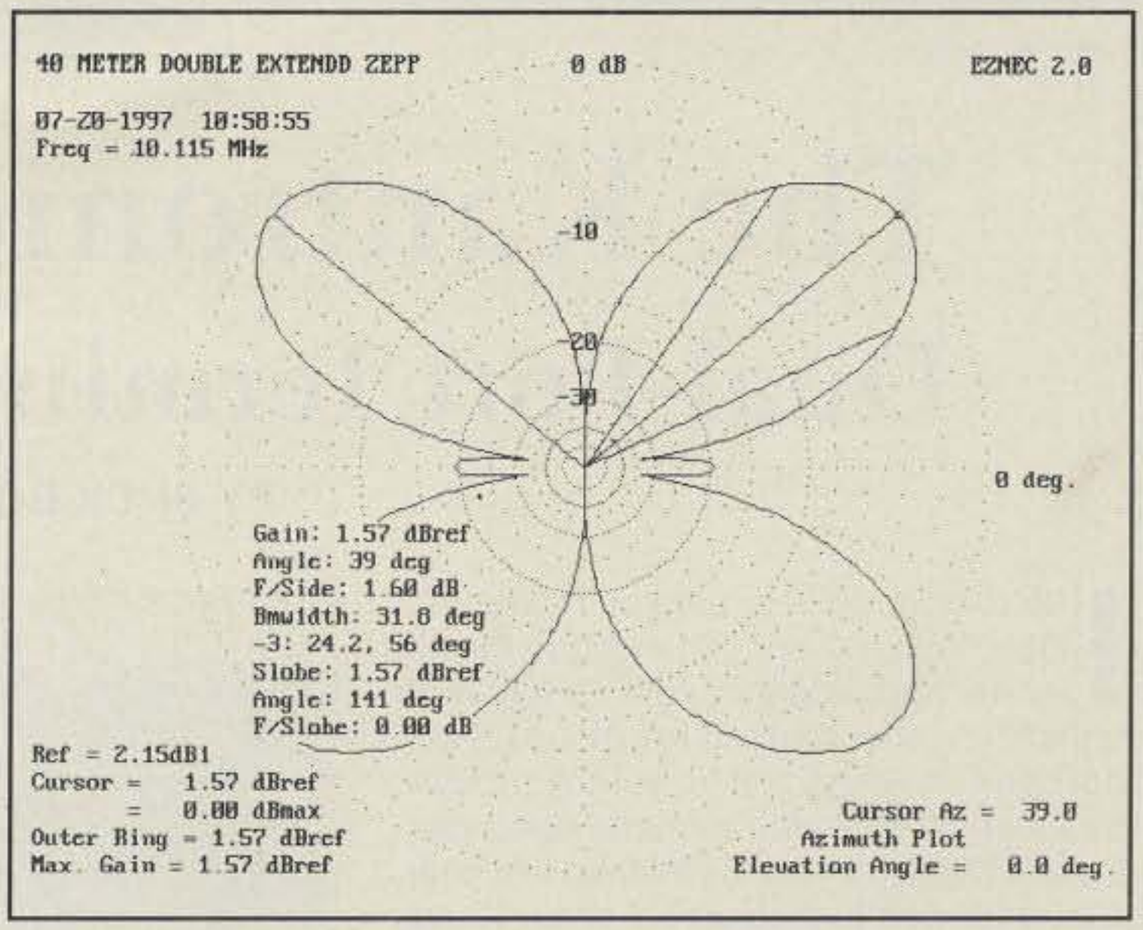


Fig. 5– Computer analysis of the antenna pattern on 30 meters.

a six-lobe pattern. I wanted to have the antenna produce a bit of gain on 40 meters, and the simple answer was to shorten the antenna to about 178 feet. This greatly attenuated two of the side lobes and provided about 3 dB of gain. Further computer analysis showed that the performance was not greatly affected on 160 and 80 meters.

I have generated free-space antenna patterns for this antenna for the 160 through 20 meter bands. I also checked the predicted impedance of the antenna on each band in question, and there were no weird values predicted. This initial analysis seemed to be sound, so on to the construction phase.

Construction

Basically, this antenna is nothing more than a long dipole fed with a balanced feed line. I built my antenna from No. 14 stranded, insulated wire. The overall length of my antenna is 178 feet, but that dimension is not critical. I cut a total of 180 feet of the wire, doubled the wire, and cut it in the middle. This gives two lengths of 90 feet. I attached the two pieces of wire to the center insulator, connected the ladder line that I was using for a feeder, and soldered the connections. Be sure these connections are well-made both mechanically and electrically. The performance of this antenna depends on the structural integrity. Subsequently, attach the end insulators and the antenna is ready to go into the air.

Placement

I placed my antenna in a normal "flat-top" configuration, since I have convenient trees on my property. It can also be installed in an inverted "Vee" configuration. The pattern probably will become slightly less pronounced as the ends of the antenna are brought closer to the ground, but I'm sure you would notice the difference on the air. Another option is to place as much of the antenna in a horizontal configuration as possible and let the ends hang vertically. Your choice of placement will depend on what's available to you.

Performance

I have been very pleased with the performance of the antenna on all bands 160 through 10 meters. My MFJ 989c transmatch was very happy with this configuration on all bands. Nowhere in the spectrum did I encounter matching difficulties.

The computer-predicted patterns for 160 through 20 meters are shown in figs. 2 through 6. The patterns on the bands from 17 through 10 meters are not included to save space, but the main radiation will become more closely aligned with the conductor.

Since this is a non-resonant antenna, it avoids the problem sometimes encountered when using a 160 meter half-wave antenna on 80 meters. Matching problems can arise when using a 160 meter half-wave antenna on 80 meters due to the fact that you are attempting to feed a full-wave antenna at a high voltage point. Since this antenna is not a full wave on 80 or a multiple of full waves on higher bands, the high-voltage feed problem does not exist. I have had no trouble matching this antenna on any bands from 160 meters through 10 meters.

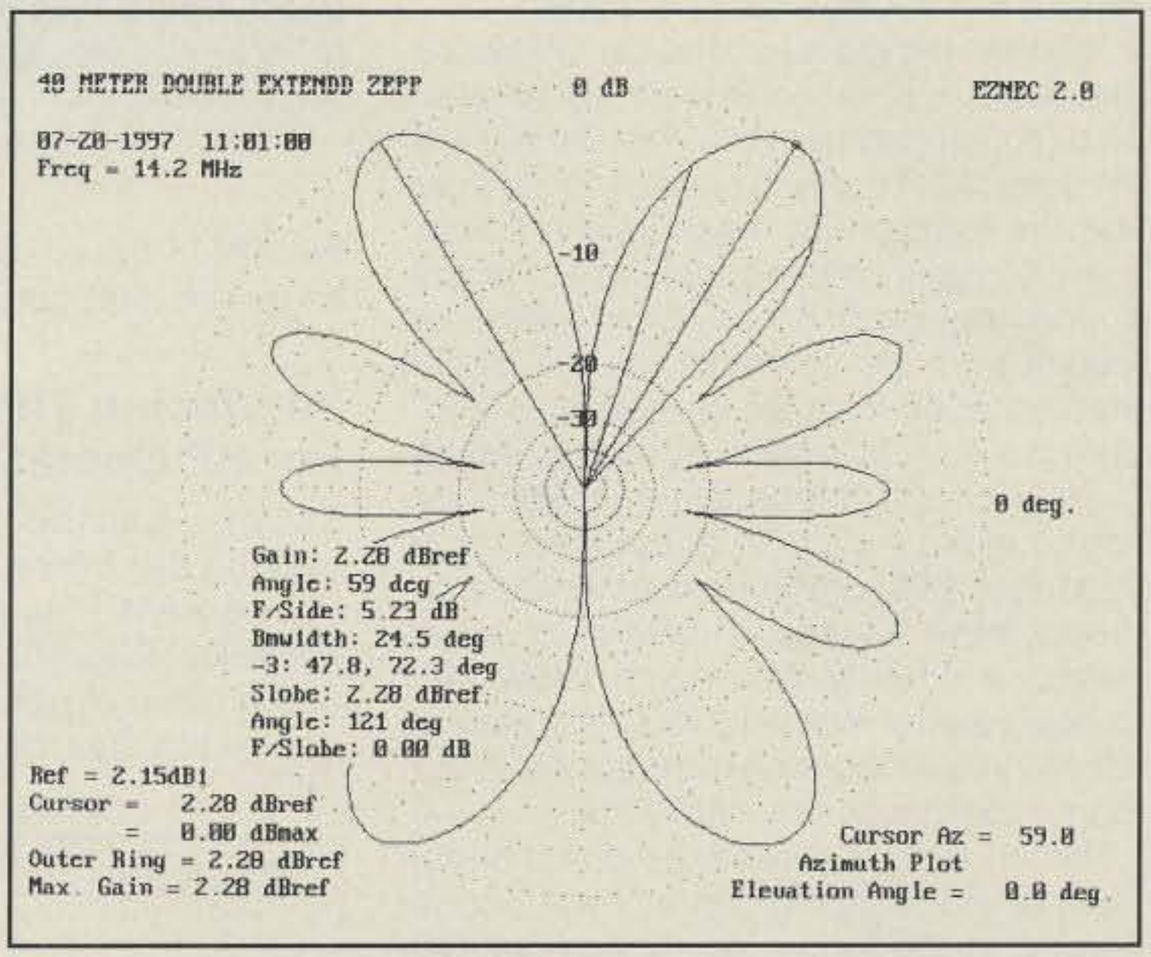


Fig. 6– Computer analysis of the antenna pattern on 20 meters.

I am often asked about bringing balanced feed line into the shack. Most times this presents no problems. If unwanted RF problems present themselves, I wind several turns of high-quality RG-8 coax around a 4 inch diameter piece of plastic water pipe and place the coil of coax outside my shack. I extend the coax to my MFJ 989c transmatch, and the problem disappears. My best advice is to use common sense.

This antenna has proven to be to be a very good performer, providing excellent results throughout the high-frequency spectrum. By the way, if you don't have room to place the antenna as it is described, you can cover the bands from 80 through 10 meters by cutting the dimensions in half. The computer plot for 160 meters will then correspond to 80 meters, and the plot for 20 meters will correspond to 10 meters. The tuning results should be the same as discussed.

Good luck, and I'll see you on the bands. I'm sure you will raise some questions when you tell people that you're using your 40 meter antenna on 160 meters! ■

The Kantronics KAM Plus™
Dual-Port Terminal Node Controller

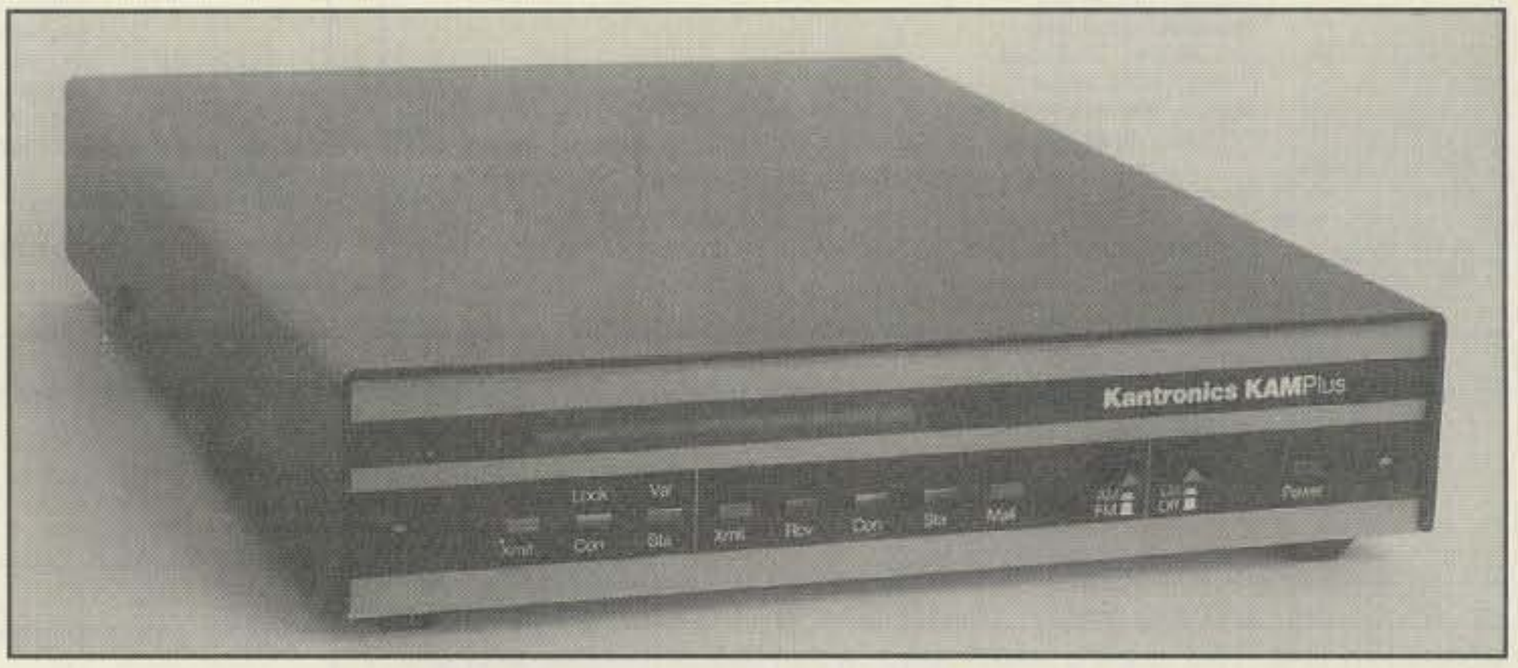
BY BUCK ROGERS*, K4ABT

I like to operate VHF packet. However, I often have a craving to move to the HF bands and enjoy a few QSOs with friends on other parts of the globe. I have not been on HF packet for sometime now, as I lost my all-mode terminal node controller (TNC) in a curious mishap last year. It seems I had picked up a 5 amp, 12 volt DC supply at a hamfest, but it was *not* 12 volts DC. The box and markings indicated that it was a 12 volt supply, but when I connected the leads to the all-mode controller, it smoked—lots of smoke!

By the time I reached the On/Off switch, the controller had gone west—or whatever direction they go when you hit them with 37 volts DC. That was my fault for not having the foresight to measure the power-supply output before attaching it to my all-mode controller. By the time I removed power from the controller, all the smoke had escaped from the components and I had no way of replenishing the smoke supply in each component. I set about trying to make repairs to it, but after I realized that 85% of the devices in the controller were trashed, I gave it up as an exercise in futility. As a result, I now have a new Kantronics KAM Plus™. I have to fill you in a bit more on the surprise(s) that came along with the KAM Plus.

When UPS delivered the unit, I began to open the shipping carton. I was accustomed to the beige, or almond-colored, case of the early KAM, but to my surprise I found a new sleek, streamlined, modern, black, hammertone-finish unit.

The KAM Plus is a dual-port, HF/VHF, multi-mode TNC used for sending and receiving data by radio. With the KAM Plus, users can operate any HF mode (including G-TOR™) and VHF packet at the same time. Users can also send and receive mail, monitor the DX cluster and work DX stations at the same time, and more. The KAM Plus easily connects to an HF radio and a VHF radio (including a handheld) and to a computer or terminal. With features such as the NEWUSER command set and on-line help messages, the KAM Plus enables even beginners to enjoy this high-performance TNC.



The Kantronics KAM Plus dual-port TNC.

Interfacing The KAM Plus For HF Operation

Saturday was the fun day, as I set about building the interface between the Kantronics KAM Plus and Jean Ann's (XYL WB4EDZ) Alinco DX-70TH. The interface was a piece of cake—nothing surprising. Kantronics has provided a manual that explains all the KAM Plus features and many KAM Plus to transceiver interfaces. The first place to look for the HF interface port connections is, of course, in the table of contents at the front of the manual (page "I"). Here you will be directed to page G5, which explains the pin numbers and connection purpose. If you need the pinout of the 8-pin DIN connector, then look at the last three or four pages at the back of the manual under the heading "References/Wiring Diagrams."

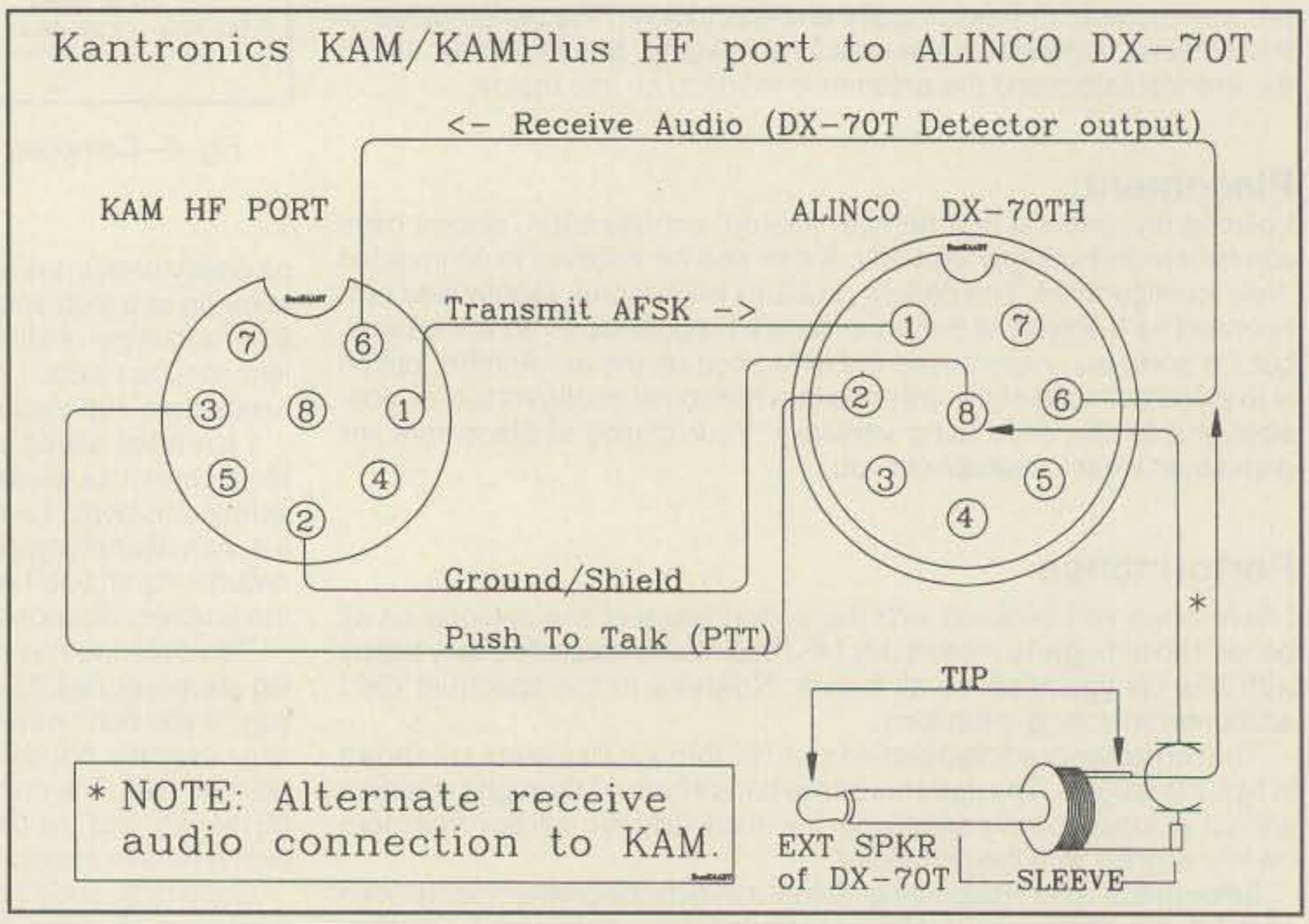


Fig. 1(A)– Interfacing the KAM or KAM Plus to the Alinco DX-70T.

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e-mail buck4abt@inmind.com
KAM Plus is a trademark of Kantronics. G-TOR is a registered trademark of Kantronics. Patent pending.

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AirCore™ Roller Inductor

MFJ-969's *AirCore*™ Roller Inductor, three-digit turns counter and spinner knob gives you exact inductance control for *absolute minimum* SWR.

MFJ's exclusive *AirCore*™ Roller Inductor has an air core *that can't burn up!* You get ultra high-Q, the lowest loss, highest efficiency and highest power handling of any roller inductor in ham radio.

MFJ's exclusive *Self-Resonance Killer*™ keeps potentially damaging self-resonances away from your operating frequency.

Large self-cleaning wiping contact gives you excellent low-resistance connection without contact arcing or burning.

Solid ¼ inch brass shaft has self-align bearings for smooth non-binding operation.

Covers 6 Meters thru 160 Meters

The MFJ-969 covers *all* frequencies from 6 Meters through 160 Meters, *including the "magic band"* -- the widest matching range of any full featured antenna tuner.

Match any Antenna

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas -- nearly *any* antenna. You can use coax cable or balanced feedlines. Has heavy duty 4:1 balun.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle Meter shows you SWR, forward and reflected power *simultaneously*. It reads *true peak* forward power and average power on 300 watt or 30 watt ranges.

Meter light has ON/OFF switch and requires 12 VDC or 110 VAC with optional MFJ-1312B, $12.95.

8 Position Antenna Switch

MFJ's 8 position antenna switch lets you select two coax fed antennas, random wire/ balanced line or built-in dummy load for use through your MFJ-969 or direct to your rig.

QRM-Free PreTune™

MFJ's *QRM-Free PreTune*™ lets you pre-tune your MFJ-969 off-the-air into a built-in dummy load without causing QRM.

Pre-tuning into a dummy load makes tuning your actual antenna faster and easier.

Full Size Dummy Load

The MFJ-969 has a *full size* non-inductive 50 Ohm dummy load.

You'll find it handy for tuning, testing and repairing your rig, setting power level, adjusting your mic gain and more.

Superior Cabinet

Each MFJ-969 cabinet has a new tough scratch-proof *vinyl* cladding. You won't find a tougher, longer lasting finish anywhere. Measures 3½x10½x9½ inches.

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Every MFJ-969 is backed by MFJ's famous one year *No Matter What*™ unconditional warranty. That means we will repair or replace your MFJ-969 (at our option) no matter what for a full year.

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Match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax or balanced lines.

MFJ's new *AirCore*™ Roller Inductor, three-digit turns counter and spinner knob gives you exact inductance control for absolute minimum SWR. *It has an air core that can't burn up!* An exclusive *Self-Resonance Killer*™ removes damaging self resonances.

Two *massive* 250 pf transmitting variable capacitors with extra wide (0.27 inch) spaced stator plates can handle 6000 volts and amps of RF current for arc-free operation.

Lighted Cross-Needle meter lets you read SWR, forward, reflected power *simultaneously*. Read peak and average power in two ranges.

The MFJ-989C's six position antenna switch is made of two individual ceramic wafers wired in parallel. Wide spaced, heavy duty contacts handle extreme current and voltages. *We've never burned one up!*

MFJ's heavy duty current balun has two giant 2½ inch toroid cores with Teflon® wire connected to ceramic feedthru insulators. You can use balanced lines without core saturation or voltage breakdown.

A *full-size* 300 watt non-inductive 50 ohm dummy load is built-in.

Has convenient flip-stand. 10¾x4½x15 inches. Backed by MFJ's famous one year *No Matter What*™ unconditional warranty.

MFJ versatile *1.5 KW* Tuner

MFJ-962D
$249.95

Use your barefoot rig now and have capacity to add a 1.5 KW PEP SSB amplifier later! Lighted Cross-Needle SWR/ Wattmeter. 6 position antenna switch, *Teflon*® wound balun, ceramic feedthru insulators for balanced lines. 1.8-30 MHz. 10¾x4½x14⅞ in.

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Note: **Don't** try to wire the connector as if it were a standard 8-pin, screw-on microphone connector. That won't work! The 8-pin DIN connector has a funky numbering scheme that only applies to connectors that fall within the "DIN" standards format.

To make your life easy, I've drawn both an interface and the pinout of the Kantronics KAM Plus HF radio port. The idea is to keep a copy of this article close by while you are building the interface (see figs. 1[A] and 1[B]).

HF and VHF Simultaneous Operation

The KAM Plus is a true dual-port TNC that offers the most flexible HF/VHF operations with two radio ports. It allows simultaneous HF and VHF packet operation, even with a simple terminal program.

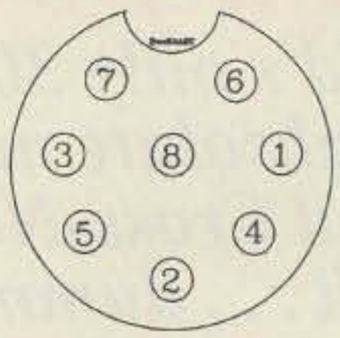
Using Host Master, multiple windows software, the KAM Plus supports operation of any HF mode and VHF packet at the same time. The two radio ports are capable of simultaneous operation, and switching between ports is accomplished with only one keystroke.

G-TOR

Here is a digital mode that excels as it provides maximum resistance to the effects of multi-path and interference. It is the fastest HF mode available in a stand-alone TNC. G-TOR operates at 300, 200, or 100 baud, automatically adjusting to maximize throughput based on the quality of the link. In addition, G-TOR offers full-frame data interleaving and Golay error correction, so any errors that may occur are quickly and accurately restored without multiple retransmissions. Now in version 8.0, the KAM Plus can monitor G-TOR QSOs and no separate software is required. Therefore, Host program users can monitor G-TOR QSOs and operate packet on VHF at the same time.

GPS Capabilities

Offering the most flexible Global Positioning System (GPS) operations available in a multi-mode TNC, the APRS-compatible KAM Plus can connect to a GPS receiver with a NMEA-0183 interface. The Kam Plus offers unique GPS capabilities such as multiple string parsing, where users select as many as four of the GPS unit's NMEA data strings. Once the data strings are selected, users can specify which of the four buffers should be transmitted and also the beacon start time as well as the amount of time between beacons for each of the buffers. Thus, multiple stations can report without collision. Since the KAM Plus's clock is regularly updated by the satellite-determined GPS clock, the transmission times and intervals are always accurate.



8 PIN DIN INDEX VIEW FROM SOLDER SIDE

1 = AFSK OUTPUT (WHITE)
2 = Ground/Shield (BLACK + SHIELD)
3 = Push to Talk "PTT" (BROWN)
4 = Key Out (GREEN) to CW key jack
5 = FSK OUT (RED) for transceivers that require RTTY keying
6 = Receive audio (BLUE) or shielded cable and 3.5 mm plug
7 = NC
8 = NOT normally required. (YELLOW) If needed, connect to squelch line

Fig. 1(B)– Pinout diagram of the KAM Plus (or KAM) HF radio port.

In addition, users can set up a tracking buffer, accessible via the KAM Plus mailbox, to store GPS data for later retrieval. The sysop may also reconfigure the GPS unit remotely by connecting to the KAM Plus and simply changing the parameters.

The PBBS

The KAM Plus includes the Kantronics PBBS (Personal Bulletin Board System). The mailbox space can be configured for more than 100K, and a mail waiting light on the front panel flashes to indicate that the user has unread mail. Accessible through either port, the PBBS offers enhanced forwarding and reverse forwarding to a full-service packet bulletin board, so users can automatically send and receive messages via the worldwide packet bulletin board system. With the ARQ BBS command, users can also access the mailbox via the HF port in G-TOR, AMTOR, or Pactor ARQ.

The KAM Plus back-panel design allows for quick, easy connections to an HF radio, VHF radio, computer, and power.

Hardware Features of The KAM Plus

The KAM Plus features separate radio ports capable of simultaneous packet operation. It also features a host program required for dual-mode operation. It comes standard with 128K RAM (expandable to 512K), battery backed to save all parameters and PBBS messages. This is a mailbox that will hold all your mail while you're on vacation, etc.

The KAM Plus has a large 10-segment bargraph for easy tuning, and front-panel LEDs that indicate status for both HF and VHF operations. Also included are the 12-pole switched capacitance filter for HF port real-time, battery-backed clock, RS-232/TTL interface, compatible with PC,

Mac, or C-64, and the low-power requirement of 12 volts DC at under 300 mA.

Firmware Features

Included is firmware for G-TOR, Pactor, AMTOR (ARQ, FEC, SELFEC, CCIR 476 and 625), packet, CW, RTTY, ASCII, NAVTEX/AMTEX, and WEFAX Receive. Also included is:

- Enhanced GPS capability that is NMEA-0183 and APRS compatible; TOR Standby for easy operation in all TOR modes (G-TOR, Pactor, AMTOR); G-TOR monitoring within the unit. No separate software required.
- Extended RTTY and AMTOR character sets.
- Programmable mark and space tones.
- Enhanced CW operation: Farnsworth spacing, weighting, programmable filter bandwidth/center frequency, and audio tone transmission.
- Software carrier detect, allowing open squelch and weak-signal detection.
- Access all commands and change all parameters from another station using remote sysop access with password protection.
- Command sets for new and experienced users; on-line help messages for each command.
- User interface supports standard terminal, Host, BBS, KISS, and GPS modes.
- Bi-level WEFAX reception (special software required).
- PBBS: Enhanced forwarding and reverse forwarding capabilities; message editing; remote sysop access; mail-waiting LED; configurable to more than 100K.

And There's More . . .

Included with the Kantronics KAM Plus are a multi-conductor cable kit with DB-9 connector (VHF radio port) and 8-pin DIN connector (HF radio port), mm power jack for connection to the power supply, reference manual with schematic, and a quick-start PC terminal program on 3½ inch disk. All you need is one radio (HF and/or VHF), one mic connector for each radio, a computer or terminal with RS232 cable (25 pin), and a 12 volt DC power source or Kantronics power adapter.

The Kantronics KAM Plus is small and compact at 1.75" × 6" × 9" (4.5 × 15.3 × 23 cm). Weight is 2.5 lb. (1.1 kg). As with all Kantronics packet controllers, the KAM Plus is made in the USA and comes with a one-year warranty.

Options include the Host Master terminal programs (PC and Macintosh), SuperFax II (WEFAX program for PC compatibles), and 120 VAC/12 VDC power adapter.

Lis price of the KAM Plus is $349.95. For more information, contact Kantronics, 1202 East 23rd Street, Lawrence, KS 66046-5099 (phone 785-842-7745; fax 785-842-2031; e-mail <sales@kantronics.com>; web <www.kantronics.com>). ■

With all the great cooking recipes, there's little room left for improvising using available materials. This school project began with a great idea and evolved much in the same way as a recipe.

Pizza, Brownies, and QRP

BY MISSY HOLLENBECK*, AAØOF

A major aim of the Andover School Amateur Radio Club (ASARC) is to encourage student "tinkering" and experimentation. As all educators know, there are only limited funds for student "hands on" projects. Additionally, educators strive to implement projects that are imaginative, creative, and challenging. As I learned, inspiration for unique electronic projects comes from a variety of sources, including older issues of *CQ*.

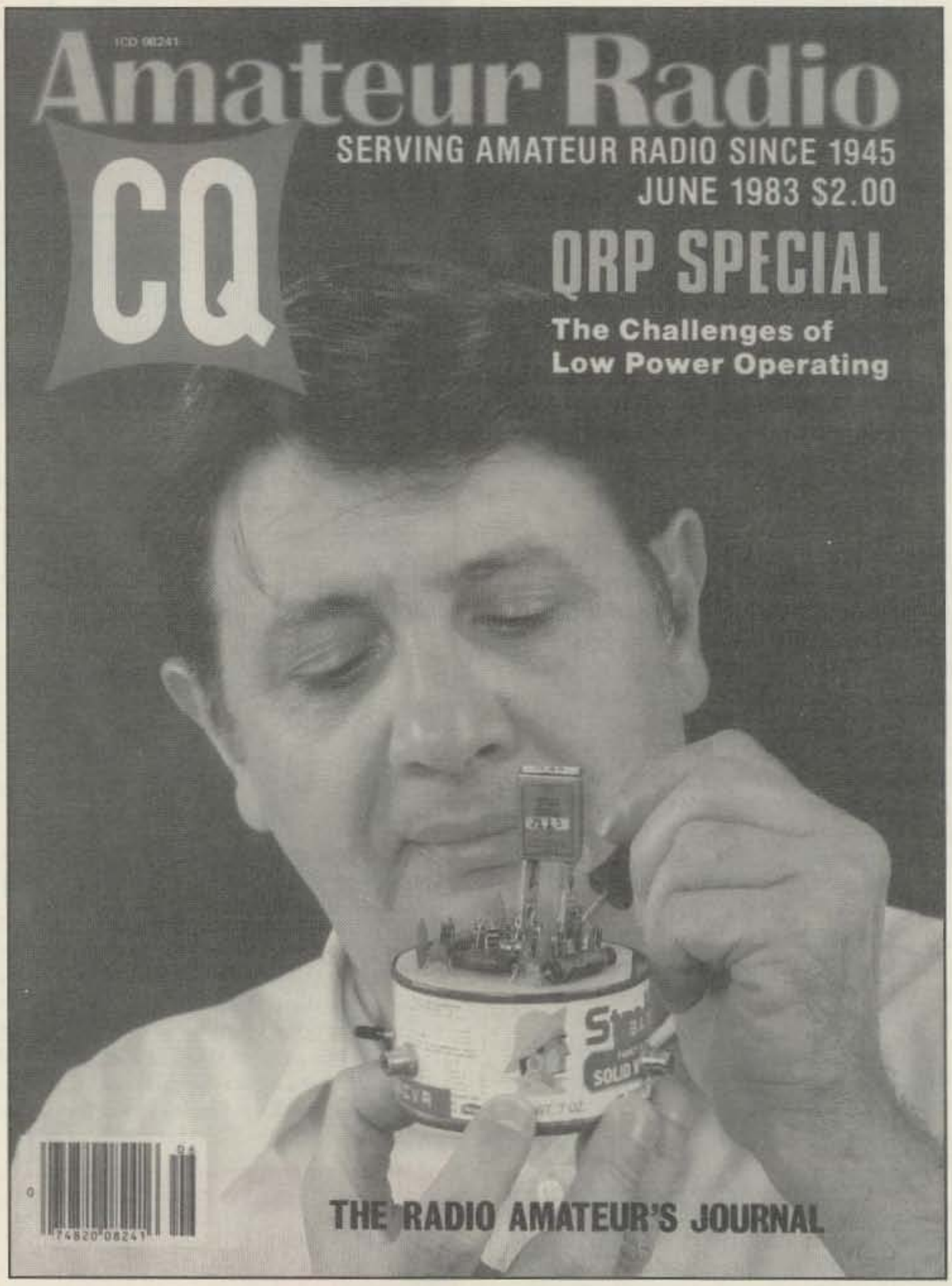
During the fall of 1996 the widow of a local amateur radio operator donated boxes of old *CQ* magazines to our school club. The magazines, covering a span of several years, intrigued my students. Especially eye-catching was the June 1983 cover of *CQ* depicting a transmitter built in a tuna-fish can. The issue, a QRP special, featured several articles about the "challenges of low power operating." Immediately my students determined that the cover of this issue, along with other delightful covers (one including the vintage Raisinette figurines), remain posted on the entrance to our school ham shack.

One day during class the students were chatting with a gentleman from Cedar Rapids, Iowa. After the initial greetings, the amateur radio operator shared with the students that he was operating with only 5 watts. "Mrs. Hollenbeck," Alex declared, "he's using QRP! Hey, we could operate with 5 watts of power if we built those tuna transmitters!"

As an educator and amateur radio enthusiast, I'd tried my best to offer QRP as a fun, low-cost mode of operation. Until that moment I assumed that all my advice remained unheard. Apparently, the *CQ* cover sparked student interest in QRP. Thus, the Tuna-Tin Transmitter project developed into more than just an entertaining magazine cover.

Our first hurdle surfaced as the usual educational roadblock—funding. Luckily, the local Texaco Company provided mini-grant opportunities to teachers in our county. These mini-grants, designed for projects costing $500 and less, arrived in my mail box at the right time. With an hour's work, my teaching colleague, Kurtis Boughton, NØUGJ, and I had a proposal ready to mail. Using the article in the 1983 *CQ* issue, we determined that ten tuna-tin

*1944 Northridge, Andover, KS 67002
aa0of@feist.com



The 1983 cover of CQ shows the QRP project that sparked the interest of the Andover School ARC and led to their accomplishments.

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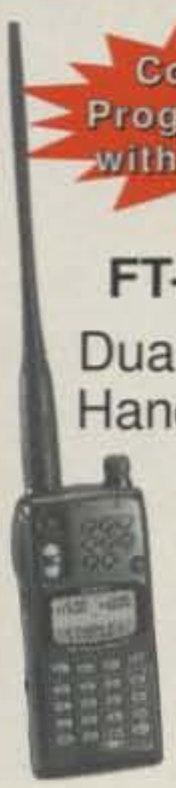

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Alex Roberts, KBØZRM, displays a talent of eating brownies and soldering at the same time. (Joseph Haynes, KBØZCA, is in the background.)

transmitter projects indeed matched a $400 funding request.

Within a few short weeks a congratulations letter from Texaco arrived. Apparently, the grant competition generated 19 applicants, 6 of which received funding. Within the month a check for $400 had arrived.

With the money in hand, I soon discovered a glitch in the Tuna-Tin Transmitter plans. I didn't realize that the electronic components, most of which were readily available from Radio Shack, had changed stock numbers since the 1983 article. All of a sudden my easy assembly project for middle-school students became increasingly more complex. Moreover, it was extremely important that my budding amateur radio enthusiasts have a successful project-building experience. I did not want an oversight of mine to cause frustration for my students.

Thus, the Tuna-Tin Transmitter project took step in another direction. Instead of ordering components separately, the students and I decided to order Ramsey 40 Meter CW Transmitter kits. While I filled out the Ramsey order form, the students determined the date and details of our "QRP Building Party."

Additionally, since the Ramsey kit circuit boards were larger than the area of a tuna-fish can, the students made plans for a variety of cases. The students offered solutions of Kraft Macaroni and Cheese boxes, old tennis shoes, oil-filter boxes, and oversized sardine cans.

The special day, May 2, 1997, arrived with student excitement. As I walked down the halls, students bombarded me with questions.

"Do we start right building right after school?"

"Mrs. Hollenbeck, are you sure you have enough solder?"

"Can I see the kits first?"

"Who gets to use the soldering irons first?"

"What if I don't know what a part is?"

"Is it okay if my mom and dad come, too?"

"Is it okay if my mom sends brownies?"

"How many pieces of pizza do we each get?"

We designed the QRP Building Party as a one-shot deal—meaning nobody was going home until everybody completed the project. Of course, the normal middle school student's main concern was if there would be enough food. My main concern was that my middle school students build a working transmitter.

While some students wanted to work on their own, several students chose to work with a partner. And my answer remained firm: no soldering until all the parts are accounted for. Fortunately, the ten kits contained the correct components.

As teachers, parents, and students worked collaboratively on the assembly process, the burning question repeatedly surfaced: "Mrs. Hollenbeck, when can we order our pizza?"

"Oh, after a bit. Let's get some more work done before we order."

Before I knew it, 6:30 PM had arrived and pizza remained unordered. Failing to realize that Friday night was a busy night for the local Pizza Hut, our order could not be delivered until after 7:30. (Trying to solder with a group of middle school students can be a bit irritating when the subject of how hungry they are constantly rings in your ears.)

"Okay," I relented, "you may eat the brownies first." After a massive flurry of aluminum foil and brownie crumbs flying through the air, the edge of hunger ceased.

Soon thereafter the pizza arrived. Once again, I truly thought that I was in a room full of savage beasts. The students, parents, and I were surrounded by open pizza boxes, uneaten pizza crusts, brownie crumbs, half-drunk cans of pop, electronic components, circuit boards, schematic diagrams, and soldering irons. I reminded myself it was late in the evening, and surely no school administrator would view the mess before it was cleaned up.

Little did I know that my principal, Dr. Linda Hope, was conducting prospective teacher interviews. I also didn't know that she would be conducting tours of our school building.

" . . . And this is our communications technology room . . . and this is our amateur radio teacher, Mrs. Hollenbeck," I heard my superior

Andover School ARC's members make sure all components are accounted for.

say as she and an interviewee stepped into the room.

Nothing changed. The students and parents kept assembling their circuit boards as if nothing was wrong or unusual with the scene. Stumbling over my words, I found myself trying to explain and justify the messiness of the room. My principal, without missing a beat, beamed as she told of my students' accomplishments.

Later that evening three additional potential teacher candidates took the tour of our room. With each tour my principal related stories of student successes with amateur radio. As late evening approached, the messiness of the room continued. Something remained on my mind, however: "Will these QRP kits, built by middle school students, actually work?" After all, our initial prototype did work. (Our prototype was previously built by my dad, Gary Hoffsommer, WØTI.) Our first contact's signal report from New Mexico indicated a slight "ripple" and hum, but it was perfectly readable.

As each student wandered to the ham shack for the initial "smoke test," a sudden hush fell upon the room. A local amateur radio operator, Carl Fisher, WØHIK, was waiting on the 7040 MHz frequency to give signal reports. Our first objective remained to see if we could get any signal out at all.

One by one each circuit board went through the "smoke test." Believe it or not, each unit worked the first time operated! Amidst cheers and shouts, the students celebrated their successes with their first project with each other.

Except for Matt. Matt, one of the students more concerned about the pizza delivery time, still wasn't quite ready to test. The students rallied around him and offered assistance. Slowly Matt strolled to the ham shack and handed me his circuit board.

"Okay, Matt," I reassured him, "the other students' projects worked the first time. I know yours will, too."

Matt plugged in the CW key and started to send a tone. Nothing. His face reflected defeat.

"Hold on. Let's take a quick look at your board," I offered.

I turned over the board. Of all things, Matt had forgotten to solder the DC power jack! With a few touches of the soldering tip, Matt, too, was on the air.

As 10:30 PM arrived, so did all the students' parents. Several parents and students stayed a few more minutes to reflect on the evening's excitement. Working together, the students and parents quickly tidied the room. The room, although obviously having the aroma of pizza, was presentable for the next week's classes.

Exhausted but pleased, I sighed as I glanced around the room. Surrounded by overflowing trash cans holding greasy pizza boxes, dirty napkins, sticky pop cans, and the proud glow of students' faces, I decided that the Tuna-Tin Transmitter project was a huge success.

Amateur radio is the natural way to bring students, parents, and teachers together—tinkering and experimenting. All technology projects don't have to be complex and costly. For a successful project, just don't forget the exceptional ingredients for an extraordinary project—pizza, brownies, and of course, QRP.

For more information about the kits and the grant, respectively, contact:

Ramsey Electronics, Inc.
793 Canning Parkway
Victor, NY 14564
(716-924-4560)

Texaco Foundation
2000 Westchester Avenue
White Plains, NY 10650

(Missy Hollenbeck, AAØOF, is a teacher and administrative intern at Andover Middle School, Andover, Kansas. She was named as Microsoft's 1996 Technology Teacher of the Year (Kansas) and recently received the school district's "Golden Apple Award" for her school amateur radio program. The Andover Middle School Amateur Radio Club's website is <http://www.feist.com~aa0of>.) ■

SHOWCASE

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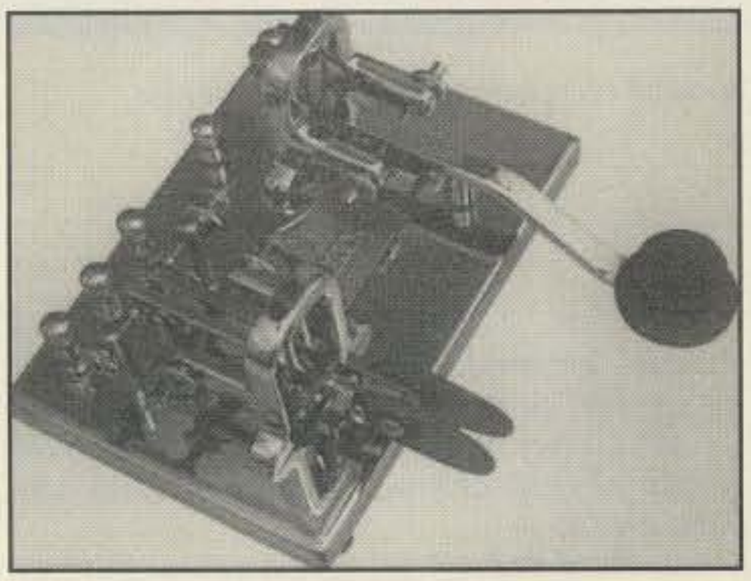

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The Bearcat 3000XLT is the ideal handheld radio scanner for communications professionals. This handheld scanner scans at 100 channels per second and searches at a rate up to 300 steps per second. A selectable attenuator eliminates annoying intermodulation from adjacent frequencies in highly populated areas. Selectable AM, Wide FM and Narrow FM modes allow you to change the default receiving mode of the BC3000XLT. For maximum scanning pleasure, order the following optional accessories: **UA502** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **LC3000** Deluxe swivel leather carrying case $34.95; **BP2500** rechargeable nickel-cadmium battery pack for up to five hours of dependable use $29.95; **ANTMMBNC** Magnetic mount scanner antenna with BNC jack and 12 feet of cable $29.95. **ANTSGBNC** Glass mount scanner antenna with BNC cable $29.95. The BC3000XLT comes with AC adapter, belt clip, flexible rubber antenna, earphone, owner's manual and one year limited Uniden warranty. Order today.

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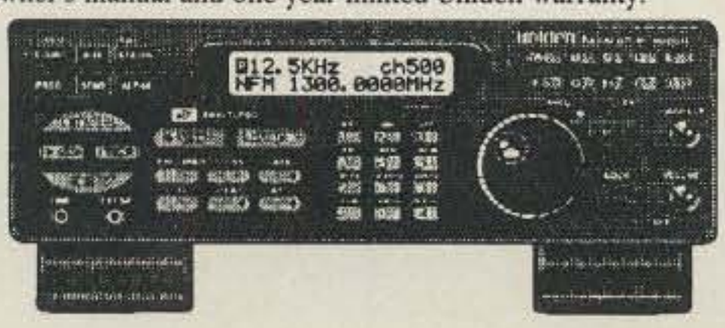
The Bearcat 9000XLT is superb for intercepting communications transmissions with features like TurboSearch™ to search VHF channels at 300 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include ***Auto Store*** - Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** - This feature lets you record channel activity from the scanner onto a tape recorder. **Hi-Cut filter** to help eliminate unwanted static noise. You can even get an optional ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **BC005** CTCSS Tone Board $54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty.



TrunkTracking

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CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

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

Single Operator/Single Band
WORLD RECORD HOLDERS

AFRICA				
1.8	IG9/IV3TAN('96)....441,252	1,203	24	102
3.5	IG9T('95)....816,959 (Opr. IV3TAN)	1,938	33	110
7.0	PJ9U('93)....1,199,968 (Opr. OH1VR)	2,637	34	120
14	PYØFM('94)....3,202,242 (Opr. PY5CC)	5,109	38	175
21	ZD8Z('94)....3,481,925 (Opr. N6TJ)	5,535	36	179
28	ZV5A('91)....2,984,166	5,154	37	156
AFRICA				
1.8	IG9/IV3TAN('96)....441,252	1203	24	102
3.5	IG9T('95)....816,959 (Opr. IV3TAN)	1,938	33	110
7.0	IG9A('95)....1,168,855 (Opr. IT9GSF)	2,486	35	120
14	ZD8Z('95)....2,356,065 (Opr. N6TJ)	3,925	38	167
21	ZD8Z('94)....3,481,925 (Opr. N6TJ)	5,535	36	179
28	ZD8Z('91)....2,341,866 (Opr. N6TJ)	4,521	33	141
ASIA				
1.8	UG7GWO('87)....255,852	1,327	12	57
3.5	UW9AF('83)....222,192	554	19	53
7.0	H21A('92)....736,422 (Opr. 4N4OO)	1,812	32	107
14	4X6TT('95)....1,557,951	2,877	40	161
21	JAØJHA('92)....1,430,856	2,912	37	130
28	JH1AJT('88)....1,421,070	2,409	38	163
EUROPE				
1.8	LZ2CJ('84)....107,818	1,319	13	61
3.5	HA8IE('90)....361,343	1,455	35	116
7.0	S59UN('92)....875,875	2,419	37	138
14	OH2BH('92)....1,870,170 (Opr. OH2IW)	4,008	39	154
21	CQ4A('90)....1,757,780 (Opr. CT1BOP)	3,912	38	141
28	YU3ZV('88)....1,541,603	3,219	39	134
NORTH AMERICA				
1.8	CG1ZZ('96)....91,803 (Opr. VE3BMV)	690	14	57
3.5	TI1C('92)....498,037 (Opr. TI2CF)	1,695	31	108
7.0	TI1C('94)....1,108,140 (Opr. TI2CF)	2,882	31	134
14	KP2A('94)....2,255,250 (Opr. KW8N)	4,810	38	156
21	V26N('93)....2,159,460 (Opr. KW8N)	4,623	36	150
28	VP2ET('88)....2,423,880 (Opr. K5RX)	5,137	37	143
OCEANIA				
1.8	KH6CC('85)....45,984	484	13	19
3.5	T32AF('85)....222,768	1,064	23	49
7.0	9M8R('95)....1,091,835 (Opr.W7EJ)	2,354	37	122
14	ZM1BIL('83)....1,334,232	2,635	38	136
21	AHØAB('82)....1,923,840 (Opr. JA3DOC)	4,509	36	108
28	KD7P/NH2('88)....2,309,304	4,885	38	123
SOUTH AMERICA				
1.8	P49I('95)....58,653 (Opr. K4PI)	353	14	43
3.5	P4ØR('87)....552,786 (Opr. K4UEE)	1,628	23	91
7.0	PJ9U('93)....1,199,968 (Opr. OH1VR)	2,637	34	120
14	PYØFM('94)....3,202,242 (Opr. PY5CC)	5,109	38	175
21	ZX5J('96)....2,976,190 (Opr. PP5JR)	5,091	36	169
28	ZV5A('91)....2,984,166	5,154	37	156

Single Operator/All Band

AF	CT3BH('90)....14,892,102 (Opr. OH2BH)	7,177	166	531
AS	H2ØA('94)....7,618,670 (Opr. 5B4ADA)	4,522	127	463
EU	S52AA('92)....7,134,192	4,378	151	473
NA	KP2A('93)....13,202,298 (Opr. CT1BOH)	8,691	148	506
O	YJ1A('90)....9,516,731 (Opr. OH1RY)	6,429	160	381
SA	HC8A('92)....16,316,568 (Opr. N6KT)	8,318	160	508
QRP	PJ2FR('87)....3,171,166 (Opr. K7SS)	3,212	100	234
Low Pwr.	TJ1GG('92)....5,925,760 (Opr. I2VXJ	5,052	96	298
Asst.	P4ØW('94)....11,224,877 (Opr. W2GD)	6,323	131	470

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	125	11	25
HC8A	3.5	357	20	51
(Opr. N6KT)	7.0	638	28	74
(1992)	14.0	1,166	34	111
16,316,568	21.0	2,031	36	127
	28.0	4,001	31	120
	Total	8,318	160	508

Multi-Operator/Single Xmtr.

AF	EA8AGD('88)....17,172,672	8,203	157	547
AS	YM5KA('90)....15,056,664	7,609	164	548
EU	IQ4A('90)....17,255,700	7,253	183	717
NA	VP2EC('92)....16,287,152	7,434	183	685
O	KH2S('91)....11,095,392	7,086	145	387
SA	PJ1B('93)....22,596,570	9,386	164	646

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	111	10	24
PJ1B	3.5	937	25	94
(1993)	7.0	1,055	29	114
22,596,570	14.0	2,011	38	147
	21.0	1,829	32	139
	28.0	3,443	30	128
	Total	9,386	164	646

Multi-Operator/Multi-Xmtr.

AF	EA9UK('93)....37,140,597	13,547	179	744
AS	EW6V('82)....18,746,136	10,100	142	544
EU	LX7A('89)....26,578,978	14,947	175	751
NA	VP2KC('79)....37,770,012	17,767	175	677
O	KHØAM('90)....35,730,600	16,309	179	565
SA	PJ1B('90)....57,610,400	19,655	189	803

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	531	19	50
PJ1B	3.5	1,335	24	99
(1990)	7.0	2,104	31	117
57,610,400	14.0	4,860	38	179
	21.0	5,395	38	176
	28.0	5,430	39	182
	Total	19,655	189	803

CQ World-Wide DX Contest All-Time CW Records

BY FREDERICK CAPOSSELA, K6SSS

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	OHØMEP('95)	251,136	1,451	24	85
3.5	EA8EA('96) (Opr. OH2KI)	1,175,550	2,672	36	114
7.0	YV5A('95) (Opr. OHØXX)	1,364,465	3,095	35	122
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZPØY('93) (Opr. K4UEE)	1,869,978	3,627	35	139
28	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128
	AFRICA				
1.8	EA8AK('82)	75,768	385	15	51
3.5	EA8EA('96) (Opr. OH2KI)	1,175,550	2672	36	114
7.0	IG9/AC6WE('96) (Opr. UA3DPX)	1,234,317	2,677	37	122
14	ED9ED('90)	1,444,436	3,063	37	121
21	CR3W('92) (Opr. DF5UL)	1,652,170	3,092	38	141
28	ZS6BCR('91)	1,397,658	3,209	34	112
	ASIA				
1.8	4X4NJ('95)	200,735	756	20	75
3.5	ZC4DX('87) (Opr. 4Z4DX)	430,560	1,318	29	88
7.0	C41A('93) (Opr. T93A)	1,307,944	2,972	34	133
14	7L1GVE('92)	1,181,937	2,255	40	139
21	4Z4T('91) (Opr. 4Z4UT)	939,900	2,240	36	120
28	4Z5DX('90)	826,759	2,003	39	120
	EUROPE				
1.8	OHØMEP('95)	251,136	1,451	24	85
3.5	ON4UN('95)	642,600	2,204	35	118
7.0	S59UN('92)	971,049	2,484	38	135
14	OHØBH('94) (Opr. OH2MAM)	1,003,353	2,957	39	130
21	OH6MCW('89)	775,620	2,208	37	102
28	9H1EL('92)	794,846	2,249	39	120
	NORTH AMERICA				
1.8	CG1ZZ('96) (Opr. VE3BMV)	218,715	898	22	83
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	ZF2TG('92) (Opr. WQ5W)	1,087,862	2,985	31	111
14	KP2A('94) (Opr. KW8N)	1,332,460	3,115	38	132
21	V29W('90) (Opr. KD6WW)	1,110,512	2,829	37	115
28	J79DX('89) (Opr. AA5DX)	859,360	2,661	33	98
	OCEANIA				
1.8	KH6CC('93)	68,250	547	18	24
3.5	9M6NA('96) (Opr. JE1JKL)	231,480	876	24	66
7.0	ZL3GQ('94)	672,612	1,732	36	102
14	ZL3GQ('91)	1,148,418	2,396	36	126
21	N7DF/NH2('89)	1,205,776	2,977	37	99
28	KD7P/NH2('88)	1,037,608	2,456	38	105
	SOUTH AMERICA				
1.8	YV3AGT('85)	147,588	591	21	63
3.5	P4ØJ('95) (Opr. WX4G)	641,245	1,650	28	103
7.0	YV5A('95) (Opr. OHØXX)	1,364,465	3,095	35	122
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZPØY('93) (Opr. K4UEE)	1,869,978	3,627	35	139
28	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

Single Operator/All Band

AF	EA8EA('91) (Opr. OH2MM)	13,225,295	6,490	171	514
AS	JY8VJ('92) (Opr. DL1VJ)	8,031,168	4,900	141	432
EU	ZB2X('93) (Opr. OH2KI)	6,129,904	4,606	147	491
NA	TI1C('93) (Opr. N6TR)	9,123,817	6,335	159	448
O	AH3C('90)	6,798,363	4,539	172	335
SA	P4ØW('96) (Opr. W2GD)	12,742,731	6,315	159	524
QRP	HI8A('91) (Opr. JA5DQH)	3,316,768	3,320	117	325
Low Pwr.	3V8BB('96) (Opr. DL2HBX)	5,489,376	4,425	94	328
Asst.	P4ØW('94) (Opr.W2GD)	10,288,950	5,541	155	460

WORLD RECORD

Station	Band	QSOs	Zones	Countries
EA8EA (1991) 13,225,295	1.8	254	14	57
	3.5	567	21	64
	7.0	1,114	30	90
	14.0	1,405	37	108
	21.0	1,374	36	100
	28.0	1,776	33	95
	Total	6,490	171	514

Multi-Operator/Single Xmtr.

AF	EA9EA('91)	13,096,080	5,854	170	582
AS	TA5KA('90)	13,915,044	7,201	175	527
EU	LZ9A('89)	9,962,386	5,342	200	626
NA	J6DX('93)	11,691,029	7,180	159	532
O	KH2S('92)	7,249,952	4,306	169	399
SA	HC8N('95)	14,302,820	7,252	162	503

WORLD RECORD

Station	Band	QSOs	Zones	Countries
HC8N (1995) 14,302,820	1.8	374	14	46
	3.5	712	26	77
	7.0	1,770	36	115
	14.0	2,128	37	119
	21.0	1,845	29	103
	28.0	423	20	43
	Total	7,252	162	503

Multi-Operator/Multi-Xmtr.

AF	CN5N('90)	33,659,256	14,179	178	644
AS	VS6WO('92)	17,799,960	9,841	190	570
EU	LX7A('89)	20,497,632	12,735	189	705
NA	KP2A('88)	32,325,150	15,198	191	631
O	KHØAM('92)	23,951,385	11,253	190	527
SA	PJ1B('88)	38,415,760	14,921	194	672

WORLD RECORD

Station	Band	QSOs	Zones	Countries
PJ1B (1988) 38,415,760	1.8	717	17	65
	3.5	1,447	24	83
	7.0	3,119	37	133
	14.0	3,791	40	140
	21.0	2,997	39	134
	28.0	2,850	37	117
	Total	14,921	194	672

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

BY FREDERICK CAPOSSELA, K6SSS

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

PHONE

Single Operator/Single Band

1.8	K1ZM('95)	55,420	215	15	70
3.5	K1ZM/2('96)	292,100	952	27	100
7.0	KC7EM('95)	409,446	1,083	34	95
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	K3RV/4('88)	1,270,478	2,298	39	148
28	WØZV('88)	1,145,368	2,158	39	142

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	24	10	21
K1AR	3.5	239	15	73
(1992)	7.0	311	26	88
7,810,446	14.0	969	39	133
	21.0	913	33	125
	28.0	1,292	32	119
	Total	3,748	155	559

QRP

KR2Q('90)	1,246,974	1,069	106	305

Low Power

N8II('92)	1,864,747	1,424	114	365

Assisted

WM5G('92) (Opr. KRØY)	6,631,513	2,800	171	662

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	32	12	30
K1AR	3.5	197	18	76
(1990)	7.0	154	26	95
11,193,606	14.0	1,370	39	167
	21.0	1,167	38	165
	28.0	1,517	37	170
	Total	4,437	170	703

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	95	14	41
N2RM	3.5	485	23	98
(1992)	7.0	721	32	128
19,603,032	14.0	1,654	40	178
	21.0	2,367	40	178
	28.0	1,688	36	170
	Total	7,010	185	793

CW

Single Operator/Single Band

1.8	K1ZM('95)	142,358	470	23	83
3.5	K1ZM('92)	416,160	1,059	30	106
7.0	K1ZM('90)	839,520	1,783	34	125
14	KM1H('93) (Opr. KQ2M)	1,001,035	1,892	39	146
21	W7WA('89)	772,146	1,647	39	119
28	K1ZM('89)	732,564	1,447	37	134

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	34	13	27
N4RJ	3.5	170	21	65
(Opr. KM9P)	7.0	687	34	104
(1992)	14.0	696	37	114
5,851,152	21.0	709	35	107
	28.0	670	32	92
	Total	2,966	172	509

QRP

AA2U('92)	1,188,000	938	118	332

Low Power

K2SG('96)	2,158,728	1,601	118	363

Assisted

K3WW('93)	5,056,464	2,499	160	547

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	36	16	33
K1AR	3.5	313	26	75
(1989)	7.0	920	35	100
9,383,459	14.0	1,139	37	128
	21.0	773	39	123
	28.0	920	37	129
	Total	4,101	150	588

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	106	16	59
K1AR	3.5	726	29	107
(1992)	7.0	1,862	37	141
19,473,615	14.0	1,721	39	156
	21.0	1,584	37	154
	28.0	1,128	34	136
	Total	7,127	192	753

Club Record: Frankford Radio Club ('92) 389,564,535
Team Contesting: Phone—Southern California Contest Club #1 ('92) 53,779,847
CW—Southern California Contest Club #1 ('93) 45,194,836

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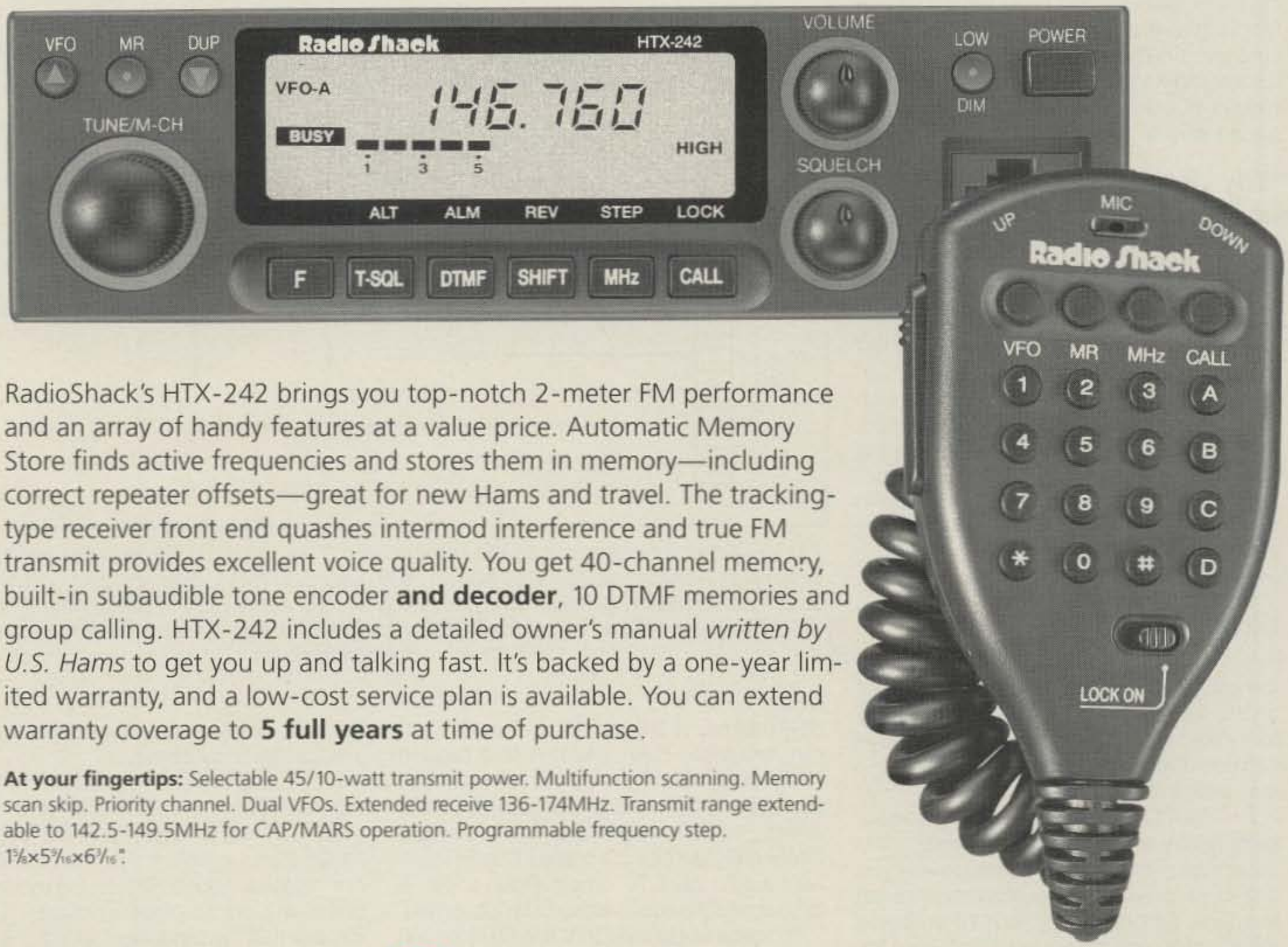

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BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Remote Antenna Switching Made Easy

Various remote antenna switching devices have been described in the amateur literature, and some commercially manufactured switchers are available today. However, the amateur who is willing to heat a soldering iron and drill a few holes can build a fine antenna switch for very little money. This article recaps some previous work I did along these lines. The circuits shown here allow switching up to four antennas from a single feed line. There is provision for a 50 ohm resistive load (dummy antenna) as well. Inexpensive surplus relays are used in the interest of minimizing cost.

The first W1FB antenna-switch article appeared in *QST*.[1] Subsequent to its publication, an excellent *QST* Technical Correspondence item by KU7G described improvements for the relay logic.[2] Those modifications are included in the fig. 1 and fig. 2 circuits that follow. Information about packaging and general construction techniques is contained in the article referenced in note 1.

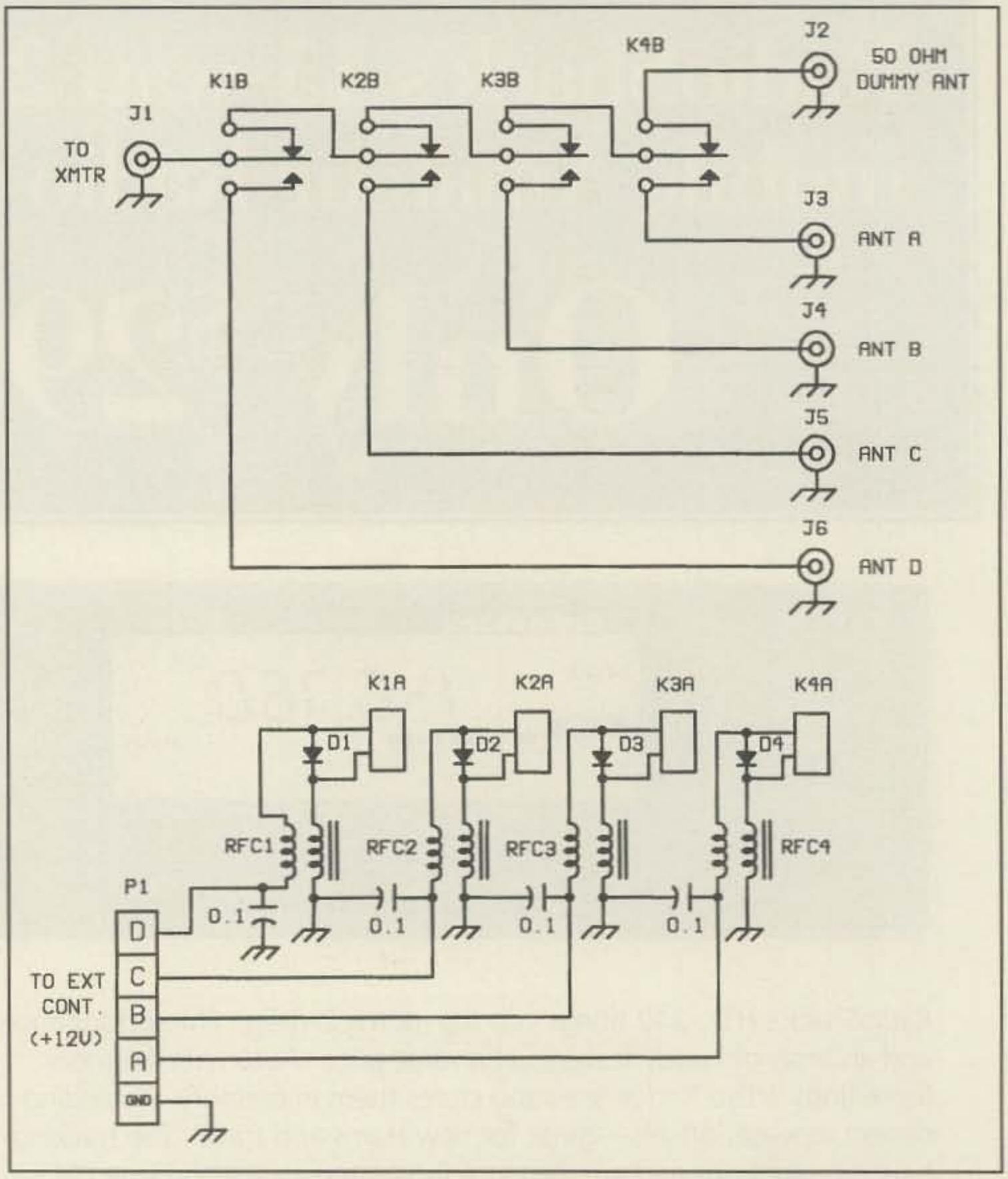

Fig. 1– Schematic diagram of the remote switching head. D1 through D4 are 1N914 small signal silicon diodes. J1 through J6 are SO-239 jacks. See text and notes 1 and 2 for data concerning K1 through K4. P1 is a male cable plug of the builder's choice. RFC1 through RFC4 have 18 bifilar turns of No. 24 enamel wire on Amidon Assoc. FT-50-43 ferrite toroid cores.

Why Use Remote Switching?

Quality coaxial feed line is fairly expensive. It makes economic sense to use one length of RG-213, RG-8, or hardline to feed more than one antenna on the tower or in the field. A remotely controlled antenna switch makes this possible. Furthermore, changing from one antenna to another (especially during a contest) is much more rapid when a remote switch is used. This requires the simple act of changing a ham shack control box switch position. I concede that a manual coax switch in the radio room provides the same convenience, but it can involve the added cost of several feed lines.

Circuit Notes

Fig. 1 contains a schematic diagram for the portion of the switcher that is installed on the tower or in the field. Although only four relays are shown, additional relays can be added to allow switching more than four antennas.

Relays K1 through K4 need to have contacts heavy enough to accommodate the maximum RF current for the power you are running, with some amperage rating to spare. A contact rating of 10 amperes minimum is recommended if you use a linear amplifier. For example, at 1.5 kw PEP there would be 273.8 volts RMS developed across a 50 ohm load. The RF current would be 5.47 amps. A less rugged relay will suffice if you do not intend to use more than 150 watts of transmitter output power. At 150 watts there would be 86.6 RMS volts across 50 ohms. The RF current would be 1.73 amps. Relays with 5 amp contacts would suffice in such a case.

It needs to be said that the fig. 1 circuit design is based on the use of antennas with a low SWR. Any SWR under 2:1 should be okay. High SWR at significant RF power levels can destroy the relays because of high RF voltages that may arc across the relay contacts.

K1 through K4 are protected from arcing between their contacts and circuit ground. This is accomplished by using RFC1 through RFC4. The relay field coils are "floated" above RF ground by virtue of bifilar-wound toroidal chokes. "Bifilar" means that two identical lengths of wire are wound on a toroid core at the same time. I am often asked what bifilar means. The relays should be mounted on an insulating base, such as plexiglass or fiber-

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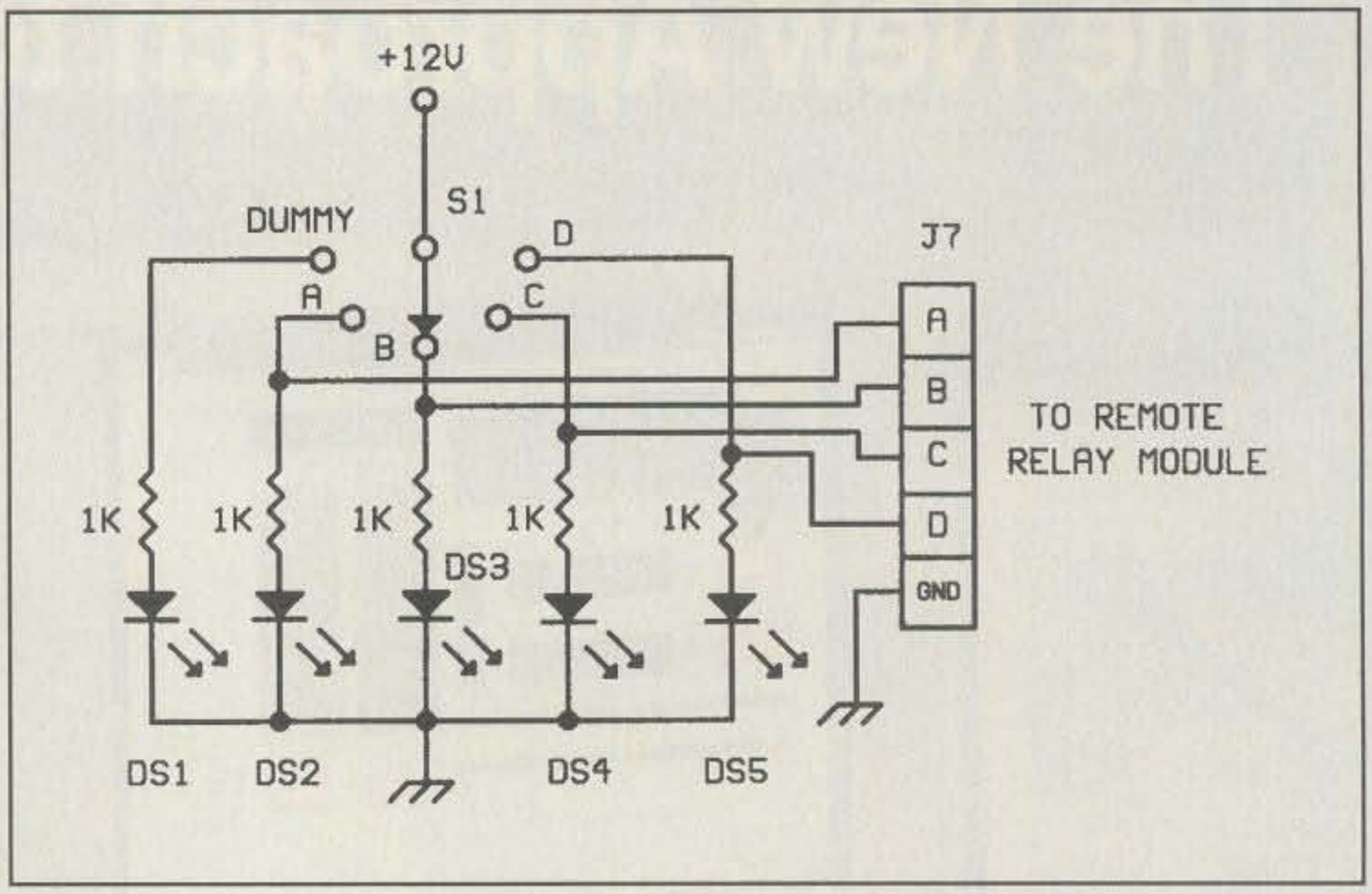

Fig. 2– Control box circuit for the antenna switcher. J7 is a female connector of the builder's choice. S1 is a single-pole, 5-position rotary wafer switch, phenolic or ceramic. A +12 volt, 500 ma wall transformer is sufficient to power the switcher.

glass, in order to isolate their frames from circuit ground.

Diodes D1 through D4 clamp on voltage spikes that can occur when the fields in the relay coils collapse. This prevents spikes from reaching the control box and 12 volt power supply. Each relay +12 volt line is bypassed with a 0.1 µF, 50 volt ceramic capacitor to keep stray RF energy off the four control lines.

A 50 ohm dummy antenna may be connected to J2 of fig. 1 if desired. This would require a weatherproof enclosure for the dummy antenna, since it would be on the tower or in the field. The dummy antenna will ensure that the transmitter has a proper load if the +12 volt relay control voltage is absent for some reason when an antenna is chosen. Tune-up into the dummy antenna may be done by using the DUMMY position of S1 in fig. 2. This removes the operating voltage from the four relays.

Construction Notes

The relay box can be made of sections of PC board. An ideal enclosure would be a cast-aluminum project box, if you can justify the expense. In any event, once the circuit is built and tested, the box should be sealed with bathtub calking or a similar weather-resistant sealant.

The control-cable conductors need only be large enough to carry the relay current without causing a voltage drop. For example, if the 12 volt relay has a 100 ohm field coil, it will draw 120 ma. No. 22 conductors should suffice for average runs of control cable.

Two SPDT high-current 12 volt relays are suggested. One of them is an automotive type with 1/4 inch spade lugs for the electrical connections. This is sold by MECI as part No. 480-0394. No. 480-0395 is the same type of relay, but it has 1/8 inch lugs. The contacts for both are rated at 30 amps. These relays sell for $1.95 each.[3] A suitable PC-mount SPDT 12 volt relay is available from All Electronics Corp. It is part No. RLY-149 and has 15 amp contacts. It sells for $2.[4]

DS1 through DS4 of fig. 2 are LEDs. You may want to use red, green, blue, and yellow LEDs to help distinguish one S1 antenna position from the others.

Closing Remarks

There is nothing new or spectacular about this project. However, it is worth repeating the information periodically for the benefit of those amateurs who arrived on the scene in recent years. My previous work on this subject was published eleven years ago.

Building this antenna switch will save dollars and should give you a feeling of pride and accomplishment. Perhaps this can be your next weekend project!

Notes

1. D. DeMaw, "A Remote Antenna Switcher for HF," *QST*, June 1986, p. 24.
2. R. Schetgen, "An Improved Remote Antenna Switcher," *QST*, Sept. 1986, p. 51.
3. MECI, 340 E. First St., Dayton, OH 45402 (phone 1-800-344-4465; e-mail <meci@meci.com>.
4. All Electronics Corp., 14928 Oxnard St., Van Nuys, CA 91411 (phone 1-800-826-5432).

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TS570D/TS570S DSP HF TRANSCEIVER

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BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

Good Things Come In Small Packages

In the 100 years or so since the "modern" electronics industry began, components have been decreasing in size almost in direct proportion to the complexity of the device. Large "G" vacuum-tube packages gave way to the "GT" style. Octal GTs gave way to 7- and 9-pin miniatures. Hearing-aid and Nuvistor type packages made a brief appearance, and then in the 1950s came the transistor. Of course, it did not stop there. The small 3- or 4-pin "pills" soon gave way to the DIP package, some containing hundreds of transistors. Now the surface-mount package "is among us," and the end is not in sight.

This month we will look at a couple of items being supplied in a variation of this package, the ultra-small MSOP, which measures roughly 1/8" × 1/8". In addition to small size, however, the tremendous growth of the wireless marketplace has also prompted the design of lower voltage devices. The 3.3 volt "standard" is becoming more and more widely used, and chips that operate from this low voltage, ranging from op-amps to logic devices to complete FM receiver building blocks, are making their appearance.

Combining these two requirements, it is therefore no surprise that the power-supply component manufacturers would introduce ways of producing low operating voltages from readily available external sources such as batteries, and in keeping with the requirement of "smaller and smaller," begin to use the tiny packages as well. This is indeed the case.

One such component now available from Linear Technology is the LT1307, a switching DC-to-DC converter that is designed to take the output from a 1.5 volt battery and efficiently convert it to 3.3 or 5 volts. The chip is quite efficient and can work with any 1.5 volt cell, such as double A (AA) or even triple A (AAA) penlight batteries.

Fig. 1 is the schematic of the basic hookup. The LT1307 operates at a switching frequency of 600 kHz, which is high enough so that it only requires a small 10 µF capacitor at the output for filtering. The high switching speed also assures that harmonics of the chip's internal oscillator fall outside the normal 455 kHz IF band used in many types of portable communications equipment.

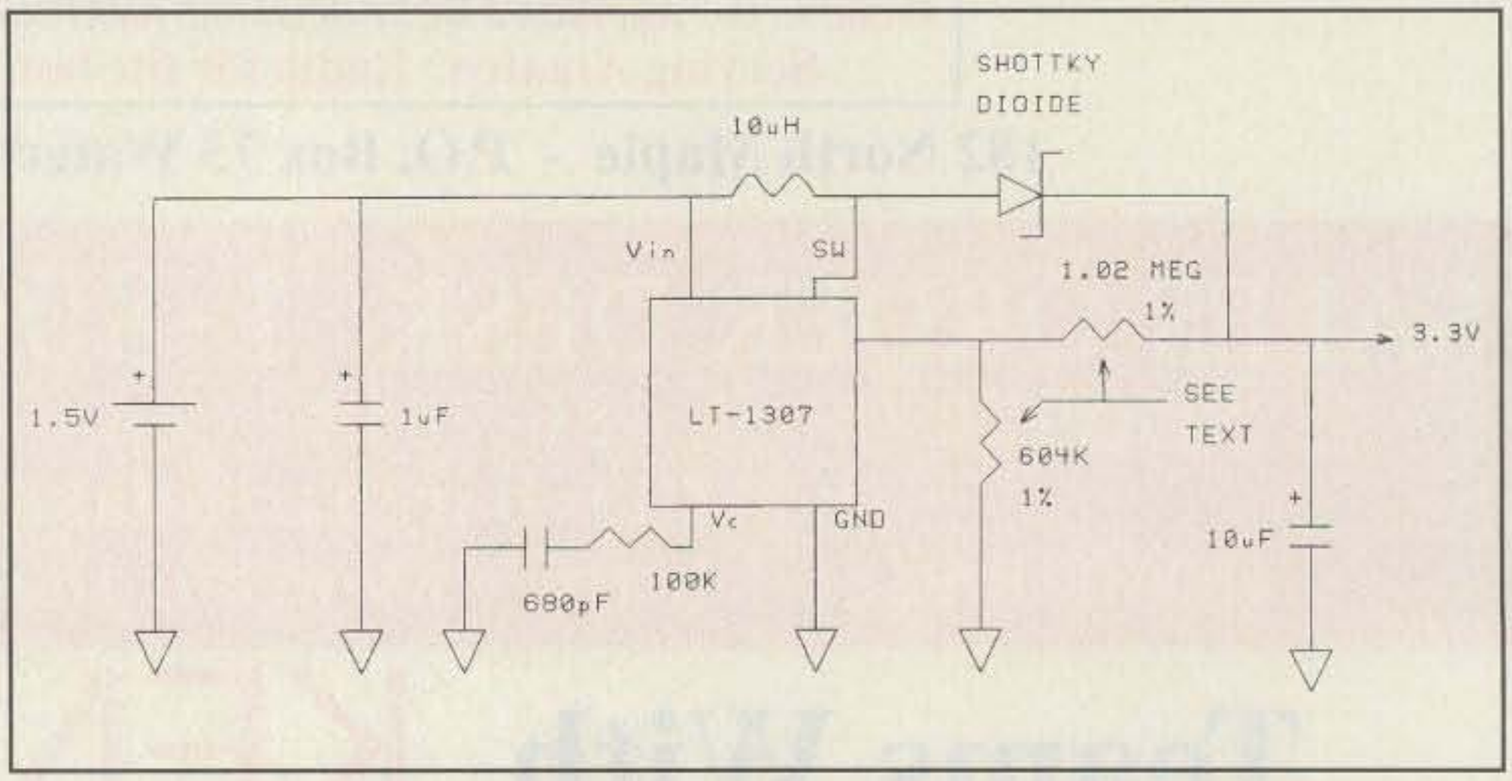

Fig. 1– Schematic of basic LT-1307 circuit.

The output voltage is controlled by a two resistor voltage divider that can easily be scaled to deliver higher outputs if desired. Output current is rated at 75 ma at 3.3 volts or 40 ma at 5 volts, and the chip itself only consumes 60 microamperes. The LTR1307 is designed to operate with as little as 1 volt input so you can really get every last drop of power from your battery. The chip comes in a surface-mount SO-8 package, a standard 8-pin DIP and of course, the micro MSOP package which is so small that you probably can build a complete DC/DC converter that is one third to one half the size of the battery used to power it.

For more information on the LT1307, contact Linear Technology Corporation at 1630 McCarthy Blvd., Milpitas, CA 95035 or call 1-800-432-1900. By the way, cost for the LT1307 is $2.50 at 100 pieces for the MSOP package.

Another low-voltage device making an appearance in the MSOP package is a

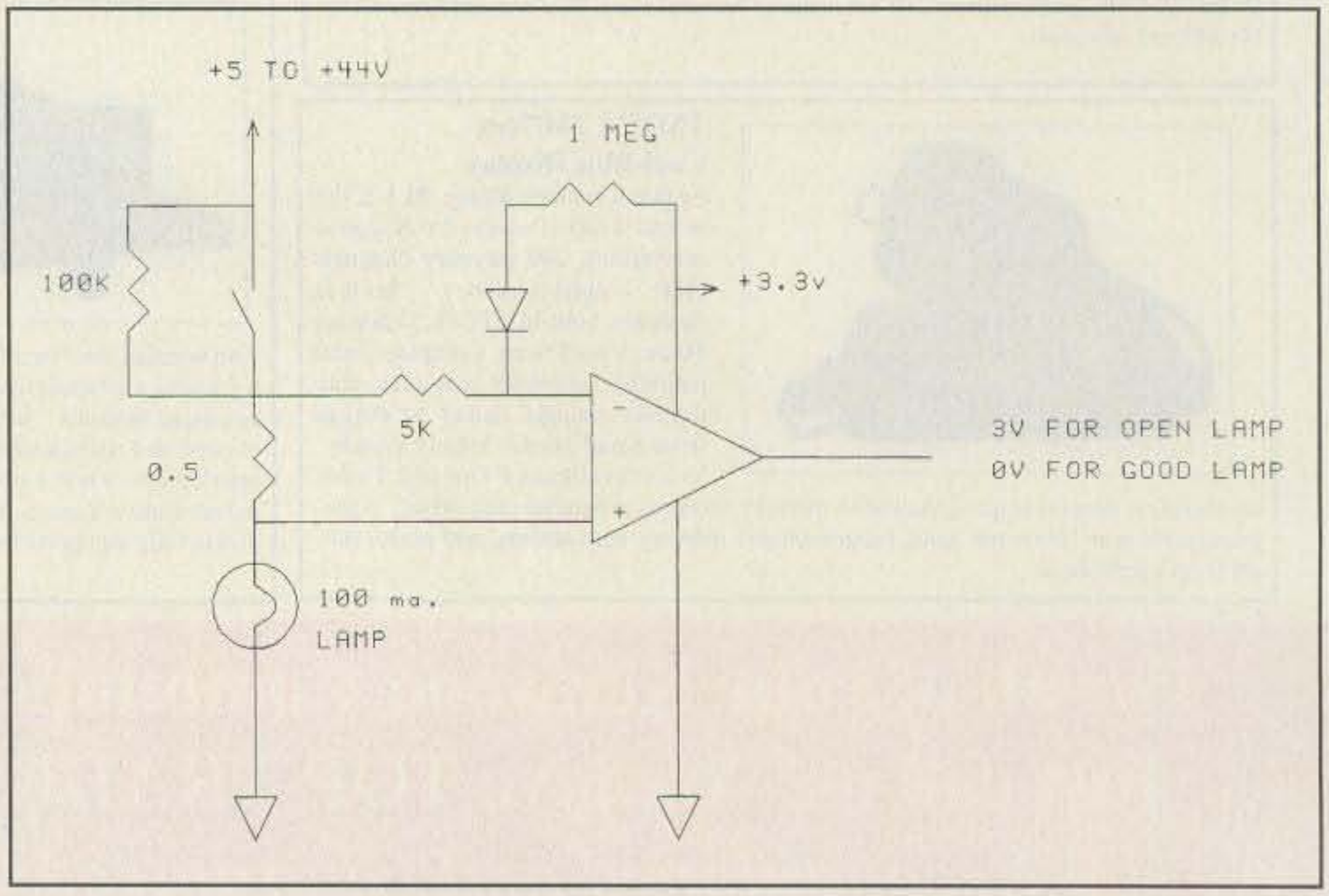

Fig. 2– Burned-out lamp detector circuit.

c/o CQ magazine

general-purpose dual op-amp, the Linear Technology LT1490. This device is a rail-to-rail op amp which will produce an output to within 25 millivolts of the power supply used to power it when driving light loads, and to within 30 mv of the power supply at output load of 10 ma. Since the device operates over a power supply range of ±1.25 volts to ±22 volts double ended, or 2.5 volts to 44 volts single ended, operation from any sort of power supply is no problem. Figs. 2 and 3 show a couple of advertised applications for the chip that may be of interest to the amateur. In fig. 2 a burned-out lamp is easily detected by measuring the voltage drop across a 0.5 ohm resistor connected in series with it. As you will note, the circuit is capable of working with lamps that operate anywhere from 5 to 44 volts. In fig. 3 the current drawn by a load is indicated by measuring the voltage drop across a 0.2 ohm resistor. This voltage drop should be low enough normally to not interfere with the operation of the circuit that is being monitored.

Two other features of the LT1490 include built-in protection from improperly connected power and the capability of withstanding voltages up to 44 volts above the negative rail or 22 volts below the negative rail. This is truly a rugged device. Cost for the LT1490 is under $2.00 in thousand quantity and somewhat higher for small quantities. Contact Linear at the above address for more details.

Not to be outdone, Maxim Integrated Circuits is offering rail-to-rail op amps in the SOT23 package, which, by the way, also measure on the order of 1/8 inch square. The MAX4162 has a gain bandwidth of 200 kHz, a power-supply requirement of 2.7 to 10 volts, and a current drain of 35 microamperes for the chip itself.

For higher speed, their MAX4330 will also work from ±1.35 volts (or 2.7 volts single-supply) and has a gain bandwidth of 3 MHz with a current requirement of only 275 microamperes. If you need still higher speed, the MAX4165 will give you a gain bandwidth of 5 MHz and a current drain of 1.4 milliamperes and still retain operation from ±1.35 volts (2.7 volts single ended). Although requiring higher operating current, the device will deliver up to 80 ma at the output.

Finally, for the highest speed in a tiny device, look at the MAX4124. This baby has a gain bandwidth of 25 MHz, 2.7 volt single-supply operation, and less than a milliampere of power-supply current. Data for all of these is available from Maxim Integrated Circuits, 120 San Gabriel Dr., Sunnyvale, CA 94086 or from any Maxim distributor.

Considering the above selection, it will be interesting to see what types of products this micro-technology will produce.

73, Irwin, WA2NDM

BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Fall Excursion '97

How the year flies! Already we've disposed of three-quarters of the year. By the time you read this, we will have marched into fall, which gives us the first signs of antenna season waning for another calendar year. In any case, let's begin our fall excursion by opening wide the antenna notebook.

Antenna Notes

SARtek-1 Universal Antenna Rotator Controller. In several columns we noted the LOGic™ series of full-featured loggers suitable for DXing, nets, paper chasing, and ragchewing and offered by Personal Database Applications (PDA) proprietor Dennis Hevener, WN4AZY. LOGic is up to Version 4 as this is written, having just gone through a major update of the prefix and awards tables, plus numerous other enhancements and bug fixes. LOGic is available in versions priced at $79 to $99 to support DOS, Windows 3.1, and Windows 95. A simplified $39 version, LOGic Jr. V4, promotes easy introduction to PC logging; it offers most of the features of LOGic 4, but lacks the radio interfacing options.

Now Dennis offers a product that allows nearly anyone with a rotatable antenna to take advantage of computer-automated antenna rotation. The SARtek-1 Universal Antenna Rotator Controller was created by Al Parsons, VE6RFM. It's claimed to be the first and only such universal controller, and it works with most rotors, even those not originally designed for computer interfacing.

The package consists of a board that fits in a standard PC slot and a small relay board that mounts inside the rotor controller's cabinet; the unit plugs into a standard 9- or 25-pin PC serial port. It's microprocessor controlled, featuring dynamic feedback, automated brake control, heavy-duty relays, and easy installation. Operational accuracy is within ±3 degrees.

Included is Windows 95-based software that provides point-and-click antenna aiming, or keyboard input of heading, grid square, or callsign prefix. It displays short and long headings; return headings; distance; country; ITU and CQ zones; latitude and longitude; and local, UTC, and destination clocks.

For further information, contact Personal Database Applications, 1323 Center Dr., Auburn, GA 30011-3318 (phone 770-307-1511; Internet <pda@hosenose.com>).

Tube Mall Supermart. While most receivers and transmitters today are solid state, and many hobbyists thumb their noses at the idea of tubes in a solid-state world, some vacuum-tube era equipment still can do a creditable job, especially for starters. For many who qualify with old-timer status, there's a certain magic in the old sets the tube filaments of which glow brightly and warmly in the dark.

One firm that's easing the tube availability problem is Typetronics, a Ft. Lauderdale mail-order firm I often see at hamfests in the southeast. Proprietor Fred G. Schmidt, N4TT, offers new and unused tubes in original boxes; no used or "pulls" are sold. Most of the tubes are receiving types, but his flyer also includes many transmitting, industrial, and special-purpose types. Also offered are tube socket connectors, extenders, and socket savers. The Typetronics flyer lists several hundreds of tubes for sale and also includes a tubes-wanted list.

For a tube flyer, contact Typetronics, P.O. Box 8873, Ft. Lauderdale, FL 33310-8873 (954-583-1340).

Vectronics Catalog. In its move to come under the MFJ umbrella in Starkville, Mississippi, Vectronics has continued many of the products it featured while a subsidiary of Valor Enterprises, and it's added some along the way. The latest Vectronics™ catalog shows a variety of antenna accessories, new and old.

For a catalog, contact Vectronics, 1007 Highway 25 South, Starkville, MS 39759 (601-323-5800).

Cable X-Perts 1997 Master Catalog. In previous columns, most recently February '96, we highlighted the cable and cable-related products offered by Cable X-Perts. Some of the more notable products we profiled included a high-performance RG Mini 8(X) coaxial cable and the LMR series UltraFlex coaxial cable; the latter is for situations requiring low loss, double shielding, repeated bending, and installation in tight spaces.

While the firm's 1997 Master Catalog focuses on several groups of coaxial cable, a complete range of wire, transmission line, and antenna and cable accessories is offered. The Cable X-Perts catalog includes ladderline, rotor and control cable, coax switches, antenna wire and wire antenna kits, grounding braid, Dacron® rope, DC power "Zip" cords, computer cables, connectors and adapters of various types, dipole center and end insulators, baluns, lightning protection devices, bandpass filters, waterproofing materials, tools, and other accessories. Also in the 20-page catalog are charts showing coax attenuation and power ratings, as well as two pages of connector and adapter "how to" installation information.

For a current catalog, contact Cable X-Perts, Inc., 416 Diens Drive, Wheeling, IL 60090 (1-800-828-3340).

Stridsberg Engineering Update. In the May column we noted the antenna power dividers offered by Stridsberg Engineering, a manufacturer of RF and antenna devices. To recall, we indicated you can use power dividers of various types to stack or combine antennas. You can do this in conjunction with antenna arrays of two, four, or more units to increase antenna system gain and directivity. With power dividers' typically low loss and good phase balance, you can obtain maximum benefits from such stacking. To this end, John Stridsberg, NY5C, offers an extensive line of two- and four-port, VHF/UHF power dividers with wide bandwidth and low SWR.

John recently introduced a new line of receiver multi-couplers. These commercial-grade, passive multi-couplers are particularly suitable for multi-receiver monitoring applications for professional agencies and the serious monitoring hobbyist.

Stridsberg Engineering offers four passive receiver multicouplers in the MC series. They require no external power to operate and introduce only 3 to 6 dB signal loss, depending on the number of ports. Two- and four-port models which cover various ranges from 40 kHz to 1 GHz are available.

Pricing, information, and spec sheets on several other new products are available from Stridsberg Engineering, Inc., P.O. Box 5050, Shreveport, LA 71135-5040 (318-861-0660).

Soft Stuff

The DELTACOMM™ I-9000 Communication Manager. In the August 1991 and December 1992 columns we highlighted the DELTACOMM Communications Managers from Delta Research. To recall, the DELTACOMM Communication Managers are PC-based comm managers for the ICOM IC-R7000, IC-7100, IC-R71A, IC- R72, IC-735, and IC-7100 receivers; prices range from $299 to $349. As we indicated, these products are designed with speed as a major goal. They offer sophisticated features including lockout of receiver birdies, complete priority channel monitoring while scanning, elimination of redundant logging of channels during search, file exchange with other software for custom report generation, user-friendly window-style screens, on-screen help, and a smart setup program.

Recently, DELTACOMM introduced the DELTACOMM I-9000 Communications Manager for the ICOM IC-R9000 receiver. The new $499 product includes all of the features presently available with the company's existing managers, plus several enhanced features, including one known as "slave receiver frequency hand-off." With this feature you can control up to four ICOM (R71, R72, R7000, or R7100) slave receivers.

A related new product is the I-8500 Communications Manager for the ICOM IC-R8500 receiver, which optionally handles Global Positioning System (GPS) coordinates at speeds over 2400 channels per minute. Still another offering is the DELTATONE 2.00 DTMF Repeater Controller Programmer. The DOS-based program allows unlimited 16-digit DTMF (Touch-Tone) generation for local or remote programming of your repeater controller.

For spec sheets and additional information

289 Poplar Drive, Millbrook, AL 36054-1674

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JST-245

160-10 Meters PLUS 6 Meter Transceiver

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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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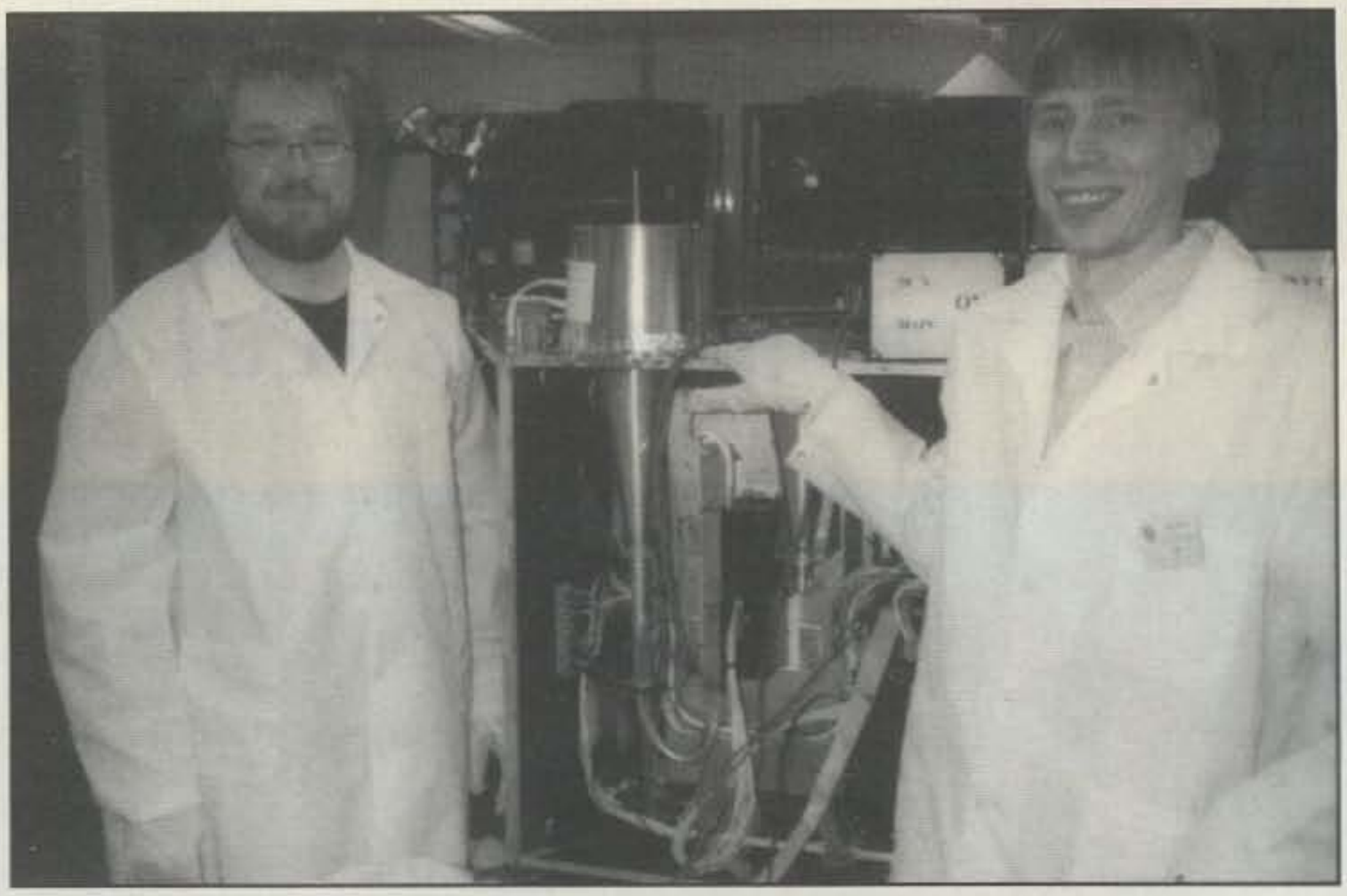
CIRCLE 151 ON READER SERVICE CARD



"Proud parents" Michael Fletcher, OH2AUE (left), and Harri Leskinen, OH2JMS (right), pause during testing of their AMSAT Phase 3D 10 GHz transmitter and traveling wave tube (TWT) amplifier at the P3D lab in Orlando, Florida. The TWT, procured by AMSAT-DL for the project, delivered a clean 60 watts output while installed in the spacecraft. AMSAT-NA Executive Vice President Keith Baker, KB1SF, adds that the "paint bucket" dummy load atop the 10 GHz feed horn worked well. He notes there's a block of carbon-impregnated concrete inside and stuck down into the horn's throat. The result was no leakage whatsoever, once they sealed the bottom with copper foil tape, providing a perfect match for testing. (AMSAT-NA photos courtesy Keith Baker, KB1SF)

on pricing, contact Delta Research, Box 13677, Wauwatosa, WI 53213 (414-353-4567, voice and fax).

Radio Era Archives CD-ROM Publications. Radio Era Archives offers a variety of older publications and documents on CD-ROM. Besides offering all the *QST* CD-ROMs, the firm offers four volumes called Radiophile, Vols. 1, 2, 3, and 4, at $85 each. These volumes include many out-of-print books on old radio technology and troubleshooting. The Radiophile series disks also contain technical and data references, service manuals, schematics, radio encyclopedias, and other documents.

Also offered is the Amateur Radio Anthology, a large collection of important references (roughly 1929–1976) of special interest to the history buff ($85); and Antique Radio Repair, at $85, which includes over 2800 pages of antique radio information including references needed for troubleshooting and repair of old-time sets. If all this weren't enough, the classic Rider's *Perpetual Troubleshooters Manual* is offered on CD-ROM, which includes 23 volumes from 1915 through 1955. This makes the CD-ROM arguably the most comprehensive resource ever produced on repair schematics of old radios, although it's a bit pricey for casual workshop use, at $450.

For a flyer, contact Radio Era Archives, 2043 Empire Central, Dallas, TX 75235 (1-888-EC-IMAGE; Internet <tsm@electrosys.com> or <http://www.electrosys.com/rea.htm>).

Quarterdeck WebCompass 2.0. Do you find the Internet fascinating, but have trouble really *finding* things on it? It's no secret that the Net, and especially the World Wide Web, can help you find almost anything or anyone. Many of the major "search engine" sites are almost magical in their uncanny ability to ferret out

After its successful journey from Japan, the metal shipping case containing JAMSAT's flight SCOPE camera experiment for the Phase 3D satellite was firmly buckled into the back seat of its transportation for the short trip from the Orlando airport to the Phase 3D lab. The P3D integration team took no chances on its being damaged enroute, considering the monetary value of the flight camera was about twice the value of the car in which it was riding!

information. Having, and knowing how to use, a good online search engine is like having a personal "genie" at your disposal, one whom you can ask any question and receive in return the answer you need.

Of course, real-world search engine genies aren't all that simple to use and interpret, and they often return a truly massive amount of information, much of which may not be useful to you. A better, hybrid approach may be for you to catalog the Web yourself using a "knowledge manager" program running on your PC.

One such product, WebCompass 2.0, can prove invaluable to anyone who gathers and analyzes information online, being billed by Quarterdeck as a "total Internet search tool." It makes the Web-cataloging task manageable by cataloging only your interests and needs. The program lets you organize your topic space in whatever way you like, and it automatically creates and updates a user-modifiable catalog of only those areas of the Web of interest to you, characterizing as much about the Web pages it finds as can be done automatically.

The new Windows 95-based program is $49.95 (estimated street price). It is available from dealers or directly from Quarterdeck Corporation, 13160 Mindanao Way, Marina del Rey, CA 90292-9705 (phone 1-800-282-0866; Internet <http://www.quarterdeck.com>).

From The Bookshelf

Antennas and Transmission Lines. MFJ Enterprises has announced another antenna book to add to its growing portfolio of publications dealing with antennas, packet radio, QRP, shortwave listening, mobile, nostalgia, technical subjects, and a variety of other topics. It's *Antennas and Transmission Lines*, by John A. Kueken. The new book represents a compromise between texts that are technical, quantitative, and theoretical, and those which are lacking in theory but are strictly anecdotal and construction-oriented. The text is direct and provides clear information.

The book has 37 brief but concise chapters divided into three sections. The first section covers basic antenna theory, the next deals with transmission lines, and the final section covers a variety of specialized antenna topics. The book is well-illustrated with diagrams and graphics and is $19.95 from MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (telephone 1-800-647-1800; Internet <mfj@mfjenterprises.com> or <http://www.mfjenterprises.com>).

Postscript: While you're checking out MFJ's Web site, peruse the Web page that gives a brief but illuminating capsule history of the firm's 25 years in "linking the world to your backyard," to use MFJ's own words. It's an interesting success story in an amateur radio marketplace in which it's become increasingly difficult to succeed in recent years.

The World Wide Web 1997 Unleashed. Several excellent (and rather thick) Macmillan books on the Internet and the World Wide Web have crossed my desk recently. In a recent column I shared my impressions of the monster-sized Sams.net *Internet 1997 Unleashed* ($49.99, 1269 pages). This month I'd like to share another rather "weighty" book with you.

The new book is the 1997 followup to *The World Wide Web Unleashed, Second Edition*, which we covered in February 1996. The updated *The World Wide Web 1997 Unleashed* edition is a 1226-page, 44-chapter Sams.net book/CD-ROM combo by Web expert John December that aims to offer you everything you need to master the Web. It shows you how to connect to the Web, navigate and explore Webspace, set up a Web site, and much more.

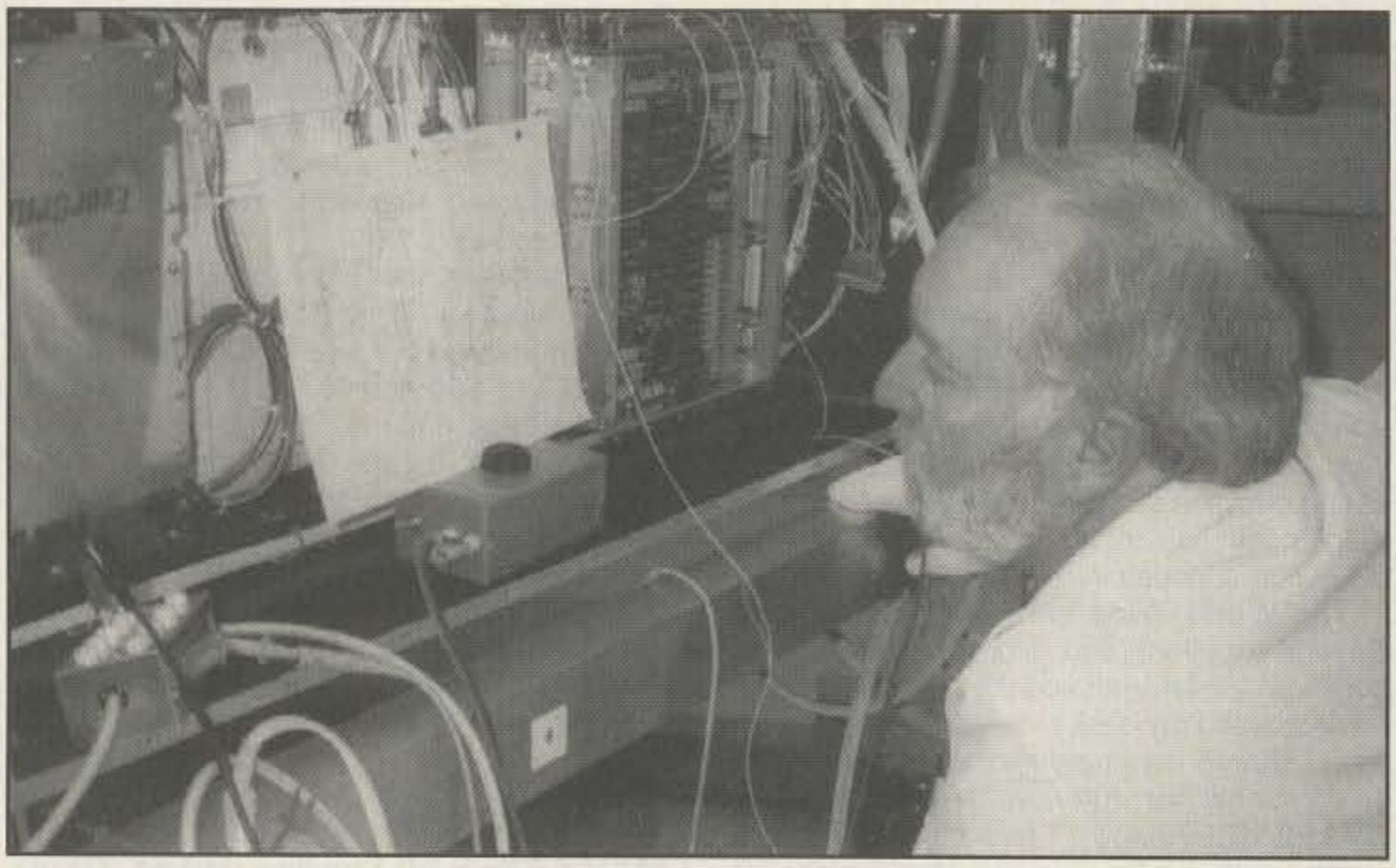
The book also includes a CD-ROM that features a variety of useful Windows and Macintosh PC Internet software, including Web browsers and over 150 development tools and utility programs. As an extra bonus, the CD-ROM part of the package includes an "electronic library" that has online hypertext versions of two popular Sams.net books, *Netscape 3 Unleashed* and *Microsoft Internet Explorer 3 Unleashed*.

The new Web book is $49.99. For more information, contact Macmillan Publishing USA, 8219 Northwest Blvd., Suite 400, Indianapolis, IN 46278 (1-800-858-7674). If you're already online, check out the Macmillan Publishing USA Web site at <http://www.mcp.com>. You can download valuable Internet software tools from their Web site and also directly from the company's FTP site, at <ftp://ftp.mcp.com>. The publisher also hosts the Macmillan Computer Publishing Forum on the CompuServe (CSi) online service (GO PHCP to access the forum).

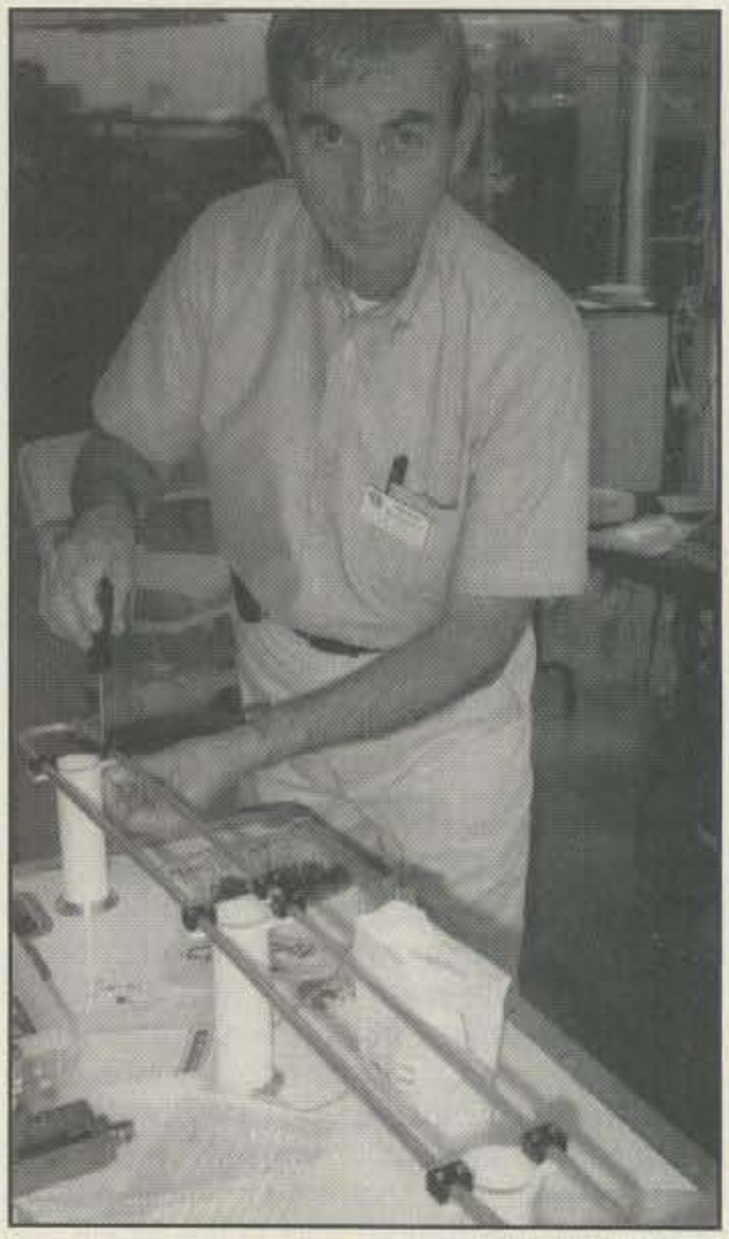
Short Bursts

AMSAT Phase 3D Satellite Update. There's some risk of being "OBE" (overtaken by events) in preparing a monthly magazine column, which must of necessity be prepared months in advance. Often, events you casually mention in the column writeup either don't happen at all, they happen in ways different than you anticipated, or their scheduled occurrence "slips." This kind of "egg-on-your face" OBE risk is particularly true with major events, such as the long-planned, much-delayed launch of the AMSAT Phase 3D satellite.

In any case, Keith Baker, KB1SF, AMSAT-NA Executive Vice President, sent me another



In this photo AMSAT-NA Phase 3D Integration Laboratory Manager Lou McFadin, W5DID, rechecks the wiring and logic of the Phase 3D's Internal Housekeeping Unit just prior to activating and testing some of the satellite's installed transmitters and receivers.



Here AMSAT-NA Assistant VP of Engineering Stan Wood, WA4NFY, is shown putting the finishing touches on one of three V-band folded dipole flight antennas for Phase 3D in preparation for its installation on the spacecraft at the P3D lab in Orlando.

packet of photos showing more of the high-tech hardware details of the new satellite as it was being prepared for launch (see photos). As long as the launch was successful, or any delay is a short one, I won't mind being "OBE" at all. At least I've got my fingers crossed.

For more details on Phase 3D and other AMSAT doings, check out their revamped Web page. It contains a complete set of fact sheets about AMSAT, news releases, downloadable software, and late-breaking Phase 3D information. You'll find it at <http://www.amsat.org>.

For a bulletin of AMSAT software and publications and their pricing, contact AMSAT, The Radio Amateur Satellite Corporation, 850 Sligo Ave., Silver Spring, MD 20910 (301-589-6062).

Clocks from Canada. Two attractive, highly functional "Universal Time Clocks" (UTCs) are available from a Canadian firm, World View Time, Inc. The patented UTCs have undergone extensive research and were designed specifically by their developer, Dwight Darling, for amateur radio operators; shortwave listeners (SWLs) should also find them very useful.

The face of the UTCs is unique. It consists of a flat, circular south polar view of the Earth having all 24-hour time zones color coded on the land areas. Around the perimeter of the map are the 24-hour indicators corresponding to each time zone. Each time zone indicator is clearly labeled with a significant city from that particular zone for quick and easy reference at a glance, and the time zone of the Greenwich meridian (UTC) is prominently highlighted. The world map face rotates under a military style time scale template, and the clock is driven by a precision quartz movement that requires a single AA battery.

The new clocks provide hands-free, easy-to-read, continuous world time at a glance. The second hand is a clear plastic disk featuring an airplane which rotates above the world map face, providing an interesting three-dimensional animated display. (It may, however, take some time to get used to the lack of conventional minute and second hands.)

The World View Time clocks are available in two different designs. One is contained in a high-quality plastic case for $39.95 (U.S.). The other is in a very attractive walnut case for $59.95. When ordering, include $4 s/h (which includes import duty). Also furnish your callsign, since each clock is personalized with your callsign engraved on a small plaque mounted on the top of the clock case. Each clock order is accompanied by a free, 8 1/2" × 10" manual world time calculator. Visa cards, checks, or money orders are accepted.

For details, contact Dwight Darling at World View Time, Inc., P.O. Box 266, Brockville, ON Canada K6V 5V5 (613-345-1537).

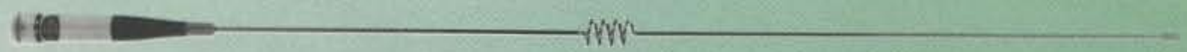
Wrap-Up

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

Overheard: If there's one thing I've learned in this life it's that you're never, ever, too old to try something new.

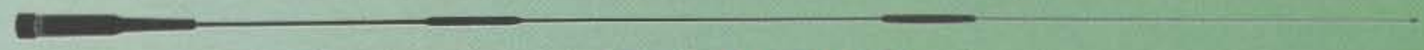
73, Karl, W8FX

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



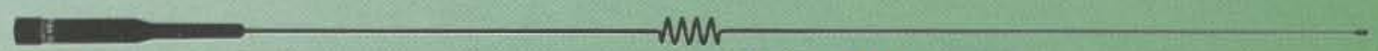
THEFT **NEW Z750** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: Gold-plated PL-259 • Max Pwr: 200W

THEFT **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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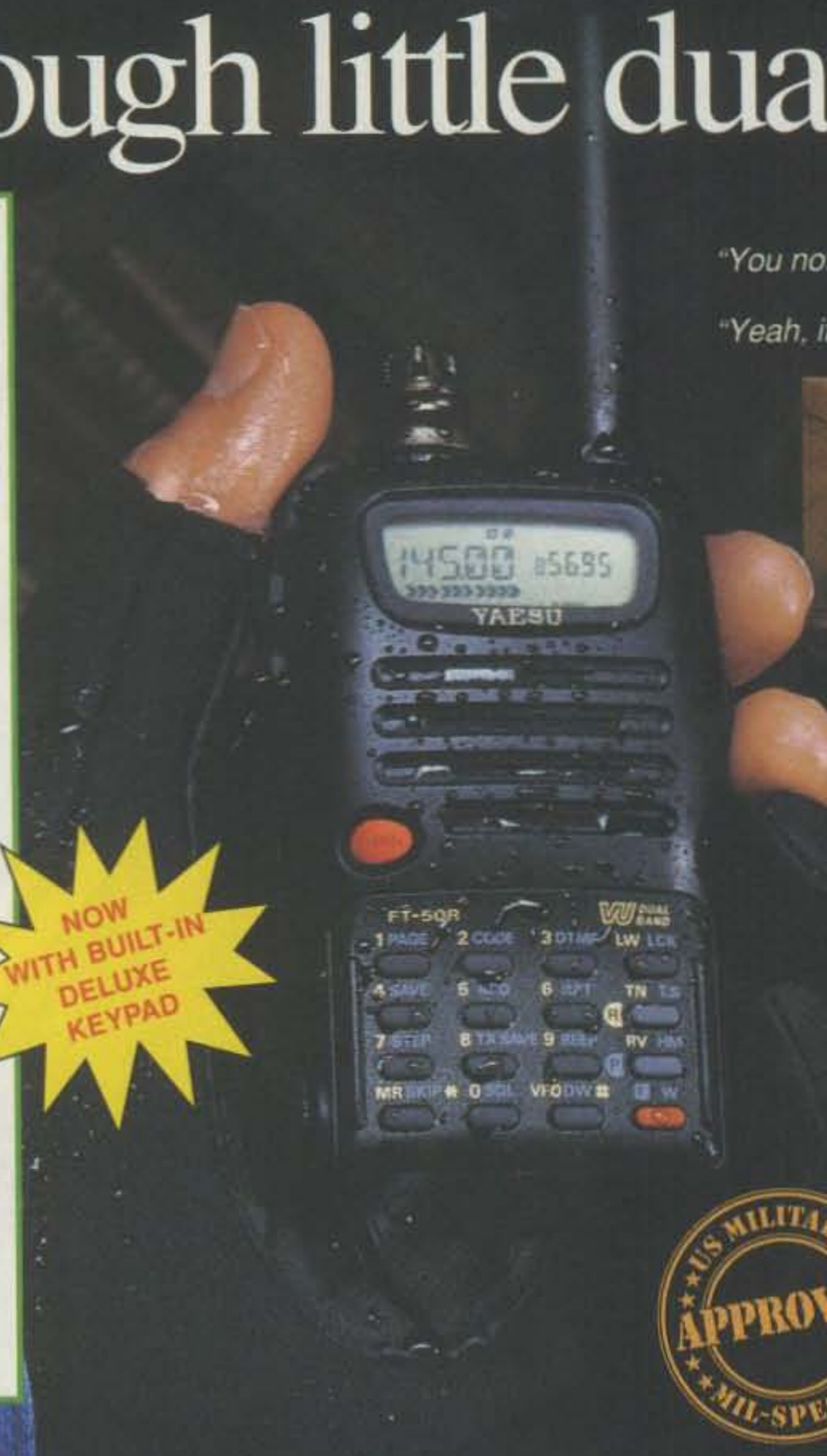

"You notice how loud this HT's audio is?"

"Yeah, it's Mil Spec tough like a commercial HT."

"Easy to operate, small, great price!"

"Yaesu did it again!"

U.S. MILITARY APPROVED MIL-SPEC 810

The foremost in top-performing, durable, dual band handhelds now includes the FTT-12 DTMF keypad with CTCSS enc/dec, DCS enc/dec, DVRS and paging/coded squelch. Manufactured to rigid commercial grade standards, the FT-50RD is the only amateur dual band HT to achieve a MIL-STD 810 rating. Already a winner; the deluxe keypad makes this stand-out HT even better! Water-resistant construction uses weather-proof gaskets to seal major internal components against the corrosive action of dust and moisture. And, the rugged FT-50RD withstands shock and vibration, so throw it in with your gear!

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FT-1000MP

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BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Phase 3-D Satellite Launch Delayed

On July 25 at the Central States VHF Conference in Hot Springs, Arkansas, AMSAT President Bill Tynan, W3XO, announced that the launch of amateur radio's latest satellite, Phase 3-D, would be delayed indefinitely. He then read portions of the following press release.

"Phase 3-D Launch Update: On Wednesday July 16 a meeting was held in Marburg, Germany between Dr. Karl Meinzer, DJ4ZC, the Phase 3-D Project Leader and AMSAT-DL President; Werner Haas, DJ5KQ, AMSAT-DL Vice President; and officials of the European Space Agency (ESA). The purpose of the meeting was to discuss the launch schedule for Ariane 502, on which the Phase 3-D spacecraft is to fly. At this meeting, the ESA officials reiterated their intent to launch A-502 at the end of September and said that the launch campaign for this flight has already begun. They stated that as part of this launch campaign the Phase 3-D spacecraft must arrive in Kourou by August 10th.

"Earlier ESA had informed AMSAT that following analysis of data from the Ariane 501 flight, they had significantly increased their estimates for the acceleration and vibration environments which spacecraft riding on Ariane 502 are expected to encounter. As a result of this new information, AMSAT has been re-evaluating the structural capabilities of the Phase 3-D spaceframe. As a part of this effort, an independent structural engineer was brought in to review the spacecraft's design and construction. His conclusions were recently presented to Dr. Meinzer and AMSAT-NA people. His report stated that in order to be confident of surviving these increased launch environments, a number of modifications must be made to the spacecraft. Since that report was presented, substantial effort has been taking place at the Phase 3-D Integration Laboratory in Orlando, Florida to manufacture and install the recommended structural parts necessary to increase the spacecraft's vibration and acceleration capability.

"At the Marburg meeting Dr. Meinzer made it clear to the ESA officials that this work, made necessary by ESA's new environmental information, would prevent AMSAT from delivering the spacecraft to Kourou by the specified August 10th date. Thus, it was the conclusion of the meeting that as a result of these ESA specification changes, the Phase 3-D schedule and that of ESA for Ariane 502 are not compatible. Thus, unless, something changes, which ESA does not presently contemplate, Phase 3-D will not be able to be launched on Ariane 502. Furthermore, in order to maintain the planned mass characteristics of the Ariane 502 vehicle, AMSAT must supply a mass simulator representing the Phase 3-D spacecraft to be sent aloft on the flight. This must be in Kourou by September 5th.

"Despite this very bad news, Dr. Meinzer and other AMSAT officials expressed some degree of confidence the Phase 3-D may yet fly on Ariane 502. They based this on a number of activities taking place in the preparation of the launch vehicle that, they believe, could cause a slip in the currently published ESA schedule. The ESA officials attending the Marburg meeting said that if a slip should occur, which they do not currently contemplate, which results in the two schedules again becoming compatible, efforts would be made to substitute the Phase 3-D spacecraft for the mass simulator. Therefore, AMSAT is continuing in the work of completing the necessary structural modifications to the spacecraft and conducting environmental testing.

"Keep tuned to AMSAT News Service for developments as they become available."

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Compuserve 72124.2734@compuserv.com

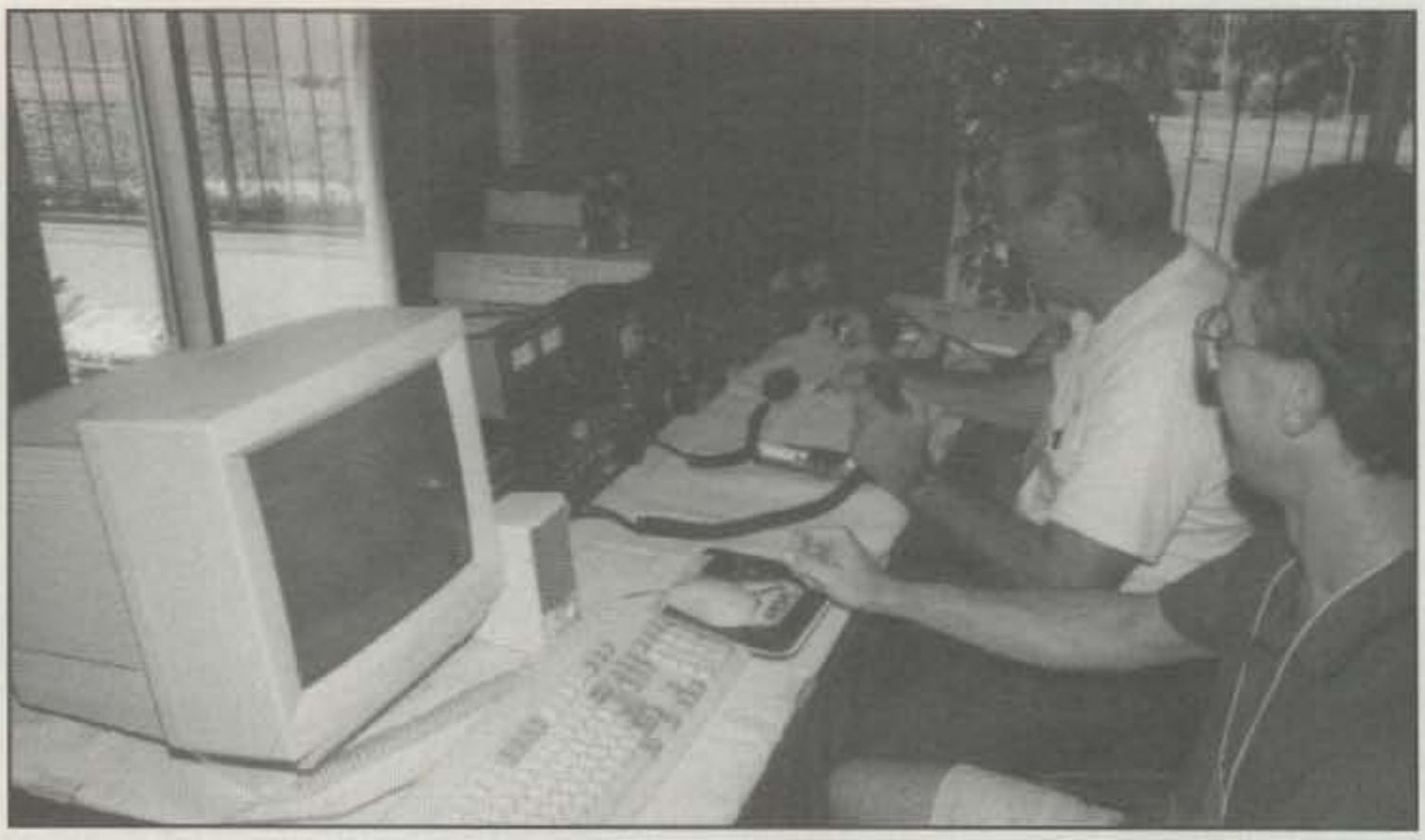
VHF PLUS CALENDAR

Oct. 1	New Moon and apogee.
Oct. 3-5	West Coast Weak Signal Society VHF Conference (see last month).
Oct. 4	Mid Atlantic VHF Conference (see last month's column).
Oct. 5	Poor EME conditions.
Oct. 8	Lowest Moon declination.
Oct. 9	First quarter Moon.
Oct. 12	Poor to moderate EME conditions.
Oct. 16	Full Moon and perigee.
Oct. 18-19	First weekend of ARRL EME Contest.
Oct. 19	Moderate EME conditions.
Oct. 21	Highest Moon Declination. *Orionids* predicted peak.
Oct. 22	Last quarter Moon.
Oct. 23-25	Microwave Update, Sandusky, Ohio.
Oct. 26	Moderate to good EME conditions.
Oct. 29	Moon apogee.
Oct. 31	New Moon.

During one of the many forums at the 1997 Central States VHF Society Conference in Hot Springs, Arkansas, Al Ward, WB5LUA, holds a two-band microwave feedhorn made from a soup can and a coffee.

Shooting the Moon Amateur Radio Style

During the month of October there is an annual renewal of interest in moonbounce, or Earth-Moon-Earth (EME), communication. Although EME has been around since World War II, successful day-to-day amateur radio communication using this mode is relatively new. The first complete amateur two-way EME communica-



CQ OSCAR. Richard Raitt, WA5VKS (background), and Jon Jones, NØJK (foreground), work a pass of the AO-27 satellite from the AMSAT demonstration station at the Central States Conference.

tions didn't occur until 1960, and it wasn't until the advent of the United States higher power limit of 1500 watts output and the arrival of GaAsFET preamps in the 1980s that EME communication became more popular.

Among the VHF/UHF bands 144 MHz is the most popular for EME communication. Although EME communication has been successful on 50 MHz, the size of the antenna arrays and background sky noise restrictions remain barriers for all but the most serious operators on that band. The higher the frequency, the higher the path loss; therefore, more elaborate arrays and power close to the legal maximum are required for successful EME work above 144 MHz. Accordingly, most operators start on 144 MHz, and if they find EME is for them, they try the higher frequencies later.

To gather information on this aspect of VHF+ DXing I talked to five 144 MHz EME communication experts: Lance Collister, WA1JXN; Bev Cavender, W4ZD; San Hutson, K5YY; John Carter, KØIFL; and the dean of 2 meter EME, Dave Blaschke, W5UN. What follows is a compilation of their thoughts about EME communication on 2 meters.

Several factors affect EME communication. These include libration fading, tremendous path loss, noise (both Sun and background sky), Faraday rotation, and spatial polarization.

Because the Earth and the Moon wobble along in their orbits, signals emitted from Earth stations hit a target *area* on the Moon, rather than a bull's eye. Also, because the Moon's surface is very irregular, the reflected signal takes on that irregular shape. The signal that comes over your radio is a bit like what you see when you bob up and down while watching your image in a funhouse mirror at a carnival. The combined effects of the wobbling orbits and irregularly shaped signals cause fading and a certain amount of Doppler shift between stations attempting communications. This is called *libration fading*. When operating on 2 meters, you'll experience longer term peaks and valleys, where portions of a callsign will be heard clearly, followed by very weak signals. While these effects aren't nearly as pronounced on 144 MHz, the effect on 1296 MHz may be as high as 20 dB fading and 10 Hz frequency shift.

The Moon is located over 221,000 miles from Earth at perigee (the closest point to Earth) and over 252,000 miles from Earth at apogee (the farthest point from the Earth). Due to the shape of the Moon, only about 7 percent of the signal that strikes it is reflected. The remaining 93 percent is absorbed and lost for communication. The path loss is directly proportional to the frequency of operation; that is, the higher the frequency, the higher the path loss. Therefore, the path loss is around 252 dB at perigee and 254 dB at apogee on 144 MHz. For the low power station, the 2 dB difference between perigee and apogee may be just enough for a successful QSO.

Noise, caused by the Sun and the background sky, inhibits your ability to receive weak signals. For those of us in the northern hemisphere, communications generally aren't favorable the day of a new moon (you won't be able to see the Moon with the naked eye, except in an eclipse) or at times when the Moon is farther south in the sky. Communications are less favorable during times when the Moon lies more to the south, not only because of increased background sky noise caused by constellations in the southern sky, but also, Dave says, because of convention. The higher latitude European stations see less of the Moon when it's farther south; consequently, they don't get on the air. The most ideal time of the month, for northern hemisphere stations, tends to be when the Moon has finished its most northerly declination and is moving southward in the sky.

Marc Thorsen, WBØTEM, records the gain measurement of a 432 MHz Yagi built by Ron Marosko, Sr., K5LLL (looking on in foreground), and his son, Ron, Jr., KK5DK (not pictured), in a homebrew Yagi contest at the Central States VHF Conference.

Faraday rotation is the polarization rotation of a signal due to the influence of the Earth's ionosphere on that signal. Some say this is the result of the effect of the Earth's magnetic field on the signal as it passes through the ionosphere. (Dave has noticed some correlation between what happens with Faraday rotation and what happens on HF propagation. It remains one of the mysteries of EME communication and deserves further study.) Faraday rotation affects the signal by causing it to go through a deep cyclical fade. This cycle changes in period, from shorter to longer, as the frequency is increased. It is estimated to have a period of approximately 20 minutes on 144 MHz. Dave says the cycle is more pronounced on some days than on others. QSO schedules are set up to accommodate this period. These schedules last typically for one-half hour to one hour on 144 MHz, with one hour for casual schedules and one-half hour for contest schedules. Although some contest QSOs operate on schedules (particularly low power stations wanting to work high power stations), most contacts are random.

Spatial polarization simply means that two stations at different locations on the Earth are aiming antennas fixed in the (horizontal or vertical) plane at the Moon. Using the mirror analogy again, if you were to look at something at an angle with a mirror, depending on how your head is tilted, that object may appear right side

John Cress, KØGCJ, holds up a 2.3 GHz dish at the Central States antenna range, while Kent Britain, WA5VJB, bends over to read the gain measurement — +20 dBd.

up, at an angle, or upside down. If one of the stations has the ability to rotate the antennas through the plane between horizontal and vertical, some of the effects of spatial polarization can be overcome. However, rotating several antennas through this plane simultaneously, while maintaining phasing relationships between each antenna, becomes a bit of a mechanical nightmare. Therefore, spatial rotation is often overcome by brute force. Adding more and more elements to an antenna array helps reduce the effects by increasing the array's dB gain. Also, Dave notes that Faraday rotation has a tendency to overcome spatial polarization during at least part of the scheduled period for a QSO on 2 meters.

There are two other points to keep in mind concerning EME communication. First, on moonrise you'll experience Doppler shift of between 300 and 500 Hz above your frequency. On moonset the Doppler shift will be 300 to 500 Hz below your frequency. When the Moon is overhead, there is no Doppler shift. Those of you who have worked the satellites are familiar with the effects of Doppler shift and keep your hand on the tuning knob. Second, if you are able to hear your echoes, be prepared for a 2.3 to 2.7 second delay. That Moon is a long way off, and it takes time for your signal to get there and back.

CW is the preferred mode of communication on EME. It's the most reliable mode due to the weakness of the signal. The transmission is at a rate between 10 and 15 wpm. Slower CW can break up as a result of fading and fluttering, while letters transmitted using faster CW tend to disappear.

EME communication is similar to meteor scatter in one sense: Both are dealing with weak and irregular signals. Therefore, as with meteor scatter, EME communication has a protocol. However, because of the nature of the EME signal, the procedure is very different from the protocol used for meteor scatter.

The preferred frequency of operation for schedules is above 144.030 MHz. The preferred frequency of operation for random QSOs is between 144.000 and 144.030 MHz. If signals are loud enough to sustain SSB QSOs, the preferred frequency is around 144.150 and up.

There are some nets you can listen to for information on conditions and schedules. One net coordinates 144 MHz EME communication. It's hosted by VE7BQH and meets every Saturday and Sunday on 14.345 MHz at 1700 UTC, or as soon as the 432 MHz net is finished. Every Monday at 0230 UTC (Sunday evening local time) at 3.818 MHz (plus or minus QRM), a VHF/UHF clearinghouse net meets to exchange information and set skeds. At 0130 UTC Tuesday (Monday evening local time) another VHF/UHF clearinghouse net meets on 3.843 MHz for the same purpose.

Now let's look at a sample QSO. A sked is set between DL8DAT in Germany and N6CW in San Diego. The QSO is scheduled to last an hour and will start at 0000 UTC. The eastern station (relative to its position on Earth) transmits first. In this case it's DL8DAT. The transmission will last for two minutes. DL8DAT will send the receiving station's call followed by his own as follows: N6CW de DL8DAT, N6CW de DL8DAT, etc. At 0002 UTC N6CW begins an identical routine, sending DL8DAT de N6CW, DL8DAT de N6CW, etc. The two amateurs transmit back and forth every two minutes, until one station hears the other sending complete callsigns.

Once the receiving station copies complete callsigns, he starts the next phase of the sequence. He sends callsigns, as before, for the first 90 seconds of the two minute sequence. But during the last 30 seconds, he adds a signal report—the letter "O."

The signal report was once either a "T," an "M," or an "O." A "T" meant that the callsigns were just barely detectable. An "M" meant that portions of a call were copied. An "O" meant that complete callsigns were received. However, because the receiving station is looking for complete callsigns, any other report would be a waste of time in completion of the QSO. As a result, the signal report convention has evolved into the letter "O."

Let's assume that N6CW was successful in

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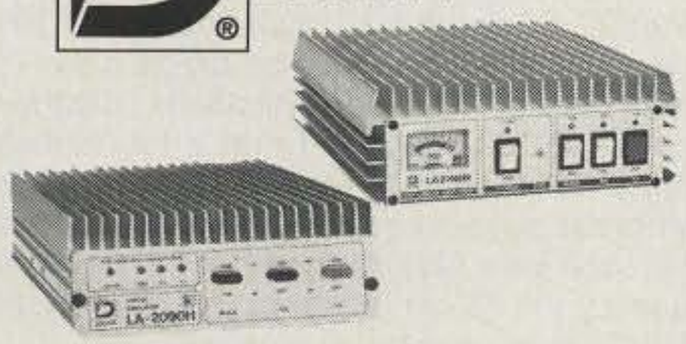

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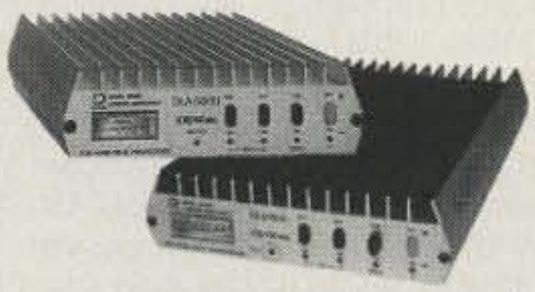

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RS300	1-15V	30/24	$149.95	$112
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PS400X	1-15V	40/32	$199.95	$157
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BLOW-OUT

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77-110	CB	40 CH LED	$ 79.95	$ 38
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Steve Kostro, N2CEI, of Down East Microwave, builds a WB5LUA-designed low-noise 2.4 GHz pre-amp. Steve built the amp on Friday afternoon, tested it at the noise-figure measurement session Friday night, and gave it away as a banquet prize on Saturday.

copying the callsigns and has initiated the second phase of the protocol. It's now up to DL8DAT to hear the signal report portion of the QSO (assuming he's already heard the complete callsign exchange). Once he hears the signal report, he sends "RO" throughout his entire two minute time period. This tells N6CW that DL8DAT has heard the signal report (the "R") and is sending a signal report of his own (the "O"). If his country requires him to sign his callsign at the end of every transmission, he sends N6CW de DL8DAT once at the end of the two minutes. Otherwise, no callsigns are sent.

When N6CW finally hears "RO," he sends only the letter "R" during his next two minute transmission. When DL8DAT finally hears the "R," he sends "73" or "73/SK" during his next two minute session—followed by complete callsigns at the end of the transmission (to comply with government rules pertaining to station identification). The QSO is considered complete when DL8DAT hears the "R" sent by N6CW. The honor system comes into effect here, because you are the only one who knows what you heard.

EME and QRP: What does it take to get "on the Moon"? San Hutson, K5YY, was able to complete his WAS, work 32 countries, and add to his grid locator total by spending just $200 more than his initial outlay for his 2 meter station. He has an excellent write-up in the 1990 Central States VHF Society *Proceedings* (available from the ARRL for $12, plus $3.50 shipping and handling).

Ray Soifer, W2RS, has made over 20 contacts running only 150 watts and a single Cushcraft long-boom beam. He presented a very informative paper entitled "QRP EME on 144 MHz: How and Why" at the 1992 Central States VHF Society conference. His paper is part of the *Proceedings* for that year, which is also available from the League for $12, plus $3.50 shipping and handling. Both Soifer and Hutson's write-ups unlock some of the mystique of EME operation for the "little guy."

EME on Other VHF+ Frequencies: While EME has taken place on 135 cm, uncertainty has caused interest to wane in recent years. Now, however, because of the FCC regulations that set aside a portion of the band for weak-signal (in the FCC's words, experimental) work, interest is picking up again. It remains to be seen, however, just how popular EME communications on that 135 cm will become.

Seventy cm is perhaps the second most popular band for EME work. It is both easier and harder to get on this band than on 2 meters. Assembling the right antenna array is one of the easier tasks. Steve Powlishen, K1FO, in the second part of his two-part article (Steve Powlishen, K1FO, "432-MHz EME 1990s Style, Part 2," *Communications Quarterly*, Fall 1991, pages 33–48. Part 1 can be found in the Premier Issue of *Communications Quarterly*, pages 29–39.) reported that a four-antenna array for 70 cm is typically 5 feet by 6 1/2 feet, whereas a typical array for 2 meters is 10 feet by 13 1/2 feet. Also, because of the higher frequency the 70 cm antennas are much shorter for the same number of elements.

Signal propagation is also a bit easier on 70 cm. While it still takes high power to make it to the Moon, factors described for 2 meters—such as Faraday rotation and sky noise—have far less influence on 70 cm. Here again the antenna becomes a consideration. Because the array used for this band is smaller, it's more practical to design polarization rotation into the antenna. This will help overcome Faraday rotation and correct for cross-polarization problems encountered when working a distant station.

As I said, however, there are some barriers to working 70 cm. While transceivers are available for this band, serious EME operators generally opt for transverters and sophisticated HF radios. Also, while the antenna construction is easier, feeding it is not. Because of feedline losses found in coaxial cables, hardline is often used. Also, you must use the correct low-loss splitters for feeding multiple Yagis in the array.

While there is some EME activity on 33 cm, the next most popular band is 23 cm. Here the antenna of choice is the dish. With a circularly polarized feed, antenna cross polarization and Faraday rotation almost become imperceptible. Additionally, sky noise is even less of a factor on this band than it is on 70 cm.

Above 23 cm most EME is experimental. Only a few operators operate regularly on 13 cm; fewer still operate on 9, 5, or 3 cm. While conditions are such that Faraday rotation and sky noise cease to be problems, other challenges crop up. Equipment availability is the chief difficulty. Learning how to operate with Doppler shift that takes place over tens of kiloHertz is another. If you're interested in pursuing these higher bands, you need to work with the experts. Paul Wilson, W4HHK, has one of the best stations in the U.S. on 13 cm. Jim Vogler, WA7CJO, is the leader on 23 cm.

It's important to note that sequencing on these higher frequencies is a bit different. Rather than lasting 2 minutes, your transmissions will be 2 1/2 minutes long. The last half minute is reserved for signal reports or nothing, depending on what you've heard from the other station.

Signal reports are also different. While the letters T, M, and O are the same, their meanings are a bit different. T means "I can hear something," M means "I have picked up fragments of callsigns," and O means "I have copied complete callsigns." While an M is sufficient on 2 meters, an O is required on 135 cm and above.

This said, there is an exception to these differing procedures. Operators on 135 cm tend

to use either the 2 meter or the 70 cm routines—depending on their background. Those who have operated more on 2 meter EME tend to stick with that method, while those who operate on 70 cm prefer that method. Consequently, when you set a sked on 135 cm, make sure that you and the other operator agree on the method of sequencing.

Current Contest

The first weekend of the ARRL annual EME contest is scheduled for 18–19 October. The contest period is the entire 48 hour period, beginning at 0000 UTC. The object of the contest is to work as many stations as possible "off the moon." Categories include single operator, single band, single operator, multi-band, multi-operator, and commercial equipment. Each contact counts as 100 points. Multipliers include each U.S. and Canadian call district and each DXCC country worked. Conditions are expected to be moderate during the contest weekend. Complete rules are in the September issue of *QST*. They also can be found on their web site at <http://www.arrl.org/contests/announcements/97/eme.html>.

Current Meteor Showers

According to the OH5IY meteor shower prediction software, the *Orionids* is predicted to peak around 21 October at approximately 0800 UTC. A characteristic of this shower is that it has several smaller peaks both before and after the main spike. The second major peak is expected about four days after the main peak. At peak the zenith hourly rate (ZHR, the number of predicted meteors falling per hour) is predicted to be around 25. Look for activity associated with this shower for approximately 16 days beginning a week before the main peak.

Current Conference

1997 Microwave Update: The following is excerpted from the home page of Tom Whitted, WA8WZG: Hosted by Tom Whitted, WA8WZG, the 1997 Microwave Update will be October 23 to October 26, 1997 at the Holiday Inn Conference Center, Sandusky, Ohio (419-626-6671). Events include tours of A.R.E. Surplus in Findlay, Ohio; Fair Radio in Lima, Ohio; and CTR Surplus in Crestline, Ohio. Friday and Saturday 8:30 AM to 4:30 PM will be Conference preceedings with speakers such as N1BWT, WA1MBA, WB5LUA, W5ZN, NJ2L, N6TX, N2CEI, WA5VJB, K9LNV, WB2VVV, K2DH, VE4MA, N6TX (SETI), KB8OIU, AB4CR, and more to come. Friday night will feature noise figure measurements and microwave fleamarket. (Ladies program will be offered.) Saturday night has scheduled a barbecue (ladies included) and EME demonstration at the QTH of WA8WZG, plus setup in building for more fleamarket "goodies." Sunday wraps up the conference and possibly includes a tour of the W8JK "Big Ear" at Ohio State University.

Tom will continue to update this page as more information becomes available. If you haven't registered for Update in the last two years, e-mail Tom with your correct mailing address so your packet can be sent.

If you register before October 2 the fee is $40; October 2 it is $45. The fee includes one copy of the proceedings. Each additional copy is $10. Saturday night dinner is $18. For hotel reservation information call the Holiday Inn Conference Center in Sandusky, Ohio at 419-626-6671 and mention that you are part of the Microwave Update Conference. For more information on what the area has to offer, contact the Sandusky/Erie County Visitor's Bureau at 1-800-255-ERIE, or check out their web page at <http://www.buckeyenorth.com>. A ladies program will also be offered.

For more info, or if anyone would like to be a speaker or write an article for the precedings, contact Tom Whitted, 4641 Port Clinton East Rd., Port Clinton, OH 43452 (phone 419-732-2944; e-mail <wa8wzg@wa8wzg.com>).

And Finally . . .

You might want to check out the Moon this month. There are a few interesting events. Perigee and the full Moon are on the same day. There are two apogee dates, with the first being the same as the new moon. Finally, the ARRL EME contest is the middle of the month. If you are into Participation Pins, then you only have to work one person "off the moon" to earn one. Good luck!

Thanks again for all of your support for this, your column. I am back in school (hopefully for my last year). Therefore, time has once again become a premium. Nevertheless, I do enjoy writing about you and your accomplishments here. If you have input for this column, please let me hear from you. Until next month . . .

73, Joe, N6CL

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Goodies, Notes, and Ideas Galore!

So many fascinating goodies, ideas, and news items have surfaced during the last few months that even squeezing brief "update notes" into opening paragraphs of each month's column has become almost impossible. Rather than shifting all that terrific information forward until next time, this month's column features a collection of tidbits on a variety of subjects. I'm sure you will find our notes interesting and informative. Just watch out for whiplash between subjects!

Many of our notes are QRP related, but interest in QRP is growing by leaps and bounds. Why? Buying new models of big rigs can be rough on downsized wallets, wrestling high-power amplifiers into the shack is tough on the old back, and setting up large antennas in restricted neighborhoods strains the nerves. QRPers, however, are having a ball using inexpensive rigs, low-profile antennas, and accessories of all types (no TVI, either). Yes, and QRP circuit designs are getting more exciting every day. Variactor tuning is a good example of that fact. Modern concepts use a ten cent diode and fifty cent inductor in series with a crystal to yield a wide VXO tuning range with rock-solid stability. Using a potentiometer rather than a capacitor for frequency selection also permits laying out a front panel in any desired arrangement. Furthermore, we can add a switch and a second pot for "dual VFOs" (or three or four pots for triple or quadruple VFOs) or switch in span-limiting resistors for more bandspread. The possibilities are endless. If we only had known of tricks such as this during our old Novice days!

Homebrewing and/or using the "hot rig of the day" (QRP Plus, 38 Special, SST, etc.) is another delightful treat. And building QRP rigs is like eating potato chips: It's difficult to stop with just one. There is always one more transceiver, tuner, or keyer we must add to our collection. Why not? All of it combined is a mere pittance compared to "super stations"!

Do QRPers really have more fun? Try it and then decide! Pardon the soapboxing, though. We have quite a bit of ground to cover and a limited amount of column space, so let's get started!

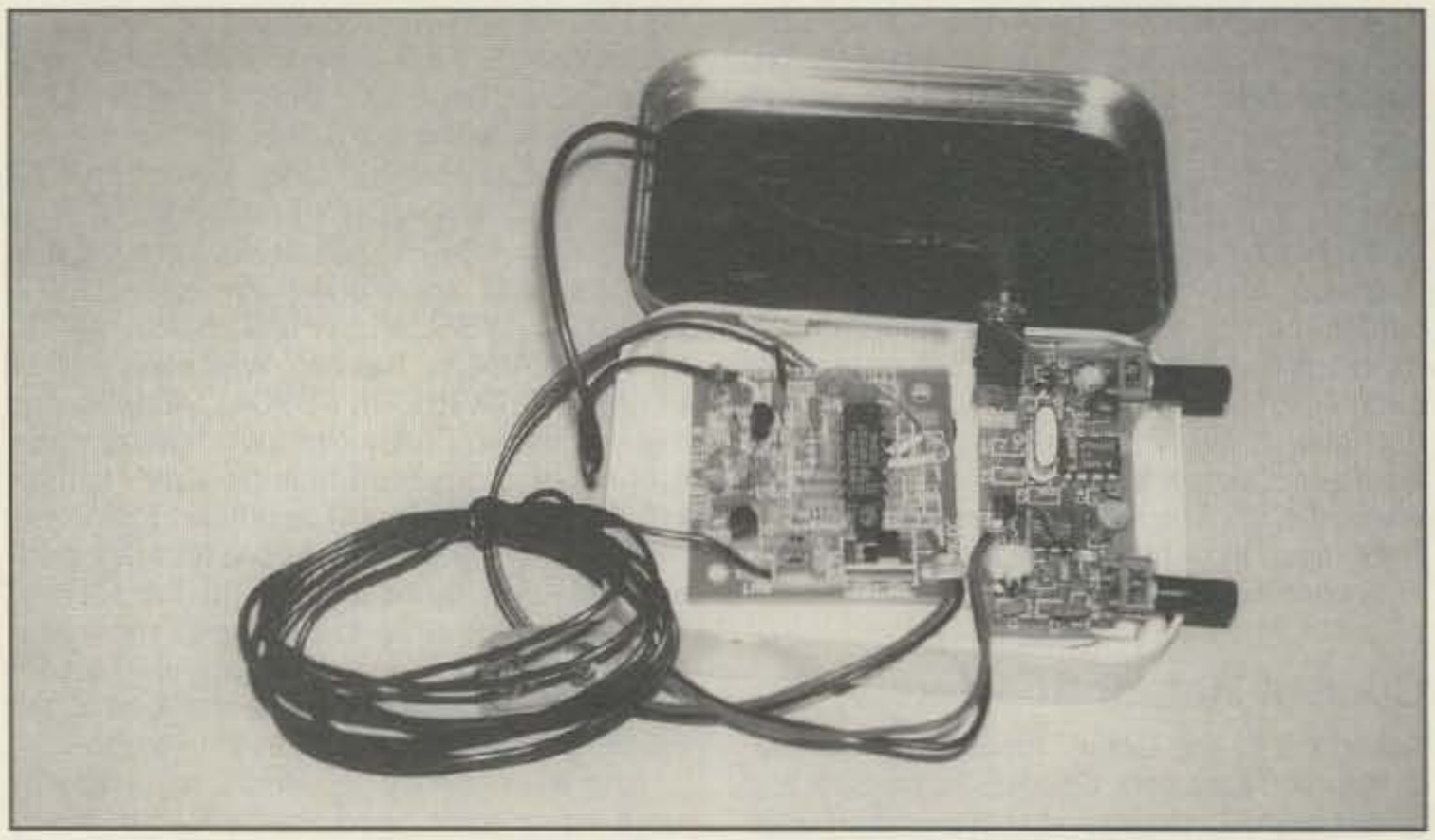


Photo A– Another Altoids tin to the rescue! This one will house K8IDN's miniature two chipper receiver (right) and Ten-Tec's "Foxhunt" wireless FM transmitter module (left). The combo works well for monitoring amateur band activities on a regular FM radio in the home or car. (More details in text.)

Mini-Rig Tips

First, thanks to everyone for making the tiny two-chipper receiver kit (available from Steve Bornstein, K8IDN) and my Micronaut transmitter kit (available from me, K4TWJ) so popular. The pair are now in shacks nationwide and on all continents! Full details on these mini-rigs, incidentally, were in our August column.

Want to have some real fun with the pair? Try these ideas. Squeeze them into a miniature "boom box" radio's cabinet to make a novel 9 volt powered "beach rig." Connect the Two Chipper's audio output across the (boom box's) volume control (a classic old trick, but it still works great),

Photo B– Check out this collection of goodies, gang. The 38 Special transceiver kit, San Luis custom enclosure, internal Tick keyer, and miniature Paddlette yield a complete QRP station for less than $100. Even Monte Hall would appreciate a deal like that one!

4941 Scenic View Dr., Birmingham, AL 35210

and presto—room-filling audio! Add an off-board tuning pot to the "chipper," mount it in place of the boom box's variable capacitor, and you have a neat rig-to-go. Are gray boom-box type enclosures too bland and generic for your taste? Check out some of the terrific looking '30s and '40s replica radios that surface in variety stores this time of year. A amateur radio rig in a cathedral or kitchen radio cabinet is nostalgic class at its best. (If we had only saved those dear little Arvins, Emersons, and Fadas!)

Another idea: Connect the two chipper's audio output to a modified Foxhunt Transmitter Kit available from Ten-Tec, and then tune in band activity using a Walkman™ or any FM radio in or around the house (photo A). Slip the combo into your car, let them play through the car radio, and you have instant "surround sound" for mobiling. Details on modifying the low-cost Ten-Tec kit, incidentally, will appear in November *CQ VHF* magazine's "Project Corner." Watch for it! Now on to the next subject.

Have you noticed all the 38 Specials that are appearing on 30 meters recently? This 5 watt transceiver has become one of the hottest little rigs on the air today, and its popularity continues to expand. Indeed, over three-thousand 38 Special kits have been sold, and the count is still rising. Considering $25 for the basic kit, another $25 for a snazzy custom enclosure, $5 for an optional Tick Keyer chip, and $38 for a miniature Paddlette, a complete and hot "station of the year" such as the one shown in photo B can be yours for less than 100 smackers. Check last month's column for full details of the 38 Special *et al,* and join the fun of QRP "modern style"!

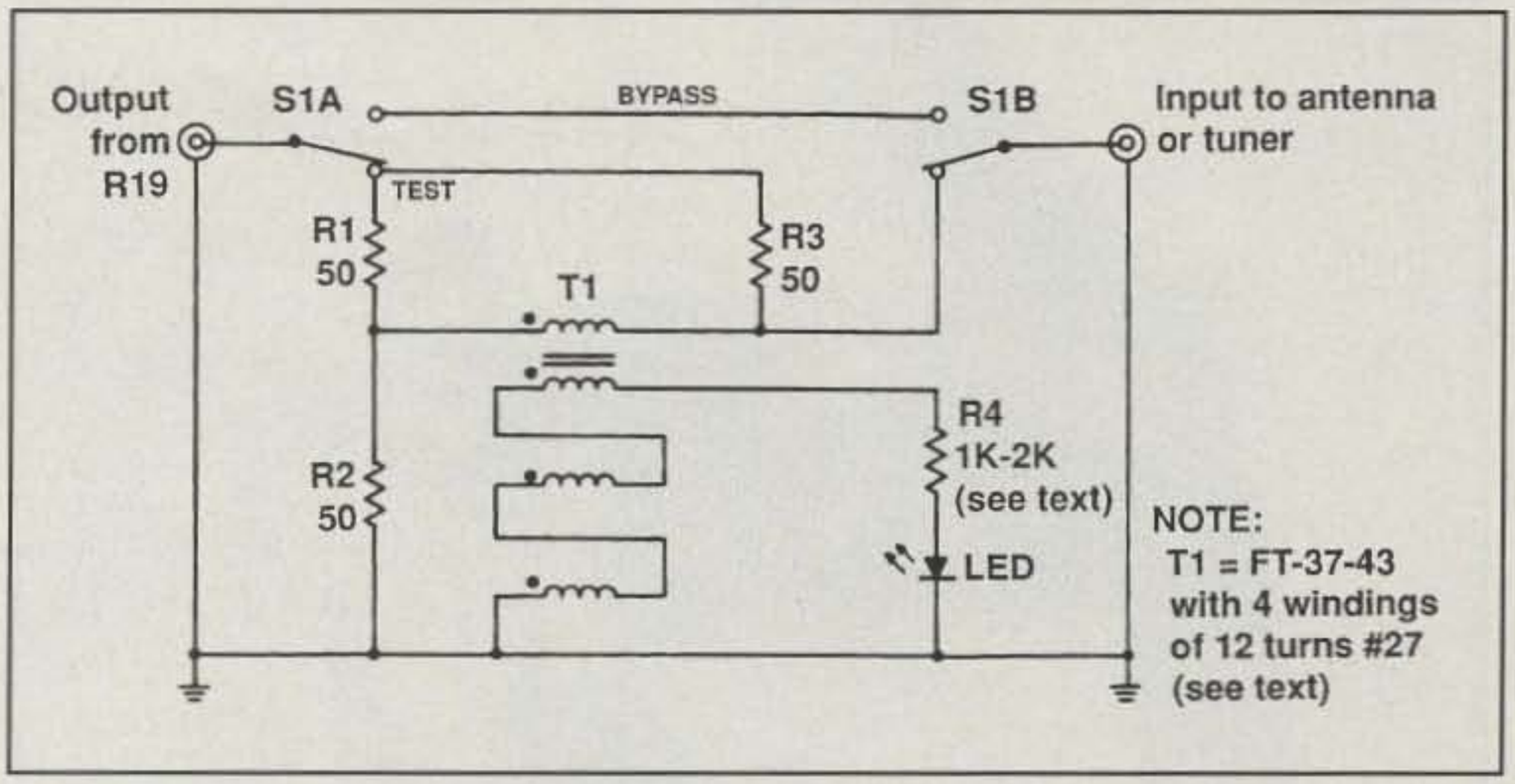


Fig. 1– Circuit diagram of N7VE's single LED SWR indicator. Pocket-size unit is good for home, portable, and mobile use. (Details in text.)

N7VE's One LED SWR Indicator

Next we have details on another quick-brew delight that could not be squeezed into last month's column: N7VE's single QRP level SWR checker. Impossible, you say? Nope! It really works, and the parts count is so low that you can probably "embed" one right in your favorite QRP rig's case. Let's start with some background notes.

Dan Tayloe, N7VE, is a member of the Arizona ScQRPion QRP Club. He therefore named this "meterless meter" the ScQRPion Visual SWR Indicator. Details herein are condensed, but complete enough to homebrew one pronto. The

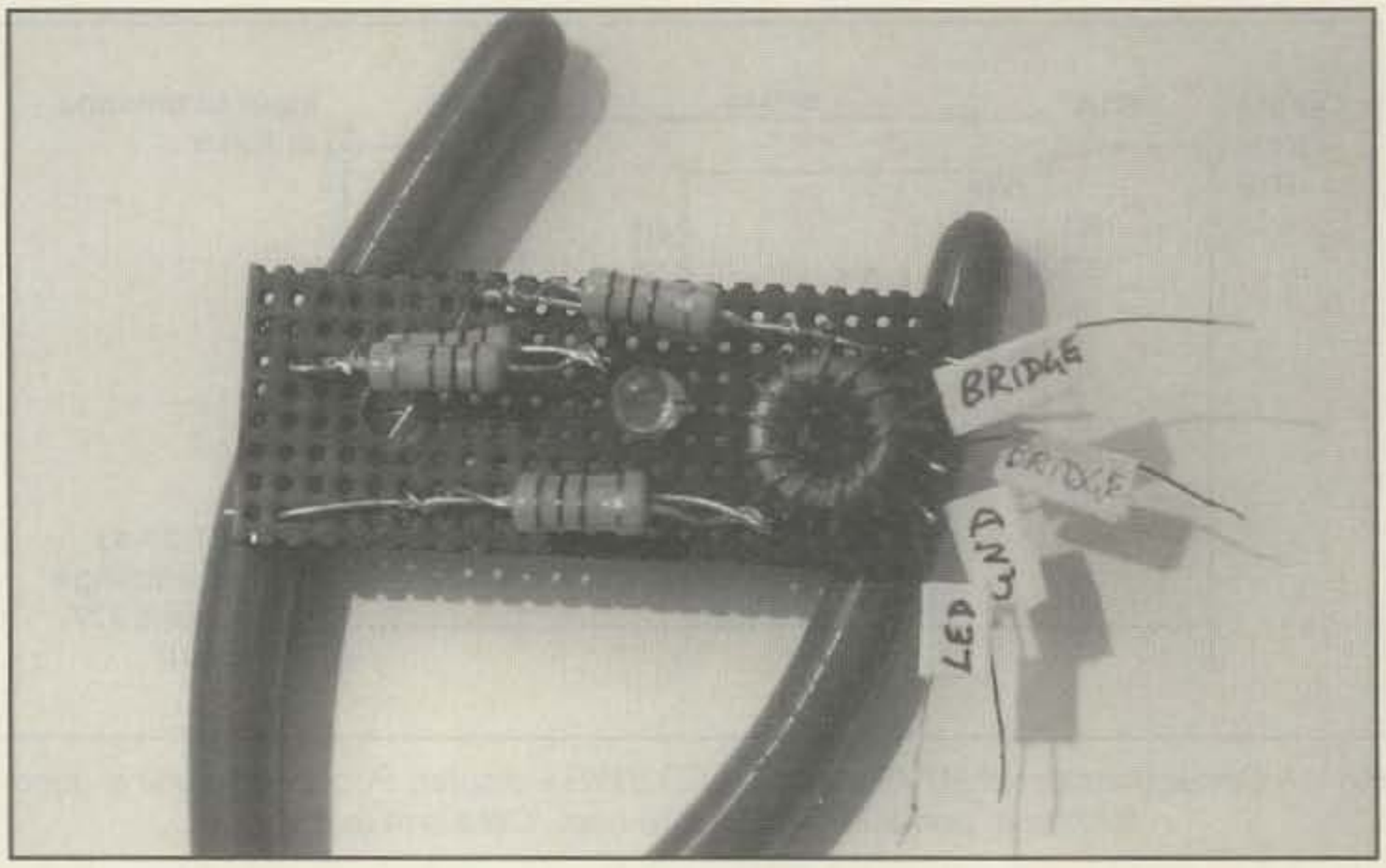


Photo C– "During assembly" photo of my single LED SWR indicator. Note wiring guides on toroid (and pretinned wire ends) for no-miss assembly. Although barely apparent in this direct top view, R1, R2, and R3 are each two resistors stacked atop each other.

item's full story appeared in the North California (NorCal) "QRPp" newsletter/magazine for Spring 1997 (a great QRP magazine; see last month's column for more details on QRPp and NorCal).

The SWR indicator's circuit diagram is shown in fig. 1, and technical details plus assembly notes follow. First, notice this is a resistive bridge with an antenna or tuner making up one leg of the bridge. A toroidal step-up transformer samples voltage due to an impedance mismatch (the antenna's SWR) and uses it to drive/illuminate an LED. When the bridge is balanced (when the antenna or load is 50 ohms and the SWR is 1:1), voltage across the transformer is zero and the LED does not light. If (and when) SWR rises, the LED's brightness increases accordingly. As a typical in-use example, the LED "fully extinguished" or "off" range is 45 to 55 ohms for 5 watts of power, 42 to 58 ohms for 2 watts of applied power, and 40 to 63 ohms for one watt of power. This concept may seem unusual or crude, but once you reference LED brightness to readings on a known, dependable SWR meter, it is surprisingly accurate and very easy to use. Furthermore, this Visual SWR Indicator is a super-handy pocket aid for tweaking a tuner or verifying that antennas used daily still exhibit a low SWR. There are a couple of minor drawbacks, however. First, the bridge absorbs approximately half of a rig's output and must be switched out of the line or disconnected after checking the SWR. Second, it works only at QRP levels of 1 to 5 watts. Lower power will not produce enough voltage to light the LED until the SWR is high (exactly how bright depends on power and SWR), and higher power will overload the LED plus burn out the bridge's resistors.

Now pay close attention to the following discussion, gang. R1, R2, and R3 are each 50 ohm carbon resistors capable of handling half of your rig's output power (in watts). The resistors must be non-inductive (carbon composition, not wire wound) and exactly 50 ohms, or bridge accuracy

Photo D– Alinco's new micro-miniature, QRP-priced DJ-C1 two meter FM handheld. Unit is only three charge cards thick!

Photo E– Original "Sucrets rig" designer Byron Weaver, WU2J, has been discovered living in Florida and still actively involved in QRP. Don't throw out those old Sucrets tins. Send them to Byron as inspiration for more mini projects!

will be sacrificed. Dan wired four 200 ohm 1/4 watt resistors in parallel to "make" each of the 50 ohm resistors (R1, R2, and R3) and get one watt of power dissipation. Since resistor wattage can be "pushed" to double normal rating, Dan's bridge can handle 2 watts of power continuously, or 4 watts intermittently. I wired two 100 ohm 1 watt resistors in parallel to "make" R1, R2, and R3 and get a power handling ability of 4 watts continuous key down or up to 8 watts intermittently. I could have "squeezed by" using single 50 ohm 1 watt resistors for R1, R2, and R3, holding the key down only long enough to view the LED, but the closest available value (47 ohms) would make the LED indicator an LED "guesstimator." Get the idea?

The toroidal core (T1) is an FT-37-43 with four windings, three of which are connected in series to produce a 1:3 voltage step-up transformer. The coils are challenging to wind, but there is good news, gang: Dan will supply readers with prewound, ready-to-install toroids for $3 each. Just send your request to Dan Tayloe, N7VE, 14240 S. Seventh Street, Phoenix, AZ 85048. I left marker tabs on mine and shot a "right before soldering" photo so you can see how neat Dan's toroids are (photo C). As an alternative, you might try "rolling your own" transformer by winding 36 turns of No. 28 wire on an FT-37-43 for the LED and then winding 12 turns over it for the bridge. Do not substitute a regular FT-50-2 or FT-37-6 for the FT-37-43 core, however; their inductance is too low for this "transformer application."

Now two quick final notes. Use a clear LED for greatest visibility when barely lit, and try increasing the LED resistor (R4) if your lowest SWR is 1.15, 1.20, or 1.25 to 1 rather than exactly 1 to 1. I found 1700 ohms perfect for extinguishing the LED at 1.2:1 with 5 watts output. N7VE's one LED indicator is a treat. Build one! You're sure to like it.

New Micro-Miniature Alinco Talkie

In the same way tiny rigs such as the previously highlighted 38 Special are generating widespread excitement on HF, Alinco's just-revealed DJ-C1 shown in photo D is setting hamdom reeling and rocking on VHF. Even before acquiring FCC approval for sales in the US, DJ-C1s were selling like hotcakes in both Japan and Europe.

The little transceiver is only 3.5 inches tall by 2.2 inches wide, and get this, gang—0.4 inch thick! Stack three or four regular charge cards on top of each other, hold them in your hand, and you have an "authentic size mockup" of the DJ-C1! If you haven't been excited about QRP on 2 meters in the past, you will be when you see this rig.

If you are not blown away by the DJ-C1's size, check out its neat features. In addition to working 2 meters with selectable transmit offsets, CTCSS encoding,

Photo F– SMT Technician Joanna Alford, KC5KZN; Vice President Steven Pan, KF5C; and President of MFJ Enterprises, Martin F. Jue, K5FLU, examining a sheet of Morse Code Tutor PC boards using surface-mount technology. This month MFJ celebrates 25 years as "the world leader in ham accessories." If you visit a hamfest this month, step up to their booth(s) and wish them a happy anniversary!

20 memories, scanning, auto shutoff function, and more, its extended receive range covers everything from the 118 MHz AM aircraft band to NOAA weather channels in the 162 to 163 MHz range. That makes the Alinco DJ-C1 doubly attractive, as it is also the world's smallest scanner. Power output is 300 milliwatts, which, as any QRPer knows, is quite adequate for working through local-area repeaters and chatting with neighborhood amateur friends on "direct" frequencies. The DJ-C1 uses a new-style rechargeable lithium-ion battery rated at 500 maH. Current drawn is 30 ma on receive and 240 ma on transmit, so operating time between recharges is very good.

Here's the real kicker: The DJ-C1 is also QRP priced and comes complete with battery, soft carrying case, and two hour desktop charger! With all that going for it, I would say the main challenge will be getting a DJ-C1 before dealers sell out. I'm sure everyone agrees with me in saying Welcome to the QRP world, Alinco, and congratulations on producing a winner!

Weaver Found Alive and Well!

Remember our April 1997 column revisiting those classic little Sucrets rigs of the '60s? It opened a time continuum, revealing the Wee-Ceiver's original designer, Byron Weaver (WB2HAL in the '60s; WU2J in the '90s), is alive, well, living the good life in Florida, and actively pursuing QRP. Recently, England's well-known *Sprat* QRP magazine featured articles on Byron's "BLT" 20/17 meter SSB transceiver, mating mini-amplifier, and SWR/impedance bridge. Hopefully, Byron can be coaxed into sharing some of his views on antennas and QRP today through a "guest appearance" in this column or an article here in *CQ* in the near future. Maybe some QSLs and notes to Byron from friends who lost track of him over the years would prod him along. Photo E is a recent picture of Byron. His address is P.O. Box 2293, Marco Island, FL 34146.

Happy 25th, MFJ!

One of the most well-known names in amateur radio manufacturing is celebrating its 25th anniversary this month: MFJ Enterprises, Inc. This Mississippi-based company started out with one man and one product in 1972 and now, a quarter-century later, has grown into a 200 employee, four company, 500 combined product line empire. That, friends, spells success from any viewpoint! Like many "southern born and southern bred" amateurs, Martin F. Jue, K5FLU, "came up the hard way," struggling to survive, yet dedicated to providing amateurs with high-quality products at affordable prices. The rewards of his endeavors are undeniable, as at least one MFJ item is in almost every amateur station today. Remarkable!

Our column space does not permit telling the full MFJ story, but it is a real amateur radio inspiration generator and enthusiasm builder you will enjoy reading. Just drop a request for a copy of the story to MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

Conclusion

We are right down to the closing line, and everything still would not fit into available space. Would you believe I originally planned this month's column as a double feature with the second part introducing a new area called "Survival Communications"? Maybe we can squeeze a few more notes and tidbits into the first part of next month's column.

Keep those good words coming, gang, and remember to include an SASE plus leave space for my replies on your letters. We'll meet you on 30 meters!

73, Dave, K4TWJ

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The CQ 1997 Contest Survey—Measuring Contest Ethics

October's Contest Tip of the Month

Having recently moved (finally!), I've been thinking about the luxury I'll have to finally set up that new station the right way. While most of you may not be moving, we're always working on new antenna/equipment projects. You don't have do be involved in major station renovations to take on that next project with perfection in mind. Attention to detail (and a little luck) is what separates winners from losers in contesting. Bear in mind that fact the next time you want to skip soldering the coax connection on a dipole or improperly weatherproof your gamma match.

It's that time of year again, time for another *CQ* Contest Survey. Every year around this time I attempt to stimulate debate and interest in contesting by surveying your thoughts on topics that are both controversial and timely. Some of you may recall a survey topic that we ran several years ago—contest ethics. At that time the topic generated the most responses ever received from a *CQ* Contest Survey, and by a wide margin.

Most contesters would like to think that their peers are fundamentally ethical and obey the rules. If this were not the case, then the entire purpose of contest operating would be severely compromised. However, there is a small part in each of us that truly wonders about the reality of contest ethics. Do top operators play the game the same way as other participants? How do we each manage the grayer areas of rule interpretation? Are there a growing number of us who just plain cheat at every chance we get?

This survey will not answer these questions totally, but the time has come again to think. As we're about to enter a new solar cycle, it's fair for all contesters to be introspective and think about how they play the game. I hope we get a huge level of participation in answering the questions posed in this survey. Even more, I hope the results show that we are fundamentally an honest lot who seek to enjoy contesting for the sport and not exclusively for the final result—especially at any ethical cost.

I challenge you to be honest in your responses. Feel free to submit your answers anonymously; I assure you that we have not hired any handwriting analysts. What does await us is an interested set of readers, including myself. In addition, your answers (and comments) are invaluable in helping guide the future editorial direction of this column. I encourage you to respond and pass along the survey to friends and club members. Feel free to include it in your next club newsletter. It will only increase participation and make this a better survey!

2 Mitchell Pond Road, Windham, NH 03087
e-mail K1AR@contesting.com
Compuserve ID: 71301,424

Calendar of Events

Sept.	**27-28**	**CQ WW RTTY Contest**
Sept.	27-28	Scandinavian Activity SSB Contest
Sept.	28-29	Heart of Dixie QSO Party
Sept.	28-29	Tennessee QSO Party
Oct.	4-5	California QSO Party
Oct.	4-5	XX Concurso Iberoamericano
Oct.	10	Ten-Ten October Sprint
Oct.	11-12	Pennsylvania QSO Party
Oct.	19-20	Illinois QSO Party
Oct.	25-26	Ten-Ten Fall CW QSO Party
Oct.	**25-26**	**CQ WW SSB DX Contest**
Nov.	1-3	ARRL CW Sweepstakes
Nov.	7-9	Japan Int'l SSB DX Contest
Nov.	8-9	Worked All Europe RTTY Contest
Nov.	9-14	Peace Country ARC QRS Contest
Nov.	15-17	ARRL SSB Sweepstakes
Nov.	**29-30**	**CQ WW CW DX Contest**
Dec.	5-7	ARRL 160 Meter Contest
Dec.	13-14	ARRL 10 Meter Contest
Dec.	28	RAC Canada Winter Contest

As always, remember that the deadline for the January issue is November 1st, and please make sure you send your information to me on time (note my new address on this page)!

73, John, K1AR

California QSO Party

1600Z Sat. to 2200Z Sun. Oct. 4–5

This year's party is sponsored again by the Northern California Contest Club. The usual extraordinary effort has been made to activate all CA counties, making this the most successful of all state parties.

Operating time is limited to 24 out of the 30-hour contest period for single operator stations (multi-ops may use the entire 30 hours, but observe the standard 10-minute rule). Off-times must be at least 15 minutes and clearly indicated in the log.

The same station may be worked on each band and mode, and CA stations may contact other in-state stations for QSO and multiplier credit. CA mobiles may be worked in each county change.

Classes: Single Operator, Multi-Single, Multi-Multi, California County Expedition, Mobile, and Novice/Technician.

Exchange: QSO number and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts; 3 points for CW.

Multiplier: CA stations use states (50) and VE call areas (8). Out-of-state entries use CA counties (maximum of 58).

Final Score: Total QSO points times the sum of the multiplier.

Frequencies: 160 meters through 2 meters, except WARC bands. CW—1805 and 40 kHz up from band edge. Phone—1815, 3850, 7230, 14250, 21300, 28450. Novices work 10 kHz up from edge of Novice bands and 28450; try CW on the half hour.

Awards: The CQP has more award opportunities than almost any other contest. Special CQP T-shirts are available for any entry with over 100 QSOs. Include your size and $10 to order. A special award of a personalized bottle of California wine goes to the top 20 single operators in CA and out of state. There are a great number of certificates and trophies available to winners of every category. Check out the contest web site at <http://www.contesting.com/cqp> for complete details as well as official rules, logs, and CQP logging programs.

Include a summary sheet showing the scoring, etc., and a dupe sheet if you make more than 200 QSOs, with a large SASE for a copy of the results. Entries may be submitted in CT Ver. 8 or 9 format with a signed hardcopy summary sheet. Electronic logs may be submitted by e-mail to <cqp@contesting.com>. Electronic logs should be mailed with your call. Preferably all files should be zipped into one file with your call as the file name.

The mailing deadline is November 15th and entries go to: NCCC, c/o Al Maenchen, AD6E, 3330 Farthing Way, San Jose, CA 95132. A $1.00 donation to help defray the costs of printing and postage is encouraged.

XX Concurso Iberoamericano

2000Z Sat. to 2000Z Sun., Oct. 4–5

Organized by "Unio Radioaficionats del Valles Oriental" and by "CW Radio Amateur de Cetisa Boixareu Editores," this contest is sponsored every year the week before October 12th to commemorate the anniversary of the discovery of America. This is a phone-only contest with emphasis on Latin-American areas. The objective is to work as many stations as possible during the contest period.

Classes: Single Operator and Multi-Operator, Single Transmitter; both Latin-American and non-Latin-American. Single Operator EC (EA novice), QRP less than 5 watts output, and SWL. Club stations are multi-operator.

Bands: All six bands, 1.8 through 28 MHz, SSB only.

Exchange: RS plus a progressive serial number starting with 001.

Points: Latin-American stations score one point per QSO. Non-Latin-Americans, 3 points per QSO with Latin-Americans, 1 point with other non-Latin-Americans. A station may be worked only once per band.

Multiplier: Latin-Americans use the DXCC list. Non-Latin Americans use the following country list: CE, CO, CP, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, KP4, LU, OA, PY, TG, TI, XE, XX9, YN, YS, YV, ZP, 3C, and DXCC dependencies.

Final Score: Total QSO points from all bands times the sum of the multipliers from all bands.

1997 *CQ* Contest Survey

Your Callsign (optional):_____
Contesting Experience (years): _____
Age:_____

1. In general, do you think leading contest operators use operating ethics similar to those of the "small guns"?
☐ YES ☐ NO

2. ZD8XXX calls you in the last 10 minutes of the CQ WW for a double multiplier. You give him his report and he doesn't reply. Would you log him anyway?
☐ YES ☐ NO

3. OHØAA is running Europe on 7045. Would you say to him "Listen for Stateside" on his transmit frequency?
☐ YES ☐ NO

4. Do you consider yourself the type of operator who loosely interprets rules, assuming that the log checkers will work out the details?
☐ YES ☐ NO

5. You have gone through your completed contest log and discover that you are only 798 points below a new category record. Would you add a few QSOs into the log to increase your score past the old record?
☐ YES ☐ NO

6. Do you have a different ethical standard in contests that are either smaller or known to employ poor log-checking techniques?
☐ YES ☐ NO

7. You have just discovered TT8ZZ on 14133. Would you work him, assuming no one will notice your QSO that far out of the band?
☐ YES ☐ NO

8. WB7XYZ, in Wyoming, just called you for a "clean sweep" in the ARRL SS contest with only 4 minutes to go. Unfortunately, you copied everything but his check. Would you write in something in your log to keep the QSO?
☐ YES ☐ NO

9. Would you knowingly take over someone else's frequency (i.e., a weak backscatter signal on the band edge that has a slower rate than you could generate)?
☐ YES ☐ NO

10. Have you ever used packet radio spotting and still claimed single operator?
☐ YES ☐ NO

11. You are tuning the bands and hear your friend running Europeans. Would you stop and ask him, "Hey, Joe, are there any good multipliers on the band?" or "What frequency is he on?"
☐ YES ☐ NO

12. Would you allow a friend to hold your frequency while you run up the band to chase a new multiplier?
☐ YES ☐ NO

13. You just passed 9Q5XX to 20 meters for a new multiplier. All you hear is a few mumbles that sound like him. Would you log him?
☐ YES ☐ NO

14. You are in the process of analyzing your Multi-Single log for 10-minute rule violations and find one that results in a lost multiplier. Would you change the time in your log to allow the contact to count?
☐ YES ☐ NO

15. Have you written in a few calls in your log during a big run, assuming that no one will be able to find them?
☐ YES ☐ NO

16. HA1XYZ just calls you on 20 meters for the fifth time. Would you change his call into a valid QSO out of frustration?
☐ YES ☐ NO

17. If there was absolutely no way that a contest administrator could determine that you have cheated in a contest, would you add points to your score from invalid/made-up QSOs/multipliers?
☐ YES ☐ NO

18. Would you look at a friend's log after the contest to find callsigns or other log information that you can correct in your own log after the contest?
☐ YES ☐ NO

19. Do you employ different operating ethics when operating in a Multi-Operator station then when you operate by yourself?
☐ YES ☐ NO

20. Have you ever changed the time in your log to extend your operating time limit?
☐ YES ☐ NO

Additional Comments (use extra sheets if necessary): _____

Return your survey responses to:
John Dorr, K1AR, 1997 Contest Survey, 2 Mitchell Pond Road, Windham, NH 03087 USA
Deadline: March 1, 1998

SWL: Same rules apply to SWL entries. The same station cannot be logged more than 15% of the total logged. The same station can only be logged again after 5 other entries. Non-Latin-American listeners can claim 3 points per QSO when at least one of the two listened to stations is Latin-American.

Penalties: Taking credit for excessive duplicate contacts, and violation of the rules and regulations could result in disqualification.

Awards: Certificates will be awarded to the highest scorers in each DXCC country. Participation certificates will go to Latin-American stations making 75 or more QSOs; non-Latin-American stations making 50 or more QSOs; and EC, QRP, and SWLs making 25 or more QSOs. There are plaques for overall winning scorers showing at least 4 hours of operation and 100 QSOs for Latin-American entries, 75 QSOs for non-Latin-American, and 50 QSOs for EC, QRP, and SWL entries.

Mailing deadline is November 30th and logs should be sent to Concurso Iberoamericano, Concepcion Arenal 5, 08027 Barcelona, Spain.

Pennsylvania QSO Party

1600Z Sat. to 0500Z Sun., Oct. 11–12
1300Z to 2200Z Sun., Oct 12

This one is sponsored again by the Nittany ARC of State College, PA. The same station may be worked on each band and mode for QSO points. PA stations may also work other in-state stations for QSO and multiplier credit, and mobiles in each county.

Classes: Single operator-Low Power (150 watts), High Power, QRP, and CW-only 150 watts (only one signal on the air at one time); Multi-Single, Multi-Multi, Portable, Novice/Technician, and Mobile, and a new Rover class. The Rover division is intended for stations that cannot go true mobile, but would like to activate some rare counties by going to a state park or farmer's field and operate "field day" style. You must make 20 QSOs from each location to qualify for bonus points.

Exchange: QSO number and county (PA stations), ARRL/RAC section or DXCC country for others.

Scoring: One point for SSB/FM contacts, 1.5 points for CW, 2 points on 80 or 160 meters. PA stations multiply total by (ARRL sections + PA counties + 1 DX country) a maximum of 151. Others use PA counties for their multiplier (total of 67 possible). Mobiles add 500 points for each county operated from, with a minimum of 10 QSOs (Rovers must make 20 QSOs). Mobiles on a county line give one QSO number but receive credit for 2 multipliers. QRP stations multiply their score by 2, Novice/Tech by 3. The Beaver Valley Amateur Radio Club, W3SGJ, will be the designated special event station. Add 200 points for each QSO with this station. Bonus points are added after all other bonuses have been taken. Final score is total QSO points times multipliers.

Frequencies: CW—1810 kHz and 40 kHz up from bottom of each band. SSB—1840, 3980, 7280, 14280, 21380, 28310, 50125, and 146550 kHz. Try 160 meters at 0300Z on Sunday.

Awards: Plaques will be awarded to the top entries in all entry divisions plus single operator USA Time Zones, EPA, WPA, and others as warranted. Certificates will be sent to county and section winners. A trophy and gavel will be given to clubs with the top aggregate score (unlimited and local class [75 members]).

Logs need to be postmarked no later than November 15th and should be sent to: Douglas Maddox, W3HDH, Nittany Amateur Radio Club, RD #1, Box 760, Petersburg, PA 16669. An information package is available for the contest by sending $1.00 to help defray printing and postage costs to the sponsor's address. You can also check out their web site at <http://members.aol.com/dougHDH/paqsoparty/narcweb.htm>.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 19–20

This is the 35th anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long. Note that 6 and 2 meter QSOs are also allowed this year.

Frequencies: 160 through 2 meters, excluding 30, 17, and 12 meters. Suggested frequencies are 3550, 7050, and 14050 kHz for CW, and 3890, 7290, and 14290 kHz for phone. Novices call 30 kHz above bottom end of Novice subbands for CW and 28390 kHz for phone.

Exchange: Illinois stations give RS(T) and county; others give RS(T) and state, province, or country.

Scoring: Count 1 point per phone QSO, 2 points per CW QSO. No repeater contacts. Stations may be worked once per band and mode, and once per band/mode/county for Illinois mobile stations. Each vehicle is considered one station and must use only one call. All parties which embark with a mobile must use the mobile's call exclusively for the duration of the contest. Contacts with/by stations at the border of two (or more) counties count as two (or more) counties and QSOs. Illinois stations multiply points by the sum of states, Illinois counties, VE provinces, and a maximum of 5 DXCC countries (W/K and VE included). Count additional DX as points but not multipliers. Non-Illinois stations multiply total points by the number of Illinois counties worked. All stations may earn one extra multiplier for every eight QSOs made with the same Illinois county. All stations may operate only one transmitter at a time.

Awards: Plaques will be awarded to the highest scoring Illinois fixed station and mobile station. Certificates will be awarded to the top 10 IL fixed stations, the top 5 IL mobile stations, the top IL county line portable station, the highest score (reporting at least 5 IL contacts) in each state, province, and country, and the highest team/club aggregate score.

Entrants must submit a log containing UTC, the call of the station worked, RST, state or province, Illinois county, band, and mode. Circle new multipliers as worked. Illinois mobiles must indicate county changes in the log. Any station with over 100 QSOs must submit a dupe sheet. A summary sheet must also be submitted with every log. Entries must be postmarked by November 17, 1997. Mail your entry to: RAMS, c/o John Matz, KB9II, 7079 West Ave., Hanover Park, IL 60103. To receive a copy of the contest results, enclose a business-size SASE with your entry.

CQ World-Wide DX Contest

Phone: Oct. 25–26 CW: Nov. 29–30
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue. With the large number of entry categories, be sure to list your entry category on your summary sheet.

A few trophies have been eliminated, but there are many new additions which fill in quite a few of the category gaps from previous years. The detailed trophy list can be found in the rules announcement.

All entries must be postmarked no later than December 1, 1997 for the SSB section, and January 15, 1998 for CW. All logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 USA. **Be sure to indicate SSB or CW on the envelope.**

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Good News—We Thought

In June 1995 my column in *CQ* praised the ARRL and told how they had done a great job of procuring a group of frequencies that would enable us to build the "Packet Radio Super Highway" for the 21st century. This would be a system of nodes in a network that would allow coast-to-coast communications as fast as—and maybe faster than—the Internet!

What happened? Here's a portion of the information that was in that June 1995 "Packet User's Notebook."

From the FCC and the ARRL
QST de W1AW
ARRL Bulletin 25 ARLB025
From ARRL Headquarters
Newington CT March 17, 1995
To all radio amateurs

SB QST ARL ARLB025
ARLB025 Amateurs get 219 MHz

The FCC has released a Report and Order in ET Docket No. 93-40, allocating the 219 to 220 MHz band on a secondary basis to the Amateur Service for point-to-point fixed digital message forwarding systems. The allocation had been requested by the ARRL as partial compensation for the loss of the 220 to 222 MHz band.

When the new rules take effect, on a date that has not yet been announced, Technician and higher class amateur licensees will be permitted to use digital emissions of up to 100 kHz bandwidth and no more than 50 watts PEP output. The primary occupant of the band is the Automated Maritime Telecommunications Systems (AMTS).

To protect the primary occupant, the ARRL has been designated as the national contact point for all amateur operations in the 219 to 220 MHz band and is responsible for maintaining a database of all amateur operations in the band. All amateur stations must notify the ARRL at least 30 days prior to initiation of operations in the 219 to 220 MHz band. Amateur stations within 50 miles of an AMTS coast station must obtain the written approval of the AMTS licensee prior to operating. Amateur stations within 398 miles of an AMTS coast station must notify the AMTS licensee in writing at least 30 days prior to initiation of operations. The ARRL will assist amateurs in fulfilling these requirements. Amateur stations operating in the 219 to 220 MHz band are not permitted to interfere with, nor are they protected from, interference by primary service operations in and adjacent to the band.

The FCC action climaxes almost six years of effort by the ARRL.

End of ARRL Bulletin 25 ARLB025

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

So it took a while longer than they thought, but in any case we now have some basis for a set of nationwide backbone frequencies. The truth is that these frequencies are not going to be available to anyone and everyone who wishes to have one.

In addition to the requirements relating to the Automated Maritime Telecommunications Systems (AMTS), there are other considerations that must be taken into account. We can rest assured there will also be a time limit or period allowed for the applicant to install and have the node operating. Only a System Node Operator (SNO) who is ready to install a fully functional node on one of the frequencies will be granted coordination. Notice that I stated there would be a "time limit" allowed for an applicant to install a node once it was approved.

I'm still a bit confused, because I have yet to see, read, or hear about a node being approved for operation on these wonderful 100 kHz wide, 219 MHz frequencies. Does anyone have any insight as to what happened? Did the ARRL forget it? Did someone at the Internet threaten to commit "sideways" if the League went ahead with the move that would have given amateur and packet radio the greatest shot in the arm that has come along since the FM repeater?

Where Are We Now?

In 1995 I also said, "Without building the bridge before the trench is dug, I should point out that no action will be taken until the ARRL has a full and comprehensive listing of all AMTS stations and locations. Further, there will be no purpose to contact the League until they release the full analysis and associated band plans." How long does it take the ARRL and committee to work out the details?

So that you are aware of the frequencies we are talking about, following are the supporting frequencies for the ten wideband (100 kHz) frequencies: 219.050 MHz, 219.150 MHz, 219.250 MHz, 219.350 MHz, 219.450 MHz, 219.550 MHz, 219.650 MHz, 219.750 MHz, 219.850 MHz, and 219.950 MHz. These are listed as "center frequency."

All Dressed Up, No Place To Go

So we have the platform for our packet radio "Limited-Access Information Superhighway," but that bit of planning with regard to what vehicle we wish to use stopped. The manufacturers don't know what to build or how many to build, because we have yet to see the final game plan. Is it because the League has no equipment capable of operating at speeds above 1200 baud, or is it a problem for Harris to build another piece of gear for the League that the rest of us can't afford?

I'm willing to bet that a couple of amateur radio manufacturers are sitting on "ready" to build a 219 MHz, 25–30 watt, wide-bandwidth transceiver that would enable the amateur to talk (digital) voice or data, coast to coast, as fast any Internet provider. Or have I hit the very crux of the matter? Could it be that someone got to . . . naw, that would be unethical!

Gimme A Break

Where is that band plan? What happened to the comprehensive listing of all AMTS stations and locations? Why are we becoming stagnant in amateur radio while our hobby slowly migrates to other mediums that are presently available?

This is the way to preserve the future of amateur radio, yet we somehow have managed to drop the ball at the most delicate moment. Just look at the list of amateur radio distributors today and compare the list to only one year ago. The list continues to shrink.

I can see the mail now, but I have to say something. I have remained calm as long as I can. Please, someone up there who professes to provide leadership for the amateur, get off top-dead-center and let's go forward while we can. The amateur manufacturers are ready; just ask them.

Think about it for a moment. If we had this network in place, we would see the trend change and the masses return to amateur radio digital modes. This would create a new demand for VHF and UHF radios that would in turn open some of the closed doors all over again. The fun would resemble the heyday of the 1970s, when FM repeaters opened a new world of mobile communications for the amateur on the move.

For Openers . . .

Just for openers, where are all the transceivers that will pass 64 kilobits, or even 38,400 baud? Let's give it a break and try

for even 19,200 baud. Wow, now there's a real number we can deal with, although it's a bit slow for the proposed bandwidth that was supposed to be available for us—almost three years ago.

Somehow we've learned the rounded numbers in multiples of 64 kb, such as 128k, 256k, 512k, 1024k, 2048k, and so on, up to 64 kb. Or is it the other way around? In there somewhere lies the 56 kb that fits well into the scheme of things related to the 100 kHz band pass with which we *could* have worked.

For whatever it's worth, let's "get real" and try to fashion this packet band plan into usable spectrum. A move on this vital issue is imperative!

I hope the ARRL will hear from all of you, and I pray they will listen to the wisdom and judgment of those of us who remember what packet was like a decade ago. We need the relief, and they hold the key to making it happen.

There are some who wouldn't dare to make the following statement. I wish we could recall for a short period the days when packet radio first began. *If*, as in *if* we could, the first thing I would change or add is a rigid and unyielding band plan for our present-day packet networks. This is some of the "wisdom" to which I refer in the previous paragraph.

Now is the time, while the ten channels of 100 kHz spectrum are new, to apply the "right stuff." If we don't, then we may as well relegate these channels to the same archives as the 140 mile-per-gallon Tucker Carburetor.

Packet Radio is Fun!

As a matter of interest, it was Kantronics and MFJ who came off top-dead-center and introduced some real 9600/19,200 baud (Kantronics) and 9600 baud (MFJ) data radios early on.

We are interested in having fun, in digital communications, in speed, so why hasn't some manufacturer come up with a decent transceiver that will deliver data beginning with 9600 baud, and up?

Without making more noise about the needs and requirements of the digital amateur, let's close this part of our quest by asking the amateur equipment manufacturers to plan for the next packet generation. (But you may have to encourage the ARRL.) Have a product ready to market when the inevitable happens—and at a price the SNO can afford.

Since 219 to 220 MHz is ready to harvest, while the amateur manufacturer is about it, let that wide-bandwidth, data-ready transceiver have an output power above 20 watts. Most of all, build it with the capability to cover all the frequencies available to the digital operator in the 219 to 220 MHz band. And just to sweeten the deal, maybe allow it to cover the 223 to 225 MHz band. Both the packet radio operator and the transceiver manufacturers will be served by this undertaking.

We Have The Clout And The Momentum

Having gathered the momentum and the numbers that give us the prominence to exert influence, it's time we make it known to the ARRL that we need them to move on the release of the band plan and the invitation to apply for the high-speed, packet backbone frequencies at 219 MHz. When the ARRL does their part, we will comply in turn!

So many times you, the readers, have written asking that I be a more vocal conduit for you. This column is attempting to do just that. I've been guilty of not saying the things the readers have been saying to me all along. If this month's column is not heard, then I've at least tried to make your letters, calls, and e-mails known. If the cry is heard and something good comes from it, then by all means, let the League know that you appreciate their action.

Happy packeting. Visit the SEDAN Packet Radio Networking Pages at <http://www.sedan.org> or e-mail me at <k4abt@sedan.org>.

73 de BucK4ABT

BY NORM VAN RAAY, WA3RTY

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we salute Jim Hoffer, KW8T, USA-CA All Counties #926. Jim adds this award to his list of amateur radio achievements, which include 9BWAS, 7BDXCC, and the CQ DX Honor Roll.

First licensed in November 1964 as WN8OVC, Jim is a pastor of the Seventh-Day Adventists, serving in southwestern

Jim Hoffer, KW8T, recipient of USA-CA All Counties award #926.

Michigan. He is also World President of the Adventist Amateur Radio Association. He served his church as a missionary in Uruguay and Brazil for six years, holding the amateur radio calls CX5AH (1970–1973) and PY5ZAF (1973–1976).

Jim's station consists of an ICOM 735, Heath SB-1000 linear, homebrew 11-element log periodic, and dipoles for 40, 80, and 160 meters. He is married and the father of four grown children. *CQ* and the amateur radio community congratulate Jim on his achievement.

Awards Available

Canadian QRP Award. With the rising popularity of QRP operation and homebrew and kit rigs, the Canadian QRP Award is designed to further encourage QRP operation. Working the twelve Canadian call districts is a significant achievement. With distant areas such as Yukon (VY1) and Newfoundland (VO1/VO2), the relatively small number of operators from the Northwest Territories (VE8), and the small size of Prince Edward Island (VY2), this achievement is obviously even more significant for QRP operators. Information about the QRP award and its recipients can be found at the Canadian QRP Award Web site at <http://www.geocities.com/colosseum/2572/QRP.html>.

The twelve call districts of Canada and their prefixes are Nova Scotia (VE1/CYØ/CY9), Quebec (VE2/VA2), Ontario (VE3/VA3), Manitoba (VE4), Saskatchewan (VE5), Alberta (VE6), British Columbia (VE7/VA7), Yukon Territory (VY1), Northwest Territories (VE8), Newfoundland (VO1/VO2), New Brunswick (VE9), and Prince Edward Island (VY2).

QRP is defined for the purpose of this award as not more than 5 watts CW or 10 watts PEP SSB. Contacts need *not* be confirmed by QSL cards; if the contact was made, it may be counted for this award. To receive the certificate, send basic log data for the twelve contacts to the address below. Include $2.00 or 2 IRCs for each certificate requested. Endorsements are available for specific bands, modes, and QRPp power levels. Endorsements can be added to the original certificate order at no additional cost. Endorsement stickers are available at any other time for $1.00 or 1 IRC. The full-color certificates are 8.5" × 11". They are numbered sequentially, as well as by country and province/state/call area.

There are no time and date requirements for this award, so check your logs to see if you meet the requirements. Send application with log data and award fee to: Canadian QRP Award, c/o Jeff Hetherington, VA3JFF, 3399 Cardinal Dr., Niagara Falls, Ontario, Canada L2H 3A6.

The Canadian QRP Award, sponsored by VA3JFF, is offered to recognize the ability "to do more with less."

The Worked EI Counties (WEIC) Award. The WEIC Award, issued by the Irish Radio Transmitters Society, is available to licensed amateurs worldwide who have worked 20 of the 26 counties of Ireland (EI/EJ). A list of the EI counties is given below. The award is also available to SWLs on a "heard" basis.

In accordance with IARU Region 1 rules, a claim for the WEIC Award must be accompanied by a QSO list and by a statement from the applicant's national DX awards manager that correctly filled in QSL cards are in the possession of the applicant. If this is not possible, the applicant must submit all relevant QSLs. Applicants in Ireland must submit QSL cards

Box 76, Pleasant Mount, PA 18453
e-mail wa3rty@epix.net

SPECIAL HONOR ROLL

James R. Hoffer, KW8T
USA-CA All Counties #926
July 25, 1997

Loren "Mac" McGinnis, WAØJCE
USA-CA All Counties #927
July 25, 1997

HONOR ROLL

500

KW8T	2976
N3TA	2977
WB9HIX	2978

1000

KW8T	1443
N3TA	1444

1500

KW8T	1204
WAØJCE	1205

2000

KW8T	1107
WAØJCE	1108

2500

KW8T	1035
WAØJCE	1036

3000

KW8T	943
WAØJCE	944

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.50. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated March 1, 1997. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

The Worked EI Counties Award is offered for contacting 20 of the 26 counties of Ireland and is sponsored by the Irish Radio Transmitters Society.

with their claims. Contacts made only on or after January 1, 1982 are valid.

There is a charge of IR£3.00 or 10 IRCs for the award. Band endorsements are available at the time of the first application. A separate "All 26" sticker is available for confirmations with all 26 counties.

For applicants in EI only: All contacts must be made from the home station. Contacts made via repeaters or while operating mobile, portable, or from an alternate address are not acceptable.

Counties of Ireland: Carlow, Cavan, Clare, Cork, Donegal, Dublin, Galway, Kerry, Kildare, Kilkenny, Laois, Leitrim, Limerick, Longford, Louth, Mayo, Meath, Monaghan, Offaly, Roscommon, Sligo, Tipperary, Waterford, Westmeath, Wexford, and Wicklow.

Send applications to The WEIC Awards Manager, Irish Radio Transmitter Society, P.O. Box 462, Dublin 9, Ireland.

Awards Issued

USA-CA 500: James R Hoffer, KW8T; David M. Barish, N3TA; Allen M Levinson, WB9HIX.

USA-CA 1000: James R Hoffer KW8T; David M. Barish, N3TA.

USA-CA 1500, 2000, 2500, 3000: James R. Hoffer, KW8T; Loren "Mac" McGinnis, WAØJCE.

On A Personal Note

We still haven't sold our house in Pleasant Mount, but we have purchased a home in Lebanon County. My wife is working for her son down there and coming home on weekends. We hope to sell before the winter. Any buyers?

We've made several visits to Lebanon and have renewed friendships with many of our old friends. It was like returning home, which in a way it is. On one recent Saturday I had the pleasure of having breakfast with the OWL group. It's a nice group of amateur radio enthusiasts and I'm looking forward to associating with them after our move.

73 Norm WA3RTY

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Annobon Island

If all goes according to plan, a large, international group of operators will put Annobon Island on the air for ten days this month. The current schedule has the crew arriving on Annobon the evening of October 11 and leaving on the 21st. They will operate on all bands and modes under the callsign **3CØDX**. Operators include EA4BPJ, EA5GRC, EA7JB, EA3AOK, EA6WV, EA6BH, EA5AD, EA3BT, W9EVI, OHØXX, OH1RY, and CQ DX Hall of Famer DJ9ZB. This DXpedition was originally set for May, but had to be postponed when promised visas for the Spanish operators were held up by Equatorial Guinea authorities.

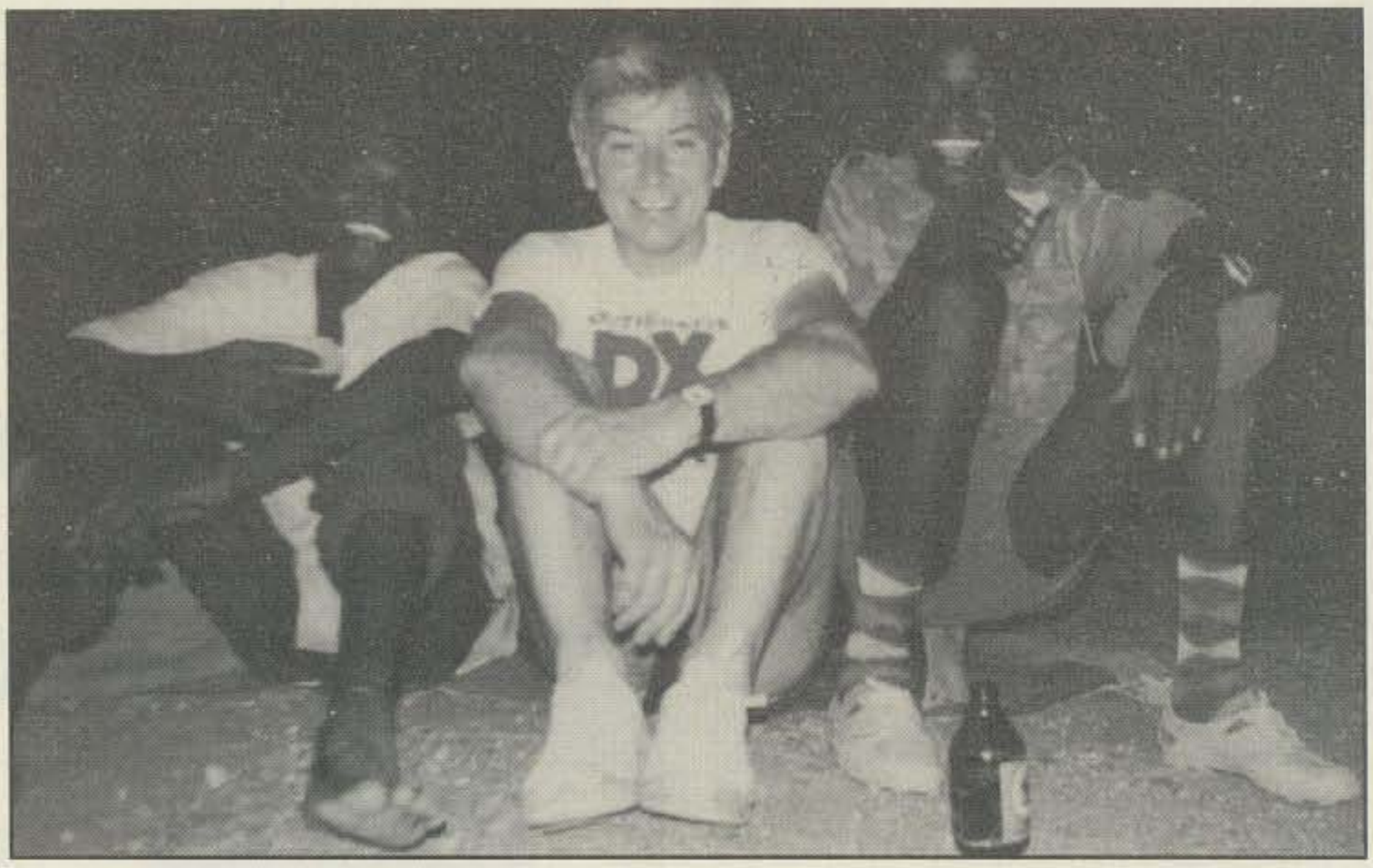
Annobon Island is one of the rarest, least visited inhabited islands in amateur radio. It is part of the country of Equatorial Guinea, but lies off the western Africa coast several hundred miles from the parent country. To find it on a map, locate the island of Sao Tome and go another 120 miles to the southwest. Annobon is only four miles long, with an area of seven square miles. About 1500 people inhabit the mountainous island.

The parent country of Equatorial Guinea gained independence from Spain in 1968. The part of the country on the African mainland consists of a small area on the coast of the Gulf of Guinea wedged between Cameroon and Gabon, just north of the Equator. In addition to the mainland section, the country also includes six offshore islands, one of which is Bioko, site of the capital city of Malabo.

DXers quickly recognized that Annobon met the requirements for a separate DXCC country, based on its 450 mile distance from the rest of the country. However, Annobon proved to be a difficult country to put on the air. Both Don Miller and Gus Browning attempted to secure operating permission, but were unsuccessful. Annobon remained a potential DXCC country into the 1970s.

A 25-year-old energetic Finnish DXer then set his sights on Annobon. That DXer was Martti Laine, OH2BH, on his first of numerous efforts to put potential DXCC countries on the air for the first time.

Together with Ville Hiilesmaa, OH2MM, Martti travelled to Bioko to meet with Equatorial Guinea officials. Their first meeting with the Home Minister did not bode well. They received a flat no. However, showing the tenacity and diplomatic skills that would later propel him into the CQ DX Hall of Fame, Martti refused to give up. He went over the head of the Home Minister to the office of the president of the country. Martti made his case directly to President Macias. After nine trips to the Presidential Palace, Martti received operating permission.



DX Hall of Famer DJ9ZB with some Southern Sudan assistants. DJ9ZB is on the 3DØDX Annobon Island DXpedition team.

As it turned out, getting operating permission was only one of the hurdles that had to be overcome to activate Annobon. The island is too far from Equatorial Guinea for a direct, nonstop flight in the size of plane that can land safely on Annobon's tiny, unimproved airstrip. The obvious solution of stopping at Sao Tome, midway between Equatorial Guinea and Annobon, was not possible for political reasons. Martti finally negotiated a flight from Gabon, and soon thereafter put Annobon on the air for the first time as **3CØAN**. Based on this July 1971 operation, the country of Annobon was added to the current DXCC country list, effective September 1, 1971.

Annobon, however, remained a Most Wanted country over the next 25 years. It has been in the top 50 Most Wanted almost every year, and had climbed to 20th position in the 1996 Most Wanted survey, with more than 30% of all reporting DXers saying they lacked a 3CØ confirmation. Because of its rarity, Annobon has been the DXpedition target of a distinguished collection of DXers. CQ DX Hall of Famers WB4ZNH and SMØAGD both have operated from Annobon, as 3CØAC and 3CØGD, respectively. (More on WB4ZNH below.) DJ9ZB thus will be the fourth member of the CQ DX Hall of Fame to operate from Annobon.

Martti's operation was not without risk or adverse consequences. An American diplomat who assisted Martti in his license quest was later murdered in Equatorial Guinea, and both Martti and Ville contracted malaria during their trip. All this didn't seem to dampen Martti's appetite for putting New Ones on the air, an activity he continues in the 1990s. For more details on 3CØAN and many of Martti's other DXpeditions, read Martti's book *Where Do We Go Next?* A limited number are available from *CQ* for $9.95 plus s/h (call 800-853-9797), or they are also available from KTE publications, 2301 Canehill Ave., Long Beach, CA 90815.

Stateside DXers looking for Annobon contacts should concentrate on the lower bands, as sunspot Cycle 23 is still in the doldrums (see below). West Coast DXers should try 80 meters during the mutually dark hours of 0130–0500Z. Forty meters should be useful into twilight hours, about 2330–0700Z. The often-neglected band of 30 meters should provide contacts between 2300 and 0630Z. On 20 meters the best time should be 2200–0100Z, just before the sun sets on the West Coast. Seventeen meters will also be useful in the 1730-2130Z range, just after local

P.O. Box 50, Fulton, CA 95439

The WPX Program

SSB

2648	N9STL	2650	EA3FYD
2649	WA4JUK	2651	DJ1YH

CW

2961	WA4JUK	2964	IK6MLI
2962	EA5JY	2965	F5OIU
2963	F5YJ		

Mixed

1787 ..... WA4JUK

CW: 350 EA5YU, F5YJ, IK6MLI, F5OIU. 400 EA5YU, F5YJ, F5OIU. 450 EA5YU, F5YJ, F5OIU. 500 EA5YU, F5YJ. 550 EA5YU, F5YU. 600 EA5YU, F5YJ. 650 EA5YU. 700 EA5YU. 750 EA5YU. 800 EA5YU. 850 EA5YU. 900 EA5YU. 950 EA5YU. 1000 EA5YU. 1050 EA5YU. 1100 EA5YU. 1150 EA5YU. 1200 EA5YU. 1250 EA5YU. 1300 EA5YU. 1350 EA5YU. 1400 EA5YU. 1450 EA5YU. 1500 EA5YU. 1700 I1EEW. 1750 I1EEW. 1850 VS2UW, HP1AC. 2950 WA2YQH. 3200 N4NO. 3250 N4NO. 3300 N4NO.
SSB: 350 DJ1YH. 400 DJ1YH. 450 DJ1YH. 500 DJ1YH, ON4BCM. 550 DJ1YH, ON4BCM. 600 DJ1YH, AA1KS. 650 DJ1YH. 850 AG4W, EA5KY. 2800 N4NO. 2850 N4NO. 2900 I1EEW. 2950 I1EEW. 3050 F2VX. 3100 F2VX. 3150 F2VX.
Mixed: 800 PA3AEB. 1050 KB5OHT. 2100 W9IL. 2150 W9IL. 2700 IK2ILH. 2750 IK2ILH. 3400 I1EEW. 3700 N4NO. 3750 N4NO. 3800 N4NO.

10 meters: EA5YU
15 meters: EA5YU
20 meters: WA4JUK, EA5YU

Asia: EA5YU, KB5OHT
Africa: KB5OHT
No. America: EA5YU, KB5OHT
So. America: EA5YU, KB5OHT
Europe: EA5YU, KB5OHT
Oceania: KB5OHT

Award of Excellence: DJ1YH

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, 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, I0RIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J, EA8BM, DL1EY.

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, I0RIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, 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.

sunset on Annobon. If the sunspots cooperate, there is a chance for a 15 meter opening around 2000Z.

DXers on the East Coast share a longer mutually dark period, with correspondingly longer and louder low-band openings. On 80 and 40 meters 2200–0600Z should be available. On 30 meters try 2000–2400Z. The 20 meter path should be best 1700–2130Z, while 17 meters features a short opening around 1700Z. If the solar flux kicks up above 90, 15 meters should provide contacts at about the same time.

DX Gatherings

The Magnolia DX Association will hold a breakfast meeting on Saturday, October 11 in connection with the MCARA convention in Mississippi. The meeting will be in the Lady Luck Casino at 7:30 AM. Cost is $6 in advance to Floyd, N5FG. The pro-

Luc Glarey, I1YRL, operates CW out of this very sharp shack.

The WAZ Program

Single Band WAZ

15 Meter SSB

506.....JA1SWL

17 Meter SSB

13.....EA8PP

20 Meter SSB

1009.....WBØCHS 1010.....PAØAKN

15 Meter CW

272.....ZS6KR

ALL CW

103.....ND5S 104.....K1EPJ

RTTY

106.....N3KK, Mixed Band
107.....WB9EEE, Mixed Band

160 Meter WAZ

69.....N4JJ, 36 Zones Endorsement

All Band WAZ

SSB

4391.....EA6ABK

CW/Phone

7749.....HA1UF 7752.....DL5IAH
7750.....IK6MLI 7753.....W4VL
7751.....S50B

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 June 30, 1997, 463 stations have attained the 200 Zone level.

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

HB9BLQ W1JR WA4FFW

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)
DL3ZA, 199 (31)
OE6MKG, 199 (31)
HA8IB, 199 (2 on 15)
OH2DW, 199 (1)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
W6SR, 199 (37)
S57J, 199 (2)
W3UR, 199 (23)
KC7V, 199 (34)
UA3AGW, 198 (1, 12)
VO1FB, 198 (1, 12)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (22, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
KG9N, 198 (18, 22)
KM2P, 198 (22, 26)
GM3YOR, 198 (12, 31)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
K3NW, 198 (23, 26)
UA4PO, 198 (1, 2)
K5RT, 198 (22, 23)
JA1DM, 198 (1, 31)
OE1ZL, 198 (1,31)
9A5I, 198 (1, 26)

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

9A5I, 198 Zones
WA4FFW, 200 Zones
WS1F, 158 Zones
9A1CAL, 175 Zones
WA4FFW, 200 Zones
ZS6KR, 189 Zones
OK1HCD, 158 Zones

Endorsements:

N2NL, 180 Zones
HB9BLQ, 200 Zones
NØFW, 197 Zones
W1JR, 200 Zones

1055 Stations have attained the 150 Zone level as of June 30, 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.

gram will be the K5YG/VP5 DXpedition. The DX forum at the convention will include Rick, K5UR, and Mike, W5ZPA, speaking on DXCC 2000. For info, contact Floyd at <floydgee@datasync.com>.

Sunspot Cycle 23

DXers have endured a long stretch of very low solar activity. It has been three years since solar flux has been consistently above 80. However, we are finally seeing some increase in sunspot numbers. The rate of increase of solar activity is widely expected to increase this fall, pushing solar flux above 100 by the end of the year. This is high enough to provide some good 10 meter openings (remember 10?).

Sunspot Cycle 23 began during the Dayton Hamvention last year. (Perhaps all that VHF radiation over Dayton did something to the sun. . . .) Of course, scientists only specify the month of the solar minimum, not the day, but real DXers aren't restricted by such arbitrary limits. Early predictions of the growth of Cycle 23 suggested that smoothed solar flux would be above 100 by this past summer. DXers were disappointed in propagation this summer, however, as solar flux remained mired below 80.

DXers with good memories will recognize that this pattern of continued low solar activity for a year or more after solar minimum in not unusual. It is the regular pattern of sunspot cycles for solar activity to remain very nearly zero for 12 to 18 months after the minimum. Solar activity then begins to increase very rapidly. We should see this pattern emerging during the next few months. By next year we will be enjoying regular high-band openings.

Savvy DXers will be out ahead of the pack, constantly testing the higher bands. Amateurs tend to forget about the higher bands during the prolonged solar minimum. They lose the habit of regularly calling CQs on apparently dead bands to see if indeed propagation is there, despite the lack of signals. The natural tendency to scan quickly across a band and abandon

CQ DX Awards Program

SSB

2231 .....VK3IR 2232 .....VE7AX

CW

964 .....YC2OK

SSB Endorsements

320 .....VE3MR/328
320 .....N4CH/326
320 .....KD8IW/323
320.....VE4ACY/323
300.....K6BZ/306
275 .....VK3IR/289
275.....YC2OK/286
200 .....VE7AX/240

CW Endorsements

320 .....WA4IUM/327
320.....K4IQJ/327
320.....K4CEB/327
310 .....K6CU/319
310 .....N4CH/316
200.....YC2OK/200
QRPp.....YC2OK
1.8 MHz YC2OK
3.5/7 MHz.....YC2OK

RTTY Endorsement

320 .....K2ENT/324 275 .....K3UA/287

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.

it if nothing is heard is misleading. If everyone is listening and nobody is transmitting, the band will appear dead even if it is wide open. DXers should remember that long-distance propagation is best as close to the maximum usable frequency as possible. Thus, DXers will have the most DX success operating on the highest band that is open for long-distance communication.

There are two ways to ensure that you are on that highest open band. The first is to call CQ in a likely direction. That is to

Eric, SMØAGD, is another DX Hall of Famer who operated from Annobon, and is shown here to the right of Eric, W6DU.

QSL INFORMATION

1P0L to DL8AAM
3D2JH to VK2GJH
3D2RT to DL8AAM
3W6LI to XW2A
4J8YL to 4K9C
4K6FT to UA9AB
4L6JR to UA6JR
4N1N to YU1AST
5H3HG to N5HG
5H3JA to KØOB
5NØYL to F2YT
5P1XBI to F6AJA
5WØNW to ZS6NW
5X4A to DL8AAM
5Z4FU to DL8AAM
5Z4OO to DL8AAM
6OØYL to VK6XZ
6W1QW to F6FNU
6Y6A to JE3MAS
8J1RM to JARL
8P6AZ to KU9C
8R1ZB to JH1NBN
8SL6PFP to SK6AW
9A5ØD/P to 9A1BHI
9A8A to 9A8AA
9G1BJ to G4XTA
9HØVRZ to PAØJR
9H1XX to DL2GBT
9H3YP to PD1ABY
9H8CI to 9H1ZE
9K2AL not to IK7JTF
9N1ARB to JM2HBO
9R1A to PA3DMH
9V1ZB to JL3WSL
9X5EE to PA3DMH
A35DB to W7TSQ
A45XL to G4VUO
AHØR/VP9 to JH6RTO
AP2AP to JA1EZM
BA4TB to 9A2AJ
BO2YA to BO2AB
C5OBI to 6W6JX
CI8DR to DL8AAM
CO6CD to W3HNK
CP6CA97 to CP6UH
CQ8CBI to CT1CBI
CS1CRA to CT1BWW
CU7DT to CU7AA
CY1JCD to VO1IMB
CY1UL to VO1UL
D25L to PA3DMH
DA4RS to VE6LJD
DU9RG to DU9RG
EA1BMI/P to EA5OL
ED1LPN to EA1DD
EK8WB to IK2QPR
EM1HO to I2PJA
ER5WU to W3HNK
EU1AI to DJØIF
EX8MLE to IK2QPR
F/G3RTE/P to G3SWH
F5RQQ to F5RQQ
FG/F2HE to F6LQJ
FG5HA to F6BUM
FP5FR to F6FNU
FS5YL to W3HNK
G3IW to G3XZR
G7NET to EI6FR
GBØON to ON4ON
GB2MI to GMØKVI
GB4JAM to G3XZR
GI/EI7NET to EI6FR
GJØMEU to ON4ON
GSØEEO/P to G3OCA
GS3ZBI/P to G3OCA
GU4YWY to G4YWY
GW4VXE/P to G3SWH
GW7A to GØDBE
GX3IW to G3XZR
HB6FG to HB9FG
HP1XBH to AD4WU
HR2JEP to WA3HUP
IC8OZM to IC8QEF
IQ6F to IK6BOB
J41AG to SV1CIB
J41W to SV1CIB
J48W to SV1CIB
J83ZB to JH1NBN
JD1/7J1AYK to W5FI
JI6KVR/6 to JJ6LXX
K4ISV/VP5 to W4FRU
K9AF/DU6 to WF5T
KG4FD to WT4K
KH6XX to W3HNK
KH7K to WA4FFW
KL1SLE to WL7KY
KP2A to W3HNK
LA2Q to LA7RW
LX2AW to CT1AWE
M6N to G3WOI
MJØASP/P to F5SHQ
OE9MON to OE2MON
OHØE to OH6LI
OHØLIZ to OH5LIZ
OH5AB/MVI to OH5NE
OJØ/DL1IAN/P to DL5IO
OJØ/DL6GV to DL5IO
OL5OPZ to OK2BIQ
OM3A to OM3KAG
OM5M to OM3KFF
OT7K to ON4ON
OY/DF8QJ/P to DK4QO
OY/DL3QQ/P to DK4QO
OY3H to W3HNK
OY5NS to W3HNK
PJ9G to WA2NHA
R1ØØW to UA9OA
R1ANF to RK1PWA
RLØP to W3HNK
RN9HM to RW6HS
RV7AA to NT2X
RZ9A to UA9AB
RZ9ATZ to UA9AB
SØ7QF to EA4URE
SM7CRW to W3HNK
SM7PKK to SM7PKK
SN3IHS to SP3WVQ
SN9JP to SP9PKZ
SN9JPT to SP9HWN
SPØYMM to SP8ARY
SU2ERA to SU1ER
SVØJB to AA5F
TØØL to DL8AAM
T30WP to JA1WPX
T95LEN to HH2HM
TA1IJ to DJ9ZB
TE1C to W3HNK
TG9AWS to W3HNK
TG9VT to W3HNK
TL8EJ to F6FNU
TM3RHC to F5REQ
TM4US to F6FGZ
TM5RT to F5PTI
TM6ACO to F6KFI
TM8R to F6FGZ
TN7A to JH1NBN
TU2IJ to DJ9ZB
TU2WL to IN3DYG
UA3AP to K3AO
UA4RZ to K7ZR
UA9AN/UI to UA9AB
UA9BA to UA9AB
UD6DFF to UA9AB
UE1QQQ/1 to RA1QQ
UE1ZNF/A to UA1ZJW
UL9PC to W3HNK
UN7JX to N2AU
UUØJM to W1TE
V31FS to NM1K
V47/NM1K to NM1K
V47NA to K5SNA
V47VJ to G4ZVJ
VC8DR to DL8AAM
VG8DR to DL8AAM
VKØGW to VK5GW
VP2EJX to LA9JX
VP5GN to K5GN
VP8CEH to GØNWY
VP9/AHØR to JH6RTO
VQ9VK to N1TO
VR2MM to JR3JFZ
VR97GO to KU9C
VS97KF to VR2KF
VS97SAR to VS6XRW
VU4ØZAP to W3HNK
VU4NG97 to VU2BGS
W2NTJ/VE8 to VE9RHS
WG3I/C6A to G3AUA
WJ2DX/IMD to W2EN
WP3A to NP4QH
WP4C to W3HNK
WT5BS to ND5G
XNØROB to VY2ROB
XU2C to 7L1MFS
XX9KC to JH2MRA
YN1RLI to WA4JTK
YN3CC to W3HNK
YN4ZUJ to KB5IPQ
YO7LVZ to YO7BSN
YP9T to YO9XC
YR7G to YO7BSN
YV1DIG to YV1AVO
Z21EV to W3HNK
ZF2CU to W5CU
ZF2MK to K9MK
ZP7ØCM to ZP1LL
ZS6ESU to W4SMG
ZX7CB to PR7RT
ZYØSK to PS7KM
3W6AR to Hiroo Yonezuka, B. P. 2659, Vientiane, Laos
5H3CA to Jonathan Anderson, P.O. Box 39, Bariadi, Tanzania
AHØY to Rodante Cruz, AAA 479, CB 10001, Saipan, MP 96950
BD4IE to Gao, No. 1 Xianqian St., Boshan, Zibo City, Shandong 255200, China
BD4RA to Miss Gu, P.O. Box 542, Nanjing, China
BO2AB to Jini Lin, P.O. Box 504, Taipei, Taiwan
BV2RF to Kao, P.O. Box 3-129, Yungho Taipei, Taiwan
CN8VB to Benchimol Maurice, 10, Rue Ibnou Khalouya, 20500 Casablanca, Morocco
FG5GG to Roland B. Bogota, Saint-Protais, F-97180 Sainte-Anne, Guadeloupe, France
HR1RC to Rolando Chavarria R., Calle I. Milagrosa No. 3611, Tegucigalpa, Honduras
KHØCE to Ignacio G. Capuchino, P.O. Box 2249, Saipan, MP 96950
KHØI to Hilario Feliciano, P.O. Box 7670, Saipan, MP 96950
RK1PWA to Nick Shapkin, P.O. Box 73, 164744 Amderma, Arkhangelskaja obl., Russia
RU1POL/Ø to Alex Spasskin, P.O. Box 44, 686610 Pevek, Magadanskaja obl., Russia
SV1ACK to Aristomenis Karelas, 1 Bouboulinas Str., GR-17455 Alimos, Greece
VR2LC to Ken Kwok, P.O. Box 89381, Hong Kong, China
VR6TY to Terry Young, P.O. Box 10, Adamstown, Pitcairn Island
XU2A to Hiroo Yonezuka, B. P. 2659, Vientiane, Laos
YBØWYN to Arwien Hartopo, P.O. Box 100/JKUPL, Jakarta 14001, Indonesia
YBØZBC to Club Station, Lokal Penjaringan, Gedung Sasana Aneka Krida, Jl. Pluit Raya Selatan, Jakarta, Utara, Indonesia

The table of QSL information 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>).

the southeast in the local morning and toward the southwest in the afternoon. ZS6EZ tells of calling CQ into a seemingly dead 10 meter band at the bottom of the sunspot cycle, with his beam aimed north. He would work a few dozen stations, and by the time he turned off his rig, the band would be filled with QSOs. The band actually was open on the north-south path, even at the solar minimum, but nobody was transmitting.

The other way to check open bands is with the worldwide multiband beacon network established by the Northern California DX Foundation (NCDXF) and by the International Amateur Radio Union (IARU). This beacon network began operation with a single transmitter in California in 1979, and has since grown into a worldwide network of five-band beacons. Each beacon has a fixed time slot, coordinated through the Global Positioning System to ensure accuracy. Each beacon transmits on 14100 kHz for 10 seconds at various power levels, then QSYs to 18110, 21150, 24930, and 28200 kHz, repeating the pattern. DXers can tune to any of these frequencies and within the space of a few minutes tell which bands are open to what parts of the world and what signal levels can be expected.

Knowledgeable DXers already have programmed five consecutive memory channels in their HF rig with these frequencies to make it easy to flip through the beacon channels. A multi-band vertical antenna is an excellent addition to beacon monitoring, to eliminate the need to change or rotate antennas as one scans the beacons. Again, a series of CQs in the direction of beacons heard may well result in DX contacts on a seemingly dead band.

Carl Henson, WB4ZNH

Carl Henson, WB4ZNH, was recently elected to the CQ DX Hall of Fame. Carl was first licensed in 1972, upgrading to General the next year. He currently holds

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with *CQ* Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions. ***MIXED files have not been edited for 1997 removals at this time.**

MIXED*

4785 F9RM	3415 VE3XN	2967 PAØSNG	2538 S53EO	2165 S58MU	1958 YU7JDE	1588 KØIFL	1362 YU1ZD	1101 VE6FR
4136 IT9TQH	3337 N4MM	2935 YU7SF	2512 JH8BOE	2131 W6OUL	1752 W7OM	1587 AE5B	1329 KSØS	1083 AA1KS
3808 W2FXA	3311 SM3EVR	2912 YU7BCD	2498 K8LJG	2128 W4UW	1745 LU8DY	1586 W7CB	1317 Z32KV	1078 WB2PCF
3728 UA3FT	3296 I2PJA	2848 K9BG	2486 I2EOW	2126 9A4RU	1717 K5IID	1560 OZ1ACB	1317 N3ED	1003 KB5OHT
3725 EA2IA	3295 N9AF	2832 IT9QDS	2448 IK2ILH	2113 W8UMR	1717 IØAOF	1500 CT1EEB	1289 WØIZV	938 VE7CBH
3636 W1CU	3290 N4UU	2697 N2AC	2396 KØDEQ	2105 KS4S	1705 EA5BM	1449 I1-21171	1212 WT3W	931 W2EZ
3612 K6JG	3195 N5JR	2661 I2MQP	2393 S51NU	2098 W9IL	1699 CT1QF	1436 VE4ACY	1123 S521M	850 US1IDX
3565 N4NO	3176 I1EEW	2639 WB2YQH	2211 K2XF	2001 G4OBK	1696 PY2DBU	1401 F6HMJ	1122 N4PYD	
3447 N6JV	3023 WA8YTM	2610 4N7ZZ	2183 N6JM	1975 SM6CST	1623 I2EAY	1368 NG9L	1112 VE6BMX	

SSB

4688 F9RM	2855 F2VX	2390 EA3AQC	2189 KF7RU	1664 N6FX	1485 CT1BWW	1332 K5IID	1097 SV3AQR	869 N3ED
4141 IT9TQH	2846 EA2IA	2385 I2MQP	2184 I2EOW	1653 K8LJG	1480 W6OUL	1318 G4OBK	1063 LN4PYD	866 HA9PP
4056 IØZV	2745 OZ5EV	2349 UA3FT	2174 CT1AHU	1651 YU7SF	1464 K8MDU	1273 NG9L	1038 S51NU	837 N1RT
3743 VE1YX	2725 I1EEW	2342 WA8YTM	2169 WF4V	1649 EA5CGU	1434 DK5WQ	1240 I3UBL	999 WT3W	836 EA3EQT
3607 ZL3NS	2707 IY4NO	2296 I8KCI	2124 KD9OT	1639 K2XF	1437 K2EEK	1193 LU5EWO	965 DJ4GJ	823 I2EAY
3311 F6DZU	2658 I4CSP	2274 EA5AT	2063 CX6BZ	1590 KS4S	1437 K3IXD	1155 WA2FKF	954 EA1AX	804 AG4W
3309 K6JG	2638 N5JR	2267 YU7BCD	2014 EA1JG	1587 KBØC	1415 IKØEIM	1151 KØIFL	953 DF1IC	768 N3DRO
3246 I2PJA	2552 PAØSNG	2265 PY4OY	1809 LU8DY	1494 CT1EEB	1398 IK2AEQ	1127 EA8AG	924 EA1MK	740 JN3SAC
2913 CT4NH	2510 I5ZJK	2251 4X6DK	1716 OE2EGL	1490 AE5B	1396 I3ZSX	1105 DF7HX	912 LU3HBO	641 VE6BMX
2892 N4MM	2404 LU8ESU							

CW

4081 IT9TQH	2817 EA2IA	2240 I2UIY	1889 KF2O	1687 I7PXF	1510 KS4S	1341 EA7AAW	1123 AC5K	890 KB5OHT
3746 WA2HZR	2614 YU7SF	2145 W8IQ	1867 S58U	1594 W6OUL	1454 EA5YU	1317 N1IA	1066 N3ED	884 I2EOW
3389 N6JV	2600 K9QVB	2074 S51NU	1854 TI4SU	1594 I1EEW	1437 JN3SAC	1293 IK5TSS	1032 W4UW	884 PY4WS
3098 UA3FT	2337 N5JR	2058 JA9CWJ	1816 SM6CST	1591 G4OBK	1416 9A3SM	1280 ZB2EO	1017 LU3DSI	727 VE6BMX
3073 N4NO	2326 G4UOL	2035 9A2NA	1804 N6FX	1548 DJ1YH	1411 SM5DAC	1268 DJ4GJ	984 I2MQP	709 KØIFL
3011 VE7CNE	2314 YU7BCD	1986 KA7T	1795 W1WAI	1539 LU2YA	1389 I2EAY	1230 EA6AA	911 HA9PP	690 WT3W
2992 YU7LS	2288 N4MM	1927 K8LJG	1777 OZ5UR	1538 IK3GER	1347 IK2ECP	1178 K5IID	896 9A3UF	623 LY3BY
2881 N4UU	2286 WA8YTM	1913 HA5NK	1755 K5UR	1529 EA6BD	1346 9A2HF	1133 EA2CIN	894 DF6SW	604 AC6DD
2832 K6JG	2247 LZ1XL	1904 VR2UW	1695 K2XF					

an Extra Class license and is on the DXCC Honor Roll. He and his wife Martha, WN4FVU, have travelled to and operated from dozens of interesting and rare DXCC countries. Among Carl's successful DX-peditions are operating from Uganda as WB4ZNH/5X during a time of government turmoil, the Annobon Island operation mentioned above, Chad TT, and Aves Island as part of the 4MØARV DXpedition. Among other countries on Carl's resume are Western Samoa 5W1BC, The Gambia C5ABC, Maldives 8Q7AF, Zaire 9Q5DH, Botswana A2, Swaziland 3D6, Equatorial Guinea 3C1BC, Mauritania 5T5BC, and many Caribbean islands. Carl and Martha also operated from Eritrea during the two years of transition time between winning the war with Ethiopia and internationally recognized independence. He's a frequent and entertaining speaker at DX events around the country. Carl is also one of the most outspoken DXers on the subject of DX nets. No, he's *not* in favor of them. Congratulations to Carl on his election to the CQ DX Hall of Fame!

Photos Wanted

My supply of photographs of DXers is running low. Please send any available photograph of DXers, DXpeditions, and DX operators to me at P.O. Box 50, Fulton, CA 95439, and you may see your photograph in the pages of *CQ*.

73, Chod, VP2ML

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

Vanity Station Callsigns—Your Questions Answered

Obtaining an amateur station callsign where you choose the call letters and numeral has proved to be very popular indeed. So far over 14,000 vanity callsigns have been issued. Here are some answers to questions of general interest about the program.

• May I obtain a 2×3 amateur station callsign beginning with the letters NA through NZ?

No. The vanity callsign system is based on specified callsign "groups." Extra class amateurs are eligible for Group "A," which contains all K, N, and W-by-2 letters; KA–KZ, NA–NZ, WA–WZ, and AA–AL-by-1 letter; and AA–AL prefixed 2×2 callsigns. Advanced class amateurs may select KA–KZ, NA–NZ, and WA–WZ-by-2 letter Group "B" callsigns. The General class may choose any available K, N, or W-by-3 letter Group "C" callsign. And Novices qualify for Group "D" callsigns: KA–KZ and WA–WZ-by-3 letters. Any amateur may select a callsign from a lower class group. For example, an Extra class amateur may also select a Group B, C, or D callsign.

The Group Call Sign System, which began on March 24, 1978, did not provide for the nearly 6.5 million possible 2×3 callsigns which begin with NA–NZ and AA–AL. The FCC recently approved the use of 1×1 format callsigns for "special event" use, so the NA–NZ and AA–AL-by-3 are the only callsign blocks that remain unavailable to the public.

• All the good 1×2 format callsigns are assigned. Is there a way I can get one?

Actually, new 1×2 callsigns are becoming available every month! It is possible to get one of them if you know how. Callsigns become available two years following license expiration or death of the grantee. A callsign is listed in the FCC database for two years beyond expiration to provide a two-year grace period during which the licensee may recoup the callsign.

There are many (possibly hundreds) available 1×2 callsigns currently listed in the FCC's amateur service database where the licensee has died two to twelve years ago. Check the Silent Keys listing in *QST* for the period 1985 through 1995 to determine which callsigns may be available. Then check the FCC database listed on the Internet to determine which callsigns are still being carried as active.

There are many amateur posted callsign databases on the World Wide Web which you can locate with a search engine. The FCC also has one. At this point, access to this database is free, since it is still in the testing stage. To get to their Amateur Radio Database Query on the Internet, go to <http://gullfoss.fcc.gov> and then select (1) Beta Test Site, (2) Wireless Telecommunications Bureau, and then (3) Amateur Radio Query—Beta Testers.

The FCC will remove the amateur callsign of a deceased amateur from its data base if you provide them with either an obituary from a newspaper or a copy of the death certificate. Mail your callsign deletion request and documentation to: FCC, Amateur Section, 1270 Fairfield Road, Gettysburg, PA 17325-7245. Then start checking the Amateur Radio Database about two weeks after you submit the deletion request. Once the callsign is deleted from the database, you may apply for it. But work fast. Someone else could beat you to the callsign.

• Are there any callsigns that are not available for assignment?

Certain combinations of letters are not assignable as sequential or vanity amateur radio station callsigns:

1. These combinations include KA2AA–KA9ZZ, KC4AAA–KC4AAF, KC4USA–KC4USZ, KG4AA–KG4ZZ, KC6AA–KC6ZZ, KL9KAA–KL9KHZ, and KX6AA–KX6ZZ. These are generally allocated to Antarctica and military stations.

2. Any callsign having the letters SOS or QRA–QUZ as the suffix. These are used for distress Q-signals.

3. Any 2×3 format callsign having the letter X as the first letter of the suffix. These are allocated to non-amateur "Experimental" stations.

4. Any 2×3 format callsign having the letters AF, KF, NF, or WF as the prefix and the letters EMA as the suffix. These are allocated to FEMA, the Federal Emergency Management Agency, for use on the amateur bands.

5. Letter combinations that prior recipients have found offensive are not assigned under the sequential callsign program. These can apparently be requested under the vanity callsign system. The FCC did not say what these offensive letter combinations were.

6. Callsigns having the single letter prefix (K, N, or W), a single digit numeral, and a single letter suffix are reserved for the special event callsign system. (The letter X may not follow the numeral.)

• Do I get my money back if I don't get a requested vanity callsign?

Yes, you do. You may choose up to 25 callsigns. If you do not get one of them, then your current callsign is not changed. You will be refunded your vanity callsign fee if you make a request by written letter to the FCC in Gettysburg. Note that the regulatory fee for a vanity callsign went to $50 on September 15, 1997.

• What callsign prefixes are available to stations located outside of the continental United States?

Applicants with mailing addresses in the 48 contiguous states may not request a callsign from: Region 11, Alaska, which has reserved callsign prefixes AL, KL, NL, and WL; Region 12, Puerto Rico/Caribbean, which has reserved prefixes KP, NP, and WP; and Region 13, Hawaii/Pacific Islands, which has reserved prefixes AH, KH, NH, and WH.

• When can I file for a vanity station callsign?

Starting gates are being used to implement the system in stages. You may not file for a vanity callsign prior to that date.

Gate 1, opened May 31, 1996: Permitted previous licensees, club stations, and close relatives to obtain a previously held callsign.

Gate 1(A), opened July 22, 1996: Permitted clubs to obtain a memorial callsign of a deceased member, providing written consent is received from a close relative. The club must have held the callsign prior to March 24, 1995.

Gate 2, opened September 23, 1996: Permitted amateur Extra class operators to request a Group A, B, C, or D callsign.

Gate 3, opened August 6, 1997: Permitted Advanced class operators to request a Group B, C, or D callsign.

Gate 4, opening date not yet an-

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443; e-mail W5YI@W5YI.org)

nounced: Permits General, Technician Plus, or Technician class operators to request a Group C or D callsign. A Novice class operator may request only a Group D callsign.

• May I hold more than one vanity callsign?

No. An individual amateur may hold one—and only one—station callsign. An amateur must trade in his/her regular callsign when he/she receives a vanity callsign. Four or more amateurs may form a club and apply for a club station callsign. One of the club members is eligible to be the station trustee. Strangely, a club may hold any number of station callsigns. The club trustee may only apply for a club call appropriate for his/her license class "group." In other words, a station trustee holding a Technician class license may only apply for a Group C or D callsign.

• How does the FCC assign a vanity callsign?

Applicants wanting a special callsign must submit either a paper FCC Form 610-V document or electronically file their application over the Internet. All requests are handled on a daily basis in order of receipt with electronically filed requests handled first. You may list up to 25 choices or may select as few as one callsign.

Upon confirming that you are eligible for the first vanity callsign on your list, the license data base as it then exists is searched by the FCC's computer. If the callsign is available for reassignment, your license is modified to show that callsign. The search is repeated using the other callsigns in your order of preference until a callsign is selected.

Should no callsign on your list be assignable to your station, the callsign that you vacated will again be shown on your license. Your vacated callsign does not become available for reassignment for a two year period. Since vanity callsign requests will be continually accepted and processed, there is no guarantee that a callsign that appears to be available on the license database will be available when your request is processed.

The FCC cannot provide current callsign status data. This information is available from the W5YI Group, however. Call 1-800-669-9594 for a computer disk which lists the assignable vanity callsigns for which you qualify.

• How do I go about paying for a vanity callsign?

Effective September 15, 1997 the fee for a vanity callsign is $50. This fee may be paid by check, bank draft, money order, or credit card. The FCC does not hold your check until it clears before issuing the callsign. Do not send cash.

You must include an FCC Form 159, "FCC Remittance Advice," if you pay the fee by credit card. The four-letter payment-type code to be entered in Line No. 14A are the letters "W A V R." Only MasterCard and VISA are accepted.

If you file by mail, the Form 610-V vanity callsign application package and $50 fee must be mailed to: Federal Communications Commission, Amateur Vanity Call Sign Requests, P.O. Box 358924, Pittsburgh, PA 15251-5924. Do not mail your request to the FCC licensing facility in Gettysburg, PA. It must go to Pittsburgh.

You may also file electronically by accessing the following URL on the Internet's World Wide Web: <http://www.fcc.gov/wtb/amradsrv.html>. If you file electronically using the interactive vanity callsign request, the system will provide you with an FCC Form 159 which you should print out. This form must be mailed together with the fee or credit card information to: Federal Communications Commission, Amateur Vanity, P.O. Box 358994, Pittsburgh, PA 15251-5994. It is important that it be received within 10 days.

This is a special box number set up to receive payments for electronically submitted Form 610-Vs. Do not send your electronic Form 159 to the regular P.O. Box 358924. Be sure to read and follow the electronic filing instructions carefully! Anyone who submits a bad check or a credit-card account number that can-

not be charged will have his/her callsign assignment reversed.

• Where do I get FCC Form 610-V?

The FCC Form 610-V "Amateur Station Vanity Call Sign Request" application form is available from FCC Forms Distribution Center, 2803 52nd Ave., Hyattsville, MD 20781. Their toll-free telephone number is 800-418-3676 (FORM). The document is also available on the Internet for downloading from <http://www.fcc.gov/formpage.html> or from the FCC's Fax-on-Demand system. Call 202-418-0177 from the handset of a fax machine.

• What is the special event vanity callsign system?

This is the third callsign system about which we wrote last month. The 750 one-by-one format callsigns have been made available by the FCC for temporary use by "special event" stations. Special event station callsigns have not been available since March 24, 1978, when the Commission discontinued all previous callsign procedures and went to the Group callsign system.

A 1×1 callsign consists of a single prefix letter (K, N, or W), the region number (through 9), and a single suffix letter (A through Z—except the letter X). A "special event" is an on-the-air amateur radio operation activated to call public attention to a self-determined event of special significance to the amateur community, such as a celebration, festival, anniversary,etc.

The callsign is selected by the station licensee from a list of callsigns shown on a common data base coordinated, maintained, and disseminated by the amateur station special event callsign data base coordinators. You do not need to hold any specific class of license to reserve a 1×1 callsign for up to 15 days. It simply allows an already licensed station to temporarily use a different callsign in the identification announcement to help attract greater attention to the on-the-air presence of the station. The special event station must also announce its regular FCC-assigned callsign at least once each hour during the operation so that listeners can determine the identity of its licensee.

The National Conference of VECs is providing the database located on the Internet at <http://ncvec.spindle.net>. The special event callsign is substituted for the callsign shown on the station license grant while the station is transmitting. The FCC has issued a public announcement requesting volunteer coordinators. The W5YI Group and the American Radio Relay League have already indicated that they will accept the appointment, and it is expected that special event callsigns will be available by the time you read this.

See you next month!

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1997 *CQ* World-Wide DX Contest, the 50th running of this most popular DX contest, will be held on the following dates:

Phone: 0000 UTC Saturday, October 25 to 2400 UTC Sunday, October 26
CW: 0000 UTC Saturday, November 29 to 2400 UTC Sunday, November 30

For the 47th consecutive year this month's propagation column is devoted to special forecasts and information applicable to both the Phone and CW contest weekends. The accuracy of the forecasts for the previous 46 contests is greater than 90%!

For Most of WW DX SSB—High Normal Conditions

At the time of this writing, early August, a long-range *CQ* day-to-day forecast based primarily on the 27-day recurrence tendencies of geomagnetic, solar, and ionospheric conditions indicates a high probability for Low Normal propagation conditions on October 25, at the beginning of the first day of the SSB contest weekend, improving to High Normal during most of October 26, at times increasing to Above Normal. See the Last-Minute Forecast on this page for additional information concerning expected day-to-day conditions for the entire month of October. An updated day-to-day forecast for the SSB contest weekend will appear as a bulletin at the beginning of next month's column. The November issue of *CQ* should reach most subscribers before the SSB contest begins.

Increasing Sunspots For 1997 Contest

While solar scientists have not as yet officially agreed upon the starting date for sunspot Cycle 23, it now appears almost certain that it began during May 1996 with a smoothed sunspot count of 8, and that the new cycle is steadily rising, albeit very slowly.

The monthly mean sunspot number for June 1997 as reported by the Royal Observatory of Belgium was 13.1. A high count of 22 was recorded on June 2, with but only a single day, June 30, spotless.

June's mean level results in a 12-month running smoothed sunspot number of 11 centered on December 1996. This is an increase of three during the first seven months of Cycle 23. Canada's Dominion Radio Astrophysical Observatory reports a corresponding 10.7 cm solar flux level of 74 for June. This results in a smoothed value of 73 centered on December 1996.

A smoothed sunspot count on the order of 20 or greater is expected during the 1997 WW DX Contest period, with a corresponding solar flux level in the low 80s or greater. This would be at about the same levels that last occurred during the 1994 WW DX Contest periods.

If Mother Nature cooperates this year and there are no unexpected radio storms during the 1997 WW DX Contest periods, conditions should be noticeably better than during the past two years. If such is the case, expect better openings and higher scores, noticeably on 10 and 15 meters.

If you plan to participate in the 1997 World-Wide DX Contest, the DX propagation charts and other information appearing in this month's column are designed to help you stay sharp and informed, and to make the best use of the ionosphere for piling up as many contacts and points as possible.

General Conditions, Band By Band

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December and centered on the contest periods.

10 Meters: With increasing solar activity, a noticeable increase in 10 meter openings is now likely. During High or Above Normal conditions look for some openings towards Africa and Europe before noon, towards Central and South America from a few hours before until a few hours afternoon, and towards the South Pacific during the afternoon.

15 Meters: The new cycle will also bring an increasing number of openings on this band. This should be a fairly good band during most of the daylight hours. When conditions are Normal, the band should open to many areas of the world from shortly after sunrise through the late afternoon. Signals from Europe and Africa should peak an hour or two before noon, while signals from Central and South America, the Far East, and the South Pacific should peak during the late afternoon. During Below Normal or Disturbed conditions, 15 meter openings will be spotty and of very short duration.

20 Meters: This is again expected to be the "backbone" band during the contest. During Normal conditions good DX openings are expected to almost every corner of the world sometime between sunrise and the early evening hours. Conditions should peak for a few hours after sunrise and again during the late afternoon and early evening. During these peak periods, 20 meters should be the optimum band for DX, with openings usually characterized by strong signal levels. When conditions are Below Normal, 20 meter openings should be fewer in number, of shorter duration, and with weaker signal levels. In general, however, the band should hold up for some DX openings during all but Disturbed conditions.

40 Meters: The band is expected to open during the late afternoon hours, and remain open for DX to one area of the world or another until shortly after sunrise. Look for openings to Europe and Africa from an hour or so before sundown to about midnight in the MST and PST time zones, and to at least 2 AM in the CST and EST zones. Good openings towards Central and South America should be possible throughout most of the hours of darkness. Openings towards the South Pacific and the Far East are expected to peak during a two-hour period before sunrise. During most of the hours of darkness, 40 meters should be the optimum band for DX propagation. When conditions are Below Normal or Disturbed, openings will be spotty and considerably fewer in number.

80 Meters: DX propagation conditions are generally at their best on this band during periods of low solar activity. Some fairly good 80 meter DX openings are expected to several areas of the world during the hours of darkness and the sunrise period. When propagation conditions are Normal, signal levels should be strong on many openings. Even during Below Normal or Disturbed periods there is a fairly good chance that some DX openings may be possible during the hours of darkness. Expect conditions normally to peak around midnight for openings towards Europe and Africa, after mid-

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for October 1997

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 1-2, 10, 14, 17, 21, 26, 29	A	A	B	C
High Normal: 8-9, 11, 13, 15-16, 27-28	A	B	C	C-D
Low Normal: 4-6, 18, 20, 23, 25, 31	B	C-B	C-D	D-E
Below Normal: 3, 7, 12, 22, 24, 30	C	C-D	D-E	E
Disturbed: 19	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 excellent (A) on Oct. 1st and 2nd, fair-to-poor (C-D) on the 3rd, fair-to-good (C-B) on the 4th through 6th, etc. Signal quality should be fair-to-good (C-B) on Oct. 25th, the first day of the CQ WW DX SSB Contest weekend, and excellent (A) on Oct. 26th.

11307 Clara Street, Silver Spring, MD 20902
e-mail: g.jacobs@ieee.org

Time EST	Optimum Band Meters	Areas To Which Band Expected To Be Open
00–02	40	Most of Europe and Middle East; most of South America; a few African countries; possibly Antarctica.
02–04	40	Not much on any band. A good time to eat and catch up on some sleep. Some openings possible to the South Pacific, Australasia, the Far East, and other Asian areas, but generally not too good. Some fairly good openings to South America.
04–06	40	Still time to catch up on some sleep. Some openings to the South Pacific, New Zealand, and Australasia. Some also to northern and central areas of South America. A few Far Eastern and Asian, and perhaps Antarctica.
06–08	20	Good openings to most of Europe, the Pacific area, Australasia, Asia, and the Far East. Also to most of South America and parts of Africa.
08–10	15	Good openings to all of Europe and the Middle East and most of South America. A possible opening to the Pacific, Australasia, and perhaps parts of Asia.
10–12	10	Openings to most of Europe, most of Africa, and most of South America. Catch them during this period or you will probably miss them!
12–14	15	Good openings to most of Africa and most of South America, and to the western and southern areas of Europe.
14–16	20	Good openings to most of Europe, the Middle East, most of Africa, northern and central South America, and possibly some long-path openings to Australasia.
16–18	20	Good openings to most of Africa and South America, with some also possible to the western and southern areas of Europe.
18–20	15	Fair-to-good openings to the Pacific area, Australasia, Far East, and other Asiatic areas. Good openings to central and southern South America, and a possible opening to Antarctica.
20–22	20	Openings to most of Africa, Pacific area, Australasia, Antarctica, and all of South America.
22–00	40	Most of Europe should be possible, as well as the Middle East,; most of South America, and some openings to the Pacific and Australasia.

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

night and before sunrise for openings towards Central and South America, and just before sunrise for openings towards the South Pacific and the Far East.

160 Meters: With longer hours of darkness, DX conditions on this band should improve. While DX conditions may not be as good on 40 and 80 meters, look for openings to many areas of the world during the hours of darkness and the sunrise period. Because of power limitations in force on this band in many areas of the world, signals are likely to be weak and noisy, especially on phone. The best time for 160 meter DX is when a path is in complete darkness. Within this period conditions often peak just as the sun begins to rise at the easterly point on the path. The best forecaster for 160 meter DX (and 40 and 80 meters, as well) is a set of sunrise and sunset tables. For example, if the sun is expected to rise at 0700 UTC in western Europe, then this would be the best time to look for 160 meter openings between western Europe and the USA, plus or minus a half hour. Conditions on 80 meters can often also serve as an indicator for 160 meter openings. The band will often open at the same time 80 meters seems to peak on a particular path. With these tips and some patience, it should be possible to work many DX areas of the world on 160 meters during the contest.

WARC Bands

While the WARC bands are not yet included in the World-Wide DX Contest, expect 12 meter openings during the same time periods as shown for 10 meters, but with this band opening a bit more frequently than 10 meters. Seventeen meters should behave much as shown for 15 meters. Openings on 30 meters should resemble 40 meter openings during local sunrise and sunset times, but the band is expected to open less frequently than 40 meters during the hours of darkness.

Contest Work Plans

The DX Propagation Charts on the following pages show the times when each amateur band from 10 through 160 meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these charts are given elsewhere in this column.

This information contained in the charts can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the contest. Experience gained during previous contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table I is a typical multi-band operational work plan devised from the propagation charts for an Eastern USA QTH. The plan shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period through-

out the day. Similar plans can be devised for other bands and for other locations.

Radio Storms

The forecasts discussed in this column are based on *normal* propagation conditions expected with a sunspot level in the low teens. If actual conditions during the contest turn out to be *above normal*, DX openings on 10, 15, and 20 meters are likely to be somewhat better than shown in the charts. On the other hand, if Mother Nature should play a trick and produce a radio storm during the contest period, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending on the storm's severity. The storm's influence will generally extend outward from the polar regions, the more severe the storm becomes. Under storm conditions expect considerably fewer openings on 10, 15, and 20 meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

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

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

Do-It-Yourself Forecasting

The age of computer bulletin boards has given way to Web pages. You now can obtain a wealth of updated and real-time solar, geomagnetic, ionospheric, and HF propagation data from several Web pages sponsored by well-known research organizations throughout the world. Having such information available would be of special importance during the 1997 *CQ* World-Wide DX Contest periods.

The one Web page that I find has a library of information and is linked to other useful Web pages as well, is sponsored by the Space Environment Center, NOAA of the US Dept. of Commerce, located in Boulder, Colorado. Its URL is: <http://www.sel.noaa.com>. This site contains a wealth of useful information and is well menued. Here is how you can use it to know what's going on with the sun, the geomagnetic field, and the ionosphere during the contest.

From the Menu page, under "Space Weather Products" hit the button "Radio Users." The Radio User's Menu is shown in fig. 1. On the Radio User's page look under "Today's Space Weather." Select "Joint USAF/NOAA Primary and Secondary HF Propagation Reports." This will give you in tabular form a summary of worldwide HF propagation conditions (which is updated every six hours), the latest value of 10.7 cm solar flux, and the latest geomagnetic indices. A sample of this report is shown in fig. 2. Other items on the User's Page will provide additional solar and geophysical information, current radio storm alerts and warnings, auroral activity, and detailed ionospheric data.

The NOAA site is linked under "Ionospheric

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.

October 15–December 15, 1997
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

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

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

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

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	10-12 (1)	09-10 (1) 10-14 (2) 14-16 (1) 23-01 (1)	22-00 (1) 19-23 (1)*	
Northern Europe & CIS**	*Nil*	07-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	21-00 (1) 21-23 (1)*
Eastern Mediterranean & Middle East	*Nil*	07-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (1) 21-23 (1)	18-22 (1) 06-08 (1)
Western Africa	09-11 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-23 (1) 19-22 (1)*
Eastern & Central Africa	*Nil*	09-12 (1)	06-09 (1) 11-13 (1) 13-16 (2) 16-18 (1) 21-23 (1)	18-21 (1) 06-08 (1)
Southern Africa	08-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	07-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-20 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (1)	04-06 (1) 06-08 (2) 08-09 (1) 05-07 (1)*
Southeast Asia	15-17 (1)	14-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-08 (1) 03-07 (1)*
Far East	14-16 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 23-01 (1)* 01-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	09-12 (1) 12-15 (2) 15-17 (4) 17-18 (2)	04-07 (1) 07-09 (3) 09-12 (2) 12-16 (1)	21-22 (1) 22-05 (3) 05-08 (2) 08-09 (1)
	18-19 (1)	16-17 (2) 17-18 (3) 18-20 (4) 20-22 (2) 22-02 (1) 02-04 (2)	22-00 (1)* 00-06 (2)* 06-07 (1)*	
Australasia	15-17 (1)	11-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-03 (1) 03-05 (2) 05-07 (1) 07-10 (3) 10-12 (2)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-10 (1) 10-14 (2) 14-15 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	00-05 (1) 05-06 (2) 06-08 (3) 08-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-22 (1)* 22-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-14 (1)	07-08 (1) 08-09 (2) 09-13 (1) 13-14 (2) 14-15 (4) 15-16 (3) 16-17 (1)	01-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-01 (2)	19-21 (1) 21-03 (2) 03-05 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*
McMurdo Sound, Antarctica	Nil	08-10 (1) 13-15 (1) 15-16 (2) 16-18 (1)	07-09 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	23-02 (1) 02-05 (2) 05-06 (1) 02-05 (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.

CIRCLE 41 ON READER SERVICE CARD

Radio User's Page

Today's Space Weather

Recent Space Environment Reports

- Joint USAF/NOAA Primary and Secondary HF Propagation Reports
- Report of Solar & Geophysical Activity
- Solar & Geophysical Activity Summary

Current Space Environment Alerts & Warnings

Auroral Activity Estimated from NOAA/TIROS Satellite

Ionospheric Data Sets

- Rice Magnetospheric Model
- Hiraiso Solar-Terrestrial Research Center
- Auroral Electrojet (Birkeland Current) Plot
- USAF Auroral Oval Display
- Current Total Electron Content (TEC) Data
- IPS Radio Space Services, Australia

Summary & Medium Range Forecasts

- Support for HF Radio in North America
- Weekly Summary and 27-day Forecast
- 27-day 10.7 cm, Ap, and Max Kp Outlook

Links to Other Radio Pages

Compliments of Yahoo!

Fig. 1– Radio User's selections from NOAA Space Environment Center Web page.

Data Sets" to the IPS Radio and Space Services site in Australia. This is another site which supplies a storehouse of useful data, including *real-time* HF propagation band predictions. These are called "Hourly Area Predictions" (HAP). They contain frequency predictions which are superimposed on area maps, given in UT, and upgraded every hour. HAPs are available in brilliant color centered on the following North American cities: Boston, Boulder, Montreal, New Orleans, San Francisco, Vancouver, White Horse, and Winnipeg. HAPs for North America can be reached from the NOAA "Radio User's Page" under "Summary & Medium Range Forecasts." Other IPS data can be obtained from the NOAA page by selecting "IPS Radio Space Services, Australia" under "Ionospheric Data Sets." This will link you directly to the IPS page. For direct access, the URL for the IPS Web site is: <http://www.ips.gov.au>.

If you do not have access to the Web pages, solar flux, geomagnetic indices, and ionospheric reports can be obtained by calling 303-497-3235 where a WWV recorded announcement is updated every three hours, or by calling the "on-duty forecaster" for a live report at the Space Environment Center 303- 497-3171. WWV, Ft. Collins, Colorado has similar geophysical alert broadcasts 18 minutes past each hour on 2.5, 5, 10, 15, and 20 MHz. Similar information is also carried at 45 minutes past each hour on 2.5, 5, 10, and 15 MHz from WWVH, Kauai, Hawaii.

Fig. 3 can be used to determine the quality of ionospheric propagation by using the solar flux values and geomagnetic indices that are provided by telephone or radio.

VHF Ionospheric Openings

While the CQ WW DX Contest does not include the VHF bands, some interesting ionospheric activity is likely to occur on these bands during October. Some fairly good meteor-scatter-type openings should be possible on the VHF bands around October 20th, when the two-day *Orionids* meteor shower is expected to begin. This should be a major shower, with a maximum hourly rate of at least 25 meteors.

Auroral activity usually increases during October, and some corresponding auroral-scatter-type and sporadic-*E* VHF openings can be expected during periods of such activity. The best days to check are those expected to be either Below Normal or Disturbed on the HF bands. See the Last-Minute Forecast at the beginning of this column for the days in October that are forecast to be in these categories.

CW Contest Forecast

This month's DX Propagation Charts are valid

SUBJ: HF RADIO PROPAGATION REPORT
JOINT USAF/NOAA BULLETIN PREPARED BY 55SWXS, FALCON AFB, CO.
PRIMARY HF RADIO PROPAGATION REPORT ISSUED AT 02/0500Z AUG 97.
PART I. SUMMARY 02/0000Z TO 02/0600Z AUG 97.
FORECAST 02/0600Z TO 02/1200Z AUG 97.

		QUADRANT			
		I	II	III	IV
		0 TO 90W	90W TO 180	180 TO 90E	90E TO 0
REGION	POLAR	N5	N5	N5	N5
	AURORAL	N4	N4	N5	N5
	MIDDLE	N5	N6	N6	N6
	LOW	N6	N6	N7	N7
	EQUATORIAL	N6	N7	N7	N7

PART II. GENERAL DESCRIPTION OF HF RADIO PROPAGATION CONDITIONS OBSERVED DURING THE 24 HOUR PERIOD ENDING 01/2400Z, AND FORECAST CONDITIONS FOR THE NEXT 24 HOURS.
A. OBSERVED CONDITIONS: HF PROPAGATION HAS BEEN NORMAL.
B. FORECAST CONDITIONS: EXPECT NORMAL HF PROPAGATION.
PART III. SUMMARY OF SOLAR FLARE INDUCED IONOSPHERIC DISTURBANCES WHICH MAY HAVE CAUSED SHORT WAVE FADES IN THE SUNLIT HEMISPHERE DURING THE 24 HOUR PERIOD ENDING 01/2400Z AUG. 97. NONE
PROBABILITY FOR THE NEXT 24 HOURS: NIL
PART IV. OBSERVED/FORECAST 10.7 CM FLUX AND K/AP.
THE OBSERVED 10.7 CM FLUX FOR 01 AUG 97 WAS 072.
THE FORECAST 10.7 CM FLUX FOR 02, 03, AND 04 AUG 97 ARE 071, 071, AND 071.
THE OBSERVED K/AP VALUE FOR 01 AUG 97 WAS 02/08.
THE FORECAST K/AP VALUES FOR 02, 03, AND 04 AUG 97 ARE 02/08, 02/10, AND 02/08.
SATELLITE X-RAY BACKGROUND: LT A1.0.
THE EFFECTIVE SUNSPOT NUMBER FOR 01 AUG 97 WAS 27.8.

Fig. 2– Sample of "Joint USAF/NOAA Primary and Secondary HF Propagation Report" available from the NOAA Space Environment Center Web page.

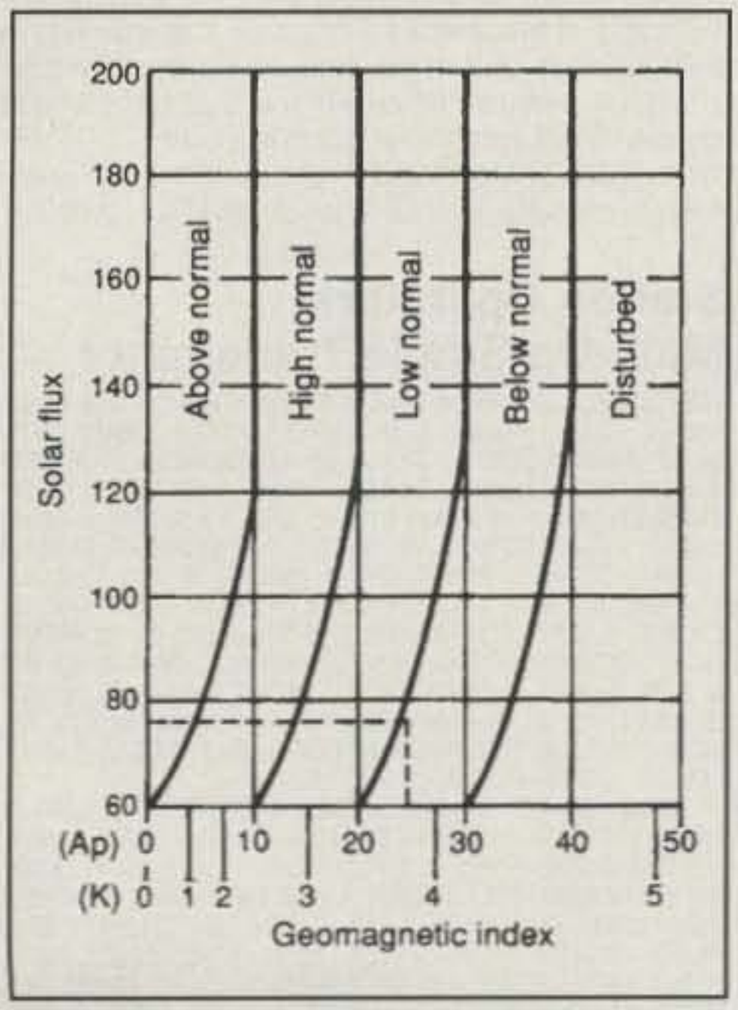


Fig. 3– Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: The solar flux is 75 and Ap is 25; therefore, expect Below Normal conditions.)

for both the SSB and CW sections of the CQ WW DX Contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

The NEW Shortwave Propagation Handbook makes an excellent companion during the CQ WW DX Contest. It contains a considerable amount of additional information concerning propagation, radio storms, do-it-yourself forecasting, and computer propagation programs. Copies can be obtained from *CQ* by calling toll-free 1-800-853-9797 (for $19.95 plus $4.00 s/h).

Experience from the past 46 contest years has shown that DX contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1997 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20915, or via e-mail to <g.jacobs@ieee.org>. Good luck in this year's CQ WW DX Contest!

73, George, W3ASK

ZONE LEADERS SINGLE OPERATOR

Zone	Call	Score	Zone	Call	Score
1	NL7RK	477,092	21	A71CW	5,985,043
2	VO2/WB8YTZ	255,706	22	VU2MTT	1,183,821
3	K6LA	1,731,660	23	JT1BH	331,315
4	K5GN	3,156,737	24	XX9X	4,117,548
5	K5ZD/1	5,461,830	25	JH5FXP	2,917,488
6	XE1VV	941,488	26	XV7SW	330,718
7	TI1C	7,346,856	27	DU1KK	1,363,440
8	8P9Z	8,650,620	28	YB1AQS	3,628,008
9	P40W	12,742,731	29	VK8AV	1,231,452
10	HC8N	11,116,880	30	VK1FF	1,865,958
11	ZX2X	753,255	31	KH6CC	47,629
12	CE3F	885,360	32	KH8/N5OLS	1,276,845
13	LU6ETB	1,554,092	33	3V8BB	5,489,376
14	CT8T	5,716,916	34	YL3IZ/MM	800,112
15	OM8A	4,601,610	35	6W1AE	1,908,253
16	RN6BY	2,835,726	36	ZD8DEZ	3,091,968
17	RA9AE	1,242,108	37	No Entry	
18	RZ9UA	867,680	38	3DAØNX	4,399,889
19	UAØJB	1,764,990	39	VQ9IE	729,030
20	4X7A	2,101,878	40	JW5NM	451,560

JY8B was activated by Ulli, DL5MBY (left), Georg, DK3QJ, and Steve, K7SP (not shown).

other five banders. Thanks to all who stayed with me to get the call correct. Only way I can make a stronger 100 watt signal is to improve the antennas. Wore me out but lots of fun! . . . *KJ9C.* I worked 5V7A and several Europeans stations when 20 meters opened up . . . *K6GT (ex-AB6YL).* Bottom of the cycle but condx were excellent on 20 and 15 . . . *K3SA.* Many stations were active. The band conditions cannot be as bad as we often think they are . . . *W8FDV (ex-KA8OUT).*

Condx seemed well down this year. Lots of mults, but very light volume into Europe . . . *K1ZM.* Great fun until the cold front came through with 6 hrs of thunderstorms and 70 mph winds. Then more great fun afterward but without 20m ant . . . *K5GN.* I had a great time even though I operated only 15 hours. Murphy struck in a big way just before the contest: my printer broke, I cut my finger repairing it, and 20 minutes before the contest my amp was lost. Fixed it and after that, I had a ball! Truly a great contest . . . *N2JT.* First time I have entered this CW contest. Great fun! . . . *K4UK.* Four and a half operators and a trainee for a MM equals no sleep and empty positions! At one time I was trying to cover three bands at the same time. We thought about doing a MS then decided to just have fun. That's exactly what we did! . . . *K4VX/Ø.*

The 40 meter propagation gods did not smile this time around. Biggest charge was working ZA1M for country number 100 as zero was fast closing! N6ZO/mm operating from Zone 34 helped out big time . . . *W8PX.* QRP even in the best of times is a challenge . . . *K5IID/8.* Having 5V7A pick me (Wow!) out of a fantastic pile-up put me in shock for a bit . . . *WA3DMH.* Best overall score in 46 years of contesting. Not bad for a tri-band beam on the higher bands . . . *W9LT/8.* Solar flux jumped to 100 on Sunday and all the bands were jumping in the final hours! . . . *K1TH.* Best moment was working C21BH for a new country on the first call . . . *NK6F.* This is my 50th year in this contest! . . . *K4FW/8.* Nice to have C21BH call me for a new one! First time with new call in the Mother of all Contests. This time more Qs but less Zs and Cs . . . *WO4O (ex-WA6KUI).*

Great contest! Awesome low bands first nite, QRN pits the second . . . *KØEJ/4.* Working 3C5A on 40 for a new one . . . *WA2YSJ.* The definite highlight for this low power, wire antenna station was having 3DAØNX answer my call on 80 meters! Plenty of juicy DX sunspots or not . . . *KM2L.* The best DX and most fun I've had in my ten months as a ham. Some nice openings to Europe and 19 new countries . . . *KQ6ES.* Breaking 100 QSOs and 10K! Working YB1AQS for first Indonesian contact . . . *WA2OCG/7.* I hate trap antennas! But sometimes you have no choice. But still nothing can beat a monoband Yagi. The question remains if I will have it next year? Maybe . . . *W3UA/5.* Really enjoyed contest. This was the first contest since winning the 1970 YV gold medal for North America. Will be back! . . . *W4ONO.*

Highlight was working HC8N (with my 4.5 W) 10 minutes before I left for work . . . *WD9IAB.* My sympathies to IG9/IT9GSF for tough call to work with during contest . . . *K6BWX.* After playing with several state QSO parties, I decided to work some of the CQ WW CW contest. Had a great time listening to hundreds of "world class" operators. I no longer think that 20 wpm is fast! . . . *K4NR.* Happy to get C21BH, 3V8BB, and 5X4F. Thanks to them for being there . . . *K3GW.* Very first time on 160 contesting! What a challenge . . . *K1UO.* Worked everyone I heard on 10 and that was not much . . . *K4JYO.* Thanks for sponsoring this contest. It sure seems to bring out the world's best . . . *K8UC.* Released from hospital Monday after total hip replacement so couldn't make much of an effort, but still had to get my feet wet . . . *W6NKR.*

First contest with computer controlled radio + packet. What a blast! . . . *NE3F.* The CW speeds keep getting higher and higher. There are some really great operators out there. Wouldn't miss it for the world! . . . *W8KTQ.* Fifteen meters came to life with a nice opening to EU and Africa. Just another FB contest . . . *K6VX.* This was my 46th CQ WW entry for both modes and I have enjoyed every minute over the years. Keep them coming! . . . *W5FO.* Great conditions! I believe *CQ* has an in with the solar flux gods! . . . *KS1L.* First time with no packet in several years; it's great! I'm hooked on unassisted again. Forty percent more QSOs than last year when I used packet. Mults way down but I can work on that . . . *WZ6Z.* I had a fun contact when I was called by a NH2 and a LU at the same time. Sent both a report and both said "OK." Two for one QSO! . . . *K7ABV.*

High winds the afternoon before the contest created an intermittent at the 5-element 20 meter feed point. Kudos to N7QQ, who spent the day on the 20 meter tower and then took the night shift on 80 . . . *W6BA.* Great job by 5V7A team. Great signals 160-15 . . . *K8RF.* Our goal was 1000 QSOs and a million points. We were very happy that we passed that point. The entire multi station, from a desk to antennas, was built in two weeks. We worked on antennas, stubs, and switching right up to the last minute. We are very proud of our 12 year operator, KG2HV, who showed up at 5:30 in the morning to operate. He was able to run for us on 20 meters. Think we will up the goal next year to 3 million points and 2000 QSOs . . . *N2FF.* Thrilled by working Northern Ireland from central Texas on 80 meters with 5 watts! . . . *NZ5A.*

Eleven years since last contest. Wasn't sure what country I was working. Prefixes are so different . . . *K6SE.* I had an unbelievably clear freq during the EU run both days! Ran exactly 400 stations Saturday morning on the same freq in 4 hrs and 40 minutes, peaking at 111 with low power! . . . *N8II.* Did the contest from a laptop and telephone at home via a remote HF site on Vashon Island. All the comforts of home with a saltwater antenna site! . . . *K7SS/Remote.* Wish A61AJ had listened for W's, but I guess it is more interesting to work Europe from A6! . . . *N6AR/4.* First time on 20 meters in any contest. Had a great time! First time I wrked JA—five of them . . . *WA2VQV.* Chemotherapy can interfere with a great contest. I will be back in 97! . . . *NA2Q.*

Amazing what can be done from an apartment with a mediocre antenna at the bottom of the sunspot cycle . . . *N7RK.* Thanks to all those big guns willing to listen and dig out my QRP signal. I worked hard for every contact my 5W got me. Enjoyed the contest . . . *K8OUA.* This is my second CQ WW CW. I was pleased to more than double my score from '95. Worked seven new countries including JA, immediately followed by my second, third, and fourth JAs! Used only 50 watts to avoid WAHE (Worked All Home Electronics). I used a 2-element X-beam in my townhouse attic fixed east. I also used a "stealth" vertical—a metal chimney liner 25 ft. high . . . *N3UMA.* Three IC-706's in car and mag-mount on the roof. The old K2VV 20 meter signal is in retirement until I get established in Missouri . . . *K2VV.*

Was it the new antenna farm or the snappy new 1×2 call that made this the most fun I've ever had in a DX contest, and at the sunspot minimum at that! . . . *K6LA.* With all the racket and a piece of wire in my apartment, I got 5V7A! There is a God . . . *N7RAP.* Working 3W5FM on 40 QRP. Was anyone else crazy enough to do 40 meter QRP single band? . . . *WØKEA.*

Station Operators
Multi-Op Single Transmitter

3C5A: N5AW, N6ZZ. **4N6N:** YU6GB, Poleksic, Jovanovic, Spasojevic, Radovic, Vujovic, Popovic. **5X4F &** N3BNA, KE4EW. **9U5DX:** F5FHI, EA1BB. **A45ZN &** SMØCXU. **AA1LN &** NV1U. **AA2FB &** K2QMF. **AB2E &** NU3Y, WA2UDT, WK2G. **AC4HB &** others. **CI2ZP:** VA3ZC, VE2ZP. **CT3/DL5YM &** DL1CW. **D44BC &** DK7YY, DL2OAP, DL2OBF, DL3DXX. **DAØRP:** DJØJE, DA2KW/K5VK, DH3PAJ, DA2KI/KB2SRS. **DF3CB &** DL1MFL, DL4MEH. **DKØEE:** DK2OY, DK6WL, DJ7CN, DL4MCF, DL4MDO, DL4MEH, DL4RCM. **DKØNT:** DJ6RN, DJ3TF, DK6NJ, DL5RDO, DJ5RE, DK1RP. **DKØTZ:** DL1SBF, DL4AAE, DF5EN. **DKØZG:** DJ2RG, DJ5WG DL6MPG, DL8CYG, DL8MUG. **DK1II &** DJ7MG. **DLØUM:** DL1EFO, DL1EFD, DK7ZT, DK7FP. **DL3SKF &** DL4SKF. **DL4SKF &** DL3SKF. **DL6RAI &** DL2NBU, DL4RDJ. **DL7AU &** DL7BY, DL7IO, DL7UBA, DL7URH. **EA5BY &** EA5BXT, EA5EU, EA5FID, EA5GRV, EA5KW, EA5SM.

EA6IB: EA3AIR, EA3AKY, EA3ALV, EA3DU, EA3KU, EA6ACC, EA6FB, EA6FO, EA6PZ. **EA7TH &** EA7DPU, EA7GYS, EA7KW. **EM7Q:** UR5QN, UR4QFE. **ES5Q:** ES5MC, ES5MG, ES5RN, ES5RY. **EU5F:** EU6DX, EW6MM, EV6Z, EW6AW, EV6M. **EW5P:** EW6DX, EW6CM, EW6AL. **EX9A:** EX2M, EXØM, EX8W. **F5JVP &** F6CEL, F6ENO. **F5KPG:** FA1ITF, FB1NZQ, F5AMQ, F5LJY, F5SMS, F5IQA, F5SDT, F6IFY, F6BGC, F6BNH, F5UHE, FB1CMF. **F5MWW &** F6GYU. **F6KEQ:** Club. **F6KLO:** F6JSZ, F5NBX, F6GRU, F1MCO, FB1IPH. **FS5PL &** K6CT, K9VV, N7RT. **G6D:** G3LZQ, G3SJJ, G3WYW, G3ZRS, G4BYG, G4DRS, G4MVA, G4TSH. **HB9AA:** HB9ARF, HB9IAE, HB9AFV, HB9DCM, HB9IAL. **HG1G:** HA1TJ, HA1DAC, HA1AV, HA1BN, HA1DAE, HG1DAI, HA1AR. **HG5A:** HA5IW, HA5GF, HA5TI, HA5OM, HA5FM, HA5AWH, HA5BSW, HA5CCC, HA5CQA, HA7RY, HG5CNC. **HG5M:** HA5MY, HA5WA, HA5OF, HA5PP, HA5BVD, HA1DK.

HG6Y: HA3NS, HA3NU, HA3OV, HA6OL/3, HA6DX, HA6OB,

HA6OY, HA7PO, Zsolti, HA6OI. **HSØAC:** LA7JO, VK3DXI, YU7AU, YU7EF, SM3DYU, WAØRJY. **II1R:** IK1LWL, I1NVU, IK1QBT, IK1DPA and supporters. **II2K:** I2KHM, I2ELJ, IK2MMF, IK2UCK, I2GXS Jr. **II4R:** IK4UOP, IK4CFV, IK4UNZ. **IL3/IK3VIA:** IK3VIA, IK3QAR. **IO2L:** IK2MLV, IK2NCF, IK2NCJ, IK2NVU, IK2PFL, IK2PIG, IK2JUB, IZ2AAJ, IZ2ABW, IZ2ACZ. **IQ4A:** I4IND, I4LCK, I4EAT, I4IKW, I4TJE, I4YRW, IK4EWK, IK4DCT, IK4XQH, IK4QJH, IK4CZF, IK4MGP, IW4ANU. **J6DX:** ACØS, K9JE, N8SM, N8NR, W9UI, W8QID, N9AG. **JAØYAK:** JEØETP, JFØESV. **JA2YKA:** JP2QNB, JS2ERL, JI4RDO, JL7JRO. **JA2ZJW:** JH2CMI, JL2ICO, JM2NFQ, JA2MNB, JK2XXK, JE2PCY, JL2WNA. **JA3ZOH:** JH3PRR, JG3KIV, JI3OPA, JH4IFF, JH4NMT. **JE6ZIH:** JR6GKT, JE6UXS, JI6BRB, JG4KEZ. **JHØZHQ:** JH1BBT, JH1TXG, JK1GKG.

JR1ZTT: JE1ATM, JRØUUU, JRØXHL, JEØBKI. **JT1T:** JT1CD, JT1BV, JT1BL, JT5AA. **JY8B:** DL5MBY (JY8YB), K7SP (JY8SP), DK3QJ (JY9QJ). **K1AR &** K1EA, K1GQ, K1MM, K5ZD. **K1GW:** K1ART, W6PH. **K1KP &** N1OEK, K1OA, KB2R, NY1L. **K1OZ &** K1RX, KF1V, K1EPJ. **K1ZZ &** K1RO. **K2TE/1 &** NE1V, W1SU. **K2VV/M &** KA2CUP, KB2QPL. **K3CP &** NU3L, KU3K. **K4QD &** AD4TG, AF4Z, K4AW, K4PX, KC4HW, KT4DI, W4JHH, W8CQN. **K5BN:** K5AAD, K5GA, N5JJ, K5NZ, WA5POK, NM5M. **K5KG &** W6TER. **K5MDX:** N5FG, WQ5L. **K5RT &** K5MR, N5KM, NJ1V, W7CT. **K6ANP &** K6LRN. **K6RO &** KC6X, K5KT. **K6ZM:** NH7A, AC6CI, KE6TCW. **K8AZ &** K8BL, K8NZ, N8AA, N8ATR, N8LXS, NX8R, W8CAR, W8KIC, WT8C. **K8LX &** N8EA, WA8ZDT. **K9UWA &** KR9U, KR9V, KC9LA, KA9A, N9NØ. **KB1H &** AA1CE, K1EBY, NB1U, K1DW. **KB3TS &** KE3RR. **KE4GI &** N1XYR, N1XYS. **KHØDQ &** JF1SQC, NH2C/JI3ERV, AL7NC/JK3GAD, WI3O/JR7OMD.

KM9D/C6A & N9NC. **KVØQ &** KTØF, WX7K, WBØHBS, KØKE. **KZ1M &** WA1HYN, N1MD, NM1Q, AND KA1ZNZ. **LA8SDA &** LA4DCA. **LU4DRC:** LU7EE, LW9ETY, LW6EFP, LW1EXU. **LX/DFØBK:** DL8SCG, DL5SEJ, DL4SDW, DL4SDX. **LY1DQ &** LY2BOS. **LY1DS &** LY1DR. **LY3AV:** LY1CX, LY1CQ, LY3BP. **LZ2KMS:** LZ2CG, LZ2XW, LZ4JO. **LZ6A:** LZ2EG, LZ3YY, LZ4BC. **LZ7M:** LZ1UQ, LZ3AS, LZ3DJ, LZ3FR, LZ3FN, LZ3SM, LZ4FN, LZ4AX, Gosho, Krasi, Ventzi, Yanko, Yasen. **LZ7N:** LZ1NG, LZ1HI, LZ1JZ, LZ1NX, LZ1VR, LZ1CAM, LZ3AB, LZ3AX, LZ3OY, LZ4IC, LZ5OL. **LZ9A:** RVØAM, LZ1UK, LZ1ZX, LZ2CC, LZ2DF, LZ2HE, LZ2HM, LZ2JE, LZ2PO, LZ2PS, LZ2TT, LZ2TX, LZ3DJ, LZ4UU. **M6A:** G4EOF, G4ZFE, 5B4WN, G3RIR, G4ARI, G4GVC. **NØZA &** KØUK, KØCL. **N1AU &** K1BB. **N1MD &** KZ1M, KA1ZNZ. **N2FF &** N2GA, AA2XY, KF2ER, KG2HV, AA2GC. **N2LBR &** WA1KKM.

N3OC & ND3A, WR3Z. **N6CQ/3 &** K3SV. **N6RV &** K6HMA, N6EV, W6UL, N6NW. **NCØP &** NØNI, WOØV, WAØFLS, WRØG. **NK7U &** N7BZ, KK7A. **NN7L &** AA7CQ. **NP4Z:** AA5DX, K5GO, KP4BZ, KP3L, NP3A, NP3J. **NXØI &** others. **OE1A:** OE1EMS, OE1SZW, OE4BKU, OM3LA. **OE3S:** OE1ETA, OE2GEN, OE2LCM, OE2VEL, OE3GSA. **OI2E:** OH1JT, OH1JZL, OH2BVI, OH2BZY, OH2HE, OH2IW, OH2JA, OH2JNX, OH2JQS, OH2KVH, OH2KXK, K3FK, K8MN. **OI5N:** OH1WZ, OH5TQ, OH5TS, OH5KW, OH5UX. **OI7T:** OH4LYX, OH6LNI, OH7MHL, OH7LTK, OH7WV, OH7KD. **OK1KUO:** OK1FFC, OK1UG. **OK2KOD:** OK2BDI, OK2BJ. **OK5W:** OK1AEZ, OK1CF, OK1WF, OK1TA, OK1WT, OK1JKT, OK1FKD. **OL2A:** OK2PDK, OK2HBY, OK2PEM. **OL3A:** OK1AY, OK1CM, OK1DRQ, OK1FCJ, OK1MD, OK1MR, OK1RR. **OM3A:** OM3DX, OM8AM, OMØWR. **OT6P:** ON4GO, ON4LAM, ON4TH, ON5OO, ON6AH, ON6MH, ON6QR, ON6VL, ON7PC, ON7LE, ON5AV, N4XYA.

OT6T: ON5UK, DJ4AX, RA3AUU, UT4UZ, RW1AC, RV1AW, ON4UN, ON4MA, ON4JO, ON4AFZ, ON4PO. **PI4ZLD:** PA3BTH, DF6JC, PA3EOB, PA3GCU, NL8884. **RKØQ:** UAØQDL, UAØQN, UAØQAS. **RK3UWA:** Parfenov, Golikov, Gusaryov. **RK4WWA:** UA4WA, RW4WA, UA4WAN. **RK6AYN:** RN6BP, RW6ACM, UA6AH. **RK9CWW:** UA9FQY, UA9CDC, RZ9CO, RU9CO, UA9CDT, Rusakov, RA9CMO. **RQ4L:** UA4LCQ, UA4LA, UA4LL, UA4LM, UA4LCH, RA4LFG. **RU6LWZ:** UA6LO, UA6LV, UA6LFQ, UR5MVZ, RA6LBX, RN6MM, RV6AJJ/6. **RW2F:** RA2FA, RN2FA, UA2FB, UA2FC, UA2FF, UA2FM, UA2FX, UA2FZ. **RW6AWT:** RN6BN, RA6AX, UA6AJU, UA6NP, RA6YY, RA6AU, RX6BA, RN6AL, RN6AA. **RW9OWD:** RA9OW, RW9OW, UA9OIL, UA9OLW, UA9OIW, UA9OAO. **RZ1AWO:** RA1ARZ, UA1-169-1332. **RZ4AYT:** UA4AIY, UA4ALI, UA9COD, UA4-156-1Ø57 **S5ØG:** S58M, S51QN, S57MAD, S57NRO.

SK4AO: SM4PEL, SM4ATJ, SM4KSM, SM4HFI, SM4RMH. **SK5AA:** SM5ACQ, SM5LNE. **SK6FM:** SM7BUA, SM6MCW, SM6FKF, SM6DYK. **SLØCB:** SMØGNU, SMØMXO, SMØTXT. **SM3KOR:** NØCKZ, SMØJHF, SMØDRD, SMØKCO. **SM5HJZ:** SMØAJV, SMØGNS, SMØHJZ, SMØHPL, SMØIHR. **SN2B:** SP2FAX, SP3ASN, SP3RBI, SP3RBR, SP8NR, SP8RX(DJØIF), SP2QVI, SP2SGL, SP2WII, SP2BMX. **SP2KFU:** Przyjemski, Badowski. **SP9KRT:** SP9-1753, SP9IIL, SP9DH, OK8AMR. **T9DX:** T9/OI6XY, T92A, T93M, T93Y, T94CW, T94NE, T94NF, T94OF, T94TU, T97M, T99S. **TF5ØIRA:** TF3EJ, TF3GB, TF3DC, TF3HP. **TM2Y:** F6BEE, F6ARC, F6FGZ, F5NLY, F6FVY, F5LND, F/OK1FWM. **UN8FB:** UN7FAR, UN8FM, UN9FB, UN9FM, UN7FK. **UR4LWY:** UR5LJC, US4LPF, US-L-1Ø18. **UR4LZA:** UY5DV, UR4LEP, UR4LEQ.

UR4MWU: UR5MB, UR5MA, UR5MFE, UR4MT. **UR4PWC:** USP-272, USP-273, UT4PZ. **UR4QZF:** UR5QKG, UR4QMP, UR4QKR. **US3I:** UR3IBM, UR5IFX, UR5IFB, US2IMA, UY3IM, UR3IDV, UR3IEW, US2IES. **US4LWM:** US-L-1Ø24, US-L-1Ø25, US-L-11Ø3, US-L-11Ø4, US-L-11Ø5. **UT7W:** UR5WCW, UT1WL, UT7WA, UT7WZ, UX2WN. **UU5J:** UU1JA, UU2JQ, UU2JZ, UU3JD, UU5JR, UUØJX. **V47VJ:** G4ZVJ, G4RWD. **VE3DC:** VE3SS, VE3OCY, VE3OZY, VE3STT, VE3VMO. **VE3EJ &** VA3DX, VE3KZ, VE3IY, G4VXE. **VE6JY &** G3OUF, VE6BF, VE6WQ, VE6LDX. **VK4EMM &** VK4XY. **VO2WL:** NB3O, N3GM, K3TM. **VR2SS &** UA3QJC. **VS6WO &** VR2NR. **W1NR &** W1BK. **W3GG &** AA3KX, WD3I. **W4PRO &** W4DHZ, WB4DNL, K4IX. **W4WA &** AA4GA, KB4GID, AE6E, KE4ZQD. **W5MJ &** N5RP, N7XX, K1OJ. **W6OAT &** AI6V. **W8AV &** K3JT, K4LT, AF8A, KU8E, W8RZ, WB8WTS. **WU3A &** NS2K, KF5FK & NO2R.

XE2L & XE2DV, XE2BEY, XE2BGD, XE2BRL, K6LL, N6HC, N6WS, N6VR. **YBØASI:** W9NGA, K4RB. **YBØZBB:** YBØKII, YCØBUI, YCØWWW. **YO6KBM:** YO6LV, YO6DDF. **YO9KPD:** YO9IF, YO9AFG. **YU1L:** YT1MS, YT1VA, Ilic Ivica. **Z37FCA:** Club. **ZF2RF:** K4UVT, K9LA, K9MK, N5HRG, AADCY, N9NS.

Station Operators
Multi-Op Multi-Transmitter

5V7A: KC7V, N7BG, K5VT, K7PN, K7GE, W6RGG, N7MB, G3SXW, GM3YTS, G4FAM. **7SØMG:** SMØKV, SMØBYD. **9A1A:** 9A5W, 9A2DQ, 9A9A, 9A6D, 9A3GW, 9A2SD, 9A2TS, 9A2EU, 9A3NR, 9A2R, 9A7R, 9A6A, S51R, 9A9AA, 9A3ZA. **C21BH:** JA1BK, N4GN, N6HR, OH2BH, SM7PKK. **DFØHQ:** DJ6TF, DL1AUZ, DL3OI, DL5ANT, DL5AXX, DL5MX, DL5YY, DL6UST, DL7VOA, DL8WAA. **DK5EZ &** DJ2YE, DK4TP, DL3EBX, DL8EAQ. **DLØKF:** DJ3UL, DJ6TN, DL8LAQ, DF6LI, DK3UA, DJ4FZ, DL9PY, DJ7SW, DF4PA, DL4LBK, DK5TI, DK8LV, DK9AV, DL3LBX, DG2LBF, DL3LAT, DL6LAG. **EA4ML:** EA4AFA, EA4AKQ, EA4CJA, EA4EKR, EA4ET, EA4KA, EA4MY, EA4MC, EA4NN, EA4TX, EA4UA, EA7CEZ, EB4EPJ, EC4AEG. **EM2I:** UT2IA, UT2IB, UT2ID, UT2II, UT2IJ, UT2IM, UT2IO, UT2IV, UT2IY, US2IR, US2IZ, US1ITU, UT8IM, UR5IOK, UX1IL.

G3SSO: G3ZRJ, G3LVP, GØFXQ. **GU3HFN:** GU4WRP, GU3MBS, GU4EON, G3IZD. **HH2B &** N4WW, NX4N, KØLUZ. **IR5R:** I5JHW, IK5QQE, IK5YZT, I5NSR, I5IIG. **J39A:** K1XM, KQ1F, K2WR, WA1S, W1FJ, KM1P. **J45T:** SV5TH, SV5VR, SV5ADD, SV5BYT, SV5BYV, SV5DZQ, SV5DZS, SV5DZT, KB4PMS. **JA1YDU:** JHØNZN, JF7TFK, JP1CWU, JL7MYL, Mizuno, JG3AXP, Ukyo, JL1WFD, JFØEGG, JA9VDA, N3NQL, JP1OGL, Nada, JHØLFE, JH6WHN. **JA1YXP:** JA1VXQ, JF1QOW, JI1UTP, JK1ATC, JM1UWB, JQ1UXN, 7K1EWD, 7L1ETO, 7M1WGZ, 7M2IXD, 7L3OCU, JJ2JQF, JL2FJA, Gerry, Tokuzo. **JA3YBF:** JA3FGJ, JL3AKW, JR3RYI, JH3NFZ, JF3NAL, JH4DHX, JF3KZB, JE3PED, JA9TOZ, JF3PGA, JJ2ICA, JJ3IMX, JF4FUF, JG4CLV, JO3LDN, JL1PEI, JJ3BDG, JR4AGT. **JA3YKC:** JP2BZE, JH3RHQ, JO3UGI, JP3PZD, JP3SMB, JS3OGO, JG4LSR, JL4CVB, JE5DTS, JL6BMJ, JP6RBN, JQ6CUT, Sakusha.

JH5ZJS: JA5BJC, JA5FDJ, JA5JCC, JH5RXS, JR5JAQ, JR5VHU. **JO1YAO:** JA1PEJ, JM1AZO, JM1NKT, JH1RFM, JR1PIZ. **KØRF &** AAØRS, K4XU, K7TD, KØAV, KIØG, NØAH, W1XE, Randy. **K1KI &** K1PI, K1RM, K1TO, KA1TAF, W1OD, W1RM, K2KQ, W2EQ. **K2LE/1 &** W2AX, N1BB, N2UN, NB1B, K1CB. **K1TI &** W1MD, K1CA, K1TR, K1BG. **K1TTT &** KB1W, NT2X, AB2AP, KB2ZIC, WR2I, AA1AS, UR5LAW. **K2AJY &** N1DS. **K3ANS &** N2BIM, N2KJM, AJ2U, N3JGX, N3XKG. **K3LR &** N3RA, W3YQ, K3UA, K3EST, N9RV, KB3AFT, ND8L, KA3JWJ, K8CX. **K4VX/Ø &** KW9KW, K9BGL, N9JF, W9WI, NØNX. **K7FR &** K7VI, W7WMO, KA7EKL. **K8CC &** AC8W, K8DD, K8JM, K8MM, N8CC, N8CQA, VA3NA, VA3EFM, W8JJ, W8MJ, WA8RRR. **KC1XX &** AD1C, K1DG, KC1F, KM3T, DL7ALM, AA1ND, NW1U, K1XX, KD1EO, Christine. **KS9K &** AG9A, N1RR, NB9C, K8GL, N9NW, K9PG, KA9FOX, WE9V.

LY5A: LY1BA, LY1DC, LY2BKW, LY2BTA, LY2IJ, LY2MW, LY2PAJ, LY2PX. **LY7A:** LY1DI, LY1EE, LY2AO, LY2BMX, LY2NK, LY2UF, LY3BAD, LY3DA, LY4AA, LY4AF, LYR-346, LYR-728. **N1TT &** W1ES, W1IA, K1TWF, K1WD, WO1N, WT1T, W1TQ, N1IWV. **N2RM &** WW2Y, K2WI, N2NC, N2AA, W2REH, WH2Z, N2NU, K2BM. **N3RS &** WA3LRO, W3UM, N3ED, N3RD, N2SR. **NJ4F &** K4EC, K4GMH, KA4RRU, W4CE, Diasy. **NL7G &** KL7Y, WL7E, KL7PJ, N7DF. **NM3K &** N3ISH, WV3F. **OH1AJ:** OH1JM, OH1WR, OH1MKT. **OH3AT:** OH3NBJ, OH3DC, OH3FS. **OI4JFN:** OH4MFA, OH4KEC, OH4EA, OH4KZM, OH4JFN. **OZ5W:** OZ1FTE, OZ1FTU, OZ1KRF. **OZ5WQ &** OZ1BIZ, OZ3PE, OZ3ZW. **PI4COM:** PA3BBP, PA3BWD, PA3CAL, PA3DMH, PA3ERC, PA3EWP, PA3GBQ, PA3BXC, PA3CTM, PA3ERL, PA3EYZ, PA3FRN. **SV1AFA:** SV1DPJ, SV1CDN, SV1CIB.

SV1SV: SV1IW, SV1KU, SV1MF, SV1TN, SV8ZS, SV1AHV, SV1BKE, SV1CDM, SV1DKL. **VE9DH:** K2NJ, KB2VIE, NR2H, W2EN, W1VE, VE9AO, VE9DX. **WØAIH/9 &** NØKK, N9CK, AA9OC, WT9Q, AA9D, NE9U, AAØZZ, K5ZO, KØTG, WAØRBW, KMØO, NØAXL. **W3EA &** WB3FIZ, WB3LFZ, W3FV, W8FJ, WU3M, K3WJV, WE3C, WB2R. **W3LPL &** K1HTV, K2YWE, AI3M, K3MQH, K3NA, K3RA, W3UR, W4ZV, K4ZW, K6ZH, KO7V. **W4MYA &** WA4QDM. **W6BA &** W6HT, W6RW, W6SR, K6CU, K6HMS, K6WS, KC6CNV, N6AW, N6RT, N7QQ. **W7RM &** K7NT, N6TR, K9JF, W2VJN, NØAX, N7EPD, WJ7R, W7YAQ, K5ZM, W7BX, AA7KF, KQ7I, K7RO, K7QQ. **WH6R &** AH6MZ, K1CC, NL7GP, K1ER, KH6IFN, KH6JAT, KH6U, WH6T, K7VAY, WH6XR. **ZM2K:** ZL1AIZ, ZL2AGY, ZL2AHC, ZL2AL, ZL2BA, ZL2BSJ, ZL2IR, ZL2AMI, ZL2ASD, ZL2IQ, ZL2UDF.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (All country terminology reflects the DXCC list at the time of the contest.)

CW RESULTS SINGLE OPERATOR NORTH AMERICA

UNITED STATES

K5ZD/1	**A**	**5,461,830**	**3061**	**144**	**469**
W1KM	**"**	**5,307,693**	**3153**	**138**	**441**
N6BV/1	**"**	**4,045,252**	**2672**	**123**	**404**
KQ2M/1	**"**	**3,717,277**	**2277**	**126**	**443**
W1WEF	**"**	**3,673,972**	**2316**	**132**	**425**
K1AM	"	3,275,935	2251	123	382
K1VR	"	2,716,208	1870	117	389
K5MA/1	"	2,512,846	1818	116	362
AA1ON	"	1,468,641	1327	98	295
WU1ITU	"	1,217,415	1732	70	223
				(Opr. KA1R)	
KV1W	"	1,156,237	1151	85	264
				(Opr. K1MBO)	
WA1LNP	"	1,126,350	912	105	345
K1HI	"	1,106,854	1119	81	265
N4XR/1	"	754,527	562	125	364
W1EYT	"	733,858	629	108	314
W1WFZ	"	602,330	693	76	234
W1AX	"	572,234	620	84	254
AA1HB	"	553,880	661	79	226
W1RH	"	408,676	520	70	214
W3SOH/1	"	255,068	380	57	185
WØMHK/1	"	236,334	274	76	255
W1CX	"	209,954	337	59	167
KA1DWX	"	186,990	294	60	170
N1SOH	"	160,820	283	56	164
				(Opr. W1FM)	
K1BV	"	57,354	177	37	84
N1RL	"	23,876	94	31	63
WA1CFS	"	23,400	128	30	70
NJ1F	"	4,368	42	20	28
AE1D	"	4,365	75	16	29
KB1SO	**14**	**439,698**	**1275**	**31**	**102**
K1EFI	"	153,408	382	31	110
K1JB	"	26,964	119	25	59
WS1M	**7**	**239,219**	**682**	**29**	**110**
K1VWL	"	130,520	365	31	99
WR1P	"	7,250	56	15	35
W1MK	**3.5**	**329,278**	**967**	**28**	**94**
K1UO	**1.8**	**32,320**	**168**	**17**	**63**
K2LP/1	"	7,080	64	7	33
***KM1X**	**A**	**1,065,582**	**1073**	**86**	**292**
***WT1O**	**"**	**963,600**	**1022**	**83**	**282**
***WS1E**	**"**	**799,890**	**773**	**95**	**295**
*K1HT	"	515,596	560	86	246
*K1NO	"	461,692	541	79	229
				(Opr. K5FUV)	
*W1EQ	"	366,080	508	67	193
*K1MO	"	360,920	466	70	210
*K1VUT	"	228,573	355	63	170
*WZ1K	"	123,540	223	65	148
*WT2Q/1	"	100,746	214	52	122
*N1ET	"	76,024	203	32	104
*KA1CLV	"	69,984	175	34	110
*K1VSJ	"	66,430	188	40	90
*KD1YN	"	52,060	142	37	100
*WA1HYN	"	46,644	127	40	98
*AI6E/1	"	44,341	129	43	96
*W1CNU	"	25,662	91	21	53
*NR1F	"	11,766	95	23	65
*K2MN/1	"	7,102	48	15	38
*AA1OK	"	6,384	46	20	37
*WA1TTE	"	1,650	23	13	17
*W3EP/1	28	2,752	34	13	19
***WA1FCN**	**21**	**85,239**	**304**	**22**	**77**
*NX1C	7	2,670	35	11	19
***W1UK**	**3.5**	**46,729**	**210**	**19**	**64**
*WV1C	"	7,395	66	11	40
N2NT	**A**	**4,794,086**	**2763**	**137**	**470**
N2LT	**"**	**4,344,384**	**2673**	**132**	**429**
W2RQ	**"**	**4,119,903**	**2791**	**119**	**394**
NJ2L	"	2,522,414	1844	122	357
W2FU	"	1,393,185	1242	103	290
KA2HMJ	"	845,152	950	78	230
WA2VYA	"	783,332	682	103	315
KW2J	"	685,368	732	95	239
N2WK	"	556,404	514	103	295
N2MR	"	282,796	413	60	184
NA2M	"	274,432	375	74	194
W2XL	"	264,384	478	49	143
K2AW	"	254,188	422	57	161
WB2YQH	"	222,425	367	54	163
N2PEB	"	201,213	322	68	169
K2MP	"	150,120	256	61	155
K2JLA	"	125,840	261	48	128
W2HCA	"	122,688	236	54	138
AJ2U	"	115,434	234	58	140
KN2Q	"	103,005	212	66	123
K2JL	"	102,312	208	63	133
W2EZ	"	74,720	161	40	120
W1ZR/2	"	47,970	138	35	88
WB2JFP	"	44,488	137	44	90
KB2NU	"	41,021	118	40	87
W2UE	"	25,602	88	40	62
K2YR	"	11,400	57	30	46
KG2BI	"	11,088	70	22	44
KE2UV	"	8,618	52	20	42
K2FR	"	5,115	41	24	31
W2AOY	"	3,912	34	13	26
WA2NPD	"	1,138	28	19	24
N2AU	28	2,088	37	9	20
W2II	**14**	**425,858**	**1101**	**33**	**109**
K1ZM/2	**7**	**593,850**	**1145**	**38**	**147**
NA2X	"	40,215	141	31	74
W2PAU	"	31,392	119	27	69
K2PS	**3.5**	**91,584**	**304**	**22**	**84**
W2FR	"	16,380	86	15	55
K2JF	"	7,260	60	9	35
W2VO	**1.8**	**20,382**	**120**	**18**	**61**
***K2SG**	**A**	**2,158,728**	**1601**	**118**	**363**
***N2BA**	**"**	**1,919,598**	**1578**	**104**	**359**
***NA2U**	**"**	**860,394**	**845**	**97**	**289**
*N2ED	"	427,721	506	72	229
*K2UF	"	330,561	415	81	216
*WØVU/2	"	267,180	437	57	162
*KM2L	"	230,832	365	57	172
*W2TZ	"	167,076	273	59	162
*WA2YSJ	"	135,432	260	54	144
*K2SZ	"	129,960	247	59	131
*KA2D	"	123,500	240	51	139
*WA2C	"	90,424	198	52	126
*NA2Q	"	67,340	176	45	95
*K2ZA	"	58,917	172	33	90
*KA2GSL	"	55,624	161	40	96
*WA2VQV	"	28,416	116	28	68
*W2OP	"	19,780	81	34	58
*K2SWZ	"	17,028	81	25	61
*KF2C	"	14,136	95	26	50
*W2LRO	"	12,075	115	28	47
*N2MBM	"	3,800	40	9	35
*K2LUQ	"	3,564	16	9	12
*WA2ASQ	21	10,092	70	16	42
***K2MFY**	**14**	**163,240**	**411**	**30**	**110**
*WB2ZMK	"	49,197	185	22	71
***AA2SZ**	**7**	**88,689**	**239**	**33**	**108**
*W2ESX	3.5	16,500	108	13	42
K3ZO	**A**	**4,096,170**	**2477**	**140**	**445**
KT3Y	**"**	**3,491,818**	**2358**	**119**	**398**
W3BGN	**"**	**3,395,878**	**2261**	**122**	**399**
W3AP	"	1,537,900	1191	116	339
W3RJ	"	1,392,780	1178	108	309
N9GG/3	"	1,337,014	1387	86	257
W3HVQ	"	756,378	825	81	241
W3AZ	"	648,274	625	100	273
WF3J	"	594,758	619	92	255
W3UJ	"	484,846	582	70	228
W3AU	"	460,314	516	86	235
K3ATO	"	422,636	480	82	250
KL7HIR/W3	"	356,427	432	84	223
N3KR	"	301,568	437	57	191
W3GU	"	282,719	410	72	197
N3RW	"	223,744	327	69	187
W3GN	"	210,938	320	72	175
W3EVW	"	192,260	296	62	148
K4JLD/3	"	192,148	290	64	178
W3NX	"	175,512	298	57	156
AD8J/3	"	167,090	284	58	159
AJ3K	"	62,370	172	38	97
W3TWI	"	33,275	110	40	81
K3GW	**14**	**46,398**	**145**	**27**	**87**
W3PP	**7**	**239,890**	**575**	**37**	**124**
W3TMZ	"	114,704	305	33	101
WA3DMH	"	10,710	67	17	46
***K3PP**	**A**	**156,704**	**251**	**70**	**166**
*W3CP	"	130,071	249	50	141
*N3UN	"	109,292	224	52	126
*W3QIR	"	105,050	209	51	140
*K3ZA	"	73,406	201	36	91
*NO3B	"	70,966	188	37	100
*NY3M	"	60,836	167	42	92
*N3ISH	"	22,848	110	28	68
*N3UMA	"	20,874	100	17	54
*W3DAD	"	13,869	73	18	51
*KA3MYM	"	4,218	42	14	23
*WJ3N	21	5,367	21	8	16
*WW3S	7	42,925	161	26	75
K4AAA	**A**	**4,286,150**	**2692**	**138**	**412**
				(Opr. N4VJ)	
W4RX	**"**	**3,036,944**	**1913**	**139**	**408**
N4CW	"	2,175,432	1586	111	372
K4AB	"	1,956,864	1604	119	329
AA4S	"	1,758,200	1333	123	349
K3KO/4	"	1,666,520	1209	114	374
KØEJ/4	"	1,593,651	1184	126	363
W4XJ	"	1,432,698	1176	120	318
N4TO	"	1,253,362	893	128	378
W3VT/4	"	1,201,934	878	119	374
N4ZJ	"	1,125,099	898	99	348
K4LTA	"	1,059,387	913	108	319
K4RO	"	1,030,316	895	116	318
N4XM	"	678,447	682	104	259
N4KW	"	480,480	616	66	207
N4MM	"	463,032	471	97	257
W4AU	"	448,092	646	61	182
AA4EL	"	399,840	440	104	236
K3IE/4	"	315,560	426	76	204
W4ZYT	"	239,787	338	68	181
W2YE/4	"	184,210	305	56	162
AE4LQ	"	179,310	260	78	180
W4IF	"	178,360	316	49	147
K4NA	"	156,006	262	59	155
WA4DAI	"	131,328	241	55	137
AD4PU	"	118,730	357	46	109
WC4E	"	94,631	199	51	122
W4YDD	"	93,480	200	64	126
W4RW	"	79,040	198	38	114
WB4UBD	"	70,912	191	34	94
N4UH	"	60,600	156	47	103
WB4RDV	"	48,552	138	49	87
N4XMX	"	30,866	96	41	81
W4VC	"	28,466	119	22	64
K6ETM/4	"	21,896	84	29	63
W4KYW	"	17,922	79	31	56
K4UX	"	10,001	47	31	42
W4YV	**28**	**12,285**	**101**	**19**	**44**
K4JYO	"	1,563	33	11	16
KC2X/4	**21**	**391,572**	**946**	**33**	**116**
N4BP	**"**	**239,104**	**667**	**28**	**100**
K4WA	"	129,794	366	"	99
K4SI	"	76,500	231	30	95
W4PA	**14**	**570,564**	**1279**	**36**	**126**
N4PN	"	356,372	818	36	128
KV4P	"	244,098	601	33	109
K4RZ	"	147,810	404	27	103
W4USQ	"	18,700	123	21	64
W6XA/4	**7**	**196,788**	**550**	**32**	**106**
W4OX	**"**	**182,484**	**434**	**34**	**114**
K8UNP/4	"	138,725	320	36	119
AB4RX	"	98,550	269	32	103
W4PLL	"	35,496	137	26	61
K4PI	**3.5**	**137,124**	**445**	**25**	**92**
N6AR/4	**"**	**133,548**	**418**	**27**	**97**
K4MA	"	39,248	185	18	70
K2UFT/4	"	23,205	105	21	64
WB4OSN	"	20,944	101	21	56
W4DR	**1.8**	**36,757**	**161**	**18**	**71**
K4TEA	**"**	**19,856**	**113**	**16**	**52**
***KN4T**	**A**	**1,625,600**	**1244**	**122**	**386**
***K7SV/4**	**"**	**1,017,968**	**898**	**113**	**314**
*WO4O	"	599,872	700	99	265
*N4YDU	"	523,605	692	88	247
*K4FPF	"	472,290	492	80	266
*W8PC/4	"	405,072	510	74	217
*WA4JUK	"	275,806	435	65	174
*WR4K	"	191,727	287	75	168
*N3TG/4	"	175,916	296	58	163
*K4UK	"	172,480	300	65	155
*N4OT	"	127,360	242	50	149
*WD4AHZ	"	111,813	221	49	134
*K4BAM	"	109,335	227	56	129
*K4WW	"	95,387	200	53	128
*AC4PQ	"	88,312	199	47	119
*W4EF	"	40,460	125	35	84
*AK4I	"	30,456	105	35	73
*AD4TJ	"	27,216	115	19	65
*K4NR	"	14,112	95	16	40
*AC4ZO	"	8,150	63	16	34
***WB4TDH**	**21**	**163,064**	**420**	**31**	**105**
*AI2C/4	"	60,604	203	27	82
*KD4FAZ	"	41,040	168	23	67
***N4MO**	**14**	**243,165**	**628**	**32**	**113**
***W4HM**	**7**	**70,566**	**225**	**29**	**85**
*KD4D	"	22,308	106	20	58
*W4ONO	1.8	1,269	26	8	19
K5GN	**A**	**3,156,737**	**2173**	**145**	**402**
K5MA	**"**	**1,928,595**	**1457**	**142**	**363**
K5YA	"	1,888,952	1561	128	315
K5YAA	"	1,764,447	1341	129	364
K5DX	"	482,460	535	96	234
K5RX	"	285,988	376	88	196
WB5B	"	187,803	287	68	163
W5CWQ	"	105,690	201	68	127
N7XX/5	"	82,162	189	61	108
N5KA	**21**	**318,360**	**900**	**32**	**108**
W5FO	**14**	**299,131**	**720**	**35**	**116**
WA5SOG	"	47,282	183	24	70
K5TR	**7**	**255,438**	**749**	**35**	**103**
K2BA/5	"	72,433	239	31	82
***WW2R/5**	**A**	**518,375**	**613**	**98**	**221**
*N5ZX	"	164,502	332	75	159
*K5WO	"	75,218	216	45	98
*W5EIJ	"	49,098	130	52	95
*WA5JWU	"	19,314	86	35	52
*WV3B/5	"	18,009	81	31	56
***W5ZO**	**21**	**51,146**	**175**	**29**	**78**
*AB5TS	7	11,816	76	18	38
K6LA	**A**	**1,731,660**	**1653**	**129**	**270**
WZ6Z	**"**	**1,276,626**	**1340**	**115**	**223**
K6XX	"	514,048	722	88	168
K6VX	"	402,052	456	118	214
WA5VGI/6	"	337,108	439	105	179
NI6T	"	245,022	310	103	188
W6FSJ	"	197,896	315	87	145
WA6TKT	"	150,775	251	56	107
N6NG	"	138,320	728	71	119
K6GT	"	106,738	248	66	100
W6RFF	"	79,000	191	68	90
N6IC	"	77,356	177	63	103
K6YK	"	76,066	204	51	95
WW6I	"	51,724	147	54	80
K6BWX	"	45,878	149	44	69
W6RCL	"	30,780	115	46	62
K6AZA	"	29,639	179	43	64
W6YM	"	23,564	103	37	49
K6SE	"	15,288	68	39	45
K6HRT	"	14,518	147	28	33
W6OUL	"	7,375	46	27	32
W6KFV	**28**	**5,002**	**56**	**16**	**25**
K6AW	**21**	**209,430**	**760**	**31**	**86**
W6YA	**"**	**197,370**	**535**	**33**	**102**
K2KW/6	**14**	**501,384**	**1210**	**37**	**119**
NU6S	**"**	**425,941**	**1004**	**36**	**121**
W6BSY	"	75,649	268	29	72
W7CB/6	**7**	**154,044**	**424**	**35**	**97**
W6NKR	3.5	686	17	7	7
***W6JTI**	**A**	**762,010**	**781**	**126**	**236**
***WA7BNM/6**	**"**	**593,280**	**732**	**111**	**198**
*N6NF	"	117,656	244	73	118
*AA6EE	"	112,288	249	67	109
*N6JM	"	104,468	234	64	100
*K6UM	"	100,980	207	74	113
*W6BH	"	96,957	210	59	112
*N6TW	"	78,400	191	57	103
*W6SA	"	73,008	201	60	84
*WA6TLA	"	61,056	140	58	101
*KQ6ES	"	51,000	163	49	71
*W6UDX	"	43,680	135	46	74
*WD6DX	"	37,296	130	46	66
*N6GL	"	36,600	143	45	55
*W6JTA	"	26,970	209	49	67
*NK6F	"	24,064	117	44	50
*AC6LK	"	3,267	38	14	19
*WA6FGV	21	19,966	115	22	45
*KU6T	"	16,653	102	19	42
*W6QJI	14	26,242	150	25	47
*K6CEO	"	12,978	75	23	40
*KO6IG	3.5	855	23	10	9
N7TT	**A**	**1,077,359**	**1075**	**112**	**247**
W7SE	**"**	**427,141**	**539**	**107**	**212**
W7ZMD	"	307,560	441	90	174
K7ABV	"	207,208	328	83	153
W7LGG	"	179,598	317	82	140
W7HS	"	147,600	279	74	131
W7YS	"	137,760	304	58	110
W8AEF/7	"	127,140	250	72	123
W7IIT	"	122,400	273	59	101
N7RK	"	105,336	235	61	110
KC7UP	"	79,365	208	53	90
WØRSG/7	"	65,919	197	52	77
NG7M	"	19,488	128	27	29
*AF7O	"	16,060	84	33	40
N7UJJ	"	12,383	77	26	35
W7USA	**28**	**3,780**	**42**	**12**	**24**
K7QQ	**21**	**169,932**	**583**	**33**	**86**
W7/VE7UF	14	72,600	298	30	58
W7AYY	"	52,976	216	22	64
W7GG	**7**	**493,570**	**1151**	**39**	**115**
N7DD	**"**	**348,198**	**986**	**34**	**97**
NX7K	**"**	**273,420**	**718**	**37**	**103**
K7SS	**3.5**	**29,016**	**161**	**27**	**45**
W7DRA	"	3	1	1	1
***W7QN**	**A**	**104,320**	**242**	**61**	**102**
*NN7A	"	62,350	162	56	89
*AA7KF	"	20,400	82	38	64
*AB7II	"	15,390	75	33	48
*WA2OCG/7	"	15,312	121	18	26
*W7GTO	"	9,222	62	25	33
*KX7J	21	8,268	57	14	38
***K7ZA**	**14**	**120,448**	**331**	**33**	**95**
*KI7DM	"	102,569	337	28	81
***K6OMB/7**	**7**	**28,480**	**131**	**28**	**52**
W9LT/8	**A**	**1,704,303**	**1314**	**115**	**348**
KF8TM	**"**	**400,722**	**440**	**86**	**243**
WA8SAE	"	383,648	457	84	220
N8AA	"	295,872	400	85	191
NG8D	"	267,720	405	68	162
W9VNE/8	"	213,172	301	73	201
W8UPH	"	167,440	336	45	139
W8KTQ	"	148,952	307	53	119
W8PN	"	111,720	229	61	129
W5OM/8	"	105,436	223	50	122
NE8Z	"	69,165	170	50	109
K2UOP/8	"	67,179	164	42	105
KC8EG	"	34,736	119	29	75
K4FW/8	"	29,654	119	19	70
WZ8A	"	26,208	93	39	73
K8PYD	"	10,575	49	32	43
WB8JBR	"	7,412	47	27	41
K8RF	"	6,426	36	29	34
WB8BUQ	"	4,230	34	20	27
NT8V	"	2,993	29	14	27
K8MR	21	22,950	112	20	55
NI8L	**14**	**639,816**	**1517**	**39**	**120**
W8UD	"	163,576	449	32	95
KT8X	"	16,884	94	17	50
W8JGU	**7**	**179,220**	**430**	**35**	**110**
W8PX	"	103,356	280	32	100
K8MFO	**3.5**	**93,600**	**298**	**24**	**96**
K8MD	"	18,348	100	16	50
K8MK	**1.8**	**46,440**	**244**	**19**	**71**
				(Opr. K8LR)	
W8UVZ	**"**	**15,624**	**97**	**18**	**54**
***NU8Z**	**A**	**242,638**	**330**	**71**	**198**
***WA8WV**	**"**	**239,000**	**358**	**65**	**174**
*K8GT	"	235,040	351	69	191
*K8CV	"	143,021	286	49	130
*N8YYS	"	100,386	255	35	108
*W8IDM	"	87,906	185	52	130
*WT8P	"	73,205	222	28	93
*KA8ZPE	"	72,128	159	61	123
*KB8FLY	"	67,782	205	51	107
*W8VE	"	59,214	166	45	97
*W8FDV	"	30,430	128	23	62
*AF8C	"	9,042	52	29	37
***N8II**	**21**	**314,440**	**820**	**29**	**111**
*K8UC	7	32,508	140	22	62
*WB8ORV	"	969	17	7	12
W9RE	**A**	**2,975,280**	**1973**	**130**	**409**
K9AN	**"**	**1,342,320**	**1017**	**120**	**356**
K9MA	"	1,280,970	1079	115	315
K9BG	"	1,260,336	1056	119	315
K9BZ	"	1,215,918	1061	115	299
				(Opr. K9WIE)	
N9BR	"	1,162,890	1169	109	256
KS9W	"	1,130,367	1028	108	291
W9MU	"	670,446	670	97	260
WA9TPQ	"	581,823	704	84	213
K9CAN	"	576,548	593	95	254
W9OA	"	428,664	462	100	237
WN9O	"	305,505	691	36	119
W9GXR	"	242,277	350	70	179
K9UQN	"	186,186	362	52	134
K9ZO	"	162,750	393	49	106
K9NR	"	150,064	257	74	152
KB9NMU	"	18,432	87	33	63
K9OM	**28**	**5,781**	**69**	**11**	**30**
W9XT	**21**	**152,766**	**446**	**30**	**93**
W9GIL	"	80,968	250	26	90
K9QVB	**14**	**304,114**	**749**	**34**	**117**
WB9HRO	"	316,333	814	32	105
W9OF	"	231,012	498	34	128
KO9Y	"	213,297	514	34	113
K9CJ	**7**	**66,105**	**207**	**32**	**85**
K9DX	**3.5**	**148,717**	**466**	**29**	**98**
W9RN	"	33,176	142	22	66
WB9Z	**1.8**	**22,357**	**128**	**19**	**60**
***W9AU**	**A**	**434,712**	**518**	**84**	**223**
***KJ9C**	**"**	**399,921**	**466**	**87**	**240**
*K9MMS	"	336,102	451	83	195
*N9CIQ	"	187,254	340	59	143
*W9ILY	"	82,110	191	50	120
*W9MYY	"	17,812	91	25	48
*WB9AYW	"	16,008	39	6	23
*WB9LAU	"	4,250	40	14	36
*W9LNQ	"	2,576	50	19	49
*W9IXX	"	1,344	17	11	17
*N9GBB	14	5,934	50	17	29
***N9AU**	**7**	**44,240**	**146**	**29**	**83**
*KC9TV	"	24,682	119	23	59
***N4TZ/9**	**3.5**	**35,200**	**164**	**18**	**62**
N2IC/Ø	**A**	**2,958,168**	**1974**	**149**	**380**
WBØO	**"**	**1,243,928**	**991**	**128**	**330**
NSØB	"	275,520	360	83	204
WØHW	"	249,458	357	82	171
WØRA	"	238,032	405	75	153
KMØR	"	160,968	268	77	151
WØML	"	144,557	270	59	134
WØID	"	103,190	228	59	111
WIØR	"	84,168	187	60	108
WAØOZP	"	64,945	166	53	102
WØAG	"	64,719	180	46	95
AAØAI	"	45,458	142	40	79
KGØUA	"	32,918	112	39	70
WØKFL	**21**	**35,010**	**139**	**24**	**66**
WØUN	**7**	**540,640**	**1249**	**37**	**123**
				(Opr. WØUA)	
KØKX	**3.5**	**61,302**	**220**	**26**	**76**
KØCS	1.8	2,030	32	11	18
***KØGSV**	**A**	**103,351**	**211**	**57**	**124**
*AAØTY	"	79,937	210	43	100
*KØBX	"	57,403	155	43	94
*KØSX	"	52,644	163	47	76
*AAØWC	"	21,240	205	31	59
*KØJPL	"	11,470	63	31	43
***KØOD**	**7**	**68,655**	**215**	**31**	**84**

ALASKA

NL7RK	**A**	**477,092**	**1245**	**57**	**97**
WL7DB	14	9,212	70	19	28
KL7RA	**1.8**	**38,024**	**267**	**17**	**39**
*KL7WP	A	68,208	228	44	72
*NL7DU	"	7,176	152	10	13

ANGUILLA

***VP2EEB**	**A**	**4,921,360**	**4403**	**103**	**351**
				(Opr. AA3B)	

ANTIGUA

V26LN	**A**	**1,748,058**	**4135**	**109**	**329**
				(Opr. K3TLX)	
*V2/G6QQ	A	181,818	444	52	130

BAHAMAS

***C6A/N4RP**	**A**	**562,248**	**1141**	**71**	**157**
*AA6EW /C6A	"	108,500	409	49	75

BARBADOS

8P9Z		**A**	**8,650,620**	**6134**	**132**	**429**
						(Opr. K4BAI)

CANADA

VO1MP		**A**	**2,092,480**	**1909**	**96**	**320**
VE1AI		"	360,047	551	71	192
VO2 /WB8YTZ		"	255,706	1052	37	81
VO1AH		"	76,840	272	30	83
VE1JF	**3.5**		**60,563**	**378**	**15**	**56**
CG1ZZ	**1.8**		**218,715**	**898**	**22**	**83**
						(Opr. VE3BMV)
***VE1GN**		**A**	**1,042,855**	**1232**	**82**	**253**
*VO1GO		"	206,028	443	42	152
VE2AYU		**A**	**937,962**	**1171**	**79**	**242**
VE2FFE		"	79,768	282	32	86
VE2CJZ		"	8,610	100	16	26
VE2ZDR		"	3,842	58	16	18
***CI2AWR**		**A**	**284,172**	**598**	**50**	**154**
VE3KP		**A**	**796,620**	**1015**	**92**	**238**
VE3ST		"	462,820	539	67	250
VE3CWE		"	85,115	239	42	103
VE3PN		"	83,088	259	43	101
VE3HX	**28**		**3,808**	**51**	**11**	**21**
VE3DO	1.8		1,825	29	10	15
*VE3OTL	A		59,829	223	37	74
*CI3LPE			28,208	150	25	60
				(Opr. VE3LPE)		
*VA3KA	21		31,996	165	19	57
*VE3STT			7,968	65	16	32
*VE3NYT	7		24,640	160	20	50
VE4JB		**A**	**303,677**	**623**	**71**	**138**
*VE4YU		A	88,821	306	49	90
VE5GC		A	5,232	167	9	7
***VE5SF**		**A**	**358,710**	**1017**	**52**	**113**
VE6HPT		A	2,289	47	12	9
***VA6JO**		**A**	**572,280**	**1305**	**71**	**119**
***VE6BMX**	**14**		**144,600**	**638**	**27**	**73**
XK7SZ		**A**	**877,924**	**1348**	**100**	**178**
						(Opr. K7LXC)
CK7U	21		156,618	880	25	52
				(Opr. VE7CDL)		
VA7A	**14**		**582,143**	**1551**	**36**	**113**
						(Opr. VE7XR)
VE7AV		"	265,856	870	32	92
VE7UBC	3.5		49,941	704	15	16
				(Opr. VE7WRA)		
*VE7XF		A	6,500	48	27	25
***XK7AHA**	**21**		**150,696**	**802**	**26**	**58**
						(Opr. VE7AHA)
***XO7A**	**14**		**547,575**	**1593**	**35**	**112**
						(Opr. VE7SV)
VY1JA		**A**	**201,895**	**611**	**67**	**82**

COSTA RICA

TI1C		**A**	**7,346,856**	**5431**	**145**	**418**
						(Opr. N6TJ)
TIØC	**3.5**		**791,208**	**2315**	**30**	**118**
						(Opr. TI2CF)

CUBA

***CO8LY**		**A**	**369,420**	**1245**	**51**	**90**
***CO2JD**		**7**	**234,987**	**1204**	**26**	**61**
*CM8TW		"	24,309	209	18	55

DOMINICANA

***HI3JH**		**7**	**406,461**	**1532**	**28**	**81**

GRENADA

J3/WJ2O		**A**	**1,282,046**	**2155**	**75**	**199**

GUANTANAMO BAY

KG4ML		**A**	**580,345**	**1445**	**58**	**127**
						(Opr. WB6VGI)

HAITI

4V2A		**A**	**7,007,128**	**5293**	**134**	**402**
						(Opr. 9A3A)

JAMAICA

6Y6A		**A**	**3,643,568**	**4341**	**107**	**261**
						(Opr. JE3MAS)

MARTINIQUE

FM5BH	**1.8**		**73,796**	**447**	**17**	**59**
***FM5CW**		**A**	**148,986**	**421**	**50**	**128**

MEXICO

XE1VV		**A**	**941,488**	**1283**	**102**	**224**
***XE2MX**		**A**	**122,946**	**268**	**69**	**117**
*XE1AVM		"	38,247	330	31	26
*4A1FEC	14		125,550	271	15	18
						(Opr. XE1BEF)
***XE1** /AA6RX	**14**		**112,941**	**584**	**24**	**65**
*XE2AC	7		18,848	284	14	18

PANAMA

3E1DX		**A**	**5,922,267**	**4860**	**127**	**380**
						(Opr. DL5XX)
*HP3XUG	A		27,334	137	32	47

PUERTO RICO

*WP4LNY	21		6,069	122	8	9

ST. EUSTATIUS

***PJ5JP**		**A**	**95,060**	**474**	**40**	**57**

ST. VINCENT

***J87GU**		**A**	**1,421,684**	**2027**	**81**	**235**
						(Opr. DL7VOG)

ST. KITTS & NEVIS

V47KP		**A**	**1,647,744**	**2126**	**92**	**244**
						(Opr. W2OX)

TURKS & CAICOS

***VP5EA**		**A**	**3,094,236**	**3196**	**106**	**308**
						(Opr. WD5N)
*VP5/N4KE	21		375	10	7	8

US VIRGIN ISLANDS

KP2A	**1.8**		**203,300**	**928**	**20**	**77**
						(Opr. KW8N)
***WP2Z**		**A**	**2,951,910**	**3519**	**88**	**263**
						(Opr. KØDEQ)
*KP3J		A	47,580	350	20	40
***KP3G**	**7**		**123,080**	**580**	**20**	**65**

AFRICA

AFRICAN ITALY

IG9 /IT9GSF			**141,096,200**	**2230**	**39**	**136**
IG9 /AC6WE	**7**		**1,234,317**	**2677**	**37**	**122**
						(Opr. UA3DPX)
IG9 /I2VXJ	**3.5**		**791,633**	**2059**	**31**	**100**

ALGERIA

7X2RO		**A**	**3,976,164**	**3737**	**81**	**275**
						(Opr. OM3CGN)

ANGOLA

D25L	14		37,985	187	25	46
						(Opr. PA3DZN)

ASCENSION ISLAND

ZD8DEZ		**A**	**3,091,968**	**2724**	**103**	**281**
						(Opr. GØDEZ)

CANARY ISLANDS

EA8AMW	14		54,270	229	20	61
EA8EA	**3.5**		**1,175,550**	**2672**	**36**	**114**
						(Opr. OH2KI)
EA8ZS	**1.8**		**108,630**	**493**	**18**	**67**
***EA8 /DJ1OJ**		**A**	**778,725**	**1163**	**55**	**170**
*EA8ASJ		"	62,238	218	47	76
***EA8CN**	**7**		**540,870**	**1499**	**27**	**94**
*EA8NQ		"	185,627	573	22	87

CEUTA & MELILLA

ED9EA	**14**		**1,429,673**	**3028**	**39**	**124**
						(Opr. EA7TL)
EA9UG	**7**		**446,939**	**1400**	**26**	**81**

CHAGOS ISLANDS

VQ9IE		**A**	**729,030**	**876**	**91**	**194**
						(Opr. WY8Q)
VQ9SS	**1.8**		**31,936**	**169**	**17**	**47**

IVORY COAST

TU2MA	**21**		**469,860**	**1543**	**33**	**90**

MADEIRA ISLANDS

CT9U	**14**		**946,656**	**2462**	**34**	**111**
						(Opr. DL2HYH)
CT3FN	**3.5**		**500,220**	**1652**	**23**	**82**
						(Opr. HB9CRV)
*CT9H	21		36,432	276	11	33
						(Opr. DF5AN)

MAYOTTE

***FH/F6HWU**		**A**	**183,696**	**370**	**62**	**110**

MOROCCO

*CN8GB	21		8,700	100	5	24

NIGERIA

***5N3 /SP5XAR**	**14**		**171,855**	**613**	**26**	**69**

PRINCE EDWARD & MARION IS.

ZS8IR		**A**	**266,294**	**566**	**52**	**109**

RWANDA

9X4WW		**A**	**389,180**	**605**	**69**	**151**
						(Opr. ON4WW)

SENEGAL

***6W1AE**		**A**	**1,908,253**	**2515**	**65**	**212**
						(Opr. F5OGL)

SIERRA LEONE

***9L1MA**		**A**	**177,289**	**451**	**40**	**93**
						(Opr. KBØLFV)

SOUTH AFRICA

ZS6SA		**A**	**950,988**	**1403**	**66**	**162**
ZS6P		**7**	**910,784**	**2018**	**35**	**117**
						(Opr. ZS6EZ)
ZS6KR	3.5		4,134	43	15	24

SWAZILAND

3DAØNX		**A**	**4,399,899**	**3213**	**120**	**343**
						(Opr. JM1CAX)

TUNISIA

***3V8BB**		**A**	**5,489,376**	**4425**	**94**	**328**
						(Opr. DL2HBX)

ZONE 34

YL3IZ/MM	**7**		**800,112**	**1688**	**35**	**123**

ASIA

ARMENIA

***EK4JJ**		**A**	**946,830**	**1482**	**55**	**167**

ASIATIC RUSSIA

UE9XAB		**A**	**521,550**	**844**	**50**	**175**
						(Opr. UA9XEN)
RA9XF		"	252,314	501	37	144
RW9SW	**21**		**237,800**	**753**	**24**	**92**
RW9JO		"	157,760	555	87	116
RA9JX		"	79,487	324	25	76
RZ9UA	**7**		**867,680**	**2136**	**40**	**132**
RW9SW		"	306,163	775	34	109
RA9YY		"	149,354	637	29	77
RW9USA	**3.5**		**302,457**	**977**	**30**	**93**
RU9CK		**"**	**287,260**	**986**	**23**	**83**
UA9OC		"	109,926	450	20	73
UA9XS		"	46,512	241	13	55
UA9KAA	**1.8**		**103,680**	**456**	**19**	**62**
***RA9AE**		**A**	**1,145,016**	**1252**	**87**	**285**
***RK9CWY**		**"**	**967,260**	**1049**	**79**	**250**
*UA9CAX		"	825,660	1004	69	228
*RA9JW		"	148,058	352	57	124
*RZØSO		"	32,184	162	33	42
*UA9OSV		"	3,640	55	9	19
***UA9YAB**	**21**		**178,852**	**659**	**28**	**94**
***RN9XA**	**14**		**118,116**	**417**	**25**	**77**
*RX9JC		"	47,460	275	13	47
***UA9CBM**	**3.5**		**99,620**	**420**	**17**	**68**
*UA9WQK		"	83,600	387	13	67
*RW9AV		"	71,500	397	14	51
*RW9QA		"	37,278	232	10	47
*UA9ORS		"	30,429	245	11	38
***UA9CI**	**1.8**		**86,156**	**450**	**12**	**56**
RAØFF		**A**	**1,576,008**	**1744**	**142**	**271**
RAØFA	**7**		**172,596**	**644**	**34**	**80**
UAØSR	3.5		43,852	298	19	57
***UAØJB**		**A**	**1,725,705**	**2010**	**125**	**280**
***RSØF**		**"**	**1,557,030**	**2012**	**115**	**240**
						(Opr. UAØFZ)
*UAØSJ		"	168,950	621	58	97
*RAØJX		"	165,121	408	73	146
*UAØCIL		"	8,800	139	19	25
***RUØSU**	**14**		**95,040**	**534**	**23**	**65**
*UAØYAY		"	34,881	215	20	57
*UAØCKA		"	30,601	233	21	50

ASIATIC TURKEY

YM2ZW	**14**		**783,432**	**1785**	**38**	**118**
						(Opr. OK2ZW)
TA2BK	**7**		**845,880**	**2028**	**34**	**125**
***TA3D**		**A**	**1,064,240**	**1409**	**62**	**203**
***TA2DS**		**"**	**886,256**	**1121**	**66**	**221**

AZERBAIJAN

***4K9W**		**A**	**193,460**	**412**	**40**	**130**

CHINA

***BY4SZ**		**A**	**338,916**	**1038**	**66**	**117**
						(Opr. BZ4SCT)
***BD4SE**	**28**		**4,056**	**122**	**12**	**14**
***BA4TB**	**3.5**		**20,790**	**386**	**15**	**30**

CYPRUS

***C4CQ**		**A**	**22,125**	**110**	**24**	**51**
						(Opr. 5B4AEA)

GEORGIA

*4L1ZG	7		34,800	208	8	50

INDIA

***VU2MTT**		**A**	**1,183,821**	**1488**	**82**	**221**
***VU2PAI**		**"**	**1,025,574**	**1086**	**100**	**279**

ISRAEL

4X/OK1JR	**21**		**360,570**	**1293**	**27**	**75**
4X4NJ	**1.8**		**158,916**	**696**	**17**	**65**
***4X7A**		**A**	**2,101,878**	**1904**	**101**	**313**
						(Opr. 4X4KK)
*4X /GØPWW		"	123,664	385	38	80
*4X6PO		"	87,000	375	30	50
*4X1VF	28		2,697	35	9	20
***4Z5FW**	**21**		**36,378**	**262**	**11**	**36**
*4Z4TA	7		82,460	400	15	55

JAPAN

JA1IDY		**A**	**1,417,687**	**1301**	**127**	**270**
JA1JKG		**"**	**934,929**	**1216**	**99**	**180**
JA1QOW		"	367,025	542	99	166
JH1PXY		"	27,666	117	40	47
JH1FNU		"	25,632	119	29	60
JH1JGZ		"	22,472	101	46	60
7L1RLL		"	2,210	25	17	17
JR1XFS	**14**		**253,000**	**721**	**34**	**91**
JR1GRF		"	1,334	20	6	17
JH1AEP	**3.5**		**85,170**	**394**	**25**	**60**
JA1XEM	1.8		120	5	4	4
***JK1JHU/1**		**A**	**397,404**	**586**	**101**	**165**
***JS1OYN**		**"**	**384,162**	**582**	**95**	**163**
***7L4IOU**		**"**	**226,314**	**351**	**106**	**148**
*JL7PVR/1		"	205,572	374	83	139
*JN1NOP		"	168,489	340	71	122
*JA2FNY/1		"	130,065	279	72	123
*JA1TRP		"	126,000	270	81	99
*JA1BUI		"	105,244	254	63	103
*JA1WHG		"	99,530	204	76	109
*JG1TVK		"	91,290	200	72	107
*JK1UJT		"	82,770	200	60	95
*JA1HP		"	63,000	208	46	79
*JR1WJM		"	52,992	152	62	82
*7N3SDR		"	49,714	163	54	80
*7K1EQG		"	48,521	163	50	71
*7N2DXF		"	45,621	159	46	65
*7J1ABD		"	36,828	125	56	68
				(Opr. WA6URY)		
*JA1BCP		"	34,131	129	41	52
*JF1LKM		"	25,168	105	38	50
*JA1AB		"	23,845	109	41	54
*JK1NSR		"	20,468	96	35	51
*JM1LRQ		"	17,750	90	24	47
*JA1CP		"	17,615	113	25	40
*JR1LEV		"	16,254	93	31	32
*JA1HFY		"	11,850	66	37	42
*JA7JNF/1		"	11,475	83	33	42
*JG1RDV		"	8,236	80	29	29
*JH1NXU		"	4,826	45	19	19
*JA1MXY		"	3,182	34	17	20
*7M2DNW		"	2,440	25	18	22
*JH1UES/1		"	1,333	21	15	16
*JE1KDM		"	627	21	7	4
*JK1REJ		"	304	9	7	9
*JE1HXZ		"	16	2	2	2
*JA1AAT	28		2,520	16	7	9
*7N1BHO/1		"	1,738	29	9	13
*JA1AAV		"	750	9	6	5
*JG1VGX	21		540	7	6	6
***JL1MUT**	**14**		**212,296**	**642**	**34**	**85**
*JA1KFX		"	36,176	185	25	43
*JA1KI		"	22,420	137	22	37
*JA7UES/1		"	15,198	116	18	33
*JR1UMO		"	6,720	56	15	27
*JA1XPU		"	5,217	49	17	30
*JK1LUY		"	756	15	9	12
*JG1FGL		"	300	8	7	8
***JF1KFV**	**7**		**94,870**	**322**	**33**	**73**
*JK1AFI		"	59,400	245	29	61
*JS1UMQ		"	46,965	191	32	61
*JA1KVT		"	36,624	171	27	57
*7L3FJP		"	10,486	85	21	28
***JE1LFX**	**3.5**		**17,136**	**99**	**24**	**48**
*JE1LPZ		"	12,600	95	19	37
*JH7AJD/1		"	2,550	33	16	18
*JE1SPY	1.8		648	15	8	10
JH2BCN		**A**	**641,498**	**819**	**105**	**181**
JH2NWP		"	330,225	495	98	161
JA2AXB		"	205,936	360	77	134
JA2VQF		"	143,990	323	68	102
JA2SWF		"	34,526	115	56	66
JA2FGE		"	11,400	58	34	42
JA2ANA	**14**		**62,060**	**191**	**34**	**82**
JE2LUN		"	9,999	101	30	69
JA2EJI	3.5		1,881	25	16	17
***JA2BY**		**A**	**606,670**	**742**	**109**	**201**
*JQ2LGS		"	31,856	140	35	53
*JA2MZ		"	9,216	54	27	37
*JA2MOG		"	4,927	85	48	53
*JE2SOY	28		1,620	27	11	16
***JA2KVB**	**21**		**207,722**	**328**	**34**	**73**
*JR2TRC		"	48	4	2	2
***JA2XI**	**14**		**191,174**	**569**	**34**	**88**
*JF2VAX		"	62,868	258	28	65
*JL2LPX		"	50,224	221	28	58
*JJ2SQP		"	735	20	8	13
***JA2NNF**	**7**		**45,026**	**187**	**30**	**64**
*JA2GTW		"	21,735	131	25	38
*JF2WXS		"	16,048	97	37	41
*JF2LTH		"	312	11	6	6
*JE2IAO		"	72	6	2	2
*JH2QMT	1.8		144	7	6	6
JR3NZC		**A**	**700,348**	**1006**	**89**	**153**
JF3CCN		**"**	**695,198**	**813**	**105**	**217**
JA3XOG		"	260,205	395	91	158
JA3ARM		"	144,255	310	67	110
JH3JYS		"	133,777	281	80	123
JA3AVO		"	11,310	22	13	15
JN3WYD	**7**		**70,576**	**293**	**27**	**61**
JR3WXA		"	49,590	221	28	59
JL3SBE		"	1,740	25	12	17
JA3CE	3.5		6	1	1	1
JH3AIU	1.8		156	6	6	6
***JE3HDD**	**A**		**734,080**	**763**	**114**	**256**
*JF3IUC		"	348,816	541	89	169
*JF3GKE		"	337,922	422	114	203
*JH3CUL		"	310,045	434	103	192
*JG3WCZ		"	16,184	89	30	38
*JO3JJN		"	8,083	53	27	32
*JG3EHD		"	1,176	20	11	10
*JA3WFQ		"	162	6	5	4
***JK3GWT**	**21**		**59,364**	**238**	**31**	**71**
*JJ3XHT		"	11,819	101	18	35
***JE3HHT**	**14**		**105,336**	**404**	**29**	**70**
*JH3FTZ		"	56,637	243	27	60
*JO3JYE		"	33,450	173	25	50
*JA3VOV		"	8,745	69	20	33
*JA3BLN	3.5		7,228	62	17	35
*JI3KDH/3	1.8		1,056	21	10	12
JA4CSH		**A**	**174,618**	**372**	**59**	**119**
JA4RTX		"	6,572	40	28	34
JA4QQJ		"	1,955	33	10	13
JM4UQM	**14**		**360,764**	**113**	**31**	**85**
JH4CPC	**3.5**		**31,240**	**145**	**27**	**61**
JA4DXT	1.8		108	7	3	3
***JR4GPA**	**A**		**390,974**	**640**	**81**	**152**
*JM4WUZ		"	186,082	329	83	138
*JA4BAA		"	87,048	230	59	97
*JA4ENY		"	50,170	153	56	89
*JA4BTD		"	24,108	92	43	55
*JA4KHD		"	10,602	57	22	40
*JA4AKV		"	9,590	51	25	45
*JE4SDB		"	6,394	60	22	24
***JH4FBV**	**28**		**5,520**	**62**	**14**	**26**
*JH4WBY		"	3,360	59	10	18
*JA4ETH		"	3,030	42	10	20
*JA4AQR		"	966	18	9	12
*JE4GJV	21		950	18	9	10
*JH4JZB	14		1,144	18	12	14
***JH4JNG**	**3.5**		**40,392**	**186**	**26**	**62**
*JE4CIL		"	14,030	97	20	41
*JI4HKA		"	2,135	31	14	21
JH5FXP		**A**	**2,917,488**	**2266**	**136**	**320**
JA5AIQ		"	61,308	172	50	81
JA5JGV		"	20,482	80	36	62
JA5DQH	**21**		**431,210**	**1025**	**37**	**118**
JA5APU	14		50,764	263	23	51
JA5THU	**7**		**598,143**	**1569**	**38**	**109**
JA5IP		"	18,144	105	25	38
***JG5OYU**	**A**		**43,550**	**133**	**50**	**80**
*JG5OYV		"	27,216	103	48	60
*JA5PQ	28		2,236	36	10	16
*JF5FGY	21		1,326	21	10	16
***JA5TXA**	**14**		**39,196**	**150**	**26**	**56**
*JA5PEE	7		150	6	6	6
JA6COW		**A**	**331,716**	**447**	**103**	**205**
JA6CF		"	5,133	33	27	32
JH6SQI	**28**		**3,040**	**42**	**12**	**20**
JJ6DGP	**7**		**36,720**	**158**	**30**	**55**
JA6JPS	**3.5**		**71,440**	**283**	**27**	**67**
JR6PGB	**1.8**		**14,553**	**86**	**21**	**42**
***JA6SRB**	**A**		**211,950**	**360**	**77**	**148**
*JH6TYD		"	160,826	319	83	111
*JA6AKV		"	49,600	171	50	74
*JA6JVY		"	21,115	41	43	60
*JA6HJP		"	13,528	70	29	47
***JA6WFM**	**21**		**71,032**	**260**	**34**	**70**
*JA6BIF		"	13,320	98	21	39
*JA6QDU		"	4,200	48	12	18
*JA6ZLI		"	1,702	26	6	17
						(Opr. JJ4HWC)
*JJ6TWQ	14		32,208	176	22	44
*JM6NJU/6		"	6	3	2	2
*JO6UIA	7		1,392	22	11	13
*JA6TQ	3.5		4,140	38	18	27
JH7WKQ		**A**	**2,045,160**	**1904**	**125**	**265**
JH7XGN		**"**	**1,566,291**	**1476**	**123**	**258**

JA7JHT	*	35,420	127	51	59
JA7ERJ	28	380	14	5	5
JA7FTR	**21**	**228,657**	**699**	**37**	**86**
JH7DNO	**14**	**317,528**	**1032**	**30**	**76**
JA7JI	*	104,796	297	32	91
JA7COI	*	35,192	158	27	56
JH7JVJ	7	234,668	718	35	81
JE7RJS	**3.5**	**58,590**	**248**	**31**	**59**
JA7NI	**1.8**	**23,616**	**138**	**21**	**43**
*JH7FUJ	A	31,680	124	45	54
*JA7VEI	*	27,100	108	39	61
*JA7SYA	*	17,220	80	35	47
*JI7VUR	*	13,932	86	48	114
*JF7BIR	*	1,196	20	12	14
***JA7DOT**	**14**	**73,458**	**273**	**28**	**71**
*JA7AXP	*	2,060	35	8	12
*JF7VVL/7	"	960	15	9	15
*JA7FFN	7	4,263	53	15	14
*JA7KM	"	1,710	34	10	9
JA8RWU	**A**	**611,391**	**773**	**106**	**185**
JH8UQJ	28	378	15	5	4
JA8YBY	**14**	**530,196**	**1340**	**34**	**104**
			(Opr. JO1DFG)		
*JA8JCR	A	277,848	479	89	138
*JA8AJE	*	143,242	314	72	115
*JA8XOD	*	50,096	159	49	75
*JH8BDA	*	33,174	123	49	65
*JA8RJE	1.8	294	9	6	8
JA9CWJ	**A**	**856,654**	**953**	**104**	**233**
JA9JFO	**14**	**118,044**	**409**	**31**	**77**
***JA9XBW**	**A**	**602,994**	**681**	**116**	**227**
***JH9KVF**	**21**	**115,390**	**409**	**34**	**76**
***JA9TSI**	**14**	**89,082**	**337**	**29**	**69**
*JA9KUG	*	7,515	62	16	29
***JR9NVB**	**7**	**51,744**	**212**	**28**	**68**
*JA9KHU	*	938	15	6	8
JHØFUW	**A**	**1,323,645**	**1237**	**129**	**266**
JAØQWO	**"**	**469,336**	**634**	**96**	**193**
JAØUMV	*	449,319	599	105	176
JHØGHZ	*	371,772	515	100	176
JRØWZR	*	109,855	237	71	102
JHØAUY	14	37,360	184	27	53
***JEØUXR**	**A**	**960,160**	**1089**	**115**	**238**
*JAØFVU	*	99,216	257	65	94
*JAØTEA	*	29,008	104	47	65
*JHØSJJ	*	23,040	116	33	46
*JHØEPI	21	91,545	402	28	57
***JFØSGW**	**14**	**53,664**	**250**	**25**	**53**
*JHØHON	*	8,771	71	18	31
*JEØFTY	7	3,770	52	12	17
*JAØGZ	*	2,464	34	14	14
*JRØBQD	3.5	2,030	35	14	15

KAZAKHSTAN

UN7LG	**21**	**322,687**	**877**	**31**	**120**
UN6T	*	116,250	402	30	95
UN9LY	**14**	**493,365**	**1230**	**37**	**118**
UN7CW	**3.5**	**427,840**	**1238**	**34**	**106**
UN7TX	*	141,867	585	25	74
UN2O	**1.8**	**26,676**	**196**	**10**	**42**
***UN7FW**	**14**	**125,114**	**447**	**31**	**90**
***UN5J**	**1.8**	**61,172**	**313**	**18**	**64**

KOREA

***HL1CG**	**A**	**259,578**	**387**	**85**	**168**
*HL5AP	*	129,108	375	59	100

KUWAIT

9K2/YO9HP	**7**	**498,420**	**1548**	**30**	**87**

LEBANON

***OD5PL**	**A**	**103,224**	**524**	**17**	**49**

MACAO

XX9X	**A**	**4,117,548**	**3648**	**139**	**353**
			(Opr. OH2PM)		

MONGOLIA

***JT1BH**	**A**	**331,315**	**834**	**71**	**144**

MYANMAR

XZ1N	28	30	4	2	3
		(Opr. K7ZV)			
XZ1N	**14**	**83,700**	**482**	**29**	**61**
		(Opr. WA7LNW)			
XZ1N	**7**	**276,471**	**1013**	**32**	**85**
		(Opr. K7WP)			
XZ1N	**3.5**	**264,543**	**1046**	**29**	**80**
		(Opr. N6BT)			
XZ1N	**1.8**	**64,167**	**347**	**20**	**53**
		(Opr. WA6CDR)			

OMAN

***A41LK**	**A**	**247,260**	**735**	**40**	**90**

QATAR

A71CW	**A**	**5,895,043**	**3943**	**134**	**405**

SAUDI ARABIA

7Z5OO	**A**	**3,687,114**	**3160**	**108**	**309**
		(Opr. K3UOC)			
HZ1HZ	**"**	**384,800**	**512**	**81**	**179**

SINGAPORE

***9V1ZB**	**A**	**725,760**	**1453**	**84**	**156**

TAIWAN

***BV/JJ1TBB**	**A**	**482,171**	**1089**	**85**	**166**

THAILAND

*HSØEHF	A	100,528	461	44	78
*HS8AS	*	50,342	246	38	65
		(Opr. E21AOY/8)			

TURKMENISTAN

EZ8BO	A	40,064	329	21	43

UK SOVEREIGN BASES

CYPRUS

***ZC4EE**	**21**	**268,488**	**1126**	**21**	**67**
		(Opr. G4OOE)			

UNITED ARAB EMIRATES

A61AJ	**A**	**2,440,704**	**2362**	**97**	**287**
		(Opr. AA6DC)			

UZBEKISTAN

***UK7F**	**A**	**342,912**	**606**	**61**	**167**

VIETNAM

3W5FM	**A**	**200,770**	**649**	**69**	**101**
		(Opr. UAØFM)			
XV7SW	**21**	**309,808**	**1292**	**34**	**102**

WESTERN MALAYSIA

***9M2TO**	**A**	**686,368**	**1227**	**77**	**164**
*9M2HQ	*	208,320	609	52	140
		(Opr. GW3GJQ)			
*9M2MC	14	9,600	100	18	32
***9M2JJ**	**7**	**87,898**	**528**	**23**	**48**

EUROPE

ALAND ISLANDS

***OHØJJS**	**A**	**1,472,640**	**2401**	**95**	**321**
***OHØMMF**	**3.5**	**151,619**	**1168**	**23**	**84**
***OIØMEP**	**1.8**	**43,815**	**560**	**13**	**56**

AUSTRIA

OE2BZL	**A**	**919,289**	**1353**	**79**	**292**
OE3DSA	**14**	**253,176**	**779**	**36**	**118**
OE3TL	**7**	**40,392**	**248**	**25**	**74**
***OE5D**	**1.8**	**5,658**	**140**	**4**	**37**
		(Opr. OE2UKL)			

BALEARIC ISLANDS

***EA6GP**	**A**	**102,564**	**440**	**35**	**119**
*EA6ZS	*	28,026	191	22	59
***EA6ZY**	**28**	**27,306**	**217**	**17**	**57**

BELARUS

EU4AA	**A**	**435,614**	**816**	**74**	**272**
EW3LN	*	59,675	195	53	102
EU7SD	*	36,005	133	45	100
EW8EW	**21**	**74,054**	**242**	**33**	**89**
EW8DX	**14**	**157,563**	**777**	**27**	**96**
EW2DD	*	92,112	513	24	77
EU1FC	**7**	**325,572**	**1376**	**36**	**120**
EW1AT	*	75,144	600	25	76
EU1AA	**3.5**	**268,660**	**1335**	**33**	**100**
EU2MM	*	94,525	798	18	77
***EU1AZ**	**A**	**402,556**	**763**	**76**	**232**
*EW1MN	*	51,960	218	34	86
*EW1WN	*	7,806	81	18	49
***EW1EA**	**14**	**50,072**	**310**	**18**	**70**
*EW2WP	*	483	21	4	19
***EW8OS**	**7**	**76,835**	**487**	**27**	**88**
*EW7DX	*	38,208	278	18	78
***EV6M**	**3.5**	**18,476**	**240**	**10**	**52**
*EW3AC	*	17,493	327	8	41

BELGIUM

ON5LL	**3.5**	**133,760**	**833**	**23**	**87**
***ON4XG**	**A**	**296,310**	**624**	**54**	**195**
*ON4ADL	*	69,204	298	58	100
*ON6CR	*	68,987	283	41	108
*ON4KFM	*	64,855	243	34	75
***ON4RU**	**21**	**335,832**	**875**	**37**	**131**
*ON6TJ	*	21,448	160	18	38
***ON4AEB**	**14**	**201,228**	**734**	**30**	**93**
*ON6CW	*	156,338	763	22	69
***ON6YH**	**1.8**	**57,096**	**592**	**15**	**63**

BOSNIA-HERZEGOVINA

***T99T**	**28**	**4,752**	**58**	**13**	**31**
***T94YT**	**3.5**	**54,936**	**656**	**8**	**64**

BULGARIA

LZ1BJ	**A**	**754,680**	**1417**	**79**	**252**
LZ1WG	**21**	**28,951**	**152**	**21**	**110**
LZ2TF	**14**	**88,683**	**470**	**28**	**75**
LZ1QZ	*	79,800	458	22	83
LZ5W	**7**	**858,960**	**2582**	**40**	**140**
			(Opr. LZ5DB)		
LZ4RV	*	107,908	461	26	80
LZ1ZD	*	37,012	319	19	57
LZ1PM	**3.5**	**55,476**	**381**	**16**	**76**
***LZ2SX**	**A**	**292,320**	**663**	**71**	**190**
*LZ2UZ	*	239,298	575	60	214
*LZ1IQ	*	40,132	184	54	104
*LZ1FJ	*	11,152	137	16	52
*LZ4BU	*	9,234	65	24	30
*LZ1ZJ	*	1,366	54	13	19
*LZ2KEM	*	740	39	4	16
			(Opr. LZ1A-1744)		
***LZ2GS**	**28**	**21,080**	**44**	**16**	**32**
***LZ2TW**	**21**	**95,232**	**320**	**30**	**94**
*LZ1CW	*	84,072	366	27	86
*LZ1KNP	7	39,100	240	24	44
			(Opr. LZ1N-143)		
*LZ1IA	1.8	4,214	90	6	37

CORSICA

TK5NN	**3.5**	**438,684**	**1930**	**30**	**109**

CROATIA

9A5I	**A**	**1,249,976**	**1275**	**107**	**369**
9A4D	**7**	**772,375**	**2348**	**39**	**146**
			(Opr. 9A7W)		
9A6K	*	479,631	1760	35	114
			(Opr. 9A4LA)		
9A7A	**3.5**	**378,576**	**1680**	**27**	**105**
			(Opr. 9A4RX)		
9A2VR	**1.8**	**116,667**	**882**	**18**	**69**
***9A3ZO**	**A**	**108,834**	**316**	**55**	**139**
*9A2WJ	*	77,840	353	29	111
*9A3MW	7	6,480	101	12	36
*9A4ZJ	*	4,515	86	8	35
***9A4RU**	**3.5**	**148,798**	**1095**	**20**	**77**
*9A3QK	*	63,210	602	14	72

CZECH REPUBLIC

OK1VD	**A**	**983,680**	**1224**	**94**	**330**
OK1EP	**"**	**788,634**	**772**	**106**	**356**
OK1FPG	*	524,433	719	85	254
OK2ABU	*	459,940	887	69	221
OK2BU	*	408,510	897	69	201
OK2SG	*	277,528	402	81	226
OK2DA/P	*	204,620	380	68	192
OK2BJT	*	162,484	394	51	145
OK2BND	*	157,522	463	49	177
OK1TW	**28**	**1,925**	**43**	**11**	**24**
OK1AES	**21**	**116,000**	**321**	**32**	**113**
OK1XW	*	80,319	281	26	97
OK1RF	**14**	**780,912**	**1919**	**39**	**135**
OK1XC	*	58,277	250	23	78
OK1FZM	*	155,769	533	32	105
OK1KSD	**7**	**384,780**	**1239**	**35**	**124**
			(Opr. OK1RP)		
OL4M	*	146,247	851	30	93
			(Opr. OK1ARN)		
OK2RZ	**3.5**	**419,368**	**1672**	**36**	**116**
OK1CW	"	263,031	1316	30	99
OK1EW	*	193,986	1147	27	90
OK2PSA	*	7,120	171	7	33
OK1DRU	**1.8**	**34,170**	**442**	**14**	**53**
OK1MNW	*	11,704	181	7	49
OK1AXB	*	11,040	76	18	51
OK1DWJ	*	2,176	24	14	20
***OK1BA**	**A**	**639,111**	**1012**	**64**	**257**
***OK1FPS**	**"**	**620,378**	**1188**	**76**	**250**
*OK2EC	*	558,900	1050	68	232
*OK1BMW	*	510,650	769	80	270
*OK2QX	*	405,888	707	83	253
*OK2EQ	*	378,994	662	80	242
*OK2PO	*	377,864	639	71	298
*OK1MKI	*	358,560	787	60	210
*OK1ZP	*	290,085	655	56	177
*OK2HI	*	288,911	625	72	205
*OK2PCN	*	284,144	746	51	185
*OK1SI	*	261,290	501	63	202
*OK1FKV	*	233,876	619	49	187
*OK1KZ	*	228,592	657	48	160
*OK1AVY	*	182,816	441	58	139
*OK2PHC	*	181,600	559	45	155
*OK1GM	"	165,086	528	40	157
*OK2ON	"	144,811	455	42	137
*OK1MZO	"	138,985	432	50	159
*OK1AYY	"	117,882	413	38	139
*OK2PBG	*	109,746	344	46	155
*OK1FCA	*	101,808	353	33	135
*OK1AJY	*	84,427	435	30	109
*OK1OX	*	83,448	329	37	115
*OK1AOU	*	51,816	238	34	93
*OK2BNC	*	34,485	163	31	64
*OK2KDS	*	27,499	131	33	74
*OK2SWD	*	27,342	294	21	72
*OK2BHE	*	25,212	132	30	36
*OK1ABF	*	11,830	87	26	65
*OK2BDI	*	7,490	37	33	37
***OK1ABP**	**21**	**166,155**	**402**	**35**	**124**
***OK2SAT**	**"**	**129,794**	**356**	**34**	**112**
*OK1IR	*	70,338	239	25	89
*OK2BNF	*	25,047	158	29	40
***OL7Z**	**14**	**369,264**	**1015**	**39**	**129**
			(Opr. OK2PAY)		
***OK2BVM**	**"**	**212,382**	**689**	**29**	**109**
*OK2TBC	*	142,308	493	33	101
*OK1NG	*	110,975	430	28	87
*OK2PCL	*	82,604	312	27	80
*OK2BXR	*	57,960	296	19	73
*OK2BCZ	*	6,248	100	9	35
*OK1JEF	*	5,088	63	18	35
***OK1YM**	**7**	**138,556**	**651**	**27**	**107**
***OK1DCF**	**"**	**128,368**	**561**	**32**	**110**
*OK1JN	*	95,120	528	24	92
*OK2VWB	*	75,840	351	28	92
***OK2WM**	**3.5**	**53,495**	**646**	**11**	**54**
***OK1FHI**	**"**	**52,772**	**567**	**12**	**67**
*OK1FOG	*	31,326	381	13	56
*OK2PJW	*	27,160	446	8	48
*OK2PMN	*	24,480	337	10	50
***OK1LV**	**1.8**	**10,670**	**173**	**8**	**47**
*OK1FF	*	9,500	177	7	43

DENMARK

OZ1LO	**A**	**2,195,564**	**2064**	**121**	**411**
OZ7BW	*	125,736	350	49	137
OZ8SW	*	95,284	369	39	127
OZ7YL	*	44,135	232	24	73
OZ5DX	**14**	**195,408**	**681**	**31**	**107**
OZ7NB	**1.8**	**6,960**	**61**	**4**	**60**
***OZ8AE**	**A**	**751,890**	**1004**	**93**	**333**
*OZ1HX	*	270,200	479	70	210
*OZ8NJ	*	231,548	759	50	164
*OZ4FF	*	201,120	428	62	178
*OZ4OC	*	164,649	503	46	167
*OZ5ABD	*	159,324	585	43	144
*OZ5UR	*	83,148	321	41	115
*OZ7AX	*	19,203	112	35	76
*OZ7JQ	*	6,657	99	25	40
***OZ1BMA**	**14**	**33,540**	**237**	**14**	**51**
*OZ /SM7GCZ	*	21,910	141	17	53
*OZ1KWG	*	18,655	141	15	50
*OZ1APA	7	5,768	72	12	44

DODECANESE

SV5/K7AR	**14**	**218,772**	**1429**	**23**	**80**
***J45DZX**	**A**	**308,699**	**1303**	**41**	**156**
		(Opr. SMØCMH)			

ENGLAND

G4BUO	**A**	**4,405,296**	**3187**	**136**	**452**
G3ZEM	**"**	**3,062,514**	**3104**	**120**	**377**
GØIVZ	*	2,646,140	2850	112	349
G3PJT	*	1,173,315	1271	110	319
M6L	*	1,004,871	1394	129	310
			(Opr. G4ODV)		
M6O	*	418,200	1094	55	200
			(Opr. GØJQN)		
GØLZL	*	401,400	749	80	220
M6W	*	125,640	336	50	130
			(Opr. G3XWK)		
G3WRR	*	71,280	267	37	83
GØAEV	**28**	**7,150**	**104**	**13**	**42**
G3TXF	**21**	**444,050**	**1067**	**34**	**132**
G6G	*	90,168	401	23	81
			(Opr. GØLII)		
G4IUF	*	33,852	185	23	55
G3WVG	**14**	**651,168**	**1854**	**35**	**118**
G3IGW	**7**	**189,414**	**728**	**32**	**121**
G6T	*	39,950	286	21	64
			(Opr. G3NYY)		
***G4KIV**	**A**	**1,649,056**	**2290**	**103**	**361**
***G3NKS**	**"**	**720,460**	**1104**	**75**	**265**
*G3ESF	*	427,638	854	54	209
*G3JKY	*	346,000	593	43	130
*G3RSD	*	321,245	821	55	180
*GØKRL	*	235,876	552	48	170
*M6C	*	228,185	603	55	180
			(Opr. G3KKQ)		
*G5MY	*	205,662	443	45	182
*G3LIK	*	204,580	420	53	169
*G3JFF	*	203,040	399	70	200
*G3GGS	*	184,730	386	48	155
*G3VQO	*	128,466	444	38	124
*GØBMS	"	67,200	287	30	90
*GØVQR	*	48,158	298	31	90
*GØMRH	*	33,500	214	30	70
*G4ZME	*	30,096	204	22	66
*G4OTY	*	20,919	162	27	30
***G3VXJ**	**21**	**86,130**	**311**	**26**	**84**
*G3KTT	14	11,180	114	14	29

ESTONIA

ES1QD	**A**	**228,336**	**458**	**70**	**214**
ES7FU	*	73,260	294	37	128
ES1OX	**21**	**81,135**	**300**	**32**	**103**
ES6DO	**3.5**	**398,398**	**1726**	**34**	**109**
ES1RA	**1.8**	**12,496**	**122**	**14**	**57**
***ES2RJ**	**A**	**464,352**	**1571**	**35**	**133**
***ES1CN**	**21**	**40,455**	**210**	**24**	**69**
***ES2RJ**	**14**	**358,028**	**1123**	**38**	**120**
*ES4NG	*	19,602	125	19	47
*ES3BM	7	6,324	124	11	40
*ES1TM	3.5	6,636	158	6	36

EUROPEAN RUSSIA

RN6BY	**A**	**2,835,726**	**2959**	**133**	**460**
RZ3Q	**"**	**2,699,284**	**3038**	**135**	**461**
			(Opr. RW3QC)		
RZ6LJ	**"**	**1,949,373**	**2098**	**126**	**401**
RU3DU	*	599,650	716	83	252
UA1QV	*	577,955	1264	75	268
RA1QN	*	438,094	1087	76	241
RV6ASY	*	272,209	706	60	199
RV6ASY	*	272,209	706	60	199
RK3BY	*	234,427	377	91	268
UA1OMX	*	202,920	419	74	193
RA3RK	*	114,072	249	60	134
RW3FO	*	90,725	804	19	76
RA6LW	*	84,588	340	33	100
UA4YG	*	52,264	290	31	108
UA3UCD	*	11,508	62	7	77
RZ3BW	**21**	**199,068**	**682**	**35**	**124**
RK3AWR	**14**	**235,770**	**880**	**35**	**110**
			(Opr. RX3APM)		
RW4AA	**7**	**523,152**	**1643**	**36**	**132**
RA1AC	*	173,972	390	32	90
UA1OMS	*	156,058	714	36	106
RW6FF	*	146,592	840	29	108
RU6AV	*	141,224	561	31	108
RW1QA	*	20,952	165	16	56
RW4PL	**3.5**	**168,335**	**846**	**30**	**101**
UA4CJJ	**"**	**107,226**	**722**	**24**	**87**
RN3F	*	98,748	590	29	88
			(Opr. RU3DX)		
UA6LTI	*	78,520	544	22	82
RA3XA	*	76,719	538	24	83
RA3XO	**1.8**	**46,880**	**508**	**13**	**67**
UA1OZ	*	25,212	288	11	55
***RA3CW**	**A**	**860,228**	**1292**	**98**	**338**
***RU4WE**	**"**	**557,740**	**1117**	**79**	**274**
*UA3ABJ	*	484,725	933	80	265
*RV6LFE	*	158,976	559	41	175
*RA3DJA	*	104,706	313	49	140
*RA6FV	*	97,194	311	50	117
*UA4QK	*	76,812	267	47	126
*RK3AD	*	63,000	228	42	98
*RV4LC	*	34,965	160	37	98
*UA6AGK	*	22,940	189	35	88
*UA1ONX	*	20,370	132	31	74
*RA4LAH	*	19,800	158	22	78
*RX3ZZ	*	17,856	99	27	37
*RU6BV	*	4,320	32	19	26
***RZ6HX**	**21**	**130,284**	**579**	**33**	**99**
*RA1ZF	*	125,172	648	25	83
*RA3SL	*	91,461	389	32	97
*UA6NZ	*	54,908	280	29	77
*UA6LAK	*	27,888	156	26	57
***RN3QO**	**14**	**250,656**	**803**	**37**	**131**
*UA1OMZ	*	53,820	353	18	72
*RU4HH	*	51,408	315	26	76
*RA3VY	*	7,224	125	9	34
***RU4AA**	**7**	**119,660**	**523**	**30**	**94**
*RX6AY	*	57,500	280	28	87
*RV1AB	*	14,421	154	16	53
***UA3AGW**	**3.5**	**63,459**	**494**	**19**	**80**
*UA1ANA	*	50,864	445	17	71
*RW3WM	*	43,907	411	3	59
*RA3PP	*	42,880	411	13	67
***RA4NW**	**1.8**	**43,516**	**298**	**21**	**71**
*RV1CC	*	37,762	396	16	63
*UA6JVP	"	9,163	149	7	42

FAROE ISLANDS

OY1CT	**A**	**1,813,686**	**3367**	**86**	**312**

FINLAND

OH1NOR	**A**	**2,780,160**	**2462**	**144**	**399**
OI6YF	**"**	**1,927,074**	**1977**	**123**	**386**
OI6KZP	*	852,021	1164	81	288
OH8BQT	*	636,104	1011	69	238
OI6NEV	*	225,960	476	57	153
OI1BV	*	138,358	419	50	159
OH2LU	*	29,260	169	26	69
OH1VL	*	25,584	99	43	61
OI1AF	**21**	**278,460**	**920**	**35**	**118**
			(Opr. OH1MDR)		
OH6MRA	*	117,838	399	33	100
OI3MMH	*	113,174	377	35	107
OH2BCD	*	13,805	57	19	36
OI1HS	**14**	**461,292**	**1386**	**38**	**118**
OI1AB	**7**	**392,960**	**1347**	**36**	**124**
			(Opr. OH1NOA)		
OH6RC	*	26,860	222	20	65
OH1NSJ	**3.5**	**255,210**	**1269**	**31**	**110**
OI9BVM	*	128,180	704	30	100
OH1SH	*	38,700	400	17	69
OH2LRE	*	9,405	130	12	45
OH1EH	**1.8**	**76,665**	**703**	**20**	**75**
OH5VT	*	71,800	537	23	77
OH2BDP	*	22,576	211	14	69
OH3TY	*	7,250	91	9	49
***OH4YR**	**A**	**1,283,789**	**1418**	**111**	**370**
*OH2LP	*	170,424	407	57	206
*OH1XT	*	155,751	603	37	156
*OH8OB	*	73,120	279	42	118
*OH6FW	*	59,184	315	30	114
*OI7JQE	*	55,695	243	39	102
*OH2RL	*	47,712	239	34	108
*OI7NW	*	19,602	156	25	74
*OH4HAX	28	96	5	3	5

.... POWER ON WITH ASTRON
SWITCHING POWER SUPPLIES ....

SPECIAL FEATURES:

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING HF.
- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE.
- EMI FILTER
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PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 90-132 VAC 50/60Hz
OR 180-264 VAC 50/60Hz
SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8 VDC

MODEL	CONT. AMP	ICS	SIZE (Inches)	WT.(LBS)
SS-10	7	10	2.3 x 6 x 9	3.2
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
SS-25M*	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30M*	25	30	3 3/4 x 7 x 9 5/8	5

- *with separate volt & amp meters
- All SS power supplies are available in a RACK MOUNT VERSION (3.5 x 19 x 9 3/8)
- To order Rack Mount Version change SS to SRM (example: SRM-10)

ASTRON CORPORATION

9 AUTRY, IRVINE, CALIFORNIA 92618
714-458-7277 FAX 714-458-0826
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***OI1LEG**	**21**	**19,926**	**101**	**22**	**59**
*OH8LC	"	9,765	97	16	47
***OH3MC**	**14**	**42,891**	**214**	**24**	**63**
*OI3NM	"	21,356	138	15	61
*OH5PA	"	7,849	80	8	39
*OI1LVR	"	315	11	6	9
***OH1TN**	**3.5**	**69,978**	**459**	**21**	**86**
*OH2NOS	"	34,416	399	12	60
*OH2BSQ	"	13,052	232	7	45
***OH4JLV**	**1.8**	**102,600**	**300**	**31**	**89**
*OH4LJL	"	2,989	48	8	41

FRANCE

F6EEM	**A**	**1,045,044**	**1240**	**89**	**317**
F5RAB	**"**	**676,500**	**904**	**84**	**291**
F5TNI	"	403,025	604	90	239
F5PIQ	"	207,564	461	55	141
F5ROX	"	196,528	604	42	131
F5OIU	"	4,032	37	20	28
TM1C	**14**	**529,092**	**1728**	**33**	**109**
			(Opr. F5MZN)		
F6DKV	"	354,144	1308	29	95
TM7XX	**7**	**517,533**	**1777**	**38**	**129**
			(Opr. F5MUX)		
F5TGR	"	35,178	405	14	52
F6EZV	**1.8**	**122,706**	**807**	**21**	**81**
F6CWA	"	68,255	554	17	68
TM9C	"	37,515	488	12	49
***F6DDR**	**A**	**610,748**	**919**	**87**	**271**
***F6IIE**	**"**	**560,700**	**1012**	**85**	**265**
*F6ACD	"	511,632	894	65	241
*F5RBG	"	421,080	840	59	205
*F5NQL	"	364,455	810	63	210
*F6FII	"	338,646	803	57	174
*F5PHW	"	317,730	720	57	181
*F5OJL	"	280,370	569	62	203
*F5JLV	"	274,850	500	59	180
*F5UCK	"	235,532	633	49	153
*F6DZD	"	201,696	611	42	149
*F5OEV	"	160,428	401	48	126
*F5POJ	"	102,080	395	32	113
*F5JOT	"	91,657	355	37	114
*F6EQV	"	73,432	250	39	98
*F5EJC	"	65,616	606	31	99
*F6CAV	"	65,000	305	40	90
*F6CYT	"	64,371	286	31	98
*F5OQJ	"	57,816	239	39	60
*F6ABI	"	46,680	245	32	88
*F5TOI	"	38,700	168	33	96
*F6DCH	"	25,389	177	26	65
*F5ROW	"	16,560	90	23	67
*F5GEG	"	13,035	100	22	57
*F2FX	"	11,760	112	20	48
*F5SEE	"	11,664	65	30	42
*F5RPB	"	9,028	87	20	41
*F5AGB	"	8,400	50	20	50
*F5ORE	"	6,437	103	20	30
*F6DLM	"	6,307	70	15	38
*FB1PDR	"	4,320	46	24	40
***F5PGP**	**21**	**268,380**	**824**	**35**	**100**
*F6AXD	"	1,782	27	10	12
***TMØZK**	**7**	**44,252**	**278**	**22**	**70**
			(Opr. F5OZK)		
*F5JDG	"	7,614	119	11	36
*F5UFX	"	2,624	80	6	26
***F5AH**	**3.5**	**20,280**	**344**	**11**	**41**
***F5PYI**	**1.8**	**19,110**	**147**	**12**	**53**
*F3AT	"	5,100	80	10	41

GERMANY

DJ6QT	**A**	**3,064,320**	**2144**	**143**	**465**
			(Opr. DL1VJ)		
DK8ZB	**"**	**2,615,620**	**2018**	**140**	**455**
DL7MAE	**"**	**1,107,150**	**1031**	**132**	**418**
DK3KD	"	933,625	1241	87	298
DL2DXX	"	871,180	909	114	316
DK3YD	"	802,893	1309	77	280
DJ8CR	"	742,520	1000	82	298
DL8YR	"	562,716	997	69	239
DF3QG	"	558,828	811	95	292
DL4JAN	"	554,320	944	76	262
DL7BQ	"	532,730	973	69	250
DL1JF	"	495,625	771	71	254
DK6OR	"	455,680	771	81	239
DL3BQD	"	341,775	698	65	214
DF1DV	"	341,044	720	64	189
DL4YAO	"	257,677	523	73	208
DF6QV	"	183,040	377	51	169
DL2GBB	"	179,550	400	53	157
DL7UWL	"	172,405	370	61	144
DJ6JC	"	143,028	383	43	131
DL3DRN	"	104,130	334	44	151
DL6DVU	"	95,418	305	41	130
DL1JPL	"	77,728	281	43	69
DK5IM	"	48,990	281	24	118
DL7YS	"	41,134	150	42	89
DL8UFO	"	5,088	56	18	30
DK7AN	"	3,840	40	16	24
DJ5MN	"	3,540	43	18	41
DK5QN	**21**	**184,824**	**480**	**35**	**118**
DLØLR	"	105,028	363	36	88
DL3LAR	"	81,972	244	33	99
DJ5JH	**14**	**301,416**	**857**	**34**	**118**
DF4SA	**"**	**296,604**	**867**	**36**	**118**
DL1SAN	"	29,890	198	18	52
DK5PD	**7**	**458,830**	**1361**	**36**	**134**
DL9SEV	"	254,828	1015	32	101
DL1EMH	"	79,680	357	28	92
DJØSH	"	56,712	331	19	83
DL5AUJ	"	23,908	143	17	69
DJ3XD	"	6,272	115	8	41
DJ2YE	"	2,300	50	8	17
DL2ZA	"	1,904	51	10	24
DK8TU	**3.5**	**191,511**	**1042**	**28**	**95**
DL1SBR	**"**	**119,888**	**699**	**24**	**94**
DL9GFB	"	52,380	442	20	70
DK2GZ	"	41,140	364	17	68
DL7VMM	"	34,196	312	18	65
***DL8OBC**	**A**	**1,088,934**	**1231**	**101**	**361**
***DJ5BV**	**"**	**867,850**	**955**	**97**	**326**
***DF4ZL**	**"**	**824,172**	**1110**	**87**	**310**
*DL4FMA	"	800,797	1177	94	307
*DK5MV	"	777,240	1111	76	305
*DL3JAN	"	697,053	1149	70	279
*DK8FS	"	631,360	956	73	247
*DL2NWK	"	600,122	835	87	295
*DL7QU	"	569,408	960	71	257
*DL6UNF	"	504,974	844	78	248
*DL2HQ	"	469,890	748	76	269
*DL4BQE/P	"	450,708	896	59	225
*DK7ZH	"	404,948	757	58	210
*DL1DTC	"	377,405	734	69	194
*DL7CF	"	353,910	607	71	211
*DL1QQ	"	317,856	1232	60	198
*DLØER	"	313,491	651	61	188
			(Opr. DL6ECA)		
*DL7ANR	"	292,400	587	58	214
*DL1TH	"	266,961	655	52	167
*DL6AG	"	225,630	508	56	174
*DL5JRA	"	224,315	525	53	150
*DL3HRZ	"	214,896	451	61	161
*DL5ZB	"	204,876	383	63	208
*DL8HCO	"	200,304	487	54	180
*DJ4PT	"	190,950	403	57	144
*DF3OL	"	187,392	425	61	183
*DL9XY	"	183,330	560	41	153
*DL4VBP	"	172,002	329	69	194
*DLØLD	"	157,530	485	45	132
			(Opr. DL2YBF)		
*DL6UCW	"	152,157	431	46	155
*DJ8EF	"	135,660	501	38	132
*DL6UAM	"	114,165	439	39	138
*DL5SVB	"	113,071	374	53	150
*DL1ZO	"	103,342	317	43	120
*DL2YAK	"	100,285	360	36	119
*DF4BJ	"	100,275	350	42	133
*DL6UKL	"	89,161	442	31	132
*DJ5CL	"	72,245	300	37	112
*DL8NBJ	"	62,832	279	39	115
*DL5DSA	"	59,860	365	46	118
*DL8UVG	"	55,020	214	28	112
*DL3ZAI	"	52,700	258	29	95
*DL3HSC	"	49,494	236	19	94
*DL3DBY	"	48,216	270	27	96
*DK5ZX	"	47,580	184	41	89
*DL5XAT	"	42,592	171	34	87
*DL3YEI	"	34,080	180	30	90
*DL3KWR	"	27,170	180	28	82
*DL4FDM	"	22,638	136	28	70
*DL2RMS	"	20,467	174	15	82
*DL5AOJ	"	19,758	155	39	50
*DF9RC	"	15,624	112	23	70
*DL1ET	"	14,344	74	30	58
*DL1IA	"	10,209	55	33	50
*DL3DCY	"	7,378	98	18	44
*DL9NEI/P	"	7,081	69	24	49
*DL6NDQ	"	2,886	77	8	31
*DF5WN	28	598	29	8	15
***DL3BRA**	**21**	**74,500**	**238**	**31**	**94**
*DL4UL	"	69,300	252	30	80
*DL2SBY	"	58,479	240	28	73
*DL1RNW	"	35,014	160	23	59
***DL1YAW**	**14**	**285,510**	**818**	**37**	**118**
*DK3DM	"	138,632	516	28	96
*DF7TU	"	53,062	309	18	66
*DL2AL	"	24,752	168	13	55
*DL4OBJ	"	10,291	129	8	32
*DL4JTH	"	8,140	91	8	29
***DKØMM**	**7**	**169,092**	**670**	**36**	**118**
*DJ2XC	"	35,236	261	16	76
*DF8AE	"	9,404	101	12	37
*DL9OCI	"	9,168	147	8	40
*DL1DWT	"	8,804	69	22	40
*DL7UXG	"	4,914	125	6	33
*DK9KW/P	"	3,796	61	13	36
***DL6MTA**	**3.5**	**42,028**	**424**	**14**	**62**
***DJ3RA**	**1.8**	**13,847**	**207**	**10**	**51**
*DJ2ZS	"	6,672	142	5	43
*DJ6WC	"	528	26	2	20

GREECE

SV2BBJ	**7**	**25,599**	**236**	**13**	**56**
*SV1JA	A	30,240	100	35	73
*SV1DET	3.5	10,050	182	8	42

GUERNSEY

*GU/F5SHQ	7	17,901	333	9	42

HUNGARY

HA6NF	**A**	**1,016,704**	**1228**	**100**	**316**
HA1BC	"	111,078	252	57	141
			(Opr. DL1MAJ)		
HGM3O	**7**	**681,292**	**1908**	**38**	**134**
			(Opr. HA3UU)		
HA9BVK	**"**	**547,896**	**1810**	**35**	**113**
			(Opr. HA9AX)		
HA6NL	**3.5**	**151,844**	**958**	**25**	**94**
HA4FF	"	57,600	612	17	63
HA9PN	"	38,775	627	10	45
HA6NY	**1.8**	**120,772**	**899**	**22**	**87**
***HA8XX**	**A**	**50,107**	**387**	**25**	**64**
*HA1VE	21	10,452	79	17	35
***HA5NK**	**7**	**156,890**	**640**	**31**	**114**
***HA8PG**	**3.5**	**168,700**	**1125**	**22**	**78**
*HA7JTR	"	38,592	510	12	55
*HA8					
/DL3KWF	3.5	1,040	41	5	21
***HA8BE**	**1.8**	**121,408**	**730**	**26**	**86**

IRELAND

EI3DP	**14**	**525,968**	**1715**	**36**	**106**
EI7M	**1.8**	**123,214**	**858**	**19**	**72**
			(Opr. EI9HC)		
***EI4DW**	**A**	**582,008**	**1058**	**66**	**266**
***EI6FR**	**14**	**264,537**	**1035**	**29**	**104**

ISLE OF MAN

***GD4UOL**	**A**	**954,448**	**1487**	**74**	**300**

ITALY

IU2E	**A**	**1,734,720**	**2085**	**104**	**313**
			(Opr. IK2VUE)		
I3EVK	**"**	**970,170**	**1157**	**101**	**337**
IØZUT	"	676,664	1153	69	259
IK2AHB	"	447,661	805	60	229
IR3L	"	168,116	474	53	159
			(Opr. I3FDZ)		
IK2YSE	"	41,750	146	50	117
IK2NVE	"	39,140	168	35	68
IR4T	**7**	**780,057**	**2311**	**39**	**134**
			(Opr. IK2QEI)		
IK2HKT	"	27,690	258	19	59
I3VHO	**3.5**	**44,145**	**368**	**18**	**63**
IKØFUX	"	9,600	72	15	45
***IKØYVV**	**A**	**911,942**	**1025**	**93**	**329**
***I3JTE**	**"**	**801,540**	**1069**	**87**	**279**
*IQ7A	"	670,133	1263	77	236
			(Opr. IK7XIV)		
*IK4EWX	"	551,525	932	76	249
*IKØWMT	"	458,700	849	82	248
*IK1RQQ	"	300,432	720	60	204
*IK4ZHH	"	273,088	541	66	185
*IK6SNQ	"	169,812	429	60	152
*IKØTUG	"	165,243	406	65	158
*IKØTXF	"	86,490	343	33	122
*I4JEE	"	50,688	177	45	131
*IK3SCB	"	50,430	188	40	83
*IK5RLS	"	45,840	161	44	76
*IK3HUG	"	36,693	207	24	57
*I3VYK	"	33,491	171	37	70
*I4VJC	"	30,597	165	27	66
*IKØYUJ	"	28,363	122	34	79
*IKØUUM	"	28,188	140	36	80
*IKØYUM	"	18,980	153	21	31
*IØYQV	"	18,425	130	23	32
*IZ3ALS	"	15,576	147	23	65
*IZØAIS	"	6,222	52	24	37
*IK1YEE	"	4,851	59	14	19
*I3MLU	28	630	34	5	13
***IK5TBK**	**21**	**54,531**	**278**	**23**	**60**
*IK3NLK	"	36,564	256	20	46
***I5ZUF**	**14**	**149,733**	**514**	**32**	**99**
*I7PXV	"	70,680	411	21	72
*IØTLX	"	4,736	72	9	28
***IK2AIT**	**7**	**23,712**	**275**	**11**	**46**
***IK4WMG**	**3.5**	**169,440**	**934**	**26**	**94**

KALININGRAD

UA2FJ	**3.5**	**471,585**	**1895**	**33**	**116**
***UA2FP**	**A**	**378,863**	**1193**	**52**	**175**
*RA2FZ	"	163,799	511	53	180
***UA2FT**	**1.8**	**49,664**	**724**	**9**	**55**

LATVIA

YL8M	**A**	**2,486,938**	**2504**	**144**	**457**
			(Opr. YL2KL)		
YL2KO	"	882,973	1302	93	310
YL2MR	"	476,386	971	77	236
YL2IP	"	32,895	100	50	79
YL2GN	**7**	**117,638**	**620**	**29**	**102**
YL2SM	**1.8**	**100,700**	**763**	**22**	**78**
***YL2UZ**	**A**	**474,474**	**1196**	**58**	**228**
*YL2TW	"	275,504	823	56	201
*YL3AD	"	26,625	311	13	58
*YL3GBU	"	10,320	276	22	72
***YL3IG**	**3.5**	**49,812**	**463**	**16**	**68**
*YL2GQT	"	16,308	242	12	54
***YL2VW**	**1.8**	**45,414**	**417**	**17**	**70**

LITHUANIA

LY2PAQ	**A**	**629,805**	**1035**	**89**	**274**
LY3BU	"	221,094	620	51	162
LY2KM	"	210,724	427	62	216
LY3CW	"	177,507	469	43	120
LY3IW	"	51,520	353	27	88
LY1FW	"	19,200	145	25	75
LY2OX	**14**	**187,250**	**703**	**29**	**96**
LY2BN	"	158,068	553	35	109
LY3BX	**7**	**290,020**	**1105**	**37**	**133**
LY3JY	**"**	**230,412**	**914**	**34**	**122**
LY6K	**3.5**	**333,606**	**1419**	**33**	**108**
LY3ID	"	76,032	492	24	84
LY2BZ	"	49,220	493	16	76
***LY2FN**	**A**	**701,250**	**1281**	**82**	**292**
*LY1DD	"	184,764	407	66	201
*LY1FM	"	118,807	503	33	136
*LY3NJM	"	41,195	363	22	85
*LY2PBM	"	32,144	255	21	77
*LY3BY	"	27,750	129	31	94
*LY3KB	"	4,484	73	12	47
***LY6M**	**14**	**262,190**	**816**	**37**	**120**
			(Opr. AC6WL)		
*LY2NV	"	60,334	299	23	74
*LY2BKT	"	38,144	336	15	49
*LY1CY	7	19,512	194	17	55
***LY2TX**	**3.5**	**22,176**	**301**	**11**	**52**
***LY2OU**	**1.8**	**27,255**	**337**	**11**	**58**

MACEDONIA

*Z32KV	28	858	66	2	11
***Z31JA**	**21**	**249,232**	**984**	**30**	**118**
*Z32XA	"	118,459	482	32	89
***Z39M**	**14**	**417,534**	**1427**	**36**	**123**
			(Opr. Z31CN)		
***Z32XX**	**7**	**264,550**	**1060**	**29**	**114**
***Z31JA**	**3.5**	**186,030**	**1264**	**23**	**84**

MALTA

9HØA	**21**	**331,420**	**1222**	**34**	**112**
			(Opr. 9H1EL)		

MOLDOVA

ERØF	**A**	**2,079,696**	**2855**	**114**	**330**
			(Opr. UXØFF)		
ER1OA	"	245,250	550	66	184
ER2WD	"	95,078	558	30	107
ER5AA	**21**	**59,496**	**274**	**27**	**84**
ER5AL	**7**	**52,151**	**217**	**26**	**95**
***ER3DX**	**3.5**	**125,672**	**1034**	**18**	**74**

NETHERLANDS

PAØLOU	**A**	**344,124**	**457**	**97**	**266**
PAØGAM	"	212,850	375	71	187
PAØCOR	"	130,713	352	51	136
PA3DKX	"	76,120	223	47	126
PAØRCT	**3.5**	**91,260**	**957**	**12**	**66**
PAØCLN	**1.8**	**78,624**	**573**	**22**	**82**
PA3BUD	"	11,664	201	8	46
***PA3GNO**	**A**	**299,466**	**570**	**59**	**195**
*PA3FMB	"	139,482	438	37	125
*PAØMIR	"	82,302	331	38	136
*PA3DUS	"	81,345	293	42	103
*PAØINA	"	57,528	175	46	90
*PA3BEJ	"	10,160	100	17	63
*PA3CAL	"	3,408	31	19	29
*PA3EXI	"	2,914	42	12	35
*PA3AYF	"	2,580	51	9	11
*PAØPLN	21	11,475	123	15	30
*PA2CHM	"	7,050	112	10	15
***PA3ELD**	**14**	**135,090**	**586**	**26**	**88**
*PA3FHA	"	100,880	477	22	82
*PAØJED	"	55,760	309	19	66
*PA3ADJ	"	27,054	208	15	39
***PA3AAV**	**7**	**292,410**	**1149**	**39**	**123**
*PA3BNT	"	15,309	168	16	47
*PA3ECJ	"	13,650	151	66	210
*PA3AFF	1.8	3,900	100	5	34

NORTHERN IRELAND

GIØKOW	**A**	**5,652,738**	**4299**	**133**	**476**
			(Opr. GIØNWG)		
***GI4SNC**	**A**	**221,580**	**497**	**42**	**138**

NORWAY

LA9DFA	**A**	**530,320**	**1388**	**58**	**222**
LA6PB	"	218,207	562	52	187
LA6IHA	"	170,934	613	39	147
LA7DHA	"	116,440	428	38	126
LA2IR	"	8,050	07	15	55
LA7SI	"	5,940	41	25	35
LA6FJA	7	5,763	113	9	42
LA9VDA	**3.5**	**378,998**	**1673**	**31**	**111**
LA9GX	**"**	**230,202**	**1224**	**27**	**99**
LA4EJ	1.8	1,134	38	5	22
***LA2O**	**A**	**324,848**	**847**	**53**	**204**
***LA1VFA**	**"**	**304,977**	**635**	**72**	**205**
*LA9MB	"	96,624	272	51	132
*LA5LJA	"	77,815	207	53	144
*LA4XFA	"	60,579	317	31	96
*LA8LA	"	21,321	103	30	73
*LA8CE	14	26,640	150	20	54
*LA8WG	1.8	7,866	139	13	33

POLAND

SP9DWT	**A**	**1,292,336**	**1549**	**105**	**367**
SP2LNW	"	418,080	786	67	245
SP2JGK	"	123,032	489	35	134
SP9ATE	"	91,676	279	46	126
SP3FLR	"	85,036	183	53	103
SP2IU	"	78,551	189	61	132
SP5CEO	"	33,375	165	35	90
SP4EAK	"	21,402	124	31	56
SP2DKI	"	9,394	95	21	56
SP9LAS	"	2,664	28	17	20
SP9HWN	**21**	**208,299**	**704**	**33**	**114**
SP3CYY	"	39,150	167	29	58
SP2FWC/P	**14**	**294,350**	**972**	**35**	**110**
SP5DIR	"	169,252	612	34	97
SP9DTH	"	32,396	138	29	60
SP6STS	"	21,424	187	16	36
SP7GIQ	**7**	**831,198**	**2332**	**39**	**135**
SP6OJE	"	207,936	656	37	134
SP4GHL	"	44,304	292	24	80
SP5CJQ	**3.5**	**187,372**	**914**	**30**	**109**
SP3GTS	"	52,061	522	15	64
SP2EBG	"	216	6	6	6
SP5GRM	**1.8**	**183,396**	**927**	**27**	**97**
SP6CTC	"	73,440	629	18	72
SP5GH	"	8,976	75	10	58
***SP4EEZ**	**A**	**1,699,320**	**1559**	**142**	**453**
***SP9XCN**	**"**	**1,035,948**	**1427**	**85**	**308**
*SP2QCH	"	842,214	1261	99	292
*SP6NIC	"	670,461	1137	84	279
*SP2UKB	"	445,500	741	82	248
*SP5ELA	"	361,326	714	75	219
*SP7NMW	"	346,000	524	82	264
*SP1AEN	"	326,860	563	64	231
*SP3EQE	"	30,9090	223	30	83
*SP6CPF	"	301,675	577	69	206
*SP3MGP	"	241,230	495	65	193
*SP3FZN	"	161,415	432	51	160
*SP9AAB	"	71,622	332	35	103
*SP1MHV	"	66,795	155	59	124
*SP5ASY	"	64,449	198	57	152
*SP5NZL	"	63,269	312	43	108
*SP6YGB	"	49,861	179	40	79
*SP6NIF	"	45,216	160	41	103
*SP4BOS	"	32,280	225	25	95
*SQ9BZK	"	29,970	182	32	49
*SQ9APN	"	26,628	164	23	61
*SP4AVG	"	21,780	164	26	73
*SP7GAQ	"	21,018	68	50	63
*SP9MDY	"	18,360	106	32	58
*SP5GKN	"	16,200	82	32	58
*SP5GKN	"	16,200	82	32	58
*SP9AGS	"	13,416	139	18	60
*SP3XR	"	13,397	235	28	74
*SP5NHI	"	11,808	89	32	40
*SP1IXG	"	11,692	60	30	44
*SQ9DXN	"	5,668	65	14	38
*SP6CES	"	5,353	40	19	34
*SQ6ELP	"	2,627	53	10	37
*SP9DH/9	"	2,432	32	14	18
*SP9PEX	"	300	10	6	9
***SP9LAB**	**28**	**2,760**	**44**	**12**	**28**
*SP5LCC	"	80	6	4	6
***SP7ELQ**	**21**	**93,800**	**302**	**29**	**105**
*SP2AVE	"	64,251	224	31	90
*SP9QJ	"	11,123	90	19	30
*SP3AOT	"	7,875	71	16	29
*SP2QVS	"	6,660	69	9	28
*SP9RTF	"	774	24	7	11
***SN9C**	**14**	**74,229**	**352**	**25**	**84**
			(Opr. SP5LGT)		
*SP5XMM	"	37,548	228	17	67
*SP3FPF	"	23,400	120	26	78
*SP6SYF	"	15,675	107	17	38
*SP5ICS	"	13,769	154	13	36
*SP9HXA	"	80	4	4	4
***SP9NLK**	**7**	**163,856**	**586**	**35**	**119**
*SP7JQQ	"	69,690	374	25	90
*SP6CDP	"	63,838	323	28	90
*SP9EML	"	35,333	252	19	70
*SP5CGN	"	24,624	214	17	64
*SN3P	"	23,147	244	16	63
			(Opr. SP3DAH)		
*SP5CNA	"	20,740	222	17	51
*SP8MJ	"	10,860	75	21	49
*3Z3AFS	"	5,600	98	7	91
*SP6BXM	"	4,403	127	6	31
***SP5JTF**	**3.5**	**66,913**	**686**	**16**	**61**
*SP3LPR	"	54,614	514	14	69
*SP6NIG	1.8	4,576	100	5	39
*SP3NX	"	3,905	50	9	26

PORTUGAL

CT8T	**A**	**5,716,916**	**4584**	**138**	**439**
			(Opr. N6AA)		
CT1DXT	"	79,000	308	46	79
***CT1AOZ**	**A**	**661,230**	**1237**	**68**	**199**
*CT1DRB	"	163,262	488	40	141
*CT1ELP	"	38,380	167	34	67
***CT4DX**	**7**	**42,120**	**261**	**14**	**58**

ROMANIA

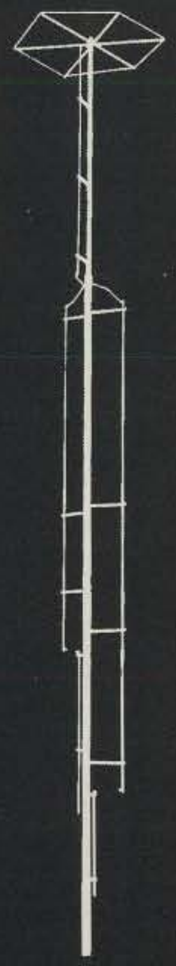
YO3APJ	**A**	**1,288,740**	**1531**	**111**	**346**
***YO8FR**	**A**	**763,310**	**923**	**83**	**287**
*YR8A	"	123,693	531	44	133
			(Opr. YO8AXP)		
*YO3FF	"	52,328	197	42	82
*YO2CJX	"	52,200	408	19	101
*YO3BWK	"	6,552	44	19	33
***YR2R**	**21**	**43,888**	**203**	**27**	**77**
			(Opr. YO2DFA)		
***YO4BBH**	**14**	**57,545**	**380**	**22**	**63**

GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.

Eagle DX

Challenger DX



Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

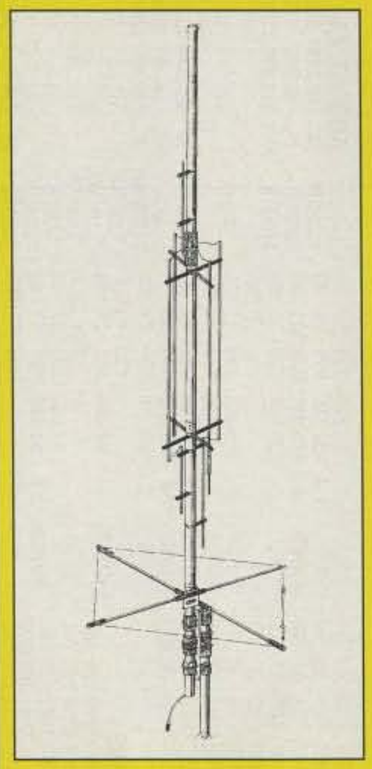
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

Latest Release: **TITAN DX**



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$299
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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*YO6DBA	"	2,185	53	6	13
*YO7LHR/P	7	270	18	4	11

SAN MARINO

T77WI	A	25,088	127	35	63

SARDINIA

ISØOMH	**A**	**359,122**	**1032**	**54**	**157**
ISØMKU	"	247,434	562	64	189
ISØUWX	"	16,872	158	23	53
***ISØWBT**	**A**	**238,349**	**576**	**60**	**181**
*ISØHQJ	"	64,080	350	38	57

SCOTLAND

GM6V	**14**	**517,068**	**1505**	**38**	**121**
				(Opr. GM3WOJ)	
GM6Z	**7**	**192,231**	**1224**	**25**	**92**
				(Opr. W5ASP)	
***GM4SID**	**A**	**546,922**	**1202**	**72**	**230**
***GM3CFS**	**14**	**67,584**	**396**	**23**	**65**
***GM4YXI**	**7**	**48,484**	**385**	**20**	**72**

SICILY

***IT9ORA**	**A**	**267,430**	**649**	**59**	**176**
*IT9AJP	"	49,446	167	46	88
*IT9DEC	21	24,354	237	19	47
***IU9AF**	**14**	**170,107**	**733**	**34**	**99**
				(Opr. IT9AF)	

SLOVAK REPUBLIC

OM8A	**A**	**4,601,610**	**3730**	**137**	**461**
				(Opr. OM3RM)	
OM3TA	"	50,375	273	30	95
OM5M	**14**	**722,936**	**1824**	**39**	**145**
				(Opr. OM3BH)	
OM3RRC	"	72,590	459	21	64
			(Opr. OM3TDV)		
OM5R	**3.5**	**174,608**	**1122**	**24**	**88**
				(Opr. OM5AW)	
OM5ZW	**1.8**	**117,393**	**663**	**25**	**84**
OM5ZM	"	30,072	255	17	67
OM7RU	"	9,570	147	10	45
***OM3PQ**	**A**	**376,629**	**639**	**80**	**223**
*OM1AF	"	346,524	797	59	209
*OM5NA	"	338,415	800	53	178
*OM3GB	"	317,165	551	70	207
*OM3TLO	"	303,480	723	53	217
*OM8ON	"	261,942	389	89	204
***OM7PY**	**21**	**35,700**	**136**	**28**	**77**
*OM9TR	14	18,760	183	14	42
			(Opr. OM3TB)		
***OM4WW**	**7**	**82,422**	**446**	**25**	**89**
*OM4DN	"	21,760	265	12	52
*OM1AW	"	11,220	141	12	48
***OM5KM**	**3.5**	**74,632**	**745**	**13**	**63**
*OM3ZIR	"	33,453	284	9	50
*OM3CDN	"	25,155	349	10	55
***OM3OM**	**1.8**	**65,160**	**590**	**16**	**74**
*OM5DW	"	2,145	50	6	33

SLOVENIA

S53R	**A**	**2,938,908**	**2265**	**143**	**450**
S51BO	**"**	**2,696,872**	**2116**	**132**	**422**
S55A	"	508,935	923	67	192
S51NY	"	43,733	344	30	71
S51AY	**28**	**19,500**	**205**	**17**	**58**
S5ØR	**21**	**276,115**	**805**	**37**	**124**
S57DX	**14**	**670,170**	**1696**	**38**	**140**
S5ØA	**7**	**847,299**	**2337**	**39**	**138**
S57AL	**"**	**671,880**	**2165**	**38**	**127**
S52OP	"	251,173	1063	33	106
S52GP	"	79,744	424	27	85
S57O	**3.5**	**282,226**	**1249**	**30**	**103**
				(Opr. S51IX)	
S58WW	"	150,904	1032	22	82
S53W	"	127,296	997	22	74
S51B	**1.8**	**89,805**	**819**	**17**	**68**
S54E	"	10,880	116	13	55
***S59AA**	**A**	**2,281,884**	**1871**	**134**	**452**
***S51EA**	**"**	**1,527,532**	**1748**	**98**	**330**
***S51FA**	**"**	**1,278,870**	**1393**	**103**	**367**
*S57U	"	1,021,680	1260	92	338
*S59D	"	139,260	476	47	164
*S51T	"	12,115	226	24	76
***S57J**	**21**	**230,971**	**550**	**36**	**127**
***S58AL**	**14**	**317,687**	**856**	**38**	**125**
***S57T**	**"**	**313,698**	**922**	**36**	**118**
*S53BM	"	70,889	327	22	69
*S51MF	"	54,240	218	27	86
*S59L	"	42,612	301	15	52
*S51TE	"	24,846	178	17	65
***S54A**	**7**	**210,826**	**843**	**35**	**119**
*S52SK	"	188,340	770	32	114
*S52OT	"	130,284	522	34	107
*S54MM	"	65,400	313	27	93
***S57X**	**3.5**	**60,210**	**544**	**15**	**75**
*S53X	"	56,619	511	14	67
*S51S	"	43,676	636	10	51
			(Opr. S57PWI)		
*S57M	"	35,706	455	11	55
*S57NGR	"	26,609	393	9	50
*S57MRW	"	19,964	343	8	38
*S57MRG	"	7,289	181	6	31

SPAIN

EA2IA	**A**	**1,918,008**	**2535**	**100**	**308**
EA3ALN	**"**	**1,104,966**	**1404**	**103**	**288**
EA1JO	"	541,960	784	87	253
EA3GHB	"	447,552	934	64	188
EA1FBJ	"	100,160	425	35	125
EA2CR	"	30,700	167	27	73
EA1FEL	**21**	**125,364**	**612**	**25**	**68**
EA3AOE	"	94,424	451	34	82
EA4AV	"	46,512	176	31	71
***EA3CA**	**A**	**1,065,016**	**1497**	**107**	**275**
***EC3AIC**	**"**	**788,840**	**1726**	**57**	**148**
*EA2BNU	"	427,000	941	54	190
*EA4AAF	"	344,470	687	61	198
*EA3BOW	"	287,382	639	58	169
*EA1ABM	"	276,794	634	60	178
*EA7TG	"	246,519	424	73	200
*EA7MT	"	200,169	490	56	151
*EA7HDO	"	198,024	448	56	166
*EA5LA	"	152,988	345	60	123
*EA1OJ	"	117,000	252	57	143
*EA4AUF	"	74,214	224	51	120
*EA3GIJ	"	63,784	235	41	95
*EA2CNH	"	58,174	233	40	78
*EA5KK	"	55,624	228	35	101
*EA4BGM	"	53,213	259	37	90
*EA4EOI	"	37,856	179	33	71
*EC2AGR	"	35,653	200	31	70
*EA3ANE	"	27,945	85	40	75
*EA4AYB	"	22,200	158	21	53
*EA1EWL	"	21,420	130	20	48
*EC3AAF	"	17,460	218	16	44
*EA1AAA	"	14,746	111	19	54
*ED2URG	"	14,726	117	21	53
			(Opr. EA2CAR)		
*EC4AEK	"	11,088	88	20	46
*EA4CIE	"	7,684	53	26	42
*EA7GVW	"	7,644	66	23	26
*EA4AQQ	"	5,529	35	24	33
*EA4AWJ	"	4,480	46	21	35
*EA1AKP	"	2,600	39	13	12
***EA3AFW**	**28**	**7,000**	**90**	**13**	**37**
*EA7BJV	"	5,676	79	12	31
***EA1AK/7**	**21**	**204,525**	**794**	**31**	**104**
*EA7GTF	"	198,170	964	23	72
*EA3GIS	"	28,350	150	23	52
*EC4DBB	"	11,818	136	9	29
*EA1BXW	"	882	14	14	42
***EA2CLU**	**14**	**349,110**	**1210**	**29**	**106**
*EA1AKB	"	90,383	528	17	50
*EA5AGW	"	9,360	112	7	33
*EA5DLT	"	7,003	96	17	30
***EA3AJW**	**7**	**94,656**	**606**	**20**	**76**
*EA7BB	"	70,286	341	24	89
*EA5GPP	"	41,760	283	17	70
*EA1FEQ	"	14,074	139	13	49
***EA5FV**	**3.5**	**107,310**	**732**	**20**	**78**
*EA7CA	1.8	672	21	5	19

SVALBARD

JW5NM	**A**	**451,560**	**943**	**63**	**149**

SWEDEN

SM5COP	**A**	**737,326**	**1020**	**86**	**260**
SM5AOE	**"**	**647,778**	**1007**	**81**	**240**
SM6NM	"	189,696	329	67	245
SMØTGG	"	121,511	372	45	124
SM3AF	"	44,172	271	29	79
SM5BEU	"	43,186	171	39	112
8S3FRO	"	21,870	163	23	58
			(Opr. SM3CVM)		
SM5IRV	"	16,758	99	29	69
SM6CST	"	9,548	63	30	47
7SØMG	**21**	**155,078**	**461**	**35**	**119**
				(Opr. SMØKV)	
SL3ZV	**14**	**537,000**	**1682**	**36**	**114**
				(Opr. SM3JLA)	
SM6JY	"	14,905	171	13	43
SM5RE	"	13,283	151	9	28
SM2BUW	"	2,769	43	11	28
SL3ZV	**7**	**305,121**	**1104**	**37**	**122**
				(Opr. SM3OJR)	
SM6DER	"	188,958	697	35	119
SM2DMU	"	172,524	793	32	100
SL3ZV	3.5	3,219	71	7	30
			(Opr. SM3OJR)		
SM6CPY	**1.8**	**108,474**	**716**	**24**	**77**
SL3ZV	**"**	**107,738**	**781**	**23**	**80**
				(Opr. SM3BDZ)	
SM6DOI	"	106,454	719	22	79
SM4HCM	"	22,673	118	27	52
***SMØBDS**	**A**	**308,844**	**657**	**67**	**209**
*SM5CEU	"	141,960	845	42	126
*SM7BHM	"	120,328	441	40	138
*SM2KAL	"	110,843	231	57	142
*SM4SX	"	86,584	332	36	101
*SM7BZV	"	30,846	185	31	75
*SM7CFR	"	19,500	123	22	43
*SMØNJO	"	6,042	120	27	44
*SM4TU	"	4,944	48	15	33
*SMØMRP	28	666	19	7	30
*SM6AHU	14	5,425	155	11	24
***SM7VZX**	**3.5**	**65,520**	**653**	**14**	**64**

SWITZERLAND

HB9ZE	**A**	**487,786**	**1004**	**54**	**203**
HB9HFN	"	209,300	303	82	217
HB9KC	"	117,660	333	39	109
HB9DX	**21**	**33,902**	**104**	**31**	**103**
*HB9AFH	A	59,340	167	51	78
*HB9QA	"	11,480	92	20	50
*HB9HFD	"	2,058	40	8	34
***HB9HLE**	**7**	**122,752**	**563**	**27**	**101**
*HB9GCD	"	106,267	558	24	95
			(Opr. OK1EE)		

UKRAINE

UT2QT	**A**	**2,817,936**	**3316**	**120**	**408**
US5WE	**"**	**2,115,910**	**2254**	**115**	**348**
UTØU	**"**	**1,122,590**	**1687**	**101**	**305**
				(Opr. UT5UDX)	
UX1UA	"	825,214	1183	107	335
UX5UO	"	645,752	876	110	314
UT2UB	"	638,583	893	97	310
UX3ZW	"	377,230	733	71	246
UT4EK	"	289,734	661	59	199
UT8IM	"	261,126	669	70	197
UY5QO	"	189,200	522	58	157
UT5UOC	"	21,505	87	44	71
UU4JN	"	11,396	130	18	56
UR7VA	**28**	**3,078**	**70**	**10**	**28**
UT1IA	**"**	**2,665**	**53**	**12**	**29**
UT7LA	**21**	**122,960**	**444**	**34**	**111**
U5MZ	"	16,800	151	20	50
UT7L	**14**	**303,264**	**980**	**37**	**125**
				(Opr. UR5LGJ)	
UT3QW	**"**	**220,480**	**769**	**36**	**124**
UX7QD	"	17,200	172	13	41
UR6QA	**7**	**557,624**	**1949**	**39**	**133**
UY2ZA	"	170,821	638	36	125
UY4WWA	"	124,960	454	30	80
			(Opr. UR5WAL)		
UR3IOB	"	82,060	480	28	82
UY3QW	"	10,800	103	15	45
UUØJM	**3.5**	**268,402**	**1278**	**30**	**104**
UT5UJO	**"**	**154,560**	**969**	**23**	**89**
UT3UZ	"	108,624	757	23	70
UYØZG	"	62,622	449	19	79
UR5LF	"	58,770	500	17	73
UT1WZ	"	41,749	398	15	68
UR7QM	"	40,810	463	14	56
UT5UIA	"	36,210	384	14	57
UY5TE	"	33,252	400	10	58
UT1ZZ	1.8	1,885	52	5	24
***US2YW**	**A**	**810,873**	**1130**	**97**	**330**
***UX7QQ**	**"**	**397,068**	**564**	**90**	**258**
*UX5EF	"	322,026	750	60	221
*UX3M	"	306,660	713	63	222
			(Opr. UR3MP)		
*UT9IR	"	150,220	267	72	187
*UU2JA	"	67,900	186	49	145
*UR5IAE	"	63,860	280	42	113
*UT3LL	"	50,076	218	38	79
*UY8W	21	3,379	49	11	20
***UT7EG**	**14**	**59,427**	**380**	**26**	**67**
*UY5WA	"	14,520	200	11	44
***UR5FEL**	**7**	**260,311**	**957**	**38**	**125**
*UR7TA	"	116,066	533	28	103
*UT3UA	"	96,668	417	32	111
*UT1PO	"	66,272	320	23	86
*UY2ZZ	"	27,600	272	15	54
***UX1HW**	**3.5**	**65,604**	**670**	**14**	**70**
*UX4UA	"	57,148	478	20	71
*UT5PW	"	47,278	495	15	62
*UR5MKD	"	8,200	139	9	41
***US7ZM**	**1.8**	**65,780**	**513**	**22**	**70**
*UX2MF	"	24,852	257	13	63
*UR5UW	"	22,050	300	9	53
*UY5VA	"	5,805	115	6	37

WALES

GW4BVJ	**A**	**367,773**	**724**	**69**	**180**
GW6J	**1.8**	**101,708**	**812**	**19**	**75**
				(Opr. GW4VEQ)	
GW3JXN	"	49,410	464	16	65
***GW3SYL**	**A**	**543,390**	**1058**	**67**	**240**
*GW3JSV	"	68,515	193	56	137
*GWØGEI	"	3,213	51	15	36
***GW4HBK**	**7**	**31,476**	**201**	**19**	**67**

YUGOSLAVIA

YT1AD	**A**	**3,786,432**	**2966**	**148**	**508**
YU7AV	**"**	**2,818,645**	**2262**	**142**	**435**
YU7BW	**"**	**2,653,717**	**2343**	**147**	**470**
YU7KM	"	213,400	666	62	158
YU7DP	"	110,526	375	44	125
YU1ZZ	**14**	**585,837**	**1836**	**36**	**117**
YT1BB	**"**	**531,864**	**1670**	**38**	**140**
YT7P	"	60,840	347	20	70
YT7A	**7**	**875,716**	**2478**	**39**	**155**
				(Opr. YU7GO)	
4O4D	**"**	**473,700**	**1856**	**35**	**115**
				(Opr. YU4NC)	
YTØT	**3.5**	**384,970**	**1628**	**32**	**105**
				(Opr. 4N1DXX)	
YT1I	**"**	**333,855**	**1534**	**31**	**104**
				(Opr. YU1NW)	
YU7NU	"	224,796	1019	30	102
YTØEXY	"	210,210	1208	23	87
			(Opr. YU1KW)		
YU7LS	"	115,533	909	19	80
YZ1AU	"	13,731	156	13	56
YU1EA	**1.8**	**109,408**	**991**	**21**	**83**
***YU7CB**	**A**	**1,025,051**	**1265**	**101**	**356**
*YTØE	"	325,304	766	53	206
			(Opr. YU1BO)		
*YU7SF	"	145,340	498	42	130
*YU1ZD	"	33,066	288	40	109
***YU1HA**	**28**	**3,192**	**50**	**11**	**31**
***YU7BJ**	**14**	**369,600**	**1150**	**36**	**114**
*4N1N	"	184,128	680	31	106
			(Opr. 4N1LB)		
***YU1AAV**	**7**	**96,086**	**597**	**21**	**86**
				(Opr. Zika)	
*YT1AU	"	41,580	180	27	78
***YU1FJK**	**3.5**	**59,684**	**531**	**17**	**69**
				(Opr. YT1MA)	
*YU1BL	"	48,590	435	19	67

OCEANIA

AMERICAN SAMOA

KH8/N5OLS	**A**	**1,276,845**	**1309**	**134**	**211**
***AH8N**	**21**	**152,810**	**716**	**27**	**47**

AUSTRALIA

VK1FF	**A**	**1,865,958**	**1811**	**108**	**245**
				(Opr. WB2FFY)	
VK8AV	**"**	**1,231,452**	**1348**	**95**	**221**
VK2BQQ	"	279,642	446	83	126
VK5GN	"	119,973	472	37	50
VK4EET	**7**	**245,086**	**704**	**31**	**87**
VK3APN	"	144,336	528	26	67
VK3IO	**1.8**	**1,720**	**26**	**12**	**11**
***VK2AYD**	**A**	**1,220,664**	**1521**	**91**	**190**
*VK6HG	"	154,241	268	80	131
*VK4XW	"	37,100	123	43	63
***VK4XA**	**28**	**54,372**	**408**	**19**	**27**
***VK2APK**	**14**	**392,448**	**1043**	**33**	**95**
*VK4TT	"	89,349	400	26	61
***VK6VZ**	**7**	**407,365**	**1223**	**31**	**82**
***VK6LW**	**3.5**	**83,300**	**346**	**22**	**63**

BELAU

KC6VW	**1.8**	**46,620**	**366**	**18**	**27**
				(Opr. JA6VZB)	

BRUNEI

V85HG	**A**	**3,377,559**	**2733**	**126**	**293**
				(Opr. JO1RUR)	

EASTERN MALAYSIA

9M6NA	**3.5**	**231,480**	**876**	**24**	**66**
				(Opr. JE1JKL)	

GUAM

KH2D	**3.5**	**72,138**	**374**	**23**	**43**

HAWAII

KH6CC	**1.8**	**47,629**	**417**	**18**	**21**

INDONESIA

YB1AQS	**A**	**3,628,008**	**2515**	**136**	**356**
				(Opr. DL8WPX)	
YB9BON	"	450,840	902	61	109
YB5QZ	"	136,566	296	62	100
***YB3OSE**	**A**	**197,670**	**422**	**67**	**98**
*YB6INU	"	24,448	131	24	40
***YB2UDH**	**21**	**90,405**	**298**	**29**	**76**
*YC3UUQ	"	3,526	45	16	25
*YB2FWQ	14	5,800	57	15	25

MARIANAS

*AHØD	A	13,293	83	24	39

NEW CALEDONIA

***TX8FU**	**7**	**46,740**	**284**	**20**	**37**
				(Opr. FK8FU)	

NEW ZEALAND

ZL3CW	**7**	**646,980**	**1778**	**32**	**91**
				(Opr. F2CW)	
ZL2VS	"	154,252	538	31	67
ZL1AXQ	**3.5**	**81,720**	**397**	**23**	**49**
*ZL1ANJ	28	1,638	47	8	6

PHILIPPINES

DU1KK	**A**	**1,363,440**	**1790**	**93**	**167**
				(Opr. WN7S)	
W4NXE/DU3	"	523,068	1141	63	93

TONGA

***A35RK**	**A**	**329,700**	**770**	**64**	**86**

SOUTH AMERICA

ANTARCTICA

EM1KA	**A**	**1,655,610**	**1730**	**90**	**229**

ARGENTINA

LU9AUY	**28**	**98,280**	**540**	**20**	**55**
LU3HIP	**"**	**86,268**	**419**	**22**	**57**
LU6ETB	**21**	**1,554,092**	**3566**	**34**	**132**
				(Opr. LU6BEG)	
LU4FM	"	258,640	1184	21	80
				(Opr. LU/NN9K)	
LSØI	**14**	**387,500**	**1073**	**30**	**95**
LU4FD	**3.5**	**58,566**	**238**	**24**	**62**
***LU8HSO**	**A**	**775,404**	**1262**	**80**	**172**
*LW2EUE	"	318,176	320	70	154
*LU1EWL	"	233,156	527	67	87
*LU4HKN	"	154,980	410	51	89
*LU3DSI	"	33,275	107	44	77
*LU5EW	"	25,670	108	41	44
***LU5UL**	**28**	**256,520**	**845**	**25**	**81**
***LW4DYI**	**"**	**256,305**	**846**	**25**	**80**
*LU6MFD	"	105,450	483	24	50
*LU7HTJ	"	15,200	145	13	25
*LW8EXF	"	5,075	77	11	14
				(Opr. LU7DW)	
***LU7FJ**	**21**	**657,850**	**1882**	**29**	**89**
*L5V	"	258,602	1037	27	59
				(Opr. LU5VC)	
*LU3EAQ	"	28,140	147	24	46
***LU3FSP**	**14**	**558,846**	**1444**	**32**	**99**
*LU1BW	"	21,509	124	23	36
***LU1IV**	**7**	**916,776**	**2029**	**35**	**118**
				(Opr. LW9EUJ)	
*LU1AEE	"	31,496	189	21	41

ARUBA

P4ØW	**A**	**12,742,731**	**6315**	**159**	**524**
				(Opr. W2GD)	

BOLIVIA

CP6AA	**A**	**4,299,834**	**3283**	**120**	**334**
				(Opr. OHØXX)	

BRAZIL

PY1AJK	A	58,420	201	49	78
PY5CC	"	34,452	110	56	76
PY7OJ	"	26,720	232	30	50
PU2KER	**21**	**44,290**	**183**	**23**	**63**
PP5BRV	"	27,510	228	17	25
PY2TI	**14**	**82,665**	**295**	**29**	**70**
PY2BW	**1.8**	**8,262**	**61**	**13**	**38**
***PY5BLG**	**A**	**202,738**	**429**	**62**	**105**
*ZW2Z	"	86,726	300	34	69
				(Opr. PY2ZI)	
*PP7CW	"	78,122	119	49	85
*PY3JRG	"	59,782	125	52	90
*PY2IQ	"	56,070	181	40	86
*PY2SP	"	25,228	87	50	69
*PY1VHF	"	17,313	72	41	46
*PP7CI	"	12,141	129	38	72
*PY1OB	"	1,560	19	12	18
*PY4AST	"	1,150	16	12	13
***PY1KS**	**28**	**53,680**	**233**	**23**	**65**
*PY2DUN	"	1,104	22	9	15
*PY3FBI	"	36	4	3	3
***PY1KN**	**21**	**396,845**	**973**	**32**	**107**
***PU2MHB**	**"**	**321,152**	**864**	**33**	**95**
*ZW2A	"	34,304	180	19	48
				(Opr. PT2BW)	
*PY2MCW	"	17,805	171	13	22
*PT7SD	"	7,310	63	15	28
*PU1LJB	"	4,699	50	16	21
*PY4WS	"	903	15	9	12
***PR7FB**	**14**	**61,812**	**216**	**30**	**71**
*PY2EYE	"	16,995	109	18	37
*PY4MBJ	"	6,760	46	20	32
*PY2NZR	"	5,165	102	18	35
***PY2NY**	**7**	**41,688**	**273**	**16**	**38**

CHILE

CE3B	A	38,979	187	33	38
				(Opr. CE3BFZ)	
CE3F	**14**	**885,360**	**2105**	**34**	**118**
				(Opr. CE3FIP)	

COLOMBIA

HK6KKK	**A**	**410,322**	**1600**	**114**	**275**
HK5QGX	"	3,675	35	15	20

GALAPAGOS ISLANDS

HC8N	**A**	**11,116,880**	**5944**	**156**	**476**
				(Opr. N5KO)	

GUYANA

8R1K	**A**	**5,902,848**	**3899**	**128**	**384**
				(Opr. AB6NJ)	

PARAGUAY

*ZP9EH	A	12,312	71	30	42

TRINIDAD & TOBAGO

9Y4H	**A**	**10,691,370**	**6422**	**143**	**420**
				(Opr. CT1BOH)	
9Y4VU	**14**	**1,009,849**	**2127**	**36**	**131**

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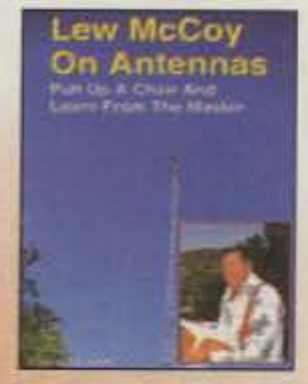

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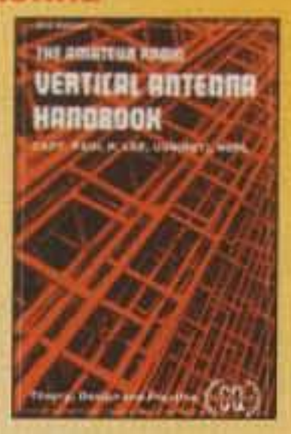

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by Dave Ingram, K4TWJ

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URUGUAY

CX6VM	21	724,200	1819	32	110
CW5W	14	491,556	1087	36	120

VENEZUELA

YW1A	7	1,060,355	2392	36	119
			(Opr. YV1DIG)		
*YY4GLD	21	104,510	512	20	50

QRP

ALL BAND

ZX2X	A	753,255	988	80	205
			(Opr. PY2OU)		
AA2U	"	549,450	615	82	248
K1RC	"	419,661	449	66	231
UT5UN	"	419,497	897	69	230
F6OIE	"	387,564	886	56	189
LY3BA	"	332,514	799	56	217
LY2FE	"	301,392	890	51	225
DL3KVR	"	298,718	715	55	211
K3DI	"	297,920	441	64	202
DLØQW	"	288,392	684	47	189
			(Opr. DL4MFM)		
UR5MTA	"	264,321	705	54	199
KA1CZF	"	259,831	422	66	187
K2PH/3	"	238,392	373	67	185
I3BBK	"	235,879	564	51	166
YU1LM	"	231,075	731	49	176
UA4YJ	"	216,814	544	52	217
K5IID/8	"	211,641	365	68	169
OH7NVU	"	200,080	619	49	156
KV8S	"	193,584	377	58	164
YU1KN	"	185,941	413	74	189
N1AFC	"	171,402	223	46	153
EA7AAW	"	153,114	434	44	107
KP3S	"	145,638	342	58	128
UAØSAU	"	136,120	352	46	120
PAØADT	"	133,722	428	37	134
LZ1AG	"	132,124	287	67	201
W8ILC	"	121,179	477	93	246
8SØFRO	"	116,127	407	45	162
			(Opr. SMØDZH)		
VE7CA	"	113,960	376	60	80
VE7CFD	"	109,625	400	53	72
ON7CC	"	104,980	385	38	107
EA3CKX	"	104,876	340	41	116
JH1HRJ	"	101,549	239	68	95
UA9UUN	"	97,032	282	49	107
UA3LIZ	"	96,160	441	32	127
HP1AC	"	89,694	242	54	97
9A3GU	"	87,763	407	35	122
UA9SG	"	81,204	249	36	98
RA6LAE	"	67,650	347	35	115
CT1ETT	"	66,814	295	26	76
W4DEC	"	60,760	177	43	97
SM5DQ	"	59,520	277	33	122
UR5ZOS	"	57,960	240	43	118
DL2TG	"	57,564	252	36	120
N9LMU	"	54,375	153	45	100
N7IR	"	53,040	196	33	71
F6CRP	"	51,775	292	21	88
K9DTB/8	"	44,278	83	56	206
OK2PLK	"	33,880	222	26	95
DL5JMN	"	33,324	223	24	92
AA1CA	"	31,744	124	40	88
KF7MD	"	29,040	100	42	68
AB4KL	"	27,650	129	23	56
EA1GT	"	27,579	189	20	67
DL1DQY	"	26,100	87	30	57
HB9AYZ	"	24,983	209	18	65
DL1LAW	"	23,735	210	20	81
UAØKCL	"	17,596	107	34	49
OH2YL	"	17,563	121	24	67
K3WWP	"	16,732	77	31	63
JE1KUP	"	14,610	74	30	42
DJ5QK	"	13,937	157	16	73
GWØKZW	"	11,428	193	19	123
IØKHP	"	10,608	94	14	37
DL2RSS	"	10,350	103	17	52
WØHEP	"	8,320	63	16	36
NQ7X	"	7,242	49	21	30
GØKZO	"	6,292	65	13	39
K8OUA	"	4,816	43	14	29
DLØMFL	"	4,796	66	14	30
			(Opr. DL2JRM)		
AB5OU	"	4,305	41	19	22
7L2OHM	"	4,175	43	21	27
WD9IAB	"	3,256	74	19	25
N7FF/6	"	3,094	58	11	15
YO2BZ	"	2,700	43	13	37
DL2JRM	"	364	16	6	7
DLØVLT	"	273	7	6	7
N8XA	"	98	8	6	8
K6MI	"	80	5	5	5
LU9HUP	28	46,934	268	20	42
JA6UBK	"	1,334	22	9	14
UX8IX	"	300	9	6	9
JM2RUV	"	153	9	5	4
GØTDX	21	65,424	335	20	67
BV3FG	"	53,949	368	22	27
Z32DR	"	48,600	257	26	64
DL9LAI	"	41,480	189	25	60
JQ1NGT	"	26,110	149	25	45
EA1BMA	"	21,855	250	11	36
US5QQX	"	18,426	113	21	53
ES1CR	"	12,537	114	18	45
JR1NKN	"	9,450	86	19	31
5B4AFM	"	8,073	102	5	22
7K2VNA	"	2,800	34	17	18
JG1UKW	"	1,961	53	15	22
K8UCL	"	1,534	24	10	16
G3LHJ	14	95,354	448	22	76
JR4DAH	"	60,984	279	27	57
HAØGK	"	43,602	264	19	62
JI3FAD/1	"	41,040	213	24	48
GØOGN	"	36,855	294	15	50
JR9OPJ	"	36,244	169	24	58
HB9CBR	"	33,594	252	18	48
SP5ANX	"	29,646	161	20	61
G3TXZ	"	25,675	237	13	52
HA7YS	"	21,870	207	14	40
JA7AS	"	21,063	145	22	37
EA3IW	"	20,838	148	18	51
K4GEL	"	18,850	116	14	44
PA3ASC	"	8,856	122	9	32
JA4XHF/3	"	6,392	66	17	30
I8SAT	"	5,882	65	13	21
N7JXS	"	3,627	47	13	18
KA6SGT	"	3,021	73	11	8
ON4ARJ	"	2,475	57	8	25
N7RAP	"	2,240	56	8	7
OZ1BXM	"	1,776	34	9	28
WB6FZH					
/KH6	"	36	4	3	4
JE8JXU	"	2	1	1	1
7K4QOK	7	25,270	142	26	44
			(Opr. JR2BNF)		
WØKEA	"	21,797	123	25	46
VE3SMA	"	13,685	193	11	24
F5LEN	"	7,536	96	11	37
IK6HWX	"	224	14	4	10
SP4GFG	3.5	36,075	487	10	55
UT5UQV	"	11,514	169	9	48
OK1KAI	"	10,556	191	11	41
OK1XNF	"	10,485	228	7	38
UXØZX	"	8,064	155	9	39
ESØNW	"	7,958	166	7	39
2EØAOK	"	4,104	106	6	32
NZ5A	"	2,695	36	11	24
UAØQGQ	"	2,366	56	12	14
DHØJAE	"	1,188	46	4	23
OK1FRO	"	989	41	5	18
W8QZA/6	"	294	10	7	7
VA3JFF	"	200	26	2	2
JK3ZQJ	"	49	6	4	3
			(Opr. JG1EIQ)		
ES1CW	1.8	28,670	435	10	51
UT8IT	"	11,760	194	7	42
YO4FRF	"	5,800	135	6	34
UR5WCQ	"	5,125	105	6	35
RA9CTK	"	4,795	124	6	29
JA1AA	"	4,752	46	16	20
UA6LEX	"	760	30	5	15
SP5NOG	"	108	12	1	8

ASSISTED

NORTH AMERICA

UNITED STATES

K1NG	A	4,797,632	2543	156	536
			(Opr. KI1G)		
K2SX/1	"	3,129,698	1682	150	532
W1NG	"	2,236,260	1304	143	467
W1BIH	"	1,111,443	767	125	402
W1RZF	"	710,700	803	75	234
W1QK	"	710,370	640	91	314
AA1V	"	681,516	607	98	298
NQ1K	"	677,586	553	117	325
KS1L	"	629,880	523	111	324
KG1D	"	564,420	584	89	256
K1SM	"	521,520	589	77	241
N6RFM/1	"	414,508	446	87	259
W1TE	"	378,114	425	82	255
K1AE	"	346,672	335	94	282
NZ1Q	"	313,632	363	77	247
K1AJ	"	281,664	363	78	210
W1XK	"	192,672	328	55	161
K1TH	"	182,130	335	56	139
WW1E	"	163,236	259	60	163
W1HR	"	104,992	196	50	143
KS9Z/1	"	55,800	134	40	110
K1GE	"	52,836	134	57	91
K1TR	"	43,896	132	38	86
K1VV	"	42,108	126	28	88
W1SU	"	33,264	104	45	81
K1HQ	"	27,707	99	28	75
K1EU	"	16,740	67	29	61
K1RV	"	3,200	31	12	28
K1MEM	"	3,129	26	20	23
N1NQD	"	1,484	18	11	17
W1JR	"	1,227	10	15	16
KI6MS/1	1.8	26,063	170	14	53
W2UP	A	4,643,950	2539	145	510
W2XX	"	4,026,978	2270	140	499
K2WK	"	3,719,668	2033	143	503
K2TW	"	3,442,374	1951	137	489
N2MM	"	2,870,430	1779	132	455
K2BU	"	1,841,798	1102	128	458
K2ONP	"	1,534,624	1146	118	358
N2TX	"	1,325,660	843	130	427
W1GD/2	"	1,053,135	854	104	331
W2YC	"	1,004,980	846	111	325
KF2O	"	939,679	641	128	405
WB2P	"	885,273	542	143	458
K2NV	"	878,990	758	94	312
W2RF	"	520,773	512	89	278
N1CC/2	"	512,400	605	84	216
N2JT	"	431,032	507	67	234
K2WS	"	275,577	337	70	221
K2XF	"	251,566	378	65	173
K2TR	"	221,067	249	84	235
N2QLT	"	142,497	252	56	157
W2XN	"	125,928	210	56	156
W2KA	"	109,053	210	53	136
N2KJM	"	73,760	175	55	105
WB2KDD	"	27,072	101	31	65
AA2MF	7	6,000	43	15	35
K3JGJ/2	3.5	60,970	236	19	72
K3WW	A	4,541,412	2394	147	527
K3MM	"	3,677,170	1989	148	507
AA1K/3	"	3,613,776	2023	146	486
N3AD	"	3,128,832	1917	133	449
K3NZ	"	3,106,158	1722	136	489
W3EEE	"	2,756,040	1658	134	445
N3RR	"	2,484,690	1469	144	454
K3MD	"	2,463,012	1557	135	423
NN3O	"	1,759,732	1103	128	431
K3OO	"	1,699,883	1400	107	312
N3AM	"	1,638,306	1188	114	372
W3MM	"	1,409,040	898	133	437
KE3Q	"	1,318,958	896	130	411
K3IPK	"	1,311,688	1122	100	313
K3II	"	1,248,192	790	130	446
K3ND	"	1,065,904	706	121	375
N3II	"	976,497	751	109	358
N3NT	"	912,429	748	102	339
WT3W	"	686,322	600	101	318
W3GK	"	608,328	610	92	265
NK3U	"	526,510	520	88	282
NY3C	"	422,800	541	68	212
WR3L	"	400,197	441	82	241
N3MKZ	"	370,272	402	87	249
WT3Q	"	338,530	361	91	258
W3FG	"	317,754	419	65	213
K3SA	"	312,550	416	70	196
W3KV	"	310,426	420	74	195
K3AR	"	306,768	343	81	251
AA3JU	"	293,986	343	81	241
K3KY	"	291,384	375	83	201
WT3P	"	280,340	400	64	198
KU3X	"	119,637	237	55	134
NW3Y	"	47,422	141	41	90
W3OV	"	10,659	73	14	37
WF3T	"	9,802	58	17	41
NN4T	A	2,564,968	1619	135	427
N4AF	"	2,544,373	1856	122	371
K4LM	"	316,940	381	91	208
W4IX	"	164,645	269	54	167
W4NF	"	119,024	245	42	131
K4NO	"	36,777	114	45	78
K4KUZ	"	8,636	50	22	46
K4AMC	14	322,560	803	32	108
W4NTI	7	52,212	170	29	85
N4CM	"	38,100	141	31	69
N2QT/4	1.8	30,800	145	18	62
KA5W	A	798,368	705	109	300
ND5S	"	637,728	589	106	310
AC5HF	"	192,280	296	81	172
N5AV	"	143,350	231	81	154
			(Opr. KN5H)		
W3UA/5	"	135,223	252	66	143
K5LP	"	108,600	200	69	131
AB5SE	"	55,152	155	50	94
NA4M/5	"	17,347	73	29	54
K5AX	14	115,217	376	34	103
K6AO	A	1,208,947	1001	130	313
			(Opr. K6PU)		
N6ND	"	1,038,635	697	155	396
K6XT	"	863,698	686	139	334
N7CW/6	"	629,156	631	107	255
K6SG	"	155,491	254	80	149
K6RIM	"	93,259	189	61	118
N7UE/6	"	72,250	170	61	109
N6OU	"	57,524	148	56	90
W6TKF	"	53,064	146	53	81
W6EU	7	443,394	1003	39	123
K7NPN	A	211,120	379	78	130
W7LR	"	161,460	261	82	148
N7RO	"	88,350	218	51	99
WO7T	"	7,308	116	27	36
KB3X/8	A	131,760	213	79	161
KD8FS	"	84,088	167	56	128
W8XI	"	19,400	74	35	65
AA8U	1.8	20,025	131	18	57
W9OP	A	664,845	630	98	283
W9RM	"	261,964	311	85	231
ND9O	"	257,868	387	67	387
NO9Z	"	159,348	316	67	129
N9AR	"	32,856	108	35	76
K9GS	3.5	18,834	87	22	64
KØEU	A	1,743,446	1260	135	367
NRØX	"	729,252	625	114	317
KJØG	"	270,810	404	87	168
WB8ZRL/Ø	"	57,376	126	47	116
KØRX	"	9,990	49	31	43
N7DR/B	14	175,370	494	32	98
KCØEI	"	89,666	313	24	83
WØCP	7	83,814	249	35	87

CANADA

CI3AT	A	1,263,427	1458	81	250
CG1HA	"	702,736	834	80	254
VA3NR	"	77,433	214	50	109

ASIA

JAPAN

JH7PKU	A	2,649,527	2188	131	302
JH7AUL	"	1,221,360	1330	114	222
JL1ARF	"	1,021,786	883	135	311
JF1SEK	"	678,704	728	110	228
JA9DDF/2	"	216,240	343	99	141
JK2VDC	"	116,960	304	73	99
JR4QZH	"	93,292	204	56	110
JAØBJY	"	91,933	234	57	92
JA7SUR	"	52,432	168	49	64
JR6LLN	"	19,068	87	37	47
7N2UTO	"	6,138	37	29	33
JE9LLO	21	21,726	125	26	45
JA8JDQ	14	63,840	242	28	67
JE1XCZ	"	34,880	165	29	51
JL3OXR	"	2,403	32	12	15
JK1OXU	7	10,260	68	26	34
JH4UYB	1.8	17,922	114	19	39

TAJIKISTAN

EY8MM	"	1,240,538	1433	100	262

EUROPE

ANDORRA

C31LJ	14	473,552	1585	27	109

BELGIUM

ON4CAS	A	212,400	521	50	150
ON4UW	14	217,722	694	31	100

CORSICA

TK5EP	1.8	270,720	1463	23	97

CROATIA

9A6V	3.5	135,892	885	20	86
			(Opr. 9A6W)		

CZECH REPUBLIC

OK1DG	A	363,654	898	66	201

ENGLAND

M6T	A	2,586,104	2578	128	440
			(Opr. G4PIQ)		
G3SWH	"	832,104	1184	77	304
G5LP	"	731,003	1107	88	289
G4PDQ	14	118,508	674	22	64
G3XTT	1.8	170,085	967	23	92

FINLAND

OH1KF	A	326,664	419	87	262
OH2VZ	"	166,600	700	72	166
OH2BO	1.8	18,204	157	19	63

FRANCE

F5YJ	A	221,750	519	60	190

GERMANY

DK3GI	A	3,287,692	2279	157	535
DJ2YA	"	1,976,923	1416	148	483
DL3KDV	"	1,176,912	1129	125	403
DFØDF	"	1,087,488	1348	105	367
			(Opr. DL2ZAE)		
DL1GGT	"	1,010,080	1287	107	321
DF4RD	"	1,002,952	823	135	431
DJ9MH	"	818,662	912	112	369
DK1RV	"	619,311	800	84	299
DL2MDZ	"	450,546	568	102	264
DL6MHW	"	361,032	627	73	234
DF9ZP	"	307,007	404	91	246
DFØIT	"	209,440	614	48	172
			(Opr. DF6QC)		
DF2RG	"	199,689	407	69	188
DL5DXF	"	192,796	284	78	229
DL5FDA	"	124,894	441	36	118
DJ1YH	"	116,750	233	67	183
DL6KVA	"	110,322	173	70	157
DL5AUA	"	25,488	94	30	78
DK9DA	"	23,634	105	35	66
DL4OCL	"	23,490	146	25	62
DL1EFW	"	22,902	148	23	43
DK6CQ	"	9,525	84	22	53
DJ6TK	28	3,034	64	8	29
DJ8FR	21	9,179	52	19	48
DL1FDV	14	328,185	938	37	116
DJ9IE	7	333,717	1095	39	134
DJ2RB	"	25,608	206	19	69
DJ9RR	3.5	27,010	290	14	60

HUNGARY

HA1AG	A	1,679,876	1646	128	395
HAØHW	"	630,522	862	90	324

IRELAND

EI8GP	14	142,044	602	26	88

ITALY

I6NOA	A	221,972	469	66	197
IK2VJF	"	24,634	101	37	76

LITHUANIA

LY5W	A	810,543	1244	89	302
			(Opr. LY1DR)		
LY2BM	3.5	138,424	1011	22	82

NETHERLANDS

PI4TUE	21	225,775	662	31	106
			(Opr. PA3EZL)		
PAØCYW	3.5	72,105	564	17	78

NORWAY

LA6MP	A	245,110	614	65	189
LA2KD	"	46,609	155	46	81

POLAND

SP6MLX	A	47,538	139	51	120
SP3FAR	"	27,104	85	49	72
SP7VCK	"	17,380	68	45	65
SP6CYX	7	157,284	625	33	120

SCOTLAND

GM6R	A	540,470	1031	58	187
GM3YOR	3.5	60,164	386	21	68

SLOVAK REPUBLIC

OM6TX	A	356,349	905	51	188

SLOVENIA

S5ØU	A	330,974	725	71	250
S57XX	"	229,888	544	56	200
S58MU	"	161,265	475	46	149

SPAIN

EA7PN	A	140,687	229	80	189
EA3BHK	"	120,684	227	60	158
EA5GRC	"	28,420	141	33	65
EA5WU	21	425,020	1184	36	122
EA1FBU	"	102,601	613	17	42

SWEDEN

SM3EVR	A	1,195,879	1141	132	425

SWITZERLAND

HB9CAT	A	538,186	610	101	273

WALES

GW3YDX	7	877,957	2423	39	154

YUGOSLAVIA

YZ7ED	A	713,468	1399	76	231
4N1A	7	665,529	2160	39	124
			(Opr. YU1RA)		

SOUTH AMERICA

ARGENTINA

LU7EAR	A	137,740	245	63	131

BRAZIL

ZZ2E	A	792,026	1053	88	174
			(Opr. PY2EX)		
PY2YP	"	83,266	194	61	97
PY2NFE	"	15,089	79	32	47
PY2NO	14	500,388	1238	30	108

FERNANDO de NORONHA

PYØFF	A	9,462,960	5612	136	449
			(Opr. OH2MM)		

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES

K1AR		8,688,340	3861	170	626
K1ZZ		5,903,541	2776	159	588
K1OZ		3,955,797	2276	140	517
K1KP		3,166,296	2011	125	439

KB1H	2,791,083	1826	129	444
K1GW	2,955,680	1827	124	456
K2TE/1	1,588,650	1118	116	394
KZ1M	1,044,798	912	94	308
W1NR	610,720	504	110	330
N1AU	446,950	463	89	261
N1MD	212,100	369	46	156
KE4GI/1	80,910	325	37	108
AA1LN	72,839	175	53	116
AA2FB	**2,757,015**	**1725**	**129**	**462**
K5KG/2	**1,992,441**	**1366**	**119**	**400**
N2FF	1,728,860	1353	107	359
AB2E	1,369,446	910	126	417
N2LBR	597,072	637	83	253
W3GG	**3,206,272**	**2050**	**133**	**459**
WU3A	**2,058,156**	**1369**	**125**	**406**
N3OC	1,866,195	1184	125	440
NE3F	1,397,038	931	124	423
K3CP	809,508	707	91	328
KB3TS	443,760	472	83	261
W4WA	**5,092,857**	**2721**	**157**	**536**
W4PRO	**1,181,003**	**795**	**125**	**416**
K4QD	335,665	352	96	263
AC4HB	289,990	648	36	119
K5RT	**2,027,547**	**1687**	**134**	**367**
K5BN	**1,722,759**	**1374**	**118**	**335**
K5MDX	474,354	503	94	248
W5MJ	462,526	632	84	197
W6REC	**1,653,468**	**1302**	**143**	**311**
N6CQ	**1,522,998**	**1332**	**100**	**301**
K6RO	1,307,440	1071	133	339
K6ANP	625,706	589	131	255
N6RV	567,336	691	105	203
K6ZM	483,458	595	111	215
W6OAT	385,056	431	107	229
NN7L	**1,581,696**	**1351**	**134**	**290**
NK7U	**1,565,460**	**1481**	**117**	**273**
K8AZ	**5,831,985**	**2797**	**166**	**587**
K8LX	**4,301,868**	**2514**	**151**	**482**
W8AV	3,650,064	2000	155	527
K9UWA	**2,199,962**	**1280**	**140**	**474**
KØRF	**5,225,584**	**3001**	**166**	**513**
KVØQ	**3,684,768**	**2358**	**154**	**432**
NXØI	2,588,736	1772	143	413
NØNI	2,490,345	1565	142	443
NØZA	286,578	408	84	177
K2VV/Ø	94,975	167	41	104

BAHAMAS

C6A/K3TEJ	**3,477,208**	**3343**	**106**	**328**
KM9D/C6A	2,468,750	2536	105	290

CANADA

VE3EJ	**6,740,685**	**3699**	**164**	**571**
VE6JY	**2,806,894**	**2756**	**128**	**329**
CI2ZP	**2,390,208**	**2356**	**105**	**317**
VO2WL	**1,597,895**	**2426**	**78**	**227**
VE3DC	108,540	501	43	65

CAYMAN ISLANDS

ZF2RF	**6,066,018**	**4693**	**133**	**425**

MEXICO

XE2L	**5,414,990**	**4781**	**146**	**344**

PUERTO RICO

NP4Z	**9,687,744**	**5475**	**163**	**541**

ST. LUCIA

J6DX	**11,493,255**	**7160**	**149**	**496**

ST.KITTS & NEVIS

V47VJ	**2,226,159**	**2589**	**79**	**280**

SAINT MARTIN

FS5PL	**7,223,975**	**5353**	**128**	**417**

AFRICA

BURUNDI

9U5DX	**2,203,535**	**2675**	**78**	**199**

CAPE VERDE

D44BC	**9,865,736**	**5484**	**139**	**465**

EQUATORIAL GUINEA

3C5A	**7,550,220**	**4892**	**128**	**409**

MADEIRA ISLANDS

CT3 /DL5YM	**4,387,058**	**3654**	**91**	**312**

UGANDA

5X4F	**3,318,312**	**2457**	**116**	**340**

ASIA

ASIATIC RUSSIA

RK9CWW	**4,189,584**	**2611**	**134**	**458**
RW9OWD	2,350,400	2072	112	340

HONG KONG

VS6WO	**1,255,798**	**1888**	**88**	**205**
VR2SS	271,614	980	83	120

JAPAN

JA3ZOH	**4,923,758**	**2892**	**164**	**438**
JR1ZTT	**2,223,940**	**1900**	**137**	**285**
JE6ZIH	**2,061,120**	**1667**	**134**	**318**
JA2ZJW	**1,646,372**	**1604**	**125**	**239**
JHØZHQ	894,950	854	122	228
JA2YKA	602,800	817	98	177
JAØYAK	142,857	371	50	93

JORDAN

JY8B	**4,810,220**	**3758**	**109**	**351**

KAZAKHSTAN

UN8FB	**1,567,800**	**1633**	**97**	**293**

KYRGYZSTAN

EX9A	**5,433,560**	**3859**	**124**	**406**

MONGOLIA

JT1T	**978,924**	**2121**	**95**	**196**

OMAN

A45ZN	**3,998,293**	**3217**	**118**	**339**

THAILAND

HSØAC	**5,046,000**	**3834**	**152**	**428**

EUROPE

AUSTRIA

OE3S	**4,573,125**	**3680**	**150**	**525**
OE1A	3,605,420	2884	141	496

BALEARIC ISLANDS

EA6IB	**8,301,228**	**5361**	**165**	**597**

BELGIUM

OT6T	**8,765,744**	**4441**	**192**	**679**
OT6P	2,593,765	2875	106	337

BELARUS

EU5F	**1,439,672**	**1664**	**113**	**395**
EW5P	438,064	1012	69	235

BOSNIA-HERZEGOVINA

T9DX	**5,522,356**	**4497**	**152**	**516**

BULGARIA

LZ9A	**6,052,536**	**4575**	**168**	**588**
LZ7M	**4,985,080**	**4053**	**157**	**523**
LZ7N	2,801,458	2565	153	485
LZ6A	535,101	1002	84	223
LZ2KMS	499,814	1215	59	207

CZECH REPUBLIC

OK5W	**5,877,236**	**3759**	**171**	**601**
OL3A	**4,514,972**	**3004**	**166**	**583**
OK2KOD	1,185,810	1363	108	362
OL2A	946,222	1480	82	252
OK1KUO	90,238	498	31	106

ENGLAND

G6D	**3,911,504**	**3282**	**132**	**472**
M6A	2,929,500	3077	117	423

ESTONIA

ES5Q	**2,321,248**	**2393**	**142**	**436**

EUROPEAN RUSSIA

RW6AWT	**4,980,096**	**3613**	**175**	**611**
RU6LWZ	**4,880,484**	**3676**	**167**	**557**
RO4L	2,711,250	2580	138	487
RK4WWA	1,456,707	1932	113	384
RZ4AYT	845,856	1493	101	295
RK6AYN	691,380	1172	88	257
RK3UWA	553,336	1146	88	240
RZ1AWO	163,500	280	72	255

FINLAND

OI2E	**5,576,816**	**3351**	**177**	**631**
OI7T	3,683,910	2855	160	530
OI5N	2,985,344	2489	155	509

FRANCE

TM2Y	**7,546,648**	**4804**	**171**	**587**
F5KPG	**1,843,552**	**2108**	**101**	**323**
F6KLO	1,682,100	2282	90	260
F5JVP	1,612,569	2234	86	271
F6KEQ	513,383	911	73	226
F5MWW	328,280	906	58	174

GERMANY

DL6RAI	**5,847,068**	**3566**	**170**	**587**
DLØUM	**4,087,500**	**2832**	**149**	**505**
DF3CB	4,048,275	2667	158	543
DKØEE	3,639,504	2626	148	530
DL7AU	2,337,764	1914	131	441
DKØNT	1,551,872	1501	115	397
DKØZG	1,538,422	1969	113	345
DK1II	1,234,027	1248	109	390
DKØTZ	1,069,344	1323	100	323
DAØRP	402,715	1076	59	180
DL4SKF	18,360	123	29	73
DL3SKF	14,062	105	24	55

GREECE

SV1AFA	**605,120**	**1447**	**77**	**120**

HUNGARY

HG1G	**7,999,292**	**5081**	**168**	**595**
HG6Y	**4,876,475**	**3747**	**144**	**511**
HG5A	4,232,228	3346	152	452
HG5M	4,036,214	3130	148	514

ICELAND

TF5ØIRA	**421,024**	**1067**	**54**	**169**

ITALY

IQ4A	**7,601,784**	**4305**	**173**	**593**
II2K	**3,732,190**	**2845**	**146**	**509**
IQ4T	3,523,872	2827	125	443
II1R	1,046,760	1285	92	298
II4R	927,402	1667	84	227
IL3/IK3VIA	898,580	1941	65	186
IO2L	884,832	1419	73	239

KALININGRAD

RW2F	**5,031,022**	**3563**	**167**	**590**

LITHUANIA

LY3AV	**1,957,472**	**2036**	**125**	**411**
LY1DQ	1,485,036	2074	105	321
LY1DS	9,240	76	23	43

LUXEMBOURG

LX/DFØBK	**1,003,125**	**1895**	**79**	**242**

MACEDONIA

Z37FCA	2,562	33	16	26

NETHERLANDS

PI4ZLD	**1,268,757**	**1681**	**98**	**343**

NORWAY

LA8SDA	**1,535,352**	**1999**	**106**	**350**

POLAND

SN2B	**6,990,816**	**4190**	**188**	**636**
SP9KRT	194,404	414	73	189
SP2KFU	1,039	64	14	31

ROMANIA

YO6KBM	**173,964**	**412**	**58**	**170**
YO9KPD	52,026	177	45	93

SLOVAK REPUBLIC

OM3A	**2,338,360**	**2244**	**123**	**407**

SLOVENIA

S5ØG	**1,365,732**	**1904**	**97**	**257**

SPAIN

EA7TH	**3,435,640**	**3178**	**122**	**398**
EA5BY	**3,160,776**	**3263**	**118**	**370**

SWEDEN

SK6FM	**2,996,284**	**2684**	**143**	**491**
SLØCB	**2,223,872**	**2270**	**130**	**414**
SM3KOR	2,181,409	2090	125	426
SK4AO	1,093,320	1825	80	280
SK5AA	685,152	1080	82	284
SM5HJZ	673,992	1048	92	315

SWITZERLAND

HB9AA	**1,996,164**	**2595**	**95**	**309**

UKRAINE

UU5J	**4,226,977**	**3388**	**173**	**614**
US3I	**3,129,979**	**4081**	**114**	**335**
UT7W	2,259,234	1950	142	484
EM7Q	1,145,001	1366	110	361
UR4PWC	785,026	1161	87	287
UR4LZA	230,669	602	64	187
UR4MWU	154,638	469	49	149
UR4QZF	85,744	323	40	144
US4LWM	71,694	521	31	95
UR4LWY	13,120	66	30	52

YUGOSLAVIA

4N6N	38,125	625	11	50

OCEANIA

AUSTRALIA

VK4EMM	**2,093,040**	**2094**	**106**	**236**

INDONESIA

YBØASI	**1,025,206**	**1172**	**93**	**208**
YBØZBB	14,874	77	23	44

MARIANAS

KHØDQ	**7,018,858**	**4460**	**155**	**384**

SOUTH AMERICA

ARGENTINA

LU4DRC	**1,592,101**	**1877**	**91**	**198**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

N2RM	**14,563,269**	**6249**	**180**	**673**
W3LPL	**13,941,174**	**5872**	**185**	**689**
K3LR	**12,317,374**	**5411**	**184**	**671**
KC1XX	**12,295,033**	**5662**	**175**	**642**
K1KI	**11,424,560**	**5031**	**170**	**635**
N3RS	**11,182,599**	**5020**	**170**	**637**
W3EA	8,464,350	4112	166	607
K1TI	7,551,126	3727	153	573
K2LE/1	7,122,720	3520	153	557
KS9K	**7,110,750**	**3641**	**165**	**585**
K1TTT	7,082,659	3739	159	572
K8CC	**6,775,514**	**3581**	**165**	**538**
K4VX/Ø	**5,533,522**	**3253**	**158**	**495**
W4MYA	**5,002,448**	**2671**	**144**	**517**
K3ANS	4,941,090	2526	149	541
W7RM	**4,307,520**	**2906**	**155**	**405**
WØAIH/9	4,167,327	2403	153	494
W6BA	**3,787,042**	**2175**	**164**	**455**
N1TT	3,555,135	2141	112	466
NJ4F	2,013,632	1648	108	323
K7FR	1,166,795	1160	116	255
NM3K	779,492	753	90	298
K2AJY/1	25,389	82	41	76

ALASKA

NL7G	**6,887,464**	**5789**	**154**	**354**

CANADA

VE9DH	**10,045,384**	**6415**	**141**	**527**

GRENADA

J39A	**15,028,500**	**9212**	**157**	**542**

HAITI

HH2B	**9,448,550**	**8418**	**125**	**380**

AFRICA

TOGO

5V7A	**26,916,240**	**12069**	**167**	**613**

ASIA

JAPAN

JH5ZJS	**9,002,664**	**4935**	**175**	**473**
JA1YDU	**6,007,914**	**3484**	**175**	**452**
JA1YXP	5,496,060	3594	161	395
JA3YKC	**5,206,684**	**3504**	**151**	**381**
JA3YBF	4,327,778	2822	160	393
JO1YAO	1,125,207	1249	113	214

EUROPE

CROATIA

9A1A	**15,513,544**	**9595**	**196**	**708**

DENMARK

OZ5W	**3,689,350**	**3100**	**135**	**446**
OZ5WQ	1,996,400	2558	110	386

DODECANESE

J45T	**3,434,992**	**5543**	**111**	**353**

ENGLAND

G3SSO	**877,270**	**1210**	**91**	**279**

FINLAND

OI4JFN	**1,541,256**	**2221**	**101**	**346**
OH1AJ	1,481,316	1662	122	412
OH3AT	20,832	120	31	65

GERMANY

DFØHQ	**11,248,125**	**6967**	**189**	**668**
DLØKF	5,102,208	4001	151	537
DK5EZ	1,026,927	1390	82	287

GREECE

SV1SV	**1,588,244**	**2554**	**100**	**333**

GUERNSEY

GU3HFN	**2,926,183**	**4036**	**91**	**312**

ITALY

IR5R	**1,005,578**	**1424**	**81**	**250**

LITHUANIA

LY5A	**10,041,980**	**6992**	**182**	**663**
LY7A	5,391,168	4646	155	533

NETHERLANDS

PI4COM	**7,949,568**	**6290**	**175**	**593**

SLOVENIA

S53M	**7,605,548**	**6087**	**164**	**558**

SPAIN

EA4ML	**8,611,812**	**6829**	**159**	**567**

UKRAINE

EM2I	**7,411,524**	**6684**	**177**	**622**

OCEANIA

HAWAII

WH6R	**8,539,377**	**5588**	**171**	**368**

NAURU

C21BH	**5,484,160**	**4954**	**132**	**248**

NEW ZEALAND

ZM2K	**6,408,790**	**4497**	**137**	**348**

Disqualification: Rule III violation, IQ4A, 10 meters.

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WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210.

FREE Ham Gospel Tracts, SASE. N3FTT, 5133 Gramercy, Clifton Heights, PA 19018.

FOR SALE: CQ/Ham Radio/QST/73 magazines and binders. SASE brings data sheet. W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

BROWNIES QSL Cards since 1939. Catalog and samples $1 (refundable with order). 3035 Lehigh St., Allentown, PA 18103.

P49V's ARUBA COTTAGE FOR RENT with 2 bedrooms, rig, and mono-band ants. For info write Carl Cook, 2150 Piedmont Way, Pittsburg, CA 94565.

FREE DISK CATALOG! Ham Radio, IBM Shareware and CD-ROMs. MOM 'N' POP'S SOFTWARE, PO Box 15003-HE, Springhill, FL 34609-0111 (phone 1-352-688-9108; e-mail momnpop@gate.net).

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 1:00–3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, 2755 Woodhull Ave., Bronx, NY 10469.

QSLS—ELEGANT, AFFORDABLE. Samples $1 (refundable with order). Elemental Designs, Dept. C7094, 1639 Fordham Way, Mountain View, CA 94040.

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 17th year of service. It is always easier to donate and usually more financially rewarding, BUT MOST IMPORTANT your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Make 1997 the year to help a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072; fax 516-674-9600; or e-mail wb2jkj@juno.com. Join us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

WORK RARE CW DX? CW CONTESTS? Contest Code is the answer. Powerful hypnosis audio tapes teach you to copy High Speed (30/40 WPM) or Ultra High Speed (50/60 WPM). Subliminals speed you along! 20 min/day for 30 days yields results. Each tape $15.95 ppd US. $3.00 shipping/handling. Specify 30/40 or 50/60 tape. Amex/VISA/ MC Order now! Call 1-800-425-2552, Alternative Arts.

DX HEADING MAPS AND LISTS: W2HOJ, 800-941-2252.

Advertiser's Index

(continued on page 107)

CLASSIC RADIOS: RadioFinder web list revised weekly: <www.radiofinder.com>; telephone/fax 1-313-454-1890; or <finder@radiofinder.com>.

MORSE 0–20 WPM 90 days guaranteed! Codemaster V for IBM compatible PC $29.95. Milestone Technologies, telephone 800-238-8205. **http://www.mtechnologies. com/mthome**

QSL SUCCESS! Book shares techniques of hams achieving 90%+ return rates. $5.00ppd USA/Canada, includes $5.00 coupon. William Plum, 12 Glenn Road, Flemington, NJ 08822-3322.

AMERICAN HAM GEAR manufactured between 1930 & 1980 needed to illustrate *CQ* book and calendar projects. Photography can be done at your location. Contact Joe Veras, N4QB, P.O. Box 1041, Birmingham, AL 35201. Tel: 205-967-2384 days, 205-967-0639 evenings and weekends.

THE 59(9) DX REPORT: Weekly DX and Contest bulletin. SASE for sample. P.O. Box 73, Spring Brook, NY 14140.

WANTED: Western Electric Audio Equipment. 1927–1960s. Amplifiers, mixing boards, microphones, preamps, speaker parts, tubes, etc. Call 1-800-251-5454.

SX88 Hallicrafters receiver wanted. Jim, W6OU, 714-528-5652.

ASTRON Power Supply, brand new w/warranty, RS20M $99, RS35M $145, RS50M $209, RS70M $249. Call for other models, AVT 626-286-0118.

ATTENTION SB-200 & SB-220 OWNERS: Restore and up-grade your tired old amplifier with our parts and kits. Power supply boards, soft keys, soft starts, new fans & motors, many more items. Write for details—**Please specify the model**. Harbach Electronics—WA4DRU, 2318 S. Country Club Rd., Melbourne, FL 32901-5809 (http://www.harbach.com).

FOREIGN AIRMAIL POSTAGE for successful QSLing! Many countries, monthly bargains, plus **EUROPEAN AIRMAIL ENVELOPES!** Bill Plum, 12 Glenn Road, Flemington, NJ 08822-3322 (908-788-1020 weekdays, FAX 908-782-2612).

W7FG Vintage Manuals and Telephone filters! Most manuals in stock. SASE for Catalog. Telephone RFI Filters $12.95. VISA/MASTERCARD accepted. 3300 Wayside Drive, Bartlesville, OK 74006 (telephone 918-333-3754 or 800-807-6146; or e-mail **http://www.w7fg.com**).

FREE HAM RADIO GOSPEL TRACTS: Christian youth leaders needed for out-reach areas. Membership is free. Send #10 SASE with call letters for details. Ray Bohmer, W1REZ, P.O. Box 8, Harmony, ME 04942.

PACKET RADIO AND MORE! Join TAPR, connect with the largest amateur radio digital group in the U.S. Creators of the TNC-2 standard, now working on Spread Spectrum technology. Benefits: newsletter, software, discount on kits and publications. $20/year US/Can/Mex; $25 elsewhere. Visa/MC. When joining, mention *CQ* and receive TAPR's Packet Radio: What? Why? How? ($12 value) FREE! Internet: tapr@tapr.org Web: http://www.tapr.org Phone: 817-383-0000 Address: 8987-309 E Tanque Verde Rd., #337, Tucson, AZ 85749-9399.

JOIN THE RAINBOW Amateur Radio Association, the gay/lesbian ham club with active HF nets. E-mail RARA@EN.COM or mail to Dept. A, P.O. Box 191, Chesterland, OH 44026-0191.

HAM TRADER YELLOW SHEETS: Number one place to buy, sell, trade ham radio equipment for the last 36 years. Published twice a month—mailed first class. Ad deadline one week prior to mailing, which assures quick results. One-year subscription (24 issues) $18.00. P.O.B. 2057, Glen Ellyn, IL 60138-2057 or P.O. Box 15142, Seattle, WA 98115. For sample copy send #10 self-addressed envelope. E-mail: Internet: HTYS@aol.com

PHASED ARRAY NETWORKS by COMTEK SYSTEMS deliver gain and front to back. Call 704-542-4808; fax 704-542-9652. COMTEK SYSTEMS, P.O. Box 470565, Charlotte, NC 28247.

RCI-2950/2970: Modification manual. Power, modulation, clarifier, NB & RF gain modifications. Parts included. $20.00 ppd money order, $26.35 COD. Scott, P.O. Box 225, St. Clair, MO 63077 (314-629-4294).

FREE GUIDE "THE TEN MOST COMMON TOWER BUILDING MISTAKES": Written by well-known tower expert Steve Morris, K7LXC, this guide will help you avoid dangerous mistakes. TOWER TECH, Box 572, Woodinville, WA 98072; e-mail UpTheTower@ aol.com or call 800-TOWERS8.

B&B WITH A HAM! Enjoy hamming from Hawaii. Join those who have chased DX from beautiful upcountry Maui! (Non-smokers only, thanks.) "SEA Q MAUI," KH6SQ, call collect 808-572-7914. E-mail: terry.clayton @mauigateway.com

HEATHKITS WANTED: Premium Prices paid for unassembled Heathkits. Rob, W3DX, 804-971-6812 evenings or e-mail Robcap@aol.com

VP5 – Be DX: Newly constructed 2BR/2BA villa with rig and antennas overlooking north coast of beautiful Middle Caicos. Telephone 904-282-0158, or e-mail islands@ southeast.net

TELEGRAPH MUSEUM: http://www.chss.montclair.edu/~pererat/telegraph.html KEYS/PHOTOS wanted! Collector/Historian: W1TP/K2DCY, 11 Squirehill, North Caldwell, NJ 07006.

FOR SALE: NOS flameproof, thigh J-45, Vietnam. 16+ page illustrated list, telegraph collectibles, my surplus, $3.00/2 stamps ($5.00 refund $25+ purchase). CQ Jacobs, 5 Yorktown Place, Fort Salonga, NY 11768 (516-261-1576).

PICTURE QSL CARDS of your shack, etc., from your photo or black ink artwork. 500 $28.00, 1000 $44.50. Also non-picture cards. Custom-printed cards, send specifications for estimate. Send 2 stamps for illustrated literature. Generous sample kit $2.00, half pound of samples $3.00. RAUM'S, 8617 Orchard Road, Coopersburg, PA 18036. FAX or phone 215-679-7238.

WANTED: Manuals receiver types Sylvania R1414/VRR; Sylvania R1451A/WLR-6; TMC GPR 110A; Rohde & Schwarz EK07; Dovetron MPC-1000 CRT2. Weber, 4845 W. 107th Street, Oak Lawn, IL 60453-5252.

WANTED: Drake RV-3 Remote VFO. AI9U, phone 630-968-1842, or e-mail: dgexpress@aol.com

HEATH, DRAKE, MORE: Equipment, manuals, parts. SWL. List $1.00 and SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

UPGRADES FOR HEATH HW-8. Wanted, copy of book produced by Adrian Weiss. Malcolm Haskard, VK5BA, Bassnet Road, One Tree Hill SA 5114, Australia; phone/fax +618 8280 7192; e-mail m.haskard@unisa.edu.au

Advertiser's Index *(cont'd)*

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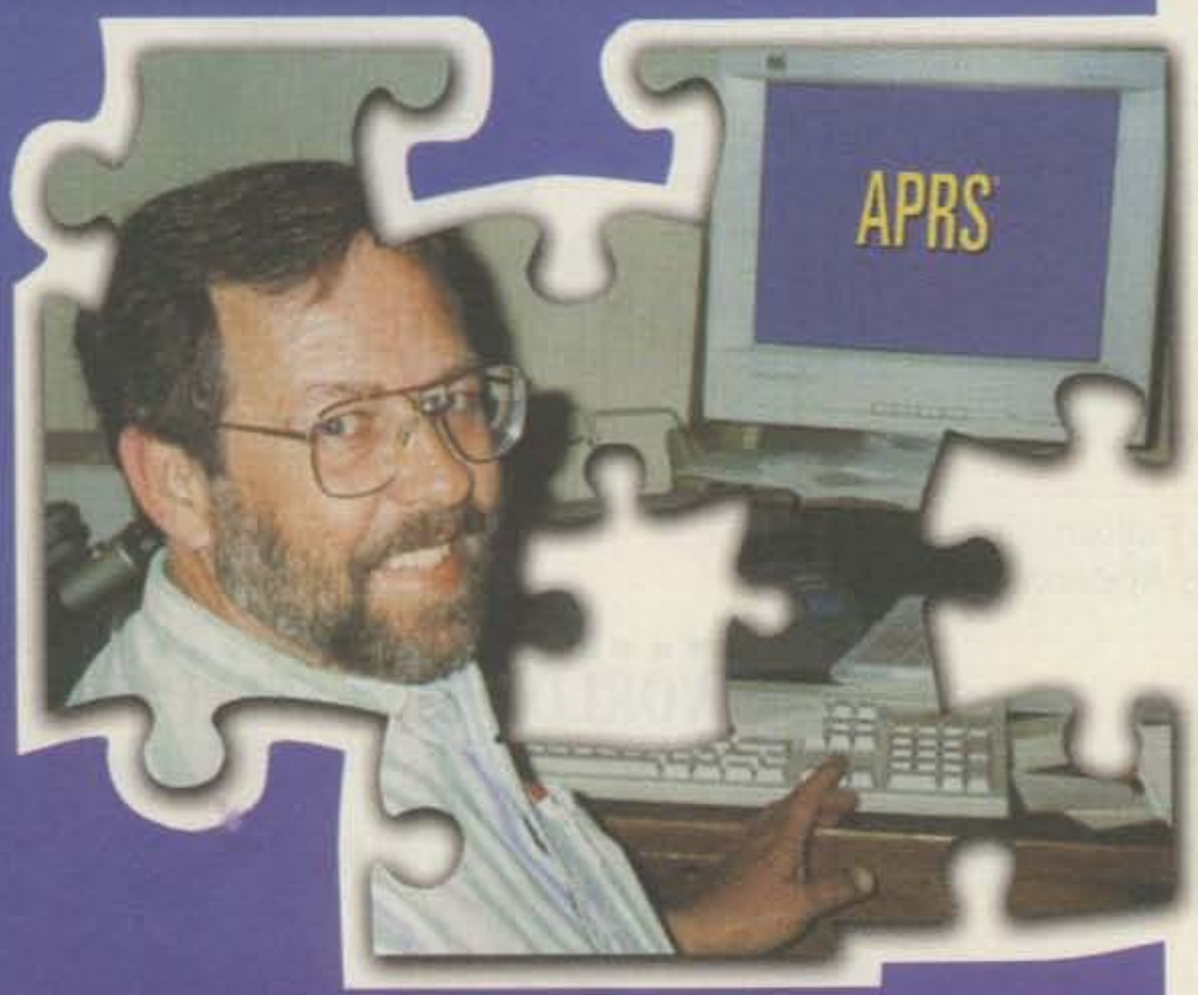

Use more of your privileges— Go Digital!

Are you only using a small portion of your ham radio license? Here's just some of the fun you may be missing!

- APRS® Position Reporting and mapping
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- Displaying and printing WEFAX weather maps
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- DX spotting and getting those rare contacts
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Kantronics offers a number of ways to enjoy the growing field of digital communications. Choose the unit that suits your interests and your budget. All Kantronics units come with a one-year limited warranty and can be upgraded when firmware updates become available.

NEW! KPC-3 Plus

- 1200 bps - Now with more features!
- Packet, GPS/APRS, Host, KISS and WEFAX modes
- Personal Mailbox (PBBS) now supports multiple calls
- Copies NWS EMWIN with optional software
- Remote access, sensing and control with two A/D and two control lines
- KA-Node or option K-Net networking capability
- PBBS 100k, expandable with optional 512k RAM
- Uses external power or internal 9v battery
- NEWUSER mode and online help

NEW! KPC-9612 Plus

- 1200 port AND second port of 4800 ~ 38,400 bps
- Most modes/capabilities of the KPC-3 Plus and POCSAG (paging)
- Unique design allows the addition of *another port, high or low speed**
- KA-Node or K-Net option works with multiple ports
- Remote access, sensing and control capability
- Telemetry transmission capability
- NEWUSER mode and online help

NEW LOOK! KAM Plus

- Same great KAM Plus performance in an attractive new package!
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*Expansion modules anticipated for availability in late 1997.

"The quick-release remote front panel gives you so many installation options."

"And with dual receive you can talk on one band, and listen on another!"

"Plus, the high-tech Enhanced Smart Search™ is great for finding repeaters --and you can watch it all on the dual display."

"Looks like Yaesu did it again!"

FT-8100R

Compact Dual Band Mobile

Now a dual-bander that remotes and is easy-to-use, without sacrificing the features you want!

With its quick-release, remote front panel system, the FT-8100R combines high-performance dual-band features in a simple-to-operate rugged mobile built to the endurance standards of commercial radios. The result is installation flexibility and industry-first, "must-have" advantages!

Use dual receive (V+V, U+U or V+U), or talk on one band while listening on another. Watch Yaesu's exclusive Enhanced Smart Search™ automatically seek out and load active frequencies--great for finding new repeaters while traveling.

Get wide receive coverage--from 110 to 550 MHz and 750 to 1300 MHz* for public safety, marine, aircraft, and weather channels. Enjoy up to 50 Watts of VHF power output (35 Watts on UHF) with High/Medium/Low choice on each band, and "plug and play" 1200 or 9600 bps packet. Utilize 208 memory channels--the greatest available on any remote mobile--to store repeater offset, CTCSS tone, packet baud rate, and power level.

Yaesu's popular Omni-Glow™ display provides a wide field of view, and includes a DC voltage meter. Quickly program, or clone frequency memories with optional Windows™ PC programmable ADMS-2D.

"User-friendly" describes the streamlined front panel layout. Eight clearly-marked keys, and separate Volume/Squelch controls for each band, make operation easy. And the backlit DTMF microphone includes 3 user-programmable keys...but no awkward keypad cover!

Don't sacrifice high-performance features in your dual-band mobile installation Get the easy-to-use FT-8100R at your Yaesu dealer now!

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For the latest Yaesu news, hottest products: visit us on the internet! http://www.yaesu.com

Features

- Frequency Coverage
  - RX: 110~550 MHz
  - 750~1300 MHz*
  - TX: 144~148 MHz
  - 430~450 MHz
- Detachable Front Panel (remotable w/optional YSK-8100)
- 3 Power Output Levels
  - 2m 50/20/5 Watt
  - 70cm 35/20/5 Watt
- 208 Memory Channels
- Enhanced Smart Search™
- CTCSS Encode
- Built-in Duplexer
- S-Meter Squelch
- Dual Receive (V+V,U+U,V+U)
- Crossband Repeat (bidirectional or one-way)
- PC Programmable w/optional ADMS-2D
- Digital Battery Voltage Display
- Auto Power Off (APO)
- Omni-Glow™ Display
- 1200/9600 bps Packet Compatible
- Alternating-Band Memory Selection (ABMS)
- DTMF Autodialer (6 Memories)
- Time Out Timer (TOT)
- Accessories: Consult your local Yaesu dealer.

*Cellular & 900 MHz Cordless Phone frequencies blocked.

50W/VHF
35W/UHF

Specifications subject to change without notice. Specifications guaranteed only within the 2-m and 70-cm amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

3 Filter Selections Right on the Front Panel

For SSB: wide (2.8 kHz)*, medium (2.4 kHz), narrow (1.9 kHz)*

For CW: wide (2.4 kHz), medium (500 Hz)*, narrow (250 or 350 Hz)*

The IC-706MKII comes with 2.4 kHz and 8 kHz filters already installed. An asterisk (*) means that the filter is optional equipment available from your ICOM dealer.

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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